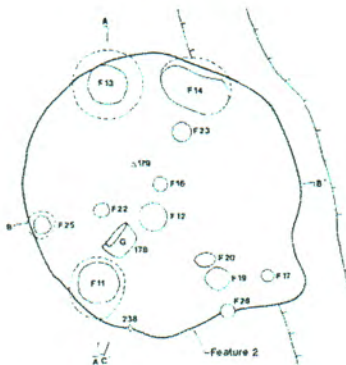


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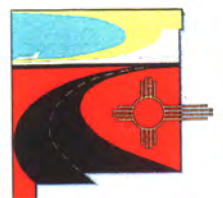


Households and Farms in Early Zuni Prehistory: Settlement, Subsistence, and the Archaeology of Y Unit Draw, Archaeological Investigations at Eighteen Sites Along New Mexico State Highway 602 - PART 1



ZCRE Report No. 593
ZCRE Research Series No. 11

New Mexico State Highway and Transportation Department



Zuni Cultural Resource Enterprise
Pueblo of Zuni

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SETTLEMENT, SUBSISTENCE, AND
THE ARCHAEOLOGY OF Y UNIT DRAW,
ARCHAEOLOGICAL INVESTIGATIONS
AT EIGHTEEN SITES
ALONG NEW MEXICO STATE HIGHWAY 602

PART I

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Conducted Under
NMSHTD Project Number TPM-0602(27)04, CN 3286
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Prepared for
New Mexico State Highway and Transportation Department

Submitted to
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Zuni Cultural Resource Enterprise Project No. 015-97
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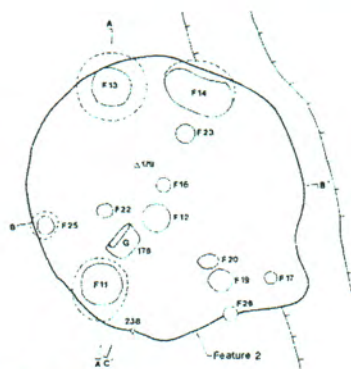
PART I

I. INTRODUCTION AND BACKGROUND

II. SITE DESCRIPTIONS

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TECHNICAL SERIES 2001-3



Households and Farms in Early Zuni Prehistory: Settlement, Subsistence, and the Archaeology of Y Unit Draw, Archaeological Investigations at Eighteen Sites Along New Mexico State Highway 602 - PART 2



ZCRE Report No. 593
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Zuni Cultural Resource Enterprise
Pueblo of Zuni

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PART 2

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IV. SYNTHESIS

V. APPENDICES

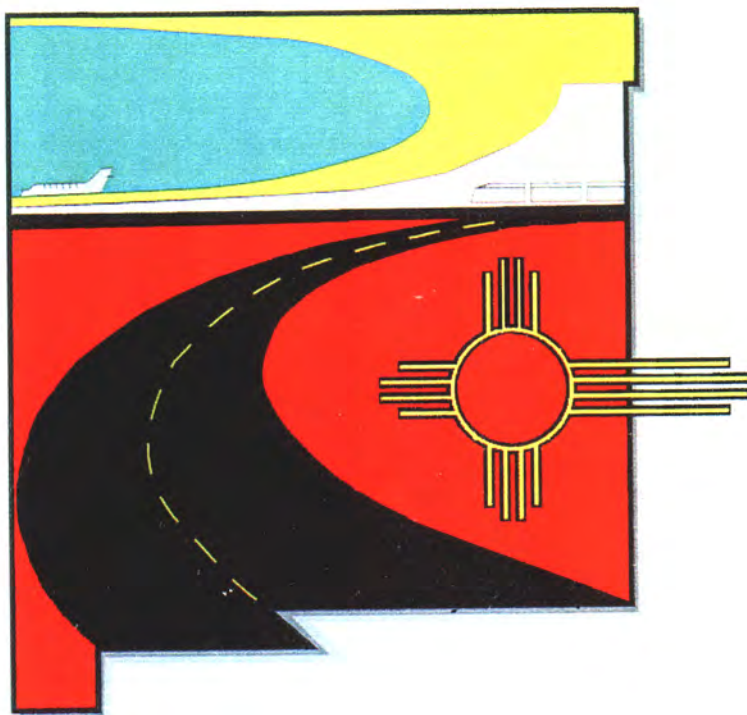
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New Mexico State Highway



And Transportation Department



ZUNI CULTURAL RESOURCE ENTERPRISE
P.O. Box 1149, Zuni, New Mexico 87327

ABSTRACT

Archaeological investigations were conducted at 18 sites along New Mexico State Highway 602 during the winter and spring of 1998. Thirteen of these sites were excavated, while analysis of surface artifacts was conducted on five other sites. Late Archaic, Basketmaker II, late Basketmaker III/early Pueblo I, Pueblo II, and early Pueblo III components were identified at the sites investigated. Data recovered from these investigations significantly contribute to our understanding of Zuni prehistory prior to the thirteenth century AD.

The Late Archaic and Basketmaker II sites examined during this project represent the oldest archaeological sites yet excavated on the Zuni Indian Reservation. These sites provide insight into a poorly known period of prehistory in this region. Three site types for the Basketmaker II period were identified: habitations, storage and/or resource processing sites, and agricultural fields (including irrigation ditches). Data from these sites indicate maize agriculture was a subsistence focus, rather than supplemental to other subsistence strategies and that irrigation technology was introduced into the Zuni area more than 3000 years ago.

Numerous Pueblo II and early Pueblo III sites are located along the slopes above the valley floor of Y Unit Draw. Both habitations and small seasonal or short-term sites (fieldhouses) are also located in the project area (only one masonry structure, however, was excavated during our testing and data recovery activities). These sites were contemporaneous with the occupation of Village of the Great Kivas, a well-known Chaco-style great house located approximately 6 km (3.8 mi) to the east in the Nutria River Valley. In this volume we compare the sites within the project and Y Unit Draw in general to Village of the Great Kivas. Pueblo II and early Pueblo III settlement dynamics are explored in relation to Village of the Great Kivas and changing strategies for agricultural production.

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SECTION I. INTRODUCTION AND BACKGROUND

Chapter 1

INTRODUCTION AND BACKGROUND

INTRODUCTION

The archaeology of Y Unit Draw provides a glimpse of the prehistory of a single valley of the upper Zuni River drainage, and in so doing permits an examination of our present understanding of the dynamics of Zuni area prehistory. Occupation and use of the valley spans more than 2000 years and perhaps more than 3000 years, from the Basketmaker II period to the present. This long span of time and the various types of archaeological sites investigated allow us to explore major research themes of Southwestern archaeology, such as early food production and household economy, as well as the Chacoan regional system. The outcome of this study was a new understanding of settlement and subsistence strategies during to time periods, Basketmaker II and Pueblo II to early Pueblo III.

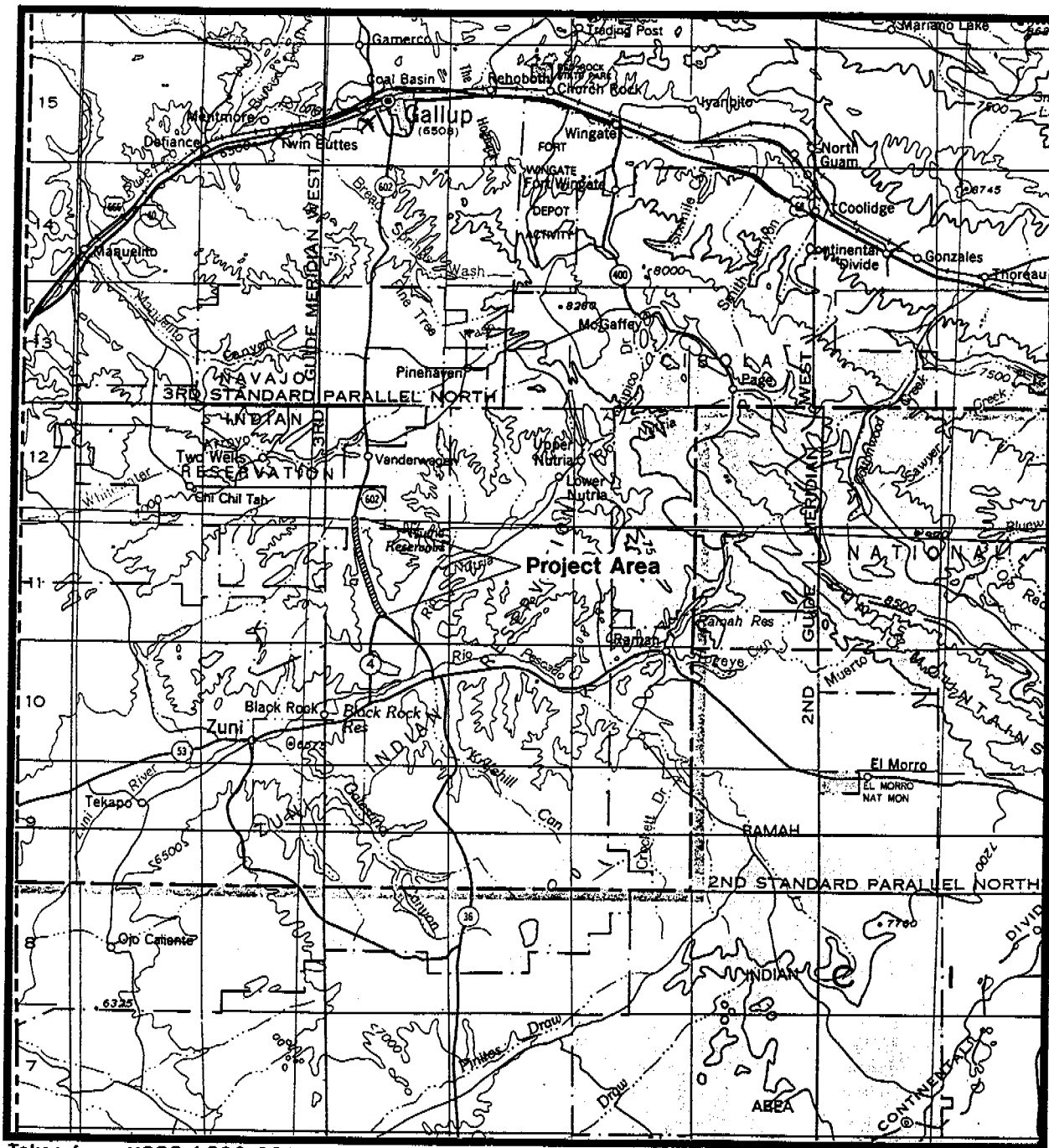
The Archaic and Basketmaker II components at sites within Y Unit Draw represent the oldest excavated sites on the Zuni Indian Reservation. The sites contained both households and farms (in addition to other features). This study focused on these households and farms to look at agricultural and social production. Evidence for maize agriculture during these periods at many of the sites provides important information regarding the nature of early food production in this portion of the American Southwest. Evidence for maize agriculture also involves information on early irrigation systems in the Zuni area. Variation in architectural features at the Basketmaker II sites suggests year-round habitation of Y Unit Draw. Large internal storage features within pitstructures, along with nearby agricultural fields containing remnants of an irrigation system, suggests maize agriculture was an important subsistence focus.

Occupation of Y Unit Draw may have reached its peak during the late Pueblo II period, or Chaco Era (AD 1050 to 1150), although large aggregated

pueblos dating to later periods exist nearby. Numerous sites within the valley date to this time period, as does Village of the Great Kivas (site LA 631). This study examines the relationships between small sites within Y Unit Draw and Village of the Great Kivas (Roberts 1932). This study also addresses the dynamics of changing farming strategies and how that might reflect settlement systems. In so doing, more general questions regarding Chacoan archaeology are addressed.

BACKGROUND

This report is submitted in partial fulfillment of the requirements for New Mexico State Highway and Transportation Department (NMSHTD) Contract Number J00310. It provides a report for archaeological testing and data recovery activities at 13 sites (LA 115334, LA 26319, LA 26309, LA 115327, LA 26306, LA 115330, LA 48695, LA 115329, LA 26308, LA 115324, LA 115323, LA 115325, and LA 49838) and analysis of surface artifacts at 5 additional sites (LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320) along State Highway 602 (NMSHTD Project No. TPM-0602(27)04, CN 3286; ZCRE Project No. 015-97; Figure 1.1). All of these sites, save for site LA 115320, are located entirely on the Zuni Indian Reservation in McKinley County, New Mexico (Figure 1.2 and 1.3). Site LA 115320 is located on both the Zuni Indian Reservation and the Chi Chil Tah Chapter of the Navajo Nation. No permits were required to perform the archaeological investigations on the Zuni Indian Reservation, as the archaeological contractor, Zuni Cultural Resource Enterprise (ZCRE) is a tribally owned enterprise. A permit was required and acquired from the Navajo Nation Historic Preservation Department for in-field analysis at site LA 115320 (NNHPD Permit No. B98137). All material associated with this report was prepared by the ZCRE under the administration of the NMSHTD.



Taken from USGS 1:500,000 scale quadrangle, STATE OF NEW MEXICO (1985)

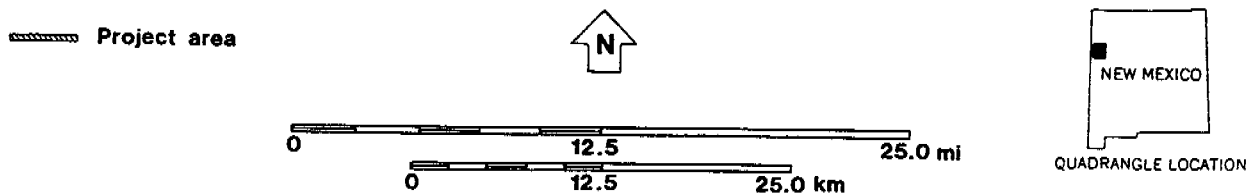
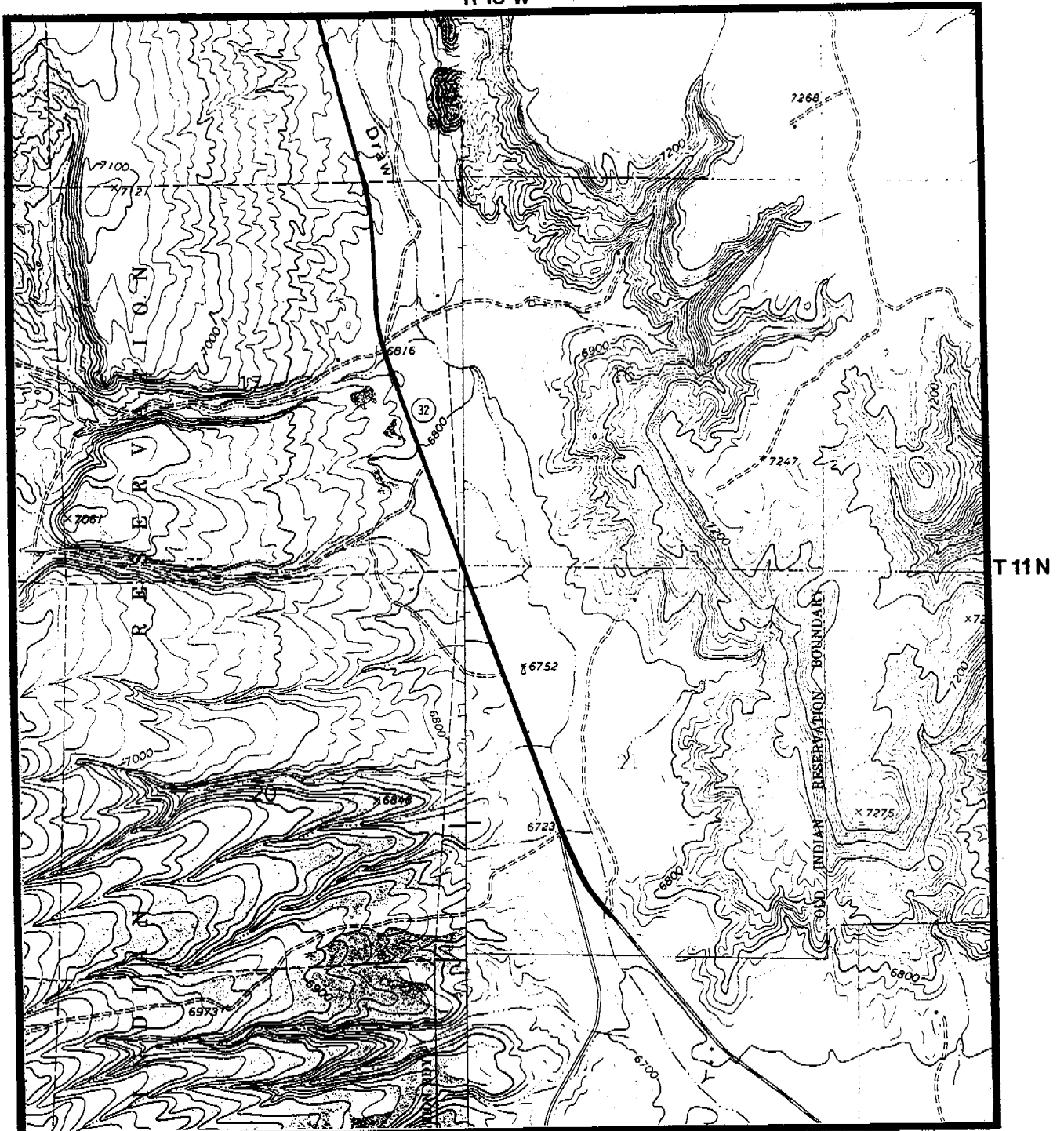


Figure 1.1. Location of the Project Area.

R 18 W



Taken from USGS 7.5-min. quadrangles, VANDERWAGEN DRAW [1972] AND HORSEHEAD CANYON NW [1972], N. MEX.

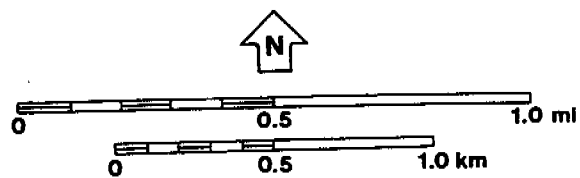
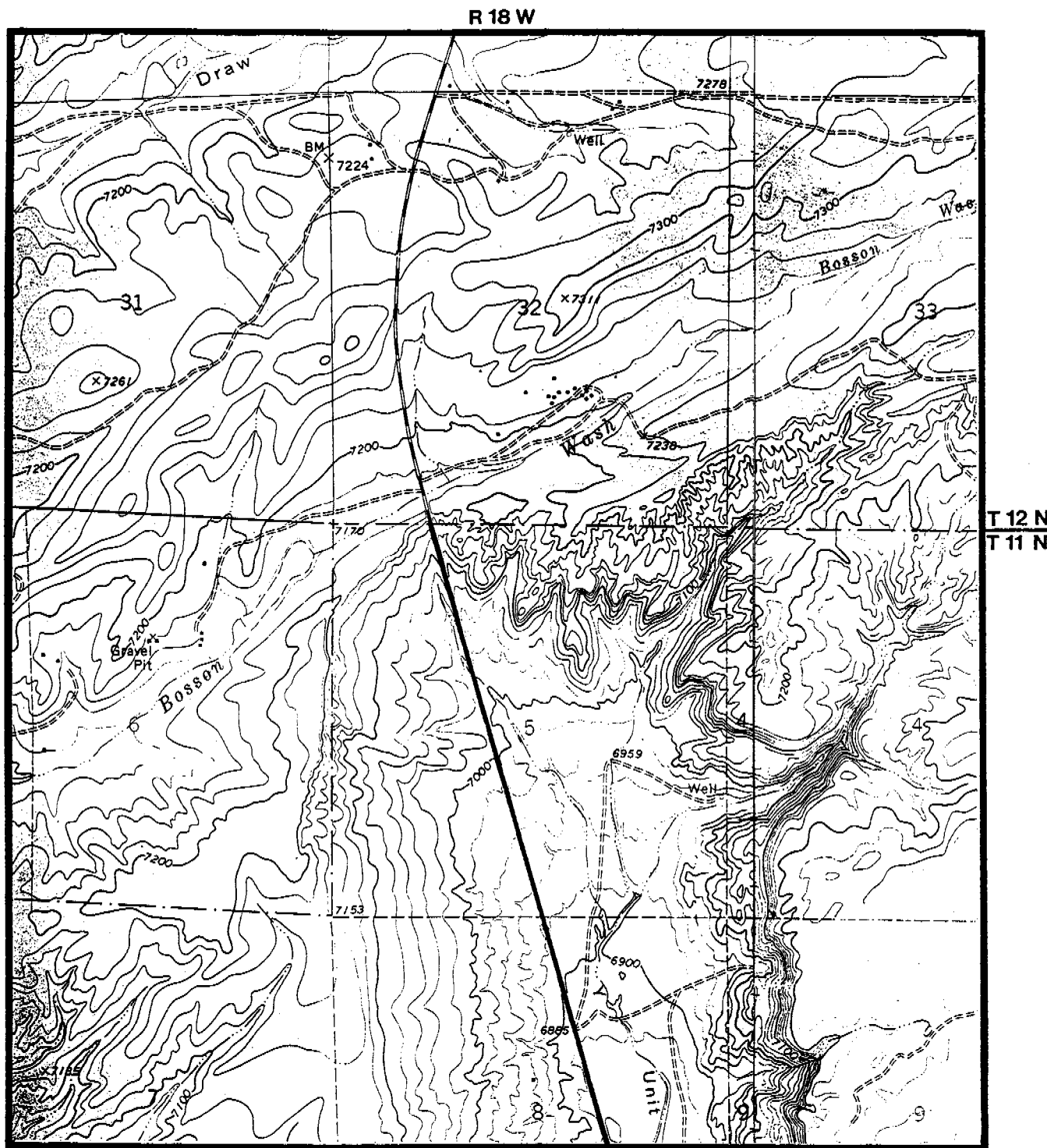


Figure 1.2. Locations of the Project Area, Southern Portion.



Taken from USGS 7.5-min. quadrangles, VANDERWAGEN DRAW (1972) AND HORSEHEAD CANYON NW (1972), N. MEX.

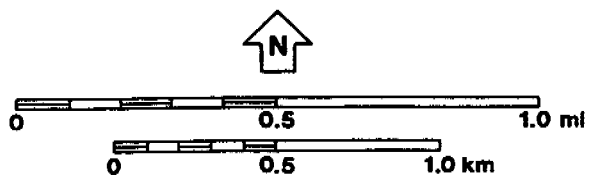


Figure 1.3. Locations of the Project Area, Northern Portion.

ORGANIZATION OF THE REPORT

This report is organized into seven sections. Section I comprises the first six chapters, which provide an introduction and background for interpretation. The first chapter presents a general description and history of the project. Chapter 2 provides a discussion of the physical environment of the project area and a brief discussion of paleoenvironmental conditions. Chapter 3 provides a brief review of Zuni area prehistory. Chapter 4 discusses previous research conducted in the area. The research design that guided investigations is presented in Chapter 5 and the methods employed during fieldwork and laboratory processing are provided in Chapter 6.

Section II comprises Chapters 7 through 20, which provide descriptive treatment of the archaeological investigations at each of the 18 sites within the project. The sites are ordered by their location from the beginning of the project (BOP) to the end of the project (EOP), basically from south to north. Each chapter provides a brief introduction to the site and the information collected during the archaeological inventory (Abbott 1997). In-depth descriptions of hand-excavated units, mechanically excavated areas, and the cultural and natural features observed are provided in these chapters. Summaries of artifacts and ecofacts recovered from each site are also presented. Interpretations regarding number of components, the age of those components, and their functions are presented in each chapter summary.

Section III consists of Chapters 21 through 26 and provides descriptions of the analyses conducted on artifacts and ecofacts recovered during the project. Results of analyses conducted on ceramics recovered during the project are presented in Chapter 21. Flaked stone artifacts and materials are described in Chapter 22. Ground stone and miscellaneous items are reported in Chapter 23. Palynological investigations are reported in Chapter 24. Chapter 25 summarizes the results of archaeobotanical remains. The analysis of the faunal assemblage is presented in Chapter 26.

Section IV synthesizes the data presented in the first three sections. A detailed summary of the entire project, including level of effort and chronology of each site, is given in Chapter 27. In closing, Chapter 28 presents conclusions regarding prehistoric Zuni settlement and subsistence patterns drawn from the investigations.

Section V provides the references cited, and Section VI contains supplementary information in the form of appendices. Appendix A provides a listing of all radiocarbon dating results. Appendix B provides the archaeomagnetic dating results. Appendix C provides tree-ring dating results. The ceramic artifact data base is given in Appendix D. The flaked stone artifact data base is provided in Appendix E. The ground stone and miscellaneous items data base is provided in Appendix F. The macrobotanical data base is provided in Appendix G. Appendix H provides the data base of the faunal material. Human remains and reburial information is given in Confidential Appendix I (bound separately).

DESCRIPTION OF THE UNDERTAKING

The NMSHTD proposes to reconstruct 8.5 km (5.3 mi) of State Highway 602 starting just south of the intersection with Zuni Route 4 (Z4). The project will include building passing lanes and reconstructing the Z4/State Highway 602 intersection. The total project will encompass the existing State Highway 602 right-of-way corridor 45.7-m (150-ft) wide. In addition to the State Highway 602 corridor, a section 609.6 by 61.0 m (2000 by 200 ft) encompassing the Z4/State Highway 602 interchange was surveyed. All of the Construction Maintenance Easements and Temporary Construction Permit areas proposed for this project fall within the 76.2-m (250-ft) corridor surveyed by ZCRE (Abbott 1997).

AUTHORITY

As specified in Section Three of Joint Powers Project Agreement, as amended, between the NMSHTD and the Pueblo of Zuni, ZCRE shall complete the series of cultural resource

investigations for the reconstruction project of Highway 602. Pursuant to Sections 110 and 106 of the *National Historic Preservation Act* (*NHPA*, P.L. 89-665, as amended) and 36 CFR 800, the federal lead agency is required to identify, evaluate, and protect cultural resources and to ensure that actions initiated by them do not inadvertently harm or destroy cultural resources. In addition to *NHPA*, these requirements are mandated by the *Archeological and Historic Preservation Act* (P.L. 93-291), the *Archeological Resource Protection Act* (*ARPA*, P.L. 96-95), the *American Indian Religious Freedom Act* (*AIRFA*, P.L. 95-341), the *Native American Graves Protection and Repatriation Act* (*NAGPRA*, P.L. 101-601), the *National Environmental Policy Act* (P.L. 91-190), and the requirements of other tribal, state, and federal laws and regulations pertaining to cultural resources.

PROJECT HISTORY

Prior to the cultural resource inventory phase of the project, ZCRE conducted a record search by accessing the Archaeological Records Management Section of the State of New Mexico Historic Preservation Division. Zuni Heritage and Historic Preservation Office (ZHHPO) site and survey records were also accessed (Abbott 1997). A cultural resource inventory was then conducted by ZCRE, by means of pedestrian survey between 26 August 1998 and 9 September 1996. Twenty-five cultural resources were located during the survey, of which nine had been previously recorded (Abbott 1997:1). In addition, 26 isolated occurrences were discovered.

During the late fall of 1997 ZCRE worked on the data recovery plan for testing and data

recovery activities along State Highway 602. On 5 December 1997 the New Mexico State Historic Preservation Office (NMSHPO) approved the data recovery plan (Kendrick et al. 1997) for 13 sites, and additional treatment measures for 5 other sites along the highway.

During this time the author met periodically with the ZHHPO and the Zuni Cultural Resource Advisory Team (ZCRAT) regarding various concerns about the project. A specific focus of these meetings, however, was the procedures regarding the discovery and treatment of human remains. Information regarding the human remains identified along State Highway 602 are given and bound separately in Confidential Appendix I.

Testing and data recovery activities began on 2 February 1998. During the next four months, ZCRE completed archaeological investigations at all of the 18 sites discussed in the data recovery plan. Data recovery activities for the project were completed on 12 June 1998. Final backfilling at sites occurred on 30 June 1998. Following these activities, a preliminary report (Kendrick et al. 1998) detailing the level of effort and significant findings at each site (as known at the time) was delivered to the NMSHTD.

The following chapters in this section provide an introduction and background for interpretation of the sites investigated along State Highway 602. The following sections of the report provide detailed descriptions of the work performed, analyses conducted, and conclusions drawn regarding the prehistory of the project area and Y Unit Draw.

Chapter 2

ENVIRONMENTAL SETTING

James W. Kendrick
with a contribution by Harland Goldstein

Recent studies have shown that environmental setting plays an important role regarding site location and variation in the general project area (Damp and Kendrick 1998; Kendrick and Hagopian 1998). In other areas of McKinley County, Kantner (1996) has shown that differences in potential agricultural lands and distribution of water have resulted in great house community variation during the Pueblo II period. A discussion is in order, then, of the physical environment of the project area and surrounding region to provide a foundation for examining the prehistory of Y Unit Draw.

PHYSIOGRAPHY AND GEOLOGY

Physiography

The project area is located within the boundaries of the Colorado Plateau Province of the North American Continent (Thornbury 1965). The Colorado Plateau is characterized by high altitude, deep canyons, and generally flat plateaus comprising gently dipping sedimentary formations, steep escarpments, and an arid climate (Cordell 1984; Thornbury 1965). Monoclines are a particularly distinctive feature of the province (Kelley 1955).

Within the Colorado Plateau, the project area is located within the Navajo Section (Thornbury 1965). Within the Navajo Section surrounding the project area, several distinctive physiographic features define the landscape. Along the northeastern portion of the upper Zuni River drainage system are the Zuni Mountains. These mountains rise to more than 2700 m (8858 ft) above mean sea level (amsl) along the Continental Divide (the Zuni Mountains rise to more than 2821 m [9256 ft] in other areas). Exhibiting over 610 m (2000 ft) of local relief (Ferguson and Hart 1985), the Zuni Mountains are the most dominant

physiographic feature in the region. These mountains also form the headwaters of the major tributaries of the Zuni River (see below). The western edge of the Zuni Mountains is marked by the Nutria Monocline, more commonly referred to as the Hogback. Along the eastern and south-eastern edges of the Zuni Mountains are lava flows and cinder cones known as the Malpais.

To the west of the Zuni Mountains the region is characterized by large mesas with steep faces, narrow canyons, buttes, cuestas, and hogbacks (Wells 1987). Numerous canyon-bound drainages from these bedrock uplands open to form alluvial fans adjacent to valley bottoms. West of the Pueblo of Zuni, the landscape becomes more open with wide, flat plains and isolated buttes (Kintigh 1985: 90).

Geology

The Quaternary alluvial deposits within Y Unit Draw are bounded by Cretaceous bedrock to the east and west (Figure 2.1). The steep mesa to the east of the project area is comprised of Mancos Shale overlain by Gallup Sandstone. Dakota Sandstone makes up the bedrock formation to the west of State Highway 602.

Beyond the project area, these Cretaceous formations overlay Jurassic Zuni and Entrada Sandstones, distinctive red and white crossbanded sandstone deposits that form steep cliffs (Ferguson and Hart 1985:106). Triassic Wingate Sandstone also outcrops with the Zuni and Entrada Sandstone. These formations are exposed along Zuni Route 4, southwest of the project area, and at Dowla Yalanne, the isolated mesa southeast of the Pueblo of Zuni. The Triassic Chinle Formation outcrops northwest of Dowla Yalanne, and consists of sandstone, conglomerate, and shale lithologies. Below the Chinle Formation is

the Triassic Moenkopi Formation, containing conglomeratic sandstone, sandstone, and shale. The Moenkopi Formation outcrops only in the southwestern portion of the Zuni Indian Reservation. Below the Triassic Formations lies the Permian San Andres Limestone and Glorieta Sandstone. These formations are only exposed in the extreme northeastern corner of the reservation, east of the Nutria Monocline (Ferguson and Hart 1985). These Permian formations rest unconformably on Precambrian granitic rock, which is exposed in the Zuni Mountains. In all, more than 750 m (2460 ft) of sedimentary deposits overlay the Precambrian geologic basement (Kintigh 1985).

General Geomorphology of Y Unit Draw

East-to-west trending ridges and east-flowing tributaries dominate the landscape on the western portion of Y Unit Draw. The east-flowing tributaries are located within the Dakota Sandstone and are capable of transporting fine sands to small clasts of sandstone into the draw. The major feature of Y Unit Draw, however, is a south-flowing ephemeral stream. This stream has formed Y Unit Draw and has most recently downcut through the Mancos Shale and into the Dakota Sandstone (Figure 2.1). It flows into the Nutria River, which in turn is a tributary to the Zuni River. Previous work on stream bank exposures in Bosson Wash (north of Y Unit Draw) and Y Unit Draw by Wells (1987) yielded evidence of cyclic aggradational and incisional events.

Bark from a tree rooted in the present stream channel in Y Unit Draw was dated to 680 \pm 90 years BP (Gellis 1998). This age suggests the timing of the culmination of the last incisional event in Y Unit Draw. Furthermore, because the most recent sand deposits occurring throughout Y Unit Draw predate the last incisional event, the age given by Gellis (1998) can be used to loosely constrain the age of the most recent sand deposit. The young age (680 \pm 90 years BP) suggested by Gellis (1998) is not contrary to the weakly developed soils in the most recent sand deposits seen throughout the study area. In addition, this

time frame, in conjunction with the degree of soil development within buried geomorphic surfaces, can be used to estimate the time of the stability of the buried geomorphic surfaces.

The deposits seen in the study area consist of two main textures: sands, and sand and gravel. The sandy deposits are widespread throughout the area and range from fine sands to clayey sands. These sandy deposits are unconsolidated and lack sedimentary structures. The sand and gravel deposits occur at a few sites (LA 115334, LA 48695) and are typically subrounded, poorly sorted, and of local lithologies (sandstone and shale). The character of these deposits suggests that they were deposited from nearby tributaries. All of the stratigraphic exposures revealed in the trenches lack sedimentary structures, thus making the processes responsible for deposition difficult to ascertain. Nevertheless, tributary and main stream deposits were differentiated based on the characteristics of the deposits (i.e., poorly sorted sand and gravel vs. well-sorted fine sand, respectively).

Organic horizons are present at many sites (LA 115327, LA 26306, LA 48695, LA 115329, LA 115323, and LA 115324) and range from trough shaped and laterally discontinuous to tabular and laterally continuous. There are three distinguishable organic horizons present throughout the study area. The first organic horizon is dark and rich, and typically occurs at depth. The second organic horizon is weakly developed and occurs at a couple of sites (LA 48695 and LA 26308) within the project area. These types of organic horizons occur at varying depths, including the present-day land surface and are designated as pedogenic Ah horizons (humic A horizons). These Ah horizons are interpreted as forming from biologic activity and biodegradation. The third type of horizon that occurs in Y Unit Draw is cultural in origin. This type contains cultural artifacts, and may have formed before occupation, contemporaneous with occupation, or after occupation. Cultural organic horizons are mostly developed within the fine sand fluvial deposits and have an average thickness of approximately 35 cm.

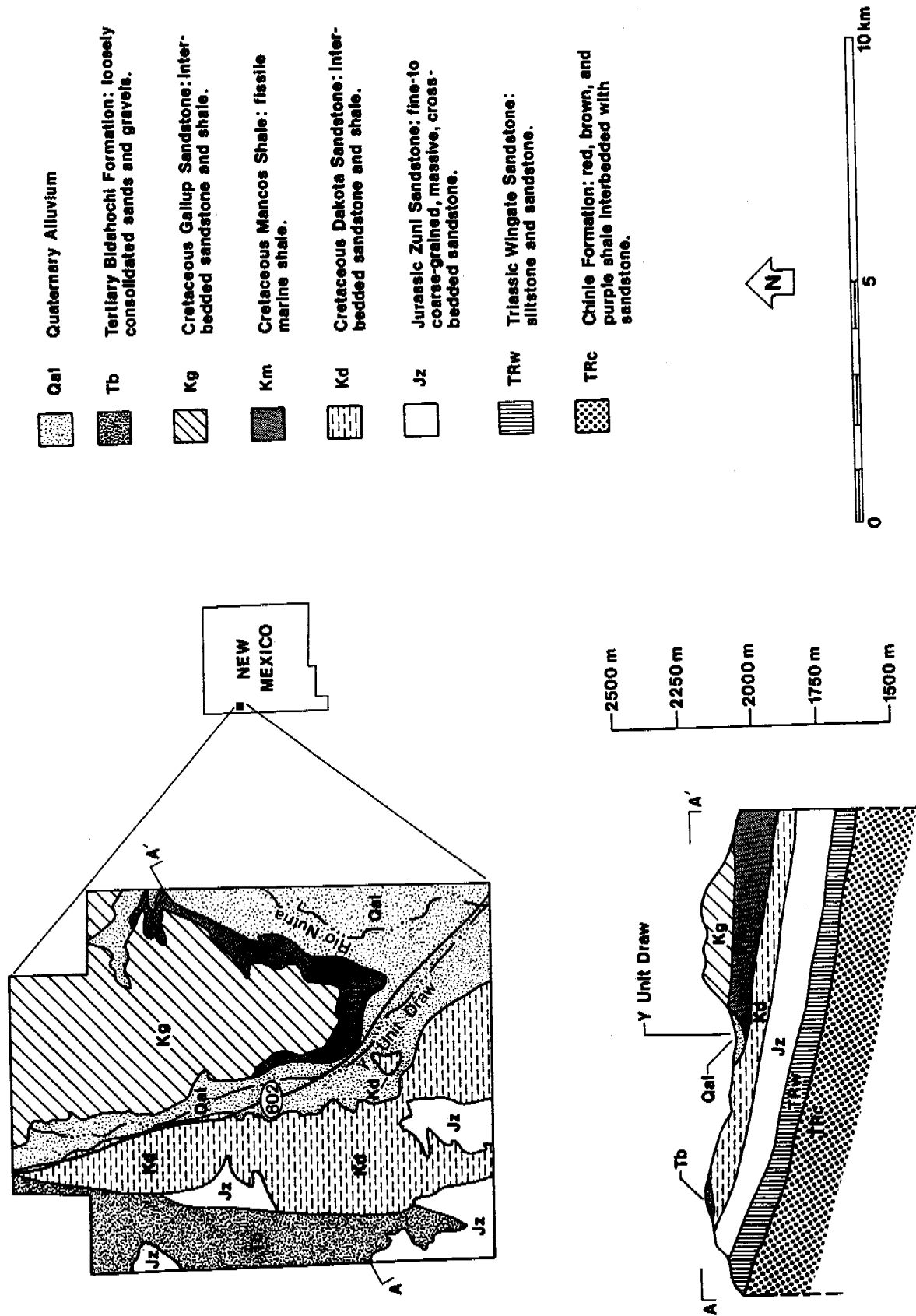


Figure 2.1. Plan View and Cross Section of Bedrock Formations Surrounding Y Unit Draw.

SOILS

According to Maker et al. (1974), the project area comprises Lohmiller-San Mateo association soils. These soils are widely distributed throughout McKinley County and occur dominantly in valley bottoms, on floodplains, and on terraces adjacent to intermittent drainages. These soils are found on gently sloping landscapes with local relief consisting only of slightly elevated ridges and low hummocks in areas of active wind erosion. These soils develop in alluvium from sedimentary formations, mainly sandstone and shale, and are susceptible to gully erosion. Deep, vertical-walled arroyos and gullies are common in immediate valley bottoms. The potential for irrigated agriculture in this association varies widely. While some areas with this association are currently considered as excellent for agriculture, some are poor, having low permeability, high salinity, or high alkali content. Other problems include susceptibility to flooding, gulying, and aeolian erosion. Nearly all of the irrigated cropland in McKinley County occurs within this soil association.

HYDROLOGY

The project area is entirely within the drainage system of Y Unit Draw, which is a major tributary of the Nutria River. The headwaters of the Y Unit Draw watershed are located approximately 2.5 to 3.0 km (1.6 to 1.9 mi) east of State Highway 602 at 2225 m (7300 ft) amsl, near the northern boundary of the Zuni Indian Reservation. Y Unit Draw is a south-flowing stream system that today is deeply incised in sections of the valley and runs intermittently. Numerous ephemeral drainages from the surrounding eastern and western slopes act as tributaries to Y Unit Draw, which drains a 24.55-sq-km (9.5-sq-mi) area (Gellis 1998). Downcutting of the present stream channel of Y Unit Draw appears to have been active by the late AD 1100s or early 1200s (Goldstein 1998; Wells 1987). This downcutting may have affected agricultural practices during the late Pueblo II to early Pueblo III periods. For information on stream flow of Y Unit Draw, see the precipitation section below.

Several modern dams can be found today within the valley of Y Unit Draw, most notably west of site LA 48695 and east of site LA 115324. These dams are used for stock purposes, but they indicate that significant flow does occur within the valley. Gellis (1998:6) reported that Y Unit Draw had flow on 39 days between 1 July 1992 and 30 September 1994, with a total runoff of 68,550 cu m (89,655 cu yd). The highest flow recorded for this period was 0.27 cu m (0.35 cu yd) per second on 10 July 1992. Springs were present within the valley in the recent past, particularly near site LA 49838, but have since dried (Jerome Zunie, personal communication 1998). Additionally, an active well is present along the valley bottom to the east of site LA 26319.

Y Unit Draw flows into the Nutria River approximately 5 km south of the project area, at an elevation of 2005 m (6580 ft) amsl. The Nutria River drains much of the northeastern portion of the Zuni Indian Reservation, and is a major tributary of the Zuni River. The Nutria River joins the Pescado River to form the Zuni River about 7 km (4.4 mi) south of the project area. The upper Zuni River drainage, then comprises the area drained by the Nutria and Pescado Rivers and their tributaries (Figure 2.2).

CLIMATE

The Zuni region has a semiarid climate, but with considerable spatial variability in both precipitation and temperature. Kintigh (1985) used four National Weather Service stations located from Zuni (Blackrock Airport) to El Morro National Monument in his discussion of modern climate for this region. For purposes here, data provided in Kintigh (1985) from the Zuni station (elevation 1963 m or 6440 ft) and El Morro National Monument (elevation 2200 m or 7218 ft) will be used. All of the sites investigated within the project are located within the elevation range of these two stations. These data are augmented by actual precipitation and streamflow records from Y Unit Draw taken between 1992 and 1994 (Gellis 1998).

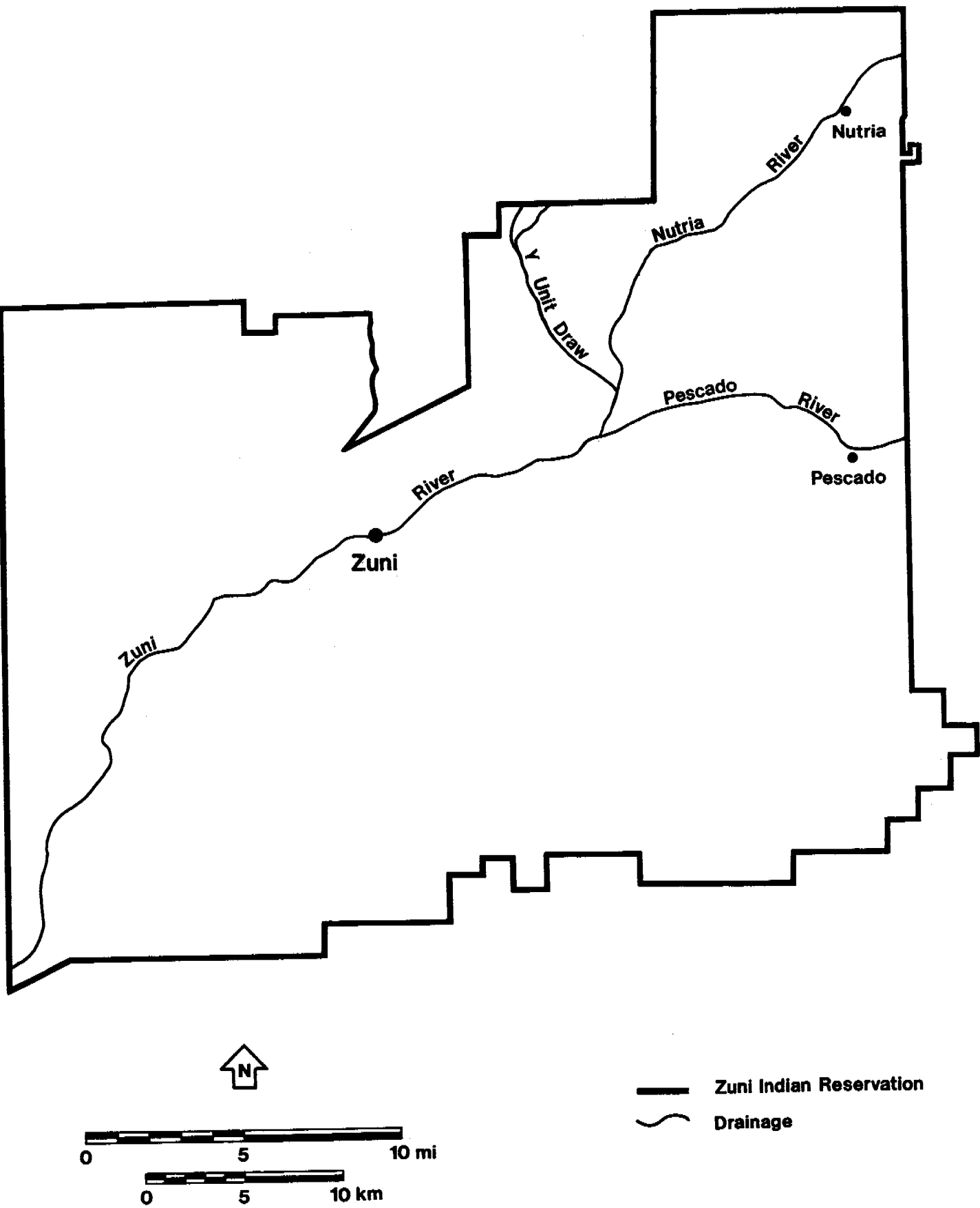


Figure 2.2. Major Tributaries of the Upper Zuni River Drainage.

Precipitation

Precipitation in the Zuni region typically is concentrated in the summer months of July, August, and September. Summer precipitation is often characterized by brief, but intense, afternoon storms. These storms follow monsoonal patterns. Annual average precipitation for 66 years of record at the Zuni station (which is approximately 61 m [200 ft] higher than the village of Zuni) is 301 mm (11.9 in), with a standard deviation of 85 mm (3.3 in; Kintigh 1985:92). Annual precipitation for 41 years of record at El Morro averages 338 mm (13.3 in), with a standard deviation of 79 mm (3.1 in). More recently, Gellis's (1998:6) record of average annual precipitation at Zuni between 1950 and 1994 was 315 mm (12.4 in).

Within Y Unit Draw two rain gauges and one streamflow gauge (near the BOP) recorded precipitation and streamflow to assess runoff for a channel and hillslope erosion project (Gellis 1998). One rain gauge is located near the head of Y Unit Draw, while the other is located down valley, approximately in the center of the project area. The head of Y Unit Draw received 237 mm (9.3 in) of precipitation between 15 March 1993 and 15 November 1993, while the lower portion of the valley received 267 mm (10.5 in) during the same time period. In contrast, the head of the draw received 79 mm (3.1 in) of precipitation between 16 March 1994 and 20 June 1994, while the gauge down valley received 61 mm (2.4 in; Gellis 1998:7).

Between 1 July 1992 and 30 September 1994, Y Unit Draw had flow on only 39 days (Gellis 1998:6). Total runoff for this period was 68,550 cu m (89,655 cu yd), with peak flow at 0.27 cu m (0.35 cu yd) per second. This peak flow was recorded on 10 July 1992.

Temperature

Kintigh (1985:95) also provided data regarding mean monthly and annual temperatures at Zuni and El Morro. Mean annual temperature for 64

years of record at the Zuni station is 10°C (50°F). January is the coldest month with a mean temperature of -1°C (30°F), while July has the warmest mean temperatures at 22°C (71°F). At El Morro, mean annual temperature is 9°C (47°F), for 33 years of record. Again, January is the coldest month with a mean temperature of -2°C (28°F), while July is typically the warmest month with a mean temperature of 20°C (69°F).

The last spring frost at the Zuni station is typically 16 May, and the first fall frost 16 October. In contrast, the last spring frost at El Morro tends to be around 3 June, and the first fall frost on 22 September (Kintigh 1985:93). Thus, according to Kintigh, the average growing season in Zuni lasts 150 days, with a standard deviation of 21 days (65 years of record). At El Morro, the growing season is typically 113 days, with a standard deviation of 17 days (Kintigh 1985:93). As Bradfield (1971) and Hack (1942) have observed for the Hopi region, maize tends to take 115 to 130 days to mature. Maize agriculture, then, is inherently risky in the Zuni region, although some races of maize may mature more rapidly.

BOTANY AND ZOOLOGY

Botany

The project area is within the Great Basin Conifer Woodland Biome, as defined by Brown and Lowe (1980). Dominant vegetation on and around the project area includes various species of juniper, pinyon pine, ponderosa pine, Gambel oak, sagebrush, narrowleaf and broadleaf yucca, opuntia, and various grasses. Table 2.1 lists the most common plant species found in the Great Basin Conifer Woodland.

Zoology

Common fauna within the project area today include Gunnison's prairie dog, coyote, and mule deer. Sheep and cattle currently graze the valley. Table 2.2 provides the most common animal species in the Great Basin Conifer Woodland.

Table 2.1. Biotic Community 122.4, Great Basin Conifer Woodland, Plants.

SCIENTIFIC NAME	COMMON NAME
<i>Agropyron smithii</i>	Western Wheatgrass
<i>Amelanchier alnifolia</i>	Saskatoon Serviceberry
<i>Artemisia arbuscula</i> ssp. <i>nova</i>	Black Sagebrush
<i>A. ludoviciana</i>	Louisiana Sagebrush
<i>Atriplex canescens</i>	Fourwing Saltbush
<i>A. confertifolia</i>	Shadscale
<i>Berberis fremontii</i>	Fremont Mahonia, Barberry
<i>B. haematocarpa</i>	Red Mahonia
<i>Bouteloua gracilis</i>	Blue Grama
<i>Bromus</i> spp.	Brome grasses
<i>Calochortus nuttallii</i>	Sego-lily
<i>Canotia holocantha</i>	Crucifixion Thorn, Canotia
<i>Ceratoides lanata</i>	Winterfat
<i>Cercocarpus intricatus</i>	Littleleaf Mountain-mahogany
<i>C. ledifolius</i>	Curleaf Mountain-mahogany
<i>C. montanus</i>	Alderleaf Mountain-mahogany
<i>Chamaebatiaria millifolium</i>	Fernbush, Desert Sweet
<i>Chrysothamnus</i> spp.	Rabbitbrushes
<i>Coleogyne ramosissima</i>	Blackbrush
<i>Coryphantha vivipara</i> var. <i>arizonica</i>	—
<i>C. missouriensis</i>	—
<i>Cowania mexicana</i>	Cliffrose
<i>Echinocereus engelmannii</i> var. <i>variegatus</i>	Hedgehog Cactus
<i>E. fendleri</i>	—
<i>E. triglochidiatus</i> var. <i>melanacanthus</i>	Red Hedgehog Cactus
<i>Ephedra viridis</i>	Mountain Joint-fir
<i>Eriogonum</i> spp.	Buckwheats
<i>Fallugia paradoxa</i>	Apache Plume
<i>Garrya wrightii</i>	Wright Silktassel
<i>Gilia</i> spp.	Gilias
<i>Gutierrezia sarothrae</i>	Broom Snakeweed
<i>Hilaria jamesii</i>	Galleta
<i>Juniperus californica</i>	California Juniper
<i>J. monosperma</i>	One-seed Juniper
<i>J. osteosperma</i>	Utah Juniper
<i>J. scopulorum</i>	Rocky Mountain Juniper
<i>Koeleria cristata</i>	Prairie Junegrass
<i>Lupinus</i> spp.	Lupines
<i>Mammillaria wrightii</i>	Wright Pincushion
<i>Muhlenbergia</i> spp.	Muhlies
<i>Opuntia basilaris</i> var. <i>aurea</i>	Yellow beavertail
<i>O. erinacea</i>	Mohave Prickly Pear
<i>O. fragilis</i>	Little Prickly Pear
<i>O. imbricata</i>	Tree Cholla
<i>O. macrorhiza</i>	Plains Prickly Pear
<i>O. phaeacantha</i>	Engelmann Prickly Pear
<i>O. polyacantha</i>	Plains Prickly Pear
<i>O. whipplei</i>	Whipple Cholla
<i>Oryzopsis hymenoides</i>	Indian Ricegrass
<i>Pediocactus papyracanthus</i>	Grama Grass Cactus
<i>P. simpsonii</i>	—
<i>Penstemon</i> spp.	Penstemons, beardtongues
<i>Pinus cembroides</i>	Mexican Pinvon

(continued)

Table 2.1. Continued.

SCIENTIFIC NAME	COMMON NAME
<i>P. edulis</i>	Rocky Mountain Pinyon
<i>P. monophylla</i>	Singleleaf Pinyon, One-needle Pinyon
<i>P. quadrifolia</i>	Parry Pinyon
<i>Purshia tridentata</i>	Antelope Bitterbrush
<i>Quercus arizonica</i>	Arizona White Oak
<i>Q. emoryi</i>	Emory Oak
<i>Q. gambelii</i>	Gambel Oak
<i>Q. grisea</i>	Gray Oak
<i>Q. turbinella</i>	Shrub Live Oak
<i>Rhamnus crocea</i>	Hollyleaf Buckthorn
<i>Rhus trilobata</i>	Squawbush, Skunkbush Sumac
<i>Ribes</i> spp.	Currants
<i>Sclerocactus whipplei</i> var. <i>intermedius</i>	—
<i>Senecio longilobus</i>	Threadleaf Groundsel
<i>Shepherdia</i> spp.	Buffaloberries
<i>Sphaeralcea coccinea</i>	Scarlet Globe Mallow
<i>S. digitata</i>	Juniper Globe Mallow
<i>S. marginata</i>	—
<i>Sporobolus</i> spp.	Dropseeds
<i>Symphoricarpos</i> spp.	Snowberries
<i>Yucca baccata</i>	Banana Yucca, Datil
<i>Y. glauca</i>	Small Soapweed

Source: Brown (1982a)

Table 2.2. Biotic Community 122.4, Great Basin Conifer Woodland, Animals.

SCIENTIFIC NAME	COMMON NAME
MAMMALS	
<i>Cervus elaphus</i>	Elk, Wapiti
<i>Neotoma cinerea arizonae</i>	Arizona Bushy-tailed Woodrat
<i>Odocoileus hemionus</i>	Mule Deer
<i>Peromyscus truei</i>	Pinyon Deer Mouse
BIRDS	
<i>Dendroica nigrescens</i>	Black-throated Gray Warbler
<i>Empidonax wrightii</i>	Gray Flycatcher
<i>Gymnorhinus cyanocephalus</i>	Pinyon Jay
<i>Icterus parisorum</i>	Scott's Oriole
<i>Vireo vicinior</i>	Gray Vireo
AMPHIBIANS AND REPTILES	
<i>Cnemidophorus velox</i>	Plateau Striped Whiptail
<i>Sceloporus graciosus</i>	Sagebrush Lizard

Source: Brown (1982a)

PALEOCLIMATE

Paleoclimatic reconstruction of the El Malpais area has recently been conducted by Grissino-Mayer et al. (1997). Although the El Malpais area is over 70 km (44 mi) to the east, it is the closest and most recent intensive study on paleoclimate available. The El Malpais reconstruction (based

on tree-ring data) extends from 136 BC to AD 1992, and correlates well with other broad reconstructions on the Colorado Plateau (Dean et al. 1985; Euler et al. 1979).

Seven alternating long-term periods of above-normal and below-normal precipitation (Figure 2.3) characterize the El Malpais paleoclimatic

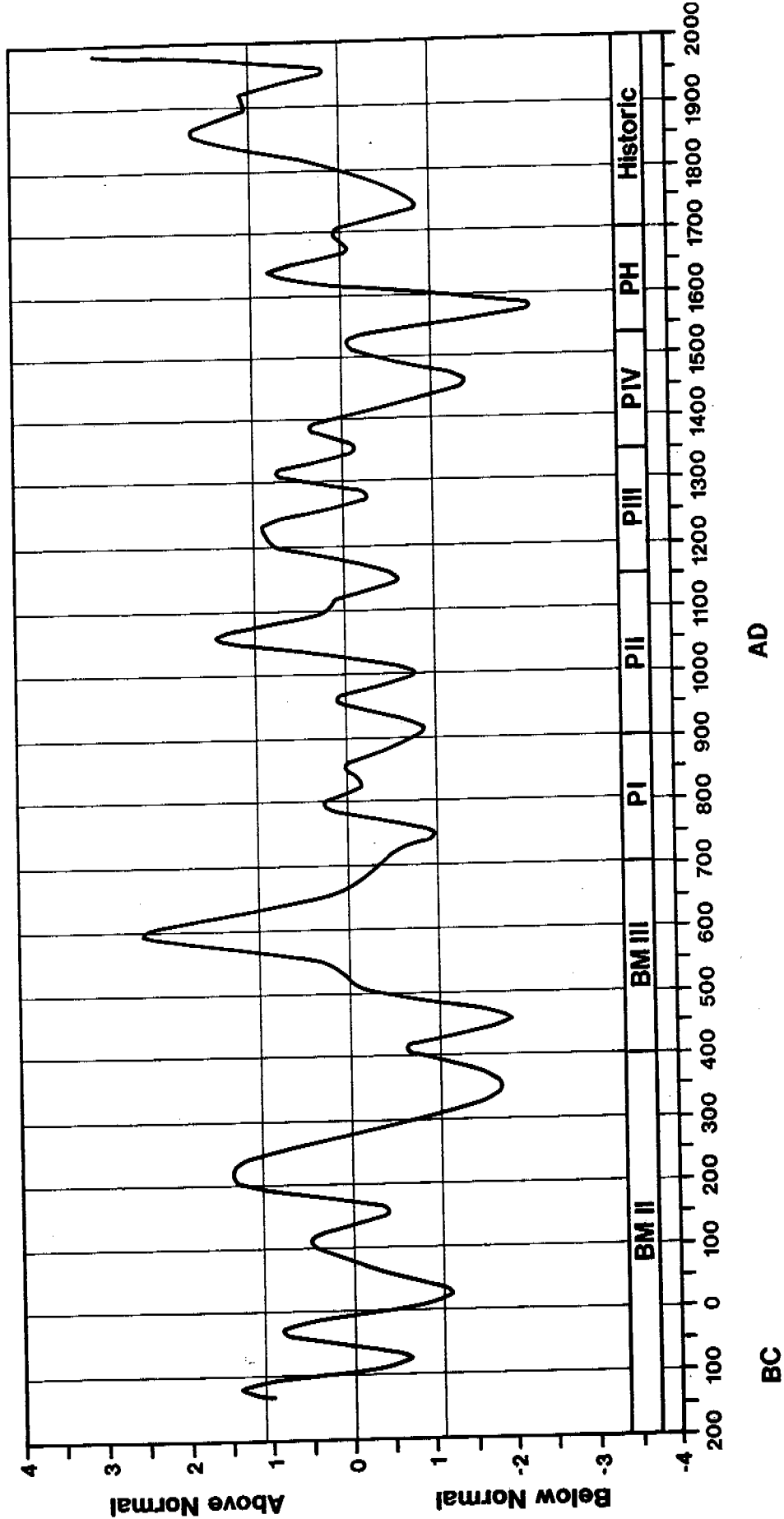


Figure 2.3. Reconstruction of Past Precipitation in the El Malpais Area, Based on Tree-Ring Data (adapted from Grissino-Mayer et al. 1997:159).

record (Grissino-Mayer et al. 1997:159). Short-term intervals of very wet or very dry conditions were also observed. The following is a brief summary of their reconstruction.

Above-normal precipitation prevailed from AD 81 to 257. This agrees with the fluvial maximum subsequent to AD 230 identified by Euler et al. (1979). The longest period of below-normal precipitation began at AD 258 and continued to 520. Grissino-Mayer et al. (1997:159) noted that tree-ring growth was "noticeably reduced" beginning around AD 350. Between AD 521 and 660 precipitation was again above normal. The ensuing hydrologic minimum identified by Dean et al. (1985) and Euler et al. (1979) was observed in the El Malpais study as a period of below-normal precipitation between AD 661 and 1023. Another period of above-normal precipitation began at AD 1024 and continued until 1398. Importantly, though, two severe short-term droughts were identified in the El Malpais tree-ring data during this period. Drought conditions prevailed from AD 1133 to 1161, and again from AD 1271 to 1296. The latter is known as the Great Drought. From AD 1399 to 1790 was another period of below-normal precipitation, followed by wetter conditions from AD 1791 to 1992. Interestingly, the period between AD 1978 and 1992 was the wettest 15-year period in the past 2129 years (Grissino-Mayer et al. 1997:160).

ENVIRONMENTAL SUMMARY

The project area runs parallel with the course of Y Unit Draw, a tributary to the Nutria River. Y Unit Draw is an incised, south-flowing stream that is bound by Cretaceous bedrock uplands. Numerous small tributaries from both the eastern

and western slopes of the valley form alluvial fans at the valley margin, conducive for runoff agriculture.

The valley is located within a pinyon and juniper woodland typical of the Great Basin Conifer Woodland. A semiarid climate prevails in this portion of New Mexico, although numerous periods of both relatively wetter and drier conditions are typical over long periods of time. Temperatures can be extreme; however, most years allow for a growing season (number of frost-free days) of between 129 and 171 days. This growing season would allow maize production during most years, yet would make yields in any given year unpredictable. Variation in growing season precipitation also places constraints on maize production.

Numerous natural resources are available today within the valley and in the surrounding region. Pinyon and juniper dominate the landscape, while isolated stands of ponderosa and oak can be found within the slopes of the valley. Important economic flora found in the valley's understory include yucca, grasses, and cacti (as described in Chapter 25). Raw materials for flaked and ground stone tools are available locally. Silicified wood and cobbles of chert and quartzite can be found in gravel deposits throughout the valley. Vesicular basalt, which was used for mauls, manos, and metates, can be found in basalt flows near the confluence of the Nutria and Pescado Rivers. Possibly the most important resources for settlement in Y Unit Draw, however, are the numerous well-drained ridges near the valley margin and the flood plain itself. These settings attracted agriculturalists to settle the valley more than 2000 years ago.

Chapter 3

CULTURE HISTORY: **A BRIEF REVIEW OF ZUNI PREHISTORY**

INTRODUCTION

The Zuni region has been both extensively and intensively occupied since prehistoric times. Numerous ruins are found across the landscape, indicative of a significant population level in the past. Even today, the Pueblo of Zuni has the largest population among all of the pueblos. It is not surprising, then, that many cultural developments have been recorded by archaeologists and historians for this long occupational sequence. This chapter presents an overview of those developments, to the extent they are known, in order to provide a background for research conducted during the project. Drawing from the works of Anyon et al. (1983), Ferguson and Hart (1985), Fowler (1980), and Varien (1987, 1990), this chapter outlines and describes the major cultural periods for the Zuni region.

The culture historical periods outlined in this chapter are based primarily on a modified Pecos Classification (Kidder 1927). These periods are known as the Paleoindian, the Archaic, and Ancestral Puebloan. The material and temporal manifestations of these periods are discussed in the following sections.

PALEOINDIAN

The Paleoindian period (ca. 9500 to 5500 BC in North America) represents the earliest human occupation of North and South America, occurring from the Late Pleistocene into the Early Holocene. It is believed by many archaeologists that at some point prior to 10,550 BC populations from northeast Asia crossed the region of the Bering Straits and settled the New World.

Across the American Southwest, Paleoindian sites tend to be discovered in areas of significant erosion or at high altitudes (Stuart and Gauthier

1981). In the Zuni region, evidence of the Paleoindian period is rare (Anyon et al. 1983; Varien 1987). The little evidence there is for occupation during this period tends to occur as isolated projectile points rather than sites. Occasionally, as pointed out in Anyon et al. (1983:48), Paleoindian projectile points are found in much later Puebloan sites such as Village of the Great Kivas (Roberts 1932).

Recent cultural resource management projects have discovered Paleoindian projectile points in the Zuni Indian Reservation and in the Rio Puerco of the West drainage. McKenna (1998) located the base of a Paleoindian projectile point on Pia Mesa, south of the Pueblo of Zuni. A Folsom projectile point was discovered by Zunie and Zimmerman (1996) in the Salt Water Wash valley southwest of Gallup, New Mexico. The Folsom complex of the Paleoindian period ranges from about 8800 to 8300 BC (Judge 1973). Well-recorded Folsom sites are located on the Plains of San Augustin, in the San Juan Basin, and near Saint Johns, Arizona (Cordell 1984). These recent discoveries indicate an extensive, but not necessarily intensive, use of the region during the Paleoindian period.

ARCHAIC

The period following the Paleoindian tradition is known as the Archaic, and dates from approximately 5500 BC to AD 400. The Archaic period represents a more diversified strategy of settlement and subsistence. Although social groups are still quite mobile, they begin to use a greater variety of sites and tool types—but lack pottery. Early in the Archaic, ground stone tools begin to appear, and by the end of the period domesticated plants are being grown. The Archaic, then, may be characterized as a period of increasing sedentism and diversified subsistence strategies.

In the region of northwest New Mexico, Irwin-Williams (1967) defined the Archaic as the Oshara tradition. Encompassing the Colorado Plateau, the Oshara tradition was believed by Irwin-Williams to have been ancestral to Puebloan culture (Irwin-Williams 1973; Vivian 1990:83). The Oshara comprises five phases: Jay, Bajada, San Jose, Armijo, and En Medio. Following Vivian (1990:83-90), the Jay and Bajada phases may be distinguished as the Oshara Early Archaic, and the San Jose, Armijo, and En Medio phases as the Oshara Late Archaic. The Oshara tradition was defined based upon Irwin-Williams' work in the Arroyo Cuervo region, located between the Cebolleta Mountains and the Rio Puerco of the East.

The Oshara Early Archaic

The earliest phase in the Oshara Early Archaic tradition is Jay, dating from approximately 5500 to 4800 BC (Irwin-Williams 1973). Large stemmed or slightly shouldered dart points, leaf-shaped knives, and scrapers are considered diagnostic for this phase (Cordell 1984). It should be noted, however, that Judge (1982) has suggested the Jay phase may actually be Paleoindian. Jay is followed by the Bajada phase, when earth ovens and cobble-filled hearths appear along with an increase in chopping tools. This period dates from 4800 to 3200 BC, and is based on the recognition of basally notched and thinned dart points that are otherwise much like those of the Jay phase. Sites in both these periods tend to be located at the heads of canyons where they are perhaps closer to water (Vogler et al. 1982).

The Oshara Late Archaic

San Jose Phase

The Oshara Late Archaic begins with the San Jose phase. The San Jose phase is characterized by the appearance of shallow basin metates, cobble manos, chopping tools, and sidescrapers. Ovens and cobble-filled hearths become more common, and the sites are larger and more numerous. San Jose dart points are similar to the Bajada dart points, but are smaller and are frequently serrated. The quality of workmanship in the rest of the chipped stone assemblage shows a marked decline. Shallow, ephemeral structures

are found and an increase in mano size and the number of chopping tools has been noted. In addition to the canyon-head site locations reported for the preceding phases, specialized hunting camps are also known (Hogan 1986). The San Jose phase is believed to date from 3000 to 1800 BC (Irwin-Williams 1973).

Armijo Phase

The succeeding Armijo phase (1800 to 800 BC) is believed to encompass the introduction of limited agriculture to the subsistence economy and an accompanying increase in site size and indicators of semipermanent settlement. The diagnostic dart points of this phase are concave to straight based with short, widely expanding stems. Other stone tools include bifacial knives, flake scrapers, drills, and choppers.

En Medio Phase

Within the Oshara Late Archaic, the period following Armijo is known as the En Medio phase, which dates from approximately 800 BC to AD 400 (Irwin-Williams 1973). En Medio sites are traditionally defined by diagnostic projectile points that are stemmed, corner-notched forms which have a tendency towards increasingly long barbs through time. More ground stone tools are typically found, but the assemblages are otherwise much the same as those of the Armijo phase. Well-made storage features appear in this period and evidence for repeated seasonal occupation of canyon-head sites is well established in the Arroyo Cuervo region. Seasonal camps on large dune ridges also appear, possibly associated with plant resources available there. The En Medio phase, however, overlaps (in time) with the Basketmaker II period (and Ancestral Pueblo tradition) as defined by the Pecos Classification. (Basketmaker I, unknown when it was postulated in 1927, is now considered to correlate with the late Archaic.)

ANCESTRAL PUEBLO

Basketmaker II

The transition from the En Medio phase of the Oshara Late Archaic to the Ancestral Pueblo tradition is not well-defined. Traits that identify

one tradition from the other do not appear contemporaneously across space. Confusing the matter is the use of a different classification system for the Puebloan tradition. This is the Pecos Classification, which was developed in 1927 when the Archaic tradition (pre-pottery) was only postulated by its framers (Kidder 1927). The pre-Puebloan periods in the Pecos Classification are known as Basketmaker I (late Archaic) and II.

According to the original Pecos Classification (Kidder 1927:490), the Basketmaker II period may be defined as the "agricultural, atlatl-using, non-pottery stage...." Vivian added that the Basketmaker II period was proposed as a period characterized by seasonal mobility and simple horticulture, but lacking ceramics (Vivian 1990:91). The Pecos Classification and modifications by Hayes et al. (1981) placed the Basketmaker II between 100 BC to AD 400, thus overlapping the En Medio phase. Others (e.g., Gratz 1991) would end the Basketmaker II at about AD 500, and Marshall et al. (1979) placed the end of the period as early as AD 50. In some regions, such as Black Mesa, this period may even last a few hundred years longer (Gumerman and Dean 1989). Vivian (1990:91) placed the Basketmaker II period between 100 BC and AD 400. Still others (Hensler et al. 1999) would begin the period as early as 600 BC. The appearance of sand-tempered brownwares around AD 400 (Varien 1990) mark the end of this period in the Zuni region.

Typically, Basketmaker II sites occur primarily in caves or rockshelters or on promontories with a view of the surrounding area (Plog 1979). Los Pinos sites (discussed below) tend to be located "in topographic situations dominated by narrow canyons containing restricted alluvial floodplains" (Vivian 1990:93). Although the period was named for the perishable items recovered from protected sites, the most common artifacts are chipped stone tools and debitage. The structures of the Los Pinos phase are generally shallow, oval pitstructures with outwardly sloping walls. Yet, as will be discussed in the following sections of this report, large, deep pitstructures dating to the Basketmaker II period were excavated at two sites on the valley floor in Y Unit Draw.

The earliest maize on the Colorado Plateau dates from approximately 3500 to 4000 years ago BC (Wills 1999), but maize is not believed to have been an important part of the diet until after about AD 1, when beans and squash also appear. Basketmaker II peoples, then, have been viewed as subsisting primarily upon wild resources, with cultigens as an additional source of food. Stuart and Gauthier (1981:36) argued that the placement of Basketmaker II sites at higher elevations allowed for the simultaneous exploitation of horticultural and foraging lands.

There has been considerable discussion on the relationships between the En Medio phase and the Basketmaker II (e.g., Berry 1982; Irwin-Williams 1973; Simmons 1982; Stuart and Gauthier 1981; Vivian 1990; Vogler et al. 1982). Vivian (1990:106) considered the Basketmaker II as a transitional stage between Archaic and Puebloan adaptations. There is disagreement on this, however (Berry 1982). Irwin-Williams (1973) proposed a gradual, in situ transition from the Archaic to Puebloan adaptations. Vivian (1990:107) concurred, and believed there are no data to indicate that the transition was other than gradual with minimal regional diversity. Berry (1982), on the other hand, believed that the Los Pinos phase represents an intrusion of agriculturalists (possibly from the southern Basin and Range Province) in the second and third centuries AD. Los Pinos sites are located in the Animas and Pinos river valleys along the periphery of the San Juan drainage. According to Berry, there are no data to support a gradual transition between hunting and gathering wild resources and growing crops.

Prior to ZCRE's investigations in Y Unit Draw, the Basketmaker II period was a virtual unknown in the Zuni area. A Basketmaker II site (site NA 14, 086) was excavated by Gratz (1977) along Zuni Route 4 just south of the State Highway 602 project. This site comprised a shallow pitstructure and a thermal feature interpreted as a roasting pit (Gratz 1977:45). The pitstructure was circular in shape and the floor area measured slightly over 13 sq m (140 sq ft). This size is roughly the same as the classic Basketmaker II pitstructures discovered in the Durango area by Morris and Burgh (1954). Unfortunately, no tree-ring or radiometric dating

of these features was conducted. Hunter-Anderson (1978:75) identified a possible Basketmaker II site (site 311) during the Yellowhouse survey. This site, which was never excavated, consists of four thermal features, a concentration of ground stone artifacts, a later Basketmaker III projectile point, and jacal. No chronometric data are available for this site.

This report adds substantially to our understanding of the Basketmaker II adaptation in the Zuni region. Seven of the nine sites with radiocarbon dates have late Archaic or Basketmaker II components. These components are all open-air sites (and so the spatial distribution of features and activity areas are not restricted by the confines of rockshelters) and range in function from habitations to specialized activity areas such as agricultural fields. The results presented in this report push the Basketmaker II period in the Zuni area back in time several centuries. The results also indicate that agriculture was a focus of subsistence rather than a supplement to wild resource collection. The sites along Y Unit Draw not only allow us to formulate new models for the Basketmaker II period but, more importantly, they also allow new ways of recognizing these sites.

Basketmaker III

This period begins around AD 400 to 500 and ends at AD 700 in the classic Pecos Classification (Kidder 1927). Hayes et. al (1981) extended the period to AD 750 and Vivian (1990) placed the end of the period at about AD 710. Basketmaker III is the first period in which there is good evidence of settlements in much of the Western Anasazi area (Plog 1979) and widespread use of ceramics. Sites of this period typically exhibit circular pitstructures with interior and exterior storage pits and hearth features, although structures exhibit variation in size and shape. Pitstructures are round to rectangular, 5.0 to 8.0 m (16.4 to 26.2 ft) in diameter, and usually less than 1.0 m (3.3 ft) deep (Bradley 1994:23). Some sites also include significantly larger structures typically interpreted as ceremonial areas, called kivas, that are located at some distance from the other structures. Many of the storage features are elaborate stone-lined cists. Sites occur on alluvial terraces or ridges and bluffs near drainages.

The artifact assemblages from this period include grayware ceramics (Lino Gray, Lino Black-on-gray, and Lino Fugitive Red), small projectile points (inferred to indicate use of the bow and arrow), and the first trough metates, with rectangular manos. In Y Unit Draw, however, trough metates and rectangular manos are being used in the Basketmaker II. In the latter part of the Basketmaker III period, a few plain redware ceramic artifacts appear.

Subsistence appears to shift toward an increased dependence upon agriculture, judging by the occurrence of plant remains, aggregated villages, and numerous storage pits (Gratz 1991). This shift, of course, depends on the level of agriculture sustained during the Basketmaker II. Plog (1979) maintained that agriculture is somewhat more important than previously, but the major food sources are still hunted and gathered wild species. Gumerman and Dean (1989) argued that the change in settlement pattern reflects a high degree of sedentism related to significant increases in farming. Environmental conditions were generally favorable in all respects, but Gumerman (1988) maintained that populations of this period preferred to reside in the better-watered areas such as the Puerco River Valley, where numerous sites of this period are reported (Gumerman and Olson 1968).

Subregional variations in and around the San Juan Basin include Sambrito, Trujillo-Sky Village, Lupton, and La Plata (Vivian 1990, cited in Bradley 1994:23). Of these, the La Plata variant is the largest, extending from the Mesa Verde region to the lower Chuska valley and encompassing Chaco Canyon. Supporting Gumerman's (1988) contention, the large Basketmaker III sites of the La Plata variant are located near the most favorably watered areas (Bradley 1994:23).

In the Zuni region, investigations focused on the Basketmaker III period are few. Wiseman (1977) interpreted a jacal structure in Blackrock as dating to the Basketmaker III period. Zuni Archaeology Program (ZAP) investigations along the Pia Mesa road south of the village of Zuni recovered sand-tempered brownwares and redwares dating to the AD 400s (Varien 1990). Similarly, Fowler

(1988) recorded architectural features related to the early introduction of ceramics in Blackrock.

Pueblo I

The Pueblo I period marks the beginning of the transition to aboveground architecture. The period runs from AD 700 to 900 in the classic Pecos Classification (Kidder 1927) and in Hayes et al. (1981). Vivian (1990) extended the period slightly to AD 920. Some authors (notably Goetz and Mills 1993) subdivided the period, making a distinction between Early and Late Pueblo I periods. Sites consist of groups of pitstructures occurring in conjunction with rectangular or curvilinear blocks of masonry rooms. The paucity of building stone indicates that the superstructure of these rooms was usually of jacal (wattle and daub). These surface rooms are believed to have functioned as storage facilities. In some cases these roomblocks are replaced with lines of semisubterranean slab-lined storage pits. Pitstructures are deeper than during Basketmaker III and contain ventilators as opposed to antechambers (Bradley 1994:225). Also, distinctive architectural features (kivas) occur within the villages; sipapus begin to occur on the floors of pitstructures.

The artifact assemblage is dominated by plainware pottery, but some utility vessels exhibit embellishment (Kana'a Neckbanded) and black-on-white and black-on-red types appear in addition to the black-on-gray wares. For the Cibola whitewares, White Mound, Kiatuthlanna, La Plata, and Red Mesa black-on-white all appear at various times in Pueblo I assemblages. For flaked stone artifacts, small side-notched projectile points are the rule and ground stone artifacts are common.

The shift toward reliance on agriculture continues during Pueblo I (Plog 1979) and in some areas there is evidence of terracing and irrigation. Sites continue to be rather small villages, although lowland floodplain villages display some degree of aggregation (Gumerman and Dean 1989). Environmental conditions appear to deteriorate during this period (Gumerman 1988), shifting toward a lower water table, higher erosion, and a decrease in growing-season precipitation. Dean et al. (1985) and Dean and

Robinson (1977) characterized precipitation levels as having high temporal and low spatial variability. It is generally held that there were population increases during this period (Gumerman 1984) in the Kayenta and Cibola areas. Both Gumerman (1984) and Gratz (1991) described increases in site size as well as increases in structure size near the end of the Pueblo I period.

Four subregional variations in the San Juan Basin are noted for the Pueblo I period: Rosa, Loma Alta, Piedra, and White Mound-Kiatuthlanna. Of these, the White Mound-Kiatuthlanna variant is most closely associated with the project area. For the Zuni region, Anyon et al. (1983) described a shift in settlement location as the most distinctive feature of this time period (which they defined as the Kiatuthlanna phase). Sites tend to be located on ridges and other "high locations," as opposed to valley bottom locations of the previous period (Anyon et al. 1983:49).

Pueblo II

The Pueblo II is dated here between AD 900 and 1150, because the material and architectural traits that define the period extend to around the middle 1100s. The Pecos Classification dates this period from AD 900 to 1100 (Kidder 1927). This period is further divided into two phases: Early Pueblo II (AD 900 to 1050) and Late Pueblo II (AD 1050 to 1150).

As in Pueblo I, pitstructures, or kivas, continue to be used for habitation, but surface rooms become the dominate habitation form. The roomblocks are more frequently built of stone masonry rather than jacal (Gratz 1991). During the Early Pueblo II, the number of sites in the San Juan Basin increases by 38% (Bradley 1994:26). Typical sites consist of a rectangular or U-shaped roomblock with a kiva in the area between the structure and the trash area to the south. This was defined by Prudden (1903) as a "unit pueblo."

Vivian (1990) defined the Early Pueblo II period as a time in which the identifiable form of Chacoan community structure begins. He cautioned, however, that there is insufficient evidence of a regional network between the sites

at Chaco and other communities in the San Juan Basin during this period and that the cultural contemporaneity of the Chaco core and outlying settlements, such as Village of the Great Kivas, is uncertain.

During the Late Pueblo II, populations continue to expand into marginal parts of the San Juan Basin. This results in a pattern of small habitation sites with water and soil control features common. There is evidence for increased specialization, exchange, and status differentiation and perhaps the development of regionally adapted corn varieties during this time (Bradley 1994:29). The period also marks the development of the Chacoan regional system (Judge 1989). Village of the Great Kivas was in some way active in this regional system, which in turn facilitated participation by sites (or households) within the project area.

The Chacoan Regional System included communities from present-day southwestern Colorado, southeastern Utah, northeastern Arizona, and northwestern New Mexico. An extensive road system was developed which connected some of these communities. Roney (1992) cautioned, however, that many of roads that have been identified are only short segments that may connect intracommunity locations rather than extend to other communities and to Chaco.

The Chacoan system has been defined primarily upon the presence of Chaco-style great houses. These are often compact, multistory structures that comprise enclosed and/or elevated kivas, Chaco-style masonry, and core-veneer wall construction (Marshall et al. 1979; Powers et al. 1983). Often associated near or as part of the great house complex are great kivas (circular ceremonial structures whose interior diameters are greater than 10 m [32 ft]), roads (linear bermed features that are often below grade), and *nazha*, or earthen features (Fowler and Stein 1992). These great houses located outside of Chaco Canyon are commonly referred to as "outliers." Village of the Great Kivas, located less than 6 km (3.8 mi) outside the project area, is one such great house.

Numerous models have been proposed in attempts to explain the widespread distribution of Chaco-style great houses during the latter portion

of the Pueblo II period. These models can be broken down into two main categories: local development and colonization (Kendrick and Judge 1996; Tainter and Gillio 1980). Local development models emphasize local processes for the appearance of great houses, but within a regional context. These models may emphasize local elites (Powers et al. 1983), political competition (Kantner 1996; Sebastian 1992), and communal integrative and public aspects of great house complexes (Adler and Varien 1993; Fowler and Stein 1992; Lekson 1991; Marshall et al. 1979; Mobley-Tanaka 1993; Toll 1985). These models are further discussed in Chapter 5.

Artifact assemblages during the Pueblo II period include increasing varieties of black-on-white ceramics and a predominance of corrugated utility vessels over plainwares. By the latter half of the period, black-on-red wares from southern regions begin to appear, and in increasing quantities. In the Cibola White Ware series Red Mesa, Puerco, Escavada, Gallup, and Chaco Black-on-white are common. White Mountain Redwares such as Puerco Black-on-red and Wingate Black-on-red may be found. Flaked stone tool technology tends to be expedient, producing most often simple utilized flakes rather than formal tools. Manos of the two-hand variety and flat slab metates are most common, although other types might predominate within local areas.

Reliance upon agriculture continued to increase, although hunting and gathering remained indispensable. Faunal assemblages from the Chimney Rock and Guadalupe outliers and from the Chaco core contain approximately 80% artiodactyls until the late eleventh century when they decrease corresponding to an increase in the percentage of prairie dog and turkey (Bradley 1994:28). In some areas there is good evidence for no permanent occupation of sites in this or the preceding periods (Powell 1983).

In the Zuni region, the number of sites in this period increases markedly, especially in its latter half, and this is considered as evidence for an increasing population. Pueblo II sites are the most common type of site in the region (Varien 1987). The environment of this period was initially poor, after the degradation of the preceding period, but began to improve in the last hundred years. Water

tables probably began to rise after AD 900 (Dean et al. 1985). Precipitation became more consistent by AD 1000, and by 1050, high spatial variability in climatic conditions were obtained (Dean and Robinson 1977).

Pueblo III

This period dates from AD 1100 to 1300 according to the Pecos Classification (Kidder 1927). Again, Hayes et al. (1981) recognized an early and late phase in this period; they placed the Early Pueblo III phase between AD 1050 and 1180 and continued the late Pueblo III phase to AD 1400. Focusing on Chaco Canyon and the San Juan Basin, Vivian (1990) used the Late Bonito phase and Mesa Verde phase as approximate correlates for Pueblo III. Many now begin the Pueblo III at AD 1150 and end the period at AD 1350 (Adler 1996).

Some later Pueblo III sites exhibit enclosed plazas and special-purpose surface structures (mealing rooms) attached to the northeast side of roomblocks (Gumerman 1984). Sites are increasingly large and exhibit evidence of planning in some respects (Plog 1979), culminating in formal multistory pueblos built around large plazas. Tower kiva complexes appear during this period in the northern Four Corners region (Vivian 1990:335).

Artifact assemblages of this period resemble those of the preceding one, with increased variety in design of ceramic items indicating regional style development (Plog 1979). Orangewares and polychrome pottery make their appearance in the Western Anasazi area. Reserve, Tularosa, Pinedale, and Snowflake black-on-white are common Cibola White Wares; and White Mountain Redwares include Wingate, St. Johns, Pinedale, and Kwakina Polychrome. Flaked and ground stone artifacts are essentially identical to those found in the Pueblo II period.

A widespread drought in the first half of the Pueblo III period is thought to be the cause of major population shifts throughout much of the Southwest. By AD 1150, the improved climate of the preceding period had deteriorated to major drought conditions coupled with low spatial and temporal variability in precipitation (Dean and

Robinson 1977; Dean et al. 1985). The drought was followed by a reversal in which water tables rose and floodplains aggraded until AD 1275 (Dean et al. 1985). By the end of the period, most populations were aggregated in the Mesa Verde, Zuni, Acoma, and portions of the Rio Grande regions.

Abandonment of the Mesa Verde region is widely regarded as the most significant event of the Pueblo III period. By AD 1300 the entire Puebloan population had abandoned the Mesa Verde region, including the large pueblos of Sand Canyon, Goodman Point, Cow Canyon, Cliff Palace, Yucca House, and many others. The Great Drought mentioned in Chapter 2, which occurred between AD 1276 and 1299, likely was a major cause of the abandonment. Van West (1990), however, studied agricultural productivity and predictability of soils within the Mesa Verde region of southwestern Colorado, along with dendroclimatological data from the region, and found that the drought was probably not the only cause for abandonment. Van West believed that there was enough productive land to support at least some of the population during this period. Interestingly, her study showed that cooperation mechanisms broke down during the late Pueblo III, and when the drought intensified the problems, abandonment was the chosen solution.

In the Zuni region, the Pueblo III period (AD 1150 to 1300) shows increased population aggregation in the Zuni area (Anyon and Ferguson 1984), particularly in the area of the Rio Pescado and its tributaries. Villages consist of large clusters of associated buildings (pueblos), built with contiguous roomblocks surrounding a plaza (Holmes and Fowler 1980; Hunter-Anderson 1978). Sites of this kind are well represented from Pescado to El Morro (Kintigh 1985) and were occupied until slightly after AD 1300.

Pueblo IV and Historic Periods

The Pueblo IV period (AD 1300 to 1540) in the Zuni area is not well understood. Site distribution suggests that the Zuni population moved westward to the Zuni River, where six historic towns, including Zuni Pueblo, were occupied when Coronado arrived in AD 1540 (Ferguson and Hart 1985).

The Historic period (AD 1540 to present) began with the arrival of the Spanish. After the Pueblo Revolt against the Spanish in 1680, the Zuni abandoned the large towns and built refuges on the top of Dowa Yalanne. The Spanish reconquered New Mexico in the 1690s. At this time, the Zuni reoccupied Zuni Pueblo, which has been occupied continuously to the present day. Following the reconquest, the Zuni founded several defensively located, seasonally occupied outlying settlements for herding and farming. These settlements were located primarily in canyons and mesas around the Zuni River valley (Mills et al. 1982:19).

Since 1848 when New Mexico became a U.S. territory, the history of Zuni has been marked by population growth, increased contact with Hispanics and Anglo-Americans, the introduction

of technological innovations, and increased involvement with the national cash-based economy (Mills et al. 1982). Agriculture remained important through World War II, and farming villages at Ojo Caliente, Nutria, Tekapo, and Pescado were heavily used. Zuni raised livestock and produce and may have sold them to Anglo-Americans and Hispanics as development occurred outside the reservation (Mills et al. 1982:29, 30, 42, and 61). After about 1945, environmental degradation became a prominent force on the landscape. Overgrazing and clear-cutting caused erosion and arroyo cutting which in turn lowered the water table, impaired irrigation, and caused springs to dry up. Perhaps as a result of this degradation and the increased importance of a cash economy, farming diminished on the Zuni Reservation (Mills et al. 1982:57-61).

Chapter 4

PREVIOUS RESEARCH

INTRODUCTION

The first accounts of archaeological sites in the Zuni region were written during the Spanish colonial period (AD 1539 to 1821). It was not until the late 1800s with the Hemingway Expeditions, however, that formal archaeological investigations began in the Zuni region. The work of the Mindeleff brothers (Mindeleff 1891), Bandelier (1892), Cushing (1886), Fewkes (1891), and Spier (1917) was among the earliest in the American Southwest, and laid the foundations for future research in the Zuni region. These early studies focused on the large ruins of the region that typically date to the later periods of Zuni prehistory and early history. Even recent archaeological investigations have typically focused on these later periods (Kintigh 1985). Despite over 100 years of research, significant questions still remain, and whole cultural periods (such as the Basketmaker II) remain virtually unknown.

This chapter discusses the previous research that has been conducted within and near the project area. Over the past few decades, several small-scale projects have been conducted within the current project area. These are typically cultural resource management projects conducted by various manifestations of the ZCRE or the Bureau of Indian Affairs. In addition, large-scale projects have been conducted periodically in the Nutria Valley, to the south and southeast of Y Unit Draw. These projects range from extensive block surveys (Hunter-Anderson 1978) to intensive excavations (Roberts 1932).

For background purposes, this chapter will provide general information on those projects that have been conducted within 1 km (0.62 mi) of the project area. There is no particular significance to the 1-km distance, other than to keep the discussion within manageable parameters. This chapter will also briefly discuss the larger projects that have been

conducted in the general area, and their significance to the archaeology of Y Unit Draw.

PREVIOUS RESEARCH WITHIN THE PROJECT AREA

During the inventory phase of this project (ZCRE Project No. 029-96), Abbott (1997) conducted a record search of the project area by accessing the Archaeological Records and Management Section of the New Mexico Historic Preservation Division to locate previously recorded sites. Nine sites were found to be previously recorded, and are listed in Table 4.1.

During the inventory survey, 16 additional archaeological resources were discovered and recorded (Abbott 1997:1). Twenty-six isolated occurrences were also recorded. These newly recorded sites and isolated occurrences are given in Tables 4.2 and 4.3, respectively, and the site locations are shown in Figures 4.1 and 4.2.

In total, 25 sites (the number 25 excludes the IOs which are also cultural resources) were documented during the survey. Twenty-four of these resources are located entirely on the Zuni Indian Reservation. One site, LA 115320, is located in part on the Zuni Indian Reservation and partly on the Navajo Nation. Four of the isolated occurrences (IO 21, 22, 23, and 25) are located on the Navajo Nation, while the remainder are located on the Zuni Indian Reservation.

A Traditional Cultural Properties Assessment (TCPA) was performed by the Zuni Heritage and Historic Preservation Office (ZHHPO) in association with the inventory. For the portion of the project that is located on the Navajo Nation, an Ethnographic Assessment (EA) was conducted by Nelson. The TCPA and the EA were given in confidential appendices within the inventory report (Abbott 1997).

Table 4.1. Previously Recorded Sites In or Near the Project Area.

Site Number	Other Site Numbers	Station	Resource in 602 R-O-W	Report Reference
LA 26306	ZAP NM:12:X2:48	123-126	Yes	Holmes 1980
LA 26308	ZAP NM:12:X2:15	160-161	Yes	Davis and Windes 1975
LA 26309	ZAP NM:12:X2:45	100-103	Yes	Holmes 1980
LA 26310	ZAE NM:12:X2:46	94-96	Yes	Holmes 1980
LA 26311	ZAE NM:12:X2:47	91-93	Yes	Holmes 1980
LA 26317	ZAP NM:12:Y2:309	39-41	Yes	Davis and Windes 1975
LA 26319	ZAP NM:12:Y2:308	50	No	Holmes 1980
LA 48695	ZAE NM:12:X2:14	145	Yes	Davis and Windes 1975
LA 49838	ZAE NM:12:X2:16	205-210	Yes	Davis and Windes 1975
	ZACT 1163			Gleichman 1984

Source: Abbott (1997)

Note: All sites are located on Zuni Tribal Trust land.

Table 4.2. Archaeological Sites Recorded During the Inventory Phase.

Site Number	Other Site Numbers	Station	Resource in 602 R-O-W
LA 115320	None	236-238	Yes
LA 115321	None	188-190	Yes
LA 115322	None	179-181	Yes
LA 115323	None	175-177	Yes
LA 115324	None	168-170	Yes
LA 115325	None	200	Yes
LA 115326	None	234	No
LA 115327	None	113-116	Yes
LA 115328	None	152-154	Yes
LA 115329	None	158-160	Yes
LA 115330	None	141-144	Yes
LA 115331	None	139-141	No
LA 115332	None	85-87	No
LA 115333	None	63-65	Yes
LA 115334	None	53	Yes
LA 115335	None	78-81	No

Source: Abbott (1997)

Note: All sites are located on Zuni Tribal Trust land, except that a portion of site LA 115330 is located on Navajo Nation Tribal Trust land.

Table 4.3. Isolated Occurrences Observed During the Inventory Phase.

Isolated Occurrence	Description
1	Quartzite hammerstone (included later within site LA 115320 boundary)
2	Chert hammerstone
3	Chert flake
4	Redware sherd
5	Chert flake
6	Chert flake
7	Chert flake
8	Chert flake
9	Reserve Black-on-white sherd
10	Indented corrugated sherd
11	Gallup Black-on-white sherd
12	Gallup Black-on-white sherd
13	Indented corrugated sherd
14	Silicified wood flake
15	Plain white sherd
16	Chert flake
17	Ground sandstone fragment
18	Ground sandstone fragment
19	Indented corrugated sherd
20	Plain white sherd (included later within site LA 115320 boundary)
21	Four black-on-white sherds and one chert flake
22	Three chert flakes
23	One redware sherd and one chert flake
24	Six Reserve Black-on-white sherds
25	Two Escavada Black-on-white sherds, two black-on-red sherds, and two chert flakes
26	One black-on-white sherd and two indented corrugated sherds

Source: Abbott (1997)

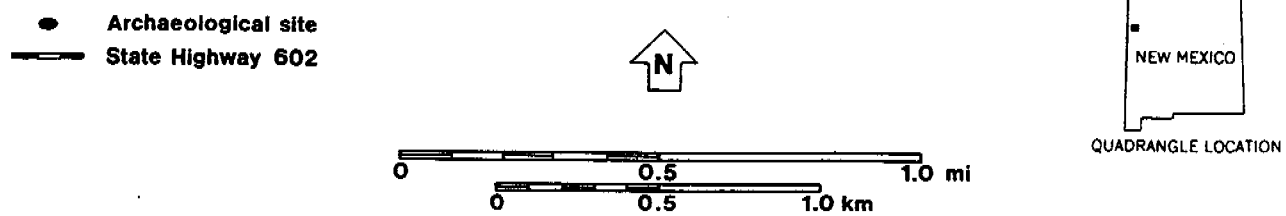


Figure 4.1. Known Cultural Resources Within the Project Area, Southern Portion.

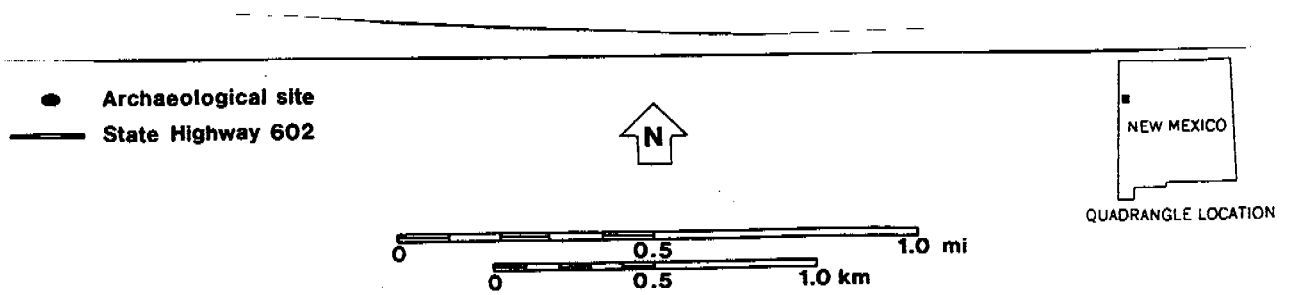


Figure 4.2. Known Cultural Resources Within the Project Area, Northern Portion.

In addition, eleven other projects have been conducted in or within 1 km (0.62 mi) of the present project area. These projects range in scope from linear surveys to test excavations. All of these projects are listed in Table 4.4, along with the author of the report if available, and their locations are shown in Figures 4.3 and 4.4.

Of these 11 projects, a few are particularly important for the present study. Davis and Windes (1975) surveyed 13.7 km (8.5 mi) along State Highway 602 from its intersection with State Highway 53 to the northern boundary of the Zuni Indian Reservation. Seven sites were located during this survey. The importance of the survey lies not in how many sites were located, but the manner in which the project began. The survey was conducted at the bequest of Stewart Peckham, then State Archaeologist for New Mexico. Peckham feared future road improvements would endanger cultural resources along State Highway 602, and requested a survey be conducted. This began a series of projects along the highway that have continued to the present project.

The Bureau of Indian Affairs has conducted several small-scale surveys in the vicinity of the project area. These surveys have been conducted for rock sources for brush and rock dams within Y Unit Draw (Harrill 1983), gabion

installation along headward cutting and eroding drainages of Y Unit Draw (McKenna 1992), and range fencing (McKenna 1995). None of these projects recorded sites within the right-of-way of State Highway 602.

Extensive linear surveys have been conducted along State Highway 602. Holmes (1980) carried out a 111-km-long (69-mi-long) survey for a Universal Telephone buried cable. This cable now lies within many of the sites discussed in this report. Calavaza (1980) conducted a survey for the northern Zuni Indian Reservation boundary. Portions of this survey cross State Highway 602 (at the Zuni/Navajo boundary).

Gleichman (1984) reported on test excavations at three sites along State Highway 602. One of these sites, LA 49838 (NM:12:X2:16), was included in the data recovery activities reported here. Gleichman's test excavations revealed a high density of artifacts within a darkly stained midden. The site likely functioned as a habitation during the late Pueblo II to early Pueblo III periods, although any architecture associated with the site has been destroyed by road construction. Our investigations (Zunie et al., Chapter 19) arrive at the same conclusions; however, we also identified a buried Basketmaker II component.

Table 4.4. Previous Projects Conducted In or Within 1 km of the Current Project Area.

Project Number	Type of Project	Resource(s) in 602 R-0-W	Report Reference	Comments
NZ-914-75	Survey along State Highway 602	Yes	Davis and Windes 1975	-
NZ-905-82	Seed plot survey	No	Harrill 1982	-
NZ-907-82	Survey for rock sources	No	Harrill 1983	6 Cibola White Ware observed
NZ-904-92	Survey for gabion installation	No	McKenna 1992	No sites recorded
NZ-901-95	Survey for range fencing	No	McKenna 1995	2 sites recorded
ZAP-028-79	Survey for buried cable	Yes	Holmes 1980	28 sites recorded
ZAP-006-80	Northern boundary fence	No	Calavaza 1980	6 sites recorded
ZAP-014-81	Disturbed burial	Yes	Anyon 1981	Site NM:12:Y2:313
ZAP-008-83	Testing	Yes	Gleichman 1984	Activities included testing at site LA 49838
ZAP-012-84	Survey of three billboard site locations	No	Banteah 1984	No sites recorded
ZAP-031-87	Water rights survey	Not available	Not available	In litigation

An extensive study of water control features in the Zuni drainage was conducted by Rhode (ZAP-031-87). This study was conducted for purposes of establishing water rights. Portions of this project were conducted within the Y Unit Draw drainage. Unfortunately, none of these data are available to the public, as water rights issues are still in litigation.

PREVIOUS RESEARCH IN THE NUTRIA DRAINAGE

Y Unit Draw enters the Nutria River south of the project area. Numerous archaeological projects have been conducted within the Nutria drainage over several decades. Most of these, again, have been conducted for cultural resource management purposes by either the Pueblo of Zuni or other agencies, but other projects have been purely research-oriented in their objective. The most well-known of all of these projects was conducted in 1930 by Frank H. H. Roberts, Jr., of the Smithsonian Institution. Roberts (1932) directed excavations at Village of the Great Kivas (site LA 631), located at the confluence of Red Paint Canyon and the Nutria Valley.

Village of the Great Kivas is a moderate-size site comprising three surface structures (Houses A, B, and C) and two large great kivas. Architectural components at Village of the Great Kivas define the site as a Chaco-style great house. These components include, within House A, multiple stories (in the central portion of the house), enclosed kivas, and Type II Chaco-style masonry (following Judd's [1954] classification). Attached to the southern portion of House A is one of the great kivas (Great Kiva No. 1).

Great Kiva No. 1 was the only such structure excavated at the site; the other great kiva (Great Kiva No. 2) was simply mapped after the tops of its walls were exposed. Great Kiva No. 1 measured 15.5 m in diameter (upper bench measurement), and contained features such as subfloor vaults and support pillars that are typically seen in Chaco-style architecture. In fact, below the western subfloor vault was a stone-lined depression similar in its location to one

discovered in the great kiva at the Aztec Ruin (Roberts 1932:89). Interestingly, the support pillars are constructed in the very same manner in which the Aztec great kiva pillars were fashioned (alternating courses of rock and wooden poles). Clearly, occupation of Village of the Great Kivas spanned the Chaco Era, or late Pueblo II (AD 1050 to 1150).

Houses B and C at Village of the Great Kivas were much smaller than House A. House B comprised 20 rooms, while House C may contain six rooms (only one room in this structure was excavated). Both houses have associated middens, while neither contains pitstructures.

While most ruins of the late Pueblo II contain less than 10 rooms and one or two small kivas, it seems clear that Village of the Great Kivas played a significant role in community life of the area. The State Highway 602 project area is located less than 6 km (3.8 mi) away from this important site. One goal guiding the structure of our research at sites along State Highway 602 is to examine the relationships between small sites (such as those we investigated) and great houses such as Village of the Great Kivas.

The Yellowhouse survey is another well-known project that was partially conducted within the Nutria drainage. Hunter-Anderson (1978) directed an extensive survey (25.27 sq km or 9.76 sq mi) in the Pescado and Nutria drainages for a proposed dam project, locating over 300 sites. The survey takes its name from one of the more prominent archaeological sites in the survey area, Yellowhouse. This large ruin dates to the late Pueblo III, and comprises hundreds of rooms around formal plazas. Yellowhouse is near the confluence of the Nutria and Pescado Rivers.

The Yellowhouse survey covered a large portion of the valley floor of the Nutria. In portions where the survey was extended to overlooking ridges, numerous sites were located. Additionally, the survey recorded "large depressions," interpreted as great kivas. Although none of these were excavated, they do indicate formal integrative facilities were present during

the Pueblo II and III periods in the general area other than Village of the Great Kivas. The Yellowhouse survey recorded 97 Pueblo II sites and 122 Pueblo III sites.

Of note also is Kotyk's (1990) survey along 5.5 km (3.4 mi) of Zuni Route 7 (Z7), which travels parallel to the Nutria River from its intersection with State Highway 602. Kotyk recorded 10 sites along this portion of Z7. Eight of these sites are habitations or "temporary" habitations that date to the late Pueblo II to early Pueblo III (Kotyk 1990:28-29). The survey is important for the State Highway 602 project in that it provides additional data regarding late Pueblo II to early Pueblo III site locations, artifact assemblages, and architectural characteristics.

Kintigh's (1985) study of settlement and subsistence in late Zuni prehistory (post-AD 1250) encompassed portions of the Nutria drainage. He focused on residential aggregation and changing subsistence patterns that began in the late AD 1200s across the Zuni drainage. Kintigh provided synchronic syntheses of agricultural technology beginning with the late Pueblo III and continuing into the early colonial period. He then examined the "economic basis of settlement pattern changes" of late Zuni prehistory and early history (Kintigh 1985:102).

Although he did not address the Pueblo II in detail, Kintigh addressed very important issues regarding agricultural technology and strategies that are quite relevant for settlement and subsistence of this time period. Through comprehensive analyses of agricultural requirements for the Zuni area, along with modern climate and paleoclimatic data, Kintigh built an argument that cultivation of maize could not have been possible without some form of human manipulation. Assuming this is correct, water control features or techniques would have been required for agriculture in Y Unit Draw. These features or techniques may have involved "contour terraces, check dams, spring or river irrigation, and floodwater farming of arroyo bottoms and floodplains" (Kintigh 1985:102). Prior to the use of spring or river irrigation in the later periods, *akchin*, or floodwater, farming was

the most common technique of agricultural production. He noted that "with few exceptions, pueblos occupied during this period (the early Pueblo III) were situated in areas with extensive possibilities for fields created by check dams" (Kintigh 1985:103). Furthermore, he added that *akchin* farming is better suited to the eastern portion of the Zuni area, or the upper Zuni River drainage.

The State Highway 602 project complements Kintigh's study by closely examining settlement and subsistence from the Basketmaker II to the Pueblo II periods, placing his study in further context. *Akchin* techniques, check dams, and possible contour terraces were investigated during the State Highway 602 project. Settlement patterns and possible household landscapes appear to be focused on alluvial fans in Y Unit Draw and the Nutria valley (Kendrick and Hagopian 1998; Roberts 1932). This is likely the result of household economic pursuits that focused on *akchin* farming of the alluvial fans. Interestingly, Basketmaker II agriculture strategies may have included irrigation. Evidence found at one site (LA 48695, Chapter 13) suggests modification in the form of ditches at these localities. Irrigation canals found at site LA 48695 (Chapter 13) are the oldest yet found on the Colorado Plateau. These canals indicate that early agricultural strategies were as intensive as later strategies.

SUMMARY

This chapter has attempted to place the State Highway 602 project in perspective of previous research in the area. The State Highway 602 project is just one of numerous studies that have taken place on the Zuni Indian Reservation. In fact, many of the earliest archaeological projects in the American Southwest were conducted in the Zuni area. Pioneers of Southwestern archaeology such as Cushing, Fewkes, Bandelier, and Spier built the foundations of Zuni culture history. Once dominated by purely research-oriented projects, archaeological work today on the reservation consists mostly of cultural resource management projects, which may be driven by specific research designs.

Of particular relevance for the State Highway 602 project is Roberts' (1932) investigation of Village of the Great Kivas. This site is a well-known Chaco-style great-house located in the Nutria valley not far from Highway 602. Recent analyses (see Chapter 21) indicate that the Village of the Great Kivas was contemporaneous with many of the sites in Y Unit Draw. The site includes classic Chaco-style architecture similar to great-house complexes known throughout the Four Corners region. A major research focus of this project examines the relationships between the Pueblo II sites investigated in Y Unit Draw and Village of the Great Kivas.

Even though Pueblo II sites are more common across the reservation than any other type of site

(Varien 1990), most research conducted in the past two decades has tended to focus on the large ruins of late Zuni prehistory (post-AD 1250). The work conducted by ZCRE along State Highway 602 investigated 18 archaeological sites dating from the Late Archaic to the early Pueblo III periods. These investigations allow close examination of early settlement and subsistence in the Zuni area. As demonstrated by this discussion, few studies have had the opportunity to focus on these earlier periods within a single drainage system such as Y Unit Draw. In addition, although pre-Pueblo III sites have been excavated in the Upper Zuni River drainage (e.g., Roberts 1932; Varien 1987, 1990), no project has sampled the diversity of sites known in Y Unit Draw.

Chapter 5

RESEARCH DESIGN

INTRODUCTION

The research design guiding the archaeological investigations along State Highway 602 was originally presented in Kendrick et al. (1997). That research design was developed without the benefit of a testing phase for the 18 sites ZCRE investigated. As a consequence, discussion regarding the chronology and function of all the sites was based upon information gathered during the pedestrian survey (Abbott 1997). Research domains and issues presented, therefore, were purposefully general in nature. This chapter presents a more focused research design, within the basic structure of the original, that has guided the analysis of the data recovered.

From the beginning, the project has been in a unique position to examine the Pueblo II period (AD 900 to 1150) in the upper portions of the Zuni River drainage. Components of many of the project sites dating to the late Archaic and Basketmaker II periods, however, also allow the possibility of examining various research issues through time. The nature and extent of the Archaic and Basketmaker II occupations of Y Unit Draw were not known prior to our investigations. Indeed, the Basketmaker II period was a virtual unknown in this region previous to this project.

Virtually no information was available on the beginning of food production or early sedentism on the Zuni Indian Reservation prior to this project. We now have a body of data available from the late Archaic or Basketmaker II sites along State Highway 602 that allow these issues to be addressed in some detail. Variation in site type and location in Y Unit Draw, along with identification of architectural suites (both deep and shallow pitstructures), allow an examination of household economy during Basketmaker II.

Current knowledge of the archaeological record for the Zuni region is based on research that focused on the latter portion of the Pueblo III (AD 1150 to 1350) and subsequent periods. As mentioned earlier, Kintigh (1985) focused on the large, aggregated pueblos of the late AD 1200s to the Historic period (AD 1539 to present). Several large surveys have been conducted, however, that have recorded numerous Pueblo II sites in the Zuni region (e.g., Fowler 1980, Hunter-Anderson 1978). Unfortunately, these studies have not had the benefit of data obtained through excavation that could address more detailed questions.

Our investigations also address these later periods (Basketmaker III through Pueblo III), but in a different light. For example, recent Pueblo II and Pueblo III settlement models typically focus on Chaco-style great houses and their associated communities. Chaco-style great houses are defined primarily upon architectural traits and material composition, and traditionally have been termed "outliers" (Marshall et al. 1979; Powers et al. 1983) because of their distance from Chaco Canyon. Architectural traits that are normally found in great houses include multiple stories with enclosed and/or elevated kivas, core-veneer wall construction, Chaco-style masonry, and larger-than-average rooms with higher-than-average ceilings (Powers et al. 1983). Other architectural features and landscape elements are often associated with great houses, which together form great-house complexes. These other features include great kivas (circular subterranean structures having interior diameters greater than 10 m), linear swales (commonly termed roads), and earthen berms (or *nazhas*) that encircle portions of the great house complex. Chaco-style great houses are often associated with smaller, contemporaneous households.

Households and household economy are very important in understanding the broader great

house community. Households during the Pueblo II and early Pueblo III typically manifest themselves as unit pueblos (Prudden 1903), and comprise the basic building blocks of the community associated with the great house. Yet, rather than applying regional models to explain local phenomena, a perspective is taken in this report that focuses on the dynamics of household economic autonomy. Village of the Great Kivas, a well-known Chaco-style great house, is located less than 6 km (3.7 mi) east of the project area. A research issue of this project is to explore the relationships between the sites investigated within Y Unit Draw and the development of Village of the Great Kivas.

In order to examine these and other issues more closely with data recovered from various types of sites, a broad research design is needed. The research design presented here is a modification of the plan outlined by Kendrick et al. (1997), which was based on research designs by Sant (1990), Fletcher (1994), and Eck (1995). The structure is based upon the general research orientation currently being used by ZCRE in the Four Corners region of the American Southwest. This orientation is based on four research domains, each containing research questions and fundamental research issues that we feel are appropriate to a variety of archaeological investigations in the region. This research design also includes general research requirements essential for interpretation of data directly related to the research issues.

Presented below are the four research domains. Within each of these domains are research issues selected from current research interests in Southwest archaeology according to their relevance to the State Highway 602 project.

1. The research domain of environment and economy involves the relationships between people and the environment. Research issues for this phase of work focus primarily on mobility/sedentism, and land use.

2. The research domain of population and demography involves human populations and their characteristics, such as age-sex ratio, life expectancy, and temporal trends of growth, decline, and expansion. Research issues for this phase of work focus on local and regional population growth and abandonment.
3. The research domain of social organization involves intragroup relationships—the social, economic, political, and ideological mechanisms of both horizontal and hierarchical group formation and integration. Research issues for this phase of work focus on the formation of groups and communities at the local level.
4. The research domain of regional relationships involves intergroup relationships—the mechanisms of regional interaction that integrate individuals and groups into wider networks and delineate the nature and extent of regional systems. Research issues for this phase of work focus on cultural affiliation and boundaries, and processes within regional systems.

The following section provides an outline and brief summary of each research domain and key research issues within each.

ENVIRONMENT AND ECONOMY RESEARCH DOMAIN

As mentioned above, the research domain of environment and economy involves the relationships between people and their natural environment. The sites investigated span the period from the late Archaic to the early Pueblo III period. This long span of time allows an extensive examination of economic and environmental changes through time. We know that major changes in mobility/sedentism and land use occurred between the Basketmaker II and Pueblo III periods in the Zuni region. Of particular interest is how and when prehistoric economies in the region changed, and how those changes manifest in the archaeological record.

Two levels of economic analysis are now important to consider in greater detail, that of the household and that of the community. Households, distinct units separate from families, have been defined by Ashmore and Wilk (1988:6; cited in Lightfoot 1994:145-146) as "the group of people that shares in a maximum definable number of activities, including one or more of the following: production, consumption, pooling of resources, reproduction, coresidence, and shared ownership." Communities, as discussed further under the research domain of social organization, may be thought of as spatially defined loci of human activity that incorporate social reproduction, subsistence production, and self-identification (Kolb and Snead 1997:611). The concepts of household and community form the structure of this research.

The specific research issues in the environment and economy domain include mobility/sedentism and land use. The research issue of mobility/sedentism can also be addressed through an organizational perspective, which includes studies of occupation duration, site spatial structure, season(s) of occupation, site reuse and modes of abandonment. Land use may be investigated through studies of environmental location, site function, and diet and subsistence practices.

Mobility/Sedentism

Mobility/sedentism may be addressed through studies of two aspects of occupation duration (Lightfoot and Jewett 1984; Rafferty 1985): residential stability—the length of time spent in any one location; and use duration—the aggregate of time that one particular location is occupied. The issue of mobility/sedentism, as mentioned above, can also be addressed through studies of site spatial structure, seasonality, site reuse, and abandonment. The importance of examining this research issue is demonstrated by the wide range of site types that were investigated along State Highway 602. Many were small sites comprising artifact scatters, fieldhouses, and activity areas. Other sites, however, were more intensively occupied, comprising pitstructures and extensive middens.

Occupation Duration

Inferring occupation duration requires an estimation of residential stability (Lightfoot and Jewett 1984). For example, Gilman (1987) argued that pitstructure occupation should be related to a biseasonal pattern of mobility in which the pitstructures are occupied at least through the winter. Annual reoccupation of a site may create a disturbed and enriched area where weedy plants flourish, like members of the goosefoot family (Chenopodiaceae) (Smith 1987). A study of frequencies and distribution of annual plants in the archaeobotanical assemblage can provide information on occupation duration, and also on diet and subsistence practices (Fritz 1984; Smith 1987).

Rafferty (1985) suggested that increased sedentism is manifested in (1) increased labor investment in habitation construction, (2) changes in dwelling shape from circular to rectangular, (3) increasingly formalized storage facilities, (4) ceremonial or integrative structures, and (5) evidence of community planning.

Artifact diversity and density may indicate occupation duration (Lightfoot and Jewett 1984) when population size and artifact use-life are consistent (Schiffer 1975; Schlanger 1990). A higher diversity of artifacts is assumed to indicate a wider range of activities and longer residential stability. Similarly, the size and depth of the midden is expected to be greater at sites with longer duration.

Site Spatial Structure

Ethnoarchaeological studies (Arnold 1987; Binford 1978, 1983, 1987; Dodd 1989; Graham 1989; Killion 1987; O'Connell 1987; Yellen 1977) suggest that limited factors influence the distribution of activities at a site among both hunter-gatherers and agriculturalists. The organization of activities is affected by climate, topography, subsistence practices, intended length of occupation, the nature of the activity, the composition of the household, and the size and composition of the group (Graham 1989:259; O'Connell 1987). Therefore, observable relation-

ships exist between variables such as length and intensity of occupation, and the site's spatial structure.

Graham (1989) has suggested that at least three assemblage criteria can be used to distinguish different kinds of refuse areas: item size, item diversity, and material density. In addition, a range of postoccupational, noncultural processes can produce both patterned size distributions and spatial dispersion of materials. Therefore, a range of analytic techniques must be applied to archaeological data sets to evaluate rather than assume the causes of patterning.

Season(s) of Occupation

A variety of data classes can contribute to determining the specific seasons of the year that a location was occupied. As mentioned above, Gilman (1987) argued that the presence of pitstructures and formal storage facilities generally indicates a winter occupation. The location of hearths in relation to structures may indicate summer versus winter and year-round habitations (Dodd 1987; Lightfoot and Jewett 1984; Powell 1983). The presence of species available only at certain times of the year can indicate seasonal occupation (Stuart 1977). The age of immature specimens can also indicate seasons of use because the season of birth for many animals is limited to spring. The presence of seasonally available plants or plant parts, especially those that are used soon after processing and are not usually stored, may also help indicate the season of site occupation (Bohrer 1975; Reichardt and Nabhan 1980; Sebastian 1983).

Site Reuse

"Reuse" refers to how often a location was used (Stevenson 1982). Reuse may be long- or short-term and may involve a portion of a site or an entire site. Long-term reuse refers to occupation for long periods of time after long temporal breaks between occupations—for example, a multicomponent site with Archaic and Puebloan occupations. Absolute and relative

dating, stratigraphy, feature superimposition, and type-based seriation can provide data on patterns of long-term site reuse.

Information pertinent to short-term reuse includes secondary burial, fine-scale chronometrics, and evidence of renovation and remodeling. Renovation (multiple floors or remodeling of features) may occur while a site or facility is still in use.

Modes of Abandonment

"Modes of abandonment" refers to the rate of abandonment (Stevenson 1982), the distance moved (e.g., Schiffer 1972), whether abandonment was intentional (Graham 1989), and whether an intent to return to the site was present (Stevenson 1982).

Data regarding modes of abandonment are likely found in the condition of structures and in the content of floor and activity area assemblages. Such information includes whether structures were burned and how much construction materials have deteriorated. Information from floor assemblages should include type and abundance of de facto refuse (material abandoned in its activity loci), and the usability and portability of objects.

Studies of the processes of abandonment should also consider cultural and natural postabandonment processes (Schiffer 1987). The scale as well as mode of abandonment may affect postabandonment process. For example, if only a portion of a site is abandoned, de facto refuse may be scavenged (Cameron 1991) or, if only a portion of the population moves, structures may be reoccupied by the remaining population (Horne 1990). Natural processes of deposition and erosion affect patterning as well. These patterns of deposition and erosion can be examined in fill contexts.

Interpretation of abandonment involves artifact curation (Binford 1973, 1976, 1979) and the presence or absence of de facto refuse (Schiffer 1972, 1976, 1987). Availability of

resources, effort in production, and value will also affect whether objects are curated or left behind.

Rapid abandonment (Stevenson 1982) should leave the following indicators: abundant de facto refuse (Montgomery 1990; Reid 1973), an abundance of items that otherwise would have been curated, and little secondary refuse. The opposite patterning would be expected with slow abandonment.

Planned abandonment involves organized processes that are relatively slow in contrast to unplanned abandonment. Where abandonment is planned, usable objects are likely to be curated. If site reuse is not intended, structures or objects may be destroyed (Cameron 1990; Wilshusen 1986). As with rapid abandonment, abundant de facto refuse as well as items that would normally be curated would be present at sites where abandonment was not planned.

When the distance of a move is large, heavy or bulky objects, such as metates, are less likely to be curated than small, portable objects. When the distance is short, both small objects and large, heavy, bulky objects that are still usable are likely to be moved. Previously occupied structures may be dismantled and their construction materials reused (Nichols and Smiley 1984).

Material culture patterning is also affected by whether return to a site was anticipated. Caches of artifacts may indicate an intent to return, although the return was not realized. Sites that have been abandoned with no intent to return have little de facto refuse, and structures or objects left behind may be destroyed or dismantled.

Land Use

Variables in land use include environmental location (Berry 1982), which is assumed to be correlated with the potential of a site for resource use; site function (Camilli et al. 1989; Reid 1982a, 1982b); diet (Minnis 1985); and subsistence practices (Thomas 1973). Basic to this is an understanding of the natural resource landscape (Blanton 1985:116). Information needed to

understand the natural resource landscape of a region includes range of raw materials, location of raw materials, distribution, nature of the deposit, geologic context, accessibility, quality, quantity, extraction energy, and postextraction energy (such as heat treatment and transport costs). For lithic resources, size range, shape, cortex type, and ability to be shaped, among other variables, are also important factors to consider. Specific physical properties of clays relating to pot construction and firing behavior are also meaningful variables relating to clay quality on which information should be gathered (Rice 1987). Diet and subsistence practices are defined by resource use, and can provide additional information about patterns of production and consumption.

Environmental Location

In this framework, "environmental location" specifically refers to the characteristics of the natural environment and the concomitant potential of a location for resource use. The concept of a natural resource landscape necessarily overlaps into the concept of environmental location. The primary data for examining resource use include geomorphology, hydrology, elevation, slope, location relative to sources of water, vegetation, types of soils, and types of fauna.

Site Function

A major focus of examining patterns of land use concerns reconstructing the settlement system and how sites functioned within the system (Parsons 1972), which requires delineating the range of activities conducted. Site function can be evaluated across three related dimensions: habitation and nonhabitation sites, range of economic activities, and total range of activities.

The first level of identification of site function concerns whether or not the site was used for habitation. As discussed above, the range of habitation or residential use of a site can be quite varied. Activities at habitation sites are often described as generalized, while activities at nonhabitation sites are described as specialized

(e.g., Dean et al. 1985). This distinction does not indicate the type or range of activities taking place at a site, and may obscure variability (Binford 1982; Whittlesey and Reid 1982).

Economic activities are categorized as procurement, manufacturing, maintenance, processing, and use-related. Varying combinations of these types of activities may take place at a site. Available data can help determine what types of social, economic, domestic and/or ceremonial, subsistence or nonsubsistence activities occurred.

To assess site function both artifact assemblage and nonassemblage data are necessary. Artifact assemblage data include artifact class, type, and frequency and diversity of classes or types as they relate to artifact function (Reid 1982b). Nonassemblage data include spatial and architectural information such as presence or absence of structures, frequencies of hearths and other features, and site area.

Information on ceramics, flaked stone, ground stone, botanical remains, fauna, artifact diversity, and the relationships between these data are the most useful way to determine the kinds and range of activities conducted at sites (Whittlesey and Reid 1982).

Diet and Subsistence Practices

Data concerning subsistence practices and diet provide information on resource use as well as on patterns of production and consumption. Primary data come from botanical and faunal remains. Additional data may be gathered from studies of architecture and features, ceramics, flaked stone, and ground stone. Major concerns of subsistence studies are subsistence change, increasing diet breadth, and intensification, particularly increasing dependence on agriculture.

POPULATION AND DEMOGRAPHY RESEARCH DOMAIN

The research domain of population and demography examines human populations and

their characteristics, such as age-sex ratio, life expectancy, and temporal trends of growth, decline, and expansion. The research issues focus on local and regional population growth and abandonment. Many of the models regarding settlement and subsistence changes for the prehistoric Southwest require population information. Presently, the current ideas concerning demographic change in the Four Corners area suggest that Basketmaker II and Basketmaker III period sites consisted of pitstructure villages and associated hunting-gathering camps. The population was smaller than that of later periods (Kearns 1992; Powell 1983). Testing and data recovery excavations plus mapping and in-field artifact analysis at the sites along State Highway 602 provide a major contribution to the research issues under this domain. Specifically, the number of sites per period and the size and/or nature of these sites allow examination of trends in population growth or decline to be discerned in the archaeological record from the Basketmaker II to the Pueblo III periods. Population trends for growth and decline may be established for the project area on the basis of site-by-site study. These trends, then, can be compared to previous data bases such as that created during the Yellowhouse study (Hunter-Anderson 1978).

Population and Demography

Population growth refers to increases in total population size and density. Increases in population have been attributed to the presence of favorable environments (Euler et al. 1979; Graves et al. 1982; Gumerman 1988), increased sedentism and dependence on agriculture (Swedlund and Sessions 1976), and the social, economic, and political draw of elites in some communities (Lightfoot 1984). The mechanisms of these increases include immigration, aggregation, and biological reproduction.

Archaeologists have tried to interpret increases and decreases in site density in terms of population change through biological growth (Christensen 1990; Dean et al. 1985; Jett 1964; Swedlund and Sessions 1976), immigration

(Berry 1982), or mortality and emigration (Colton 1960; Davis 1965; Linton 1944). Recent interpretations consider these shifts in settlement patterns as due to changes in long-term regional land use (Nelson 1993), fluctuations between stable and resilient adaptations (Upham 1984), and short distance moves (Berry 1982; Gumerman 1988). Examination of small habitation and limited-activity sites, such as those along State Highway 602, have become important sources of data for interpreting alternate uses of local and regional areas (Nelson 1993).

Abandonment indicates the absence or near absence of habitation evidence of any duration in a previously occupied location (Fish et al. 1990). The causes of local and regional abandonments are inferred to be catastrophic events (Colton 1960; Linton 1944; Parsons 1939). Catastrophic events are prolonged systemic processes relating to fluctuation in environmental conditions (Cordell 1975; Gumerman 1988), population pressure (Zubrow 1975), and increased internal conflict (Titiev 1944). Mechanisms of abandonment include emigration, population dispersion, and death. Van West (1990) has suggested the abandonment of the Mesa Verde region was not entirely a result of prolonged drought in the late AD 1200s. Her study demonstrated differential access to productive and predictable agricultural lands was also a likely factor in abandonment.

Small sites in the Zuni area, such as those in Y Unit Draw, have not been systematically studied for evidence of such population dynamics. The sites investigated will provide a first approximation.

Local and Regional Population Growth and Abandonment

Varién (1987:10) stated that the number of sites in the Zuni region increases after AD 700. He added that Pueblo II period sites are the most commonly recorded type in the Zuni region. Are apparent changes in site frequencies representative of population change and/or shifts in land use? What is the relationship between

population and environment and socioeconomic phenomena, such as cooperation, competition, and conflict?

To address these questions, accurate estimates of local area population size, density, and changes through time are needed. A prerequisite for making these estimates is an understanding of the settlement system and patterns of mobility/sedentism, as discussed above. Second, it is desirable to determine the source mechanisms of demographic variability (i.e., fertility and mortality rates, rates of immigration and emigration). Third, it is necessary to identify the scale and processes of abandonment in the area.

Population Size, Growth, and Decline

To identify population size and patterns, accurate population estimates are needed at the site level to calculate local area population levels (Hassan 1978). Estimates of population size at a site are usually based on one or more attributes. These attributes include (1) dwelling space, (2) number of dwellings per site, (3) number of rooms per dwelling or site, (4) number of persons per room, (5) number of hearths, (6) site area, (7) volume of site deposits, and (8) amount and type of artifacts or food remains (Castleberry 1974; Cook 1972; Hassan 1978; Narroll 1962). Before population can be estimated, site contemporaneity, occupational duration of the site, occupational history, site function, and site size (Hassan 1978; Plog 1975) must be known and must be consistent. These data are difficult to recover, particularly since excavations were restricted to areas within the right-of-way and area of effect on each site.

Mechanisms of Demographic Variability

Biological reproduction or migration between areas could account for growth and decline within an area. Age (and possibly sex) profiles of human remains can be first compared with life tables of stable populations (Weiss 1973). Deviations between the two can be interpreted in terms of biological growth and sedentism (Binford and Chasko 1976; Swedlund and Sessions 1976). It

should also be noted that variation and change in age distributions among human remains might be due to factors such as stresses on health, rather than simply showing population growth. To evaluate the arguments presented above, data on age and sex of the human remains need to be collected. A statistically significant sample of human remains was not recovered, however, during the State Highway 602 project to confidently address demographic variation.

Processes of Abandonment

To consider the processes of abandonment, studies that identify the areal scale and modes of abandonment are needed. The areal scale of abandonment varies from intrasite (structure or activity area) to site, local area, and region (Cameron 1991). Specific studies and data requirements for identifying the modes of intrasite and site abandonment are discussed under the section on mobility/sedentism and land use. Once modes of intrasite and site abandonment have been examined and identified, it is possible to consider processes of abandonment in the local area as a whole.

SOCIAL ORGANIZATION RESEARCH DOMAIN

Archaeologists do not excavate social organization. However, data recovered from these investigations, along with settlement pattern information, allow inferences to be made regarding various levels of social organization. The social organization research domain pertains to intragroup relationships—the social, economical, political, and ideological mechanisms of both horizontal and hierarchical group formation and integration.

Current research issues focus on community development. That is, what mechanisms play a role in community development and how can this be manifested in the archaeological record? As previously mentioned, a community may be thought of as a minimal spatially defined locus of human activity that incorporates social reproduction, subsistence production, and self-identification (Kolb and Snead 1997:611).

The first step in addressing this research domain is to identify three key strategies: (1) differential labor investments (which may be examined by evaluating the labor needed for various types of architecture, cooperative agricultural projects, or religious monument construction, e.g., a great kiva; Kolb and Snead 1997); (2) spatial analysis of cultural resources; and (3) boundary maintenance (e.g., investment of distinctive styles, use of socially integrating structures, and patterns of exchange; Kolb and Snead 1997). These markers may then be used to propose relationships between the sites within the project area. We can then detect patterns of socioeconomic integration within Y Unit Draw. This patterning will then be compared or contrasted with other patterns noted in the Southwest and will provide a predictive model for other locales within the Zuni region.

Social Organization

Studies of social organization include examinations of intragroup interaction, and the mechanisms of group formation, integration, and differentiation. The delineation of the group (i.e., household, community, etc.) defines the scale of interaction and integration. Excavations at the sites along State Highway 602 have yielded data that will be compared to surrounding areas. Such comparisons provide an opportunity to address the research issues under this domain.

Community Development

Community development pertains to interactions between households at the local level; the formation of local social organizations above the level of the household; and the social, economic, political, and ideological mechanisms that integrate and organize groups at the local level. There is growing recognition that dispersed groups of sites and multiple settlements, not just large nucleated pueblos, form communities (Adler 1990, 1996; Kintigh 1990; Lekson 1990; Lightfoot 1978). Attention has turned to the causes of community development and their organizational structure and complexity.

The development of settlement aggregates and communities has been related to highly productive environments (Graves et al. 1982), the development of organizational complexity and community integration by political elites (Lightfoot 1984; Lightfoot and Feinman 1982; Upham 1982), and a conflict minimization strategy triggered by scalar stress resulting from population growth (Orcutt et al. 1990).

To examine community development, we need to identify patterns of intersite integration within a local area (such as Y Unit Draw), and the structure and complexity of community organization. Community integration may vary with the spatial size of the community, the intensity of links between units in the community, and the kinds of economic, social, political and ideological mechanisms integrating the community. The structure and complexity of community organization may vary horizontally (households and residence groups) and vertically (ranked divisions made within the community; Flannery 1972; McGuire 1983).

To address the issue of community development, data dealing with intersite integration, horizontal differentiation, vertical differentiation and inequality, and demographic and environmental variables are needed. Patterns of integration among sites can be found through studies of spatial patterning of settlements, distribution of stylistic attributes, distribution of features, and distribution of artifacts. Horizontal and vertical differentiation can be addressed through spatial and architectural information that provides insights on patterns of production, distribution, and use of goods and resources. Incorporating information obtained from Village of the Great Kivas, the largest late Pueblo II site in the area, is important to address these issues.

Patterns of Intersite Integration

Patterns of integration among sites can be identified through analysis of the spatial patterning of settlements, distributions of stylistic attributes, and distributional patterns of features and artifacts related to manufacture, distribution, and use. Interpretations of spatial patterning of

settlements are based on the assumption that the distance between contemporaneous sites is a determinant of the intensity of interaction between those sites (Earle 1976; Pinder et al. 1979). Clustering is interpreted as showing high interaction, while greater spatial distance shows low interaction. Spatial voids between clusters are interpreted as boundaries or buffer zones between communities (Adler 1990; Johnson 1977). Before interpretations of community integration are made, it is important to also consider other lines of evidence. For instance, clustering of sites may be associated with other factors, such as patchy environments or concentrations of important resources.

To conduct settlement pattern analyses, data on the relative locations of sites are needed. The area over which patterning occurs provides an indication of the scale of the interactions and of the potential community or communities. The distance between sites suggests the degree of integration. Sites that are being compared must be contemporaneous. Habitation versus nonhabitation and seasonal versus year-round sites must be distinguished (Graves and Reid 1984; Lightfoot and Most 1989).

Analyses of the distribution of stylistic attributes can also be used to evaluate evidence of community development and the scale, degree, and nature of social integration among sites. Arguments similar to those discussed below in the cultural affiliation and boundaries issue, which relate stylistic patterns with patterns of interaction and communication, apply to this issue as well. The distribution of stylistic attributes can be plotted and a pattern of design similarity examined for breaks in continuity. For this issue, the two primary classes of material culture from which stylistic data should be collected are ceramics and architecture.

The presence and location of structures or features such as great kivas (Adler 1989) or formal burial areas (Chapman 1981) can show the scale, degree, and nature of intersite integration. Data needed for this study are primarily architectural and spatial.

Horizontal Organization

Horizontal structure pertains to the nature and extent of internal segmentation and integration within the community. Spatial and architectural data can be used to infer internal divisions and groupings within the community (e.g., Dean 1969; McGuire 1983; Rohn 1971). Determination of the degree of functional interdependence among units can help define groupings such as households or household clusters within the community. As with intersite integration, the aim is to identify clusters of interaction based on patterns of production, distribution, and use of goods and resources.

Vertical Organization

Differential access to space and to goods and resources, as well as differential energy expenditure on habitations or burials (Lightfoot and Feinman 1982; Plog and Upham 1983), may suggest the nature and extent of vertical differentiation and inequality within communities.

Spatial and architectural information can be used to consider differential access to space and energy expenditure. Site size differences, supported by functional differences, are often used to infer settlement hierarchies (Lightfoot 1984). Again, habitation and nonhabitation sites and seasonally occupied sites must be differentiated before propositions about settlement hierarchies are made (Lightfoot and Most 1989). This research issue is examined by comparing the overall assemblage from the Village of the Great Kivas to the assemblages from the sites within the project area.

REGIONAL RELATIONSHIPS RESEARCH DOMAIN

Regional relationships concern intergroup relationships—the mechanisms of regional interaction and communication that integrate individuals and groups into wider networks and delineate the nature and extent of regional systems. The research issues within this domain include cultural affiliation and boundaries, and the processes on the peripheries of regional systems.

Added to this from the original research design are current great-house models that are directly related to better understanding Pueblo II communities in the Zuni region and their place in Southwest prehistory.

Several investigations over the past two decades have focused on the development of Chaco-style great houses, such as Village of the Great Kivas, and the relationship of these sites to regional centers (e.g., Fowler and Stein 1992; Kantner 1996; Kendrick and Judge 1998; Marshall et al. 1979; Powers et al. 1983; Vivian 1990). These investigations examine the relationship between Pueblo II sites (or households) and the larger great houses. The relationship of these communities to the Chacoan core is also explored.

Several concerns are critical within this research domain. Most important is the charting of site function and variability through time, or at least from Basketmaker to early Pueblo III times. Evidence for dramatic population growth or lack of it may be used to address previously proposed models for settlement in the Zuni area (e.g., Leonard and Reed 1993) and to test specific great-house models (e.g., Vivian 1990). Specifically, if no dramatic rise in site density during the Pueblo II period is noted, it would force us to rethink the possibility of significant migration into the Zuni area in the Chacoan period. In other words, how much was the Zuni area actually affected by interaction with other areas, or was much of the development *in situ*?

Regional Relationships

Studies on regional relationships include examination of intergroup relationships and the mechanisms of regional interaction and communication that tie individuals and groups into wider networks and delineate the nature and extent of regional systems. The issues that relate primarily to this research domain are cultural affiliation and boundaries, and processes at the peripheries of regional systems. The broad patterns of Basketmaker to Pueblo III architecture and artifact assemblage variability

can be used to address the issues under this domain for the State Highway 602 project area.

Cultural Affiliation and Boundaries

Historically, cultural traditions and areas were defined by sets of shared traits (Haury 1936; Kidder 1927, 1936; Wissler 1923), based on the idea that cultural areas represented different cultural groups and that shifts in boundaries reflected the mass movements of people. When different sets of traits were found at one location it was inferred that different culture groups were living side-by-side (Wasley 1960). Currently, broad patterns of spatial and temporal similarities and differences are interpreted as corresponding to patterns of adaptation, interaction, and ethnicity (Braun and Plog 1982; Plog 1984; Wobst 1977).

The issues of cultural affiliation and boundaries are concerned with the identification, development, and material correlates of social territories, and what territories and their related boundaries signify culturally. Do material culture similarities and differences show environmental adaptations, group integration and/or differentiation, or the intensity of interaction between groups, in which apparent boundaries are the result of a lack of interaction? These propositions are not mutually exclusive and different explanations may characterize different areas or times.

To evaluate these propositions, data dealing with interaction and communication are needed: (1) stylistic variation, (2) exchange, and (3) human physical variation or biological distance. Data about stylistic variability and exchange provide complementary information on social interaction and information exchange (Braun and Plog 1982). Technological organization links material culture variability and environmental adaptation and provides information on "styles" of manufacture and use as well. Human physical variation can be used to show biological proximity of different populations (Mackey 1980). Data obtained from human remains, however, are not available for these kinds of analyses.

Style

"Style" can be defined as patterned variation in the communicational aspects of form (DeBoer 1990; Wiessner 1983). The degree of stylistic similarity among social groups has been directly related to the amount of interaction between those groups (Deetz 1965; Leone 1968; Tuggle 1970). Style may also function actively to integrate and differentiate social groups, expressing information concerning social identity and marking social boundaries (Conkey 1978; Wobst 1977).

Exchange

Unlike stylistic data, evidence of exchange, the presence of materials or resources from distant sources, is a more direct indication of interaction between groups. It is assumed that nonlocal materials result from exchanges between groups rather than from direct procurement. This assumption increases in validity as populations increase and/or become more sedentary and/or territorial.

The type and amount of exchange reflect boundary dynamics. Proportions of exchange goods can be plotted across space and their patterning examined (Hodder 1974, 1979; Renfrew et al. 1968). A decrease in importance of an item has been interpreted as the location of a boundary. Spatial changes in size through time can also indicate shifts in boundary dynamics.

Processes on the Peripheries of Regional Systems

The development of regional systems has recently become a major focus of research in the Southwest (Braun and Plog 1982; Crown and Judge 1991; Hantman 1983, 1984; Plog 1983, 1984). The three regional systems most commonly identified include Casas Grandes to the south (DiPeso 1974; Minnis 1989), Chaco to the northeast (Judge 1989), and Salado/Hohokam (Wilcox 1979) to the southwest. These systems developed during the Pueblo II period or later. The archaeological resources in the project area date to these periods as well. How do the data

from the project area show relationships to processes that were ongoing in the Chaco area? For example, were these processes interrelated or were there independent developments within the Zuni region during the Pueblo II period? In the post-Chacoan Pueblo world did Zuni become a "labor sink" that attracted populations from other regions of the Southwest (Leonard and Reed 1993:655)?

Great House Models

Chaco-style great houses become the dominant cultural feature on the landscape of the Four Corners region during the Pueblo II period. The upper Zuni River drainage is no exception. Village of the Great Kivas has been well-known to Southwest archaeologists since the early 1930s (Roberts 1932). As mentioned above, Village of the Great Kivas is located less than 6 km (3.8 mi) east of the project area. Recent ceramic analysis of sites within Y Unit Draw by Kendrick and Hagopian (1998) indicate the presence of Chaco Black-on-white, demonstrating interaction at the household level with the larger Chaco regional system (Judge 1991). Interestingly, and as discussed in more detail below (Chapter 21), *no* Chaco Black-on-white is present in the ceramic assemblage from Village of the Great Kivas.

Numerous models have been developed over the past several decades that attempt to explain the phenomenon of Chaco-style great houses outside of Chaco Canyon. These models can be divided into two basic categories: local development and colonization (Kendrick and Judge 1996; Tainter and Gillio 1980).

All of the colonization models focus on the nonlocal and intrusive character of the Chaco-style architecture and material goods within great houses and their associated communities. Colonization models propose the construction and use of great-house complexes as the result of persons or groups of persons from the Chaco core. These persons are variously regarded as emigrants (Irwin-Williams 1972; Vivian 1990), missionaries (Bradley 1993), priests (Eddy 1977; Warburton and Graves 1992), and even armies (Wilcox 1993).

The second category explains great houses as local developments. These models emphasize local processes, but within the regional context of the Pueblo II. These models may feature local elites (Powers 1984; Powers et al. 1983), political competition (Kantner 1996; Sebastian 1992), and the communal integrative and public aspects of great-house complexes (Adler and Varien 1993; Fowler and Stein 1992; Lekson 1991; Marshall et al. 1979; Mobley-Tanaka 1993; Toll 1985).

The perspective taken here focuses on the household, and household economic production, to examine the development of great houses and great house communities. By examining control of economic production, whether that control is vested in the household or community, and by exploring access to critical resources (such as water or productive and predictable agricultural land), more sophisticated modeling can be accomplished for great house and community development.

FUNDAMENTAL RESEARCH REQUIREMENTS

In order to examine the research domains described above, four areas of fundamental research requirements must be met: (1) archaeological description, (2) chronology, (3) past environmental conditions, and (4) processes of formation of the archaeological record.

Archaeological description refers to the documentation of observations on relevant archaeological phenomena. Determination of chronology identifies the temporal sequences of events. Together, descriptive and chronological information is used to construct cultural historical frameworks and form a basis for interpretations within a processual framework.

Delineation of past environmental conditions is necessary for developing and testing explanatory models linking cultural processes with environmental conditions and/or change. Inferring past environments requires combining information on the modern environment with paleoenvironmental reconstruction. Paleoenvironmental reconstruction requires data

on past climates, vegetation, wildlife, and depositional and erosional processes.

Meaningful interpretation of archaeological data requires understanding both the cultural and environmental processes that created the archaeological record (Schiffer 1987). Specific data requirements for each of these basic research requirements are discussed in further detail below.

Archaeological Description and Material Analysis Requirements

Consistent and thorough descriptive information is mandatory for each site, feature, and artifact class. This descriptive information includes (1) description of field and analytical methods used, (2) description of findings, and (3) classificatory information on all archaeological material classes including spatial relationships; architecture and features; additive technologies (ceramics, etc.); reductive technologies (flaked stone, etc.); botanical, faunal, and human remains; chronometrics; and historic documentation. These categories represent standard information collected in this region of the Southwest and by ZCRE, regardless of research issues.

Basic descriptive information was collected for each major artifact class during investigations at each site. The list below provides a set of basic descriptive data requirements that can be applied to all architectural/feature and artifact classes.

A. Architecture and Features

1. Measurements (length, width, height, thickness)
2. Morphology
3. Qualitative data (details of construction, raw material type)
4. Type (where appropriate)
5. Function (where definitive)
6. Evidence for remodeling/reuse

B. Additive Technologies (ceramics, etc.)

1. Type
2. Technological attributes (paste, temper, paint)
3. Clay source

4. Form (vessel shape, vessel portion)
5. Measurements (dimensions, thickness, weight)
6. Count (by provenience unit)

C. Reductive Technologies (flaked stone and ground stone, for example)

1. Primary artifact type (flake, core, tool)
2. Secondary artifact type (flake type and metate type, for example)
3. Raw material type
4. Raw material source
5. Measurements (length, width, thickness, weight)
6. Count (by provenience unit)

D. Botanical Remains

1. Taxon
2. Plant part
3. MNI (minimum number of individuals)
4. Measurements (length, width, and thickness for domesticates; weight for wood)
5. Pollen concentration and intensive systematic microscopy (Dean 1994)
6. Maize analysis (Bird 1990)

E. Faunal Remains

1. Taxon
2. Skeletal element(s)
3. MNI (minimum number of individuals)
4. MNS (minimum number of species)
5. NISP (number of individual specimens present)
4. Weight

F. Burial (CONFIDENTIAL)

1. Human remains (in-field recording)
 - a. Age
 - b. Sex
 - c. Skeletal elements present
 - d. MNI (minimum number of individuals)
 - e. Skeletal morphological attributes relating to health status, nutrition, diet, trauma, and affinity
2. Type of interment (primary or secondary, for example)
3. Location (pit or midden, for example)

4. Type and location of associated grave goods
5. Measurements

G. Historical Artifacts

1. Object type (can or bottle, for example)
2. Material type (glass or metal, for example)
3. Date
4. Dimensions

H. Geomorphology/Stratigraphy

1. Profile
2. Sediment characteristics
3. Inclusions
4. Horizontal and vertical location

A major focus of the State Highway 602 project is an examination of patterns of land use, settlement strategy, and community development through time. A key element of analysis is how sites functioned within the system. Interpreting site function requires delineating the types and the range of types of activities conducted at sites and within sites.

An additional consideration has to do with interpreting the archaeological patterning to try to determine how sites function in the settlement system. Studies of technological organization follow material culture from its origin to ultimate deposition in the archaeological record. At the same time, research efforts have been made to understand the formation processes, both cultural and physical, that affect patterning in material culture (discussed further in the section on formation processes below). Simple relationships between material culture patterns and site function are rare. Therefore, interpretation of material culture patterns associated with site function should incorporate the results of such studies.

To assess the range of variation in site function, studies involving both artifact assemblages and nonassemblage data are required. Artifact assemblage data include artifact class, artifact type, and frequency and diversity of classes or types as they relate to artifact function (Reid 1982a). Artifact assemblages were analyzed by specialists for those sites that were excavated

(Section III, Analytical Contributions). For the nonexcavated sites, in-field analysis was conducted on flaked and ground stone and ceramic assemblages. "Nonassemblage data" refers to spatial and architectural information including presence or absence of masonry architecture, numbers of rooms at a site, and site area. All sites within the currently defined State Highway 602 project area have been mapped for architectural detail and features.

Architectural/Spatial Studies

The presence or absence of masonry architecture has been frequently used to distinguish between habitation and nonhabitation sites (Dean et al. 1985). In addition, the number of structures or rooms within a settlement has been used to distinguish differing functions of sites with masonry architecture, creating a typology of sites functioning as villages, farmsteads, and fieldhouses (e.g., Hogan 1985). In situations without clear evidence of masonry architecture, site area has been used to identify habitation sites, with the larger sites assumed to be habitations and the smaller sites limited-activity sites (Whalen 1984).

Spatial and architectural evidence may be useful for distinguishing habitation from nonhabitation sites. However, additional information is needed to determine the specific functions of the structures or rooms, and similarly, extramural features. The presence and identification of function of internal features such as hearths, storage cists, meal bins, or *sipapus* can aid in determination of structure or room function. Similar information can aid in the interpretation of extramural feature function. Data on feature form, construction, location, and nature of fill need to be collected and examined to aid in these determinations.

Analyses of artifact assemblages from sites are the most useful ways to determine the kinds of activities and range of activities conducted at sites (e.g., Whittlesey and Reid 1982). Data on all classes of artifacts as well as the relationships between these data can inform on site function.

Ceramics

Several attributes of ceramics provide data that can be used to interpret site function. One must be able to provide plausible inferences of vessel function, or at least identify functional differences, before secure inferences about activities at sites can be made. Vessel function is reflected in several ways, including vessel form (bowl vs. jar) and ware color (slipped/painted versus unslipped/unpainted wares), vessel volume, and use-wear (Blinman 1988).

It is assumed that variability in vessel form can provide a strong indication of the activities that took place at a site. Ratios of bowls to jars and painted to unpainted (utility) ware have been used in this regard (Plog 1980; Reid 1982a; Sebastian 1983). Unpainted and painted bowls are assumed to have been used for serving or ceremonial functions, while unpainted jars are assumed to have been used for cooking. Painted jars are often interpreted as having been used for storage.

Several site function typologies have been developed, using these functional interpretations of ceramics. Plog (1980) proposed that permanent habitation sites are expected to have higher proportions of storage jars and lower proportions of cooking and serving vessels. Reid (1982b) found that as settlement function became increasingly specialized, the proportion of jars increased. This is contrary to Plog's expectations, assuming that more generalized activities occurred at habitation sites. Similarly, Sebastian (1983) argued that bowl-dominant assemblages indicate habitation sites, while jar-dominant assemblages characterize fieldhouse sites.

In relation to such studies, it should be remembered that numerous other variables besides site function can influence the proportions of sherds left from different functional ceramic classes on a site. For example, differential use-life for variant functional classes may be influenced by resistance to breakage caused by use of different clays, tempers, production methods, etc. Also, levels of exchange may influence ratios, especially for more easily transported forms such

as bowls. Such factors as these must be considered when designing and interpreting research into site function by examination of ceramic functional classes.

Using survey data from the Puebloan period sites just south of the Zuni area, Angstadt-Leto and Kintigh (1993) found changes through time in the ratios of slipped and unslipped jars and bowls. During their late ceramic period (AD 1100 to 1275), slipped jars are much more common at sites with architecture than at artifact scatters. If slipped jars were used primarily for storage, then storage is much more common at sites with architecture, supporting their interpretation as focused habitation sites. During their early ceramic period (AD 850 to 1000) the difference in percentages of slipped jars between sites with architecture and artifact scatters is relatively small. The median proportion of jars is higher in the middle period (AD 1000 to 1100) than in the early period, however, suggesting that the middle period sites are more permanent than the early sites. Slipped bowls, while much less common overall, occur more frequently in sites with architecture than those without during the late period. If slipped bowls were used in food preparation and service, then their higher percentages also support an interpretation of architectural sites as focused habitations during the late ceramic period.

Flaked Stone

Flaked stone and other reductive artifact types are important for understanding site function within the State Highway 602 project area, because information on different stages of the life cycle of the artifacts is commonly present in the archaeological record. Identification of artifact type and the range of types present is necessary for interpretations of site function. Artifact type identification can be made using a combination of morphological, technological, and functional analyses.

For studies of site function, the full range of flaked stone debris must be recovered. Analyses of debitage may be most relevant to discussion of

methods and locations of manufacture as well as the tools manufactured, because debitage is generally discarded near the location of production. The tools themselves are often used and discarded elsewhere and thus may not be reliably representative of manufacture in flaked stone assemblages. Variability in tool use-lives may also affect assemblage characteristics. Although different classes of flaked stone debitage are important for determining different stages of manufacture, analysis of microdebitage may provide the most information on tool production, maintenance, and use activities.

Ground Stone

The amount, type, and distribution of ground stone artifacts also have implications for interpreting site function. Numerous ground stone artifacts were noted during the survey of the State Highway 602 project area (Abbott 1997). Ground stone implements, such as manos and metates, are generally associated with activities related to plant processing (Lancaster 1986), but have other uses as well. With regard to plant processing, the type, shape, and amount of ground stone present on a site have implications for the activities conducted at sites (Reid 1982a) as well as activity intensity (Hard 1990). Use-wear and residue analyses may be useful in determining the types of activities in which ground stone implements were involved (Adams 1988). Such studies may be able to distinguish between activities associated with plant processing, sherd grinding, pigment grinding, and hide softening.

Faunal Data

Faunal data may also be used to examine the subsistence-related activities at sites. The types of animal parts represented within the faunal assemblages of sites or portions of sites can help distinguish locations where butchering and meat processing took place as opposed to locations of consumption. Locations where butchering and processing took place probably contain only the portions of the animal that were not utilized, while faunal remains where consumption took place will include those parts that were utilized.

Cooking activities may be identified by the presence of burned bones.

Botanical Data

Botanical remains aid interpretations of site function. In studies of crop production, processing, and consumption, activities related to processing most often take place in habitation areas. Crop processing encompasses activities such as preparation, storage, cooking, and the use and deposition of edible and inedible plant parts. The collection and analysis of flotation, pollen, and phytolith samples from specific contexts can be used to selectively examine the intensity of various activities related to processing.

Artifact Assemblage Studies

In addition to studies of artifact assemblage type and composition, artifact assemblage diversity may also inform on site function (Leonard and Jones 1989; Reid 1982a, 1982b). It is assumed that assemblage diversity is related to range of activities conducted. Highly diverse assemblages are associated with a wide range of activities, while less diverse assemblages are associated with specialized activities. Assemblage composition and therefore diversity, however, depend on artifact use-lives, replacement/deposition rates, and occupation duration (Schiffer 1975; Schlanger 1990). Thus, Schlanger (1990:111) cautions that "ratios involving artifacts of different deposition rates ... appear to be yielding information more directly relevant to the length of occupation than site function."

Chronological Requirements

Dating of archaeological resources is fundamental to all the research issues described above. Precise dating will usually require a combination of absolute and relative dating techniques.

One of the most important chronological issues is dating aceramic sites and otherwise undated artifact scatters. Placement of these sites into

temporal periods allows examination of the full range of research issues. For the Puebloan period, chronological data will improve the developmental framework and history of occupation, refine ceramic and other type-based chronologies, and help in detecting contemporaneity among sites.

The seriation of ceramic types or attributes, projectile point typologies, architectural types, or other chronologically sensitive material may be useful for dating. Dates derived from relative techniques can be refined and calibrated using chronometric techniques (Plog and Hantman 1986).

Environmental Study Requirements

Knowledge of past environmental conditions is crucial to understanding the adaptive patterns of prehistoric and historic populations in the project area. Obtaining this knowledge requires relating an understanding of the modern environment to clues about past conditions to reconstruct the paleoenvironment.

Interpreting past environmental conditions requires the study of (1) geology and physiography, (2) geomorphology and hydrology, (3) soils, (4) vegetation, (5) fauna, and (6) climate.

Geology and Physiography

Raw material types in the region of the project area should be mapped if possible. These studies require map analysis and field reconnaissance by the lithic artifact and ceramic specialists. The results of such studies can be used to consider the resource potential of the area and actual resource use. Regarding clay sources, significant work has been conducted by Mills (1995) in the Zuni region.

Geomorphology and Hydrology

Geomorphological studies are used to investigate erosional and depositional patterns in the project area and how they changed through

time. These studies also reveal information on the integrity of, and potential for, buried archaeological deposits. Geomorphological studies include studies of microstratigraphic sequences to identify cultural and natural depositional processes at archaeological sites. Information on potential water sources is also needed. Data can be collected on streamflow for major ephemeral streams to find out the time of year water is available and the rates at which it flows. Location data on springs, seeps, and natural ponds should be collected also.

Soils

An examination of soils and soil distribution in Y Unit Draw is necessary to distinguish variability of potential agricultural lands. These data can then be compared against settlement and subsistence strategies within the valley. This would assist in the examination of control of access rights to critical resources by households or communities.

Raw Materials (Lithic and Clay)

Studies of lithic raw materials and clay resources used for ceramic manufacture in the project area are necessary to characterize local resources and distinguish them from nonlocal resources. These studies provide baseline data that address research questions about land-use and exchange practices.

Vegetation

While a general level of knowledge exists concerning vegetation in the project area, a detailed study of the modern vegetation can show significant differences in vegetation zones and fuel wood availability. Data on modern vegetation can be compared with the results of micro- and macrobotanical data recovered from archaeological contexts. Recently, Grissino-Mayer et al. (1997) have published data on old-age conifers in El Malpais (to the east of the project area). These data are used to interpret paleoclimate back to nearly 2000 BP.

Fauna

Field studies can provide information on the types of wildlife that presently use the project area. Faunal assemblages from archaeological contexts provide information on the types of wildlife that previously used the area and modern intrusions. Knowledge of both vegetation and fauna provides information on past environmental conditions.

Climate

Finally, modern records of temperature and precipitation are useful for examining climatic changes in the recent past. Dendroclimatology and palynology studies can be conducted to provide information on climate and natural vegetation.

Formation Processes Requirements

Cultural and postdepositional natural formation processes create the evidence of past societies and environments that the archaeologist studies (Schiffer 1983, 1987). It is essential that these processes be understood well, before sociocultural interpretations are made. Considering many properties of artifacts and archaeological deposits can identify formation processes. These include simple and complex properties of artifacts, artifact relationships, and properties of deposits (Schiffer 1983).

Simple Properties of Artifacts

Simple properties of artifacts include size, density (specific gravity), shape, orientation and dip within the soil matrix, use-life, damage, and accretions (Schiffer 1983). Recording these properties can aid in identifying the responsible formation process(es). One-sixteenth-inch or 1/8-inch screen can be used to enable collection of a greater range of artifact sizes present.

Complex Properties of Artifacts

Complex properties of artifacts involved in formation processes include vertical and horizontal distribution, artifact diversity, artifact density, and disorganization (Schiffer 1983). It is important to understand the erosional and depositional processes that led to the formation of each stratigraphic unit. It is also necessary to evaluate the effects of vertical movement of artifacts within and between depositional units. Geomorphological studies of macro- and microstratigraphy will provide such information.

SUMMARY

The research design presented above is a modification from its original version (Kendrick et al. 1997). It focuses on four research domains: (1) environment and economy, (2) population and demography, (3) social organization, and (4) regional relationships. Inclusive of these domains are specific research issues. Particular emphasis has been placed on the Basketmaker II and Pueblo II periods in this research design because most of the sites investigated during the project date to these periods.

Particular focus is placed on the household and community levels of organization. The research design presented above, although very broad in scope, allows detailed analyses at each of these levels. The interpretive value of each domain and issue, however, cannot stand alone. They need to be woven together to complement one another and to eventually provide a statement, or model, that will contribute to future archaeological investigations.

Research perspectives focusing on the household and community form the structure of the research design. The research domains and issues discussed allow detailed examinations at the household and community levels.

Chapter 6

METHODS

James W. Kendrick and Janet Hagopian

INTRODUCTION

This chapter presents a discussion of archaeological methods employed during the investigation of 18 sites along State Highway 602. Portions of 13 sites were excavated, and at five sites analyses of surface artifacts were conducted in the field. Procedures for the collection of data were uniform for all 13 excavated sites, and followed those outlined in the ZCRE Data Recovery Manual (Eck 1997). The data recovery plan (Kendrick et al. 1997) provided the structure for the level of effort at each of these sites. Laboratory procedures for the processing of all artifacts and samples followed the ZCRE Laboratory Manual (Avallone and Hagopian 1997). Synopses of both field and laboratory methods employed during the project, including the in-field analysis, are provided below.

FIELD METHODS

Excavated Sites

The methods for investigating each site followed a uniform approach. Initially, the original site datum established by ZCRE personnel during the Inventory Assessment of State Highway 602 (Abbott 1997) was located. A permanent datum and datum cap with the Laboratory of Anthropology (LA) site number and the ZCRE project number (ZCRE-015-97) replaced the survey datum. Following identification and replacement of the datum, the ZCRE crew would then systematically survey the immediate area in 2-m transects in order to reestablish or redefine site boundaries, marking the location of each artifact with a pin flag. Most of the sites investigated were found to have slightly different boundaries than those originally defined, but boundaries were not different enough to alter the data recovery plan.

Following the establishment of site and project boundaries, a grid system was overlaid on each site for the control of horizontal provenience. A Sokkia Set F-5 Total Station or Sokkia Optical Transit was used to position the grid across each site. The grids for each site was tied into the original site datum, and oriented to magnetic north. Once grids were in place, data were collected through a series of steps beginning with the surface collection of all artifacts within the right-of-way, followed by hand excavation of small study units (ranging from 1 by 1 m to 3 by 3 m), to mechanical excavation of larger study units (described in the field as backhoe trenches). Mechanical stripping was conducted once the mechanically excavated trenches were recorded. The following is a discussion of the methods employed for each of these steps.

Surface Collection

All surface artifacts within the right-of-way, and within the area of effect, on each of the 13 sites were systematically collected. Each artifact was given a point location (three-dimensional provenience) relative to the site grid. Each artifact was then given an Field Specimen (FS) number, and all provenience information was recorded on the field specimen catalog sheet (described below).

Hand Excavation

Hand-excavated units were placed in various locations across the sites. Primarily, hand-excavated units were placed in areas of high artifact density, where indications of features were observed from the surface, or where there was a high probability of subsurface cultural deposits. The grid coordinates of the southwest corner provided the horizontal provenience of each unit. Vertical control was provided by placing a sub-datum with a known elevation near

the hand-excavated unit, or by using a transit placed over the main site datum or sub-datums. Before excavation, each hand-excavated unit was given a study unit (SU) number. Study unit numbers could be given to any defined space on the site, such as mechanically excavated trenches, hand-excavated units, or even to the site itself.

All hand-excavated units were excavated in arbitrary 10-cm levels (except in cases where sloping surface elevations necessitated a slightly different thickness for the first level). The units were not excavated by natural and cultural strata. Arbitrary levels excavated to define feature boundaries, sterile sediments, or other natural or cultural phenomena were not necessarily 10 cm thick. Each arbitrary level, no matter its thickness, was given an FS number. Soil from each level was screened through 1/4-in hardware mesh, and artifacts were bagged by type, such as ceramic, flaked stone, ground stone, etc. All artifacts from the level were given the same FS number (corresponding with the level's FS number) and recorded on the field specimen catalog sheet. The FS system is further explained in the recording and provenience section below.

In general, all hand-excavated units were continued to a minimum of two sterile levels (levels that are absent of cultural material) below the last level containing cultural material, except in those instances when bedrock was encountered sooner. In some cases, units were continued for more than two levels past sterile. This was considered necessary because several of the sites are covered by considerable overburden. Once the excavation of a unit was discontinued, at least one representative profile was drawn to scale and all natural and cultural strata were described in detail. In certain circumstances where the stratigraphy warranted greater description, several profiles would be drawn and described. In some cases, such as at site LA 115323, units were created for the purpose of surface-stripping an area or feature, and were not continued to the depth of sterile deposits. Profile drawings were not made for these units.

Mechanically Excavated Trenches

A Case 580K® backhoe was used in order to determine the nature and extent of cultural

deposits at 13 sites in the project. All trenches were excavated with a 0.61-m-wide bucket. Following hand scraping, these trenches were typically 70 cm wide, which is the figure used to calculate the volume of the trenches.

These trenches were excavated in order to confirm site boundaries, to determine the depth of cultural deposits, and to locate features. Each trench was monitored during the entire excavation by a ZCRE archaeologist to identify the presence of cultural materials and to prevent the accidental destruction of features by the backhoe. All trenches were scraped and inspected for cultural deposits.

For trenches 10 m or less in length, at least one 1-m-wide profile was drawn and all strata described in detail. In certain cases, if cultural material was present or a single 1-m-wide profile was not considered representative, the entire trench wall was profiled. Trenches were then backfilled to prepare the site for mechanical stripping. At each site (save for site LA 26309), at least one trench remained open for analysis by the project geomorphologist. Areas around these trenches were then stripped at a later date.

Mechanical Stripping

Mechanical stripping, utilizing the front-end loader of the Case 580K® backhoe, was conducted once the trenches were recorded to identify the presence of cultural features. The entire excavation process was monitored by a ZCRE archaeologist. Nearly all of the features identified throughout the project were discovered during mechanical stripping.

Excavation of Features and Sampling Procedures

Most features were excavated in a two-step process. First, the feature was bisected (usually along its long axis) and half of the feature fill was excavated either in one level or in arbitrary 10-cm-thick levels in order to determine its morphology and content. Profile drawings (to scale) of the feature's stratigraphy were then made. Secondly, the remainder of the fill was removed (again, either in one level or arbitrary levels depending on the complexity of the feature's stratigraphy).

Following the excavation of a feature, a cross-section was drawn and a feature summary form was completed. Samples for archaeobotanical remains were scraped from the base, or floor, of each feature.

Other Activities

Other activities that were conducted on some sites included in-field analysis of ceramic artifacts located outside of the project right-of-way (e.g., sites LA 115334 and LA 115325), and shovel scraping (e.g., sites LA 49838 and LA 26306). In-field analysis was conducted in cases where a more complete assessment of the site's function and antiquity was necessary. Shovel scraping was conducted along very steep and narrow road cuts at sites LA 49838 and LA 26306. Heavy machinery in these locations was not possible. The shovel scraping at each of these sites proved to be very efficient and informative.

In-Field Analysis

Five of the 18 sites required in-field analyses of artifacts and features. Initially at each of these sites, the site datum placed during the inventory phase of the project (Abbott 1997) was located and a permanent datum cap established. Each artifact was then given a point location (three-dimensional provenience) and an FS number. Analyses of ceramic and ground stone artifacts were conducted. Ceramic artifact analysis included recording ceramic ware and type, temper, paste color, vessel form and part, count, and comments. Recorded ground stone artifact variables included artifact type; raw material; presence of striations, grinding, shaping, and/or burning; completeness (percentage); length; width; and thickness.

With the permission of the Zuni Heritage and Historic Preservation Office (ZHHPO) and the New Mexico State Highway and Transportation Department, the flaked stone artifacts were collected and sent to the project's flaked stone artifact analyst (Shokler, Chapter 22). This allowed for comparison of variables between the in-field analysis sites and the excavated sites. The

flaked stone artifacts were returned to the exact locations from which they were collected.

RECORDING AND PROVENIENCE METHODS

Provenience

A hierarchical system of provenience for artifacts, study units, and features was employed on all sites investigated. As mentioned above, all hand-excavated units were given a study unit number, and corresponding grid coordinates for their southwest corner were recorded. These locational data were then given an FS number and recorded on the excavation unit log and field specimen catalog sheet. Any area or specific location of the site could be given an FS number, thus the hierarchical system. In this system the smallest possible portion of site space is a single artifact or sample, and the largest possible portion is the entire site (Eck 1997). Any discrete subsection of the site can be an individual portion, subject to three-dimensional definition. Thus, each arbitrary level could be given an FS number, as could any point-provenienced artifact.

For each FS number, one line of data is entered onto the field specimen catalog sheet. These data include the number of the study unit and feature, if applicable. The grid coordinates, dimensions of the study unit, and elevations associated with the portion of site space are all recorded. The characteristics of the individual portion are noted, including screen size used in excavation, stratum designation, and arbitrary level number, as applicable. The initials of the excavators and the date(s) of excavation or study are noted. Finally, the classes of archaeological materials recovered are recorded, using the single-letter codes presented on the Unit Level Excavation form, and sterile deposits are positively identified by checking a null column, signifying no materials were recovered.

Records

Numerous forms enabled the field crews to record the various data collected from each site.

The field specimen catalog sheet has been described above, and was one of the primary tracking forms used on the project. The Unit Level Excavation form was used during the excavation of all arbitrary levels. All of the entry data called for on this form is a real number or label, or a simple check. Plan views of the base of each level were drawn on this form.

Specific logs enabled the supervisory archaeologists to track information. For each site investigated, individual logs were kept for study units, features, sub-datums, film, and photographs by roll and frame number. In addition, the supervisory archaeologists kept a daily field log and notes during the entire project.

LABORATORY METHODS

Artifacts and associated field specimen catalog sheets were turned in to the lab on a regular basis. Upon arrival at the lab, artifact bags were checked in to make sure that the provenience information on the bag matched the field specimen catalog sheet entry. For those that did not match, the bags and paperwork were returned to the supervisory archaeologist in charge of that site for correction.

Artifacts were processed following the guidelines outlined in the ZCRE Laboratory Manual (Avallone and Hagopian 1997). Ceramics, flaked stone, and ground stone were washed in tap water and allowed to dry on drying racks. Fauna, shell, and miscellaneous artifacts were dry-brushed and wrapped in acid-free paper, as necessary. Unmodified stone and miscellaneous

items were either washed in tap water or dry-brushed, depending on the material type. The artifacts remained in their paper bags, and small boxes, vials, or capsules were used for the fragile items.

Samples, such as vegetal, radiocarbon, flotation, waterscreen, pollen, and tree-ring, were allowed to dry for at least a week before rebagging or processing. Vegetal samples were wrapped in acid-free paper, placed in vials or boxes, and bagged in their paper bags. Radiocarbon samples remained in their aluminum foil packaging and bagged in their paper bags. The flotation and waterscreen samples remained in their original paper bags until they were processed. After processing, the light and heavy fractions were bagged separately in plastic bags so that the light fraction could be sent for analysis. The ethnobotanical chapter (McBride, Chapter 25) provides further information on the actual processing of samples. The pollen samples were collected in paper bags and allowed to dry without opening the bags to prevent contamination. The tree-ring samples were wrapped in acid-free paper and cotton batting, following the procedures recommended by the Laboratory of Tree-Ring Research at the University of Arizona.

All artifacts and samples were boxed by material type and site, inventoried, and prepared for distribution to the various analysts. It should be noted that all the artifacts and samples from this project remained in their paper bags, unless otherwise noted, until final curation of these items has been decided upon.

SECTION II. SITE DESCRIPTION

Chapter 7

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115334

Jerome Zunie and James W. Kendrick

with Analytic Contributions by
Suzanne L. Eckert, Donovan Quam, and Jeffrey E. Shokler

INTRODUCTION

Archaeological investigations at site LA 115334 were conducted between 3 and 6 March 1998, and again on 19 May 1998. The site comprises a small Late Pueblo II rubble mound and associated artifact scatter located outside the western right-of-way fence. A light scatter of artifacts extends downslope and into the project area, which justified testing and data recovery efforts. The site is located on a bedrock ridge overlooking an alluvial fan, at approximately 2057 m (6750 ft) above mean sea level. Vegetation across the site is dominated by juniper, pinyon, sagebrush, narrowleaf yucca, grasses, and prickly pear cactus.

SURVEY RESULTS

Abbott (1997) recorded three features (one rubble mound, one sandstone alignment, and one possible rubble scatter; Figure 7.1), along with a ceramic and lithic artifact scatter. Artifacts recorded included vesicular basalt ground stone, flaked stone debitage, and cores. Lithic raw materials included quartzite, silicified wood, basalt, and Zuni Spotted chert. Gallup Black-on-white was the only diagnostic ceramic type identified during the survey, although White Mountain Redwares were observed. The site had not previously been recorded.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations, the entire site was examined again by pedestrian survey in transects at 2-m intervals. All surface artifacts were then marked with a pin flag and collected. Four lithic artifacts were recovered from the surface of site

LA 115334 within the project area (right-of-way). These artifacts (FS 1 through 3, FS 2 comprised of two artifacts) were point located with a Sokkia Total Station. These artifacts were located along the northeastern boundary of the site (Figure 7.2), and indicated a low density of cultural material within the area of effect.

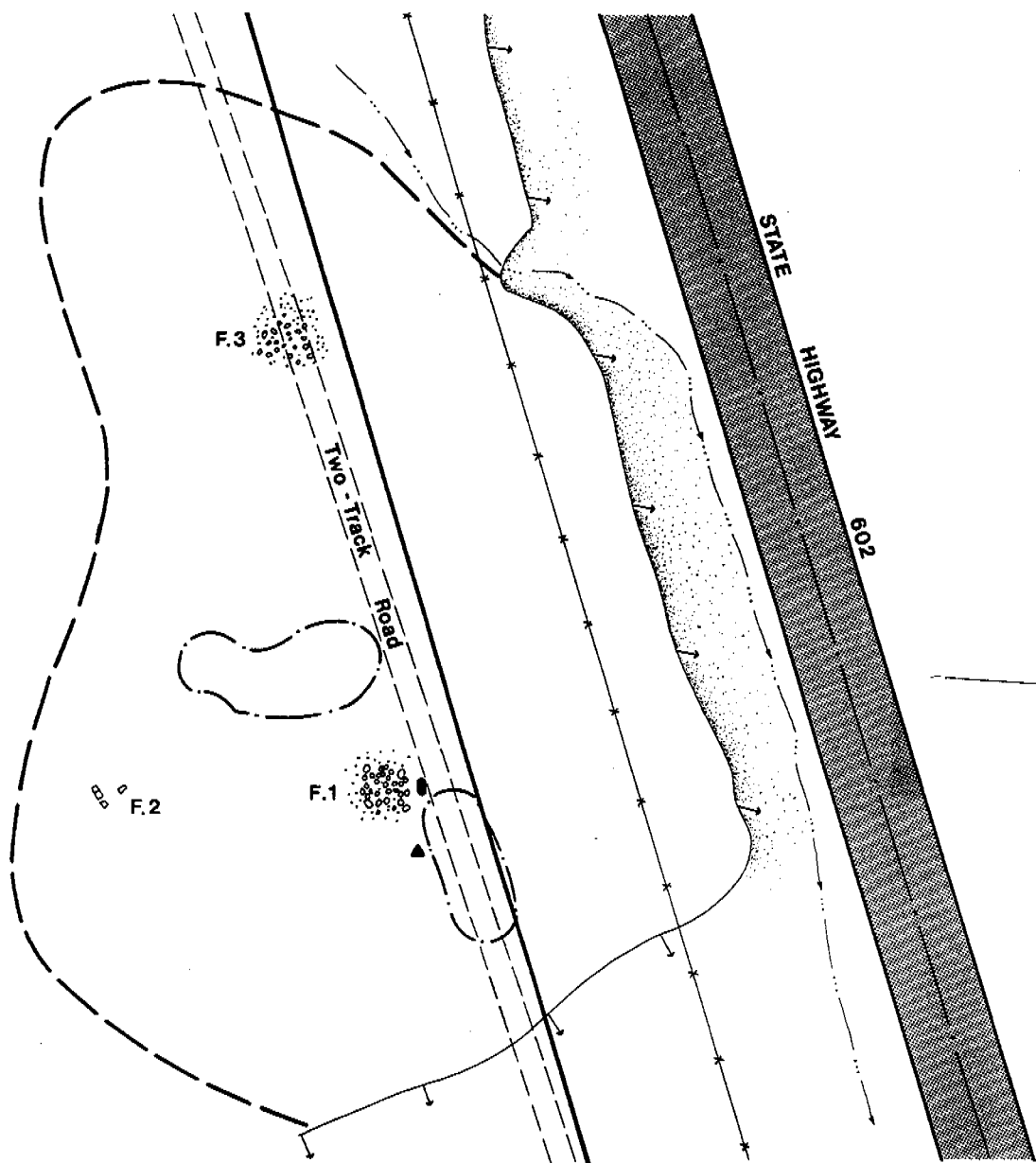
Excavation

Hand Excavation

Hand excavation of two 0.50-by-2.00-m units was conducted in order to determine the nature and depth of cultural deposits on site LA 115334. An artifact distribution map generated from the controlled surface collection was used as a guide for the placement of the two units (Figure 7.2). Both test units were excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit 1. Study Unit (SU) 1 was located within the site boundaries and just inside the western right-of-way fence line. The grid coordinates for the southwest corner of SU 1 are N122.14, E112.54 (Figure 7.2). This 0.50-by-2.00-m unit was placed in an area of moderate ground disturbance and in an area with no surface artifacts.

A total of four 10-cm levels were excavated revealing a single stratum. One 2-m-long profile of the east-facing wall was drawn for SU 1 (Figure 7.3). No cultural materials or features were observed within the study unit. The sterile matrix indicates that cultural deposits do not extend into the boundaries of the project area. Surface artifacts within this portion of the site are most likely slopewash deposits. Due to the absence of artifacts or features in SU 1 excavation was terminated at Level 4.



- ▲ Site datum
- Site boundary
- Centerline
- Fence line and west edge of right-of-way
- West edge of buffer zone
- F. Feature no.
- Sandstone rubble
- Sandstone alignment
- Ground stone
- Artifact concentration

- Cut bank
- Direction of downslope
- Drainage

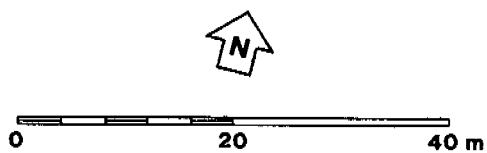


Figure 7.1. Site LA 115334 Survey Site Map.

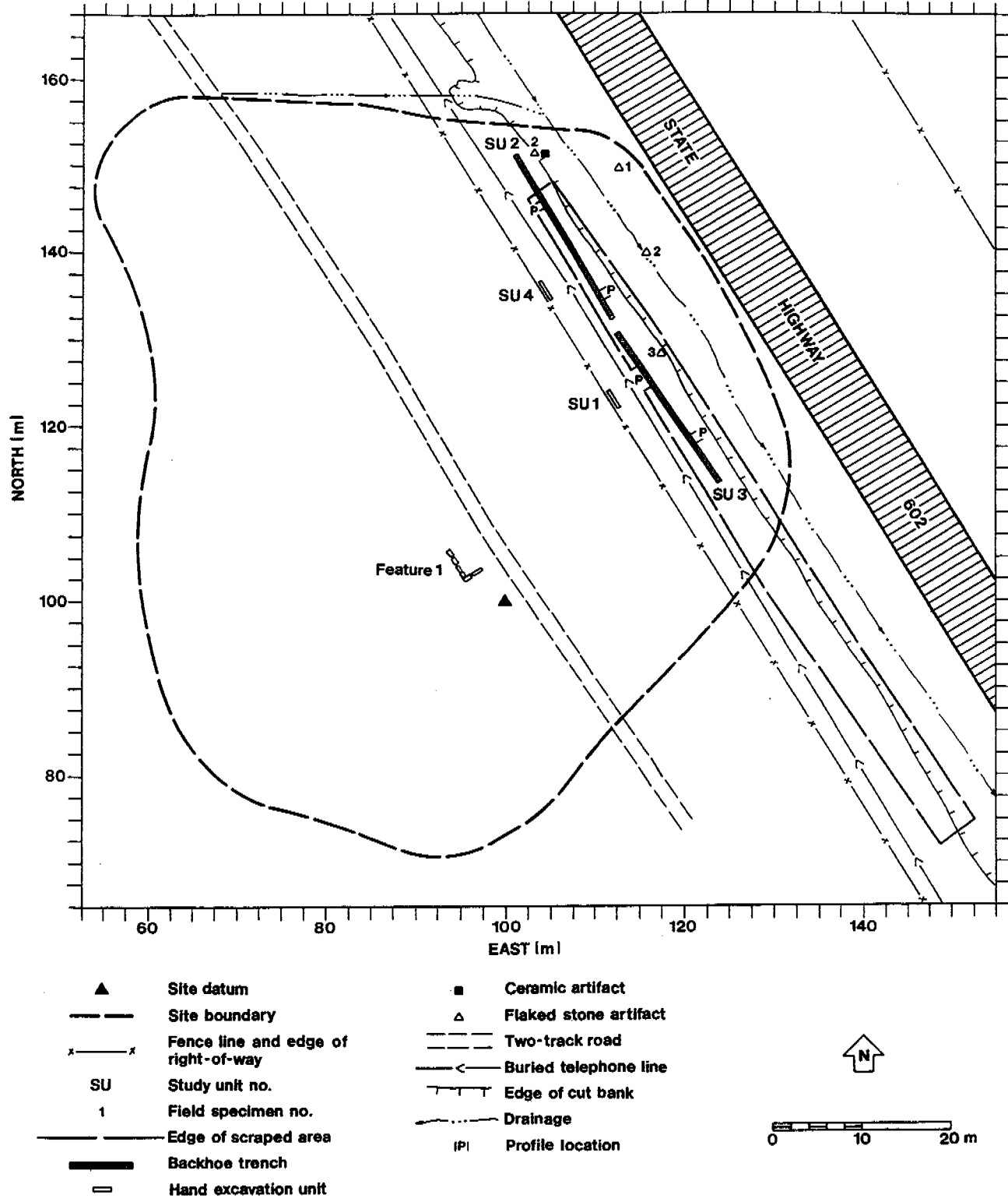


Figure 7.2. Site LA 115334 Data Recovery Site Map, Surface Artifacts, Feature, Study Units, and Mechanical Stripping.

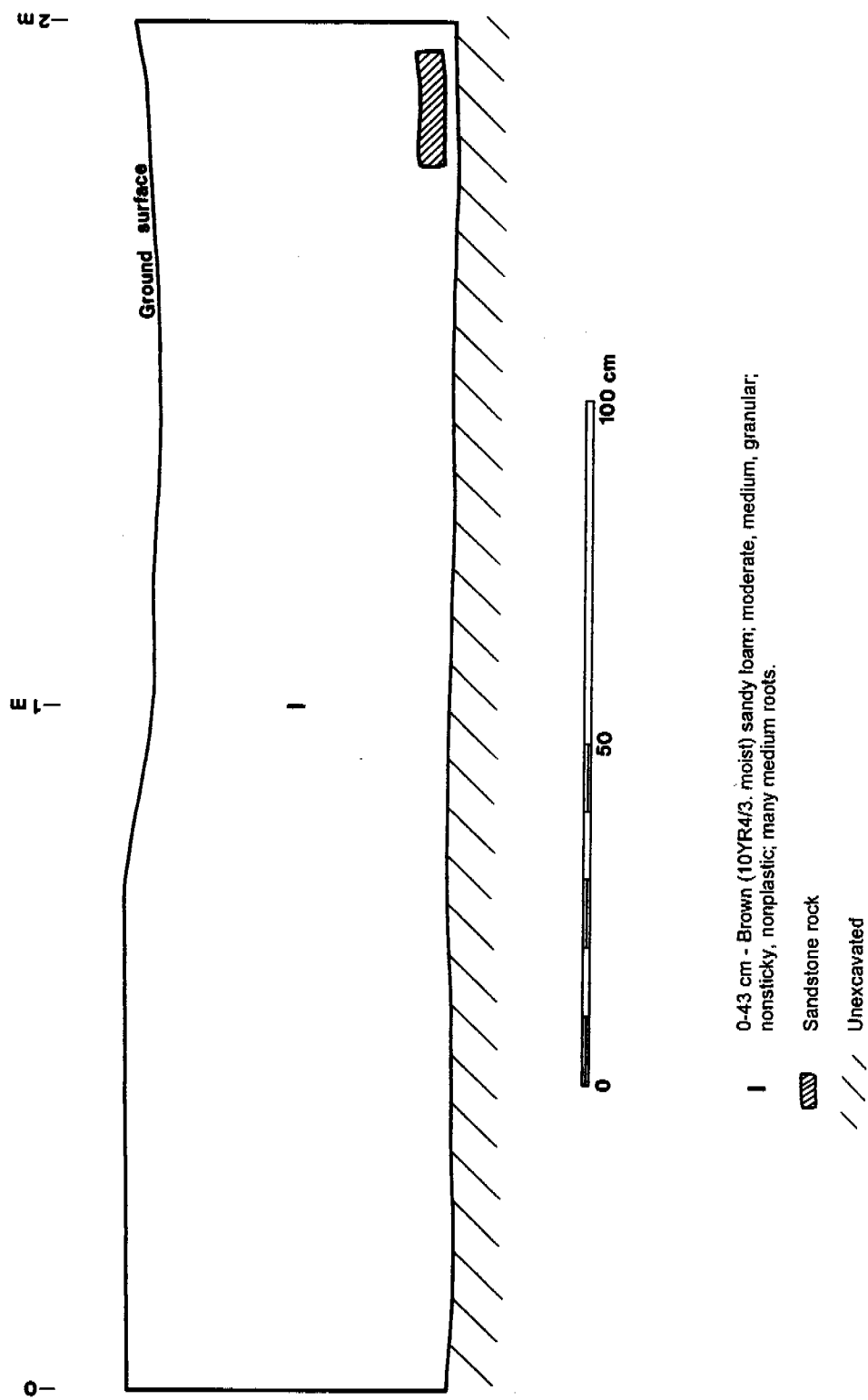


Figure 7.3. Site LA 115334 Study Unit 1, East-facing Profile.

Study Unit 4. SU 4 was located within the site boundaries and just inside the western right-of-way fence line. The grid coordinates for the southwest corner of SU 4 are N134.05, E105.88 (Figure 7.2). This 0.50-by-2.00-m unit was placed in an area of least amount of ground disturbance and no surface artifacts.

A total of four 10-cm levels were excavated revealing two strata (Figure 7.4); both strata were sterile of cultural deposits or features. The dark yellowish brown soils observed from the two strata were most likely some natural organic deposition or midden soils deposited by sheetwash from the upper slope of the site. Due to the absence of artifacts or features within SU 4 excavation was terminated.

Mechanical Excavation

Mechanical excavation of two trenches was conducted in order to determine whether additional cultural deposits or features were present on site LA 115334. The artifact distribution map generated during the control surface collection, information recovered from the hand excavation, and the possibility of buried deposits in the eastern portion of the site were used as a guide for the placement of the trenches.

The trenches were designated SU 2 and 3. The trenches were approximately 0.70 m wide. A total of 6 m of profiles were drawn. A Munsell soil chart was used to identify soil color within each stratum of the backhoe trenches.

Study Unit 2. SU 2 was located within the site boundaries and within the western right-of-way of the existing State Highway 602. It began at coordinates N132.99, E111.36 and extended northward 21.40 m to N151.37, E100.51 (Figure 7.2). The trench was placed in an area of least amount of ground disturbance and no surface artifacts. The maximum depth of the trench was 1.54 m at the north end of the trench.

Two 1-m-long profiles were drawn of SU 2. These profiles were located along the east-facing and west-facing trench walls at the north and

south end of the trench. Three strata were identified at the north end of the trench (Figure 7.5). Strata I, II, and III were dark yellowish brown soils possibly indicating organic deposition or midden soils being deposited by sheetwash activities. Stratum IV soils had inclusions of gravel most likely indicating some alluvial activity. Two strata were identified at the southern end of the trench (Figure 7.5). Strata I and II were dark yellowish brown soils indicating possible natural organic deposition or midden soils deposited by sheetwash activities.

Study Unit 3. SU 3, located within the site boundaries and within the western right-of-way of the existing State Highway 602, began at coordinates N113.24, E123.73 and extended northward 20.50 m to N130.55, E112.91 (Figure 7.2). The trench was placed in an area of least amount of disturbance and very light artifact scatter. The maximum depth of the trench was 1.40 m at the north end of the trench.

Two profiles were drawn of SU 3. A 3-m-long profile was drawn of the west wall at the north end of the trench, and a 1-m-long profile was drawn of the east trench wall near the southern end (Figure 7.6). Four strata were identified from the south end. Strata I, II, and III consisted of different shades of dark yellowish brown soils. Stratum I soils are most likely culturally stained soils deposited by sheetwash activity. Strata II and III soils are most likely natural organic deposition. Stratum IV soils were culturally sterile. Three strata were identified from the north end. Strata I and II had the same characteristics as the Strata I and II of the south end. The difference in Stratum III was the silt loam sandy loam of the south end. No artifacts or features were observed within SU 3.

Mechanical Stripping

Mechanical stripping was conducted on site LA 115334 in order to investigate the possibility of buried cultural deposits or features on the west side of the existing highway. Information recovered from the hand excavation and mechanical excavations was used to determine the

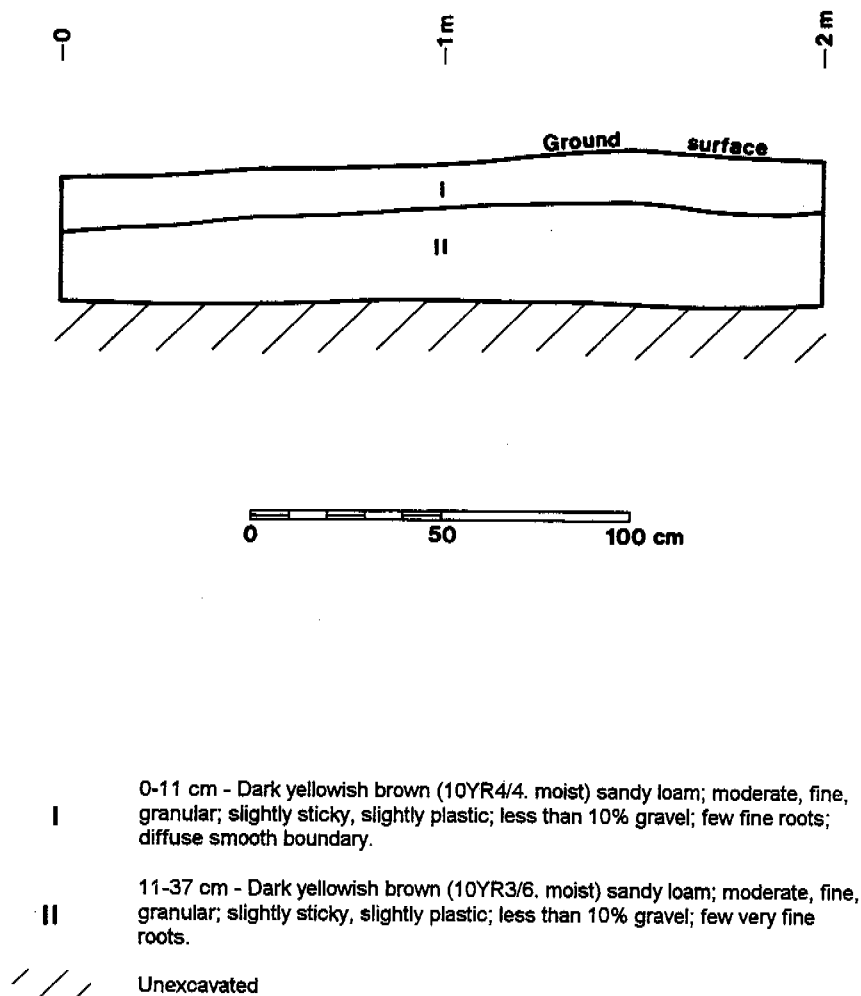
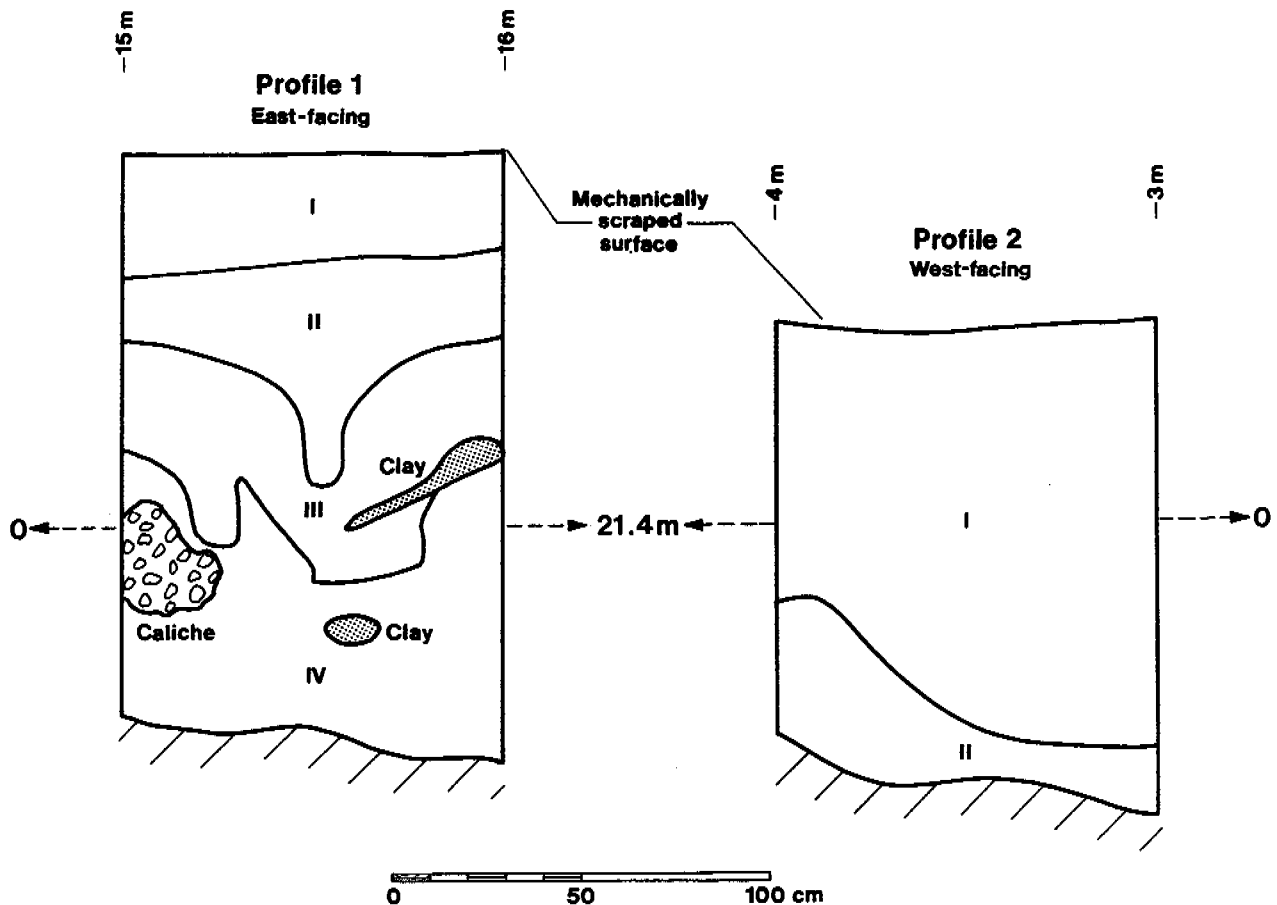


Figure 7.4. Site LA 115334 Study Unit 4, East-facing Profile.



Profile 1

- I** 0-30 cm - Dark yellowish brown (10YR4/4. moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; common fine roots; diffuse smooth boundary.
- II** 30-88 cm - Dark yellowish brown (10YR3/4. moist) sandy loam; moderate, fine granular; slightly sticky, slightly plastic; less than 10% gravel; few fine roots; diffuse irregular boundary.
- III** 88-108 cm - Dark yellowish brown (10YR4/6. moist) sandy loam; moderate very fine, granular; slightly sticky, slightly plastic; less than 10% gravel; few very fine roots; abrupt irregular boundary.
- IV** 108-153 cm - Yellowish brown (10YR6/6. moist) sandy loam; moderate, coarse, granular; nonsticky, nonplastic; 10% gravel; very few micro roots.

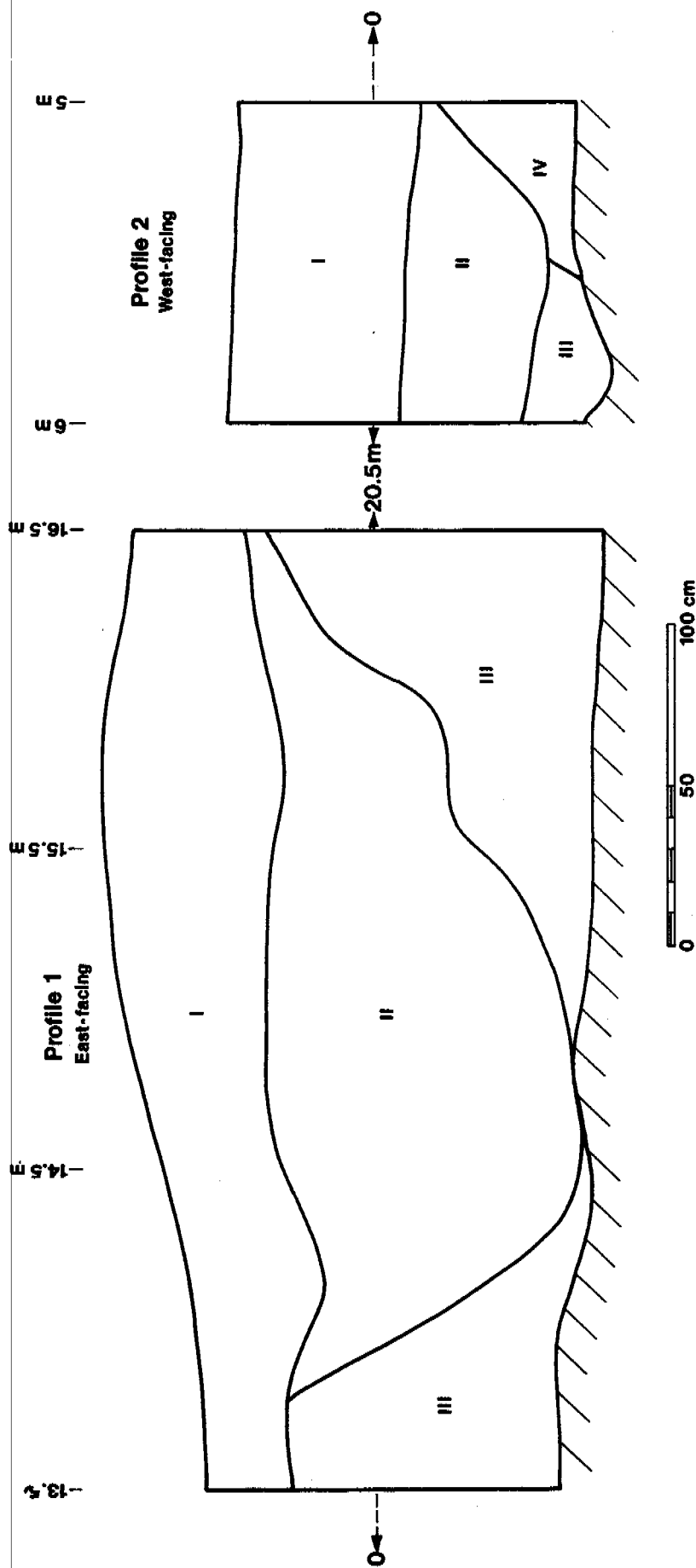
/// Unexcavated

Profile 2

- I** 0-104 cm - Dark yellowish brown (10YR4/4. moist) sandy loam; massive fine, granular; slightly sticky, slightly plastic; less than 10% gravel; few very fine roots; diffuse wavy boundary.
- II** 104-118 cm - Dark yellowish brown (10YR3/4. moist) very fine sand; weak, very fine, granular; nonsticky, nonplastic; less than 10% gravel; very few micro roots.

/// Unexcavated

Figure 7.5. Site LA 115334 Study Unit 2, East-facing and West-facing Profiles.



Profile 1

- I 0-45 cm - Dark yellowish brown (10YR4/4, moist) very fine sand; weak, very fine, granular; nonsticky, nonplastic; less than 10% gravel; common fine roots; diffuse wavy boundary.
- II 45-140 cm - Dark yellowish (10YR3/4, moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; common fine roots; diffuse wavy boundary.
- III 42-143 cm - Dark yellowish brown (10YR4/6, dry) silt loam; weak, very fine; granular soft; very few micro roots.

Unexcavated

Profile 2

- I 0-53 cm - Dark yellowish brown (10YR4/4, moist) very fine sand; weak, very fine, granular; nonsticky, nonplastic; few very fine roots; diffuse smooth boundary.
- II 53-102 cm - Dark yellowish brown (10YR3/4, moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; very few very fine roots; diffuse wavy boundary.
- III 92-117 cm - Dark yellowish brown (10YR4/6, moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; very few very fine roots; diffuse smooth boundary.
- IV 64-116 cm - Dark yellowish brown (10YR4/4, dry) sandy loam; weak, very fine, granular; nonsticky, nonplastic; loose; very few micro roots.

Unexcavated

depth of the surface stripping. A total of 399.75 sq m at an approximate depth of 0.50 m was mechanically stripped using a backhoe. No cultural deposits or features were observed.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Forty sherds were analyzed from site LA 115334. Only one sherd was recovered from within the right-of-way. This sherd, FS 12, received a complete attribute analysis as described in Chapter 21. The other 39 sherds were located on the surface surrounding the rubble mound (Feature 1) outside the right-of-way. These sherds were not collected but, instead, were analyzed in the field. As a result, the only two attributes recorded for these 39 artifacts were form and type. Appendix D outlines the ceramic data by provenience. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware.

Chronometrics

Nine diagnostic ceramic artifacts were recorded on the surface surrounding the rubble mound (Feature 1). One Cibola White Ware sherd of the Gallup Black-on-white type was identified. Eight White Mountain Redware sherds of the Wingate Black-on-red type were identified. These types make up a ceramic assemblage that dates from the late Pueblo II period to the early Pueblo III period (AD 1050 to 1175).

A mean ceramic date of AD 1122 \pm 40 years was generated for the surface collection. This estimate supports the date range for the diagnostic ceramic assemblage discussed above, suggesting that a late Pueblo II to early Pueblo III temporal designation is an appropriate assignment for the site. Chapter 21 has further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. Most sherds were identified as undifferentiated bowls or jars. There are a total of 6 bowls and 34 jars recorded. Both bowl and jar forms are represented in the white- and redware sherds, while all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of almost 6/1 for the entire ceramic assemblage, suggesting storage may have been intensely practiced. Neither sooting nor modification was recorded for this assemblage.

Compositional Variability

Tempering material was recorded for the one unidentified Cibola White Ware sherd, FS 12, collected from within the right-of-way. This artifact was tempered with sherd, the most common tempering material for Cibola White Ware. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The assemblage from site LA 115334 is very small and comes from surface collections. A variety of wares common to the area are present at the site, including nine diagnostic sherds. Given the date range for the ceramic assemblage of diagnostics, and a mean date of AD 1122 \pm 40, a late Pueblo II period to early Pueblo III period (AD 1050 to 1175) temporal range is assigned to the site. A relatively high jar to bowl ratio suggests storage may have been intensely practiced at the site.

Flaked Stone Artifacts

A total of four flaked stone artifacts were recovered from site LA 115334. They were found in a very light surface artifact scatter. Three artifact classes are represented in this assemblage:

debitage (one), debris (two), and manuport (one). The manuport consists of a 620-g cobble of high-quality silicified wood. This piece was identified as a manuport by the presence of four percussion marks on one surface. The debris anddebitage are chert. One piece of debris (record number 1134 in Appendix E) is made of Zuni Yellow Spotted chert.

Excluding the manuport, the three remaining artifacts weigh 1 g or less. The two pieces of debris are non-cortical, and the piece ofdebitage is sub-cortical. Throughout this report *non-cortical* flaked stone artifacts are defined as having no cortex, *sub-cortical* artifacts as having from 1 to 50% cortex, and *cortical* artifacts as having greater than 50% cortex on their surface.

The presence ofdebitage and debris in this assemblage suggest that lithic reduction was taking place at site LA 115334. Beyond this relatively simple inference, little else can be said based on this small assemblage concerning site function, or more broadly, concerning Pueblo II lithic technology or raw material economy.

STRATIGRAPHY

The stratigraphy of site LA 115334 is best exemplified by the west wall (east-facing) of SU 2 at its northern end (Figure 7.5). Tributary deposits of poorly sorted sand and gravel are found at the base of the trench (Stratum IV). Overlying these deposits are two strata comprising fine sands and clays (described as sandy loams in the field). Capping these deposits are fine sands to sandy loams.

A large drainage feature was observed along the north end of SU 3 underlying Stratum I (Figure 7.6, Profile 1). This feature was approximately 2.70 m wide by 0.90 m deep, and

was distinguished by its steep sides. It was filled with very fine sands. This stratum is most likely a natural drainage; however, ditch features were observed at site LA 48695 and dated to the Basketmaker II period. Within Y Unit Draw, the Basketmaker II occupations tend to be below the first stratum (the Ah horizon). The drainage observed in SU 3 underlies this horizon, and may potentially date to the Basketmaker II period. Future investigations, such as ground-based subsurface survey (particularly magnetometry), should further examine the possibility of runoff ditches in this portion of the valley. As mentioned elsewhere (Damp and Kendrick 1998), remote sensing has been very productive in identifying Basketmaker II field systems in Y Unit Draw.

CHRONOMETRIC DATA

Ceramic artifacts provide the only chronometric information for site LA 115334. These data have been discussed by Eckert and Quam above, and by Eckert and others in Chapter 21. To summarize, a mean ceramic date of AD 1122 \pm 40 was calculated from the assemblage's diagnostic types.

SUMMARY

Site LA 115334 is a late Pueblo II habitation, based upon surface architecture and associated artifacts. The nature of the habitation is unknown; however, it is likely the site was occupied on a short-term basis or seasonally. Its proximity to a relatively broad alluvial fan (for Y Unit Draw), which would have been conducive to *akchin* farming, suggests agricultural pursuits may have been a focus of activities at this site. Larger domestic facilities, unit pueblos, occur upslope and are likely contemporaneous with site LA 115334 (Kendrick and Hagopian 1998).

Chapter 8

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 26319

Jerome Zunie and James W. Kendrick

**with Analytic Contributions by
Suzanne L. Eckert, Janet Hagopian, Pamela McBride,
Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations at site LA 26319 were conducted between 13 February and 3 March 1998. Winter storms slowed the progress of testing and data recovery activities on several occasions during this period. Testing and data recovery activities were conducted only to the east of State Highway 602. Surface artifacts and the small masonry structure (located outside the western right-of-way) were recorded, however.

The site is similar to site LA 115334, located to the south, in that site LA 26319 comprises a late Pueblo II fieldhouse and associated artifact scatter located on a bedrock ridge overlooking a small alluvial fan and the valley bottom at 2060 m (6760 ft) above mean sea level. Our investigations, however, also discovered Basketmaker II storage and thermal features at the easternmost extent of the site. As discussed below, these features and their contents are indicative of subsistence-related activities, and also provide information regarding the season(s) in which the site was occupied during the Basketmaker II period. Common vegetation today across the site includes juniper, pinyon, sagebrush, grasses, prickly pear cactus, spiderwort, and rabbitbrush.

SURVEY RESULTS

Abbott (1997) recorded the small rubble mound, an upright sandstone slab near the mound, and an associated artifact scatter that extended across State Highway 602 to the eastern right-of-way fence (Figure 8.1). Ground stone (unidentified slabs and metates), made from vesicular and fine-grained basalt as well as sandstone, were recorded. Flaked stone debitage, cores, and hammerstones were also observed.

Lithic raw materials were identified as cherts (including Zuni Spotted chert), silicified wood, and quartzite. Diagnostic ceramic artifacts observed during the survey (Red Mesa Black-on-white, Gallup Black-on-white, Escavada Black-on-white, and Puerco Black-on-red) firmly place the occupation in the late Pueblo II. Prior to Abbott's survey, site LA 26319 was previously recorded by Holmes (1980).

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations, the entire site was examined again by pedestrian survey in transects at 2-m intervals. All surface artifacts were then marked with a pin flag, and collected within the right-of-way. Artifacts were recovered within the right-of-way from both the east and west sides of the existing highway. All of these artifacts were point located with a Sokkia Total Station. Although the density of artifacts was low on the surface within the right-of-way (Figure 8.2), interesting patterns are present. On the west side of the highway, ceramic, flaked stone, and ground stone artifacts were recovered. These are likely associated with the late Pueblo II fieldhouse located upslope and to the west. On the east side of the highway, where subsurface Basketmaker II features were located, only flaked stone artifacts were recovered. No artifacts were observed on the shoulder of the existing highway.

Excavation

Hand Excavation

Hand excavation of one 1-by-1-m unit was conducted in order to determine the nature and

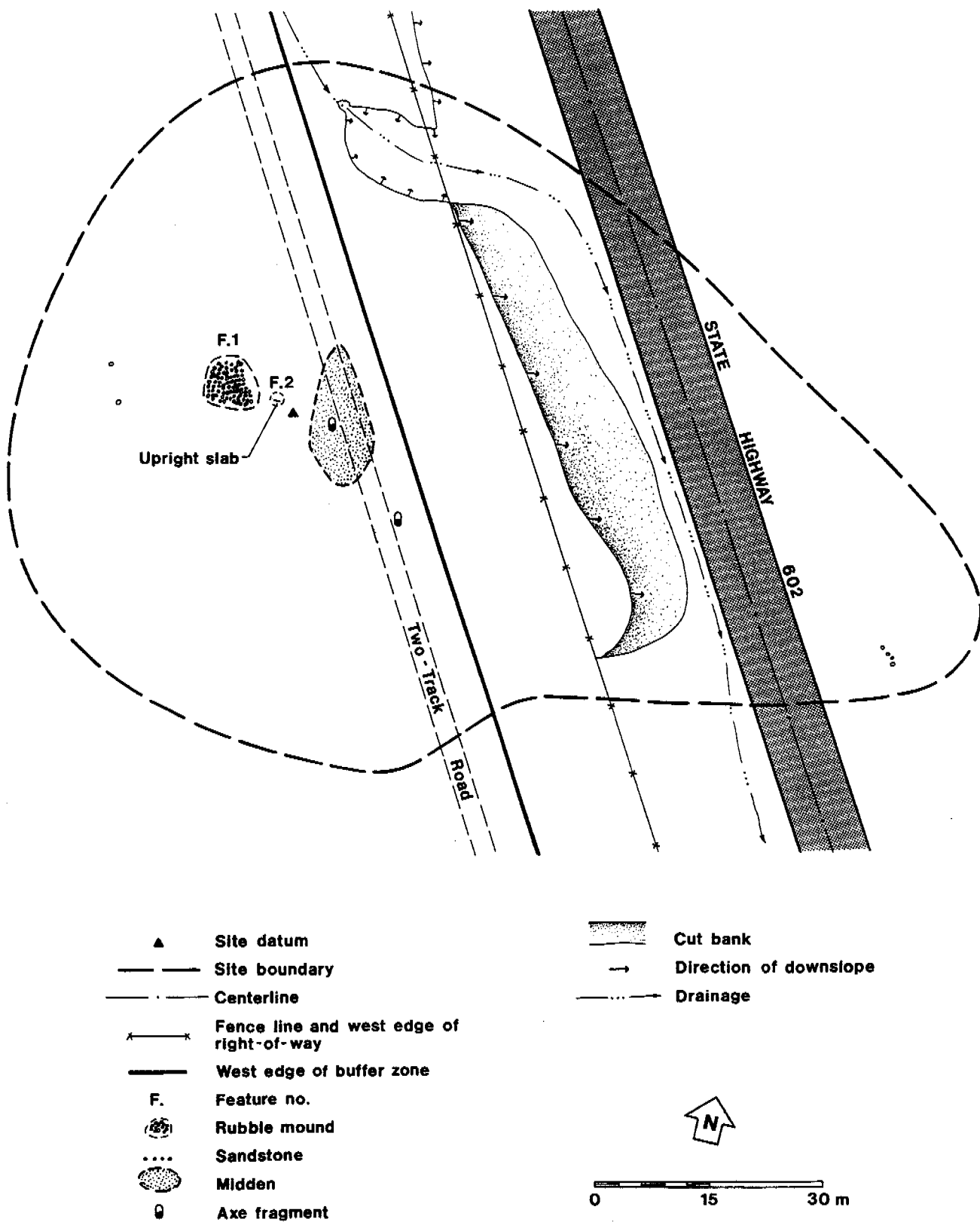


Figure 8.1. Site LA 26319 Survey Site Map.

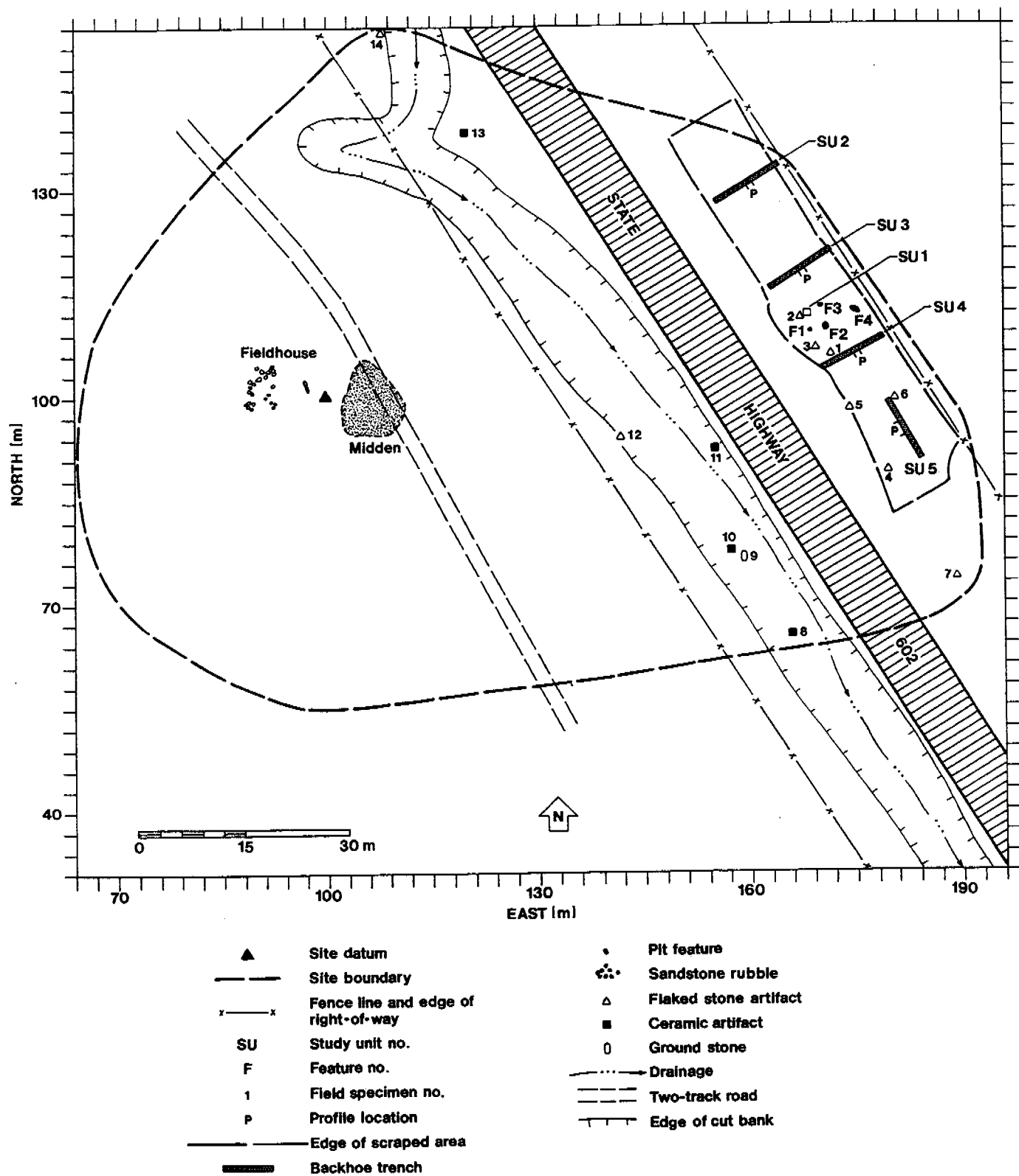


Figure 8.2. Site LA 26319 Data Recovery Map, Surface Artifacts, Features, Study Units, and Mechanical Stripping.

depth of buried cultural deposits on site LA 26319. An artifact distribution map generated during the controlled surface artifact collection was used as a guide for the placement of the study unit. The test unit was excavated in arbitrary 10-cm levels and all sediments were screened through 1/4-in hardware mesh.

Study Unit (SU) 1 was located within the site boundaries and within the eastern right-of-way of the existing State Highway 602. The grid coordinates for the southwest corner of SU 1 are N111.01, E168.16 (Figure 8.2). This unit was placed in an area of very light artifact scatter and in an area of least amount of ground disturbance.

A total of ten 10-cm levels were excavated revealing four strata. Since strata description for all four walls of the unit were identical, a single profile of the north-facing wall was drawn for SU 1 (Figure 8.3). Artifacts recovered from the test unit consisted mostly of flaked stone. These artifacts were recovered from Levels 6, 7, and 8, in Stratum III. Level 9 was within Strata III and IV. This indicated that the cultural deposits in this portion of the site were buried at least 50 cm below the present ground surface. Due to the absence of cultural deposits or features in level 10, excavation of SU 1 was terminated.

Mechanical Excavation

Mechanical excavation of four trenches was conducted in order to determine whether additional buried cultural deposits or features were present on site LA 26319. The artifact distributions defined, information recovered from the hand excavation, and the possibility of buried cultural deposits in the eastern portion of the site were used as guide for the placement of the backhoe trenches.

The trenches were designated SU 2 through 5. The mechanically excavated trenches ranged from 9.6 to 10 m in length. The trenches were typically 0.70 m in width and a maximum depth of 1.33 m. A total of 40 m of backhoe trenches were excavated and a total of 5 m of trench profiles were drawn. A Munsell soil

chart was used to identify soil color of each stratum within each trench.

Study Unit 2. SU 2, located within the site boundaries and eastern right-of-way of the existing State Highway 602, began at coordinates N128.07, E155.54 and extended eastward 10 m to N133.41, E172.12 (Figure 8.2). This trench was placed in an area of least amount of ground disturbance and no surface artifacts. The maximum depth of the trench at the middle was 1.25 m.

One 1-m-long representative profile of the north-facing trench wall was drawn (Figure 8.4). Five strata were identified within the trench. No cultural deposits or features were observed during the excavation of SU 2. The excavation of this backhoe trench revealed that subsurface cultural deposits did not extend to the northeast portion of site LA 26319.

Study Unit 3. SU 3 was located within the eastern site boundaries and within the eastern right-of-way of the existing State Highway 602, began at coordinates N115.45, E163.19 and extended eastward 10 m to N120.64, E171.12 (Figure 8.2). This trench was placed in an area of least amount of ground disturbance and no surface artifacts. The maximum depth of the trench near the middle was 1.32 m.

One 1-m-long representative profile of the north-facing trench wall was drawn of SU 3 (Figure 8.5). Six strata were identified within the trench. Stratum I consisted of aeolian deposits with no cultural materials observed. Within Stratum II, although no artifacts were observed, there were inclusions of fine charcoal flecks within this stratum. No evidence of cultural deposits were observed within Stratum III; however, charcoal again was observed. Strata IV and V were sterile matrix with no evidence of cultural deposits or features. Stratum V had inclusions of very fine charcoal flecks.

Study Unit 4. SU 4 was located within the eastern site boundary and within the eastern right-of-way of the existing State Highway 602. It

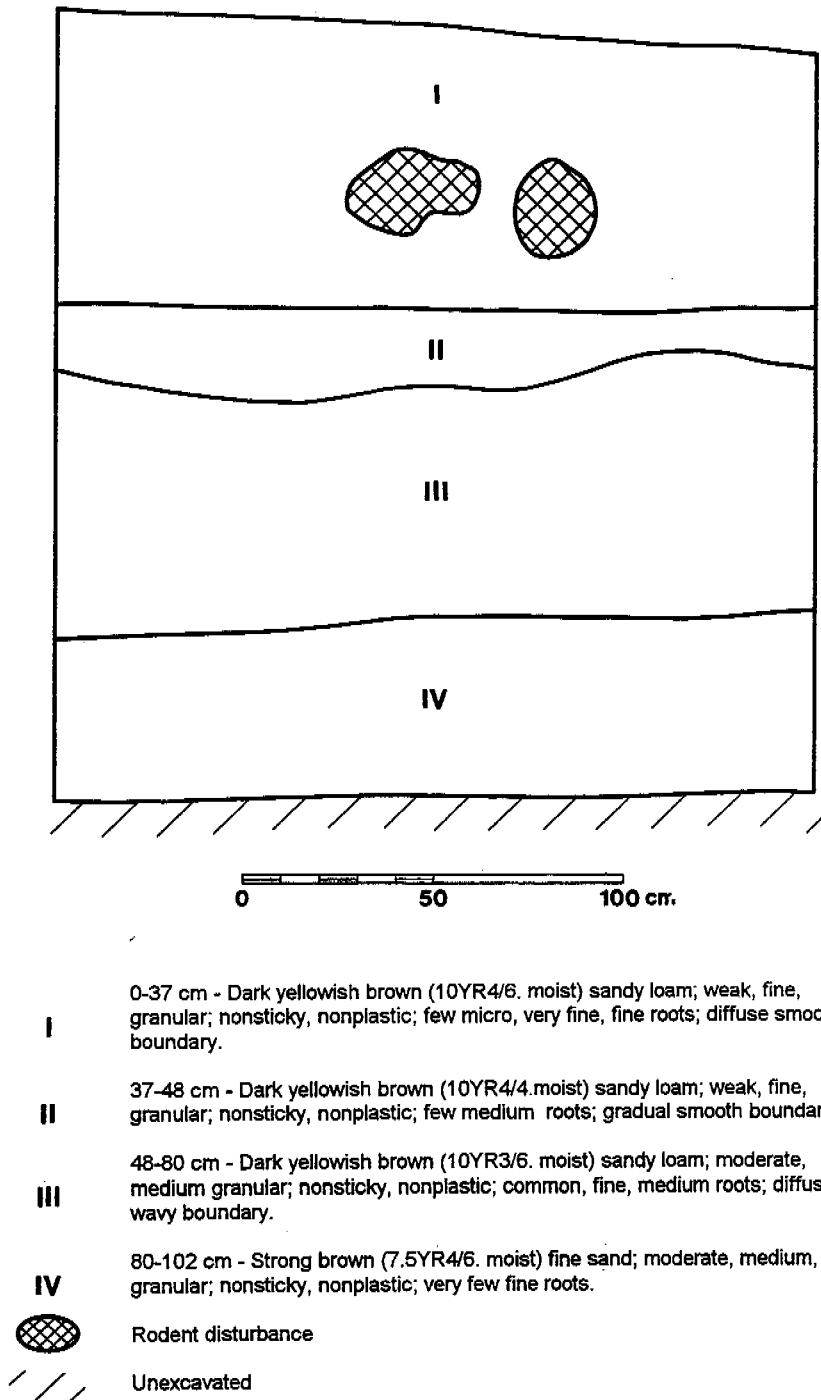
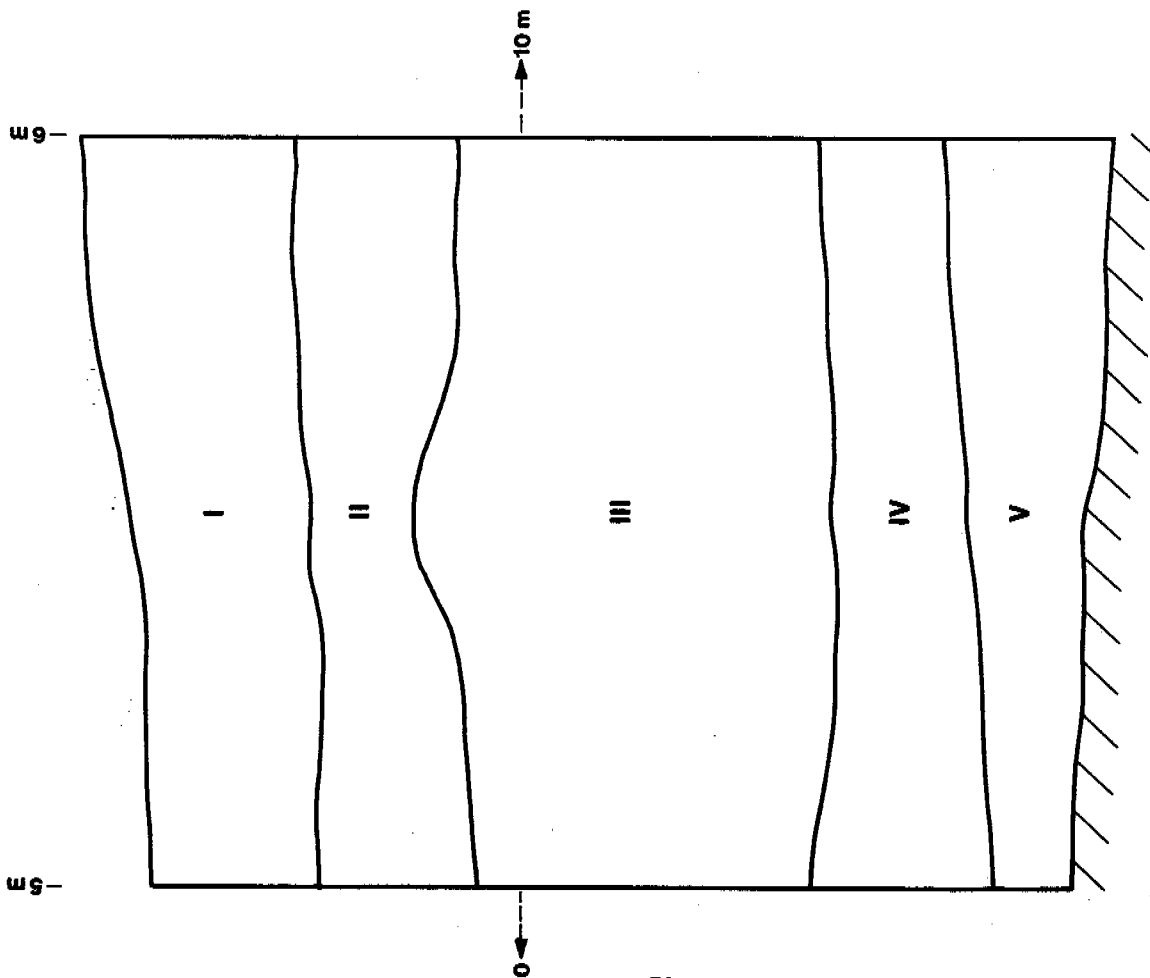


Figure 8.3. Site LA 26319 Study Unit 1, North-facing Profile.



I 0-23 cm - Dark yellowish brown (10YR4/6, moist) sandy loam; weak, medium, granular; nonsticky, nonplastic; many fine roots; diffuse smooth boundary.

II 23-37 cm - Dark yellowish brown (10YR3/6, moist) sandy loam; moderate, medium, granular; slightly sticky, slightly plastic; common fine roots; diffuse smooth boundary.

III 37-92 cm - Dark yellowish brown (10YR4/4, moist), brown (10YR5/3, dry) sandy loam; weak, medium, granular; nonsticky, nonplastic; slightly hard; few very fine roots; diffuse smooth boundary.

IV 92-109 cm - Brown (10YR5/3, dry) fine sand; moderate, medium, granular; nonsticky, nonplastic; few very fine roots; abrupt smooth boundary.

V 109-125 cm - Yellowish brown (10YR5/4, dry) fine sand; moderate, medium, granular; nonsticky, nonplastic; slightly hard; few very fine roots.

/// Unexcavated

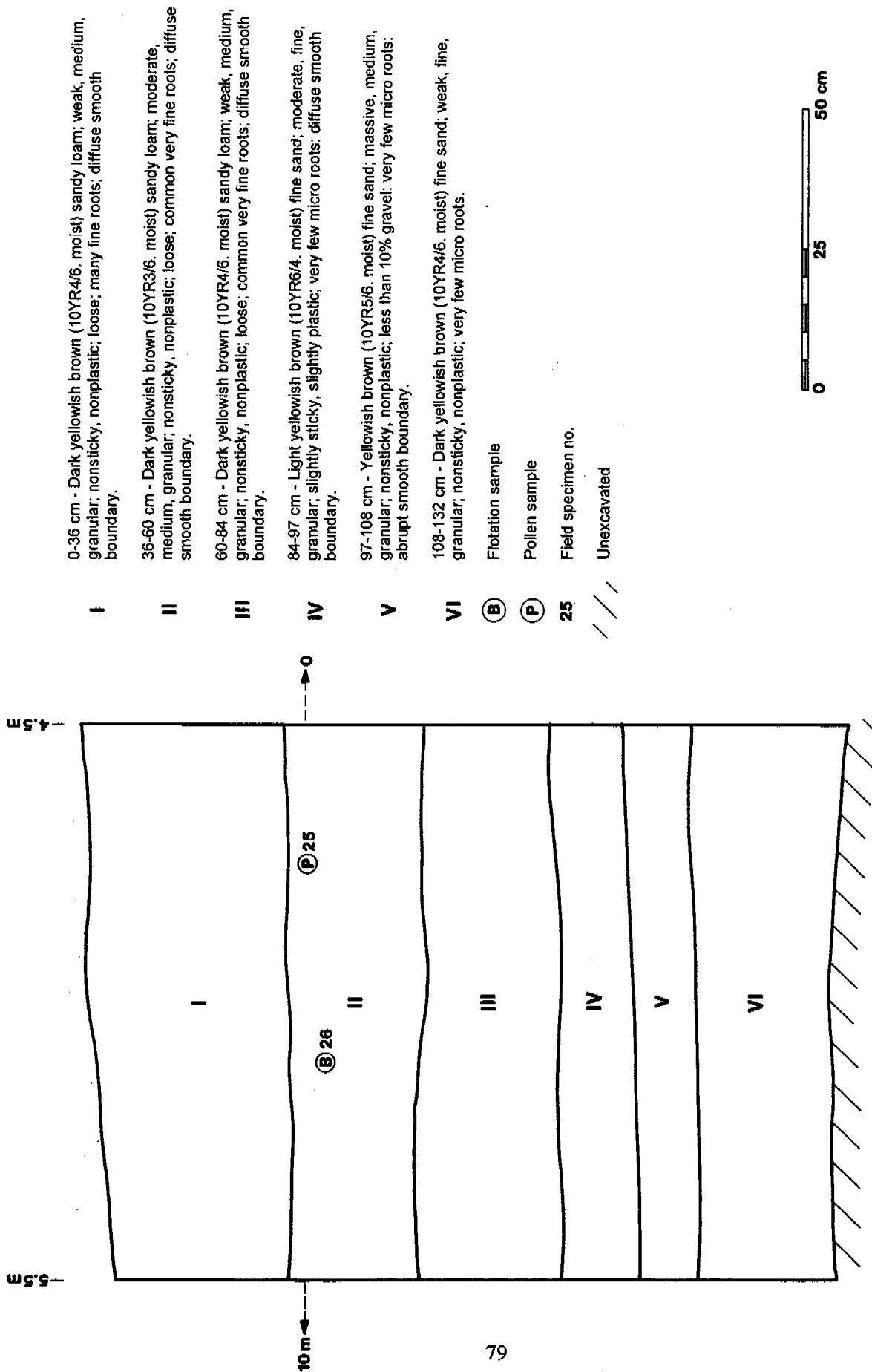


Figure 8.5. Site LA 26319 Study Unit 3, North-facing Profile.

began at coordinates N104.10, E171.18 and extended eastward 10 m to N108.47, E179.31 (Figure 8.2). This trench was placed in an area of very light artifact scatter and aeolian deposits. The maximum depth of the trench near the middle was 1.33 m.

One 1-m-long representative profile of the north-facing trench wall was drawn of SU 4 (Figure 8.6). Three strata were identified within the trench. Stratum I, dark yellowish brown sandy loam, represents a weakly developed A horizon. No artifacts or features were observed within the stratum. Both Strata II and III were sterile of cultural deposits. Stratum III, interestingly, has the same characteristics (laminated layers of fine sand) as Stratum III in SU 3 at site LA 48695. In those deposits, maize pollen was recovered, indicative of an agricultural field.

Study Unit 5. SU 5 was located within the southeast portion of the site and within the eastern right-of-way of the existing State Highway 602, began at coordinates N90.22, E184.94 and extended northward 9.6 m to N99.09, E180.26 (Figure 8.2). This trench was placed in an area of very light artifact scatter and ground disturbance. The maximum depth near the middle of the trench was 1.14 m.

One 2-m-long representative profile of the east-facing trench wall was drawn of SU 5 (Figure 8.7). Four strata were identified within the trench. Stratum I was recent aeolian deposition with no evidence of cultural deposits or features. Stratum II was brown soil that had the characteristics of an organic deposition as was also observed in SU 4. No artifacts or features were observed within this stratum. Stratum III consisted of dark yellowish brown soils with light inclusions of charcoal flecks, similar to SU 1 and 3. Stratum IV consisted of sterile matrix with no evidence of cultural deposits or features. Evidence of organic deposition in Strata II and III indicates possible prolonged agricultural practice in this portion of the site.

Mechanical Stripping

Mechanical stripping was conducted on site LA 26319 in order to investigate the possibility of

buried cultural deposits or features on the east side of the existing State Highway 602. Information recovered from the hand excavation and mechanical excavations were used to determine the depth of the surface stripping. A total of 693 sq m of area was stripped using a backhoe to an approximate depth of 0.50 m. A total of four features were identified as a result of the mechanical stripping.

Feature Descriptions

Feature 1

Feature 1 was located on the east side of State Highway 602 within the eastern site boundary, the center point grid coordinates for Feature 1 are N108.89, E169.14 (Figure 8.2). Feature 1 was a small bell-shaped earthen pit measuring 26 cm north-to-south by 31 cm east-to-west (Figure 8.8).

The west half of Feature 1 was excavated in one 18-cm level. The west-facing profile was drawn for Feature 1 (Figure 8.8). One stratum was identified within the feature fill. Stratum I consisted of sandy loam deposits with inclusions of charcoal. The east half was also excavated in one 18-cm level. Flotation and pollen samples were collected from the sediments of the feature fill. One maize cupule was identified within the flotation sample. No artifacts were recovered from the west and east half excavations of Feature 1.

Feature 2

Feature 2 was located 2 m east of Feature 1 on the east side of State Highway 602; the center point grid coordinates for Feature 2 are N109.39, E171.75 (Figure 8.2). Feature 2 was an earthen thermal feature with the charcoal scatter measuring 1.50 m in diameter and the basin hearth measuring 47 cm in diameter and 14 cm deep (Figure 8.9).

The charcoal scatter was bisected and the west half excavated in two 10-cm levels. The west-facing profile was drawn of the charcoal scatter (Figure 8.10). One stratum was identified within the charcoal scatter. Stratum I consisted of sandy loam deposits with inclusions of charcoal and fire-cracked rocks. Artifacts recovered in Level 1

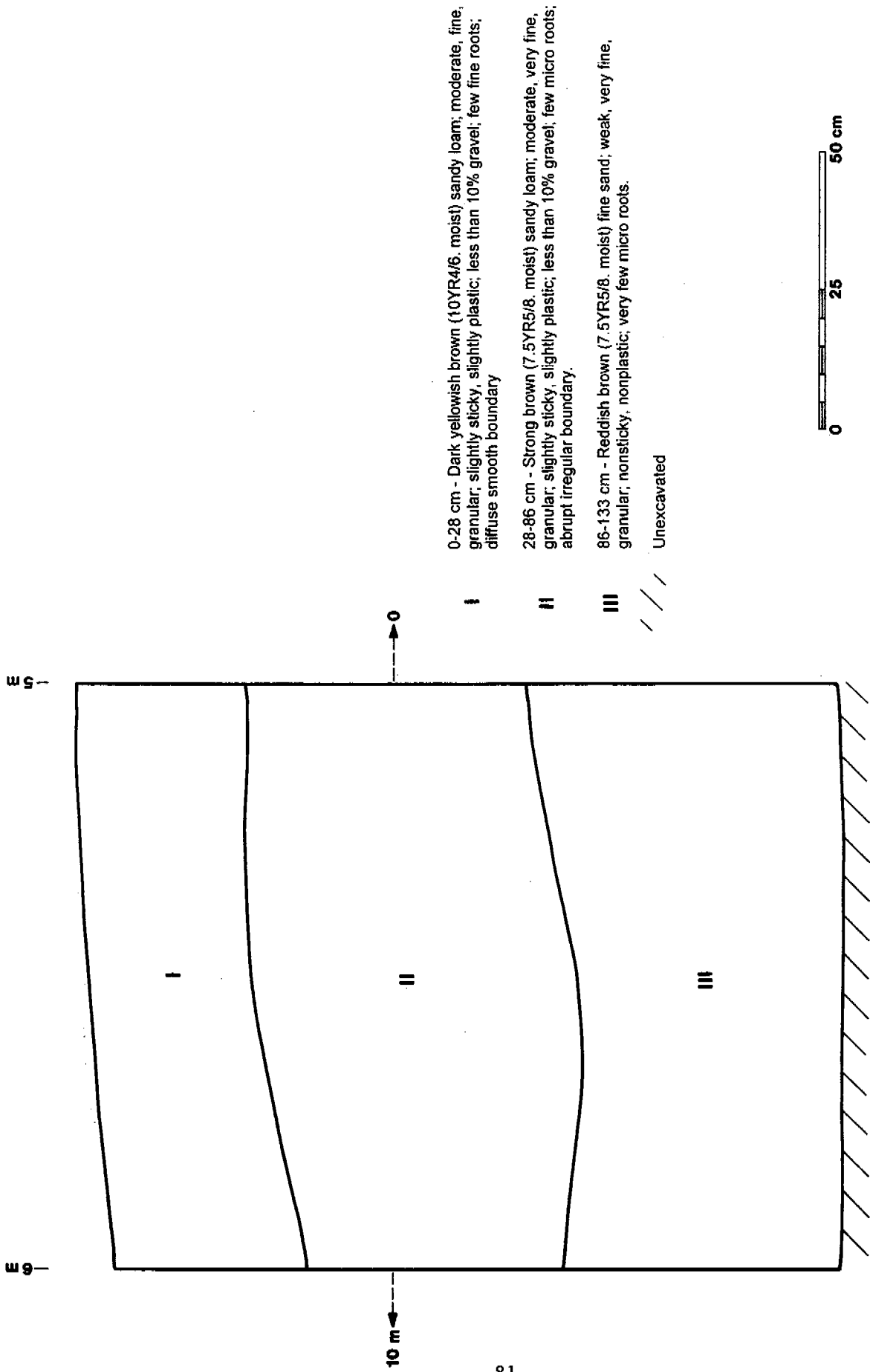
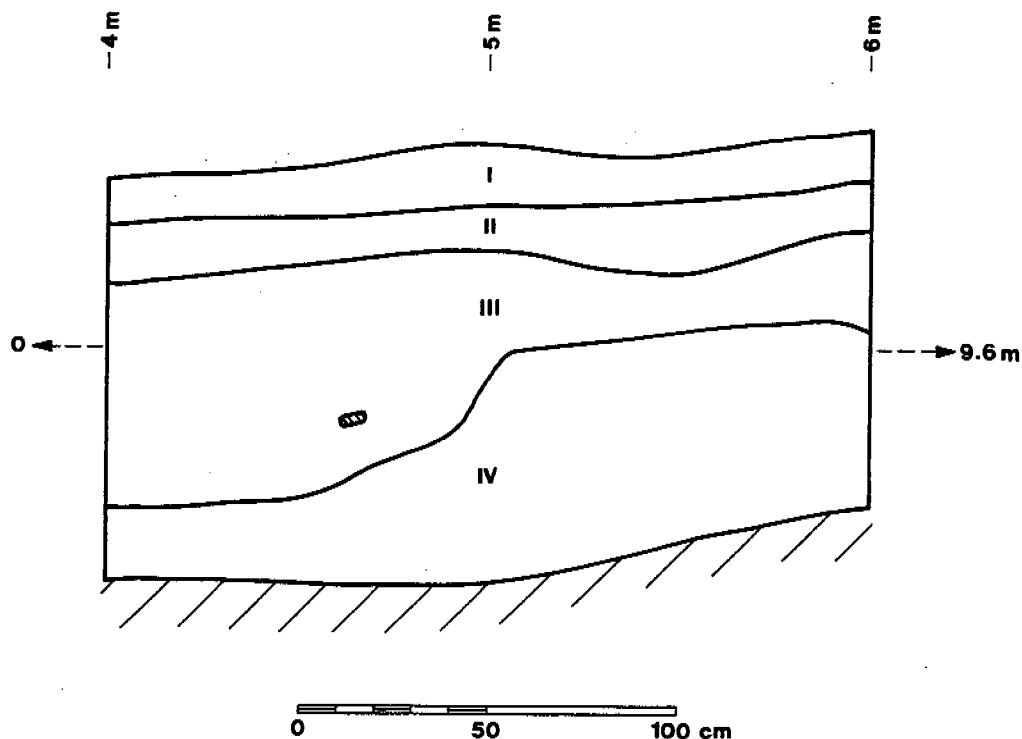


Figure 8.6. Site LA 26319 Study Unit 4, North-facing Profile.





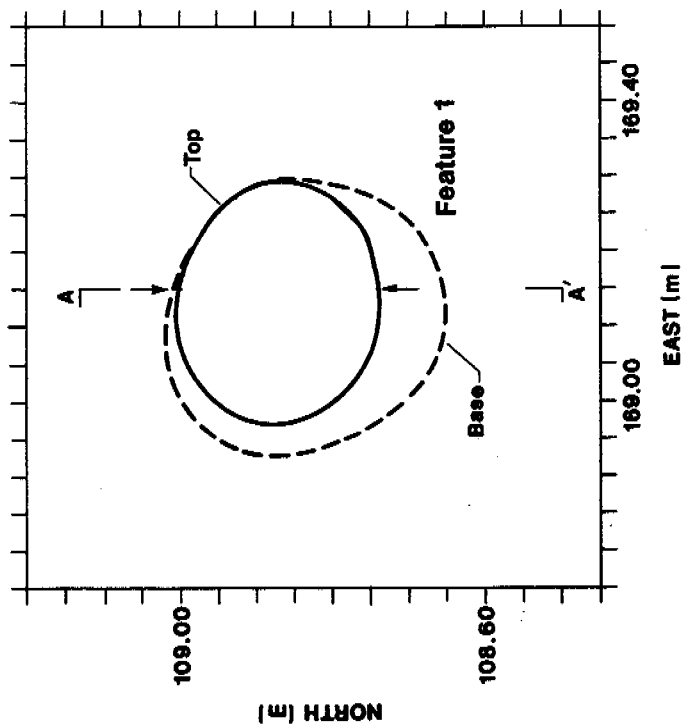
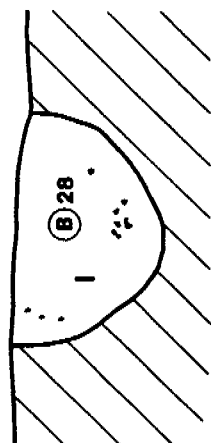
- I** 0-17 cm - Dark yellowish brown (10YR4/4. moist) sandy loam; weak, fine, prismatic; slightly sticky, slightly plastic; less than 10% gravel; common very fine roots; diffuse smooth boundary.
- II** 17-28 cm - Brown (10YR4/3. moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few very fine roots; abrupt smooth boundary.
- III** 28-66 cm - Dark yellowish brown (10YR3/6. moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; diffuse irregular.
- IV** 66-114 cm - Strong brown (7.5YR5/6. moist) fine sand; weak, very fine granular; nonsticky, nonplastic; less than 10% gravel; very few micro roots.
-  Sandstone rock
-  Unexcavated

Figure 8.7. Site LA 26319 Study Unit 5, East-facing Profile.



West-facing profile



0-18 cm - Dark yellowish brown (10YR4/6, moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; abrupt smooth boundary.

I

ⓑ Flotation sample

28 Field specimen no.

Charcoal flecks

Unexcavated

Cross section

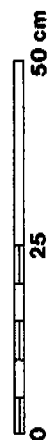
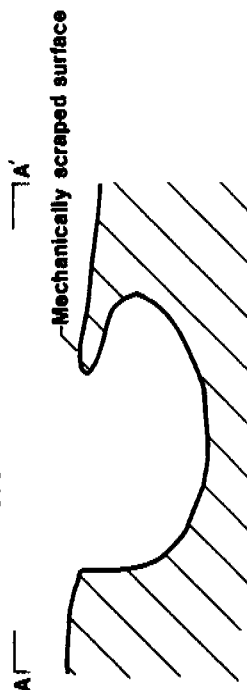


Figure 8.8. Site LA 26319 Feature 1, Plan View, Cross Section, and West-facing Profile.

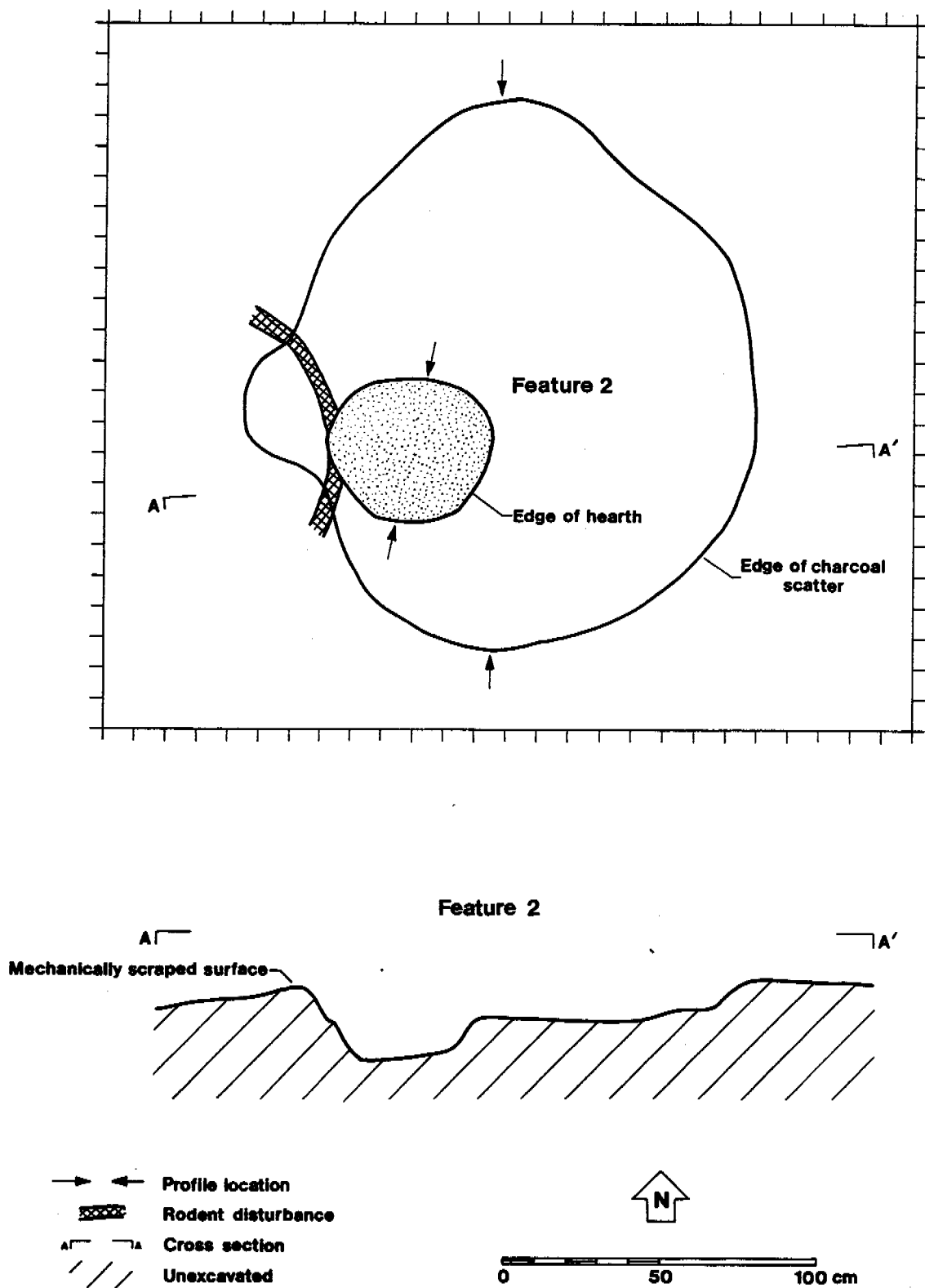
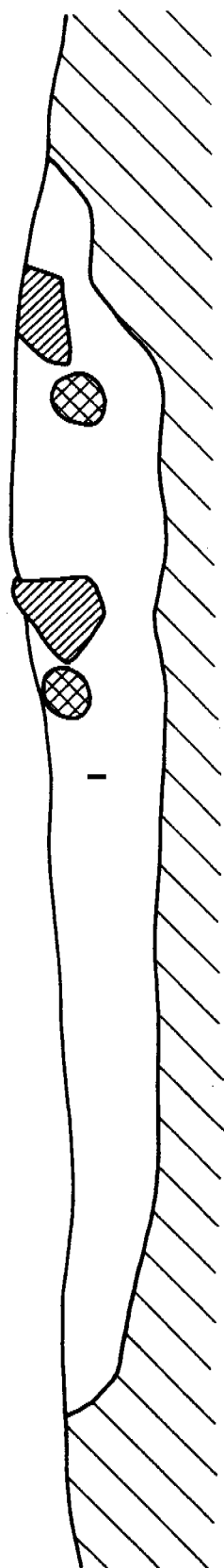


Figure 8.9. Site LA 26319 Feature 2, Plan View and Cross Section.

West-facing profile of charcoal scatter



0-16 cm - Dark yellowish brown (10YR3/4, moist) sandy loam; weak, medium, granular; nonsticky, nonplastic; few fine roots; abrupt smooth boundary.

I



Sandstone rock

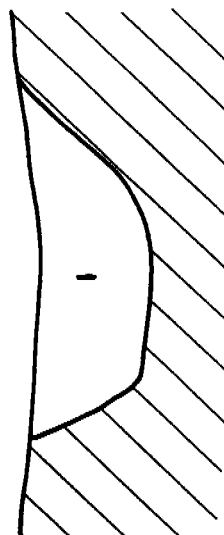


Rodent disturbance



Unexcavated

West-facing profile of hearth



16-29 cm - Dark yellowish brown (10YR3/4, moist) sandy loam; weak, medium, granular; nonsticky, nonplastic; few fine roots; abrupt smooth boundary.

I



Unexcavated



Figure 8.10. Site LA 26319 Feature 2, West-facing and East-facing Profiles.

of the west half included flaked stone and ground stone fragments. Flaked stone artifacts were recovered from Level 2, and a vegetal sample was collected. The excavation of the east half recovered flaked stone and ground stone artifacts.

The basin-shaped hearth was located at the western limits of the charcoal scatter. The west half of the hearth was excavated first in one 14-cm level. The fill within the hearth was identical to that of the charcoal scatter: sandy loam deposits with inclusions of charcoal and fire-cracked rock. No artifacts were recovered in the west half of the hearth. A single fragment of ground stone artifact was recovered from the east half.

A charred pine umbo and a charred maize cupule recovered from the Feature 2 indicate that the feature functioned for subsistence purposes.

Feature 3

Feature 3 was located 2.5 m north of Feature 2 on the east side of the highway, the center point grid coordinates for Feature 3 are N112.78, E170.57 (Figure 8.2). Feature 3 was a bell-shaped earthen pit measuring 45 cm north-to-south by 50 cm east-to-west at the top and 24 cm deep (Figure 8.11).

The east half of the feature was excavated in one 24-cm level. The east-facing profile of Feature 3 was drawn (Figure 8.12). Two strata were identified within the feature fill. Stratum I consisted of sandy loam deposits with inclusions of charcoal. Stratum II consisted of sandy loam deposits with very light inclusions of small charcoal flecks. A flotation sample was collected from the fill sediments and a pollen sample was scraped from the base of the feature. Charred Cheno-am and goosefoot seeds were recovered from the flotation sample. No artifacts were recovered from east and west half excavations of Feature 3. Evidence of rodent and root disturbance were recorded during the excavation.

It is possible that Feature 3 was a small storage pit at one time; however, the integrity of the feature was destroyed by rodent burrowing and

roots. As Smith states (below and Chapter 25), processed maize would not leave a strong pollen signature. In other Basketmaker II sites she suggests that bell-shaped pits were used to store husked, or processed, maize, rather than maize just harvested.

Feature 4

Feature 4 was located 4 m northeast of Feature 2 on the east side of State Highway 602; the center point grid coordinates for Feature 4 are N111.97, E175.21 (Figure 8.2). Feature 4 was an oblong earthen pit measuring 90 cm northwest-to-southeast by 42 cm northeast-to-southwest and 20 cm deep (Figure 8.13).

The east half of Feature 4 was excavated in one 20-cm level. The west-facing profile was drawn for Feature 4 (Figure 8.14). One stratum was identified within the feature fill and consisted of sandy loam deposits with very light inclusions of charcoal. The west half was also excavated in one 20-cm level. One ground stone fragment was recovered from the west half. The excavation of the east half of the feature resulted in no recovery of artifacts. Roots were the only disturbance documented during the excavation. A flotation sample was collected from the sediments of the west half and a pollen sample was scraped from the base of the feature. This sample revealed high concentrations of Cheno-am pollen (described below).

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Thirty-one sherds were analyzed from site LA 26319. Six sherds were recovered from within the right-of-way. These sherds received a complete attribute analysis as described in Chapter 21. The other 25 sherds were surface artifacts located outside the right-of-way. These sherds were not collected but, instead, analyzed in the field. As a result, the only two attributes recorded for these 25 artifacts were form and type. Appendix D outlines the ceramic data by provenience. The assemblage contains

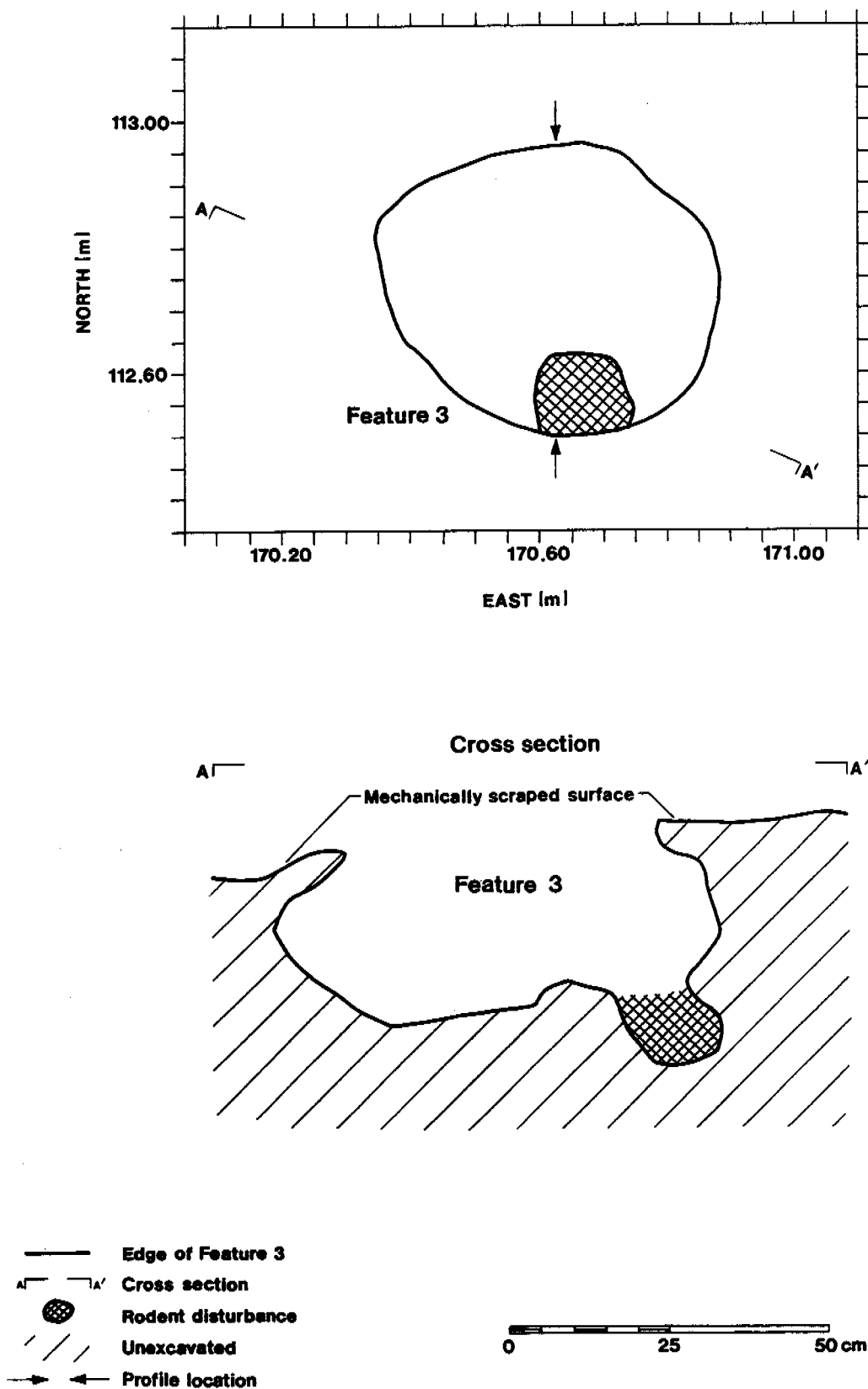


Figure 8.11. Site LA 26319 Feature 3, Plan View and Cross Section.

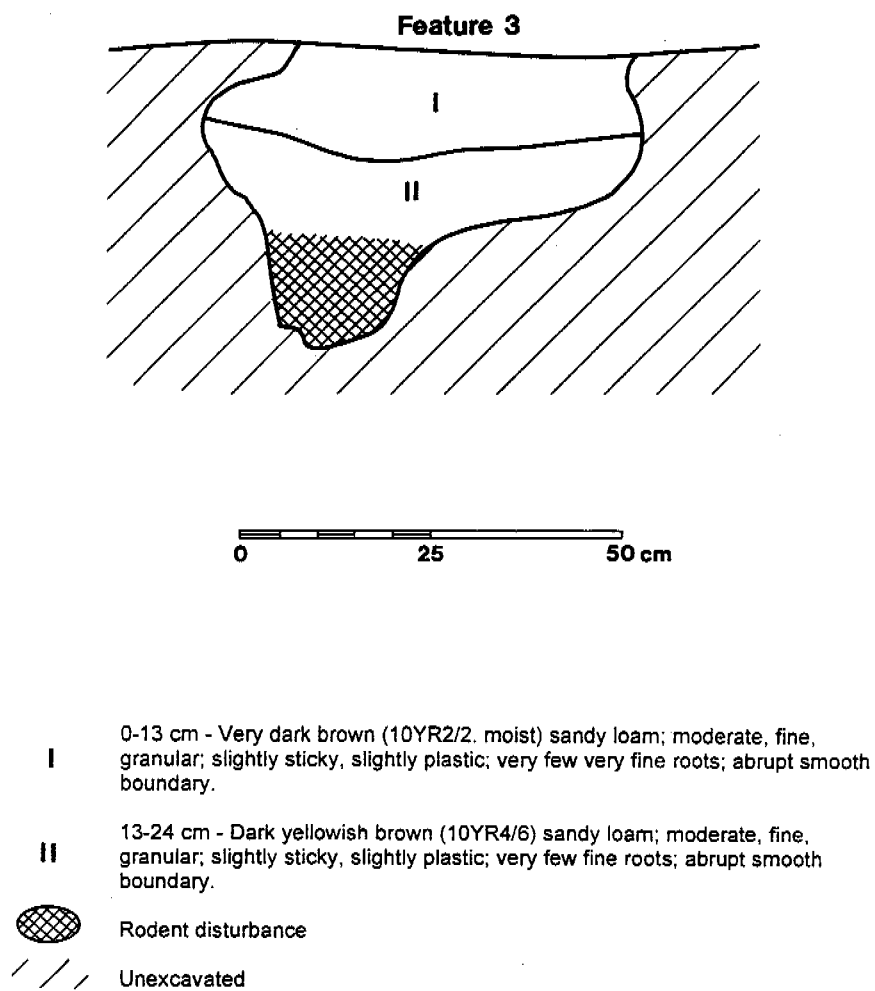
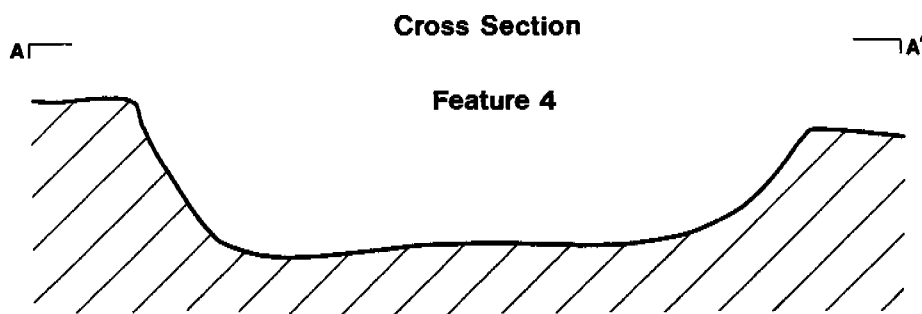
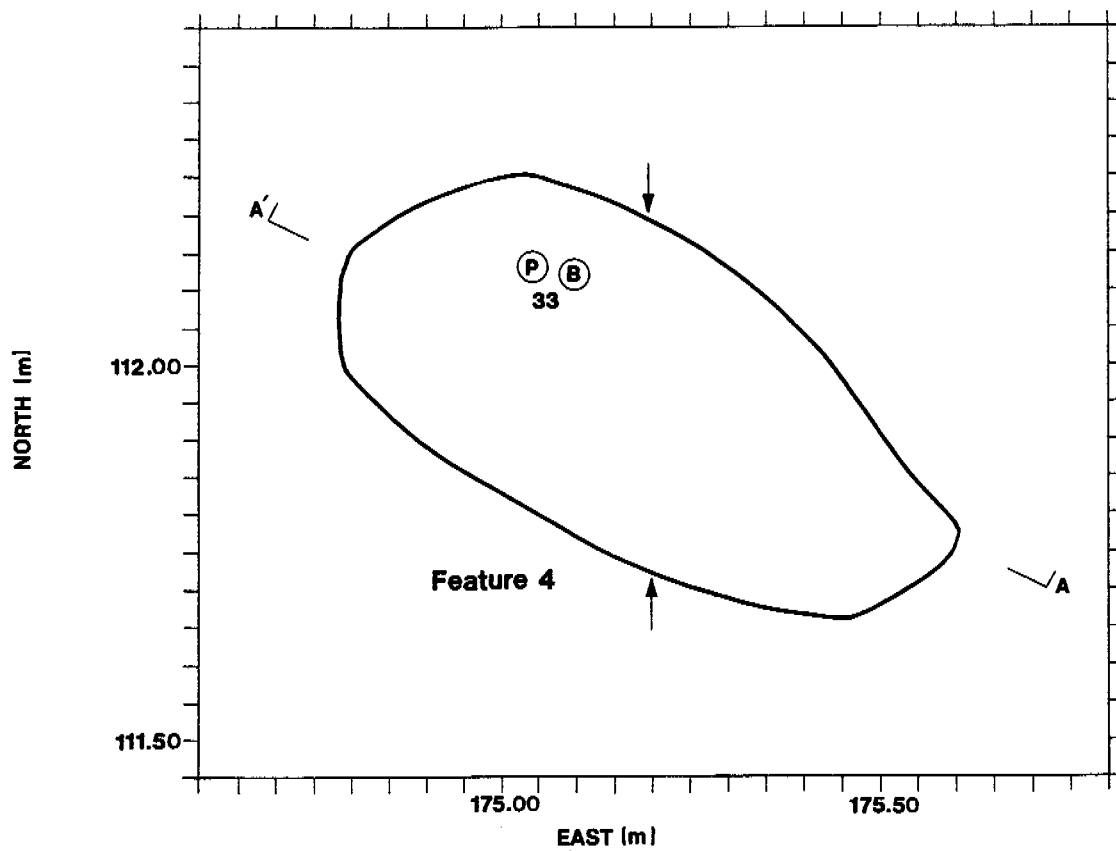


Figure 8.12. Site LA 26319 Feature 3, East-facing Profile.



- Edge of Feature 4
- (P) Pollen sample
- (B) Flotation sample
- 33 Field specimen no.
- A—A' Cross section
- /// Unexcavated
- ← Profile location

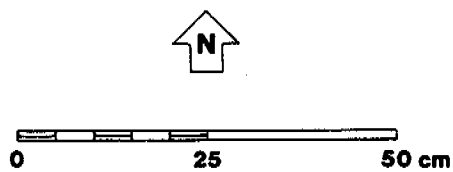
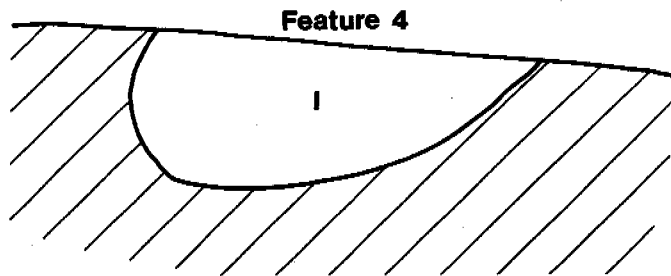


Figure 8.13. Site LA 26319 Feature 4, Plan View and Cross Section.



0 25 50 cm

- I 0-21 cm - Strong brown (7.5YR5/6. moist) sandy loam; moderate, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.
- /// Unexcavated

Figure 8.14. Site LA 26319 Feature 4, West-facing Profile.

wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware.

Chronometrics

Five diagnostic ceramic artifacts were recorded on the surface outside the right-of-way. Among the Cibola White Ware, two Escavada Black-on-white sherds and one Gallup Black-on-white sherd were identified. Among the White Mountain Redware, one Puerco Black-on-red sherd and one Wingate Black-on-red sherd were identified. These types make up a ceramic assemblage that dates from the late Pueblo II period to the early Pueblo III period (AD 1050 to 1175).

A mean ceramic date of AD 1084 \pm 50 years was generated for the surface collection. This date supports an earlier date range than suggested by the diagnostic ceramic assemblage discussed above. This mean ceramic date supports a middle to late Pueblo II (AD 1025 to 1150) temporal designation for site LA 26319. Chapter 21 presents further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There are a total of 23 jars, 7 bowls, and 1 ladle present. Most of the sherds were identified as coming from jar bodies, although one ladle handle, four bowl bodies, and three bowl rims were also recorded. Both bowl and jar forms are represented in the whiteware sherds, while all redware sherds are from bowls and all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of approximately 3/1. Neither sooting nor modification was recorded for this assemblage. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site. Chapter 21 offers a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for the six indented corrugated Cibola Gray Ware sherds collected from within the right-of-way. Five sherds were tempered with sherd, the most common tempering material for Cibola Gray Ware. One sherd was tempered with a combination of sherd and sand; this combination is not uncommon for Cibola Gray Ware. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The ceramic assemblage from site LA 26319 is very small and comes from surface collections. A variety of wares common to the area are present at the site, including five diagnostic sherds. The date range for the ceramic assemblage of diagnostics supports a late Pueblo II to early Pueblo III temporal range (AD 1050 to 1175). This date range is contrasted by a mean ceramic date of AD 1084 \pm 50 years, a middle to late Pueblo II date. Functional variation among ceramics suggests a variety of activities practiced at the site.

Flaked Stone Artifacts

Twenty flaked stone artifacts were recovered from site LA 26319. Twelve of these artifacts come from the Basketmaker II component of the site while the remaining eight artifacts were found in Pueblo II contexts. Table 8.1 provides frequencies and percentages for the artifact classes present in the site LA 26319 Basketmaker II and Pueblo II components. Artifacts from within the features or on the surface on the east side of the highway are considered to be of Basketmaker II origin, while those artifacts on the western side of the road (and near the rubble mound) are considered to be part of the Pueblo II assemblage.

Basketmaker II Assemblage

As Table 8.1 shows, cores and reduction products (in the form of primary and secondary

Table 8.1. Summary Counts and Percentages of Site LA 26319 Basketmaker II and Pueblo II Flaked Stone Artifacts by Artifact Class.

Artifact Class	Basketmaker II		Pueblo II		Total	
	n	%	n	%	n	%
Core	2	16.7	-		2	10.0
Debitage	5	41.7	2	25.0	7	35.0
Debris	4	33.3	6	75.0	10	50.0
Projectile Point	1	8.3	-		1	5.0
Total	12	100.0	8	100.0	20	100.0

flakes and debris) comprise 91.7% of this small Basketmaker II assemblage. The cores are both single platform and show little evidence of intensive reduction. However, some platform preparation in the form of faceting was observed on the quartzite core. Percussion marks present on the reduction surface of the quartzite core reflect unsuccessful attempts to start another platform prior to abandonment. Both cores were likely abandoned due to hinge fracturing.

With the exception of the one quartzite core, the Basketmaker II flaked stone assemblage is composed almost entirely of chert (91.7%). This is consistent with the overall Basketmaker II pattern of high chert exploitation (92.7% of all Basketmaker II artifacts analyzed in this study are chert) and only minor use of other raw materials such as quartzite and silicified wood. As exemplified by the two cores in this assemblage, small secondary alluvial cobbles and pebbles of chert and quartzite were selected for reduction. The project area contains abundant alluvial gravel deposits which appear to have been exploited as sources for lithic raw materials used by the Basketmaker II inhabitants of this site.

The presence of the cores, primary and secondary reduction products, and debris in this assemblage provide evidence of lithic reduction activity at the site. The single chert projectile point preform also suggests that bifacial reduction was occurring at the site (although no tertiary reduction debris was found). It may, however, have been brought to the site in its current form

and then discarded. There are two possible interpretations which can account for the relative paucity of flake stone artifacts in this component: (1) lithic reduction and/or tool production was only a minor activity at the site, or (2) the occupation itself was ephemeral or of short duration. Due to the small sample size, more detailed conclusions concerning site function and Basketmaker II technological organization or raw material economy are not possible.

Pueblo II Assemblage

The Pueblo II flaked stone assemblage at site LA 26319 consists of a total of eight pieces of debris anddebitage. The six pieces of debris are chert. One piece of debris is very large, weighing 23 g, while the remaining pieces weigh 2 g or less. The 23-g piece is a cortical chert chunk containing severe internal flaws. The high percentage of cortex (greater than 75%) suggests this large chunk was a primary reduction product. Its angular, chunky (rather than flake-like) form appears to be the result of the internal fractures inherent in the raw material.

Of the two pieces ofdebitage recovered, one piece is a quartzite primary flake and the other is a chert tertiary flake. The presence of a tertiary (retouch or trimming) flake suggests some tool production or tool maintenance activity took place during the Pueblo II occupation of the site. Given the small sample size, it would not be useful to go beyond simply noting the dominance of chert in this assemblage (87.5% or seven of the eight total

pieces) and the presence of the one piece of quartzite debitage. The small sample size also precludes further inferences concerning Pueblo II lithic technology or raw material economy based solely on this assemblage.

Ground Stone Artifacts

A total of five ground stone artifacts were recovered from site LA 26319. A sandstone trough metate fragment, recovered from the surface of this site, is shaped and has parallel striations on one surface. A two-hand mano fragment, also of sandstone, was recovered during stripping of the eastern portion of the site. This item is shaped and has parallel striations on one surface only.

Three ground stone artifacts were found within Feature 2, a basin-shaped earthen hearth within a charcoal scatter. Two of the ground stone artifacts were recovered from the charcoal scatter and one was within the fill of the hearth. A basin metate fragment and a complete passive abrader, both of sandstone, were found within the charcoal scatter. The metate is ground and shaped on one surface but no striations are visible. The abrader has parallel striations on one surface. An indeterminate mano fragment, recovered within the fill of the hearth, is made of sandstone and has parallel striations on one surface.

Macrobotanical Remains

The floral assemblage consisted of maize, weedy annuals, and an unknown grass. The hearth produced the richest array of plant remains including maize cupules and goosefoot, pitseed goosefoot, cheno-am, and unknown grass seeds. The Cheno-Am category refers to seeds that could be either in the genus *Chenopodium* or *Amaranthus*. This category is used when the condition of a seed prohibits a more specific identification.

Documented economic uses of weedy annuals like goosefoot and pigweed seeds abound in the ethnographic literature. Castetter (1935) describes the use of these as a ground meal, either eaten as

gruel or combined with other food such as corn meal and made into cakes. Grasses were used extensively by Southwestern groups (Doebley 1984) and it is no surprise that these resources, rich in carbohydrates, are usually part of archaeobotanical assemblages from all time periods. Wood taxa identified from flotation and radiocarbon samples were solely coniferous and included unknown conifer, pinyon, and pine.

A vegetal specimen from the hearth was identified as a charred scale or umbo from a pine cone. The umbo could represent fuel residue, or if the cone fragment came from a pinyon tree, debris from roasting pinyon nuts in the cone. Reagan (1928:146-147) refers to this method of roasting pinyon nuts by the White Mountain Apache of Arizona: "The females go in large numbers to gather piñon nuts every fall.... The nuts are gathered in the cone which is either burned off the nuts near where gathered or after the return home. In this process of charring the cones, the nuts are roasted." However, a lack of pinyon nutshell from the floral assemblage suggests the umbo is more likely to be residue from fuel wood use rather than nut roasting activities.

Occupants of site LA 26319 were probably cultivating maize nearby, using locally available wood for fuel, and collecting weedy annual and grass seeds. Weedy annual seeds mature in late summer, while grasses, depending on whether they are cool- or warm-season types, can be harvested in the spring or summer to early fall. The presence of maize, grass, and weedy annuals suggests occupation of the site took place possibly in spring and into the fall.

Pollen

The pollen samples analyzed from site LA 26319 included one sample from around the edge of an extramural hearth and base samples from three extramural pits. The pollen assemblage from the Feature 2 hearth sample was characterized by high representations of juniper (6%), sunflower family (35%), spurge (5%), and beeweed (7%). The base sample from pit Feature 1 had a low pollen concentration (600 gr/cc), high juniper

(5%) and Cheno-Am (38%), and moderate grass (3%) and beeweed (3%). The pollen sample from pit Feature 3 produced a high pollen concentration (1800 gr/cc), high percentages of sagebrush (4%), spurge (4%), and beeweed (5%) with moderate grass (3%) and buckwheat pollen (2%). Pollen concentration was high in the pit Feature 4 sample at 3200 gr/cc probably due to high frequencies of Cheno-Am (47%) and sunflower family (34%). Buckwheat was high in the Feature 4 sample at 1%.

No maize pollen was identified from site LA 26319, but the representation of weedy plants and grass in the pit samples suggest nearby fields, disturbed ground around the pits, or deliberate harvests of Cheno-Am, beeweed, grass, and sunflower family were associated with the features. Husked maize may have been stored in the pits and would not have left a significant pollen signal (Geib and Smith 1998).

STRATIGRAPHY

The stratigraphy of site LA 26319 comprises primarily laterally continuous strata across the eastern portion of the site. Strata I through III were all described as sandy loams. Stratum I (which contained artifacts on its surface) is continuous across the eastern portion of the site (with a slightly different color towards its southernmost extent). Stratum II is darker than Stratum I, comprising more organic accumulation, and may represent a buried humic A horizon (though weakly developed). Stratum III represents the cultural horizon within the stratigraphy of the eastern portion of the site. The features described above occur within this stratum. Cultural indicators such as artifacts and charcoal flecks are present from SU 3 southward to SU 5. Interestingly, Stratum III in SU 4 is characterized by laminated fine sands. Maize pollen and charcoal flecks were recovered from that stratum, indicative of an agricultural setting. Given maize remains from Feature 2 at site LA 26319, the laminated fine sands here may also be indicative of agricultural activities.

Below the cultural horizon of Stratum III are fine sand deposits that are sterile of cultural deposits. Stratum V in SU 3, however, did contain charcoal flecks. No other indications of cultural activity, such as artifacts or features, were observed with this stratum.

CHRONOMETRIC DATA

Chronometric data from site LA 26319 consists of one radiocarbon date for Feature 2 and the ceramic assemblage associated with the small rubble mound outside the western right-of-way. The radiocarbon sample consisted of charred *Pinus* sp. *Pinus edulis*, and unknown conifer, returning a date of 2350 ± 80 BP (Beta-121230; Appendix A). The calibrated intercept date for this sample is 395 BC. For the later component, Eckert and Hagopian (in the section above) calculate a mean ceramic date of $AD 1084 \pm 50$ for the ceramic artifact assemblage.

SUMMARY

Site LA 26319 is a multicomponent site located along a ridge overlooking the valley of Y Unit Draw. Components identified during our investigations date to the Basketmaker II and to late Pueblo II periods. The earlier component is located entirely along the eastern side of the highway (at the valley margin), and comprises four earthen features. These features, along with ground stone and flaked stone artifacts and archaeobotanical data, indicate subsistence-related activities were conducted at this site. Maize agriculture and harvesting and storage of Cheno-Am, beeweed, grass, and sunflower are indicated by the archaeobotanical information recovered from the features (and possibly from the stratigraphy). The flaked stone assemblage for this component supports a short-term occupation or specialized function, which is consistent with a subsistence-related interpretation for this component.

The later component, represented by a small rubble mound and associated artifacts, dates to the late Pueblo II. Similar in many ways to site LA

115334, this mound is located on a ridge spur overlooking the valley bottom of Y Unit Draw. Short-term or seasonal habitation is inferred from the mound's small size and light density of artifacts, and no apparent pitstructure within the

right-of-way. Subsistence-related activities were likely a focus of this component's function. Without testing outside the project area, however, it is impossible to further determine the nature of this component of site LA 26319.

Chapter 9

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 26309

Jerome Zunie and James W. Kendrick

with Analytic Contributions by Jeffrey E. Shokler

INTRODUCTION

Archaeological investigations were conducted at site LA 26309 between 9 and 11 March 1998. The site comprises two small rubble mounds and an associated artifact scatter. Located at approximately 2079 m (6821 ft) above mean sea level on a bedrock ridge overlooking an alluvial fan, the site is similar in setting to others in the project area. Although the rubble mounds are intact and stable, a large portion of the site was destroyed by previous road construction. Vegetation within the right-of-way consist primarily of grasses, while juniper and pinyon remain beyond the western right-of-way fence. Our investigations were conducted only within the site boundaries within the right-of-way, east of the existing State Highway 602.

SURVEY RESULTS

Abbott (1997:44) recorded both rubble mounds and the associated artifact scatter (flaked stone artifacts and ceramics), along with a "light scatter of artifacts" (Figure 9.1) on the eastern side of the right-of-way. Only one diagnostic ceramic sherd was observed during the survey (one Kiatuthlanna Black-on-white sherd); this suggested the site dated to the late Pueblo I or early Pueblo II period. Lithic artifacts observed included a hammerstone and four pieces of chert debitage. One silicified wood core was also observed. Site LA 26309 had previously been recorded by Holmes (1980), who recorded only one mound and observed a single whiteware sherd.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations, the entire site was examined again by pedestrian survey in transects at 2-m intervals. All surface artifacts were then

marked with a pin flag and collected. Artifacts collected from the surface within the right-of-way on site LA 26309 included lithic and ground stone artifacts. All artifacts located on the site (including those outside the right-of-way) were point located with a Sokkia Total Station.

Similar to site LA 26319, site LA 26309 also comprises a low-density scatter of both ceramic and flaked stone artifacts associated with the rubble features on the western side of the highway, while the eastern side comprises only flaked stone and ground stone artifacts (Figure 9.2). A higher density of flaked stone artifacts was observed along the eastern portions of the site, outside of the project area.

Excavation

Hand Excavation

Hand excavation of one 1-by-1-m unit was conducted in order to determine the nature and depth of cultural deposits on site LA 26309. An artifact distribution map generated from the controlled surface collection was used as a guide for the placement of the one unit. The test unit was excavated in arbitrary 10 cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit (SU) 1 was located in the east portion of the site, east of the existing State Highway 602. The southwest grid coordinates are N262.00, E228.00 (Figure 9.2). This 1-by-1-m unit was placed within a very light artifact scatter and in an area of severe ground disturbance by road construction.

SU 1 was excavated in three 10-cm levels. Three strata were identified (Figure 9.3). No cultural deposits were observed in the excavated

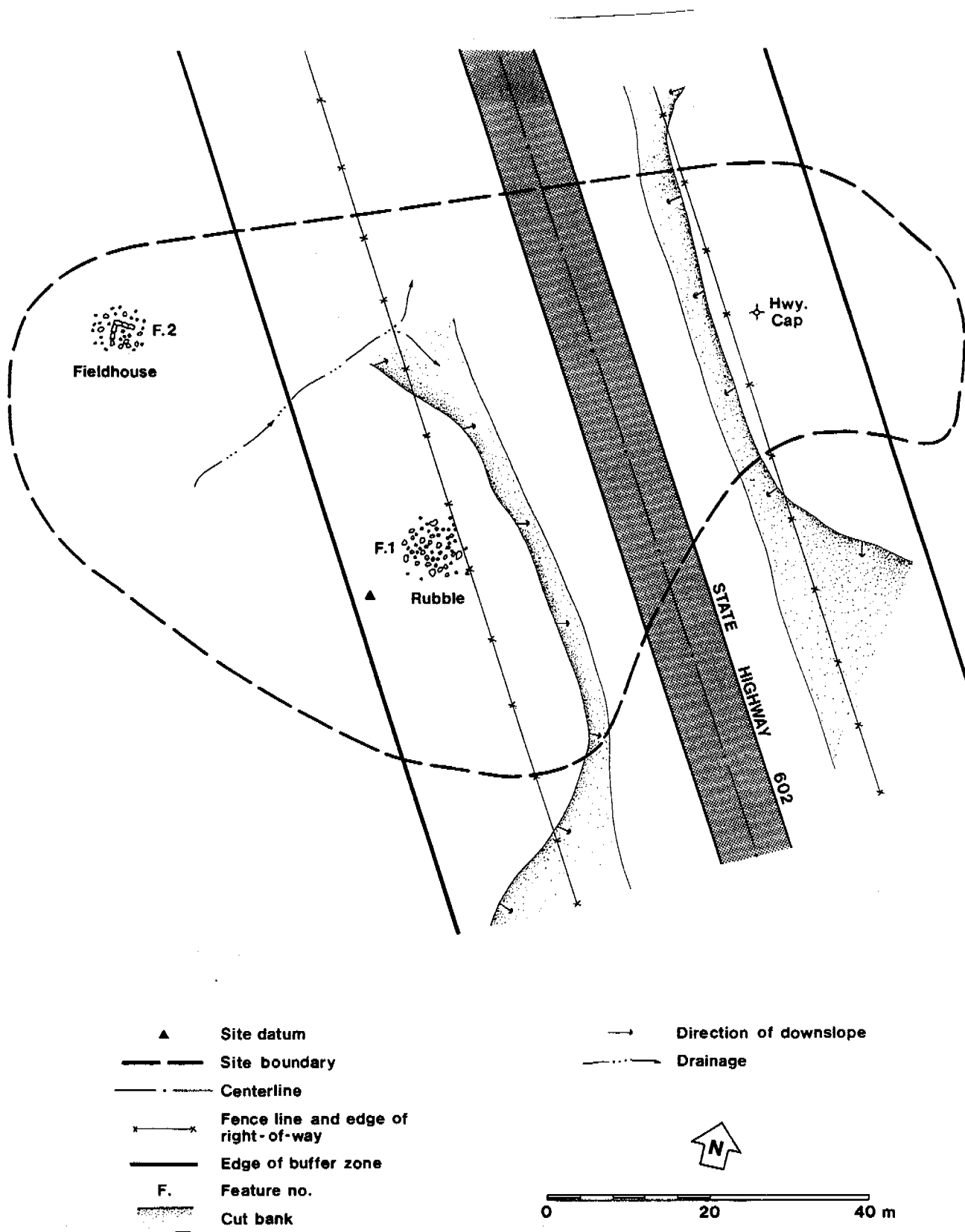


Figure 9.1. Site LA 26309 Survey Site Map.

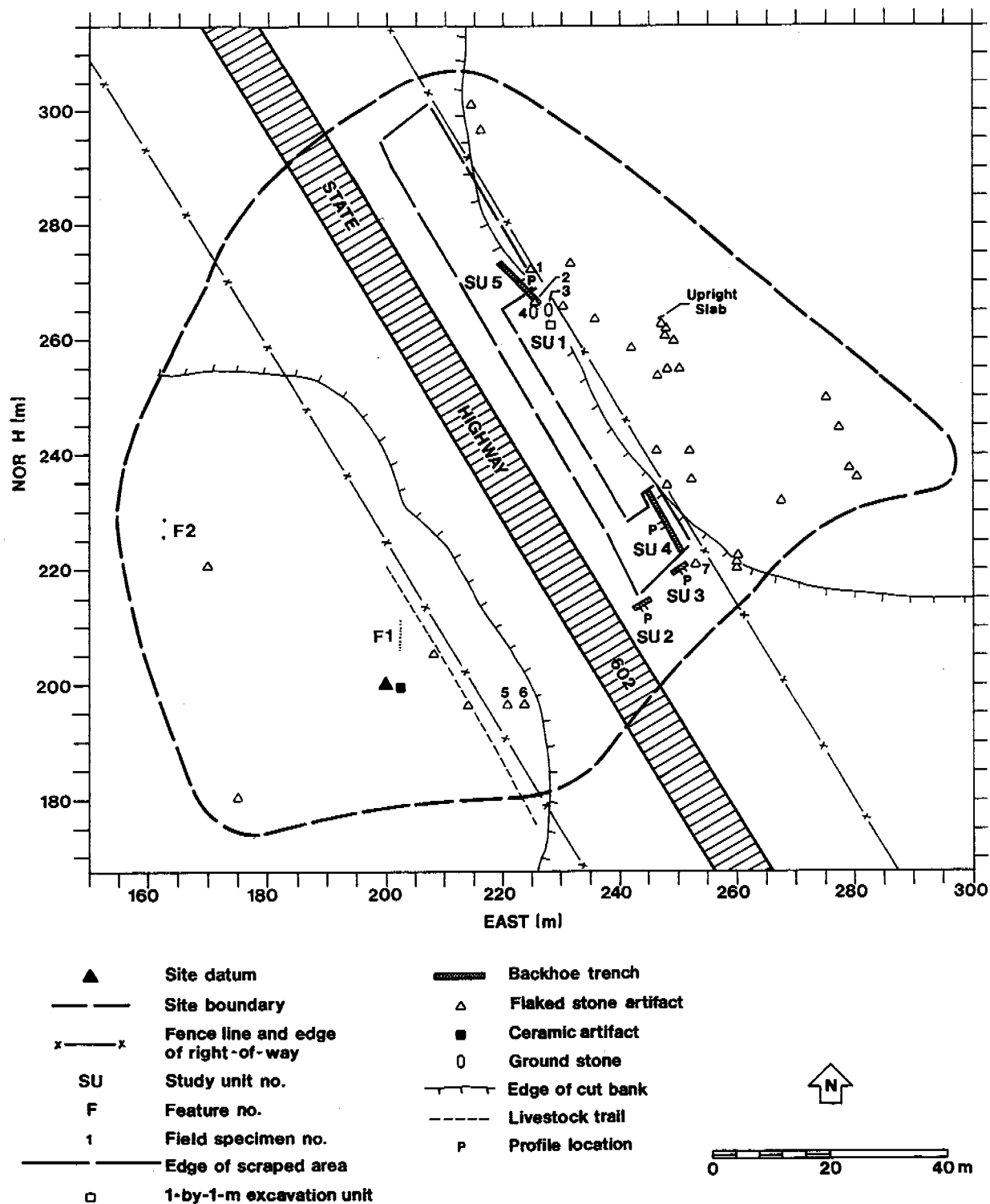


Figure 9.2. Site LA 26309 Data Recovery Site Map, Surface Artifacts, Features, Study Units, and Mechanical Stripping.

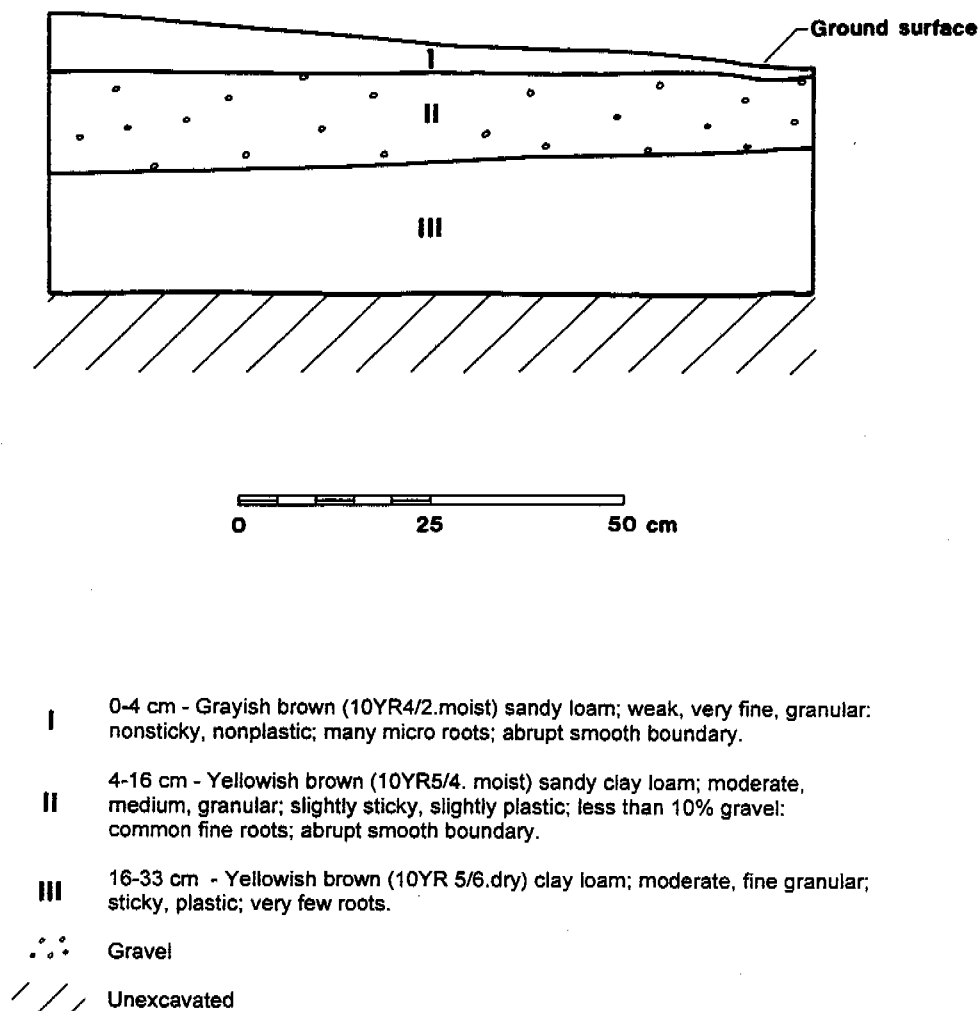


Figure 9.3. Site LA 26309 Study Unit 1, West-facing Profile.

levels of the unit. All three strata were of sterile matrix. Due to the absence of cultural materials or features, excavation of SU 1 was terminated after three sterile levels.

It is most likely that if any cultural materials or features were present within the east right-of-way and in the middle portion of the site, they were annihilated during the initial construction of State Highway 602.

Mechanical Excavation

Mechanical excavation of four trenches was conducted in order to determine whether additional buried cultural deposits or features were present on site LA 26309. The artifact distributions defined during the controlled surface collection, information recovered from hand-excavated unit, and the possibility of buried deposits within the eastern right-of-way and the eastern portion of the site were used as guides for the placement of the backhoe trenches.

The trenches were designated SU 2 through 5 (Figure 9.2). Excavated mechanical trenches were variable in length, ranged from 3.10 to 12.00 m in length, and totaled 28.20 m. The trenches were typically 0.70 m wide and a maximum of 0.95 m deep. A total of 5.00 m of trench profiles were illustrated. A Munsell soil chart was used to identify soil color within each stratum of the backhoe trenches.

Study Unit 2. SU 2, located within the site boundaries and within the eastern right-of-way of the existing State Highway 602, extended from grid coordinates N212.87, E243.14 eastward 3.50 m to N214.53, E245.19 (Figure 9.2). The trench was placed in an area that has undergone severe ground disturbance due to road construction. The maximum depth of the trench at the middle was 0.91 m.

One 1-m-long profile was drawn of SU 2. The profile was located along the north-facing wall near the middle of the trench (Figure 9.4). Three strata were identified within the trench. No cultural deposits or features were observed within

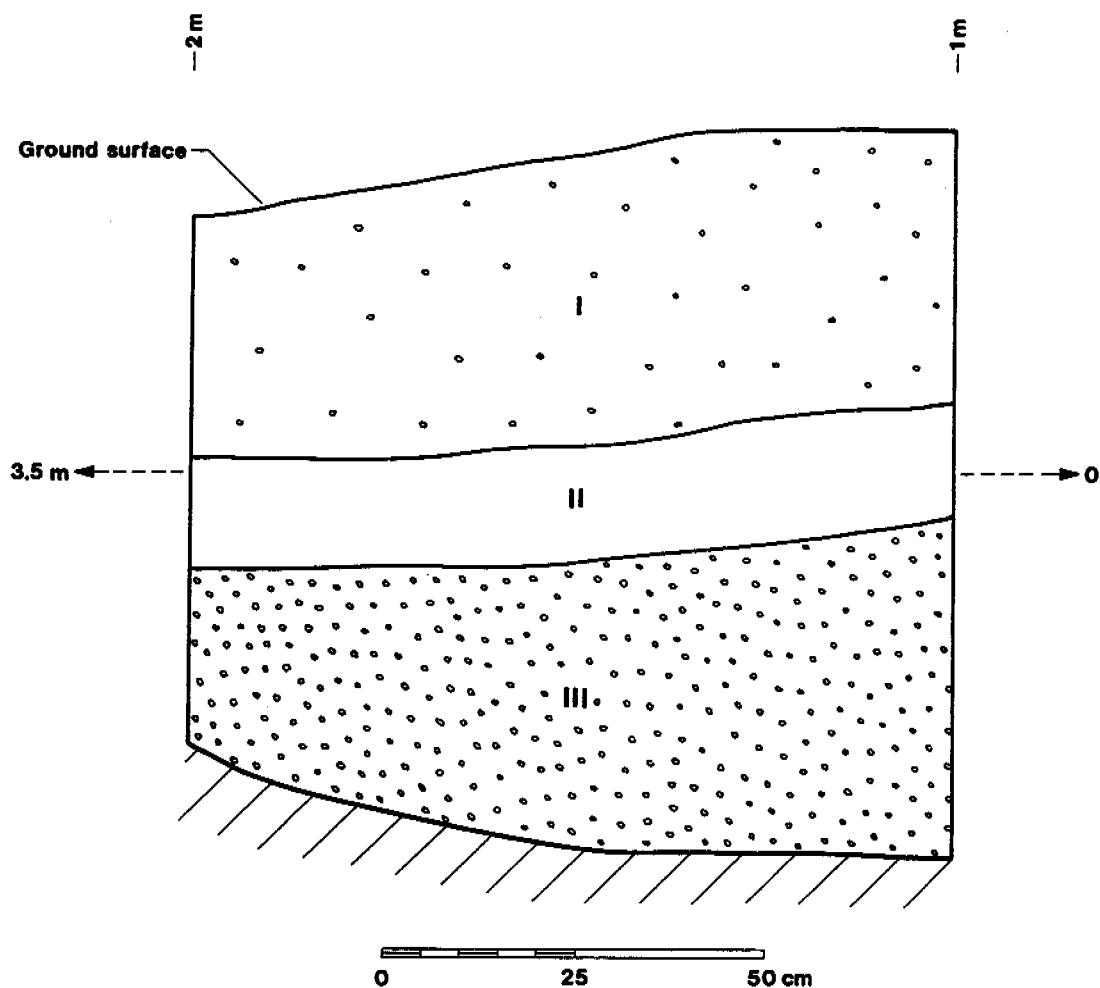
the trench. It is most likely that if any cultural deposits or features were located in this portion of the site, they were destroyed by the initial road construction. This trench demonstrated that the shoulder of the highway did not need to be included in the mechanical stripping.

Study Unit 3. SU 3, located within the boundaries of the site and within the right-of-way of the existing State Highway 602, began at grid coordinates N218.98, E249.62 and extended eastward 3.10 m to N220.61, E252.19 (Figure 9.2). This trench was placed in an area that had undergone severe ground disturbance due to road construction. The maximum depth of the trench at the middle was 0.94 m.

One 1-m-long profile was drawn of SU 3. The profile was located along the north-facing wall near the middle of the trench (Figure 9.5). Two strata were identified within the study unit and had no evidence of cultural deposits or features. Both strata had high amounts of gravels indicating alluvial activity in this part of the site. If any cultural deposits or features were located within this portion of the site they were destroyed by the initial road construction.

Study Unit 4. SU 4, located within the boundaries of the site and within the east right-of-way of the existing State Highway 602, extended from grid coordinates N222.80, E250.77 northwestward 12.00 m to N233.26, E244.90 (Figure 9.2). This trench was placed in an area that had undergone severe ground disturbance due to road construction. The maximum depth of the trench near the middle was 0.77 m.

One 1-m-long profile was drawn of SU 4. This profile was located along the east-facing wall near the middle of the trench (Figure 9.6). Two strata were identified within the trench. Both strata had no evidence of cultural deposits or features and had moderate amounts of gravel indicating some alluvial activity. It is most likely that any cultural deposits or features located in this portion of the site were destroyed by the initial construction of the road.



I 0-39 cm - Yellowish brown (10YR 5/6, moist) sand; weak, very fine, granular; nonsticky, nonplastic; less than 10% gravel; few very fine roots; diffuse smooth boundary.

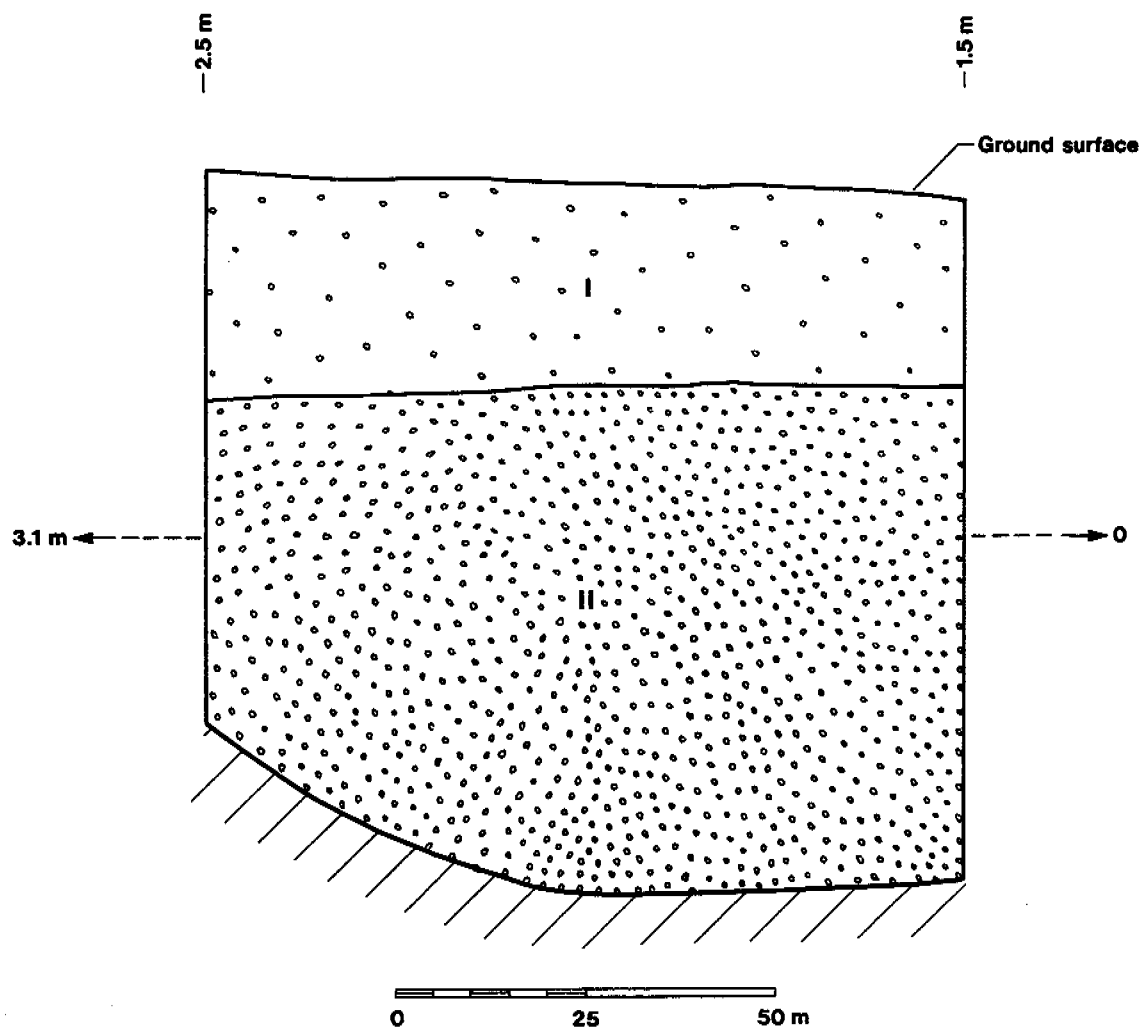
II 39-54 cm - Light olive brown (2.5Y 5/4, moist) sandy clay loam; moderate, fine, granular; sticky, plastic; few very fine roots; abrupt smooth boundary.

III 54-61 cm - Yellowish brown (10YR 5/6, moist) sandy loam; moderate, coarse, granular; slightly sticky, slightly plastic; 50% gravel; few very fine roots.

Gravel

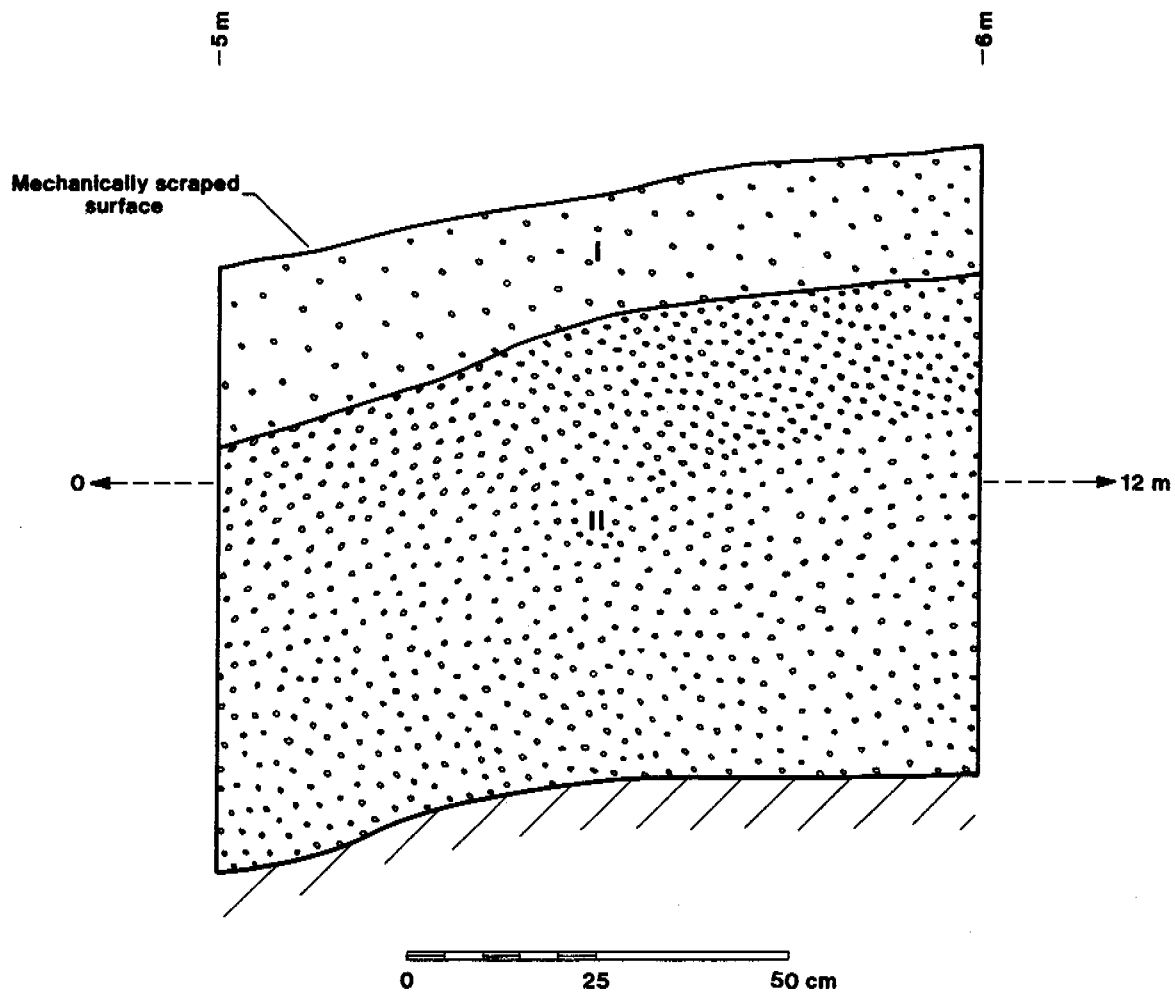
Unexcavated

Figure 9.4. Site LA 26309 Study Unit 2, North-facing Profile.



- I 0-27 cm - Yellowish brown (10YR5/4. moist) sandy; weak, fine, granular; nonsticky, nonplastic; 10% gravel; few very fine roots; abrupt smooth boundary.
- II 27-94 cm - Light olive brown (2.5Y5/4. moist) sandy loam; moderate, coarse, granular; slightly sticky, slightly plastic; 50% gravel; very few micro roots.
- Gravel
- /// Unexcavated

Figure 9.5. Site LA 26309 Study Unit 3, North-facing Profile.



- I 0-16 cm - Yellowish brown (10YR5/6. moist) sand; weak, fine, granular; nonsticky, nonplastic; 25% gravel; abrupt smooth boundary.
- II 16-77 cm - Light olive brown (2.5Y5/4. moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; 50% gravel; very few micro roots.
- Gravel
- Unexcavated

Figure 9.6. Site LA 26309 Study Unit 4, East-facing Profile.

Study Unit 5

SU 5, located within the boundaries of the site and within the eastern right-of-way of the existing State Highway 602, began at grid coordinates N266.18, E225.93 and extended northward 9.60 m to N273.06, E219.27 (Figure 9.2). This trench was placed in an area of very light artifact scatter and in an area that had undergone severe ground disturbance. The maximum depth of the trench near the middle was 0.95 m.

One 2-m-long profile was drawn of SU 5. This profile was located along the west-facing wall near the southern portion of the trench (Figure 9.7). Three strata were identified within the trench. All strata had no evidence of cultural deposits or features. Stratum III had some gravel inclusions indicating previous alluvial activity in that area. It is most likely that any cultural deposits or features that were present in that portion of the site were destroyed by the initial road construction.

Mechanical Stripping

Mechanical stripping was conducted on site LA 26309 in order to investigate the possibility of buried cultural deposits or features on the east side of the existing State Highway 602. Information recovered from the hand excavation and mechanical excavation of trenches was used to determine the depth of the surface stripping. A total of 633.75 sq m of area at an approximate depth of 20 cm was completed. No cultural deposits or features were identified.

ANALYTIC CONTRIBUTION

Four flaked stone artifacts were the only materials recovered from site LA 26309. Three artifact classes are represented: one core, two debris, and one retouched piece. One piece of debris is quartzite while the remaining three items are chert. One piece of chert debris (record number 4 in Appendix E) is possibly Washington Pass chert. The raw material attribution for this piece is proposed only tentatively because the analyst had access to a very small comparative

collection of geologic samples for possible use in sourcing archaeological materials. With the exception of the chert core which weighs 33 g, the remaining pieces in this assemblage weigh 1 g or less.

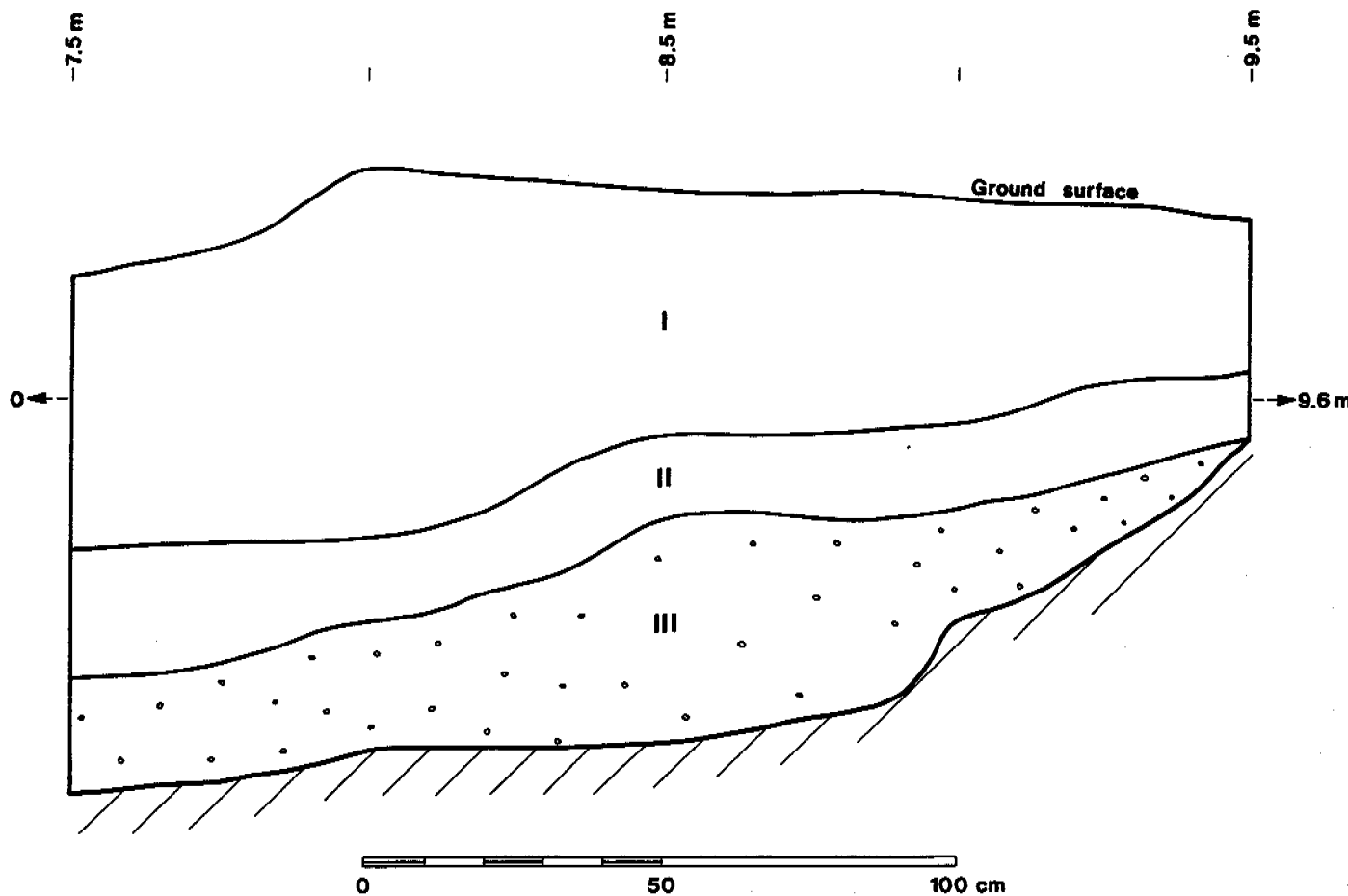
Of the four items in this assemblage, two merit a bit more discussion. The core can be classified as a "core on flake." The original piece is a primary (100% cortical) flake with a punctiform, cortical platform. Three attempts were made to reduce this flake. These attempts proved unsuccessful and resulted in hinge fractures which appear to have been caused by material flaws within the core itself. The retouched piece is a proximal flake fragment which contained normal pressure retouch along both its left and right edges. This may be a fragment of a small unifacial knife or projectile point.

STRATIGRAPHY

The stratigraphy of the tested portion of site LA 26309 wholly comprises naturally deposited sediments. Along the northeastern portion of the site, SU 5 (Figure 9.7) revealed three strata dipping to the north. The top two strata are brown to dark grayish brown loamy sands, overlying a light olive brown sandy loam. The lowermost layer contained less than 10% gravel, indicating fluvial activity along this portion of the site. SU 1 (Figure 9.3) was located upslope from SU 5, on a more stable surface of the ridge. Three strata again were identified, comprising in descending order a sandy loam, a sandy clay loam, and a clay loam.

Along the southeastern portion of the site, SU 3 and 4 (Figures 9.5 and 9.6) revealed two strata. These strata dip to the south within SU 4, which was located slightly upslope from SU 3. Stratum I is a yellowish brown sand with gravel inclusions, while Stratum II is a light olive sandy loam with gravel inclusions.

SU 2 was excavated to test the nature of the deposits within the shoulder of the existing highway. Three strata were observed, all of which appeared to be the result of road construction. No



I 0-43 cm - Brown (10YR4/3. moist) loamy sand; weak, fine, granular; nonsticky, nonplastic; common micro, fine roots; abrupt smooth boundary.

II 43-57 cm - Dark grayish brown (10YR4/2. moist) loamy sand; weak, fine, granular; nonsticky, nonplastic; common fine, medium roots; abrupt smooth boundary.

III 57-66 cm - Light olive brown (2.5Y5/4. moist) sandy loam; moderate, medium, granular; slightly sticky, slightly plastic; less than 10% gravel; very few medium, coarse roots.

••• Gravel

/// Unexcavated

Figure 9.7. Site LA 26309 Study Unit 5, West-facing Profile.

cultural material or features of any kind were observed within this trench. Mechanical stripping, then, was not conducted within the area of the highway shoulder.

CHRONOMETRIC DATA

No intact cultural contexts were observed within the project boundaries, and no diagnostic material was located outside of the project boundaries. Therefore, no chronometric data are available for the material and features at site LA 26309. One Kiatuthlanna Black-on-white sherd (AD 850 to 925) was observed by Abbott (1997), but this artifact could not be relocated.

SUMMARY

The small rubble mounds along the western portion of the site may date from the late Pueblo I or Pueblo II periods. Their location is consistent with other small rubble mounds that are located on ridge spurs overlooking the valley of Y Unit Draw. It is likely they functioned as short-term or seasonal habitations, possibly related to agricultural activities along the valley margin.

The lithic scatter along the eastern portion of the site could not be investigated thoroughly; nearly all of the material was located outside the project boundaries.

Chapter 10

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115327

Jeffery Waseta and James W. Kendrick

with Analytic Contributions by

**Jonathan C. Driver, Suzanne L. Eckert, Janet Hagopian,
Pamela McBride, Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Site LA 115327 is located on both the east and west sides of State Highway 602, on an east-facing slope overlooking Y Unit Draw at an elevation of 2082 m (6830 ft) above mean sea level. Archaeological investigations were conducted at site LA 115327 from 2 to 23 February 1998 on the eastern side of the existing highway. The western side of the site was not excavated, and fenced to be avoided during construction activities.

The site comprises multiple components dating to the Basketmaker II and Pueblo II periods. The Basketmaker II component comprises storage and other pit features, while the Pueblo II component consists of a ceramic and lithic artifact scatter and a possible one-room fieldhouse (located outside the western right-of-way fence). Vegetation today at the site consists of juniper, pinyon, sagebrush, and grasses.

SURVEY RESULTS

The survey recorded a scatter of sandstone rubble, associated with a light scatter of lithic and ceramic artifacts, and burned earth (Abbott 1997:27). The sandstone recorded as rubble is located outside the western right-of-way fence (Figure 10.1), and was not investigated during data recovery activities. It was believed during this phase of the project, however, that the sandstone concentration was a natural occurrence. Ceramic artifacts such as Red Mesa Black-on-white and Escavada Black-on-white suggested the site dated to the Pueblo II period. Flaked stone artifacts observed were primarily debitage and cores made of chert, quartzite, and silicified wood. One vesicular basalt metate was also observed. The site had not previously been recorded during any of the other surveys along State Highway 602.

DATA RECOVERY ACTIVITIES

Surface Collection

Before excavations began, a pedestrian survey was conducted in transects at 2-m intervals. All surface artifacts were marked with a pin flag, and then point located with a Sokkia Total Station (Figure 10.2); however, only those artifacts on the eastern side of the existing highway were given an FS number and collected. The collected artifact assemblage comprises ceramic, flaked stone, and ground stone artifacts. In general, artifact density on the eastern side of the site was low; however, two concentrations were discovered. Both of these concentrations occurred on the northeastern portion of the site, and both contained ceramic artifacts.

Excavation

Hand Excavation

Hand excavation of two 1-by-1-m units was conducted in order to determine the nature and depth of possible buried cultural deposits on site LA 115327. An artifact distribution map generated from the controlled surface collection was used as a guide for the placement of both units. The two units were excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit 1. Study Unit (SU) 1 was placed with the southwest corner located at site grid coordinates N130.00, E140.00 (Figure 10.3). A total of five 10-cm levels were excavated revealing three strata as shown in the north-facing wall profile (Figure 10.4). Deposits within Level 3, Stratum II, included small sandstone rocks less than 2 cm in size mixed with very light charcoal deposits in a sandy loam. Materials collected from the level

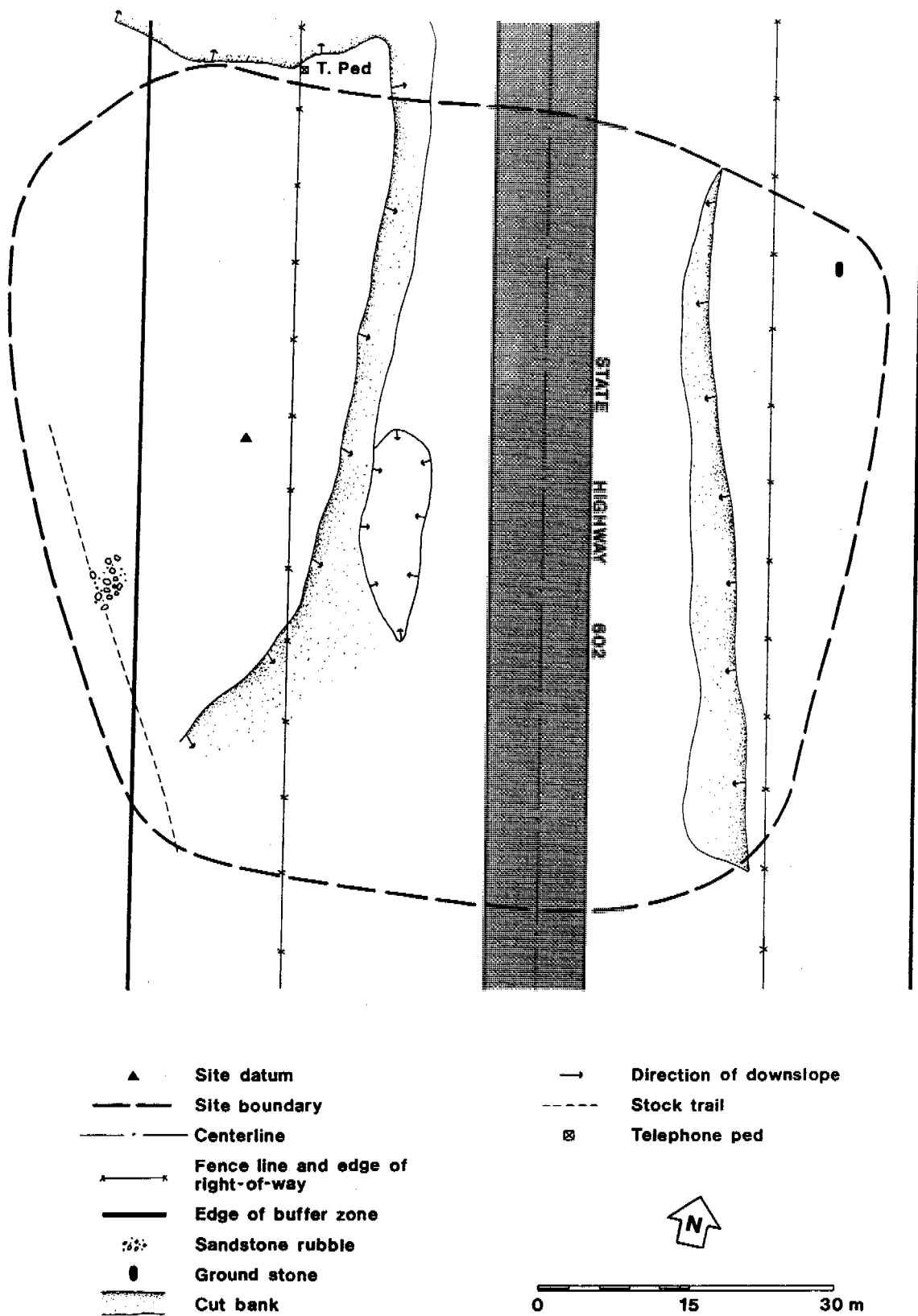


Figure 10.1. Site LA 115327 Survey Site Map.

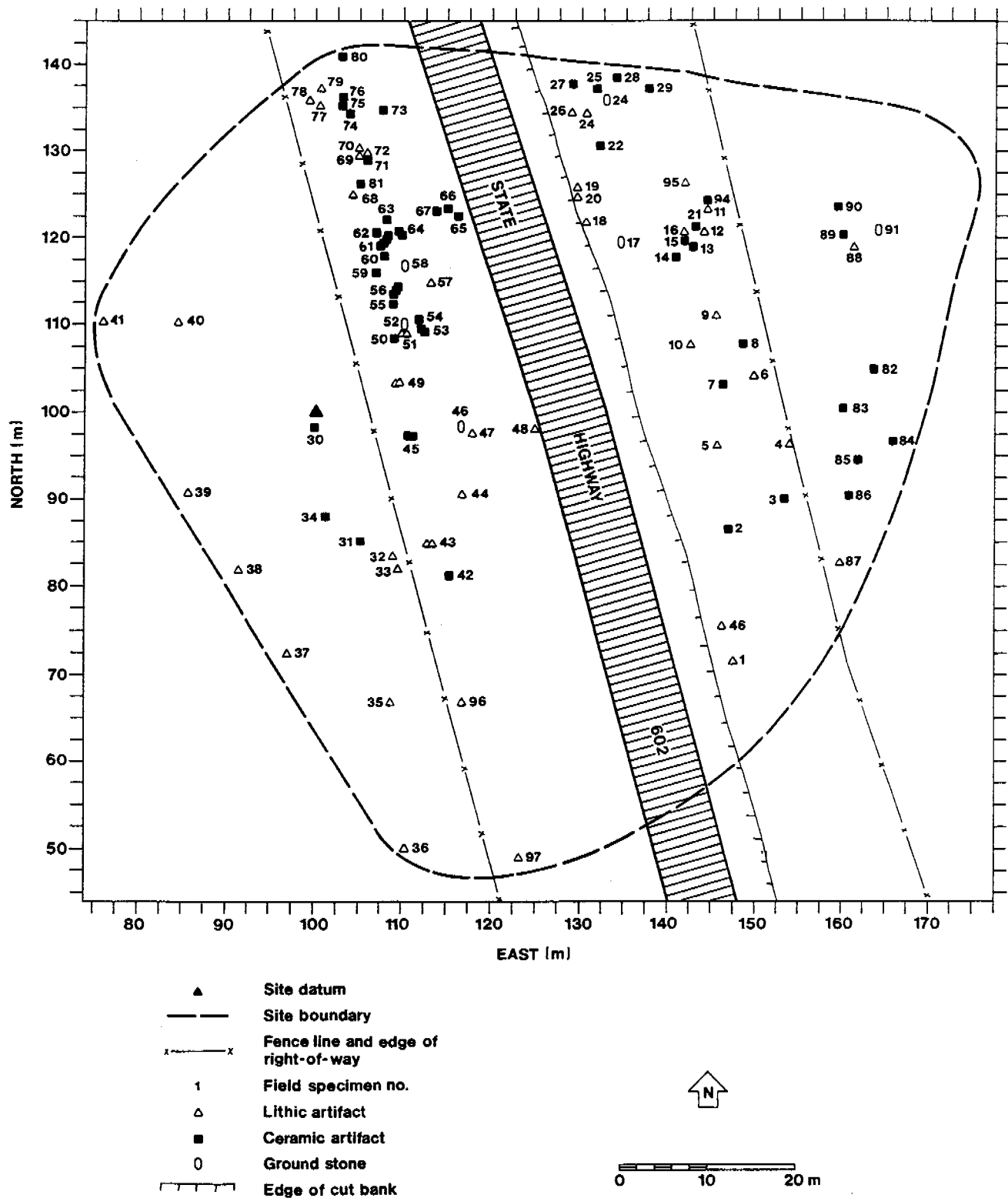


Figure 10.2. Site LA 115327 Data Recovery Site Map, Surface Artifacts.

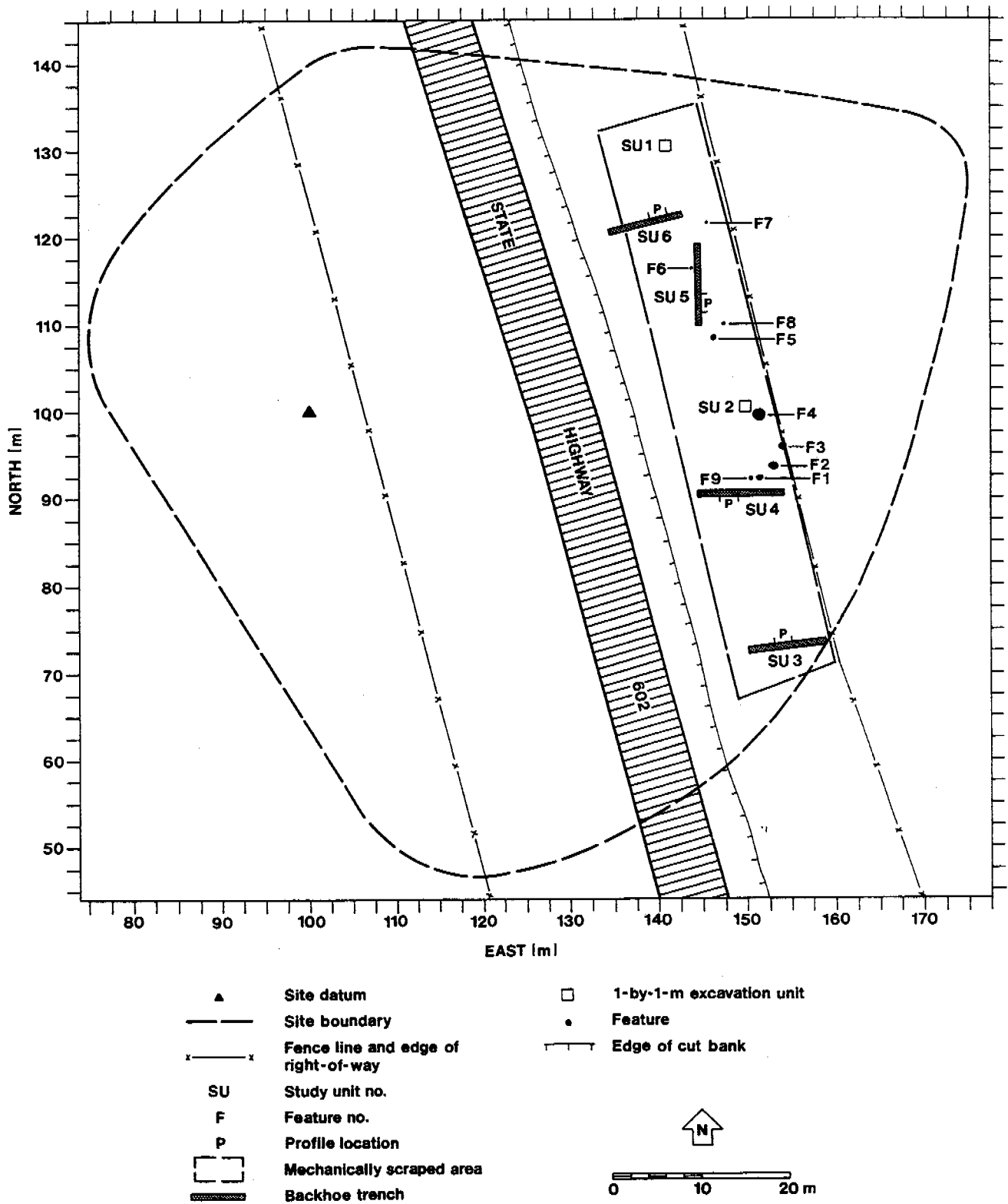
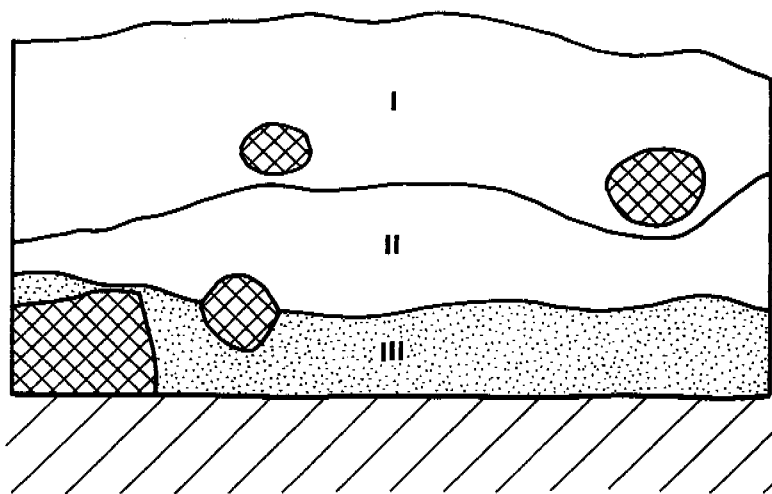


Figure 10.3. Site LA 115327 Data Recovery Site Map, Features, Study Units, and Mechanical Stripping.



0 25 50 cm

I 0-25 cm - Brown (10YR4/3, moist) sandy loam; strong; slightly sticky, slightly plastic; less than 10% gravel; many roots; diffuse wavy boundary.

II 25-40 cm - Strong brown (7.5YR4/6, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; very few roots; diffuse wavy boundary.

III 40 cm + - Dark yellowish brown (10YR4/6, moist) sandy loam; moderate; slightly sticky, slightly plastic; no gravel; very few roots.

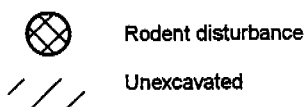


Figure 10.4. Site LA 115327 Study Unit 1, North-facing Profile.

included ceramic and flaked stone artifacts. During excavation of the study unit a high amount of rodent disturbance was recorded throughout investigations and observed along the south wall profile. Excavation of the unit was terminated after two sterile levels (Levels 4 and 5). No subsurface features were identified.

Study Unit 2. SU 2 was placed with the southwest corner located at site grid coordinates N100.00, E149.00 (Figure 10.3). A total of five 10-cm levels were excavated revealing two strata, as shown on the north-facing wall profile (Figure 10.5). During excavation of SU 2, no cultural materials were collected. Soil mottling, consisting of charcoal deposits recorded as less than 5% in density, was observed in Levels 1 and 3, Stratum I, and Level 4, Stratum II. The mottled deposits in these three levels may have been the result of rodent activity and insect disturbance. Samples from the excavation included flotation and pollen that were collected in Strata I and II. No features were identified.

Mechanical Excavation

Four backhoe trenches were excavated on site LA 115327 in order to determine the nature and depth of cultural deposits. The trenches were designated SU 3 through 6 and typically were 8.00 to 9.00 m long with an average depth of approximately 1.40 m. A total of 35.85 m of trench was excavated.

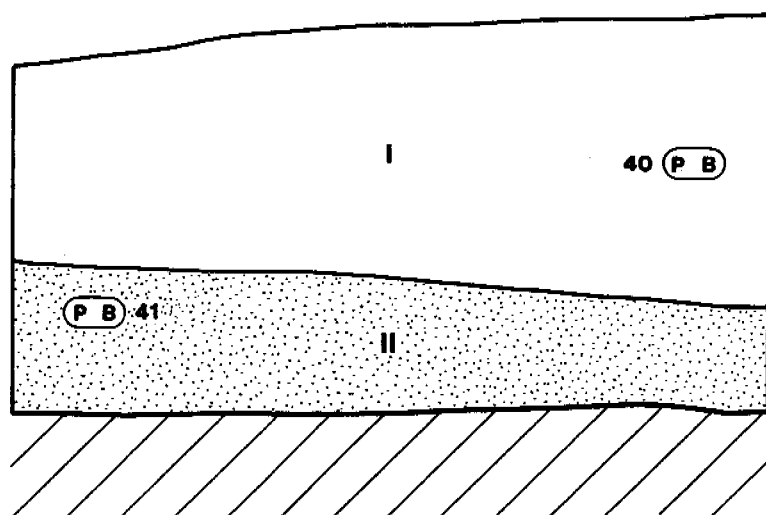
Study Unit 3. SU 3 was placed on the east side of State Highway 602 in the furthest southeast portion of site LA 115327 (Figure 10.3). The trench was 8.80 m in length with a maximum depth of approximately 1.20 m. SU 3 was oriented northeast-to-southwest with the northeast end located at site grid coordinates N73.70, E158.30 and the southwest end at N72.60, E149.60. A representative 2-m-long profile was drawn of the south-facing wall that shows two strata (Figure 10.6). SU 3 was placed to identify and record any possible buried features and strata located near the southern end of the site. Stratum I included sediments that contained no cultural deposits, and may be considered an overburden layer that is

much thicker in this area of the site than in the northern end of the site. Stratum II was a brown sandy loam with an undefined buried boundary and an absence of cultural deposits.

Study Unit 4. SU 4 was placed approximately 17 m north of SU 3, with the east end located at site grid coordinates N90.60, E153.20, and N90.60, E143.80 at the west end (Figure 10.3). The trench is 9.40 m in length with a maximum depth of approximately 1.40 m. A representative 2-m-long profile was drawn of the north-facing wall that shows three strata (Figure 10.7). SU 4 was placed to identify and record any possible buried features and strata located at the southern end of the site. Stratum I is basically the same type of overburden seen in SU 3 Stratum I, with a variation in soil color. The upper portion of Stratum II, is at the same elevation where subsurface features were discovered during mechanical stripping and will be discussed below. Stratum III is obviously a natural sediment containing no cultural deposits. No features were observed in SU 4.

Study Unit 5. SU 5 was placed on the east side of State Highway 602, with the north end located at site grid coordinates N119.40, E144.00, and the south end at N109.90, E144.00 (Figure 10.3). The trench was 9.5 m in length with a maximum depth of approximately 1.45 m. A representative 2-m-long profile was drawn of the west-facing wall that shows three strata (Figure 10.8). The trench was placed to identify and record any possible buried features and strata located at the northern end of the site. Stratum I in SU 5 is an overburden sediment similar to those described above. In this trench Stratum II included a fair amount of charcoal inclusions seen within the profile, along with heavy rodent disturbance. Stratum II contained cultural materials approximately 2 m southeast of the profile location. Stratum III was also noticed in SU 4 and consists of noncultural sediments. No features were identified in SU 5.

Study Unit 6. SU 6 was placed on the east side of State Highway 602, with the northeast end located at site grid coordinates N122.60, E142.20, and the southwest end at N120.60, E133.90.



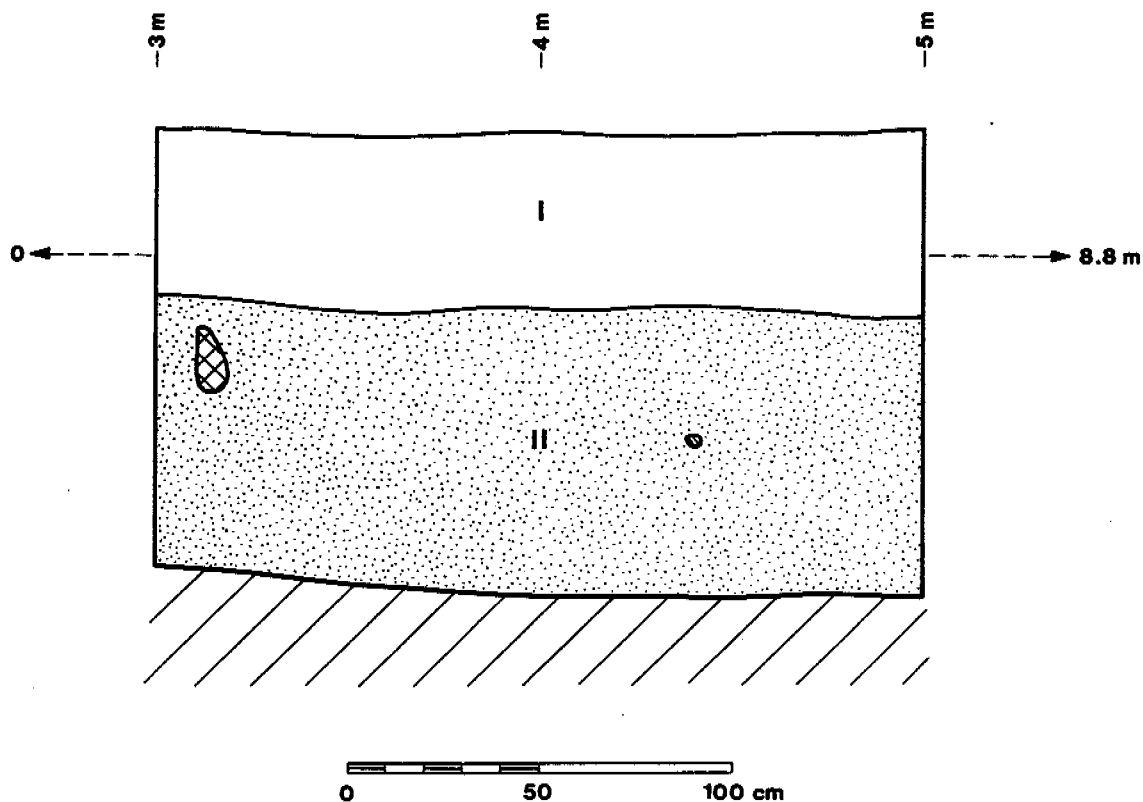
- I 0-35 cm - Brown (10YR4/3, moist) sandy loam; strong; slightly sticky, slightly plastic; less than 10 % gravel; common roots; diffuse smooth boundary.
- II 35 cm + - Dark yellowish brown (10YR4/6, moist) sandy loam; moderate; slightly sticky, slightly plastic, 10% gravel; very few roots.

(P B) Pollen and flotation samples

/// Unexcavated

40 Field specimen no.

Figure 10.5. Site LA 115327 Study Unit 2, North-facing Profile.



I 0-23 cm - Brown (10YR4/3, moist) sandy loam; strong; slightly sticky, slightly plastic; no gravel; many roots; diffuse smooth boundary.

II 23 cm +/- Dark yellowish brown (10YR4/6, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; very few roots.



Rodent disturbance

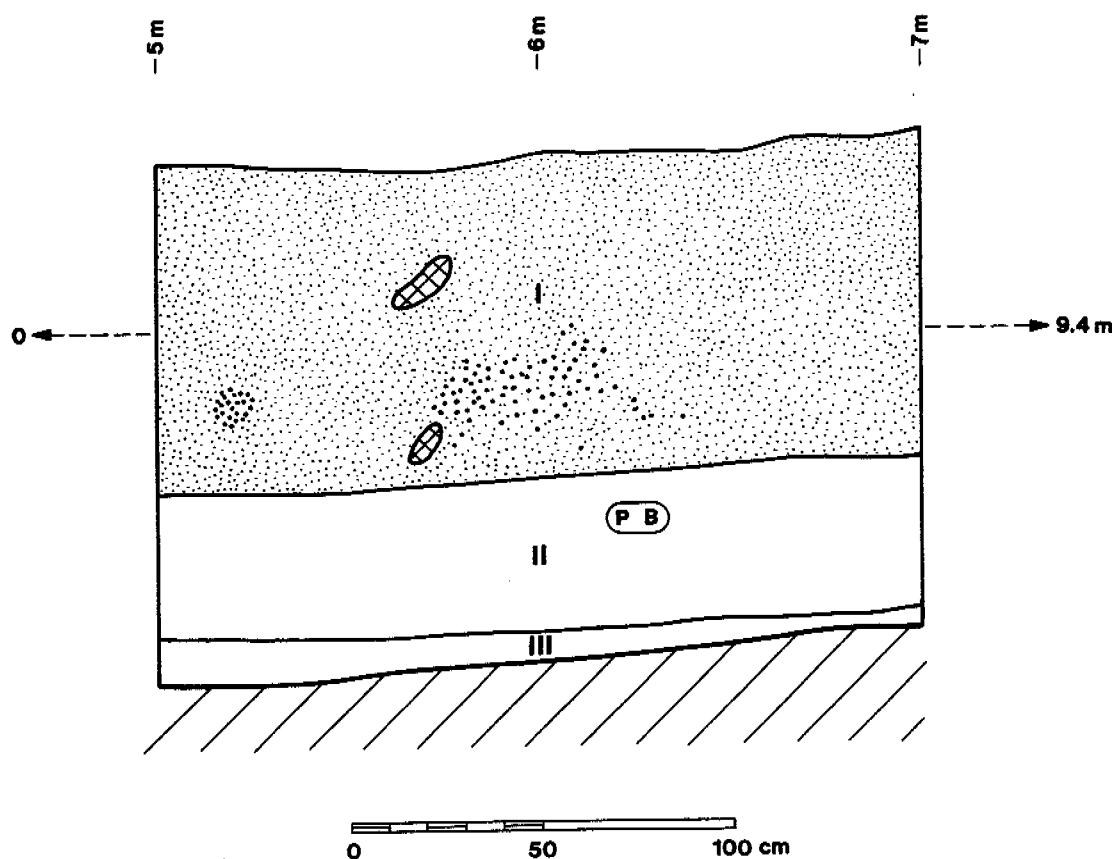


Sandstone rock



Unexcavated

Figure 10.6. Site LA 115327 Study Unit 3, South-facing Profile.



I 0-84 cm - Dark yellowish brown (10YR3/2, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; common roots; diffuse smooth boundary.

II 84-125 cm - Very dark grayish brown (10YR3/2, moist) sandy loam, dark grayish brown (10YR 4/2, dry); moderate; sticky, slightly plastic; slightly hard; no gravel; very few roots; diffuse smooth boundary.

III 125 cm + - Strong brown (7.5YR4/6, moist) sandy loam, brown (7.5YR5/4, dry); strong; sticky, slightly plastic; slightly hard; no gravel; very few roots.

- Charcoal flecks
- (P B) Pollen and flotation samples
- ⊗ Rodent disturbance
- /// Unexcavated

Figure 10.7. Site LA 115327 Study Unit 4, North-facing Profile.

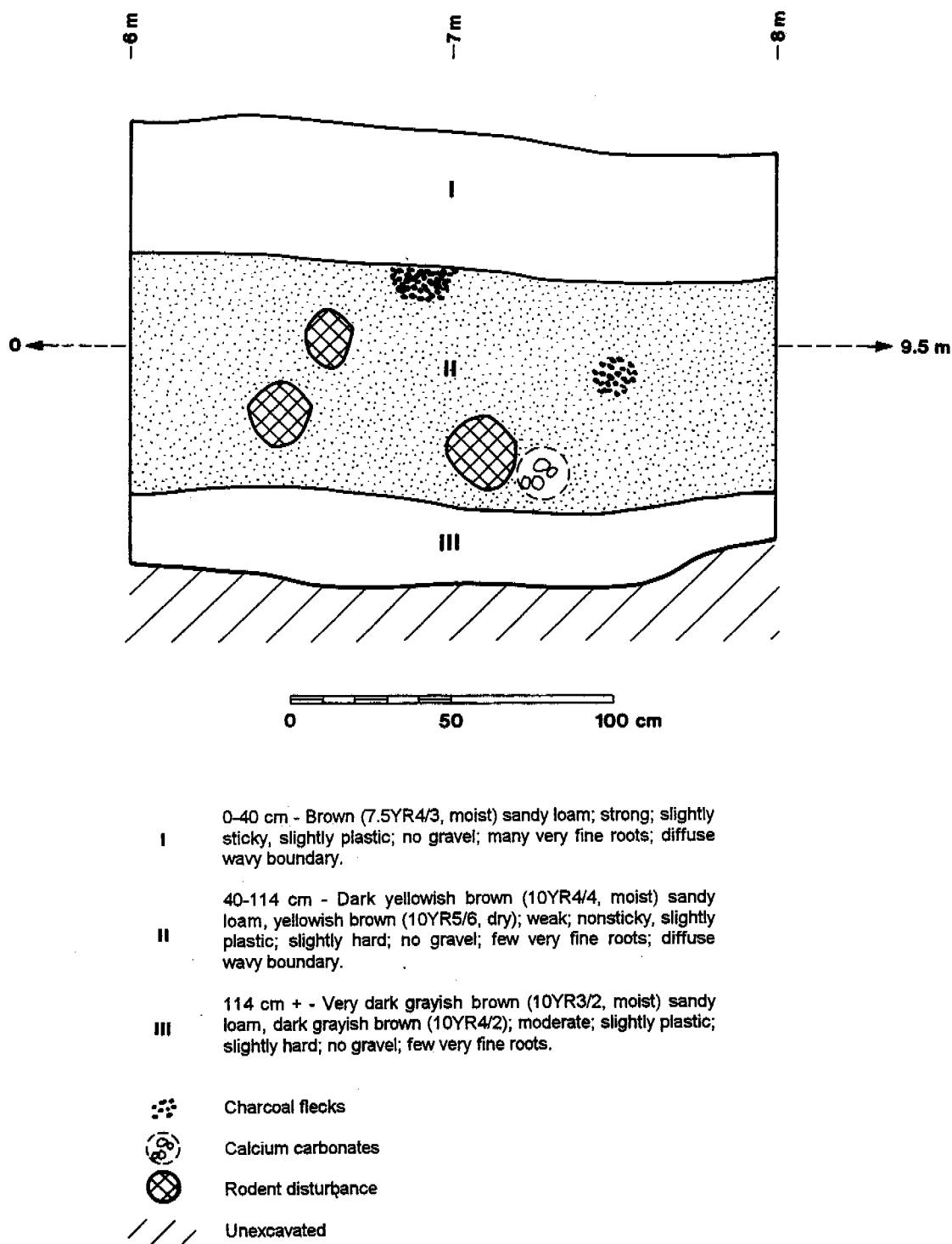


Figure 10.8. Site LA 115327 Study Unit 5, West-facing Profile.

approximately 4 m northwest of SU 5 (Figure 10.3). The trench was 8.65 m in length with a maximum depth of approximately 1.20 m. A representative 2-m-long profile was drawn of the south-facing wall that shows two strata (Figure 10.9). Stratum I within SU 6 was a sandy overburden sediment atop the cultural unit, Stratum II. No features were observed within SU 6.

Mechanical Stripping

Approximately 20 to 50 cm of sediment was mechanically removed with a backhoe from a 67.00-by-11.60-m area (777.20 sq m) located within the site boundaries between the east edge of State Highway 602 and the existing east fence. Nine cultural features were discovered within this area and were designated Features 1 through 9, (Figure 10.3).

Feature Descriptions

Nine cultural features were identified during data recovery activities at site LA 115327 (Figure 10.3). Features 1 and 3 through 9 were earthen pits, and Feature 2 was identified as a human burial within a previously-use thermal feature. When possible all features were bisected with one side fully excavated to the base of the feature. Prior to removal of the opposite half, a profile was drawn of the feature's deposit(s), with flotation and pollen samples collected from each identified stratum. The opposite half was then either excavated in one level or excavated by sediment strata. Fill from the features was screened through 1/8-in hardware mesh. Excavation of Feature 2 included removal of the human burial and relocating the remains to an area designated by the Zuni Heritage and Historic Preservation Office (ZHHPO; Confidential Appendix J).

Feature 1

Feature 1 was an earthen pit located at site grid coordinates N92.28, E151.24 (Figure 10.3). In plan view the feature was roughly circular measuring 55 cm east-to-west and 50 cm north-to-south. The cross section of the pit was bell shaped, with a maximum depth of approximately

39 cm (Figure 10.10). The feature was bisected into north and south portions. Each half was excavated in one level to the base of the feature, yielding a sandy loam sediment mixed with sparse charcoal flecks, sandstone spalls, roots, and a high amount of rodent disturbance. Cultural materials were only collected within the south half: these included flaked stone, bone, and a gravel-sized unmodified stone resembling pigment or ochre. Samples retrieved from Feature 1 included flotation, pollen, and radiocarbon. Prior to removal of the north half, a south-facing profile was drawn which revealed two strata in Feature 1 (Figure 10.11). Stratum I was a cultural matrix including the collected artifacts. Stratum II appeared to be a thin layer of fine sand. Complete excavation of Feature 1 revealed an earthen interior surface with indications of some oxidation along the northern wall. The base of the feature had an uneven earthen surface which is evident along the eastern edge shown in the feature profile. Four maize cupules were identified from the flotation sample.

One radiocarbon date of 2070 +/- 40 BP (Beta-123605; maize cupule; $\delta^{13}\text{C} = -10.7\text{‰}$) was obtained for Feature 1; this is contemporaneous with features or deposits at sites LA 115330, LA 48695, and LA 26306.

Feature 2

Feature 2 included the remains of a human burial within a shallow pit, located at site grid coordinates N93.73, E152.58 (Figure 10.3). In plan view the pit measured 1.20 m north-to-south by 1.10 m east-to-west. Excavation procedures began by removing the south half of the feature. Within the first 10 to 15 cm below the ground surface bone fragments were exposed and identified as human remains. At this point the excavation was halted and removal procedures were implemented. The remains were carefully excavated and relocated to a location designated by the ZHHPO (Confidential Appendix J). Removal of the remains revealed a basin-shaped pit with a maximum depth of approximately 45 cm. Inspection of the interior walls found evidence of oxidation, and the base of the feature

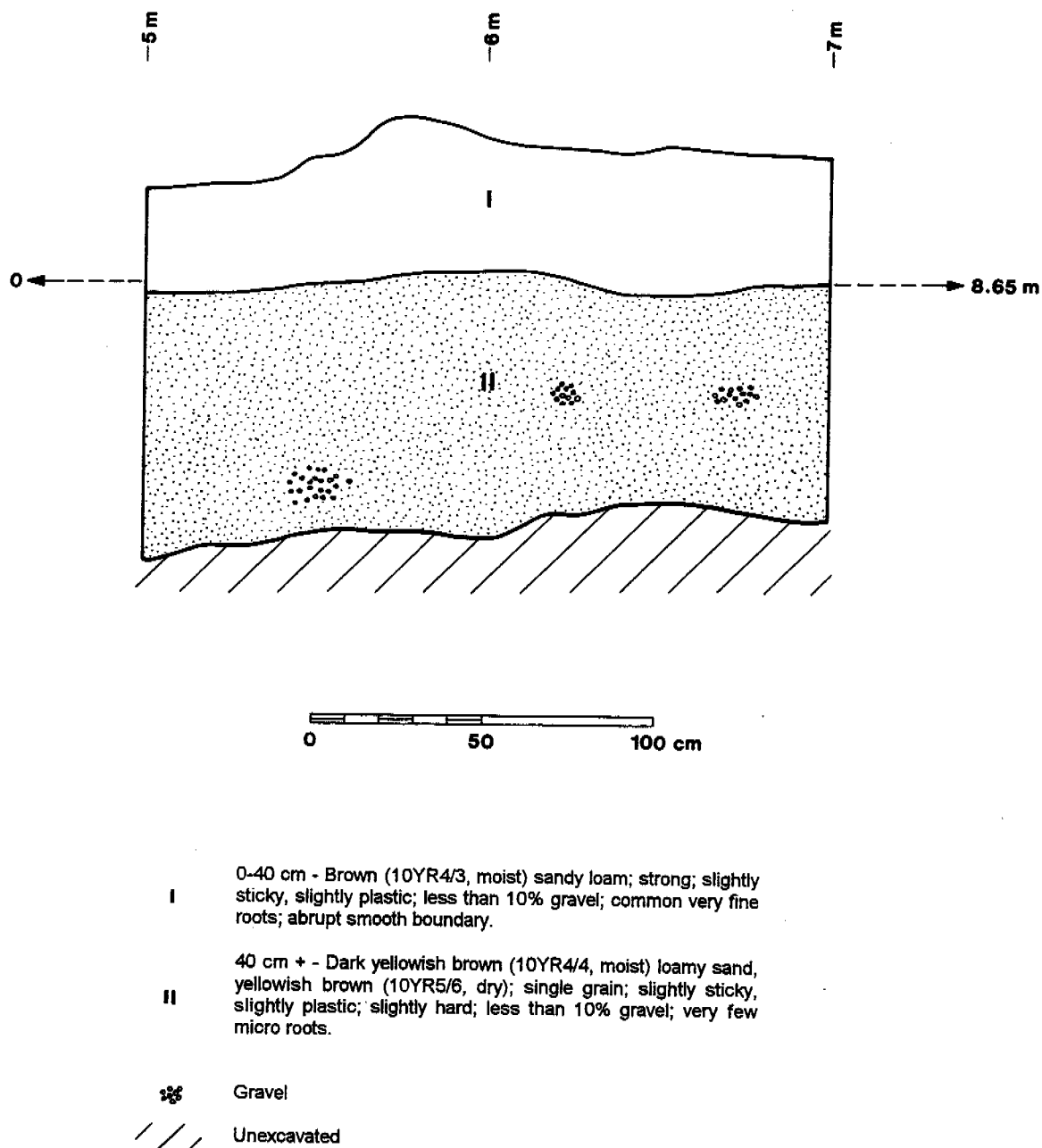
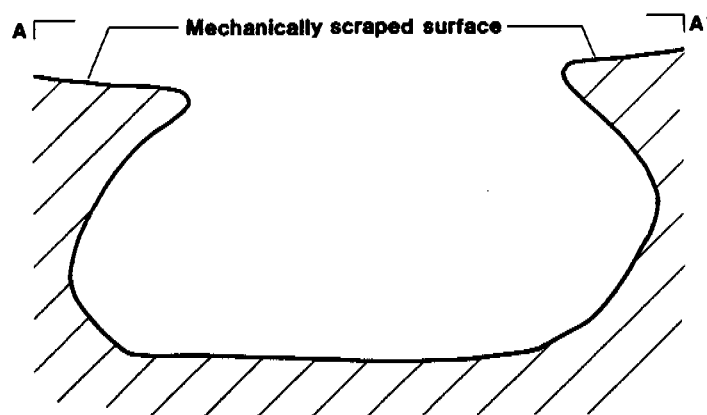
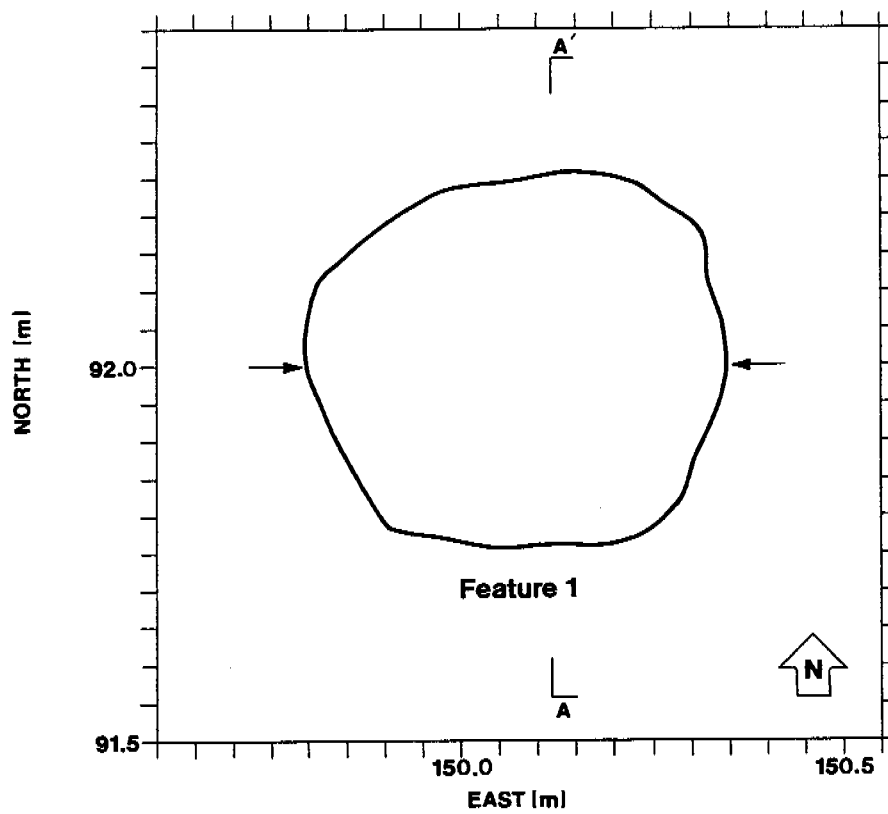


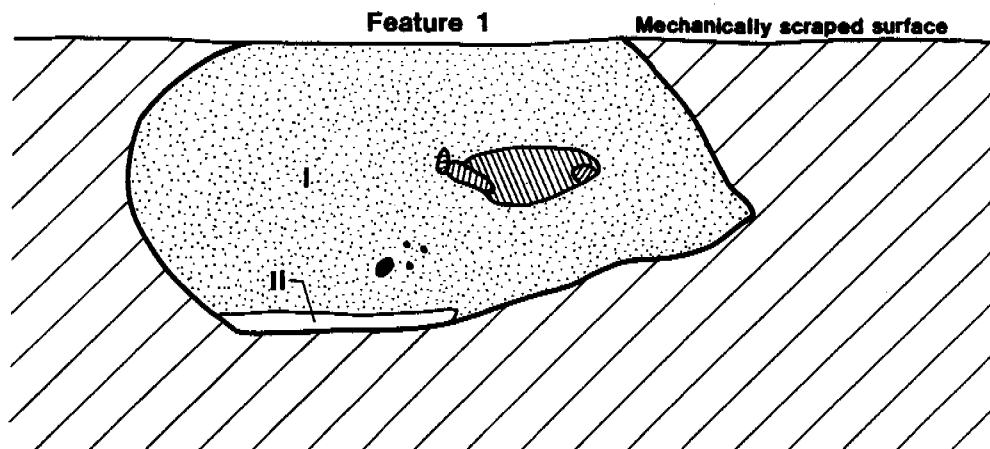
Figure 10.9. Site LA 115327 Study Unit 6, South-facing Profile.



0 25 50 cm

- Edge of Feature 1
- A' — A' Cross section
- /// Unexcavated
- ← Profile location

Figure 10.10. Site LA 115327 Feature 1, Plan View and Cross Section.



0 25 50 cm

- I 0-36 cm - Dark yellowish brown (10YR4/6, moist) sandy loam; strong; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; abrupt broken boundary.
- II 36-39 cm - Yellowish brown (10YR5/8, moist) sandy loam; fine; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; abrupt broken boundary.

•• Charcoal

▨ Sandstone

/// Unexcavated

Figure 10.11. Site LA 115327 Feature 1, South-facing Profile.

exhibited a highly oxidized surface. These findings may indicate that the original use of the feature was thermal, then the pit was subsequently used for a burial.

Feature 3

Feature 3 was an earthen pit located at site grid coordinates N96.00, E153.35 (Figure 10.3). In plan view the feature was oblong measuring 84 cm north-to-south by 67 cm east-to-west. An east-to-west cross section exhibits a wide cylindrical shape with a maximum depth of approximately 50 cm (Figure 10.12). Excavation of Feature 3 included one complete 50-cm level in the west half and two cultural strata levels from the east half. Complete excavation of the west half revealed two strata along a west-facing profile (Figure 10.13). The west half consisted of a sandy loam mixed with sparse charcoal flecks and an abundant amount of rodent and insect disturbance. No cultural materials were collected within this portion of the feature. Samples taken from the west portion included flotation, pollen, and radiocarbon. In the east half, Level 1, Stratum I, was a 12-cm level of sandy loam sediment mixed with sparse charcoal flecks and high amounts of rodent and insect disturbance. Level 2, Stratum II, was a 38-cm level revealing a darker soil color with sparse charcoal flecks and evidence of rodent and insect activity. Cultural materials were absent in both Levels 1 and 2; however, flotation, pollen, and waterscreen samples were retrieved from the two strata. Complete excavation of Feature 3 revealed earthen walls that slanted in slightly towards the base of the feature with no indications of oxidation. The base of the feature was a slightly hard uneven surface that slanted down to the north as shown on the wall profile. Absence of artifacts may indicate the feature was not intentionally filled with refuse but rather filled with natural sediments.

Feature 4

Feature 4 was a large earthen pit located at site grid coordinates N99.62, E150.96 (Figure 10.3). In plan view the feature was nearly circular measuring 1.33 m north-to-south by 1.22 m east-

to-west. A north-to-south cross section exhibits a roughly belled shape with a maximum depth of approximately 75 cm (Figure 10.14). The pit was excavated in northeast and southwest portions with the northeast half containing the majority of feature fill. Excavation of the southwest half included a complete level approximately 75 cm in thickness, consisting of charcoal inclusions and 10% sandstone inclusions within a homogeneous sediment with evidence of rodent and insect disturbance throughout the level. Approximately 32 cm into the excavation faunal remains were encountered within a loose matrix. The bones were identified as canine bones (Figure 10.15) discussed in detail below. The articulated remains included a cranium, vertebrae, and long bones. Other materials collected from the general fill included a single ground stone artifact. Flotation, pollen, and radiocarbon samples were retrieved. Completion of the southwest half excavation revealed a southwest-facing profile showing two strata (Figure 10.16). Stratum I includes a matrix that begins at the upper portion of the pit and extends towards the bottom of the pit. Stratum I also shows a dense area of rodent activity mixed within a sandy loam sediment with charcoal inclusions. Canine remains encountered in the southwest half were also visible in the profile. Stratum II is present along the northern wall edge and consists of a brown sandy loam also with inclusions of charcoal and rodent disturbance. A unmodified sandstone slab was exposed at the base of the pit where a pollen sample was retrieved. Stratum II is thought to have been formed by past rodent activity.

After the profile was drawn, excavation procedures continued with the removal of fill within the northeast half of Feature 4. Stratum I was a homogeneous sediment mixed with sparse charcoal deposits and heavy amounts of rodent and insect disturbance. Approximately 35 cm into the excavation the remaining dog bones exposed in the southwest half excavation were recovered. Other materials collected in the general fill included flaked stone artifacts, ground stone, unmodified stone, and miscellaneous faunal specimens. Samples retrieved were flotation, pollen from the base of the feature, waterscreen,

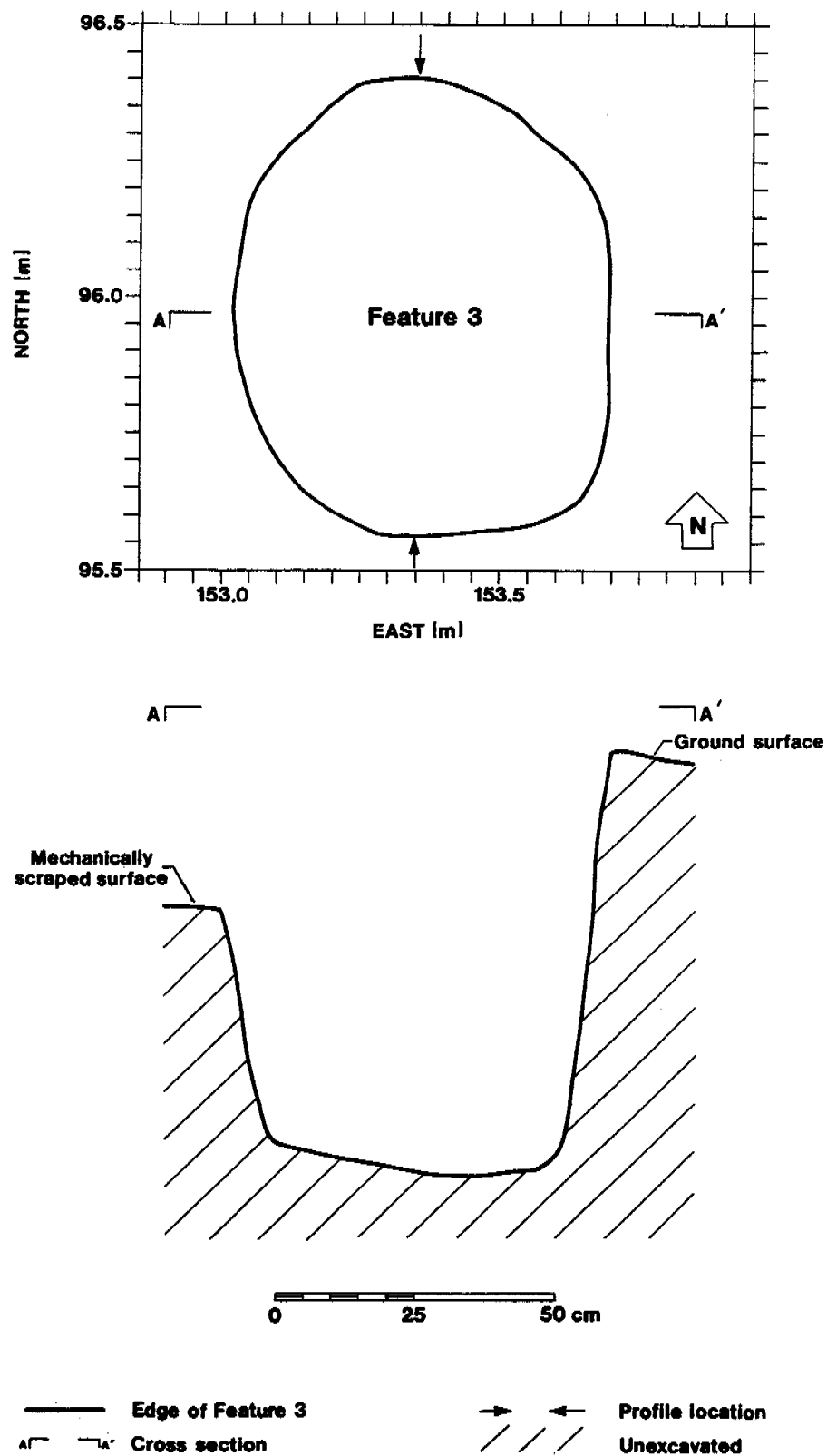
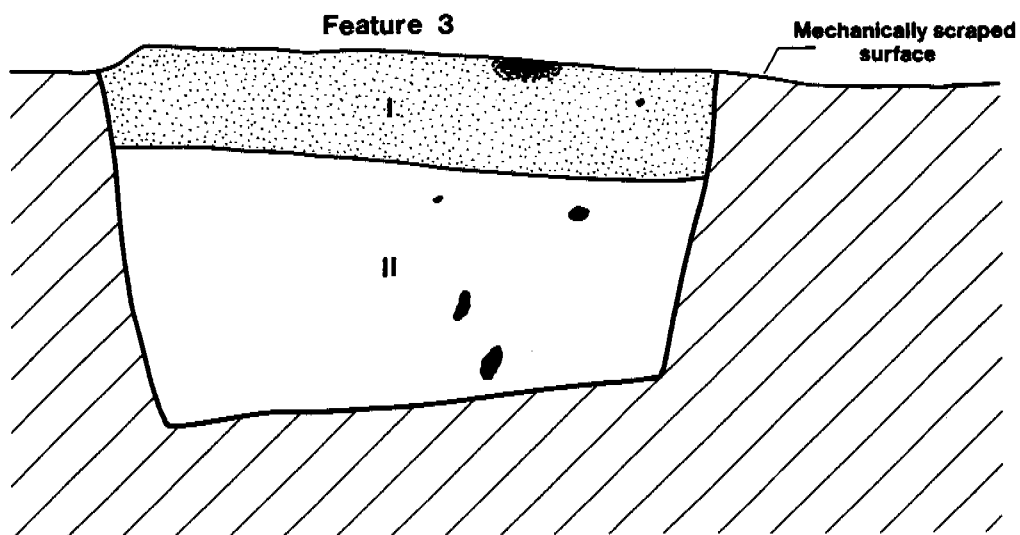


Figure 10.12. Site LA 115327 Feature 3, Plan View and Cross Section.



0 25 50 cm

I 0-13 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, weak; slightly sticky, slightly plastic; no gravel; very few very fine roots; abrupt smooth boundary.

II 13-50 cm - Strong brown (7.5YR4/6, moist) sandy loam; weak; slightly sticky, slightly plastic; no gravel; few very fine roots; abrupt smooth boundary.

●●● Charcoal

/// Unexcavated

Figure 10.13. Site LA 115327 Feature 3, West-facing Profile.

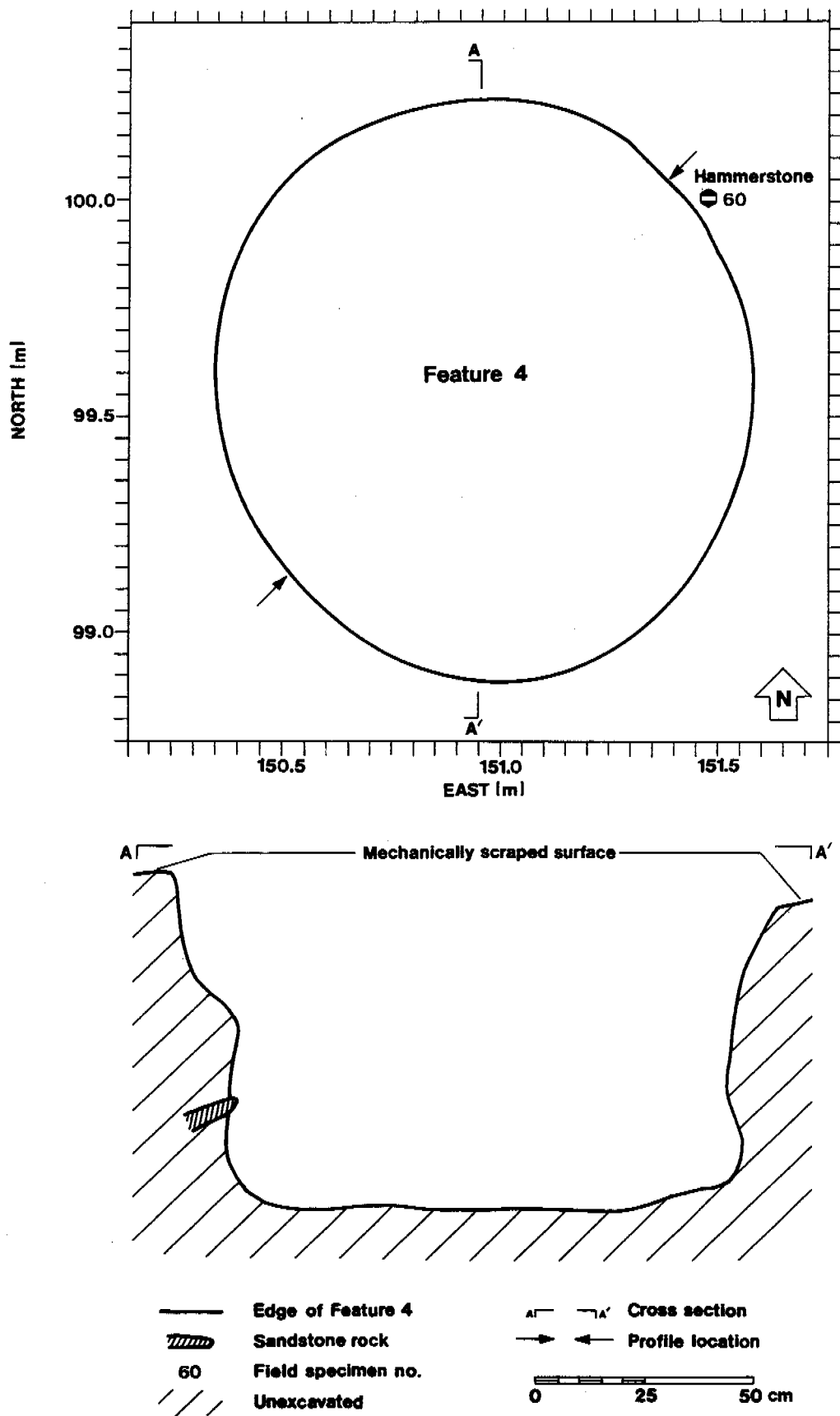


Figure 10.14. Site LA 115327 Feature 4, Plan View and Cross Section.

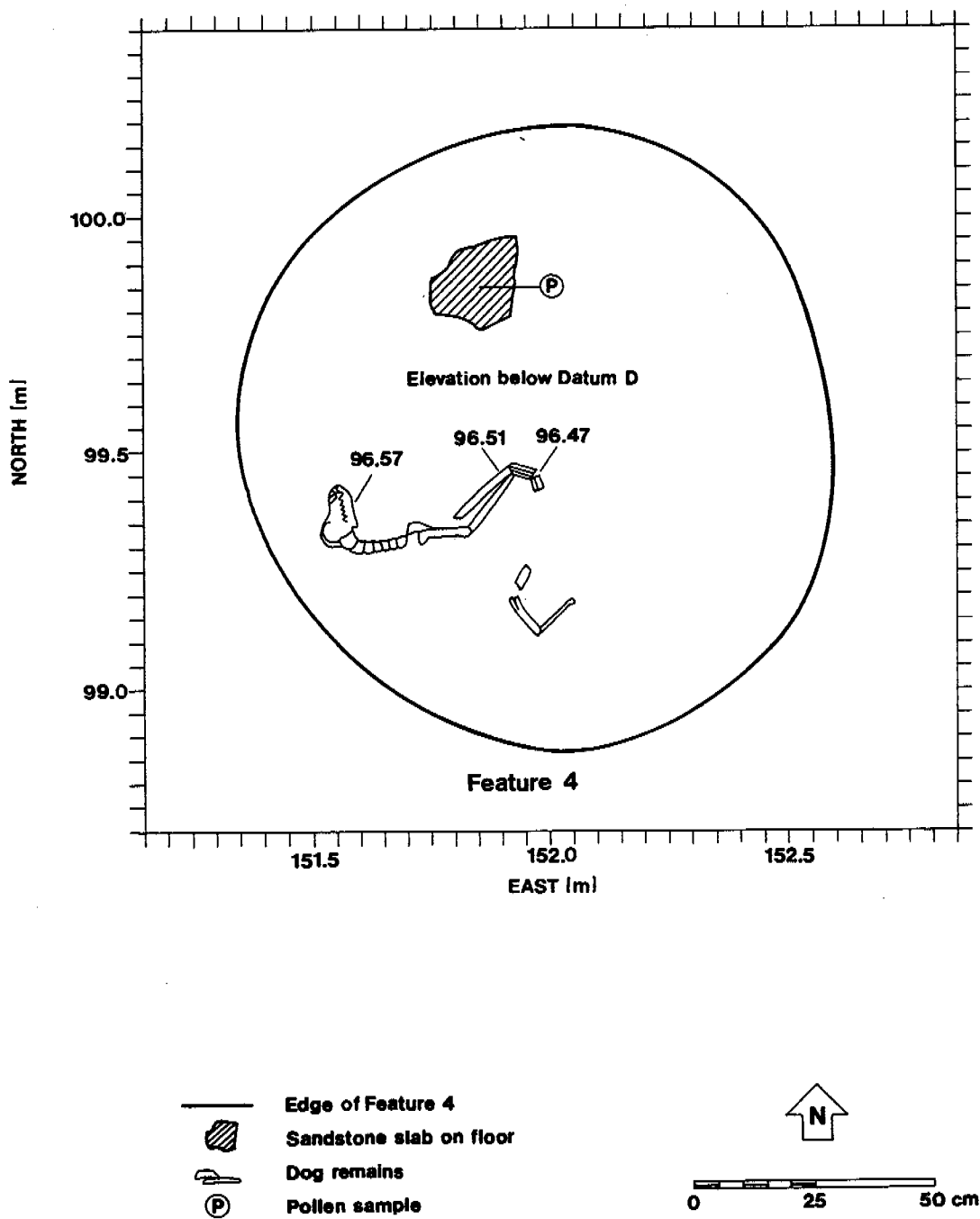
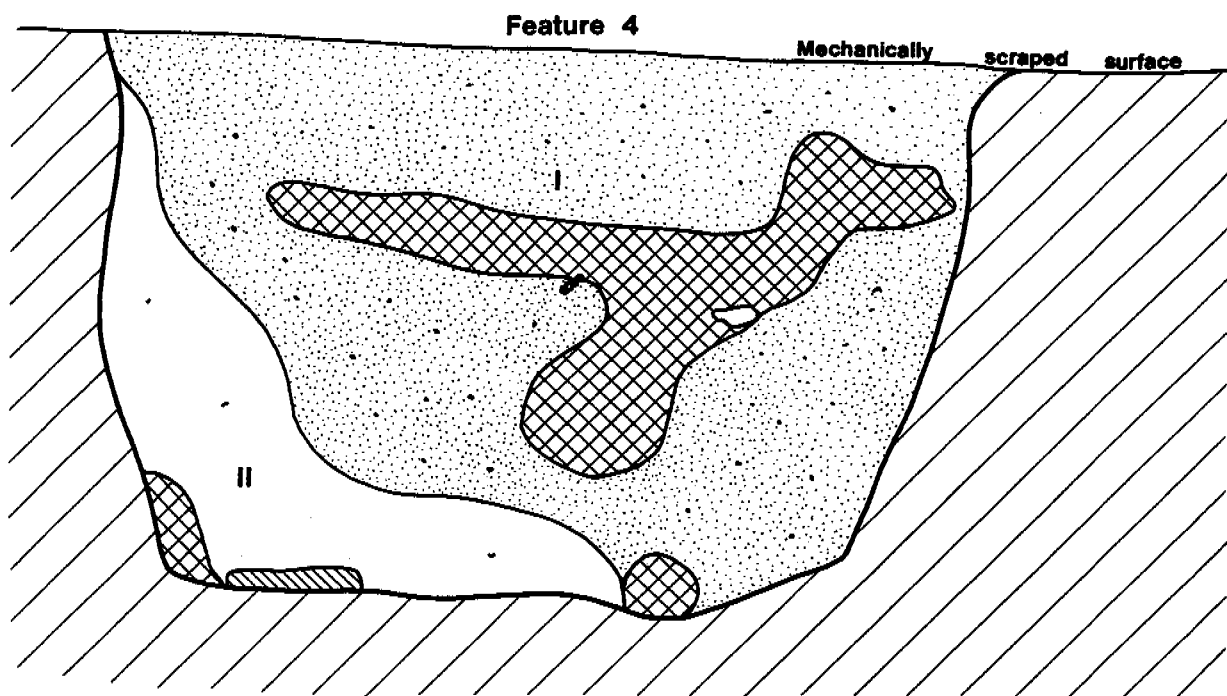


Figure 10.15. Site LA 115327 Feature 4, Plan View Showing Dog Burial.



0 50 100 cm

I
0-73 cm - Dark yellowish brown (10YR4/4, moist) sandy loam, strong brown (7.5YR4/6, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; common roots; abrupt irregular boundary.

II
5-73 cm - Brown (10YR4/3, moist) sandy loam, strong brown (7.5YR4/6, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; very few roots; abrupt broken boundary.






-  Faunal
-  Charcoal flecks
-  Sandstone
-  Rodent disturbance
-  Unexcavated

Figure 10.16. Site LA 115327 Feature 4, Southwest-facing Profile.

and radiocarbon. With the fill removed, the pit appeared bell shaped with unprepared earthen walls. The base of the pit was a very hard earthen surface that exhibited evidence of heavy oxidation and was reddish orange in color. The oxidation continued upward along the walls for approximately 30 to 40 cm, then ended. Feature 4 was used as a storage feature (as maize cupules were recovered), then subsequently used for a dog burial. Oxidation of the feature's base and walls likely functioned to stabilize the interior of the pit.

One radiocarbon date of 2450 ± 90 BP (Beta-121237; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$) was obtained for Feature 4, indicating use during the Basketmaker II period.

Feature 5

Feature 5 was a thermal feature located approximately 10 m northwest of Feature 4, at site grid coordinates N108.60, E145.88 (Figure 10.3). In plan view the feature is slightly oblong measuring 66 cm north-to-south by 60 cm east-to-west. A north-to-south cross section shows a basin-shaped pit with a maximum depth of approximately 18 cm (Figure 10.17). The feature was bisected into north and south portions. Both portions were excavated from the top of the feature to the base of the feature in two separate 18-cm levels. The fill was a compact sandy loam mixed with sparse sandstone rocks, roots, and charcoal deposits adequate for a radiocarbon sample. Artifacts were absent in both north and south half excavations. Samples included flotation and pollen. Prior to removal of the north half a south-facing profile was drawn that shows a single stratum consisting of the fill extracted in the excavations (Figure 10.18).

Feature 5 had earthen walls with evidence of moderate to heavy oxidation; the base of the feature also had indications of heavy oxidation and a very hard unprepared earthen surface. Feature 5 was obviously used for some type of thermal preparation.

Feature 6

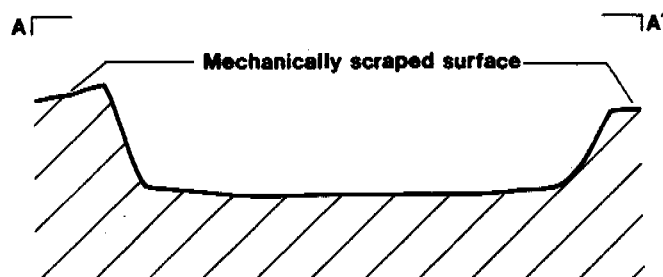
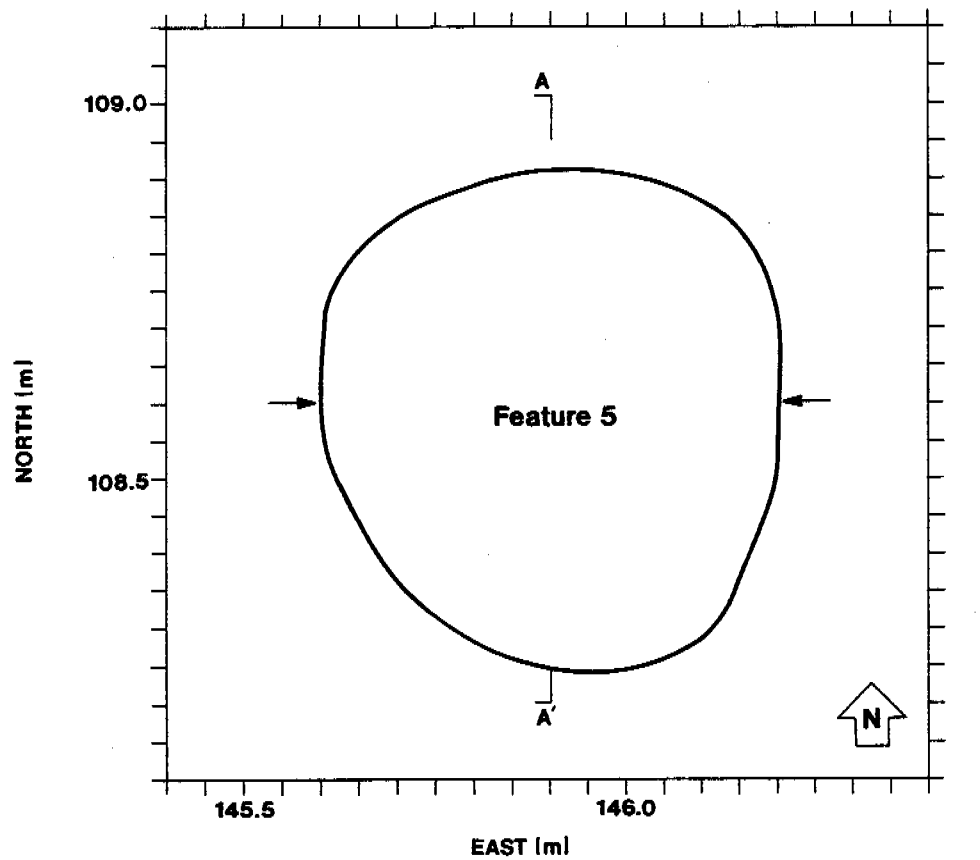
Feature 6 was an earthen pit located approximately 8 m northwest of Feature 5, at site

grid coordinates N116.10, E143.32 (Figure 10.3). In plan view the feature was roughly circular measuring 60 cm east-to-west by 56 cm north-to-south. A cross section of the feature exhibits an irregular cylindrical shape, with a maximum depth of approximately 46 cm (Figure 10.19). The feature was bisected into north and south portions. Both excavated portions were separate 45- to 46-cm levels, revealing sandy loam mottled with very sparse charcoal flecks and small sandstone rocks approximately 2 cm in size. Calcium carbonate deposits were noticed at the base of both levels. An abundant amount of rodent activity and few roots were also recorded throughout the excavation. No artifacts were collected within the fill of Feature 6; however, samples included two flotation samples, pollen, and waterscreen.

Removal of fill from Feature 6 revealed uneven earthen walls that slanted slightly in towards the base of the feature, an uneven loose earthen surface with embedded calcium carbonate deposits and large numbers of insect holes. Investigations of Feature 6 provided no relevant information to determine the function of the feature, and Feature 6 was classified as an indeterminate earthen pit.

Feature 7

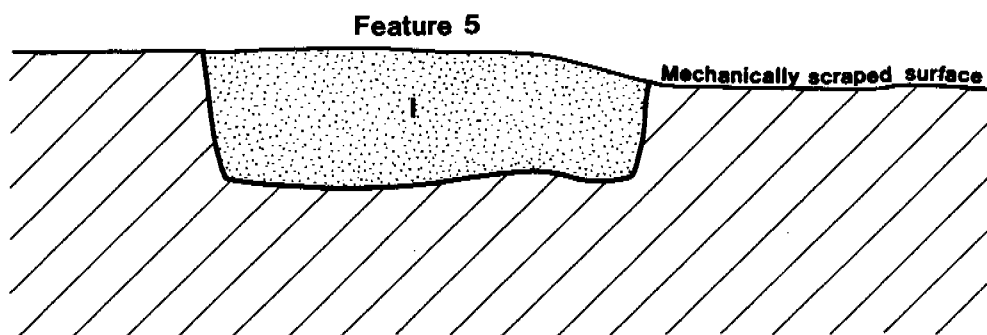
Feature 7 was an earthen pit located approximately 6 m northeast of Feature 6, at site grid coordinates N121.84, E145.12 (Figure 10.3). In plan view the feature was roughly circular measuring 60 cm north-to-south by 56 cm east-to-west. A cross section of the pit shows an irregular cylindrical shape with a maximum depth of approximately 48 cm (Figure 10.20). The feature was excavated in north and south portions. The south half was removed in one complete 48-cm level to the base of the feature. Soil included very sparse charcoal flecks encountered mostly in the upper portion of the level, along with decomposing sandstones approximately 2 to 3 cm in size and 2% fire-cracked rock approximately 5 cm in size. Rodent disturbance was also observed throughout the level. Completion of the south half excavation revealed two strata as shown along a south-facing profile of the pit (Figure 10.21). Stratum I was a sandy loam mottled with



- Edge of Feature 5
- A — A' Cross section
- /// Unexcavated
- ← Profile location

0 25 50 cm

Figure 10.17. Site LA 115327 Feature 5, Plan View and Cross Section.



I 0-18 cm - Dark yellowish brown (10YR3/4, moist) sandy loam;
weak; slightly sticky, slightly plastic; less than 10% gravel;
many micro roots; abrupt smooth boundary.

Unexcavated

Figure 10.18. Site LA 115327 Feature 5, South-facing Profile.

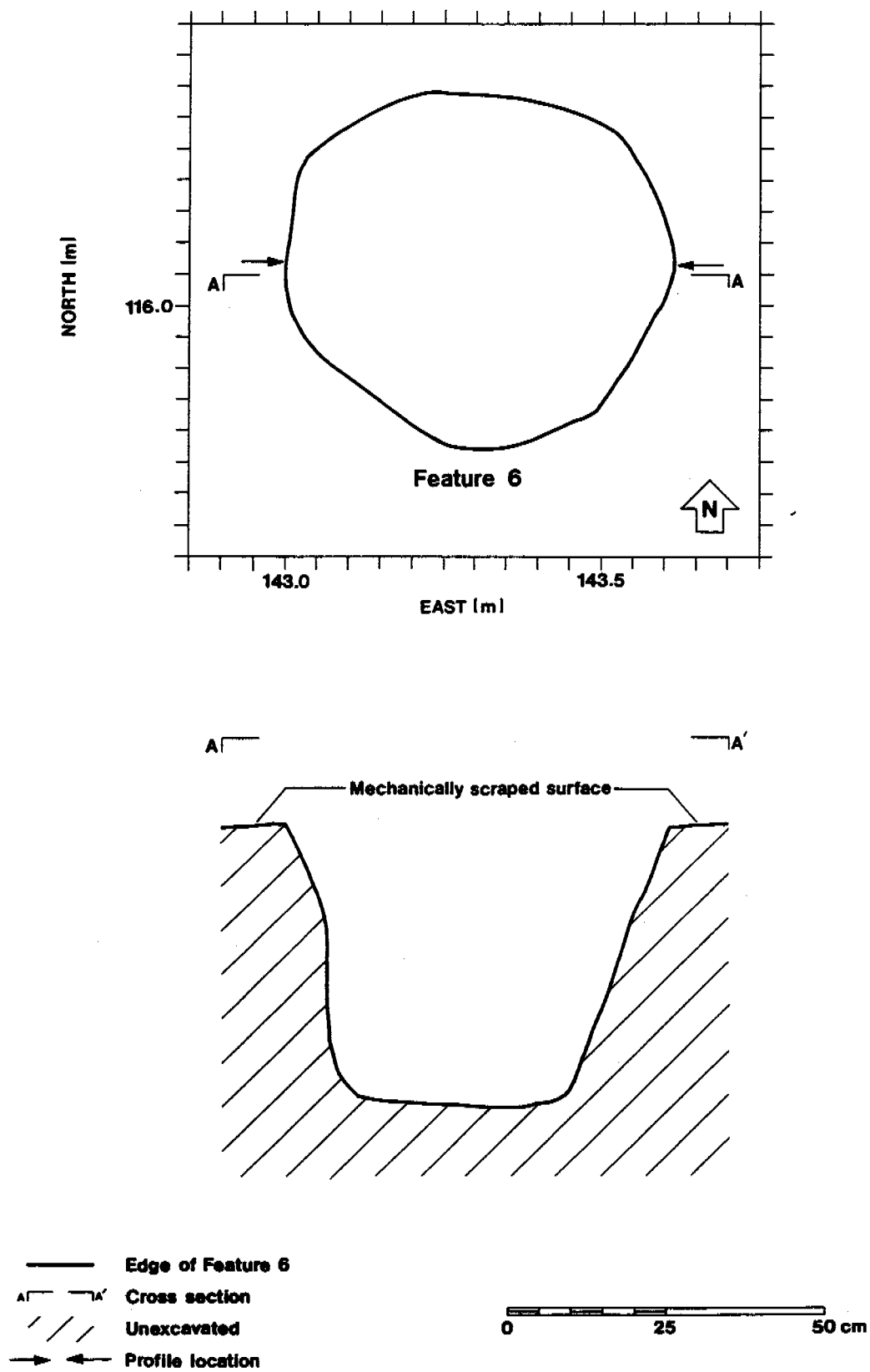


Figure 10.19. Site LA 115327 Feature 6, Plan View and Cross Section.

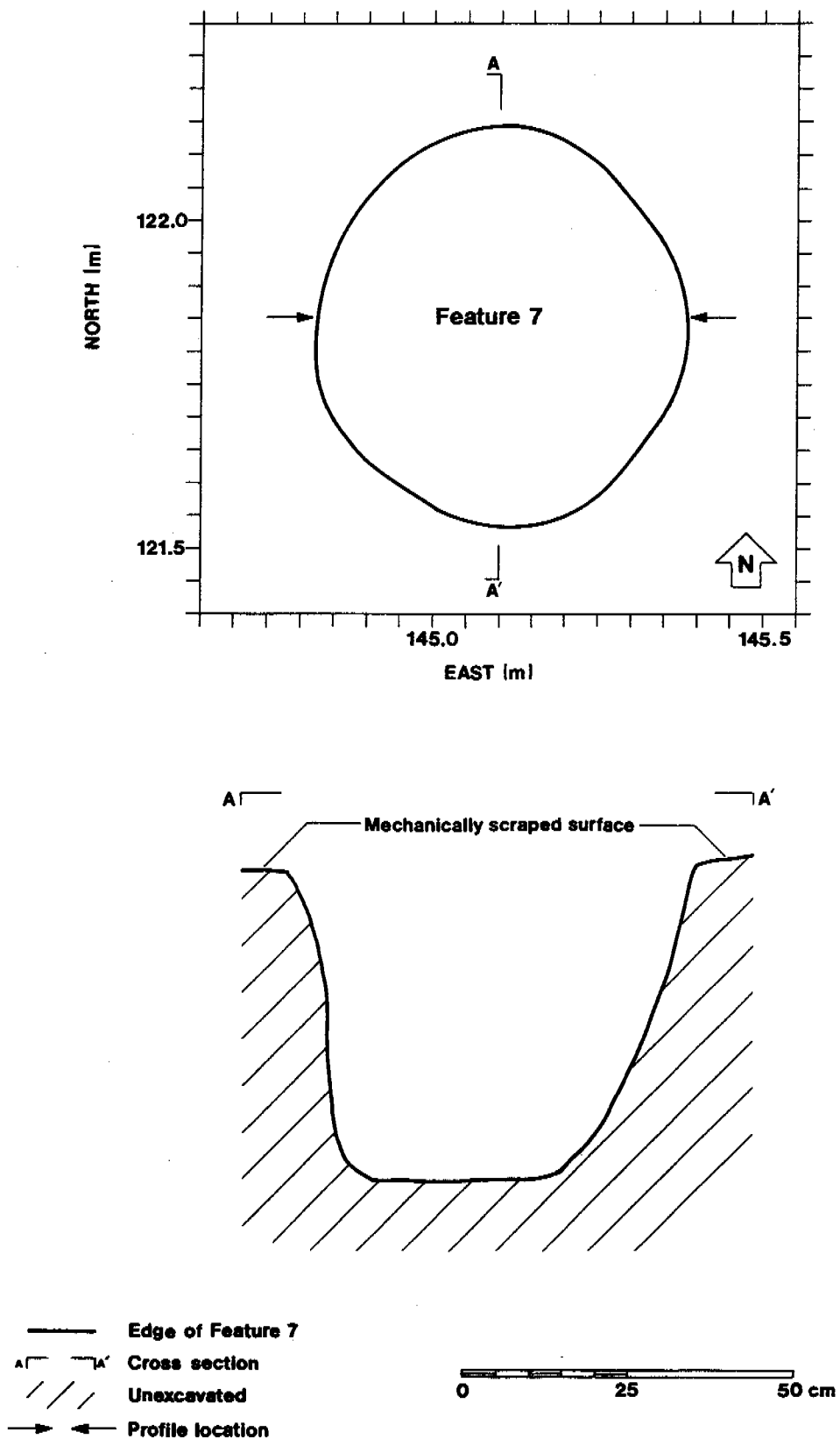
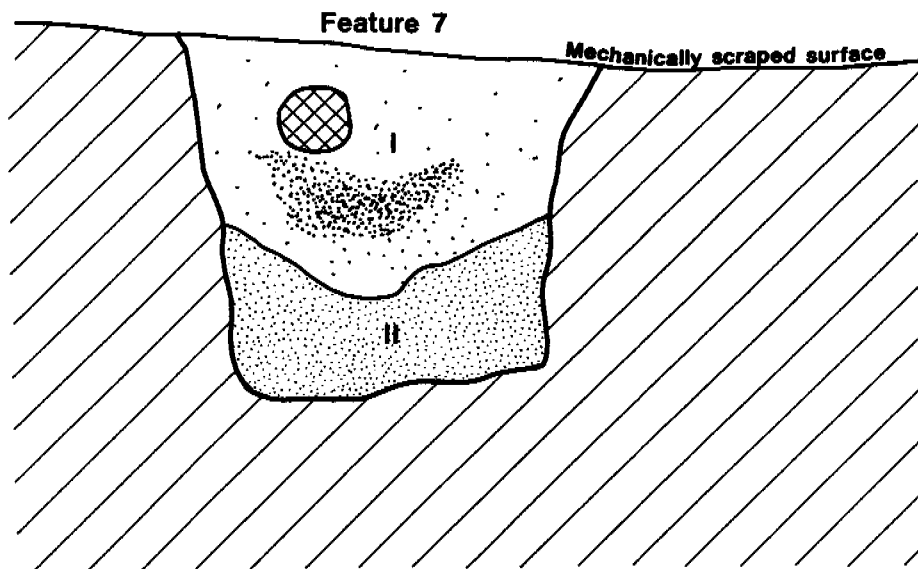


Figure 10.20. Site LA 115327 Feature 7, Plan View and Cross Section.



0 25 50 cm

- I 0-35 cm - Brown (10YR4/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; very few roots; clear wavy boundary.
- II 25-46 cm - Dark yellowish brown (10YR4/6, moist) sandy loam; weak; slightly sticky, slightly plastic; no gravel; very few roots; abrupt wavy boundary.
- Charcoal flecks
- Rodent disturbance
- Unexcavated

Figure 10.21. Site LA 115327 Feature 7, South-facing Profile.

charcoal flecks and sands that appeared to be oxidized. Stratum I was at least 34 cm in thickness. Stratum II included a more sterile or clean fill with no mottling. The maximum thickness of Stratum II was 22 cm. Excavation of the north half of Feature 7 continued by removing the fill in two cultural strata levels as shown in the north wall profile. Both excavated levels included the same soil descriptions as the north wall profile. Both levels also revealed the absence of artifacts. Flotation, pollen, and waterscreen samples were collected from the two strata.

Removal of the general fill of Feature 7 revealed slightly compact earthen walls which had indications of slight to moderate oxidation, similar to the base of the pit. This may suggest that Feature 7 was used for some type of thermal function, or that oxidation of the feature walls functioned to stabilize the pit for storage.

Feature 8

Feature 8 was an earthen pit located approximately 2 m northeast of Feature 5, at site grid coordinates N110.07, E146.91 (Figure 10.3). In plan view the feature was roughly oblong measuring 52 cm northwest-to-southeast by 36 cm southwest-to-northeast. A northwest-to-southeast cross section exhibits an irregular shape with a maximum depth of approximately 35 cm (Figure 10.22). The northwest and southeast portions of Feature 8 were excavated in two separate levels beginning at the top of the feature and ending at the base of the feature. Both halves included the same type of soil mottling consisting of sparse charcoal flecks mixed with roots and gravels. Rodent disturbance was also observed throughout the excavation. No artifacts were collected in either excavation. Soil was collected for flotation, pollen, and waterscreen samples. Prior to excavation of the southeast half, a single stratum was observed along a northwest-facing profile (Figure 10.23). Soil description on the profile is similar to the description mentioned in the level excavations.

After excavations were completed, observations revealed uneven earthen walls and an uneven earthen base with no indications of modification. Analysis of Feature 8 samples indicate the presence of maize, pinyon, grass, and beeweed pollen (discussed below). This suggests Feature 8 functioned as a storage pit.

Feature 9

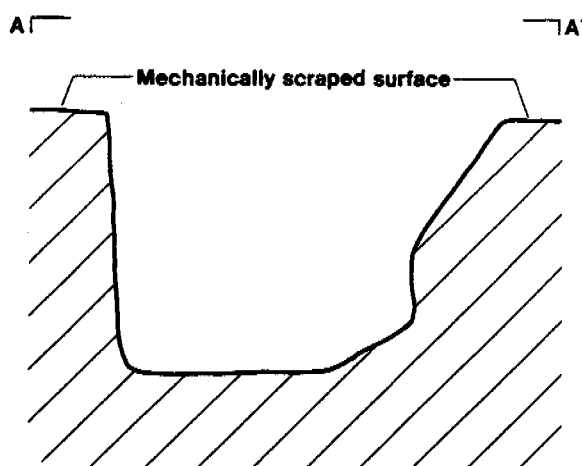
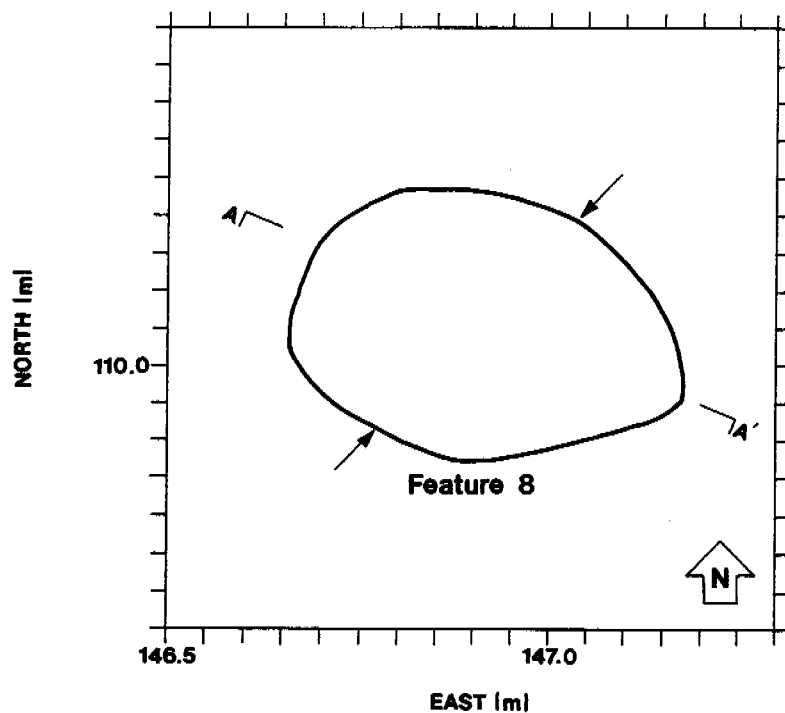
Feature 9 was an earthen pit located approximately 1 m west of Feature 1, at site grid coordinates N92.48, E150.06 (Figure 10.3). In plan view the feature was circular measuring 26 cm in diameter. A cross section of the pit appears cylindrical with a maximum depth of approximately 25 cm (Figure 10.24). The west and east portions of the feature were removed in two separate levels, beginning at the top of the feature and ending at the base of the feature. Both excavated portions comprised soil mixed with approximately 2% charcoal flecks and root disturbance. Excavations also revealed no artifacts within the pit. Soil samples were collected for flotation and pollen analysis. Prior to removal of the east half a single stratum was recorded along a west-facing profile, consisting of the same type of sediment removed from the general fill excavations. Further observations of the pit revealed loose earthen walls and base with no indications of modification.

Investigations of Feature 9 provided no relevant information to determine the function of the feature, and Feature 9 was classified as an indeterminate earthen pit.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

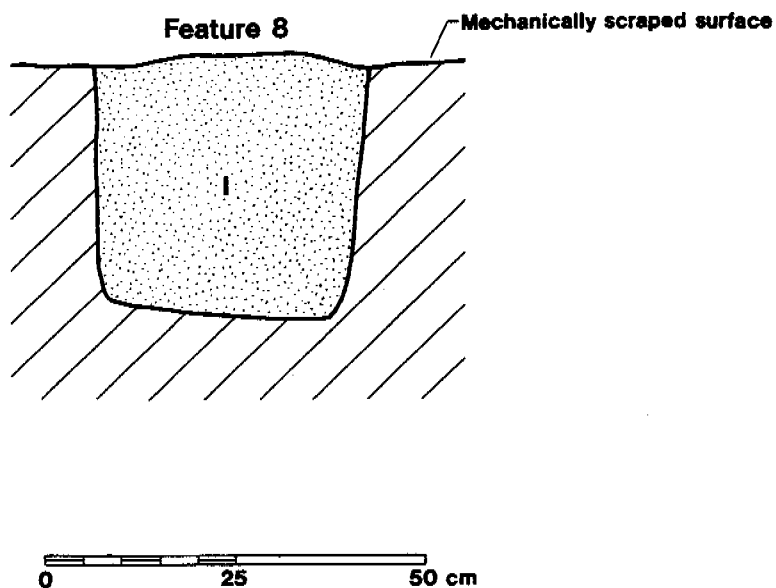
Nineteen sherds were analyzed from site LA 115327. With the exception of three sherds that were only partially analyzed (FS 8) due to their small size and, therefore, were eliminated from the data analysis, no subsampling of the recovered ceramic assemblage was made for the attribute analysis as described in Chapter 21. One sherd, FS 35, was recovered from excavation. The remain-



- Edge of Feature 8
- A A' Cross section
- /// Unexcavated
- ← Profile location



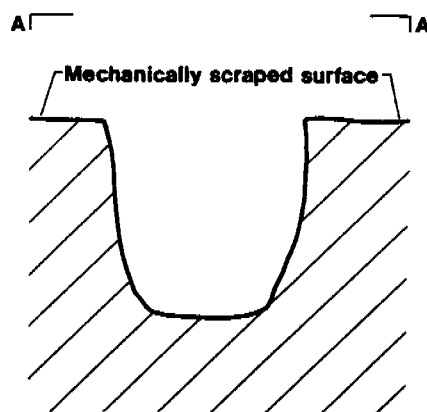
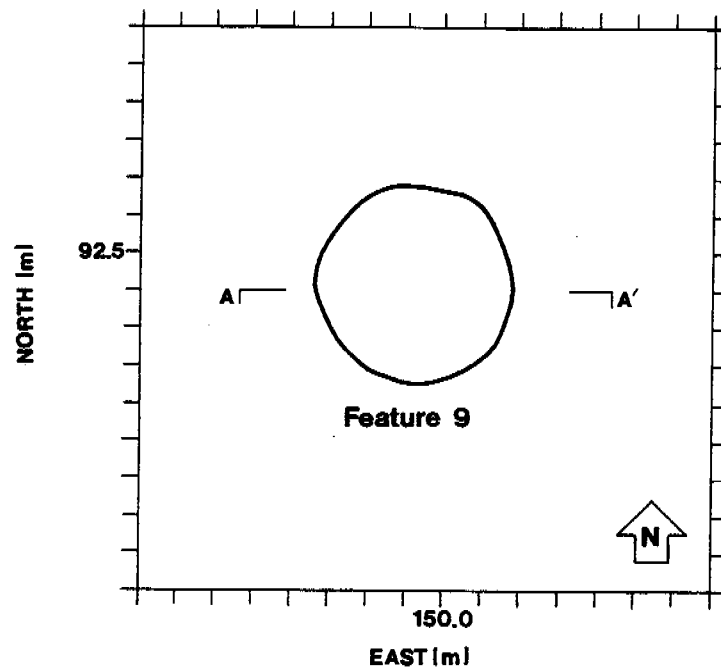
Figure 10.22. Site LA 115327 Feature 8, Plan View and Cross Section.



I 0-35 cm - Dark yellowish brown (10YR3/4, moist) sandy loam; weak; slightly sticky, slightly plastic; less than 10% gravel; few very fine roots; abrupt smooth boundary.

/// Unexcavated

Figure 10.23. Site LA 115327 Feature 8, Northwest-facing Profile.



— Edge of Feature 9
 A-A' Cross section
 /// Unexcavated

0 25 50 cm

Figure 10.24. Site LA 115327 Feature 9, Plan View and Cross Section.

ing ceramic artifacts were surface collected. Appendix D outlines the ceramic data by provenience. The assemblage contains wares common to the Zuni area, including Cibola White Ware and Cibola Gray Ware.

Chronometrics

Two diagnostic ceramic artifacts were recovered from site LA 115327, one from the surface and one from an excavated unit (SU 1). Both are Cibola White Ware sherds; one is an Escavada Black-on-white sherd while the other is a Gallup Black-on-white sherd. These types make up a ceramic assemblage that dates from the middle to late Pueblo II period (AD 1025 to 1100).

A mean ceramic date of AD 1072 \pm 37 years was generated for the surface collection. This date supports the date range for the diagnostic ceramic assemblage discussed above, suggesting that a middle to late Pueblo II temporal designation is an appropriate assignment for the site. Nevertheless, it is impossible to provide an accurate date range for the site with a sample size of two. See Chapter 21 for a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of 14 jars, 1 bowl, and 1 indeterminate form present. Most of the sherds were identified as coming from jar bodies, although one bowl rim was also recorded. Both bowl and jar forms are represented in the whiteware sherds, while all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of 14/1, suggesting storage may have been intensely practiced. Neither sooting nor modification were recorded for this assemblage.

Compositional Variability

Tempering material was recorded for 16 ceramic artifacts, including 11 Cibola Gray Ware sherds and 5 Cibola White Ware sherds. Four of the Cibola White Ware sherds and six of the

Cibola Gray Ware sherds are tempered with sherd; this is a common temper for both wares. One of the Cibola White Ware sherds and five of the Cibola Gray Ware sherds are tempered with a combination of sand and sherd; this combination is not uncommon to either of these wares. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The assemblage from site LA 115327 is very small and comes mostly from surface collections. Two wares common to the area are present at the site, including two diagnostic sherds. The date range for the ceramic assemblage of diagnostics, as well as a mean ceramic date of AD 1072 \pm 37 years, supports a middle to late Pueblo II (AD 1025 to 1100) temporal range. A high jar to bowl ratio, with no evidence of sooting, suggests storage may have been intensely practiced at the site.

Flaked Stone Artifacts

Twenty-three flaked stone artifacts were recovered from site LA 115327. Seven of the 23 artifacts are Basketmaker II (from features or subsurface) in age while the remaining 16 were found in Pueblo II contexts (surface). Table 10.1 provides frequencies and percentages for the artifact classes present in the Basketmaker II and Pueblo II components of the site. Table 10.2 provides summary metric data (length, width, thickness, and weight) for the artifacts in this collection both in total and separated by period.

Basketmaker II Assemblage

As Table 10.1 shows, the entire Basketmaker II assemblage at this site consists of one core and a handful of lithic reduction products including debitage (three pieces) and debris (three pieces). The core is a relatively large (136 g) chert single-platform core produced on a 5.8-cm-diameter chert pebble. Such pebbles are both abundant and readily accessible in the gravel-bearing alluvial sediments found throughout the project area.

Table 10.1. Summary Counts and Percentages of Site LA 115327 Basketmaker II and Pueblo II Flaked Stone Artifacts by Artifact Class.

Artifact Class	Basketmaker II			Pueblo II			Total	
	n	%		n	%		n	%
Bifacially battered piece	-	-		1	6.3		1	4.4
Core	1	14.2		2	12.4		3	13.0
Debitage	3	42.9		6	37.5		9	39.1
Debris	3	42.9		6	37.5		9	39.1
Retouched piece	-	-		1	6.3		1	4.4
Total	7	100.0		16	100.0		23	100.0

Table 10.2. Summary Metric Data for Site LA 115327 Basketmaker II and Pueblo II Flaked Stone Assemblages.

Summary Statistic	Basketmaker II (n= 7)				Pueblo II (n= 16)				Total (n= 23)			
	Length (cm)	Width (cm)	Thick. (cm)	Weight (g)	Length (cm)	Width (cm)	Thick. (cm)	Weight (g)	Length (cm)	Width (cm)	Thick. (cm)	Weight (g)
Mean	2.6	2.1	1.0	20.4	2.4	2.1	1.2	11.3	2.5	2.1	1.1	14.1
10% trimmed mean	2.6	2.1	1.0	20.4	2.3	2.0	1.0	7.9	2.3	1.9	0.9	6.2
Median	2.1	1.4	0.5	-	2.0	1.9	0.8	1.5	2.1	1.7	0.7	1.0
Standard error	0.6	0.6	0.6	19.3	0.4	0.3	0.3	5.3	0.3	0.3	0.3	6.7
Standard deviation	1.6	1.6	1.5	51.0	1.5	1.3	1.3	21.1	1.5	1.4	1.3	32.1
Minimum	1.0	0.8	0.2	-	0.5	0.4	0.1	-	0.5	0.4	0.1	-
Maximum	5.8	5.4	4.3	136.0	5.1	5.0	4.0	70.0	5.8	5.4	4.3	136.0
Range	4.8	4.6	4.1	136.0	4.6	4.6	3.9	70.0	5.3	5.0	4.2	136.0

Key: Thick. = Thickness

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

The three pieces of debitage consist of one cortical primary flake and two subcortical secondary flakes. All three pieces of debitage are chert and weigh from less than 1 to 5 g (primary flake). Of the three pieces of debris, one is quartzite and the remaining two are chert. All weigh less than 1 g.

The composition of this small assemblage, consisting of a core, debitage, and debris, indicates lithic reduction took place at site LA 115327 during the Basketmaker II period. As was the case with the Basketmaker II flaked stone assemblage from site LA 26319, there are two possible interpretations which can account for the small size of the collection from the Basketmaker II component of this site: (1) lithic reduction and/or tool production was only a minor activity at the site, or (2) the occupation itself was ephemeral or of short duration. The Basketmaker II flaked stone artifacts were recovered from Features 1 and 4 at the site. Both features are described as containing evidence of their use as thermal features. It should be noted that none of the flaked stone artifacts shows signs of thermal alteration. Excavated from the first 10-cm level of each of these features, the flaked stone artifacts may represent secondary fill deposited in the earthen pits some time after their primary use and abandonment.

Pueblo II Assemblage

The Pueblo II component of site LA 115327 was more diverse than the Basketmaker II component. As shown in Table 10.1, 5 artifact classes are represented among the 16 artifacts in this assemblage. The artifact classes are bifacially battered piece, core, debitage, debris, and retouched piece.

Cores and lithic reduction products (debitage and debris) comprise 87.5% of the assemblage. Of the two cores, one is chert and single platform and the other is quartzite and opposed platform. Both cores have over 50% cortex and neither shows any evidence of platform preparation. Only the opposed reduction strategy employed on the quartzite core indicates any attempt at intensive

reduction strategies. In contrast, the chert core represents a "tested" piece of raw material where only one flake was removed before discard. The dominance of primary flakes (five of six pieces) in the debitage assemblage reflects both the small package size of the locally available raw materials and an expedient reduction strategy (local raw materials and Pueblo II reduction strategies are discussed in Chapter 22).

The classification of the chert retouched piece in this assemblage is equivocal. It may be more appropriately classified as debitage. Normal, peripheral retouch is present along its right distal edge. This "retouch" may be related to platform preparation of another platform on the core from which this piece was struck rather than representing intentional retouch.

The raw material composition of the Pueblo II lithic assemblage is 73.9% chert, 21.7% quartzite, and 4.4% silicified wood. The higher representation of quartzite and silicified wood in the site LA 115327 collection is consistent with the pattern seen in other Pueblo II assemblages in this study. Although chert comprises the majority of Pueblo II flaked stone artifacts (78.7% of all Pueblo II flaked stone artifacts in this study), non-chert raw materials, particularly quartzite and silicified wood, play a greater role in the Pueblo II raw material economy than they do during the earlier Basketmaker II period.

Primary lithic reduction was certainly occurring during the Pueblo II occupation of site LA 115327. The reduction technology appears to be expedient in nature resulting in the production of simple cores and cortical debitage. The presence of a bifacially battered piece in this collection suggests wood- or bone-working may have taken place at the site. *Bifacially battered pieces* (*scaled pieces* in European typologies) are commonly interpreted as having been produced from their use as wedges in the splitting and working of wood or of bone. Tixier (1963) and Marks (1976) define scaled pieces as "...generally rectangular or broken pieces, sometimes small, with two extremities (rarely only one) commonly exhibiting bifacial scaling caused by violent

percussion." Throughout this report the term *bifacially battered piece*, a technological classification, is used to refer to these artifacts.

Miscellaneous Items

Two miscellaneous items were recovered from site LA 115327. One was a piece of red ochre from Feature 1, an earthen pit. One edge is ground with parallel striations visible. The other item is an unidentifiable off-white colored substance recovered from Feature 4, a large earthen pit. It is triangular in cross section, possibly from use. This item is degrading into a powder and is very fragile. This is quite possibly what the Zunis refer to as *Kechibawa*, a substance used as a white pigment.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of faunal remains from the entire project can be found in Chapter 26. Detailed description of faunal remains is provided in Appendix I.

This site produced a small bone assemblage, dominated by parts of a single dog skeleton from Feature 4 (Table 10.3). The identification as dog was based upon mandibles and the fragmentary cranium. Based on size, the specimen cannot be a wolf. Based on tooth size in relation to mandible size as well as tooth crowding in mandible and maxilla, the cranium and mandible can be

identified as domestic dog with confidence. Following this analyst's identification procedures, other parts of the skeleton were identified to the genus *Canis* rather than *C. familiaris*, but there is little doubt that a single dog skeleton is represented. The skeleton is incomplete, but the feature was completely excavated. Individual specimens are poorly preserved. The cranium is in many pieces and some of the teeth are fractured and exfoliating; many of the long bones have lost their proximal and distal ends, and there are numerous fractures in the bone caused by postdepositional taphonomic processes. It seems likely that poor preservation conditions are responsible for some bone loss, and rodent disturbance may also have removed some parts of the skeleton. This specimen should be conserved if it is to survive for future analysis.

Apart from the dog skeleton, there is a very sparse assemblage of small mammals and one unidentified specimen. None of the bones were burnt.

Macrobotanical Remains

Uncharred goosefoot, dropseed grass, and mint family seeds were identified in four of the eight samples examined and should be considered as modern intrusives. Samples from Feature 1 and 4 yielded the only charred nonwood remains including maize cupules and a bugseed seed. Although bugseed has no documented ethnobotanical uses, it was no doubt used in much the same way as goosefoot. Charred bugseed has

Table 10.3. Faunal Assemblage from Site LA 115327.

Taxon	NISP	MNI
<i>Sylvilagus</i> sp.	2	1
Small rodent	1	1
<i>Canis familiaris</i>	3	-
<i>Canis</i> sp.	40	-
Unidentified	1	-
Total	47	3

Key: MNI = minimum number of individuals.

NISP = number of identified specimens.

been recovered from southeast Utah (Reed 1983), the Chaco area (Donaldson and Toll 1982), Tsaya Wash (Minnis 1978) and the San Juan Basin (Hammett and McBride 1993). These data along with bugseed that was found in coprolites at Cowboy Cave (Hogan 1980) provide convincing evidence that bugseed was a source of food for prehistoric populations. Wood taxa identified were solely coniferous including pine and unknown conifer.

Extensive root, insect, and/or rodent disturbances were present in all features, seriously impacting preservation of fragile plant material. The most that can be said is that site occupants were probably growing maize nearby, bugseed could have been part of the wild resources collected for food, and locally available conifer woods were gathered for fuel.

Pollen

Five extramural pit samples were analyzed from site LA 115327: base samples were obtained from Features 5, 8, and 4; and in Features 3 and 1, samples were collected from fill 10 cm above the pit bases. The fill sample from Feature 3, a bell-shaped pit, was pollen-sterile, and the other four samples produced low sample pollen concentrations less than 900 gr/cc. The base sample from Feature 5 produced a high pinyon value (8%), relatively high Cheno-Am (33%), grass (6%), and beeweed (4%), and beeweed aggregates were documented. The base sample from Feature 8 had a minimum pollen concentration of <200 gr/cc and high values of maize (6%), pinyon (11%), grass (9%), and beeweed (11%). In the Feature 4 sample, the most notable pollen types were Cheno-Am and beeweed with values of 44% and 8% respectively; this sample also had a higher pollen concentration (900 gr/cc) for the site. The Feature 1 sample produced a moderate pollen concentration (800 gr/cc) with high percentages of Cheno-Am (40%) and beeweed (10%), and maize was identified.

The pollen results from site LA 115327 show that maize was probably associated with the pits and grass appears to have been used in the pits or

stored as a resource. High pinyon, beeweed, and Cheno-Am representations could reflect stored resources or layering materials, and the Cheno-Am and beeweed also likely reflect local weeds around the site.

STRATIGRAPHY

The stratigraphy of site LA 115327 is best illustrated in the profiles of SU 2, 4, and 5. A brown sandy loam approximately 35 to 40 cm thick caps the underlying deposits over most of the site (it was not identified in SU 4). Below this layer is found a thick (approximately 75 cm) dark yellowish brown sandy loam. This layer comprises the Basketmaker II component discussed above. Below this cultural horizon occur very dark brown, sand and clay deposits. This is best represented by Stratum II in SU 4. This is an organically rich horizon.

The stratigraphy is similar to that of other sites in the project. That is, the Basketmaker II occupation is found below a thick, brown sandy loam deposit (a humic A horizon). At site LA 115327, as at site LA 48695, the Basketmaker II occupation overlies a thick dark organic horizon (an O horizon).

CHRONOMETRIC DATA

Chronometric data available for site LA 115327 comprise two radiocarbon dates and the ceramic artifact assemblage. Table 10.4 summarizes the radiocarbon samples, establishing the early component at the site to the Basketmaker II period. For the later component, Eckert calculated a mean ceramic date of AD 1072 \pm 37 years from the ceramic artifact assemblage.

SUMMARY

Site LA 115327 is a multicomponent site located along the base of the valley's western slope. Site boundaries extend across both sides of the highway, however, testing and data recovery activities focused only on the eastern portion of the site. Identified components include Basketmaker II and late Pueblo II occupations.

Table 10.4. Summary of Radiocarbon Samples from Site LA 115327.

FS No.	Conv. Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Material	Context
50 56	2450 ± 90	BC 780 to 400	BC 805 to 375	BC 515	Unknown conifer and pine	F 4, storage pit with dog burial
49	2070 ± 40	BC 115 to 20	BC 180 to AD 25	BC 50	Maize cupule	F 1, storage pit

Subsistence-related activities appear to have been a focus of the Basketmaker II occupation of the site. This is particularly demonstrated by archaeobotanical remains of maize, Cheno-Am, and beeweed. Variation in feature type, such as storage and thermal, indicate a range of activities took place at the site. The human and canine burials suggest habitation in the immediate area, however, no architectural features, such as pitstructures, were located during our investigations. Contemporaneous habitations are located nearby, at sites LA 26306 (Chapter 11) and LA 115330 (Chapter 12).

The later component at site LA 115327 dates to the late Pueblo II period based upon the

ceramic artifact assemblage. This component is represented along the eastern portion of the site by a low density of surface artifacts. A small stone feature is located outside the eastern right-of-way boundary, and may or may not be associated with this later component. The late Pueblo II occupation of site LA 115327, however, is located primarily along the western right-of-way, which was not investigated during testing and data recovery activities. Ceramic, flaked stone, and ground stone artifacts were observed, and suggest the site functioned as a habitation. Testing, however, would be needed to further determine the nature and extent of this component.

Chapter 11

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 26306

Jerome Zunie and James W. Kendrick

with Analytic Contributions by

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Pamela McBride, Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations at site LA 26306, a multicomponent site located on both the east and west sides of the highway, were conducted in two phases as a result of poor weather conditions. The initial phase of work was conducted between 2 and 12 February 1998. Activities during this period comprised initial mapping, collection of artifacts, and the excavation of three 1-by-1-m hand-excavated study units and five mechanically excavated trenches. Due to frozen earth and the presence of a dark midden, high artifact densities, and the high probability of encountering features, further activities were postponed until spring. Frozen earth was extremely difficult to strip mechanically, and it was determined the site could be better investigated once the weather warmed and the earth thawed. Data recovery activities resumed for the second phase on 14 April and continued through 26 May 1998. Pinyon, juniper, grasses, rabbitbrush, and narrowleaf yucca are the most common plants found today across the site. The site is located at approximately 2085 m (6840 ft) above mean sea level.

Site LA 26306 comprises Basketmaker II and Pueblo II components, and contains the most features of any site in the project. The Basketmaker II component consists of two shallow pitstructures, a deep pitstructure, and extramural features. The later component, dating to the Pueblo II, consists of a dark midden deposit along the eastern side of the highway. A late Pueblo II fieldhouse is located outside the eastern right-of-way fence, near the tip of the bedrock ridge and overlooking the valley of Y Unit Draw.

SURVEY RESULTS

Holmes (1980) originally recorded site LA 26306, which was also recorded by Abbott (1997). The predominant feature at the site is a small fieldhouse at the easternmost portion of the site (Abbott 1997:36, Figure 17). A dark organic stain representing a Pueblo II midden was also recorded on the east side of the highway within the right-of-way (Figure 11.1). A light scatter of lithic and ceramic artifacts extended up the slope of the bedrock ridge west of the existing highway.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations at site LA 26306, a pedestrian survey was conducted in transects at 2-m intervals to determine surface artifact distribution. Each artifact within the right-of-way was marked with a pin flag, point located with a Sokkia Total Station, and then collected. Only those artifacts within the right-of-way (in this case on both sides of the highway) were collected. Due to time constraints, artifacts outside the eastern right-of-way were not point located.

A dense concentration comprising both flaked stone and ceramic artifacts was observed on the eastern side of the highway (Figure 11.2). This represents the midden of the Pueblo II occupation of the site. A low-density scatter of ceramic, flaked stone, and ground stone artifacts was observed on the western side of the highway. This low density is surprising because two Basketmaker II pitstructures and an extramural feature were discovered in this area (as described

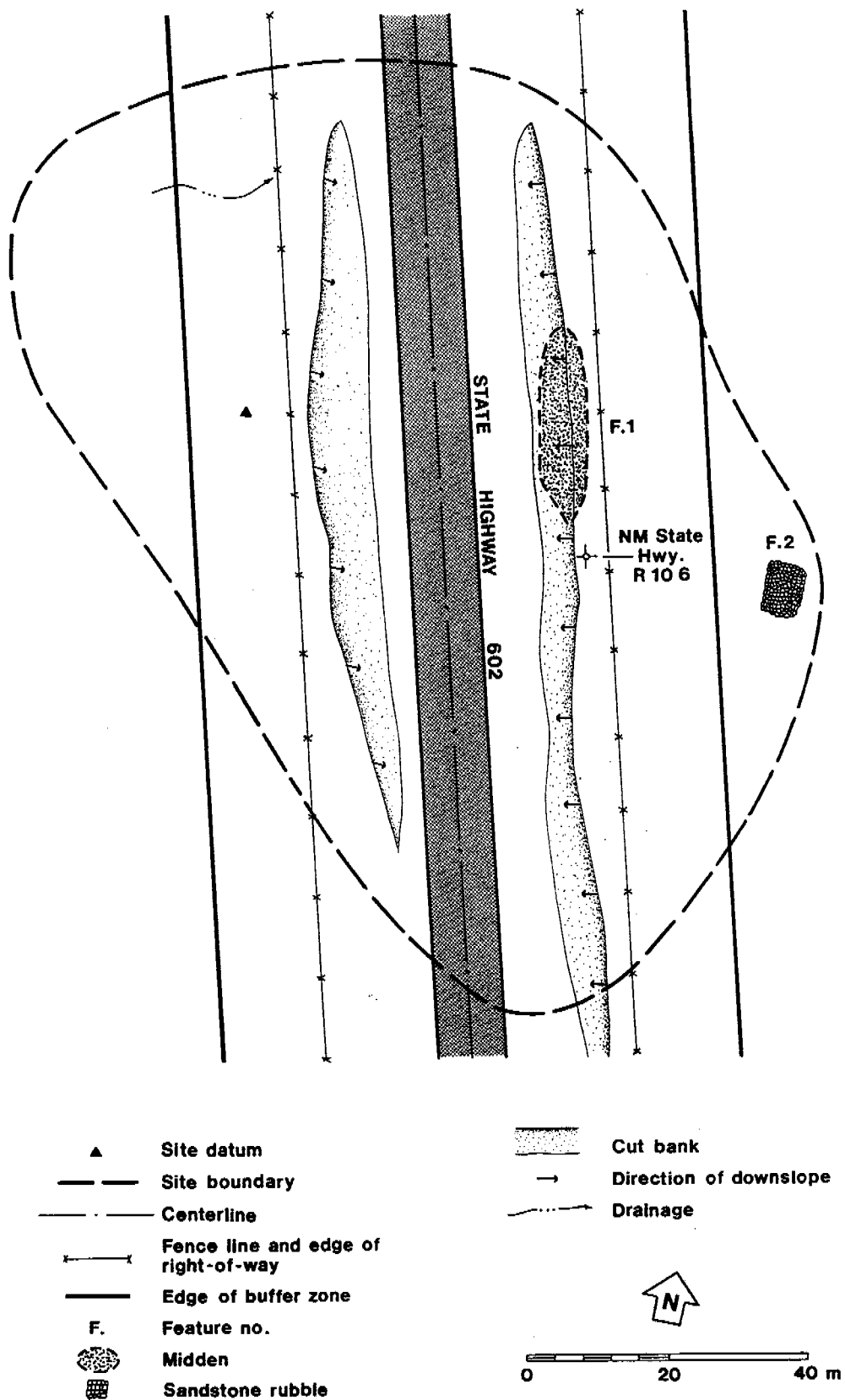


Figure 11.1. Site LA 26306 Survey Site Map.

below). Even more surprising is that these features were not far below the surface (less than 20 cm). This was a good reminder that surface distributions are not always indicative of subsurface deposits, especially in Y Unit Draw.

Excavation

Hand Excavation

Hand excavation of three 1-by-1-m units was conducted in order to determine the nature and depth of the cultural deposits on site LA 26306. An artifact distribution map (Figure 11.2) generated from the controlled surface collection was used as a guide for the placement of the three units. Six additional hand-excavated units, designated Study Unit (SU) 9, 10, 11, 12, 13, and 14 were all placed within features to investigate the nature and depth of those cultural deposits within the features. All test units were excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit 1. SU 1 was located within the eastern portion of the site and east of the existing State Highway 602. The grid coordinates for the southwest corner of SU 1 are N130.00, E166.00 (Figure 11.3). This 1-by-1-m unit was placed in an area of dense artifact concentration and in an area of severe ground disturbance by road construction.

SU 1 was excavated in seven 10-cm levels. Since all four walls of the unit were identical, a single 1-m-long profile of the west-facing wall was drawn for SU 1 (Figure 11.4). Three strata were identified within the unit. Stratum I consisted of dark yellowish brown loamy sand defined as midden deposits. Levels 1 and 2 were excavated within Stratum I. No artifacts or features were defined in Level 1. Artifacts from Level 2 consisted of flaked stone. Stratum II consisted of dark brown midden deposits. Levels 3, 4 and 5 were excavated within this stratum. Level 3 yielded ceramics, flaked stone, and faunal specimens. Level 4 material culture consisted of flaked stone and faunal specimens. Level 5 also yielded flaked stone and faunal specimens. No

features were defined within this stratum. Stratum III consisted of strong brown silt loam. Levels 6 and 7 were excavated within this stratum. Artifacts recovered from Level 6 consisted of only flaked stone. No cultural deposits or features were defined at Level 7 and excavation was terminated for SU 1. Excavation of SU 1 revealed that the cultural deposits were within Strata I and II and extended to at least 42 cm below the surface.

Study Unit 2. SU 2 was located west of the eastern right-of-way fence line within the eastern portion of the site and east of the existing State Highway 602. The grid coordinates of the southwest corner of SU 2 are N115.40, E169.40 (Figure 11.3). This 1-by-1-m unit was placed in an area of dense artifact concentration and moderate ground disturbance by road construction.

SU 2 was excavated in five 10-cm levels. One 1-m-long representative profile of the west-facing wall was drawn of SU 2 (Figure 11.5). Two strata were defined within the unit. Stratum I consisted of dark brown sandy loam deposits considered as cultural deposits. Levels 1, 2, and 3 were excavated within this stratum. Artifacts recovered from Level 1 consisted of ceramic and flaked stone. Level 2 materials recovered consisted of ceramics, flaked stone, ground stone, and faunal specimens. Only ceramic were recovered from Level 3. Stratum II consisted of brown sandy loam with very few deposits of cultural materials. Level 4 and 5 were excavated within this stratum. Level 4 artifacts consisted of only flaked stone. No artifacts were recovered from Level 5. Due to the absence of artifacts or features at Level 5 excavation of SU 2 was terminated.

Study Unit 3. SU 3 was located east of the western right-of-way fence line, west of the existing State Highway 602, and at the eastern limit of the road cut. The grid coordinates of the southwest corner of SU 3 are N74.00, E148.14 (Figure 11.3). This 1-by-1-m unit was placed in an area of very light artifact scatter and at the edge of severe ground disturbance by road construction.

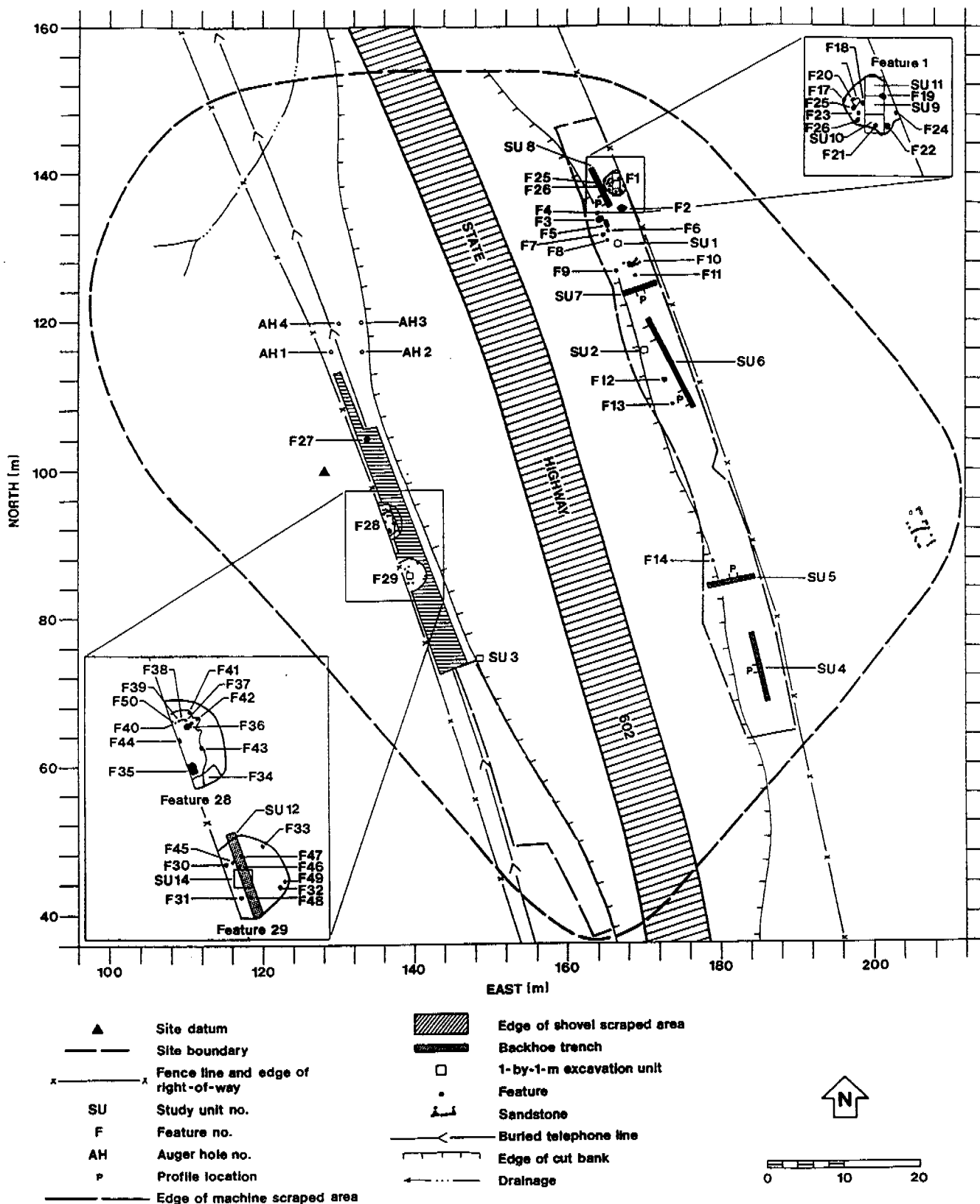
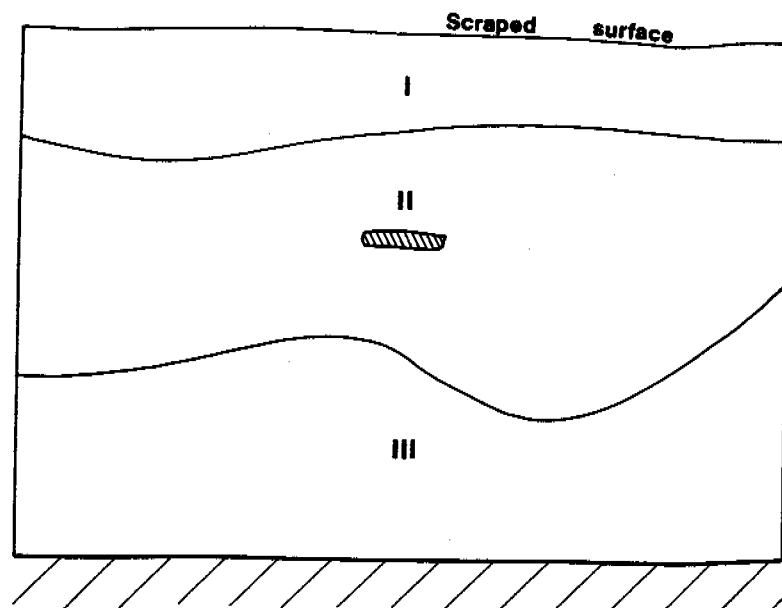


Figure 11.3. Site LA 26306 Data Recovery Site Map, Features, Study Units, and Mechanical and Hand Stripping.





- I 0-13 cm - Dark yellowish brown (10YR3/6. moist) loamy sand; weak, very fine, granular; nonsticky, nonplastic; less than 10% gravel; very few fine roots; diffuse wavy boundary.
- II 13-42 cm - Dark brown (10YR3/3. moist) sandy loam; weak, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few very fine roots; abrupt wavy boundary.
- III 42-70 cm - Strong brown (10YR5/6. moist) silt loam; moderate, very fine granular; nonsticky, nonplastic; less than 10% gravel; very few micro roots.
-  Sandstone rock
-  Unexcavated

Figure 11.4. Site LA 26306 Study Unit 1, West-facing Profile.

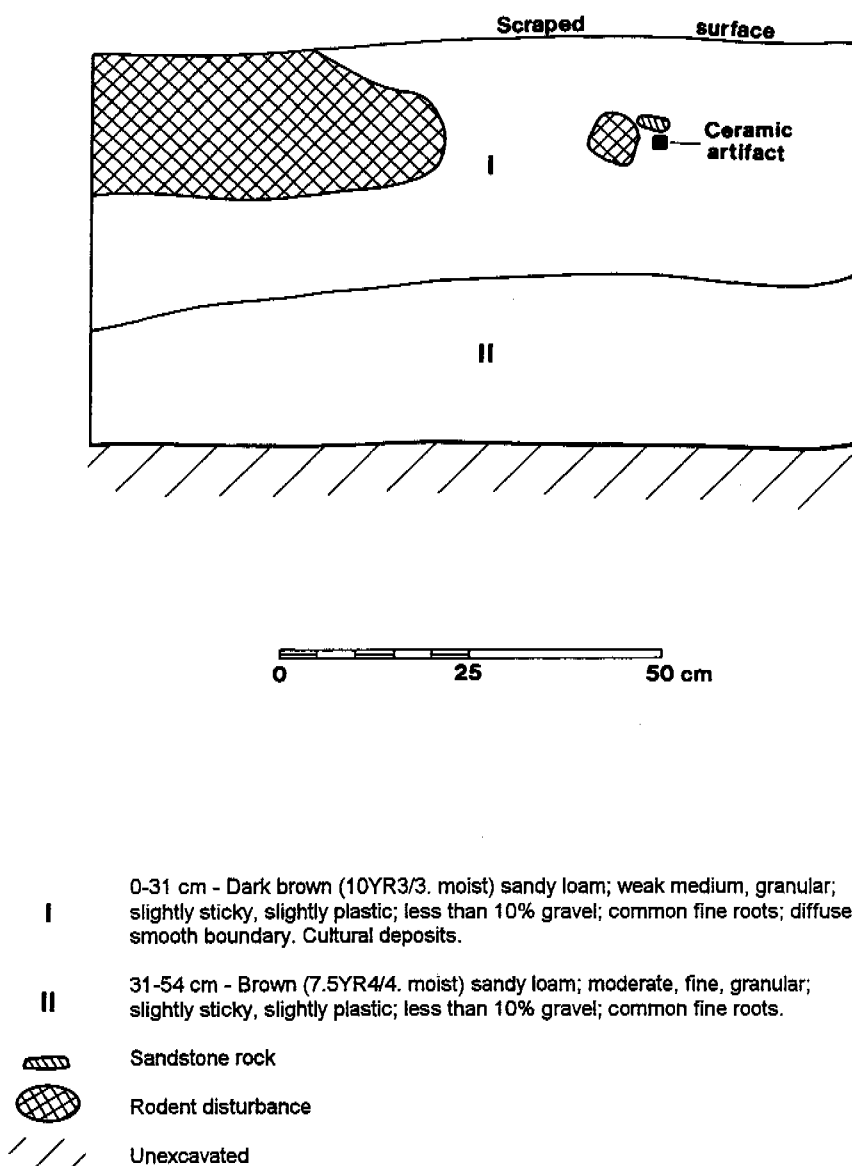


Figure 11.5. Site LA 26306 Study Unit 2, West-facing Profile.

Due to the local topography of the area the first level of SU 3 was 26 cm deep. Levels 2 and 3 were 10-cm levels. One 1-m-long representative profile of the east-facing wall was drawn of SU 3 (Figure 11.6). Three strata were defined within the unit. Stratum I consisted of dark yellowish brown sediments considered to be cultural deposits. Level 1 excavation was within this stratum. Artifacts recovered from this level consisted of ceramic and flaked stone. Stratum II consisted of strong brown sandy clay deposits. Level 2 was excavated within this stratum. Artifacts recovered from Level 2 consisted of only flaked stone. Stratum III consisted of olive brown silty clay. Level 3 was excavated within this stratum. No cultural deposits or features were recovered within this level and excavation of SU 3 was terminated. The excavation of SU 3 revealed that the cultural deposits within the western portion of the site were shallow.

Study Unit 9. SU 9 was located within the boundaries of Feature 1 and east of the existing State Highway 602. The grid coordinates for the southwest corner of SU 9 are N138.36, E165.64 (Figure 11.3). This 1-by-1-m unit was established within the feature to determine the depth of cultural deposits and floor of the feature.

SU 9 was excavated in four 10-cm levels. One 1-m-long representative profile of the north-facing wall was drawn for SU 9 (Figure 11.7). Two strata were identified within the unit. Stratum I consisted of cultural deposits within the feature. Levels 1 through 4 were excavated within this stratum. No artifacts were recovered from Level 1. Artifacts recovered from Level 2 consisted of ceramics, flaked stone, and ground stone. Materials from Level 3 included flaked stone, ground stone, and unmodified stone. One flaked stone was recovered from the floor context in Level 4. Four maize cupules, maize pollen, and charred Cheno-Am seeds were some of the archaeobotanical remains recovered from the floor context of Feature 1 (described below). Stratum II consisted of sandy loam free of cultural deposits. This stratum had evidence of severe disturbance by insect burrowing. Excavation of SU 9 defined the floor of a shallow pitstructure.

Study Unit 10. SU 10 was located just south of SU 9 and within Feature 1. The grid coordinates for the southwest corner of SU 10 are N137.36, E165.64 (Figure 11.3). This 1-by-1-m unit was placed within Feature 1 to define the extent of the floor to the south, and to determine if walls were present within the feature.

SU 10 was excavated in two 10-cm levels. One 3-m-long profile located along the west-facing wall of SU 9, 10, and 11 was drawn (Figure 11.8). One stratum was identified within the study unit. Stratum I continues from SU 9 towards the south and is the cultural fill of the shallow pitstructure. Excavation of SU 10 revealed that the floor is uneven and extends south to the limit of the cultural deposits.

Study Unit 11. SU 11 was located directly north of SU 9 within Feature 1 and east of the existing State Highway 602. The grid coordinates for the southwest corner of SU 11 are N139.36, E165.64 (Figure 11.3). This 1-by-1-m unit was established to determine the extent of the floor and if walls were present within the feature.

SU 11 was excavated in three 10-cm levels. One 3-m-long representative profile of the west-facing wall of SU 9, 10, and 11 was drawn (Figure 11.8). One stratum was defined within the study unit. Stratum I was the cultural fill of the shallow pitstructure. The floor of the pitstructure extends to the limits of the cultural fill and no wall was defined in the north portion of the feature. Flaked stones were the only artifacts recovered from Levels 1, 2, and 3. At Level 3 the flaked stones were recovered from the floor context.

Study Unit 12. SU 12 was located within Feature 29, on the west side of State Highway 602, and within the western portion of the site. The grid coordinates at the southwest corner of SU 12 are N84.08, E139.78 (Figure 11.3). This 0.50-by-2.00-m unit was placed over Feature 29 to determine the depth of the feature.

SU 12 was excavated in four 10-cm levels. One 4.5-m-long representative profile located along the east-facing wall was drawn of SU 12

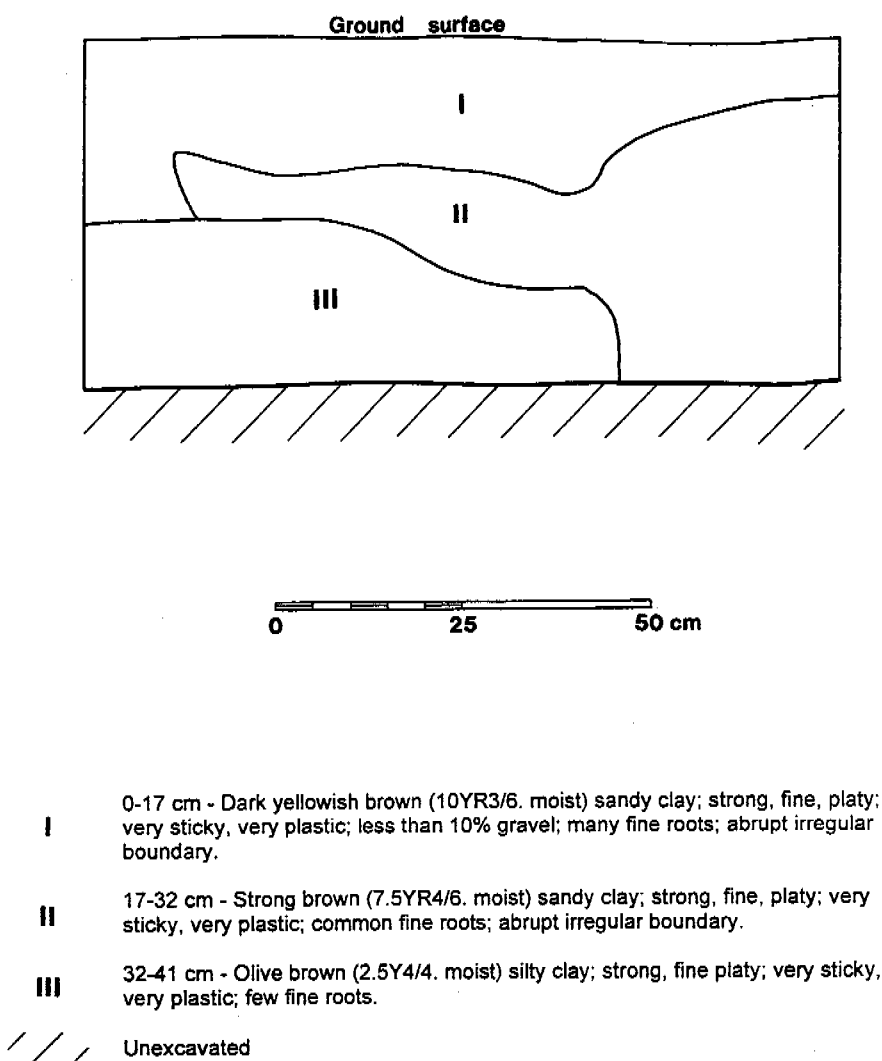
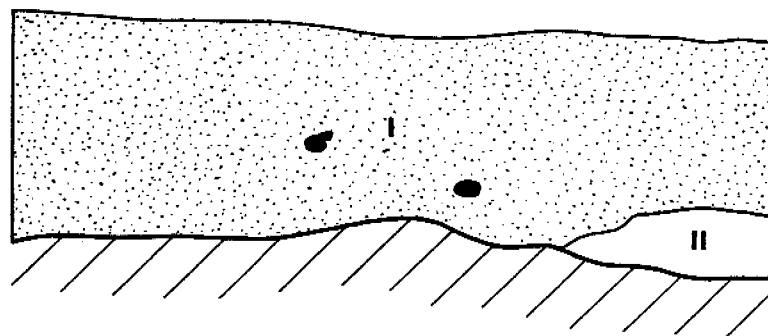


Figure 11.6. Site LA 26306 Study Unit 3, East-facing Profile.

N138.36
-E166.64

N138.36
-E165.64

Feature 1



0 25 50 cm

I 0-22 cm - Black (10YR2/1. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; few fine roots; abrupt smooth boundary.

II 22-31 cm - Strong brown (7.5YR4/6. moist) sandy loam; weak, very fine, granular; very few micro roots.

● Charcoal

/// Unexcavated

Figure 11.7. Site LA 26306 Study Unit 9, North-facing Profile, Feature 1.

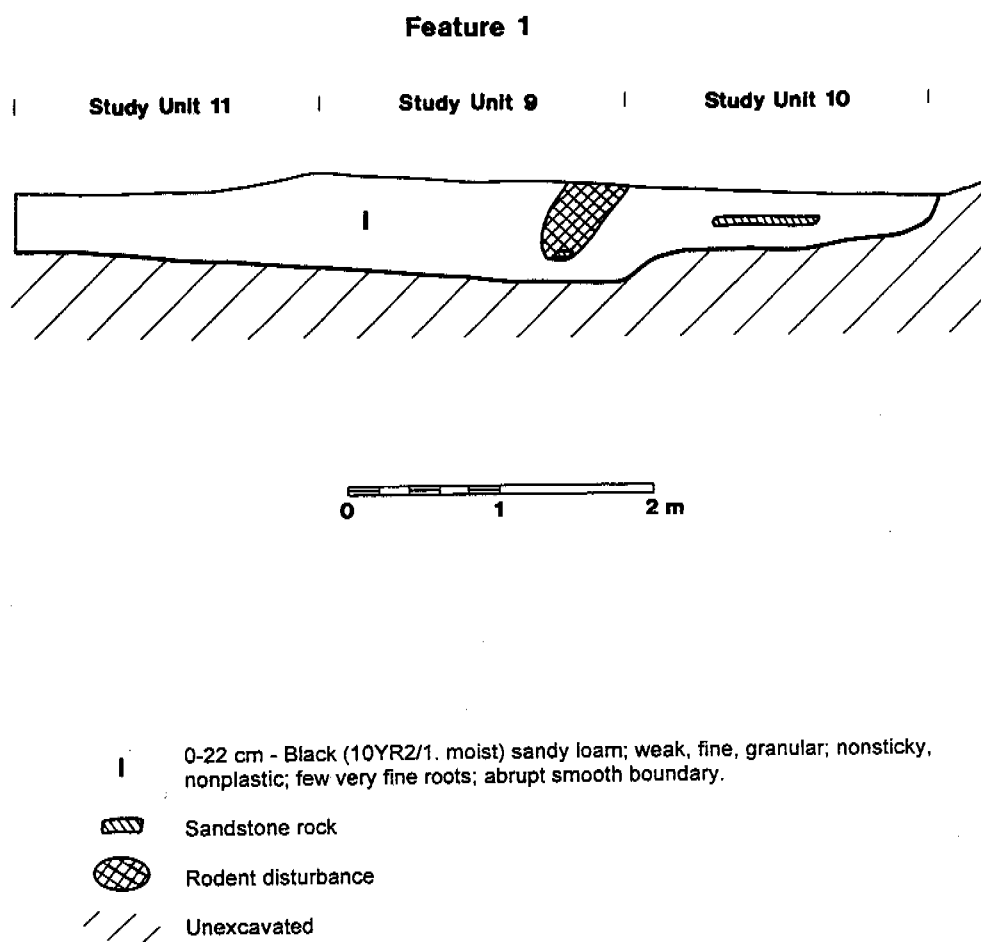


Figure 11.8. Site LA 26306 Study Units 9, 10, and 11, West-facing Profile, Feature 1.

(Figure 11.9). Two strata were defined within Feature 29 cultural fill. Stratum I consisted of fine sandy loam cultural deposits. Level 1 was excavated within this stratum and artifacts included ceramics, flaked stone, ground stone, unmodified stone (blue paint pigment), and faunal specimens. Stratum II consisted of sandy loam with cultural deposits. Levels 2, 3, and 4 were excavated within this stratum. Cultural materials recovered from Level 2 consisted of flaked stone, ground stone, and unmodified stone (blue pigment). At Level 2 a piece of burned wood was exposed at the north end of the SU 12. Artifacts recovered from Level 3 consisted of flaked stone, unmodified stone, and faunal specimens. Three pieces of burned wood were also collected from this level. Cultural materials from Level 4 consisted of flaked stone and ground stone. At the base of this level the floor of the shallow pitstructure was defined. It was also determined that the pitstructure was basin-shaped with walls absent.

Study Unit 13. SU 13 was located west of the highway within Feature 28; the grid coordinates for the southwest corner of SU 13 are N90.82, E137.65 (Figure 11.3). This 0.50-by-5.0-m test unit was placed across Feature 28 to determine the nature and depth.

SU 13 was excavated in eight 10-cm levels. Three strata were identified within the test unit. Stratum I consisted of very dark grayish brown loamy sand deposits. Levels 1 through 4 were excavated within this stratum. Artifacts recovered from Level 1 consisted of only flaked stone. Artifacts recovered from Level 2 consisted of flaked stone, ground stone, and unmodified stone. No artifacts were recovered from Level 3. Artifacts recovered from Level 4 consisted only of flaked stone. Stratum II consisted of dark brown loamy sand deposits. Levels 5, 6, and 7 were excavated in this stratum. No artifacts were recovered from Level 5 excavation. Flaked stone and ground stone were recovered from Level 6 and 7. Stratum III consisted of black loamy sand with heavy inclusions of charcoal. Level 8 was excavated within this stratum. No artifacts were recovered from this level. Excavations of SU 13 revealed the lower bench of Feature

28. It was decided at the end of Level 8 that no profile would be drawn until the entire feature was exposed.

Study Unit 14. SU 14 was located west of the highway and within Feature 29. The grid coordinates for the southwest corner of SU 14 are N85.20, E138.80 (Figure 11.3). This 1-by-1-m test unit was placed within Feature 29 to investigate the possibility of buried cultural deposits below the floor.

SU 14 was excavated in one 10-cm level. One stratum was identified within the test unit and consisted of strong brown loamy sand. No artifacts or cultural deposits were observed during the subfloor excavation, and excavation was terminated.

Hand Stripping

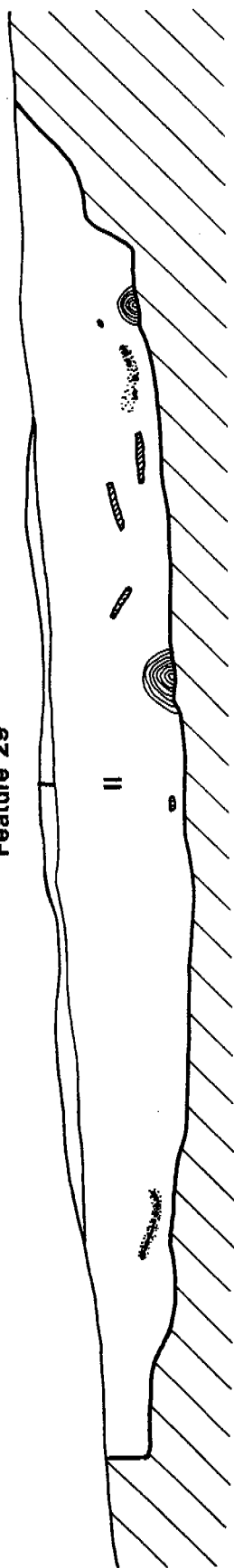
Hand stripping was conducted in order to investigate the possibility of buried features in the areas where machinery was restricted due to a buried utility cable and steep cutbank. A total of 138.36 sq m was hand stripped, using shovels, to a depth of approximately 10 cm below surface. A total of three features (Features 27, 28, and 29) and 22 internal pitstructure features were identified as a result of hand stripping.

Mechanical Excavation

Mechanical excavation of five trenches was conducted in order to determine whether additional buried deposits were present on site LA 26306. The artifact distribution defined during the controlled surface collection, information recovered from hand-excavated units, and the possibility of buried deposits at the eastern boundary of the site were used as guides for the placement of backhoe trenches.

The trenches were designated SU 4 through 8 (Figure 11.3). Excavated backhoe trenches were variable in length ranging from 4.70 m to 13.50 m in length. The trenches were typically 0.70 m wide and a maximum depth of 1.17 m deep. A total of 39.30 m of backhoe trenching was completed on the site and at least

Feature 29



I - 0-4 cm - Light yellowish brown (10YR6/4, moist) fine sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.

II - 4-40 cm - Dark brown (7.5YR3/4, moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.

 Sandstone rock

 Burned wood

 Charcoal

 Unexcavated

Figure 11.9. Site LA 26306 Feature 29, East-facing Profile, Study Unit 12.

one representative profile was drawn for each trench in 1-m-wide sections. A total of 6.00 m of trench profiles were drawn. A Munsell soil chart was used to identify soil color within each stratum of the mechanical trenches.

Study Unit 4. SU 4 was located in the southeast portion of the site and east of the existing State Highway 602, began at coordinates N68.40, E185.80 and extended northward 9.20 m to N77.70, E183.70 (Figure 11.3). This trench was placed in an area of light artifact scatter and very light ground disturbance by road construction. The maximum depth of the trench near the middle was 1.12 m deep.

One 1-m-long representative profile located along the east-facing wall near the middle was drawn for SU 4 (Figure 11.10). Two strata were defined within the trench walls. Stratum I consisted of recent aeolian deposits with some inclusions of gravel. No cultural deposits or features were defined within this stratum. Stratum II consisted of sandy loam deposits with gravel inclusions and evidence of calcium carbonate deposits. No cultural deposits or features were defined within the stratum. Excavation of SU 4 indicated that the subsurface cultural deposits did not extend into the southeast portion of the site. The calcium deposits of Stratum II also indicated that this stratum predated the cultural stratum of the site.

Study Unit 5. SU 5 was located in the southeast portion of the site and east of the existing State Highway 602, began at coordinates N83.50, E177.30 eastward 6.40 m to N85.00, E184.50 (Figure 11.3). This trench was placed in an area of light artifact scatter and moderate ground disturbance by road construction. The maximum depth of the trench near the middle was 1.01 m.

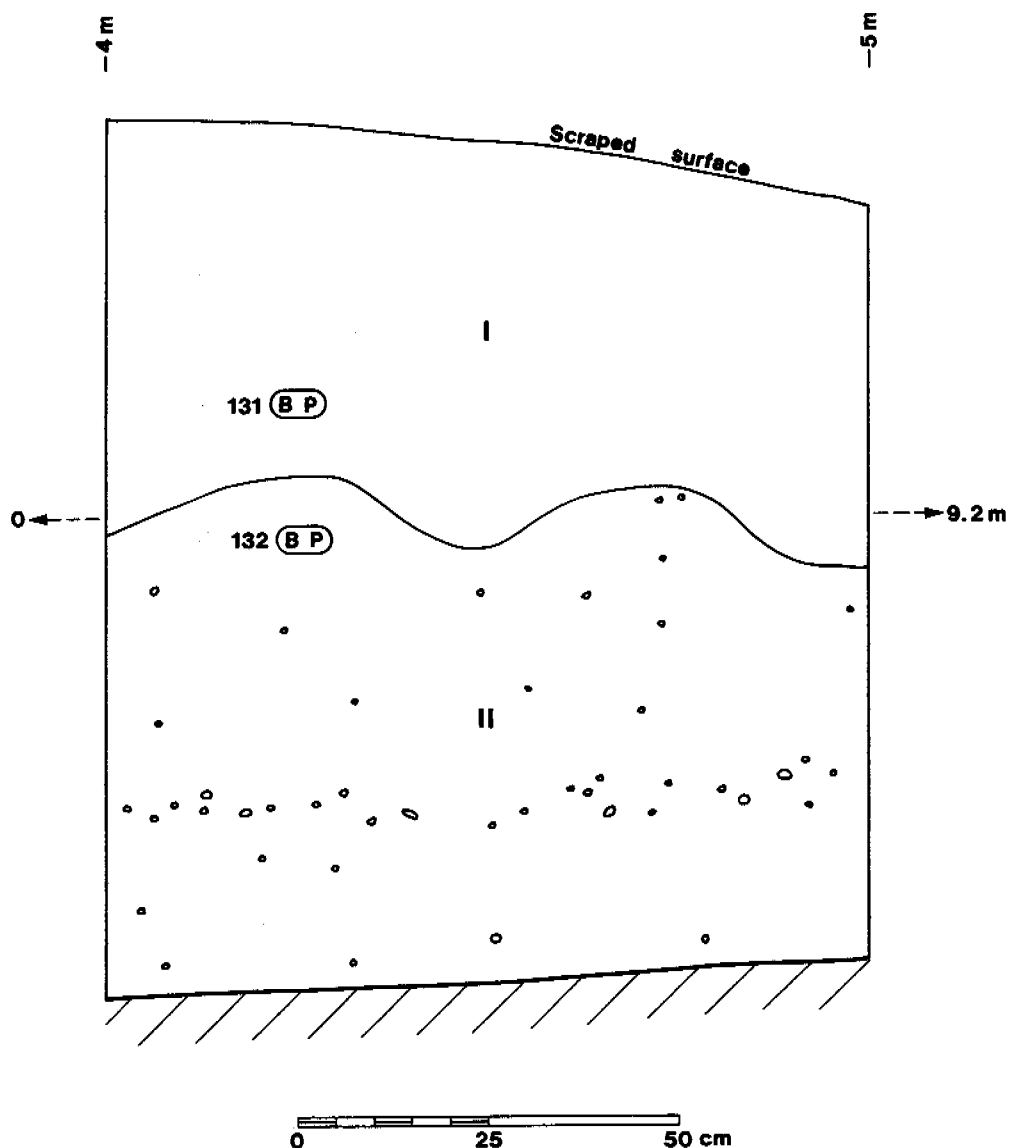
One 1-m-long representative profile located along the south-facing wall near the middle was drawn for SU 5 (Figure 11.11). Three strata were defined within the trench walls. Stratum I consisted recent deposits of fine sandy loam. No cultural deposits or features were identified within this stratum. Stratum II consisted of sandy loam

deposits with no cultural deposits or features. Stratum III consisted of silt loam deposits with calcium carbonate deposits. The calcium carbonate deposits indicate that this stratum predates the cultural deposits at the surface.

Study Unit 6. SU 6 was located in the east central portion of the site and east of the existing State Highway 602, began at coordinates N108.00, E176.20 and extended northward 13.50 m to N120.20, E170.20 (Figure 11.3). This trench was placed in an area of very dense artifact concentration and moderate ground disturbance by road construction. The maximum depth of the trench was 1.02 m at the north end.

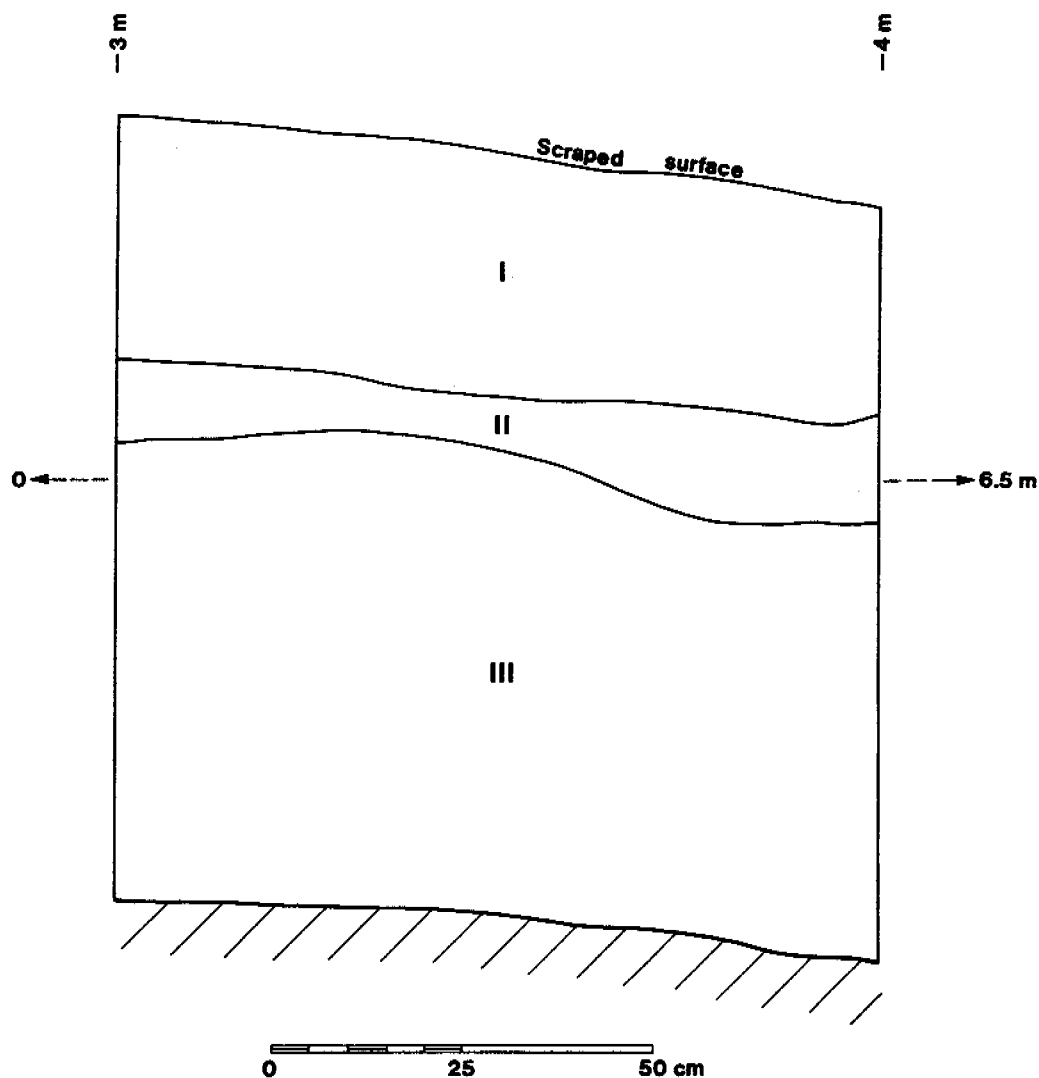
Two 2-m-long representative profiles located along the east-facing wall at the south (Figure 11.12) and north (Figure 11.13) ends were drawn for SU 6. Three strata were identified at the south end of the trench. Stratum I consisted of typical dark yellowish brown culturally stained fine sandy loam. Ceramic artifacts along with very small charcoal flecks were observed within this stratum. No features were identified within the stratum. Stratum II also consisted of cultural deposits, but of a different color and texture of soil. Ceramics were observed within the stratum. Strata I and II had evidence of severe insect burrowing. Stratum III consisted of silty loam deposits sterile of cultural deposits or features. At the north end of the trench, three strata were defined. Strata I and II continued to this end of the trench and totaled 62 cm thick. No artifacts were identified within Stratum I. Some oxidized tabular sandstones were observed within Stratum II. Stratum III also continued on into the north end of the trench with severe rodent disturbances observed within this stratum. No cultural materials or features were observed within this stratum. Excavation of SU 6 indicated that this portion of the site was indeed a midden area and that features would most likely be identified in mechanical stripping of the area.

Study Unit 7. SU 7 was located within the northeast portion of the site and east of the existing State Highway 602, began at coordinates N123.30, E167.40 and extended eastward 4.80 m



- I** 0-54 cm - Strong brown (7.5YR4/6. moist) sandy loam; moderate, medium, granular; slightly sticky, slightly plastic; less than 10% gravel; common fine roots; diffuse wavy boundary.
- II** 54-112 cm - Dark yellowish brown (10YR4/4. moist) sandy loam; strong, fine, columnar; slightly sticky, slightly plastic; less than 10% gravel; very few very fine roots.
- (B P)** Flotation and pollen samples
- 131** Field specimen no.
- ° ° ° Gravel
- /// Unexcavated

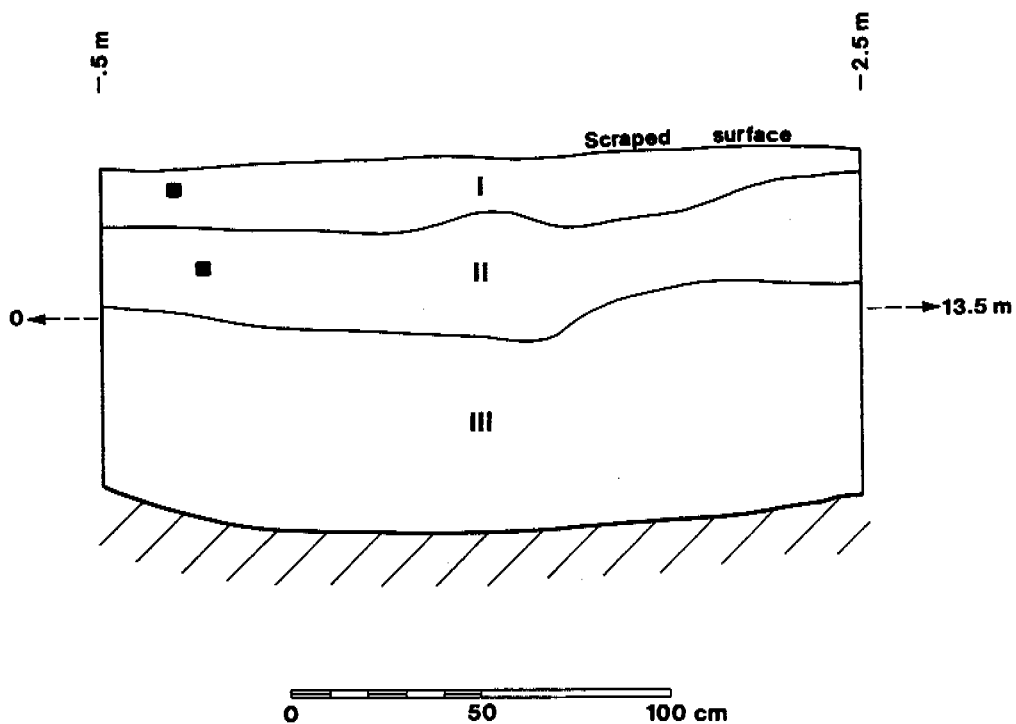
Figure 11.10. Site LA 26306 Study Unit 4, East-facing Profile.



- I 0-32 cm - Dark yellowish brown (10YR4/4. moist) fine sandy loam; weak, fine, granular; slightly sticky, slightly plastic; common very fine, fine, and medium roots; diffuse smooth boundary.
- II 32-40 cm - Strong brown (7.5YR4/6. moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; few fine roots; diffuse smooth boundary.
- III 40-101 cm - Strong brown (7.5YR5/6. dry) silt loam; weak, fine, granular; slightly hard; very few micro roots.

/// Unexcavated

Figure 11.11. Site LA 26306 Study Unit 5, South-facing Profile.

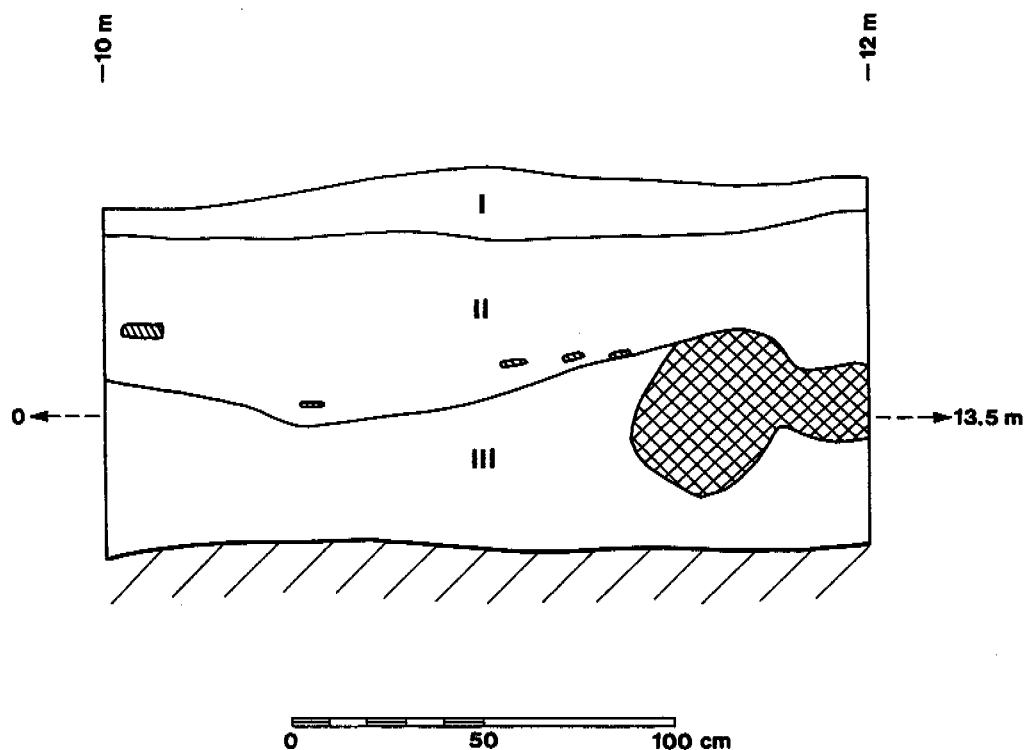


- I 0-13 cm - Dark yellowish brown (10YR4/4. moist) fine sandy loam; weak, fine, granular; nonsticky, nonplastic; many fine roots; diffuse wavy boundary.
- II 13-47 cm - Dark grayish brown (10YR3/3. moist) sandy loam; weak, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; many medium roots; abrupt wavy boundary.
- III 47-99 cm - Strong brown (7.5YR4/6. dry) silty loam; weak, fine, granular; slightly hard; few medium roots.

■ Ceramic artifact

/// Unexcavated

Figure 11.12. Site LA 26306 Study Unit 6, East-facing Profile.






- I 0-20 cm - Dark yellowish brown (10YR4/4. moist) fine sandy loam; weak, fine, granular; nonsticky, nonplastic; many medium roots; diffuse smooth boundary.
- II 20-62 cm - Dark grayish brown (10YR3/3. moist) sandy loam; weak, fine, granular; slightly sticky, slightly plastic; less than 10% gravel, many medium roots; abrupt wavy boundary.
- III 62-102 cm - Strong brown (7.5YR4/6. dry) silty loam; weak, fine, granular; slightly hard; few fine roots.
-  Sandstone rock
-  Rodent disturbance
-  Unexcavated

Figure 11.13. Site LA 26306 Study Unit 6, East-facing Profile.

to N124.80, E171.80 (Figure 11.3). This trench was placed in an area of high artifact density and moderate ground disturbance. The maximum depth near the middle of the trench was 1.17 m.

One 1-m-long representative profile located near the middle along the north-facing trench wall was drawn of SU 7 (Figure 11.14). Four strata were identified within the walls of the trench. Stratum I consisted of recent aeolian deposits with cultural artifacts and sandstone. Stratum II consisted of dark grayish brown cultural deposits. Ceramics were observed within this stratum. Stratum III consisted of dark yellowish brown sandy loam deposits with evidence of light calcium carbonate deposits. The upper portion of this stratum had evidence of insect burrowing. Stratum IV consisted of strong brown silty loam deposits with light deposits of calcium carbonate. Excavation of SU 7 revealed that the midden deposits continued into the northern part of the site and extended approximately 45 cm below the surface. Stratum IV had deposits of calcium carbonate indicating that this stratum predates the cultural deposits.

Study Unit 8. SU 8 was located just west of the eastern right-of-way fence line and east of the existing State Highway 602, began at coordinates N135.40, E165.20 and extended northward 5.60 m to N140.50, E163.40 (Figure 11.3). This trench was placed in an area of moderate artifact density and light ground disturbance. The maximum depth of the trench at south end was 0.56 m.

One 1-m-long representative profile located at the south end along the east-facing trench wall was drawn of SU 8 (Figure 11.15). Three strata were identified within the trench walls. Stratum I consisted of recent aeolian sandy loam deposits. No artifacts or features were defined within this stratum. Stratum II consisted of midden deposits; artifacts and oxidized sandstone were observed within this stratum. Stratum III consisted of culturally sterile silty loam deposits. Excavation of SU 8 revealed that midden deposits extended into this portion of the site and that mechanical stripping in this area would most likely expose features.

Mechanical Stripping

Mechanical stripping was conducted in order to investigate the possibility of buried features within the site boundaries and within the eastern right-of-way of State Highway 602. A total of 716.50 sq m, approximately 20 to 50 cm below surface, was mechanically stripped using a backhoe. A total of 516.40 sq m was stripped east of the highway and 200.10 sq m was stripped on the west side of the highway. A total of 26 features including the internal features of a pitstructure were defined on the east side of the highway. No features were found by mechanical stripping west of the highway.

Feature Descriptions

Feature numbering started with Feature 1 for the data recovery phase, although during the survey (Abbott 1997) Feature 1 was assigned to the rubble mound (a possible fieldhouse) outside the right-of-way. All sediments from the feature fill were screened through 1/8-in hardware mesh.

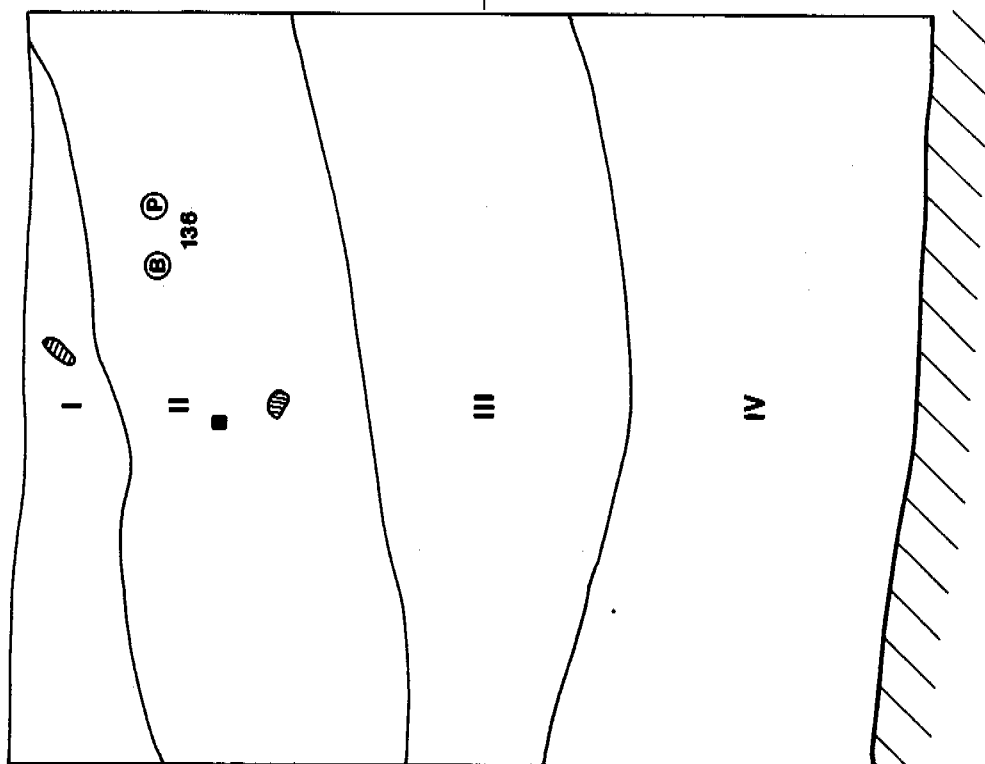
Feature 1

Feature 1 was an irregular-shaped shallow pitstructure located partially within hand-excavated units SU 9, 10 and 11, just inside the eastern right-of-way fence line, east of State Highway 602 (Figure 11.3). No southern recess, bench, ventilator shaft, hearth, walls, or pilasters were present. The main chamber measured approximately 2.94 m northwest-to-southeast and 2.50 m northeast-to-southwest, with an estimated floor area of 6.78 sq m (Figure 11.16). Only one floor was present; associated with the floor were 10 features. The extant height of the shallow pitstructure was 22 cm from floor to contact surface. After completion of study units, Feature 1 was excavated by hand to a depth of approximately 10 cm above floor. The remaining fill was excavated by 1-by-1-m unit with site grid coordinate at the southwest corner of 1-by-1 units.

Floor Features. The floor was uneven in most parts of the pitstructure. The floor was unprepared and consisted of sterile, strong brown sandy loam

E 3

2 m



I 0-11 cm - Yellowish brown (10YR5/6, dry) sandy loam; weak, fine, granular; loose; many very fine, medium roots; abrupt smooth boundary.

II 11-45 cm - Dark grayish brown (10YR3/3, moist) sandy loam; weak, medium, granular; slightly sticky, slightly plastic; less than 10% gravel; common, medium, coarse roots; diffuse smooth boundary.

III 45-80 cm - Dark yellowish brown (10YR4/4, moist) sandy loam; moderate, medium, columnar; slightly sticky, slightly plastic; few, medium roots; abrupt smooth boundary.

IV 80-117 cm - Strong brown (7.5YR4/4, dry) silty loam; weak, fine, granular; loose; very few micro roots.

Sandstone rock

Ceramic artifact

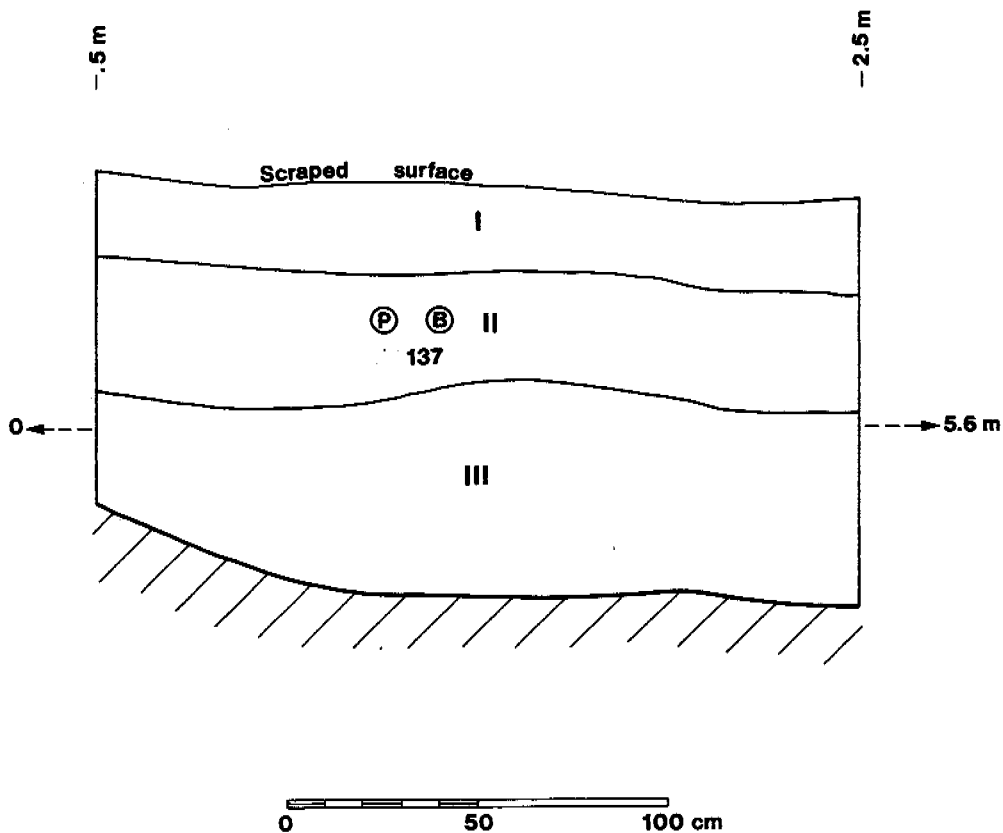
Flotation sample

Pollen sample

Field specimen no.

Unexcavated





- I 0-13 cm - Yellowish brown (10YR5/6. dry) sandy loam; weak, fine, granular; nonsticky, nonplastic; loose; many very fine roots; abrupt smooth boundary.
- II 13-27 cm - Dark grayish brown (10YR3/3. moist) sandy loam; weak, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; diffuse smooth boundary.
- III 27-56 cm - Strong brown (7.5YR4/4. dry) silty loam; weak, fine, granular; slightly hard; very few micro roots.
- (B) Flotation sample
- (P) Pollen sample
- 137 Field specimen no.
- /// Unexcavated

Figure 11.15. Site LA 26306 Study Unit 8, East-facing Profile.

subsoil. Some parts of the floor were covered with a very thin dark film of sand. One sandstone metate was exposed in situ. Ten floor features were defined (Figure 11.16): a posthole (Feature 17), indeterminate pits (Features 18, 20, 23, 24, 25, and 26), small storage pits (Features 19 and 21), and a shallow storage bin (Feature 22). These internal features are discussed below.

Feature 17 was located at grid coordinates N139.16, E164.47 (Figure 11.3). This feature is defined as a posthole measuring 20 cm east-to-west and 28 cm north-to-south. The east half of Feature 17 was excavated in one level. A cross section and an east-facing profile of the feature were drawn (Figure 11.17). One stratum was defined within the feature. The west half was also excavated in one level. The feature fill consisted of sandy loam with no evidence of cultural material.

Feature 18 was located at center point grid coordinates N138.96, E165.74 (Figure 11.3). This feature was defined as an indeterminate pit with severe rodent disturbance. The feature measured 28 cm north-to-south and 34 cm east-to-west. The east half of the feature was excavated in one 31-cm level. An east-facing profile was drawn for Feature 18 (Figure 11.18). Rodent activity was observed throughout the excavation and determination of feature function could not be made. No artifacts were recovered from the excavation of the east half or the west half. A flotation sample was collected from the west half of Feature 18.

Feature 19 was located within Feature 1, at center point grid coordinates N139.26, E166.62 (Figure 11.3). This feature was defined as a small storage bin and measured 48 cm east-to-west by 22 cm north-to-south. The west half of the feature was excavated in one 11-cm level down to the base of the feature. A cross section and a west-facing profile were drawn for Feature 19 (Figure 11.19). The east half was also excavated in one level down to base of the feature, no artifacts were recovered from the excavation. The determining factor for the interpretation of the feature as a storage bin was its morphology and the

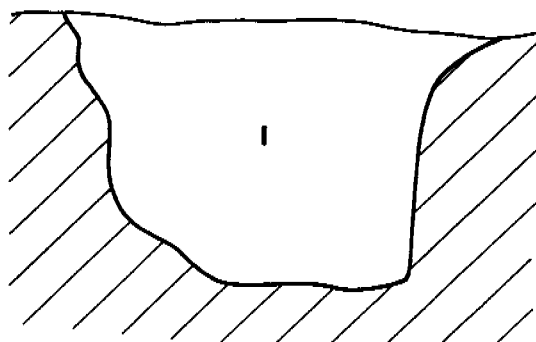
identification of a maize cupule and charred Cheno-Am and goosefoot seeds from the flotation sample.

Feature 20 was located at center point grid coordinates N139.13, E165.04 (Figure 11.3). This feature was defined as an indeterminate pit measuring approximately 23 cm in diameter. The west half of the feature was excavated in one 5-cm level. A cross section and a west-facing profile were drawn for Feature 20 (Figure 11.20). One stratum, sandy loam fill, was defined within the feature. No artifacts were recovered. Flotation and pollen samples were collected from the fill. Analysis of the flotation sample identified charred Cheno-Am, bugseed, and purslane seeds, along with charred pine.

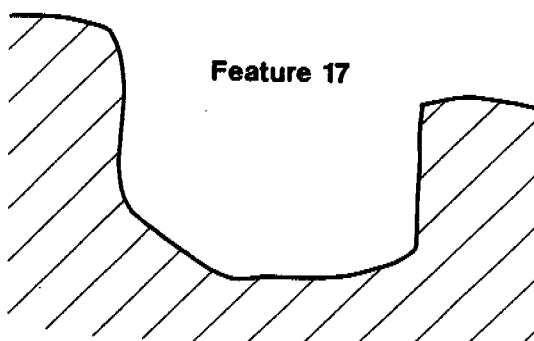
Feature 21 was located at center point grid coordinates N137.65, E166.22 (Figure 11.3). This feature was defined as a posthole that measured 23 cm east-to-west by 25 cm north-to-south. The west half of the feature was excavated in one 15-cm level. A cross section and a west-facing profile were drawn (Figure 11.21). One stratum was defined within the feature and consisted of sandy loam. No artifacts were recovered from the excavation; flotation, waterscreen, and radiocarbon samples were collected from the feature fill. Analysis of the flotation sample identified only charred juniper and unknown conifer.

Feature 22 was located east of Feature 21 at center point grid coordinates N137.60, E166.86 (Figure 11.3). This feature was defined as a shallow storage bin that measured 44 cm in diameter and 11 cm in depth. The west half of the feature was excavated in one 11-cm level. A cross section and a west-facing profile were drawn for Feature 22 (Figure 11.22). The east half was excavated in one level down to the base of the feature. One stratum was defined within the feature, consisting of cultural fill. No artifacts were recovered during the excavation. Samples collected from the feature fill included flotation and pollen (not analyzed). Analysis of the flotation sample identified charred juniper and pine remains.

**East-facing profile
Feature 17**



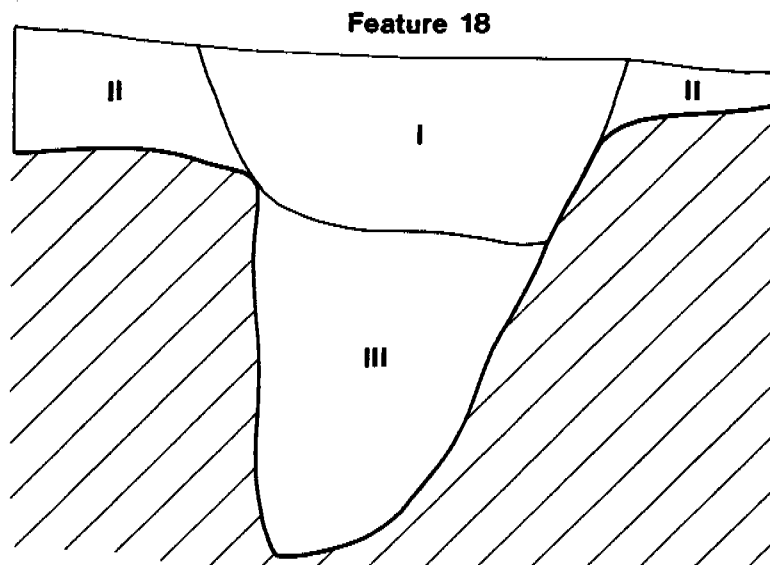
**Cross section
Feature 17**



0 10 20 cm

- I 0-17 cm - Dark yellowish brown (10YR4/6. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few fine roots; abrupt smooth boundary.
- /// Unexcavated

Figure 11.17. Site LA 26306 Feature 17, East-facing Profile and Cross Section.



0 10 20 cm

I 0-11 cm - Dark yellowish brown (10YR4/6. moist) sandy loam; moderate, very fine, granular; slightly sticky, slightly plastic; very few very fine roots; abrupt smooth boundary.

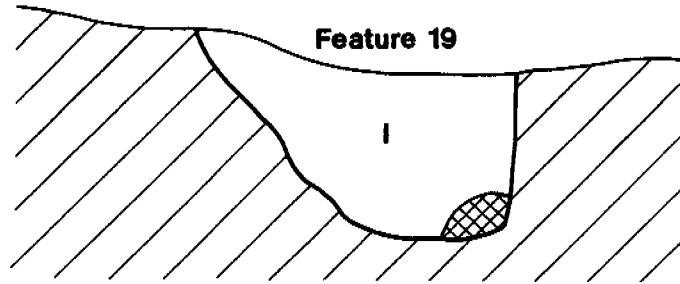
II 0-7 cm - Strong brown (7.5YR5/8. moist) sandy loam; weak, very fine granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.

III 11-33 cm - Strong brown (7.5YR5/8. moist) sandy loam; weak, very fine, granular; nonsticky, nonplastic.

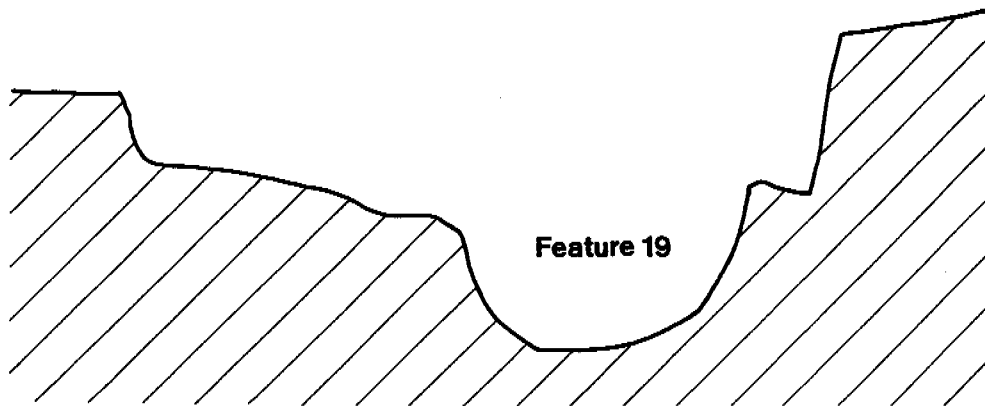
/// Unexcavated

Figure 11.18. Site LA 26306 Feature 18, East-facing Profile.

West-facing profile



Cross section



0 10 20 cm



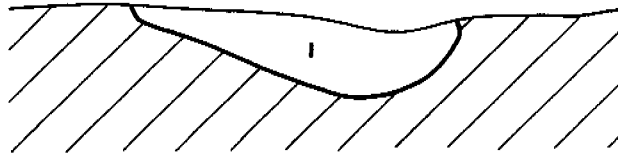
- I 0-11 cm - Dark yellowish brown (10YR4/6. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.
-  Rodent disturbance
-  Unexcavated

Figure 11.19. Site LA 26306 Feature 19, West-facing Profile and Cross Section.

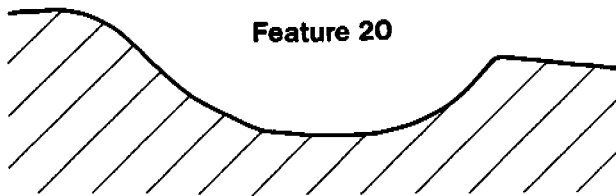
West-facing profile

Feature 20



Cross section

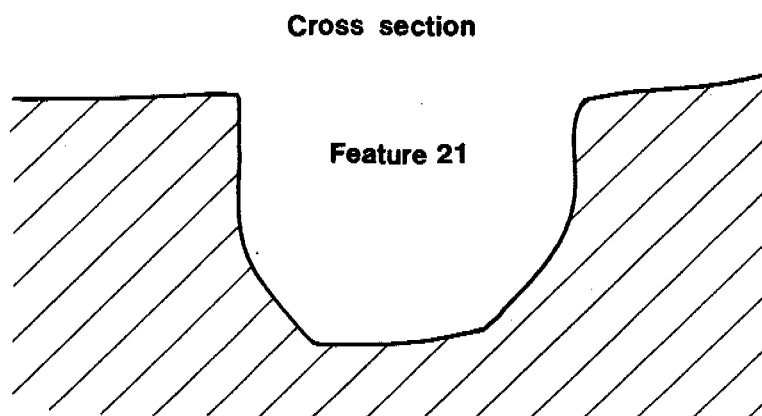
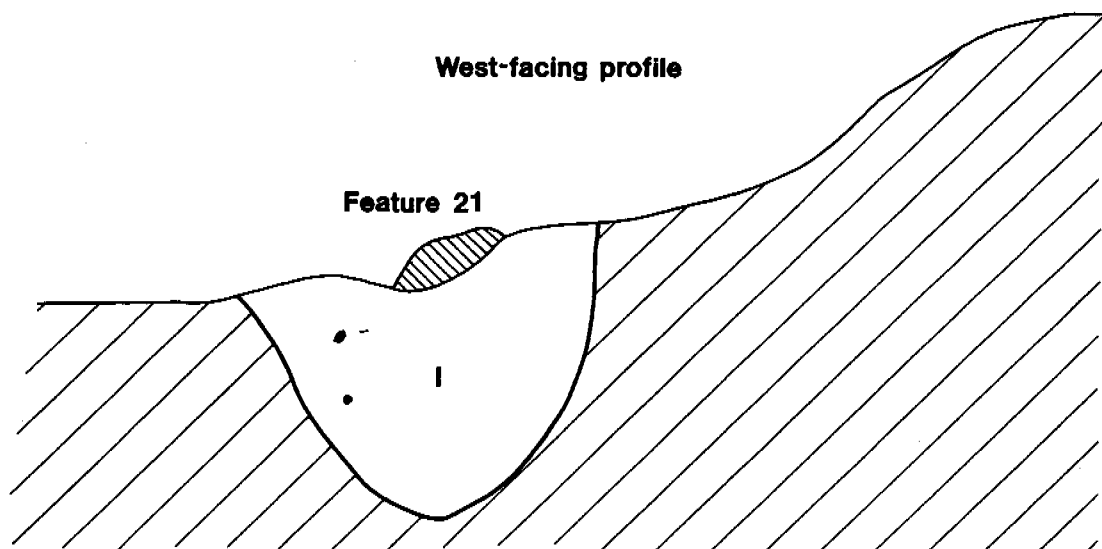
Feature 20



0 10 20 cm

- I 0-5 cm - Dark yellowish brown (10YR3/4, moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.
- /// Unexcavated

Figure 11.20. Site LA 26306 Feature 20, West-facing Profile and Cross Section.



0 10 20 cm




- I 0-15 cm - Strong brown (7.5YR5/8. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.
-  Sandstone rock
-  Charcoal
-  Unexcavated

Figure 11.21. Site LA 26306 Feature 21, West-facing Profile and Cross Section.

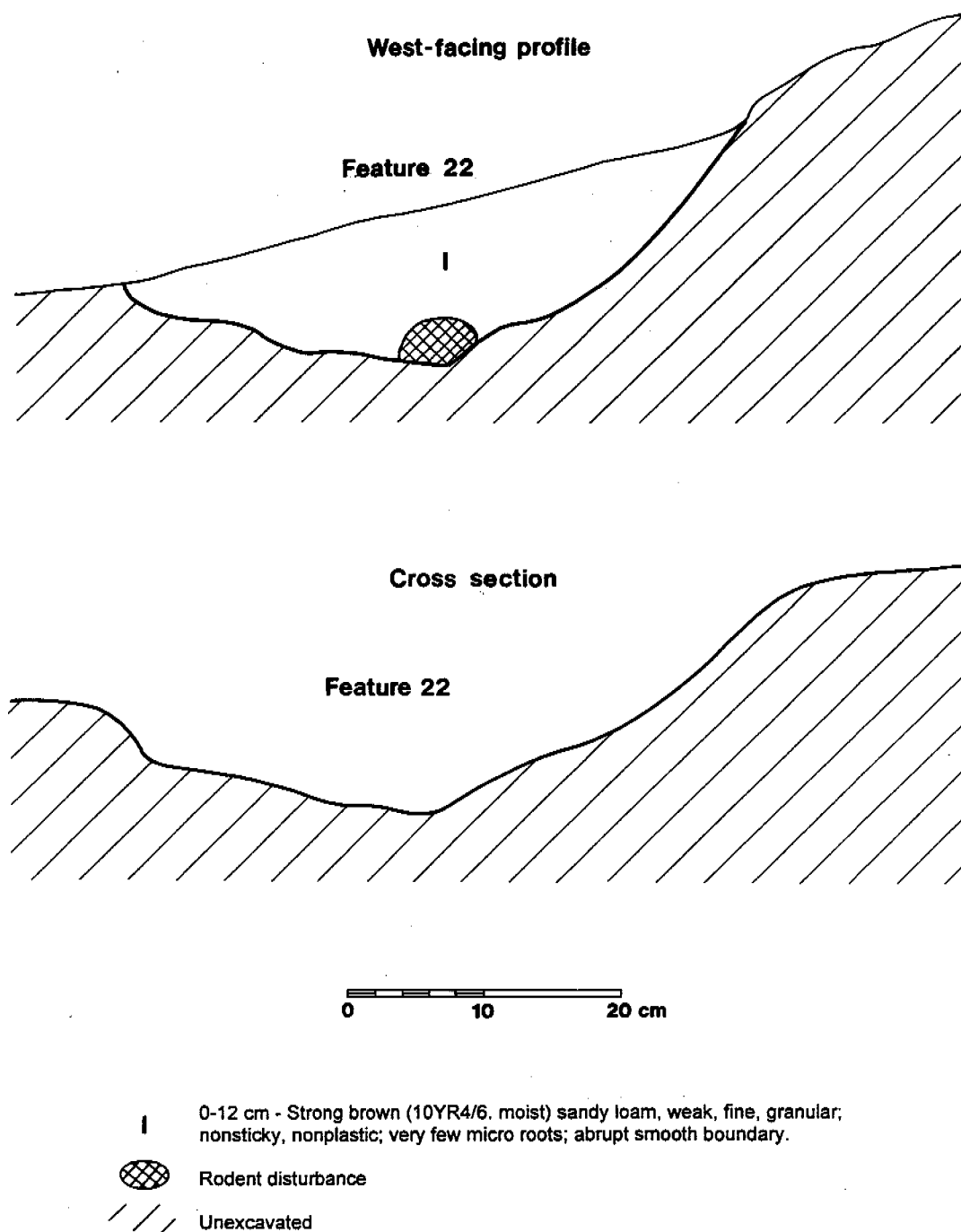


Figure 11.22. Site LA 26306 Feature 22, West-facing Profile and Cross Section.

Feature 23 was located in the western half of the pitstructure, at center point grid coordinates N138.39, E165.23 (Figure 11.3). This feature was defined as an indeterminate small pit measuring 13 cm north-to-south by 20 cm east-to-west. The west half of the feature was excavated in one 12-cm level to the base of the feature. One cross section and a west-facing profile were drawn (Figure 11.23). No artifacts were recovered from the excavation of either the west half or the east half. The severe rodent disturbance throughout the feature made determining the feature function impossible.

Feature 24 was located just inside the right-of-way fence line and on the eastern limit of excavation, at center point grid coordinate N138.57, E167.18 (Figure 11.3). This floor feature was defined as an indeterminate pit. The east half of feature was excavated in one 24-cm level with no recovery of artifacts. A profile of the east-facing wall of the feature was drawn for Feature 24 (Figure 11.24). During excavation of the west and east halves of the feature severe rodent activity was observed. The integrity of this feature was destroyed by rodent activity, and therefore it was classified as an indeterminate pit.

Feature 25 was located at center point grid coordinates N138.65, E165.01 (Figure 11.3). This floor feature was defined as an indeterminate pit measuring 30 cm north-to-south by 29 cm east-to-west. The west half of the feature was excavated in one 8-cm level. A cross section and one 30-cm long west-facing profile were drawn for Feature 25 (Figure 11.25). The feature fill consisted of sandy loam sediments. Excavation of both the west and east halves of the feature did not recover any artifacts. The feature's function could not be identified.

Feature 26 was located at center point grid coordinate N138.07, E165.04 (Figure 11.3). This feature was defined as an indeterminate shallow pit measuring 25 cm north-to-south by 26 cm east-to-west and 3 cm deep. The northwest half of the feature was excavated down 3 cm to the base. A northwest-facing profile was drawn for Feature 26 (Figure 11.26). The southeast half of the

feature was excavated 3 cm to the base. One stratum was defined within the feature and consisted of sandy loam sediments. Excavation of the northwest half of the feature recovered blue paint pigment and no cultural materials were found in the southeast half. Pollen and waterscreen samples were collected from the southeast portion of the feature. The feature's function was not determined.

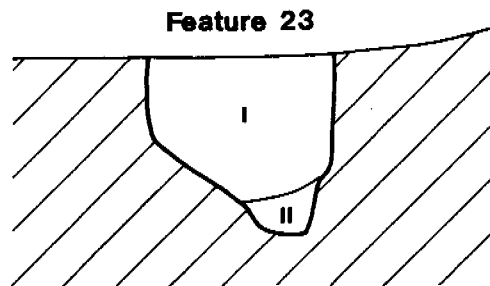
Floor Assemblage. Artifacts from the floor of Feature 1 included one basin-shaped sandstone metate located at N139.08, E165.26 and three fragmented one hand manos located at N137.80, E165.19 (Figure 11.16). As mentioned previously, maize pollen and maize cupules were identified from the floor of Feature 1.

Roof. Feature 1 had one internal posthole that was positively defined. This posthole (Feature 17) was located at the northwest corner of the pitstructure. Feature 21 was in the right location to serve as a posthole; however, due to severe rodent disturbance it was not classified as one in the field. The lack of roof debris in the fill of the floor may indicate that the roof had been dismantled. There was no further evidence for roof construction or support posts.

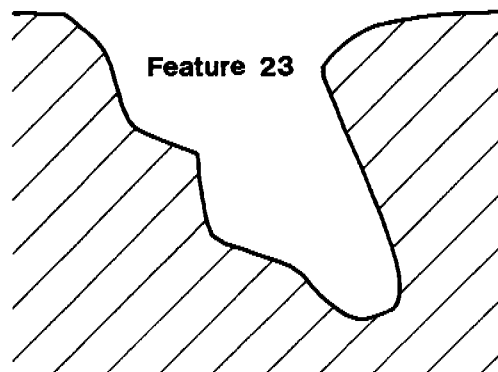
Abandonment and Postabandonment. Feature 1 appears to have been cleaned out prior to abandonment. Sandstone in the fill of the floor of the pitstructure in combination with the lack of roof debris on the floor may indicate that the roof had been dismantled. The shallow pitstructure was subsequently filled with trash and naturally deposited sediments. Midden deposits dating to the Pueblo II period cap the fill of Feature 1.

Interpretation. Feature 1 was an irregular-shaped shallow pitstructure located on the east side of State Highway 602. The pitstructure was bisected by SU 9, 10, and 11. Only one floor was present, containing features associated with habitation. There was no evidence of roof debris, suggesting it most likely dismantled. The pitstructure was subsequently filled with trash and naturally deposited sediments. The pitstructure was shallow, possibly indicating use only in the

West-facing profile



Cross section



I 0-9 cm - Strong brown (7.5YR4/6. moist) sandy loam; weak, medium, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.

II 9-12 cm - Light yellowish brown (10YR6/4. moist) fine sand; moderate, fine, granular; few micro roots; abrupt smooth boundary.

/// Unexcavated

Figure 11.23. Site LA 26306 Feature 23, West-facing Profile and Cross Section.

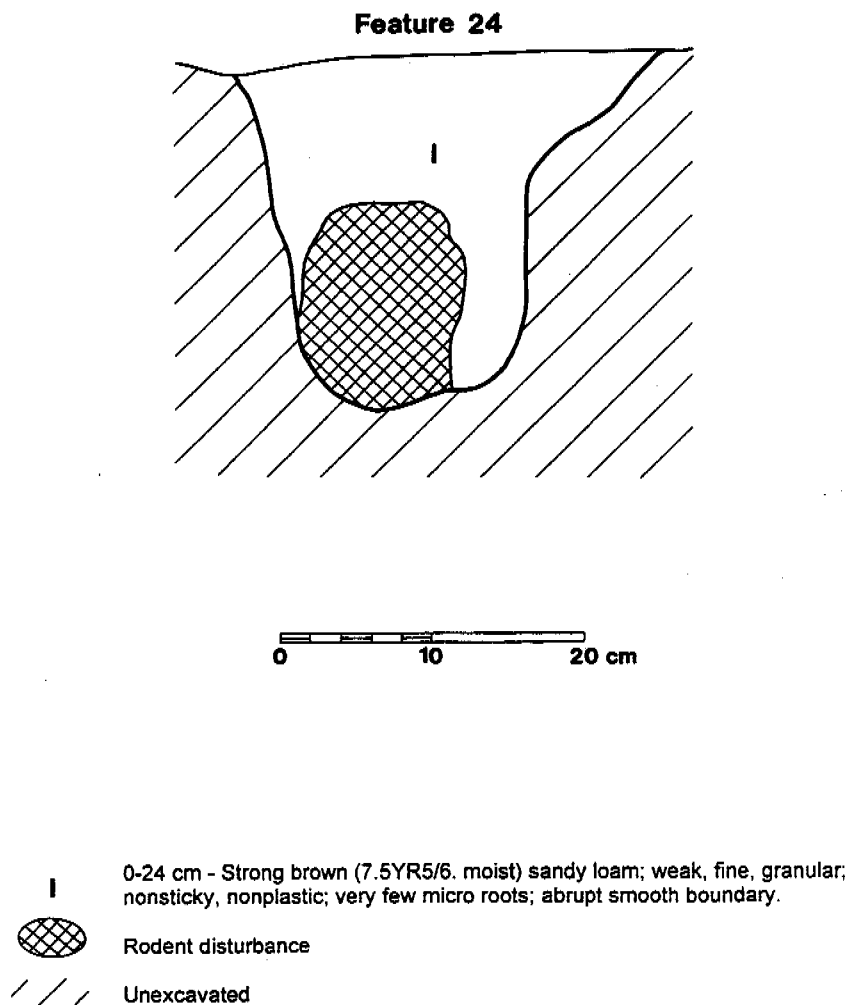
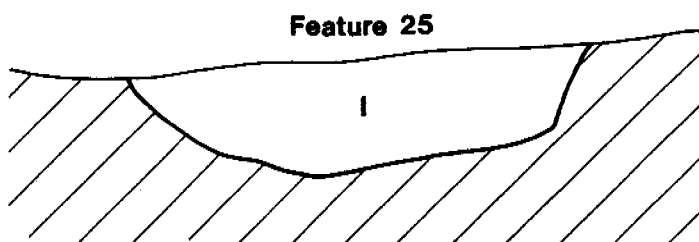
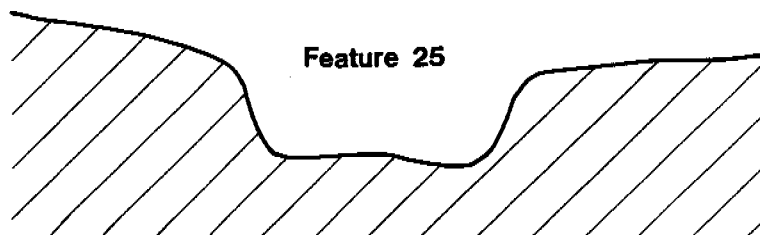


Figure 11.24. Site LA 26306 Feature 24, East-facing Profile.

West facing profile



Cross section



0 10 20 cm

- I 0-8 cm - Strong brown (7.5YR5/6, moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.
- /// Unexcavated

Figure 11.25. Site LA 26306 Feature 25, West-facing Profile and Cross Section.

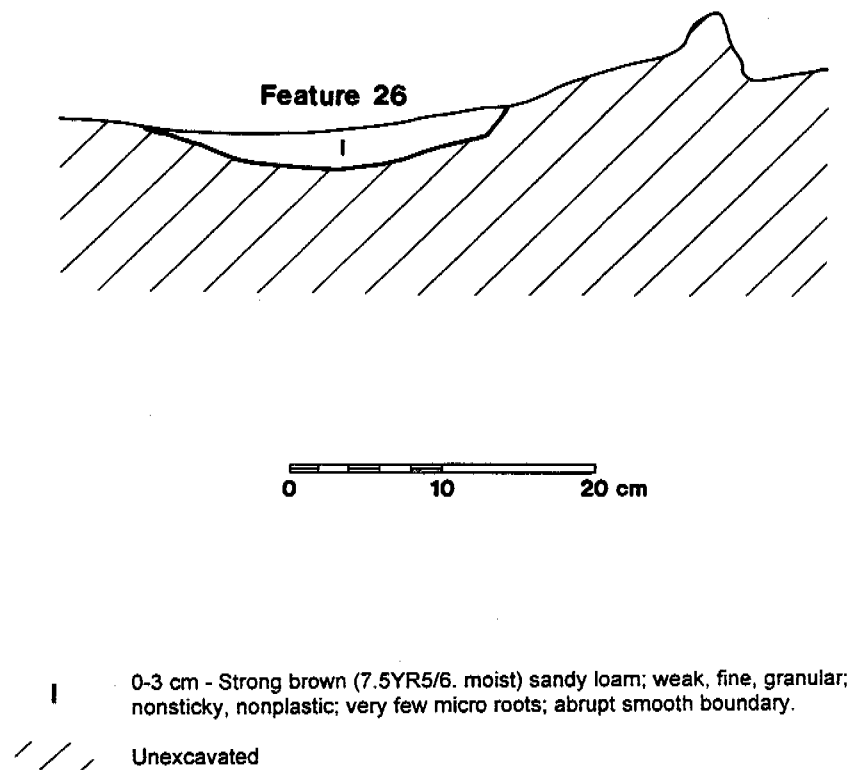


Figure 11.26. Site LA 26306 Feature 26, Northwest-facing Profile.

summer months when protection needed from the natural elements was minimal. One radiocarbon date of 1920 \pm 120 BP (Beta-121222, wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$) indicates this pit structure dates to the Basketmaker II period.

Feature 2

Feature 2 was located within the eastern right-of-way of the existing State Highway 602, at center point grid coordinate N135.25, E166.90 (Figure 11.3). This feature was defined as a roasting/storage pit measuring 107 cm north-to-south by 117 cm east-to-west on the surface. The depth of the feature varied from 55 to 59 cm (Figure 11.27). The west half of the feature was excavated first to investigate the nature of the feature. Flaked stone and ground stone artifacts were recovered from the west half. One west-facing profile (Figure 11.28) was drawn. One stratum was defined within the feature and consisted of loamy sand mottled with cultural deposits and charcoal. Artifacts recovered from the east half excavation included flaked stone and faunal specimens. Flotation, pollen, and waterscreen samples were also collected from the east half.

The oxidization of the feature walls indicates a prolonged use at high temperatures, suggesting the pit's function to be a roasting pit. On the other hand the walls could have been oxidized deliberately for the purpose of sealing the walls for prolonged storage purposes. This is supported by the recovery of one maize cupule and two goosefoot seeds from the flotation sample.

Information regarding site reuse was recovered from Feature 2. As Figure 11.28 shows, there are actually two pits, one being cut into another. This is the only example in the entire project where such evidence for reuse is so demonstrable.

Feature 3

Feature 3 was located east of State Highway 602, at center point grid coordinates N133.43, E163.68 (Figure 11.3). This feature measured 72 cm north-to-south by 105 cm east-to-west (Figure

11.29). The west half of the feature was excavated in one 27-cm level to the base. One west-facing profile was drawn for Feature 3 (Figure 11.30). The east half was excavated 24 cm down to the base. One stratum was defined within the feature and consisted of loamy sand cultural deposits. Feature 3 excavations recovered only a single flaked stone. Evidence of severe rodent and insect burrowing was observed throughout the feature. Five maize cupules and the charred fruit of pinyon pine were identified from the flotation sample, suggesting that this feature was used for storage purposes.

Feature 4

Feature 4 was located east of State Highway 602 and in the northeastern portion of the site, at center point grid coordinates N134.68, E163.67 (Figure 11.3). This dark stain, measuring 51 cm north-to-south by 44 cm east-to-west, was defined as a rodent burrow. Excavation was conducted on the west half in one 12-cm level. One west-facing profile was drawn for Feature 4 (Figure 11.31). One stratum was defined within the feature and consisted of loamy sand. Artifacts recovered from the west half excavation consisted only of flaked stones. Excavation of the east half also recovered flaked stone artifacts. The feature is interpreted as a rodent burrow because of the loose fill that was extending downward at an angle.

Feature 5

Feature 5 was located east of the existing State Highway 602. The center point grid coordinates are N133.00, E165.05 (Figure 11.3). This feature was defined as an indeterminate pit measuring 37 cm east-to-west by 98 cm north-to-south (Figure 11.32). Excavation was first conducted on the north half in one 8-cm level. One north-facing profile (Figure 11.33) was drawn for Feature 5. One stratum was defined within the feature and consisted of loamy sand cultural deposits. Flaked stone artifacts were recovered from the north half of the feature; the south half yielded no artifacts. Flotation, pollen, and waterscreen samples were collected from the south half. No charred remains were identified from the flotation sample.

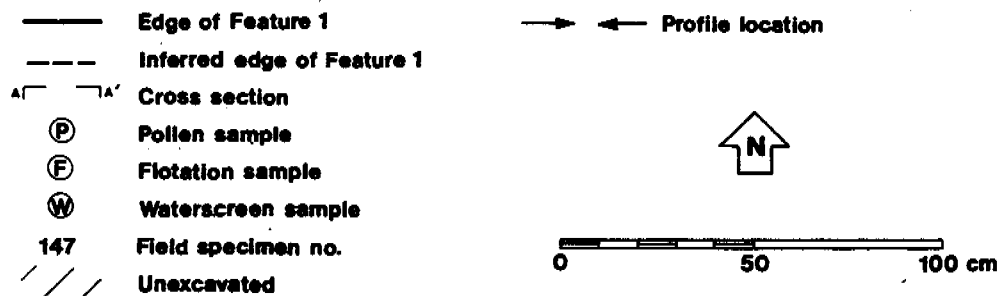
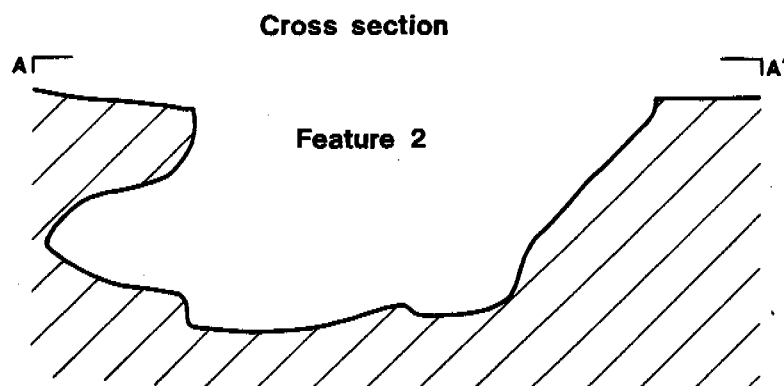
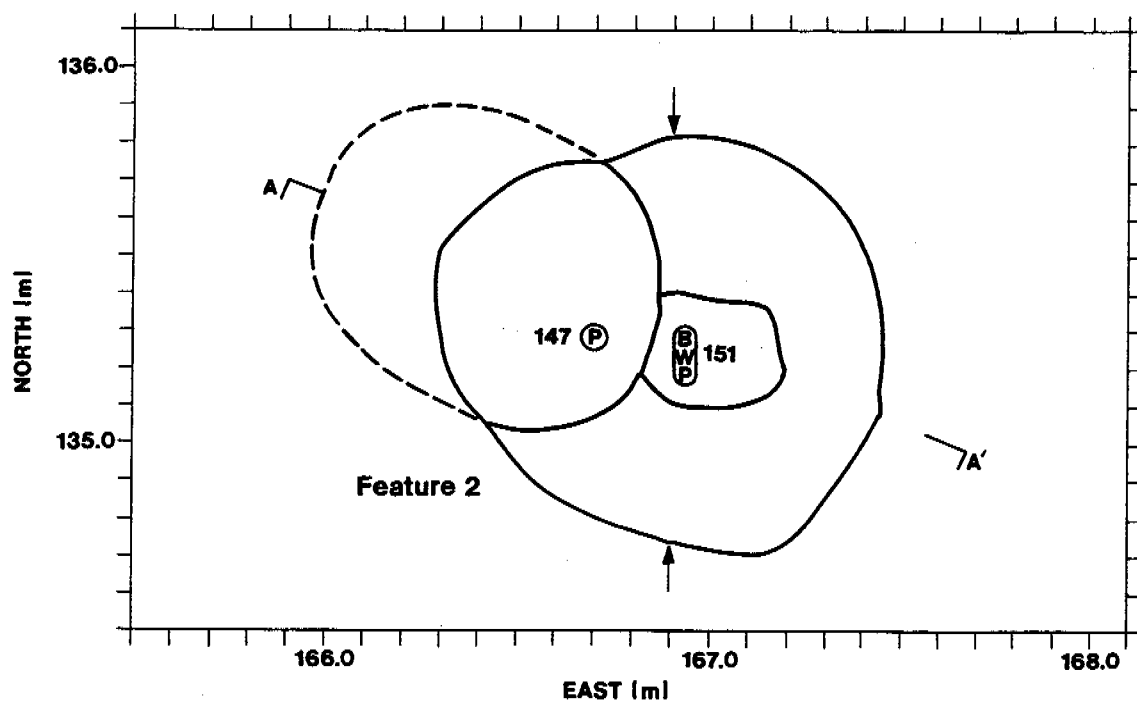
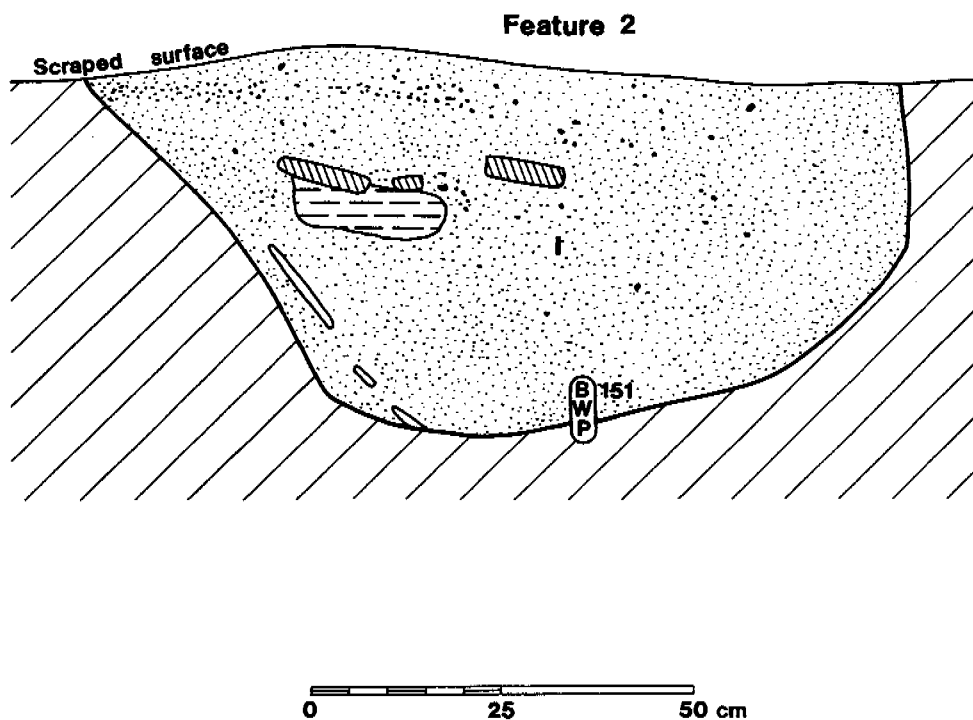


Figure 11.27. Site LA 26306 Feature 2, Plan View and Cross Section.









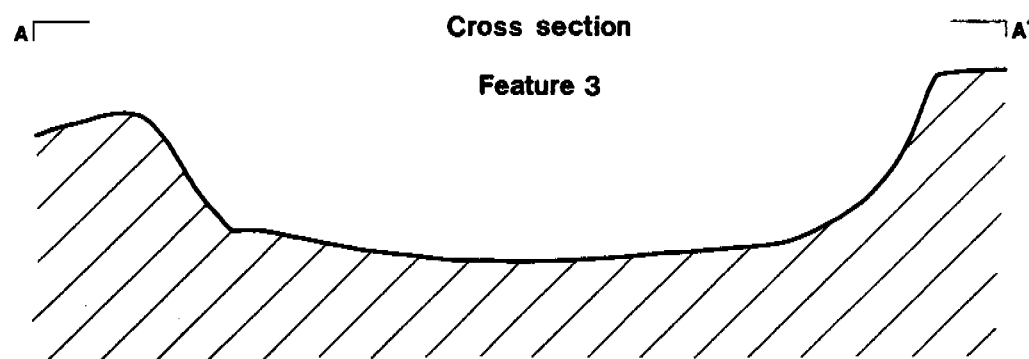
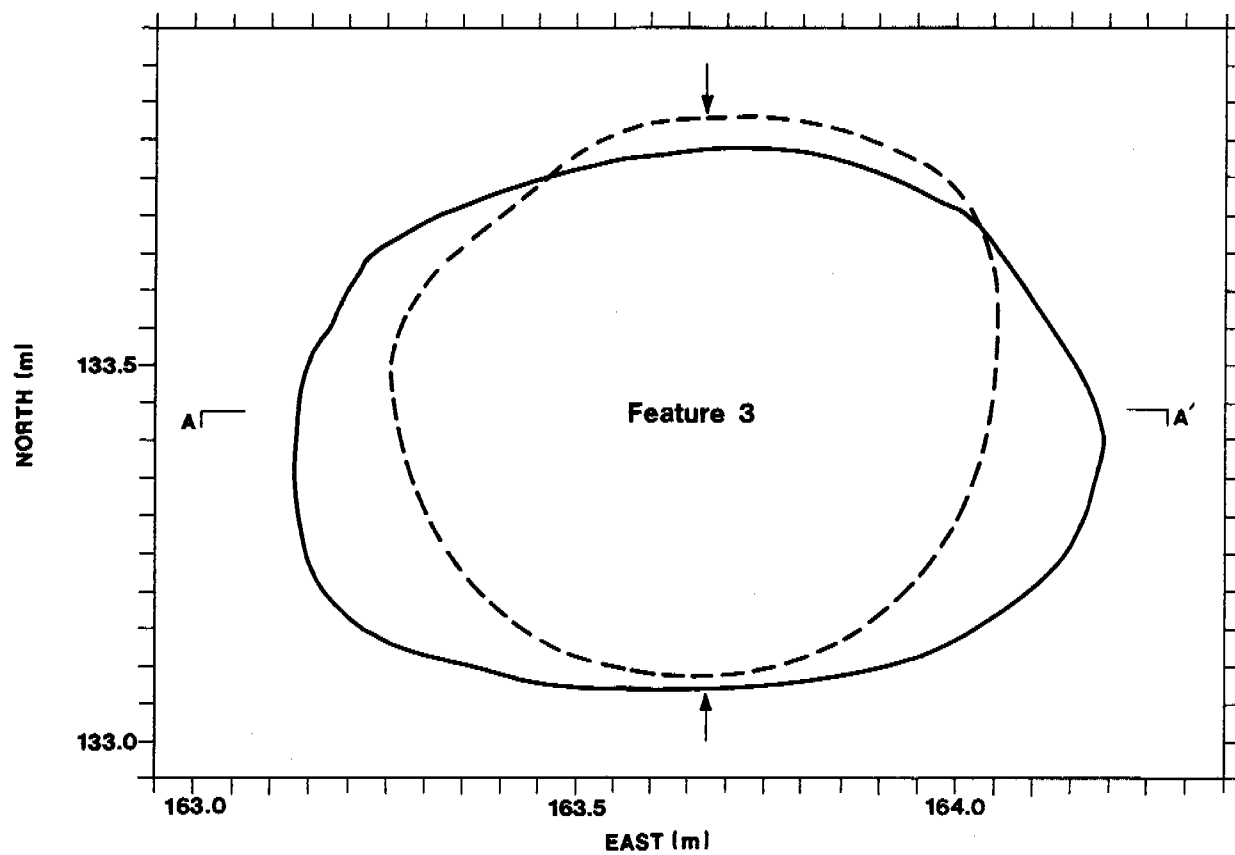
- I** 0-47 cm - Dark yellowish brown (10YR3/4. moist), dark brown (10YR3/3. dry) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; soft; less than 10% gravel; abrupt smooth boundary.
-  Sandstone rock
-  Charcoal fleck
-  Oxidized stain
-  Gray clay
-  Flotation, waterscreen, and pollen samples
- 151** Field specimen no.
-  Unexcavated

Figure 11.28. Site LA 26306 Feature 2, West-facing Profile.



- Top edge of Feature 3
- - - Base of Feature 3
- A — A' Cross section
- /// Unexcavated
- ← Profile location

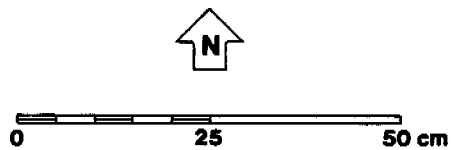
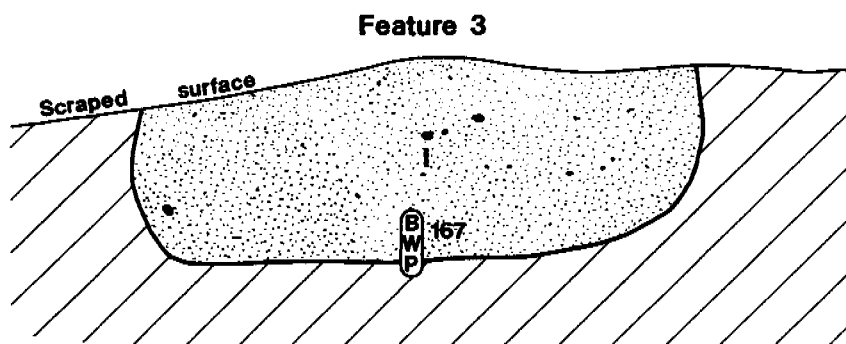


Figure 11.29. Site LA 26306 Feature 3, Plan View and Cross Section.



0 25 50 cm

I

0-27 cm - Brown (10YR4/3. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; abrupt smooth boundary.



Charcoal flecks



Flotation, waterscreen, and pollen samples

167

Field specimen no.



Unexcavated

Figure 11.30. Site LA 26306 Feature 3, West-facing Profile.

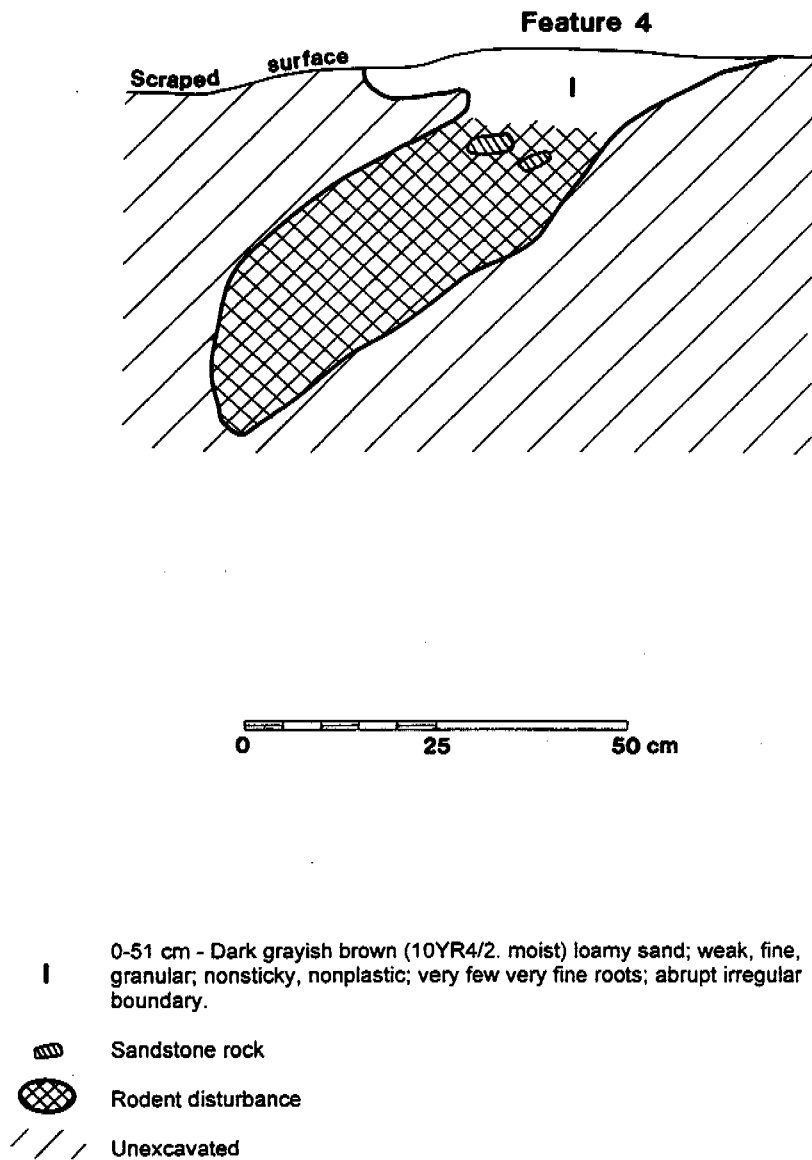


Figure 11.31. Site LA 26306 Feature 4, West-facing Profile.

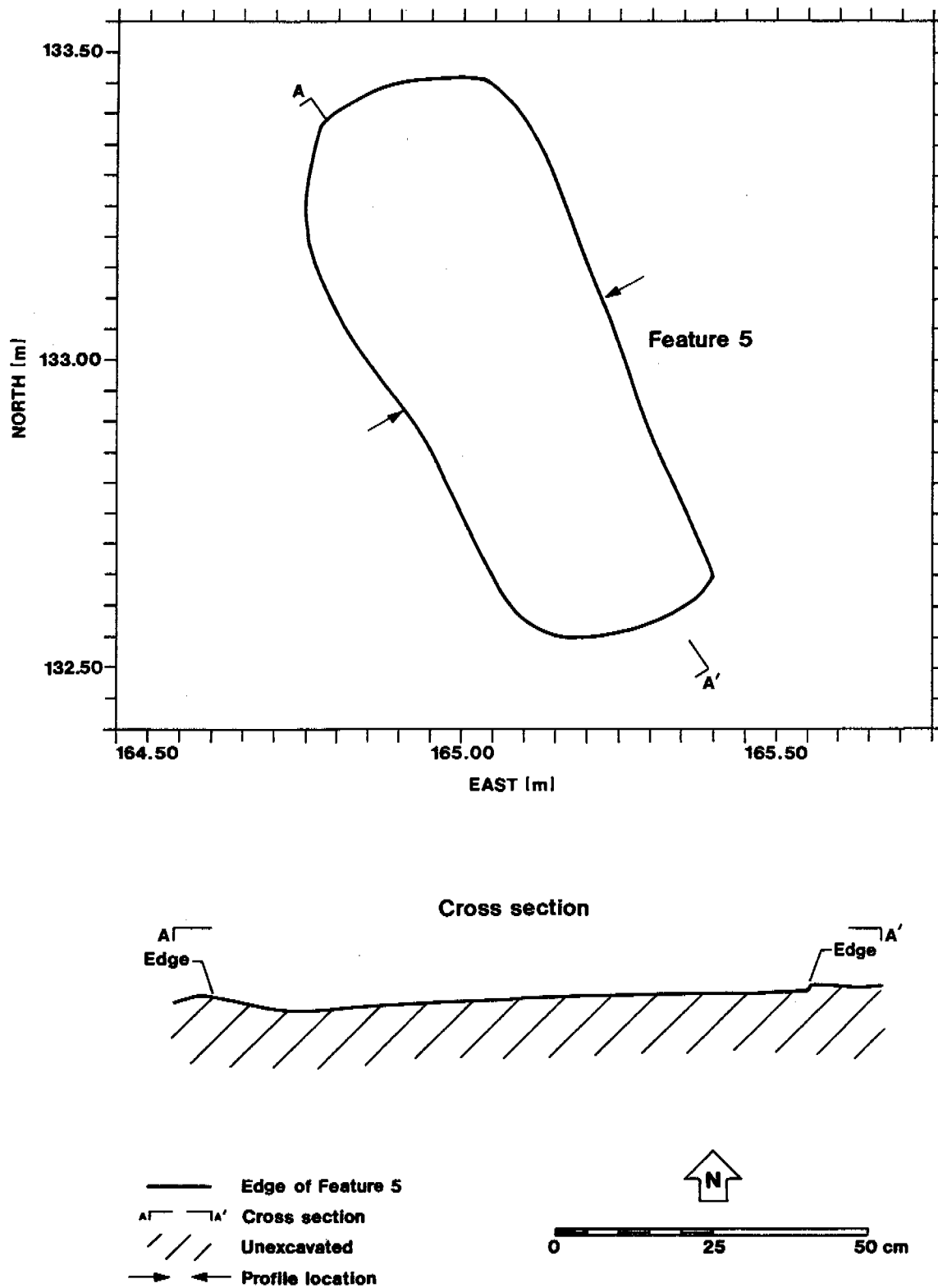
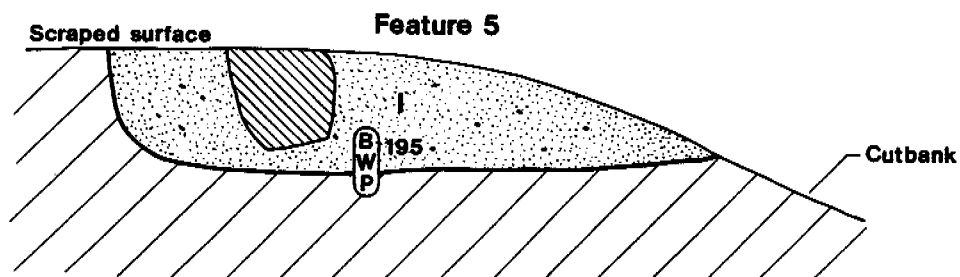


Figure 11.32. Site LA 26306 Feature 5, Plan View and Cross Section.



0 12.5 25.0 cm




- I 0-8 cm - Dark yellowish brown (10YR3/4. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; very few micro roots; abrupt smooth boundary.
-  Sandstone rock
-  Flotation, waterscreen, and pollen samples
- 195** Field specimen no.
-  Unexcavated

Figure 11.33. Site LA 26306 Feature 5, North-facing Profile.

Feature 6

Feature 6 was located 40 cm southeast of Feature 5 and east of the existing State Highway 602, at center point grid coordinates N133.13, E165.69 (Figure 11.3). Feature 6 was defined as an indeterminate pit measuring 18 cm in diameter. The east half of the feature was excavated in one 10-cm level. One east-facing profile was drawn for Feature 6 (Figure 11.34). Two strata were defined within the feature. Stratum I consisted of loamy sand with light mottling of cultural deposits. Stratum II consisted of sterile aeolian deposits. Only a flaked stone artifact was recovered from the east half. Excavation of the west half yielded no artifacts. Evidence of rodent and insect burrowing was observed during the excavation of Feature 6. Only charred unknown conifer was identified from the flotation sample.

Feature 7

Feature 7 was located 40 cm south of Feature 5 and east of the existing State Highway 602, at center point grid coordinates N132.19, E165.16 (Figure 11.3). Feature 7 was defined as an oblong-shaped indeterminate pit measuring 30 cm east-to-west by 50 cm north-south (Figure 11.35). The east half of Feature 7 was excavated in two 10-cm levels. One west-facing profile was drawn for Feature 7 (Figure 11.36). One stratum was defined within the feature and consisted of loamy sand cultural deposits. Evidence of rodent burrowing was observed within the feature profile. Flaked stone artifacts were recovered from both Level 1 and 2 excavations in the east half. Excavations of the west half resulted in recovery of flaked stone artifacts at Level 2. Because of severe rodent disturbance Feature 7 was defined as an indeterminate pit.

Feature 8

Feature 8 was located 1.5 m south of Feature 7 and on the east side of State Highway 602, at center point grid coordinates N130.95, E164.80 (Figure 11.3). Feature 8 was defined as an ovoid indeterminate pit measuring 36 cm north-to-south by 43 cm east-to-west (Figure 11.37). The east

half of the feature was excavated in one 18 cm level to the base of the feature. One east-facing profile was drawn for Feature 8 (Figure 11.38). One stratum was defined within the feature and consisted of loamy sand deposits with inclusions of charcoal flecks. Insect and rodent disturbance were observed during the excavation. No artifacts were recovered from the east and west halves of the feature. Defining the feature other than as an indeterminate pit would be speculative due to the paucity of information recovered from the excavation.

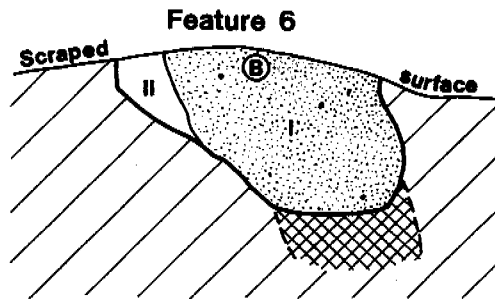
Feature 9

Feature 9 was located 4 m south of Feature 8 and on the east side of State Highway 602, and is at center point grid coordinate N126.66, E166.37 (Figure 11.3). Feature 9 was a circular indeterminate pit measuring 28 cm east-to-west by 34 cm north-to-south and 23 cm deep with a bell-shaped interior (Figure 11.39). The west half of the feature was excavated in one 23-cm level. One west-facing profile was drawn for Feature 9 (Figure 11.40). Two strata were defined within the feature. Strata I and II consisted of loamy sand deposits with no evidence of cultural deposits. No artifacts were recovered from the east and west half excavations of Feature 9. There was evidence of severe insect and rodent activity within the feature. Flotation, pollen, and waterscreen samples were collected from sediments of the east half of the feature. Only charred juniper and unknown conifer were recovered from the flotation sample.

Feature 10

Feature 10 was located 2 m northeast of Feature 9 and east of State Highway 602. The grid coordinates at the southwest corner of Feature 10 are N127.31, E168.47 (Figure 11.3). The feature is defined as an indeterminate rock pile measuring 1.25 m by 2.00 m (Figure 11.41).

A controlled excavation was conducted on the east half of Feature 10; excavation was conducted in four levels. Due to the local topography of Feature 10, Level 1 was excavated 4 cm and the



0 12.5 25.0 cm

I 0-10 cm - Dark yellowish brown (10YR3/4. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; very few micro roots; abrupt smooth boundary.

II 0-5 cm - Strong brown (7.5YR5/6. moist) sand; weak, very fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.

Charcoal fleck

Flotation sample

Rodent disturbance

Unexcavated

Figure 11.34. Site LA 26306 Feature 6, East-facing Profile.

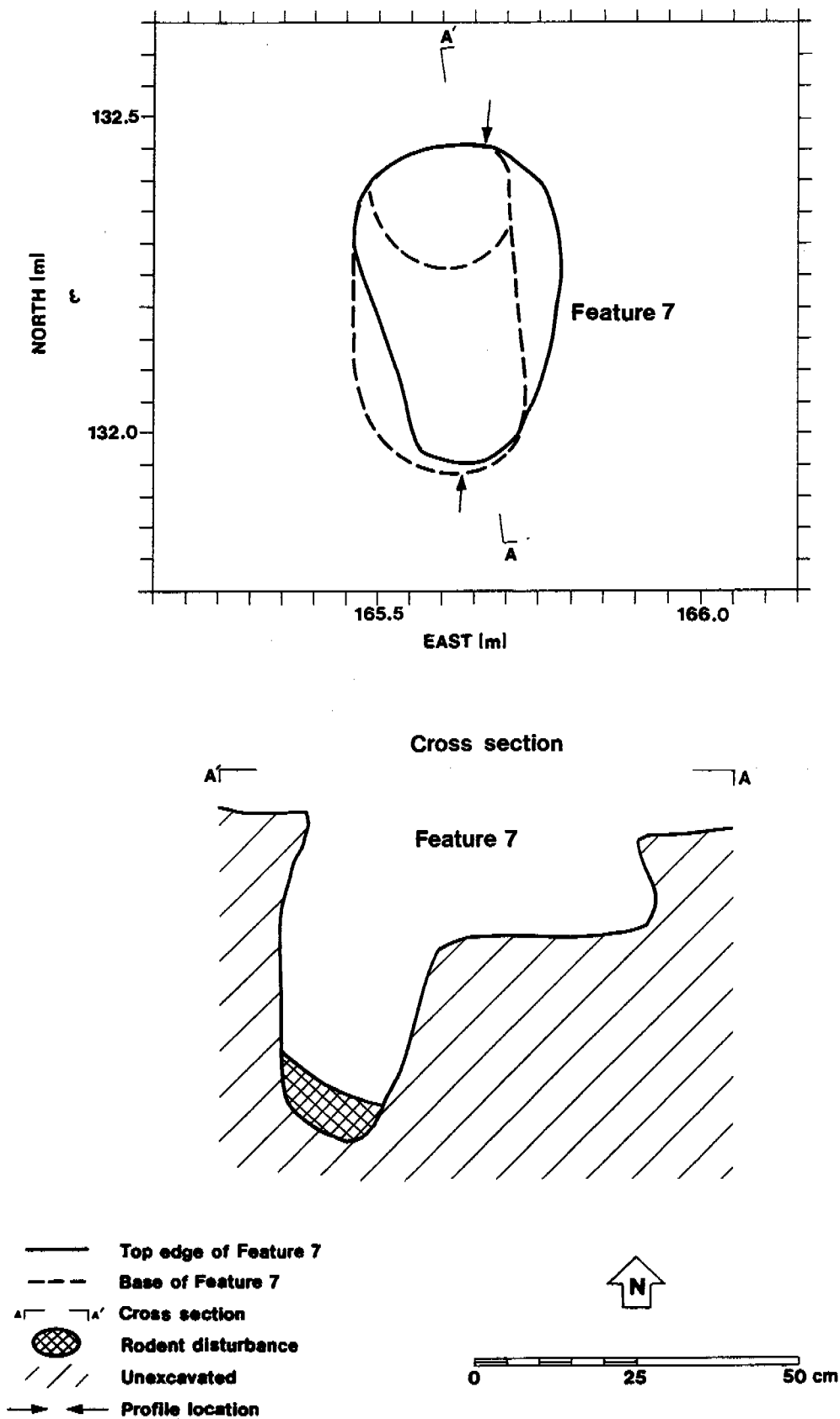


Figure 11.35. Site LA 26306 Feature 7, Plan View and Cross Section.

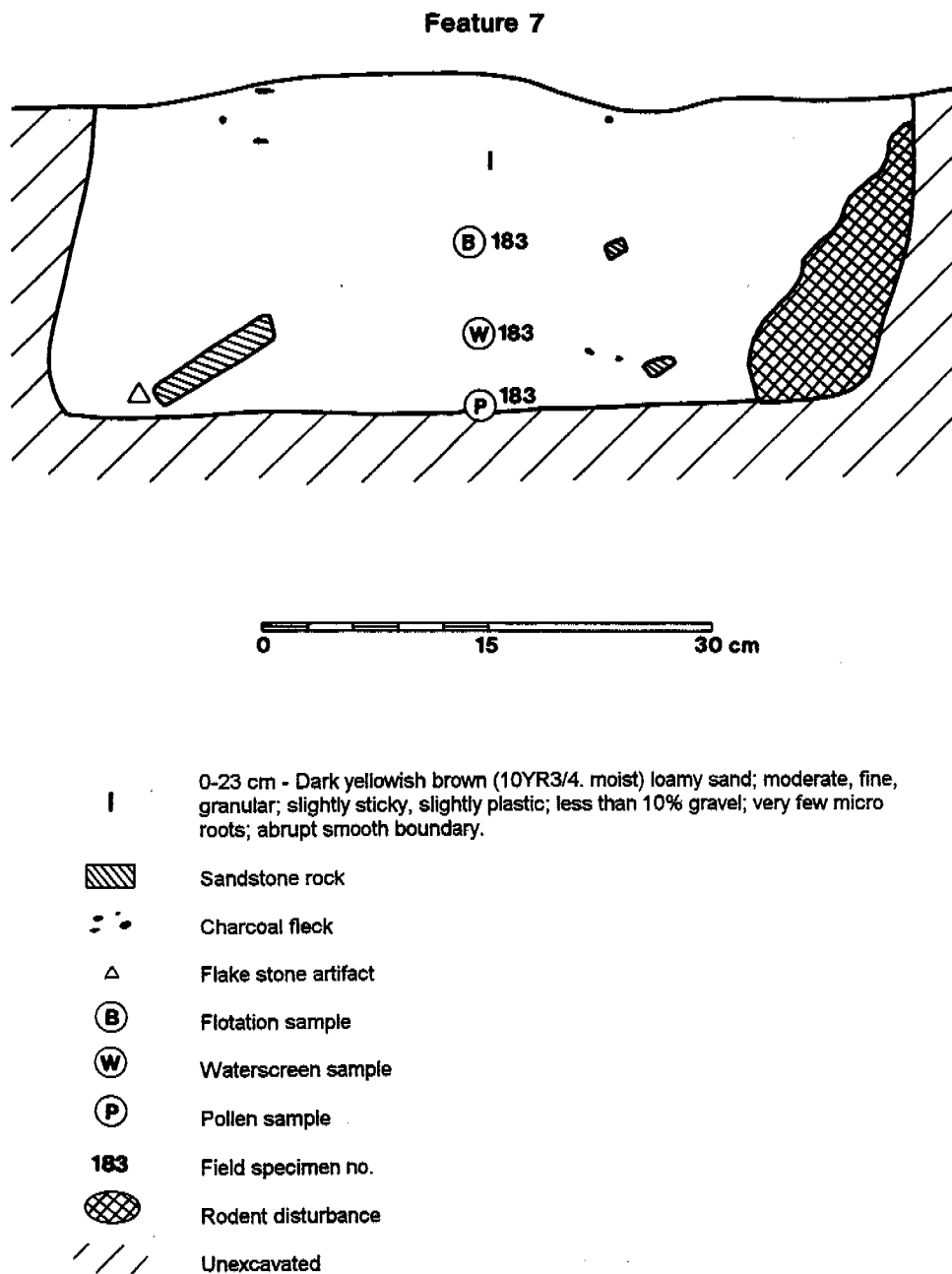
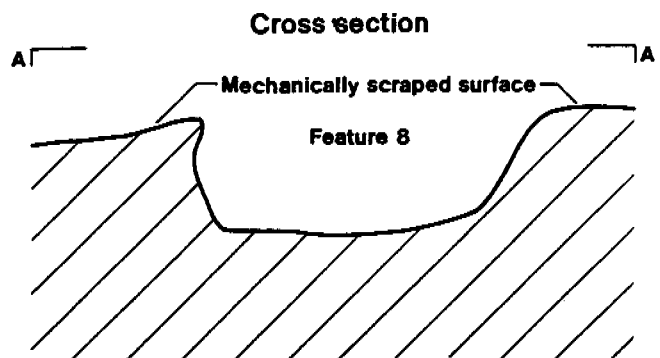
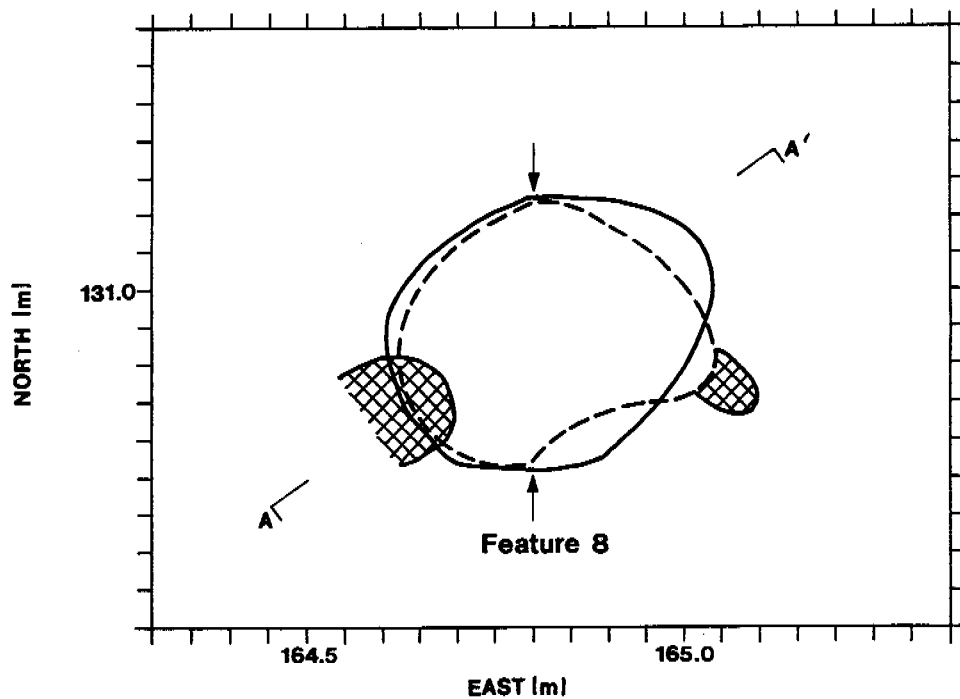


Figure 11.36. Site LA 26306 Feature 7, West-facing Profile.



- Top edge of Feature 8
- Base of Feature 8
- A—A' Cross section
- ⊗ Rodent disturbance
- /// Unexcavated
- ← Profile location

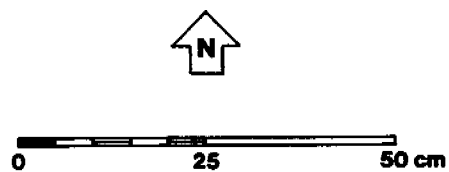


Figure 11.37. Site LA 26306 Feature 8, Plan View and Cross Section.

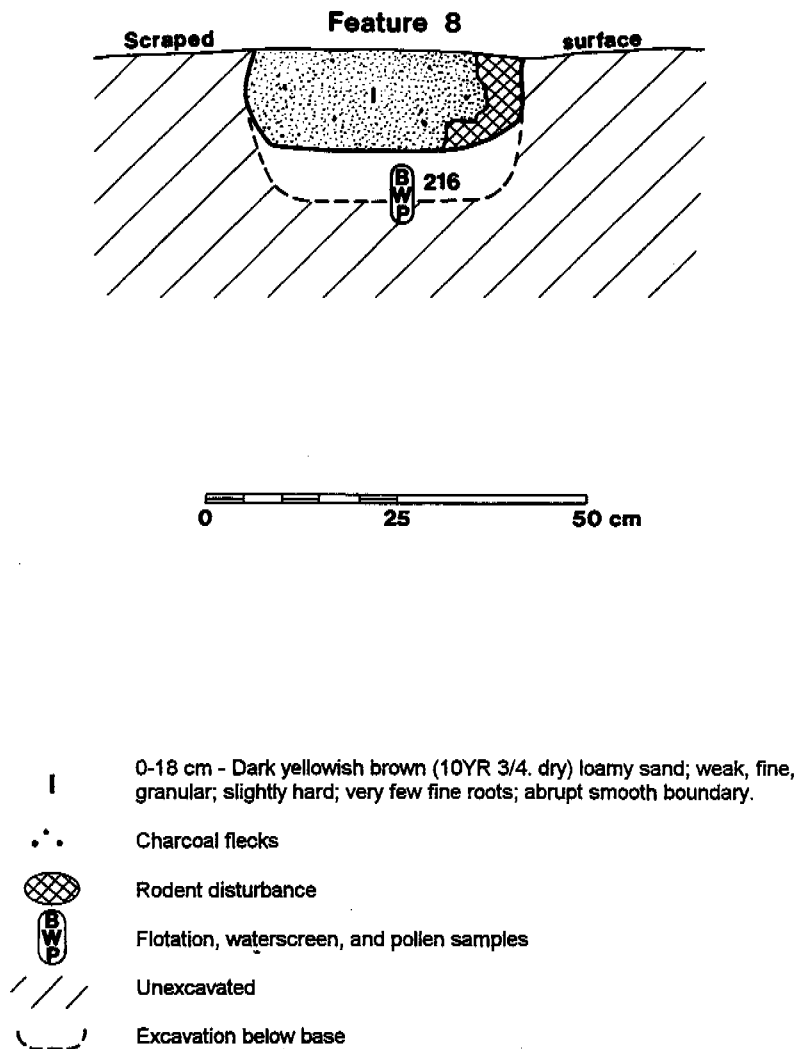


Figure 11.38. Site LA 26306 Feature 8, East-facing Profile.

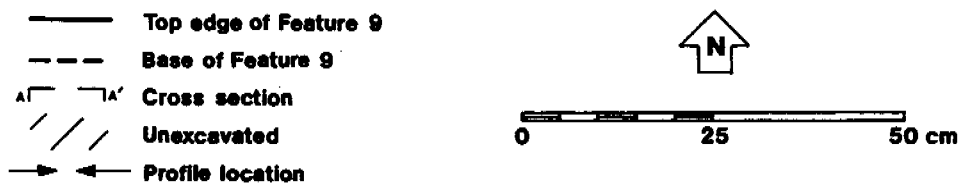
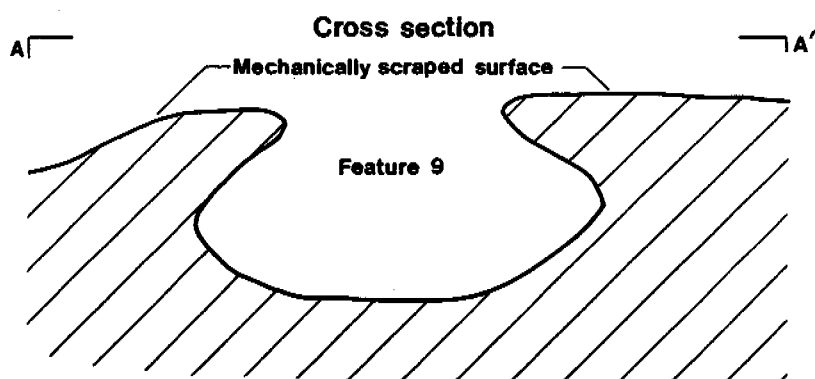
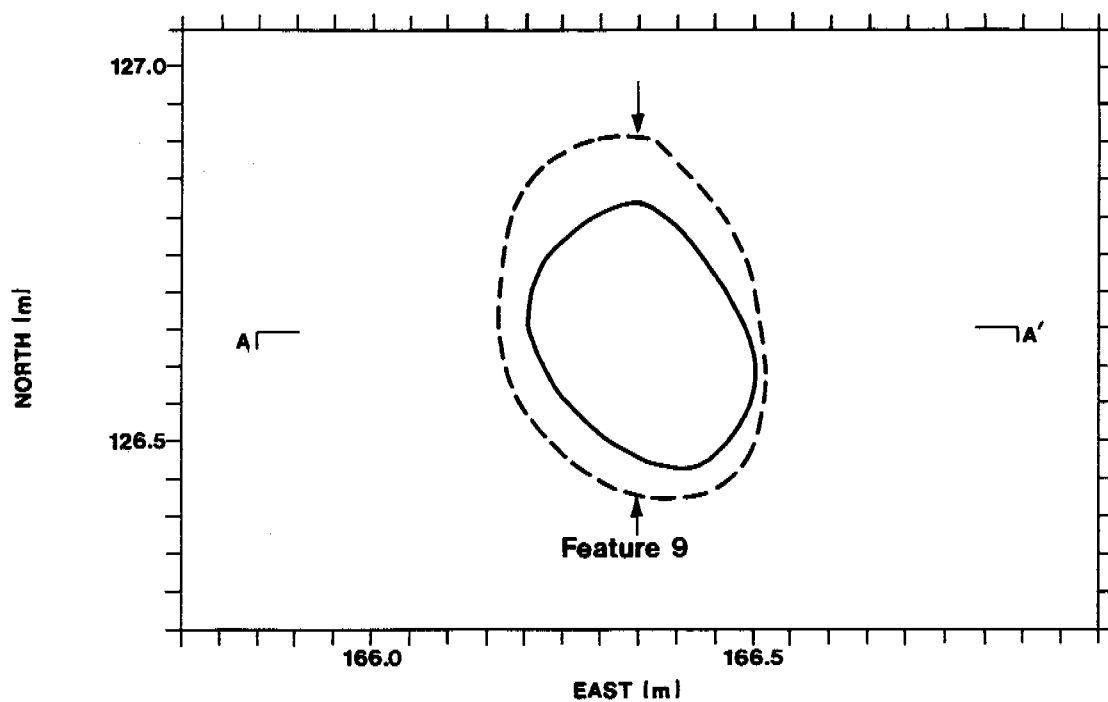


Figure 11.39. Site LA 26306 Feature 9, Plan View and Cross Section.

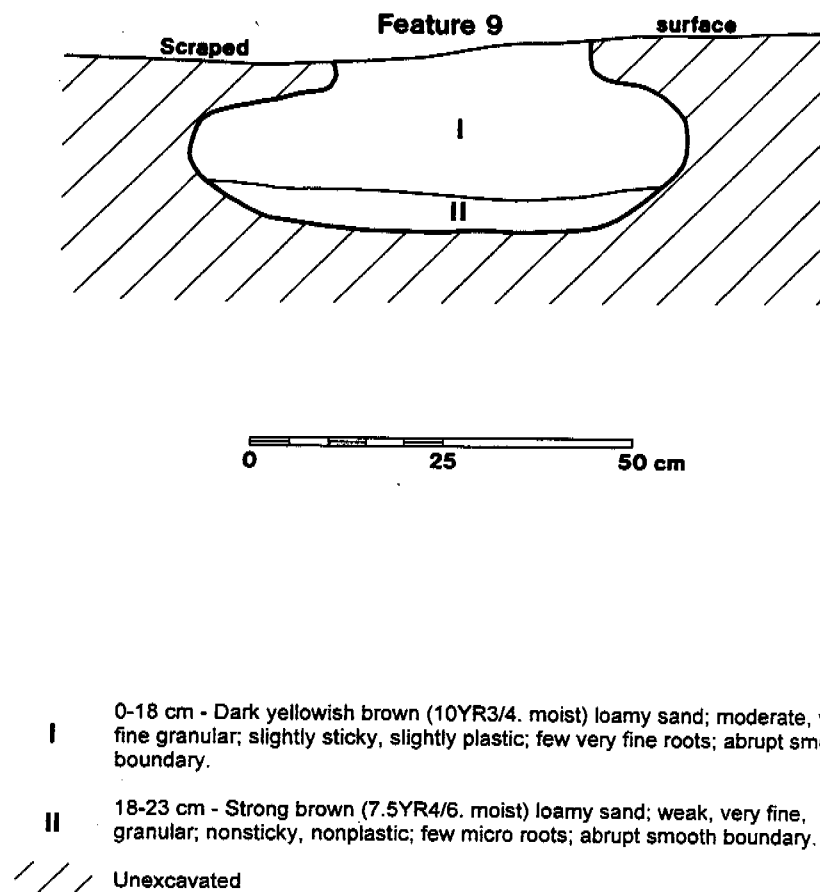


Figure 11.40. Site LA 26306 Feature 9, West-facing Profile.

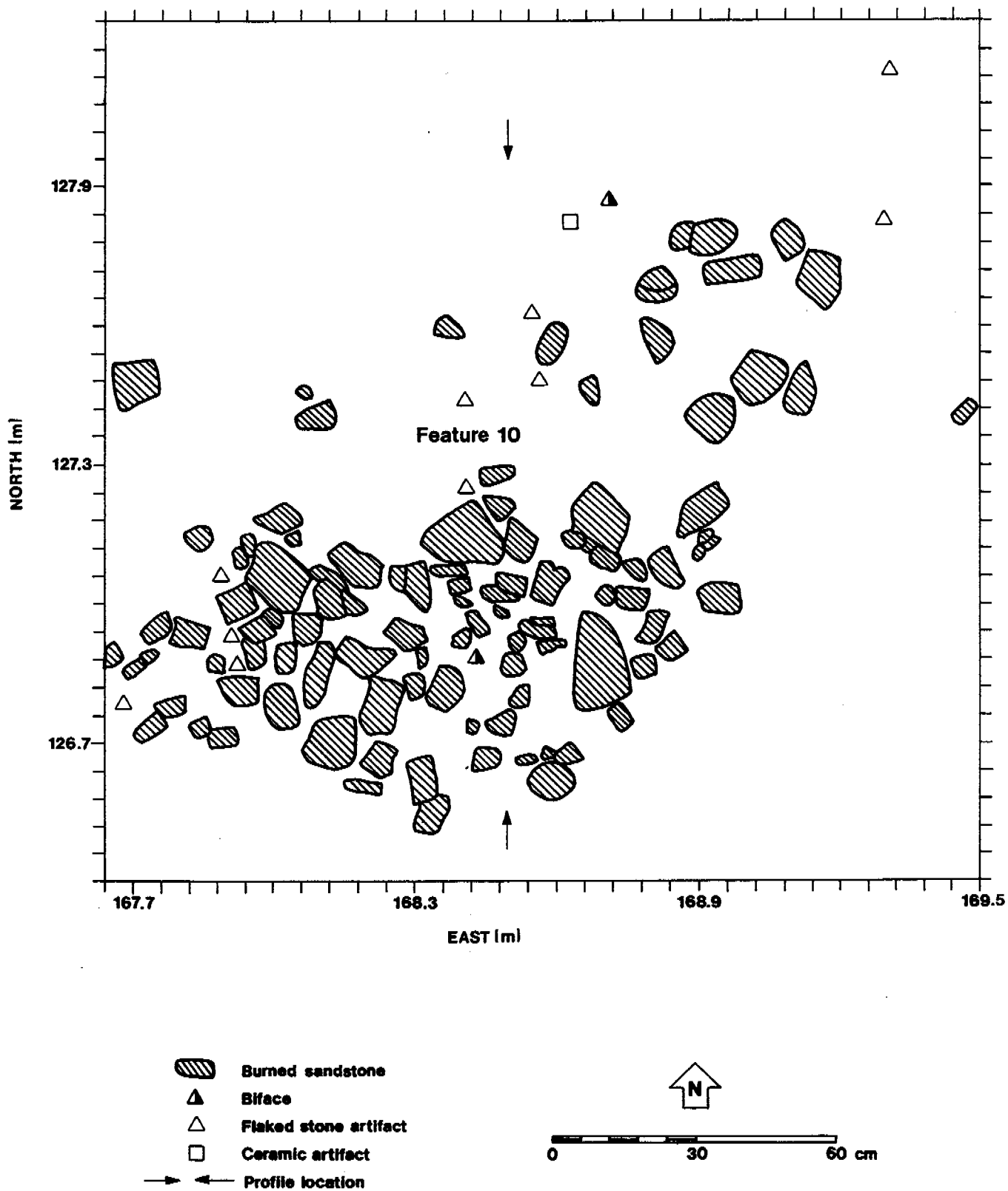


Figure 11.41. Site LA 26306 Feature 10, Plan View.

remaining levels were excavated in 10 cm levels. One 1.8-m-long, east-facing profile was drawn of Feature 10 (Figure 11.42). Two strata were defined within the profile of the feature. Stratum I consisted of clay loam cultural deposits. Excavation of Level 1 was within Stratum I and within the dense sandstone cobble layer. Artifacts recovered from the excavation of Level 1 consisted of ceramics, flaked stone, and faunal specimens. Flaked stones were mostly collected just below the cobble layer. Level 2 excavation was 10 cm in depth and within the lower portion of Stratum I. Artifact density decreased at this level, and finds consisted of ceramics and flaked stones. A radiocarbon sample was collected at Level 2. Level 3 excavation went down to the base of Stratum I. Artifacts diminished to only six flaked stones at this level and very few cobbles were present. Level 4 excavation was within Stratum II. One projectile point base was found at this level. Excavation in the west half was conducted in one level down to the base of the cobble layer. Artifact densities were high within this level and consisted of ceramics, flaked stones, ground stone, and faunal specimens.

Information recovered from the excavations of Feature 10 might indicate two possible functions. First, with the high density of flaked stones and oxidized sandstone within the feature, one might conclude that the feature was a lithic material heat-treatment area. The other possibility is that this cobble scatter could be associated with Feature 2, the only feature indicating prolonged use at high temperatures, located approximately 8 m to the north. Smith (below), however, identified maize pollen from this feature and suggests it functioned as a roasting pit.

One radiocarbon date of 2230 ± 80 (Beta-121223; wood charcoal; $\delta^{13}\text{C} = -21.5\text{‰}$) was obtained for Feature 10, indicating use during the Basketmaker II period.

Feature 11

Feature 11 was located 1 m south of Feature 10 on the east side of State Highway 602, at center point grid coordinate N126.22, E168.80 (Figure

11.3). This feature was defined as an indeterminate pit measuring 42 cm in diameter and 12 cm deep (Figure 11.43).

The west half of Feature 11 was excavated in one 12-cm level. One west-facing profile was drawn for Feature 11 (Figure 11.44). One stratum was defined within the feature profile and consisted of loamy sand deposits. Artifacts recovered from the excavation of Feature 11 consisted of mostly flaked stones. Evidence of severe insect and rodent burrowing was observed during the excavation. Based on the information recovered from the excavations, a determination of function could not be made for Feature 11. Charred Chenopodium and goosefoot seeds were identified from the flotation sample.

Feature 12

Feature 12 was located 15 m south of Feature 11 on the east side of State Highway 602, at center point grid coordinate N111.48, E172.54 (Figure 11.3). This feature was defined as an irregular-shaped indeterminate dark stain or rodent burrow measuring 85 cm north-to-south by 90 cm east-to-west (Figure 11.45).

The east half of Feature 12 was excavated in one 11-cm level. One east-facing profile was drawn for Feature 12 (Figure 11.46). Two strata were defined within the fill of the feature. Stratum I consisted of strong brown loamy sand deposits mottled with Stratum II, dark yellowish brown loamy sand deposits. Ceramic and flaked stone artifacts were recovered from the excavations of Feature 12. Flotation, vegetal (identified as charred juniper), and waterscreen samples were collected from the east half of the Feature 12 excavation. Severe rodent and insect burrowing was observed during the excavation and the feature was defined as a probable rodent burrow.

Feature 13

Feature 13 was located 3.5 m southeast of Feature 12 and on the east side of State Highway 602, at center point grid coordinate N108.59, E173.61 (Figure 11.3). This feature was

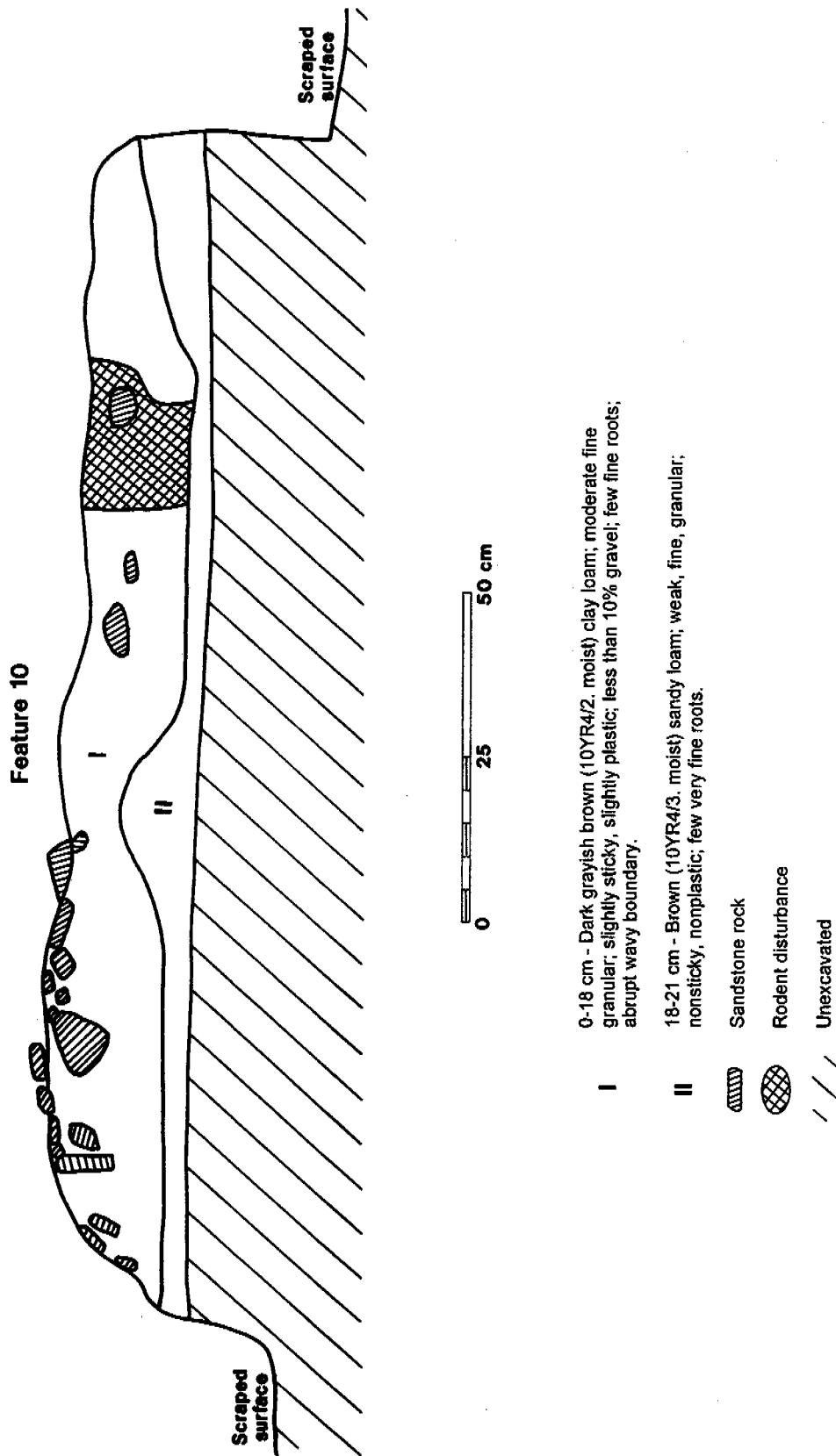


Figure 11.42. Site LA 26306 Feature 10, East-facing Profile.

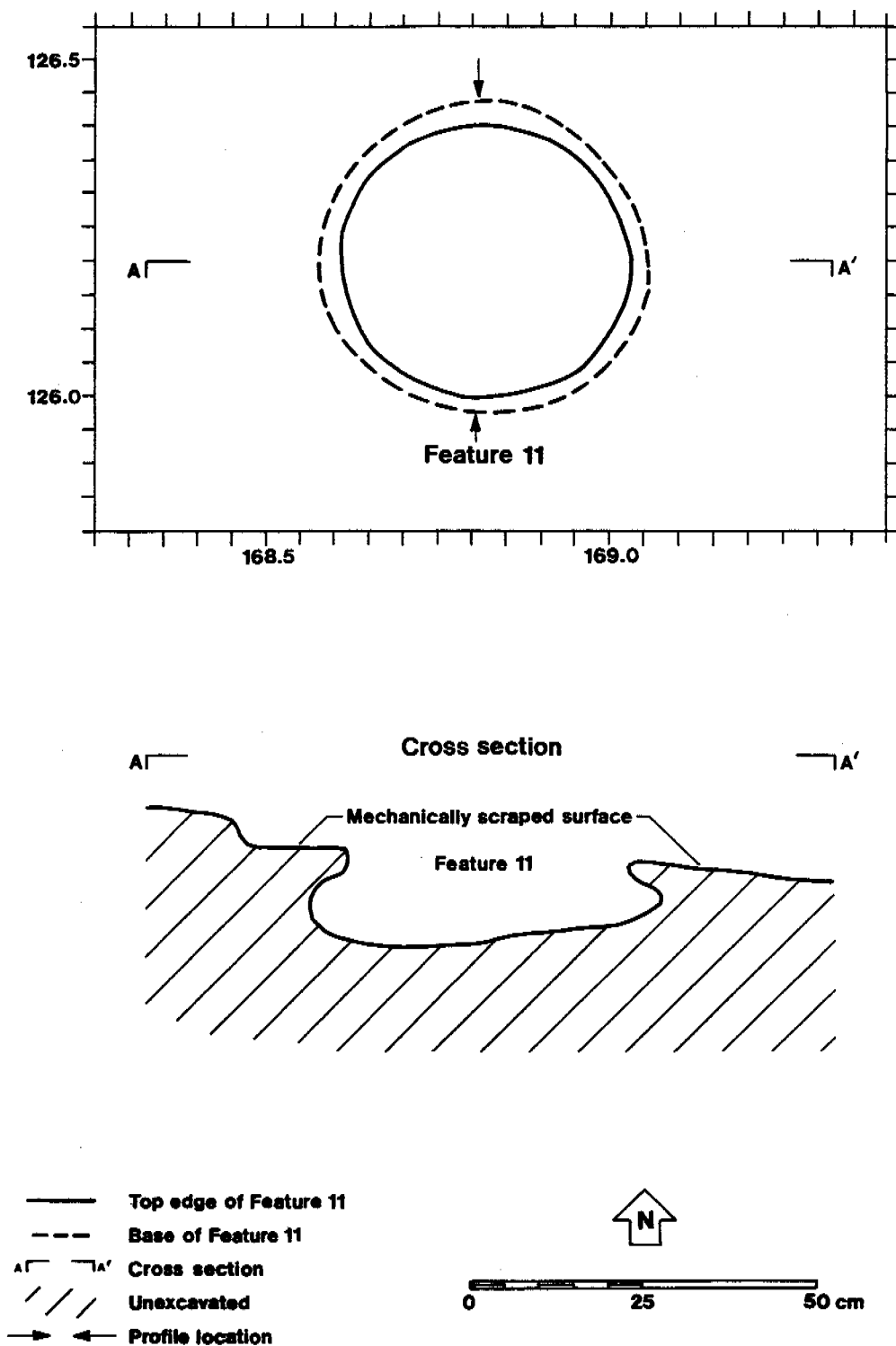
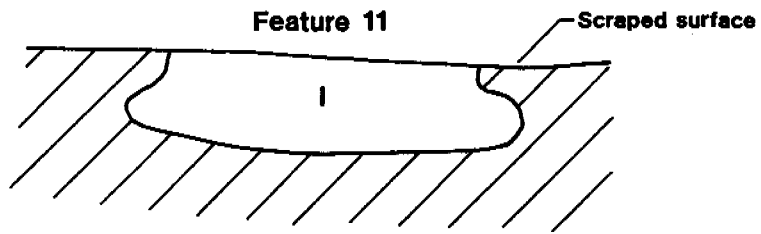


Figure 11.43. Site LA 26306 Feature 11, Plan View and Cross Section.



I 0-18 cm - Very grayish brown (10YR3/2. moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; very few fine roots; abrupt smooth boundary.

/// Unexcavated

Figure 11.44. Site LA 26306 Feature 11, West-facing Profile.

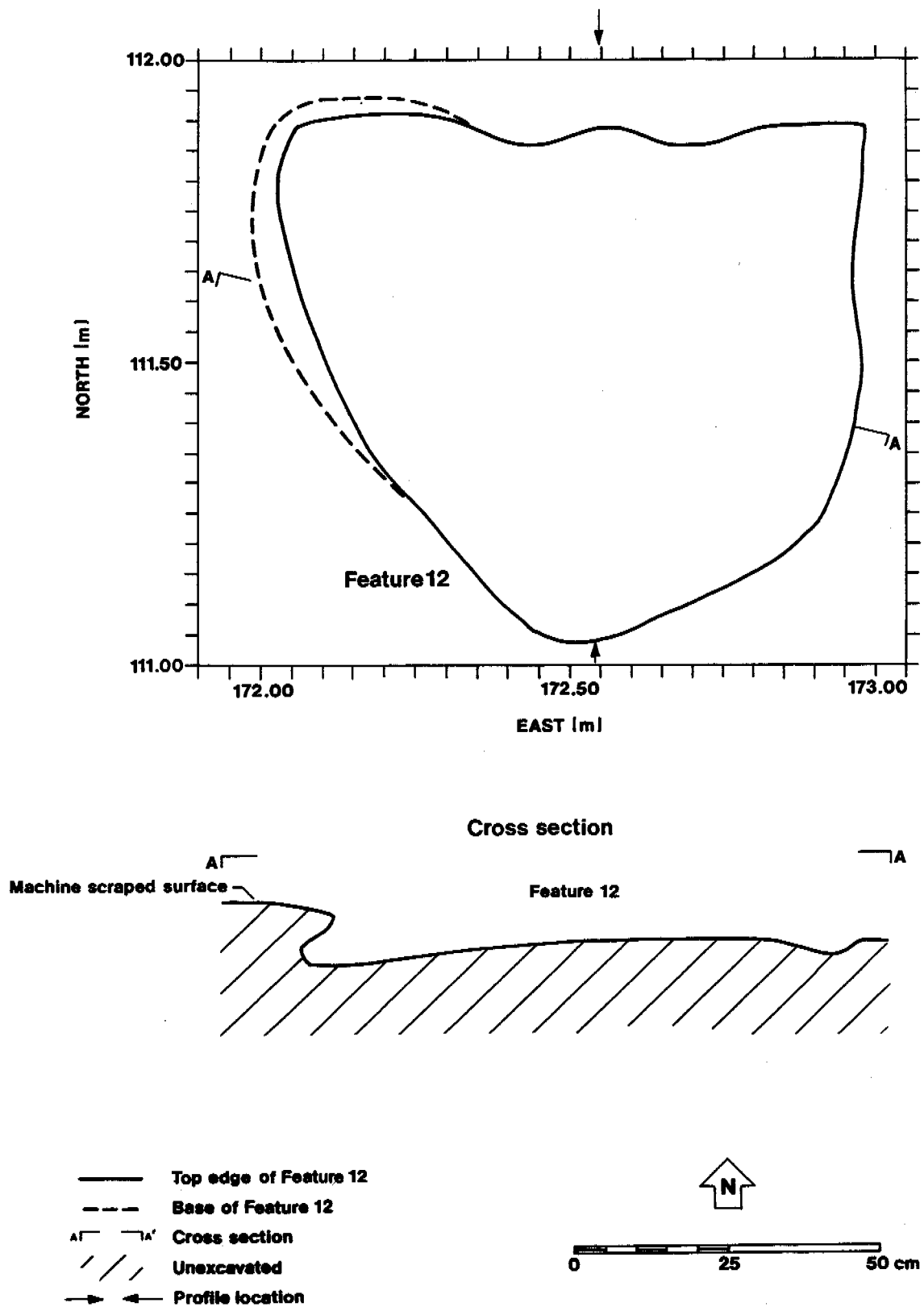
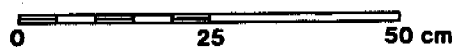
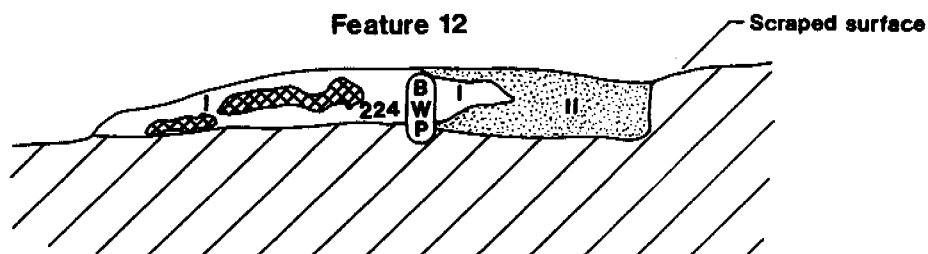


Figure 11.45. Site LA 26306 Feature 12, Plan View and Cross Section.



- I** 0-11 cm - Strong brown (7.5YR4/6. moist) loamy sand; weak, fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.
- II** 0-11 cm - Dark yellowish brown (10YR3/3. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; very few micro roots; abrupt smooth boundary.



Rodent disturbance

Flotation, waterscreen, and pollen samples

224

Field specimen no.



Unexcavated

Figure 11.46. Site LA 26306 Feature 12, East-facing Profile.

defined as a rodent burrow measuring 21 cm north-to-south by 17 cm east-to-west (Figure 11.47).

The west half of Feature 13 was excavated in one 23-cm level. One west-facing profile was drawn for Feature 13 (Figure 11.48). Two strata were defined within the feature; both Strata I and II consisted of sterile sandy loamy deposits. No artifacts were recovered from the excavations of the east and west halves of the feature. A flotation sample was collected from the sediments of the east half. Evidences of a rodent run clearly indicated that this feature was indeed a rodent burrow.

Feature 14

Feature 14 was located 21.5 m south of Feature 13 and on the east side of State Highway 602, at center point grid coordinates of N88.44, E179.17 (Figure 11.3). This feature was defined as an indeterminate pit measuring 24 cm north-to-south by 30 cm east-to-west and 15 cm deep (Figure 11.49).

The east half of Feature 14 was excavated in one 14-cm level. One east-facing profile was drawn for Feature 14 (Figure 11.50). One stratum was defined within the feature sediments. Stratum I consisted of loamy sand with light inclusions of charcoal and ash. No artifacts were recovered from excavation of the east and west halves of Feature 14. Severe rodent and root disturbance was observed during the excavations. A flotation sample was collected from the sediments of the west half of Feature 14, but it produced no data (Appendix H). Based upon the information recovered, no determination of function could be made for Feature 14.

Features 15 and 16

Features 15 and 16 were identified and assigned numbers during the mechanical stripping. Both features were circular dark stains at the time of identification. It was later determined that both were active rodent burrows.

Feature 27

Feature 27 was located in the western portion of the site and west of State Highway 602, at center point grid coordinates N104.19, E133.61 (Figure 11.3). Feature 27 was defined as a bell-shaped earthen storage bin measuring 1.00 m in diameter and 47 cm deep (Figure 11.51). Due to the presence of a buried telephone cable, excavation was limited to the west half of Feature 27.

Feature 27 was excavated in five levels: four 10-cm levels and the fifth, a 3-cm level. One west-facing profile was drawn for Feature 27 (Figure 11.52). Three strata were identified within the feature fill sediments. Excavation of Level 1 was within Stratum I which consisted of loamy sand with inclusions of charcoal flecks and fire cracked rocks. Artifacts recovered from Level 1 consisted of flaked stone. Level 2 excavation was within Stratum II and consisted of loamy sand with mottling of oxidized sand and inclusions of small charcoal flecks, light ash, and fire-cracked rock. Materials recovered from this level consisted of flaked stone and faunal specimens. Level 3 excavation was within the lower part of Stratum II and the upper deposits of Stratum III. Stratum III consisted of clay loam deposits with inclusions of fine charcoal flecks. Artifacts recovered at Level 3 consisted of only flaked stones. Level 4 excavation was within Stratum III. Artifacts recovered from this level consisted of only flaked stones. Flotation and waterscreen samples were collected at Level 4. Level 5 excavation was down to the base of the feature. No artifacts were recovered at this level. A pollen sample was scraped from the base of the feature (analysis results are discussed below). Analysis of the flotation sample identified maize cupules and kernels, charred Chenopodium, goosefoot, and hedgehog cactus seeds. Charred juniper, pinyon, and pine bark scale were also identified.

Feature 27 had been excavated into a clay loam stratum. No evidence of oxidized walls was present. The feature bells out to approximately 1.30 m north-to-south and 61 cm east-to-west (Figures 11.51 and 11.52). One radiocarbon date

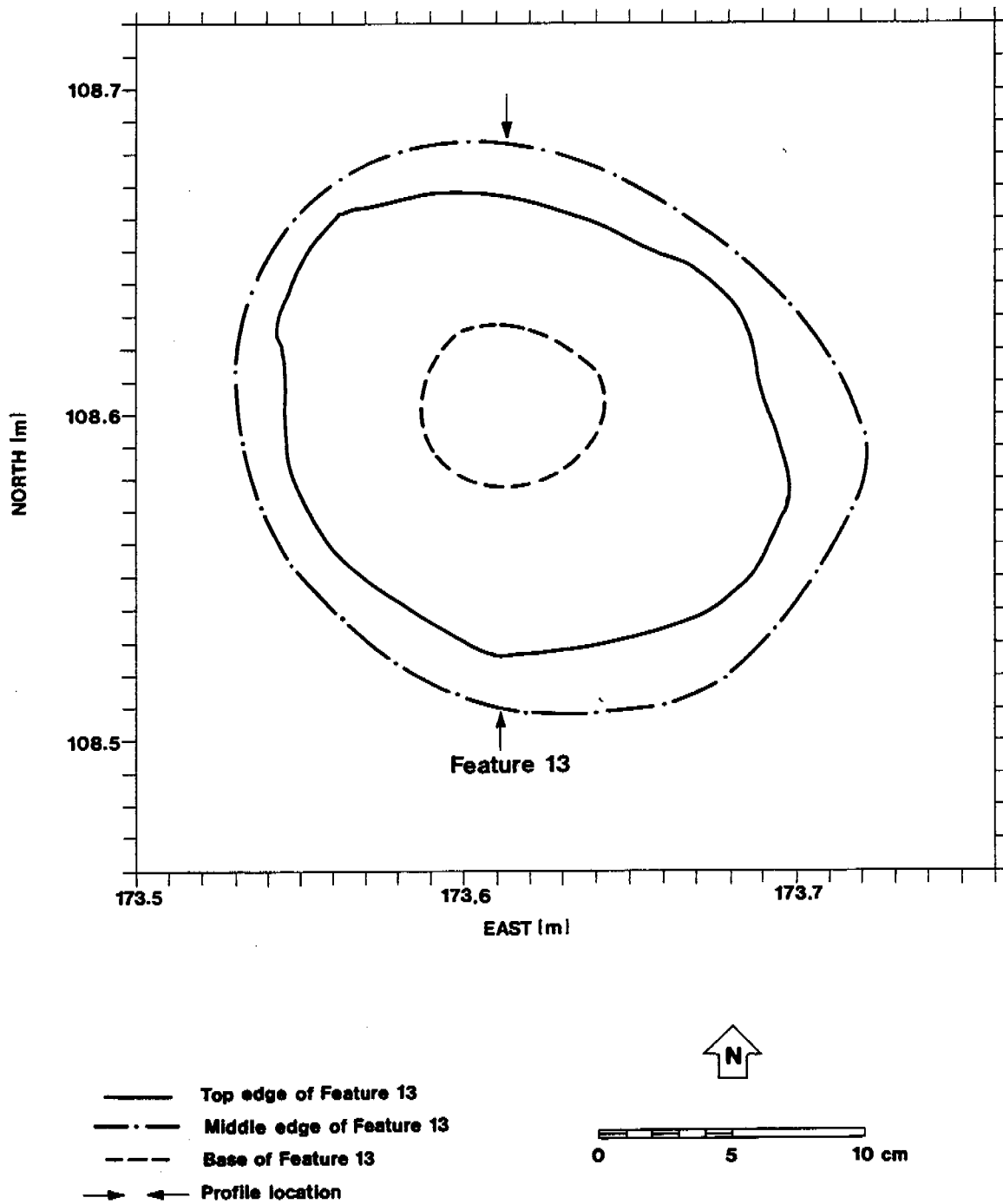
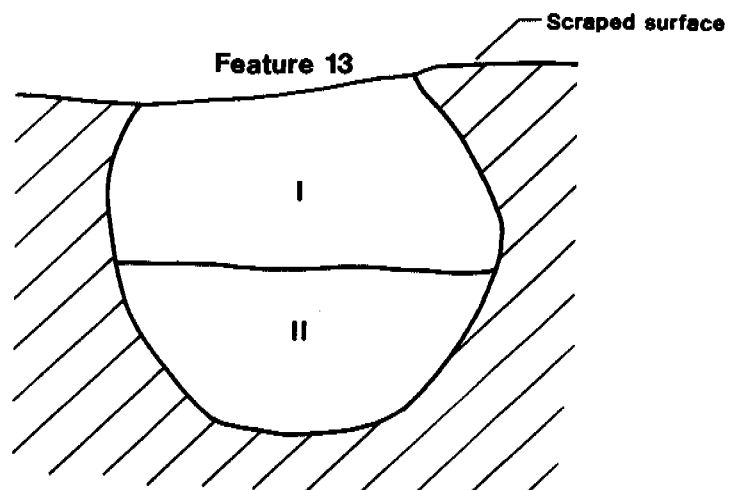


Figure 11.47. Site LA 26306 Feature 13, Plan View.



0 10 20 cm

- I 0-12 cm - Dark yellowish brown (10YR4/4. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few fine roots; abrupt smooth boundary.
- II 12-23 cm - Strong brown (7.5YR5/6. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; very few fine roots; abrupt smooth boundary.
- /// Unexcavated

Figure 11.48. Site LA 26306 Feature 13, West-facing Profile.

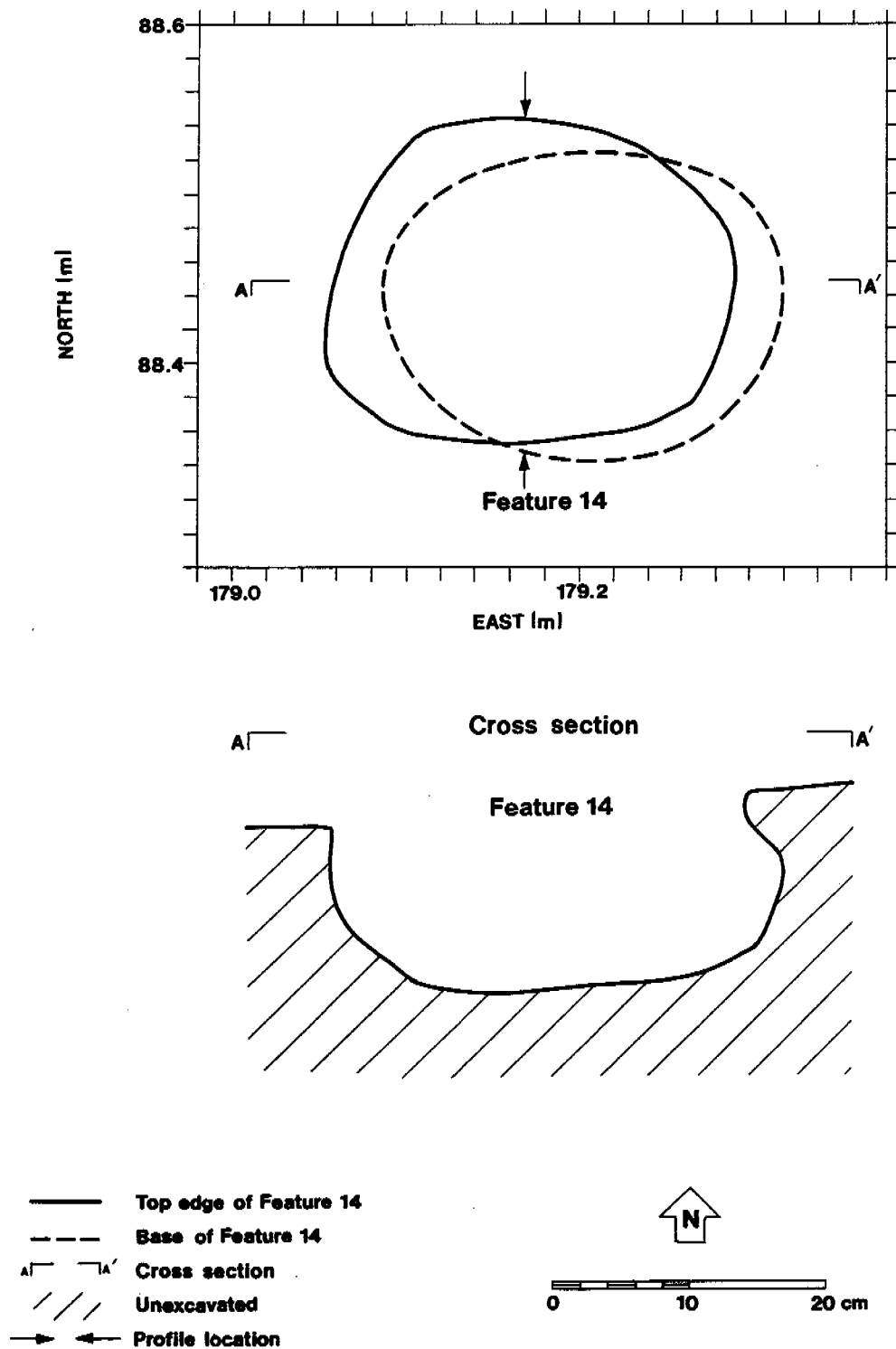


Figure 11.49. Site LA 26306 Feature 14, Plan View and Cross Section.

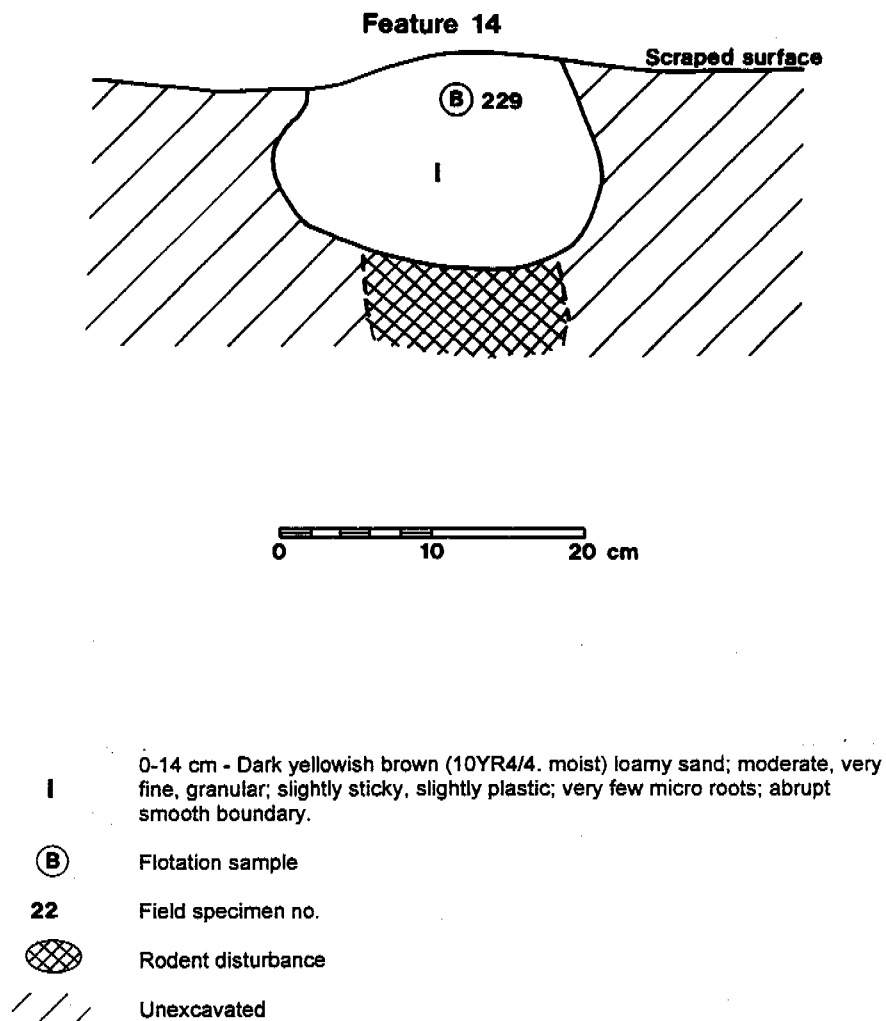


Figure 11.50. Site LA 26306 Feature 14, East-facing Profile.

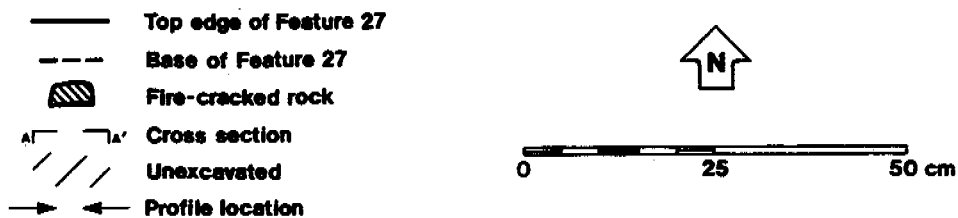
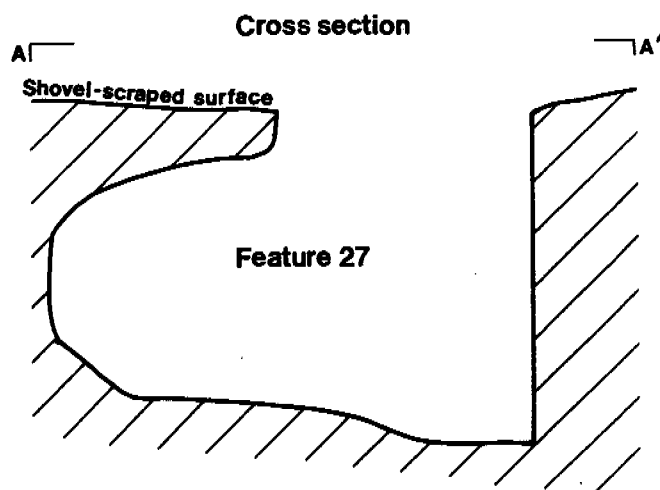
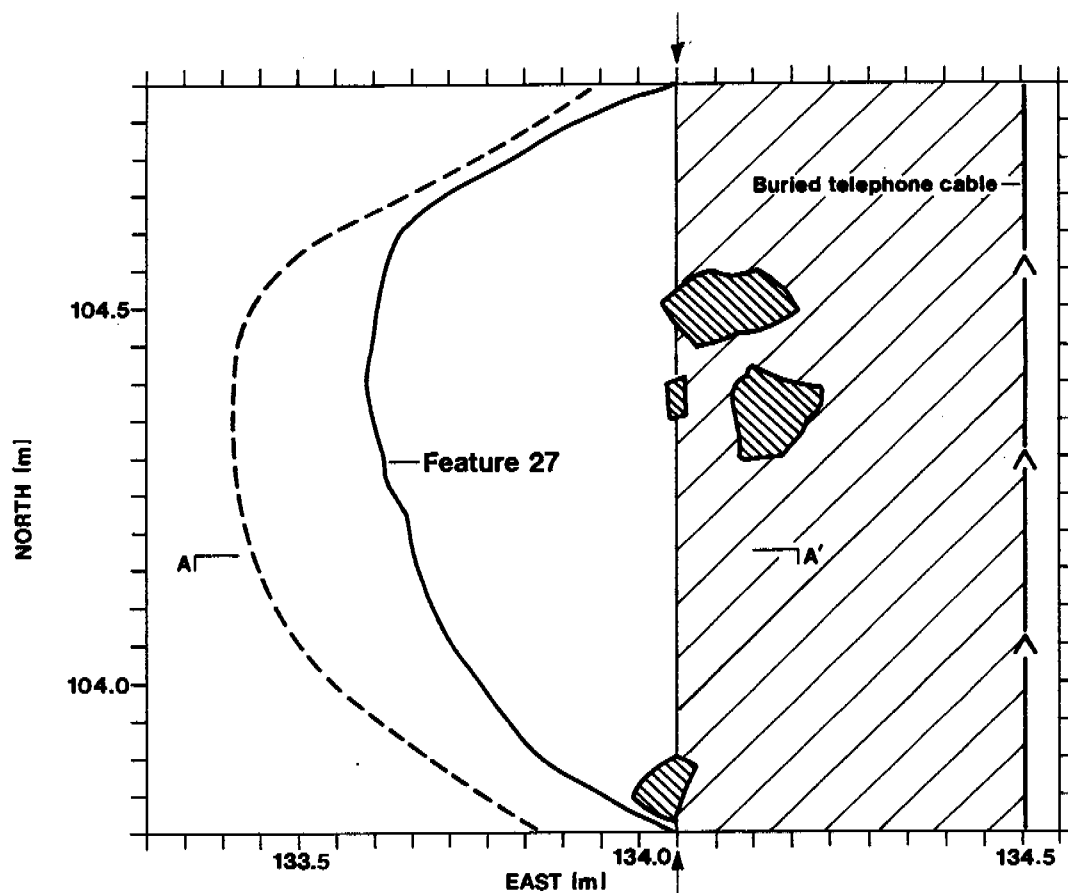
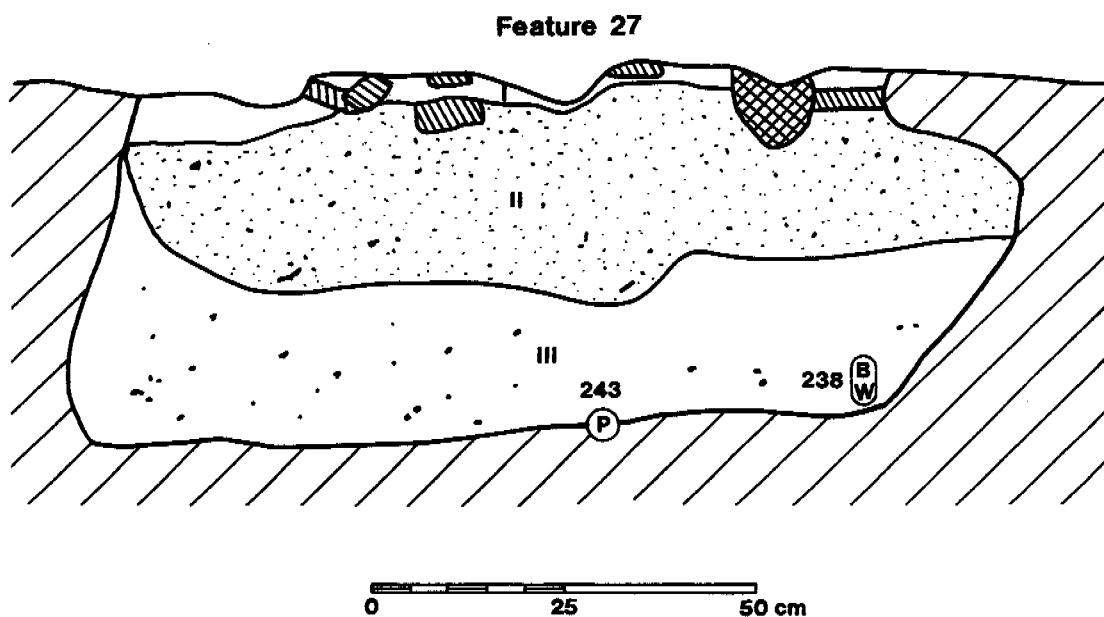


Figure 11.51. Site LA 26306 Feature 27, Plan View and Cross Section.









- I 0-3 cm - Dark yellowish brown (10YR3/4. moist) loamy sand; moderate, fine, platy; slightly sticky, slightly plastic; very few micro roots; diffuse wavy boundary.
- II 3-26 cm - Very dark grayish brown (10YR3/2. moist) loamy sand; moderate, slightly sticky, slightly plastic; less than 10% gravel; few very fine roots; diffuse wavy boundary.
- III 26-47 cm - Dark yellowish brown (10YR3/4. moist) clay loam; moderate, very fine, platy; sticky, plastic; very few micro roots; abrupt smooth boundary.
-  Sandstone rock
-  Rodent disturbance
-  Charcoal flecks
-  Pollen sample
-  Flotation and waterscreen samples
- 238** Field specimen no.
-  Unexcavated

Figure 11.52. Site LA 26306 Feature 27, West-facing Profile.

of 1700 ± 90 BP (Beta-121225; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$) was obtained from Feature 27, indicating use during the late Basketmaker II period.

Feature 28

Feature 28 was a circular pitstructure located partly within SU 13, west of State Highway 602 (Figure 11.3). No southern recess or vent shaft was present within the excavated portion of the pitstructure. The excavated main chamber measured 3.80 m in diameter northwest-to-southeast by 1.00 m northeast-to-southwest with an estimated 11.33 sq m of floor area (Figure 11.53). One floor was present, associated with the floor were a hearth, primary and secondary postholes, storage bins, and indeterminate pits. The extant height of the pitstructure was 1.30 m from floor to modern surface.

Walls and Bench. Two benches and walls were present in Feature 28. The upper bench (Feature 34) located in the south end of the Feature 28 was an earthen bench, 1 m above the floor. This bench was absent on the north portion of the pitstructure. The second bench (Feature 51) was an earthen construction located along the bottom of the wall, with the height above the floor ranging from 20 to 30 cm. Two sections of walls were exposed, one at the north and the second at the south portion of the pitstructure. Both sections of walls were earthen. The north wall had evidence of oxidation. No wall features were present.

Floor Features. Only one floor was present in Feature 28. The floor was unprepared and consisted of sterile strong brown loamy sand subsoil. The floor was covered with a thin layer of very fine light sand. Eleven floor features were identified (Figure 11.53): two storage bins (Feature 35 and 41), four postholes (Features 36, 42, 43, and 50), four indeterminate pits (Features 37, 38, 39, and 40), and a hearth (Feature 44).

Feature 35 was an earthen storage bin located in the southeast corner of pitstructure, at center point grid coordinates N91.71, E136.58 (Figure 11.3). The storage bin surface was even with the

floor of the pitstructure and belled out at the bottom of the bin. The earthen bin was excavated into the south wall and approximately 29 cm below the floor. It measured 1.05 m north-to-south and 42 cm east-to-west (incomplete) and was circular in outline (Figure 11.54). Only the east portion of the feature was excavated; the west half was outside the right-of-way fence line. Feature fill consisted of sandy loam and roofall debris. Materials recovered from the storage bin included flaked stones and faunal specimens. Samples collected from the feature included flotation, pollen, radiocarbon, and waterscreen. Charred oak and pine along with a charred sunflower achene were identified by from the flotation sample. Smith, however, identified maize pollen (discussed below) from this feature. One radiocarbon date of 1940 ± 70 BP (Beta-121227; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$) indicates use during the Basketmaker II period.

Feature 36, a posthole, was located in the northeast portion, at center point grid coordinates N94.20, E136.20 (Figure 11.3). Feature 36 was an irregular-shaped dark stain on the floor; excavation revealed a posthole measuring 14 cm in diameter with a depth of approximately 29 cm below the floor surface (Figure 11.55). No artifacts were recovered from the excavations of Feature 36. Samples collected from the feature included vegetal (identified as uncharred pine, similar to the plant remains in Feature 2 at site LA 115330), flotation, and waterscreen samples.

Feature 37 was located in the northeast portion of the floor, at center point grid coordinate N94.12, E136.36 (Figure 11.3). Feature 37 was a circular basin-shaped earthen indeterminate pit measuring 20 cm in diameter and 4 cm deep (Figure 11.56). Feature fill consisted of sandy loam deposits with inclusions of small charcoal flecks. Some rodent and root disturbances were observed during the excavation of the feature. No artifacts were recovered from the feature fill. A flotation sample was collected from the sediments within the feature.

Feature 38 was located 20 cm west of Feature 37, at center point grid coordinates N94.20,

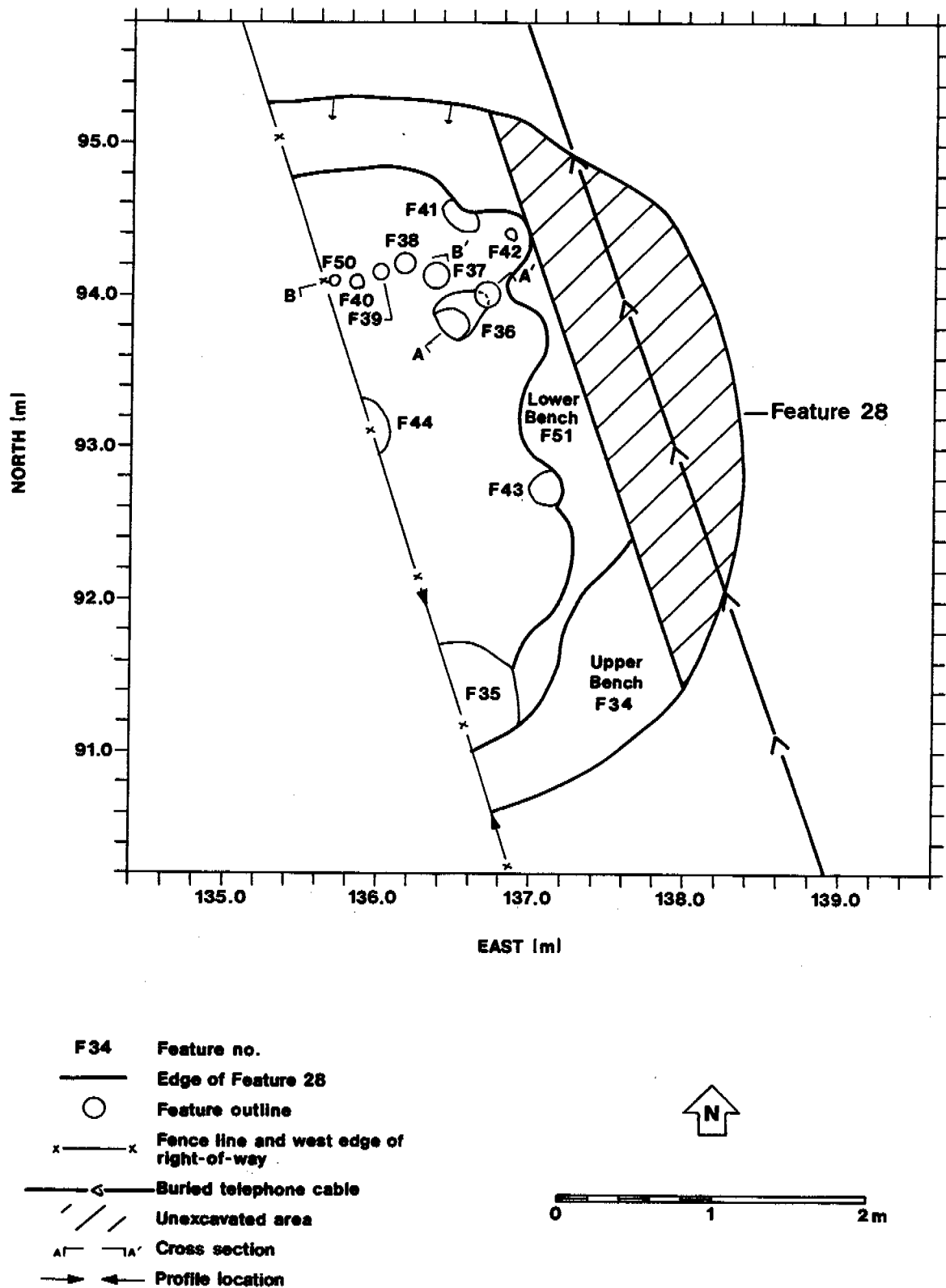
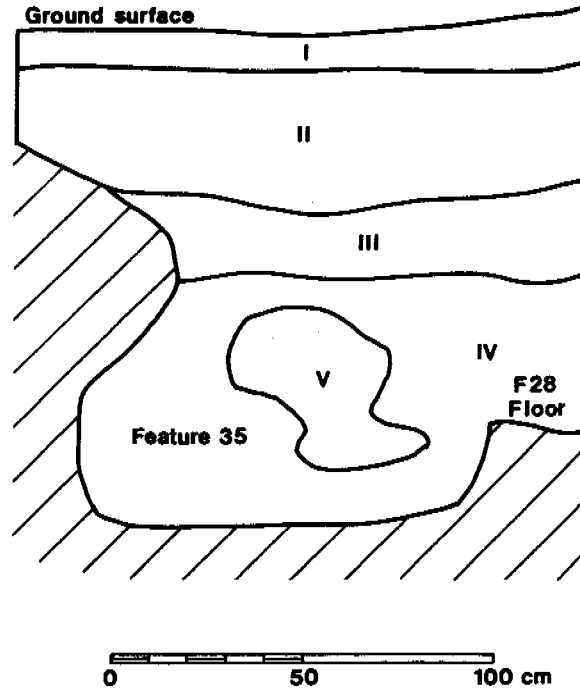


Figure 11.53. Site LA 26306 Feature 28, Plan View.



- I 0-10 cm - Dark brown (10YR3/3. moist) sandy loam; weak, fine, granular; slightly sticky, slightly plastic; many medium roots; diffuse smooth boundary.
 - II 10-49 cm - Dark yellowish brown (10YR3/4. moist) sandy loam; moderate, fine; sticky, plastic; common fine roots; diffuse smooth boundary;
 - III 49-66 cm - Brown (10YR4/3. moist) sandy loam, moderate, fine; slightly sticky, slightly plastic; less than 10% gravel; diffuse smooth boundary.
 - IV 66-132 cm - Very dark grayish brown (10YR3/2. moist) sandy loam; moderate, fine; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; abrupt smooth boundary.
 - V 74-116 cm - Strong brown (7.5YR5/6. moist) sandy loam; moderate, fine; slightly sticky, slightly plastic; very few micro roots; abrupt irregular boundary.
- /// Unexcavated

Figure 11.54. Site LA 26306 Feature 35, East-facing Profile.

Feature 36

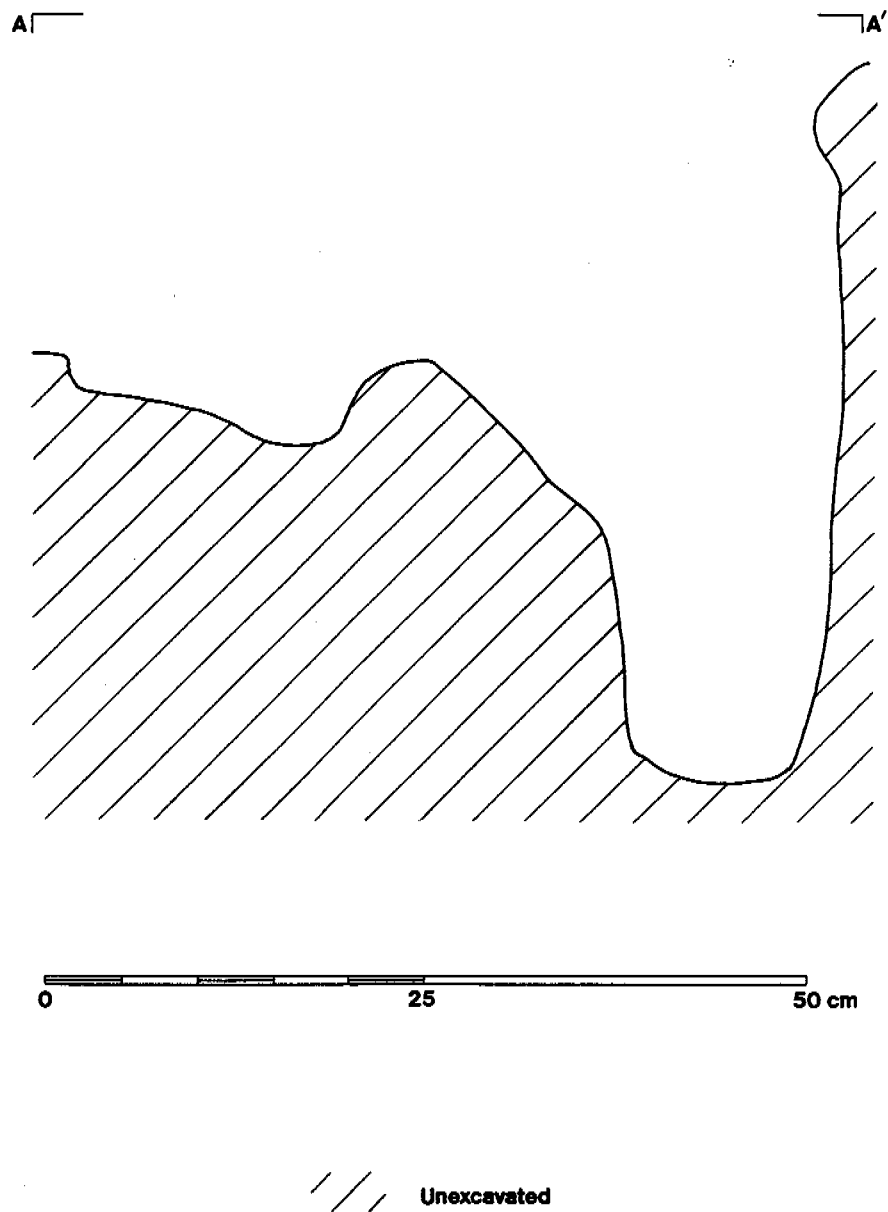


Figure 11.55. Site LA 26306 Feature 36, Cross Section.

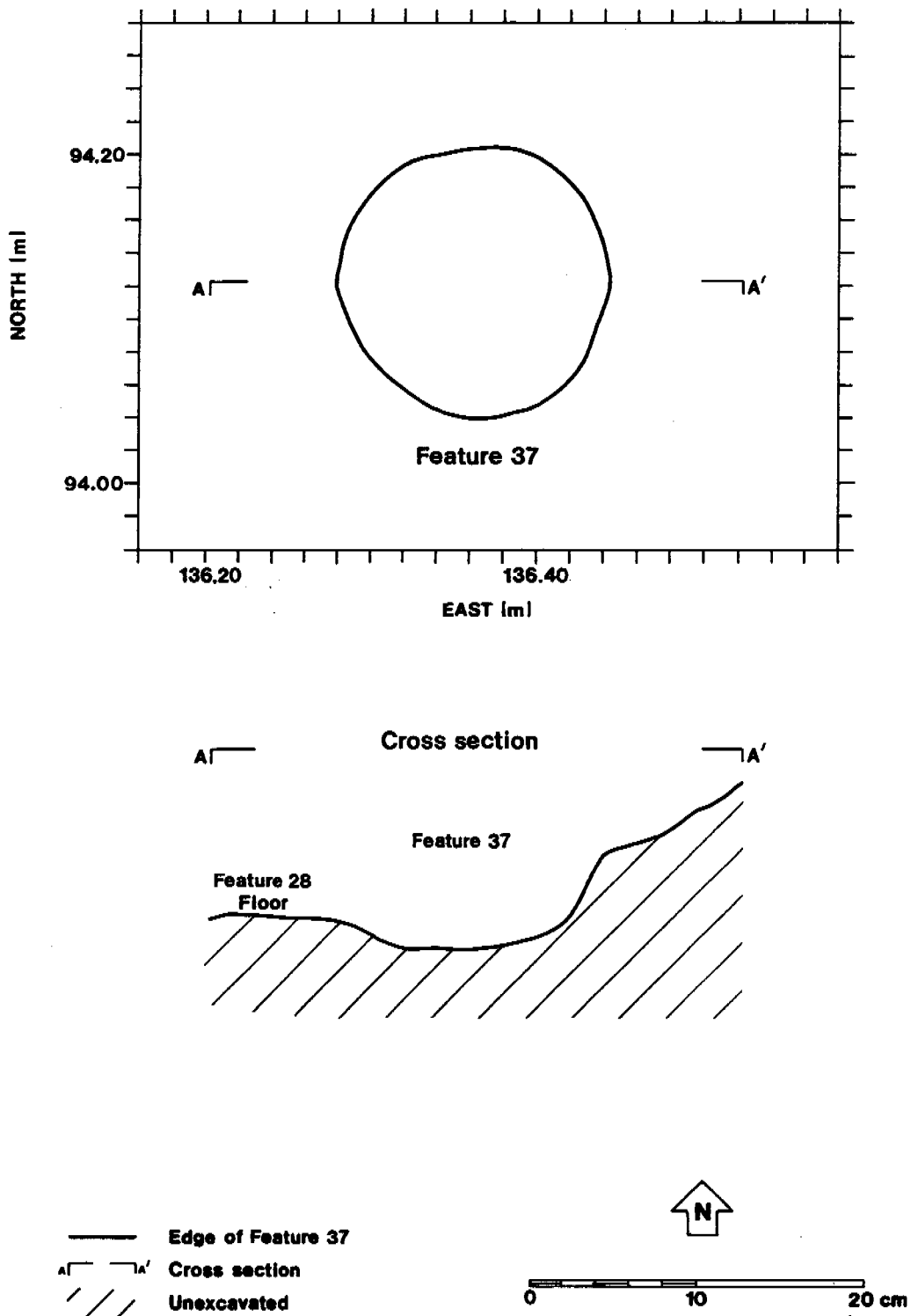


Figure 11.56. Site LA 26306 Feature 37, Plan View and Cross Section.

E136.15 (Figure 11.3). This feature was circular in shape and measured 14 cm north-to-south by 12 cm east-to-west and 3 cm deep (Figures 11.53 and 11.57). The base of the feature was basin-shaped and earthen. Feature fill consisted of loamy sand with inclusions of small charcoal flecks. Evidence of rodent burrowing was observed during the excavations. No artifacts were recovered from the excavation of Feature 38. The paucity of information recovered from the feature excavation did not allow functional interpretations.

Feature 39 was located 10 cm west of Feature 38 in the northern portion of floor, at center point grid coordinates N94.14, E136.00 (Figure 11.3). Feature 38 was circular basin-shaped earthen pit measuring 9 cm in diameter and 3 cm deep (Figures 11.53 and 11.57). Feature fill consisted of loamy sand with no artifacts. Insect and rodent burrowing was observed during the excavation of Feature 39. Due to the paucity of information recovered from the excavation the feature function could not be determined.

Feature 40 was located 10 cm to the west of Feature 39 in the north portion of the floor, at center point grid coordinates N94.08, E135.85 (Figure 11.3). Feature 40 was a cylindrical pit measuring 8 cm in diameter and 11 cm deep (Figures 11.53 and 11.57). Feature fill consisted of loamy sand with inclusions of charcoal flecks. No artifacts were associated with the feature and there was severe insect and rodent burrowing. Very little information was recovered from the excavation to determine the function of the feature. It was, therefore, classified as an indeterminate pit.

Feature 41 was located 24 cm north of Feature 37, just next to the north wall, at center point grid coordinates N94.51, E136.49 (Figure 11.3). Feature 41 was oval-shaped measuring 38 cm north-to-south by 16 cm east-to-west and 10 cm deep (Figure 11.58). This feature was excavated into the wall and the interior of feature was bell-shaped. Feature fill consisted of fine sandy loam with inclusions of small charcoal flecks. No artifacts were associated with the feature. Samples

collected from the feature fill included flotation and waterscreen. A pollen sample was scraped from the base of the feature. The cross section of Feature 41 revealed a small bell-shaped storage bin.

Feature 42 was located 20 cm east of Feature 41 and within the lower bench (Feature 51), at center point grid coordinates N94.40, E136.84 (Figure 11.3). Feature 42 was a small cylindrical pit measuring 7 cm in diameter and 11 cm deep (Figure 11.59). Feature fill consisted of loamy sand with charcoal inclusions. No artifacts were associated with the feature. Sediments from the feature were collected for a flotation sample. The cylindrical shape and the depth of Feature 42 indicates the feature as a posthole.

Feature 43 was located in the southeast portion of the floor just next to the lower bench, at center point grid coordinates N92.72, E137.10 (Figure 11.3). Feature 43 was a cylindrical posthole that was excavated into the lower bench. It measured 23 cm north-to-south by 24 cm east-to-west and 25 cm deep (Figure 11.60). Feature fill consisted of fine loamy sand with inclusions of charcoal and wood debris. No artifacts were recovered from the excavations of Feature 43. Samples collected from feature fill sediments included flotation, vegetal (identified as unknown conifer, charred), and waterscreen. The cylindrical shape and the depth of Feature 43 indicates the feature as a primary roof support posthole.

Feature 44 was located in middle of the floor just inside the right-of-way fence line, at grid coordinates N93.14, E136.01 (Figure 11.3). Feature 44 was a basin-shaped earthen hearth measuring 38 cm north-to-south by 13 cm east-to-west, with a maximum depth of 4 cm (Figure 11.61). Only the east half of the feature that was within the right-of-way was excavated. The west half of the feature was outside of the right-of-way. The base and perimeter of the hearth had evidence of oxidation indicating prolonged use of the hearth and habitation of the pitstructure. Feature fill consisted of ash and charcoal deposits. No artifacts were recovered from the excavation of Feature 44. Feature deposits were collected for a

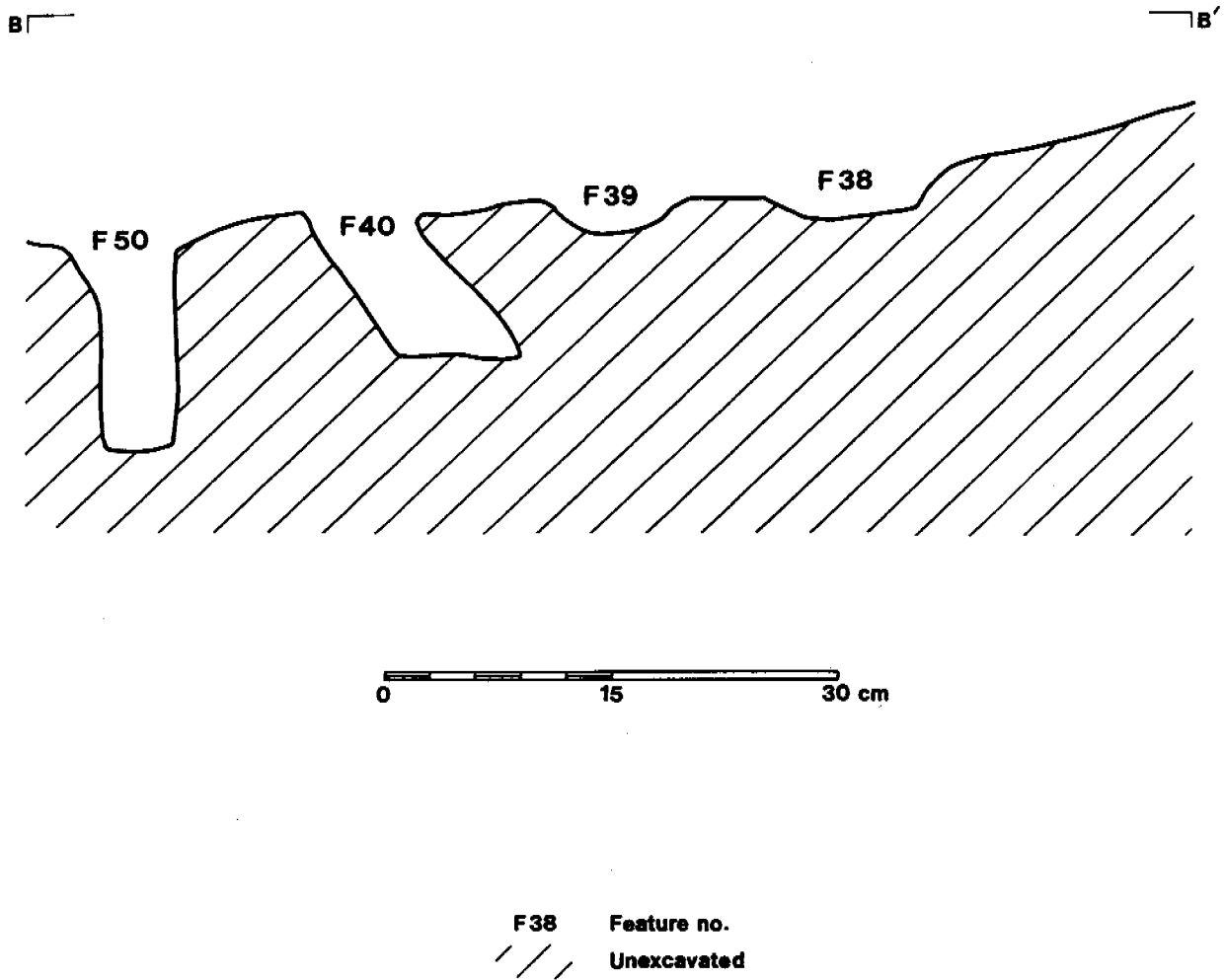


Figure 11.57. Site LA 26306 Features 38, 39, 40, and 50, Cross Sections.

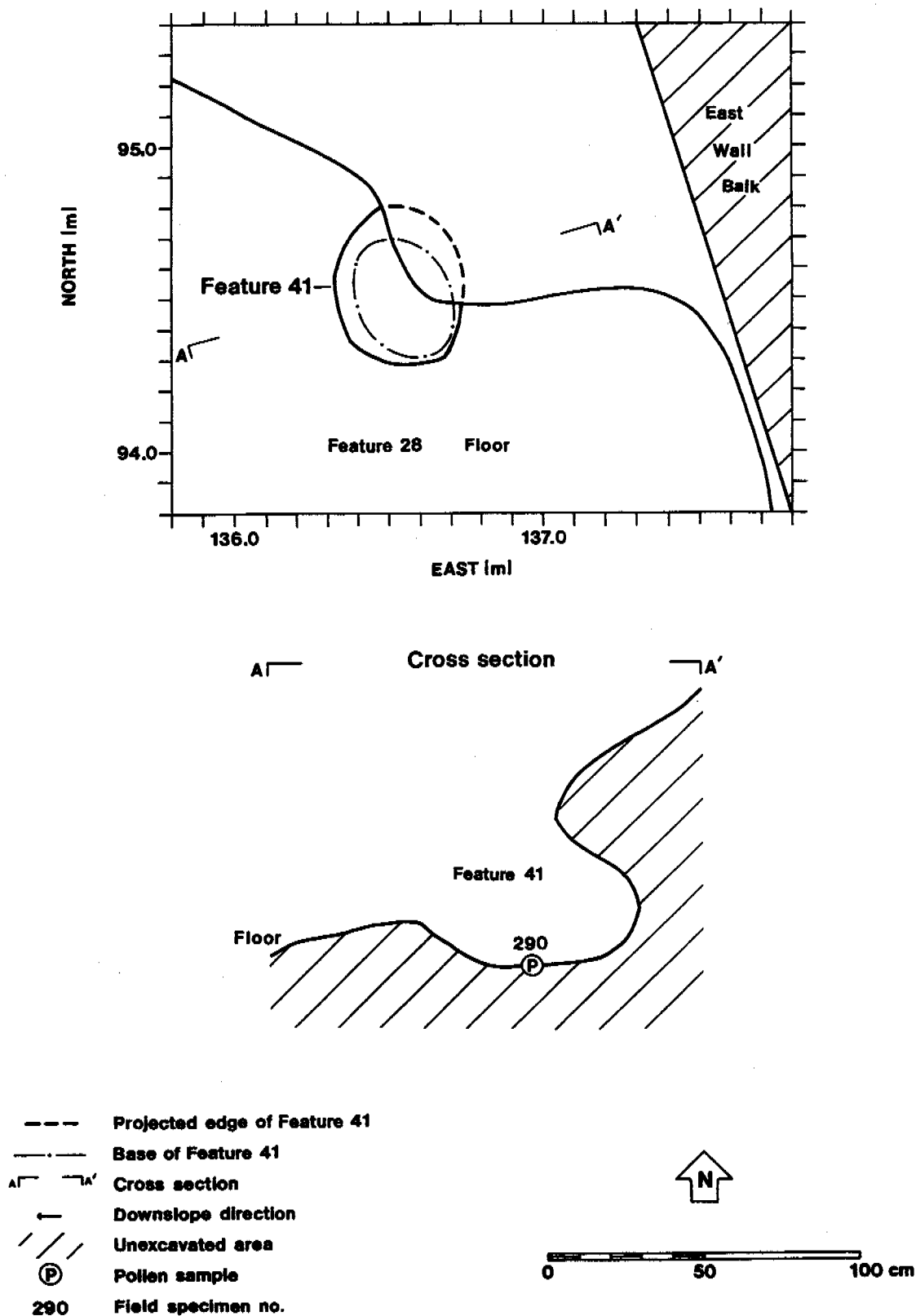


Figure 11.58. Site LA 26306 Feature 41, Plan View and Cross Section.

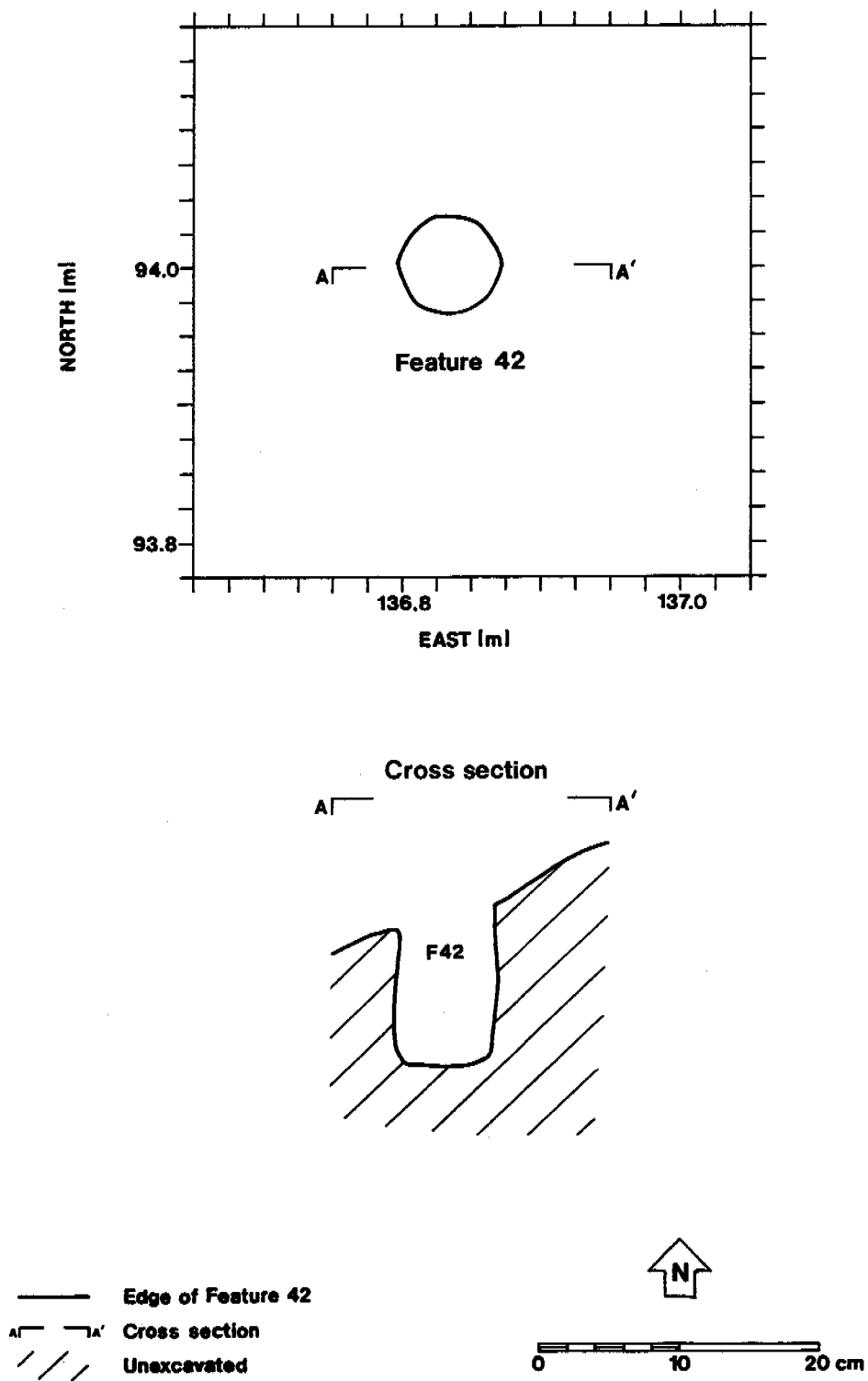


Figure 11.59. Site LA 26306 Feature 42, Plan View and Cross Section.

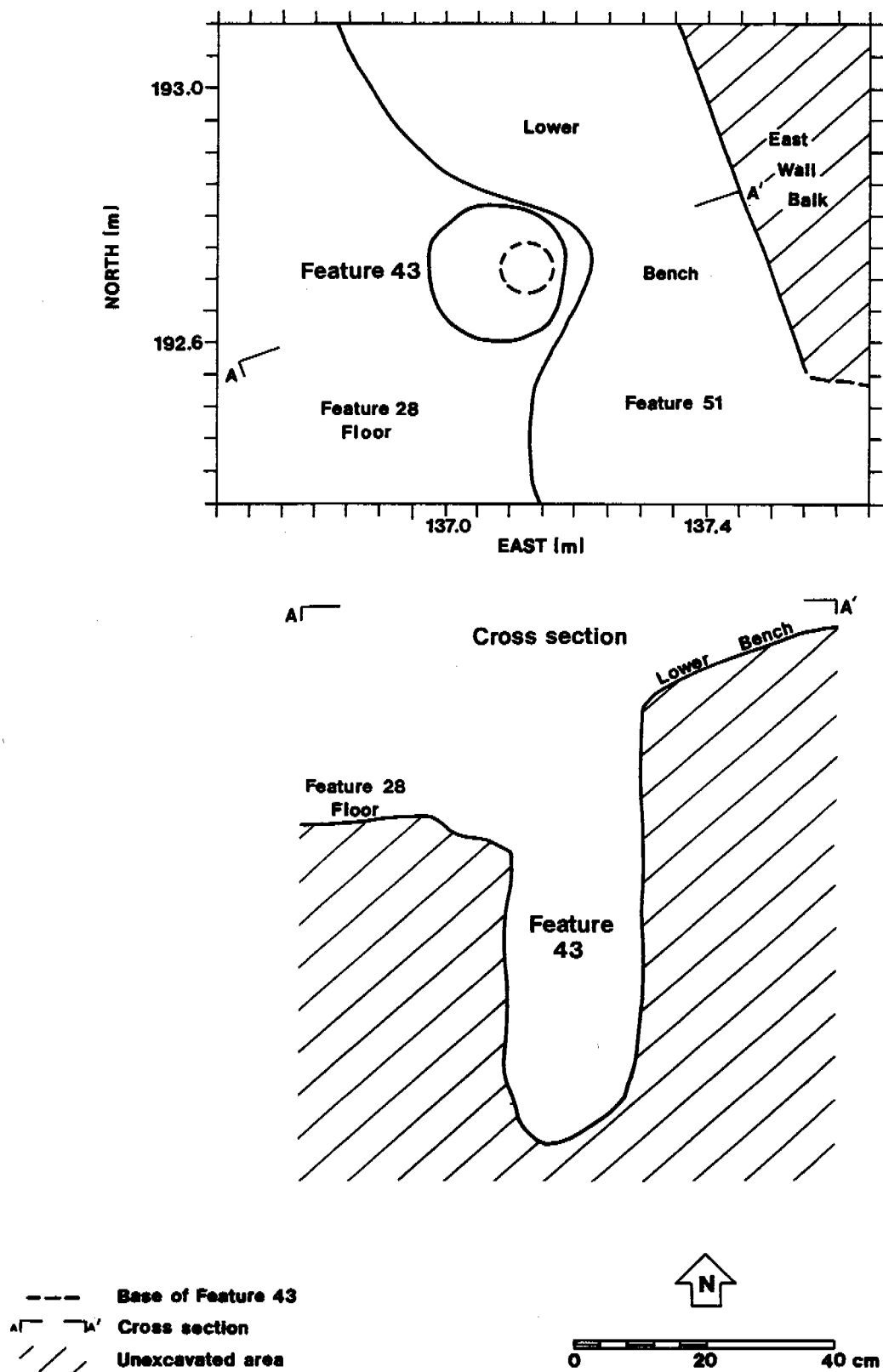


Figure 11.60. Site LA 26306 Feature 43, Plan View and Cross Section.

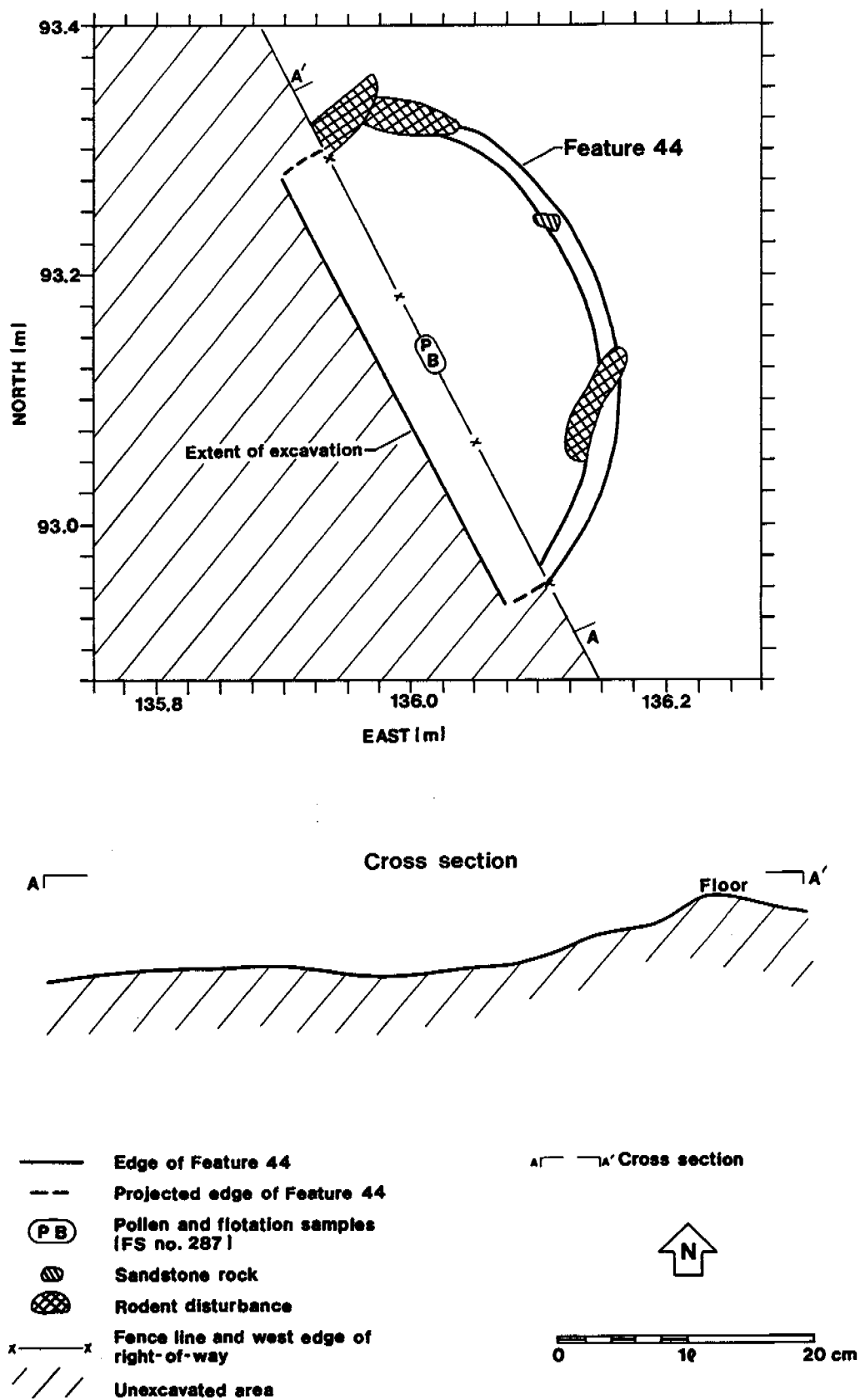


Figure 11.61. Site LA 26306 Feature 44, Plan View and Cross Section.

flotation sample. The hearth was sampled for archaeomagnetic dating, the results of which support a Basketmaker II occupation (Appendix B).

Feature 50 was located 10 cm west of Feature 40 in the northwest portion of the excavated floor, at center point grid coordinates N94.08, E135.69 (Figure 11.3). Feature 50 was defined as a secondary posthole measuring 7 cm in diameter and 16 cm deep. (Figures 11.53 and 11.57). Feature fill consisted of loamy sand with inclusions of small charcoal flecks. No artifacts were recovered from the excavation of Feature 50. Information from the cross section (Figure 11.57) was used to determine that the feature was a secondary posthole.

Floor Assemblage. No artifacts were recovered in situ on the Feature 28 floor. It appears that the inhabitants of the pitstructure removed all material prior to abandonment. Charred sunflower (achene), Cheno-Am, bugseed, and goosefoot seeds, along with a maize cupule and charred juniper, oak, and pine were recovered from floor contexts.

One radiocarbon sample from floor context dated to 2090 ± 60 BP (Beta-121226; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$). This suggests contemporaneity with sites LA 115327, LA 115330, and LA 48695 (all within the project area).

Roof. Feature 28 had evidence of primary and secondary postholes to support a roof. The pitstructure had burned roof debris 25 cm above the floor. It is most likely that the roof was intentionally burned after abandonment.

Abandonment-Postabandonment. Feature 28 appears to have been cleaned out prior to abandonment. Burned roof debris in the fill above the floor indicate that the pitstructure was intentionally burned after abandonment. The pitstructure was subsequently filled with trash and naturally deposited sediments.

Interpretation. Feature 28 was a circular pitstructure located partly within SU 13 on the west side of the existing State Highway 602. It was occupied during the Basketmaker II period. Only 1 floor was present with 11 floor features and 2 benches associated with habitation. The absence of in situ artifacts indicates that the pitstructure was cleaned out prior to abandonment. The pitstructure was subsequently filled with trash and naturally deposited sediments.

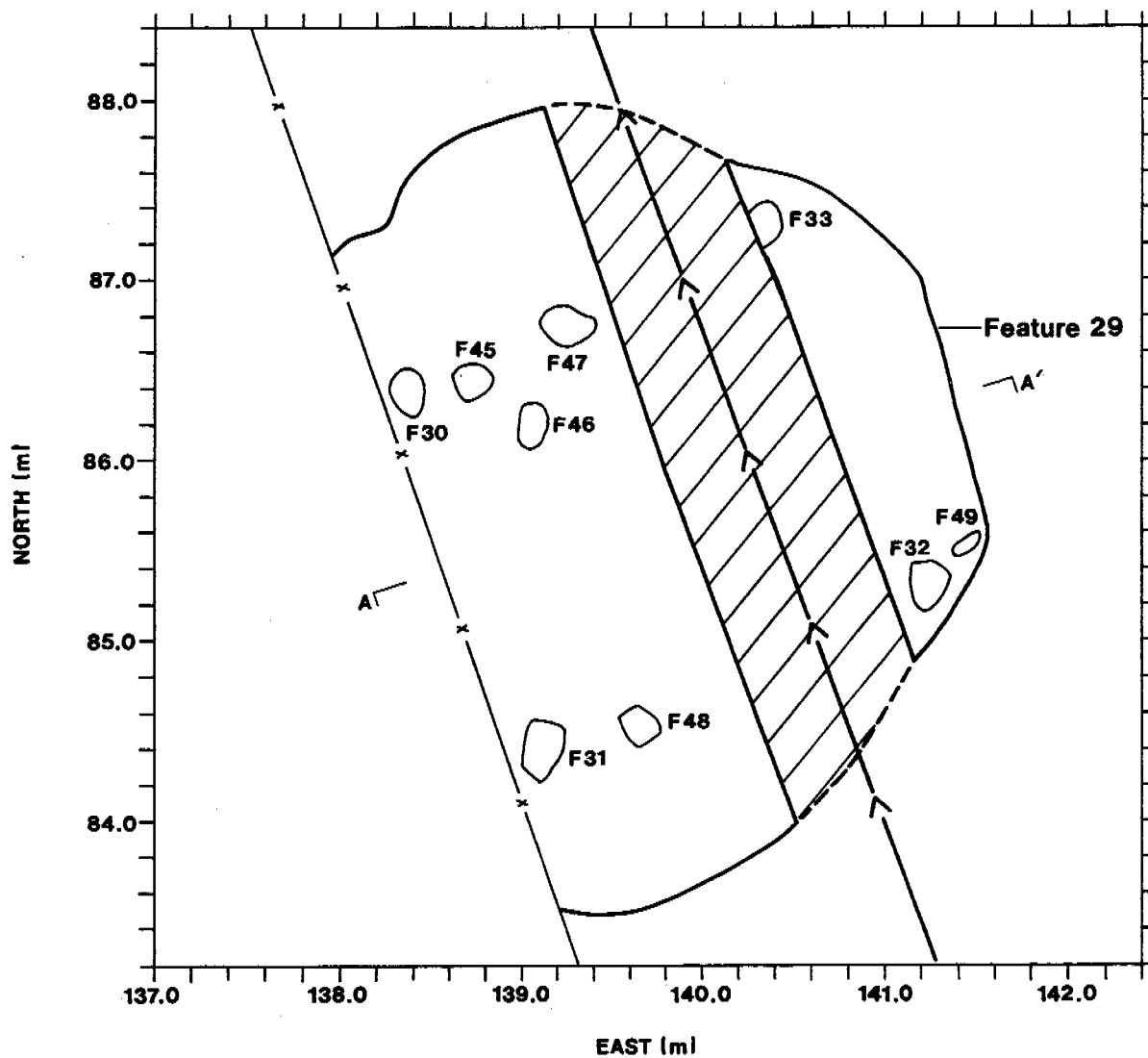
Feature 29

Feature 29 was located 3 m southeast of Feature 28 on the west side of State Highway 602, at center point grid coordinates N85.5, E139.5 (Figure 11.3). Feature 29 was a shallow circular basin-shaped pitstructure partly within SU 12. No walls, hearth, southern recess, bench, or pilaster were present within the feature. The most likely place for a hearth would have been near the center of the pitstructure. It is possible that the hearth was underneath the buried telephone cable.

The main chamber measured 4.50 m in diameter, with an estimated floor area of 15.89 sq m (Figure 11.62). Only one floor was present; nine associated floor features were identified. The extant height of the pitstructure was 0.55 m (at its maximum depth) from the floor to the modern surface (Figure 11.63).

Floor Features. Only one floor was present in Feature 29. The floor was unprepared and consisted of sterile strong brown loamy sand subsoils covered with a thin dark silty film. The floor had severe insect and rodent disturbance. Nine floor features were identified (Figure 11.62): four postholes (Features 30, 31, 32, and 33) and five indeterminate pits (Feature 45, 46, 47, 48, and 49).

Feature 30 was a primary posthole located in the northwest portion of the floor, at center point grid coordinates N86.41, E138.32 (Figures 11.3 and 11.62). Feature 30 was 20 cm east-to-west by



- F30 Feature no.
- Edge of Feature 29
- - - Projected edge of Feature 29
- Feature outline
- x — x Fence line and west edge of right-of-way
- < Buried telephone cable
- /// Unexcavated area
- A-A' A'-A' Cross section

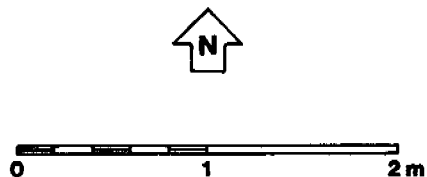


Figure 11.62. Site LA 26306 Feature 29, Plan View, Study Units 12 and 14.

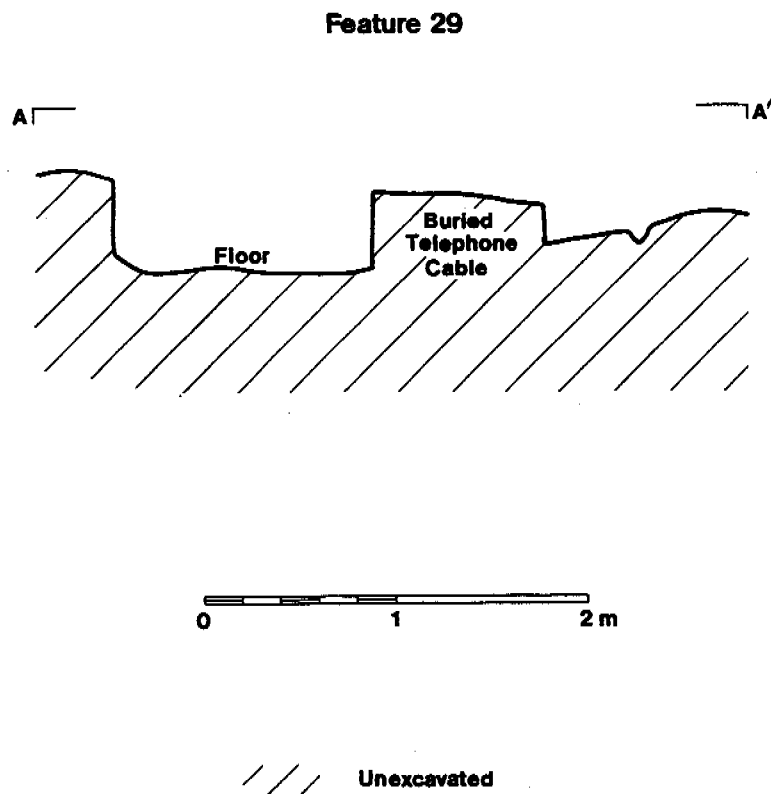


Figure 11.63. Site LA 26306 Feature 29, Cross Section.

25 cm north-to-south and 48 cm deep (Figure 11.64). Feature fill consisted of sandy loam with inclusions of decayed wood and charcoal flecks. Artifacts recovered from the feature included flaked stone and fragmented ground stone. The ground stone was wedged in between the posthole and the decayed wood most likely to stabilize the post. The decayed wood and the depth of the posthole were the determining factors for defining the feature as a primary posthole.

Feature 31 was a primary posthole located in the southwest portion of the floor, at center point grid coordinates N84.47, E139.14 (Figures 11.3 and 11.62). Feature 31 was nearly cylindrical in shape, measuring 34 cm northeast-to-southwest by 23 cm northwest-to-southeast and 50 cm in depth (Figure 11.64). Feature fill consisted of sandy loam with inclusions of charcoal flecks and decayed wood. No artifacts were recovered from the excavation. Feature 31 had evidence of rodent activity within the feature. The inclusion of decayed wood and the depth of the posthole were the determining factors for defining the feature as a primary posthole.

Feature 32 was a primary posthole located in the southeast portion of the pitstructure, at center point grid coordinates N85.22, E141.25 (Figures 11.3 and 11.62). Feature 32 was nearly cylindrical in shape, measuring 26 cm northeast-to-southwest by 20 cm east-to-west and 24 cm deep (Figure 11.64). Feature fill consisted of sandy loam deposits with inclusions of very few charcoal flecks. One ground stone fragment was recovered from the excavation. Feature 32 had evidence of root disturbance. Information recovered from the cross section and location of feature were the determining factors for defining the feature as a primary posthole.

Feature 33 was a primary posthole located in the northeast portion of the pitstructure, at center point grid coordinates N87.30, E140.39 (Figures 11.3 and 11.62). Feature 33 was oval-shaped and measured 21 cm north-to-south by 14 cm east-to-west and 12 cm deep (Figure 11.64). Feature fill consisted of sandy loam with inclusions of very few charcoal flecks. No artifacts were recovered

from the excavation of Feature 33. The information from the cross section (Figure 11.64) and the location of the feature were the determining factors for defining Feature 33 as a primary posthole.

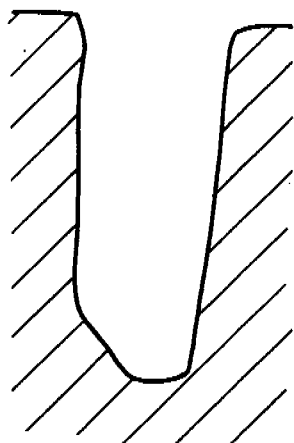
Feature 45 was a small indeterminate pit located in the northwest portion of the pitstructure, at center point grid coordinates N86.45, E138.71 (Figures 11.3 and 11.62). Feature 45 was oval-shaped, measuring 15 cm north-to-south by 23 cm east-to-west and 10 cm deep (Figure 11.64). Feature fill consisted of sandy loam with very light inclusions of charcoal flecks. No artifacts were recovered from the excavation of Feature 45. The lack of information recovered from the excavation made it impossible to determine Feature 45's function.

Feature 46 was a small indeterminate pit located 20 cm southeast of Feature 45, at center point grid coordinates N86.19, E139.04 (Figures 11.3 and 11.62). Feature 46 was irregular-shaped, measuring 27 cm north-to-south by 19 cm east-to-west and a maximum of 7 cm deep (Figure 11.64). Feature fill consisted of sandy loam deposits with very light inclusions of charcoal flecks. No artifacts were recovered from the excavations of Feature 46. Evidence of root and rodent disturbance was documented from the feature. Feature 46 function was defined as an indeterminate pit, due to the paucity of information recovered from the excavation.

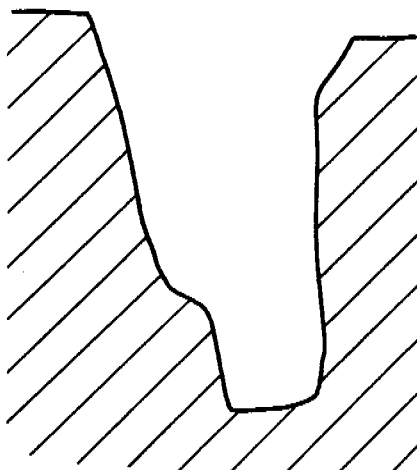
Feature 47 was a small indeterminate pit located 35 cm northeast of Feature 46; the center point grid coordinates are N86.77, E139.24 (Figures 11.3 and 11.62). Feature 46 was a basin-shaped small pit measuring 23 cm north-to-south by 29 cm east-to-west and 9 cm deep (Figure 11.64). Feature fill consisted of sandy loam deposits. No artifacts were recovered from the excavation of Feature 47. Feature 47 was defined as an indeterminate pit, due to the paucity of information recovered from the excavation.

Feature 48 was a small indeterminate pit located 30 cm east of Feature 31 in the southwest portion of the pitstructure; the center point

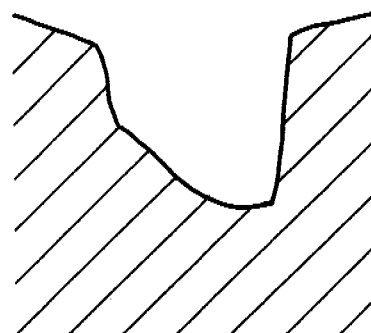
Feature 30



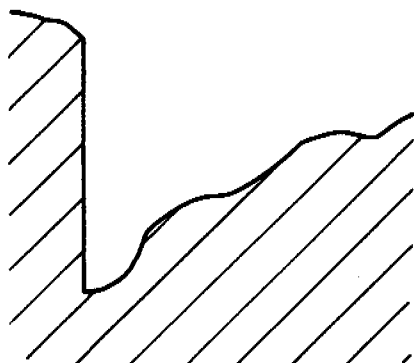
Feature 31



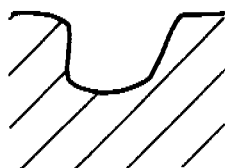
Feature 32



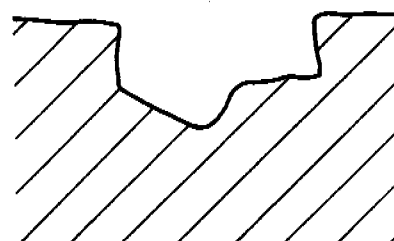
Feature 33



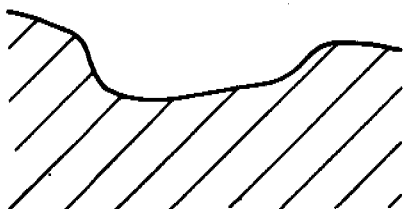
Feature 45



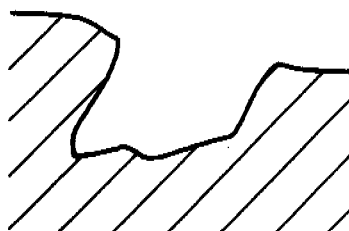
Feature 46



Feature 47



Feature 48



Feature 49



0 25 50 cm

Unexcavated

Figure 11.64. Site LA 26306 Features 30, 31, 32, 33, 45, 46, 47, 48, and 49, Cross Sections.

coordinates of Feature 48 are N84.52, E139.76 (Figures 11.3 and 11.62). Feature 48 was irregular-shaped, measuring 20 cm north-to-south by 18 cm east-to-west and 18 cm deep (Figure 11.64). Feature fill consisted of sandy loam deposits with very light inclusions of charcoal flecks. Rodent burrowing and root disturbances were noted during the excavation of Feature 48. No artifacts were recovered from the excavations. Feature 48 was defined as an indeterminate pit, due to the paucity of information recovered from the excavations.

Feature 49 was a small indeterminate pit located 10 cm northeast of Feature 32 at the southeast portion of the pitstructure; the center point coordinates of Feature 49 are N85.59, E141.54 (Figures 11.3 and 11.62). Feature 49 was basin-shaped measuring 10 cm north-to-south by 15 cm east-to-west and 7 cm deep (Figure 11.64). Feature fill consisted of sandy loam deposits. One ground stone artifact was recovered from the excavation of Feature 49. Because of the limited information recovered from the excavation of Feature 49, its function was defined as indeterminate.

Floor Assemblage. In situ artifacts on the floor of Feature 29 included one mano fragment and a metate fragment. The mano and metate were located at N86.83, E138.34. A maize cupule, charred bugseed, Cheno-Am, purslane, and goosefoot seeds, along with charred juniper and pine were identified from floor contexts. Smith, in addition, identified maize pollen from below the ground stone artifacts.

Roof. Feature 29 had four primary postholes to support the roof. Three burned wood samples were in situ on the floor; sample 1 (FS 241) was located at N86.38, E139.15; sample 2 (FS 248) was located N86.23, E138.95; and sample 3 (FS 250) was located at N87.20, E138.55. The absence of roof debris indicated that most of the roof was likely dismantled and the rest burned. The only evidence of soil oxidation was around the burned wood samples. The samples were analyzed by the Tree-ring Laboratory at the University of Arizona. The

samples were not suitable for dating; however, species identifications were made (Appendix C).

Abandonment-Postabandonment. The lack of artifacts in situ on the floor of Feature 29 indicate the pitstructure was cleaned out prior to abandonment. The fragmented ground stone recovered from posthole features appeared to have been wedged in beside the posts for stabilization and not removed. The lack of roof debris above the floor signified that perhaps the roof was partially dismantled and the support posts burned during abandonment. The pitstructure was subsequently filled with trash and naturally deposited sediments.

Interpretation. Feature 29 was a nearly circular shallow basin-shaped pitstructure measuring approximately 4.5 m in diameter, located on the west side of State Highway 602. A single unprepared floor was present, and four posthole features and five indeterminate features were associated with habitation. The lack of a hearth within the shallow pitstructure might indicate that the pitstructure was used only in the summer months or for specialized purposes. The roof appeared to have been partially dismantled and burned. This was indicated by the lack of roof debris above the floor. The pitstructure was subsequently filled with trash and naturally deposited sediments. One radiocarbon sample from floor context was sent for analysis. This sample dated to 1990 ± 70 BP (Beta-121224; wood charcoal; $\delta^{13}\text{C} = -25$ ‰), indicating use during the Basketmaker II period.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Four hundred thirty-two sherds were analyzed from site LA 26306. Of these 432 sherds, 180 were only partially analyzed due to their small size and, therefore, were eliminated from the data analysis. No other subsampling of the recovered ceramic assemblage was made, leaving 252 sherds for the attribute analysis as described in Chapter 21. The bulk of the ceramic artifacts were recovered from the surface; however, 38 sherds

were recovered from excavation. Of the 51 features excavated, only four yielded ceramics (Features 1, 10, 12, 29). Ceramic artifacts within Features 1, 10, and 29 are intrusive, and Feature 12 was determined to be a rodent burrow. Appendix D outlines the ceramic data by provenience. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware. The assemblage also contains wares less common to the Zuni area, including Little Colorado White Ware, Mogollon Brown Ware, trachyte-tempered Cibola White Ware, and Chuska Gray Ware.

Chronometrics

Twenty-five diagnostic ceramic artifacts were recorded, only two of which were in excavation units. Among the 18 Cibola White Ware sherds are 7 Red Mesa Black-on-white, 6 Puerco Black-on-white, 1 Chaco Black-on-white, 1 Gallup Black-on-white, 2 Escavada Black-on-white, and 1 Corrugated Reserve Black-on-white. Among the seven White Mountain Redware sherds are three Puerco Black-on-red and four Wingate Black-on-red. There is one Little Colorado White Ware sherd identified as a Holbrook A Black-on-white. These types make up a ceramic assemblage that dates from the early Pueblo II period to the early Pueblo III period (AD 950 to 1175).

A mean ceramic date of AD 1111 \pm 55 years was generated for the ceramic assemblage. This date supports the date range for the diagnostic ceramic assemblage discussed above, suggesting that a middle Pueblo II to early Pueblo III temporal designation is appropriate. Chapter 21 provides a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Although the excavated sample size is too small to calculate a mean ceramic date, it should be noted that both diagnostic ceramics recovered from excavation were White Mountain Redware sherds. FS 116 Item 4 was recovered from SU 2; this sherd was identified as a Wingate Black-on-red. FS 133 Item 6 was recovered from SU 6; this sherd was identified as a Puerco Black-on-red.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of 175 jars, 63 bowls, and 4 ladles present. The rest of the sherds are indeterminate forms. Most of the sherds were identified as coming from jar bodies, although 6 jar rims, 5 bowl bodies, 12 bowl rims, and 4 ladle bodies were also recorded. Both bowl and jar forms are represented in the whiteware and redware sherds, while all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of approximately 3/1.

Sixteen percent of the jars were recorded as having soot; sooting normally occurred on the exterior of jars, but interior sooting, as well as sooting on both surfaces, was also recorded. One modified sherd was recorded. This sherd had been ground on two edges, possibly through scraping, but function could not be determined with any certainty. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site. Chapter 21 has a more in-depth discussion of functional variability.

Compositional Variability

Tempering material was recorded for all 252 sherds. In this sample, the vast majority (90%) of the ceramic artifacts have either sherd temper or a combination of sherd and sand temper. The majority of the Cibola White Ware and the White Mountain Redware artifacts have only sherd temper, but a combination of sand and sherd is not uncommon. The majority of Cibola Gray Ware artifacts have a combination of sand and sherd temper, but sherd temper is not uncommon. Both sherd and a combination of sand and sherd temper probably represent local production. The remaining 10% of the ceramic artifacts can be divided into four temper types: quartz sand, multilithic sand, mica, and a combination of trachyte and sherd (found in one artifact). It is uncertain whether or not quartz and multilithic sand represent local or nonlocal production without further analysis; however, the presence of

either mica or trachyte suggests nonlocal origins. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

The variety of temper types at site LA 26306 reflects the range of ceramic wares found at the site. The majority of ceramics were identified as Cibola White Ware, White Mountain Redware, and Cibola Gray Ware, all of which are known to be produced within the Zuni area. Also present, though in far fewer numbers, are examples of Mogollon Brown Ware, Little Colorado White Ware, trachyte-tempered Cibola White Ware, and Chuska Gray Ware. These wares are believed to be of nonlocal origins. Chapter 21 gives a further discussion and implications of these findings.

Summary

The ceramic assemblage from site LA 26306 is relatively large, consisting of 252 fully analyzed sherds. A variety of wares both common and uncommon to the area are present at the site, including Cibola White Ware, White Mountain Redware, Cibola Gray Ware, Mogollon Brown Ware, and Little Colorado White Ware. Twenty-five diagnostic ceramics were identified in the overall assemblage. The date range for the ceramic assemblage of diagnostics, as well as a mean ceramic date of AD 1111 \pm 55 years, supports a Pueblo II to early Pueblo III temporal range (AD 950 to 1175). Functional variation among ceramics suggests a variety of activities were practiced at the site.

Flaked Stone Artifacts

Surface collection and excavation at site LA 26306 yielded a total of 495 flaked stone artifacts. Of these, 110 are Basketmaker II in age while the remaining 385 were found in Pueblo II contexts. The Basketmaker II contexts are the features discussed above, while the Pueblo II contexts comprise the surface and midden. Table 11.1 provides frequencies and percentages for the artifact classes present in the Basketmaker II and Pueblo II components of the site. Table 11.2 provides summary metric data (length, width,

thickness, and weight) for the artifacts in this collection. Results of the lithic analysis of site LA 26306 Basketmaker II and Pueblo II flaked stone assemblages are discussed below.

Basketmaker II Assemblage

The Basketmaker II occupation of this site has been interpreted (this chapter) as a year-round residence consisting of both shallow and deep pitstructures and storage features. The lithic assemblage from this component proved to be quite diverse. Ten different artifact classes are represented (in decreasing order of representation): debris (50.0%), debitage (37.3%), core (2.7%), retouched piece (2.7%), other (1.8%), utilized piece (1.8%), denticulate (0.9%), hammerstone (0.9%), manuport (0.9%), and projectile point (0.9%). The two artifacts classified as "other" are core fronts. A *core front* is a core maintenance product produced when the entire working face of a core is removed by a strike far back on the platform. This is done in an effort to rejuvenate the face of the core (the platform axis) or to get behind severe hinge fractures or material flaws. The presence of these two core fronts, both from opposed-platform cores, is significant in that they provide evidence for core maintenance. More importantly they also suggest more intensive or perhaps "less expedient" lithic reduction strategies were employed during the Basketmaker II period, particularly when contrasted with Pueblo II lithic reduction practices (Chapter 22). Oddly, the actual core assemblage appears to reflect a more expedient reduction strategy than the presence of the two core fronts would suggest.

The core assemblage from site LA 26306 is rather small, consisting of only three cores, one of which (the quartzite core) began life as a hammerstone and was only later utilized as a core. The quartzite core is a multiplatform core which weighs 177 g. Hinge fracturing and material flaws likely led to the abandonment of this core. The two remaining cores are both chert and are single platform. One weighs 256 g and the other 45 g. All three of the cores in this collection are cortical (having greater than 50% cortex).

Table 11.1. Summary Counts and Percentages of Site LA 26306 Basketmaker II and Pueblo II Flaked Stone Artifacts by Artifact Class.

Artifact Class	Basketmaker II		Pueblo II		Total	
	n	%	n	%	n	%
Biface	-	-	6	1.6	6	1.2
Core	3	2.7	28	7.3	31	6.3
Debitage	41	37.3	152	39.5	193	39.0
Debris	55	50.0	169	43.9	224	45.3
Denticulate	1	0.9	-	-	1	0.2
Hammerstone	1	0.9	4	1.0	5	1.0
Manuport	1	0.9	3	0.8	4	0.8
Other	2	1.8	4	1.0	6	1.2
Projectile point	1	0.9	2	0.5	3	0.6
Scraper	-	-	2	0.5	2	0.4
Retouched piece	3	2.7	12	3.1	15	3.0
Utilized piece	2	1.8	3	0.8	5	1.0
Total	110	100.0	385	100.0	495	100.0

Table 11.2. Summary Metric Data for Site LA 26306 Basketmaker II and Pueblo II Flaked Stone Assemblages.

Summary Statistic	Basketmaker II (n= 110)				Pueblo II (n= 385)				Total (n= 495)			
	Length (cm)	Width (cm)	Thick. (cm)	Weight (g)	Length (cm)	Width (cm)	Thick. (cm)	Weight (g)	Length (cm)	Width (cm)	Thick. (cm)	Weight (g)
Mean	2.4	1.9	0.7	9.9	2.6	2.1	0.9	13.9	2.6	2.1	0.9	13.0
10% trimmed mean	2.2	1.6	0.6	2.3	2.4	1.9	0.7	4.5	2.4	1.9	0.7	3.8
Median	2.0	1.7	0.5	1.0	2.2	1.7	0.6	2.0	2.2	1.7	0.6	1.0
Standard error	0.1	0.1	0.1	3.3	0.1	0.1	0.1	2.2	0.1	0.1	0.1	1.8
Standard deviation	1.4	1.3	0.7	34.5	1.5	1.3	1.0	42.6	1.5	1.3	0.9	41.0
Minimum	0.7	0.4	0.1	-	0.5	0.4	0.1	-	0.5	0.4	0.1	-
Maximum	8.3	7.6	4.0	256.0	8.8	7.8	6.3	450.0	8.8	7.8	6.3	450.0
Range	7.6	7.2	3.9	256.0	8.3	7.4	6.2	450	8.3	7.4	6.2	450.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

Lithic reduction products, debitage and debris, account for 87.3% of the total number of pieces in this assemblage. Ninety-six pieces of debitage and debris were recovered. Of the 41 pieces of debitage, 9 (22.0%) are primary flakes, 22 (53.6%) are secondary flakes, 6 (14.6%) are tertiary retouch or trimming flakes, and 4 (9.8%) are bifacial thinning flakes. Late reduction stage products dominate the Basketmaker II debitage at the site.

Platform attributes were recordable for 39 of the 41 pieces of debitage in the Basketmaker II assemblage. Of these, only six (15.4%) show evidence of platform preparation. One piece (16.7%) is single faceted, three pieces (50.0%) are multifaceted, and two pieces (33.3%) are ground or abraded. As was the case with the core assemblage, the relatively low incidence of platform preparation is indicative of more expedient reduction practices.

Only one flake of the total 39 for which platform data are available contains a platform with percussion marks. The common occurrence of percussion marks on platforms is a strong indicator of the use of hard-hammer, direct percussion techniques. The very low frequency of percussion marks in this assemblage likely reflects the kind of reduction activity which occurred during the Basketmaker II occupation of this site, mostly secondary reduction and tool production and maintenance, rather than an actual lack of or infrequent use of hard-hammer techniques for lithic reduction. If site LA 26306 served as a residential site during the Basketmaker II period, it is reasonable to ask where the majority of the primary reduction occurred. Primary reduction may have occurred off-site, at different locations within the site than at those where secondary reduction and tool production and maintenance occurred, or in portions of the site which were not sampled during the project.

The high representation of artifacts associated with lithic reduction (a hammerstone, cores, core fronts, debris, and debitage) clearly indicate that lithic reduction occurred at the site during the

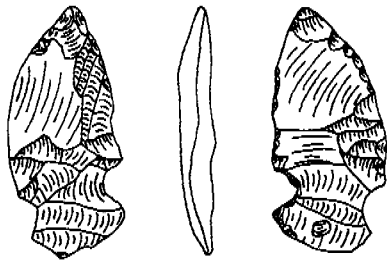
Basketmaker II occupation. Was lithic reduction an important or major activity at the site? It does not appear to have been. The artifact classes listed above which are associated with lithic reduction are represented by only 102 pieces. Modern flintknappers can easily produce such a collection in less than an hour of modest effort. This is not to say that the Basketmaker II occupation of the site was necessarily ephemeral or of short duration. The small collection could also indicate that maintenance (cleaning) of occupation surfaces took place and reduction debris was removed and disposed of at secondary locations in other parts of the site. Excavation data suggest that the floor of the pitstructure (Feature 28) was cleaned prior to abandonment.

The formal and informal tools in this collection include one side-notched projectile point (Figure 11.65), a denticulate, and two utilized flakes. The projectile point is side notched and highly asymmetrical about its long axis. The asymmetry, convex blade edges, and steep, almost alternately beveled distal edges suggest this piece may actually have functioned as a hafted, asymmetrical knife similar to those documented by Lekson (1997:Figure 4.12A) in Chaco Canyon.

Following the pattern noted earlier for the Basketmaker II assemblages analyzed in this study, the site LA 26306 assemblage is dominated by chert (90.0%). It also contains some quartzite (8.2%) and silicified wood (1.8%). None of the 99 chert artifacts in the Basketmaker II assemblage could be attributed to Zuni Yellow Spotted chert. This strongly contrasts with the Pueblo II assemblage from this site which contains 30 Zuni Yellow Spotted chert artifacts (9.4% of the 318 chert artifacts in the Pueblo II assemblage). For a detailed discussion of differences in raw material economy between the Basketmaker II and Pueblo II periods see Chapter 22.

Pueblo II Assemblage

The Pueblo II flaked stone collection at site LA 26306 is more than three times larger than the Basketmaker II collection. A total of 385 flaked stone artifacts were recovered from surface



Actual Size

Figure 11.65. Site LA 26306 Side-notched Projectile Point.

collections and excavation of the Pueblo II midden. This assemblage also proved to be quite diverse with 11 artifact classes represented in the assemblage. The artifact classes present are (in decreasing order of representation): debris (43.9%), debitage (39.5%), core (7.3%), retouched piece (3.1%), biface (1.6%), hammerstone (1.0%), other (1.0%), manuport (0.8%), projectile point (0.5%), utilized piece (0.8%), and scraper (0.5%). Four artifacts were classified as "other." One is a core trimming flake, two are potlids (debris produced from the too rapid heating or overheating of chert), and one is a fossil bone fragment. It could not be determined whether the fossil bone occurred naturally at the site or if it was brought in or curated by the Pueblo II occupants.

Twenty-six cores and two core fragments comprise the core assemblage from the Pueblo II component of the site. Of the 26 cores, 18 (69.2%) are single platform, 4 (15.4%) are discoidal, 2 (7.7%) are on flakes, and 2 (7.7%) are multiple platform. The cores have a mean weight of 76.8 g (10% trimmed mean of 65.4 g), a median of 52 g, a maximum of 339 g, and a minimum of 21 g.

Debitage and debris account for 83.4% (Table 11.1) of the total Pueblo II collection from site LA 26306. Of the 152 pieces of debitage 42 (27.6%) are classified as primary flakes, 100 (65.8%) as secondary flakes, and 9 (5.9%) as tertiary retouch or trimming flakes (data are missing for one item). The seven bifacial thinning flakes present in the collection can also be considered secondary reduction products.

Platform data were obtained for 147 of the 152 pieces of debitage. Twenty-two (15.0%) pieces showed evidence of platform preparation. Two (9.1%) were single faceted, 9 (40.9%) were multifaceted, and 11 (50.5%) were ground or abraded. Fifty-one (34.7%) of the 147 pieces of debitage had cortical platforms. Only 16 (10.9%) had percussion marks on their platforms.

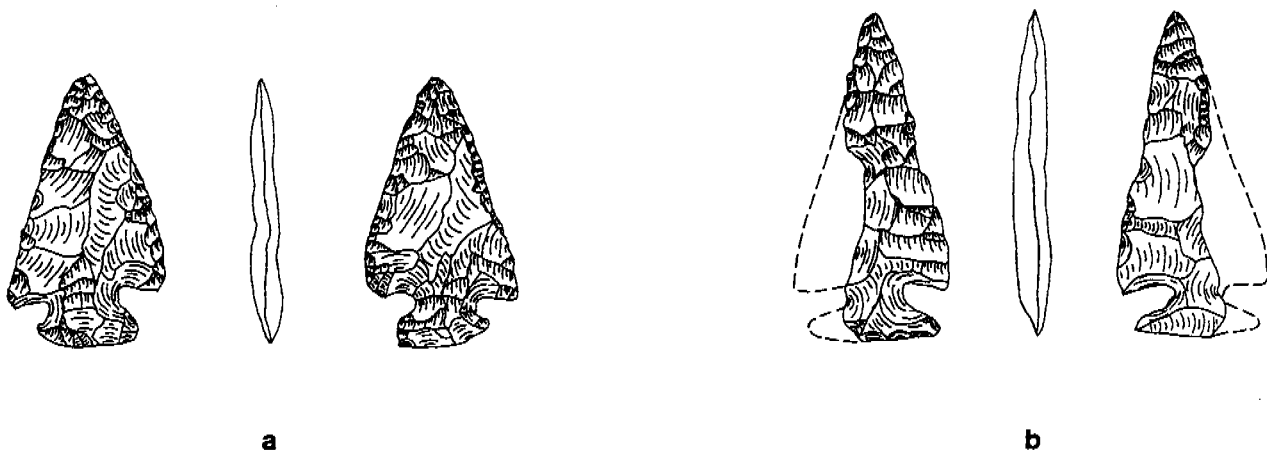
Seventeen of the 152 pieces of debitage were thermally altered. Crazeing and potlidding of the

materials were most commonly observed. Crazeing and potlidding result from the overheating of chert or, more commonly, from the material being heated too rapidly. Rapid heating can occur unintentionally when an artifact falls into or near a fire (or is on the surface or in near-surface contexts during a grass or brush fire). Crazeing and potlidding can also occur during intentional thermal alteration, heat-treating, if the rate of heating is not well controlled. Looking at the entire site LA 26306 Pueblo II assemblage, there is no evidence for the intentional heat-treatment of lithic raw materials.

The majority of the site LA 26306 Pueblo II flaked stone assemblage is composed of chert (82.6%). Thirty of the 318 chert artifacts are Zuni Yellow Spotted chert, including debitage, debris, a core fragment, and a core trimming flake. Quartzite (13.8%), silicified wood (3.4%), and quartz (0.3%) are also represented in the collection.

The relatively high number of cores, debitage, and debris and the presence of four quartzite hammerstones clearly indicate lithic reduction occurred at the site during the Pueblo II occupation. Primary, secondary, and tertiary reduction products reveal that all phases of reduction and tool production and maintenance occurred. Evidence for bifacial tool production and maintenance is also present in the form of seven bifacial thinning flakes, three biface fragments, one bifacial preform, and two corner-notched projectile points (one fragmentary and one complete).

The tool assemblage consists of 2 corner-notched projectile points or point fragments, 2 scrapers, 12 retouched pieces, and 3 utilized pieces. The projectile points (Figure 11.66) are all chert. One is complete and one is a longitudinal fragment. There is some question as to the age of the complete point (Figure 11.66). During analysis, it was noted that air was present beneath several flake scar terminations and hinges. This may indicate the piece is recent and has not undergone burial. The recovery of this point in the first 10-cm level of Feature 29 leaves its age and



Actual Size

Figure 11.66. Site LA 26306 Projectile Points. A) Complete Corner-notched Projectile Point [Record Number 1414], B) Longitudinal Projectile Point Fragment.

its origin in question. The longitudinal point fragment (Figure 11.66) has formal affinities with the points documented by Lekson (1997:669, Fig. 4.3G) in Chaco Canyon.

Ground Stone Artifacts

Site LA 26306 yielded 27 ground stone artifacts from both surface and subsurface contexts. A pendant fragment, a one-hand mano, and two indeterminate ground stone fragments were recovered from the surface. The pendant fragment is made from argillite, is shaped, and has multidirectional striations on both surfaces. The one-hand mano is made of sandstone and is nearly complete. It is shaped, and ground on both surfaces, but no striations are visible. It is wedge-shaped in longitudinal cross section. One indeterminate ground stone fragment is made of vesicular basalt and is ground on one surface. The other indeterminate ground stone fragment is made of sandstone, is shaped, and is ground on both sides. No striations are visible on either of these indeterminate fragments.

Several study units yielded ground stone artifacts. One slab metate fragment of vesicular basalt was recovered from SU 1, a 1-by-1-m hand-excavated unit. It is shaped and is ground on one surface with evidence of parallel striations. A complete active abradar was recovered from SU 2, a 1-by-1-m hand-excavated unit. It is made of sandstone, shaped, and ground on one surface, but has no visible striations. SU 6, a backhoe trench, yielded a one-hand sandstone mano fragment. It is shaped and ground on one surface, but has no visible striations.

Feature 1, an irregular-shaped shallow pitstructure, yielded six ground stone artifacts (Table 11.3). An indeterminate mano fragment was recovered from the feature fill. A trough metate fragment, three complete one-hand manos, and a complete two-hand mano were on the floor of this pitstructure.

The indeterminate mano fragment was originally rectangular in shape. It was shaped by pecking and flaking. One surface is wedge-

shaped from use. Thumb and finger notches are present on opposing longitudinal edges.

The first one-hand mano (FS 174-1) is rectangular in plan and in cross section. One grinding surface is flat and pecked, and has parallel striations that are perpendicular to the longitudinal axis. The other grinding surface is ground smooth with some pecking still visible, and is slightly curved from use. Parallel striations are also visible on this surface, but are at approximately a 45° angle to the longitudinal axis.

The second one-hand mano (FS 174-2) is kidney-shaped in plan view and discoidal in transverse and longitudinal cross sections. The grinding surface is almost perfectly flat and smooth with only a few residual peck marks. Thumb and finger notches are present on opposing longitudinal edges. The lack of grinding along its edges and the flat grinding surface indicate that this mano was probably used with a slab metate.

The third one-hand mano (FS 174-3) is biscuit-shaped and the grinding surface is smooth with some residual pecking visible. The multidirectional striations and the convex grinding surface indicate that this mano was probably used with a basin metate.

The two-hand mano is minimally shaped along the ends and edges. It is rectangular in plan and cross sections. The grinding surface is smooth with very little pecking.

Feature 2, a roasting/storage pit, yielded three ground stone artifacts: a slab metate fragment, a complete one-hand mano, and an indeterminate ground stone fragment. The slab metate fragment is made of sandstone, is shaped, and has parallel striations on one surface only. The one-hand mano is also made of sandstone, has multidirectional striations on one surface only, and exhibits little use-wear. Thumb and finger notches are present on opposing longitudinal edges. The indeterminate ground stone fragment is made of sandstone, has parallel striations on one surface, and is burned.

Table 11.3. Ground Stone Artifacts Recovered from Feature 1 at Site LA 26306.

FS No.	Provenience/Artifact Type	Raw Material	Description
<u>Feature Fill</u>			
142-1	Indeterminate mano fragment	Sandstone	Parallel striations on both surfaces; shaped; pecked
<u>Floor</u>			
172-1	Trough metate fragment	Sandstone	Parallel striations on one surface only; shaped
174-1	One-hand mano - complete	Sandstone	Parallel striations on both surfaces; shaped; pecked
174-2	One-hand mano - complete	Sandstone	Parallel striations on one surface only; shaped; pecked
174-3	One-hand mano - complete	Sandstone	Multidirectional striations on one surface only; shaped
175-1	Two-hand mano - complete	Sandstone	Parallel striations on one surface only; shaped; pecked

Two ground stone artifacts were recovered from Feature 10, a possible maize roasting pit. Both are indeterminate sandstone metate fragments, are ground on one of their surfaces, and do not exhibit striations. Even though these two items have similar characteristics, they are fragments from different metates.

Feature 28, a deep circular pitstructure, yielded three ground stone artifacts. One is an indeterminate ground stone fragment made from what appears to be siltstone. It is ground on one surface and has multidirectional striations. Another indeterminate ground stone fragment is made of sandstone, is ground and pecked on one surface only, and exhibits little use-wear. No striations are visible. The third item is a complete sandstone anvil. It is shaped; it is not ground nor are any striations visible. Pecking marks on one side serve as evidence for its use as an anvil.

Six ground stone artifacts were recovered from Feature 29, a shallow circular pitstructure located 3 m southeast of Feature 28 (Table 11.4). An indeterminate metate fragment and a two-hand mano fragment were recovered from the floor of this pitstructure. These items do not appear to

have been used together. The remaining items, a sphere, a slab metate fragment, a trough metate fragment, and an indeterminate mano fragment, were recovered from the fill associated with this feature.

The sphere was shaped into a ball by pecking and grinding. Its function is unknown. The indeterminate mano fragment was originally rectangular in shape. Both surfaces are ground smooth and are pecked. Parallel striations are visible on both surfaces and are oriented parallel to the transverse axis. The two-hand mano fragment was originally rectangular in shape. It is slightly wedge-shaped in transverse cross section. Both surfaces are ground and pecked. Thumb and finger notches are present on opposing longitudinal edges.

Miscellaneous Items

A total of 13 miscellaneous items were recovered from several features on site LA 26306. One piece of red ochre and one piece that is possibly yellow ochre were recovered from Feature 1, an irregular-shaped shallow pitstructure. Neither of these pieces was worked or ground.

Table 11.4. Ground Stone Artifacts Recovered from Feature 29 at Site LA 26306.

FS No.	Artifact Type	Raw Material	Description
<u>Feature Fill</u>			
FS 259-1	Sphere - complete	Sandstone	Multidirectional striations; shaped; pecked
FS 267-1	Indeterminate mano fragment	Sandstone	Parallel striations on both surfaces; shaped; pecked
FS 256-1	Slab metate fragment	Sandstone	Parallel striations on one surface only
FS 236-1	Trough metate fragment	Sandstone	Multidirectional striations on both surfaces; shaped; burned
<u>Floor</u>			
FS 252-1	Two-hand mano fragment	Sandstone	No striations visible; grinding on both surfaces; shaped; pecked
FS 251-1	Indeterminate metate fragment	Sandstone	Parallel striations on one surface only; shaped

Trace amounts of blue pigment, probably azurite, were found in Feature 26, an indeterminate shallow pit within Feature 1. The trace amounts were the size of sand grains and unfortunately were lost during processing in the lab.

A possible gaming piece of ground siltstone or mudstone was recovered from Feature 28, a deep circular pitstructure. Both faces and the entire outer edge of this piece are ground. Parallel striations are visible on all sides.

Feature 29, a shallow circular pitstructure located about 3 m southeast of Feature 28, yielded by far the most miscellaneous items. Two pieces of blue pigment (probably azurite), five pieces of yellow ochre, one piece of red ochre, and one chert nodule were recovered from this feature. None of the pigments are worked or ground. The chert nodule is spherical in shape.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of faunal remains from the entire project can be found in Chapter 26. Detailed descriptions of faunal remains are provided in Appendix I.

Although only 41 bone specimens were recovered (Table 11.5), the assemblage is surprisingly diverse. Faunal remains were recovered from the surface, from SU 1, 2 and 6, and from Features 1, 2, 10, 27, 28, 29, and 35. Unidentified fragments make up 44% of the assemblage.

Of two bird bones recovered, one was part of the tibiotarsus of a large bird, but could not be identified more precisely. The other bird bone is a virtually complete phalanx from the foot. Bird phalanges are often difficult to identify. However, this is a very large phalanx, and this reduces the number of possible identifications and makes it easier to suggest a specific identification. Most bird species can be ruled out, simply based on the size of the specimen. Compared to the large birds present in the region today, this item does not have the morphology of a large Ciconiiformes (herons), Anseriformes (e.g. large goose or swan), Falconiformes (eagles, hawks, etc.) or Strigiformes (owls). It is very similar to comparative specimens of sandhill crane (*Grus canadensis*), but much larger. It is therefore identified as a large crane (Gruiformes), and is probably from a whooping crane (Table 11.5).

Table 11.5. Faunal Assemblage from Site LA 26306.

Taxon	NISP	MNI	Burnt
Gruiformes	1	1	-
Large bird	1	-	-
<i>Sylvilagus</i> sp.	4	2	-
<i>Lepus</i> sp.	2	1	-
<i>Neotoma</i> sp.	1	1	-
<i>Cynomys</i> sp.	1	1	-
Sciuridae	2	-	-
<i>Canis</i> sp.	6	1	-
Carnivore	1	-	-
<i>Odocoileus</i> sp.	1	-	-
Medium artiodactyl	2	1	-
Small mammal	1	-	-
Unidentified	18	-	3
Total	41	8	3

Key: MNI = minimum number of individuals

NISP = number of identified specimens

The mammals include cottontail (*Sylvilagus* sp.), jackrabbit (*Lepus* sp.), prairie dog (*Cynomys* sp.), packrat (*Neotoma* sp.), coyote or domestic dog (*Canis* sp.), and deer (*Odocoileus* sp.). Less precisely identified specimens were classed as small mammals, Sciuridae (squirrel family), carnivore, and medium-sized artiodactyl.

The canid specimens consist of two carpals, a metacarpus, and three first (proximal) phalanges from the same foot. Site LA 115329 produced a similar set of specimens, and site LA 115327 contained parts of a probable dog burial.

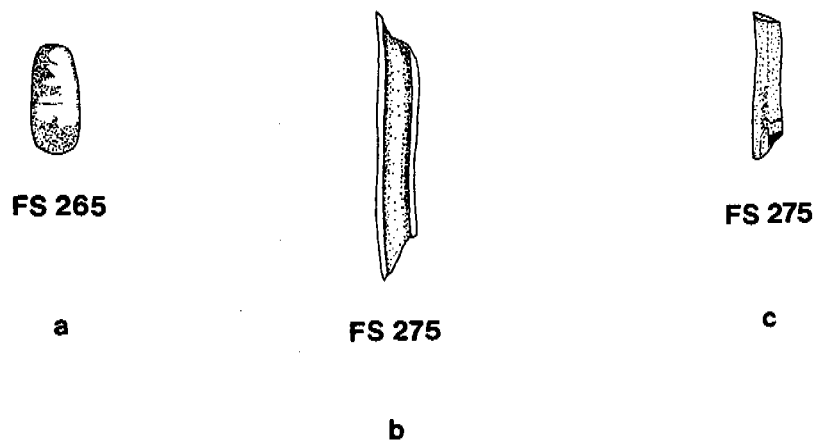
Three bone artifacts were recovered: a bone "counter" (an ovoid disc of bone worked on all surfaces; Figure 11.67a) and the tip of an awl (Figure 11.67b), both unidentified to species and element, and a modified scapula blade from a medium-sized artiodactyl (Figure 11.67c). These artifacts are included in the totals reported in Table 11.5. Artiodactyl bones are difficult to identify to species, especially when fragmentary. The scapula artifact could be from a deer or pronghorn antelope. The specimen consists of a scapula blade which has been cut and ground

along the crest of the spine and along both margins. The anterior end of the bone has been chewed by a carnivore, probably before it was made into an artifact.

Macrobotanical Remains

Maize cupules, goosefoot, and Chenopodium seeds were the most common plant remains identified from flotation samples. Not only is maize a nutritious food resource, but also cobs, minus the edible kernels, are a good source of fuel, and cob fragments (such as cupules) usually comprise a large percentage of archaeobotanical assemblages. Documented economic uses of weedy annuals like goosefoot and pigweed seeds abound in the ethnographic literature. Castetter (1935) describes the use of these as a ground meal, either eaten as gruel or combined with other food such as corn meal and made into cakes.

Absolute abundance was extremely low, with the highest number of plant remains per liter of soil recovered from an extramural bell-shaped pit. The five taxa identified from the bell-shaped pit along with pine bark and juniper, pinyon, pine,



Actual Size

Figure 11.67. Site LA 26306 Bone Artifacts.

and undetermined conifer woods probably represent part of the secondary trashy fill of the feature rather than the primary storage contents. Plant remains identified from extramural indeterminate pits and the rock pile do not contribute to the identification of functions of the features. Plant remains from three (Features 6, 9, and 10) were limited to wood charcoal and Feature 14 was sterile, containing only uncharred rootlets.

Segregation of three taxa was apparent; pinyon nutshell and hedgehog cactus only occurred in extramural features, while sunflower achenes were restricted to Feature 28 pitstructure contexts. Hedgehog cactus fruits were eaten fresh, baked, or made into a cake by cooking the pulp with sugar (Castetter 1935:26). The spines were removed by burning and perhaps this procedure was conducted outside along with processing of the fruits; this may explain why the hedgehog cactus seeds were restricted to the extramural feature.

The fall-ripening pinyon nut crop is an exceedingly valuable wild food resource, especially given its nearby availability. The nuts are distinguished by a particularly high energy value (635 calories per 100 grams, higher than most other plant and animal foods used prehistorically, including corn; Ford 1968:158,160). Ethnographic references for the Tewa, Isleta, and Zuni indicate the prevalence of storing nuts in the shell, sometimes preceded by roasting (Castetter 1935:40-42; Jones 1930:37; Robbins et al. 1916:41). These accounts note how roasting the nuts benefits both flavor and preservation. Possibly, roasting pinyons was also an outdoor activity.

The oil-rich seeds of the sunflower were an important source of food and oil. The ground seeds could be boiled until the oil rose to the surface and could then be skimmed off. The seeds were parched and eaten whole, hull and all, or ground into a meal (Harrington 1967:314). The Zuni used pulverized ray flowers of the sunflower along with blossoms of paper daisy (*Psilostrophe tagetina*) for ceremonial purposes (Stevenson 1915:59). Preservation conditions in Feature 28, the deepest

of the pitstructures, may have been better than for the other two structures and may account for the isolated occurrences of sunflower from this feature.

Flotation and radiocarbon wood charcoal was predominately coniferous including pine, juniper, pinyon, ponderosa pine, and unknown conifer. Oak wood was restricted to Feature 28, a pitstructure. Charred and partially charred juniper was recovered in the vegetal sample collected from the floor fill of Feature 29, a pitstructure. Vegetal samples examined from a posthole and a primary roof support hole from pitstructure Feature 28 produced fragments of uncharred pine, indicating that pine was the preferred conifer used for roof support posts.

Archaeobotanical remains from site LA 26306 indicate site occupants were using locally available wood for fuel, cultivating maize, and gathering wild plants like goosefoot and purslane whose seeds mature in late summer and the fall-ripening resources, pinyon nuts, hedgehog cactus fruits, and sunflower achenes. The presence of goosefoot, pinyon, maize, and sunflower suggest at least a late summer to fall occupation.

Pollen

Ten pollen samples were submitted from site LA 26306 from three pitstructures, three extramural pits, and one thermal feature. All 10 samples were productive and pollen abundance, estimated by sample pollen concentrations, was high relative to other sites analyzed for the State Highway 602 project. Table 11.6 presents a summary of the pollen results and lists sample pollen concentrations, occurrence of maize, Cheno-Am percentages, and percentages of other pollen types with high values or significant presence. In most of the samples Cheno-Am and sunflower family comprised greater than 50% of the assemblages with bursage-type, grass, pine, and juniper contributing up to 30% of the pollen counted. The main economic types interpreted from this site are maize, Cheno-Am, grass, and purslane with some evidence for use of pinyon, sagebrush, sunflower family, beeweed, and lily family.

Table 11.6. Summary Pollen Results with Sample Concentrations and Percentages of Significant Types at Site LA 26306.

FS No.	Feature Number and Context	Pollen Conc. gr/cc ¹	Maize (%)	Cheno-Am (%)	Other Significant Types
144	1 - Pitstructure floor	4400	1	61	1% spurge
171	1 - Pitstructure floor beneath metate	4000	-	41	30% sunflower family, large grass present, 1% spurge, 3% beeweed
293	29 - Pitstructure floor beneath ground stone	2600	<1	59	Rose family, beeweed aggregates & mustard present, 3% grass
295	28 - Pitstructure floor	5800	-	62	2% grass, purslane present
287	44 - Hearth in Feature 28	400	-	44	13% pinyon, 6% grass, 1% mustard
275	35 - Storage feature in Feature 28	700	4	28	11% pinyon, 5% sagebrush, 6% grass, 2% beeweed, lily family present
243	27 - Pit, bell-shaped, base	1500	-	30	14% pinyon, 10% juniper
151	2 - Pit, storage, base (fire-hardened)	4100	-	27	8% sagebrush, 24% sunflower family, 3% beeweed, 10% grass, purslane present
235	10 - Thermal feature, cobble-filled, base	3300	<1	49	-
183	7 - Pit base	1200	-	38	Knotweed, mustard, & grass aggregates present

¹Pollen concentration is expressed as grains per cubic centimeter of sample sediment (gr/cc) rounded to the nearest 100.

Feature 1

Two floor samples were analyzed from this pitstructure, one general floor area (FS 144) and one sample from beneath a metate (FS 171). Sample pollen concentrations were similar in the two samples at about 4000 gr/cc and Cheno-Am percentages were high. The sample from beneath the metate contrasted with FS 144: FS 171 had a greater variety of significant types including beeweed, a high value of sunflower family, moderate spurge percentage, and presence of large grass type, which may represent Indian ricegrass. The 3% beeweed from FS 171 was the highest beeweed value from this site. Maize pollen was identified only from the general floor sample, FS 144. Possible economic resources in Feature 1 are Cheno-Am, maize, beeweed, grass, and sunflower family.

Feature 29

One floor sample from beneath ground stone was analyzed from Feature 29, a pitstructure. Beeweed aggregates and maize pollen were present and the percentages of Cheno-Am and grass pollen were high. These resources may have been directly utilized inside the structure for subsistence activities. Other resources suggested by the pollen results include rose family and mustard.

Features 28, 44, and 35

A floor sample, hearth fill (Feature 44) sample, and base sample from a storage feature (Feature 35) were analyzed from pitstructure Feature 28. The floor sample was characterized by the highest pollen concentration of the three samples and the

maximum Cheno-Am percentage from site LA 26306. No maize was identified from the floor, but purslane pollen was present and grass pollen was moderate. The Feature 44 hearth fill sample yielded a low pollen concentration and high Cheno-Am, grass, and pinyon percentages. The Feature 35 sample stands out from the floor and hearth samples. Although it has a low pollen concentration, it also has a maximum maize percentage of 4%, the presence of lily family (includes yucca and onion), and high values of pinyon, sagebrush, and grass.

These results indicate maize and perhaps grass, pinyon, sagebrush, and lily family were stored or processed in pitfeature 35, or were used as layering material. Grass pollen was notable in all three pitstructure samples and some subsistence or construction use of grass appears indicated. The glimpse of purslane pollen from the floor sample, although a low representation, may also reflect a utilized resource, and the relatively high pinyon values in this pitstructure could represent food, fuel, or house construction use of pinyon.

Feature 27

One base sample was analyzed from Feature 27, a bell-shaped pit and there was little information in the pollen results. No maize was identified and Cheno-Am was low relative to other pollen samples from site LA 26406. Pinyon and juniper were relatively high in the sample. Perhaps natural background pollen rain diluted any cultural pollen signal or pinyon and juniper were used in the pit.

Feature 2

A base sample from Feature 2, a storage pit, produced a high sample pollen concentration and high values of sagebrush, sunflower family, grass, beeweed, and purslane pollen was present. The diverse assemblage may reflect layering materials used in the pit, field weed pollen blown into the pit, or pollen deposited from stored harvests of maize or other seeds.

Feature 10

One base sample was submitted from Feature 10, a thermal feature. The pollen assemblage from this sample included maize, a high value of Cheno-Am, and a moderate pollen concentration value. Cheno-Am taxa may have been used to layer around maize for cooking, or both maize and Cheno-Am were food resources.

Feature 7

The pit base sample from Feature 7 was characterized by a low sample pollen concentration and relatively low Cheno-Am percentage for this site. The only pollen evidence for plants associated with the feature were grass aggregates, mustard, and perhaps knotweed, a member of the Polygonaceae family. Grass pollen representation was high in several extramural and intramural samples and grass was probably an important economic resource at site LA 26306.

STRATIGRAPHY

The stratigraphy of the western portion of the site is fairly straightforward. From Feature 28 southward, a thin (10- to 15-cm) cap of fine sands overlies the Basketmaker II cultural surface. The Basketmaker II features are, in turn, excavated into fine sands lacking soil development. North of Feature 28, the overlying fine sands cap clay and sand deposits. Feature 27, a bell-shaped storage pit, was excavated into these deposits.

Stratigraphy of the eastern portion of the site is best illustrated in SU 7. Stratum I was identified as a recent fine sand to sandy loam. This deposit overlies Stratum II, a dark gray brown clayey sand to sandy loam. Stratum II comprises the Pueblo II to early Pueblo III midden. Below this deposit is Stratum III, a dark yellowish brown clayey sand to sandy loam. The Basketmaker II deposits/features occur within this deposit. Underlying this deposit is Stratum IV, a strong brown clayey sand (identified as a silt loam in the field). This stratum contained no cultural material or features.

CHRONOMETRIC DATA

Chronometric data at site LA 26306 comprise six radiocarbon samples, a single archaeomagnetic sample, projectile point styles, and the ceramic artifact assemblage. Table 11.7 summarizes the radiocarbon samples. The archaeomagnetic sample (Appendix B) was taken from the hearth of Feature 28, the deep pitstructure. Information from this sample was equivocal, suggesting an occupation of the pitstructure either in the first century BC, or in the seventh century AD (Appendix B). Given the array of radiocarbon dates, use of the pitstructure in the first century BC is more likely.

The later component at the site is dated by means of the ceramic artifact assemblage. Eckert (above) calculated a mean ceramic date of AD 1111 ± 55 years for the entire assemblage. A potential range of occupation, however, occurs from approximately AD 950 to 1175.

SUMMARY

Site LA 26306 is a multicomponent site with occupations dating from the Basketmaker II and

the late Pueblo II (and possibly as late as the very early Pueblo III). The western portion of the site comprised a Basketmaker II habitation, consisting of both deep and shallow pitstructures, along with an extramural storage feature. The eastern portion of the site also comprised a Basketmaker II component, yet only a shallow pitstructure was identified along with several extramural features. A deep pitstructure may have been present at one time, but it was destroyed during previous road construction or is located outside the project area. Also along the eastern portion of the site was a dark midden primarily dating to the late Pueblo II period (based on the ceramic assemblage). A rubble may have been present in this location at one time, as the midden implies an intensive and long-term habitation. No such structure was identified, and this structure may have been destroyed during previous road construction. A small masonry structure that is associated with this component lies downslope and east of the right-of-way fence. Such small structures are typically considered fieldhouses. This pattern, that of fieldhouses along ridge spurs overlooking the valley bottom, is consistent with the settlement pattern throughout Y Unit Draw.

Table 11.7. Summary of Radiocarbon Samples from Site LA 26306.

FS No.	Conv. Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Material	Context
144	1920 ± 120	BC 35 to AD 240	BC 185 to AD 395	AD 90	<i>Juniperus</i> <i>P. edulis</i> <i>Quercus</i>	F.1, pitstructure floor
215	2230 ± 80	BC 385 to 180	BC 405 to 50	BC 355 and BC 290 and BC 230	<i>P. edulis</i> <i>Pinus</i> <i>Juniperus</i>	F.10, thermal rock feature
228	1990 ± 70	BC 45 to AD 90	BC 165 to AD 160	AD 25	<i>P. ponderosa</i>	F.29, pitstructure floor
232	1700 ± 90	AD 245 to 435	AD 130 to 560	AD 380	<i>Juniperus</i> <i>P. edulis</i> <i>Quercus</i>	F.27, storage pit
265	2090 ± 60	BC 180 to 20	BC 345 to 310 BC 210 to AD 55	BC 75	<i>P. edulis</i> <i>Pinus</i> <i>Juniperus</i>	F.28, pitstructure floor
271	1940 ± 70	AD 5 to 135	BC 60 AD 240	AD 75	<i>P. edulis</i>	F.35, storage pit (in F.28)

Chapter 12

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115330

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with Analytic Contributions by

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Pamela McBride, Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations at site LA 115330 were conducted between 27 April and 12 June 1998. Site LA 115330 is a multicomponent site, with extensive Basketmaker II features and a light scatter of later ceramics on the surface of the site. Site boundaries extend across both sides of the existing highway, however, all of the features discovered were located on the western side. In all, 28 Basketmaker II features were excavated, ranging in function from pitstructures to extramural features. The site represents the best example to date of a Basketmaker II household in the Zuni region. In addition, a contemporaneous agricultural field was located at site LA 48695, just to the north of site LA 115330. Site LA 115330 thus allows an examination of the timing and nature of early agricultural strategies, as well as other research issues, during the Basketmaker II.

Site LA 115330 is located at 2090 m (6860 ft) above mean sea level on a southeastern slope of a bedrock ridge, about 100 m (328 ft) from Y Unit Draw. Vegetation today is predominately pinyon, juniper, and sagebrush, with minor amounts of ponderosa pine, narrowleaf yucca, prickly pear cactus, and rabbitbrush.

SURVEY RESULTS

Site LA 115330 had not previously been recorded prior to the inventory phase of this project. Two stains observed in the road cut bank (Figure 12.1) were recorded as possible Basketmaker II pitstructures by Abbott (1997:40-41). Two ceramic artifacts were observed during the survey (both unidentified redware), but they

were not believed to be associated with the stains or lithic artifacts. A range of lithic artifacts was observed, such as bifacial thinning flakes, microdebitage, and a retouched chert scraper. Lithic raw material recorded at this time included primarily chert, with silicified wood, quartzite, and Zuni Spotted chert.

DATA RECOVERY ACTIVITIES

Surface Collection

Knowing that dense concentrations of artifacts were present at site LA 115330, a pedestrian survey was conducted at the site in transects at 2-m intervals prior to excavations. Each artifact observed within the right-of-way was marked with a pin flag, point located with a Sokkia Total Station, then collected.

As expected, concentrations of lithic artifacts were located along the western portion of the site (Figure 12.2), extending outside the right-of-way. A few ceramic artifacts were also observed and collected along the western cut bank. Only two artifacts were observed east of the existing highway, suggesting the main portion of the site was located along the western right of way.

Excavation

Hand Excavation

Hand excavation of three 1-by-1-m and one 50-cm-by-3.80-m units, designated as Study Units (SU) 1, 2, 9 and 10, was conducted in order to determine the nature and depth of cultural deposits at site LA 115330 (Figure 12.3). An artifact distribution map generated from the

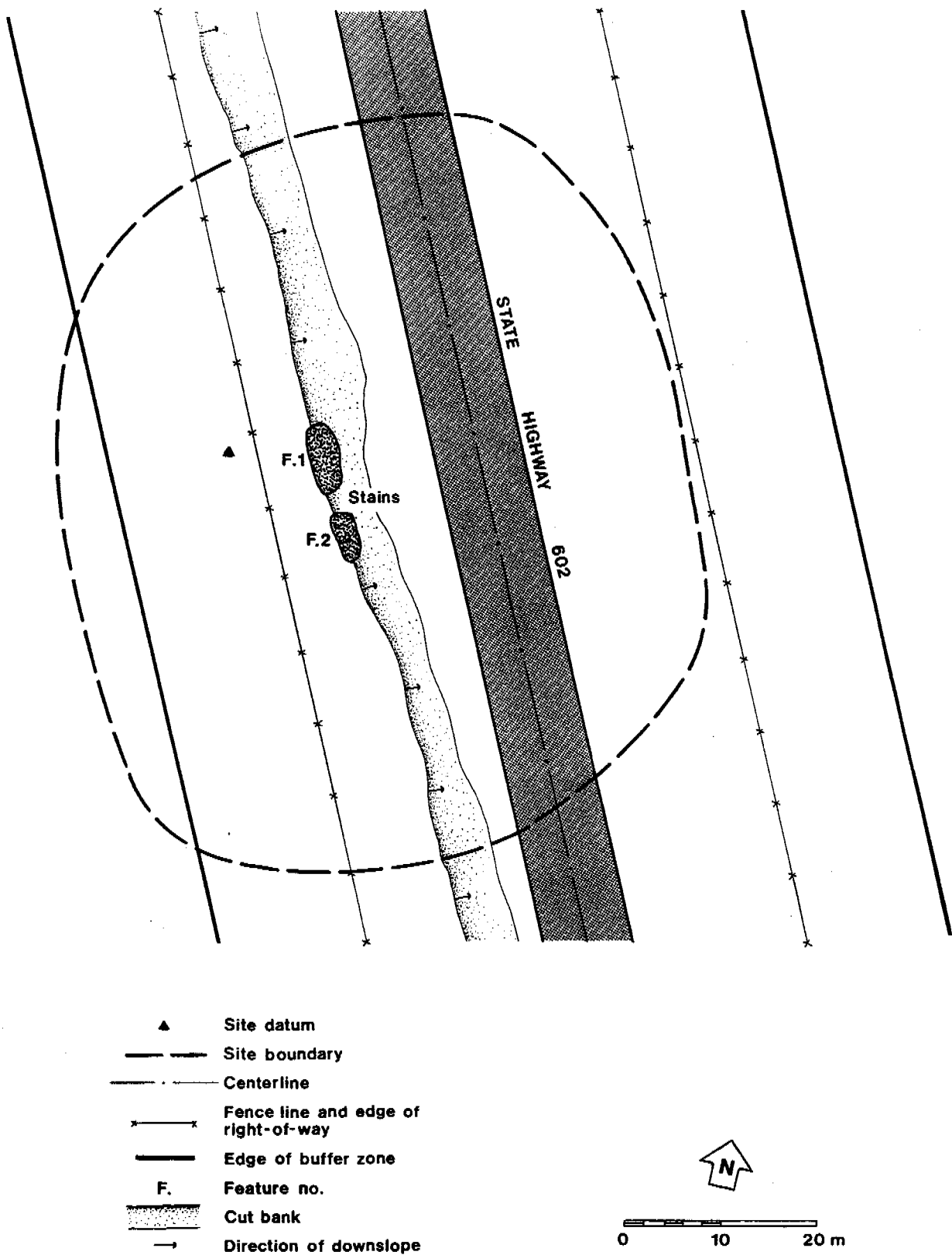


Figure 12.1. Site LA 115330 Survey Site Map.

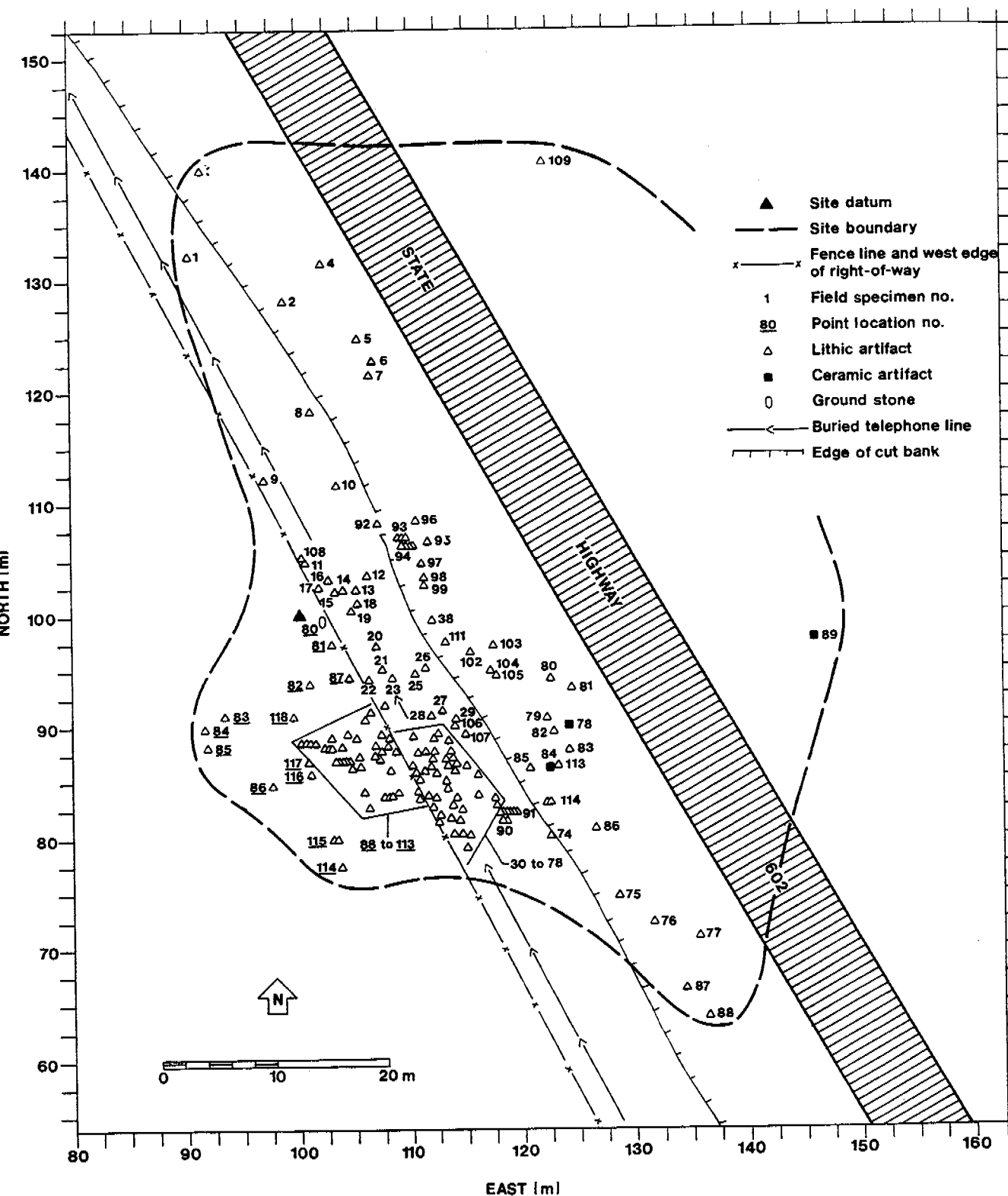


Figure 12.2. Site LA 115330 Data Recovery Site Map, Surface Artifacts.

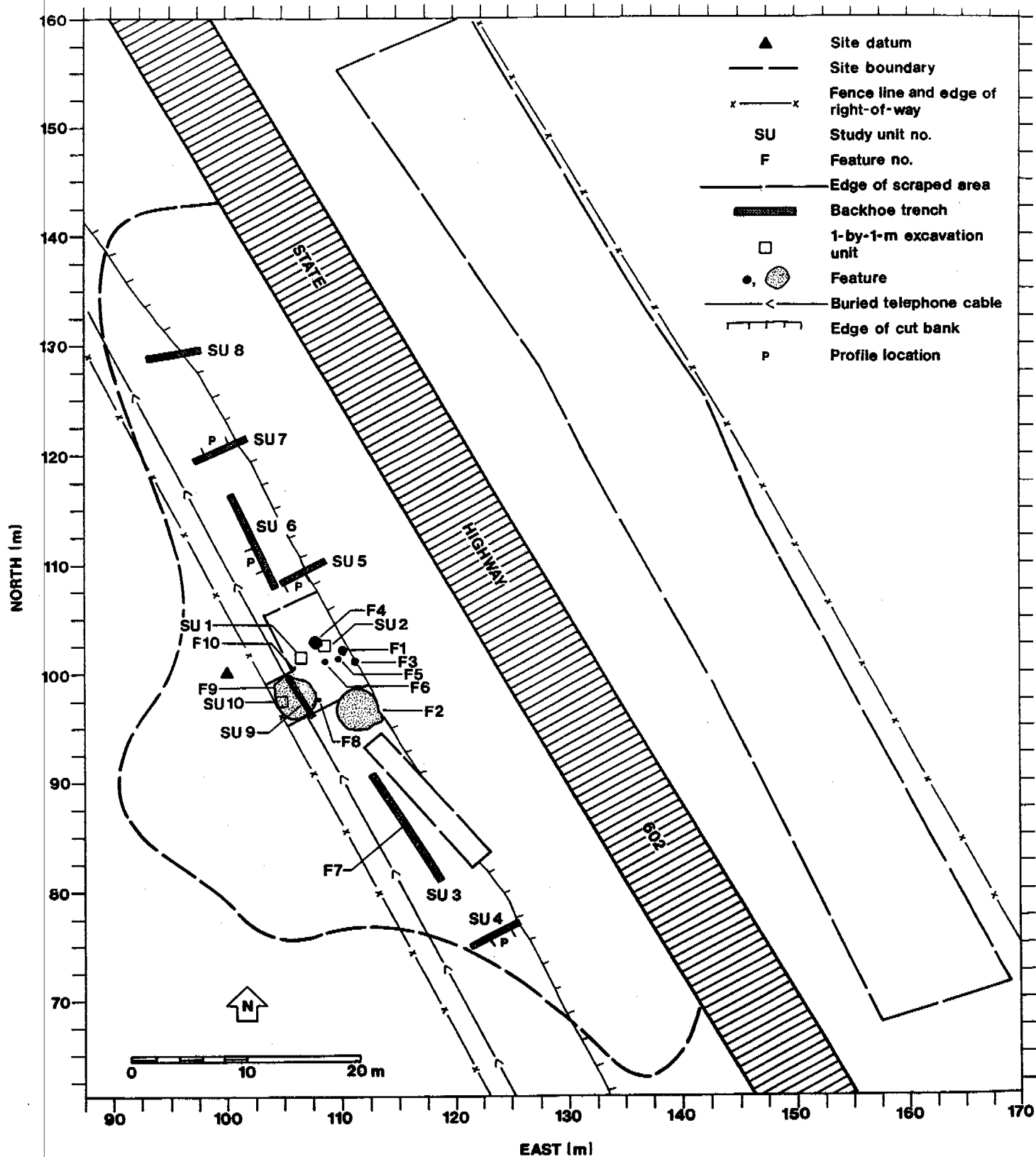


Figure 12.3. Site LA 115330 Data Recovery Site Map, Features, Study Units, and Mechanical Stripping.

controlled surface collection was used as a guide for the placement of SU 1 and 2. SU 9 and 10 were placed in an organic stain designated as Feature 9, and will be discussed with the feature descriptions. Additional hand-excavated units included 27 2-by-2-m shovel-scraped units (Figure 12.4), these excavations were not designated as study units, but rather located by the site grid coordinate of the southwest corner, and will be discussed following the study unit descriptions.

Study Unit 1. SU 1 was a 1-by-1-m unit placed with the southwest corner located at site grid coordinates N101.00, E106.00 (Figure 12.3). A total of eight 10-cm arbitrary levels were excavated revealing three strata as shown along a south-facing wall profile (Figure 12.5). The upper portion of Level 1 was situated within Stratum I, described as a loose sandy loam overburden deposit. The lower portion of Level 1 was in a layer recorded as Stratum II, appearing as a possible organic layer with coarse roots and a brown soil color. Other materials within Level 1 included moderate amounts of oxidized sandstone rocks approximately 5 to 10 cm in size. Cultural materials recovered from the level were flaked stone artifacts. Levels 2, 3, and most of Level 4 were contained in Stratum II.

Cultural materials within the stratum included flaked stone artifacts collected in Levels 2 and 3. Level 4 contained no artifacts. Levels 5 through 8 were within Stratum III, which is thought to be the possible occupation surface of site LA 115330. Within this stratum cultural materials were recovered in Levels 5 and 6. Levels 7 and 8 contained no artifacts. Flotation and pollen samples were also retrieved from Strata II and III. No additional features were encountered in excavations of SU 1.

Study Unit 2. SU 2 was a 1-by-1-m unit placed approximately 1 m northeast of SU 1, with the southwest corner located at site grid coordinates N102.00, E108.00 (Figure 12.3). A total of two 10-cm levels and one 3-cm level were excavated within SU 2. The loose overburden deposit of Level 1 was removed during a 2-by-2-m shovel-

scrape excavation. Excavations of SU 2 began within Level 2 and continued with Levels 3 and 4. Level 2 consisted of a sandy loam mixed with small sandstone rocks approximately 5 to 10 cm in size, charcoal flecks, and roots. Cultural materials within the level included flaked stone artifacts. Level 3 included at least 10% charcoal deposits along with a high amount of root disturbance. Flaked stone artifacts were collected throughout the level. Both Levels 2 and 3 were contained within Stratum II as described in SU 1. Approximately 3 cm below the beginning of Level 4, a charcoal stain within a defined outline was observed. The staining included visible charcoal flecks, mixed with sandstone rocks. A single ground stone artifact was recovered from the level. Further investigations revealed a circular charcoal stain designated as Feature 4, which will be discussed in the following feature descriptions.

Hand Stripping

A total of 27 2-by-2-m units were hand-stripped on site LA 115330. These units were placed in association with the site grid system (Figure 12.4), and were excavated to investigate not only nature and extent of the site, but also possible activity areas. The majority of the units were excavated in 15- or 20-cm levels determining the depth of the overburden deposits. All of the units yielded flaked stone artifacts ranging from 10 or 20 pieces to 70 pieces per unit, the latter of which was collected at the southern end of the site. No additional buried features were encountered during these investigations.

Mechanical Excavation

Mechanical excavation of six backhoe trenches was conducted in order to determine the nature and depth of possible cultural deposits on site LA 115330. An artifact distribution map generated from the controlled surface collections and a previous survey map were used as a guide for placement of the trenches. The trenches ranged from 4.00 m to 11.00 m in length, with a maximum depth of 1.40 m. A total of 39.60 m of trench was excavated on site.

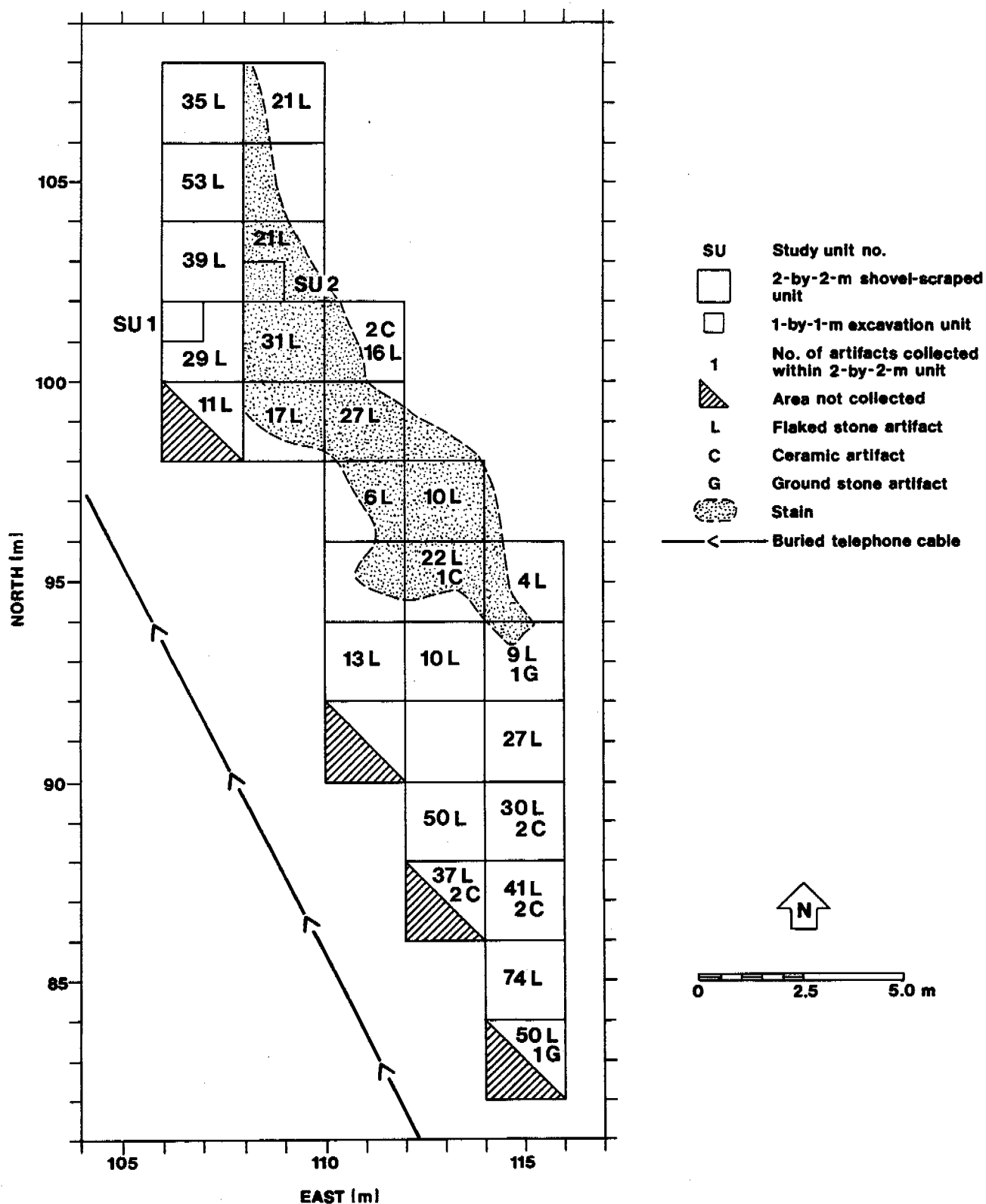
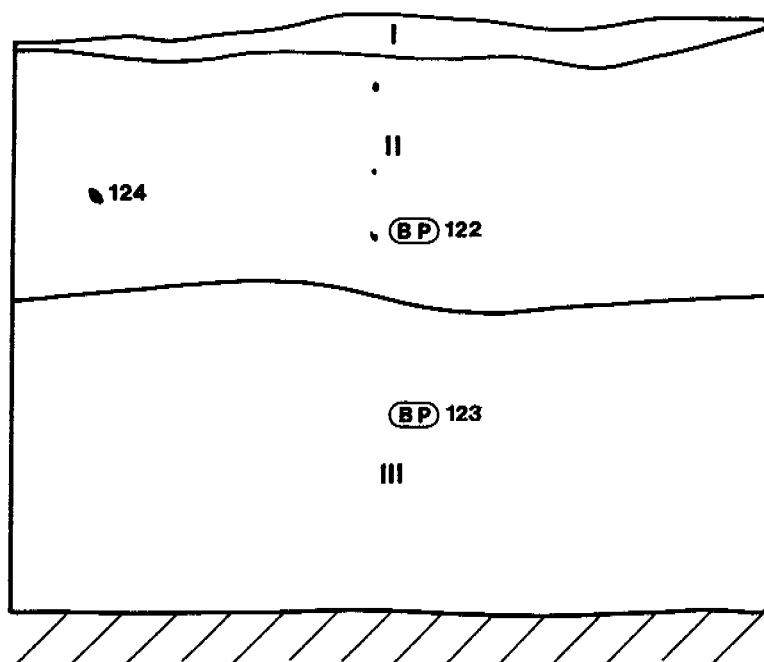


Figure 12.4. Site LA 115330 Data Recovery Site Map, Hand Stripping, Study Units 1 and 2



0 25 50 m

I 0-5 cm - Brown (10YR4/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; few micro roots; clear wavy boundary.

II 5-35 cm - Brown (10YR4/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; 25% gravel; few coarse roots; diffuse smooth boundary.

III 35 cm + - Strong brown (7.5YR4/6, moist) sandy loam; moderate; slightly sticky; slightly plastic; 25% gravel; very few micro roots.

(BP) Flotation and pollen samples

• Charcoal

122 Field specimen no.

/// Unexcavated

Figure 12.5. Site LA 115330 Study Unit 1, South-facing Profile.

Study Unit 3. SU 3 was placed on the west side of State Highway 602, with the northwest end located at site grid coordinates N91.00, E112.50, and N81.00, E118.50 at the southeast end (Figure 12.3). The trench was 11.00 m in length with a maximum depth of approximately 1.30 m. Five strata were recorded along the entire southwest-facing wall profile (Figure 12.6). Part of Stratum I was removed during the shovel-scraper excavation. The remaining portion of Stratum I included a loose overburden deposit mixed with sandstone inclusions. Stratum II was the organic layer that was also observed within SU 1 and 2. Stratum III included an organic stain of some sort; further investigations of the deposit found it to be noncultural. Stratum III also contained an abundant amount of rodent disturbance visible throughout the profile. Stratum IV comprised a sediment containing a calcium carbonate deposit at least 50% in content mixed with sandstone and gravel deposits, suggesting that cultural deposits are absent in this area of the site. Stratum V included a noncultural clay deposit observed at the lower right end of the trench.

Study Unit 4. SU 4 was placed at the southwest end of the site on the valley bottom, with the northeast end located at site grid coordinates N77.20, E125.60, and the southwest end at N74.80, E121.00 (Figure 12.5). The trench was 5.00 m in length with a maximum depth of 1.00 m. Two strata were recorded along a representative 2-m-long northwest-facing wall profile (Figure 12.7). Stratum I was the organic layer that had been observed within all previous study units. Stratum II was a clay loam deposit consisting of a noncultural sediment.

Study Unit 5. SU 5 was placed on the west side of State Highway 602, opposite to the steep sloping cut bank edge, with the northeast end located at site grid coordinates N110.20, E108.40, and the southwest end at N108.20, E104.50 (Figure 12.3). The trench was 4.40 m long with a maximum depth of approximately 1.25 m. Three strata were recorded along a northwest-facing wall profile (Figure 12.8). All strata were typical

of those described within SU 1 and 2. Evidence of mechanical disturbance was observed along the cut bank edge which most likely was caused during construction of State Highway 602. No additional buried features were encountered during excavation of SU 5.

Study Unit 6. SU 6 was placed parallel to the cut bank with the northwest end located at site grid coordinates N116.40, E100.00, and the southeast end at N107.60, E104.00 (Figure 12.3). The trench was 9.40 m in length with a maximum depth of approximately 1.30 m. Three strata were documented along a northeast-facing wall profile (Figure 12.9). Again Stratum I was a loose overburden deposit atop the organic sediment of Stratum II. Stratum III was located at the elevation at which cultural deposits were observed in SU 1 and 2. No additional features were encountered in SU 6.

Study Unit 7. SU 7 was placed with the northeast end over the cut bank edge at site grid coordinates N121.40, E101.60, and the southwest end at N119.20, E96.80 (Figure 12.3). The trench was 5.00 m in length with a maximum depth of approximately 1.34 m. Two strata were drawn along a representative 2-m-long profile of the southeast-facing wall (Figure 12.10). Both strata include noncultural sediments similar to those recorded within the previous trenches. No additional features were encountered in SU 7.

Study Unit 8. SU 8 was placed at the northwest end of the site with the northeast end located at site grid coordinates N129.60, E97.40 and the southwest end at N129.00, E92.80 (Figure 12.3). The trench was 4.80 m in length with a maximum depth of approximately 1.40 m. Two strata were identified along the entire northwest-facing wall profile (Figure 12.11). The upper west end of the trench within Stratum I includes a sandstone and gravel inclusion that may indicate alluvial deposits within this area of the site. Stratum II includes a sediment that has been heavily disturbed by rodent activity mixed with a noncultural sandy loam deposit. No additional features were encountered during excavation of SU 8.

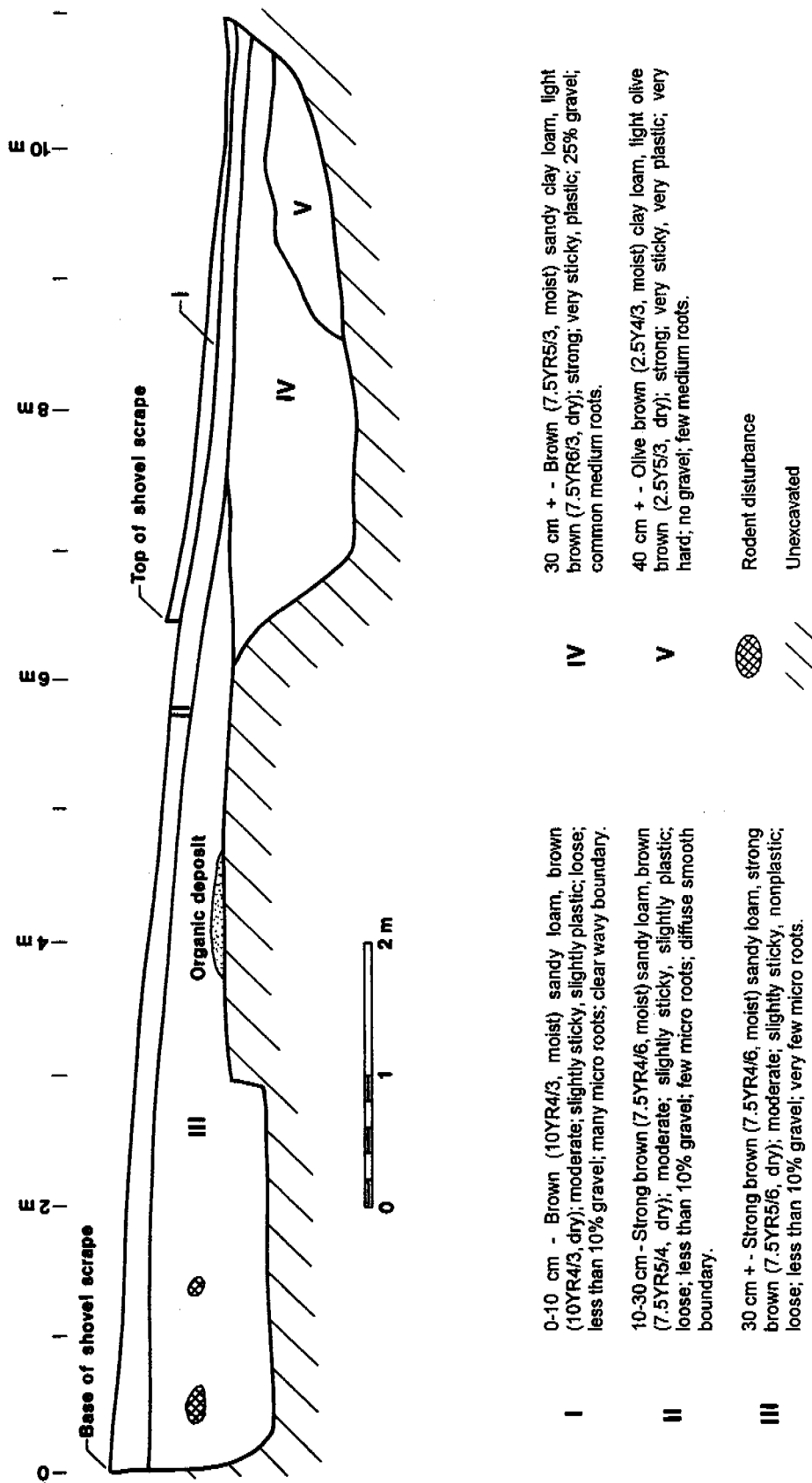
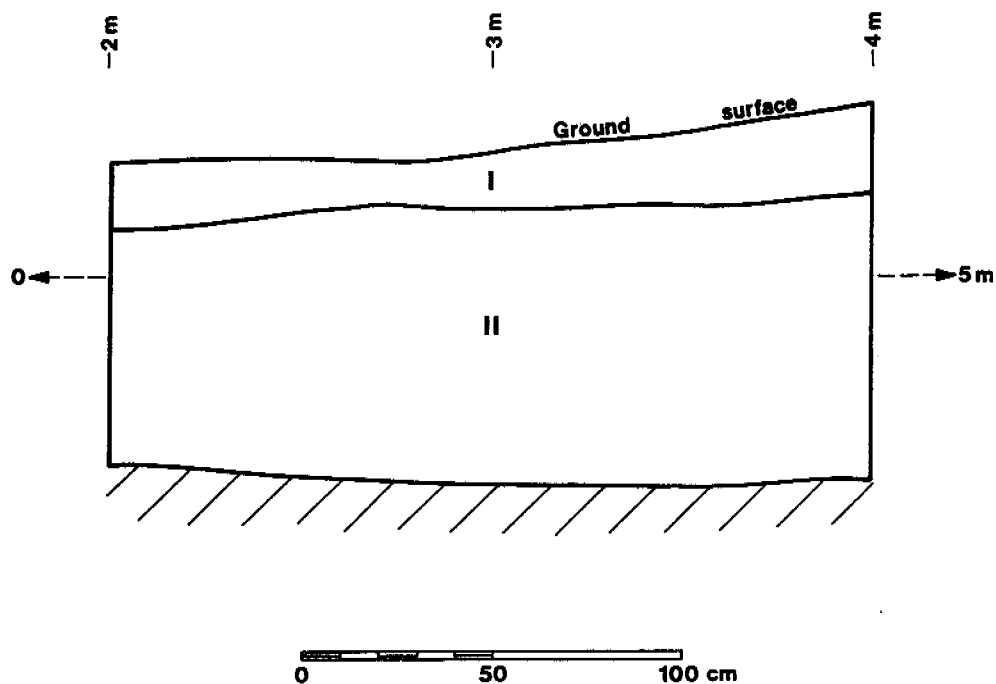


Figure 12.6. Site LA 115330 Study Unit 3, Southwest-facing Profile.

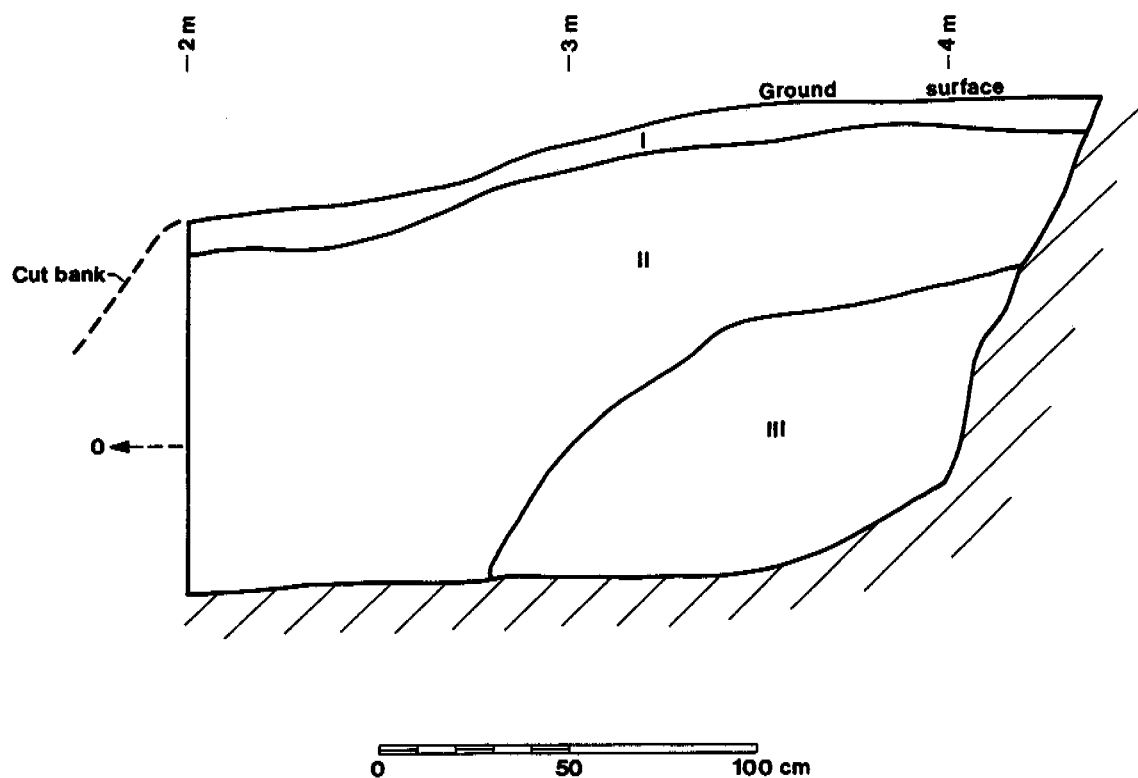


I 0-20 cm - Dark yellowish brown (10YR3/6, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; many fine roots; clear smooth boundary.

II 20 cm + - Olive (5Y4/4, moist) clay loam, pale olive (5Y6/4, dry); strong ; very sticky, very plastic; less than 10% gravel; very few fine roots.

/// Unexcavated

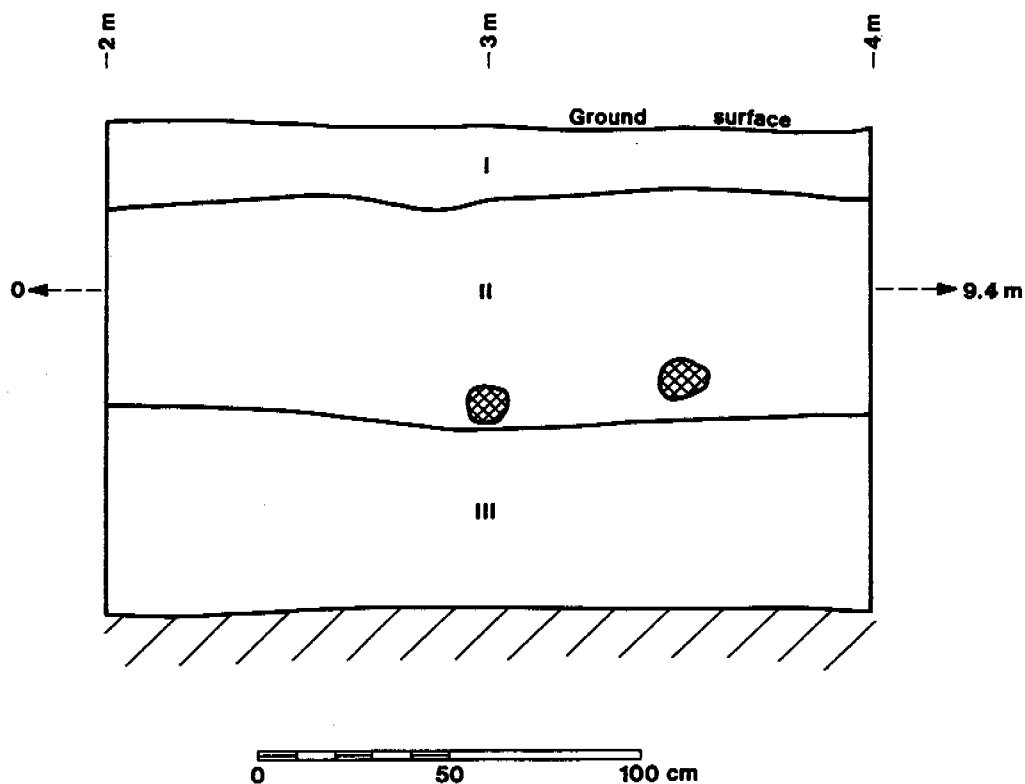
Figure 12.7. Site LA 115330 Study Unit 4, Northwest-facing Profile.



- I 0-10 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; many medium roots; clear wavy boundary.
- II 10 cm + - Dark yellowish brown (10YR4/4, moist) sandy loam, strong; slightly sticky, slightly plastic; no gravel; many medium roots.
- III 55 cm + - Dark brown (7.5YR3/4, moist) sandy clay loam, brown (7.5YR4/3, dry); weak; nonsticky, nonplastic; hard; no gravel; common very fine roots.

/// Unexcavated

Figure 12.8. Site LA 115330 Study Unit 5, Northwest-facing Profile.



I 0-20 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, brown (10YR4/3, dry); moderate slightly sticky, slightly plastic; loose; less than 10% gravel; many coarse roots; abrupt wavy boundary.

II 20-82 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, dark yellowish brown (10YR4/4, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; many medium roots; gradual smooth boundary.

III 82 cm + - Strong brown (7.5YR4/6, moist) sandy loam, strong brown (7.5YR5/8, dry); moderate; weak; slightly sticky, slightly plastic; slightly hard; no gravel; very fine roots.

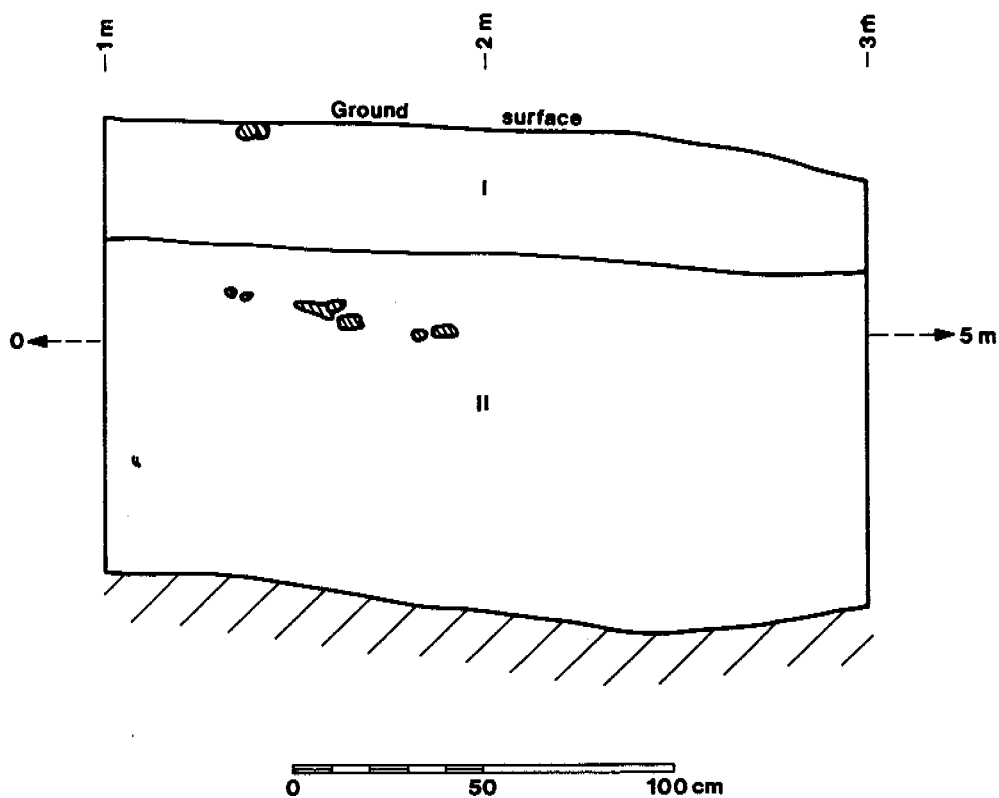


Rodent disturbance




Unexcavated

Figure 12.9. Site LA 115330 Study Unit 6, Northeast-facing Profile.



I 0-25 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; strong medium roots; diffuse smooth boundary.

II 25 cm + - Strong brown (7.5YR5/8, moist) sandy loam, strong brown (7.5YR4/6, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; very few fine roots.

 Sandstone rock


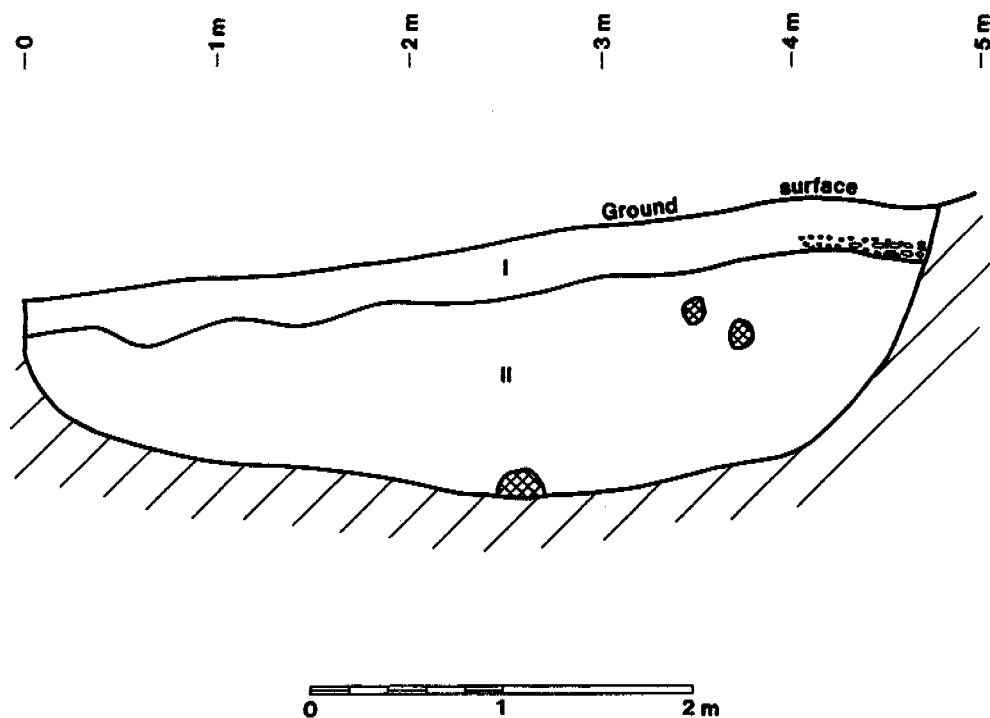
 Unexcavated

Figure 12.10. Site LA 115330 Study Unit 7, Southeast-facing Profile.






- I 0-15 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; loose; 25% gravel; many medium roots; diffuse wavy boundary.
- II 15 cm + - Strong brown (7.5YR5/8, moist) sandy loam, strong brown (7.5YR4/6, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; very few fine roots.
-  Rodent disturbance
-  Small sandstone rocks/gravel
-  Unexcavated

Figure 12.11. Site LA 115330 Study Unit 8, Northwest-facing Profile.

Mechanical Stripping

Mechanical stripping on site LA 115330 was accomplished on both sides of State Highway 602 (Figure 12.3). On the east side of the road an area 100 m in length by 12 m in width (328 by 39 ft) was stripped removing approximately 20 to 30 cm of topsoils and vegetation. Mechanical stripping on this side of the road revealed no cultural features. Two other areas were mechanically stripped on the west side of the road (Figure 12.3). Stripping in both areas removed approximately 20 to 40 cm of topsoils and vegetation. The 14.60-by-2.00-m area revealed no cultural features during stripping. After hand stripping of topsoils were completed, the last area stripped required additional mechanical stripping and measured approximately 9.60 by 5.00 m, revealing the majority of the discovered cultural deposits designated as Features 4, 5, 6, 8, 9, and 10. (Features 1 and 2 had been encountered during survey work and Feature 3 was discovered during investigation of Feature 2. Feature 7 was assigned in backhoe trench SU 3, and it was determined that the "feature" was a noncultural organic stain of some unknown type.) In all, 1277.20 sq m were mechanically stripped.

Feature Descriptions

A total of 27 cultural features and 1 unknown organic stain were investigated during data recovery activities on site LA 115330. Features 1, 3 through 6, 8, and 10 were extramural earthen pits, in addition to one pitstructure Feature 2, and an activity area (or possibly a shallow pitstructure) Feature 9, with five internal features (Figure 12.3). Feature 7 was an organic stain that was determined noncultural.

When possible all extramural pits and internal pits were hand excavated by dividing the feature in half and excavating one side in one complete level then removing the opposite half either by sediment strata or one complete level if only one stratum was identified along the feature profile. Excavation of the pitstructure consisted of a hand-excavated control unit placed within the structure in addition to several floor-fill units ranging from

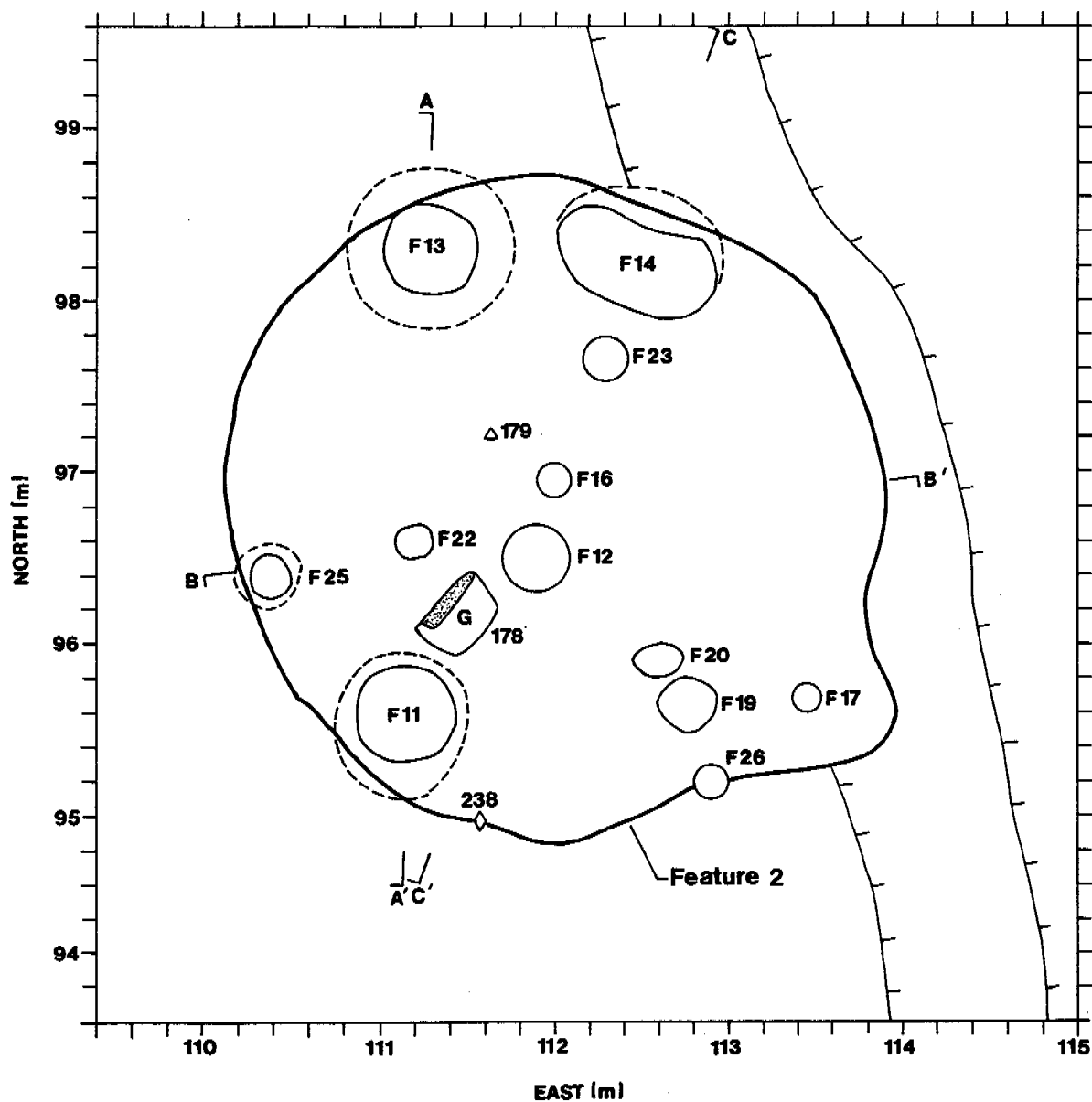
approximately 10 to 20 cm in thickness. The activity area was treated in the same manner. All feature fill was screened through 1/8-in hardware mesh. Control unit levels were screened through 1/4-in hardware mesh.

Description of the features will begin with discussion of Feature 2 (pitstructure), followed by Feature 9 (activity area or shallow pitstructure) and its associated features, and extramural features.

Feature 2

Feature 2 was an earthen pitstructure that was encountered during the survey work, eroding out of the cut bank (Figure 12.1). The center point of the feature is located at site grid coordinates N97.00, E112.00 (Figure 12.3). In plan view the structure was nearly circular measuring approximately 3.70 m east-to-west by 3.86 m north-to-south (Figure 12.12). Maximum floor area, then, was approximately 11.7 sq m.

Excavation of Feature 2 began by shovel scraping the upper portion of fill and exposing the entire diameter of the pitstructure. Once this was accomplished a 2-by-2-m control unit was placed within the structure located with the southwest corner at site grid coordinates N96.00, E112.00. A total of eight arbitrary levels were removed from the unit revealing three strata as shown on two 2-m-long profiles of the north-facing and east-facing walls (Figure 12.13). Arbitrary levels began using Level 2, since Level 1 was removed during shovel scraping. Level 2 and the upper portion of Level 3 were contained in Stratum I, a sandy loam mixed with approximately 20% charcoal flecks, 10% gravel, 50% sandstone rocks, and 20% rodent disturbance. Artifacts within Level 1 included flaked stone materials and ground stone fragments. In Level 3 flaked stone artifact density dropped abruptly. Levels 4 and 5 were within Stratum II, which consisted of a sandy loam mixed with approximately 25 to 30% charcoal deposits, evidence of oxidized soil, and burnt sandstone rocks. Artifacts collected from the two levels included a low amount of flaked stone materials. Levels 6 through 9 were included



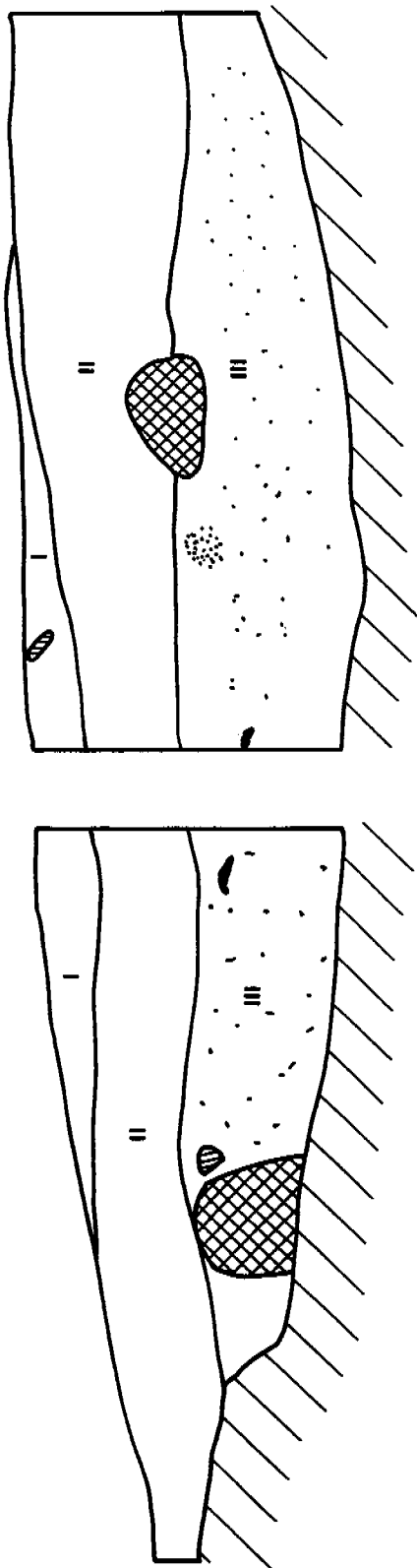
- | | |
|------|------------------------|
| F11 | Feature no. |
| 178 | Field specimen no. |
| — | Edge of Feature 2 |
| ○ | Feature outline |
| ○ | Base of feature |
| G | Ground stone |
| △ | Flaked stone artifact |
| ◇ | Miscellaneous artifact |
| — | Edge of cut bank |
| A—A' | Cross section |



Figure 12.12. Site LA 115330 Feature 2, Plan View.

North-facing Profile

East-facing Profile



0-14 cm - Brown (10YR4/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; loose; 10% gravel; many coarse roots; clear broken boundary.

14-40 cm - Dark brown (10YR3/3, moist) sandy loam, yellowish brown (10YR5/4, dry); moderate; slightly sticky, slightly plastic; loose; 10% gravel; many medium roots; diffuse smooth boundary.

40-42 cm - Dark brown (10YR3/3, moist) sandy loam, yellowish brown (10YR5/4, dry); moderate; slightly sticky, slightly plastic; loose; 10% gravel; many medium roots; abrupt smooth boundary.

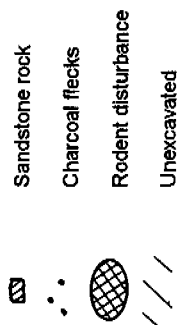
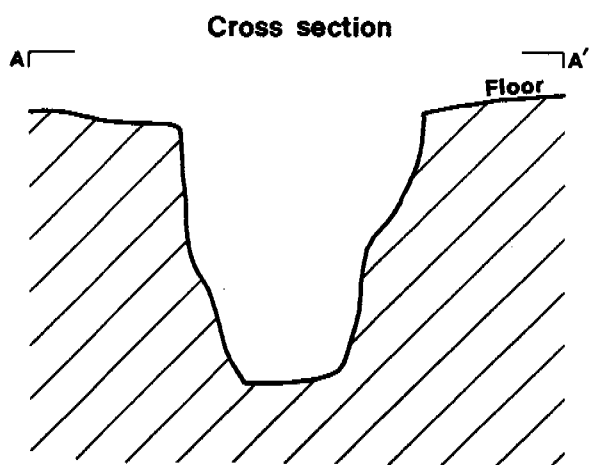
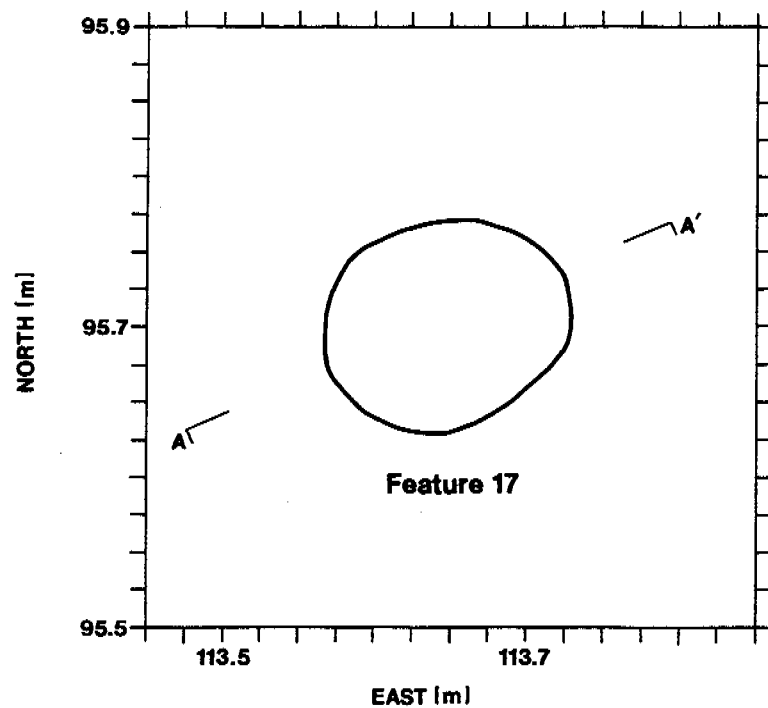


Figure 12.13. Site LA 115330 Feature 2, Control Unit, North-facing and East-facing Profiles.



— Edge of Feature 17
 A A' Cross section
 /// Unexcavated

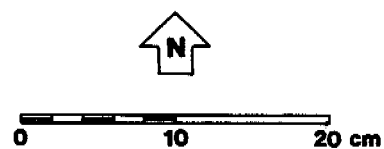


Figure 12.19. Site LA 115330 Feature 17, Plan View and Cross Section.

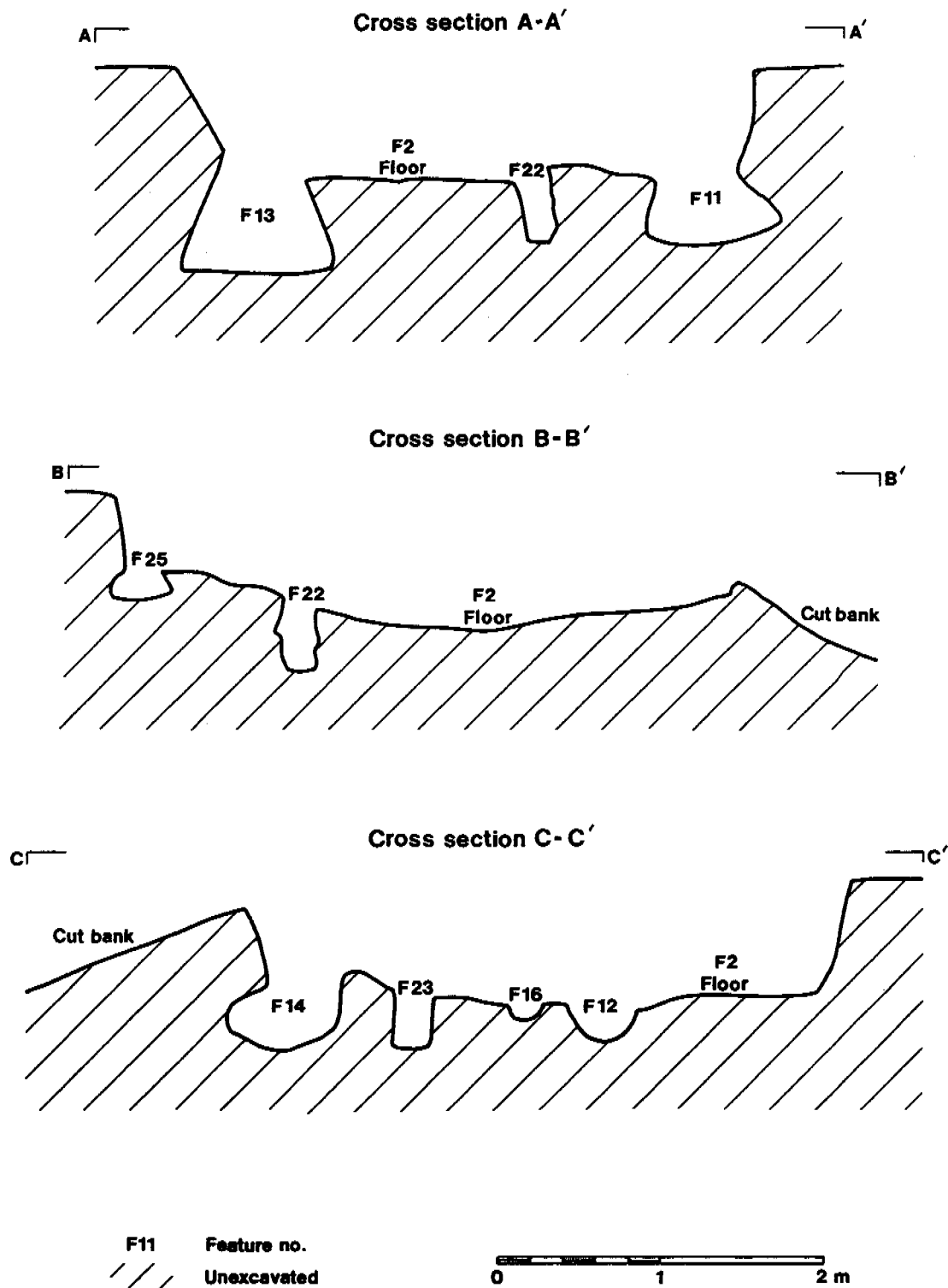
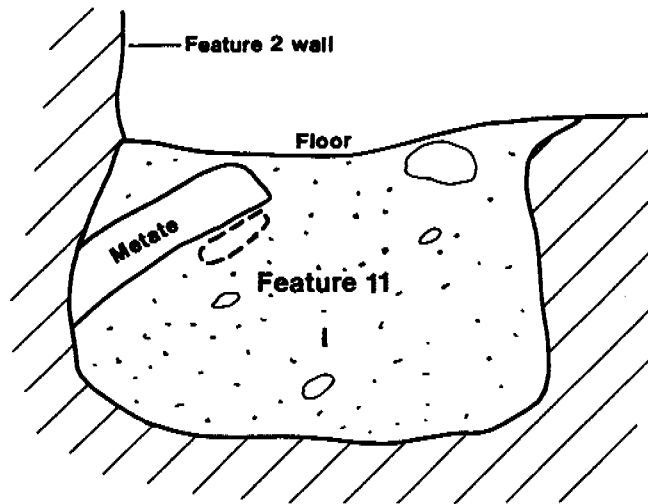


Figure 12.14. Site LA 115330 Feature 2, Cross Sections.



0 25 50 cm

- 0-38 cm - Dark brown (10YR3/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, nonplastic; loose; less than 10% gravel; few micro roots; abrupt smooth boundary.
- Charcoal flecks
- Mano
- Mottling of strong brown sandy loam
- Unexcavated

Figure 12.15. Site LA 115330 Feature 11, East-facing Profile.

Feature 11 was mostly likely utilized as an internal earthen storage pit. This is supported by the pollen and macrobotanical analyses (discussed below), which both identified maize within Feature 11. Cholla, beeweed, and pinyon pollen were also identified from this feature.

Feature 12 was the hearth located near the center of the pit structure at site grid coordinates N96.50, E111.90 (Figure 12.12). In plan view the hearth was circular measuring 40 cm in diameter. A northeast-to-southwest cross section of the feature showed a basin shape with a maximum depth of 20 cm (Figure 12.14).

The feature was bisected into southeast and northwest portions with both halves revealing the same strata: two different colors of a hard sandy loam with at least 20% charcoal deposits mixed with small sandstone rocks. Only flaked stone materials were collected from the fill along with flotation, pollen, waterscreen, and radiocarbon samples.

Prior to removal of the west half a single stratum was observed along an east-facing profile (Figure 12.16), showing a different type of fill from that of the floor-fill units which consisted of a lighter brown colored sediment. This suggests that the fill removed from Feature 12 during excavation may be sediment remains of the hearth, not fill deposited after abandonment of the pit structure.

The interior portion of the hearth included evidence of moderate oxidation: coloring of the walls and bottom of the hearth. The feature was not modified in any way, but rather was constructed as an earthen pit. Feature 12 most likely was used for heating and other domestic activities associated with the pit structure. Charred maize cupules, Cheno-Am seeds, and purslane seeds were recovered from the hearth, all of which indicate economic uses. Charred juniper, pine, and oak were also recovered from this feature.

One radiocarbon sample from Feature 12 dated to 2190 ± 60 BP (Beta-121240; wood charcoal; $\delta^{13}\text{C} = -22.3$ ‰; Appendix A), which is exactly

the same date obtained from a sample from Feature 4 (an extramural storage pit).

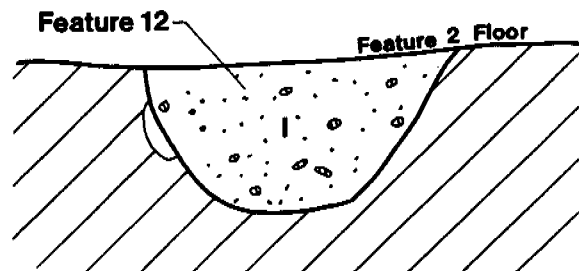
Feature 13 was a large earthen pit situated in the northwest part of Feature 2, at site grid coordinates N98.30, E111.30 (Figure 12.12). In plan view the pit was circular measuring 55 cm in diameter. A north-to-south cross section depicts a typical bell-shaped pit with a maximum depth of 60 cm. The base of the pit undercuts the northern wall edge and the floor surface of the pit structure, with a diameter of 94 cm (Figure 12.14).

Feature 13 was bisected into north and south halves, with the south half excavated in one complete 60-cm level to the base of the feature. This revealed a sandy loam sediment mottled with at least 50% charcoal inclusions and charred sandstone rocks within the majority of the fill; at the base of the excavation, sediments had a much lighter color and 10% sparse charcoal flecks. Materials from the fill included charred corn cob fragments and an abundant amount of charred corn kernels observed mostly in the upper portion of the fill. Other collected materials included flaked stone artifacts and faunal remains.

Removal of the south half revealed Strata I and II as shown along a south-facing profile (Figure 12.17). Stratum I included a dense amount of charcoal and vegetal remains along with faunal remains. Stratum I may possibly represent a refuse episode, from the variety of cultural deposits recorded. Stratum II was yellowish brown sandy loam sediment mixed with light charcoal deposits, unmodified sandstone rocks, and gravels.

The profile was used as a guide in excavation of the north half which was accomplished in two levels. Level 1, Stratum I, included a maximum depth of 50 cm revealing the dense cultural deposit. Along with more charred corn cobs and kernels, a large mammal pelvis was collected within the level.

Level 2, Stratum II, included a maximum depth of 10 cm and had mottled sands mixed



0 25 50 cm

I

0-20 cm - Very dark grayish brown (10YR3/2, moist) sandy loam, dark grayish brown (10YR4/2, dry); sandy loam, moderate; slightly sticky, slightly plastic; hard; less than 10% gravel; very few micro roots; abrupt smooth boundary.

B

Sandstone rocks

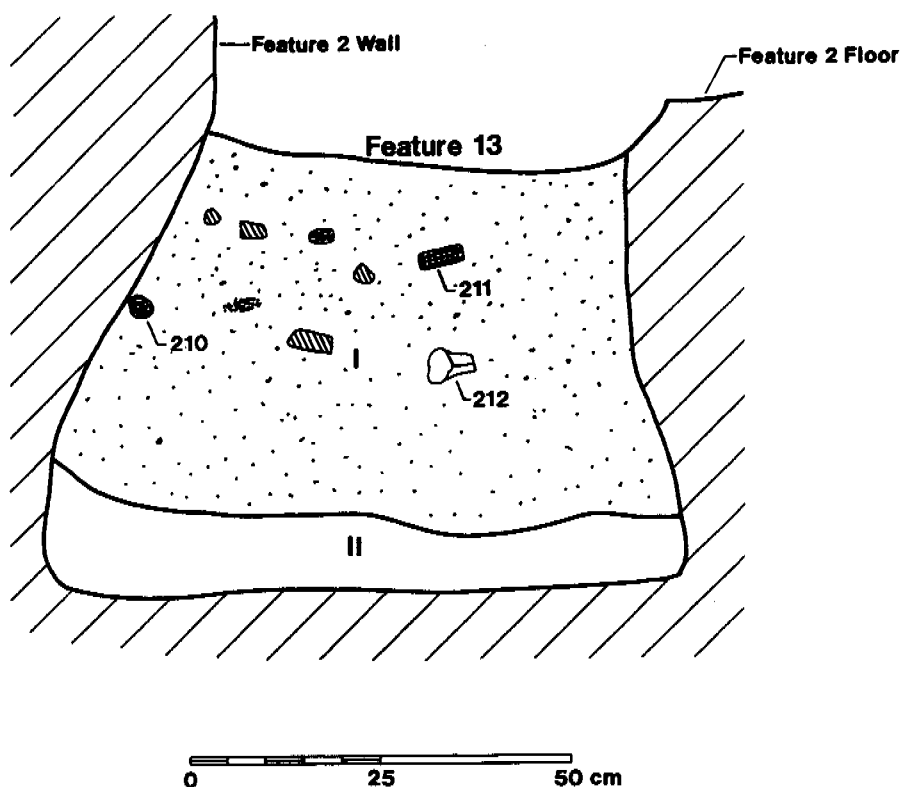
•••

Charcoal flecks

///

Unexcavated

Figure 12.16. Site LA 115330 Feature 12, East-facing Profile.



I
0-48 cm - Dark brown (10YR3/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; slightly hard; 10% gravel; very few fine roots; abrupt smooth boundary.

II
48-57 cm - Dark yellowish brown (10YR4/6, moist) sandy loam, yellowish brown (10YR5/6, dry); moderate; nonsticky, nonplastic; loose; 10% gravel; very few micro roots abrupt smooth boundary.






-  Burnt corn cobs
-  Faunal specimen
-  Burnt sandstone rocks
-  Charcoal flecks
- 210** Field specimen no.
-  Unexcavated

Figure 12.17. Site LA 115330 Feature 13, South-facing Profile.

with charcoal deposits and other inclusions. Flaked stone artifacts and faunal remains were collected within the level.

Feature 13 had earthen walls with a little evidence of oxidation along the upper portion of the southern wall. The majority of the interior surface of the pit had no indication of fire-alteration. Feature 13 was used as a storage unit, and may have subsequently been used for discarded materials.

One radiocarbon sample from Feature 13 dated to 2070 ± 60 BP (Beta-121241; maize kernels; $\delta^{13}\text{C} = -11.3\text{‰}$; Appendix A). This date is contemporaneous with the Basketmaker II deposits at site LA 48695, the use of site LA 115327 (as indicated by Feature 1), and site LA 26306 (as indicated by Feature 28).

Feature 14 was a linear earthen pit situated along the north wall edge of pitstructure Feature 2 at site grid coordinates N98.30, E112.40 (Figure 12.12). In plan view the pit was kidney-shaped measuring 96 cm northwest-to-southeast and 46 cm northeast-to-southwest. A northeast-to-southwest cross section exhibits an irregular shape with a maximum depth of 40 cm and maximum base measurements of 96 cm northwest-to-southeast and 70 cm northeast-to-southwest (Figure 12.14).

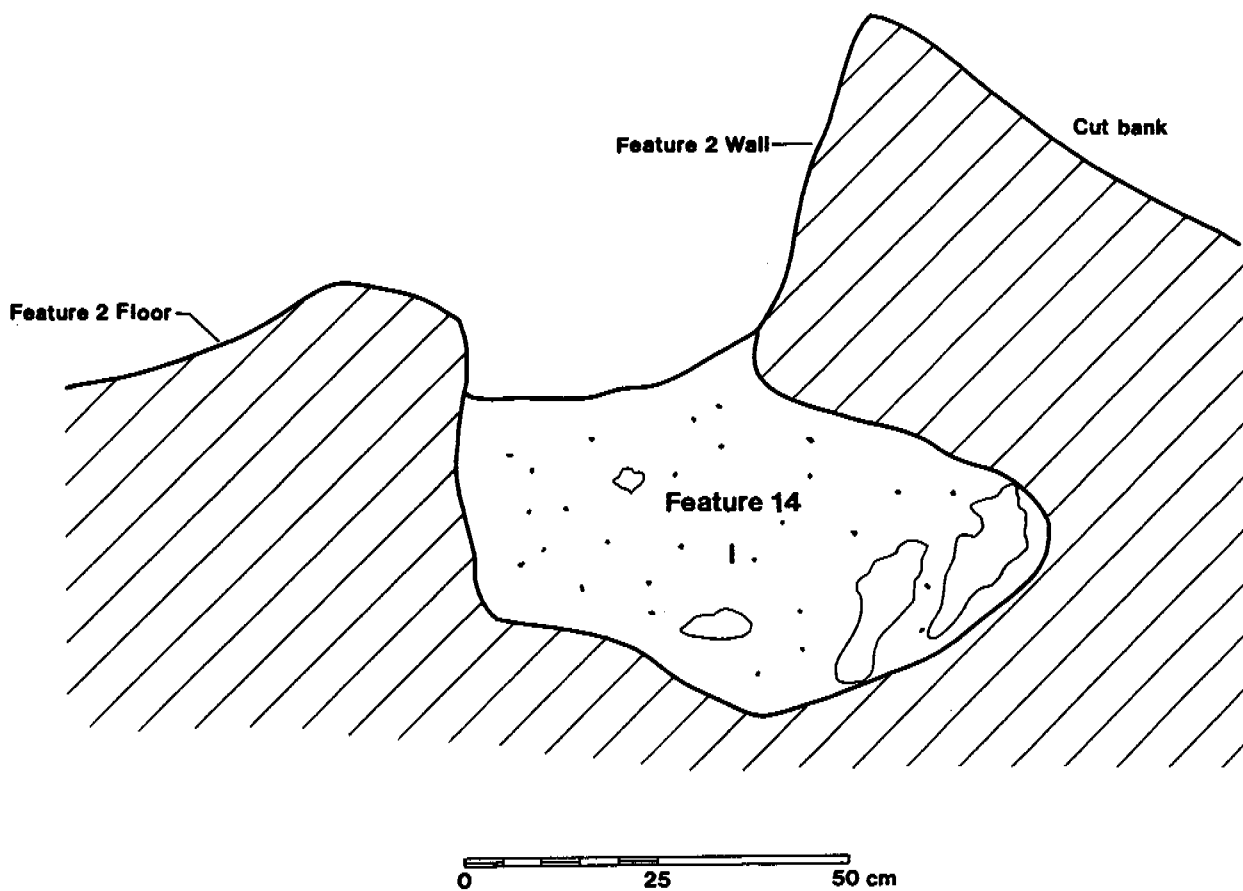
The feature was excavated by separating the northwest and southeast portions of fill. The southeast half was excavated in one complete 40-cm level, revealing a brown sandy loam sediment mixed with at least 20% charcoal deposits and 10% unmodified sandstone rocks. Rodent and root disturbance was also noticed throughout the level. Materials collected within the level included flaked stone and faunal remains. A radiocarbon sample also was retrieved from the fill.

A single stratum was identified on a south-facing profile (Figure 12.18). Stratum I consisted of a dark sandy loam mottled with inclusions of other sandy loam sediments, as well as dispersed charcoal flecks and sandstone rocks. The profile also showed the height of the northern wall edge

of Feature 2 as it topped the existing cut bank, and the height of the floor surface as it extended towards the middle of the structure. Only a small area of fill was removed from the northwest half of the pit due to the large amount removed from the southeast half. Similar sediment deposits were found, with flaked stone artifacts and faunal remains retrieved from the excavation. The pit had earthen walls and a slightly hard earthen surface at the bottom of the feature. Feature 14 may have been some type of storage unit considering the size and location of the pit. This is supported by the pollen and macrobotanical analyses. Maize pollen was identified by Smith and Cheno-Am seeds were identified by McBride (discussed below). The relative paucity of cultural deposits and cultural materials may indicate the feature was subsequently filled in naturally.

Feature 16 was a shallow earthen pit located in the center of pitstructure Feature 2, at site grid coordinates N96.95, E112.00 (Figure 12.12). In plan view the pit was circular measuring 20 cm in diameter. On a northeast-to-southwest cross section the feature showed a shallow basin shape with a maximum depth of 10 cm (Figure 12.14). Due to the low amount of sediment remaining within Feature 16, the entire quantity of fill was collected as a flotation sample. McBride identified bugseed, Cheno-Am, goosefoot, and pigweed seeds, along with charred juniper and pine. This suggests Feature 16 had a subsistence-related function.

Feature 17 was an earthen pit situated at the southeastern edge of Feature 2, at site grid coordinates N95.70, E113.45 (Figure 12.12). In plan view the pit was nearly circular measuring 16 cm east-to-west by 14 cm north-to-south. A northeast-to-southwest cross section shows an irregular-shaped feature with a maximum depth of approximately 18 cm (Figure 12.19). Excavations of Feature 17 were similar to those used on Feature 16, which included collecting the entire amount of fill within the pit as flotation (not analyzed) and waterscreen samples. The interior of the feature was an earthen surface with no indications of modification, and Feature 17 was recorded as an indeterminate earthen pit.



I 0-48 cm - Brown (10YR4/3, moist) sandy loam, dark yellowish brown (10YR4/6, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; few fine roots; abrupt smooth boundary.




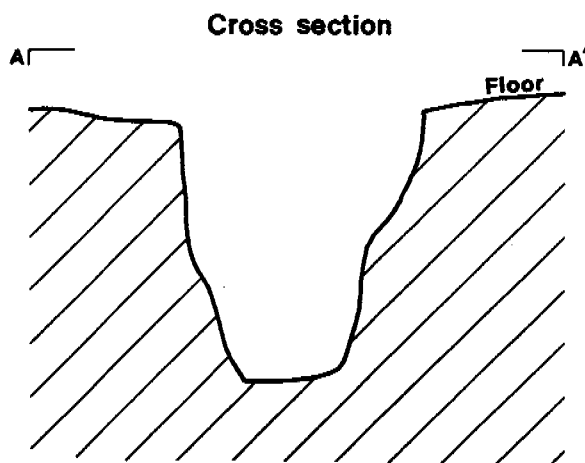
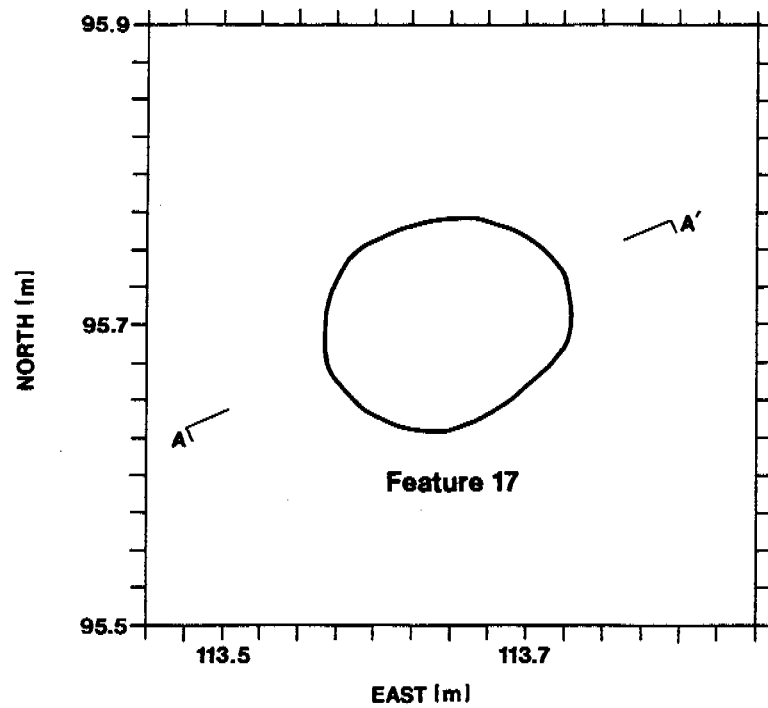
-  Charcoal flecks
-  Mottling of strong brown sandy loam
-  Unexcavated

Figure 12.18. Site LA 115330 Feature 14, South-facing Profile.



— Edge of Feature 17
 A-A' Cross section
 /// Unexcavated

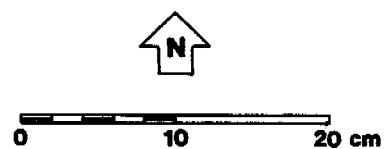


Figure 12.19. Site LA 115330 Feature 17, Plan View and Cross Section.

Feature 19 was a earthen pit located approximately 40 cm west of Feature 17, at site grid coordinates N95.65, E112.75 (Figure 12.12). In plan view the pit was nearly circular measuring 34 cm east-to-west by 32 cm north-to-south. A northwest-to-southeast cross section exhibits a very irregular shape with a maximum depth of 10 cm (Figure 12.20).

Feature 19 was bisected into east and west portions with the east half excavated in one complete 10-cm level, revealing a sandy loam deposit mixed with at least 20% charcoal deposits and 5% root content. A few flaked stone artifacts were collected within the excavation. The west half was removed as flotation, waterscreen, and pollen samples (which were not analyzed).

The interior of Feature 19 consisted of an earthen surface with no indication of alterations or modification, and the feature was recorded as an indeterminate earthen pit.

Feature 20 was a shallow earthen pit located immediately northwest of Feature 19, at site grid coordinates N95.90, E112.60 (Figure 12.12). In plan view the feature was oval-shaped measuring 28 cm east-to-west by 22 cm north-to-south. A northwest-to-southeast cross section shows a basin-shaped pit with a maximum depth of 5 cm (Figure 12.20). The illustration also shows a possible association with Feature 19, considering the limited distance between the two features.

Excavation of Feature 20 included collection of the entire pit fill as flotation and pollen samples due to the low quantity of sediment. The soil was a sandy loam mixed with approximately 20% charcoal deposits and roots. Feature 20 had an earthen interior surface with no indication of alterations or modification, and the feature was recorded as an indeterminate earthen pit. Charred maize cupules, juniper, oak, and pine were identified from the flotation sample, suggesting a storage function for Feature 20.

Feature 22 was an earthen pit situated approximately 40 cm west of Feature 12, the hearth, and located at site grid coordinates

N96.60, E111.20 (Figure 12.12). In plan view the feature was nearly circular measuring 22 cm east-to-west by 20 cm north-to-south. A northeast-to-southwest cross section revealed an irregular-shaped pit with a maximum depth of approximately 40 cm (Figure 12.14). The fill of the pit was removed in one complete 40-cm level, revealing a dark brown sandy loam matrix mixed with at least 10% charcoal deposits, gravel-sized sandstone rocks, and inclusions of a brown sandy loam dispersed throughout the level. Roots and a high amount of rodent disturbance were also observed, and it is thought that the rodent activity is the cause of the irregular-shaped cross section considering the rodent holes noticed along the interior walls of the feature. Materials collected within the fill consisted of flaked stone and possible vegetal remains.

Macrobotanical remains recovered from Feature 22 include maize (cupules), bugseed, Chenopodium, goosefoot, evening primrose, pigweed, purslane, and spurge. Charred wood includes juniper and oak. These data suggest Feature 22 may have functioned for storage purposes.

Feature 23 was an earthen pit located 20 cm southwest of Feature 14, at site grid coordinates N97.65, E112.30 (Figure 12.12). In plan view the feature was circular measuring 26 cm in diameter; an east-to-west cross section shows a cylindrical pit with a maximum depth of 35 cm (Figure 12.21).

Excavation of Feature 23 was accomplished in one complete 35-cm level, revealing a dark brown sandy loam mixed with 20% charcoal deposits, roots, and rodent disturbance. Within the general fill a single bone fragment was recovered, along with flotation, waterscreen, pollen, and radiocarbon samples. Macrobotanical remains identified from this feature include bugseed, Chenopodium, and goosefoot seeds, along with charred juniper, pine, and oak.

Feature 25 was an earthen pit situated along the western edge of Feature 2 at site grid coordinates N96.40, E110.40 (Figure 12.12). In

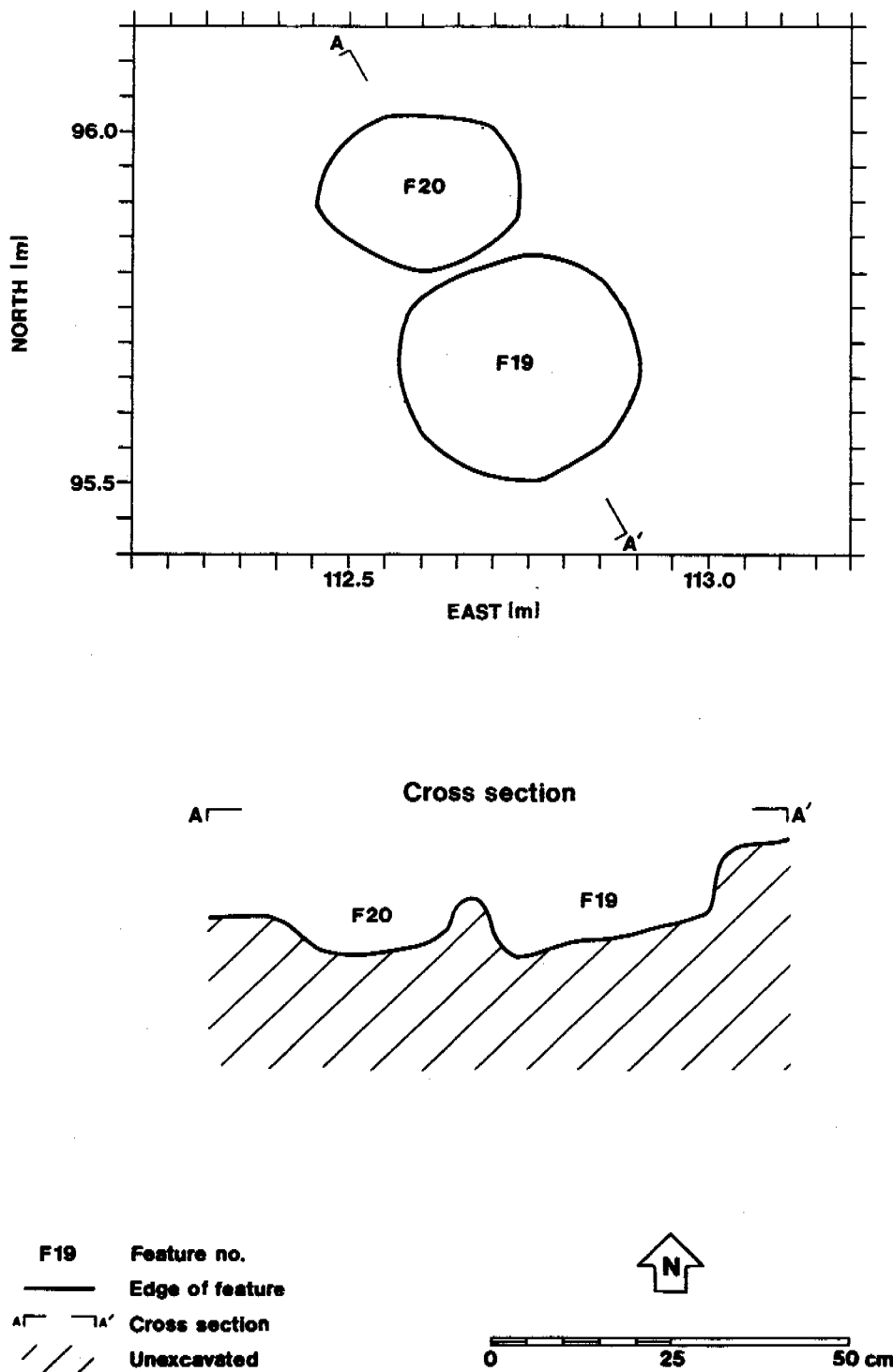


Figure 12.20. Site LA 115330 Features 19 and 20, Plan View and Cross Section.

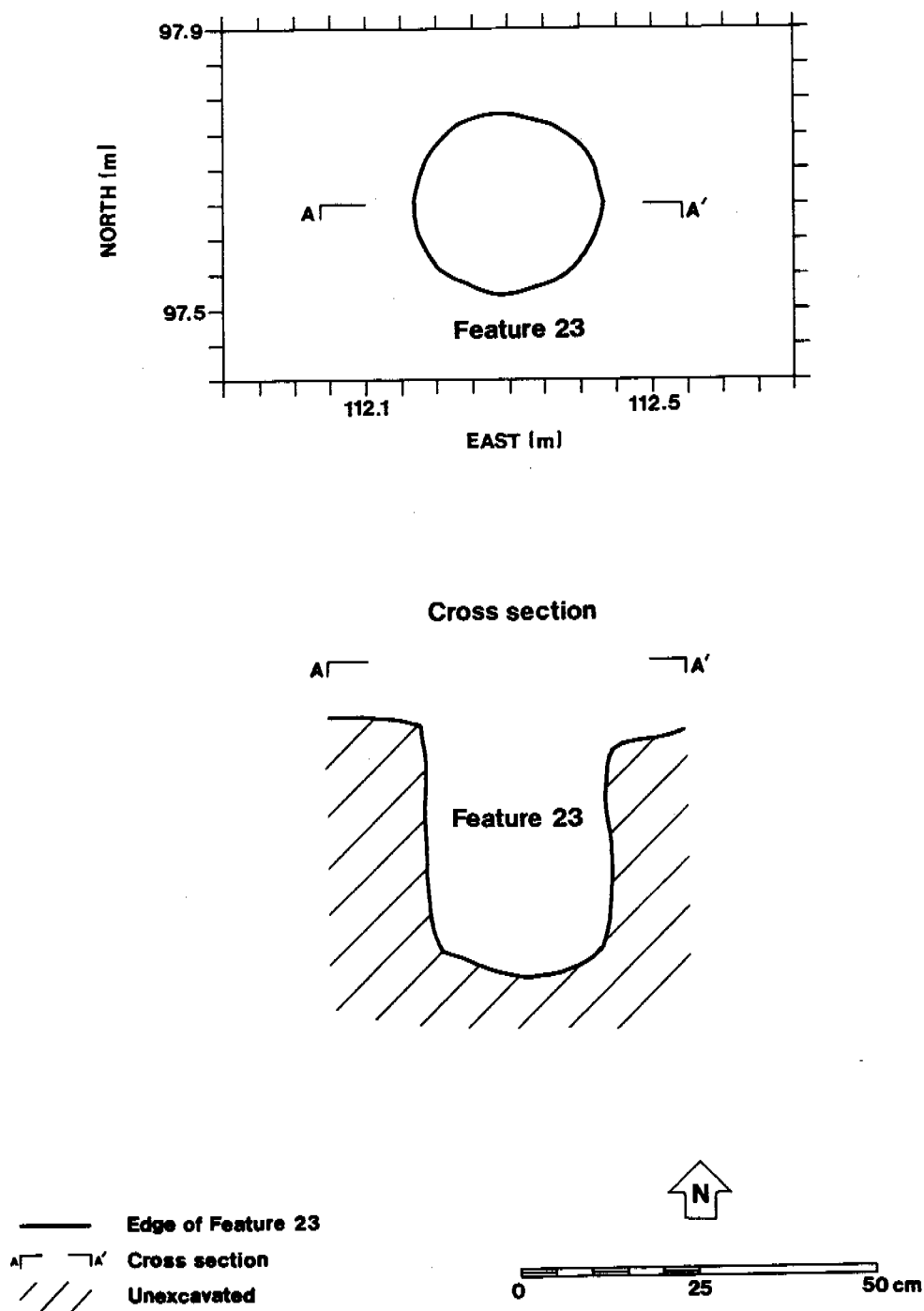


Figure 12.21. Site LA 115330 Feature 23, Plan View and Cross Section.

plan view the feature was nearly circular measuring 22 cm east-to-west by 26 cm north-to-south. A southwest-to-northeast profile shows a bell-shaped pit with a maximum depth of 18 cm and a maximum base diameter of 36 cm (Figure 12.14).

Excavation of Feature 25 was conducted in one complete 18-cm level removing a dark brown sandy loam sediment mixed with 20% charcoal deposits, 10% gravel-sized sandstone rocks, medium-sized roots, and moderate rodent disturbance. Materials collected from the excavation included flaked stone, unmodified stone, and possible vegetal remains much like those collected in Feature 22. Samples retrieved included flotation, pollen, waterscreen, and radiocarbon.

The pit had earthen walls that belled out to a slightly hard earthen surface at the bottom. Feature 25 was recorded as a possible storage unit, considering the location and shape of the pit. This is supported by charred Cheno-Am seeds recovered from the flotation sample.

Feature 26 was a posthole along the southern edge of Feature 2, at site grid coordinates N95.20, E112.90 (Figure 12.12). In plan view the feature was circular measuring 20 cm in diameter. A south wall elevation of Feature 2 exhibits the cylindrical cross section of Feature 26, with a maximum depth of 50 cm from the floor surface of Feature 2 to the base of Feature 26 (Figure 12.22).

The feature was excavated in one complete level, revealing a sandy loam sediment mixed with 10% charcoal deposits, and moderate root and rodent disturbance. Other materials in the fill included small pieces of unburned wood fragments (identified as pine by McBride) which are thought to be possible post remains. Cultural materials collected from the fill included lithic artifacts, unmodified stone, faunal remains, and possible vegetal remains.

Feature 26 was recorded as a posthole considering the depth, location and morphology of the feature.

Floor Assemblage. Artifacts from the floor of Feature 2 included a ground stone metate fragment (FS 178), located at site grid coordinates N96.20, E111.50, and a flaked stone artifact (FS 179), located at N97.20, E111.64 (Figure 12.12). Both artifacts were encountered during excavation of the floor-fill units. One radiocarbon sample from floor context dated to 1750 ± 60 BP (Beta-121239; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A).

Roof. Excavation of Feature 2 revealed a single possible posthole located along the southern wall edge (Figure 12.12). No evidence of internal postholes was encountered which may suggest that the roof was supported outside the wall edges. The lack of roof debris in the fill of the floor may indicate that the roof had been dismantled. With the exception of the single posthole no evidence of roof construction or supports were found.

Abandonment and Postabandonment. Feature 2 appears to have been cleaned out prior to abandonment. The two artifacts that were on the floor surface may have been intentionally placed as refuse deposits. It is thought that the pitstructure was subsequently filled with trash and naturally deposited sediments.

Interpretation. Feature 2 was a circular pitstructure dating to the Basketmaker II period, located on the west side of State Highway 602. The pitstructure included one floor surface with several floor features which are associated with the residence. No ventilator was present in Feature 2; however, a hearth was discovered on the floor surface, and if a ventilator was constructed it is most likely the opening would have been located in the southeastern portion of the structure where the wall was destroyed by construction of the cut bank of State Highway 602.

Feature 2 is the single best example to date of Basketmaker II architecture in the Zuni region. In addition, maize pollen, cupules, kernels, and cobs from this pitstructure support the interpretation of site LA 115330 as an early farmstead. Upon abandonment, the roof appeared to have been

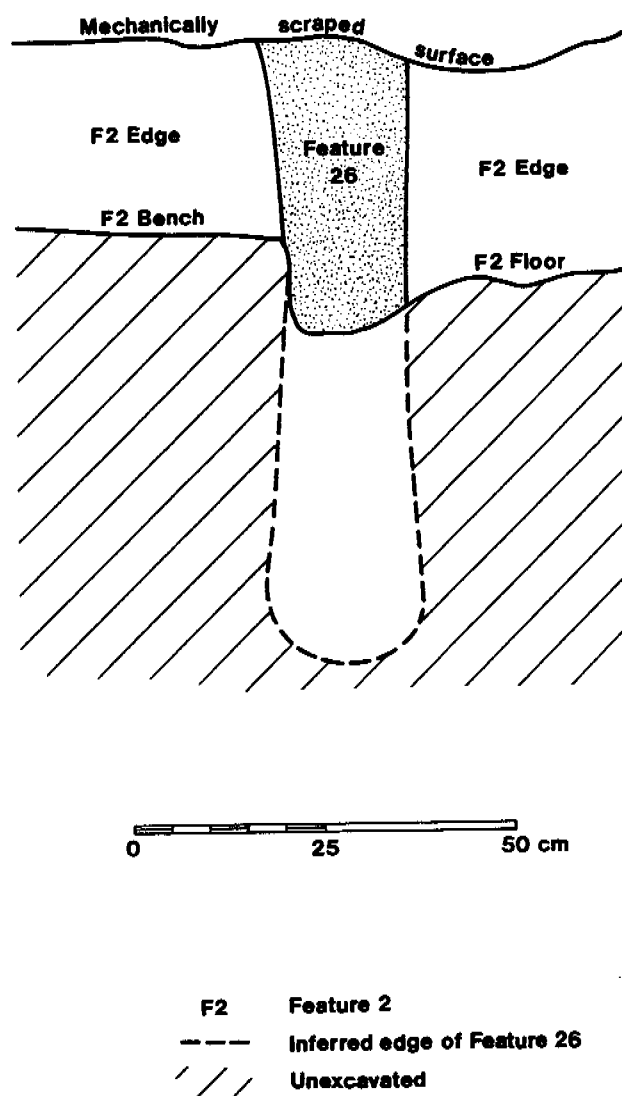


Figure 12.22. Site LA 115330 Feature 2, South Wall Elevation Showing Feature 26 Cross Section.

dismantled and the pit structure was subsequently filled with trash and naturally deposited sediments.

Feature 9

Feature 9 was considered an activity area, or possible shallow pit structure, located approximately 3 m northwest of Feature 2 and adjacent to the existing west fence line at site grid coordinates N98.00, E106.00 (Figure 12.3). Feature 9 was discovered during mechanical stripping of the site, and was bisected by an existing buried telephone cable as shown on a plan view of Feature 9 (Figure 12.23). In plan view the feature was irregular-shaped measuring 4.20 m east-to-west by 3.80 m north-to-south (providing a maximum floor area of 13.8 sq m). A cross section of the feature also shows the balk of sediment in which the buried telephone cable exists and the area of Feature 9 on either side of the buried cable (Figure 12.24). The upper portion of Feature 9 was encountered approximately 40 cm below the modern ground surface and included a depth of approximately 20 cm to the base of the feature.

Once the overburden sediment located on both sides of the buried cable was removed and the boundaries of Feature 9 were established, a 3.80-m-by-0.50-m hand-excavated trench designated as SU 9 was excavated to determine the depth and nature of Feature 9. The unit was located on the east side of the buried telephone cable with the southwest corner of the unit at site grid coordinates N96.40, E107.80 (Figure 12.23).

A total of two 10-cm levels were excavated from the trench revealing a dark brown sediment mixed with dispersed charcoal flecks and roots which were observed in both levels. Artifact materials from Level 1 included flaked stone, ground stone, and faunal remains. Level 2 retrieved flaked stone artifacts and faunal remains which appear to have been modified.

A second control unit was placed on the west side of the buried cable, consisting of a 1-by-1-m unit, SU 10 located at N97.00 E104.00. This unit

removed two arbitrary 8- to 10-cm levels consisting of a dark brown sandy loam fill with charcoal inclusions, sandstone rocks, roots, and rodent disturbance. Only flaked stone artifacts were collected from the unit.

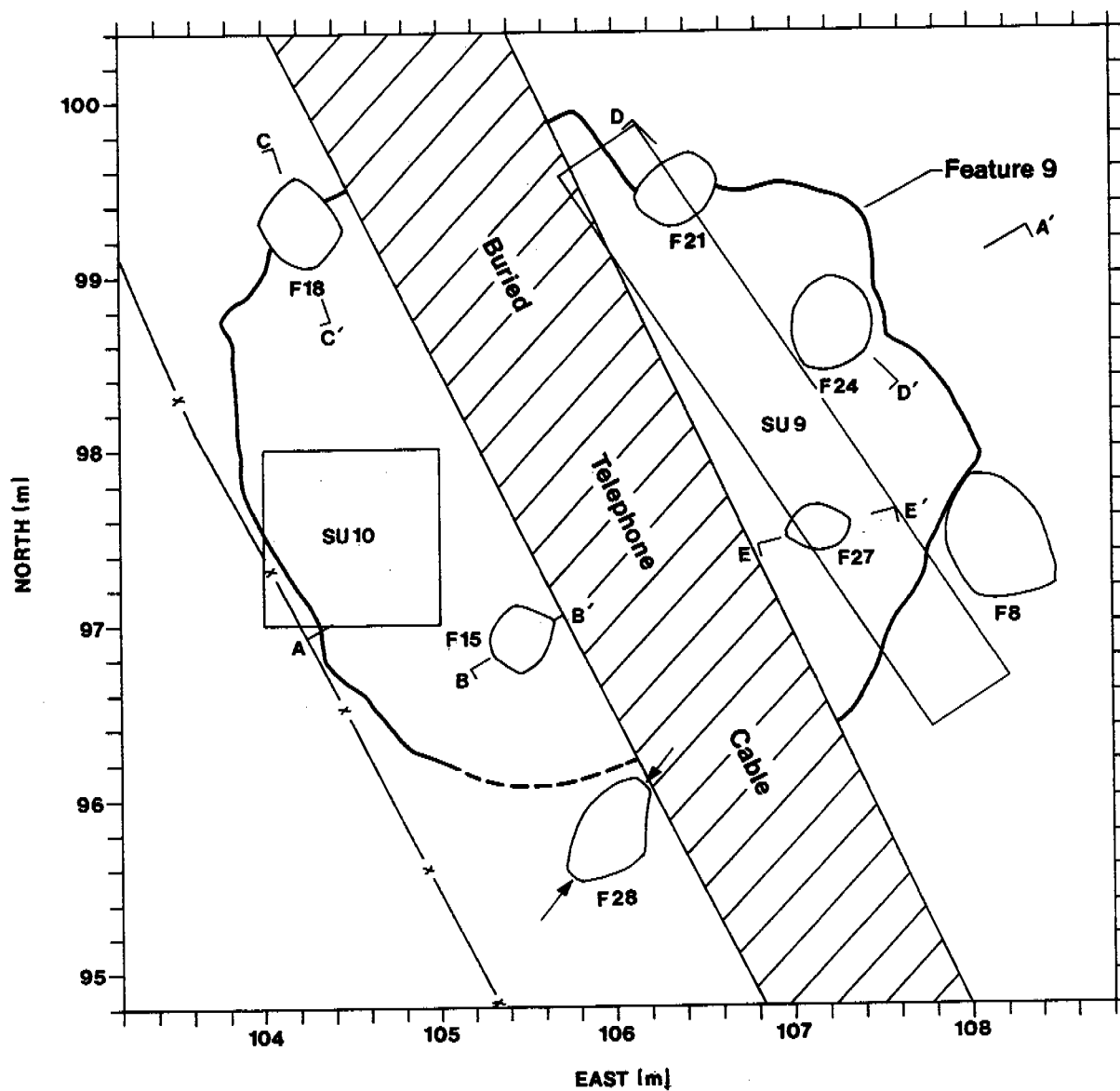
Once the depth of Feature 9 was determined, excavation procedures continued by establishing eight floor-fill units, four on each side of the cable line. All units revealed the same type of sediment consisting of a dark brown sandy loam matrix mixed with at least 10% charcoal deposits, small sandstone rocks, roots, and evidence of heavy rodent and insect disturbance.

Cultural materials collected from the units included flaked stone artifacts, ground stone, and faunal remains. One of the flaked stone artifacts was a possible projectile point fragment, along with worked bone observed in some of the faunal assemblage. Other interesting items included a worked bone bead, a possible pipe also made of bone, and at least three pieces, each less than 2 cm in size, of blue colored pigment. These are detailed in the Analytical Contributions section of this chapter.

Removal of fill from Feature 9 revealed a large shallow depression exposing six charcoal stains at the bottom of the feature. These pits were designated Features 15, 18, 21, 24, and 27 (Figure 12.23). All the features were fully investigated and are discussed below.

Associated Features. Feature 15 was an earthen pit situated within Feature 9, next to the buried telephone cable at site grid coordinates N96.90, E105.50 (Figure 12.25). In plan view the feature was irregular-shaped measuring 40 cm north-to-south by 36 cm east-to-west. A cross section of the pit shows a cylindrical shape with a maximum depth of approximately 48 cm (Figure 12.25).

The fill within Feature 15 was excavated in one complete 48-cm level, revealing a dark brown sandy loam sediment mixed with sparse charcoal deposits dispersed throughout the level. Cultural materials collected within



- SU Study unit no.
- F8 Feature no.
- Edge of Feature 9
- - - Inferred edge of Feature 9
- Feature outline
- x— Fence line and west edge of right-of-way
- /// Unexcavated area
- A' — A' Cross section
- ← Profile location

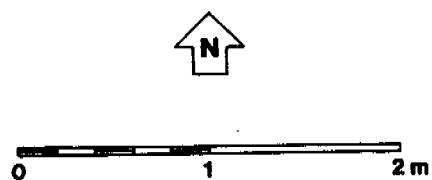


Figure 12.23. Site LA 115330 Feature 9, Plan View.

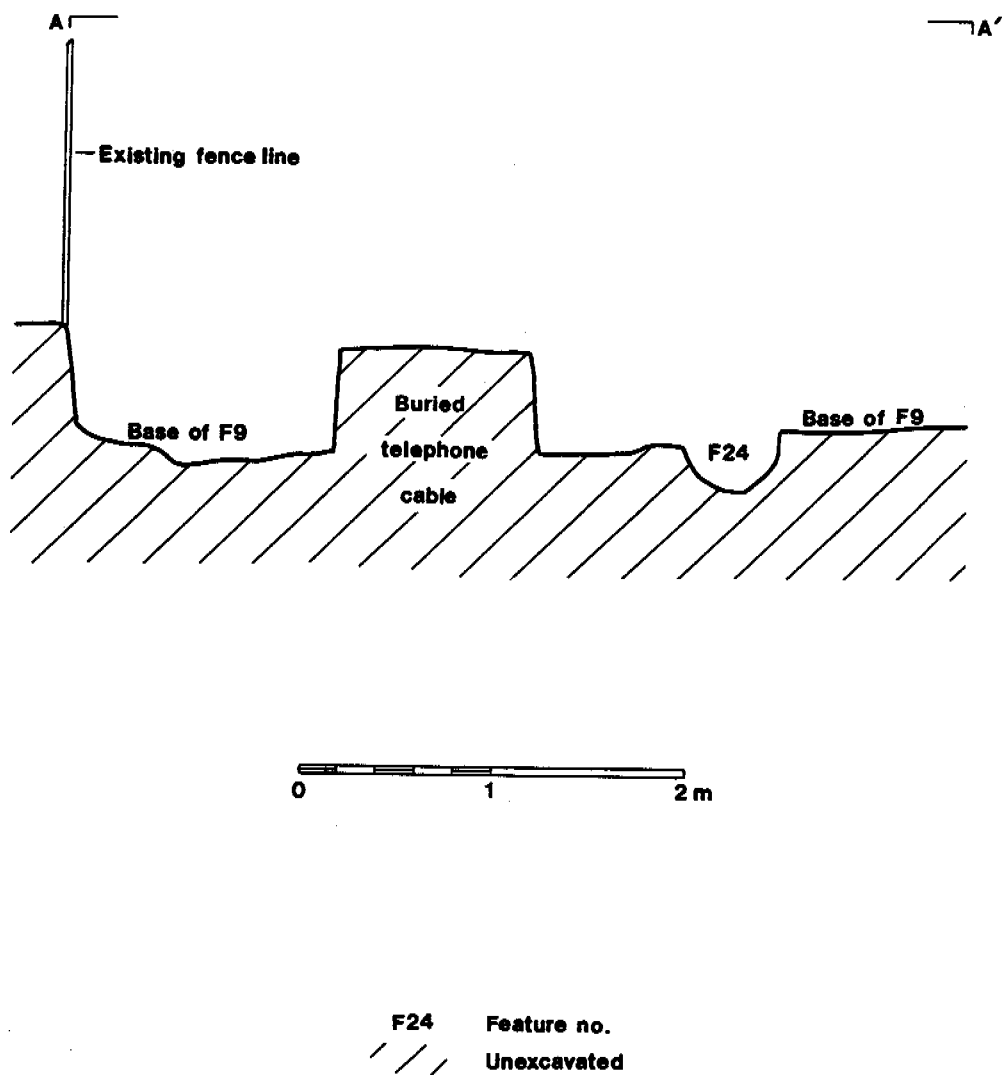


Figure 12.24. Site LA 115330 Feature 9, Cross Section.

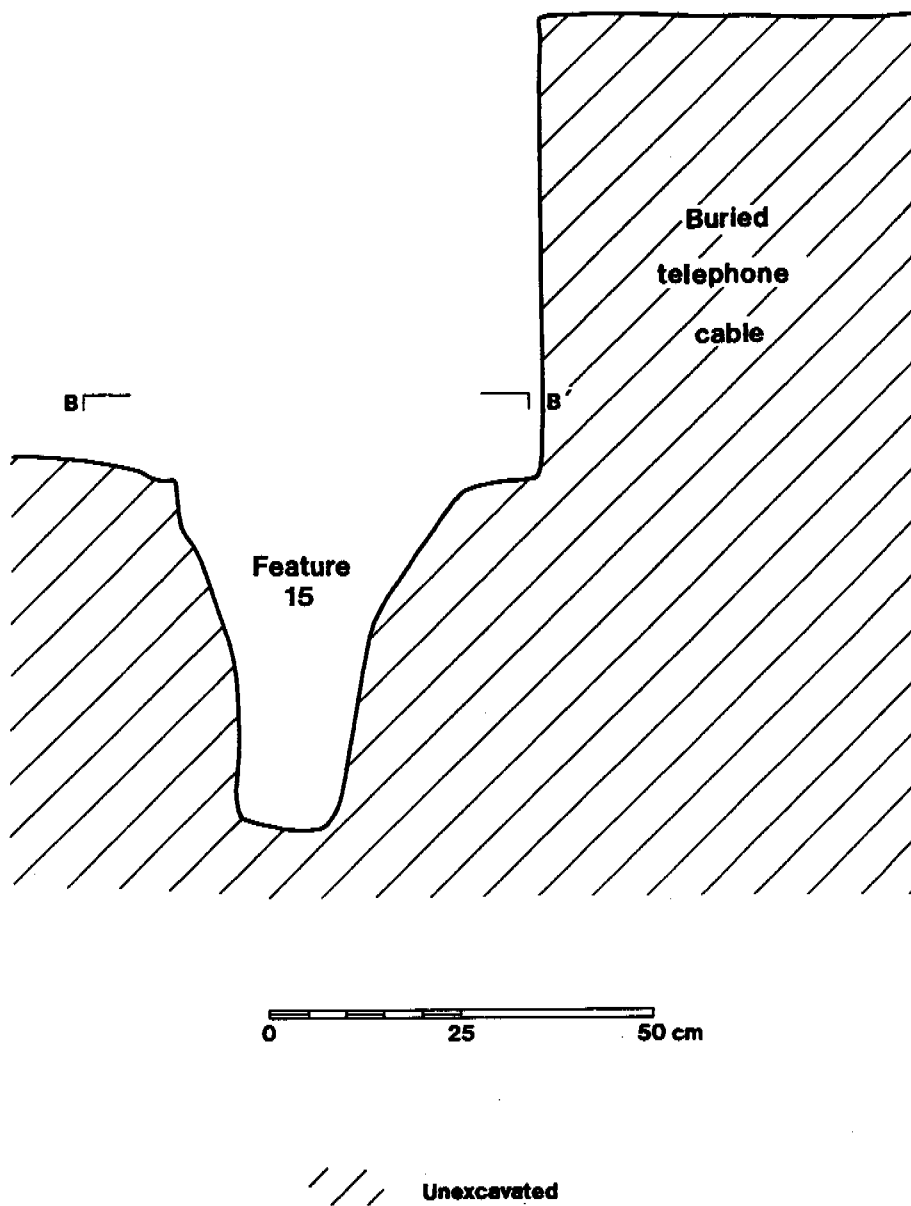


Figure 12.25. Site LA 115330 Feature 15, Cross Section.

the level consisted of flaked stone artifacts and a piece of blue pigment approximately 2 to 3 cm in size.

The pit had earthen walls as well as an earthen bottom, with no indications of modification or alterations such as oxidation. Feature 15 was recorded as a posthole considering the depth and cross-section shape of the pit. Archaeobotanical remains include one maize cupule, bugseed and *Cheno-Am* seeds, and maize and sunflower pollen. Contents of the fill suggest the feature was subsequently filled with trash and naturally deposited sediments.

One radiocarbon sample from Feature 15 dated to 2210 ± 60 BP (Beta-121242; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A), suggesting use during the Basketmaker II period.

Feature 18 was an earthen pit situated along the northwest edge of Feature 9, at site grid coordinates N99.30, E104.25 (Figure 12.23). In plan view the feature was irregular-shaped measuring 44 cm east-to-west by 50 cm north-to-south. A cross section of the pit also exhibits an irregular shape with a maximum depth of approximately 35 cm (Figure 12.26). Excavation of Feature 18 was completed in one 35-cm level, revealing a dark brown sandy loam with inclusions of charcoal deposits and heavy root disturbance which is the cause of the irregular-shaped walls observed during excavation. Cultural materials collected from the pit included flaked stone materials, faunal remains, and one gravel-sized piece of yellow pigment. Flotation, pollen, waterscreen, and radiocarbon samples were also taken from the fill.

Excavation of the pit revealed disturbed earthen walls and an earthen surface at the base of the feature, with no indication of alterations such as oxidation. Six maize cupules were recovered from the flotation sample, suggesting a storage function for Feature 18.

Feature 21 was an earthen pit situated along the northeast edge of Feature 9, at site grid coordinates N99.50, E106.40 (Figure 12.23). In

plan view the feature was nearly oval-shaped measuring 44 cm northeast-to-southwest by 35 cm northwest-to-southeast. A northwest-to-southeast cross section of the pit reveals an irregular shape with a maximum depth of approximately 28 cm (Figure 12.27).

Feature 21 was excavated in northwest and southeast portions. The northwest half was removed in one complete level as was the opposite half. Both halves contained the same type of sediment type which is shown along a northwest-facing profile of the pit feature (Figure 12.28). The single stratum comprised a sandy loam deposit mixed with small sandstone rocks, at least 5% charcoal flecks, and roots. Materials recovered from the fill of Feature 21 included flaked stone artifacts and yellow pigment, similar to those collected in the pit Feature 18. Samples taken from the pit were flotation, pollen, waterscreen, and radiocarbon.

The walls and bottom surface of Feature 21 were earthen surfaces with no indication of modification or alterations such as oxidation. One maize cupule and one maize kernel were recovered from Feature 21, suggesting its function was subsistence related.

Feature 24 was an earthen pit situated along the eastern edge of Feature 9, at site grid coordinates N98.70, E107.25 (Figure 12.23). In plan view the feature was nearly circular measuring 52 cm north-to-south by 44 cm east-to-west. A northwest-to-southeast cross section shows a basin-shaped pit with a maximum depth of approximately 24 cm (Figure 12.27).

Feature 24 was excavated in east and west portions. The west portion was removed in one complete level as was the opposite half. Both portions contained the same type of matrix as shown along a west-facing profile (Figure 12.29). The single stratum consists of a dark brown sandy loam mixed with sparse charcoal flecks, sandstone rocks, roots, and heavy insect disturbance that was observed along the walls of the pit. Items collected from the fill included three flaked stone artifacts and a few burned faunal remains.

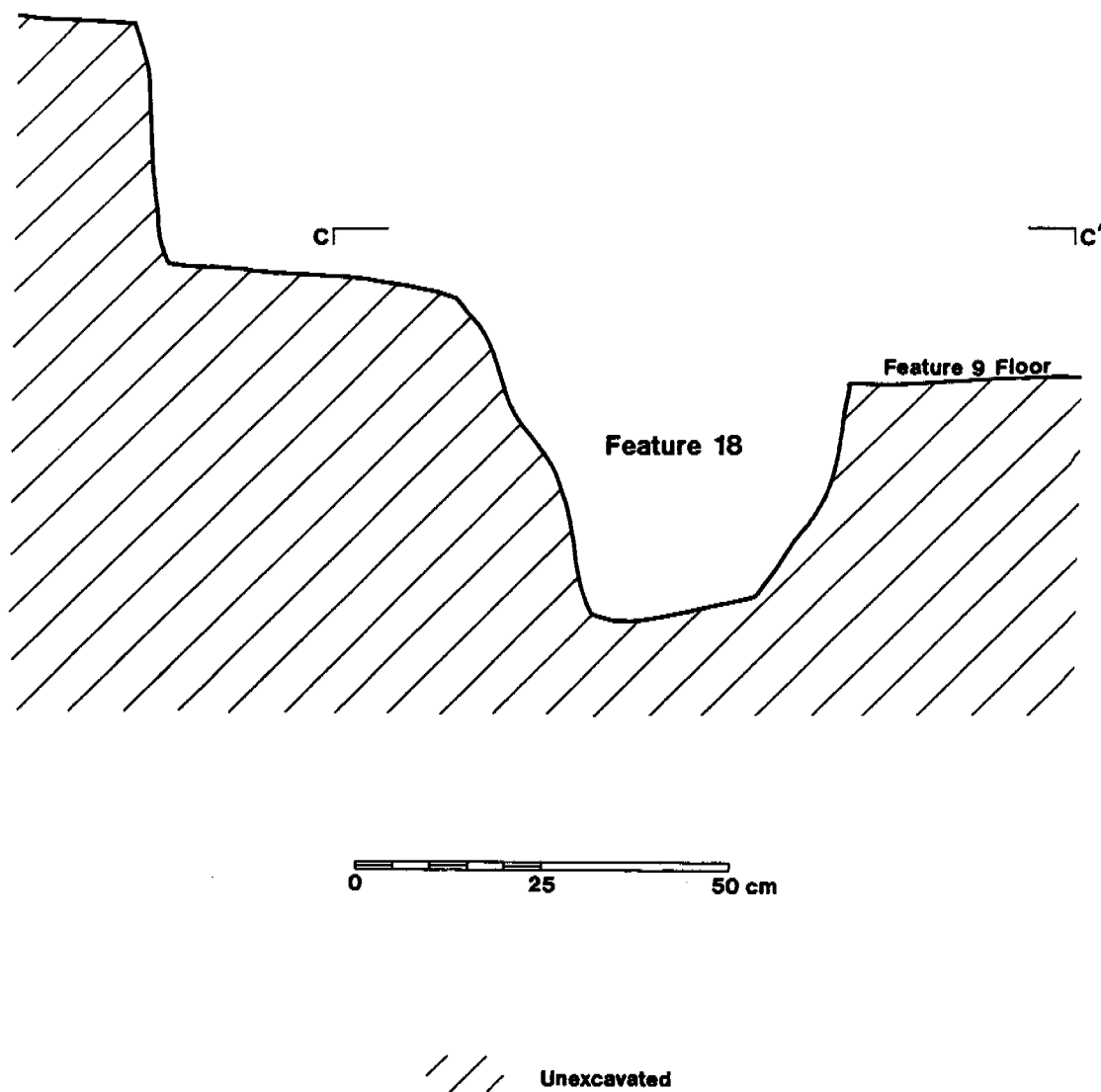
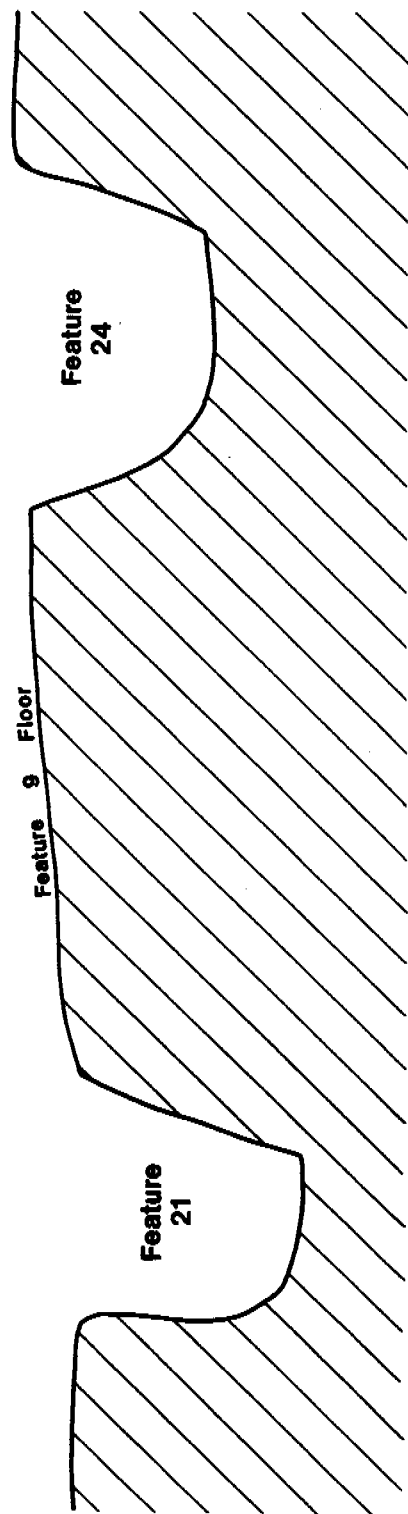


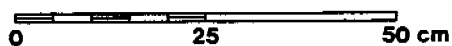
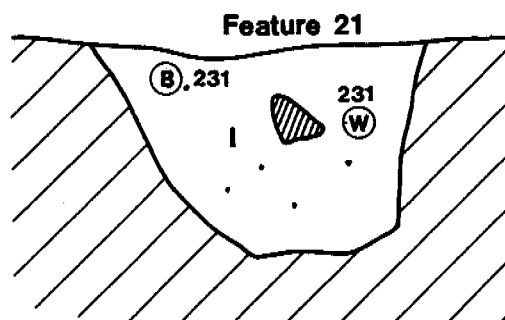
Figure 12.26. Site LA 115330 Feature 18, Cross Section.

—10'

D1



/// Unexcavated



0-28 cm - Dark brown (10YR3/3, moist) sandy loam, brown (10YR3/4, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; common fine roots; abrupt smooth boundary.

I



Charcoal flecks



Flotation sample



Waterscreen sample



Sandstone rock

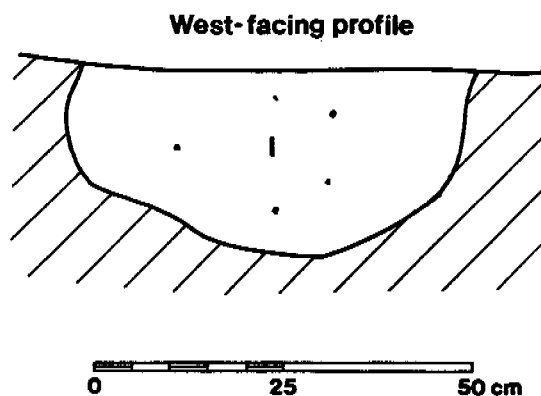
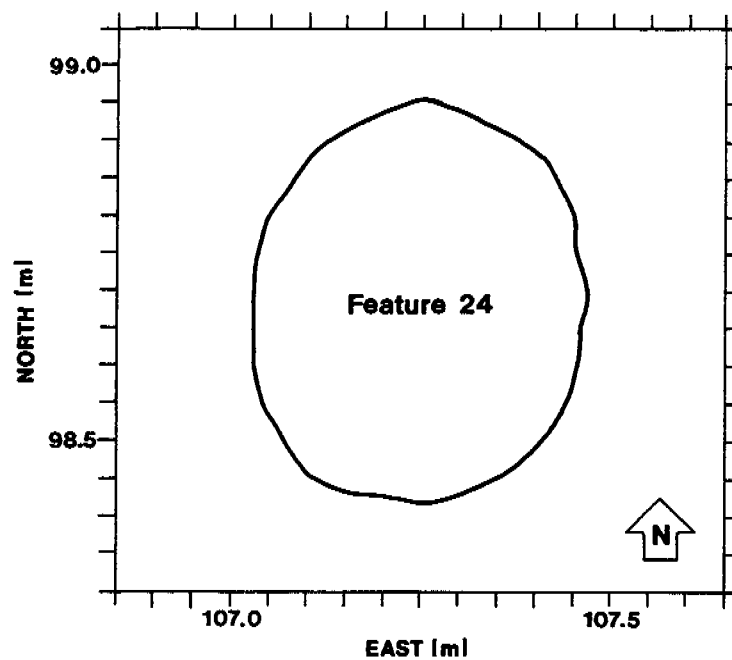
231

Field specimen no.



Unexcavated

Figure 12.28. Site LA 115330 Feature 21, Northwest-facing Profile.



- 0-24 cm - Dark brown (10YR3/3, moist) sandy loam, brown (10YR3/4, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; few fine roots; abrupt smooth boundary.
- • Charcoal flecks
- /// Unexcavated

Figure 12.29. Site LA 115330 Feature 24, Plan View and West-facing Profile.

The pit had an earthen surface with no indication of modification or alteration such as oxidation. The majority of the walls were heavily disturbed by insect holes and made it difficult to follow a definite wall edge during excavation. Three maize cupules were identified from the flotation sample, and maize pollen was also present. This suggests Feature 24 was used for storage purposes.

Feature 27 was an earthen pit situated along the southeast end of Feature 9, at site grid coordinates N97.54, E107.20 (Figure 12.23). The pit was oval-shaped in plan view measuring 36 cm east-to-west by 25 cm north-to-south. A cross section revealed a basin-shaped pit with a maximum depth of approximately 18 cm (Figure 12.30).

The feature was small enough that the fill of the pit was excavated in one complete level, revealing a dark brown sandy loam with less than 2% charcoal content, gravel-sized sandstone rocks, roots, and heavy rodent and insect disturbance which was observed along the wall surfaces and throughout the fill. A single flaked stone artifact was retrieved from the pit. Samples collected included flotation, pollen, and waterscreen.

The pit had earthen surfaces with evidence of heavy rodent and insect disturbance. Five maize cupules were identified from the flotation analysis, suggesting Feature 27 was used for storage purposes.

Interpretation. Feature 9 was documented as an activity area (or possible shallow pitstructure) with six associated pit features (Figure 12.23). Each of these pits contained evidence of maize. Additionally, it is quite likely that additional features (such as a hearth) exist below the buried telephone cable where investigations were not conducted. The designation of Feature 9 as an activity area was determined by the absence of walls and other features which are typically observed such as in pitstructures. Shallow pitstructures are known for this period, with very subtle walls (such as at site LA 26306; Chapter

11). Such walls in Feature 9 could not be identified; however, the feature was a depression. The activity area, however, may have been sheltered by a roof or ramada, as a possible posthole was discovered. No definite roof or ramada debris were encountered, however.

Extramural Features

A total of seven extramural features were investigated on site LA 115330 (Figure 12.3). These features were designated as Features 1, 3, 4, 5, 6, 8, 10, and 28 all of which were earthen pits in various sizes (Figure 12.31). (Feature 7 turned out to be noncultural; it is described below.) All features were fully investigated by means of hand excavation. When possible each feature was bisected into two portions with one half excavated in one complete level, and the opposite side excavated according to strata observed along the feature profile; the profile was drawn prior to removal of the remaining fill of the feature. When a profile showed a single stratum, the opposite side was also removed in one complete level. When small features were encountered all fill was removed with no profile drawn. All sediments removed from features were screened through 1/8-in hardware mesh, and samples were taken.

Feature 1. Feature 1 was originally described as a possible pitstructure (Figure 12.1), that was encountered during survey work (Abbott 1997). Further investigations during data recovery determined the feature to be a small earthen pit. Feature 1 was located on the top edge of the westcut bank at site grid coordinates N102.00, E110.00 (Figure 12.3). In plan view the pit was irregular-shaped measuring 80 cm northwest-to-southeast by 65 cm northeast-to-southwest. A cross section of Feature 1 exhibits a slightly belled shape with a maximum depth of approximately 64 cm (Figure 12.32). The northwest half of the feature was excavated in one complete 64-cm level, consisting of a sandy loam mixed with inclusions of decomposing sandstone deposits and approximately 5% charcoal flecks observed throughout the level. Artifacts collected were flaked stone materials and a possible biface fragment in addition to faunal remains. A radio-

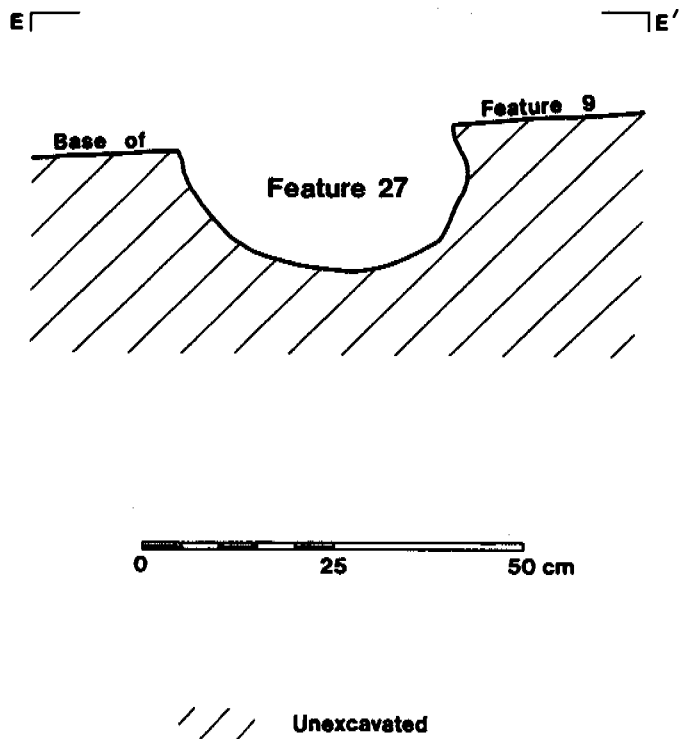


Figure 12.30. Site LA 115330 Feature 27, Cross Section.

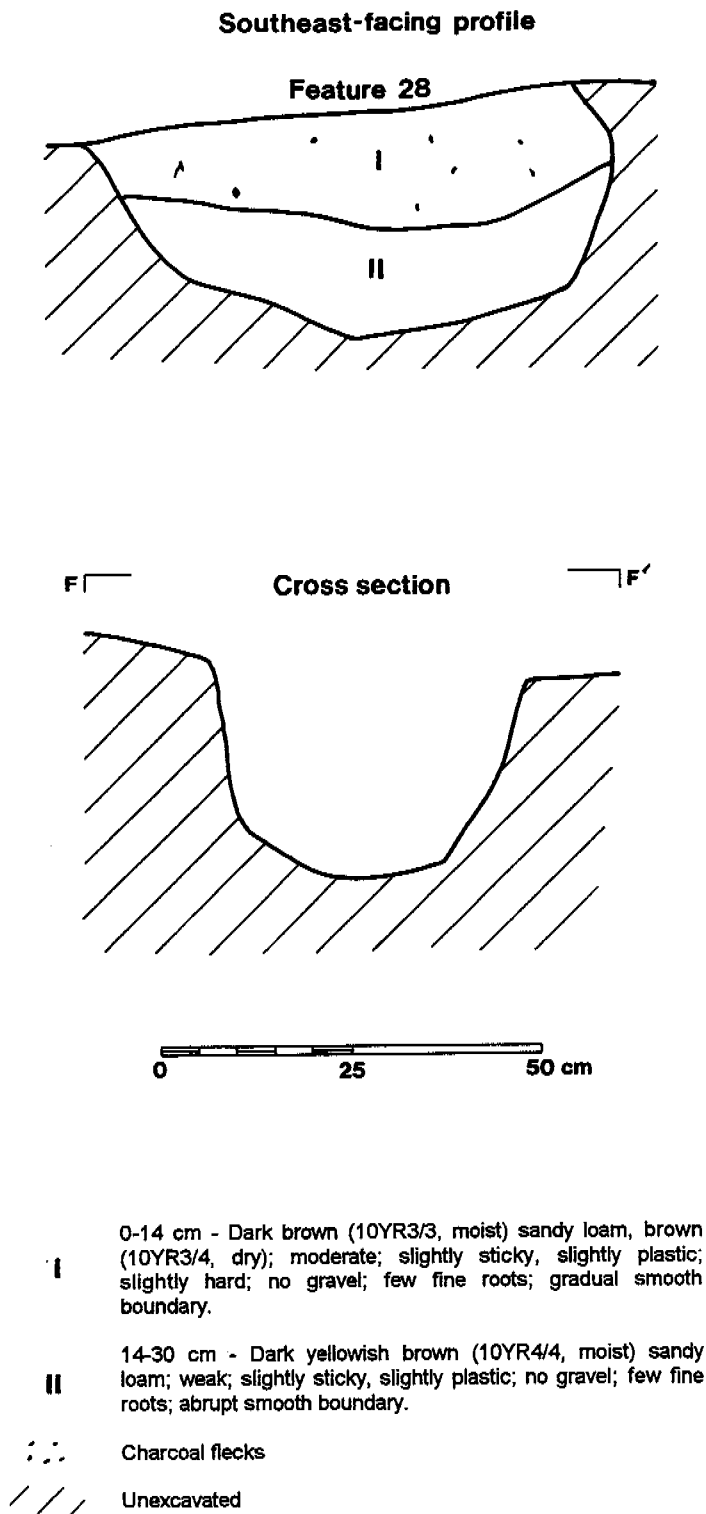


Figure 12.31. Site LA 115330 Feature 28, Southeast-facing Profile and Cross Section.

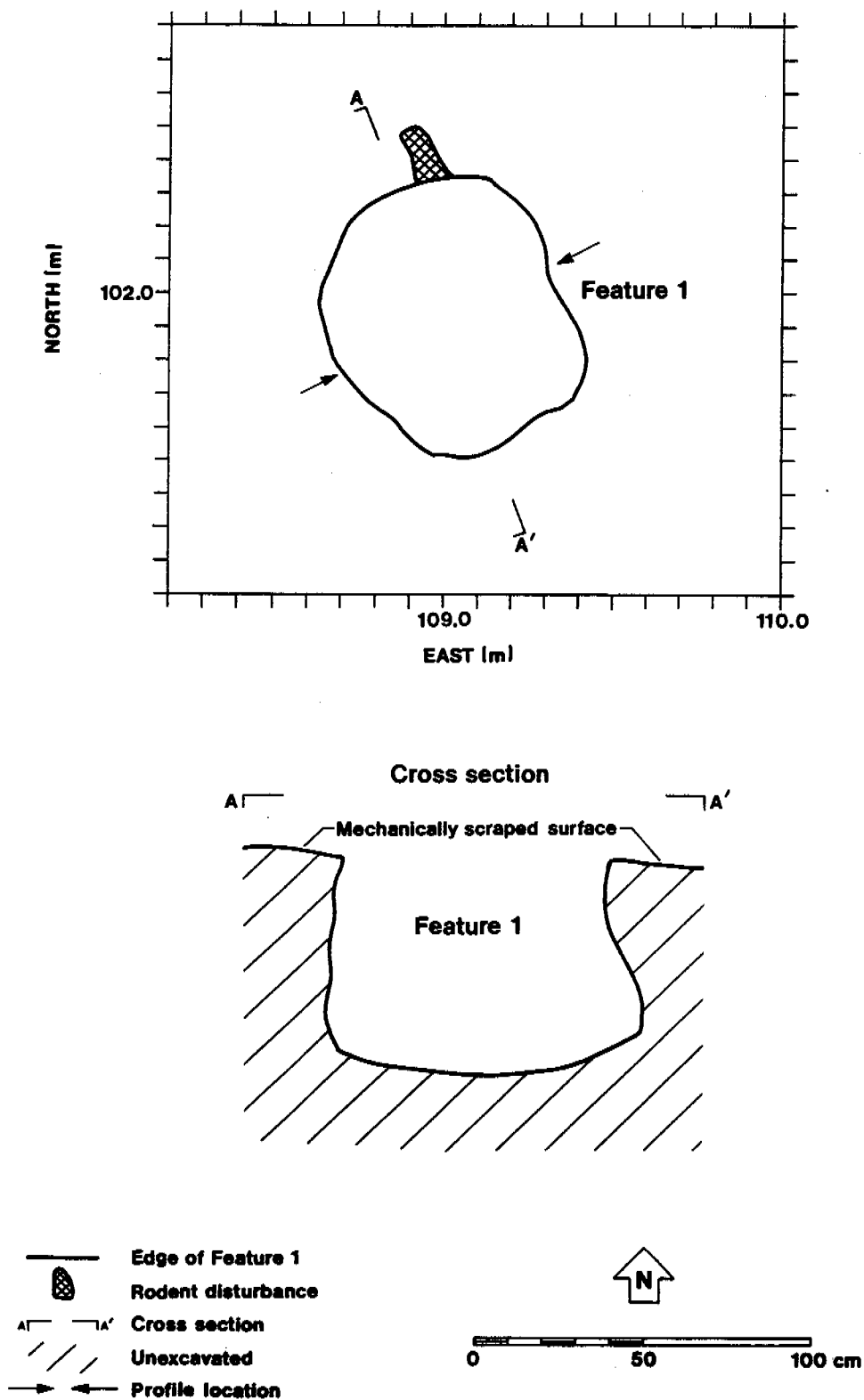


Figure 12.32. Site LA 115330 Feature 1, Plan View and Cross Section.

carbon sample was also retrieved from the fill of the pit. Completion of the northwest half excavation revealed a single stratum as shown along a southeast wall profile (Figure 12.33). The southeast half was also removed in one complete level due to the single stratum observed in the profile. Fill contents included approximately 10% charcoal flecks mottled within the sediment as well as decomposing sandstone that was also found in the northwest half. Cultural materials included flaked stone artifacts and faunal remains. Flotation, pollen, waterscreen, and radiocarbon samples were also taken from the fill. The pit had slightly hard earthen walls and an earthen surface at the bottom of the feature. The feature is presumed to be some type of storage unit that was subsequently filled with trash and naturally deposited sediments. This is supported by maize cupules (n=4) and maize pollen identified during analysis.

Feature 3. Feature 3 was the remains of an earthen pit situated on the west edge of the sloping cut bank of State Highway 602, at site grid coordinates N100.90, E111.20 (Figure 12.3). The eastern edge of the feature had been destroyed by construction of the cut bank. A projected plan view measurement was determined from the intact bottom surface of Feature 3, showing a diameter of 60 cm. A east-to-west cross section reveals a better perspective of the disturbed pit located on the sloping cut bank and the remaining fill that was removed during excavation (Figure 12.34).

The fill located within the east half of the feature was removed; it consisted of two types of soil as shown along an east-facing profile of Feature 3 (Figure 12.35). Stratum I was brown sediment with sparse charcoal flecks dispersed throughout the stratum. It blended into the lighter yellowish brown sediment of Stratum II, located at the base of the feature, which contained the same amount of charcoal flecks. The only difference between the strata was the soil color.

The west half of the feature was excavated in one complete level. Cultural materials retrieved from the fill of the pit included four pieces of

flaked stone. Samples collected were flotation, pollen, waterscreen, and radiocarbon.

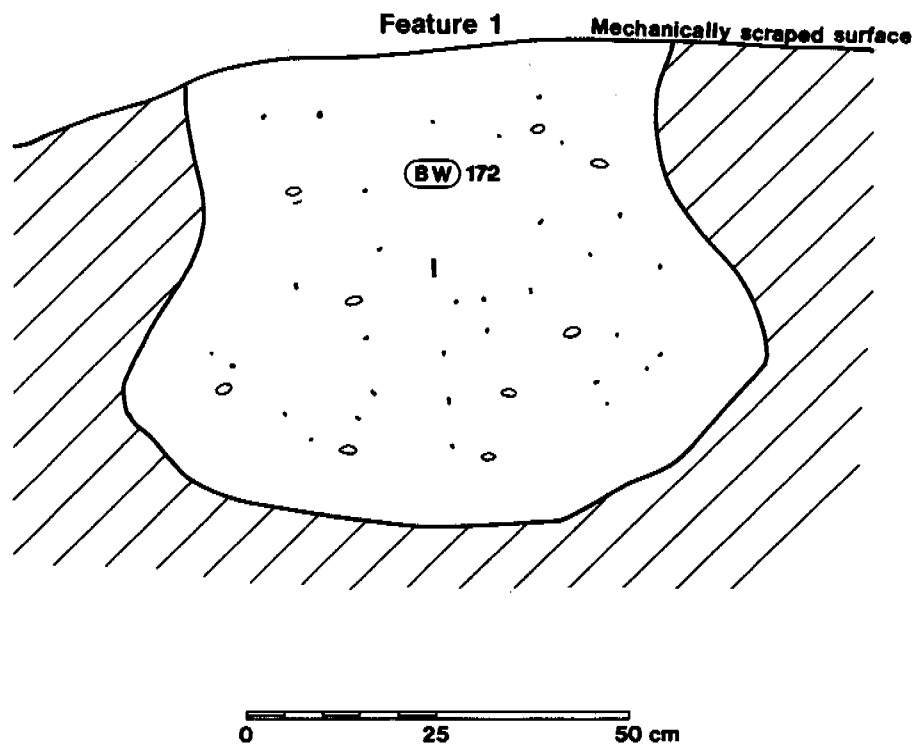
From observations of the western wall edge, Feature 3 may have been the remains of some type of storage unit, considering the bell-shaped contour of the wall and the basin-shaped bottom surface of the pit. This is supported by a maize cupule recovered from the flotation sample.

Feature 4. Feature 4 was a large earthen pit that was encountered during excavations of SU 2, and located at site grid coordinates N102.70, E107.70 (Figure 12.3). In plan view the feature was circular measuring 1.07 m east-to-west by 1.15 m north-to-south. An east-to-west cross section shows a trough-shaped pit with a maximum depth of approximately 48 cm (Figure 12.36).

Feature 4 was bisected into east and west portions which were excavated separately. The east half was excavated in one complete level to the base of the feature. Soils within the fill included approximately 45% charcoal content, pieces of fire-cracked rock approximately 2 to 10 cm in size, many medium-to-coarse roots, and evidence of heavy insect disturbance mostly observed at the base of the feature. Artifacts recovered from the fill of the east half excavation included 35 to 45 pieces of flaked stone, pigment, burnt bone, and eggshell fragments. Other collected specimens included large pieces of charcoal 3 to 4 cm in size which were retrieved as a radiocarbon sample.

Completion of the east half excavation revealed two strata as shown along an east-facing profile of Feature 4 (Figure 12.37). Stratum I included a dense concentration of charcoal deposits mixed with fire-cracked rock observed at the northern end of the pit. Stratum I gradually faded into Stratum II which had similar soil colors and texture but a lower amount of charcoal deposits and fire-cracked rock. Stratum II also exhibited a high concentration of insect activity noticed throughout the stratum.

Excavation of Feature 4 continued by removing the west half in two stratum levels



- I 0-65 cm - Dark yellowish brown (10YR4/4, moist) sandy loam, dark yellowish brown (10YR3/4, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; many fine to medium roots; abrupt smooth boundary.
- ○ ○ Gravel
- • • Charcoal flecks
- (BW) Flotation and waterscreen samples
- 172 Field specimen no.
- /// Unexcavated

Figure 12.33. Site LA 115330 Feature 1, Northwest-facing Profile.

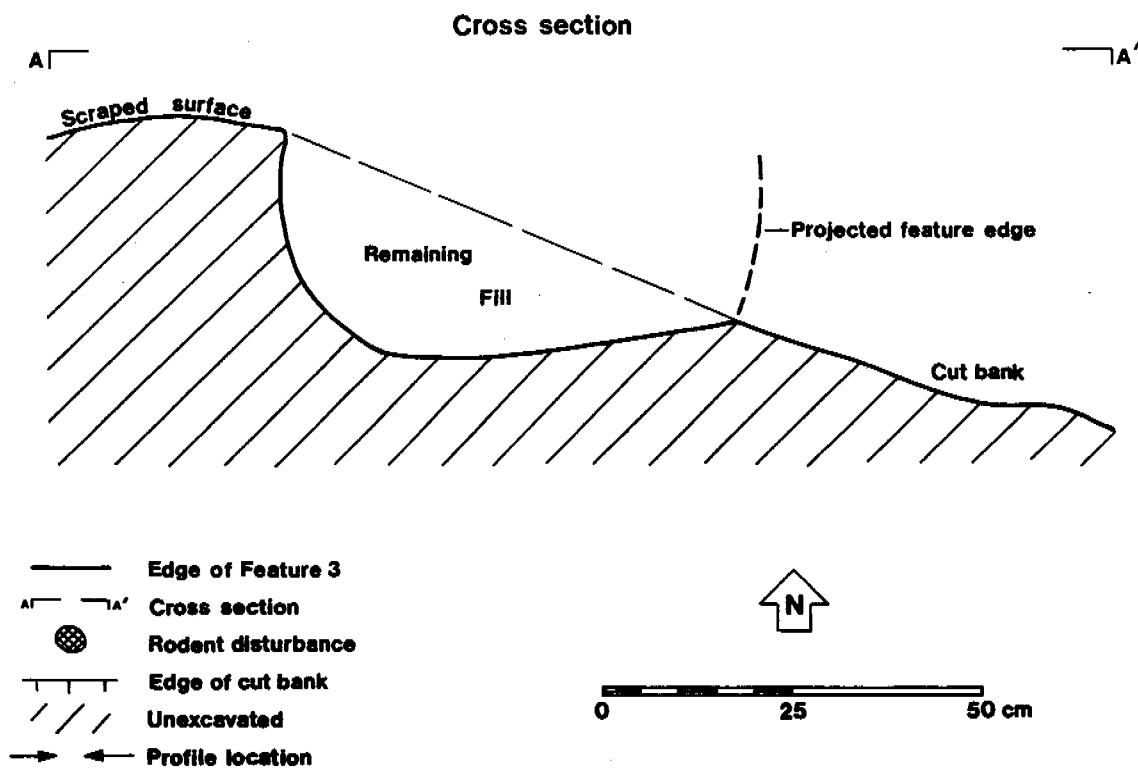
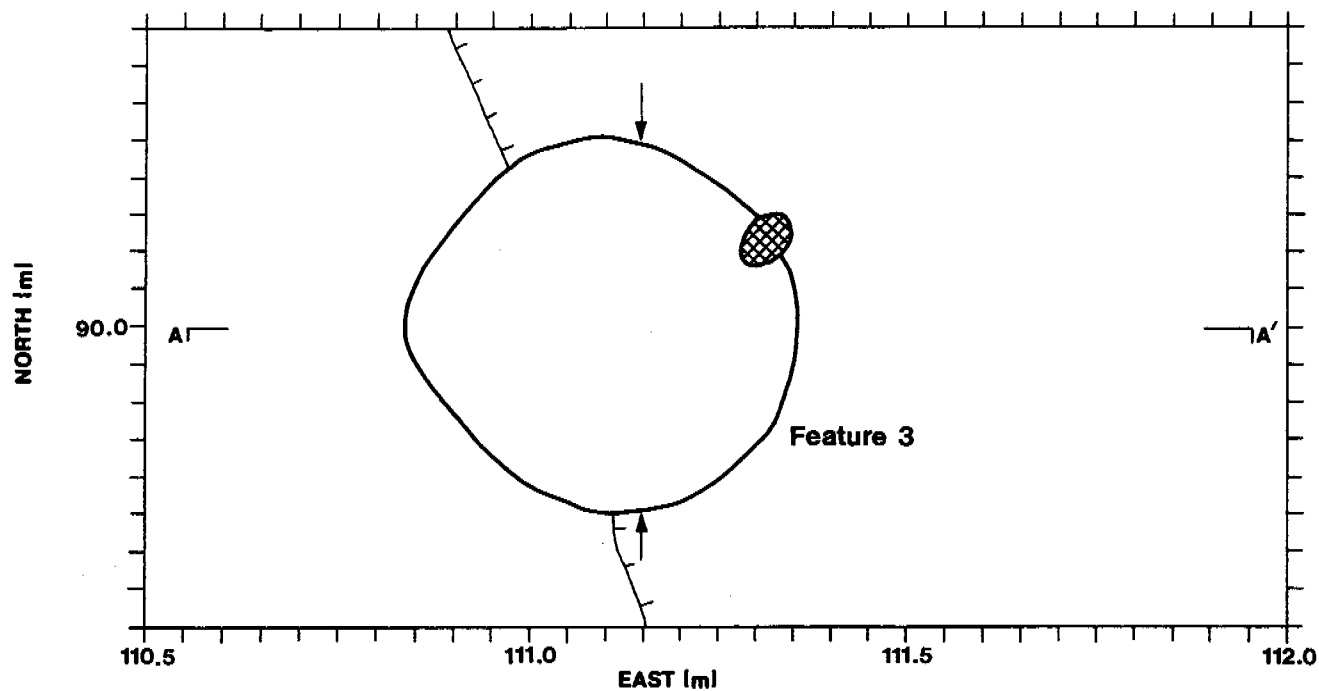
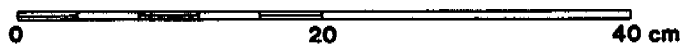
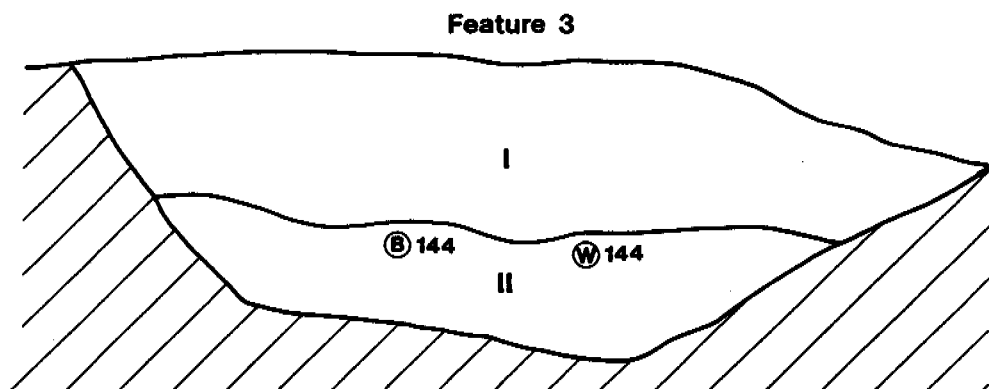


Figure 12.34. Site LA 115330 Feature 3, Plan View and Cross Section.



I 0-10 cm - Brown (10YR5/3, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; many micro roots; diffuse smooth boundary.

II 10-40 cm - Yellowish brown (10YR5/6, moist) sandy loam, yellowish brown (10YR5/6, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; many micro roots; abrupt smooth boundary.

(B) Flotation sample

(W) Waterscreen sample

144 Field specimen no.

/// Unexcavated

Figure 12.35. Site LA 115330 Feature 3, East-facing Profile.

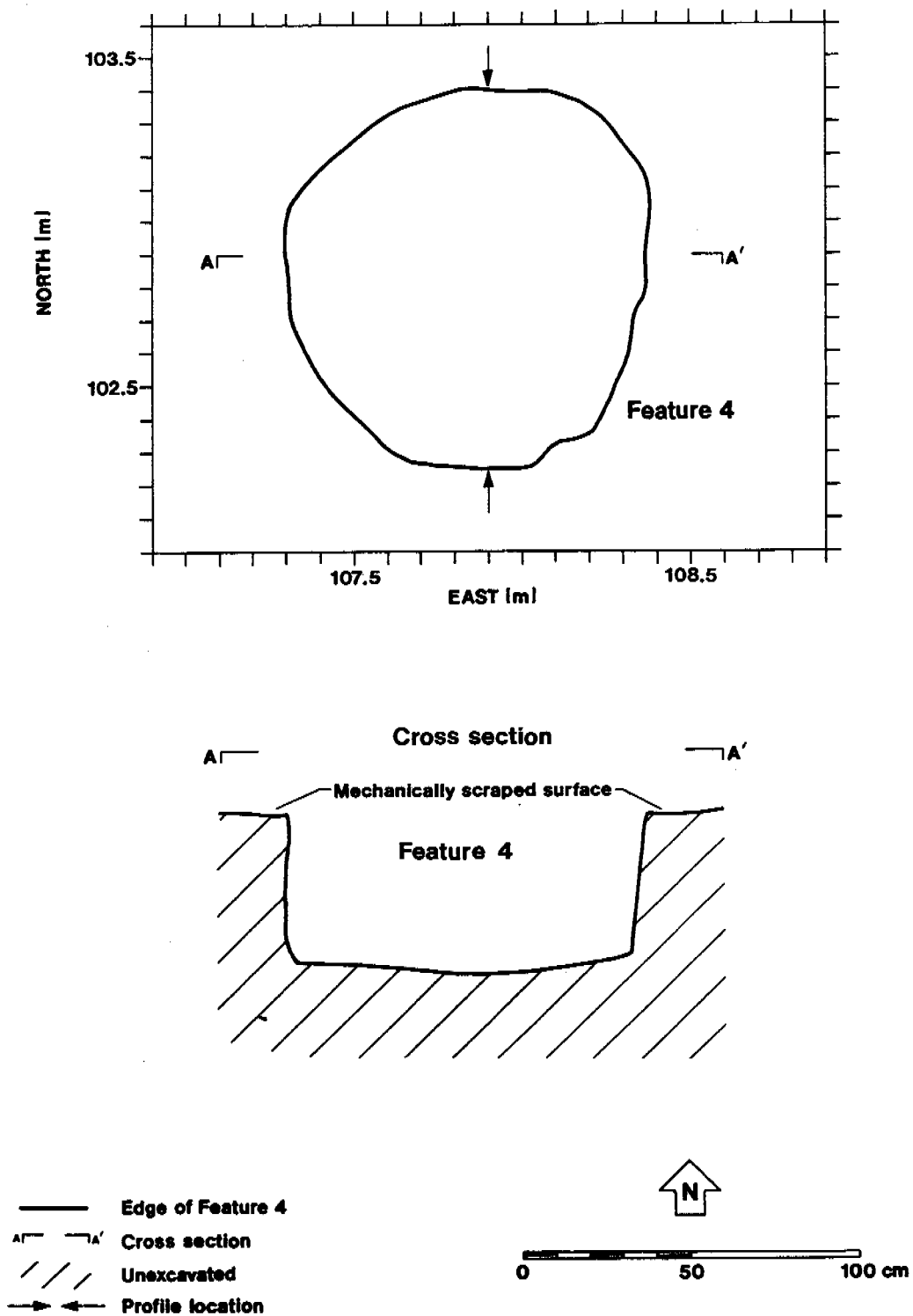
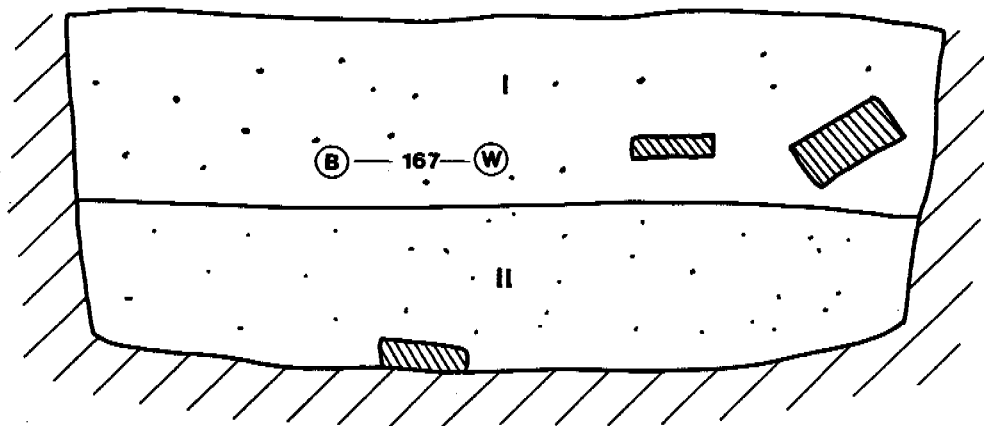


Figure 12.36. Site LA 115330 Feature 4, Plan View and Cross Section.

Feature 4



0 25 50 cm

I

0-22 cm - Brown (10YR5/3, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; many medium to coarse roots; diffuse smooth boundary.

II

22-45 cm - Brown (10YR4/3, moist) sandy loam, yellowish brown (10YR5/4, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; common fine roots; abrupt smooth boundary.



Charcoal flecks



Sandstone rock



Flotation sample



Waterscreen sample

167

Field specimen no.



Unexcavated

Figure 12.37. Site LA 115330 Feature 4, East-facing Profile.

according to the wall profile. Level 1, Stratum I, was a 25-cm level consisting of the dense charcoal deposit and fire-cracked rock. Cultural materials collected in the level consisted of flaked stone, ground stone artifacts, and faunal remains. Samples taken from the fill included flotation, waterscreen, and radiocarbon.

Level 2, Stratum 2, was a 23-cm level revealing a sandy loam sediment mixed with light charcoal flecks, sandstone rocks, roots, and heavy insect disturbance. Cultural materials recovered from the level were flaked stone, ground stone fragments, and small bone fragments.

Samples taken from the fill included flotation, pollen, waterscreen, and radiocarbon. Examination of the pit walls revealed coloring that indicated oxidation mostly along the eastern wall; other portions of the wall also revealed burning with evidence of heavy insect and root disturbance. The base of the feature also consisted of an oxidized surface in areas where root and insect disturbance was not present. Fill removed from the feature combined with profile observations suggested that the pit was subsequently filled with a combination of naturally deposited sediments and cultural debris.

Investigations of Feature 4 revealed the pit may have been used as some type of thermal feature and possibly obtained a second usage as a storage unit. Archaeobotanical remains support this interpretation. These remains include maize and Cheno-Am pollen, along with maize cupules, a charred pine umbo, and a sunflower achene.

One radiocarbon sample from Feature 4 dated to 2190 ± 60 BP (Beta-121238; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A), indicating use during the Basketmaker II period. Exactly the same date was obtained from a sample taken from the pitstructure hearth (Feature 12).

Feature 5. Feature 5 was a shallow earthen pit adjacent to Feature 1, at site grid coordinates N101.20, E109.60 (Figure 12.3). In plan view the feature was oval-shaped measuring 55 cm northwest-to-southeast by 64 cm northeast-to-

southwest. A east-to-west cross section reveals a nearly basin-shaped pit with a maximum depth of approximately 17 cm (Figure 12.38).

The feature was bisected and excavated in east and west portions. The west half was excavated in one complete level to the base of the feature. Contents included 2% charcoal deposits dispersed throughout the level along with roots and a high amount of insect disturbance similar to Feature 4. Only three flaked stone artifacts were recovered from the level along with a radiocarbon sample.

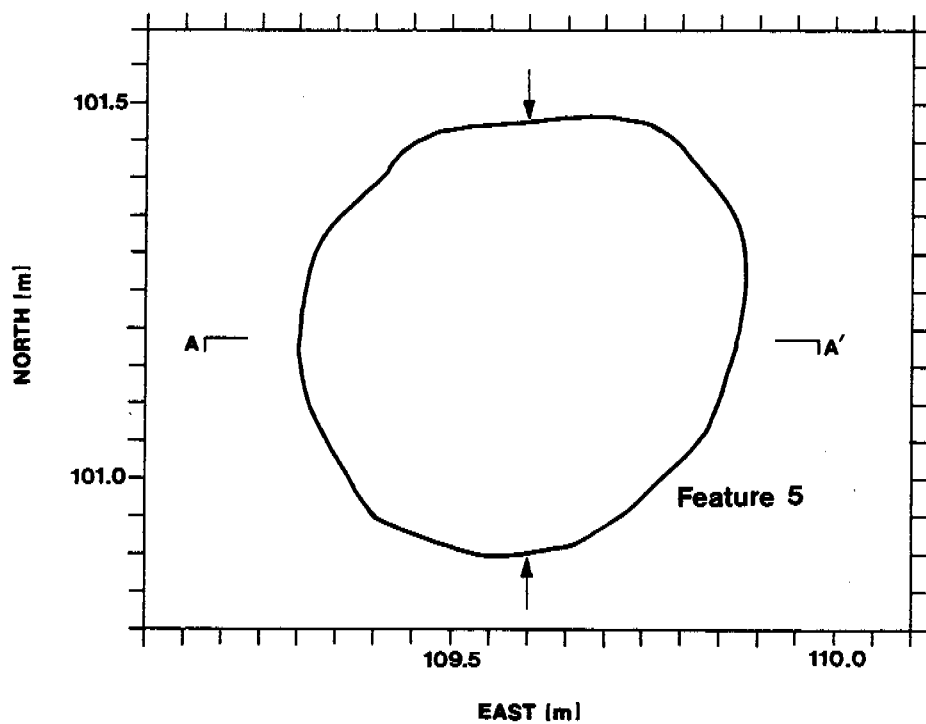
Prior to removal of the east half a single stratum was observed along the west-facing profile. Stratum I consisted of a dark yellowish brown sandy loam mixed with very sparse charcoal flecks and roots (Figure 12.39).

Excavation of the east half revealed the same type of soils mentioned in the west half. A total of four flaked stone items were collected within the fill of the east portion. Samples were also taken: flotation, pollen, waterscreen, and radiocarbon.

The pit walls were earthen surfaces with no indication of alterations such as oxidation; however, the walls as well as the bottom of the feature were covered with insect and root disturbance.

Feature 5 was determined to have been a shallow earthen storage pit considering the shape and depth of the feature. This is supported by a maize cupule and maize pollen, and charred Cheno-Am seeds that were identified from the feature. The low amount of artifacts and other cultural debris collected within the pit may suggest that the majority of the fill was naturally deposited.

Feature 6. Feature 6 was an earthen pit situated approximately 1 m southwest of Feature 5, at site grid coordinates N101.00, E108.50 (Figure 12.3). In plan view the feature was irregular-shaped measuring 40 cm northwest-to-southeast by 35 cm northeast-to-southwest. A east-to-west cross section shows a basin-shaped pit with a maximum depth of 15 cm (Figure 12.40).



Cross section

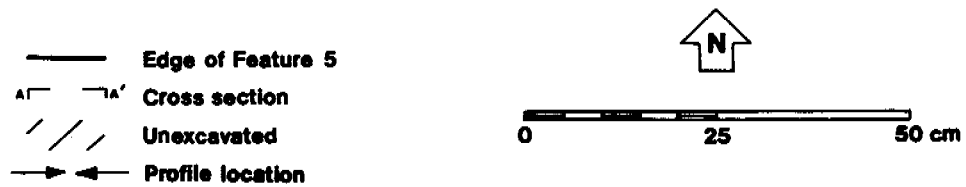
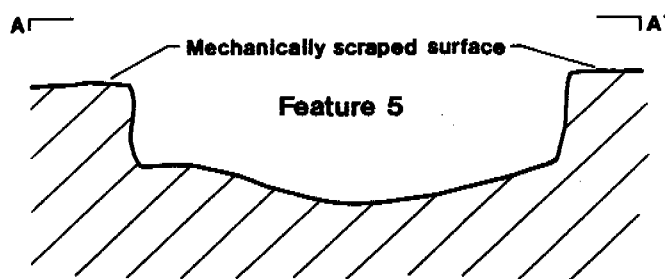
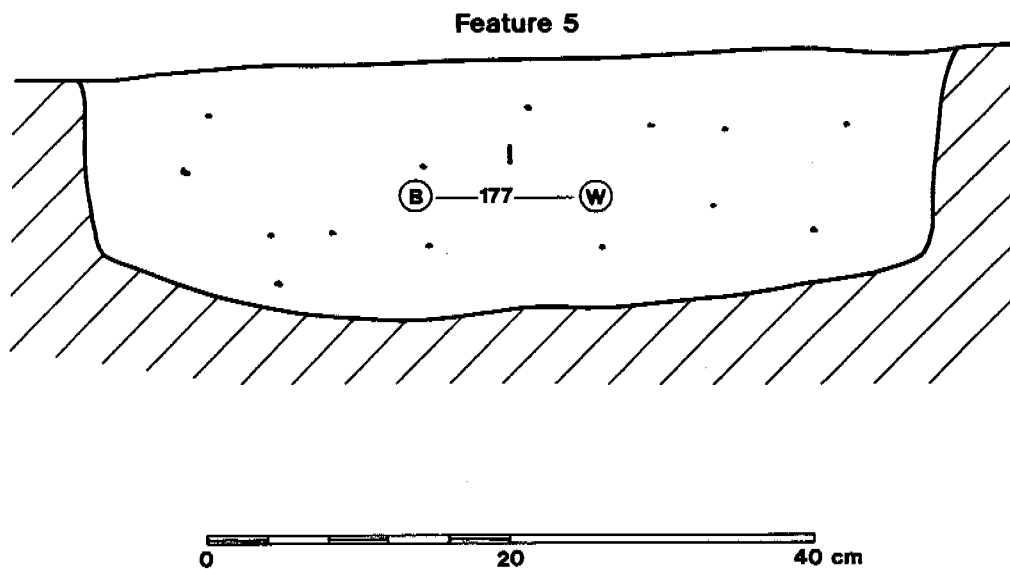


Figure 12.38. Site LA 115330 Feature 5, Plan View and Cross Section.



- 0-16 cm - Dark yellowish brown (10YR4/4, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; few fine roots; abrupt smooth boundary.
- ⓑ Flotation sample
- Ⓦ Waterscreen sample
- ⋯ Charcoal flecks
- 177 Field specimen no.
- /// Unexcavated

Figure 12.39. Site LA 115330 Feature 5, West-facing Profile.

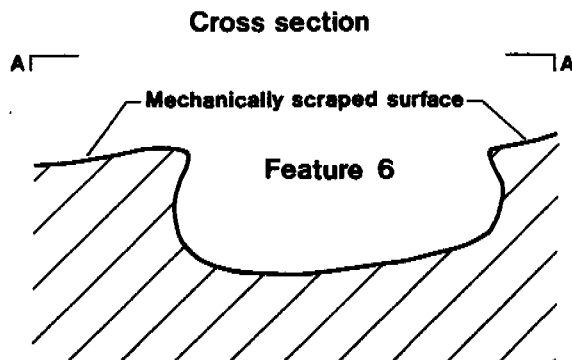
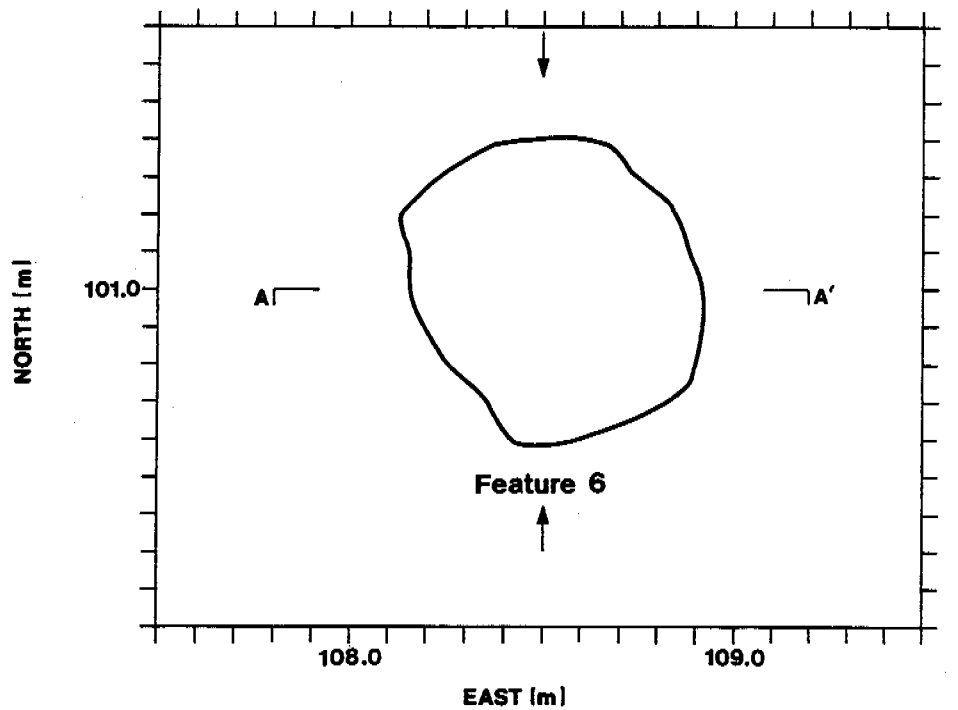


Figure 12.40. Site LA 115330 Feature 6, Plan View and Cross Section.

The feature was bisected into east and west portions. The fill of the east half was excavated in one complete level to the base of the feature; it consisted of a sandy loam sediment mixed with at least 2% charcoal flecks, sparse sandstone rocks, gravels, and roots. No artifacts were collected within the east half of the pit fill.

Prior to removal of the west half pit fill, two strata were observed as shown along an east-facing profile (Figure 12.41). Stratum I was a dark soil with sparse charcoal flecks, gravel, and roots. Stratum II consisted of a lighter colored sediment mixed with few roots.

Despite the two strata observed on the profile, the west half was excavated in one complete level to the base of the pit. Pit fill was the same as that in the east half with the exception of a single flaked stone artifact retrieved from the upper portion of the excavation. Samples recovered from the fill included flotation, pollen, and waterscreen.

The pit had earthen walls with no indication of alteration such as oxidation. The base of the pit was a smooth earthen surface also with no indication of oxidation. Feature 6 was interpreted as a shallow earthen pit that possibly was used as some type of storage unit. This is supported by two maize cupules, charred purslane, and a sunflower achene identified from the flotation sample. The feature was subsequently filled with naturally deposited sediments considering the near lack of artifacts collected.

Feature 7. Feature 7 was an organic stain observed in backhoe trench SU 3 at site grid coordinates N86.95, E114.50 (Figure 12.3). Feature 7, was first described as a circular charcoal stain measuring approximately 1 m in diameter; however, further investigations of the feature found it to be an unknown organic stain comprised of reddish orange sand with a high amount of iron content and no evidence of cultural deposits. With these findings no further work was conducted on Feature 7.

Feature 8. Feature 8 was an earthen pit located near Feature 9, at site grid coordinates N97.45,

E108.00 (Figures 12.3 and 12.23). In plan view the feature was irregular-shaped measuring 77 cm northwest-to-southeast by 60 cm northeast-to-southwest. A cross section of the pit reveals a nearly basin-shaped outline with a maximum depth of approximately 15 cm (Figure 12.42).

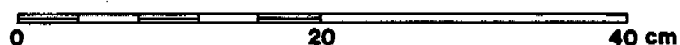
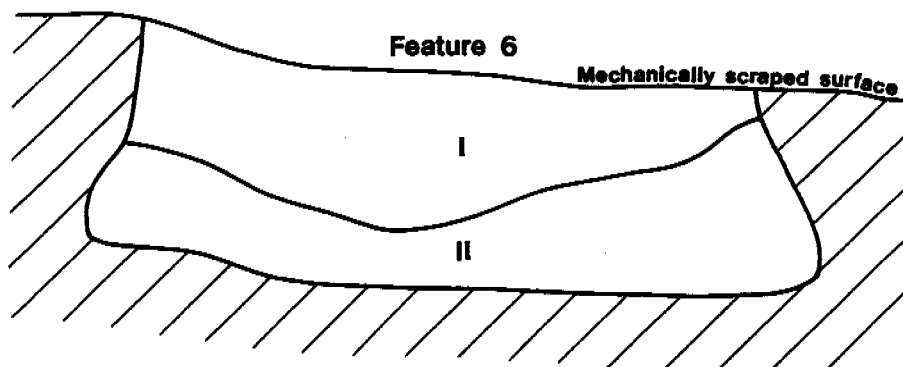
The feature was bisected and excavated in east and west portions. The west half was excavated in one complete level, consisting of a sandy loam matrix mottled with at least 5% charcoal content, gravel-sized sandstone rocks, fine-to medium-sized roots, and evidence of insect disturbance. Cultural materials collected from the fill included flaked stone, ground stone fragments, and faunal remains. Samples taken were flotation, pollen (determined by Smith to be sterile), waterscreen and radiocarbon specimens. Removal of fill from the west half exposed a single stratum as shown along a west-facing profile (Figure 12.43). The single stratum was a dark colored soil with roots and sparse charcoal flecks.

Excavations of the east half revealed the same type of soil and sediment mixing as the opposite half. Artifacts retrieved from the fill included less than 10 pieces of flaked stone.

Feature 8 exhibited an uneven earthen bottom surface along with smooth earthen walls. Identification of a maize cupule and a sunflower achene suggest Feature 8 possibly functioned as an external storage feature associated with Feature 9.

Feature 10. Feature 10 was an earthen pit located at site grid coordinates N100.50, E105.90 (Figure 12.3). In plan view the feature was circular measuring 28 cm in diameter. A cross section exhibits a nearly cylindrical shape with a maximum depth of 28 cm (Figure 12.44).

This feature was excavated in east and west portions. Each half was excavated as one complete level, both revealing a sandy loam sediment mixed with very sparse charcoal deposits and few roots, as seen along an east-facing profile of Feature 10 (Figure 12.45). Artifacts collected from the fill included flaked stone, bone, and vegetal remains (identified as



I 0-10 cm - Very dark brown (10YR3/3, moist) sandy loam, dark yellowish brown (10YR4/4, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; very few fine roots; abrupt wavy boundary.

II 10-14 cm - Dark yellowish brown (10YR3/4, moist) sandy loam, yellowish brown (10YR5/6, dry); weak; nonsticky, nonplastic; loose; no gravel; few fine roots; abrupt smooth boundary.

/// Unexcavated

Figure 12.41. Site LA 115330 Feature 6, East-facing Profile.

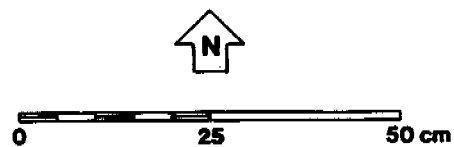
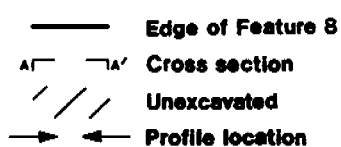
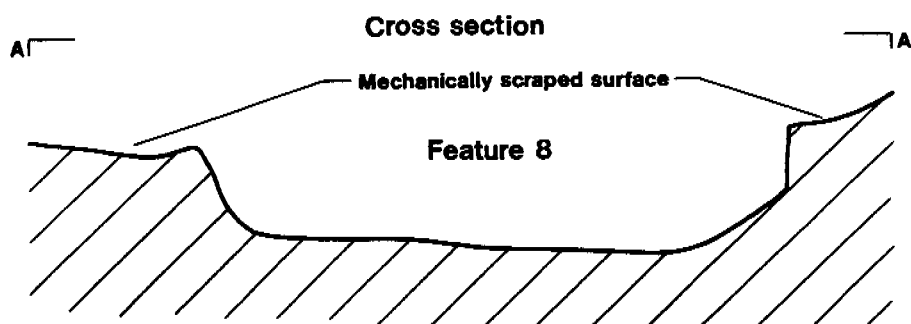
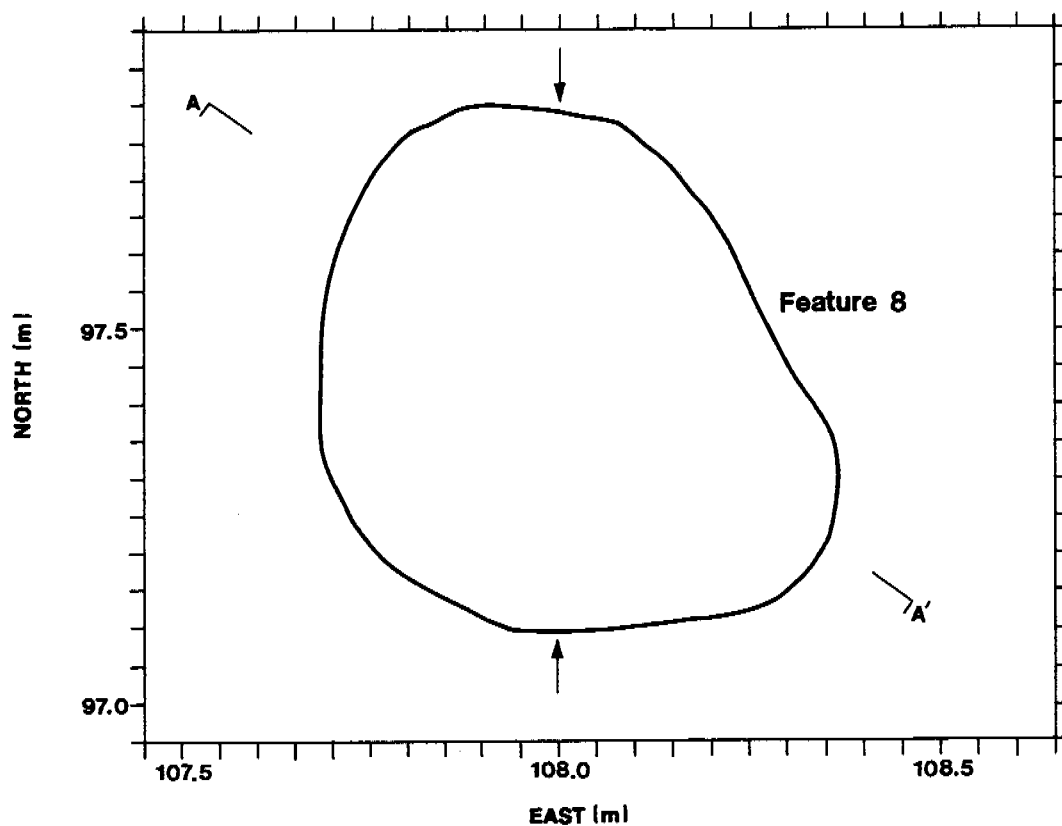
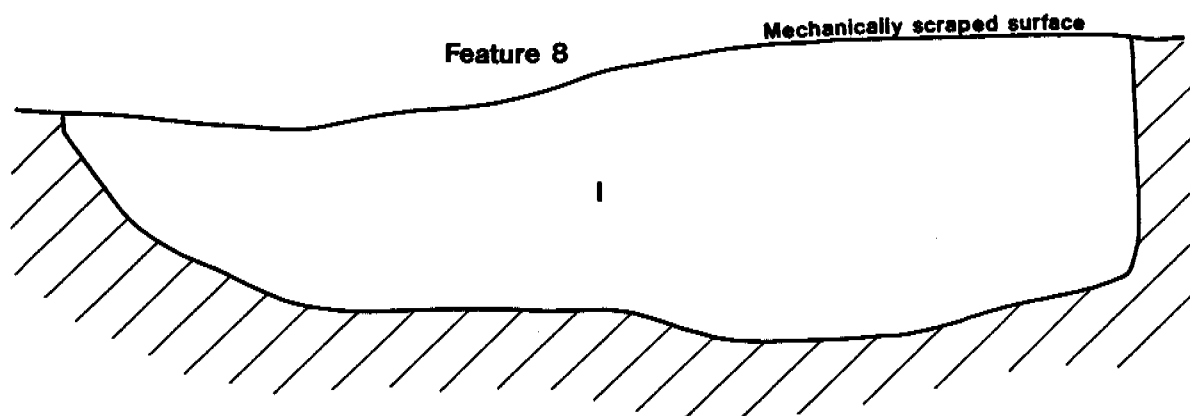


Figure 12.42. Site LA 115330 Feature 8, Plan View and Cross Section.



I
0-20 cm - Dark brown (10YR3/3, moist) sandy loam, dark yellowish brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; many fine to medium roots; abrupt smooth boundary.

/// Unexcavated

Figure 12.43. Site LA 115330 Feature 8, West-facing Profile.

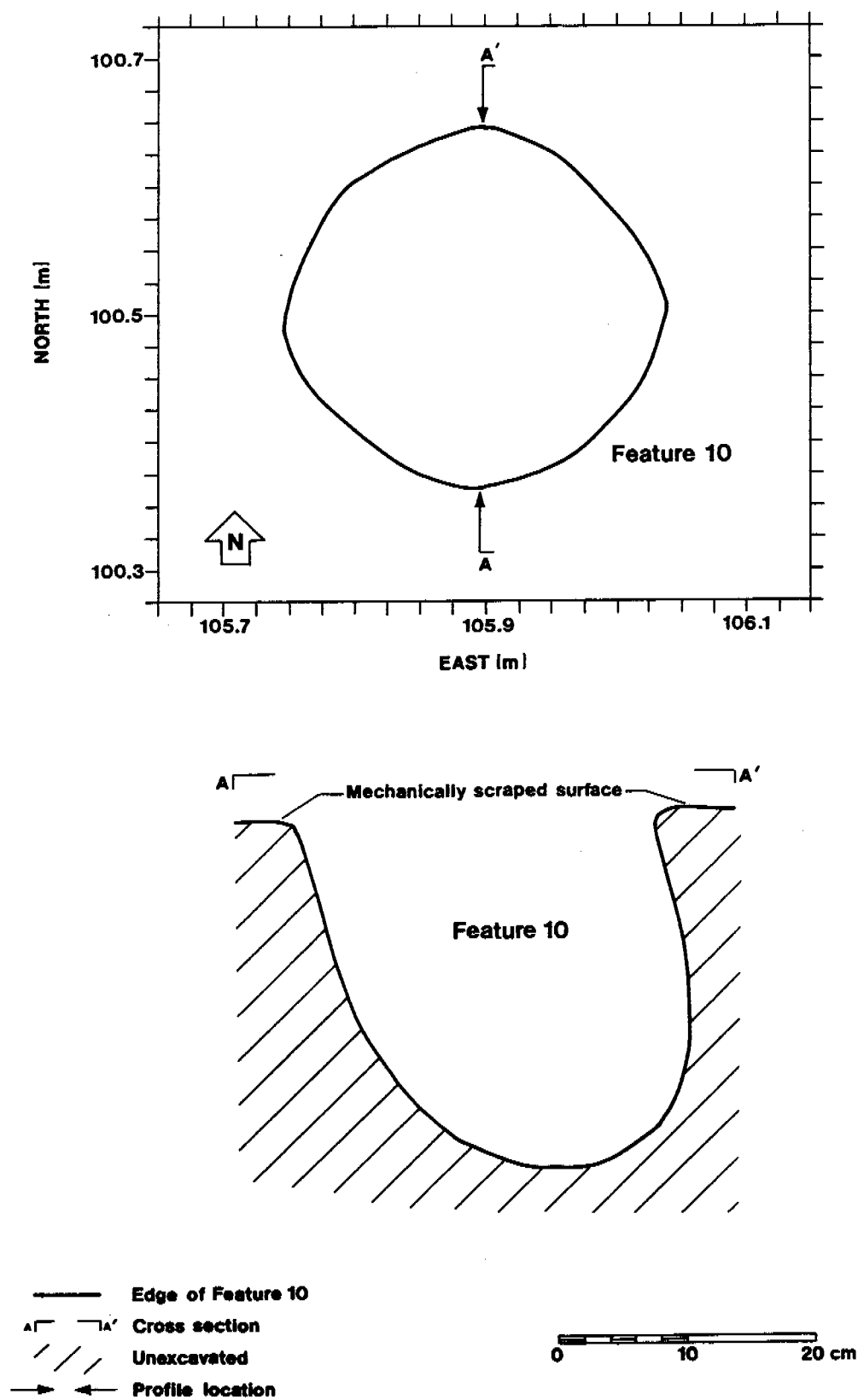
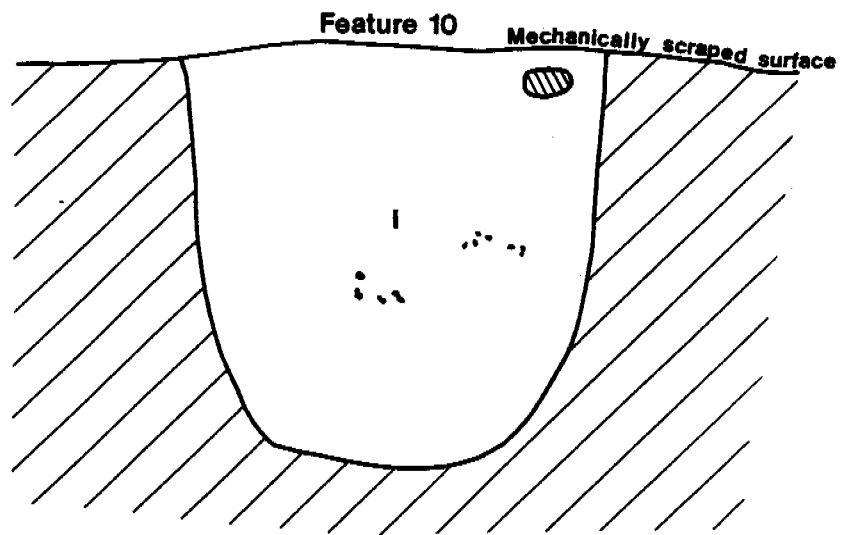


Figure 12.44. Site LA 115330 Feature 10, Plan View and Cross Section.



0 20 40 cm

0-28 cm - Dark brown (10YR3/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; few micro roots; abrupt smooth boundary.

 Sandstone rock

 Charcoal flecks

 Unexcavated

Figure 12.45. Site LA 115330 Feature 10, East-facing Profile.

juniper and pine). Flotation and waterscreen samples were also retrieved from the pit fill.

Feature 10 had earthen surfaces with no indication of alteration such as oxidation. Feature 10 may possibly have been some type of storage unit considering the shape and depth of the pit. This is supported by a single maize cupule identified from the flotation sample.

Feature 28 was an earthen pit situated outside of the shallow depression of Feature 9, at site grid coordinates N95.80, E106.00 (Figure 12.23). In plan view the feature was irregular-shaped measuring 66 cm southwest-to-northeast by 42 cm southeast-to-northwest. A northwest-to-southeast cross section exhibits a basin shaped, while a northeast-to-southwest cross section shows an irregular shape, both with a maximum depth of 30 cm (Figure 12.31).

Feature 28 was excavated in northwest and southeast portions; the northwest half was excavated in one complete level as was the opposite side. Both halves revealed the same type of sediment deposit as shown along a southeast-facing wall profile which reveals two strata (Figure 12.31). Stratum I was a soil that was observed in all earthen pits inside Feature 9. Stratum II, however, was not observed in any of the pits; it was dark yellowish brown fill with no indications of charcoal deposits. During excavation of Feature 28, flaked stone and ground stone artifacts were collected along with flotation, waterscreen, pollen, and radiocarbon samples. Maize cupules were recovered from the flotation sample, suggesting Feature 28 functioned as a storage pit.

All extramural features are believed to be associated with the pitstructure (Feature 2) and activity area (or shallow pitstructure, Feature 9). A similar suite of architectural and extramural features was observed at site LA 26306, a contemporaneous Basketmaker II habitation.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Fifteen sherds were analyzed from site LA 115330. Of these 15, 6 were only partially

analyzed due to their small size and, therefore, were eliminated from the data analysis. No other subsampling of the recovered ceramic assemblage was made, leaving nine sherds for the attribute analysis as described in Chapter 21. Five sherds were recovered from the surface (FS 78, 84, 89, and 201); four sherds were recovered from excavation (FS 133, 159, 161, and 170). Feature 2 was the only feature to yield ceramics. FS 133, 159, and 161 were recovered from within 10 cm of the surface. FS 170 was recovered in a disturbed area and is most likely intrusive. No other ceramic artifacts were recovered from the fill of Feature 2, or any of its internal features. This suggests that the ceramic artifacts are intrusive and are not related to Feature 2. Appendix D outlines the ceramic data by provenience. The assemblage contains two wares common to the Zuni area: White Mountain Redware and Cibola Gray Ware.

Chronometrics

Two diagnostic ceramic artifacts were recorded. The White Mountain Redware sherd was identified as a Wingate Black-on-red. The Cibola Gray Ware sherd was identified as Lino Gray. It is impossible to provide an accurate date range based on two diagnostic sherds, especially with such widely spaced production periods. Wingate Black-on-red was produced most prevalently during the late Pueblo II/early Pueblo III period (AD 1100 to 1175). Lino Gray was produced during the Basketmaker III to Pueblo I periods (AD 450 to 950). A mean ceramic date of AD 912 \pm 187 years was generated for the ceramic assemblage. This date is suspect due to the small sample size. Chapter 21 has a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of seven jars and two bowls present. All sherds were identified as coming from vessel bodies. Both bowl and jar forms are represented in the grayware sherds, while the one redware sherd is a bowl. Overall, jars outnumber bowls by a ratio of approximately 3/1. Neither sooting nor modification was recorded for this assemblage.

Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site. Chapter 21 provides a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for nine sherds. Six of the Cibola Gray Ware sherds and the one White Mountain Redware sherd are tempered with a combination of sand and sherd; this combination is not uncommon to either of these wares. One of the Cibola Gray Ware sherds is tempered with sherd; this is a common temper for this ware. The Cibola Gray Ware identified as Lino Gray is tempered with coarse quartz sand. This is the diagnostic temper for this type. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and inter-regional interaction.

Summary

The ceramic assemblage from site LA 115330 is very small but comes from both surface and excavated collections. Two wares common to the area are present at the site, including two diagnostic sherds. Given the small sample size for the ceramic assemblage of diagnostics, it is difficult to provide a meaningful temporal range. Functional variation among ceramics suggests a variety of activities was practiced at the site.

Flaked Stone Artifacts

The flaked stone assemblage from site LA 115330 was the largest of all of the sites in this study. A total of 3485 flaked stone artifacts were recovered from the 18 sites in the State Highway 602 Project. Of these, 2183 (62.6%) are from site LA 115330. Given the size of this assemblage, it is not surprising that it is also the most diverse assemblage in the study. The 13 artifact classes represented (Table 12.1) include the following (in decreasing order of representation): 1118 pieces of debris (51.1%), 940 pieces of debitage (43.1%), 37 cores (1.7%), 37 retouched pieces (1.7%), 16 bifaces or biface fragments (0.7%), 8 utilized pieces (0.4%), 7 hammerstones (0.3%), 8 projectile points (0.4%), 5 perforators (0.2%), 3

scrapers (0.1%), 2 bifacially battered pieces (0.1%), 1 denticulate (0.1%), and 1 other (0.1%). The one artifact classified as "other" is a small (less than 1 g) piece of hematite from Level 2 of Feature 5 at the site. Only 39 artifacts show signs of thermal alteration (e.g., oxidation, potlidding, or crazing).

Site LA 115330 has been interpreted as a Basketmaker II year-round residence. A deep pitstructure (Feature 2), a large activity area (Feature 9) with six associated features, and a number of extramural features were identified during surface survey and excavations at the site. Table 12.2 details the artifact classes represented in each of the site features. Table 12.3 provides summary metric data for all of the flaked stone artifacts recovered from the site. Overall, both the size and diversity of the flaked stone assemblage at site LA 115330 are consistent with the interpretation that this site functioned as a residence in the Basketmaker II settlement system.

Seven different core types are represented among the 37 cores in this collection. Of these cores, 14 (37.8%) are single platform, 6 (16.2%) are multiple platform, 6 (16.2%) are on flakes, 5 (13.5%) are amorphous, 3 (8.1%) are opposed platform, 2 (5.4%) are discoidal, and 1 (2.7%) is dihedral. Thirty (81.1%) of the cores contain a hinge fracture, multiple hinge fractures, or material flaws. The remaining seven (18.9%) of the cores contain no evidence of hinging or of material flaws. The majority of the cores, 26 (70.3%), are chert; 8 (21.6%) are quartzite; and 3 (8.1%) are silicified wood. Fourteen (37.8%) of the cores were found on the surface or in Level 1 of Feature 9 (Table 12.2), the activity area located roughly 3 m northwest of Feature 2 and adjacent to the west fence line. One other core (record number 3545 in Appendix E) was found in Feature 15, an internal feature located within Feature 9.

A total of 2099 artifacts, 96.2% of the flaked stone artifacts found at the site, are either lithic reduction products (cores, debitage, and debris) or are artifacts associated with reduction activity (e.g., hammerstones). Of the debitage, 127 (13.8%) are primary flakes, 661 (70.5%) are secondary flakes, 91 (9.7%) are tertiary retouch or

Table 12.1. Summary Counts and Percentages of Site LA 115330 Basketmaker II Flaked Stone Artifacts by Artifact Class.

Artifact Class	n	%
Biface	16	0.7
Bifacially battered piece	2	0.1
Core	37	1.7
Debitage	940	43.1
Debris	1118	51.1
Denticulate	1	0.1
Hammerstone	7	0.3
Manuport	4	0.2
Other	1	0.1
Perforator	5	0.2
Projectile point	8	0.4
Scraper	3	0.1
Retouched piece	37	1.7
Utilized piece	8	0.4
Total	2183	100.0

Table 12.3. Summary Metric Data for Site LA 115330 Basketmaker II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	1.6	1.3	0.4	3.2
10% trimmed mean	1.4	1.1	0.3	0.3
Median	1.3	1.0	0.3	-
Standard error	0.02	0.02	0.01	0.4
Standard deviation	1.0	0.9	0.6	18.9
Minimum	0.3	0.2	-	-
Maximum	7.4	9.7	7.7	423.0
Range	7.1	9.5	7.7	423.0

Notes: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).
n = 2184

trimming flakes, and 60 (6.4%) are bifacial thinning flakes. Lithic reduction, particularly secondary reduction and tool production, finishing, and maintenance, were clearly important activities during the Basketmaker II occupation of the site.

The greatest concentration of debitage (333 pieces or 35.5%) and debris (486 pieces or 43.6%) at the site was found in Feature 2, the deep pitstructure, and its associated features (Table 12.2). Of the 333 pieces of debitage recovered from these features, 218 were found in fill (surface through Level 5). Only 44 pieces were found in floor and near-floor contexts during excavation. Similarly, 336 pieces of debris were found in fill, while only 37 pieces were from the floor fill. Of the 262 pieces of debitage recovered from Feature 2, 178 (67.9%) are secondary flakes, 54 (20.6%) are tertiary flakes, 18 (6.9%) are primary flakes, and 12 (4.6%) are bifacial thinning flakes. This pattern indicates that lithic reduction (primary, secondary, tertiary, and bifacing) did occur in Feature 2 during the Basketmaker II occupation of the site. After abandonment of the pitstructure (Feature 2), lithic reduction debris from other parts of the site appear to have been deposited in the feature as trash. This debris later formed part of the feature fill.

While many (15) of the cores in the site LA 115330 assemblage were found in Feature 9 and its associated internal features, only 10.6% (100 pieces) of the debitage came from these features. Of the 86 pieces of debitage from Feature 9 itself, 64 (74.4%) are secondary flakes, 17 (19.8%) are primary flakes, 4 (4.7%) are bifacial thinning flakes, and 1 (1.1%) is a tertiary retouch or trimming flake. The abundance of cores suggests Feature 9 was also a locus for lithic reduction during the occupation. The relatively low density of debitage in the feature may reflect maintenance (cleaning) of the surface and disposal of the reduction products outside of the activity area, or reduction products may have been removed for further modification into tools in other parts of the site. The virtual lack of tertiary (retouch or trimming) products and low frequency of bifacial thinning flakes supports the latter interpretation. Feature 9 appears to have served as a locus for primary and secondary lithic reduction but not for tool production and maintenance.

Platform data were obtained for 924 of the 940 pieces of debitage. Of these, 163 contained evidence of platform preparation. Thirty-eight were single faceted, 57 were multifaceted, and 68 were ground or abraded. The percentage of debitage with platform preparation in this assemblage is not significantly higher than that

seen in the next largest Basketmaker II assemblage in this study, that of site LA 26306. Two hundred twenty-six artifacts had cortical platforms.

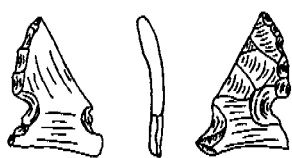
Consistent with the site LA 26306 Basketmaker II assemblage, relatively few (36) of the 924 pieces of debitage for which platform data were available contained percussion marks suggesting the use of hard-hammer, direct percussion. In contrast, 271 of the pieces had linear platforms and 31 were ventrally lipped — both suggestive of the use of *soft-hammer* direct percussion. Given the evidence of bifacing occurring at the site (60 bifacial thinning flakes, 16 bifaces, and 8 projectile points or point fragments), the use of soft-hammer techniques for secondary reduction and tool production and maintenance is not unexpected.

The site LA 115330 flaked stone assemblage contains 2183 artifacts: 2030 (93.0%) are chert, 87 (4.0%) are quartzite, 57 (2.5%) are silicified wood, 6 (0.3%) are quartz, 2 (0.1%) are obsidian, and 1 (0.1%) is metamorphic. One of the obsidian artifacts is a secondary flake while the other is a tertiary retouch or trimming flake. Both pieces weigh less than 1 g. As in the Basketmaker II assemblage at site LA 26306, chert dominates this assemblage. However, 153 non-chert artifacts were recovered from this site—43 more artifacts than were recovered in the entire Basketmaker II component of site LA 26306. Eight of the 2030 chert artifacts (0.4%) are made of Zuni Yellow Spotted chert. These pieces are either debitage (secondary flakes) or debris. The very low occurrence of Zuni Yellow Spotted chert in Basketmaker II flaked stone assemblages contrasts with the pattern of more intensive exploitation seen later during the Pueblo II period. Both obsidian and Zuni Yellow Spotted chert are considered nonlocal raw materials in this study. Basketmaker II and Pueblo II lithic raw material economy are discussed in detail in Chapter 22 of this report.

The formal and informal tools in this collection consist of (in decreasing order of representation):

16 bifaces (including 9 biface fragments), 8 utilized pieces, 8 projectile points or projectile point fragments, 5 perforators, 3 scrapers, and 1 denticulate. One of the projectile points is a side-notched point fragment (Figure 12.46a). The base is intact, and the side notches are also present. The notches are slightly oblique. Due to a longitudinal fracture, the left shoulder of the point is missing along with the left one-third of the blade including the point. The base is slightly concave. The second point (Figure 12.46b) is a basal fragment of a corner-notched projectile point. The presence of crazing and of some surficial thermal fracturing indicates this piece was thermally altered. Two of the remaining points are very unusual (Figure 12.46c and 12.46d). Both points are made on small unifacial flake blanks. The only bifacial retouch present on these pieces are notches on their left proximal and right proximal edges. The first point (Figure 12.46c) also has normal, shallow, peripheral retouch present along its right and left medial edges. The second point (Figure 12.46d) contains normal, semiabrupt retouch along the remainder of the left edge above (distal of) the left bifacial notch. The right edge contains normal, abrupt retouch above the right notch. These two points appear to be small unifacial projectile points. Distally, both pieces appear to have impact fractures (distal fractures or snaps).

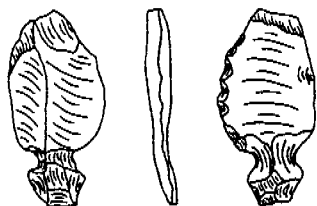
The presence of the five perforators (one of which is a graver), three scrapers, and the denticulate is worth noting in that these artifact classes are not at all common in the project sites. Only six perforators are represented among the sites in this study and five of them are from site LA 115330. The perforators and graver (Figure 12.47) are artifacts associated with hide-working and possibly wood- or bone-working activity (drilling or engraving). The denticulate recovered from Level 2 fill in Feature 2 (the deep pitstructure) is illustrated in Figure 12.48. This piece may have been discarded before use due to a distal snap which occurred during production. While denticulates are most commonly associated with woodworking, they can also be used for the processing (separation) of plant fibers for later use in basketry or in the production of cordage.



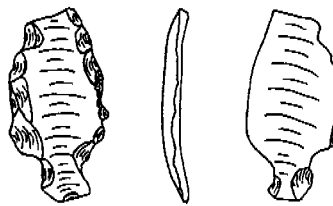
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b



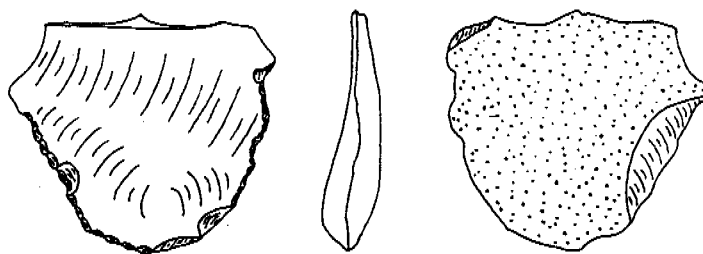
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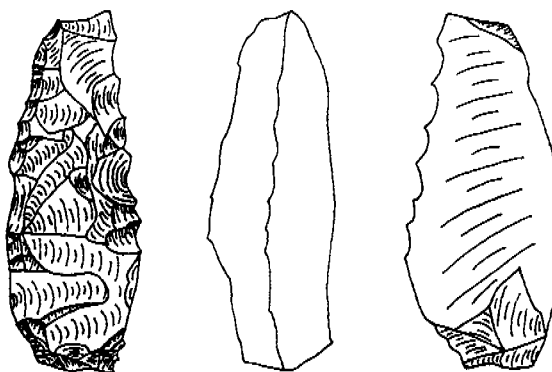
Actual Size

Figure 12.46. Site LA 115330 Projectile Points.



Actual Size

Figure 12.47. Site LA 115330 Graver.



Actual Size

Figure 12.48. Site LA 115330 Denticulate.

Ground Stone Artifacts

A total of 34 ground stone artifacts were recovered from surface and subsurface contexts at site LA 115330. An indeterminate ground stone fragment was found during shovel scraping. It is shaped, has multidirectional striations along one ground edge, and appears to have been in the early stages of production when it broke. It is made of either slate or white argillite limestone, the material from which ornaments or fetishes were made. Another indeterminate ground stone fragment was recovered from SU 2, a 1-by-1-m hand-excavated unit. This item is made of the same material described above and also appears to have been in the early stages of production. It is shaped and has parallel striations on one ground surface. A complete one-hand sandstone mano was recovered from SU 9, a 1-by-1-m hand-excavated unit. It is shaped and has striations parallel to the transverse axis of each surface. Both surfaces are pecked and ground smooth. One side is convex from use.

Most of the ground stone artifacts (n=18) were recovered from Feature 2, an earthen pitstructure. These include an ornament, a sphere, abraders, manos, metates, and indeterminate ground stone fragments (Table 12.4).

The ornament measures 21.1 by 0.6 by 0.2 cm. One side is grooved/etched with a series of parallel lines. The other side and edges are polished. Faint multidirectional striations cover the entire piece.

The sphere is made from a naturally round piece of limestone that has been further shaped by pecking. It is similar to the sphere recovered from site LA 26306. Its function is unknown.

One of the active abraders (FS 171-1) is fairly square in plan and rectangular in cross section. There are a few peck marks along the edges indicating minimal shaping. Both surfaces are ground flat and pecked. Use-wear extends from edge to edge on both surfaces.

The one-hand mano is nearly circular in plan view and oval in cross section. It is nearly complete, save for a small portion of the edge and grinding surface. The mano has been moderately shaped by pecking. The grinding surface is pecked and ground smooth, and is convex from wear. Three distinct finger notches have been pecked into the edges of the mano.

The one-hand mano/anvil is subrectangular to oval in plan and discoidal in cross section. It has been shaped by pecking and flaking. Both sides exhibit light to moderate use and light residual pecking. One side has concentrations of pitting in the center of it which appear to have been created after most, if not all, of the grinding of this side was done, suggesting secondary use of this item as an anvil.

The indeterminate mano fragment (FS 146-4) is dome-shaped in cross-section. The grinding surface is ground smooth, has residual pecking, and is convex. This surface shows extensive use-wear.

One of the trough metate fragments (FS 187-1) was roughly shaped around the edges and both sides have been lightly ground. The only use-wear occurs in the trough and on the shelf. Although subsequently modified, one end of the metate appears to be open. This end either broke or was purposefully broken, such that the area encompassed by the end of the trough now projects inward toward the center of the metate along the longitudinal axis. This gives the metate a roughly U-shaped appearance in plan. This is not a result of simple use-wear. The trough has been ground very smooth and subsequently pecked to roughen the surface. There are striations in the trough that run parallel to the long axis.

The two passive abradar fragments refit and were analyzed together. One was recovered from the feature fill and the other from the floor fill. This abradar looks like a metate but was not classified as one since it was not intentionally shaped. The depression on the grinding surface

Table 12.4. Ground Stone Artifacts Recovered from Pitstructure Feature 2 at Site LA 115330.

FS No.	Provenience/Artifact Type	Raw Material	Description
<u>Feature Fill</u>			
FS 136-1	Ornament - complete	Shale	Multidirectional striations on both surfaces; shaped
FS 136-2	One-hand mano fragment	Sandstone	No striations visible; one surface ground; shaped; pecked
FS 146-1	Indeterminate mano fragment	Sandstone	No striations visible; ground on both surfaces; shaped; pecked; burned
FS 146-2	Trough metate fragment	Sandstone	Parallel striations on one surface only; shaped; pecked
FS 146-3	One-hand mano/anvil - complete	Sandstone	No striations visible; both surfaces ground; shaped; pecked
FS 146-4	Indeterminate mano fragment	Sandstone	Parallel striations on one surface; shaped; pecked; burned
FS 146-5	Active abradar - complete	Sandstone	No striations visible; one surface ground
FS 170-1	Indeterminate ground stone fragment	Sandstone	No striations visible; ground on one surface
FS 171-1	Active abradar - complete	Sandstone	No striations visible; both surfaces ground; shaped; pecked
FS 171-2	Sphere - complete	Limestone	Shaped; pecked; not ground; no striations visible
FS 173-1	Indeterminate ground stone fragment	Sandstone	No striations visible; ground on one surface
FS 173-2	Passive Abrader Fragment	Sandstone	Parallel striations on one surface; pecked; refits with passive abradar recovered from floor fill (FS 188-1).
FS 176-1	Indeterminate metate fragment	Sandstone	No striations visible; ground on one surface
FS 187-1	Trough metate fragment	Sandstone	Parallel striations on one surface only; shaped; pecked
<u>Floor Fill</u>			
FS 148-1	Indeterminate ground stone fragment	Sandstone	No striations visible; ground on one surface
FS 148-2	Indeterminate ground stone fragment	Sandstone	No striations visible; ground on one surface
FS 188-1	Passive abradar fragment	Sandstone	Parallel striations on one surface; pecked; refits with passive abradar recovered from fill (FS 173-2)
<u>Floor</u>			
FS 178-1	Trough metate fragment	Sandstone	Parallel striations on both surfaces; shaped; pecked

resulted strictly from use-wear. The grinding surface extends across most, but not all, of one side of the slab. The heaviest wear is concentrated around the center of this side. An oval-shaped depression has formed from use. This area was lightly pecked to increase abrasiveness. There are parallel striations along what would be the long axis of the stone if it were complete. This also suggests a reciprocal grinding motion rather than a rotary one typically associated with basin metates.

The trough metate fragment (FS 178-1) recovered from the floor of this pit structure has troughs worn into both of its surfaces, which are oriented along the longitudinal axis. Both surfaces have been pecked to create the trough, and to resurface them. Both of the surfaces are ground smooth. Both troughs exhibit heavy use-wear, and striations parallel to the longitudinal axis is evident in one of the troughs. Each of the troughs is closed, with one end serving as a shelf for each.

Feature 11, a large earthen storage pit within Feature 2, yielded a two-hand mano and a trough metate. Both are complete and fit together, indicating they were used together. Both are made of sandstone. The mano is rectangular in plan and cross section and has rounded edges. It is heavily pecked on the edges and on one surface, presumably the grinding surface, to enhance the grinding capability of the mano. The other surface is ground flat but does not appear to be the result of active grinding on the metate. The grinding surface is slightly convex in both cross sections and has been heavily ground. Use-wear extends across the entire surface. In plan, the metate is subrectangular to oval in shape and has an open end. The bottom of the metate is flat, as is the top of the metate outside the trough. The closed end, or shelf, has been ground smooth through use but the sides (walls) do not exhibit any use-wear.

Feature 9, an activity area approximately 3 m northwest of Feature 2, yielded eight ground stone artifacts from both surface and subsurface contexts. These include two spheres, a mano, a two-hand mano/anvil, and an indeterminate metate (Table 12.5).

The two spheres are naturally round and exhibit only a few pecked or ground areas. One was recovered from the modern ground surface and the other from feature fill. These are similar to the one discussed above and the one recovered from site LA 26306. The function of these objects is unknown.

The two-hand mano was used as an anvil before it broke. This item is rectangular in plan, wedge-shaped in transverse cross section, and discoidal in longitudinal cross section. It is completely shaped and rounded. Both surfaces are ground and pecked. Only one surface exhibits use-wear. Located in the center of the opposing surface and along the broken edge is an area of concentrated pitting. This pitting is a result of the mano's use as an anvil, a function which may have caused it to break.

The indeterminate metate fragment is ground on both surfaces. One surface is fairly flat and exhibits light use as a grinding surface. The use-wear extends to the original outer edge of the slab, suggesting that this side may have been a slab metate. The other surface is also ground and exhibits heavier use. This surface is thought to be a basin or trough metate because the depression has been purposefully created by pecking. It is extremely smooth except where there are peck marks and along the side of the original edge where there is no use-wear.

The mano fragment was recovered from the floor of this feature. It is a two-hand mano that was reused as a one-hand mano. The two-hand mano broke along the transverse axis. This mano fragment is rectangular in transverse and longitudinal cross sections. Originally as a two-hand mano, it would have been rectangular in plan. This fragment is more D-shaped in plan. The edges of the original two-hand mano are completely shaped by pecking. One surface of the mano is ground and pecked flat and shows minimal use-wear. The other surface shows considerably much more use-wear. There are parallel striations oriented parallel to the longitudinal axis of the original two-hand mano. After the mano broke, this fragment was turned

Table 12.5. Ground Stone Artifacts Recovered from Feature 9 at Site LA 115330.

FS No.	Provenience/Artifact Type	Raw Material	Description
<u>Modern Ground Surface</u>			
FS 201-1	Sphere - complete	Sandstone	No striations visible; not ground; shaped; pecked
FS 201-2	Active abrader fragment	Sandstone	No striations visible; ground on one surface
FS 201-3	Two-hand mano/anvil fragment	Sandstone	No striations visible; ground on one surface; shaped; pecked
FS 201-4	Indeterminate metate fragment	Sandstone	No striations visible; ground on both surfaces; pecked
<u>Fill</u>			
FS 208-1	Active abrader fragment	Sandstone	No striations visible; ground on one surface
FS 209-1	Sphere - complete	Mudstone	Parallel striations on several surfaces; shaped; pecked
FS 217-1	Active abrader - complete	Sandstone	No striations visible; ground on one surface
<u>Floor</u>			
FS 215-1	Mano fragment	Sandstone	Parallel striations on both surfaces; shaped; pecked; burned

90° and used as a one-hand mano. The grinding surface is flat except along the broken edge and the edge opposite to it (end of original two-hand mano). These two edges became rounded and curved from being used as a one-hand mano. There is no apparent intentional reshaping of the mano after it broke. Any reshaping resulted from use-wear.

Feature 4, a large extramural earthen pit located approximately 3 m northeast of Feature 9, yielded two ground stone artifacts, an indeterminate abrader fragment and an indeterminate ground stone fragment. The abrader fragment is lightly ground on one side but no striations or peck marks are visible. The indeterminate ground stone fragment is completely ground on one side. No striations are visible.

One indeterminate ground stone fragment was recovered from Feature 28, an earthen pit located outside Feature 9. This sandstone fragment is ground flat on one surface and exhibits little use-wear. It is not shaped and no striations are visible.

Miscellaneous Items

Site LA 115330 yielded over 20 miscellaneous items, including red ochre, yellow ochre, blue

pigment, and green mineral. A piece of red ochre was recovered from Feature 4, a large extramural earthen pit. One face is ground and multidirectional striations are visible.

Several miscellaneous items were recovered within the earthen pitstructure (Feature 2). Three pieces of red ochre were recovered from the feature fill of the pitstructure. Two of these pieces refit. On these pieces, both faces and one edge are ground. Parallel striations are visible. The third piece has one ground edge, with parallel striations visible. A piece of blue pigment, possibly azurite, was recovered from Feature 13, a large earthen pit in the northwest part of the pitstructure. It was not worked. One small piece of yellow ochre was found within Feature 25, an earthen pit in the west edge of the pitstructure. It has not been worked. Several small pieces of yellow ochre were recovered from Feature 26, a posthole along the south edge of the pitstructure. The yellow ochre was not worked.

Feature 9, an activity area approximately 3 m northwest of Feature 2, and associated features yielded several miscellaneous items. A blue pigment and a green mineral were recovered from Feature 9. The blue pigment has been shaped into a disc. The green mineral, probably malachite, has not been worked. A piece of yellow ochre was

recovered from Feature 15, an earthen pit within the activity area. One face was worked and parallel striations are visible. Three pieces of yellow ochre were found within Feature 18, an earthen pit within the activity area. None of these pieces were worked. One piece of yellow ochre was recovered from Feature 21, an earthen pit within the activity area. One face was worked and parallel striations are visible.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of faunal remains from the entire project can be found in Chapter 26, which also covers methods and general conclusions. Detailed description of faunal remains is provided in Appendix I.

With 250 faunal specimens the assemblage from this site is larger than the combined assemblages from the six other sites examined (Table 12.6). Faunal remains were recovered from Feature 1, Feature 2 (and Features 11, 13, 14, 23 and 26 in the floor of Feature 2), Feature 4, Feature 8, Feature 9 (and Features 18 and 24 within Feature 9), and Feature 10. The assemblage is dominated by small mammals, notably cottontail (*Sylvilagus*) and jackrabbit (*Lepus*).

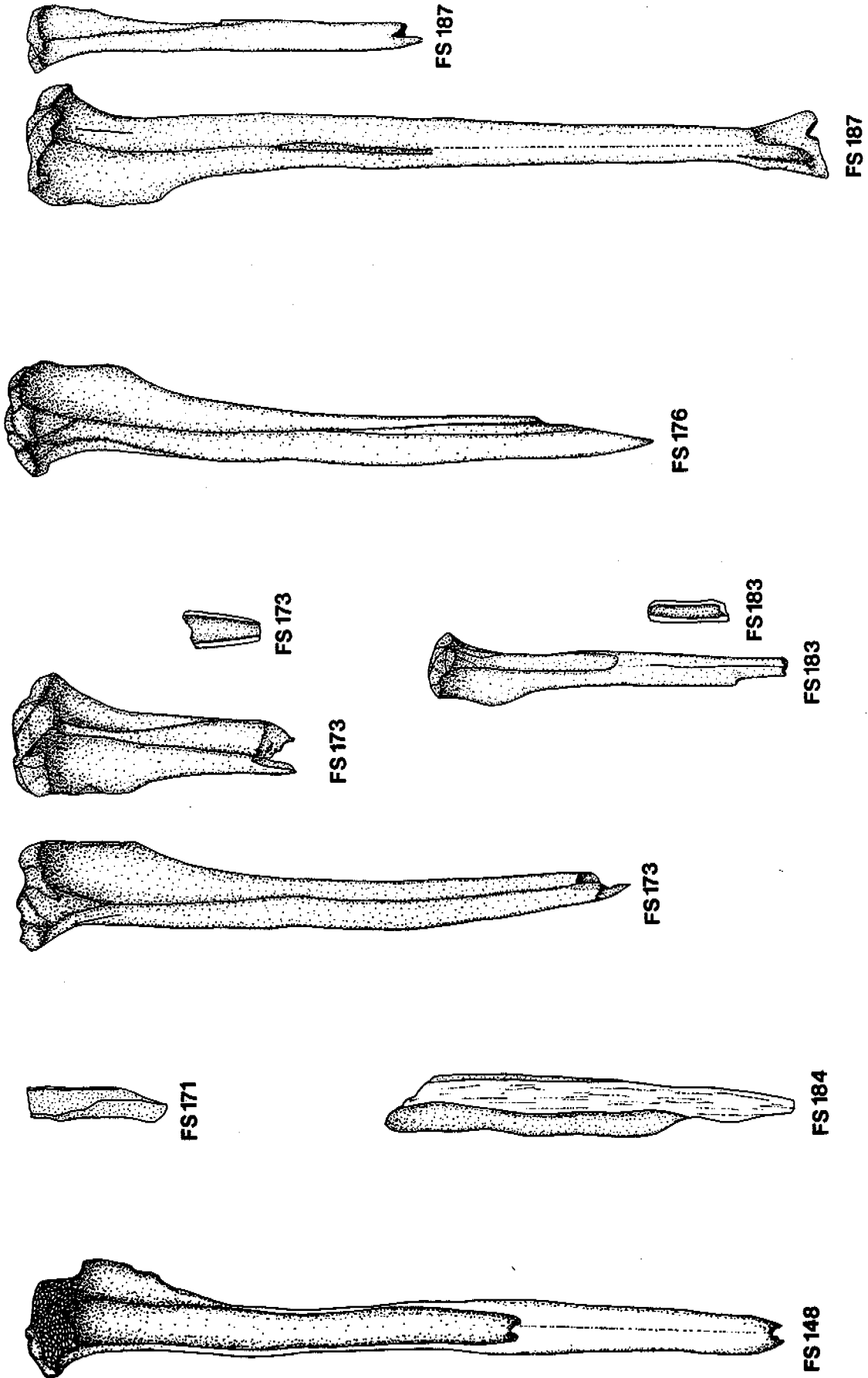
Rodents include packrat (*Neotoma* sp.), prairie dog (*Cynomys* sp.), and kangaroo rat (*Dipodomys ordii*), all of which can be found in the region today. Two species of artiodactyl — pronghorn (*Antilocapra americana*) and deer (*Odocoileus* sp.) — make up a small percentage of the assemblage.

This larger assemblage produced correspondingly more bone artifacts, and the overall frequency of bone artifacts (6% of the faunal remains) is higher than at other sites studied in this project. Three unidentified bone fragments appear to be midshaft fragments of awls, and exhibit polish and/or striations similar to those on more complete specimens. An awl tip was also made on an unidentified fragment, and an unidentified long bone fragment was also modified as an awl. Two pieces of unidentified long bones which had been grooved and snapped to make tubes or beads were identified. A small flat circular unidentified bone disc was perforated by a single hole, and may also be a bead. An ulna midshaft from a large bird was cut and polished to make a bone tube. Five awls were made from proximal tibiae of jackrabbit (three specimens) and cottontail (two specimens). The bone artifacts are illustrated in Figures 12.49 and 12.50.

Table 12.6. Faunal Assemblage from Site LA 115330.

Taxon	NISP	MNI	Burnt
Medium bird	1	1	-
Large bird	2	1	-
<i>Sylvilagus</i> sp.	66	5	5
<i>Lepus</i> sp.	17	4	-
<i>Cynomys</i> sp.	5	2	-
<i>Dipodomys ordii</i>	4	1	-
Muridae	1	-	-
<i>Neotoma</i> sp.	14	4	-
<i>Antilocapra americana</i>	1	1	-
<i>Odocoileus</i> sp.	2	1	-
Medium artiodactyl	1	-	1
Small mammal	13	-	1
Unidentified	121	-	30
Total	250	19	37

Key: MNI: minimum number of individuals
NISP: number of identified specimens



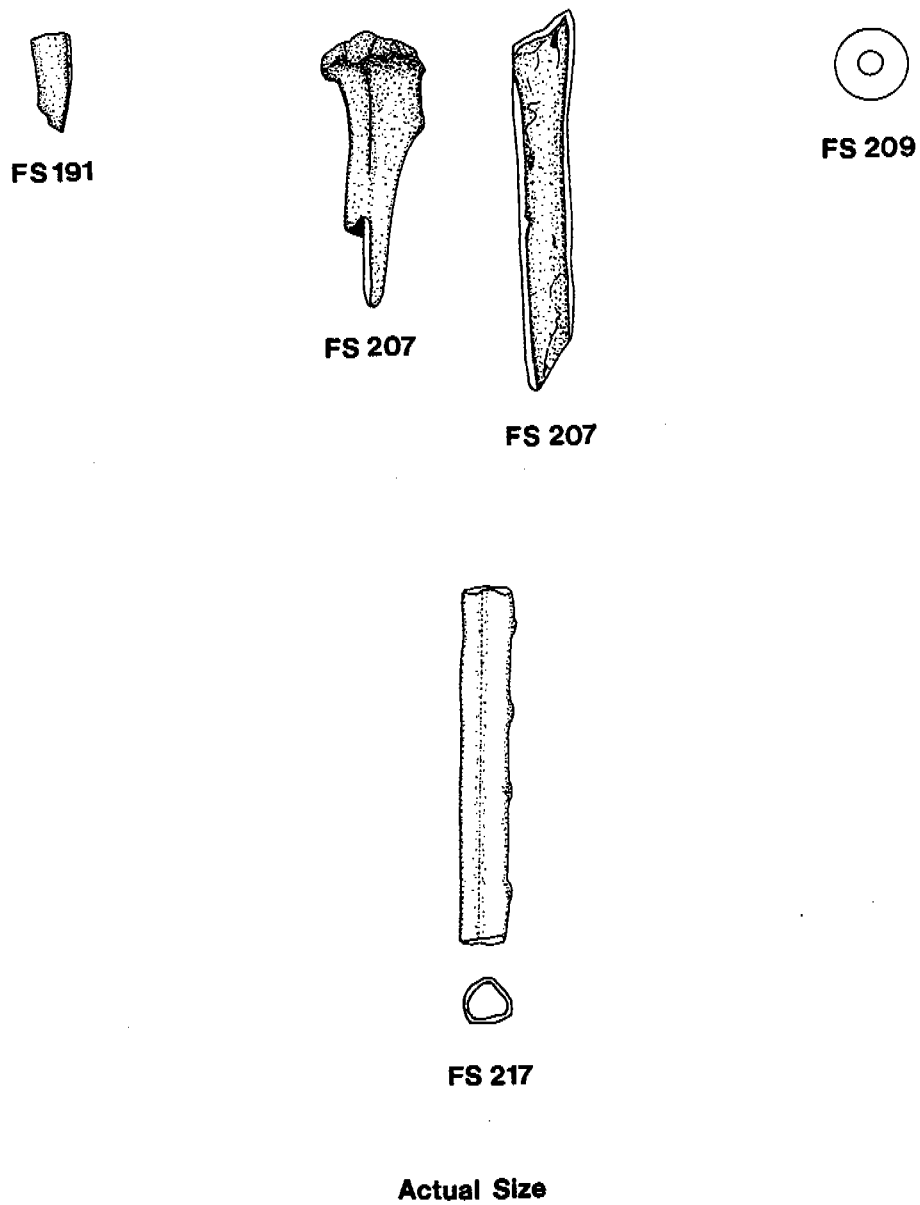


Figure 12.50. Site LA 115330 Bone Artifacts.

Burning is present on about 15% of the assemblage, mainly on unidentified specimens.

Macrobotanical Remains

Twenty-seven flotation samples were analyzed, yielding 15 charred taxa including banana yucca, bugseed, dropseed grass, goosefoot, grass family, juniper, maize, pigweed, pine, pitseed goosefoot, purslane, sedge family, spurge, sunflower, and winged pigweed. Maize cupules were the most common plant remain recovered followed by Cheno-Am, bugseed, and goosefoot seeds.

Every part of the yucca was used either for food, fiber, or soap. The pulp of banana yucca fruit was used in a variety of ways including gruel, dumplings, bread, and conserve (Harrington 1967:334). The Cheno-Am category refers to seeds that could be either in the genus *Chenopodium* or *Amaranthus*. This category is used when the condition of a seed prohibits a more specific identification. Documented economic uses of weedy annuals like Cheno-Ams and pigweed seeds abound in the ethnographic literature. Castetter (1935) described the use of these as a ground meal, either eaten as gruel or combined with other food such as cornmeal and made into cakes. Although bugseed has no documented ethnobotanical uses, it was no doubt used in much the same way as goosefoot. Charred bugseed has been recovered from southeast Utah (Reed 1983), the Chaco area (Donaldson and Toll 1982), Tsaya Wash (Minnis 1978), and the San Juan Basin (Hammett and McBride 1993). These data along with bugseed that was found in coprolites at Cowboy Cave (Hogan 1980) provide convincing evidence that bugseed was a source of food for prehistoric populations.

The ground seeds of dropseed grass were used by the Navajo to make dumplings, rolls, and griddle cakes; and the Hopi ground the seeds and mixed them with cornmeal (Castetter 1935:28). Even though dropseed grass grains are very small, the positive qualities of abundant seed production and the retention of the grains by the plant after maturation, preventing their loss before harvesting, (Doebley 1984) outweigh the problem

of small seed size. The juniper leaflets that were recovered in two samples are probably an artifact of using juniper twigs for fuel, and the same can be said about the presence of pine needles.

At least one member of the sedge family, bulrush, was used extensively by many Native American groups. The young shoots were eaten raw or cooked, the pollen was collected when the plant was in flower and mixed with meal, the stems were used to make baskets or mats, and the seeds were ground into a meal (Harrington 1967:212). Stevenson (1915:17) reported medicinal uses of two species of spurge for the Zuni and one of the same taxa was referenced by Kirk (1970:31-32) for treating various ailments. However, neither of the species documented was the spurge, *Euphorbia glyptosperma* that was found in flotation samples from site LA 115330.

The oil-rich seeds of the sunflower were an important source of food and oil. The ground seeds could be boiled until the oil rose to the surface and could then be skimmed off. The seeds were parched and eaten whole, hull and all, or ground into a meal (Harrington 1967:314). The Zuni used pulverized ray flowers of the sunflower along with blossoms of paper daisy (*Psilostrophe tagetina*) for ceremonial purposes (Stevenson 1915:59).

Unusual numbers of maize kernels and cupules were recovered from flotation and radiocarbon samples from the interior storage pit Feature 13. Several fused masses of kernels and 470 loose kernels (absolute count) along with 195 cupules (including fragments) and four measurable cobs were part of four radiocarbon samples from the feature. Absolute counts of maize remains from the flotation samples amounted to 99 cupules and 57 kernels. The excavation notes characterize the upper fill of the feature (where samples were collected) as a possible isolated refuse episode. The presence of fused kernel masses indicates that a cache of shelled kernels burned and were either stored in the feature and burned in situ or were burned elsewhere and deposited in the feature along with faunal and other floral remains recovered in the upper fill.

Eight taxa were identified from extramural contexts at site LA 115330 versus 12 from interior contexts. The difference in plant assemblage richness between exterior and interior contexts could indicate that the majority of plant processing and consumption took place indoors. However, differential preservation could be a factor here. Deeper deposits and structure walls protect fragile plant parts from erosive elements better than exposed, shallow extramural features.

Wood charcoal taxa identified in flotation and radiocarbon samples include juniper, oak, pine, pinyon, unknown conifer, and saltbush/greasewood. The only samples from the entire project that produced saltbush/greasewood wood were those collected from grids in the activity area and the pitstructure at site LA 115330.

The occupants of site LA 115330 were cultivating maize, using locally available woods for fuel and construction, and exploiting at least 15 wild plant taxa. Plants in this rich floral assemblage could be collected from midsummer and as late as October or November. Plants that could have been collected in the spring like tansy mustard or Indian ricegrass are missing from the record, but a year-round occupation of the site cannot be ruled out based solely on the absence of plants with a spring harvesting signature.

Pollen

Eleven pollen samples were analyzed at site LA 115330: three samples from pitstructure Feature 2, three samples from ramada Feature 9, and base samples from five extramural pits. Two of the extramural pit samples were pollen-sterile, Features 6 and 8 (FS 180 and 196, respectively). Table 12.7 presents a summary of the pollen results and lists sample pollen concentrations and percentages of pollen types with high values. The nine productive samples were characterized by low pollen abundance with eight of the samples producing less than 2000 pollen grains per cubic centimeter (gr/cc) of sample sediment. In many of the samples Cheno-Am and sunflower family comprised greater than 50% of the assemblages with ragweed/bursage, grass, pinyon, and juniper

contributing up to 30% of the pollen counted. The main economic types interpreted from this site are maize, Cheno-Am, grass, and beeweed with some evidence for cultural use of cholla, sunflower family, buckwheat, sagebrush, and a large grass pollen type that may represent Indian ricegrass.

Features 2, 11, and 14

A floor sample and two intramural pit samples (from Features 11 and 14) were analyzed from Feature 2. The floor sample produced the highest pollen concentration of the three samples at 1100 gr/cc. Possible economic resources associated with the floor include Cheno-Am, grass, maize, and pinyon. Maize pollen and aggregates of maize were identified in pit Features 11 and 14 indicating maize was associated with the two pits. Only maize husks retain significant amounts of pollen, compared to the essentially pollen-sterile kernels and husked cobs (Geib and Smith 1998), which suggests that the maize in Features 11 and 14 could result from direct use of maize pollen, some use of husks, or perhaps green maize still in tassel. Cheno-Am was relatively high in the two pits and could reflect a field weed or subsistence plants, used either for food or for pit-layering material. In Feature 11 high beeweed and pinyon values and occurrence of cholla pollen may signify subsistence resources.

Features 9, 15, and 24

Sediment samples from the floor, a posthole (Feature 15), and pit (Feature 24) were analyzed from Feature 9, and activity area. All three yielded maize pollen during scans. The low maize representation could result simply from blowing crop pollen near the feature, or may signify that only husked maize was brought into Feature 9. High beeweed and moderate sagebrush percentages were calculated from the floor, and in the posthole sample, only sunflower family was notable. Beeweed and some member of the sunflower family may have been manipulated in the structure, or a brush roof of beeweed, sunflower family, and sagebrush may have left pollen inside the feature.

Table 12.7. Summary Pollen Results with Sample Concentrations and Percentages of Significant Types at Site LA 115330.

FS No.	Feature Number and Context	Pollen Concentration gr/cc ¹	Maize and Aggregates* (%)	Cheno-Am (%)	Other Significant Types
183	2 - Pitstructure floor	1100	<1	45	Grass aggregates, 7% pinyon
203	11 - Pit in Feature 2	500	<1*	49	Cholla present, 5% beeweed, 7% pinyon
222	14 - Pit in Feature 2	700	2*	42	-
208	9 - Ramada?	1400	present in scan	26	4% sagebrush, 14% beeweed, 30% sunflower family
221	15- Posthole in Feature 9	5900	present in scan	20	33% sunflower family
234	24 - Pit, basin-shaped, base in Feature 9	1600	present in scan	36	Legume, 7% grass, large grass present, 1% buckwheat, 5% sagebrush
172	1 - Pit, bell-shaped, base	1000	2*	58	5% grass, large grass present
177	5 - Pit, basin-shaped, base	400	<1	40	2% buckwheat, 5% beeweed
168	4 - Pit, trough-shaped and fire-hardened, base	1600	<1	33	8% grass, large grass present, 2% buckwheat, 15% beeweed

¹Pollen concentration is expressed as grains per cubic centimeter of sample sediment (gr/cc) rounded to the nearest 100.

The base sample analyzed from Feature 24 was characterized by a high pollen concentration (1600 gr/cc) for this site, and a diverse assemblage with the rare occurrence of legume pollen (pea family), a high grass value, moderate buckwheat and sagebrush values, and the occurrence of large grass and maize pollen. Cheno-Am was low, compared to other site LA 115330 samples. The variety of pollen types suggests that the pit may have remained open for some time capturing atmospheric pollen or that pollen from vegetation around maize fields was incorporated into harvested material laid into the pit. There may also be traces of cultural use in the representation of some of the types in this sample and the best candidates are grass, buckwheat, and large grass (possibly Indian ricegrass).

Feature 1

A base sample from Feature 1, a bell-shaped pit had a high maize value with presence of maize pollen aggregates, high Cheno-Am and grass percentages, and presence of large grass pollen, which may reflect Indian ricegrass. Maize was probably stored in the pit and some use of grass and Cheno-Am is indicated.

Feature 5

The base sample from Feature 5, a basin-shaped pit, yielded a low pollen concentration at less than 400 gr/cc, but maize pollen was identified and moderate percentages of beeweed and buckwheat pollen were calculated. Maize apparently was associated with the pit and beeweed and buckwheat could reflect field weeds or directly manipulated resources.

Feature 4

Feature 4, a trough-shaped pit, was characterized by presence of maize pollen and a low percentage of Cheno-Am, but high percentages of grass, beeweed, and buckwheat, and the occurrence of large grass. Similar to other extramural pits at site LA 115330, maize is the obvious cultural plant and other possible economic taxa include grass, beeweed, and buckwheat.

STRATIGRAPHY

The stratigraphy of site LA 115330 is consistent with that found on many other sites in the project, in that the cultural deposits dating to

the Basketmaker II period are located below a humic A horizon. This horizon is capped with recent sand deposits (Stratum I) in SU 3, 4, 5, and 6. The A horizon appears as Stratum I in SU 7 and 8 at the northernmost portion of the site. Underlying this horizon is a strong brown sandy loam, on which rests the Basketmaker II occupation surface. This stratigraphic sequence is laterally continuous across the northern and central portion of the site. In the southern portion of the site, SU 3 and 4 reveal underlying limey shale deposits of the Dakota Sandstone (Goldstein 1998).

CHRONOMETRIC DATA

The chronometric data for site LA 115330 comprise five radiocarbon samples and a very small ceramic artifact assemblage. Table 12.8 summarizes the radiocarbon samples. All of the radiocarbon dates fall within the general cultural period of the Basketmaker II.

The later component is tentatively dated by means of a small ceramic assemblage (two diagnostic sherds). Eckert (above) calculated a mean ceramic date of $AD\ 912 \pm 187$ for these two sherds.

SUMMARY

Site LA 115330 represents a poorly known period in the archaeology of the Zuni area.

It is primarily a single-component Basketmaker II habitation, comprising numerous and varied features. These features include a deep pitstructure (with internal storage pits), an activity area (or shallow pitstructure, also with internal storage pits and a possible posthole), and extramural storage pits.

Along with the Basketmaker II component at site LA 26306, the architecture at site LA 115330 is some of the earliest documented in the Zuni area. Given the data presented above, site LA 115330 is interpreted to have functioned as a farmstead during the Basketmaker II period. Interestingly, the nearby and contemporaneous site LA 48695 produced sediments and other features indicative of an agricultural field system.

The abundance of maize at the site and the nearby field at site LA 48695 indicate occupation at least from the spring to late fall, the period between planting and harvesting. This is consistent with the wild plant resources that were also recovered from our investigations. The presence of a deep pitstructure in the storage pits suggests occupation throughout the winter (Gilman 1987). Site LA 115330, therefore, is interpreted as essentially a year-round habitation, with maize as its primary subsistence focus.

Table 12.8. Summary of Radiocarbon Samples from Site LA 115330.

FS No.	Conventional Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Material	Context
168	2190 ± 60	BC 365 to 165	BC 385 to 50	BC 200	<i>Pinus edulis</i> , <i>Juniperus</i> , unknown conifer	F4, extramural storage pit
188	1750 ± 60	AD 235 to 390	AD 135 to 425	AD 265 and AD 290 and AD 320	<i>Pinus edulis</i> , <i>Juniperus</i> , unknown conifer	F2, pitstructure floor
205	2190 ± 60	BC 365 to 165	AD 385 to 50	BC 200	<i>Pinus</i> , <i>Quercus</i> , unknown conifer	F12, hearth in F2
207	2070 ± 60	BC 165 to AD 5	BC 200 to AD 70	BC 50	maize kernels	F13, storage pit in F2
221	2210 ± 60	BC 375 to 180	BC 390 to 75	BC 345 and BC 310 and BC 210	<i>Pinus</i> , <i>Juniperus</i> , unknown conifer	F15, posthole within F9 activity area

Chapter 13

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 48695

Jonathan Damp, Stephen Hall, Jeffery Waseta, and Jerome Zunie

with an Analytic Contribution by Suzanne L. Eckert

INTRODUCTION

Archaeological investigations at site LA 48695 were conducted between 9 and 17 March 1998 and again during the summer and fall months of 1999. The site is located entirely on the eastern side of the highway, at an elevation of 2087.9 m (6850 ft) above mean sea level. On the surface, the site comprises several clusters and alignments of sandstone rocks, one of which (Feature 4) extends into the highway right-of-way. Investigations at this site were initially limited to testing this feature, and 30 m of mechanical trenching within the site boundaries within the right-of-way. Testing suggested Feature 4 was a check dam or some similar type of agricultural feature, possibly dating to the Pueblo II. The most significant finding at the site, however, was evidence in subsurface deposits of Basketmaker II agriculture contemporaneous with the occupation of sites LA 115330, LA 26306, and LA 115327. In essence, this location was used during the Basketmaker II period as an agricultural field. It was also apparently considered a good location for similar pursuits during later times.

Site LA 48695 is located along the valley margin of Y Unit Draw, at the base of the western slope. Modern vegetation consists of a lone juniper tree, sagebrush, and grasses. A large stock pond has been built up slope and to the west of the site, indicative of significant runoff of precipitation in this particular location.

Survey Results

Davis and Windes (1975) originally recorded site LA 48695 during their survey of cultural resources along State Highway 602. They recorded the linear concentration of sandstone (Feature 4), but observed no other prehistoric

cultural material on the site. Abbott (1997:32-34) recorded four features (sandstone concentrations) at the site, three of which were entirely outside the right-of-way (Figure 13.1). These features are described below. A single Red Mesa Black-on-white sherd observed during the survey suggested the site dated to the Pueblo II period.

DATA RECOVERY ACTIVITIES

Surface Collection

A pedestrian survey was conducted across LA 48695 in transects at 2 m intervals to locate all surface artifacts and features before excavations began. No artifacts were observed within the right-of-way, and only one ceramic artifact was observed outside the right-of-way (Figure 13.2). Five sandstone concentrations, however, were observed and designated Features 1 through 5. As mentioned above, only Feature 4 was located within the right-of-way.

Excavation

Hand-Excavated Study Units

Hand excavation of a 1-by-2-m combined within a 2-by-2-m unit designated as Study Unit (SU) 1 was conducted in order to determine the nature and depth of Feature 4 on site LA 48695. The unit was excavated in arbitrary levels with all sediment deposits screened through 1/4-in hardware mesh. Descriptions of SU 1 will be discussed in the description of Feature 4.

Mechanical Trenches

Mechanical excavations of three backhoe trenches designated as SU 2, 3 and 4 were conducted on site LA 48695, in order to determine

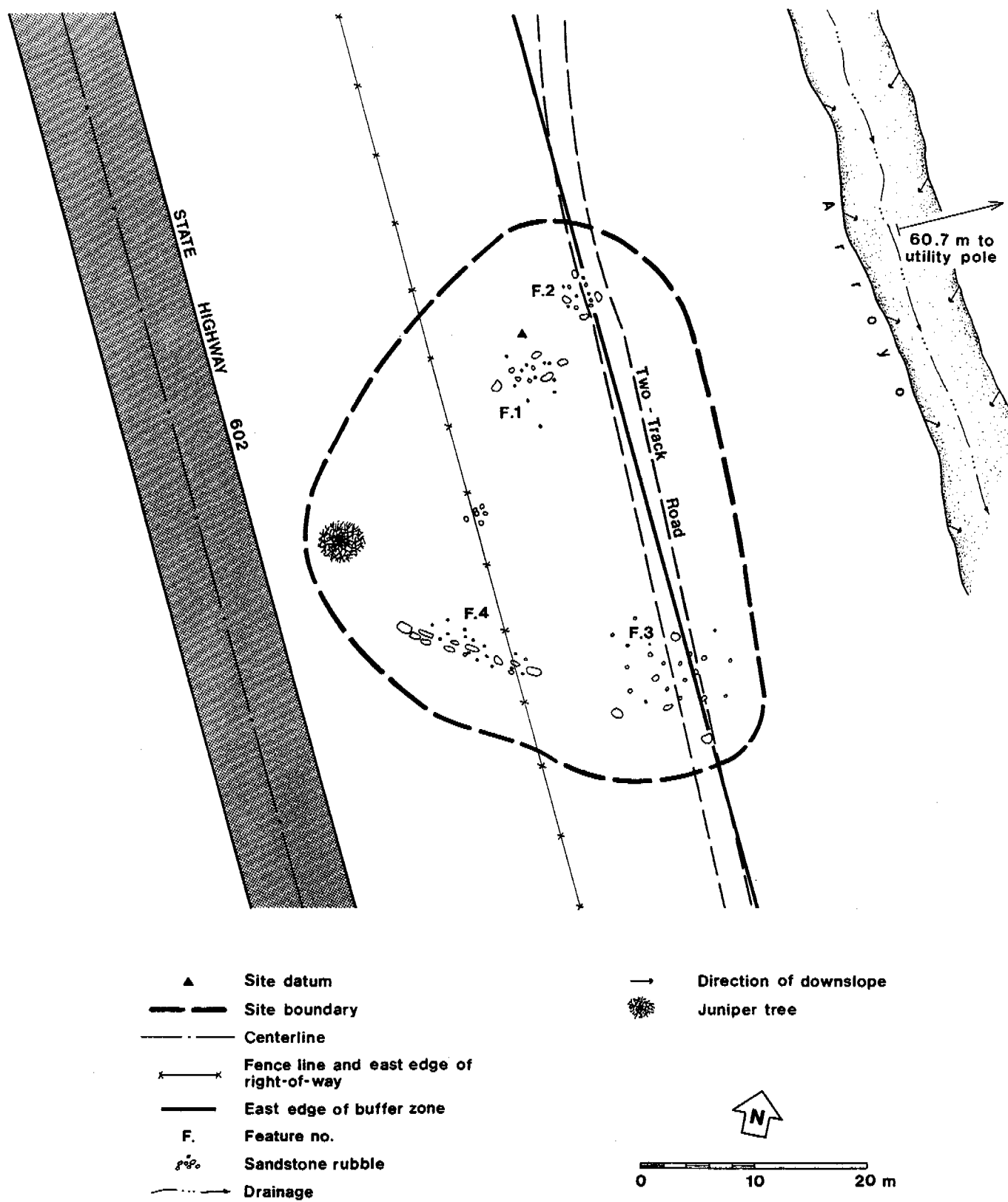


Figure 13.1. Site LA 48695 Survey Site Map.

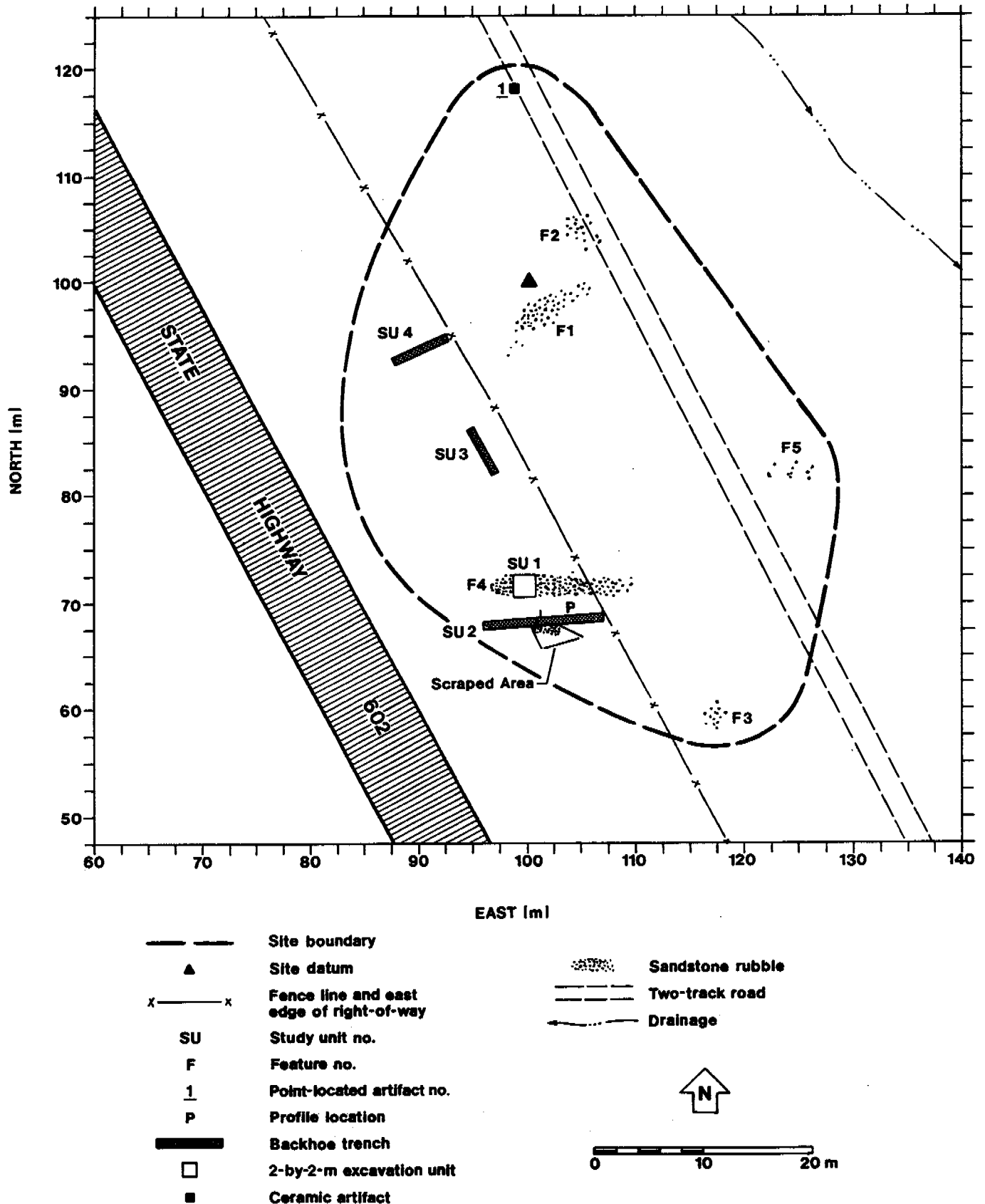


Figure 13.2. Site LA 48695 Data Recovery Site Map, Features, Study Units, and Mechanical Stripping

the nature and depth of cultural deposits and any possible association with Feature 4. The trenches ranged from 4.0 to 5.50 m in length and included an average maximum depth of approximately 1.30 m. A total of 15.70 of trench was excavated on the site (Figure 13.2).

Study Unit 2

SU 2 was placed approximately 2.0 m south of SU 1, with the west end located at site grid coordinates N67.70, E94.63, and N68.70, E106.71, at the east end (Figure 13.2). The length of the trench measured 11 m, with a maximum depth of approximately 1.30 m. A representative 5.50 m long profile was drawn of the south-facing wall, revealing four strata (Figure 13.3). Stratum I includes a sediment described as an organic layer (a humic A horizon) consisting of a sandy loam mixed with less than 10% gravel and common roots, the sediment contained no cultural deposits in profile view. Stratum II includes a dark yellowish brown matrix of light amounts of clay mixed with sand, and also contains upright sandstone rocks noticeable along the western end of the profile. Goldstein (1998) identifies this as a poorly sorted sand and gravel deposit with subrounded gravels of local lithologies (shale and sandstone). He also believes this is a tributary deposit based on these characteristics. Stratum III includes a linear pocket of a dark yellowish brown, soil mixed with 75% gravel and most likely is an alluvial deposit. Stratum IV exhibits a sandy loam mixed with at least 10% charcoal flecks. Goldstein identifies this as a trough shaped organic horizon that likely formed in a cienega-type setting (later investigation of this stratum resulted in its identification as a buried A horizon not necessarily related to cienega conditions). Samples included flotation and pollen which were collected from Strata II and IV.

Study Unit 3

SU 3 placed approximately 11 m northwest of Feature 4, with the northwest end of the trench located at site grid coordinates N86.27, E94.50, and N82.15, E96.81 at the southeast end (Figure 13.2). The trench is 4.80 m in length with a

maximum depth of approximately 1.10 m. Six strata were recorded along a southwest-facing wall profile (Figure 13.4). Stratum I comprises a thick (0.40 m) sandy loam deposit mixed with sandstone rocks, roots and one visible pocket of gravels observed at the northeast end of the trench. Stratum II exhibits an obvious alluvial deposit consisting of dense gravel content mostly concentrated from the northeast end of the trench to the mid portion of SU 3. Other natural materials include small to medium size sandstone rocks that are observed through out the stratum. Stratum III was separated into an A, B, and C layers. The layers designated as Stratum III, A and B are characterized by numerous thin (less than 1 cm) laminations of very fine sands mixed with charcoal flecks. In profile, Stratum III, A begins at the southeastern end of the trench and pinches out below the large sandstone rock situated within the mid portion of the profile. Stratum III, B lies below Stratum III, A and pinches out 48 cm to the northeast of where Stratum III, A pinches out. Stratum III, C is described as thin (< 1 cm) laminations of loamy sands that extend to the northwest from its interface with Stratum III, B. In all Stratum III, A, B, and C are considered to be alluvial deposits. Two radiocarbon samples were also retrieved from layers A and B and one sample was submitted for chronometric determination (see below). Stratum IV is located at both ends of the trench and exhibits a sediment of very coarse sands mixed with at least 75% gravel content, this stratum also is observed as an alluvial layer. Stratum V is characterized as a pocket of dark brown sandy loam located between Stratum IV and above Stratum VI. Stratum VI includes a loamy sand with very few roots and no gravel which is a very abrupt change from the previous strata. No additional buried features were encountered during excavation of SU 3.

Study Unit 4

SU 4 was placed approximately 11 m northwest of SU 3, with the northeast end located at site grid coordinates N95.09, E92.63, and N92.68, E87.55 at the southwest end (Figure 13.2). The trench is 5.40 m in length with a

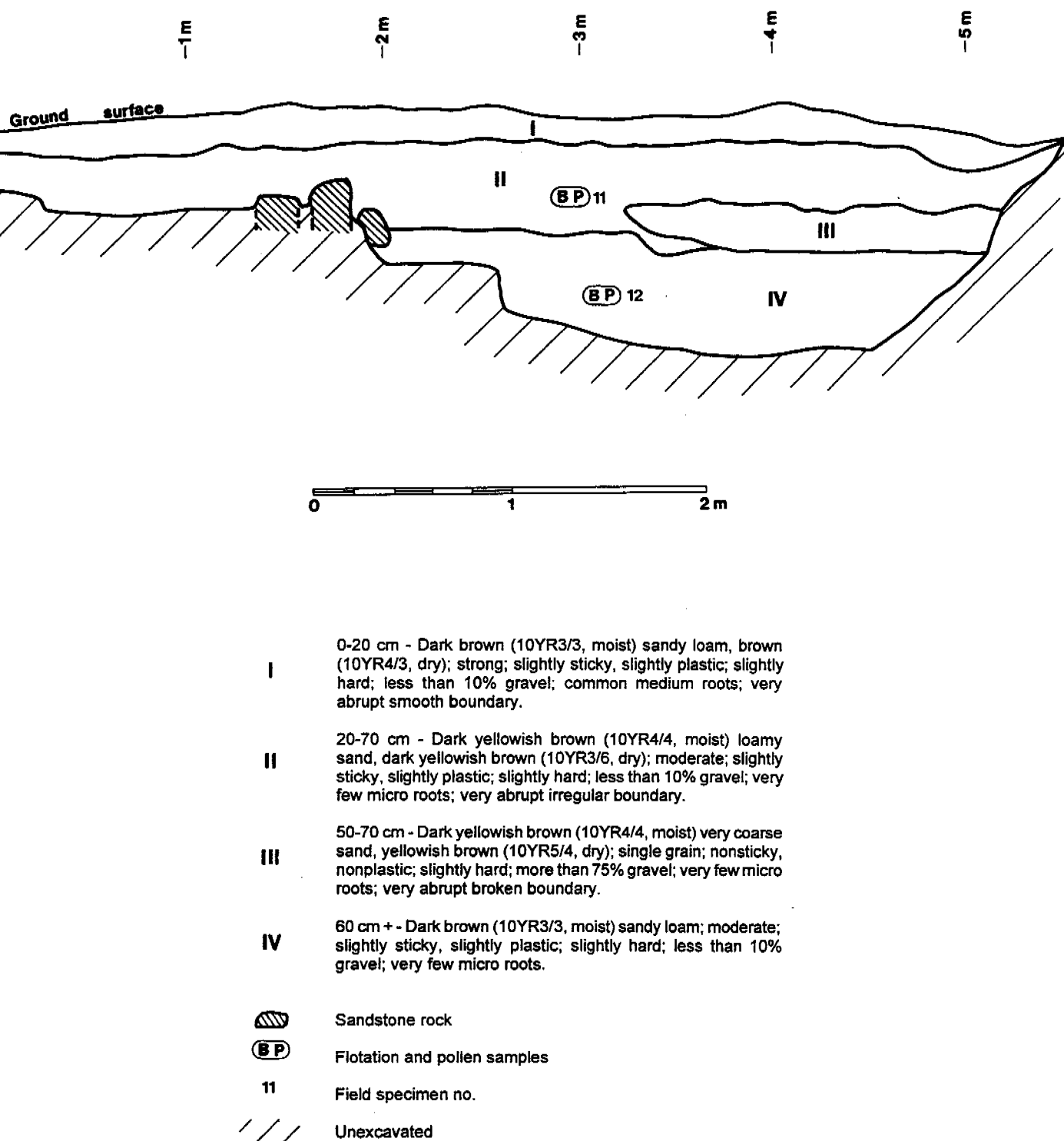
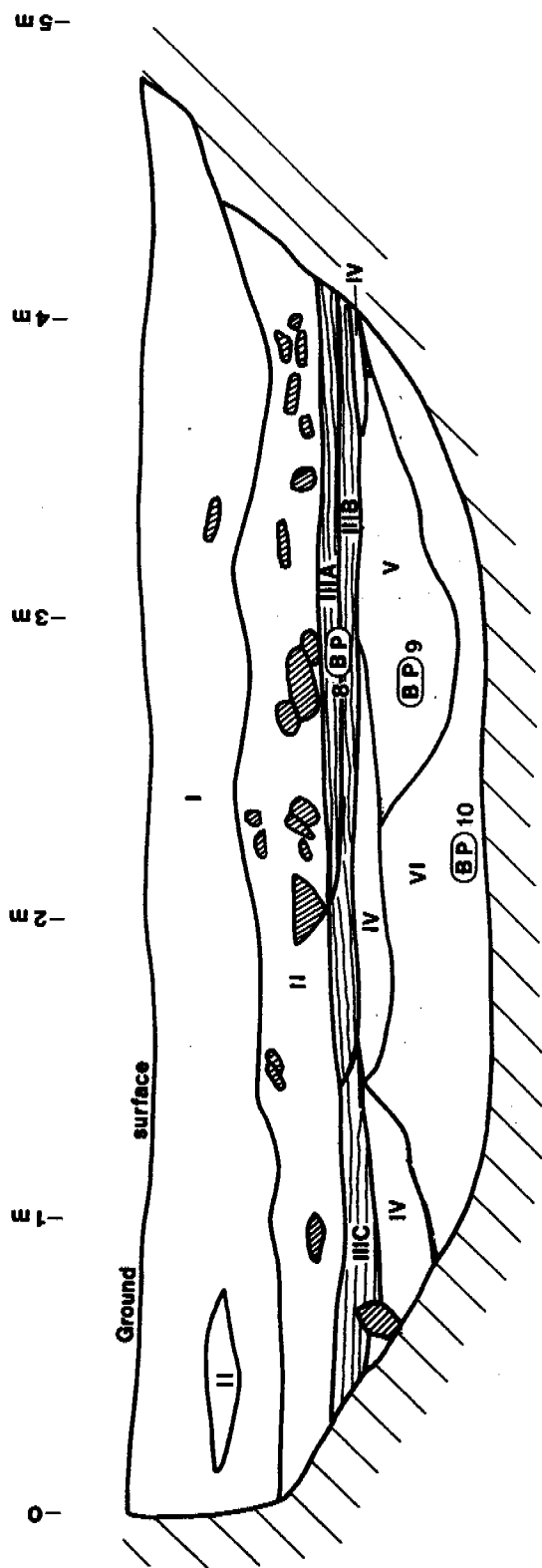


Figure 13.3. Site LA 48695 Study Unit 2, South-facing Profile.



66-78 cm - Dark yellowish brown (10YR4/4, moist) very coarse sand, yellowish brown (10YR5/4, dry); single grain; nonsticky, nonplastic; loose; more than 75% gravel; very few micro roots; gradual broken boundary.

70-100 cm - Dark brown (10YR3/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; loose; no gravel; very few micro roots; diffuse broken boundary.

80 cm + - Dark brown (10YR3/3, moist) sandy loam, brown (10YR5/3, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; very few micro roots.

Sandstone rock

Fine soil laminations

Flotation and pollen samples

Field specimen no.

Unexcavated

0-40 cm - Dark yellowish brown (10YR4/4, moist) sandy loam, brown (10YR4/3, dry); moderate; slightly sticky, slightly plastic; loose; less than 10% gravel; common medium roots; diffuse wavy boundary.

40-60 cm - Dark yellowish brown (10YR4/4, moist) very coarse sand, yellowish brown (10YR5/4, dry); single grain; slightly sticky, slightly plastic; loose; more than 75% gravel; very few micro roots; diffuse wavy boundary.

60-66 cm - Pale brown (10YR6/3, dry) very fine sand; massive, granular; nonsticky, nonplastic, soft; no gravel; very few fine roots; abrupt, smooth boundary.

66-70 cm - Pale brown (10YR6/3, dry) loamy sand; massive, granular; slightly sticky, slightly plastic, slightly hard (dry); no gravel; very few fine roots; abrupt, smooth boundary.

62-68 cm - Pale brown (10YR6/3, dry) loamy sand; massive, granular; slightly sticky, slightly plastic, slightly hard (dry); no gravel; very few fine roots; abrupt, smooth boundary.

maximum depth of approximately 1.30 m. Four strata were documented along a northwest-facing wall profile (Figure 13.5).

Stratum I characterized an organic layer of dark brown, sandy loam mixed with a high amount of very fine roots and a sparse amount of non-cultural charcoal flecks observed at the base of the stratum. Stratum II and III include the same soil texture with the only difference consisting of the size of roots ranging from micro roots to very fine roots, both strata include the same percentage of gravel as well. The upper portion of Stratum IV blends into the lower portion of Stratum II which suggests a separate episode of sediment deposition. Flotation and pollen samples were taken from Strata I, III, and IV. No additional buried features were encountered during excavation of SU 4.

Feature Descriptions

One water control feature and four indeterminate sandstone rock scatters were recorded during survey work on site LA 48695 (Figure 13.2). Only Feature 4, the water control feature, was investigated during data recovery. The remaining features were located outside the project right-of-way and were documented by drawing a plan view map and filling out a feature description form.

Feature 1

Feature 1 was an indeterminate sandstone rock scatter located outside the project right-of-way at site grid coordinates N97.00, E101.00 (Figure 13.2). In plan view the scatter encompassed an area 7.30 m southwest-northeast by 2.20 m northwest-southeast (Figure 13.6). Ground surface observations of the feature revealed three upright sandstone rocks and small areas of gravel concentrations. No formal wall alignments or surface architecture were noticed. Due to the location of the feature no further work was conducted.

Feature 2

Feature 2 was an indeterminate sandstone rock scatter situated outside the project right-of-way at site grid coordinates N105.00, E105.00 (Figure 13.2). In plan view the feature measured 3.20 m northwest-southeast by 2 m northeast-southwest (Figure 13.7). Ground surface observations included an undefined scatter of sandstone rocks with inclusions of gravel, with no indication of wall alignments. Due to the location of the feature no further work was conducted.

Feature 3

Feature 3 was an indeterminate sandstone rock scatter situated outside the project right-of-way at site grid coordinates N60.00, E117.00 (Figure 13.2). In plan view the scatter measured 2.50 m north-south by 1.0 m east west (Figure 13.8). Ground surface observations consisted of thirteen pieces of sandstone rocks with a small concentration of gravels to the north. Due to the location of Feature 3, no further work was conducted.

Feature 4

Feature 4 was a sandstone rock water control feature, sometimes referred to as a check dam. The center point of the feature was located at site grid coordinates N71.50, E102.80 (Figure 13.2). In plan view the feature is linear-shaped measuring approximately 12.90 m in length by 2.0 m in width (Figure 13.9).

The feature was investigated by placing a 2-by-2-m unit in the middle of the feature in order to determine the depth and nature of the rock scatter the unit was designated SU 1 with the results following.

SU 1 excavations began as a 2-by-2-m unit placed over the linear sandstone and rock scatter of Feature 4. The southwest corner of the unit was established at site grid coordinates N70.74, E98.47 (Figure 13.2). A total of nine 10-cm levels were excavated within SU 1, revealing four strata as shown along a west-facing wall

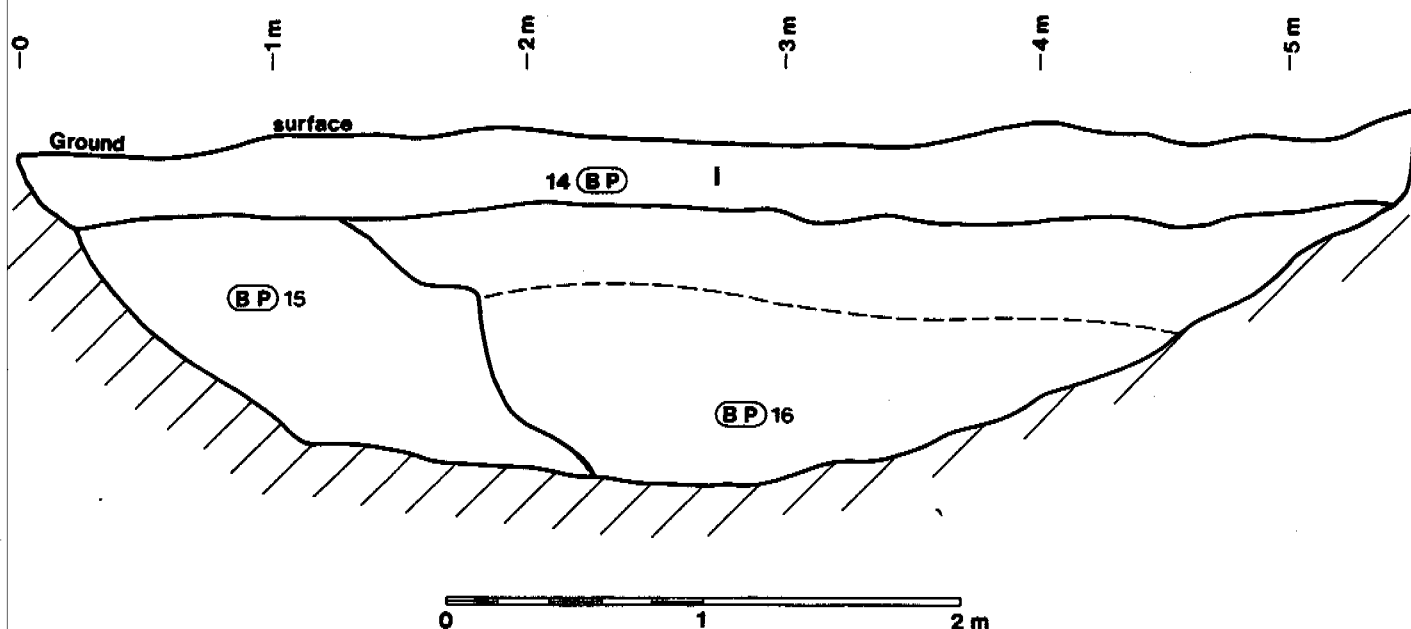


Figure 13.5. Site LA 48695 Study Unit 4, Northwest-facing Profile.

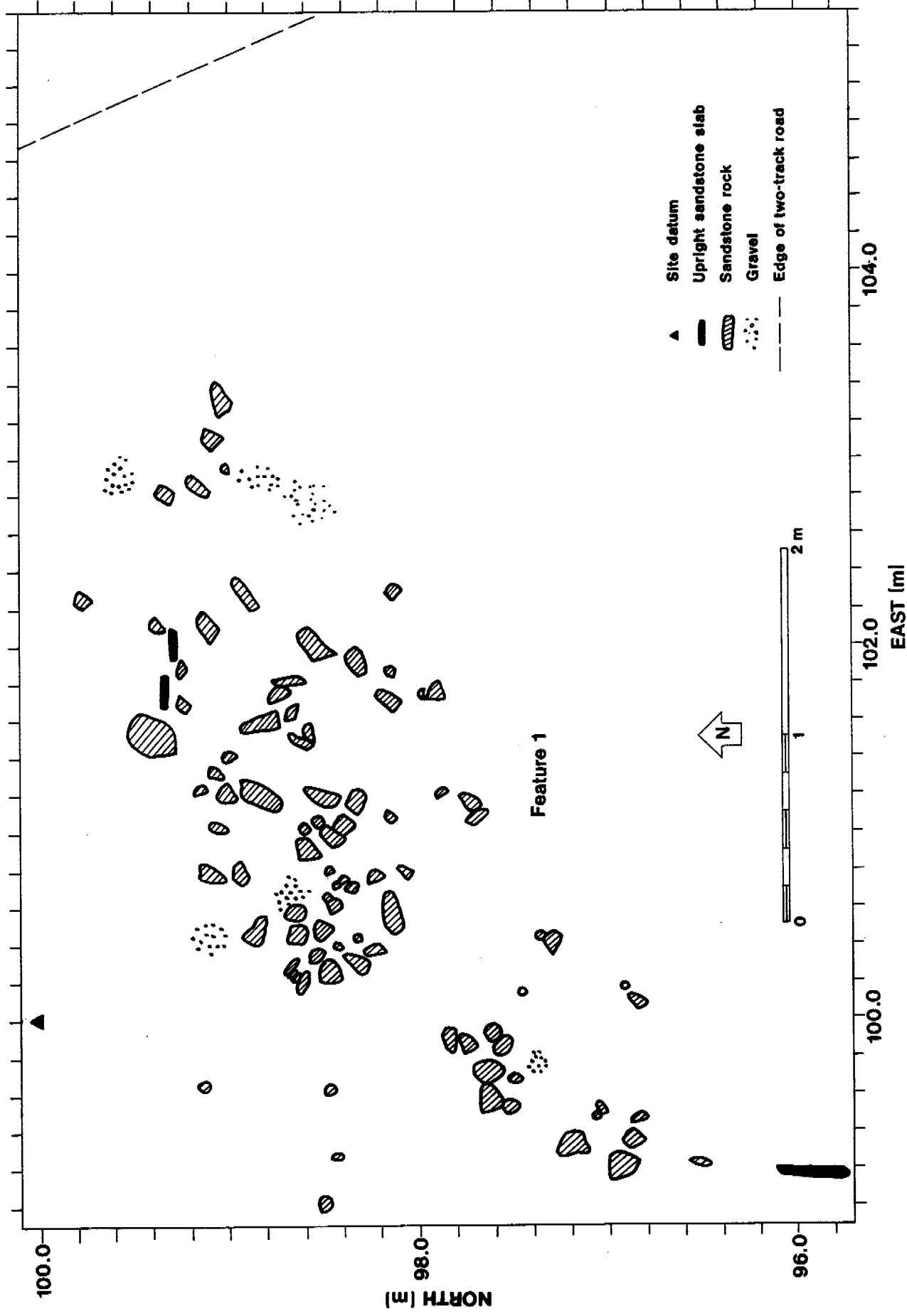


Figure 13.6. Site LA 48695 Feature 1, Plan View.

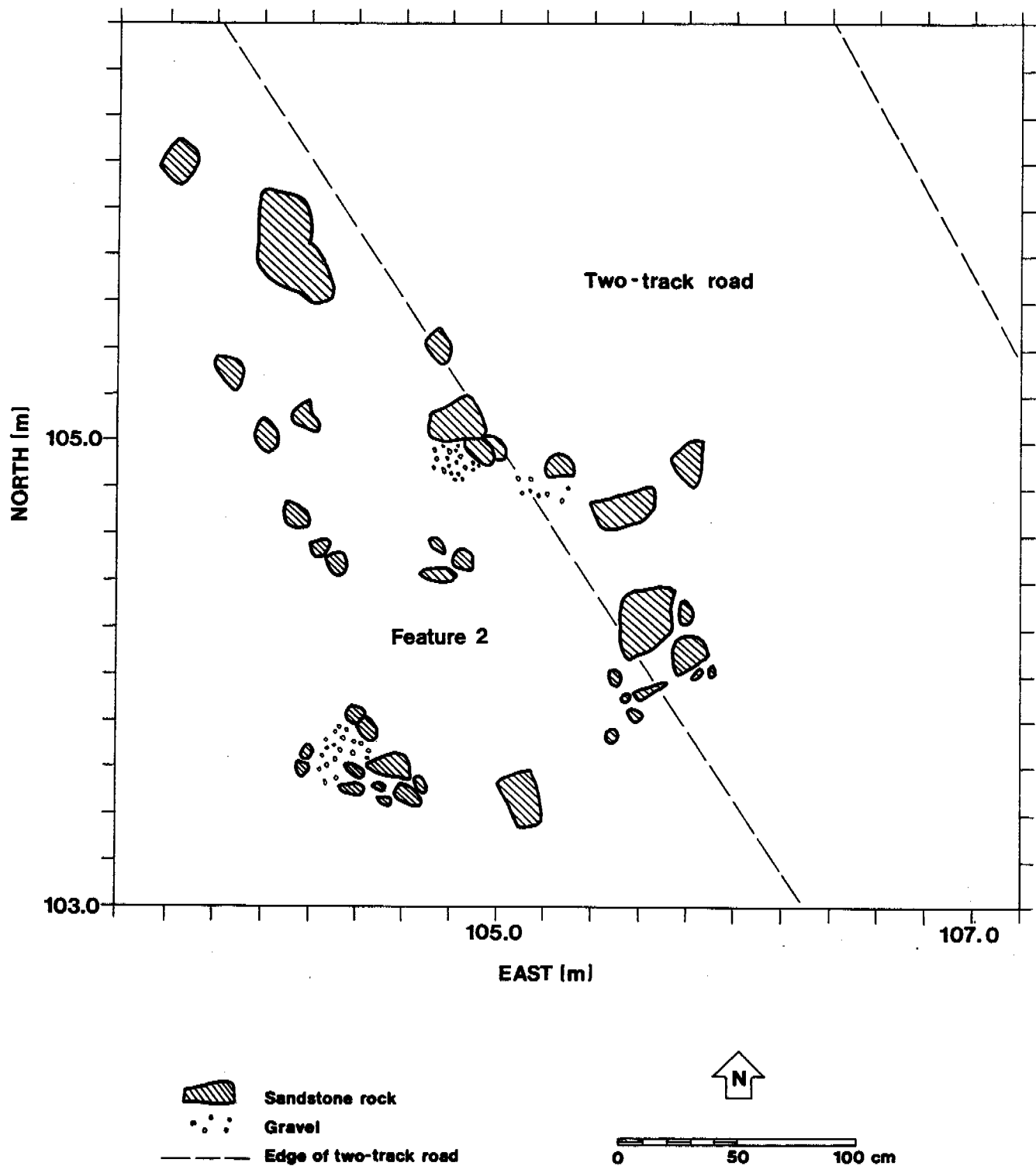
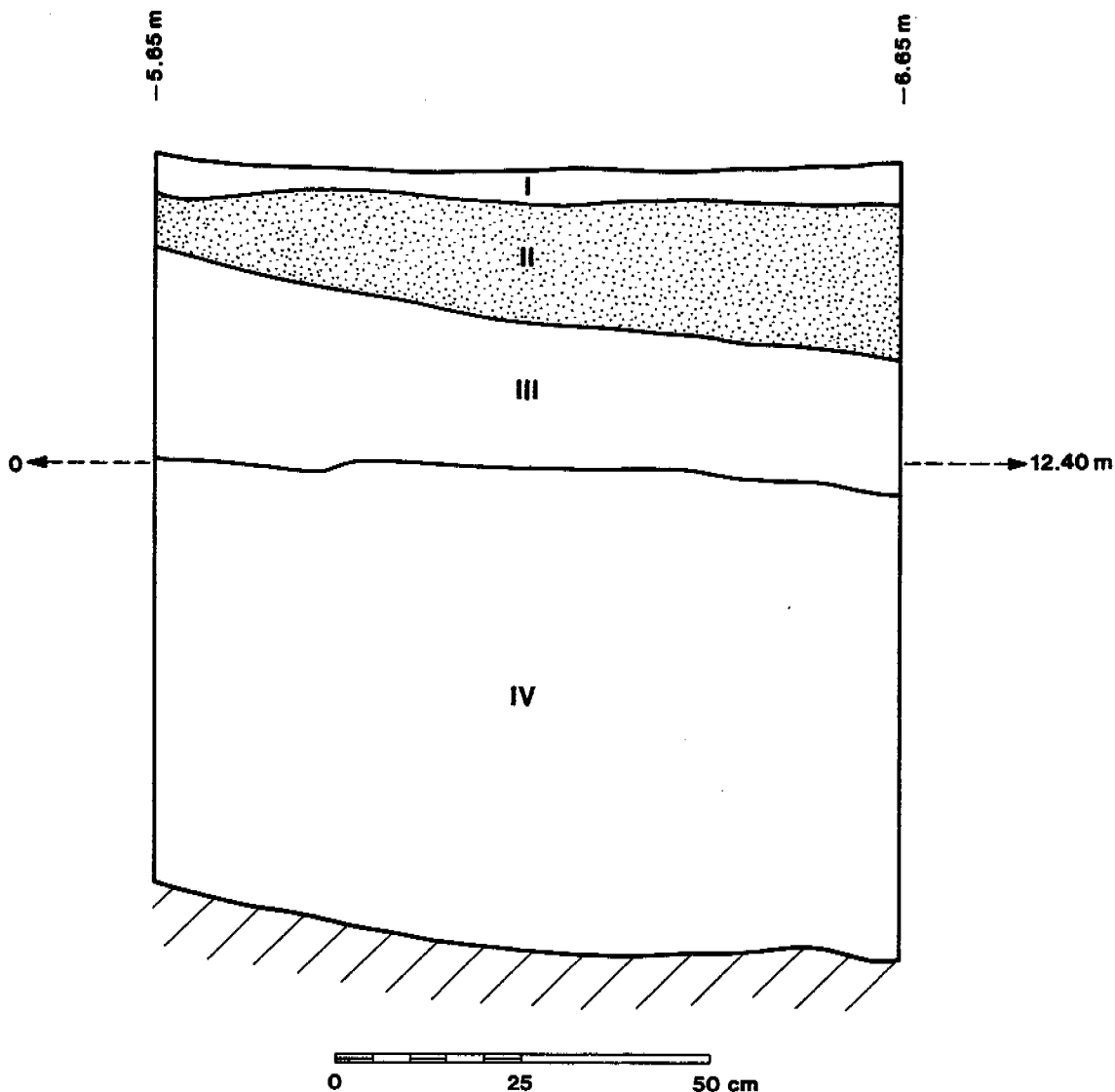
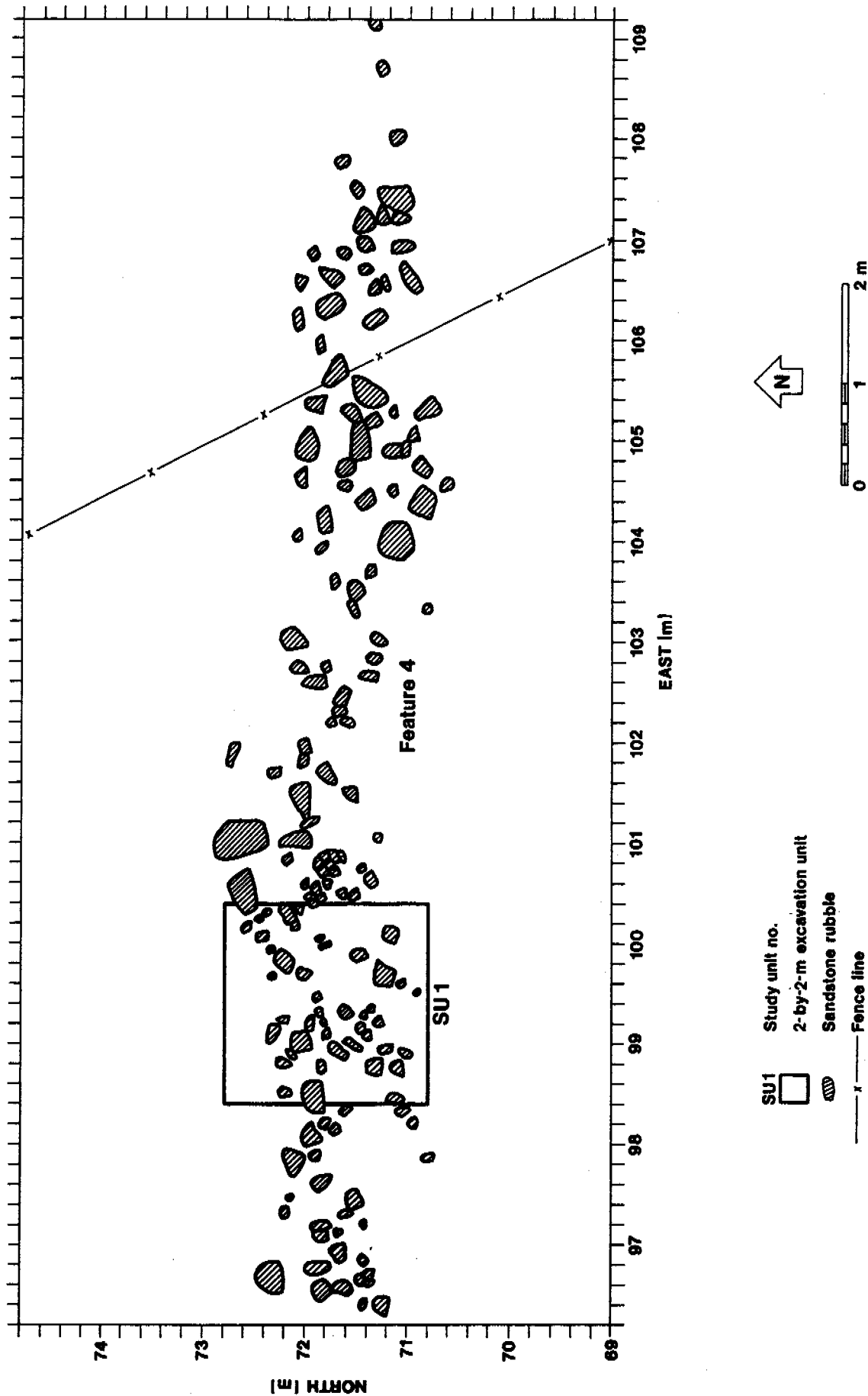


Figure 13.7. Site LA 48695 Feature 2, Plan View.



- I 0-5 cm - Brown (10YR4/3. dry) very fine sandy loam; moderate, very fine granular; nonsticky, nonplastic; less than 10% gravel; few fine roots; clear smooth boundary.
 - II 5-21 cm - Dark yellowish brown (10YR3/4. moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; few very fine roots; diffuse smooth boundary.
 - III 21-41 cm - Dark brown (10YR3/3. moist) sandy clay loamy; moderate, fine, granular; slightly sticky, slightly plastic; very few roots; abrupt smooth boundary.
 - IV 41-107 cm - Yellowish brown (10YR5/4. moist) sandy loam; weak, very fine, granular; nonsticky, nonplastic; very few very fine roots.
- /// Unexcavated

Figure 15.10. Site LA 26308 Study Unit 9, East-facing Profile.



profile (Figure 13.10). Levels 1 and 2 of the excavation included Stratum I, consisting of approximately 25% angular sandstone rocks approximately 10 to 15 cm in size mixed with a dark brown, sandy loam and common roots. A small amount of cultural materials were collected within Level 2, consisting of ceramic and unmodified stone artifacts. At this point excavation of the 2-by-2-m unit was reduced to a 1-by-2-m unit, within Level 3, Stratum I and II, with the excavation concentrated within the east half of the unit. The portion contained in Stratum I, Level 3, continued to reveal sandstone rubble mixed with a sandy loam. Excavations within Stratum II, Level 3 revealed a dark yellowish brown, sandy loam mixed with smaller sandstone rocks and gravel (as seen in SU 2 and 3). No cultural materials were collected within Level 3. Levels 4, 5, and the upper portion of Level 6 were also situated within Stratum II, revealing the same type of mottling as described above. Ceramic artifacts were also collected within Level 5. The lower portion of Level 6 along with Levels 7 and 8 were contained within Stratum III, exhibiting an alluvial deposit consisting of 75% gravel content mixed with a dark yellowish brown, sandy loam. Level 9, Stratum IV revealed a dark brown, sandy loam with approximately 2% charcoal mottling suggesting the layer may also be associated with an alluvial deposit of some type. This is the same deposit Goldstein (1998) identified as having been deposited in a cienega-like setting. Subsequent study of this deposit has demonstrated that it is a buried A horizon. Flotation and pollen samples were retrieved from Strata I, II, and IV.

Investigations of Feature 4 revealed unmodified sandstone rocks within a linear surface scatter that had a maximum depth of approximately 30 cm. No formal alignment or coursing of the sandstones was observed during excavation or along the feature profile (Figure 13.7).

Feature 5

Feature 5 was an indeterminate sandstone rock scatter located outside the project right-of-way at

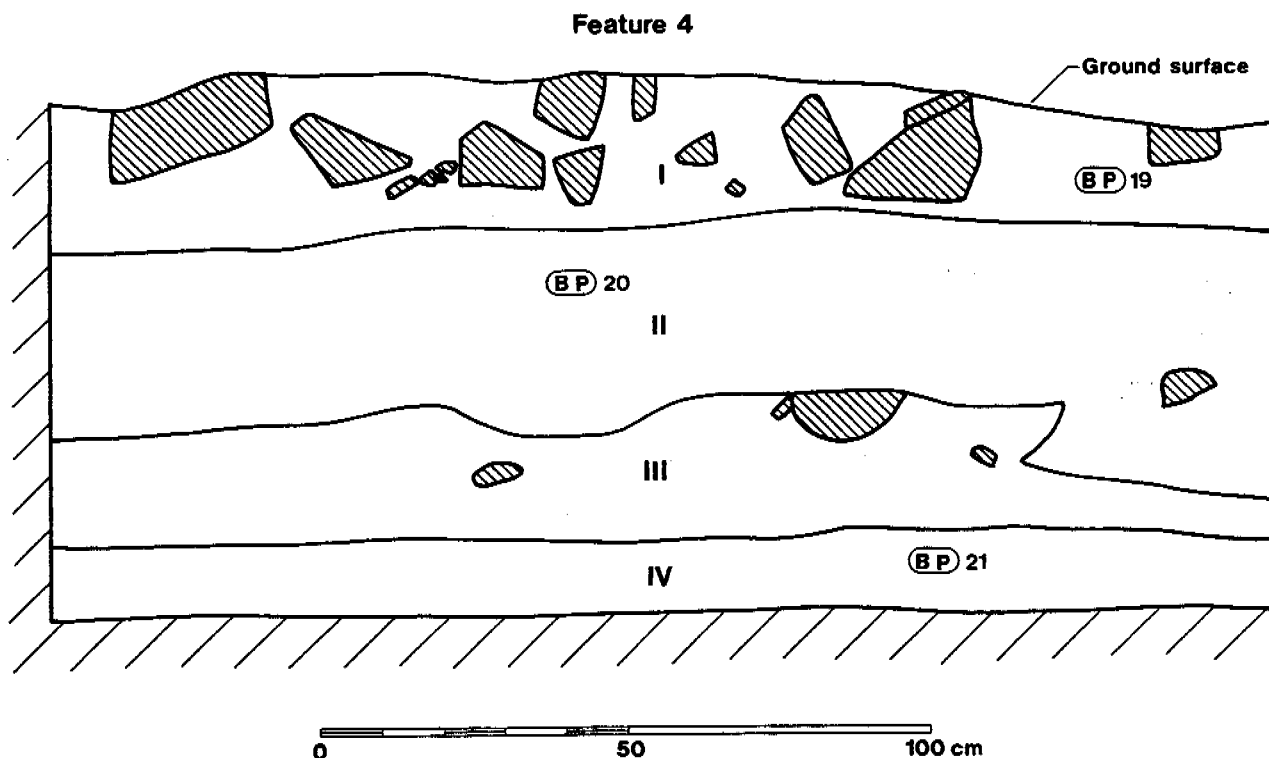
site grid coordinates N81.80, E123.50 (Figure 13.2). In plan view the sandstone scatter measured 4 m east-west by 2 m north-south (Figure 13.11). Ground surface observations' exhibits eight pieces of unmodified sandstone rocks with a small concentration of gravels. Due to the location of the scatter no further work was conducted.

ADDITIONAL INVESTIGATIONS

Remote Sensing

As part of a remote sensing research initiative developed by ZCRE with the collaboration of Dr. Lewis Sommers of Geoscan Research, remote sensing was carried out at site LA 48695 during July 1999. The remote sensing study of the prehistoric field system at site LA 48695 in Y Unit Draw focused on archeomagnetism and electrical resistivity to explore the extent of the Basketmaker field system hinted at in the excavations described above. A 40-by-40-m grid was examined using the two techniques (Figure 13.12). In the archaeomagnetic study several anomalies are apparent (Figure 13.13). The black linear feature on the left is a modern day fence and a modern day two-track road is visible in the bottom right. Of consequence to the prehistoric study of the field system are three curvilinear features that are located in the bottom half of the figure. The lowermost curvilinear feature is the most distinct and it emanates from a trough-shaped feature observed in the trench just south of the possible check dam. The two upper curvilinear features are progressively less apparent but the uppermost originates at the location of the trough-shaped feature where the overlying sand sediments yielded maize pollen and a date of 60 BC. In sum, the three curvilinear features appear to represent an irrigation system that dates to the Basketmaker II period and is associated with individual households located at the nearby site LA 115330.

The electrical resistivity study provides evidence that can be similarly interpreted. Dark anomalies throughout the mapped area exhibit a roughly rectangular structure (Figure 13.14). These dark anomalies are probably basalt stones






- I** 0-25 cm - Dark brown (10YR3/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; common roots; very abrupt smooth boundary.
- II** 25-75 cm - Dark yellowish brown (10YR4/4, moist) loamy sand; strong; nonsticky, nonplastic; no gravel; very few medium roots; abrupt irregular boundary.
- III** 55-77 cm - Dark yellowish brown (10YR4/6, moist) very coarse sand; weak, granular, nonsticky, nonplastic; more than 75% gravel; very few fine roots; abrupt broken boundary.
- IV** 77 cm + - Dark brown (10YR3/3, moist) sandy loam; strong; slightly sticky, slightly plastic; no gravel; few fine roots.
-  Sandstone rock
-  Flotation and pollen samples
- 19 Field specimen no.
-  Unexcavated

Figure 13.10. Site LA 48695 Study Unit 1, West-facing Profile, Feature 4.

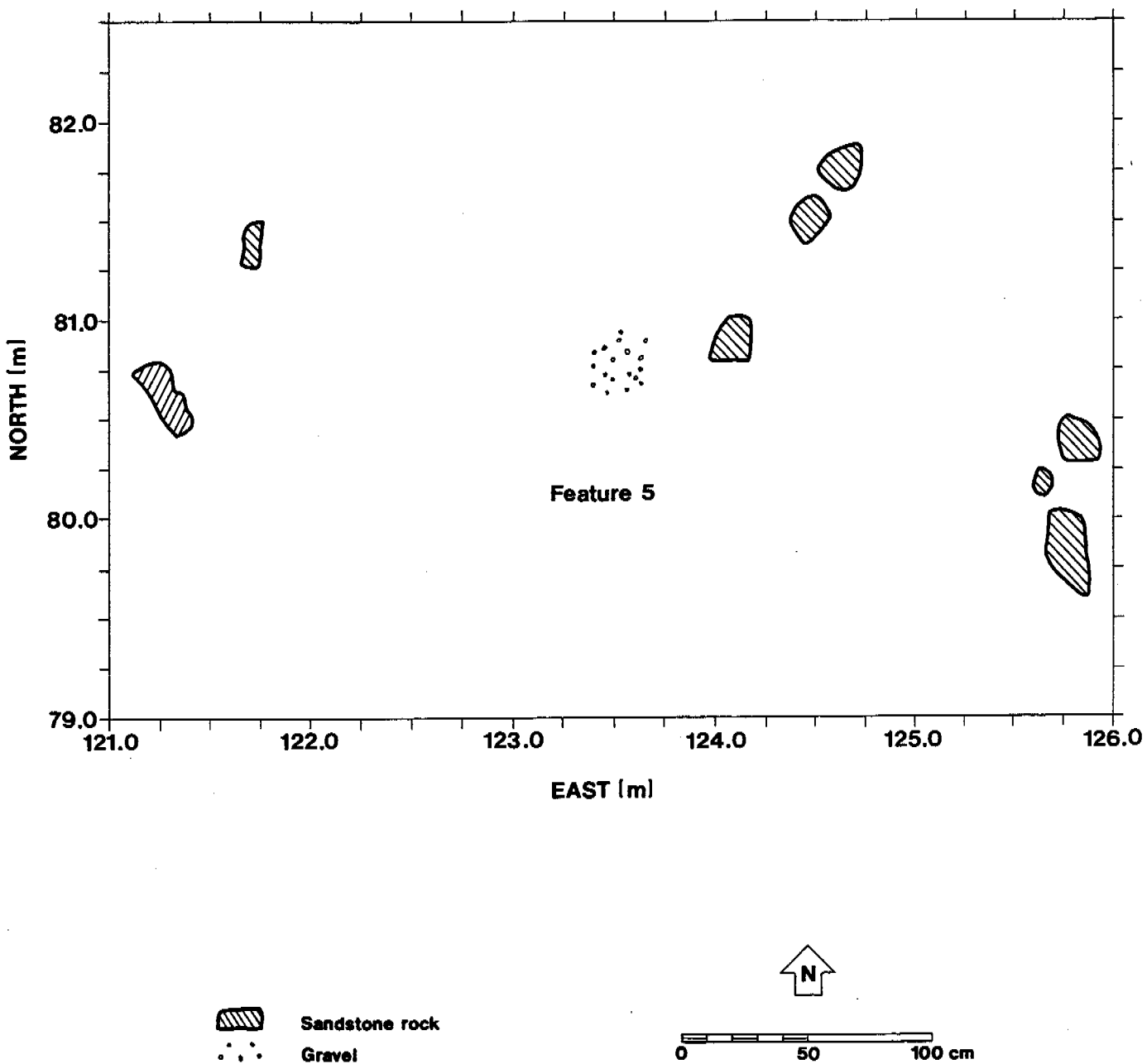
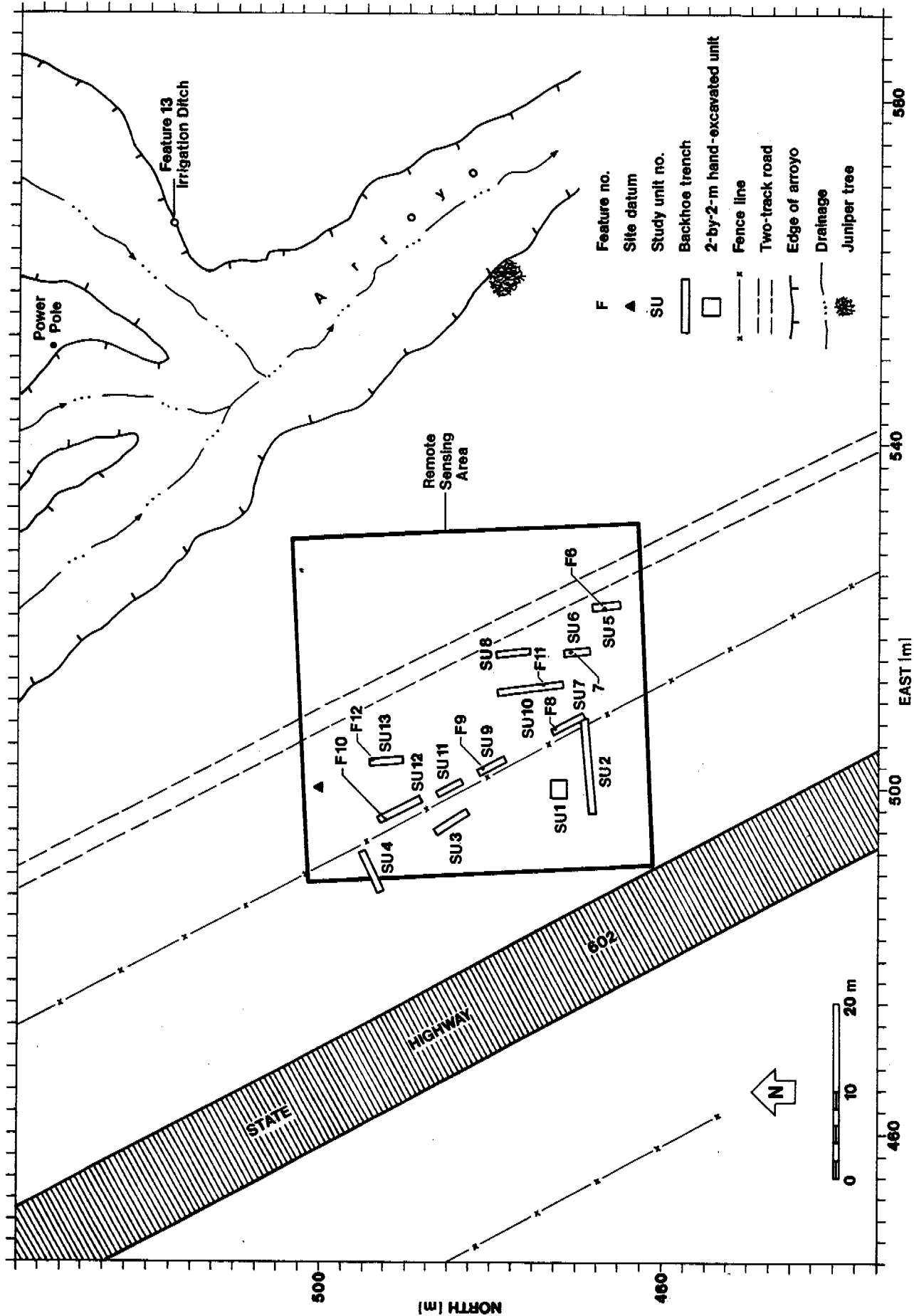


Figure 13.11. Site LA 48695 Feature 5, Plan View.





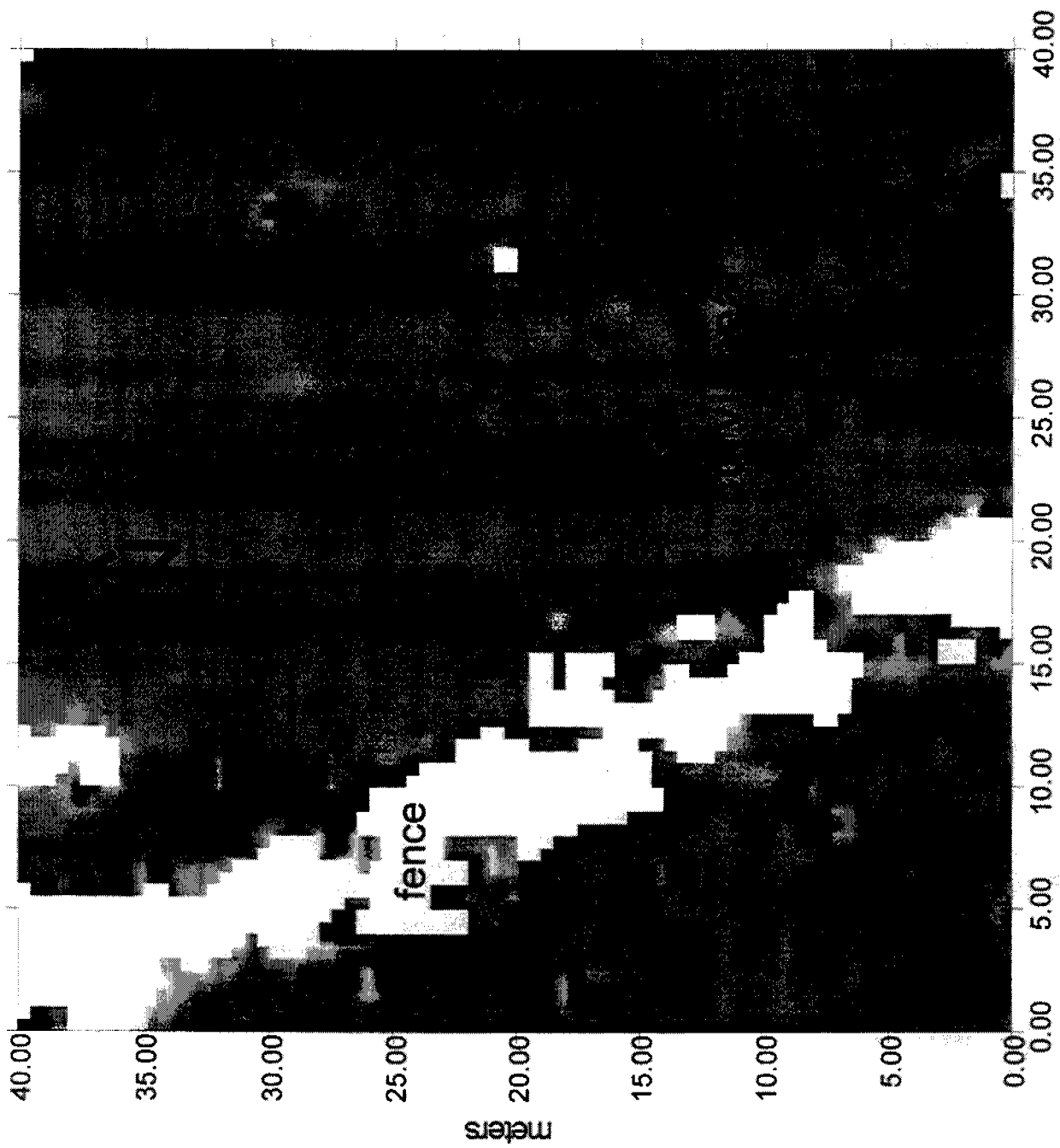
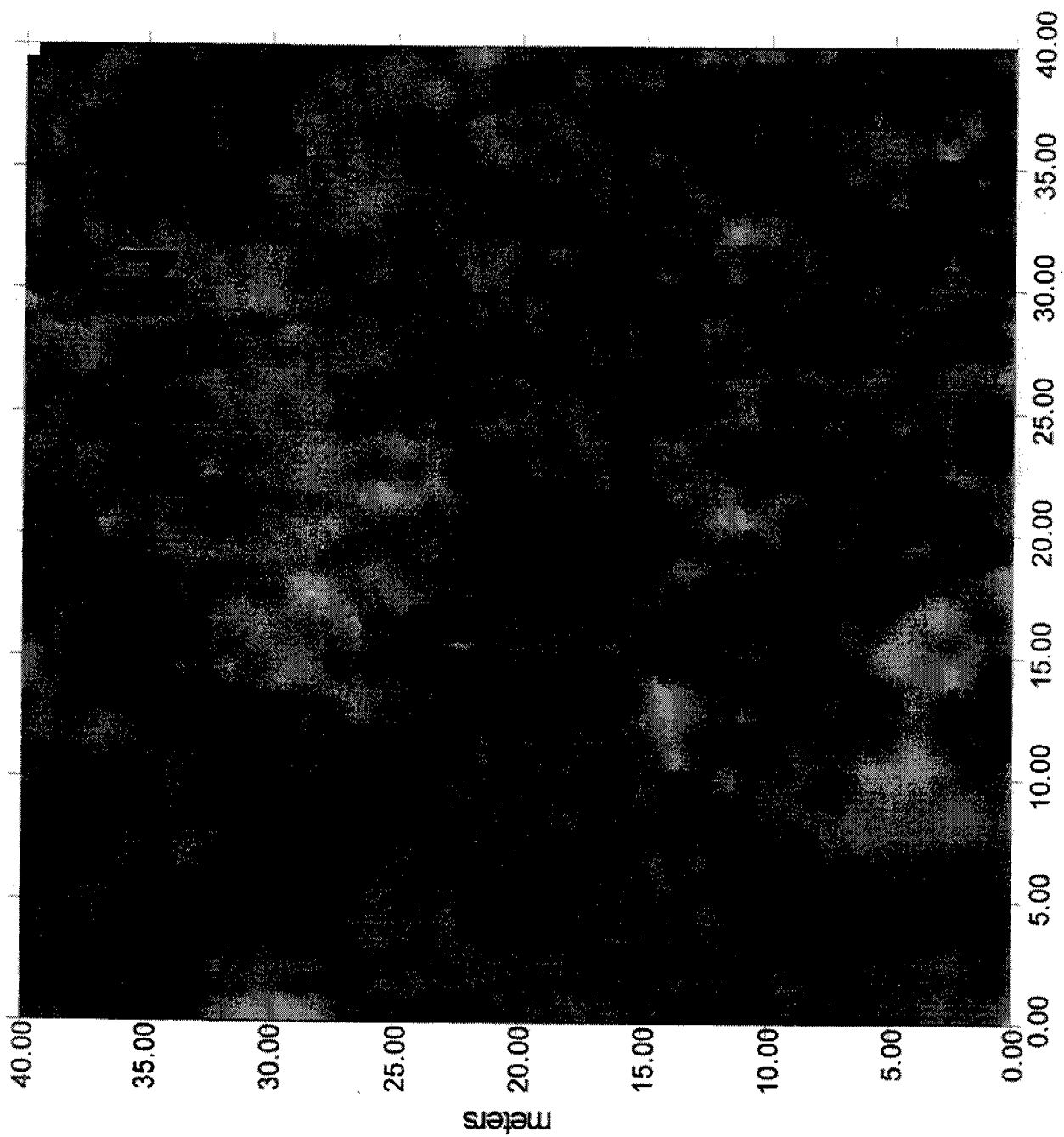


Figure 13.13. Site LA 48695 Remote Sensing Showing Results of Magnetometry Study.



that lie under the surface. The rectangular shape is a hallmark not of natural sedimentary processes but, rather, of artificial manipulation of the landscape. In this case the underlying basalt stones (up to small boulder size) were probably arranged to control rainfall run-off in much the same way noted by Cushing during the last century. We believe, because of the depth of electrical resistivity penetration, that this rectangular anomaly pertains to the Pueblo II period and that it can be correlated with the several surface features (check dams) noted at site LA 48695.

Additional Data Recovery Activities

Additional data recovery work at site LA 48695 was conducted from 7 October to 10 November 1999. Data recovery work was conducted outside the right-of-way of State Highway 602 in order to investigate possible agricultural features discovered by the remote sensing exercise describe above. Nine study unit trenches were placed within a 40 by 40 m remote sensing area (Figure 13.12). These study units were designed SU 5 through SU 13. These study units were hand excavated and are described in the following.

Study Unit 5

SU 5 was placed approximately 12 m east of the east right-of-way and the southwest corner of the study unit located at site grid coordinates N465.09, E521.42 and the northwest corner at N468.09, E521.28 (Figure 13.12). The length of the trench was 3 m with a maximum depth of 1.30 m. A representative 3.0-m-long profile was drawn of the west wall, revealing three strata (Figure 13.15). Stratum I was an organic layer (a humic A horizon) consisting of very fine sands with no gravels and common roots: the sediments contained no cultural deposits in profile view. Stratum II was a dark yellowish brown matrix of coarse sand and contained few amounts of sandstone and 10% gravel and very few roots: no cultural deposits were in profile view. Stratum III was a very dark grayish brown sandy clay loam soil with no gravel and very few roots. Stacked

boulders within a trough-like feature carved into this stratum were listed as Feature 6. A circular hole within this arrangement was interpreted as a post hole (Figures 13.16, 13.17, and 13.18).

Study Unit 6

SU 6 was placed approximately 8 m east of the eastern right-of-way and the southwest corner of the trench at site grid coordinates N468.32, E515.38 and the northwest corner at N471.30, E515.36 (Figure 13.12). The length of the trench was 3.02 m with a maximum depth of 1.34 m. A representative 3.0-m-long profile of the west wall was drawn, revealing three strata (Figure 13.19). Stratum I comprised of a organic layer consisting of very fine sands and no gravel with fine roots common: no cultural deposits were in profile view. Stratum II comprised of dark yellowish brown coarse sand with 25 % gravel and very few fine roots: charcoal flecks were within view of profile. Stratum III was very dark grayish brown sandy clay loam matrix with no gravels and very few fine roots. At the base of the stratum an arrangement of boulders similar to that seen in SU 5 (Feature 6) was observed (Figures 13.20, 13.21, and 13.22). As in SU 5, this feature (Feature 7) was located within a trough-like deposit interpreted as an agricultural irrigation. The location of this irrigation ditch is such that it corresponds to one of the remote sensing anomalies and, as such, it would appear to be part of the same irrigation ditch as revealed in SU 5.

Study Unit 7

SU 7 was placed approximately 1 m east of the eastern right-of-way fence line and outside of the State Highway 602 right-of-way. The southwest corner of the trench was located at site grid coordinates N469.04, E507.78 and the northwest corner at N472.58, E506.10 (Figure 13.12). The length of the trench was 4.0 m with a maximum depth of 1.20 m. A representative 4-m-long profile of the east trench wall was drawn revealing three strata (Figure 13.23). Stratum I was an organic layer consisting of very fine sand with no gravels and many micro roots: no cultural

Study Unit 5

Feature 6

East-facing

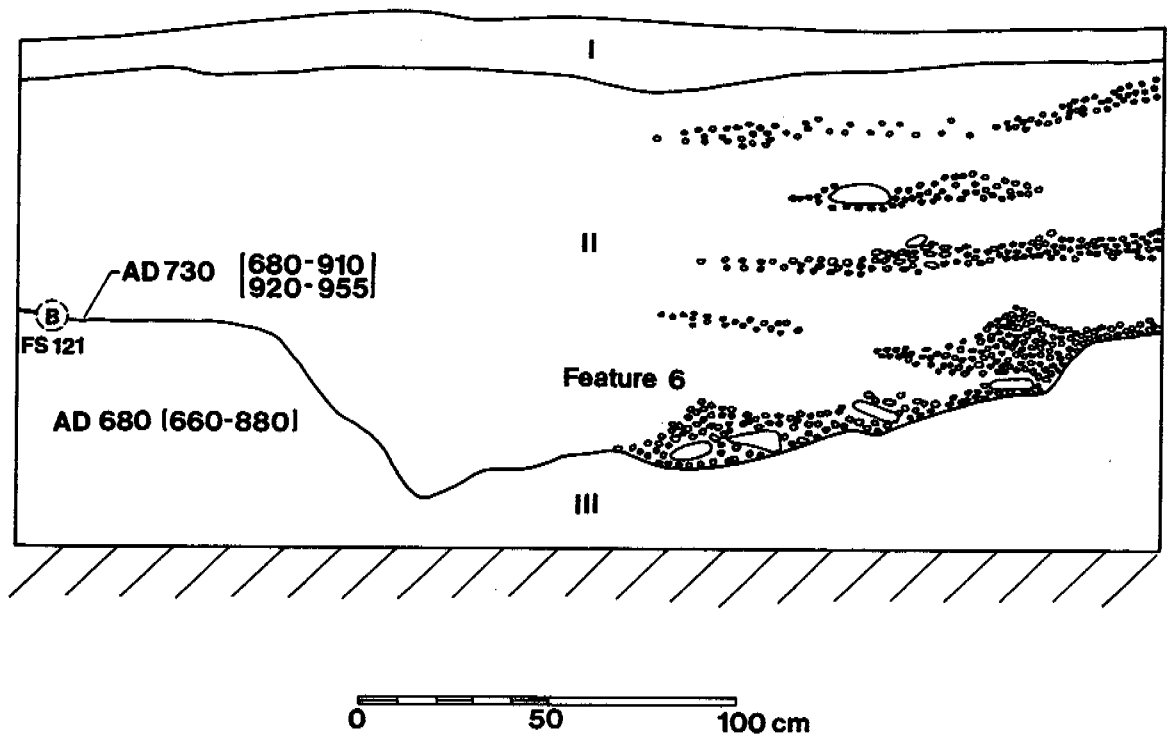


Figure 13.15. Site LA 48695 Study Unit 5, East-facing Profile, Feature 6.

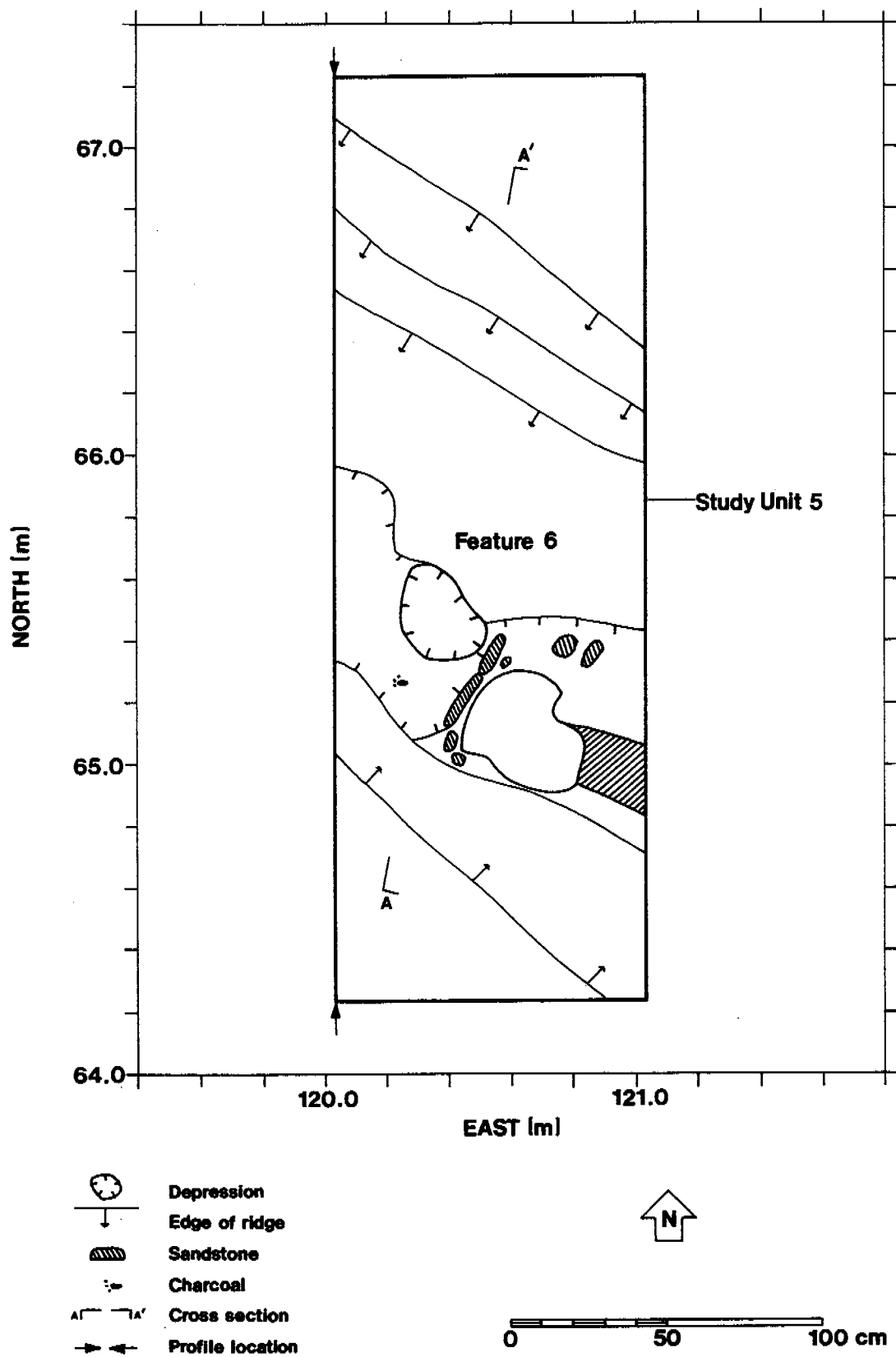
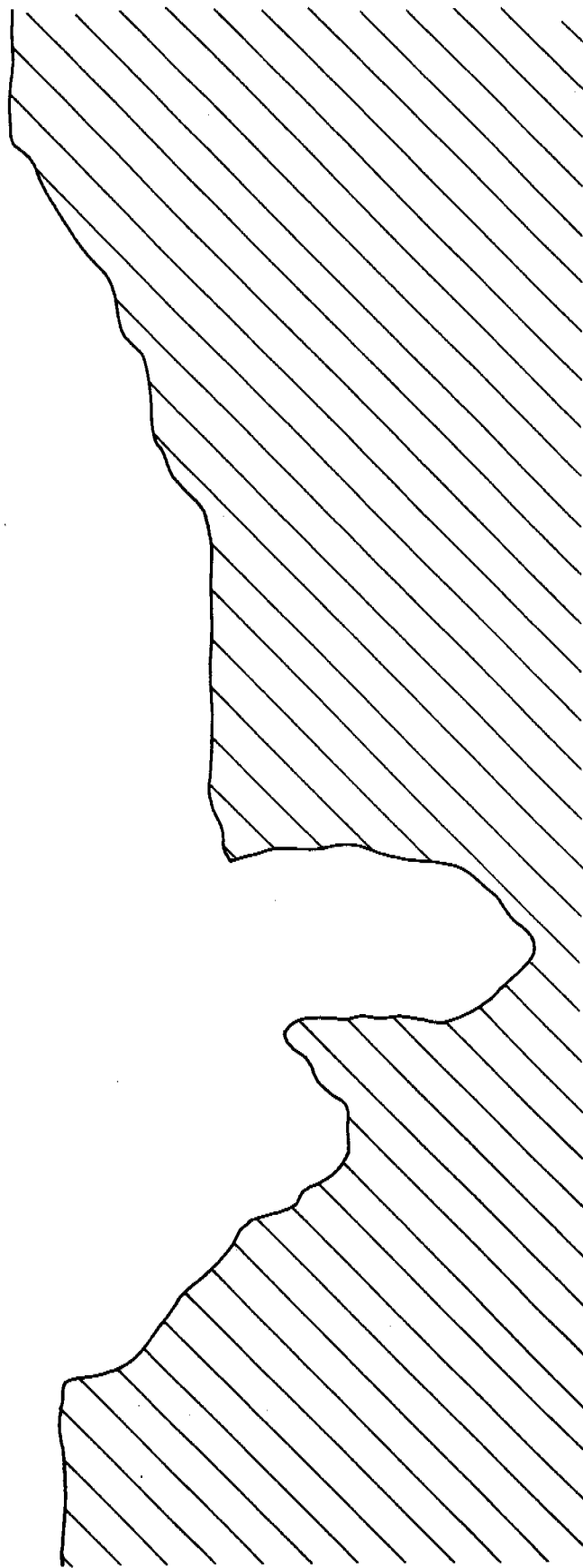


Figure 13.16. Site LA 48695 Study Unit 5, Feature 6 Plan View.

**Feature 6
Cross Section**

—A'



/// Unexcavated area



Figure 13.18. Site LA 48695 Feature 6, Post Hole and Stacked Boulders in Irrigation Ditch.

Study Unit 6
Feature 7
East-facing

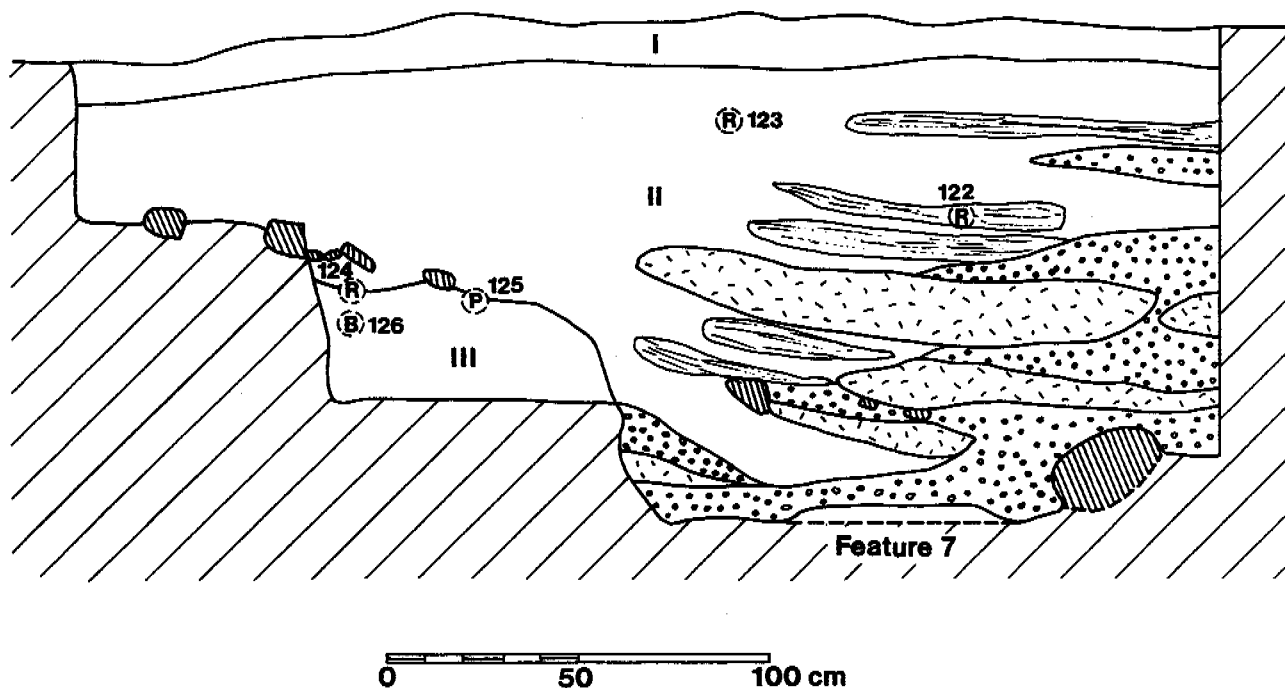


Figure 13.19. Site LA 48695 Study Unit 6, East-facing Profile, Feature 7.

Study Unit 6
Feature 7
Cross Section

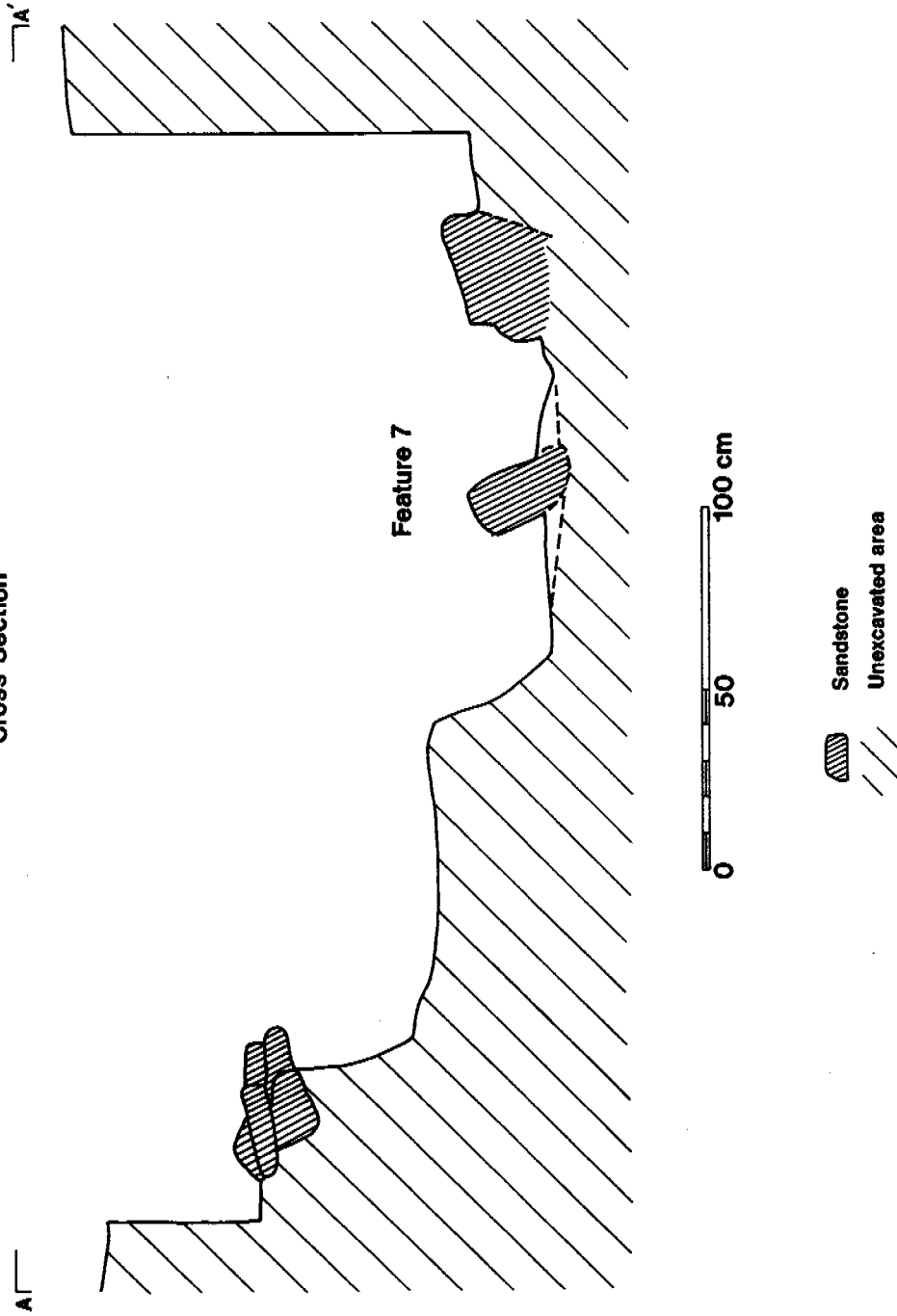


Figure 13.20. Site LA 48695 Study Unit 6, Feature 7 Cross Section.

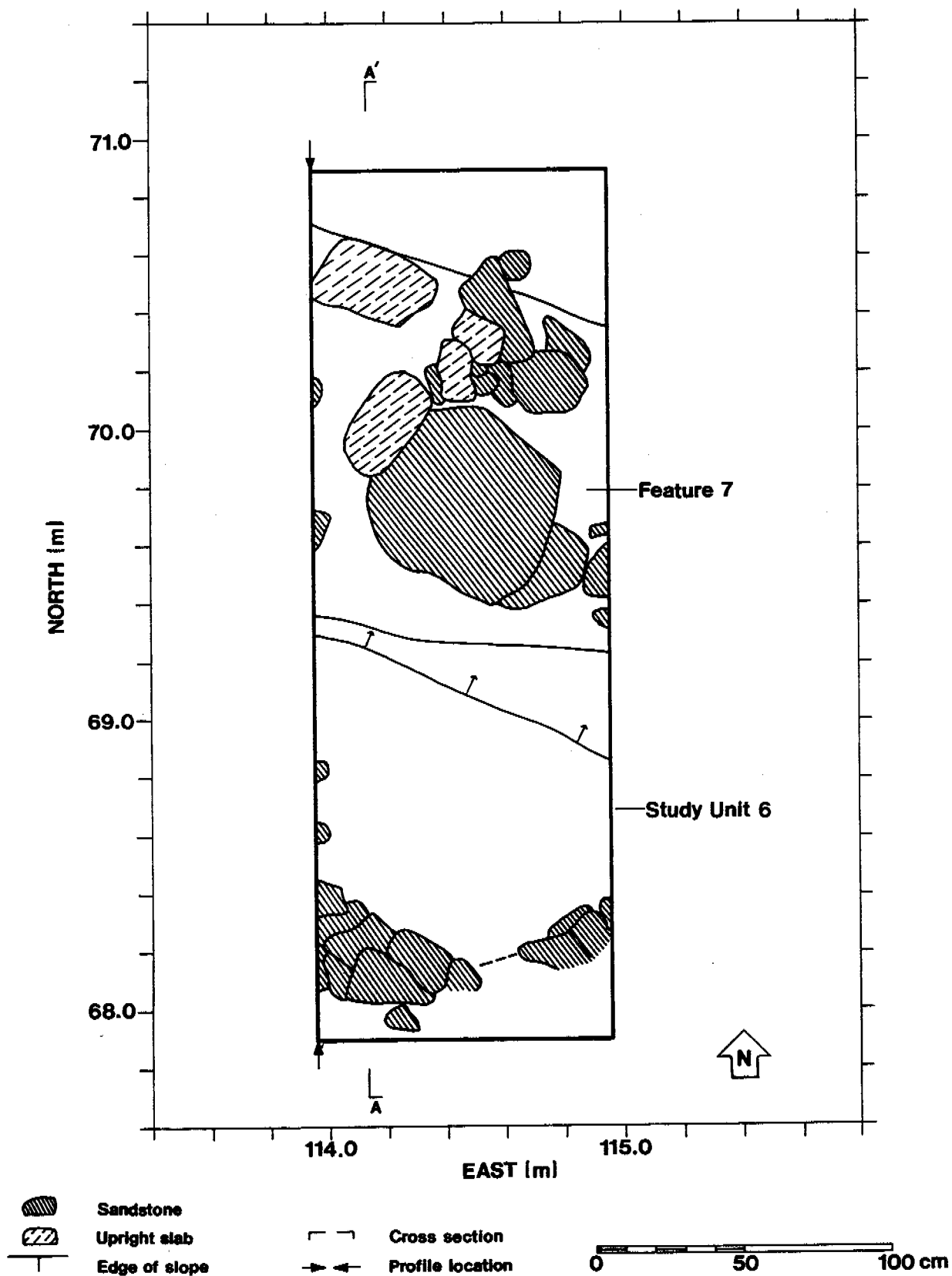


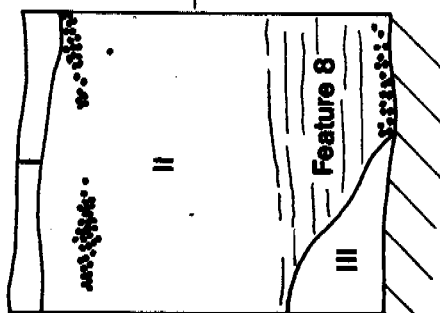
Figure 13.21. Site LA 48695 Study Unit 6, Feature 7 Plan View.



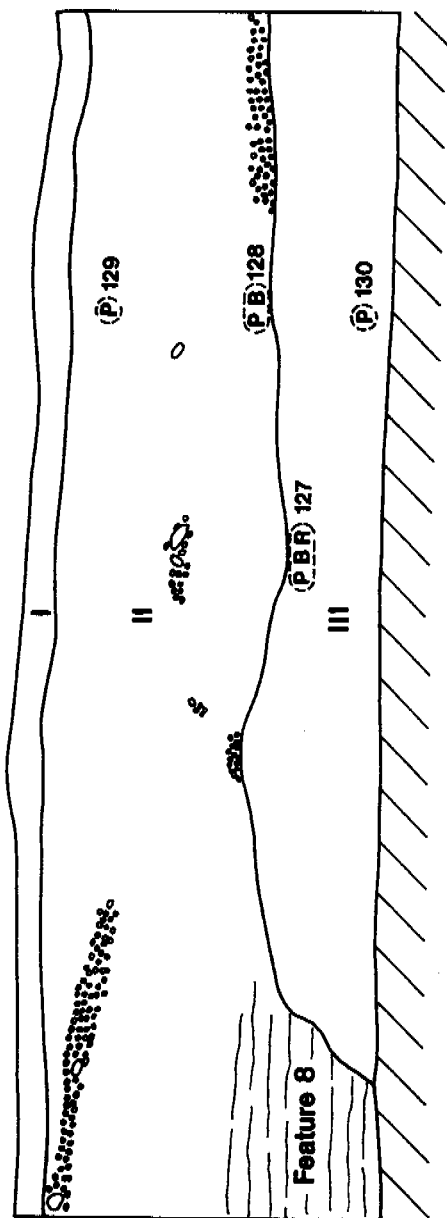
Figure 13.22. Site LA 48695 Feature 7, Check Dam in Irrigation Ditch.

Study Unit 7
Feature 8

South-facing



West-facing



deposits were in profile view. Stratum II comprised of very fine sands with 25 % gravels and very few fine roots: cultural deposits consisting of charcoal flecks and a possible irrigation canal at left bottom of the profile. Stratum III comprised of very dark grayish brown sandy clay loam with no gravel and very few very fine roots. Carved into the Stratum III deposit in the northern end of the study unit was another trough-like deposit interpreted as an irrigation ditch (Feature 8). Again, this irrigation ditch lines up with the two rock features described above for SU 5 and 6, which were placed in trough-like deposits.

Study Unit 8

SU 8 was placed 12 m east of the eastern right-of-way fence outside of the State Highway 602 right-of-way. The southwest corner of the trench was located at site grid coordinate N475.35, E515.36 and the northwest corner at N479.35, E515.33 (Figure 13.12). The length of the trench was 4 m with a maximum depth of 1.14 m. A representative 4-m-long profile of the west trench wall was drawn (Figure 13.24) revealing three strata. Stratum I was a humic layer consisting of very fine sand with no gravel and a few fine roots. Stratum II comprised of sandy loam with 25% gravel and sandstones and fine roots common: charcoal flecks were present within the stratum. Stratum III consisting of very dark grayish brown sandy clay loam with no gravel and very few fine roots: charcoal flecks were present within the stratum. No definable features were located within this study unit.

Study Unit 9

SU 9 was placed 1 m east of the existing State Highway 602 right-of-way fence line. The southwest corner of the trench was located at site grid coordinates N478.05, E503.27 and the northwest corner at N481.56, E501.45 (Figure 13.12). The length of the trench was 4 m with a maximum depth of 0.92 m. A representative 4-m-long profile of the east trench wall was drawn (Figure 13.25) revealing three strata. Stratum I was an organic layer consisting of very fine sand

with no gravel and fine roots common. Stratum II comprised of brown sandy loam deposits with no gravel and fine roots common. Stratum III was very dark grayish brown sandy clay loam matrix with no gravel and very few micro roots. A possible irrigation feature was identified at left bottom of the stratum (Figure 13.26; Feature 9).

Study Unit 10

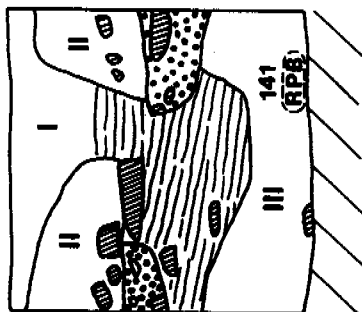
SU 10 was placed 6 m east of the existing State Highway 602 right-of-way fence line. The southwest corner of the trench was located at site grid coordinates N471.45, E510.98 and the northwest corner at N479.40, E510.57 (Figure 13.12). The length of the trench was 8 m with a maximum depth of 0.95 m. A representative 8-m-long profile of east trench wall (Figure 13.27) was drawn revealing four strata. Stratum I comprised of very fine sand with no gravel and many very fine roots. Stratum II was comprised of very fine sand with 25% gravel and few very fine roots: charcoal flecks were in profile view. Stratum IIa was a pocket of very fine sand with no gravel and very few micro roots: no cultural deposits were in profile view. Stratum III comprised of sandy clay loam with no gravel and very few very fine roots. An agricultural feature interpreted as an irrigation ditch (Feature 11) was identified at the right bottom of Stratum III (Figure 13.28).

Study Unit 11

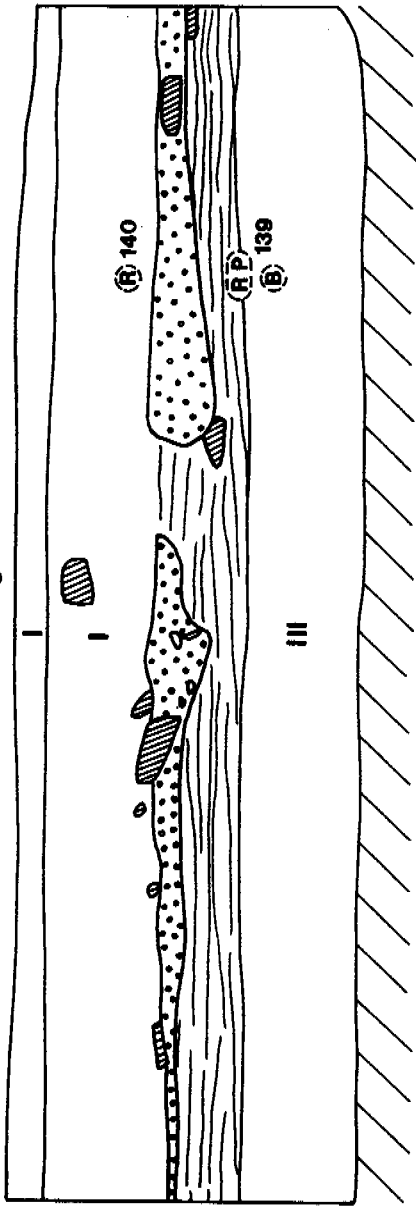
SU 11 was placed 1 m east of the existing State Highway 602 right-of-way fence line (Figure 13.12). The southwest corner of the trench was located at site grid coordinates N483.36, E500.53 and the northwest corner at N486.02, E499.16. This trench was 3 m in length with a maximum depth of 1.10 m. A representative 3-m-long profile of the east trench wall (Figure 13.29) was drawn revealing three strata. Stratum I was an organic layer comprised of very fine sand with no gravel and few fine roots. Stratum II comprised of sandy loam with 50% gravel and few fine roots: charcoal flecks were in profile view. Stratum III comprised of sandy clay loam with no gravel and very few fine roots.

Study Unit 8

South-facing



East-facing



Study Unit 9
Feature 9
Northwest-facing Profile

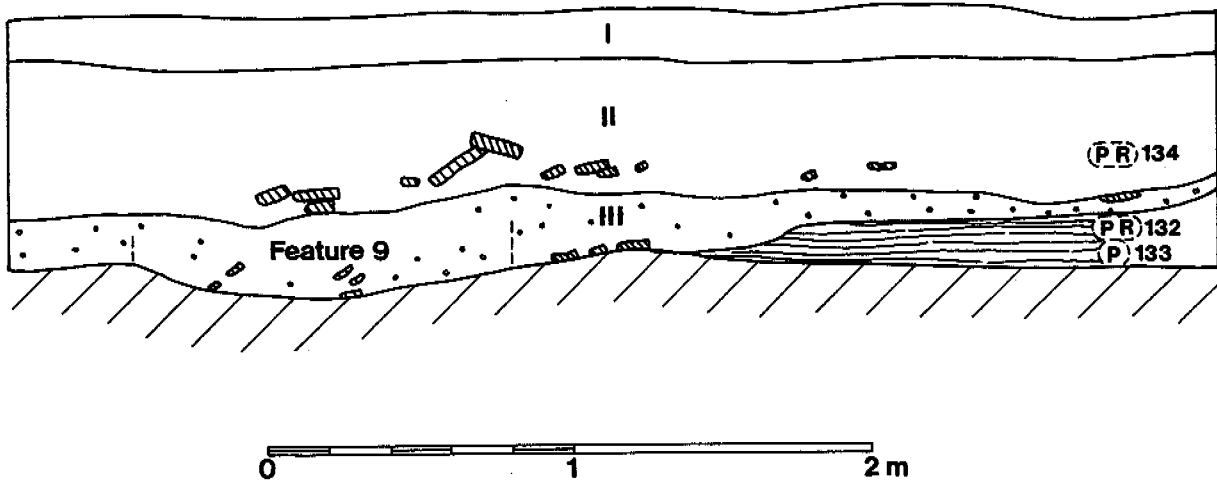


Figure 13.25. Site LA 48695 Study Unit 9 Northwest-facing Profile.

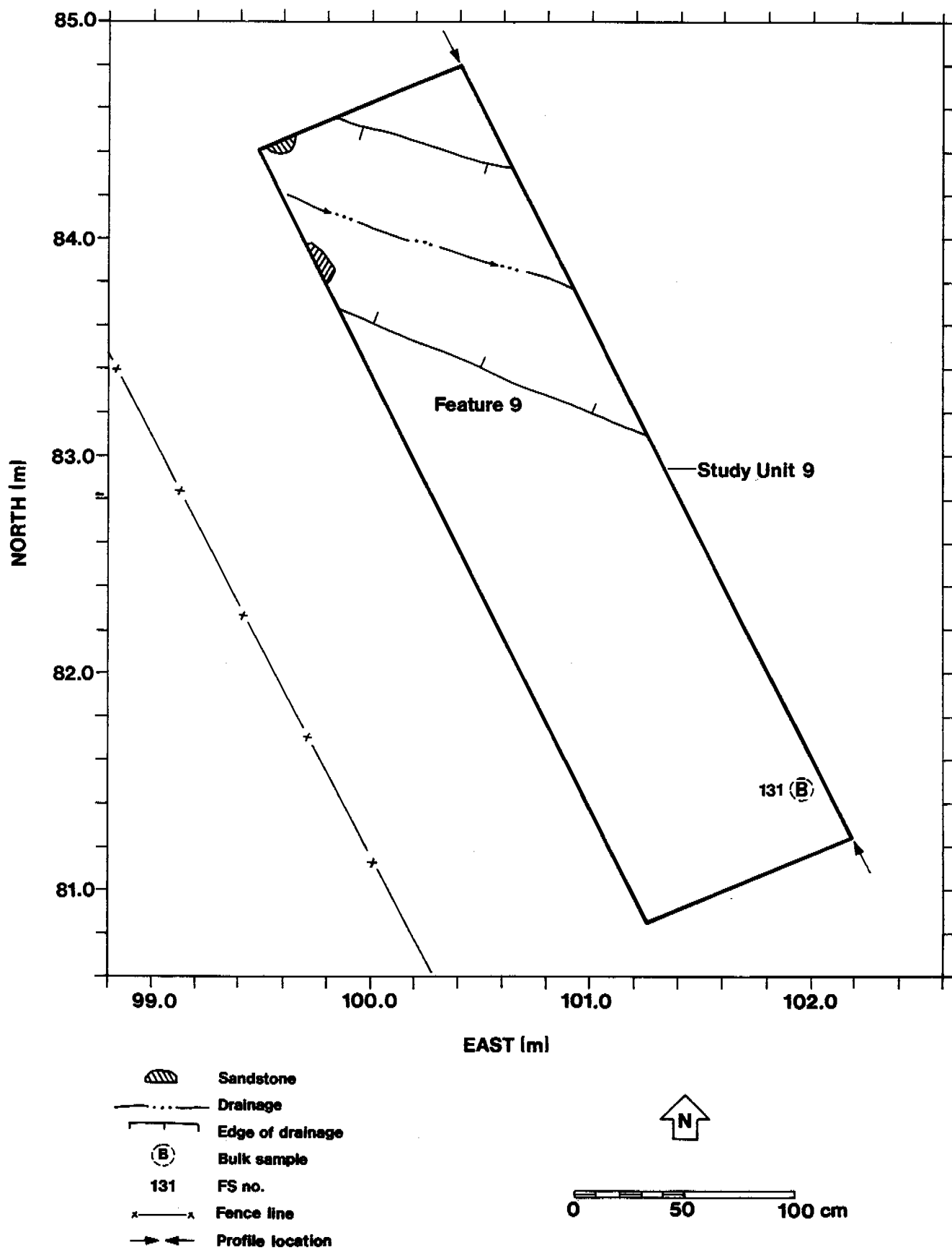


Figure 13.26. Site LA 48695 Study Unit 9, Feature 9 Plan View.

Study Unit 10
Feature 11
West-facing Profile

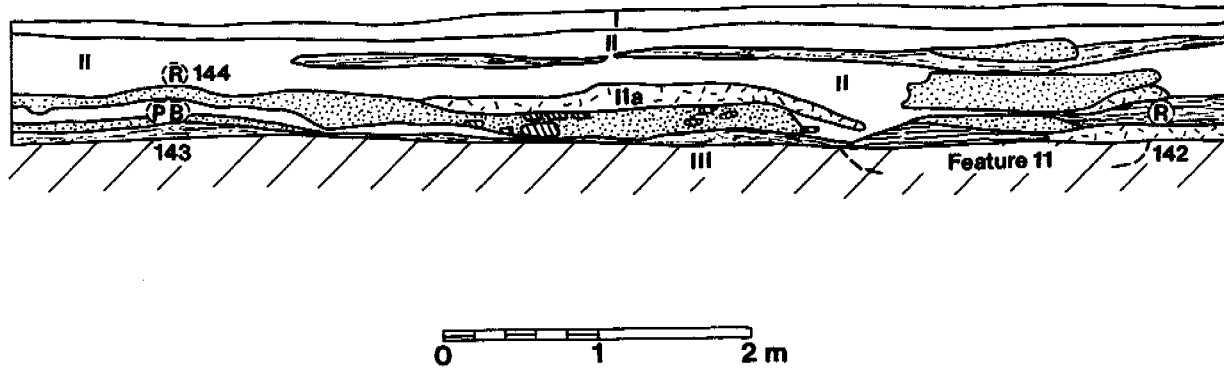


Figure 13.27. Site LA 48695 Study Unit 10, West-facing Profile, Feature 11.

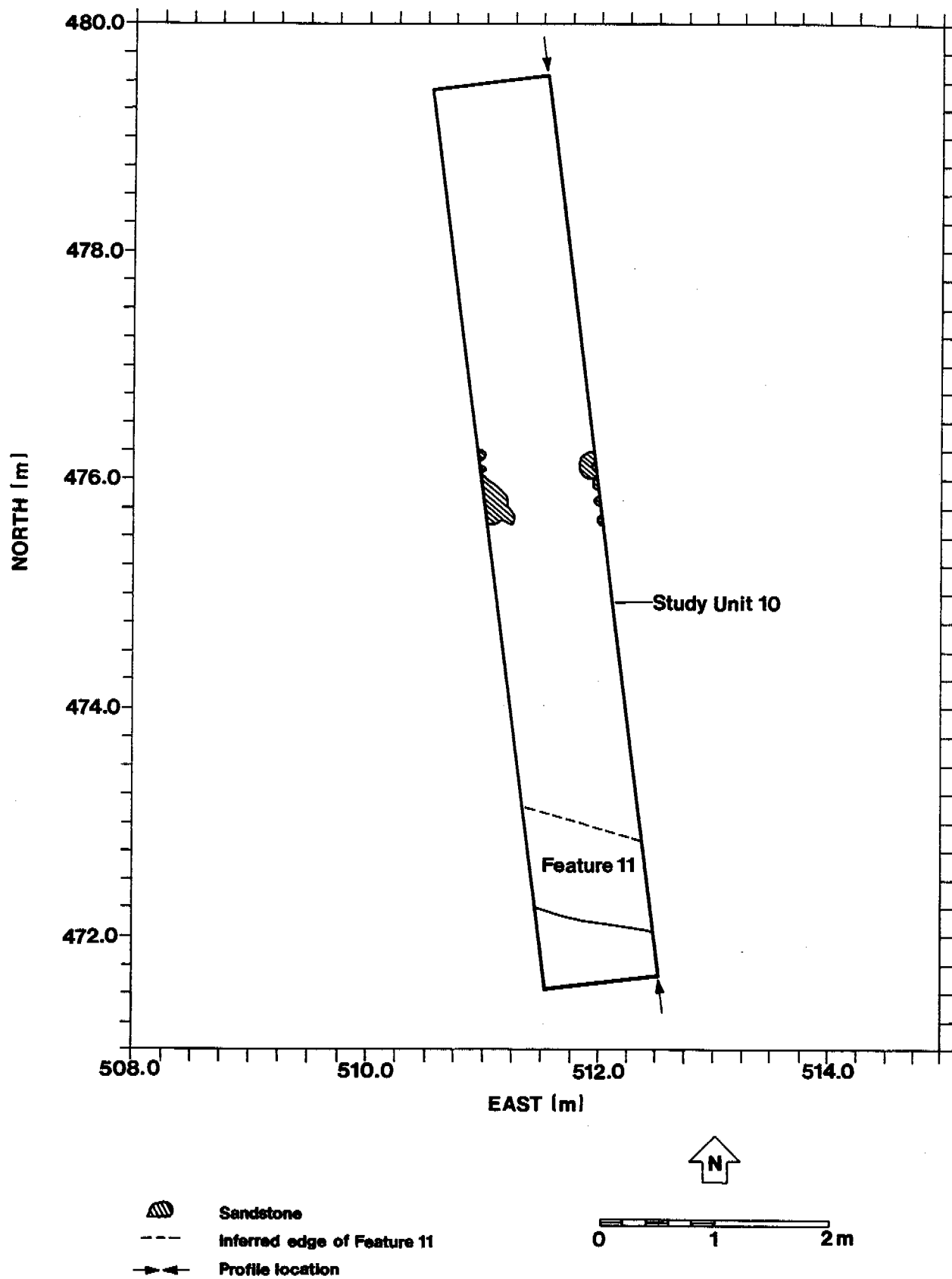


Figure 13.28. Site LA 48695 Study Unit 10, Feature 11 Plan View.

Study Unit 11
West-facing Profile

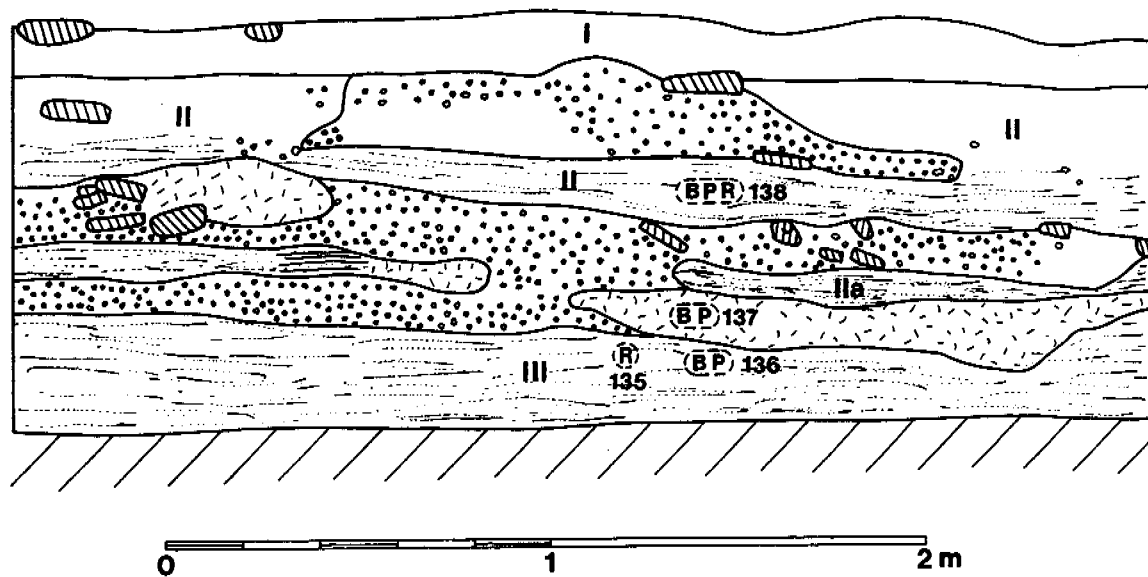


Figure 13.29. Site LA 48695 Study Unit 11, West-facing Profile.

Study Unit 12

SU 12 was placed 1 m east of the existing State Highway 602 right-of-way fence line (Figure 13.12). The southwest corner of the trench was located at site grid coordinate N487.83, E498.25 and the northwest corner at N493.13, E495.59. The length of the trench was 6 m with a maximum depth of 1.06 m. A representative 6-m-long profile of the west trench wall (Figure 13.30) was drawn revealing three strata. Stratum I was an organic layer comprising of fine sand with no gravel and fine roots common. Stratum II comprised of sandy loam with 50% gravel and fine roots common. A probable irrigation ditch (Feature 10) was identified at base of Stratum II. Stratum III comprised of sandy clay loam with no gravel and very few fine roots. Embedded in Stratum III and on the northern edge of Feature 10 was identified the imprint of a human foot (Figures 13.31 and 13.32), apparently covered by a sandal and having dimensions of approximately 21 by 10 cm. The lateral side of the footprint, lying slightly downslope along the edge of the irrigation ditch, was supinated to compensate for the irregularities in topography. As such, the individual who left the footprint was probably walking along the edge of the irrigation ditch and headed east or with the flow. The size of the footprint may be indicative of a child's foot. A series of three small postholes extended south from the irrigation ditch (Figure 13.31).

Study Unit 13

SU 13 was placed 7 m east of the State Highway 602 right-of-way fence line (Figure 13.12). The southwest corner of the trench was located at site grid coordinate N490.34, E502.98 and the northwest corner at N494.35, E502.73. The length of the trench was 4 m with a maximum depth of 0.90 m. A representative 4-m-long profile of the east trench wall was drawn (Figure 13.33) revealing two strata. Stratum II which was identified in the previous trenches was absent in SU 13. Only Strata I and II were present in the profile. Stratum I comprised of sandy clay loam with 10% gravel and fine roots common. A

probable Pueblo II storage feature (Feature 12) was located at the north end of the profile. Stratum III comprised of sandy clay with no gravel and very few fine roots.

Feature Descriptions

A total of one water control feature and four indeterminate sandstone rock scatters were recorded during survey work on site LA 48695 (Figure 13.2). Only Feature 4, the water control feature, was investigated during the first round of data recovery excavations in 1998. Several anomalies were identified during remote sensing outside the right-of-way during July 1999. As a result of this identification, ZCRE requested that additional excavations take place outside the right-of-way in able to fully understand the nature of the site. The anomalies identified during remote sensing were subject to examination by the placement of hand-excavated trenches. Within these trenches a number of cultural features were identified. Documentation of the features through the profiling of the trench wall and plan views are described in the following.

Feature 6

Feature 6 is a check dam placed within an irrigation ditch located 5.40 m northeast of the State Highway 602 right-of-way fence line at site grid coordinates N467.00, E520.00. The irrigation ditch was identified in SU 5. The width of the irrigation ditch is approximately 2.16 m with a maximum depth of 0.44 m below the A Horizon (Figures 13.15, 13.17, and 13.18). The gravity flow direction of the canal was from northwest to southeast. The check dam itself was constructed from boulders placed within the irrigation ditch. These boulders would have acted to impede the flow of the water. The boulders could not have been the result of natural transport as they are too large to have been supported by the hydrologic flow. One post hole was also noted in association and probably served to support the check dam. Charcoal samples were collected from the canal and submitted to a commercial radiocarbon laboratory.

Study Unit 12
Feature 10

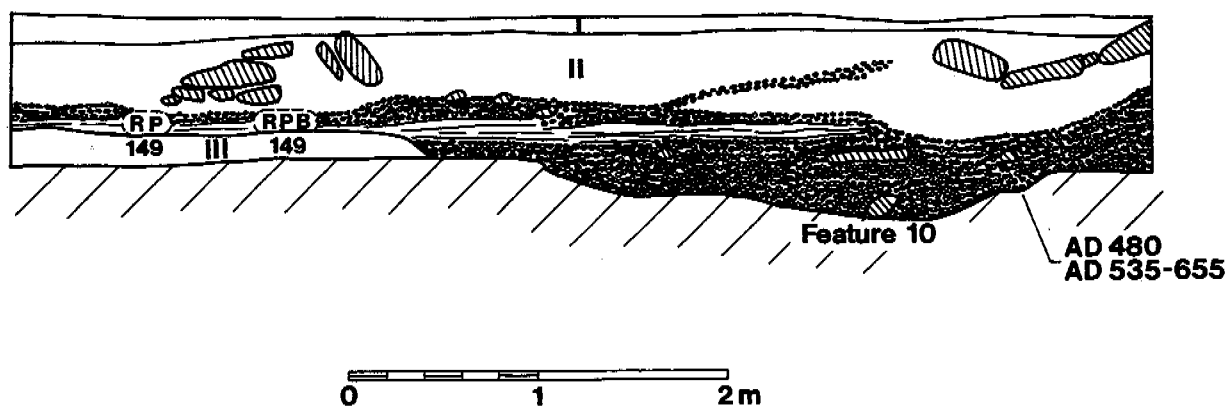


Figure 13.30. Site LA 48695 Study Unit 12, Feature 10 Profile.

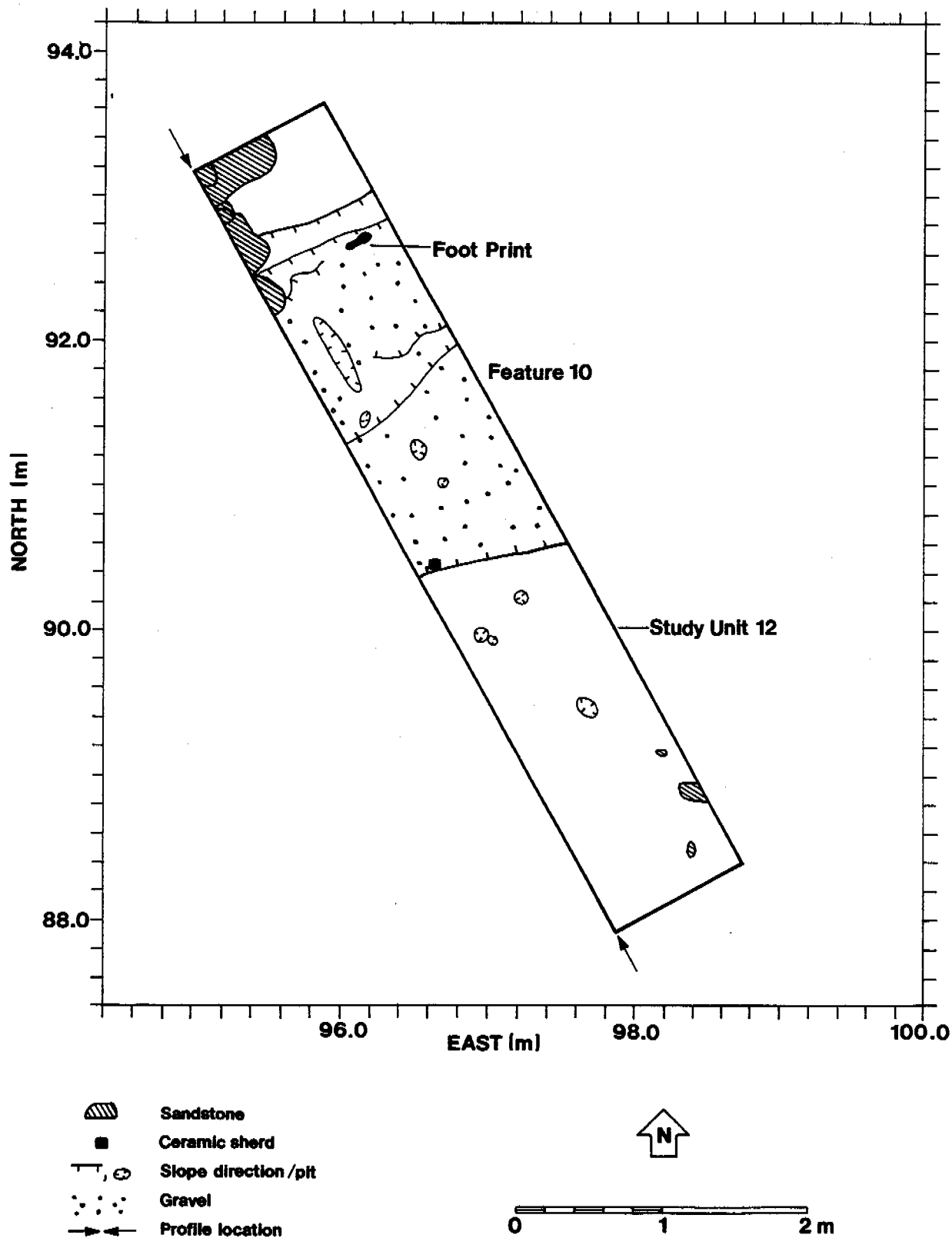


Figure 13.31. Site LA 48695 Study Unit 12, Feature 10 Plan View.

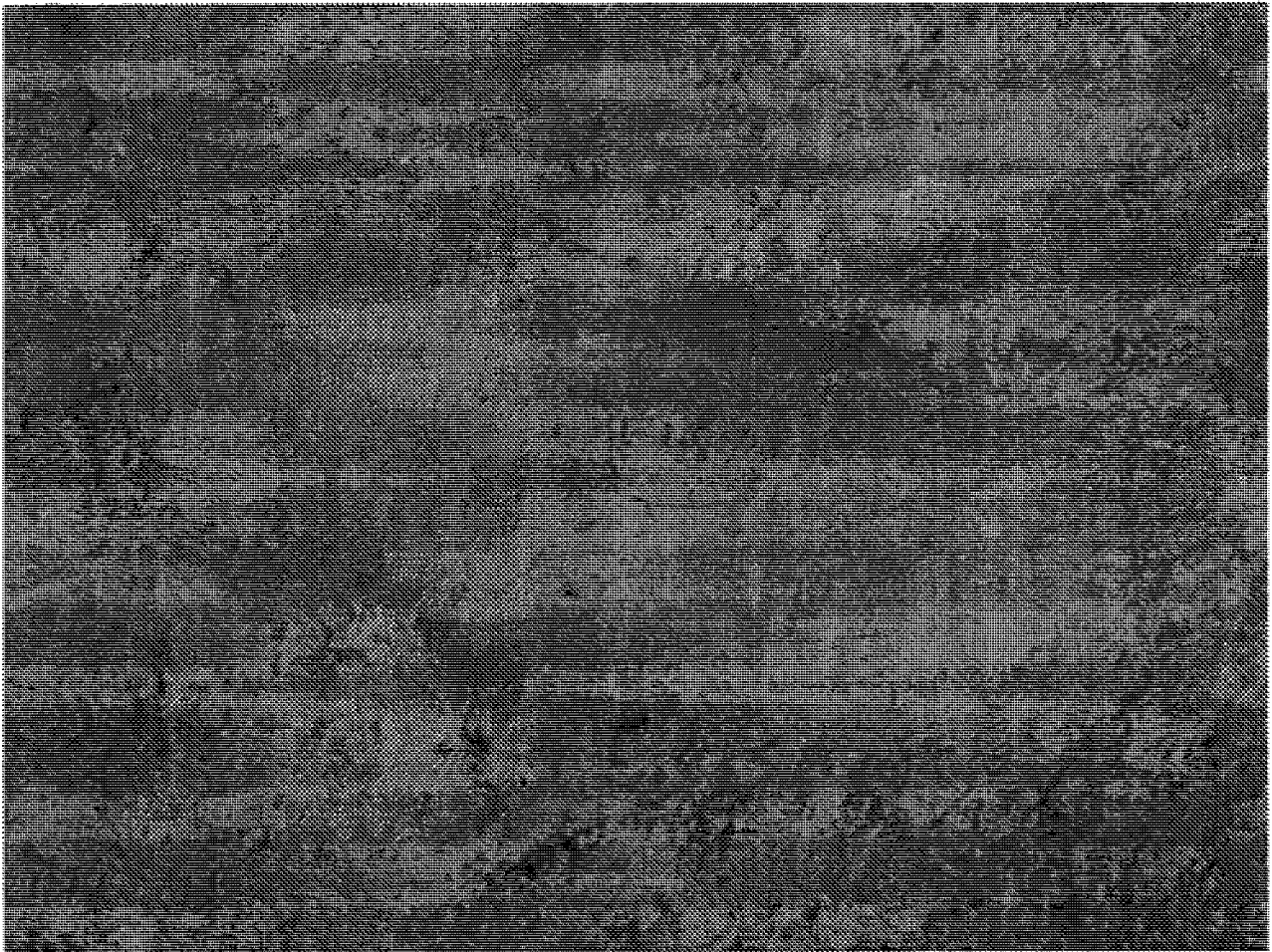
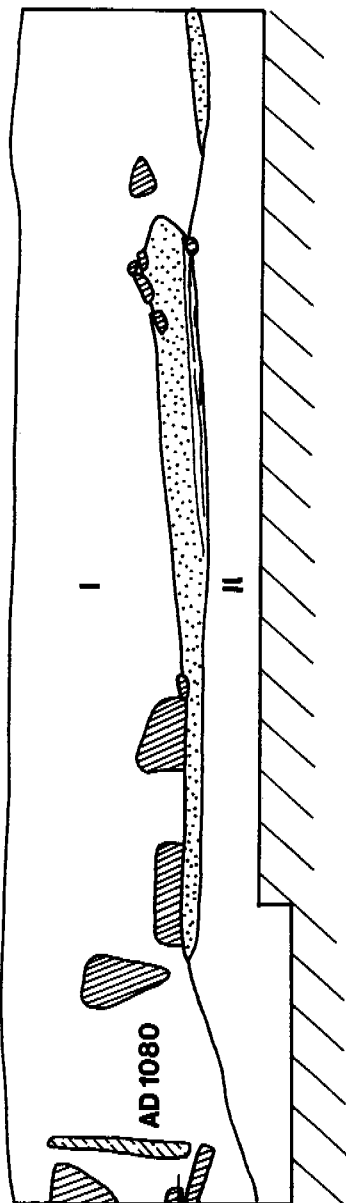


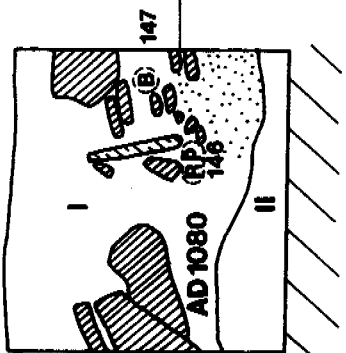
Figure 13.32. Site LA 48695, Human Foot Impression in Feature 10.

Study Unit 13

West-facing



South-facing



Feature 12

Feature 7

Feature 7 is another check dam placed within an irrigation ditch. The feature was identified in SU 6 and was located east of the right-of-way fence line at site grid coordinate N472.50, E515.50. The approximate width of the canal was 1.48 m with a maximum depth of 0.45 m. Feature fill comprised of gravels and large stones at the base of the ditch possibly to slow the flow of water (Figures 13.19, 13.20, 13.21, and 13.22). Ceramics were recovered from the feature fill. It is not clear as to whether these ceramics were deposited at the time of use of the irrigation ditch or later. Radiocarbon samples (FS 105) were collected from the fill.

Feature 8

Feature 8, an irrigation ditch that was identified in SU 7, was located east of the right-of-way fence at site grid coordinate N472.60, E506.50 (Figure 13.23). The full width and depth of the ditch was not exposed in the excavation of SU 7. The exposed portion of the ditch measured 0.45 m in width with an unknown depth. Feature fill comprised of small gravel and micro laminations of fine sand. No other cultural materials were recovered within the ditch fill.

Feature 9

Feature 9 is an irrigation ditch that was located east of right-of-way fence line at site grid coordinate N481.00, E502.50 (Figures 13.25 and 13.26). The width of the canal is approximately 0.95 m with a maximum depth of 0.15 m and the length of canal is indeterminate. The gravity flow of the canal was from northwest to southeast. Feature fill comprised of gravel and fine sand.

Feature 10

Feature 10 is another irrigation ditch that was located east of the existing right-of-way fence line at site grid coordinate N492.00, E496.50 (Figures 13.30 and 13.31). The width of the canal feature is 2.60 m with a maximum depth of 46 cm and indeterminate length. The feature was identified 0.60 m below the modern surface. The canal had

postholes located at the south edge, possibly remnants of a head gate or water control feature. At the northern edge of the canal near the A horizon was an imprint of a human foot. A plaster mold was made of the foot imprint. Feature fill comprised of gravel and laminations of fine sand. No other cultural materials were recovered from the feature fill.

Feature 11

Feature 11 was located 5 m northwest of Feature 7 at site grid coordinates N473.50, E512.00. Feature 11 was an irrigation ditch identified in SU 10 at 0.92 m below the modern surface (Figures 13.27 and 13.28). The width of the was 0.80 m and because the feature was not excavated the depth is unknown.

Feature 12

Feature 12 was located 8 m northeast of the State Highway 602 right-of-way fence line at site grid coordinate N494.00, E503.50. Feature 12 is interpreted as a storage feature with upright sand stone slabs (Figure 13.33). The length of the hearth was 0.55 m with a maximum depth of 0.45 m. Unlike the irrigation features described above, this feature was located in the upper portion of the profile and is not related to the irrigation features. Because the feature was not excavated the width of the feature is unknown. Radiocarbon samples were collected at the base of the hearth yielding an AD 1080 date, consistent with the ceramic assemblage collected elsewhere from this site and associated with the same depth (or above). A flotation sample (FS147) was also collected.

Feature 13

Feature 13 is a irrigation ditch located 74 m east of the right-of-way fence line at site grid coordinates N517.50, E565.00. This feature was identified by Steve Hall during his reconnaissance of the present Y Unit Draw channel (Figure 13.34). No excavation of this feature took place although it was recorded and samples were retrieved. This feature is discussed in length below.

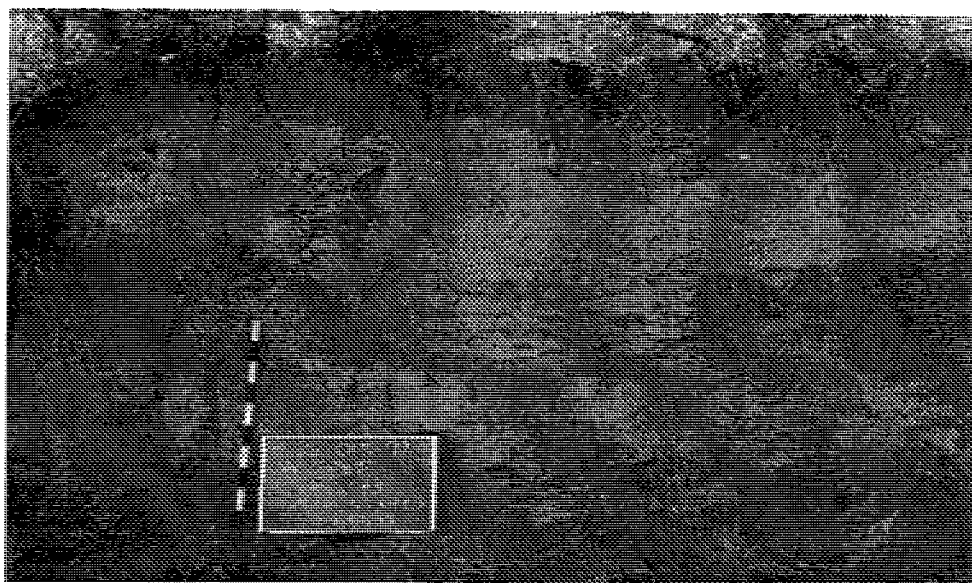


Figure 13.34. Site LA 48695 Feature 13, Irrigation Ditch in Profile of Y Unit Draw.

GEOMORPHOLOGY

Site LA 48695 lies at the west margin of the comparatively narrow alluvial valley formed by Y Unit Draw, a small south-flowing ephemeral tributary of the Nutria River. The watershed of the small valley is developed in Cretaceous strata that includes sandstone, shales, and coals of the Dakota sandstone, Mancos shale, and Gallup sandstone (Orr 1987). The weathered bedrock is a source of the abundant sand and gravel that makes up the alluvial valley fill.

The sequence of sediments exposed at site LA 48695 consists of, at the base, a gravely sand with a thick cumulic A-horizon soil at the top (the lower gravely sand unit is not exposed at the site, but its presence is conjectured from nearby exposures of valley fill in the arroyo). The buried soil or paleosol is mantled by 80 cm of gravely sand, the top of which forms the modern surface at the edge of the valley. A thin young A-horizon soil occurs at the top of the surface sediments, although in places the soil is buried by a few centimeters of recent sand. The irrigation ditches are cut into the thick paleosol; the paleosol was the surface at the time the ditches were active. The buried ditches are filled with laminar, cross-bedded sand and gravel deposited by running

water. The ditches also contain stones that are too large for natural fluvial transport; they have to have been brought to the ditches by human activity. The stratigraphic sequence is summarized in Table 13.1.

The Unit Y Draw arroyo deepens near site LA 48695, exposing the upper 2 m of alluvial valley fill. In one exposure is preserved a cross-section of an irrigation ditch (Feature 13). Exploration elsewhere along the arroyo did not reveal other ditches.

The basal alluvium exposed at the Feature 13 ditch locality consists of massive very fine sand with small gravels (Figure 13.35). A thick, brown, cumulic A-horizon soil occurs at the top of the basal sand unit. The ditch has been cut into the soil, or paleosol. The top of the paleosol forms a sharp contact with the overlying sand and gravel, which mantles the paleosol surface. The ditch is filled with alternating sand and clay layers (Figure 13.36). The five thin layers of clay are clay drapes which formed in slack or ponded water in the ditch. The sand layers consist of well-rounded, medium sand grains and are laminated, indicating deposition in moving water. A thin dark grayish brown A-horizon soil occurs at the top of the alluvial fill at the modern surface of the valley.

Table 13.1. General Stratigraphy of Site LA 48695.

Unit	Description
I	<p>Post-soil sand and small gravels; poorly sorted, colluvial; may originate from 20th-century land use (subunit I-A)</p> <p>Upper-most A-horizon soil developed on Unit II gravely sand; weak soil does not include B- horizon; soil is likely less than 200 years old (subunit I-B)</p>
II	<p>Sand, gravel, mostly fluvial in origin; some laminated sand, gravels occur in lenses; upper part of sandy unit is turbated; unit contains stones that are too large for transportation by natural processes, this they must be related to human activity at site; bedding of sand and gravel indicates deposition in a minimum of 5 episodes; erosion and turbation could mask additional episodes of deposition within this unit; sharp basal contact with underlying buried paleosol, indicating top of paleosol is eroded and basal zone of unit 11 sand and gravel was deposited during episode of high-energy fluvial transport</p>
III	<p>Paleosol; cumulic A-horizon soil developed in clayey, silty sand; upper contact eroded, burrow- fills in upper cm of paleosol, numerous pores throughout paleosol, little or no carbonates, absence of visible iron oxides; widespread occurrence of paleosol indicates stable surface and different climatic/hydrologic regime; paleosol likely formed by gradual accumulation during runoff events where water spread over the surface of the valley floor, slowly depositing fines and associated organic matter; during accumulation of this cumulic A-horizon soil, the valley floor was not trenched and more water was in the drainage system, probably indicating increased annual rainfall compared with the present climate; the irrigation channels at site LA 48695 are cut into the top of this paleosol</p>
IV	<p>Sand and gravel, forms the valley-fill on which the Unit III paleosol is developed; exposures in arroyo cutbanks show massive sand with lenses of small gravels, sand slightly calcareous; does not include soils; unit not exposed at site LA 48695</p>



Figure 13.35. Site LA 48695 Feature 13, Bedded Deposits within Irrigation Ditch.



Figure 13.36. Site LA 48695 Feature 13, Sand and Clay Layers at the Base of Irrigation Ditch.

Several centimeters of recent light yellowish brown sand overly the upper thin soil. The stratigraphy at the arroyo ditch locality is summarized in Table 13.2.

Buried Paleosol

A paleosol is a soil, buried or unburied, that has formed in the past under environmental and geomorphic conditions that do not exist today. The paleosol at this study site is a brown cumulic A-horizon soil that formed by gradual accumulation of silt and very fine sand on the floor of the narrow alluvial valley. Other studies of the paleoecology of these types of soils indicate that they form during periods of comparatively moist climate, resulting in frequent runoff with water spreading out over the valley floor, depositing thin layers of fine sediment (Hall 1990). The presence of a thick cumulic A-horizon soil generally means that a deep arroyo was not present; if an arroyo was present, muddy water from runoff would be carried by the channel and not spread out over the valley floor. Modern conditions at Y Unit Draw are not producing cumulic soils. The paleosol does not have a B-horizon, indicating that it was buried soon after it developed.

The paleosol is about 65 cm thick at site LA 48695 and 80 cm thick in the arroyo, an expected difference where the arroyo locality would be slightly thicker since it is in the central axis of the valley floor and would receive greater concentration of runoff and sediment accumulation. Based other late Holocene cumulic soils, the paleosol at the site would take between 500 and 1000 years to form (Hall 1990).

Prominent cumulic-A paleosols, such as observed at site LA 48695, do not occur elsewhere in the Zuni area even though thick sequences of late Holocene have been documented (Hall, unpublished). In contrast, a similar paleosol is ubiquitous in the southern Great Plains, which, as a region, experienced a uniform paleoenvironmental history. Thus, the presence of the paleosol only along Y Unit Draw suggests that that valley experienced a period of moist conditions that may have been unique to that valley, or at least a parallel alluvial record has not yet been discovered or picked up in adjacent alluvial valleys at Zuni.

Paleotopography

The presence of the prominent buried paleosol provides a de facto prehistoric surface that can be

Table 13.2. Stratigraphy of Alluvium at Ditch Locality in Arroyo.

Unit	Description
I	Light yellowish brown sand, mantles upper A-horizon soil; 7 cm thick (subunit I-A) A-horizon soil, dark grayish brown (10YR 4/2), very fine, fine to silty to coarse, quartz, subangular, moderately sorted; sharp upper contact, gradational lower contact; 7 to 15 cm depth (subunit I-B)
II	Very fine, silty to medium, quartz, angular, moderately sorted, small burrow fills in upper part, gravel lenses at upper boundary and at 40 to 60 cm interval; this sand-gravel unit overlies paleosol and irrigation ditch; unit 15 to 73 cm depth
III	Paleosol, brown (10YR 5/3), silt, very fine to coarse quartz sand, moderately well sorted, carbonate filaments; cumulic A-horizon soil, about 80 cm thick; correlates across valley; irrigation ditch cut into paleosol
IV	Very fine and fine sand, quartz, angular, well sorted, cross-bedded and laminar to massive, carbonate filaments, gravel lenses, gradational contact with overlying paleosol; exposed to 240 cm depth

About 400 ft upstream, the above Units I and II are thicker and the top of Unit III paleosol is 123 cm below the modern surface.

correlated throughout the valley floor and its margins, although the cumulic paleosol or its equivalent is eroded and missing from the gently sloping sides of the valley. The paleosol is buried by a uniform 70 to 80 cm of sand at the site and in the arroyo, indicating that the modern surface may mimic the contours of the prehistoric paleosol surface. This relationship can be used to predict the depth of occurrence of buried fields and irrigation features, at least in the vicinity of site LA 48695. A further implication of the above paleotopographic relationship is that the ditches at the site and the ditch in the arroyo were indeed linked hydrologically.

Irrigation Ditches and Prehistoric Fields

All irrigation ditches identified at site LA 48695 were cut into the same buried paleosol. The top of the paleosol correlates with the edges of the ditches, thus the paleosol was the surface when the irrigation ditches were active and in use. However, the top of the paleosol is in sharp contact with the gravely sand that overlies it, indicating that the upper boundary of the paleosol as preserved today may have been partly eroded. If so, then the actual agricultural field surface may be missing and, thus, plant macrofossil and pollen analysis of the upper sediments of the paleosol may not yield remains or evidence of prehistoric crops.

Site LA 48695

The site's irrigation ditches bottom-out at two different levels. The larger ditches containing human-transported stones are 128 to 146 cm depth, while the smaller adjacent ditch without stones is 110 cm below the modern surface. Both ditches are filled with cross-bedded sand and fine gravels, indicating they filled up by fast-moving water. There is no evidence the ditches were cleaned out after this episode(s) of filling, although of course the ditches could have been cleaned numerous times for many years prior to the sand-gravel fill present now. The sand-gravel fill that is preserved in the ditches may represent deposition after the abandonment of the ditch-field system.

Arroyo Ditch.

The base of the ditch in the arroyo (Feature 13) is 145 cm below the modern surface, identical to the depth of burial of the deepest ditch at site LA 48695 and providing strong evidence that the ditches were linked. The arroyo ditch is filled with cross-bedded sand alternating with five thin layers of silty clay or mud drapes. The sand was deposited in the ditch by running water, and the clay drapes formed by mud settling out of slack or ponded water in the ditch once flow had stopped. Whether the cross-bedded sand and clay drapes accumulated during human use of the ditches or after their abandonment cannot be determined. The alternating sand and mud layers could be natural filling of the ditches after abandonment, or the sand and mud could represent continued human use but without cleaning the ditches. At least five major periods of water flow and sand-mud deposition occurred in the ditch before it was completely filled with sediment.

Conclusions

The morphology of the ditches does not resemble natural arroyos or gullies; the ditches are narrow, shallow, and uniform in shape, contrasting with naturally eroded gullies, which tend to be wider, deeper, and varying in shape. The stratigraphy and sequence of depositional events at site LA 48695 and the arroyo ditch locality are identical, indicating the ditches were all connected to the same water-flow system. It is concluded that the ditches are human in origin. Also, the stones that occur in the deeper ditches could have only originated by human transport. The paleosol in which the ditches were cut and maintained formed during a period that was wetter than today, at least in Y Unit Draw valley.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Three sherds were retrieved from site LA 48695 during the first stage of excavations. Eight additional sherds were obtained from the second round of excavations. No subsampling of the

recovered ceramic assemblage was made for the attribute analysis as described in Chapter 22. The first three sherds were recovered from the excavation of Feature 4 and are described below. The additional eight sherds were located both within the upper Pueblo II stratigraphic horizon and within the fill covering the irrigation ditch features. These sherds are described separately from the first three sherds, as they were not available for analysis. Appendix D outlines the ceramic data by provenience for the first three sherds. The assemblage contains two wares common to the Zuni area including Cibola White Ware and Cibola Gray Ware.

Chronometrics

Only one diagnostic ceramic artifact was recorded (FS 5). This Cibola White Ware was identified as a Puerco Black-on-white. It is impossible to provide an accurate date range based on one diagnostic sherd. However, Puerco Black-on-white was produced during the middle Pueblo II period to the early Pueblo III period (AD 1030 to 1200) (Toll et al. 1997). This type has a mean ceramic date of AD 1115 \pm 42 years. See Chapter 22 for a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of two jars and one bowl present. All sherds were identified as coming from vessel bodies. Both bowl and jar forms are represented among the white ware sherds, while the one gray ware sherd is a jar. Overall, jars outnumber bowls by a ratio of approximately 2:1. The extremely small sample size makes speculation about functional variability at this site impossible. See Chapter 22 for a more in depth discussion of functional variability between sites. Neither sooting nor modification were recorded for this assemblage.

Compositional Variability

Tempering material was recorded for three sherds. Both Cibola White Ware sherds are

tempered with sherd, the most common temper type for this ware. The Cibola Gray Ware sherd is tempered with a combination of sherd and sand. This combination is not uncommon for Cibola Gray Wares. Chapter 22 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and inter-regional interaction.

Additional Sherd Sample

Eight sherds were excavated during the fall months of 1999 during the second stage of excavations. These sherds were not included in the overall ceramic analysis for the State Highway 602 project and are not included in the counts or discussions in either Chapter 22 or Appendix D. The sherds are briefly described in this section and in Table 13.3.

The additional sherd sample originated in the fill deposited on top of the irrigation ditches. Most of the sherds date to the period between AD 1000 and 1300 and would, thus, appear to represent intrusive elements into the gravel and cobble matrix. A well-dated and marked Pueblo II horizon in the upper 30 to 40 cm of fill at site LA 48695 and throughout the Y Unit Draw project area attests to this placement.

Summary

The ceramic assemblage from Site LA 48695 is very small and was recovered exclusively from excavated collections. Given the small sample size for the ceramic assemblage of diagnostics, it is difficult to provide a meaningful temporal range. Most of the sherds, however, date to the Pueblo II period and appear to pertain to the upper cultural deposits. Similarly, the small sample size makes it difficult to speculate about activities practiced at the site. The paucity of ceramics may be a reflection of agricultural use of the site.

Lithic Artifacts

No flaked stone artifacts were recovered from site LA 48695.

Table 13.3. Ceramic Retrieved During Second Phase of Data Recovery at Site LA 48695.

FS No.	Type	Form	Study Unit	Feature	Date
105	Plain Whiteware	Jar	6	7	AD 700 to 1100
106	Reserve Black-on-white	Jar	6	7	AD 1030 to 1200
107	Red Mesa Black-on-white	Jar	8		AD 900 to 1050
113	Gallup Black-on-white	Bowl	10		AD 1030 to 1125
115	Escavada Black-on-white	Bowl	11		AD 1000 to 1300
116	Indented Corrugated	Jar	12		AD 1040 to 1300
117	Intended Corrugated	Jar (Base)	12	10	AD 1040 to 1300
119	Intended Corrugated	Jar	13		AD 1040 to 1300

Ground Stone

One ground stone artifact, described as a complete passive abrader, was recovered from Feature 4, a water control feature, at site LA 48695. It was a small sandstone slab used as a nether stone. One whole face was ground smooth from edge to edge and exhibited parallel striations.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of fauna from the entire project can be found in Chapter 27, which covers methods and general conclusions. Detailed description of fauna is provided in Appendix I.

One unidentified bone fragment was recovered from SU 3 (Table 13.4). No modification was observed.

Macrobotanical Remains

One flotation sample from the water control feature was examined for floral remains. The flotation sample was devoid of cultural plant material. Nine uncharred taxa were recovered including pigweed, goosefoot, dropseed grass, pitseed goosefoot, spurge, purslane, and mint family seeds along with juniper twigs and dicot leaves; these should be considered intrusives.

Three radiocarbon samples were examined from the water control feature resulting in the identification of undetermined conifer and pine wood charcoal. How charred wood was deposited in a feature like a check dam is questionable. Charred remains only have an opportunity of appearing in the record when food preparation activities have taken place and an accident occurs or when fire of some kind was involved.

Maize pollen was identified in laminated alluvial deposits northwest of the water control feature, indicating the area was used for agricultural pursuits (see below).

Pollen

Fourteen pollen samples were analyzed from the field area at site LA 48695. Three of the samples were analyzed by conventional microscopy methods and after finding maize pollen in one sample, 11 additional samples were submitted and analyzed by an intensive scanning microscopy method (Chapter 24). Four samples were collected from the base of a paleosol designated as Unit III, five samples were taken from the surface of Unit III, two samples were collected from fine sands that capped Unit III, and three samples were taken from discrete features associated with the field (Feature 4 buried rock alignment, ditch Feature 13, and upright slabs Feature 14). Maize pollen was identified in 6 of

Table 13.4. Number of Identified Faunal Specimens, Site LA 48695.

Taxon	NISP	MNI	Burnt
Unidentified	1	-	-

the 14 samples (42% sample frequency) and maize pollen aggregates occurred in 2 of the 14 samples. All six samples with maize pollen were at or just above the surface of the buried soil (fine sands capping Unit III: FS 3 and 7, and Unit III surface sediments: FS 100, 123, 139, and 148). The maize aggregates occurred in FS 100 and 148, both samples were from the Unit III surface. No cultigen pollen was identified from samples taken from the base of Unit III nor from the three discrete features.

There was an interesting contrast in the pollen spectra between sample with and without maize. Sagebrush representation was higher and conifer pollen (pines plus juniper) was lower in the samples with maize, compared to the negative maize samples. The average conifer pollen value from the six samples with maize was 7%, compared to 16% in the eight samples without maize. It is not clear what this difference means. Since the maize was associated with the surface of the buried soil, one speculation is that there was a different vegetation community at the surface of Unit III compared to the base. There may have been a few pinyon and juniper in the field area that were cleared for agriculture such that nearby sagebrush then registered more strongly in field soils. There was no indication of a weed signal, which is surprising as generally disturbed field soils are prime habitat for weeds. Cheno-Am pollen, the best candidate to contain a weed signal, averaged 27% and 28% respectively from the six samples with maize and eight without. The average Cheno-Am percentage from all other State Highway 602 samples with significant counts ($n = 38$) was 30%. The Feature 4 rock alignment sample (FS 19) had a moderate Cheno-Am representation at 37% and the highest juniper percentage (12%) out of all the 56 project samples. It is possible that juniper boughs and Cheno-Am bushes were anchored by the rocks for a wind-break and water diversion device.

CHRONOMETRIC DATA

Twelve radiocarbon dates were obtained from the site (Table 13.5). These dates span from the Late Archaic/Basketmaker II period to the Pueblo II period. The Pueblo II period was identified in the upper sediments and the chronometric assignment was confirmed by the presence of a single Puerco Black-on-white sherd in the same sediments, yielding a possible range AD 1030 to 1200. Additional Pueblo II period sherds were retrieved during the second phase of excavations. These sherds appear as intrusive into the gravel and cobble fill that interfaces and overlies the irrigation ditches.

SUMMARY

Site LA 48695 is a multiple component site comprising five surface features, and subsurface deposits indicative of prehistoric maize agriculture practiced through irrigation. The earliest component at the site is dated to the Basketmaker II period, and is contemporaneous with habitations at sites LA 115330 and LA 26306, if not earlier. It is also contemporaneous with other specialized Basketmaker II sites such as sites LA 115327 and LA 49838.

ZCRE carried out addition investigation at the site with remote sensing of a 40-by-40-m area outside of the right-of-way. Archaeomagnetic and electrical resistivity studies were carried out as a component of the remote sensing study. ZCRE then excavated nine hand-excavated trenches across the curvilinear anomalies identified during remote sensing. In most cases these excavation located trough-like features that are now interpreted as irrigation ditches. Geomorphological interpretation of these features was carried out by Dr. Stephen Hall of the University of Texas, Austin and is included in this chapter.

Table 13.5. Radiocarbon Dates from Site LA 48695.

Beta No. (FS No.)	Conventional Age (BP)	Calibrated Intercept Date(s) (BC)	$\delta^{13}\text{C}$	Provenience	Material
136527 (122)	36,720 \pm 320 BP	NA	-26.5 ‰	SU 6, F 7 sediment fill	Conifer bark contaminated with coal
138517 (160)	4110 \pm 40 BP	2630 BC	-21.2 ‰	F 13, irrigation ditch, lowest clay lens	Organic sediment, possibly contaminated
138516 (158)	2960 \pm 40 BP	1190 BC	-23.8 ‰	F 13, irrigation ditch, sand lens	Unidentified charred material
121231 (23)	2080 \pm 80 BP	60 BC	-22.1 ‰	SU 3, Stratum III	<i>Pinus</i> , unknown conifer
133644 (12)	1800 \pm 50 BP	AD 235	-24.7 ‰	SU 2, within buried A horizon	Unidentified charred material
136525 (108)	1620 \pm 50 BP	AD 425	-22.1 ‰	SU 8, within buried A horizon	<i>Pinus</i>
136530 (150)	1470 \pm 40 BP	AD 610	-22.7 ‰	F 10, near footprint	Unknown conifer
136526 (120)	1270 \pm 50 BP	AD 720 AD 745 AD 760	-22.8 ‰	SU 5, within buried A horizon	Unknown conifer, possibly with bark
133645 (16)	1260 \pm 40 BP	AD 765	-23.7 ‰	SU 4, Stratum IV	Unidentified charred material
136524 (100)	1220 \pm 50 BP	AD 785	-22.0 ‰	SU 5, top of buried A horizon	Unknown conifer
136528 (139)	910 \pm 40 BP	AD 1155	-22.0 ‰	SU 8, interface of buried A horizon and fine sands	<i>Pinus</i>
136529 (146)	870 \pm 40 BP	AD 1185	-22.1 ‰	F 12, Pueblo II storage pit	Unknown conifer

Initial use of site LA 48696 took place during the Basketmaker II period, as indicated by a number of radiocarbon dates. The first date to be submitted from the original data recovery excavation, 2080 \pm 80 BP (Beta-121231; Appendix A), was obtained from wood charcoal within Stratum III of SU 3. Additional dates obtained from the second round of excavations outside of the highway right-of-way, confirmed this date and amplified the overall contextual and stratigraphic relationships. These additional dates include two for Feature 13, the irrigation ditch

observed in the arroyo profile of Y Unit Draw adjacent. The first date was obtained on organic material and yielded a reading of 4110 \pm 40 BP and the second date was obtained from small charcoal flecks within the ditch stratigraphic units and resulted in a date of 2960 \pm 40 BP. The first date is considered too early and probably reflects contamination of the organic material. The second date is in accordance with dates from the Las Capas site in southern Arizona where similar ditches have been excavated (Mabry 1999:14).

Additional dating of the stratigraphy in the hand-excavated trenches yielded a series of eight dates spanning the period from 1800 ± 50 BP to 870 ± 40 BP. The last date was retrieved from a Pueblo II feature well above the irrigation features. The entire series of dates brackets the irrigation features at site LA 48695 to a period extending back approximately 3000 years and ending by approximately 1000 years ago. One obviously aberrant date was also obtained and was the result of contamination, $36,720 \pm 320$ BP.

As discovered in other sites within the project area, the Basketmaker II presence is located below Stratum I, a humic A horizon. The results of the radiocarbon dating indicate that the period of time represented under this humic A horizon extended from the early Basketmaker II period to the Pueblo I period. Cultural modification of the landscape is indicated by maize pollen from throughout the site. These deposits are interpreted as Basketmaker II to Pueblo I field systems. Features found within the buried irrigation ditches include check dams composed of boulders placed to impede the flow of water within the ditches, a posthole that probably functioned in association with the check dams, and a footprint that probably dates to the Basketmaker III period.

One radiocarbon date of the Pueblo II period was obtained during the subsequent work at the site (see discussion above). This date pertains to a small pit feature that post-dates the irrigation activities at the site. Archaeomagnetic results show the presence of rectangular patterning of subsurface material. Many basalt boulders were retrieved during the final excavations from the upper, or Pueblo II period, deposits. The most likely interpretation of the patterning is that it results from the purposeful distribution of basalt for check dams similar to those reported during the last century by Cushing in Zuni. This patterned field system seemingly relates to the Pueblo II period and marks a significant departure in agricultural strategies when compared to the Basketmaker and early Puebloan irrigation strategies.

To summarize, the location of site LA 48695 was used as an agricultural area over two to three thousand years ago. It was used in this capacity at the same time sites LA 115330 and LA 26306 were occupied. It is also contemporaneous with site LA 115327 and possibly site LA 49838. Irrigation ditch features examined in profile and in plan view, and the possibility of intentional burning of local vegetation, suggest deliberate modification of the landscape for agriculture.

Chapter 14

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115329

Jeffery Waseta and James W. Kendrick

**with Analytic Contributions by Jonathan C. Driver,
Suzanne L. Eckert, Janet Hagopian and Jeffrey E. Shokler**

INTRODUCTION

Archaeological investigations were conducted at site LA 115329 between 23 February and 4 March 1998. The site is located entirely on the east side of the road, at the base of a bedrock ridge at an elevation of 6820 ft (2078 m). Site LA 115329 is a ceramic and lithic artifact scatter, dating to the late Pueblo I or early Pueblo II, the same time period in which site LA 26308 (upslope and to the west) was occupied. Much of the site has been disturbed by previous highway construction, and sagebrush and grasses were the predominate vegetation within the right-of-way. Beyond the right-of-way to the east, small juniper can be found along with narrowleaf yucca. Less than 100 m to the west, isolated ponderosa pine can be found.

SURVEY RESULTS

Although the survey reported a concentration of sandstone rubble (Abbott 1997:36; Figure 14.1), no such feature was discovered during data recovery activities at site LA 115329. The survey also recorded one Gallup Black-on-white sherd, one piece of chert debitage, and a one-hand vesicular basalt mano. Two fragments of a sandstone metate were also observed. Site LA 115329 had not previously been recorded.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to the excavations, a pedestrian survey was conducted across the site in transects at 2-m intervals to locate all surface artifacts and features. No features were observed on the surface, and all artifacts were marked with a pin flag, point located with a Sokkia Total Station,

and then collected. Ceramic, flaked stone, and ground stone artifacts were collected within the right-of-way. In general, surface artifacts were distributed in low densities across the site (Figure 14.2).

Excavation

Hand Excavation

Hand excavation of three 1-by-1-m units was conducted in order to determine the nature and depth of cultural deposits on site LA 115329. An artifact distribution map generated from the controlled surface collection, was used as a guide for placement of the three units. All study units were excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit 1. Study Unit (SU) 1 was placed with the southwest corner located at site grid coordinates N89.00, E98.00 (Figure 14.2). A total of five 10-cm levels were excavated revealing two strata along two 1-m-long profiles, as shown on the south-facing and west-facing walls (Figure 14.3). Cultural deposits were recorded within Levels 1, 2, and 3, Stratum I. Within these first three levels, sediment consisted of sandy loam with fire-cracked rock and sparse amounts of charcoal deposits. Level 4, Stratum II, included very light charcoal deposits mixed with small sandstone rocks less than 5 cm in size and a high amount of insect disturbance. Level 5, Stratum II, contained no cultural materials; sediment consisted of sandy loam with small gravels and insect disturbance. No features were observed during excavation of SU 1.

Study Unit 2. SU 2 was located with the southwest corner at site grid coordinates N102.00,

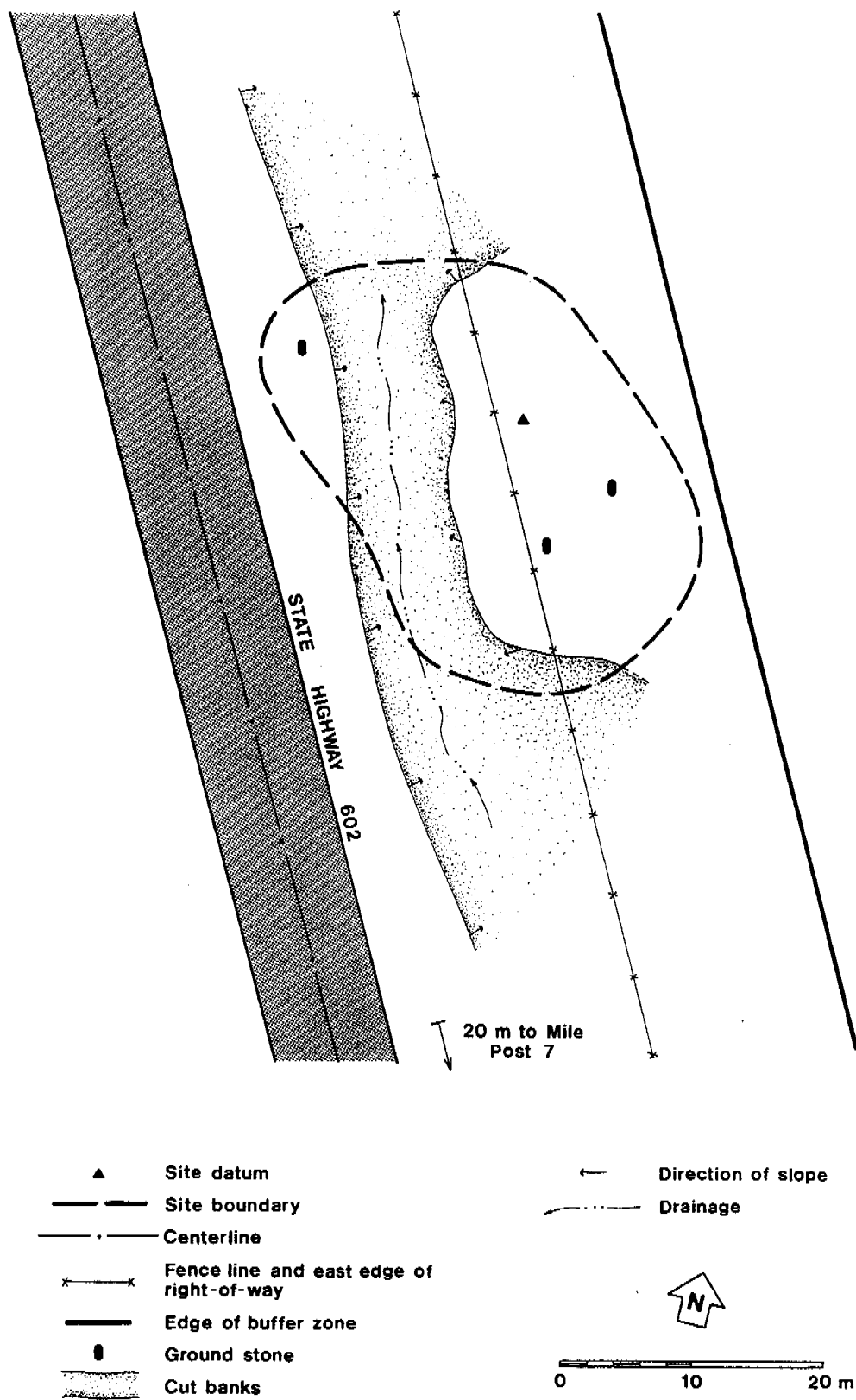


Figure 14.1. Site LA 115329 Survey Site Map.

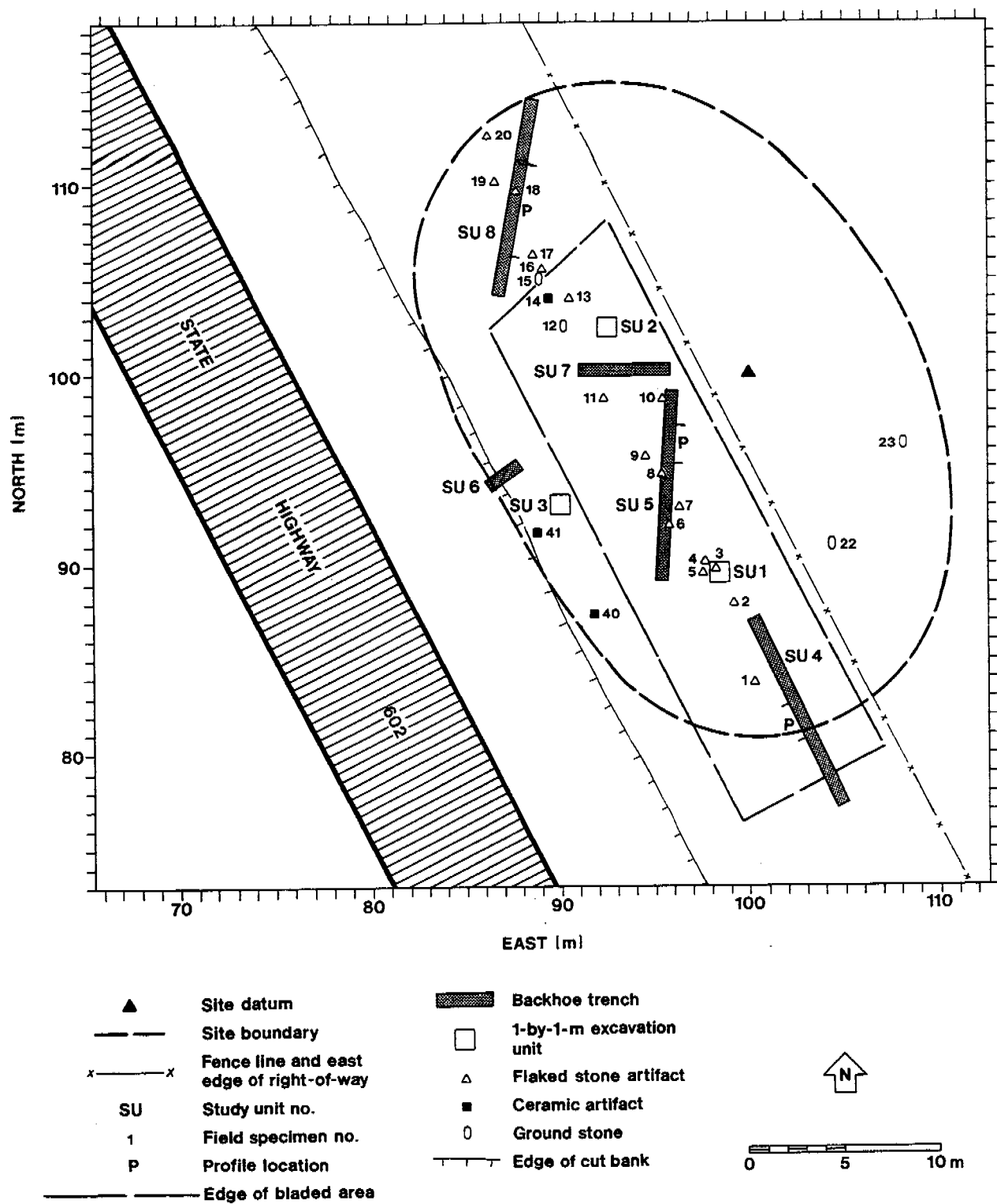
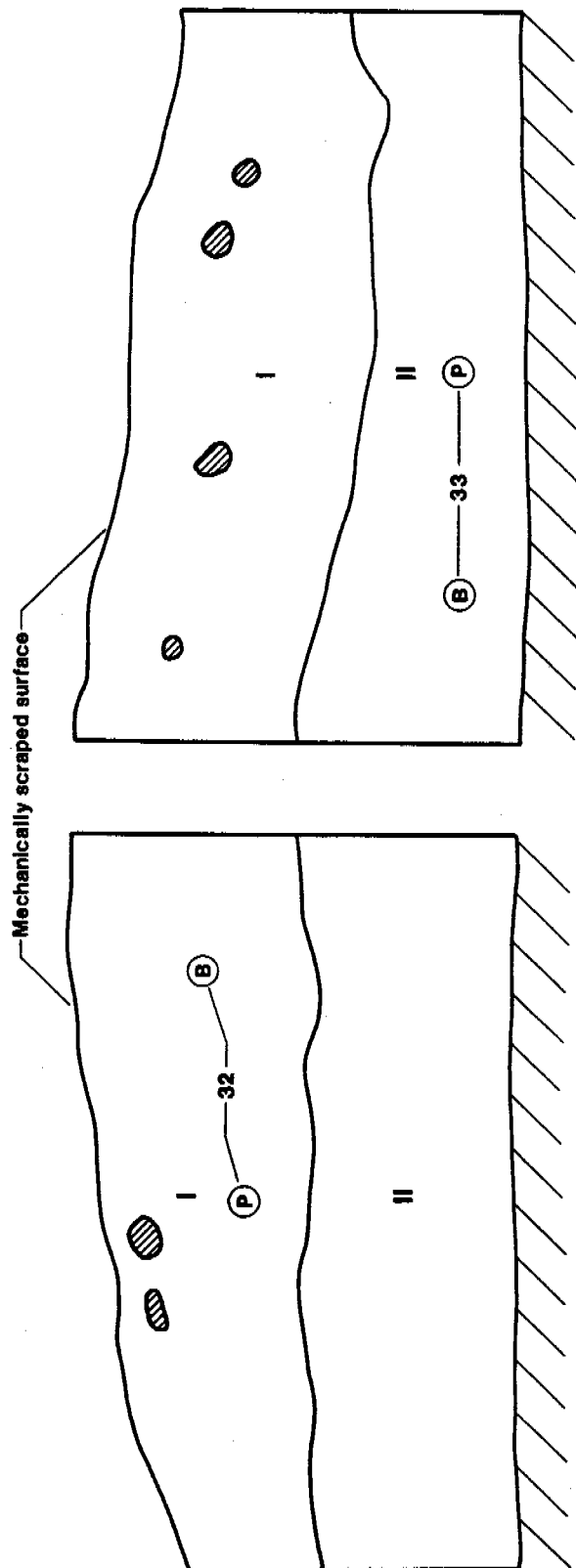


Figure 14.2. Site LA 115329 Data Recovery Site Map, Surface Artifacts, Study Units, and Mechanical Stripping.

South-facing profile



(B) Flotation sample
(P) Pollen sample
32 Field specimen no.
/// Unexcavated

I 0-30 cm - Dark brown (10YR3/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; 10% gravel; common roots; diffuse smooth boundary.

II 30 cm + - Yellowish brown (10YR5/6, moist) sandy loam; weak; slightly sticky, slightly plastic; less than 10% gravel; very few roots.

/// Sandstone rock

E92.00 (Figure 14.2). The unit was placed in the northern portion of the site atop a slight rise in the topography near the existing east fence line. A total of six 10-cm levels were excavated in SU 2 revealing two strata as shown on the north-facing and east-facing wall profiles (Figure 14.4). Cultural materials were retrieved from Levels 2, 3, and 4, Stratum I, and the upper portion of Stratum II. Materials included flaked stone, ground stone, and faunal remains. Sediment deposits that were recorded during excavation of SU 2 included very light charcoal mottling (less than 5%) observed in Levels 3 and 4, Stratum I. Sediment disturbance was observed throughout the excavation consisting of many roots and rodent burrows. No features were encountered during excavation of SU 2.

Study Unit 3. SU 3 was located with the southwest corner at site grid coordinates N94.52, E89.40 (Figure 14.2). The unit was placed at the base of the cut bank approximately 9 m east of the edge of State Highway 602. A total of one 20-cm level and four 10-cm levels were excavated within SU 3, revealing two strata as shown on a east-facing wall profile (Figure 14.5). Flaked stone artifacts were recovered only within Level 3, Stratum II. Deposits included road gravels, roots, and rodent activity. Approximately 30 to 40% road gravels were observed in Levels 1 through 4, and were absent in Level 5. Root and rodent disturbance was noticed in all levels. No features were encountered during excavation of SU 3.

Mechanical Excavation

Mechanical excavations of five backhoe trenches was conducted in order to determine the nature and depth of possible buried cultural deposits on site LA 115329. The trenches were designated SU 4 through 8 and ranged from 2.00 to 11.00 m in length, with a maximum depth of approximately 1.80 m. A total of 38.40 m of trench was excavated on the site (Figure 14.2).

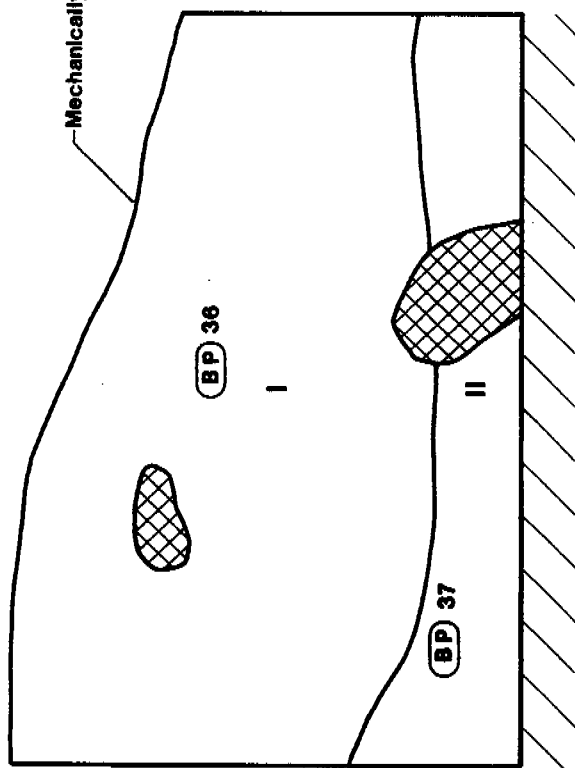
Study Unit 4. SU 4 was placed on the east side of State Highway 602, with the northwest end located at site grid coordinates N87.20, E100.20, and the southeast end at N77.30, E104.80 (Figure 14.2). The trench was 11.00 m in length with a

maximum depth of approximately 1.40 m. A representative 2-m-long profile of the northeast-facing wall shows two strata (Figure 14.6). Stratum I represents an organic layer consisting of sandy loam with less than 5% charcoal deposits mixed with sandstone rocks, gravel, and root disturbance. A single flaked stone artifact (FS 45) was collected within Stratum I approximately 60 cm below the ground surface, suggesting that the cultural deposits are present at this depth in this area of the site. Stratum II appears to be a natural stratum consisting of sandy loam with sandstone inclusions, very few roots, and no cultural deposits. No features were encountered in SU 4.

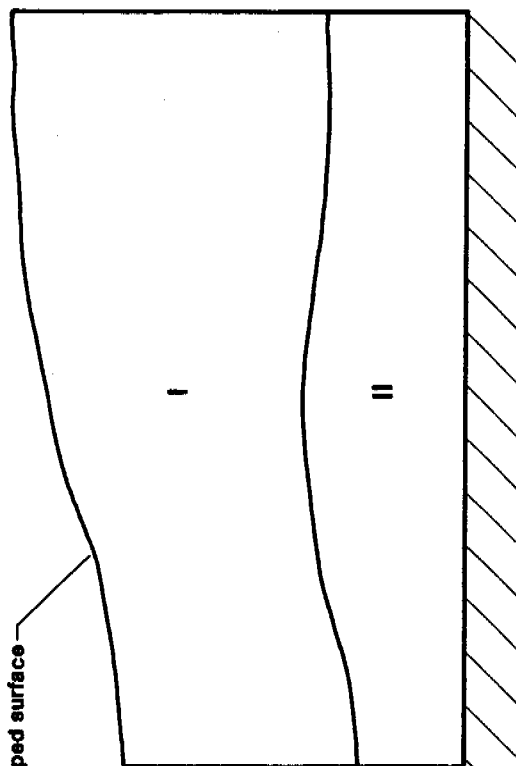
Study Unit 5. SU 5 was placed approximately 5 m northwest of SU 4, with the north end located at site grid coordinates N99.20, E96.00, and the south end at N89.10, E95.40 (Figure 14.2). The trench was 10.00 m in length with a maximum depth of approximately 1.70 m. A representative 2-m-long profile was drawn of the west-facing wall revealing four strata (Figure 14.7). Stratum I consisted of a possible organic layer that included a sandy loam sediment with less than 10% gravel, and was noticeable in the previous study units excavated. Stratum I did not contain any cultural deposits. Stratum II was the same texture as Stratum I with a slight difference in root content and a slight difference in visible color. Strata III and IV appeared to be pockets of natural sediments both consisting of the same Munsell colors and both revealing the absence of cultural deposits. SU 5 did not encounter any features.

Study Unit 6. SU 6 was placed on the east side of State Highway 602 along the cut bank edge, with the southwest end located at site grid coordinates N94.00, E86.00, and the northeast end at N95.20, E87.90 (Figure 14.2). The trench was 2.00 m in length with a maximum depth of approximately 1.72 m. A profile was drawn of the northwest-facing wall revealing a single sediment deposit identified as Stratum I (Figure 14.8). Stratum I consists entirely of disturbed soil that was deposited from construction of the state highway. The deposit includes road gravels mixed in a sandy loam.

North-facing profile



East-facing profile



I 0-40 cm - Dark brown (10YR3/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; 10% gravel; many roots; diffuse smooth boundary.

II 40 cm + - Yellowish brown (10YR5/6, moist) sandy loam; weak; slightly sticky, slightly plastic; less than 10% gravel; few roots.

BP

36



Flotation and pollen samples

Field specimen no.

Rodent disturbance

Unexcavated

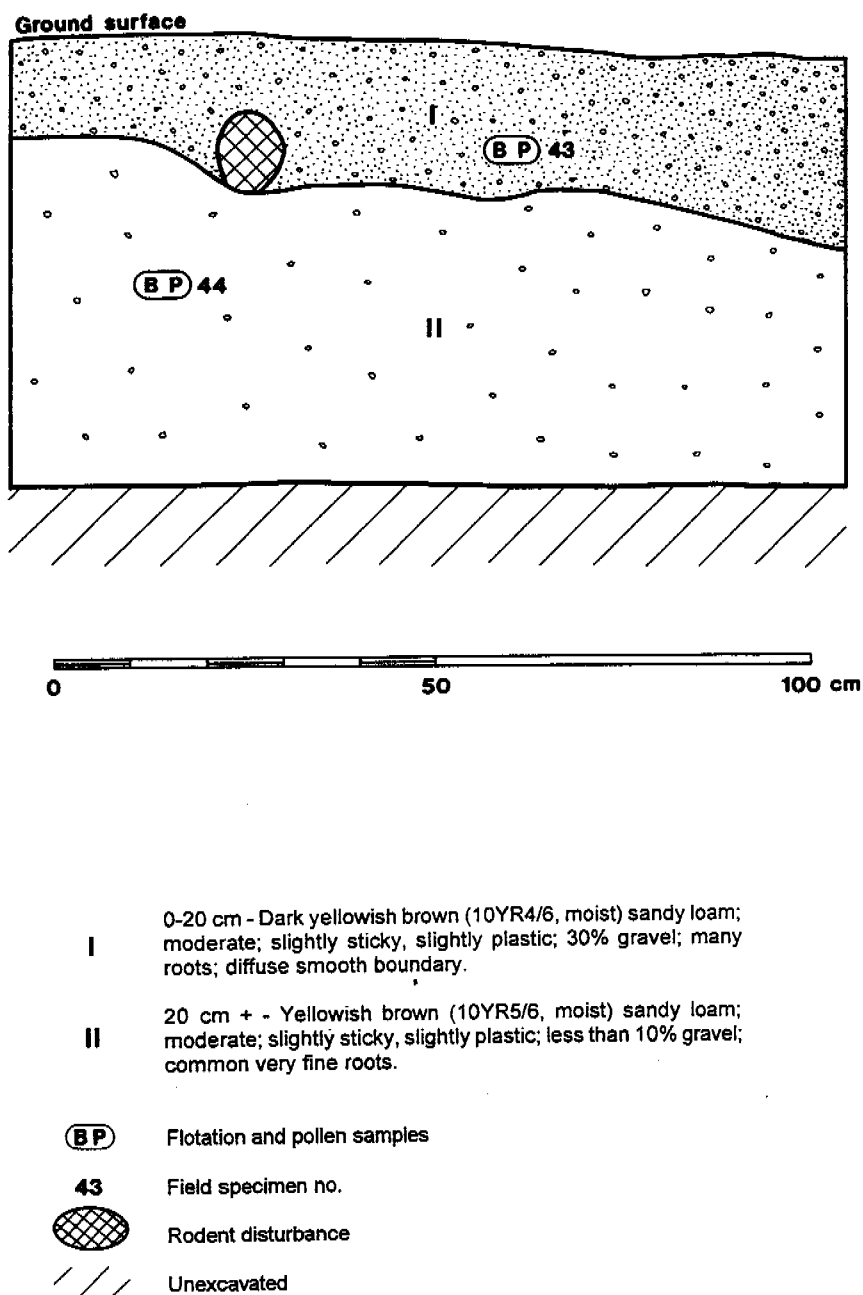
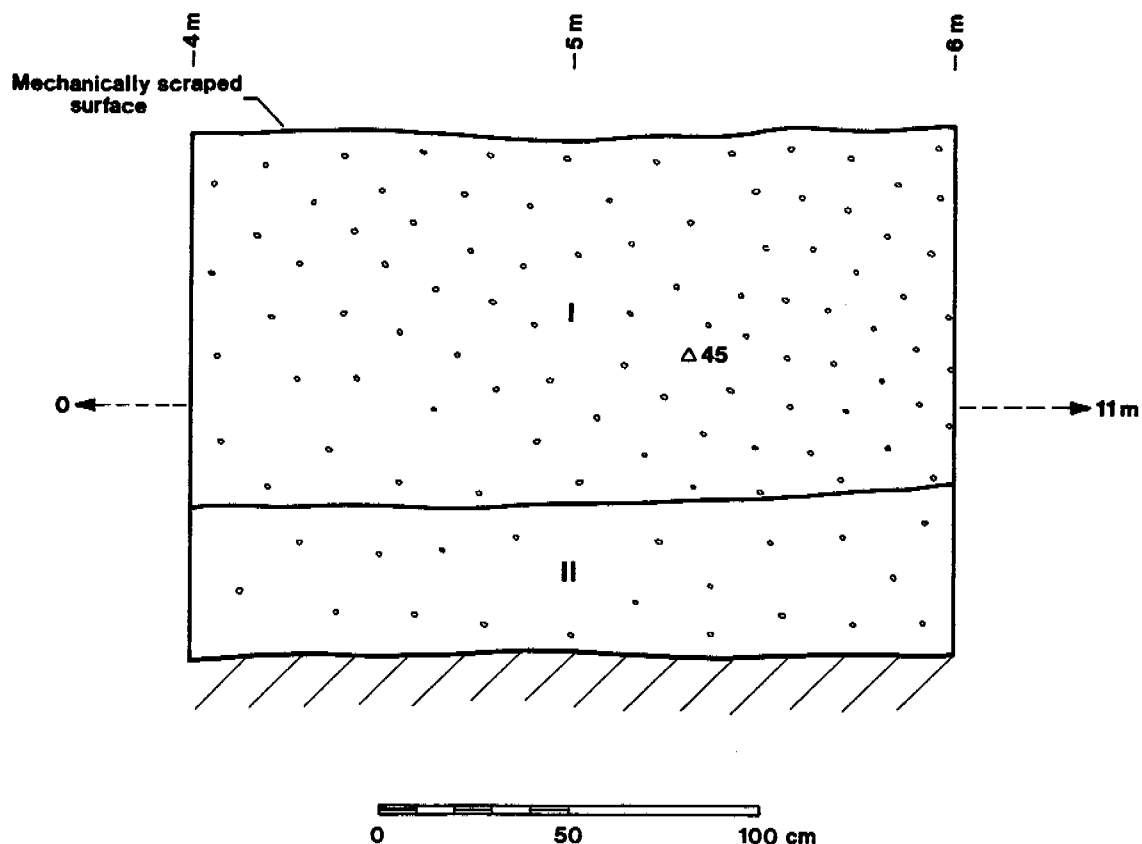


Figure 14.5. Site LA 115329 Study Unit 3, East-facing Profile.



I 0-100 cm - Dark brown (10YR3/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; many very fine roots; diffuse smooth boundary.

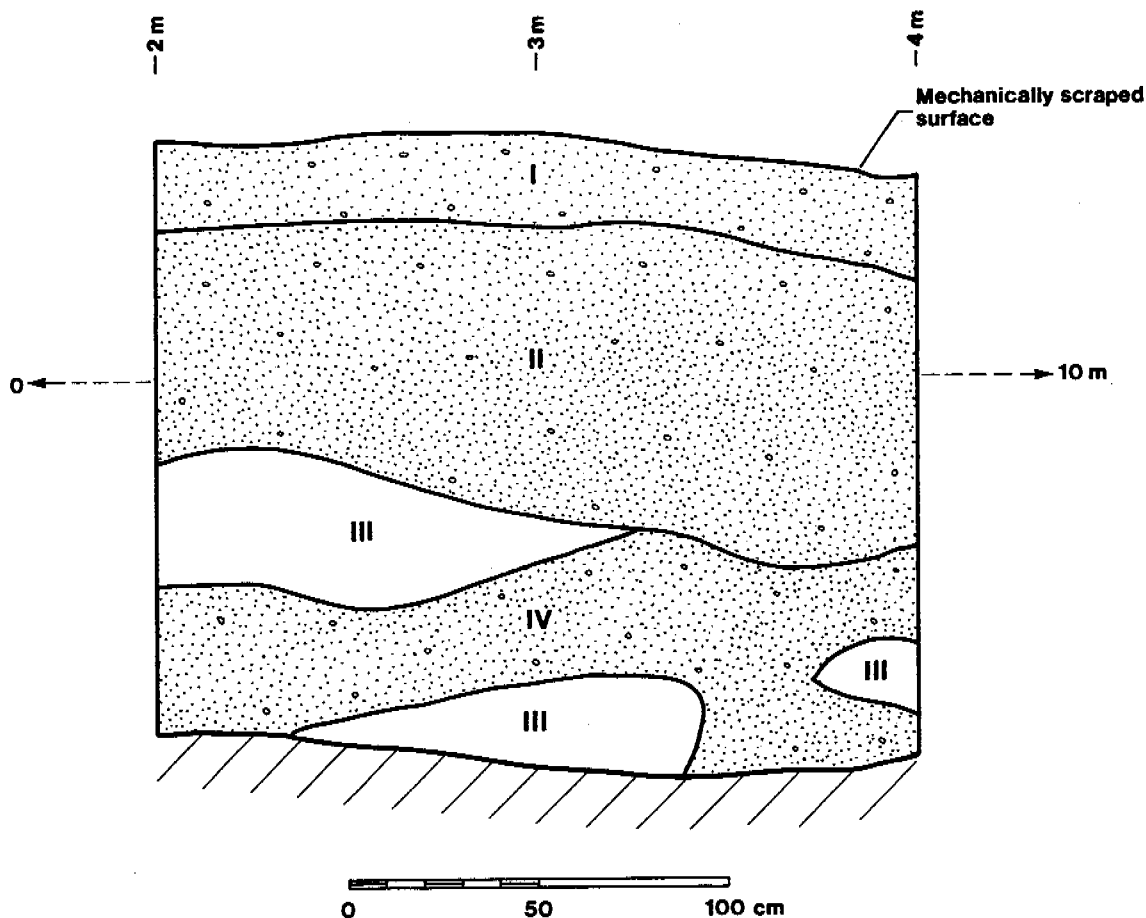
II 100 cm + - Yellowish brown (10YR5/6, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; very few very fine roots.

Δ Lithic artifact

45 Field specimen no.

/// Unexcavated

Figure 14.6. Site LA 115329 Study Unit 4, Northeast-facing Profile.



- I** 0-20 cm - Dark yellowish brown (10YR3/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; many roots; diffuse smooth boundary.
- II** 20-110 cm - Dark yellowish brown (10YR4/6, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; common roots; diffuse wavy boundary.
- III** 80 cm + - Dark yellowish brown (10YR4/6, moist) fine sand, yellowish brown (10YR5/6, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; very fine roots.
- IV** 100 cm + - Dark yellowish brown (10YR4/6, moist) sandy loam, yellowish (10YR5/6, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; very fine roots.

/// Unexcavated

Figure 14.7. Site LA 115329 Study Unit 5, West-facing Profile.

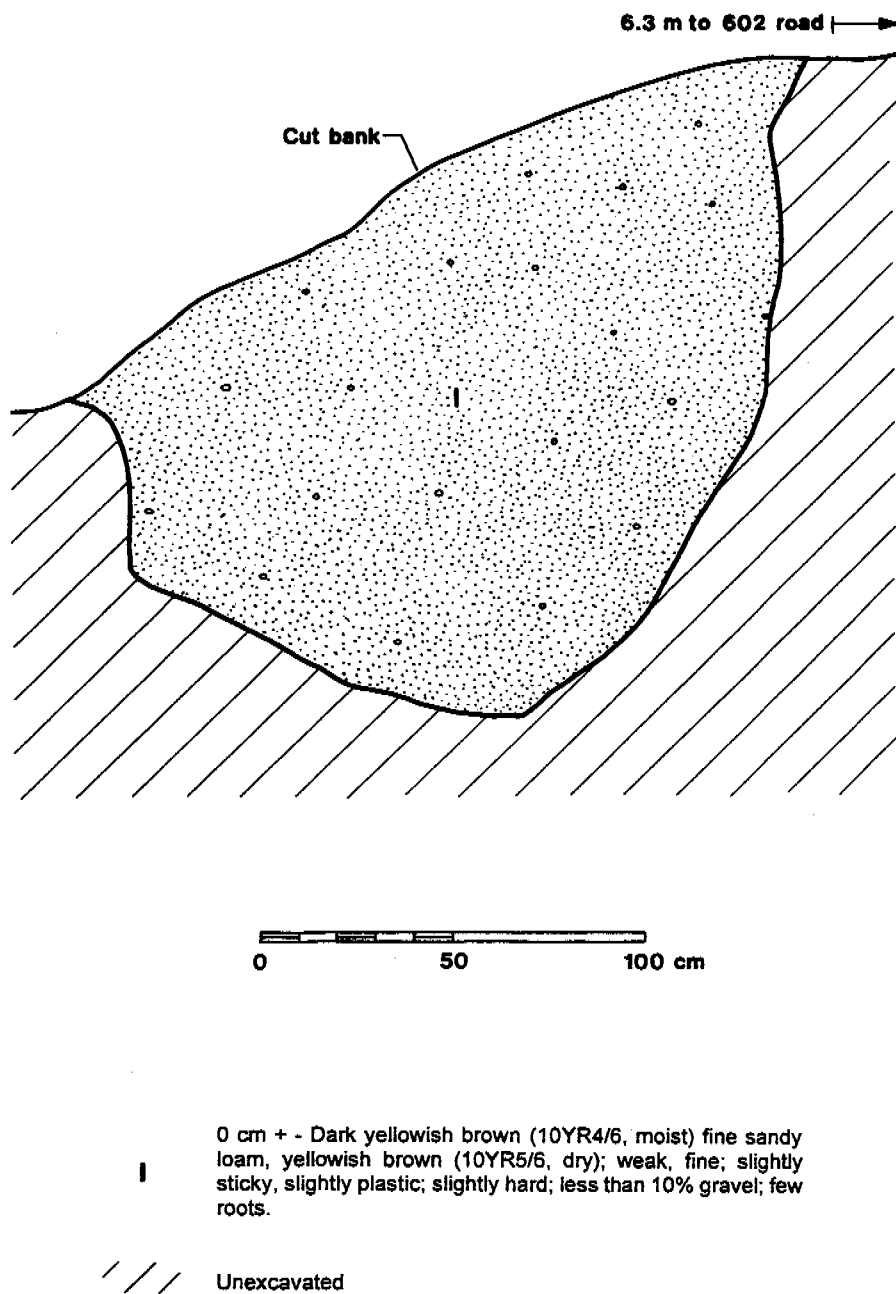


Figure 14.8. Site LA 115329 Study Unit 6, Northwest-facing Profile.

Study Unit 7. SU 7 was placed on the east side of State Highway 602, with the west end of the trench located at site grid coordinates N100.20, E91.00 and the east end at N100.20, E96.00 (Figure 14.2). The trench was 5.00 m in length with a maximum depth of approximately 94 cm. A south-facing wall profile shows two strata (Figure 14.9), both similar to the strata seen in the SU 1, 2, and 4. No buried features were discovered.

Study Unit 8. SU 8 was placed on the east side of State Highway 602 at the northern end of the site, with the northeast end located at site grid coordinates N114.50, E88.60, and the southwest end at N104.10, E86.70 (Figure 14.2). The trench was 10.40 m in length with a maximum depth of approximately 1.80 m. A representative 5-m-long profile was drawn of the northwest-facing wall revealing three strata (Figure 14.10). Stratum I in SU 8 is believed to be the same soil observed in SU 4 at the southern end of the site; this suggests that the sediment deposit is most likely present throughout the site at the surface. Stratum I varies in color from dark brown to a dark yellowish brown. Stratum II may represent an abrupt break in the sediment deposition that was possibly caused by road construction, considering the base of the cut bank extended down slope and appears to have been bladed by mechanical operations during construction of the right-of-way. Stratum III was a natural sediment deposit also observed in other study units; it varies in color depending on the moisture content of the soil. This stratum also may have been disturbed by road construction. No buried features were encountered during excavation of SU 8.

Mechanical Stripping. Mechanical stripping was done only on the east side of the road consisting of an area 31 m in length by approximately 9 m in width (210.00 sq m). Approximately 30 to 40 cm of frozen ground top soils and vegetation was removed revealing no additional buried features.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Three sherds were analyzed from site LA 115329. No subsampling of the recovered ceramic assemblage was made for the attribute analysis as

described in Chapter 21. All three sherds were recovered from surface collections. Appendix D outlines the ceramic data by provenience. The assemblage contains two wares common to the Zuni area: Cibola White Ware and Cibola Gray Ware.

Chronometrics

Two diagnostic ceramic artifacts were recorded. The Cibola White Ware sherd was identified as a Gallup Black-on-white. The Cibola Gray Ware was identified as Lino Gray. It is impossible to provide an accurate date range based on two diagnostic sherds. However, Gallup Black-on-white was produced during the middle to late Pueblo II period (AD 1040 to 1150). Lino Gray was produced during the Basketmaker III to Pueblo I periods (AD 450 to 950). A mean ceramic date of AD 897 \pm 175 years was generated for the ceramic assemblage. This date is suspect due to the small sample size. Chapter 21 gives a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of two jars and one bowl present in the assemblage. All sherds were identified as coming from vessel bodies. Both bowl and jar forms are represented among the grayware sherds, while the one whiteware sherd is a jar. Thus, jars outnumber bowls by a ratio of 2/1. Neither sooting nor modification were recorded for this assemblage. The extremely small sample size makes speculation about functional variability at this site impossible. Chapter 21 offers a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for three sherds. The Cibola White Ware and one Cibola Gray Ware are tempered with sherd, the most common temper type for these wares. The Lino Gray is tempered with quartz sand. This temper is diagnostic for the type. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

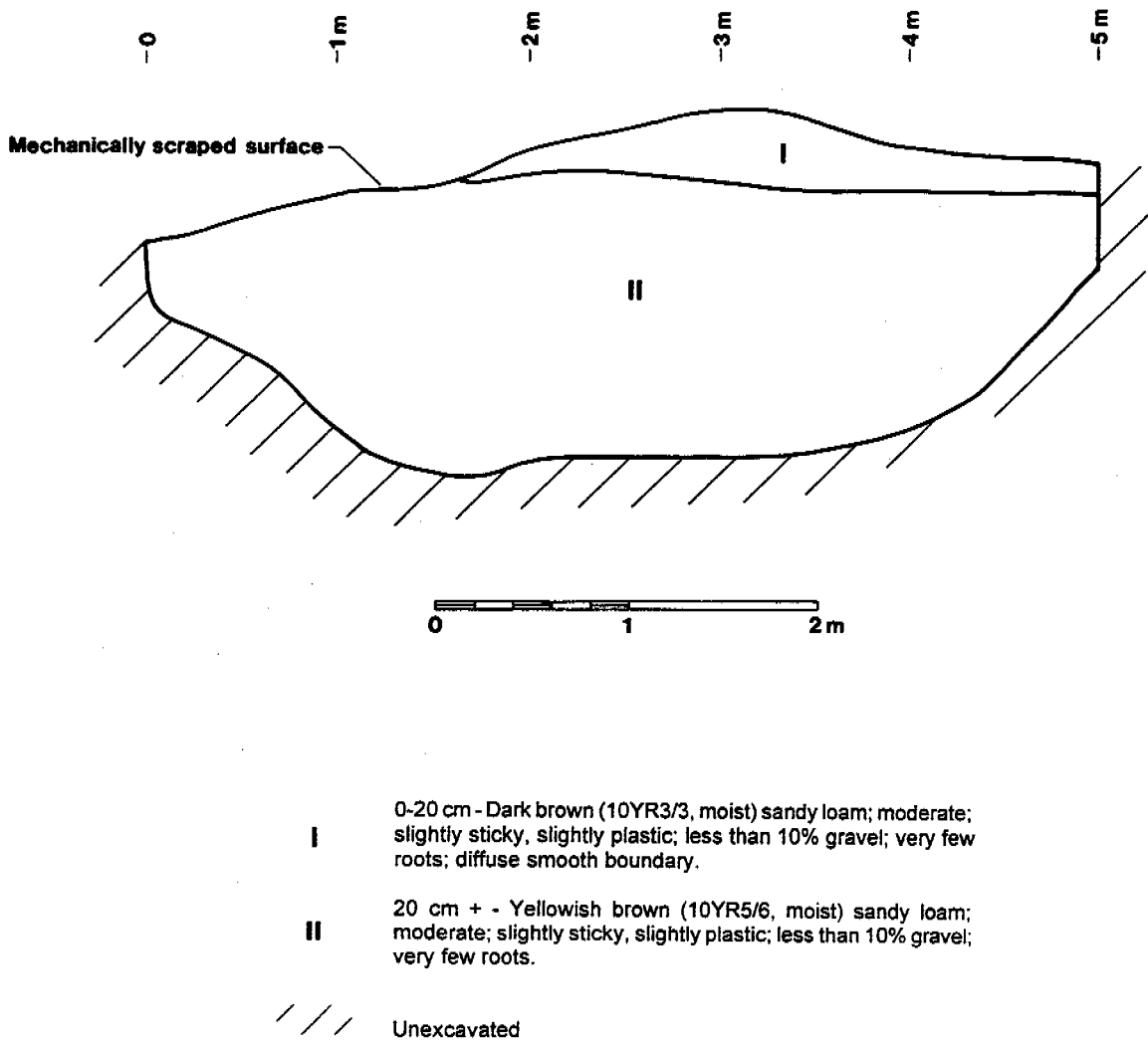
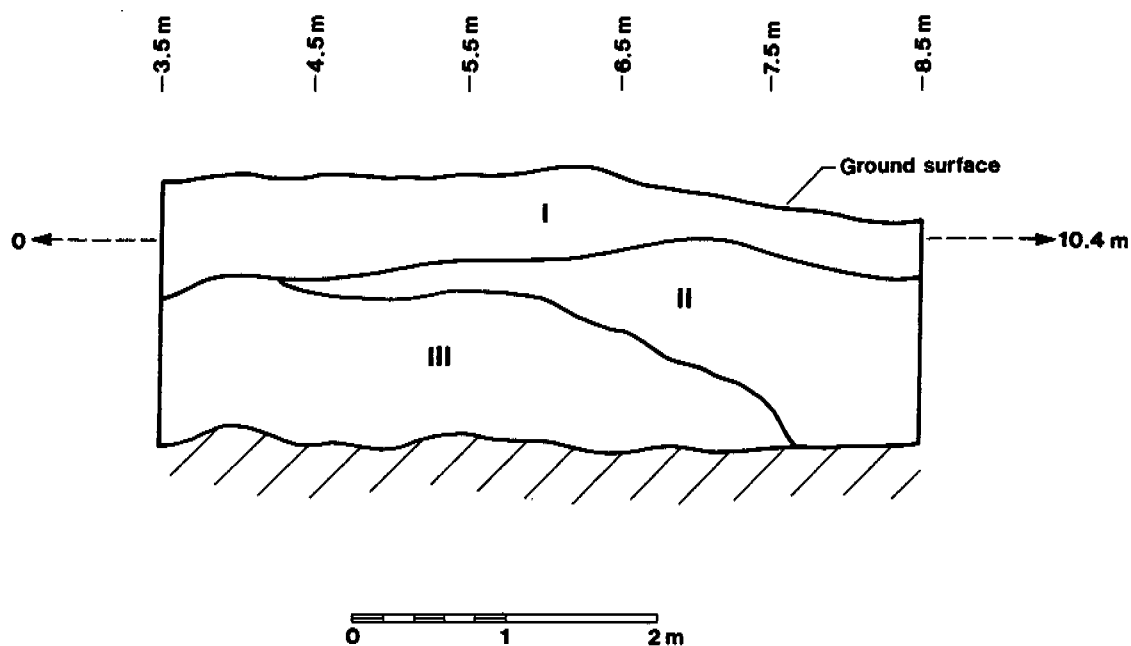


Figure 14.9. Site LA 115329 Study Unit 7, South-facing Profile.



I 0-60 cm - Dark brown (10YR3/3, moist) sandy loam; weak; slightly sticky, slightly plastic; less than 10% gravel; many roots; diffuse wavy boundary.

II 60 cm + - Dark yellowish brown (10YR4/6, moist) sandy loam; weak; slightly sticky, slightly plastic; no gravel; few roots.

III 70 cm + - Dark yellowish brown (10YR4/6, moist) fine sand, yellowish brown (10YR5/6, dry); weak; slightly sticky, slightly plastic; slightly hard; no gravel; no roots.

/// Unexcavated

Figure 14.10. Site LA 115329 Study Unit 8, Northwest-facing Profile.

Summary

The ceramic assemblage from site LA 115329 is very small and was recovered exclusively from surface collections. Two wares common to the area are present at the site, including one diagnostic sherd. Given the small sample size for the ceramic assemblage of diagnostics, it is difficult to provide a meaningful temporal range. Similarly, the small sample size makes it difficult to speculate about activities practiced at the site.

Flaked Stone Artifacts

The site LA 115329 flaked stone assemblage consists of 27 artifacts. Three artifact classes are represented (in decreasing order of representation): debris (13), debitage (9), and core (5). Nineteen (70.4%) pieces are chert, 4 (14.8%) are quartzite, and 4 (14.8%) are silicified wood. One of the chert artifacts, a subcortical piece of debitage weighing 6 g from SU 4 (Stratum I), is made of Zuni Yellow Spotted chert. Three artifacts (11.1%) show evidence of thermal alteration in the form of potlidding or crazing. Table 14.1 provides summary metric data for the artifacts recovered from site LA 115329.

Of the nine pieces of debitage in the collection, one is a primary flake, five are secondary flakes, and three are cortical bipolar flakes. Evidence of bipolar reduction in this small collection is indicative of the exploitation of very small chert and quartzite pebbles. A bipolar reduction technology is required in order to begin reduction of small spherical pebbles. This may also reflect a relatively expedient reduction strategy focused on the selection and reduction of raw materials present in the alluvial gravels located in the immediate area of the site.

Platform data was recordable for five of the nine pieces of debitage. Only two of these pieces showed evidence of platform preparation. One piece was single faceted and one was multifaceted and ground or abraded.

The core assemblage consists of three single-platform cores, one amorphous core, and one dihedral core. Four of the five cores contained hinge fractures or material flaws which likely led to their abandonment. Three of the cores are chert and two are silicified wood. Four cores are cortical having over 50% cortex (three of these have greater than 75% cortex), and

Table 14.1. Summary Metric Data for Site LA 115329 Late Pueblo I to Early Pueblo II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	2.9	2.2	1.4	19.2
10% trimmed mean	2.7	2.1	1.2	10.1
Median	2.4	2.0	1.1	3.0
Standard error	0.3	0.3	0.3	7.5
Standard deviation	1.8	1.5	1.3	38.9
Minimum	1.0	0.6	0.2	-
Maximum	7.9	6.0	6.0	146.0
Range	6.9	5.4	5.8	146.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm.

Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

n = 27

one is subcortical. The high percentage of cortex on the cores reflects minimal or very low-intensity reduction of raw materials during the occupation.

Ground Stone Artifact

One ground stone artifact was recovered from site LA 115329. It is believed to be a fragment of an expedient passive abradier made from sandstone, based on the poor quality of the stone, the lack of shaping, and multidirectional striations on the grinding surface. It was recovered from the surface of this site.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of faunal remains from the entire project can be found in Chapter 26, which covers methods and general conclusions. Detailed description of faunal remains is provided in Appendix I.

SU 2, Level 2, produced the only faunal remains from the site (FS 24). A carpal, metacarpus, and first (proximal) phalanx were identified as *Canis* sp. No modification to the specimens was observed. The distal end of the metacarpus is unfused, showing that the animal died before reaching skeletal maturity. It is difficult to differentiate various species of *Canis* using bones of the appendicular skeleton. Based on size, these are unlikely to be wolf, but they could be either coyote (*C. latrans*) or domestic dog (*C. familiaris*). A similar set of canid bones was recovered from site LA 26306, and portions of a domestic dog skeleton were recovered from site LA

115327. The three specimens from site LA 115329 could well be from one individual, and may be part of a dog burial.

STRATIGRAPHY

The stratigraphy of site LA 115329 is best represented in SU 8 (Figure 14.10). A recent fine sand caps the underlying deposits. Below this deposit is a dark brown organically rich sand and clay (identified as a sandy loam) deposit (Stratum I). Below this is a dark yellowish brown sand and clay deposit (Stratum II, also identified as a sandy loam). Goldstein (1998) believed this deposit was stable for only a short time, as it lacked prolonged soil development. Below this is a yellowish brown fine sand deposit (Stratum III). Goldstein (1998) identified this as the earliest valley fill event exposed in the project area. Each of these deposits is laterally continuous across the entire site.

CHRONOMETRIC DATA

Chronometric data from site LA 115329 are only provided by the ceramic artifact assemblage. These are discussed by Eckert above, and in Chapter 21. To summarize, a mean ceramic date of AD 897 \pm 175 was calculated from the assemblage.

SUMMARY

Site LA 115329 is interpreted as a late Pueblo I to early Pueblo II limited activity site. Limited lithic reduction was one of these activities. Further discussion of the function of site LA 115329 would be speculative. It should be noted, however, that site LA 26308 appears to be a nearby contemporaneous site where storage and other activities were conducted.

Chapter 15

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 26308

Jerome Zunie and James W. Kendrick

**with Analytic Contributions by
Suzanne L. Eckert, Janet Hagopian, Pamela McBride,
Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations were conducted at site LA 26308 between 26 May and 4 June 1998. Situated on the eastern slope of a bedrock ridge, site LA 26308 is a multicomponent site located entirely on the western side of the existing highway. The site is located approximately 2098 m (6885 ft) above mean sea level. The site consists of late Pueblo I to early Pueblo II features along its easternmost boundary (within the right-of-way) and a late Pueblo II rubble mound upslope and along its westernmost boundary. The rubble mound was not investigated as a part of this project. Ponderosa pine, sagebrush, juniper, grasses, narrowleaf yucca, and prickly pear cactus can all be found across the site today.

SURVEY RESULTS

Davis and Windes (1975) recorded site LA 26308 during their survey of cultural resources along State Highway 602. Abbott (1997) also recorded the site during the inventory phase of this project. The Late Pueblo II rubble mound was measured at 20 by 28 m, with well-defined wall alignments (Figure 15.1). An in-use two-track road cuts through the midden associated with this rubble mound. Along the eastern portion of the site's boundary, three artifact concentrations were recorded. One of these is outside the right-of-way, while the two others are inside. Just prior to data recovery activities at site LA 26308, road maintenance crews of the New Mexico State Highway and Transportation Department covered the northernmost artifact concentration with fill from a nearby drainage, precluding our ability to collect those artifacts.

Ceramic artifacts observed during the survey included Gallup Black-on-white, Escavada Black-on-white, Puerco Black-on-white, unidentified black-on-red, indented corrugated, exuberant corrugated, and clapboard corrugated. Lithic artifacts observed included debitage, cores, and a hammerstone. Lithic raw materials included primarily silicified wood and quartzite. One vesicular basalt basin metate was also observed. At the time of the survey, artifacts were actively eroding out of the western road cut bank.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations, a pedestrian survey was conducted in transects at 2-m intervals across the site within the right-of-way to locate all surface artifacts and features. Each artifact was marked with a pin flag, point located with a Sokkia Total Station, and then collected. Both ceramic and lithic artifacts were recovered. The highest concentration of artifacts was located in the northeastern portion of the site, where several subsurface features were located during data recovery activities (Figure 15.2).

Excavation

Hand Excavation

Hand excavation of seven 1-by-1-m and one 1-by-2-m units was conducted in order to determine the nature and depth of cultural deposits on site LA 26308. An artifact distribution map generated from the controlled surface collection was used as a guide for the placement of the eight units. All

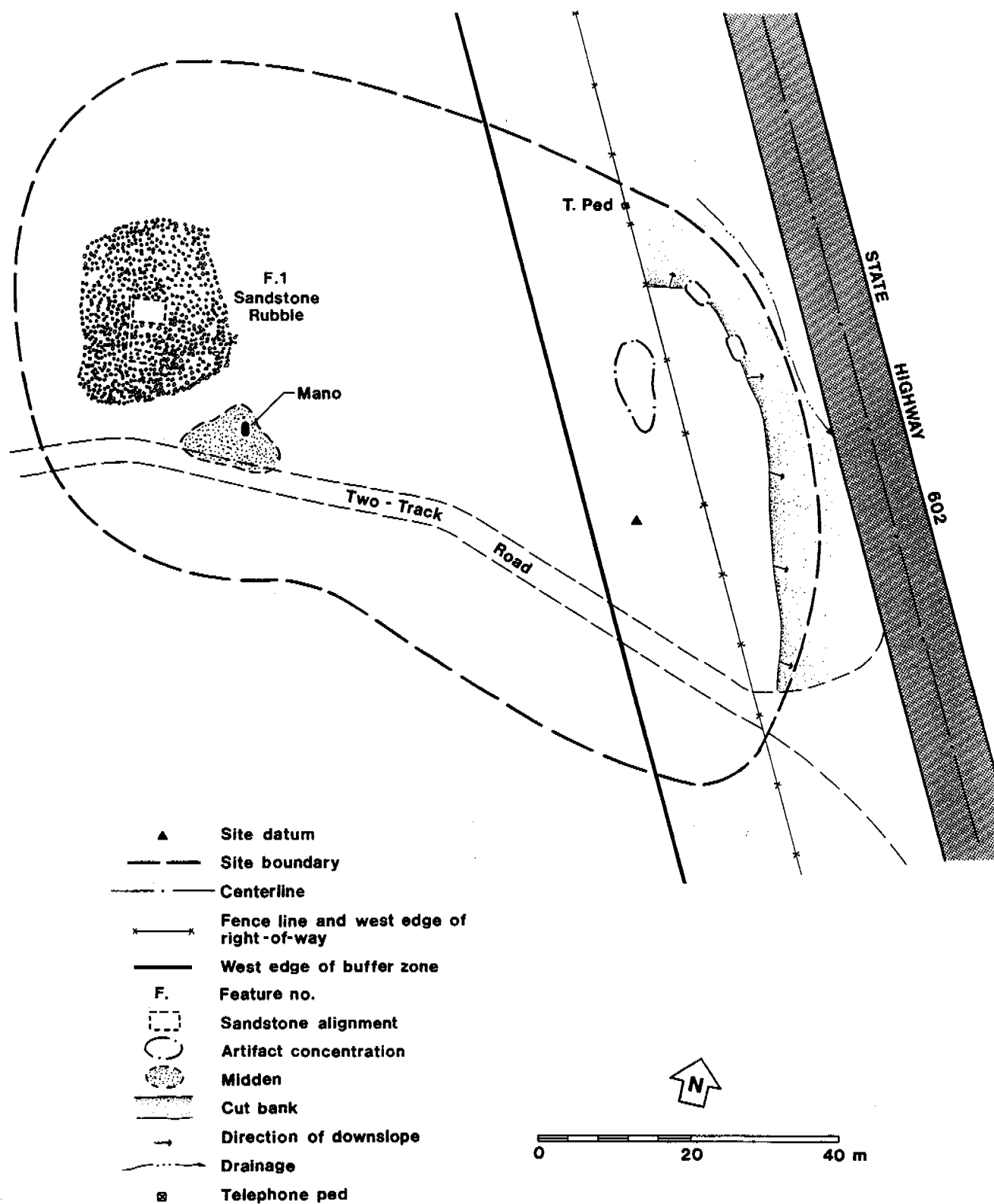


Figure 15.1. Site LA 26308 Survey Site Map.

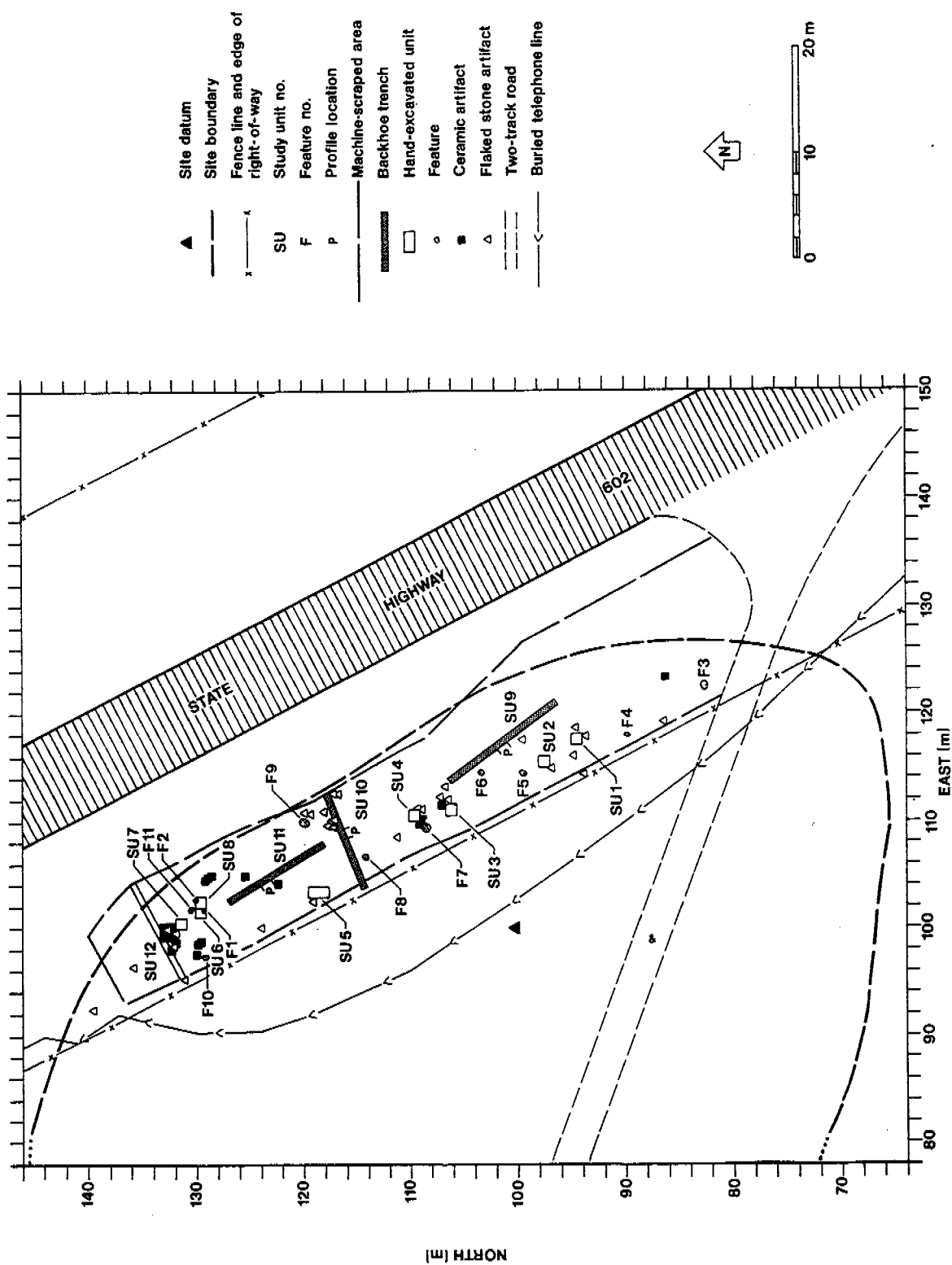


Figure 15.2. Site LA 26308 Data Recovery Site Map, Surface Artifacts, Features, Study Units, and Mechanical Stripping.

test units were excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit 1. SU 1 was located west of the existing State Highway 602 in the eastern portion of the site. The grid coordinates for the southwest corner of SU 1 are N94.00, E117.00 (Figure 15.2). This 1-by-1-m unit was placed in a light artifact scatter and in an area of minimal ground disturbance by road construction.

SU 1 was excavated in three 10-cm levels. Since all four walls of the unit were identical a single 1-m-long representative profile of the east-facing wall was drawn of SU 1 (Figure 15.3). The excavation revealed two strata. Level 1 and 2 were within Stratum I, yielding flaked stone artifacts from Level 1 and unmodified stone from Level 2. Level 3 excavation was within Stratum II. No cultural deposits or features were observed within Stratum II. The excavation of SU 1 revealed that cultural deposits extended within the western right-of-way of State Highway 602 and the eastern portion of the site.

Study Unit 2. SU 2 was located west of the existing State Highway 602 in the eastern portion of the site boundary. The grid coordinates for the southwest corner of SU 2 are N97.00, E115.00 (Figure 15.2). This 1-by-1-m unit was placed in an area of light artifact scatter and minimal ground disturbance by road construction.

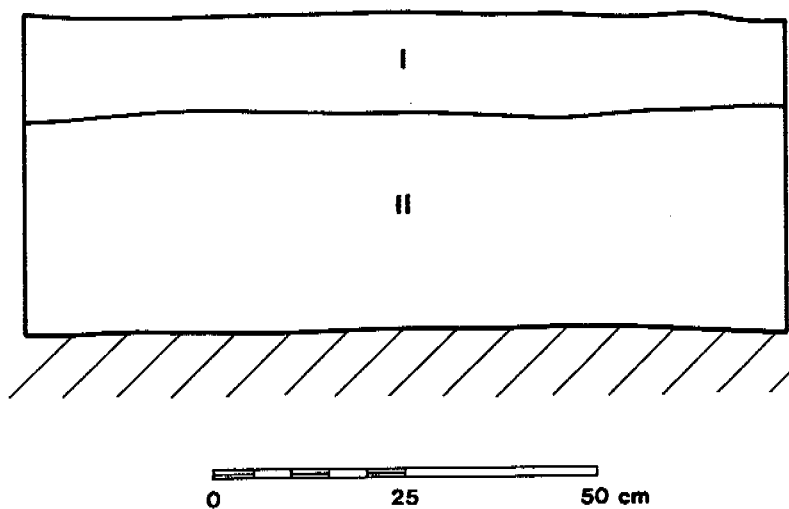
SU 2 was excavated in three 10-cm levels. Since all four walls of the unit were identical a single 1-m-long representative profile of the east-facing wall was drawn of SU 2 (Figure 15.4). The excavation revealed two strata. Levels 1 and 2 were within Stratum I. A single flaked stone artifact was recovered from Level 1. No artifacts were recovered from Level 2. Level 3 excavation was within Stratum II. Due to the absence of cultural deposits or features in Stratum II and Level 3, excavation of SU 2 was terminated. The excavation of SU 2 revealed that Stratum I contained cultural deposits that extended within the western right-of-way of State Highway 602.

Study Unit 3. SU 3 was located west of the existing State Highway 602 in the eastern portion of the site. The grid coordinates for the southwest corner of SU 3 are N105.40, E110.50 (Figure 15.2). This 1-by-1-m unit was placed in an area of light artifact scatter and little ground disturbance by road construction.

SU 3 was excavated in three 10-cm levels. Since all four wall of the unit were identical, a single 1-m-long representative profile of the east-facing wall was drawn of SU 3 (Figure 15.5). The excavation revealed three strata. Due to the local topography, Level 1 was 22 cm deep. Level 1 excavation was within Stratum I, recent aeolian deposits. No artifacts were recovered from Level 1. Level 2 was within Stratum II, a culturally deposited stratum. Flaked stone artifacts were recovered from this stratum. Level 3 excavation was within Stratum III. Due to the absence of cultural deposits or features in Level 3, excavation of SU 3 was terminated. Excavation of SU 3 revealed that the cultural deposits within Stratum II extended within the western right-of-way of State Highway 602.

Study Unit 4. SU 4 was located west of the existing State Highway 602 and in the eastern portion of the site boundary. The grid coordinates of the southwest corner of SU 4 are N109.00, E110.00 (Figure 15.2). This 1-by-1-m unit was placed in very light artifact scatter and in an area of minimal ground disturbance.

SU 4 was excavated in three 10-cm levels. Since all four walls were identical within this unit, a single representative profile of the north-facing wall was drawn (Figure 15.6). The excavation revealed three strata within the study unit. No artifacts or features were observed within SU 4, although Strata I and II were culturally stained soils with inclusions of small charcoal flecks. Due to the absence of artifacts or features in Level 3 of Stratum III, excavation of SU 4 was terminated. The excavation of SU 4 revealed that the cultural stratum (Strata I and II) extended within the western right-of-way of State Highway 602.



I 0-13 cm - Dark brown (10YR3/3. moist) sandy loam; weak, very fine, granular; slightly sticky, slightly plastic; few fine roots; diffuse smooth boundary.

II 13-42 cm - Brown (7.5YR4/4. moist) silt loam; moderate, very fine granular; nonsticky, nonplastic; few fine roots.

/// Unexcavated

Figure 15.3. Site LA 26308 Study Unit 1, East-facing Profile.

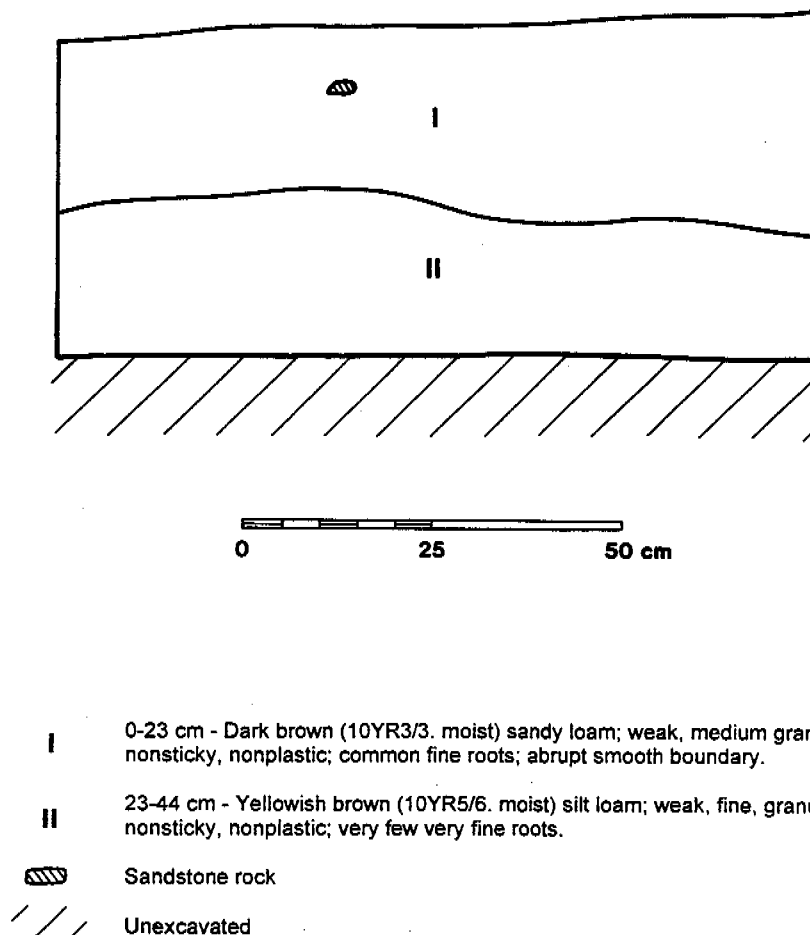
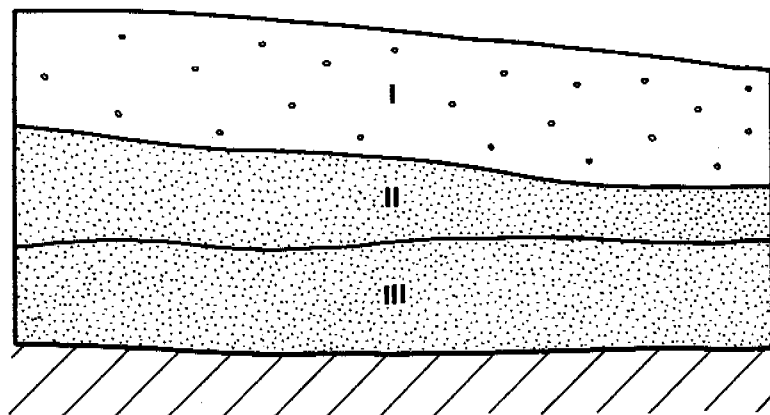


Figure 15.4. Site LA 26308 Study Unit 2, East-facing Profile.



0 25 50 cm

I 0-17 cm - Brown (10YR4/3. moist) loamy sand; weak, very fine, prismatic; nonsticky, nonplastic; less than 10% gravel; common fine roots; diffuse smooth boundary.

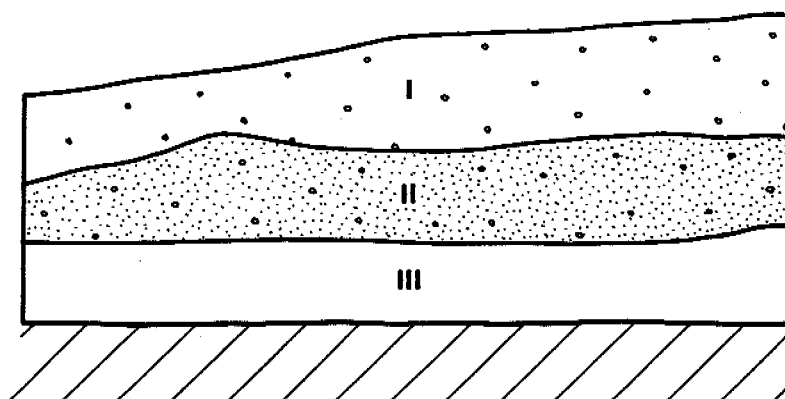
II 17-28 cm - Dark yellowish brown (10YR3/4. moist) loamy sand; moderate, fine, granular; nonsticky, nonplastic; few fine roots; diffuse smooth boundary.

III 28-43 cm - Dark yellowish brown (10YR3/6. moist) clay loam; strong, fine, platy; sticky, plastic; few micro roots.

Gravel

Unexcavated

Figure 15.5. Site LA 26308 Study Unit 3, East-facing Profile.



0 25 50 cm

- I 0-15 cm - Dark brown (10YR3/3. moist) loamy sand; moderate, fine, granular; nonsticky, nonplastic; less than 10% gravel; few fine roots; diffuse smooth boundary.
- II 15-22 cm - Dark yellowish brown (10YR3/6. moist) clay loam; moderate, fine, granular; sticky, plastic; less than 10% gravel; few fine roots; abrupt smooth boundary.
- III 22-38 cm - Strong brown (7.5YR4/6. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; very few micro roots.
- Gravel
- /// Unexcavated

Figure 15.6. Site LA 26308 Study Unit 4, North-facing Profile.

Study Unit 5. SU 5 was located just inside the western right-of-way fence line and west of the existing State Highway 602. The grid coordinates of the southwest corner of SU 5 are N117.50, E103.00 (Figure 15.2). This 1-by-2-m unit was placed in an area of very light artifact scatter and very little ground disturbance by road construction.

SU 5 was excavated in two levels. Since all four walls were identical a single 2-m-long profile of the east-facing wall was drawn (Figure 15.7). Due to the local topography Level 1 was 32 cm deep and Level 2 was 10 cm deep. The excavation identified two strata within SU 5. Level 1 excavation was within Stratum I; artifacts recovered from Level 1 consisted of ceramics and flaked stones. Level 2 excavation was within Stratum II where no artifacts were recovered. Due to the absence of artifacts in Level 2, excavation of SU 5 was terminated. Excavation of SU 5 revealed that the cultural deposits within Stratum I extended beyond the western right-of-way of State Highway 602.

Study Unit 6. SU 6 was located west of the existing State Highway 602 and within the eastern portion of the site. The grid coordinates of the southwest corner of SU 6 are N129.00, E101.00 (Figure 15.2). This 1-by-1-m unit was placed in area of high artifact density and moderate ground disturbance by road construction.

SU 6 was excavated in four 10-cm levels. Since all four walls of the unit were identical, a representative profile of the north-facing wall was drawn (Figure 15.8). Excavation of SU 6 revealed three strata within the unit. Level 1 was excavated within Stratum I. This stratum consisted of aeolian deposits with inclusions of cultural materials. Ceramics and flaked stone artifacts were recovered from Level 1. Level 2 and 3 excavations were within Stratum II, a dark brown stratum with cultural deposits. Artifacts recovered from Level 2 consisted of ceramics and flaked stones. Level 3 artifacts consisted of ceramics and a single flaked stone. There were no artifacts recovered from Level 4 which was excavated within Stratum III. A small charcoal stain (Feature

1) was identified at the southeast corner of the unit and SU 8 was established to investigate the extent of Feature 1.

Study Unit 7. SU 7 was located near the northeast edge of the site and west of the existing State Highway 602. The grid coordinates of the southwest corner of SU 7 are N131.00, E100.00 (Figure 15.2). This 1-by-1-m unit was established in an area of high artifact density and moderate ground disturbance by road construction.

SU 7 was excavated in eight 10-cm levels. A profile of the east-facing wall was drawn for the study unit (Figure 15.9). Four strata were identified within the west wall profile. Artifacts were recovered from Levels 1 through 4 and 6. Levels 1 and 2 of Stratum I recovered artifacts consisting of ceramics and flaked stone. Artifacts recovered in Level 3 were from the bottom of Stratum II and the upper part of Stratum III, and consisted of ceramics, flaked stone, and ground stone. Artifacts recovered in Level 4 were from the lower part of Stratum III and consisted of ceramics and flaked stone. Level 6 artifacts consisted of ceramics and flaked stone. Strata I through IV had cultural deposits. Level 7 was excavated within Stratum IV which was sterile of cultural deposits and features. Rodent disturbance was observed within Strata I through III.

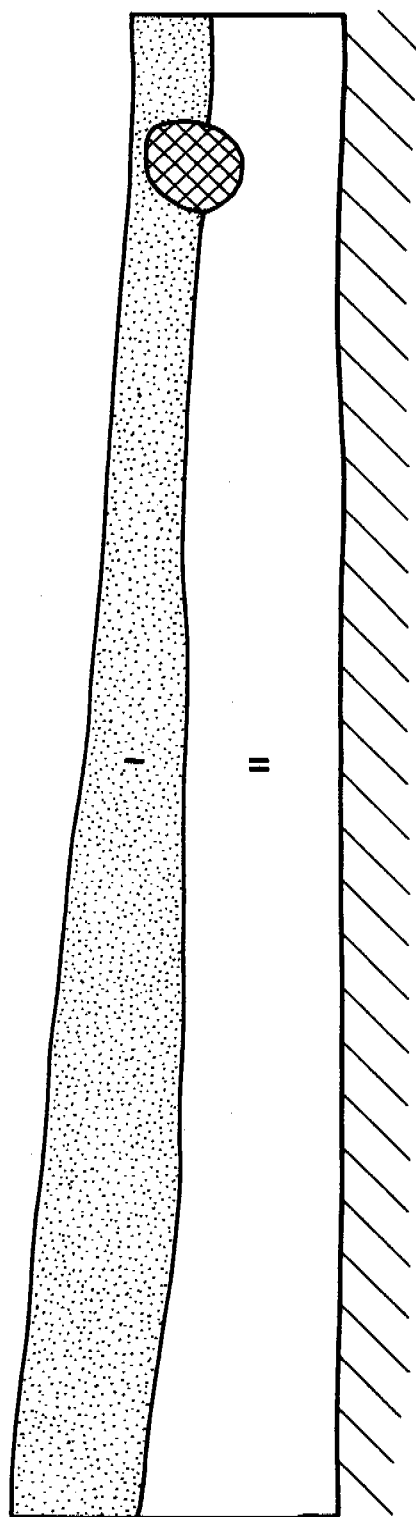
Study Unit 8. SU 8 was located near the northeast portion of the site and west of the existing State Highway 602. The grid coordinates of the southwest corner of SU 8 are N129.00, E102.00 (Figure 15.2). This unit was established just east of SU 6 to investigate the charcoal stain (Feature 1), and in an area of high artifact density.

SU 8 was excavated in three 10-cm levels. A south wall profile of SU 6 and 8 was drawn (Figure 15.8). Excavations revealed three strata. Stratum I was recent aeolian material with some cultural deposits. Stratum II was clearly a cultural layer that was identified in the previous study units. Stratum III was sterile of cultural deposits, except in areas where it was disturbed by rodents. The charcoal stain that was followed out from SU 6 was determined to be a rodent *krotovina*.

—2 m

—1 m

0



0 50 100 cm

I 0-13 cm - Dark yellowish brown (10YR3/4. moist) sandy loam; weak, medium, granular; slightly sticky, slightly plastic; common fine roots; diffuse smooth boundary.

II 13-33 cm - Yellowish brown (10YR5/6. moist) silt loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots.

Rodent disturbance

Unexcavated

Study Unit 8

Study Unit 6

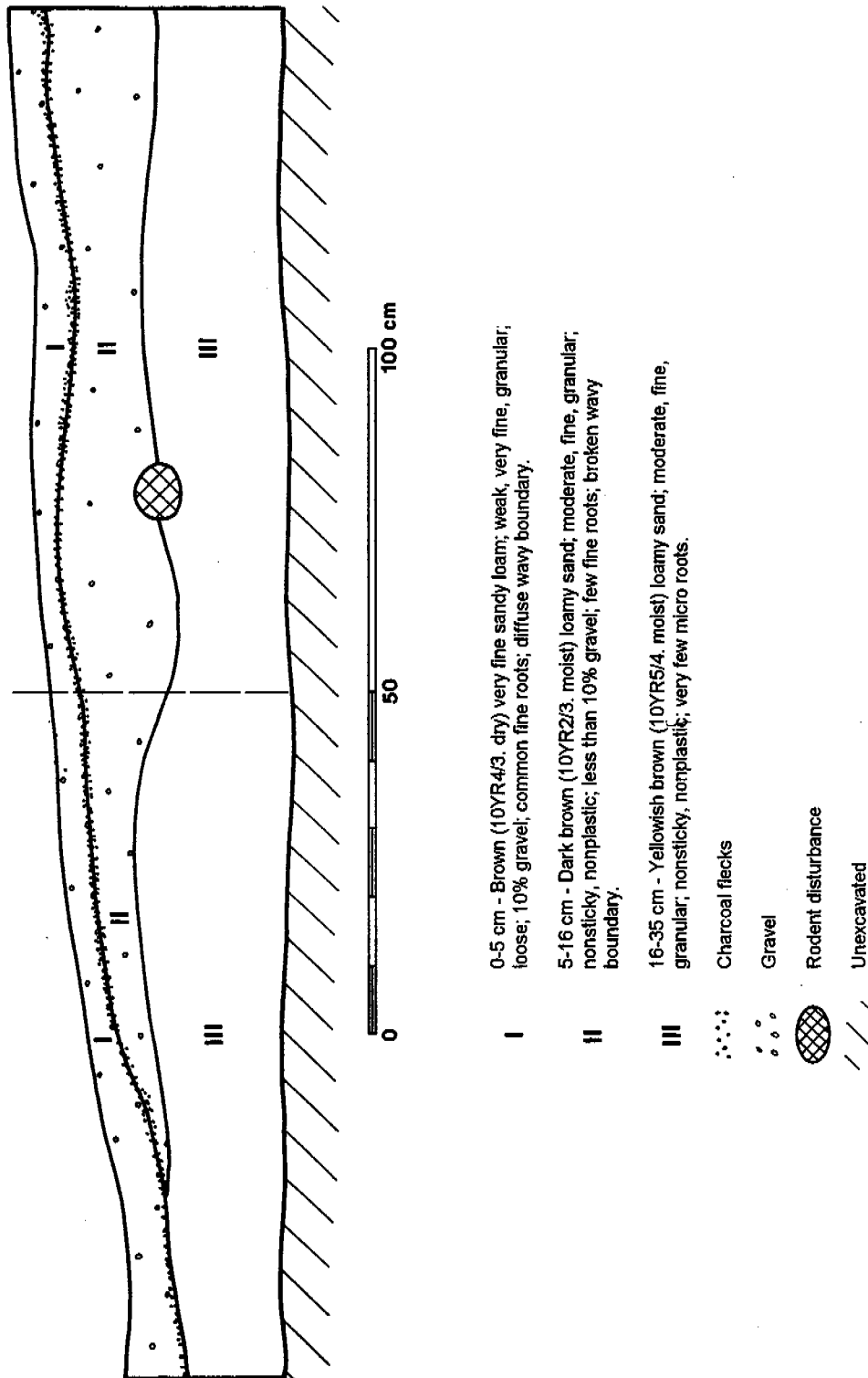


Figure 15.8. Site LA 26308 Study Units 6 and 8, North-facing Profile.

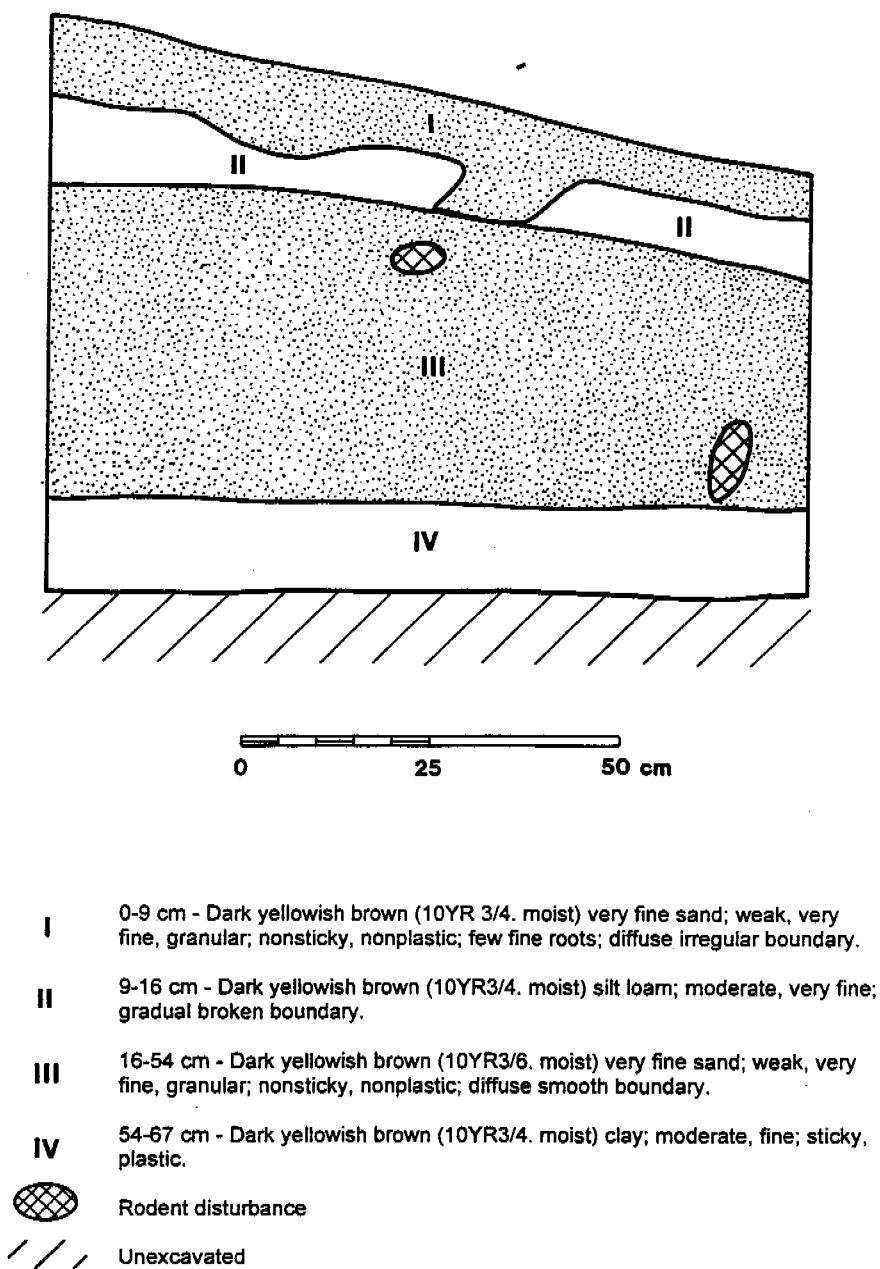


Figure 15.9. Site LA 26308 Study Unit 7, East-facing Profile.

Excavation revealed a small circular stain (Feature 2) at the northwest corner of SU 8. Excavation of SU 8 determined that Strata I and II were cultural deposits extending into the western right-of-way of State Highway 602.

Mechanical Excavation

Mechanical excavation of four trenches was conducted in order to determine whether additional buried cultural deposits or features were present on site LA 26308. The artifact distributions defined during the controlled surface collection, information recovered from hand-excavated units, and the possibility of buried deposits at the eastern boundary of the site were used as guides for the placement of the backhoe trenches.

The trenches were designated SU 9 through 12 (Figure 15.2), and ranged from 9.60 to 12.20 m in length. The trenches were typically 0.70 m wide and a maximum of 1.24 m deep. A total of 42.20 m of backhoe trenching was completed on the site and one 1-m-wide representative profile was drawn for each trench. A total of 4 m of trench profiles were drawn. A Munsell soil chart was used to identify soil color within each stratum of the trench.

Study Unit 9. SU 9 was located within the site boundaries and west of the existing State Highway 602, began at grid coordinates N96.00, E120.60 and extended northward 12.20 m to N106.00, E113.40 (Figure 15.2). The trench was placed in an area of very light artifact scatter and moderate ground disturbance by road construction. The maximum depth at the middle of the trench was 1.07 m.

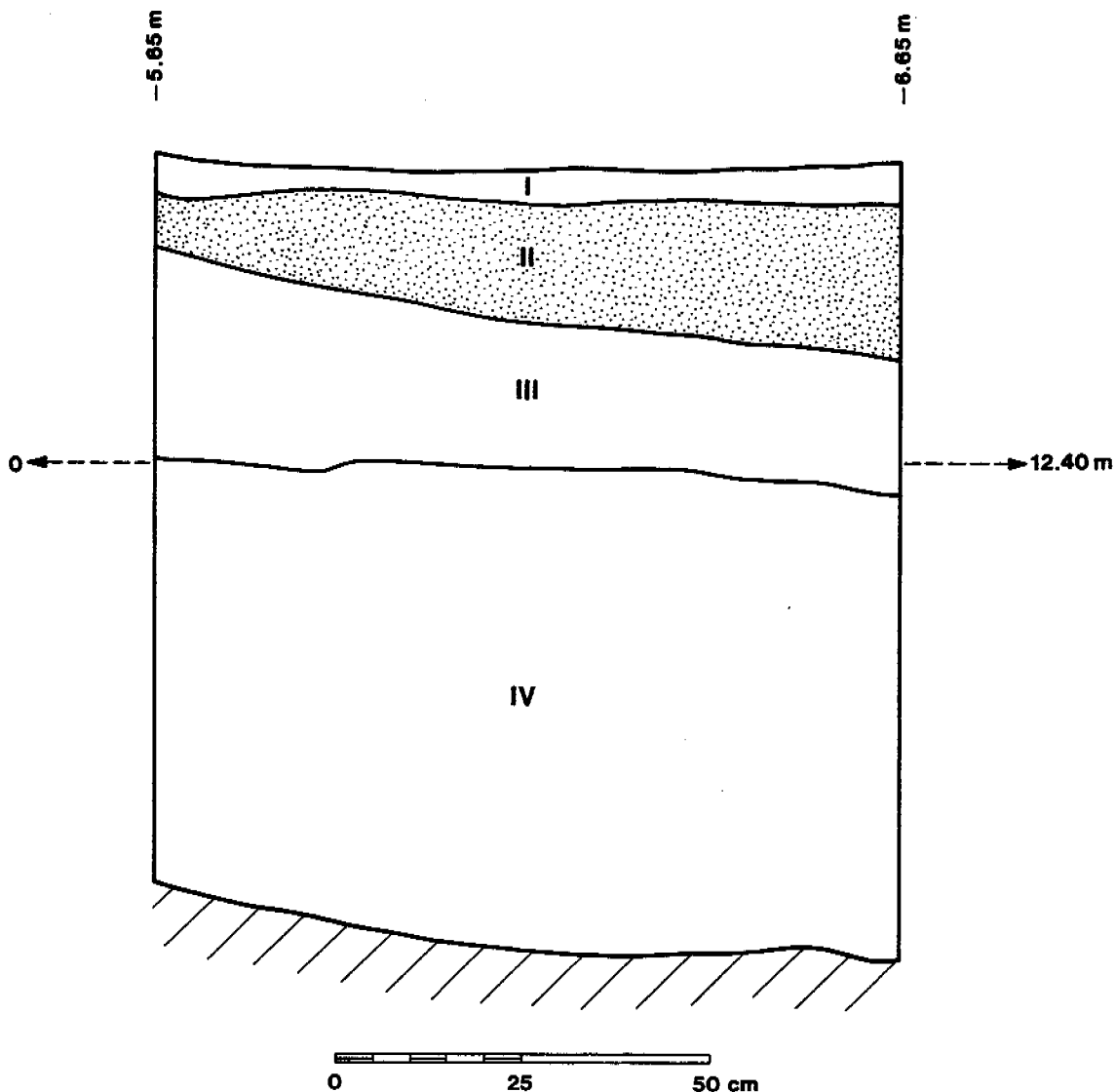
One 1-m-long profile was drawn of SU 9 (Figure 15.10). This profile was located along the east-facing wall near the middle of the trench. Four strata were identified within the trench. Stratum I consisted of recent aeolian deposits. Strata II and III consisted of dark yellowish brown and dark brown soils, respectively, that are both typical of culturally stained deposits. Stratum IV consisted of yellowish brown sterile matrix. No cultural

materials or features were identified within SU 9. Excavation of SU 9 revealed that the cultural Strata II and III extended into the western right-of-way of the existing State Highway 602 and that these strata extended at least 30 cm below the surface of the site.

Study Unit 10. SU 10 was located within the site boundaries and west of the existing State Highway 602, began at grid coordinates N113.84, E104.26 and extended eastward 9.60 m to N117.33, E112.81 (Figure 15.2). This trench was established in an area of light artifact scatter and moderate ground disturbance by road construction. The maximum depth at the middle of the trench was 1.24 m.

One 1-m-long representative profile of the north-facing trench wall was drawn of SU 10 (Figure 15.11). This profile was located at the middle of the trench. Five strata were identified within the trench. Stratum I consisted of very fine sandy loam aeolian deposits. No artifacts or features were observed within this stratum. Stratum II consisted of dark brown sandy clay loam and appeared typical of culturally stained soils. No artifacts or features were identified within this stratum. Stratum III consisted of dark yellowish brown soil, appearing typical of culturally stained soils. No cultural materials or features were observed within this stratum. Stratum IV consisted of dark brown loamy sand deposits with inclusions of very small charcoal flecks. No cultural materials or features were observed within this stratum. Stratum V consisted of yellowish brown sterile matrix. Excavation of SU 10 defined the cultural strata within the western right-of-way of State Highway 602 and established that these strata extended at least 41 cm below the surface.

Study Unit 11. SU 11, located within the site boundaries and west of the existing State Highway 602, began at coordinates N117.76, E107.74 and extended northward 10.40 m to N126.77, E102.39 (Figure 15.2). This trench was established in an area of very light artifact density and moderate ground disturbance by road construction and erosion. The maximum depth at the middle of the trench was 1.00 m.

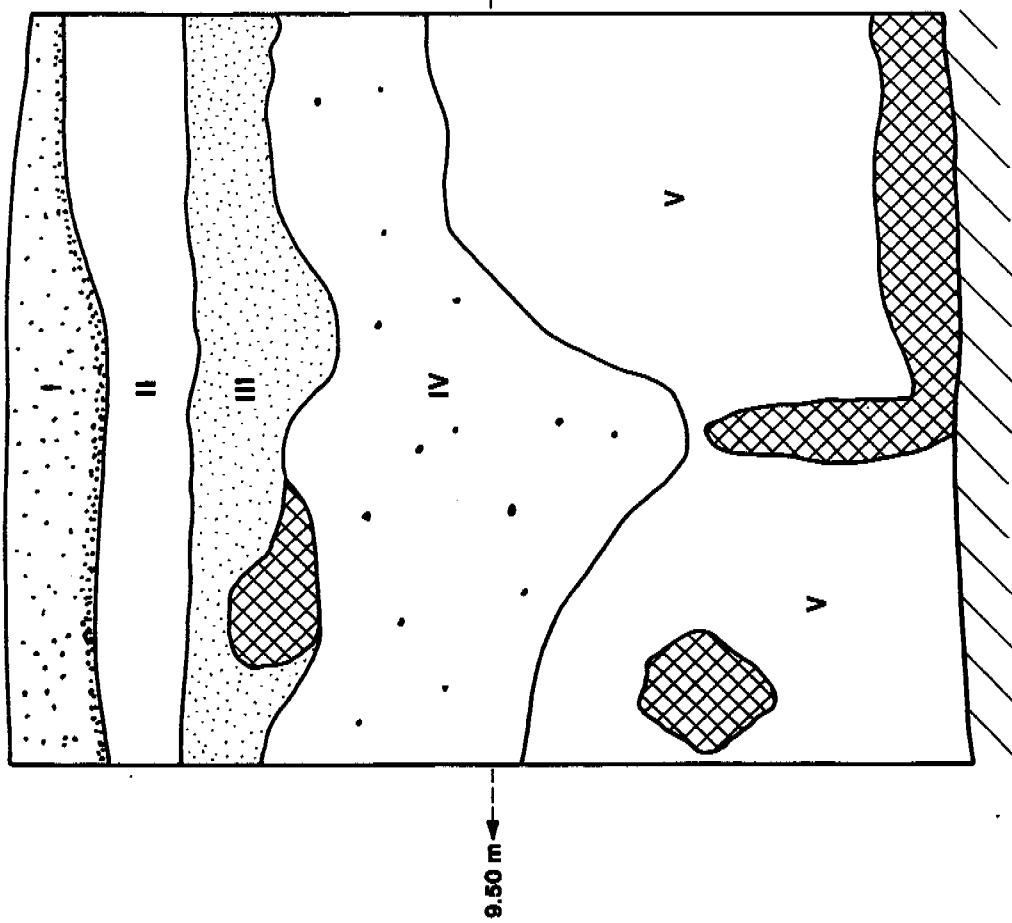


- I 0-5 cm - Brown (10YR4/3. dry) very fine sandy loam; moderate, very fine granular; nonsticky, nonplastic; less than 10% gravel; few fine roots; clear smooth boundary.
 - II 5-21 cm - Dark yellowish brown (10YR3/4. moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; few very fine roots; diffuse smooth boundary.
 - III 21-41 cm - Dark brown (10YR3/3. moist) sandy clay loamy; moderate, fine, granular; slightly sticky, slightly plastic; very few roots; abrupt smooth boundary.
 - IV 41-107 cm - Yellowish brown (10YR5/4. moist) sandy loam; weak, very fine, granular; nonsticky, nonplastic; very few very fine roots.
- /// Unexcavated

Figure 15.10. Site LA 26308 Study Unit 9, East-facing Profile.

5.08 m

9.08 m



- I - 0-13 cm - Brown (10YR4/3, dry) very fine sandy loam; weak, very fine; nonsticky, nonplastic; less than 10% gravel; few fine roots; diffuse smooth boundary.
- II - 13-24 cm - Dark brown (10YR3/3, moist) sandy clay loam; moderate, columnar; slightly sticky, slightly plastic; very few micro roots; diffuse smooth boundary.
- III - 24-41 cm - Dark yellowish brown (10YR3/4, moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; diffuse wavy boundary.
- IV - 41-67 cm - Dark brown (10YR2/3, moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; few very fine roots; diffuse irregular boundary.
- V - 67-124 cm - Yellowish brown (10YR5/4, moist) sandy loam; weak, very fine, granular; nonsticky, nonplastic; very few micro roots.

- Charcoal flecks
- Rodent disturbance
- Unexcavated



Figure 15.11. Site LA 26308 Study Unit 10, North-facing Profile.

One 1-m-long representative profile located at the middle of the east-facing trench wall was drawn for SU 11 (Figure 15.12). Three strata were identified within the trench. Stratum I consisted of sandy loam aeolian deposits with no evidence of cultural material or features. Stratum II consisted of cultural deposits with no evidence of features. Stratum III had no evidence of cultural deposits or features. The stratum is believed to be an organic stratum that predates the site. Excavation of SU 11 revealed that the cultural stratum is at least 36 cm below the surface of the site and extends into the western right-of-way of the existing State Highway 602.

Study Unit 12. SU 12, located within the sites boundaries and west of the existing State Highway 602, began at grid coordinates N131.29, E95.26 and extended eastward 10.00 m to N135.90, E104.60 (Figure 15.2). This trench was established near an area of high artifact density and in an area of severe ground disturbance by road construction and maintenance. The maximum depth at the middle of the trench was 1.20 m.

One 1-m-long representative profile located along the north-facing trench wall near the middle was drawn of SU 12 (Figure 15.13). Four strata were identified within the trench. Stratum I consisted of loose aeolian deposits with no evidence of cultural deposits or features. Strata II and III had no evidence of cultural deposits or features, but both had evidence of rodent disturbance. Stratum IV consisted of sterile matrix with inclusions of gravel and was believed to be an alluvial deposit that predates the site. This stratum had evidence of rodent activity.

Mechanical Stripping

Mechanical stripping was conducted in order to investigate the possibility of buried features within the site boundaries and within the western right-of-way of State Highway 602. A total of 688 sq m was stripped to an approximate depth of 50 cm using a front end loader. A total of nine features were identified.

Feature Descriptions

Feature 1

Feature 1 was located within SU 6 on the west side of State Highway 602 on the southeast portion of the site. The center point grid coordinates for Feature 1 are N129.24, E101.87 (Figure 15.2). Feature 1 was an ovoid basin-shaped pit. Feature 1 measured 32 cm northeast-to-southwest by 20 cm northwest-to-southeast and was 20 cm deep (Figure 15.14).

The northwest half of Feature 1 was excavated in one 13-cm level to the base of the feature. The northwest-facing profile was drawn for Feature 1 (Figure 15.15). One stratum was identified within the feature fill. Stratum I consisted of sandy loam deposits with light inclusions of small charcoal flecks and rock. No artifacts were associated with the feature. Sediments from the southeast half were collected for waterscreen and pollen samples. Evidence of rodent and root disturbance was documented during the excavation.

Information recovered from the excavation determined that the deposits were severely disturbed by rodents and roots, making it difficult to clearly define the function of Feature 1. The feature was, therefore, defined as an indeterminate pit.

Feature 2

Feature 2 was located within SU 8 and 1.20 m northeast of Feature 1 on the west side of State Highway 602. The center point grid coordinates for Feature 2 are N129.87, E102.69 (Figure 15.2). Feature 2 was an ovoid basin-shaped pit that measured 39 cm east-to-west by 31 cm north-to-south and 13 cm deep (Figure 15.16).

The west half of Feature 2 was excavated in one 13-cm level to the base of the feature. The west-facing profile was drawn for Feature 2 (Figure 15.17). Two strata were identified within the feature fill. Stratum I consisted of loamy sand deposits with light inclusions of charcoal flecks

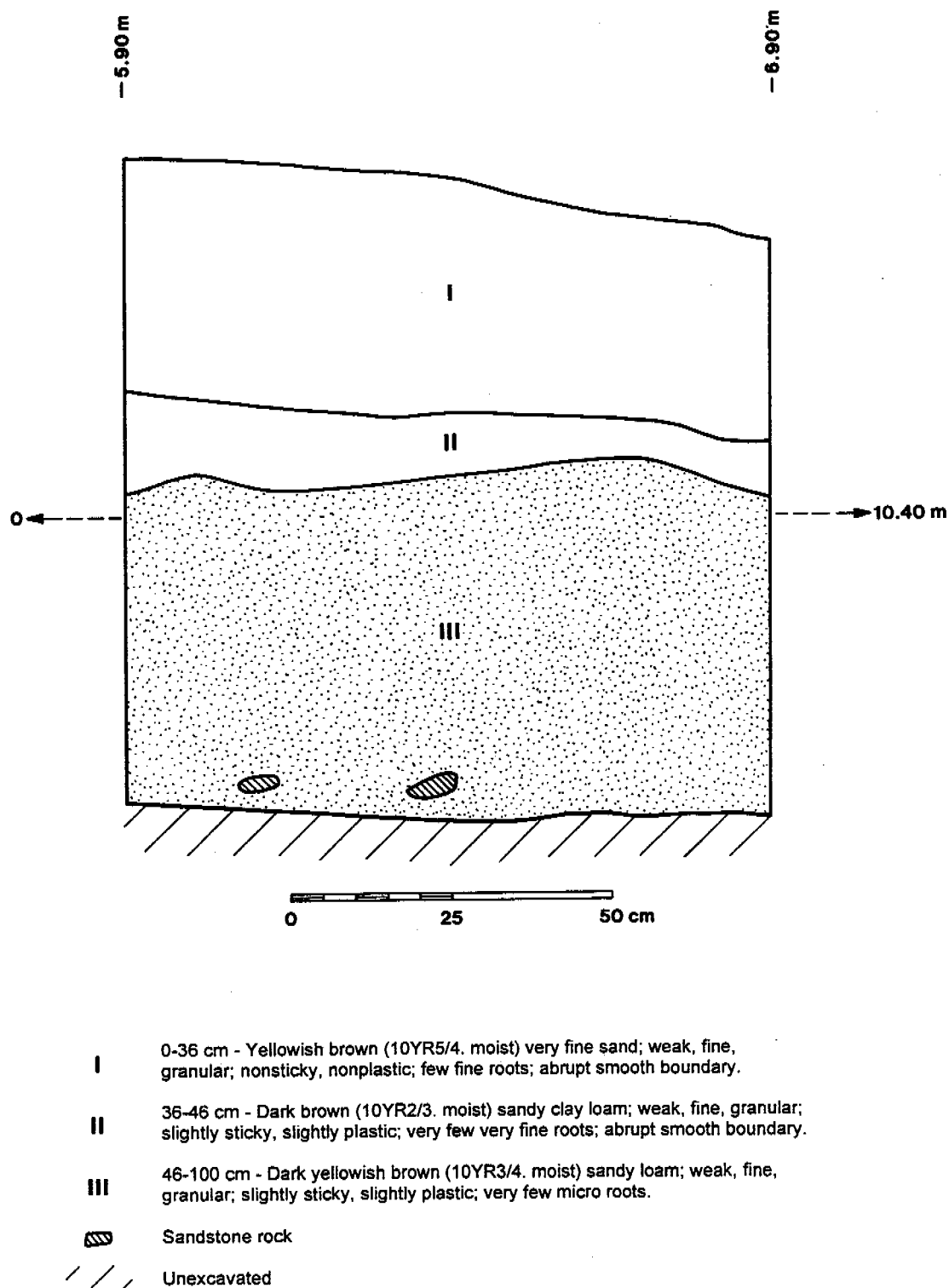
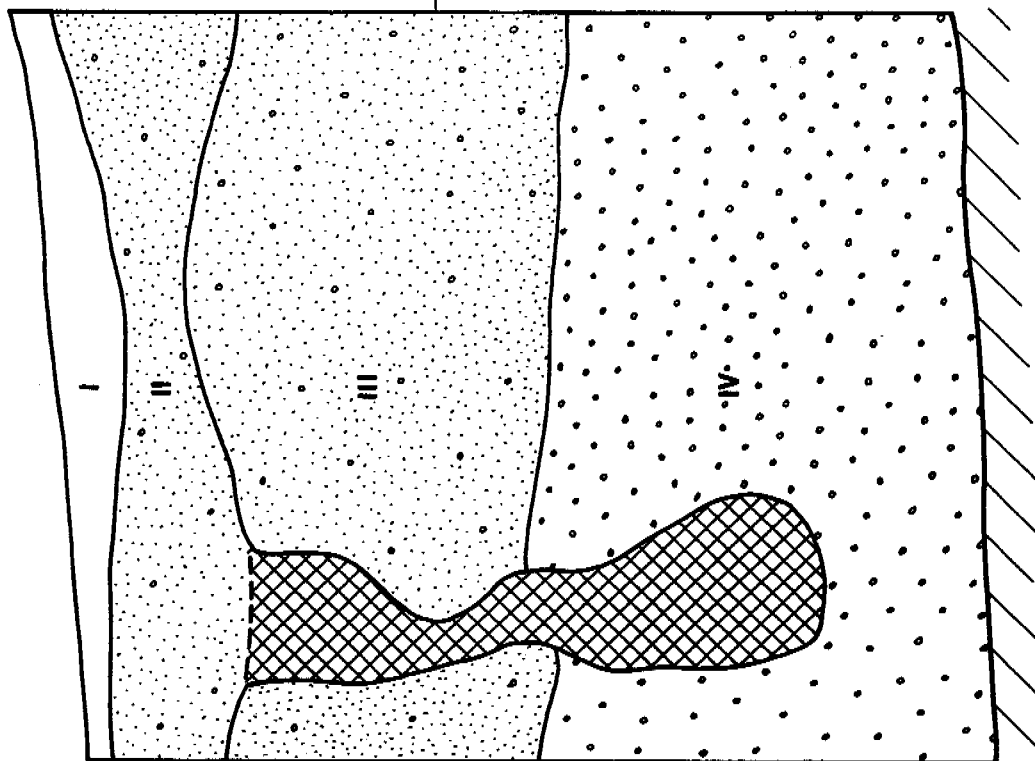


Figure 15.12. Site LA 26308 Study Unit 11, East-facing Profile.

-4.25 m

-5.25 m

10.00 m



I

II

III

IV

0

Gravel

Rodent disturbance

Unexcavated

0-8 cm - Very dark brown (10YR3/2, moist) sandy loam; weak, very fine, granular; nonsticky, nonplastic; common fine roots; diffuse smooth boundary.

8-19 cm - dark yellowish brown (10YR3/4, moist) sandy clay loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; few fine roots; diffuse smooth wavy boundary.

19-64 cm - dark yellowish brown (10YR4/4, moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; 10% gravel; very few very fine roots; diffuse wavy boundary.

64-120 cm - yellowish brown (10YR5/4, moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; 30% gravel; very few micro roots.



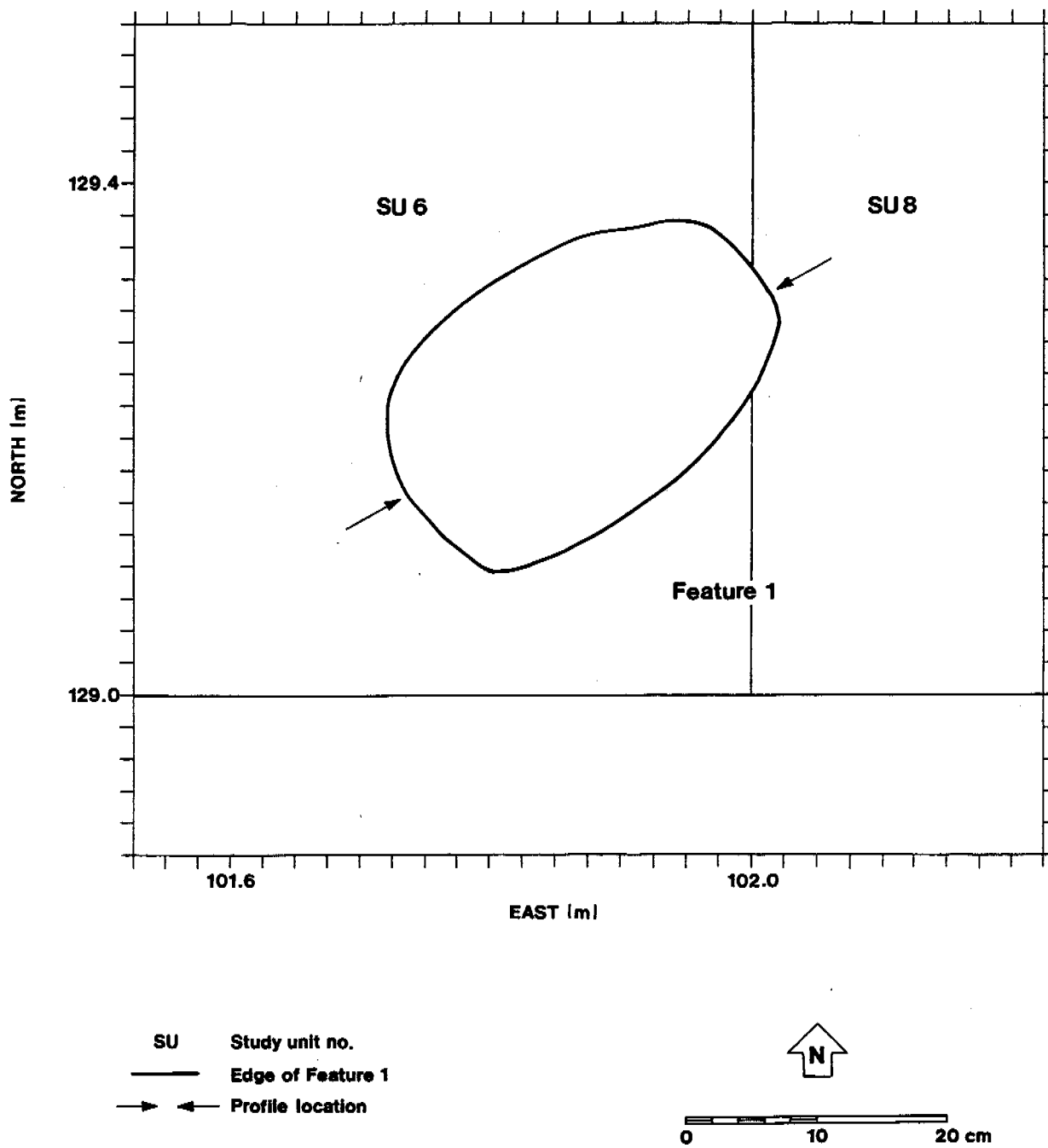
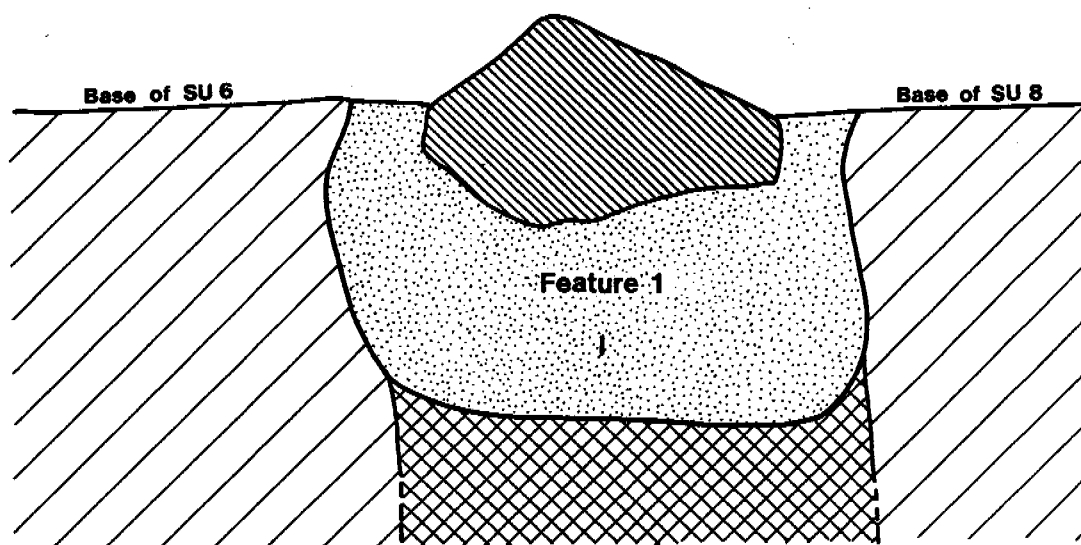


Figure 15.14. Site LA 26308 Feature 1, Plan View.



0 25 50 cm




- I 0-20 cm - Yellowish brown (10YR4/4. moist) sandy loam; weak, very fine, granular; nonsticky, nonplastic; few very fine roots; abrupt smooth boundary.
-  Sandstone rock
-  Rodent disturbance
-  Unexcavated

Figure 15.15. Site LA 26308 Feature 1, Northwest-facing Profile.

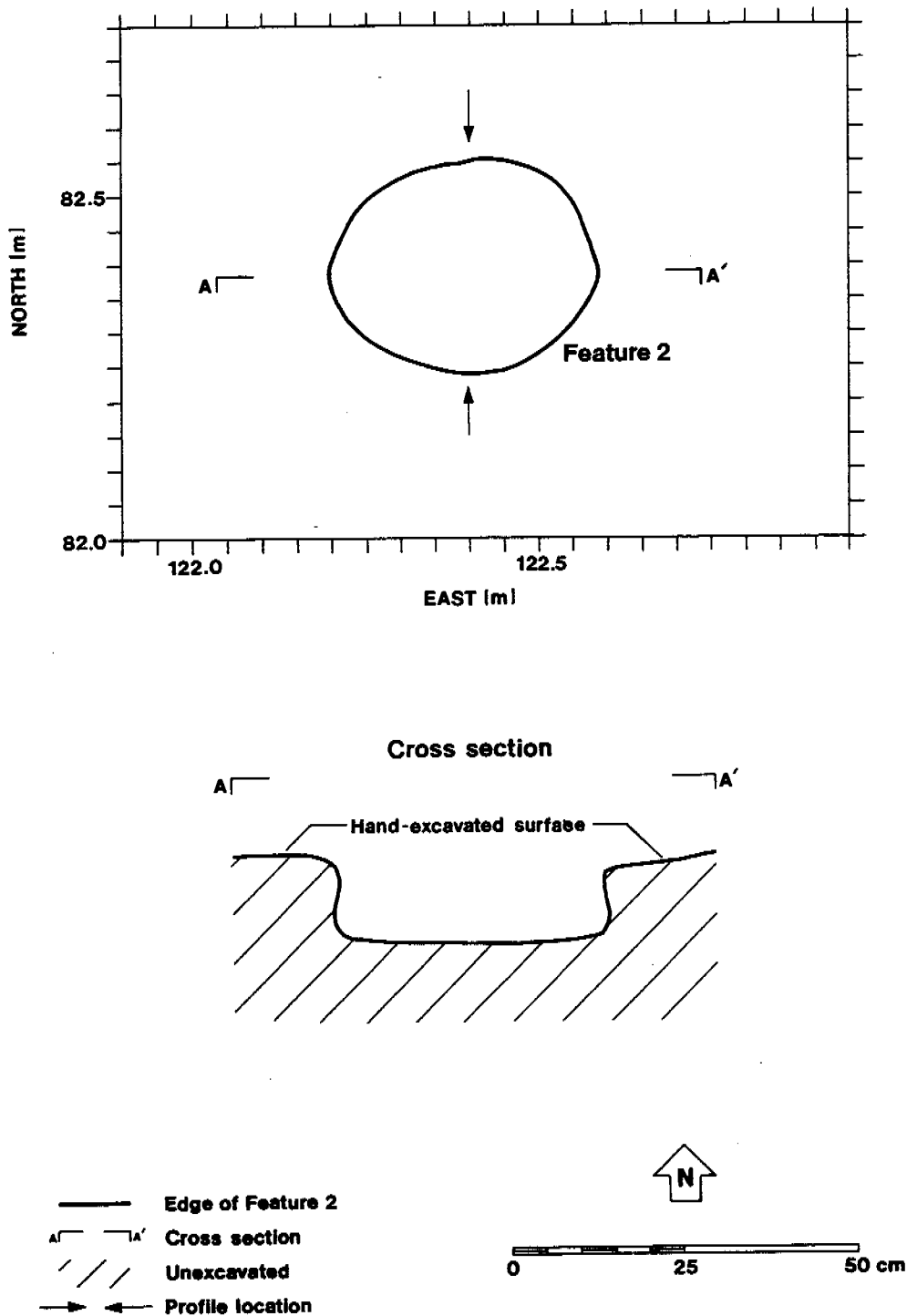
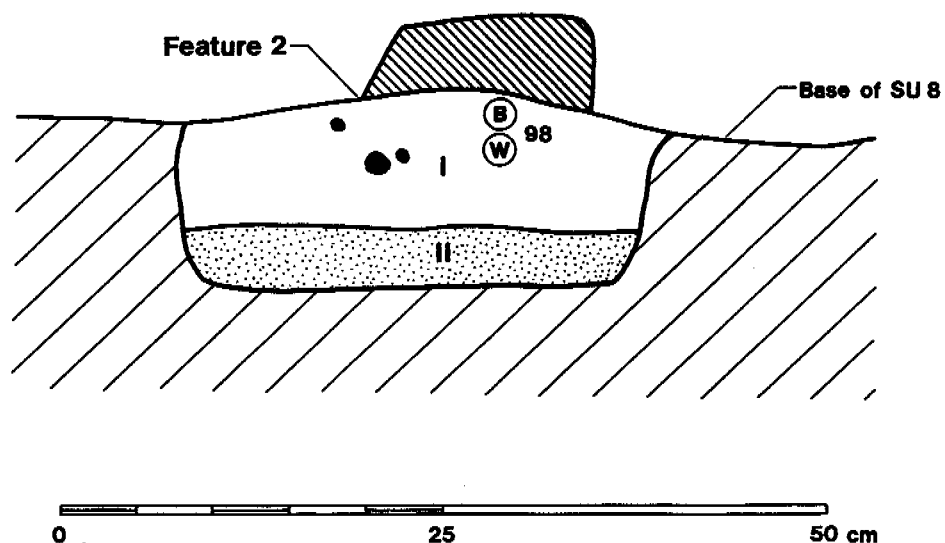


Figure 15.16. Site LA 26308 Feature 2, Plan View and Cross Section.








- I 0-9 cm - Brown (10YR4/4. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; few very fine roots; abrupt smooth boundary.
- II 9-13 cm - Dark yellowish (10YR4/3. moist) sandy loam; weak very fine, granular; nonsticky, nonplastic; few very fine roots; very abrupt smooth boundary.
-  Sandstone rock
-  Charcoal
-  Flotation sample
-  Waterscreen sample
- 98** Field specimen no.
-  Unexcavated

Figure 15.17. Site LA 26308 Feature 2, West-facing Profile.

and a rock was embedded on the surface of the feature. Stratum II consisted of sterile sandy loam deposits. Sediments from the east half excavation were collected for flotation and waterscreen samples. No artifacts were recovered from Feature 2 excavations. The fill within the feature had severe disturbance by rodent burrowing and roots.

Information recovered from the excavations of Feature 2 determined that the deposits within the feature were severely disturbed by rodents and roots, making it difficult to clearly define the function of the feature. The feature was, therefore, defined as an indeterminate pit.

Feature 3

Feature 3 was located in the southeast portion of the site and on the west side of State Highway 602. The center point grid coordinates for Feature 3 are N82.40, E122.40 (Figure 15.2). Feature 3 was an ovoid cylindrical pit that measured 80 cm northeast-to-southwest by 50 cm northwest-to-southeast (Figure 15.18) and 92 cm deep.

The east half of Feature 3 was excavated in one 92-cm level. The east-facing profile was drawn for Feature 3 (Figure 15.19). One stratum was identified within the feature fill. Stratum I consisted of fine sand with light inclusions of small charcoal flecks. No artifacts were recovered from the excavation of the east half. Evidence of rodent and insect burrowing was documented during the excavation. It was determined that Feature 3 was a rodent burrow and excavation was terminated.

Feature 4

Feature 4 was located 8.2 m northwest of Feature 3 on the west side of the State Highway 602. The center point coordinates for Feature 4 are N89.65, E117.82 (Figure 15.2). Feature 4 was a circular cylindrical earthen pit measuring 30 cm east-to-west by 29 cm north-to-south and 30 cm deep (Figure 15.20).

The east half of Feature 4 was excavated in one 56-cm level. The east-facing profile was drawn

for Feature 4 (Figure 15.21). Two strata were identified within the feature fill. Stratum I consisted of loamy sand deposits with light inclusions of small charcoal flecks. Stratum II consisted of loamy sand with very light inclusions of small charcoal flecks. No artifacts were recovered from the excavation of the east half of Feature 4. Flotation, pollen, and waterscreen samples were collected from the sediments of the west half of the Feature 4, but no artifacts were found. High maize pollen values were recovered from the pollen sample, and suggest the pit was used for storage.

Feature 5

Feature 5 was located 10 m northeast of Feature 4 on the west side of the highway. The center point grid coordinates for Feature 5 are N99.31, E114.31 (Figure 11.2). Feature 5 was an ovoid earthen pit measuring 40 cm north-to-south by 37 cm east-to-west (Figure 15.22).

The east half of Feature 5 was excavated in one 65-cm level. The east-facing profile was drawn of Feature 5 (Figure 15.23). One stratum was identified within the feature fill and consisted of loamy sand with light inclusions of small charcoal flecks. No artifacts were recovered from the excavation of the east half of Feature 5. It was determined that Feature 5 was a rodent burrow and excavation was terminated.

Feature 6

Feature 6 was located 4 m north of Feature 5 on the west side of the highway. The center point grid coordinates for Feature 6 are N103.12, E114.40 (Figure 15.2). Feature 6 was a small irregular-shaped earthen pit measuring 16 cm north-to-south by 26 cm northeast-to-southwest (Figure 15.24).

The east half of Feature 6 was excavated in one 27-cm level. The east-facing profile was drawn of Feature 6 (Figure 15.25). One stratum was identified within the feature fill. Stratum I consisted of sandy loam deposits with very light inclusions of small charcoal flecks. No artifacts

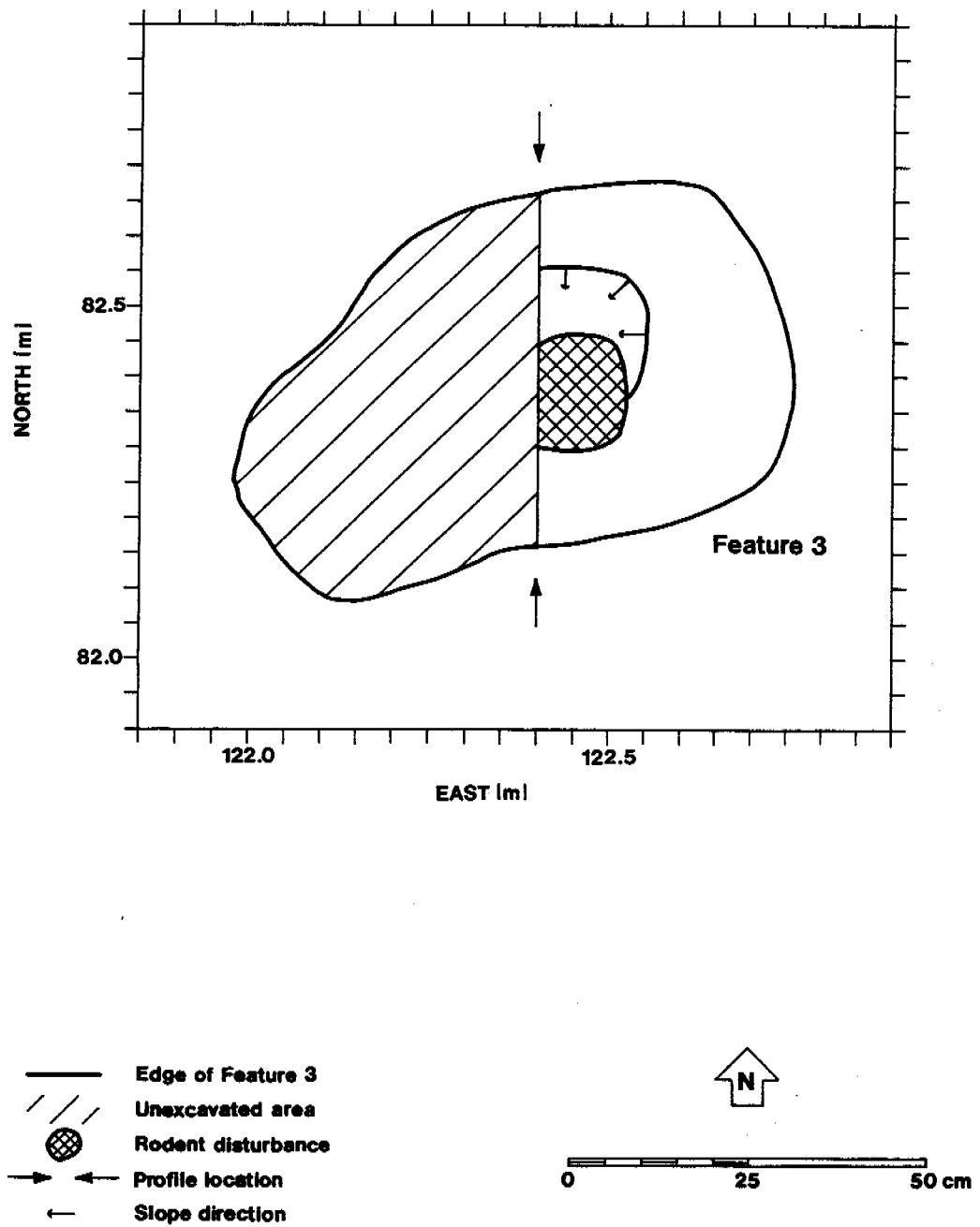


Figure 15.18. Site LA 26308 Feature 3, Plan View.

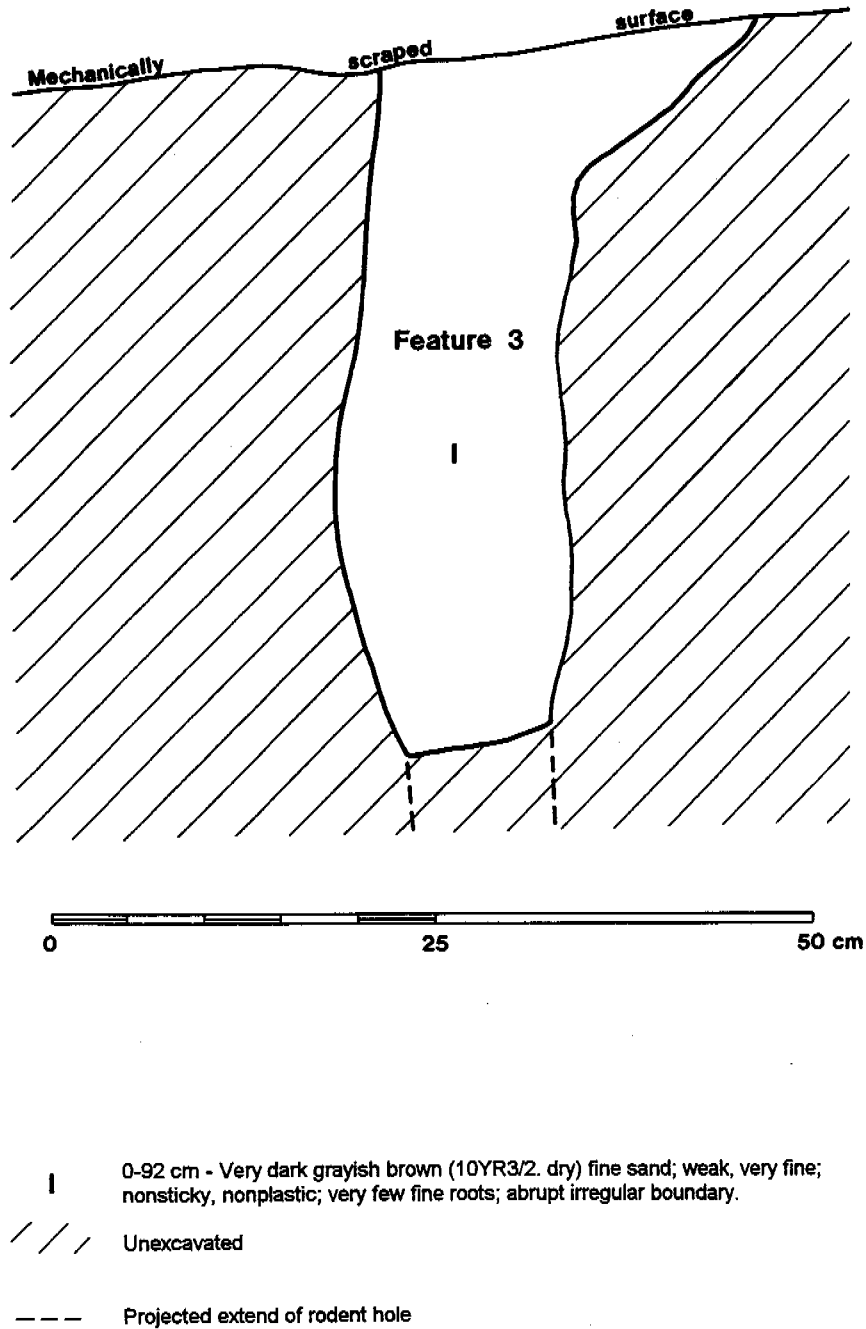


Figure 15.19. Site LA 26308 Feature 3, East-facing Profile.

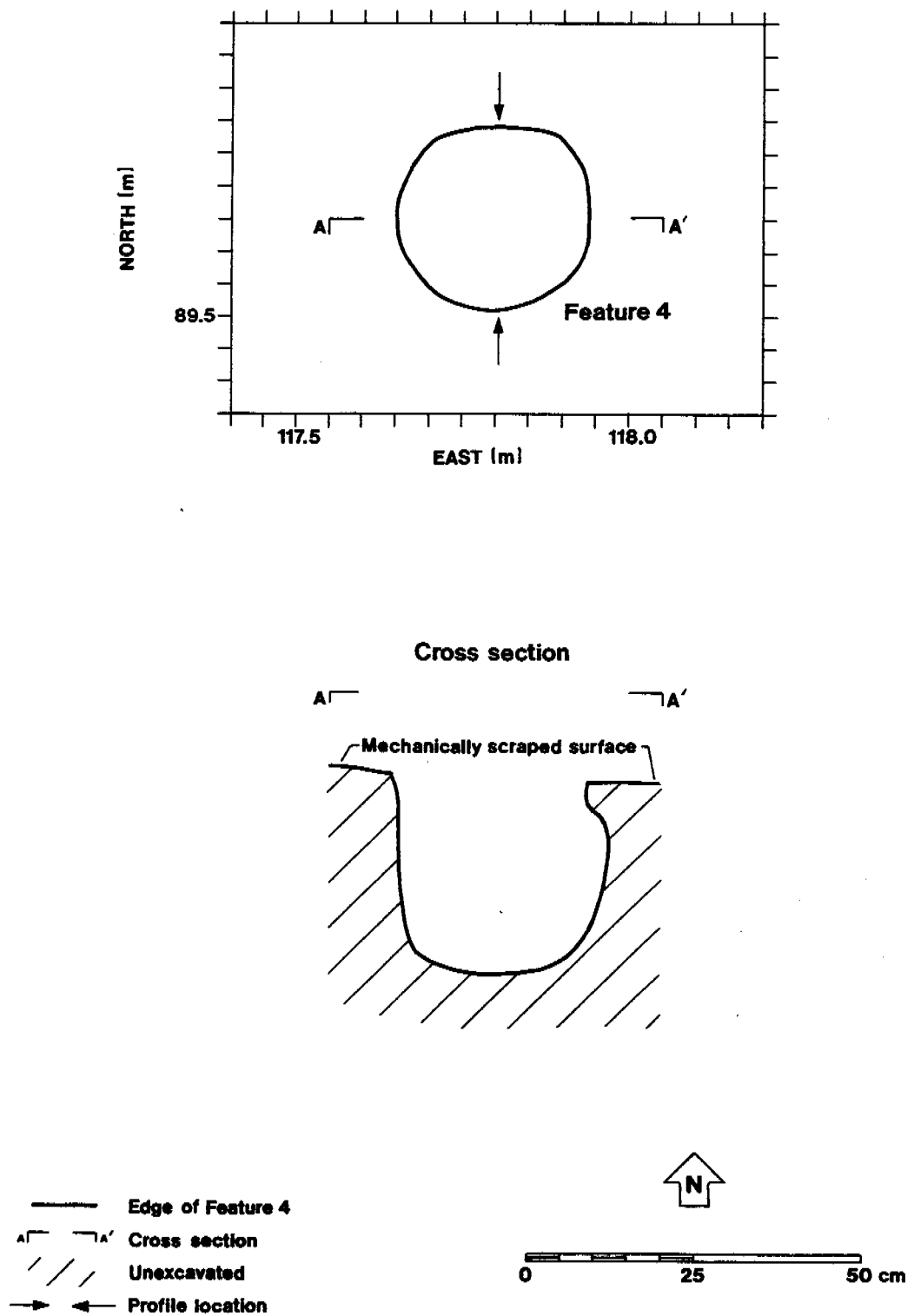


Figure 15.20. Site LA 26308 Feature 4, Plan View and Cross Section.

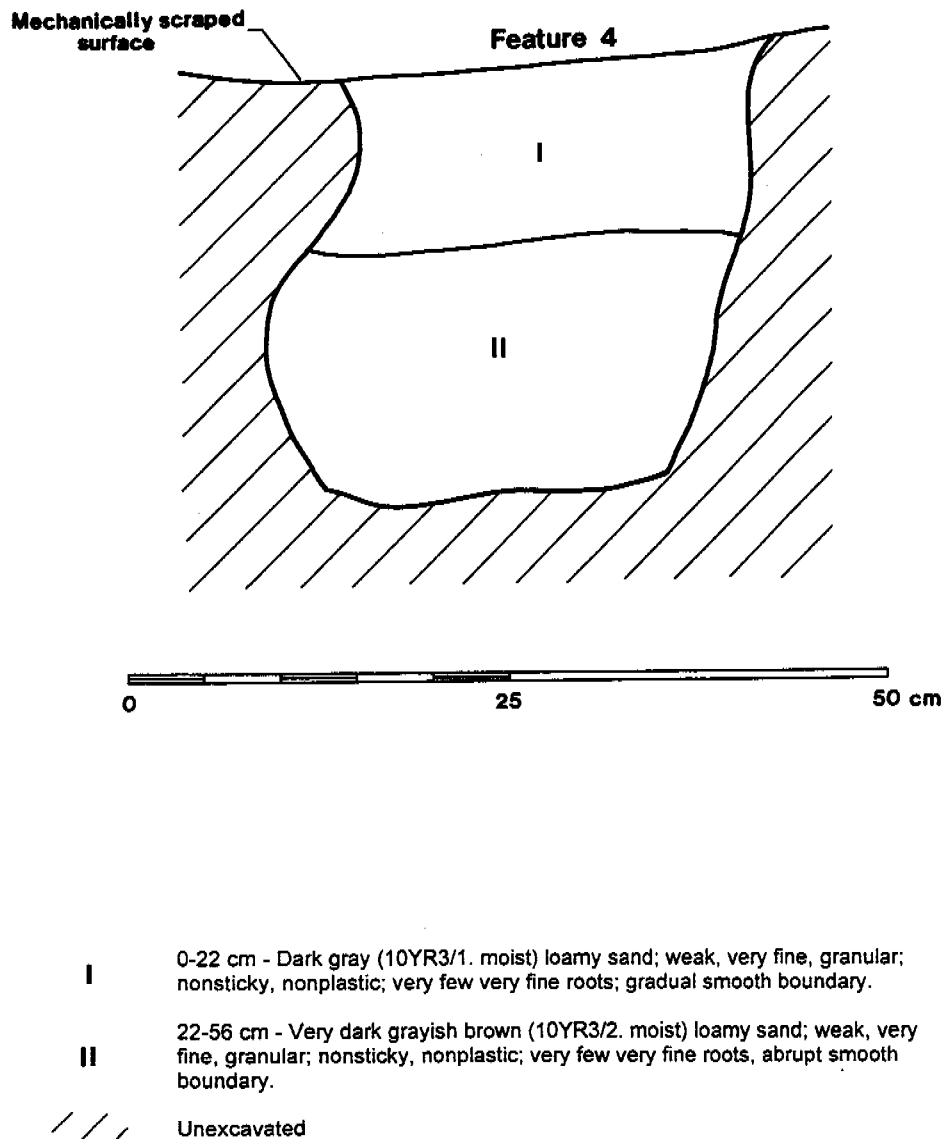


Figure 15.21. Site LA 26308 Feature 4, East-facing Profile.

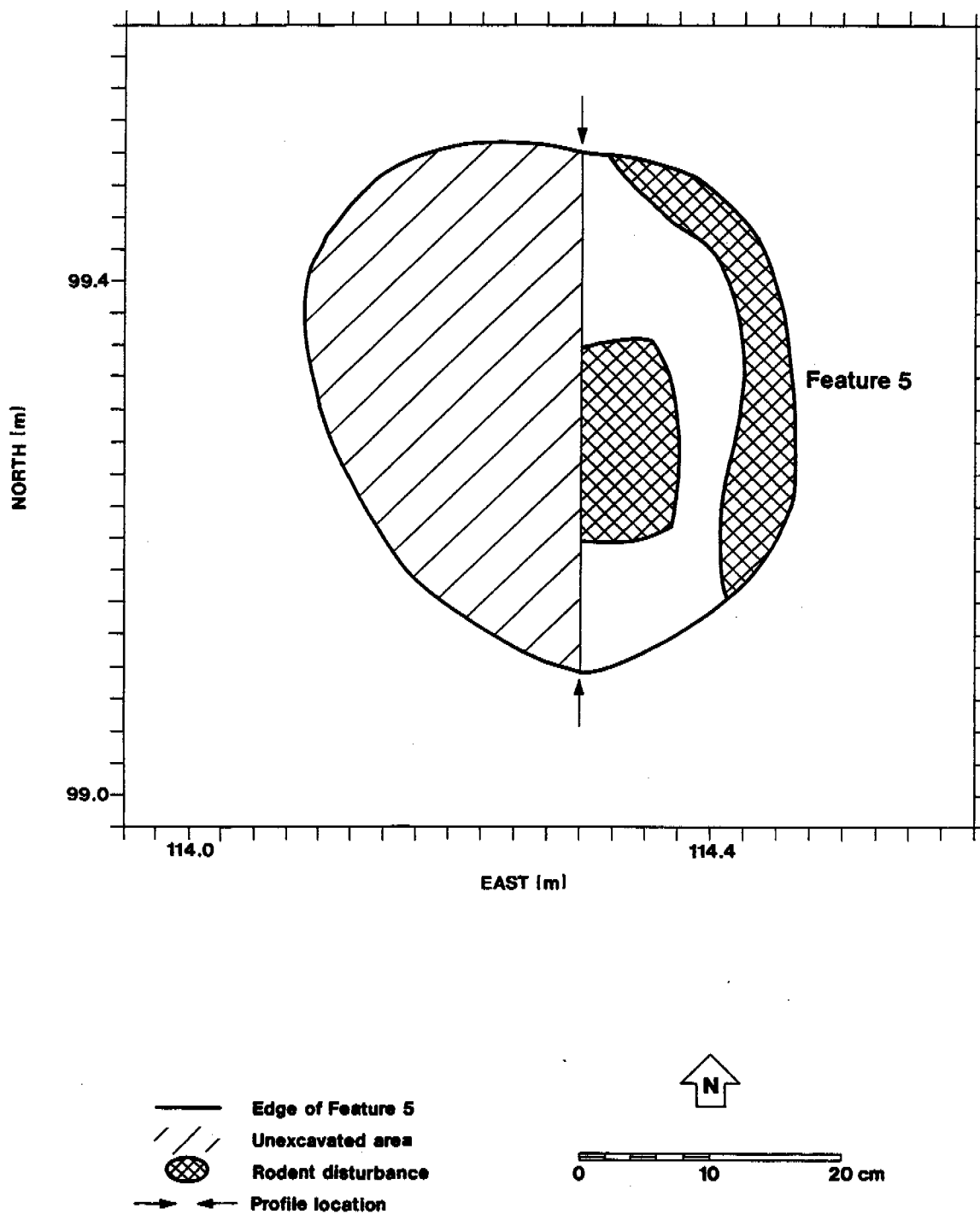
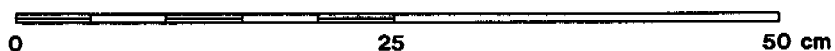
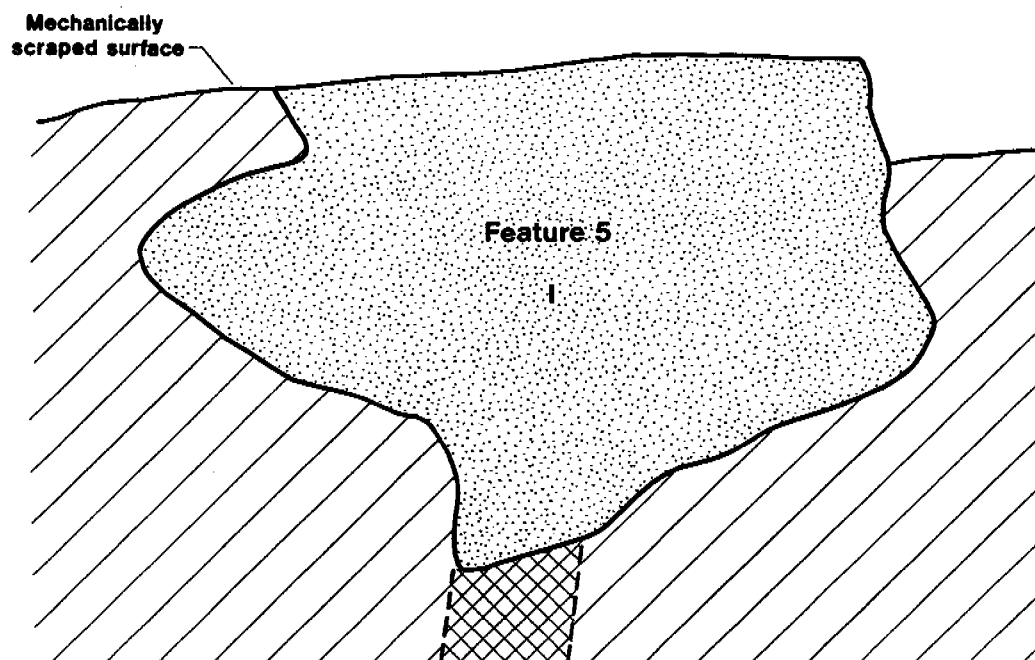


Figure 15.22. Site LA 26308 Feature 5, Plan View.





- I 0-65 cm - Dark yellowish (10YR4/4, moist) loamy sand; weak, very fine granular; nonsticky, nonplastic; very few very fine roots; abrupt smooth boundary.
-  Rodent disturbance
-  Unexcavated

Figure 15.23. Site LA 26308 Feature 5, East-facing Profile.

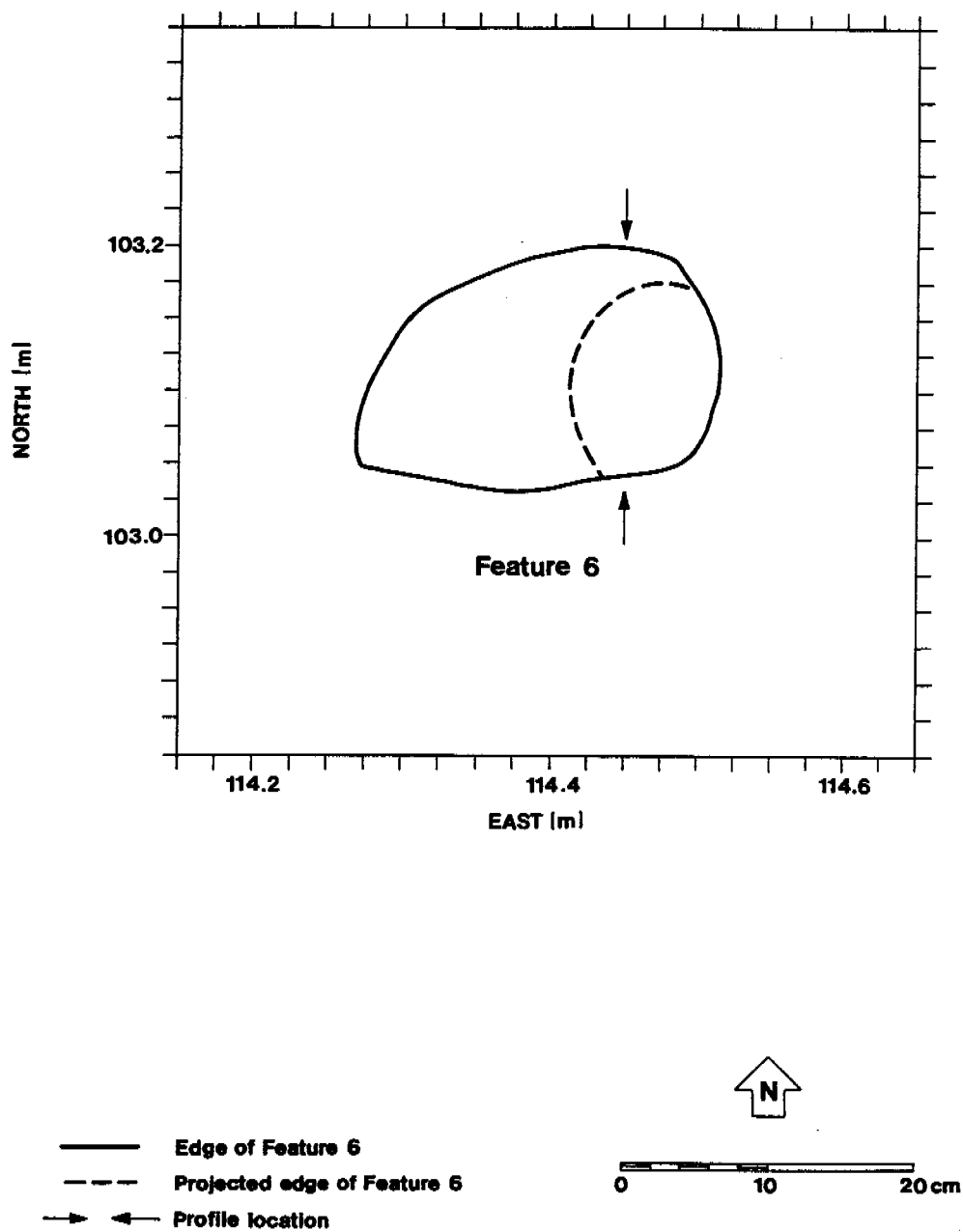


Figure 15.24. Site LA 26308 Feature 6, Plan View.

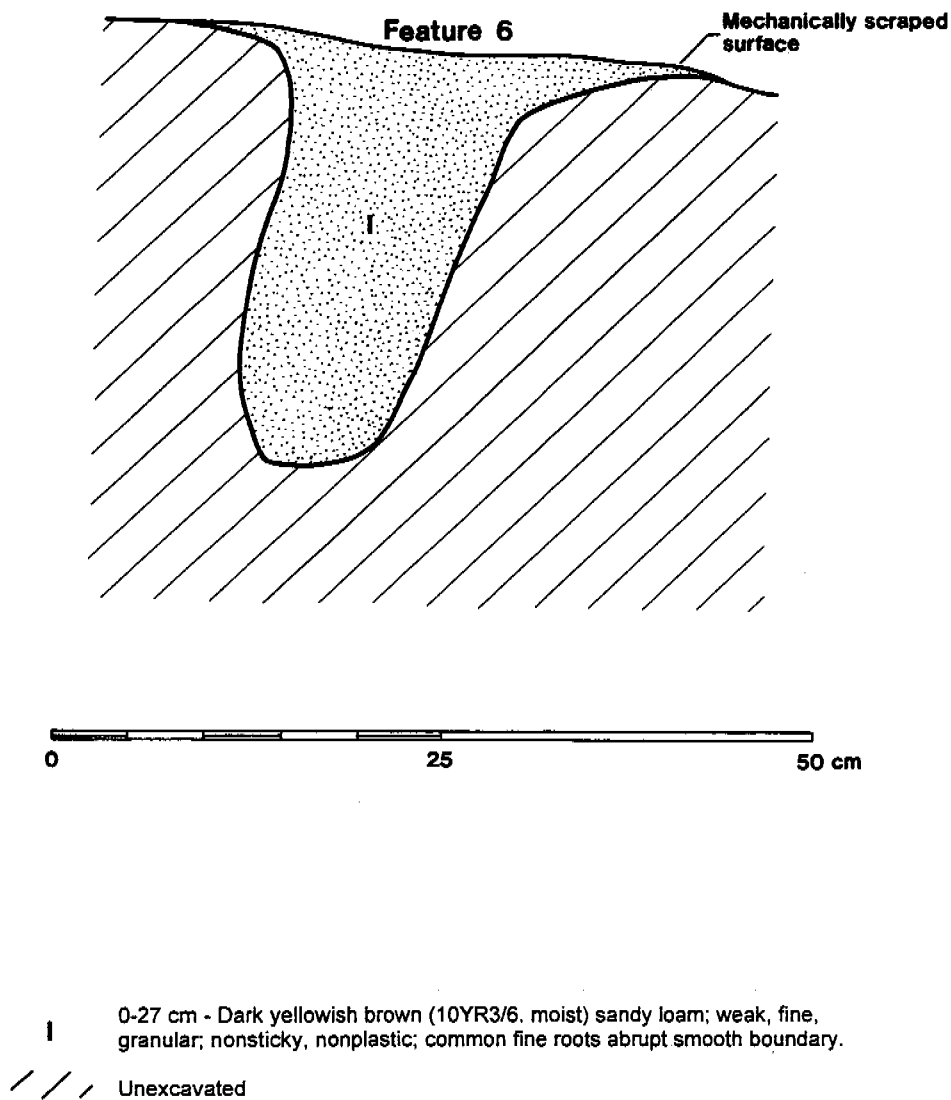


Figure 15.25. Site LA 26308 Feature 6, East-facing Profile.

were recovered from the east half. Excavation of the west half also yielded no artifacts, and it was determined that Feature 6 was a rodent burrow.

Feature 7

Feature 7 was located 7 m northwest of Feature 6 on the west side of the highway. The center point grid coordinates for Feature 7 are N108.40, E108.48 (Figure 15.2). Feature 7 was a nearly circular and basin-shaped earthen hearth measuring 80 cm north-to-south by 83 cm east-to-west and 15 cm deep (Figure 15.26).

The east half of Feature 7 was excavated in two levels. Level 1 was 10 cm deep and Level 2 was 5 cm deep. The east-facing profile was drawn for Feature 7 (Figure 15.27). One stratum was identified within the feature fill. Stratum I consisted of sandy loam deposits with inclusions of charcoal. Flaked stone artifacts were recovered from Level 1; no artifacts were recovered from Level 2. Excavations of the west half yielded no artifacts. Flotation, pollen, and waterscreen samples were collected from the sediments of the west half of Feature 7.

Excavations of Feature 7 revealed that the basin of the hearth was slightly oxidized indicating prolonged use of the hearth. It is most likely that this feature is associated with the late Pueblo II habitation.

Feature 8

Feature 8 was located 6 m northwest of Feature 7 on the west side of the highway and within the site boundaries. The center point grid coordinates for Feature 8 are N114.03, E106.92 (Figure 15.2). Feature 8 was a small irregular basin-shaped hearth measuring 53 cm north-to-south by 48 cm east-to-west and 13 cm deep (Figure 15.28).

The east half of Feature 8 was excavated in one 13-cm level. The east-facing profile was drawn for Feature 8 (Figure 15.29). One stratum was identified within the feature fill. Stratum I consisted of sandy loam deposits with inclusions of charcoal. The west half was excavated and sediments collected for flotation, pollen, and

waterscreen samples. No artifacts were recovered from the excavations of Feature 8. Evidence of root disturbance within the feature fill was documented. No evidence of soil oxidation was observed at the base of the hearth to indicate prolonged use of the hearth.

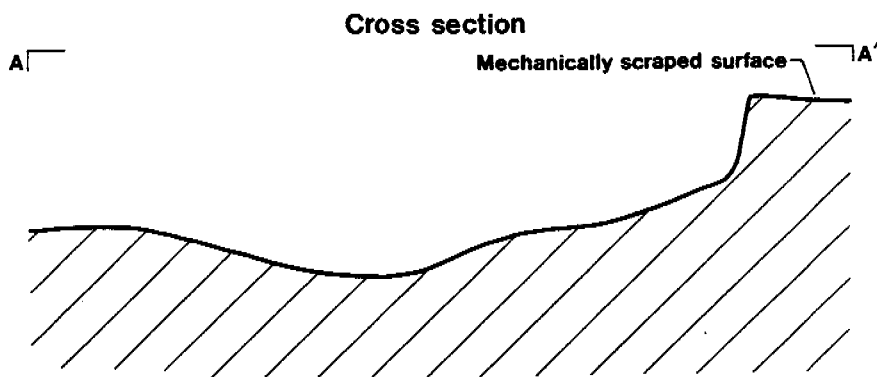
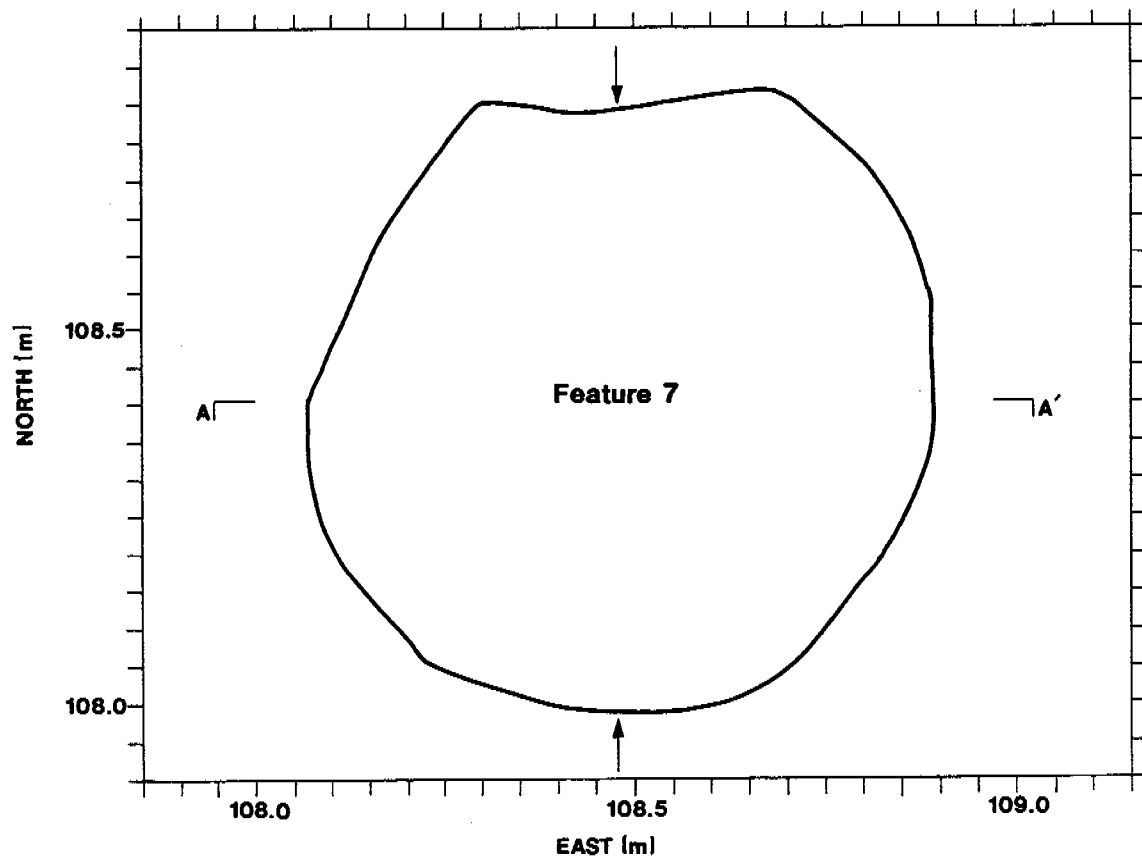
Feature 9

Feature 9 was located 6 m northeast of Feature 8 on the west side of the highway within the site boundaries. The center point grid coordinates for Feature 9 are N119.84, E110.14 (Figure 15.2). Feature 9 was a bell-shaped earthen storage pit measuring 90 cm in diameter at the opening and 133 cm northeast-to-southwest by 110 cm northwest-to-southeast at the bottom of the pit. The maximum depth of Feature 9 was 64 cm (Figure 15.30).

The east half of Feature 9 was excavated in six 10-cm levels. The east-facing profile was drawn for Feature 9 (Figure 15.31). Two strata were identified within the feature fill. Stratum I consisted of loam deposits with light inclusions of charcoal flecks and cultural materials. Levels 1 through 4 were excavated within this stratum. Artifacts recovered consisted of flaked stone in Level 1, none in Level 2, flaked stone and ground stone in Level 3, and flaked stone in Level 4. Stratum II consisted of culturally sterile deposits of fine sand. Levels 5 and 6 were excavated within this stratum. Excavation of the west half of Feature 9 recovered one flaked stone artifact. Flotation, pollen, and waterscreen samples were collected from sediments 10 cm above the base of the storage pit. Maize pollen was recovered from Feature 9, along with grass, beeweed, cholla, and globemallow (described below).

Feature 10

Feature 10 was located just inside the western right-of-way fence line on the west side of the highway. The center point grid coordinates for Feature 10 are N119.84, E110.14 (Figure 15.2). Feature 10 was a nearly circular basin-shaped earthen hearth measuring 89 cm northeast-to-southwest by 85 cm northwest-to-southeast (Figure 15.32).



- Edge of Feature 7
- A — A' Cross section
- /// Unexcavated
- ← Profile location

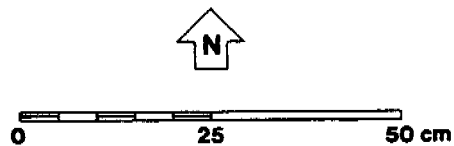
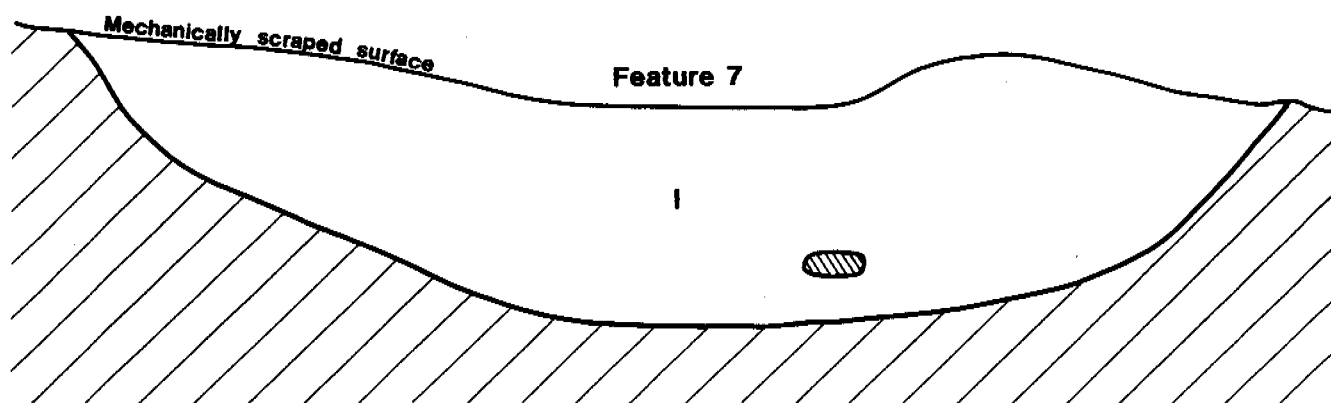


Figure 15.26. Site LA 26308 Feature 7, Plan View and Cross Section.



0 25 50 cm



- I 0-15 cm - Very dark brown (7.5YR2.5/2. moist) sandy loam; weak, fine, granular; slightly sticky, slightly plastic; few fine roots; abrupt smooth boundary.
-  Sandstone rock
-  Unexcavated

Figure 15.27. Site LA 26308 Feature 7, East-facing Profile.

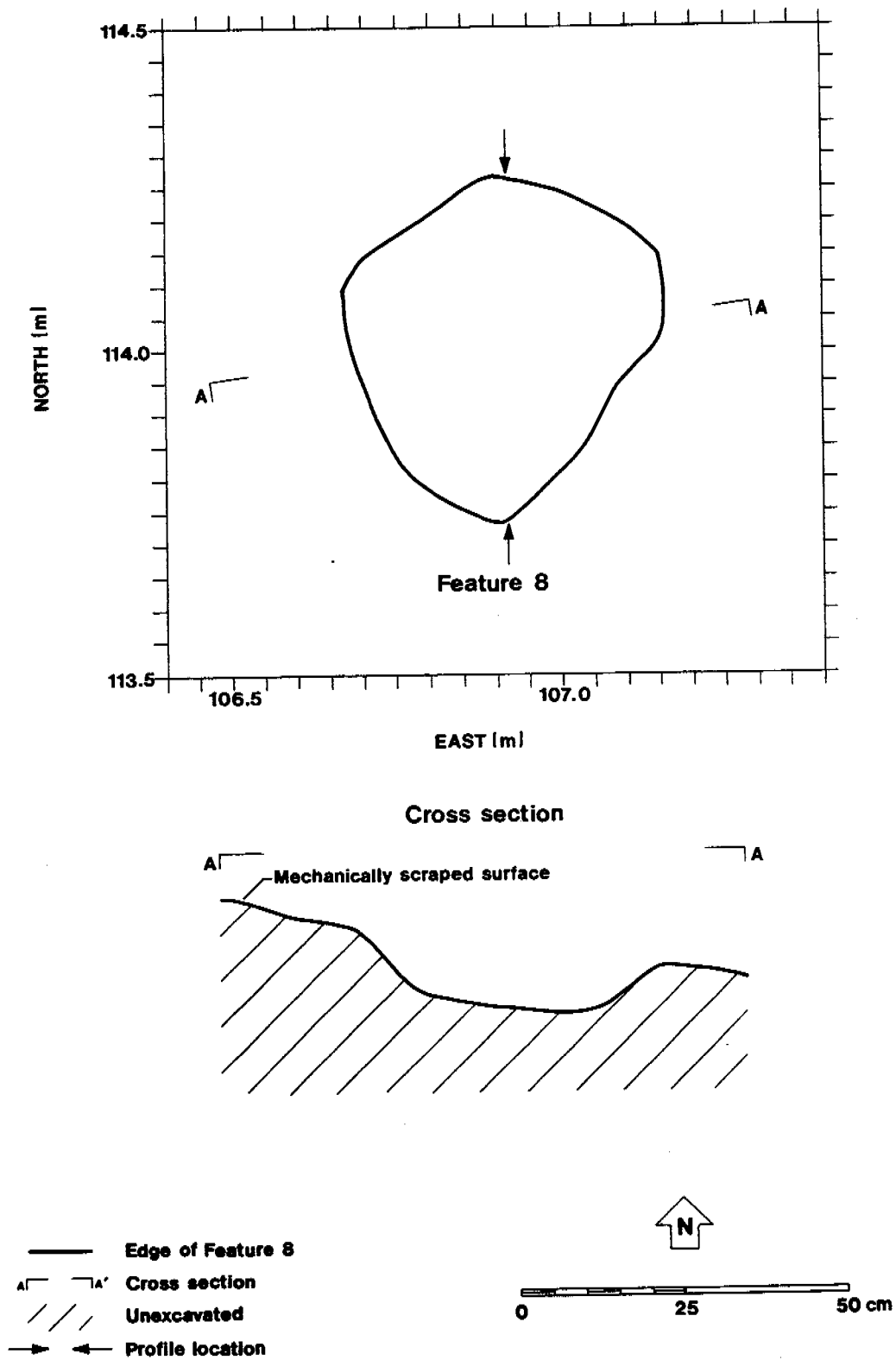
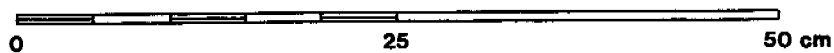
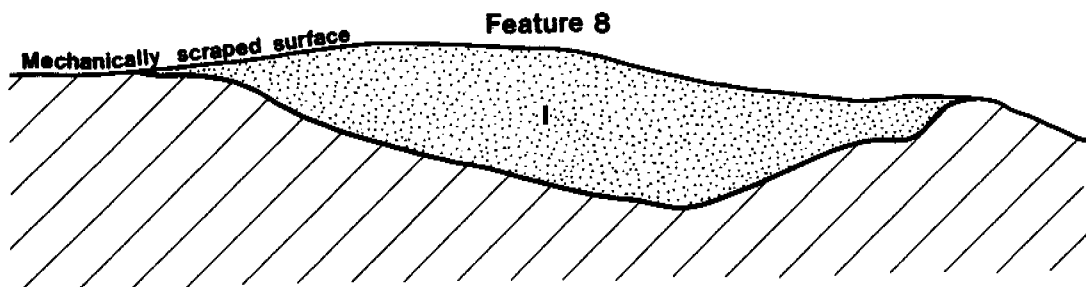


Figure 15.28. Site LA 26308 Feature 8, Plan View and Cross Section.



- I 0-13 cm - Dark yellowish brown (10YR4/6. moist) sandy loam; weak, fine, granular; nonsticky, nonplastic; few fine roots; abrupt smooth boundary.
- /// Unexcavated

Figure 15.29. Site LA 26308 Feature 8, East-facing Profile.

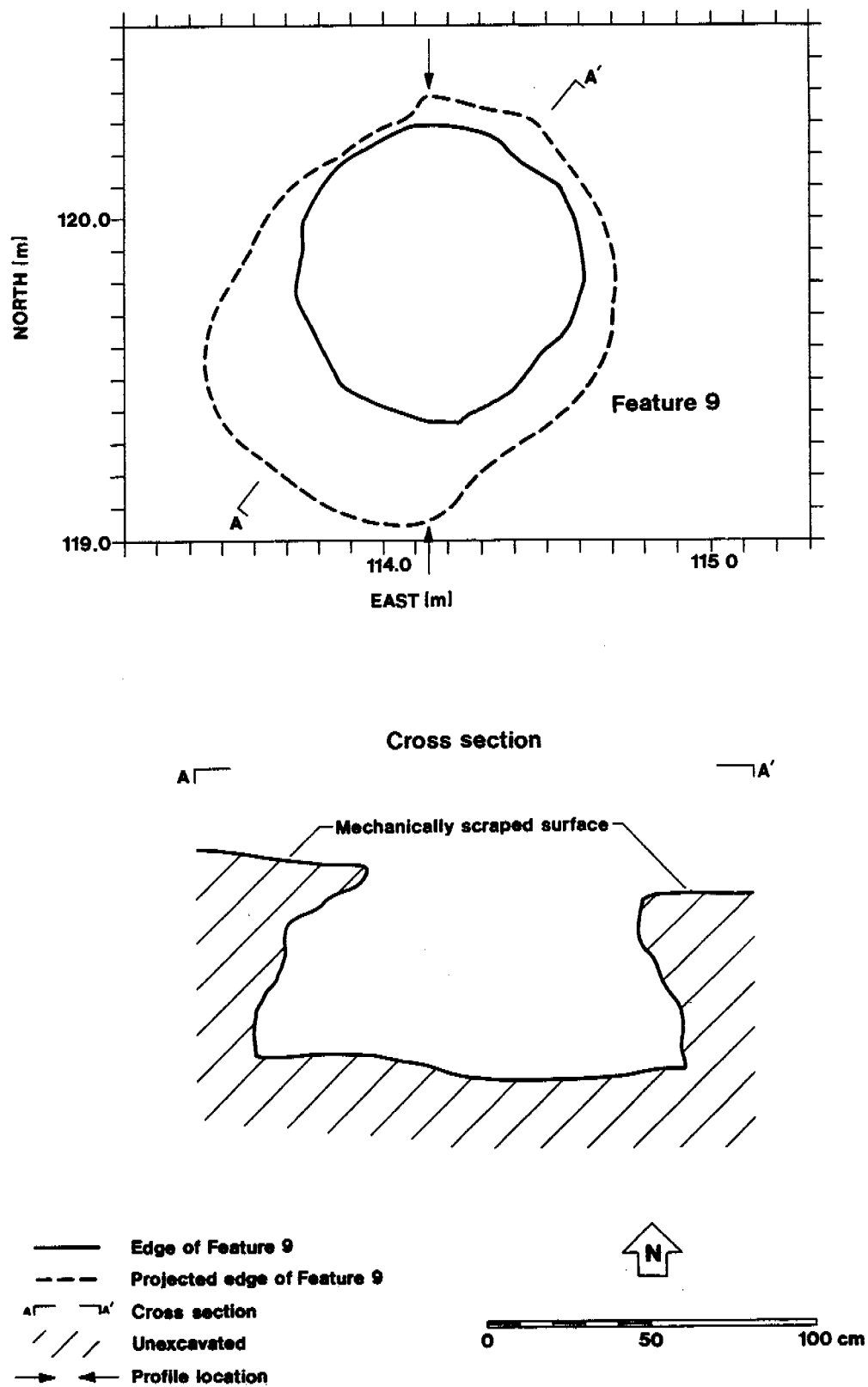
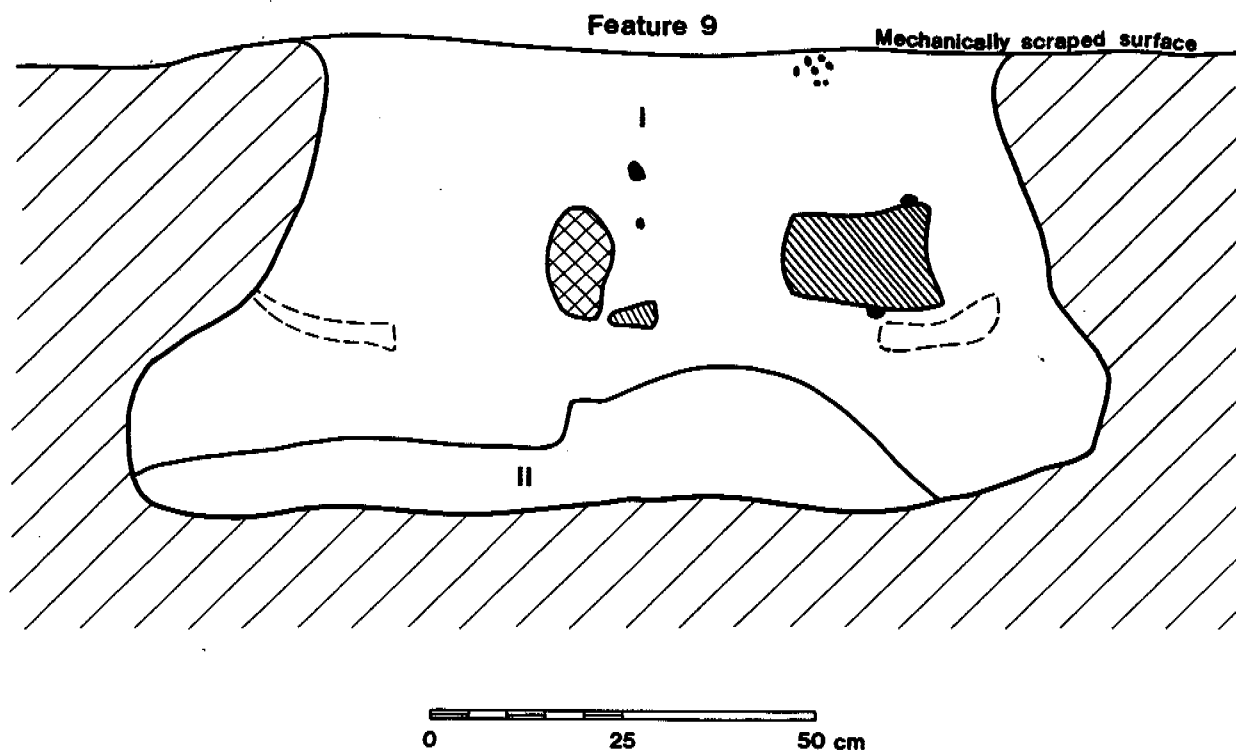


Figure 15.30. Site LA 26308 Feature 9, Plan View and Cross Section.








- I 0-45 cm - Dark grayish brown (10YR4/2. moist) loam; moderate, very fine granular; slightly sticky, slightly plastic; few fine and coarse roots; diffuse irregular boundary.
- II 45-60 cm - Light yellowish brown (10YR6/4. moist) fine sand; moderate, fine, granular; nonsticky, nonplastic; few fine and coarse roots; abrupt smooth boundary.
-  Sandstone rock
-  Charcoal
-  Rodent disturbance
-  Oxidized sand
-  Unexcavated

Figure 15.31. Site LA 26308 Feature 9, East-facing Profile.

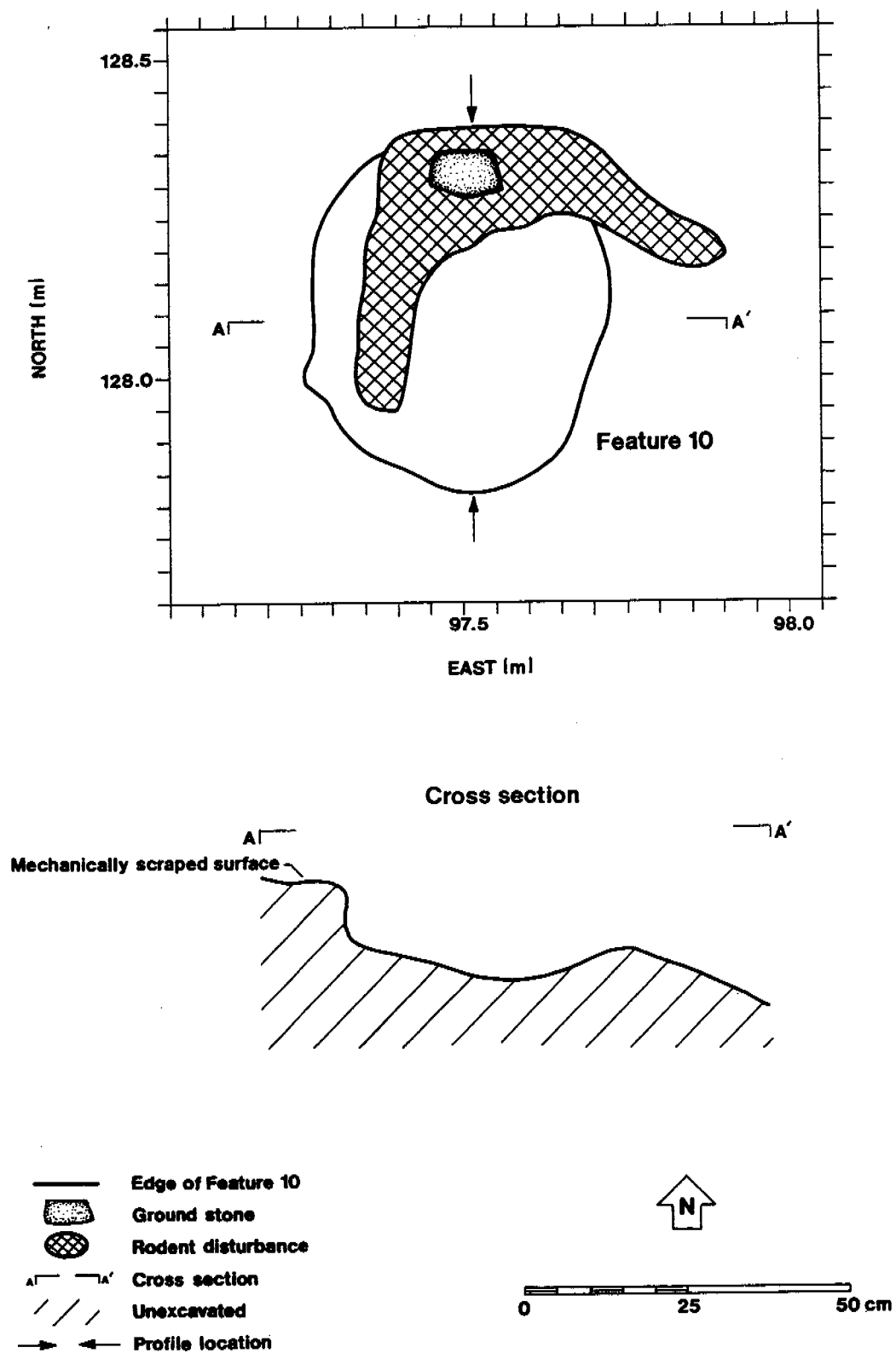


Figure 15.32. Site LA 26308 Feature 10, Plan View and Cross Section.

The east half of Feature 10 was excavated in one 11-cm level. The east-facing profile was drawn for Feature 10 (Figure 15.33). One stratum was identified within the feature fill and consisted of sandy clay loam deposits with inclusions of charcoal and fire-cracked rocks. No artifacts were recovered from the excavation of the east half. The west half sediments were collected for flotation, pollen, and waterscreen samples. One mano was recovered from the excavation of the west half of Feature 10, and one radiocarbon sample was obtained.

The base of Feature 10 had evidence of oxidation indicating prolonged use of the hearth. It is most likely that the hearth is associated with an early Pueblo II component. This is based upon stratigraphy and one radiocarbon date. A date of 970 ± 60 BP (Beta-121228; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A) was obtained from this feature. The calibrated intercept date of AD 1035 supports an early Pueblo II designation for this feature.

Feature 11

Feature 11 was located 1 m north of Feature 1 on the west side of the highway within the northeastern site boundary. The center point grid coordinates for Feature 11 are N130.32, E101.80 (Figure 15.2). Feature 11 was ovoid basin-shaped earthen hearth measuring 41 cm northwest-to-southeast by 69 cm northeast-to-southwest and 14 cm deep (Figure 15.34). The feature was truncated by mechanical stripping, leaving the south half intact.

The north-facing profile was drawn for Feature 11 (Figure 15.35). Three strata were identified within the hearth fill. Stratum I consisted of sandy loam deposits with inclusions of charcoal. Stratum II consisted of silt loam deposits with inclusions of large pieces of charcoal and fire-cracked rock. Stratum III was the oxidized base of the hearth and consisted of compact silt loam. Stratum IV consisted of sterile silt loam deposits.

The east quarter of Feature 11 was excavated in one 14-cm level. No artifacts were recovered

from the east quarter of the hearth. Flaked stone artifacts were recovered from the west quarter excavation. Flotation and pollen samples were collected from sediments of the west quarter. One charred banana yucca seed was recovered from the flotation sample.

Excavations of Feature 11 revealed that the base of the hearth was prepared by compacting silt loam as lining for the hearth. The oxidized liner indicated prolonged use of the hearth. One radiocarbon date of 1320 ± 50 BP (Beta-121229; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A) was returned for this feature. The calibrated intercept date of AD 685, and the one sigma range of AD 665 to 770, supports a late Basketmaker III to early Pueblo I designation for Feature 11. This is consistent with the stratigraphic interpretation provided below.

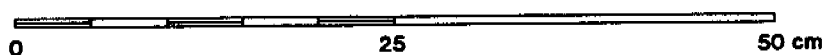
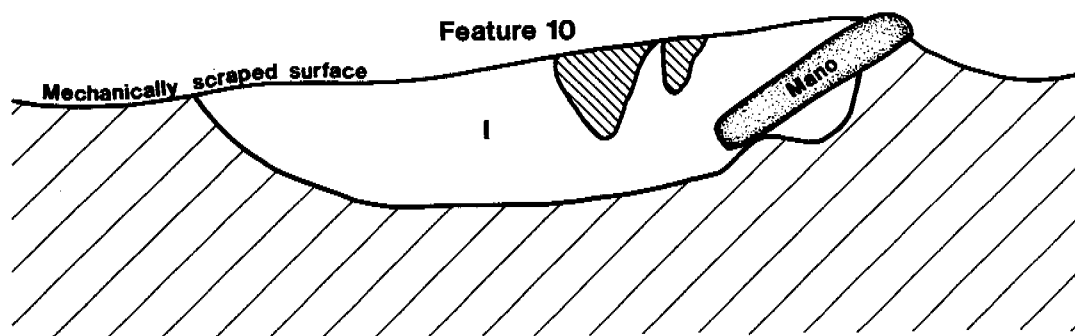
ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

One hundred eleven sherds were analyzed from site LA 26308. Of these 111 ceramic artifacts, 31 were only partially analyzed due to their small size and, therefore, were eliminated from the data analysis. No other subsampling of the recovered ceramic assemblage was made, leaving 80 sherds for the attribute analysis as described in Chapter 21. Ceramic artifacts were recovered from both the surface and excavation units. Appendix D outlines the ceramic data by provenience. The assemblage contains two wares common to the Zuni area: Cibola White Ware and Cibola Gray Ware.

Chronometrics

Twenty diagnostic ceramic artifacts were recorded, 13 (FS 61, 62, 64, 65, 67) of which were in excavation units. Among the 19 Cibola White Ware sherds are 10 Red Mesa Black-on-white, 4 Kiatuthlanna Black-on-white, 1 Puerco Black-on-white and 4 Gallup Black-on-white. The one Cibola Gray Ware sherd is Lino Gray. These types make up a ceramic assemblage that dates from the late Basketmaker III period to the middle





- I 0-11 cm - Black (2.5Y2.5/1. moist) sandy clay loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few fine roots; abrupt smooth boundary.
-  Sandstone rock
-  Unexcavated

Figure 15.33. Site LA 26308 Feature 10, East-facing Profile.

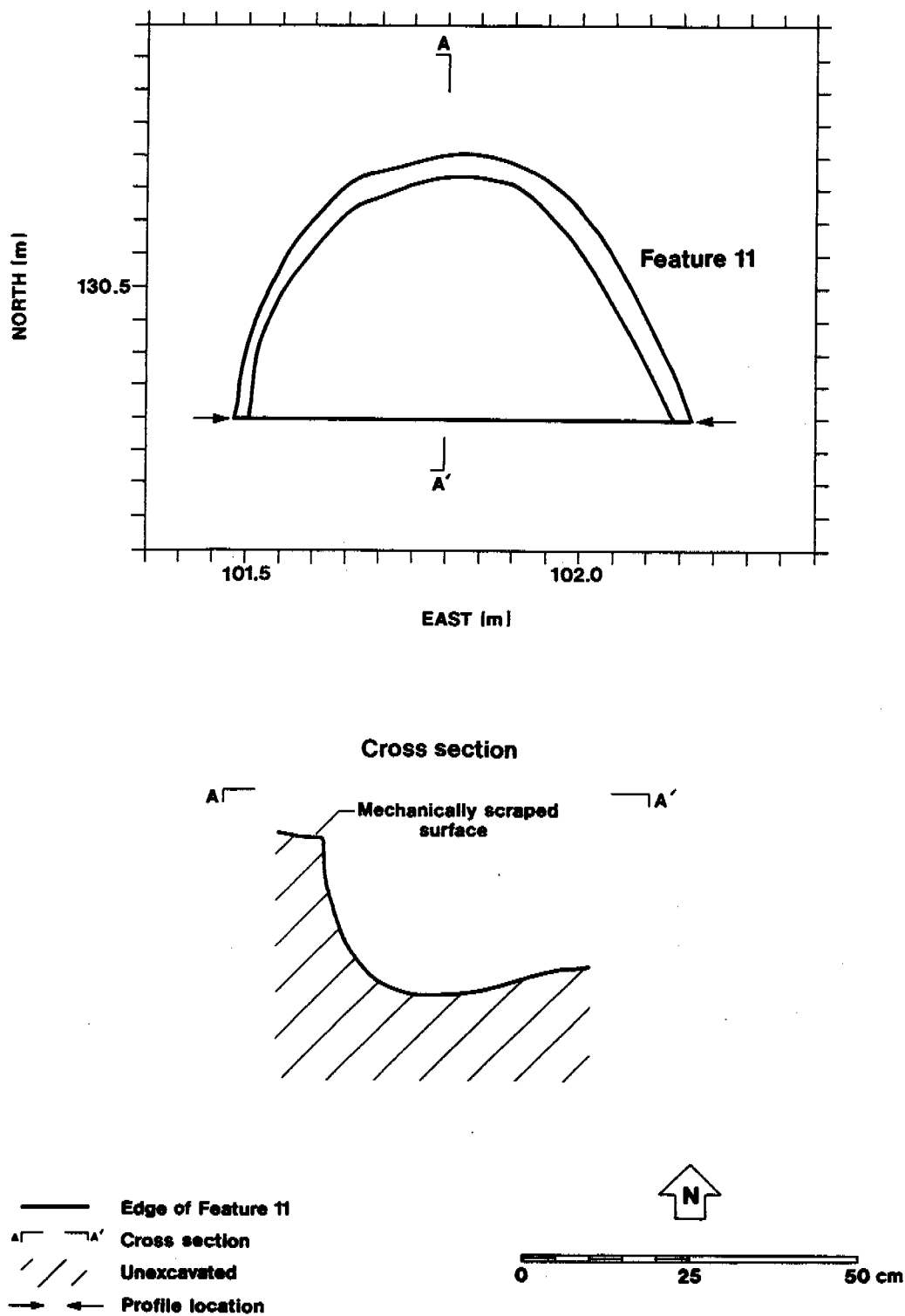
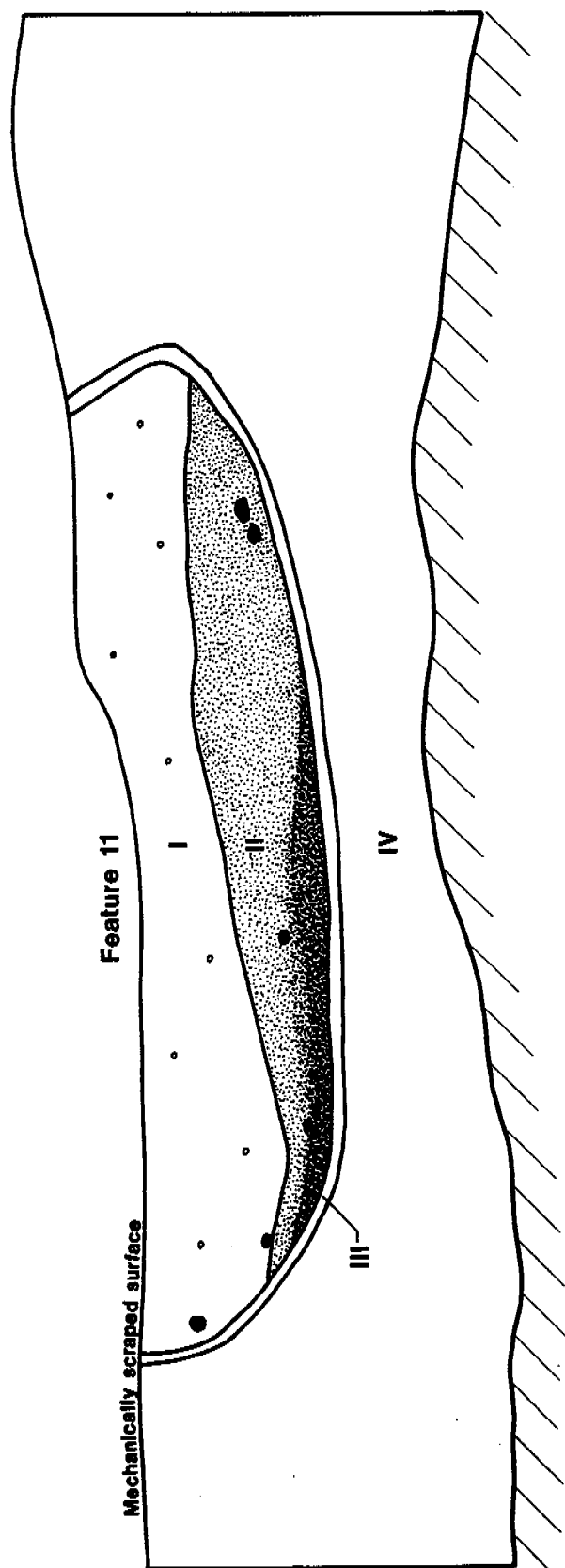


Figure 15.34. Site LA 26308 Feature 11, Plan View and Cross Section.



14-21 cm - Brownish yellow (10YR6/6, dry) silt loam; weak, very fine, granular; nonsticky, nonplastic.

IV

Gravel

Charcoal

Ash and charcoal

Unexcavated

0-7 cm - Very dark brown (10YR2/2, moist), brown (10YR4/3, dry) sandy loam; moderate, very fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few fine roots; abrupt smooth boundary.

7-11 cm - Brown (10YR2/1, moist), very dark grayish brown (10YR3/2, dry) silt loam; weak, very fine, granular; nonsticky, nonplastic; very few micro roots; abrupt smooth boundary.

11-14 cm - Strong brown (10YR4/6, moist) strong brown (7.5YR5/6, dry) silt loam; weak very fine granular; nonsticky, nonplastic; very few micro roots; very abrupt smooth boundary.

Figure 15.35. Site LA 26308 Feature 11, North-facing Profile.

Pueblo II period (AD 450 to 1100). A mean ceramic date of $AD\ 966 \pm 62$ years was generated for the ceramic assemblage. Although utility wares often have long production ranges and therefore are not ideal when calculating ceramic dates for sites, site LA 26308 has an abundant proportion of clapboard corrugated grayware (10 of 14 corrugated vessels). This type has a short production range of AD 850 to 925. If these ceramics are included in the mean ceramic date calculations, a date of $AD\ 926 \pm 62$ years is generated. Both mean ceramic dates support the date range for the diagnostic ceramic assemblage discussed above, suggesting that a late Pueblo I to middle Pueblo II temporal designation is appropriate.

The diagnostic ceramic assemblage was divided between surface and excavation collections; temporal ranges were then recalculated using these two subsamples. Seven diagnostic ceramic artifacts were identified among the surface collections: six Cibola White Ware sherds and one Cibola Gray Ware sherd. Diagnostic types in the surface ceramics include Kiatuthlanna Black-on-white, Gallup Black-on-white, Red Mesa Black-on-white, and Lino Gray. This assemblage dates from the late Pueblo I period to the middle Pueblo II period. A mean ceramic date of $AD\ 931 \pm 50$ years was generated for the surface diagnostic assemblage. These recalculations support the temporal designation assigned to the entire diagnostic assemblage.

Thirteen diagnostic ceramic artifacts were recovered from excavated units. All 13 diagnostic ceramics are Cibola White Ware and include Kiatuthlanna Black-on-white, Gallup Black-on-white, Red Mesa Black-on-white, and Puerco Black-on-white. This assemblage dates from the late Pueblo I period to the middle Pueblo II period. A mean ceramic date of $AD\ 985 \pm 62$ years was generated for the excavated diagnostic assemblage. These recalculations also support the temporal designation assigned to the entire diagnostic assemblage. Chapter 21 has a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of 64 jars, 14 bowls, and 2 indeterminate forms recorded. Most of the sherds are identified as coming from jar bodies, although 5 jar rims, 11 bowl bodies, and 3 bowl rims are also present. Both bowl and jar forms are represented in the whiteware and grayware sherds. Overall, jars outnumber bowls by a ratio of approximately 5/1. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site.

Only 6% of the jars were recorded as having soot; sooting normally occurred on the exterior of jars, but interior sooting, as well as sooting on both surfaces, was also recorded. No modification was recorded. The jar to bowl ratio is a little higher here than at many of the sites in the study, suggesting that there may have been a somewhat higher emphasis on cooking and/or storage. Chapter 21 offers a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for all 80 sherds. In this sample, the vast majority (97%) of the ceramic artifacts have either sherd temper or a combination of sherd and sand temper. The majority of the Cibola White Ware artifacts have only sherd temper, but a combination of sand and sherd is not uncommon. The majority of Cibola Gray Ware artifacts have a combination of sand and sherd temper, but sherd temper is not uncommon. Both sherd and a combination of sand and sherd temper probably represent local production. The remaining 3% of the ceramic artifacts are tempered with either quartz or multilithic sand. All of these artifacts are Cibola Gray Ware. Quartz sand is typical of Lino Gray, which is present in the assemblage. Multilithic sand may represent nonlocal production or a late Pueblo I/early Pueblo II ceramic technology. It is difficult to know which without further analysis.

Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The ceramic assemblage from site LA 26308 consists of 80 fully analyzed sherds from both surface and excavated collections. Two wares common to the area are present: Cibola White Ware and Cibola Gray Ware. Twenty diagnostic ceramics were identified in the overall assemblage. These diagnostics support a late Pueblo I to middle Pueblo II temporal range (AD 850 to 1100). This temporal range is further supported by mean ceramic dates of 966 ± 62 years and 926 ± 62 years, the latter date using utility ware counts to calculate. This temporal range is supported even when the diagnostic assemblage is divided between surface and excavation collections and dates are recalculated. Functional variation among ceramics suggest a variety of activities were practiced at the site.

Flaked Stone Artifacts

Investigations at site LA 26308 yielded a total of 94 flaked stone artifacts. Eight artifact classes were identified in the collection. The artifact classes represented include (in decreasing order of representation) debris (48.9%), debitage (37.2%), core (6.4%), hammerstone (2.1%), retouched piece (2.1%), biface (1.1%), projectile point (1.1%), and utilized piece (1.1%). Table 15.1 provides summary metric data for the flaked stone artifacts in this assemblage. Only five (5.3%) of the artifacts revealed evidence of thermal alteration (potlidding or crazing). There is no evidence for the intentional thermal alteration of artifacts at this site.

Lithic reduction products (cores, debitage, and debris) and artifacts associated with reduction activity, such as hammerstones, account for 94.7% of the entire lithic assemblage. Of the six cores, three are single platform, two are on flakes, and one is multiple platform. Five of the six cores contain hinge fractures or material flaws. The debitage consists of 19 secondary flakes, 12 primary flakes, 2 tertiary

retouch or trimming flakes, 2 bifacial thinning flakes, and 1 bipolar flake. Platform data could be obtained for 34 of the 35 pieces of debitage in the collection. Only four of these 34 artifacts show evidence of platform preparation. One is multifaceted and three are ground or abraded. Fifteen pieces of debitage have cortical platforms. Only one of the 34 platforms contains percussion marks.

The formal and informal tool assemblage consists of two retouched pieces, one biface, one projectile point, and one utilized piece. All of the tools are chert. The projectile point (Figure 15.36) is a side-notched point fragment which appears to have been broken during manufacture or finishing. The point was snapped distally and also suffered a longitudinal snap opposite the surviving notch.

The pattern of raw material exploitation documented in this assemblage is consistent with that seen in the other Pueblo period sites in the study. Seventy-one or 75.5% of the artifacts are chert, 13.8% (13) are silicified wood, and 10.6% (10) are quartzite. Two of the quartzite artifacts are hammerstones which do not, therefore, represent raw materials selected for reduction.

Ground Stone Artifacts

A total of eight ground stone artifacts were recovered from subsurface contexts at site LA 26308. Two items were from SU 7, a 1-by-1-m hand excavated unit. One is a sandstone slab metate fragment that is ground on one surface only. No striations are visible. The other is an unidentified ground stone fragment made of sandstone. It is ground on one surface only but no striations are visible. It is burned. SU 8, another 1-by-1-m hand-excavated unit, yielded a sandstone slab metate fragment. It is ground on one surface and parallel striations are visible.

Feature 10, a nearly circular basin-shaped earthen hearth, yielded one ground stone artifact. These include an indeterminate mano fragment and four indeterminate ground stone fragments (Table 15.2). All of the items recovered from this feature are burned.

Table 15.1. Summary Metric Data for Site LA 26308 Late Pueblo I to Early Pueblo II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	2.3	1.9	0.8	6.6
10% trimmed mean	2.2	1.8	0.6	2.6
Median	2.1	1.6	0.6	1.0
Standard error	0.1	0.1	0.1	1.7
Standard deviation	1.1	1.0	0.7	16.4
Minimum	0.6	0.5	0.1	-
Maximum	5.8	6.0	4.9	110.0
Range	5.2	5.5	4.8	110.0

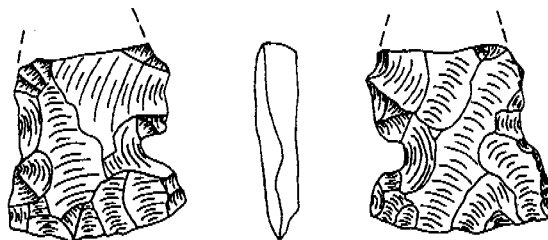
Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm.

Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

n = 94

Table 15.2. Ground Stone Artifacts Recovered from Feature 10 at Site LA 26308.

FS No.	Artifact Type	Raw Material	Description
99-1	Indeterminate ground stone fragment	Sandstone	Parallel striations on one surface; shaped; burned.
99-2	Indeterminate ground stone fragment	Sandstone	No striations; one surface ground; burned.
99-3	Indeterminate ground stone fragment	Sandstone	No striations; one surface ground; burned.
99-4	Indeterminate ground stone fragment	Sandstone	No striations; one surface ground; burned.
99-5	Indeterminate mano fragment	Sandstone	No striations. One surface ground; shaped; burned.



Actual Size

Figure 15.36. Site LA 26308 Side-notched Projectile Point.

Miscellaneous Items

Site LA 26308 yielded both yellow and red ochre. One edge of the piece of yellow ochre is ground with parallel striations visible. This piece fits well in the hand with the ground edge facing outwards. It was recovered from a 1-by-1-m hand-excavated unit (SU 1).

Many small pieces of the red ochre were recovered from Feature 9, a bell-shaped earthen storage pit. None of the pieces appears worked.

Macrobotanical Remains

Cheno-Ams and banana yucca seeds comprised the evidence of potential food resources used by site occupants. The Cheno-Am category refers to seeds that could be either in the genus *Chenopodium* or *Amaranthus*. This category is used when the condition of a seed prohibits a more specific identification. Documented economic uses of weedy annuals like goosefoot and pigweed seeds abound in the ethnographic literature. Castetter (1935) described the use of these as a ground meal, either eaten as gruel or combined with other food such as cornmeal and made into cakes. Harrington (1967) cited the same uses and said the seeds can be parched and eaten partly raw, although he found the seeds too small to chew easily.

Frequent references to the use of yucca can be found in the ethnographic literature (Harrington 1967:335, 339). Every part of the yucca was used either for food, fiber, or soap. The pulp of banana yucca fruit was used in a variety of ways including gruel, dumplings, bread, and conserve (Harrington 1967:334).

A minute amount of conifer wood that was found in the sample from the bell-shaped storage pit represents trash fill of the feature. Flotation and radiocarbon wood charcoal was predominately coniferous including pine, juniper, pinyon, and unknown conifer. Oak wood was restricted to the Feature 10 hearth.

During the use of site LA 26308, occupants collected locally available wood for fuel and seem to have targeted two resources: the seeds of Cheno-Ams that mature in late summer, and the fruits of banana yucca that ripen in the fall. The site was probably used at least from late summer into the fall.

Pollen

Base samples from two extramural pits, Features 4 and 9, were collected for pollen analysis at site LA 26308. The results from Feature 4 were characterized by a low sample concentration (600 gr/cc), moderate sagebrush (6%), high pinyon (16%) and grass (8%), presence of phlox family, and a high maize value (3%). The Feature 9 pit sample produced a low sample concentration (700 gr/cc); moderate sagebrush (8%); high values of ragweed/bursage (18%); beeweed (4%); and globemallow (2%); moderate grass (4%); presence of cholla pollen; and aggregates of maize and beeweed. Maize appears to have been associated with both pit features, and in Feature 9, grass, beeweed, and possibly cholla and globemallow may have been utilized.

STRATIGRAPHY

The stratigraphy of site LA 26308 is deceptively complex. Numerous strata were identified in the study units, along with eight different features. "Features" 3, 5, and 6 were determined to be noncultural and will not be discussed in this section. The other features, however, occurred within three different stratigraphic levels of the site.

SU 10 is a good place to begin a discussion of the site's stratigraphy. Five different strata were identified. Stratum I is described as a very fine sandy loam. Below this deposit is Stratum II, a sandy clay loam, which overlies Stratum III, a loamy sand. Stratum IV is also a loamy sand that overlies Stratum V, another loamy sand. The first cultural horizon evident is within Stratum III.

Feature 9 occurs within this deposit, along with Features 2 and 11 (which are in Stratum III in SU 6 and 8). This deposit, based upon the radiocarbon date from Feature 11 (1320 ± 50 BP), is interpreted to date to the late Basketmaker III to early Pueblo I period.

An early Pueblo II component occurs within Stratum II, a sandy clay loam to clay loam that is found across the site (except for SU 7; also, it is Stratum III in SU 3). Feature 10 occurs within this stratum, as does Feature 8, and possibly Feature 4. Radiocarbon results from Feature 10 (970 ± 60 BP) establish this occupation during the early Pueblo II.

The uppermost layer, Stratum I, is continuous across the site as a sandy loam or loamy sand. Pockets of very fine sand (see SU 7) may cap this deposit. Feature 7, a thermal feature, occurs within this stratum. As it occurs stratigraphically above the other two cultural horizons, Feature 7 is interpreted here to represent a late Pueblo II component. This would make it associated with the late Pueblo II rubble mound located upslope.

CHRONOMETRIC DATA

The chronometric data for site LA 26308 comprise two radiocarbon dates and the ceramic artifact assemblage. Table 15.3 summarizes the radiocarbon samples. Eckert calculated a mean ceramic date of AD 926 ± 62 years, when the

clapboard corrugated sherds were included as a diagnostic type. A potential occupation span from AD 450 to 1100 is indicated by the ceramic assemblage, which is consistent with the stratigraphic interpretation presented above.

SUMMARY

Site LA 26308 comprises multiple components dating at least from the late Basketmaker III/early Pueblo I period (or the late AD 600s to 700s) through the late Pueblo II period. These components are manifest in storage pits and thermal features. The only known architecture at the site is a late Pueblo II rubble mound that was not located within the project boundaries. Nonetheless, one thermal feature (Feature 7) is believed to be associated with this occupation based upon its stratigraphic position.

From the very small portion of the site that was investigated, it is difficult to assess the nature or function of the components prior to the late Pueblo II. Storage and resource processing were activities taking place at the site during these earlier components, and may indicate that subsurface architecture, such as pit structures, are present but outside the project boundaries. Consistent with many of the other sites in the project area, the features excavated indicate subsistence-related tasks (particularly maize agriculture) were a focus activities along this portion of site LA 26308.

Table 15.3. Summary of Radiocarbon Samples from Site LA 26308.

FS No.	Conventional Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Material	Context
99	970 ± 60	AD 1010 to 1165	AD 980 to 1215	AD 1035	<i>Pinus</i> , <i>P. edulis</i> , <i>Quercus</i> , unknown conifer	F 10, hearth
101	1320 ± 50	AD 665 to 770	AD 645 to 800	AD 685	<i>Pinus</i> , <i>P. edulis</i> , <i>Juniperus</i>	F 11, hearth

Chapter 16

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115324

Jeffery Waseta and James W. Kendrick

**with Analytic Contributions by Suzanne L. Eckert, Janet Hagopian,
Pamela McBride, Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations were conducted at site LA 115324 between 8 and 27 April 1998. The site is located on both the east and west sides of the highway, and comprises multiple components. The site is located at the base of a slope overlooking the valley bottom of Y Unit Draw at an elevation of 2099 m (6885 ft). Vegetation on the site is mainly pinyon, juniper, sagebrush, grasses, narrowleaf yucca, and rabbitbrush. Most of the artifacts are concentrated on the western side of the road. A very light scatter of artifacts on the eastern side, however, warranted investigations on this side also. Interestingly, all four of the subsurface features identified and excavated at site LA 115324 were located on the east side of the existing highway. These comprise possible storage features that may date to the late Archaic period.

The artifact scatter on the western side of the highway dates approximately from the late Pueblo I to Pueblo II period. Two surface features were recorded which may be associated with this later component, both of which were indeterminate sandstone concentrations (making a total of six features identified at site LA 115324). This is not surprising, in that several sites are located upslope and to the west of site LA 115324.

SURVEY RESULTS

Site LA 115324 was recorded as a late Pueblo II and Historic site, comprising sandstone rubble and prehistoric and historic artifacts (Abbott 1997; Figure 16.1). Artifacts on the eastern side of the road were interpreted as slopewash from the main artifact concentration on the west side of the highway. Ceramic artifacts observed included

Gallup Black-on-white, Wingate Black-on-red, indented corrugated, and clapboard corrugated types. Lithic artifacts included 11 pieces of debitage and a core, along with 1 sandstone basin metate. Lithic raw materials included mainly chert and silicified wood. Historic artifacts included a porcelain plate sherd, a porcelain cup handle, and the foot of a cast-iron stove. The site had not previously been recorded.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations, a pedestrian survey was conducted in transects at 2-m intervals across site LA 115324 to locate all surface artifacts and features. Each artifact was marked with a pin flag and point located with a Sokkia Total Station. Only those artifacts within the right-of-way were collected. As seen in Figure 16.2, surface artifacts are concentrated in the northwestern and west-central portions of the site. Only three artifacts (all ceramic) were observed east of the existing highway. Surprisingly, four subsurface features (not associated with the ceramic artifacts on the surface) were discovered and excavated on this eastern side, while no features were found on the western side within the right-of-way.

Excavation

Hand Excavation

A single 1-by-1-m hand-excavated unit was established in order to determine the nature and depth of cultural deposits on site LA 115324. An artifact distribution map generated from the controlled surface collection was used as a guide for the placement of the unit. The unit was

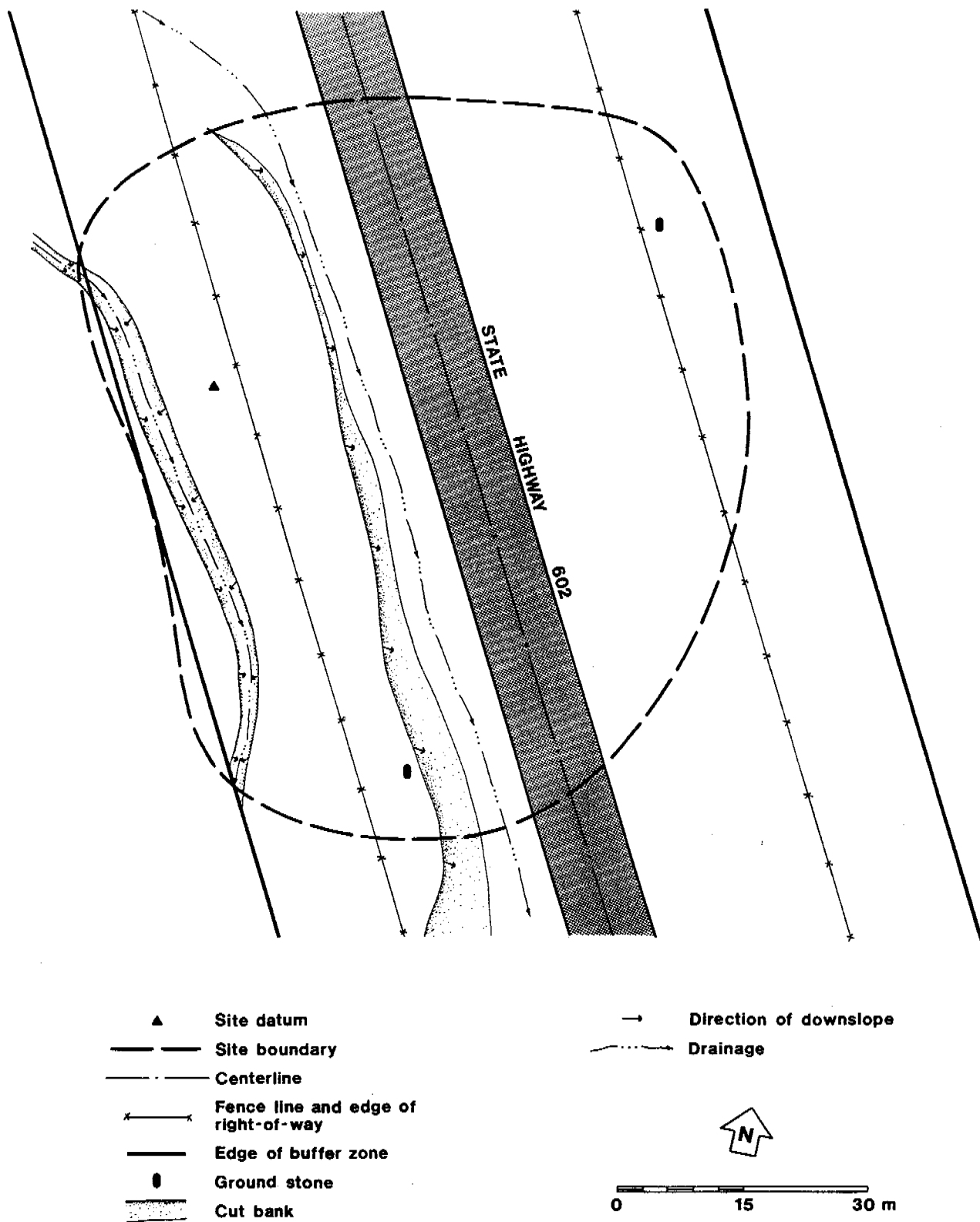


Figure 16.1. Site LA 115324 Survey Site Map.

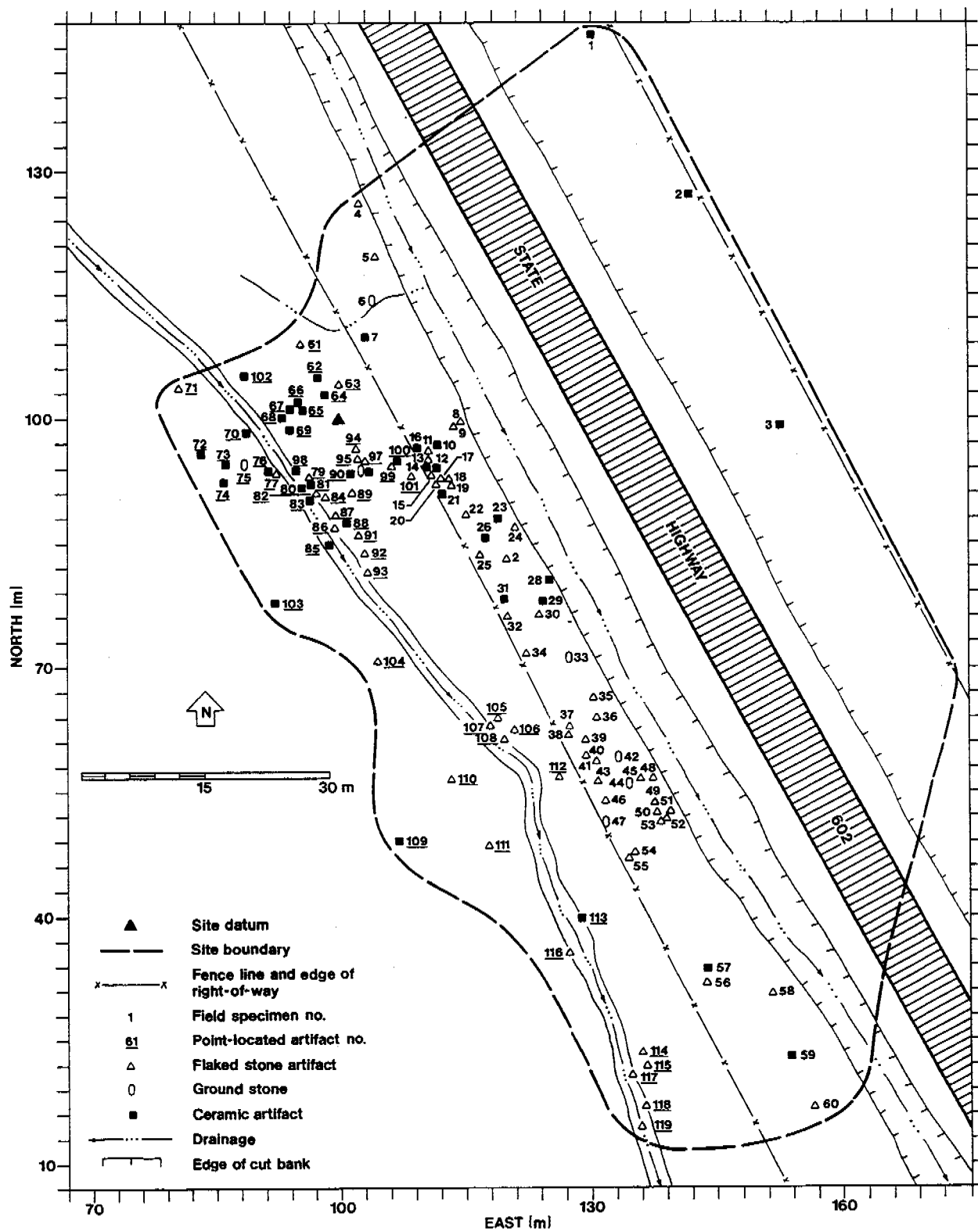


Figure 16.2. Site LA 115324 Data Recovery Site Map, Surface Artifacts.

excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

Study Unit 1 (SU 1) was placed on the west side of State Highway 602, with the southwest corner of the unit located at site grid coordinates N93.56, E110.71 (Figure 16.3). A total of five 10-cm levels were excavated revealing two strata as shown along a west-facing wall profile (Figure 16.4). Cultural deposits were documented within Levels 1, 2, and 3, Stratum I. Level 1 yielded ceramic, flaked stone, and ground stone artifacts. Levels 2 and 3 retrieved flaked stone artifacts only. Sediment deposits within the three levels included sparse amounts of charcoal flecks observed only within Level 1, along with gravel and decomposing sandstone deposits which were recorded within all three levels. Levels 4 and 5, Stratum II, contained no cultural materials within a sandy loam soil. Flotation and pollen samples were collected from both strata. No buried features were encountered in SU 1.

Mechanical Excavation

Mechanical excavation of seven backhoe trenches was conducted in order to determine the nature and depth of possible buried cultural deposits on site LA 115324. The trenches ranged from 3.20 m to 8.50 m in length with a maximum depth of 1.40 m. A total of 40.90 m of trench was excavated on site (Figure 16.3).

Study Unit 2. SU 2 was placed on the east side of State Highway 602, at the north end of the mechanically scraped area and approximately 2 m west of Feature 5. The northwest end was located at site grid coordinates N130.14, E139.91, and the southeast end at N122.28, E141.69 (Figure 16.3). The trench was 8.00 m in length with a maximum depth of approximately 1.40 m. Three strata were recorded along a southwest-facing wall profile (Figure 16.5). Stratum I was described as a thin layer of loose overburden of a sandy loam, with less than 10% gravel and common roots. Stratum I did not contain any visible cultural deposits within the profile. Stratum II also was a sandy loam with sparse amounts of charcoal flecks

distributed along the wall profile; the base of Stratum II was undefined, extending below the base of the trench. Again no cultural materials were visible along the profile at the time of documentation. Stratum III appeared to be a pocket of a hard sandy loam with no gravel or roots. An unusual dip was located at the top of the stratum. It is unknown if this deposition episode is natural or intentionally caused. Nevertheless, a flotation and a pollen sample were collected from the dip as well as with Stratum II and within Stratum III. No buried features were encountered during excavation of SU 2.

Study Unit 3. SU 3 was placed on the east side of State Highway 602, at the south end of the mechanically scraped area with the northwest end located at site grid coordinates N68.80, E163.60, and the southeast end at N68.50, E173.04 (Figure 16.3). The trench was 8.50 m in length with a maximum depth of approximately 1.00 m. Three strata were recorded along the entire southwest-facing wall profile (Figure 16.6). Stratum I was a thin layer of a loose sandy loam, described usually as an overburden sediment deposit, that contained no visible cultural materials or deposits within the profile. Stratum II was a loamy sand deposit containing no gravels and fine roots; no cultural deposits were observed. Stratum III was a second loamy sand deposit with the only difference consisting of very few roots. No cultural deposits were observed. Flotation and pollen samples were collected within Strata II and III.

Study Unit 4. SU 4 was placed on the west side of State Highway 602, with the northeast end of the trench situated on the sloping cut bank at site grid coordinates N41.84, E147.89, and the southwest end at N39.11, E143.22 (Figure 16.3). The trench was 5.65 m in length with a maximum depth of approximately 1.00 m. Two strata were documented on the entire northwest-facing wall profile (Figure 16.7). Given the color of Stratum I and the location of SU 4, Stratum I may be some type of organic layer with the slopewash accumulating in this area of the site. Stratum II may be an aeolian deposit with no gravels and very few roots. Flotation and pollen samples were collected from both strata.

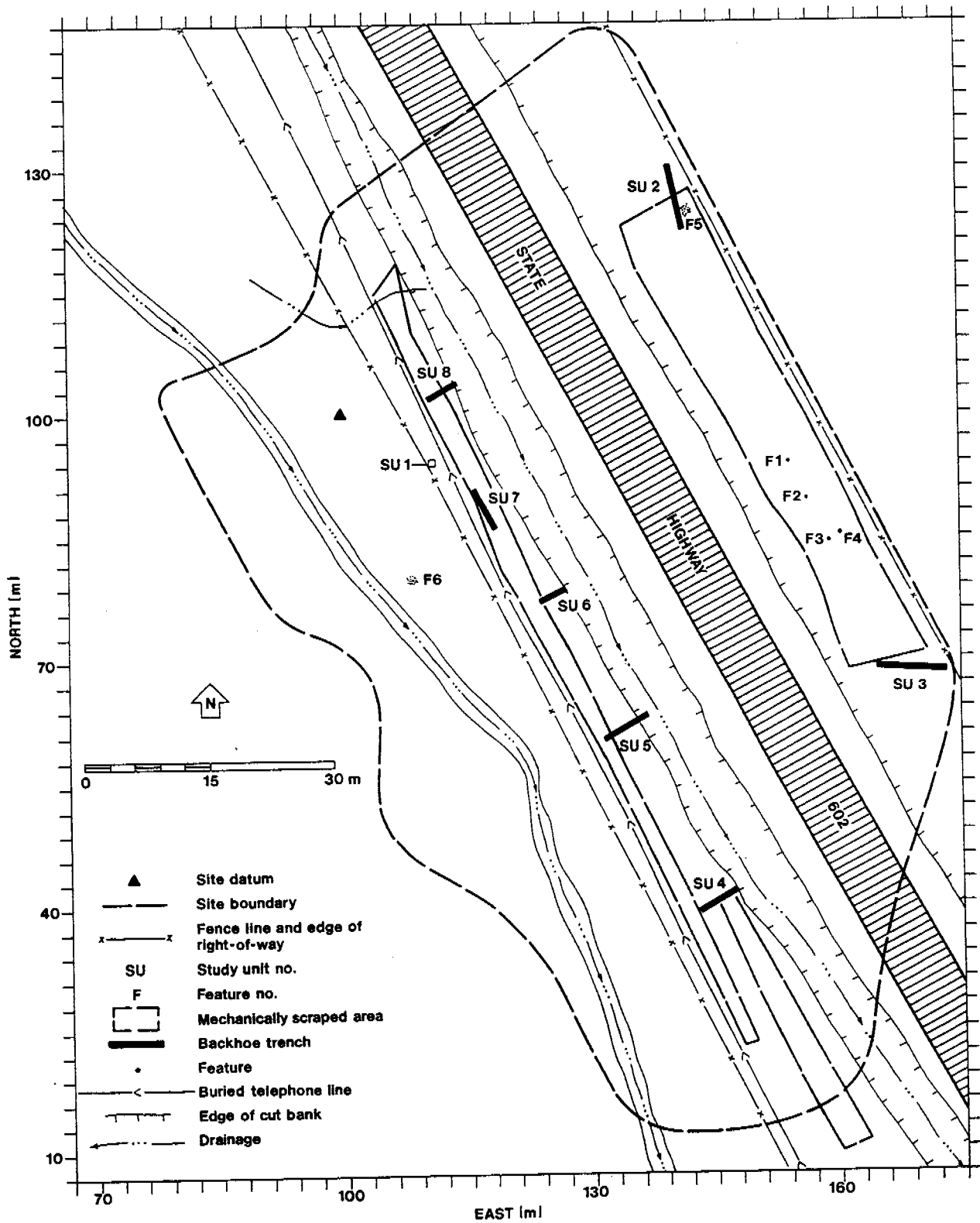


Figure 16.3. Site LA 115324 Data Recovery Site Map, Features, Study Units, and Mechanical Stripping.

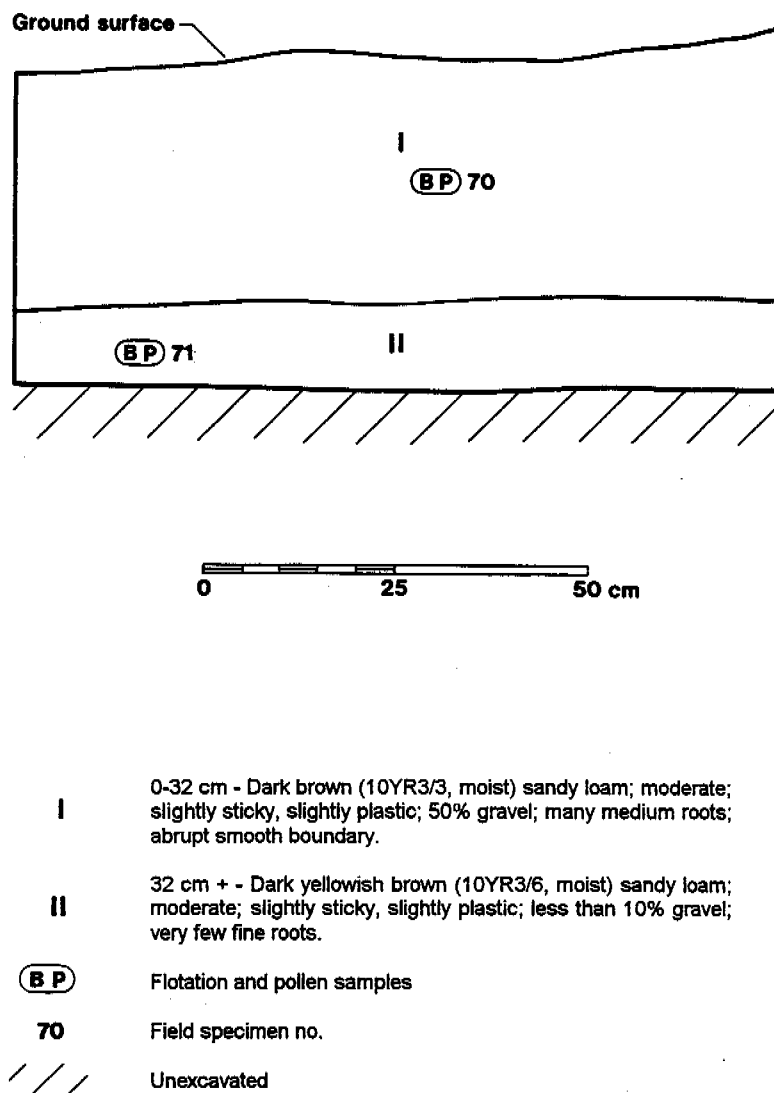


Figure 16.4. Site LA 115324 Study Unit 1, West-facing Profile.

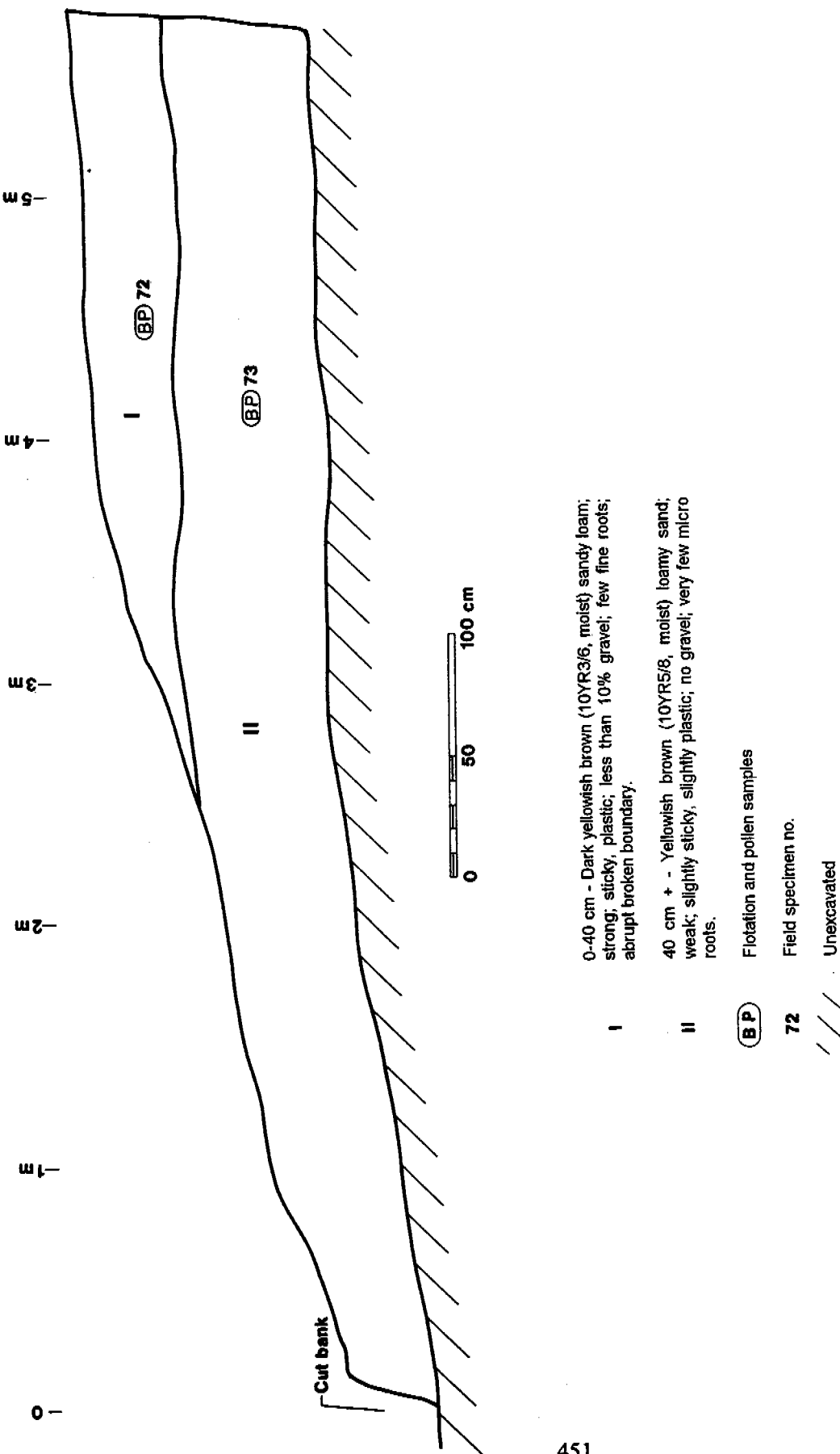


Figure 16.7. Site LA 115324 Study Unit 4, Northwest-facing Profile.

Study Unit 5. SU 5 was placed on the west side of State Highway 602, with the northeast end of the trench situated on the sloping cut bank at site grid coordinates N62.94, E136.44, and the southwest end at N60.07, E131.73 (Figure 16.3). The trench was 6.10 m in length with a maximum depth of approximately 1.00 m. Two strata were recorded along the entire southeast-facing wall profile (Figure 16.8). Stratum I is similar to that of Stratum I of SU 4, with the same soil color; the trench locations were similar. Stratum II appeared to be an aeolian deposit with an absence of gravel and few roots. Flotation and pollen samples were collected from Stratum I. No buried features were encountered during excavation of SU 5.

Study Unit 6. SU 6 was placed on the west side of State Highway 602, with the northeast end of the trench situated on the steep sloping cut bank at site grid coordinates N78.63, E126.98, and the southwest end at N77.20, E123.91 (Figure 16.3). The trench was 3.20 m in length with a maximum depth of approximately 1.10 m. Two strata were drawn along the entire southeast-facing wall profile (Figure 16.9). Stratum I appeared to be an organic layer similar to that observed in SU 4 and 5, except for a difference in soil color. The soil in SU 6 was darker possibly due to the steep cut bank where the trench is located. The base of Stratum I faded into Stratum II in contrast to the abrupt boundary change noticed in the two previous trenches. Stratum II consisted of dark yellowish brown sandy loam, the same soil color described in Stratum I within SU 4 and 5; however, in SU 6 this soil was lower in depth and included a stronger structure than in SU 4 and 5. Both strata contained no cultural deposits; however, flotation and pollen samples were collected from the two strata.

Study Unit 7. SU 7 was placed on the west side of State Highway 602 near the northern end of the site, with the northwest end located at site grid coordinates N90.84, E115.72, and the southwest end at N86.03, E118.40 (Figure 16.3). The trench was 5.30 m in length with a maximum depth of approximately 1.00 m. Two strata were recorded along the entire southwest-facing wall profile (Figure 16.10). Stratum I contained the same dark

brown sediment that was observed in SU 6. Stratum II also resembled Stratum I in SU 6, suggesting that the sediment deposits are similar within this area of the site. Flotation and pollen samples were collected from both strata. No features were encountered during excavation of SU 7.

Study Unit 8. SU 8 was placed on the west side of State Highway 602, at the north portion of the site with the northeast end located at site grid coordinates N103.89, E113.89, and the southwest end at N101.87, E110.36 (Figure 16.3). The trench was 4.15 m in length with a maximum depth of approximately 90 cm. Two strata were recorded along the entire northwest-facing wall profile (Figure 16.11). Both strata are similar to if not the same as those in SU 7, with no features encountered.

Mechanical Stripping

Mechanical stripping on site LA 115324 was accomplished on both sides of State Highway 602 (Figure 16.3). These operations were done upon completion of all study unit excavations. The first location, on the east side of the road, encompassed an area approximately 62.00 m in length by 8.50 m in width (527 sq m). Approximately 50 cm of soils and vegetation was removed from the area revealing four charcoal stains (Features 1 through 4) and a cluster of sandstone rocks (Feature 5), all discussed below. The other two locations were situated on the west side of the state highway, measuring 103.00 m in length by 3.00 m wide (309.00 sq m) and 34.00 m in length by 3.50 m wide (119.00 sq m). The maximum depth of these two mechanically stripped areas was approximately 40 to 50 cm. Stripping of the two areas did not encounter any buried features. The total area mechanically stripped was 955.00 sq m.

Feature Descriptions

Six features were identified during data recovery on site LA 115324 (Figure 16.3). Features 1 through 5 were discovered during mechanical stripping on the east side of State

—6

—5

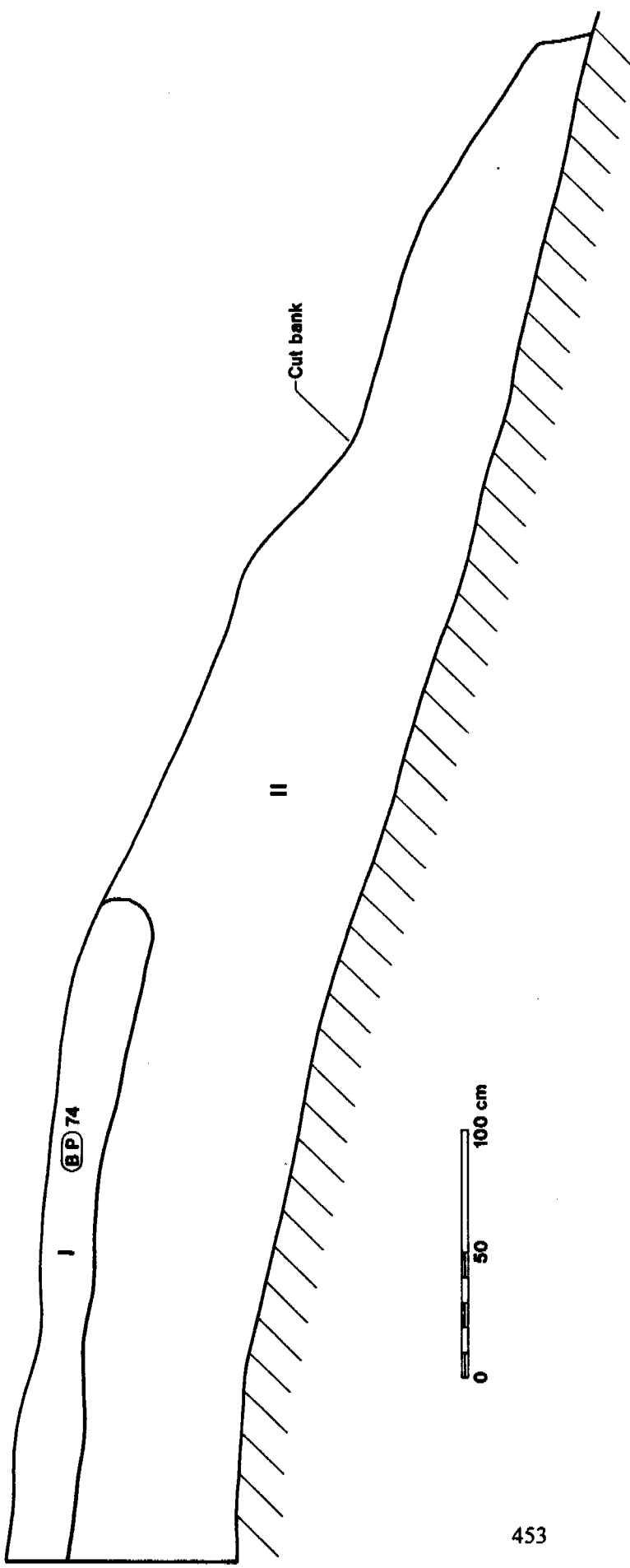
—4

—3

—2

—1

0



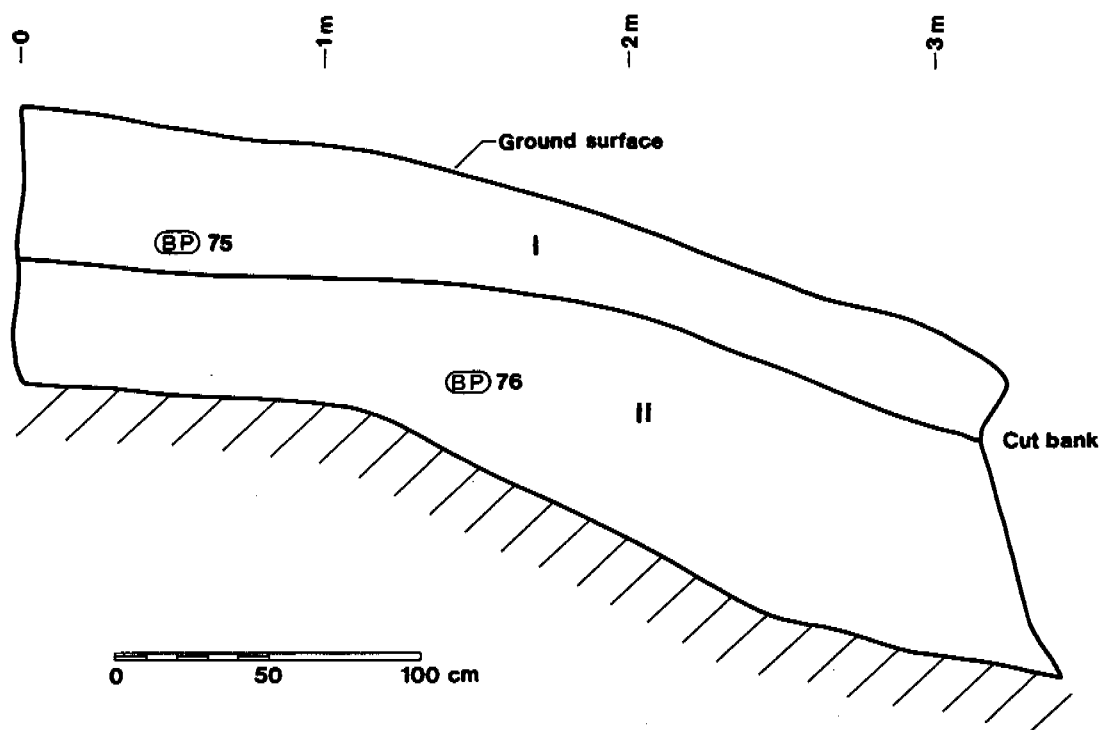
I 0-20 cm - Dark yellowish brown (10YR3/6, moist) sandy loam; strong; sticky, plastic; less than 10% gravel; few fine roots; abrupt broken boundary.

II 20 cm + - Dark yellowish brown (10YR4/4, moist) sandy loam, yellowish brown (10YR5/6, dry); moderate; slightly sticky, slightly plastic; slightly hard; no gravel; very few micro roots.

/// Unexcavated

(BP) Flotation and pollen samples

Figure 16.8. Site LA 115324 Study Unit 5, Southeast-facing Profile.



- I 0-20 cm - Very dark brown (7.5YR2.5/3) sandy loam, dark brown (7.5YR3/4, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; common fine roots; diffuse smooth boundary.
- II 20 cm + - Dark yellowish brown (10YR3/4, moist) sandy loam, dark yellowish brown (10YR4/6, dry); strong; sticky, plastic; slightly hard; no gravel; few fine roots.
- (BP) Flotation and pollen samples
- 75 Field specimen no.
- /// Unexcavated

Figure 16.9. Site LA 115324 Study Unit 6, Southeast-facing Profile.

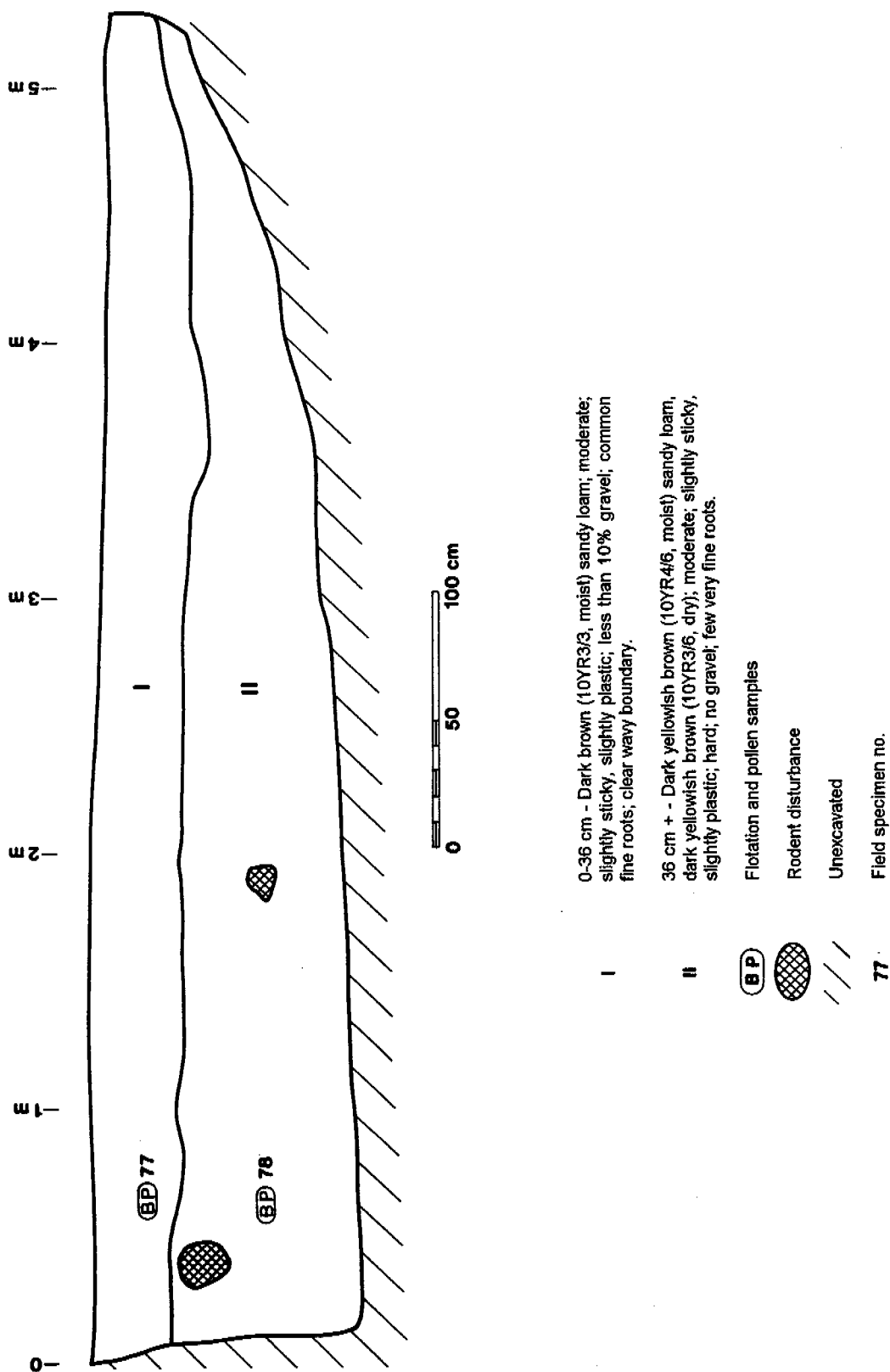
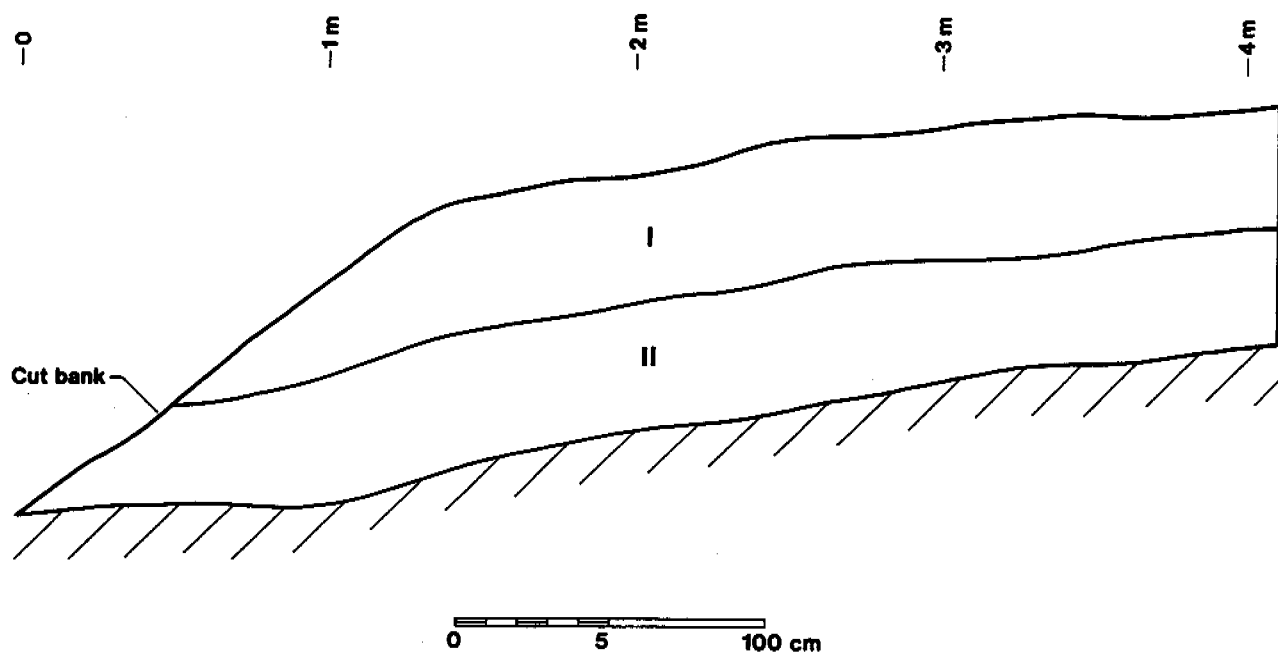


Figure 16.10. Site LA 115324 Study Unit 7, Southwest-facing Profile.



I 0-44 cm - Dark brown (10YR3/3, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; many medium roots; abrupt smooth boundary.

II 44 cm + - Dark yellowish brown (10YR3/6, moist) sandy loam; moderate; slightly sticky, slightly plastic; less than 10% gravel; very few fine roots.

/// Unexcavated

Figure 16.11. Site LA 115324 Study Unit 8, Northwest-facing Profile.

Highway 602. Feature 6 was encountered during surface artifact tabulations, outside the right-of-way on the west side of the road. Features 1 through 4 were charcoal stains, and Features 5 and 6 were considered indeterminate sandstone rock scatters. When possible the feature's were investigated by bisecting them and excavating one half in one complete level to the bottom of the feature. Prior to removal of the opposite half a wall profile was drawn of the features sediment deposit(s), with flotation and waterscreen samples retrieved from the deposit(s). The remaining fill was then removed either in one complete level or by feature strata. All general fill of the feature was screened through 1/8-in hardware mesh.

Feature 1

Feature 1 was an earthen pit located at site grid coordinates N93.86, E154.50 (Figure 16.3). In plan view the feature was very irregular-shaped measuring 50 cm north-to-south by 22 cm east-to-west. A north-to-south cross section reveals an irregular shape with a maximum depth of approximately 21 cm (Figure 16.12). The original plan view and cross-section appearance of Feature 1 is thought to have been slightly oblong and basin-shaped measuring 28 cm north-to-south by 22 cm east-to-west as shown by a projected feature edge (Figure 16.12). The present appearance of the feature is thought to have been caused by heavy rodent disturbance located within the northern edge of the pit. Excavations consisted of first removing the south half of the feature which would be the majority of the original feature fill. The north half of feature fill removed included the rodent disturbance portion. The south half was removed in one complete 21-cm level, including less than 2% charcoal flecks, pebble-sized sandstones, and roots. Prior to removal of the opposite half a south-facing profile was drawn. The north half was removed in one complete 15-cm level, revealing heavy soil disturbance most likely caused by rodent activity which was observed at the base of the feature. No artifacts were collected in either excavation. Samples recovered from the south half included flotation and waterscreen. The feature had earthen walls along the south portion of the pit and evidence of

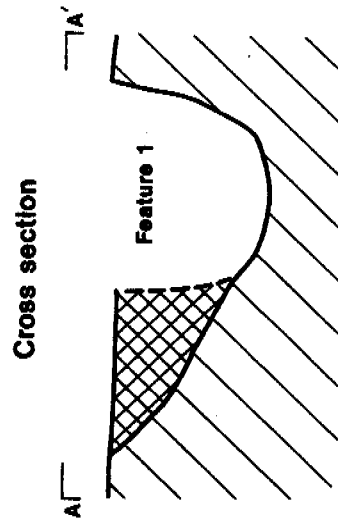
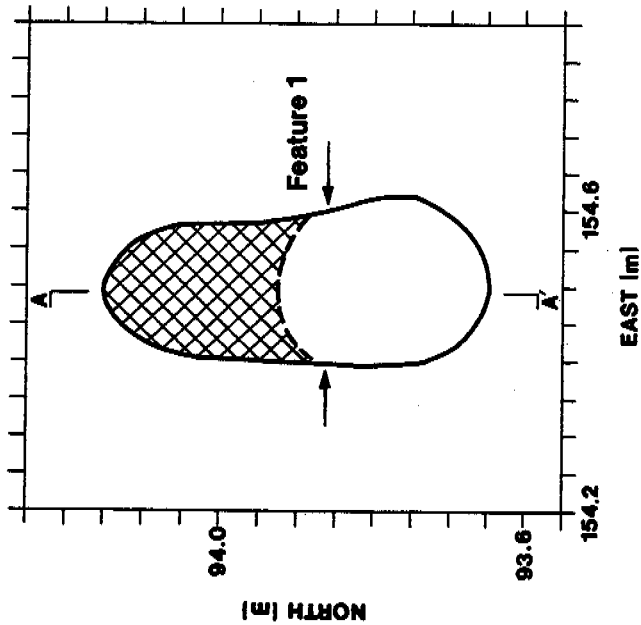
rodent activity within the northern portion of the pit. Heavy rodent disturbance combined with lack of artifacts precluded the determination of function, and Feature 1 was classified as an indeterminate earthen pit. A charred purslane seed, however, was identified from Feature 1 (discussed below).

Feature 2

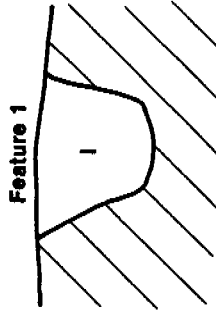
Feature 2 was an earthen pit located approximately 5 m southeast of Feature 1 at site grid coordinates N89.55, E156.44 (Figure 16.3). In plan view the feature was nearly circular measuring 70 cm east-to-west by 61 cm north-to-south (Figure 16.13). A east-to-west cross section shows an irregular-shaped pit with a maximum depth of 65 cm. A west-facing profile shows a more cylindrical outline and two strata (Figure 16.14).

Excavations of Feature 2 included removal of feature fill by excavating east and west portions in two separate levels beginning at the top of the feature and ending at the bottom of the feature. The west half contained a sandy loam mixed with sparse charcoal flecks, sandstone rock spalls, decomposing sandstone, and medium-sized roots. Prior to removal of the east half, a west-facing feature profile was drawn showing two strata. Both strata contained the same wet soil consistence and were described separately on the profile due to differences in the dry consistence of the soil. It was determined that it was not necessary to excavate the east half by strata. Both halves included the same type of soil mottling. No artifacts were collected in either excavation suggesting that the pit was not used as a refuse unit after abandonment and was subsequently naturally filled.

The pit had loose earthen wall surfaces and a loose earthen surface at the bottom of the feature. Feature 2 was documented in the field as a possible earthen storage pit, considering the depth and shape of the feature (Figure 16.14). This interpretation is supported by the possible maize cupule (from which the radiocarbon sample was taken) and maize pollen recovered from the feature (described below).



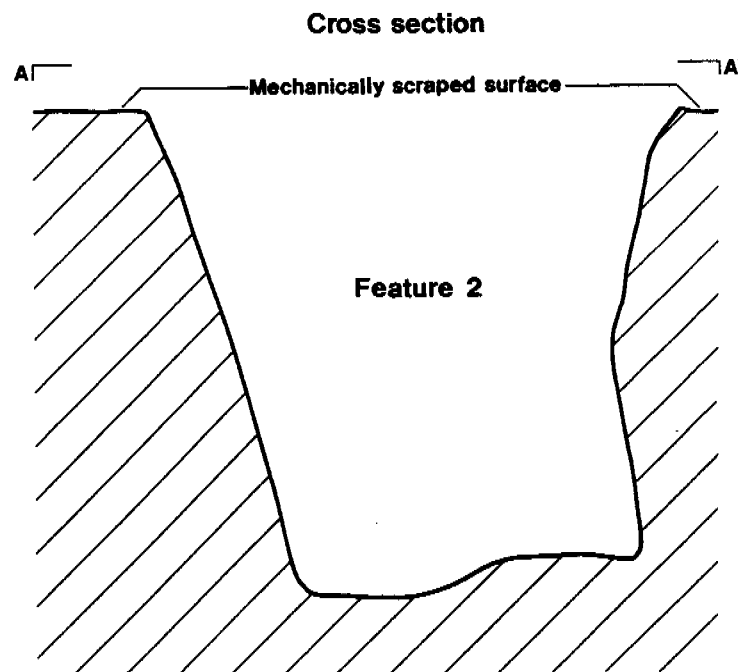
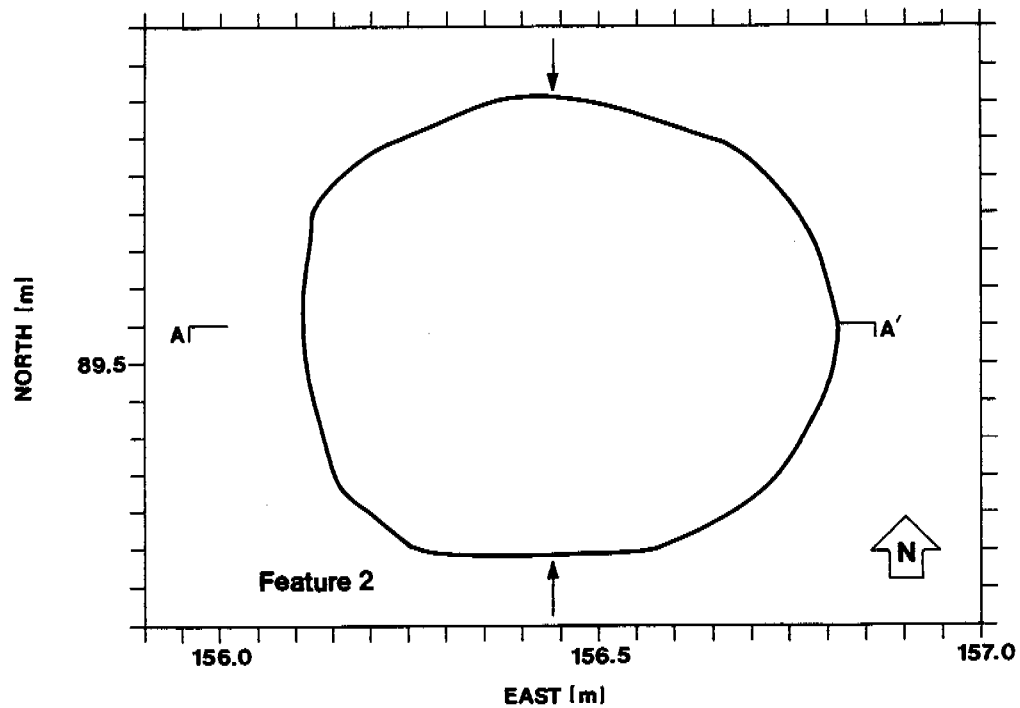
South-facing profile



0-15 cm - Very dark grayish brown (10YR3/2, moist) sandy loam, dark grayish brown (10YR4/2, dry); moderate, slightly sticky, slightly plastic; slightly hard; less than 10% gravel; few micro roots; abrupt smooth boundary.

- Projected original edge of Feature 1
- ▨ Rodent disturbance
- A—A' Cross section
- /// Unexcavated
- Profile location

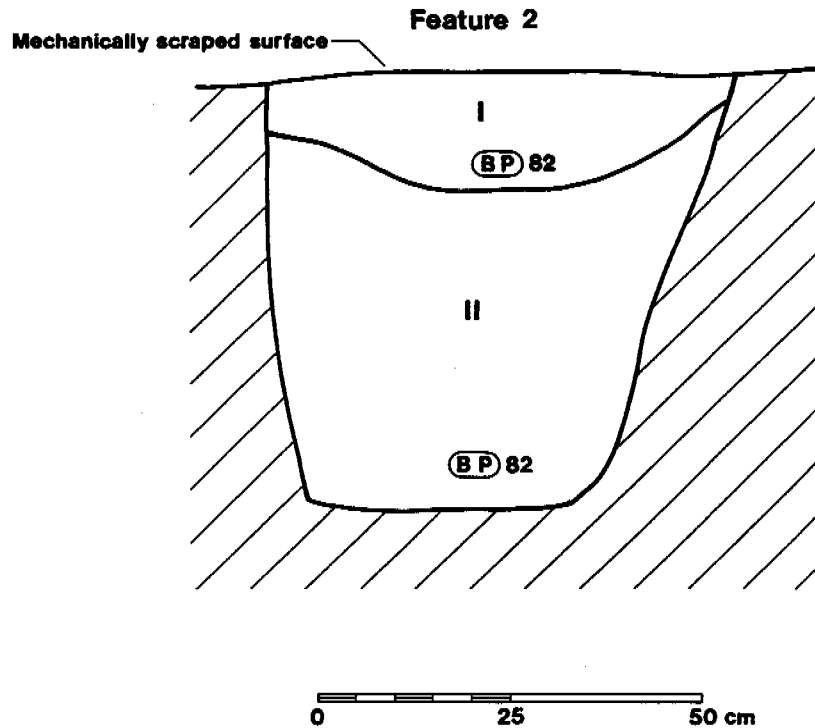




- Edge of Feature 2
- A A' Cross section
- /// Unexcavated
- ← Profile location

0 25 50 cm

Figure 16.13. Site LA 115324 Feature 2, Plan View and Cross Section.



- I 0-16 cm - Dark brown (10YR3/2, moist) sandy loam, dark grayish brown (10YR4/2, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; many micro roots; abrupt wavy boundary.
- II 16-57 cm - Dark brown (10YR3/3, moist) sandy loam, dark yellowish brown (10YR4/6, dry); weak; nonsticky, nonplastic; slightly hard; less than 10% gravel; few micro roots; very abrupt wavy boundary.
- (BP) Flotation and pollen samples
- /// Unexcavated
- 82 Field specimen no.

Figure 16.14. Site LA 115324 Feature 2, West-facing Profile.

The radiocarbon sample dated to 4870 ± 40 BP (Beta-123604; maize cupule and charred *Pinus* sp.; $\delta^{13}\text{C} = -21.6\text{‰}$; Appendix A). As this would represent an example of extremely old maize, the accuracy of the date is in question. Feature 2 and the other subsurface features, are preceramic and date at least to the Basketmaker II period based on their stratigraphic position.

Feature 3

Feature 3 was an earthen pit located approximately 5 to 6 m directly southeast of Feature 3 at site grid coordinates N84.82, E158.85 (Figure 16.3). Attributes of Feature 3 are very similar to those of Feature 1, including rodent disturbance that destroyed a portion of the feature wall edge. In plan view Feature 3 was irregular-shaped measuring 60 cm southwest-to-northeast by 33 cm northwest-to-southeast. A cross section of the pit exhibits an irregular shape with a maximum depth of approximately 30 cm. The projected plan view of the original pit is circular measuring 35 cm in diameter (Figure 16.15). Excavation procedures of Feature 3 included removing the northeast half which would be the majority of the projected original feature, and removing the southwest half of feature fill that includes the portion affected by rodent disturbance. Both portions revealed 1% charcoal inclusions and gravel-sized sandstone rocks mixed in a sandy loam. The southwest half included evidence of rodent activity mostly along the wall edges and the floor surface of the pit. No artifacts were collected in either excavation. Flotation and waterscreen samples were taken within the southwest portion. Prior to removal of the southwest half of the feature a northeast-facing profile was drawn that exhibits one stratum and the same type of feature fill described above (Figure 16.15). The pit had loose earthen walls and a loose earthen surface at the bottom of the feature. Investigations of Feature 3 provided no relevant information to determine the function of the pit, considering the heavy rodent disturbance, and Feature 3 was documented as an indeterminate pit.

Feature 4

Feature 4 was an earthen pit located approximately 2 m northeast of Feature 3 at site

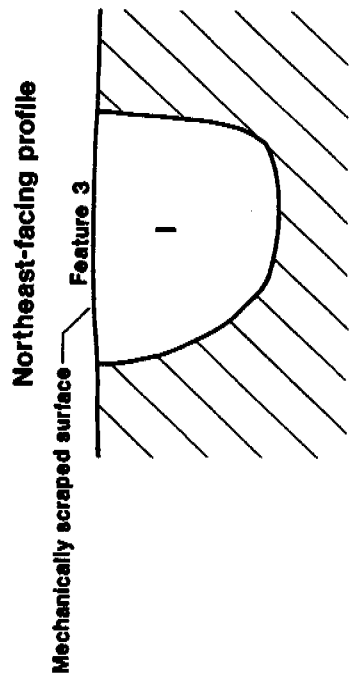
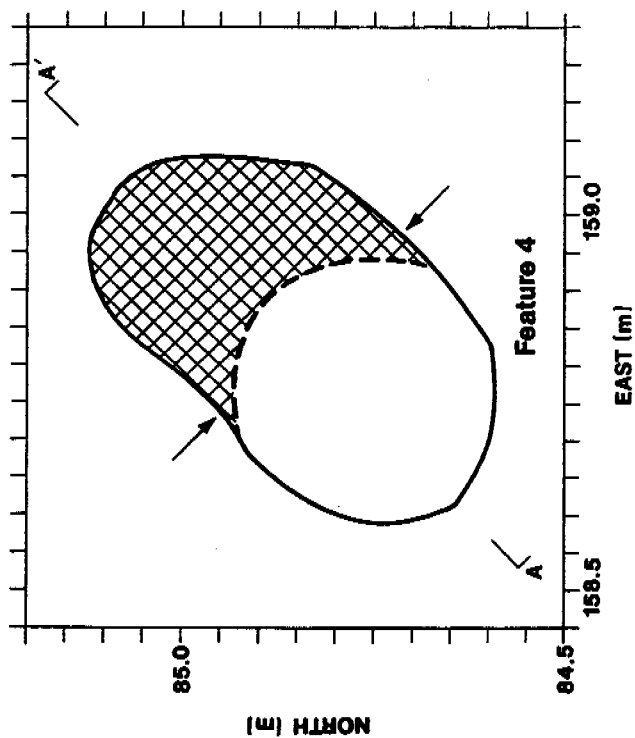
grid coordinates N85.16, E160.53 (Figure 16.3). In plan view the feature was circular measuring 45 cm in diameter. A east-to-west cross section reveals a basin-shaped pit with a maximum depth of approximately 31 cm (Figure 16.16). The feature was excavated in east and west portions in two separate 27-cm levels. The fill of the east half consisted of a sandy loam mixed with 1% charcoal inclusions, sandstone rocks less than 10 cm in size, and evidence of root and rodent disturbance observed throughout the excavation. Prior to removal of the opposite half an east-facing profile was drawn of the feature matrix, revealing a single stratum (Figure 16.16). Similar sediment deposits were observed in the west half excavation. Investigations of the interior of Feature 4 revealed semicompact earthen walls and a slightly compact earthen surface at the base of the pit, which also contained evidence of rodent disturbance. With the absence of artifacts it is assumed that the feature was subsequently naturally filled, and may have been used as a storage feature. This is supported by maize pollen and possible Indian ricegrass pollen recovered from the feature (discussed below).

Feature 5

Feature 5 was a scatter of sandstone rocks located at the far north end of the mechanically stripped area, at site grid coordinates N124.80, E142.40 (Figure 16.3). The scatter consisted of 19 pieces of unmodified sandstone rocks with no visible wall alignments or distinguishable attributes. The feature encompassed an area 1.40 m northeast-to-southwest by 1.10 m northwest-southeast (Figure 16.17). After mechanical stripping, investigations continued by manually removal of the soils around the rocks to expose the feature. No cultural deposits besides the rocks were encountered, and it was determined that no further work was necessary.

Feature 6

Feature 6 was an indeterminate scatter of sandstone rocks situated outside the project right-of-way on the west side of State Highway 602, at site grid coordinates N80.00, E108.50 (Figure 16.3). The surface scatter revealed approximately 11 sandstone rocks, which encompassed an area 2.00 m northwest-to-southeast by 1.10 m



0-24 cm - Very dark grayish brown (10YR3/2, moist) sandy loam, dark grayish brown (10YR4/2, dry); moderate, slightly sticky, slightly plastic; slightly hard; less than 10% gravel; few micro roots; abrupt smooth boundary.

Projected original edge of Feature 3

Rodent disturbance

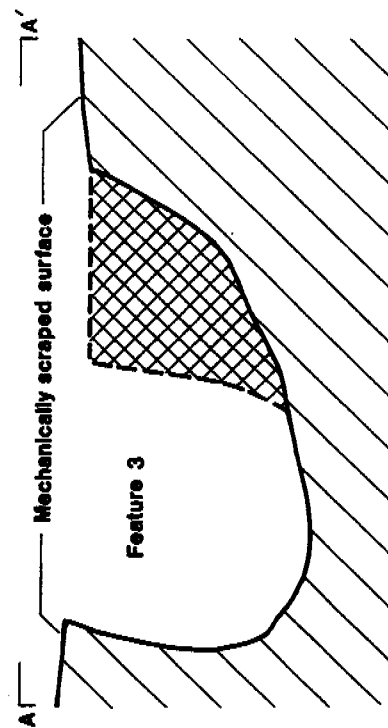
Cross section

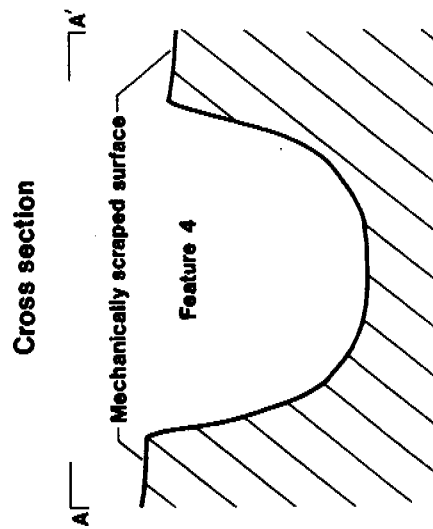
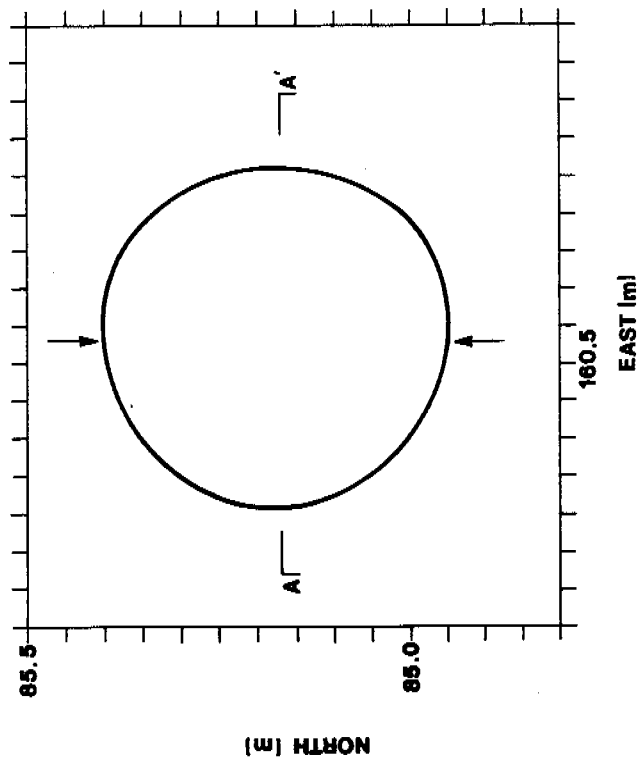
Unexcavated

Profile location

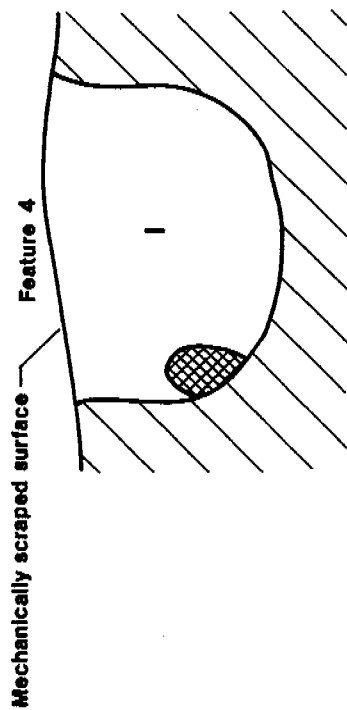


Cross section





East-facing profile



0-21 cm - Very dark grayish brown (10YR3/2, moist) sandy loam, dark grayish brown (10YR4/2, dry); moderate; slightly sticky, slightly plastic; slightly hard; less than 10% gravel; few micro roots; abrupt smooth boundary.

- Cross section
- Rodent disturbance
- Unexcavated
- Profile location



Figure 16.16. Site LA 115324 Feature 4, Plan View, Cross Section, and East-facing Profile.

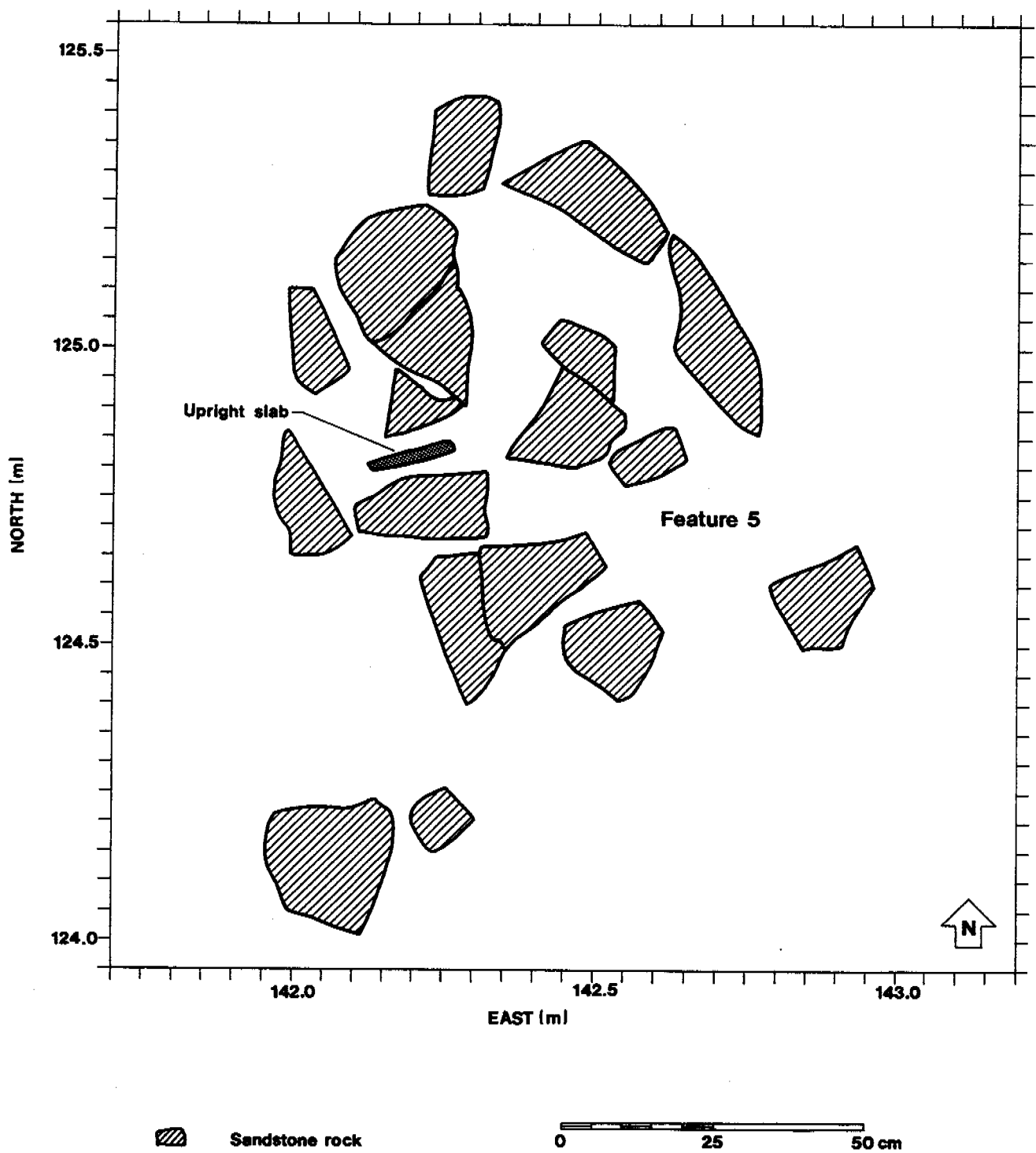


Figure 16.17. Site LA 115324 Feature 5, Plan View.

northeast-to-southwest (Figure 16.18). Due to the location of the feature outside the project boundary data recovery investigations were not implemented.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Twenty-six sherds were analyzed from site LA 115324. Of these 26, 11 were only partially analyzed due to their small size and, therefore, were eliminated from the data analysis. No other subsampling of the recovered ceramic assemblage was made, leaving 15 sherds for the attribute analysis as described in Chapter 21. All ceramic artifacts were recovered from the surface. Appendix D outlines the ceramic data by provenience. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware. The assemblage also contains wares less common to the Zuni area, such as Mogollon Brown Ware.

Chronometrics

Two diagnostic ceramic artifacts were recorded (FS 1 and 16). Both diagnostic sherds are Cibola White Ware: a White Mound Black-on-white and a Reserve Black-on-white. It is impossible to provide an accurate date range based on two diagnostic sherds, especially with such widely spaced production periods. White Mound Black-on-white was produced during the Basketmaker III to the Pueblo I periods (AD 550 to 850). Reserve Black-on-white was produced during the late Pueblo II period (AD 1050 to 1150). A mean ceramic date of AD 850 \pm 150 years was generated for the ceramic assemblage. This date is suspect due to the small sample size. Chapter 21 has further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of 10 jars, 3 bowls, and 2 ladles present in the assemblage. All sherds were identified as coming from vessel bodies. Both bowl and jar forms are represented in the whiteware sherds, while all

grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of approximately 3/1. Neither sooting nor modification was recorded for this assemblage. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site. Chapter 21 offers a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for 14 of the 15 sherds (temper in one sherd was indeterminate). In this sample, 50% of the ceramic artifacts have a combination of sherd and sand temper. This is not uncommon for Cibola White Ware, Cibola Gray Ware, or Mogollon Brown Ware. The other 50% of the ceramic artifacts have quartz or multilithic sand. This is not uncommon for early Cibola White Ware or Cibola Gray Ware. It is uncertain if quartz and multilithic sand represent local or nonlocal production without further analysis; however, the presence of a Mogollon Brown Ware is evidence of at least some nonlocal production. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The assemblage from site LA 115324 is small and comes exclusively from surface collections. Two wares common to the area are present on the site, as well as one ware uncommon to the area. Only two diagnostic ceramics were identified in the overall assemblage, making any calculation of a date range for the site suspect. Functional variation among ceramics suggests a variety of activities were practiced at the site.

Flaked Stone Artifacts

A total of 38 flaked stone artifacts were recovered in surficial contexts at site LA 115324. All of these artifacts are attributed to the Pueblo II (surface) occupation of the site. Eight artifact classes are represented in this assemblage. The assemblage comprises (in decreasing order of representation) 16 pieces of debitage, 11 pieces of debris, 4 cores, 2 retouched pieces, 1 denticulate,

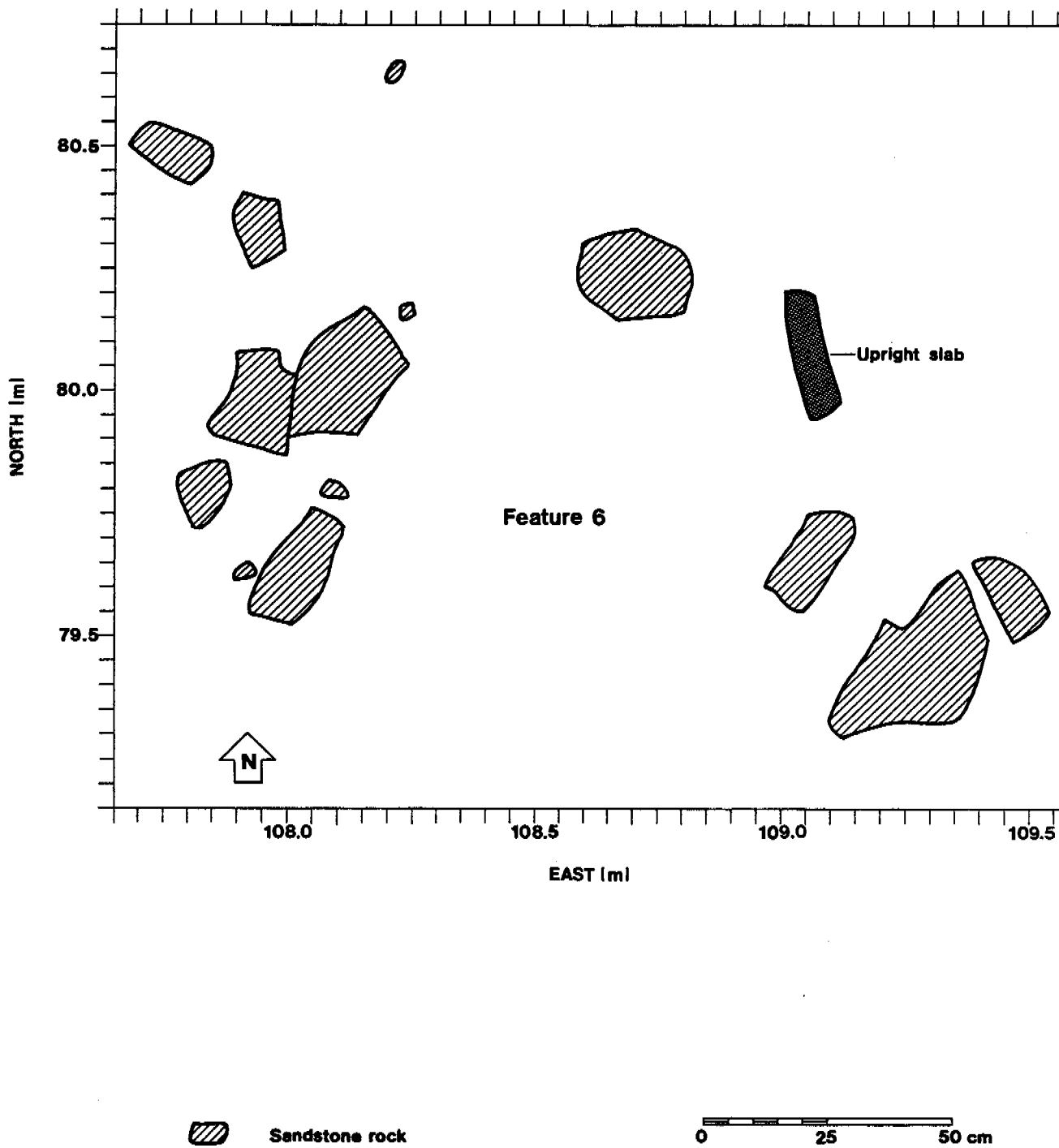


Figure 16.18. Site LA 115324 Feature 6, Plan View.

1 hammerstone, 1 scraper, 1 utilized piece, and 1 other. The artifact classified as "other" has been omitted from further analysis because it appears to be a natural pebble bearing modern machine or tool damage. Table 16.1 provides summary metric data for the flaked stone artifacts in this collection.

Lithic reduction products and artifacts associated with the reduction process (e.g., the hammerstone) comprise 86.5% of this assemblage. Two cores and two core fragments are present. Of the two complete cores, one is a silicified wood, single-platform core and other is a chert, multiple-platform core. The two core fragments are both chert. The debitage consists of seven primary flakes, nine secondary flakes, and one bifacial thinning flake. Five of the 14 pieces of debitage for which platform data are available show evidence of platform preparation. Two are single faceted, one is multifaceted and ground or abraded, one is multifaceted, and one is ground or abraded. Four pieces have cortical platforms and one contains ventral lipping. Only one piece has a platform bearing percussion marks.

Given the small size of this assemblage, it is highly diverse with respect to its raw material composition. Twenty-six pieces (68.4%) are chert, 5 (13.2%) are silicified wood, 3 (7.9%) are quartzite, 2 (5.3%) are quartz, 1 (2.6%) is obsidian, and 1 (2.6%) is a sedimentary, carbonate rock. The obsidian artifact is a retouched flake weighing 5 g. It has shallow to invasive inverse retouch along the right proximal and right medial edges. Moderate, discontinuous edge damage is present around the remaining perimeter of the piece. This obsidian artifact is the only piece in the collection made on a nonlocal raw material.

The formal and informal tool collection at site LA 115324 also proved to be highly diverse in light of the small size of the assemblage. The presence of two retouched pieces, one denticulate, one scraper, and one utilized piece suggests that a fairly wide variety of activities beyond lithic reduction occurred during the occupation.

Ground Stone Artifacts

Six ground stone artifacts were recovered from site LA 115324. Five of these were from the

surface and one was from SU 1, a 1-by-1-m hand-excavated unit. The artifacts recovered from the surface include two active abraders, one two-hand mano, one trough metate, and one disk (Table 16.2).

A complete active abrader was found within SU 1. It was made from sandstone and exhibits light use on one side and moderate use on the other. The light-use side has been completely ground flat. The moderate use side is the only use-surface with parallel striations.

Macrobotanical Remains

A sample was examined from each of the four pits. Features 3 and 4 produced uncharred purslane and dropseed grass seeds. These should be considered as modern intrusives. Features 1 and 2 yielded the only charred nonwood remains. A charred purslane seed was identified from Feature 1 and a possible maize cupule fragment was recovered from Feature 2. The size of the possible cupule fragment prohibited any positive identification of the specimen. Although there are numerous documented uses of purslane in the ethnographic literature (Castetter 1935:43; Harrington 1967:87-89; Kirk 1970:32), interpretation of a single seed is difficult. Wood taxa identified during analysis of flotation and radiocarbon samples from Features 1, 2, and 4 included unknown conifer and pine.

Extensive root and/or rodent disturbances were documented during excavation of all features. These disturbance factors along with heavy water movement of artifacts downslope (a historic occupation of the area was also noted upslope of site LA 115324) precludes an accurate interpretation of the floral remains.

Pollen

Three samples were analyzed from site LA 115324 from a cylindrical pit (Feature 2), a basin-shaped pit (Feature 4), and a possible runoff ditch 70 cm below ground surface in SU 2 (FS 66). In the Feature 2 base sample the notable pollen types included 5% sagebrush, 15% grass, <1% maize, and presence of a large grass type which may represent Indian ricegrass. The Feature 2 sample pollen concentration was approximately 1000 gr/

Table 16.1. Summary Metric Data for Site LA 115324 Pueblo II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	2.7	2.1	0.9	14.0
10% trimmed mean	2.4	1.9	0.8	6.2
Median	2.4	1.7	0.6	1.5
Standard error	0.3	0.2	0.2	5.5
Standard deviation	1.6	1.2	0.9	33.6
Minimum	1.0	0.5	0.1	-
Maximum	7.4	5.5	4.2	171.0
Range	6.4	5.0	4.1	171.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

Table 16.2. Ground Stone Artifacts Recovered from the Surface of Site LA 115324.

FS No.	Artifact Type	Raw Material	Description
6	Active abrader fragment	Sandstone	Multidirectional striations on one surface; shaped.
33	Active abrader - complete	Sandstone	Parallel striations on one surface
47	Two-hand mano fragment	Vesicular basalt	No striations; both surfaces ground; one side ground to a polish; shaped.
42	Trough metate fragment	Sandstone	Parallel striations on one surface; pecked
44	Disk fragment	Sandstone	Multi-directional striations on both surfaces; edge ground; shaped; originally circular

cc. The base sample from pit Feature 4 produced a concentration of 800 gr/cc and high pine with 11% ponderosa pine pollen and 26% pinyon. Other significant pollen types included 1% maize pollen, 6% grass, and presence of large grass type. Maize, grass, and perhaps Indian ricegrass may have been stored or manipulated in the two pit features and some use of pinyon seems indicated in Feature 4. The ditch sample (FS 66) was characterized by a high sample concentration for the site (2600 gr/cc), high values of Chenopodium (29%) and sunflower family (30%), and moderate grass (5%) and beeweed (3%). The assemblage from the ditch sample is interpreted to reflect primarily weedy plants growing on disturbed ground.

STRATIGRAPHY

Five mechanically excavated trenches along the western portion of site LA 115324 revealed two laterally continuous strata. Stratum I is a dark brown to dark yellowish brown sandy loam that ranges between 20 and 40 cm thick. This stratum is similar to the humic A horizons observed at other sites in the project area. Cultural materials were recovered from the surface of this stratum, and to a depth of approximately 40 cm. Underlying this stratum is a lighter (dark yellowish brown) sandy loam that is sterile of cultural material or features.

Two mechanically excavated trenches within the eastern portion of the site revealed three deposits. A thin (6-cm) deposit identified as a brown to dark brown sandy loam caps the underlying strata. A thick (60- to 88-cm), dark yellowish brown sandy loam underlies this deposit, and is the stratum in which the features were located (Stratum II). Along the interface between Strata II and III in SU 2 a small (40-cm-wide by 15-to-20-cm-deep) drainage-like concavity was observed. Analysis of a pollen sample from the fill of this "feature" revealed high Chenopodium pollen. This suggests a weedy, disturbed area nearby. Similar concavities were also recorded at sites LA 48695 and LA 115323, each with weedy pollen signatures.

CHRONOMETRIC DATA

Chronometric data from site LA 115324 comprise a single radiocarbon sample from Feature 2, and the ceramic artifact assemblage. A possible charred maize cupule from Feature 2 was used for Accelerator Mass Spectrometry (AMS) dating. Beta Analytic, Inc., requested additional material, when it was determined the possible cupule did not contain a sufficient content of carbon for dating. A small fleck of charred *Pinus* was sent to supplement the sample. The combination of the cupule and the wood charcoal returned a date of 4870 ± 40 BP (Beta-123604, Appendix A), with a calibrated intercept date of 3655 BC. Without additional sampling, however, we may not know if it is an accurate date for this component.

The ceramic artifact assemblage allowed an estimate for the age of the later component at site LA 115324. Eckert calculated a mean ceramic date of $AD\ 850 \pm 150$ years for this component, which is primarily on the western side of the highway. Potential occupation, however, ranges between AD 550 and 1150. Given the numerous Pueblo II sites upslope and to the west, this component is believed to be primarily of that time period.

SUMMARY

Site LA 115324 is a multicomponent site located at the base of the western slope overlooking the valley bottom of Y Unit Draw. The earliest component includes a possible late Archaic occupation along the easternmost portion of the site, adjacent to the valley margin. This component was dated to 4870 ± 40 BP (Beta-123604, Appendix A). Based on the types of features and the archaeobotanical remains recovered from them, agricultural and subsistence-related activities were a focus of the occupation during this time. Pollen recovered from a possible drainage or runoff ditch located 70 cm below the surface indicates a weedy environment was present in this location. This possible ditch is similar to the ones observed at

site LA 48695. Both Cheno-Am and sunflower pollen were recovered from these drainage features. It is equivocal whether this "feature" dates to the late Archaic. Based upon its stratigraphic position, however, it is consistent with other preceramic (pre-AD 400) strata within the project area.

The later component potentially dates from the late Pueblo I into the Pueblo II, even though only two diagnostic ceramic artifacts were recovered.

Two indeterminate sandstone features (Features 5 and 6) may be associated with this later occupation. Without additional testing outside the right-of-way, it is impossible to determine the nature of this occupation further. Numerous archaeological sites are located upslope (to the west) and are within 100 to 200 m of site LA 115324. It is possible that site LA 115324 acted as an area in which to conduct limited or specialized activities, while more permanent domestic facilities were located upslope.

Chapter 17

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115323

Jeffery Waseta and James W. Kendrick

**with Analytic Contributions by Suzanne L. Eckert, Janet Hagopian,
Pamela McBride, Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations were conducted at site LA 115323 between 9 March and 6 April 1998. Located on an east-facing slope of a bedrock ridge at an elevation of 2109 m (6920 ft). The site comprises a single-room masonry structure and ceramic and lithic artifact scatter. The data, although limited, suggest the masonry room dates to the early Pueblo III period. This was the only masonry structure excavated during the entire project. The site is located entirely on the west side of the road, with a vegetation cover primarily of pinyon, juniper, sagebrush, grasses, and narrowleaf yucca.

SURVEY RESULTS

Abbott (1997:19) recorded Feature 1 as a semicircular sandstone feature associated with a scatter of lithic artifacts, ceramics, and sandstone. Burned earth was also noted in association with the feature, which was eroding out of the western road cut bank (Figure 17.1). Ceramic artifacts observed at this time comprised plain whiteware, unidentified black-on-white, and unidentified black-on-red. Lithic artifacts observed included two pieces of chert debitage. Abbott dated the site to the late Pueblo II period. No other surveys had recorded this site prior to the inventory phase of this project.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to excavations, a pedestrian survey was conducted in transects at 2-m intervals across the site to locate all surface artifacts and features. Each artifact observed was marked with a pin flag

and point located with a Sokkia Total Station. Only those artifacts within the right-of-way were collected. As Figure 17.2 illustrates, surface artifacts were concentrated in the northern portion of the site. A concentration of ceramic and lithic artifacts was observed near Feature 1, a small masonry structure. The absence of artifacts in the south-central portion of the site (Figure 17.2) is likely the result of disturbance from previous road construction, as the study units in this portion of the site demonstrated.

Excavation

Hand Excavation

Hand excavation of three 1-by-1-m units designated as Study Units (SU) 1, 2, and 8, and one 1-by-2-m unit, SU 7, was conducted on site LA 115323. The four units were excavated in order to determine the depth and nature of cultural deposits associated with Feature 1. All units were excavated in arbitrary levels with sediment deposits screened through 1/4-in hardware mesh. Discussion of these excavations is within the feature description below.

Mechanical Excavation

Mechanical excavation of four backhoe trenches was conducted in order to determine the nature and depth of possible buried cultural deposits on site LA 115323. These trenches were designated SU 3 through 6, and ranged from 9 to 11 m in length, with an average maximum depth of approximately 1.50 m. A total of 39.59 m of trench was excavated on the site.

Study Unit 3. SU 3 was placed on the west side of State Highway 602, with the northwest end

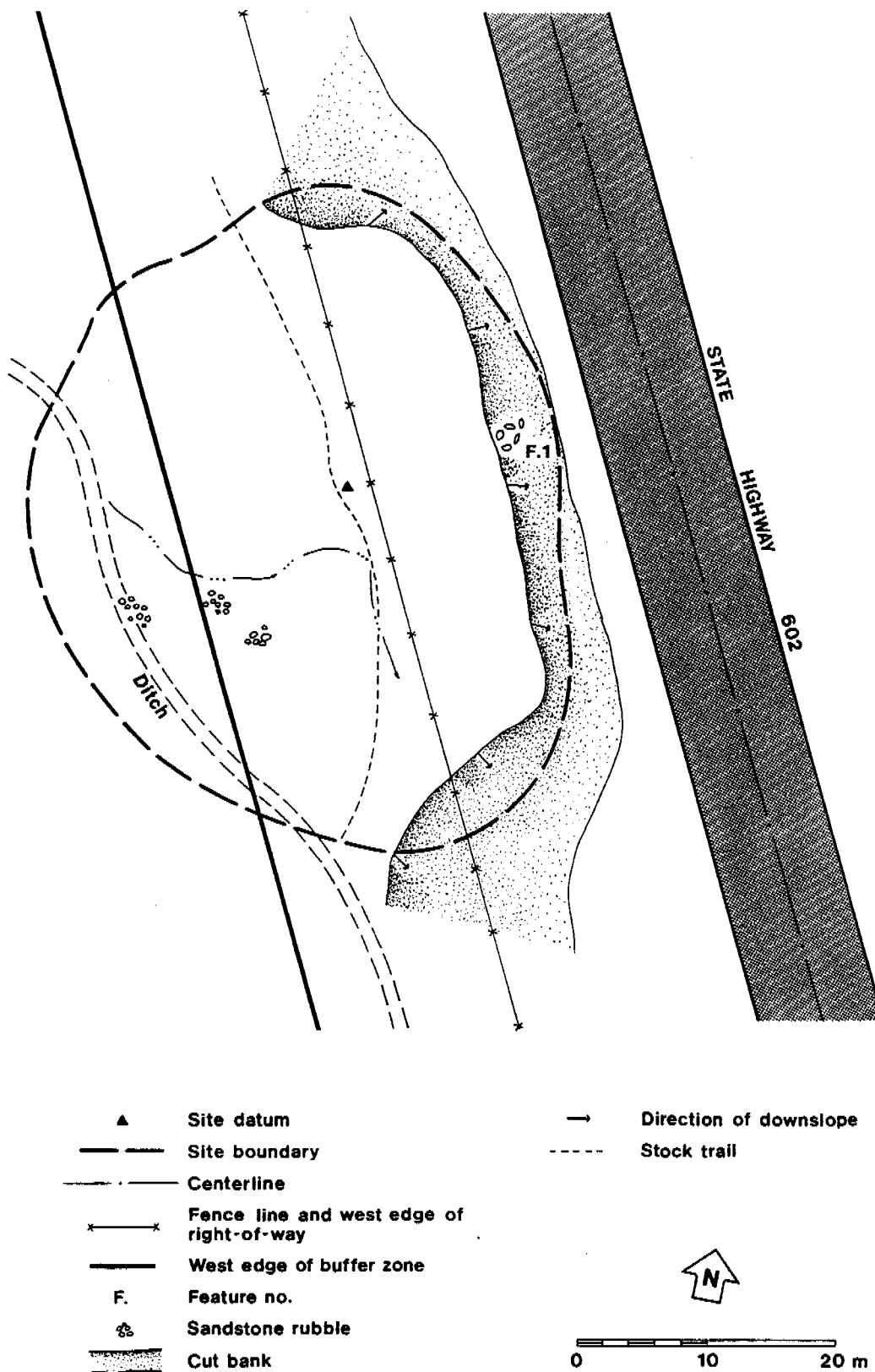


Figure 17.1. Site LA 115323 Survey Site Map.

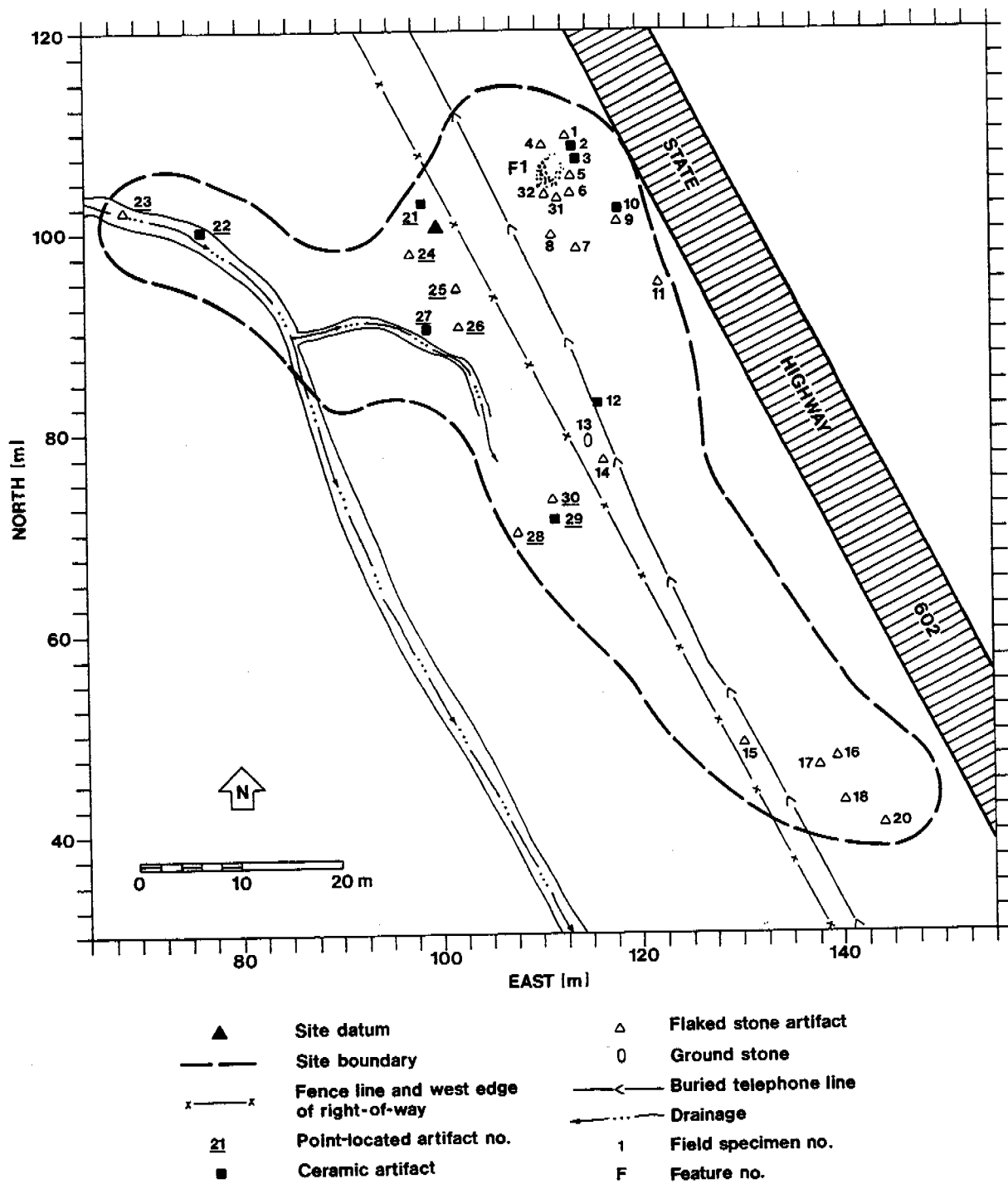


Figure 17.2. Site LA 115323 Data Recovery Site Map, Surface Artifacts.

located at site grid coordinates N111.21, E105.96, and the southeast end at N101.21, E108.62 (Figure 17.3). The trench was 10.30 m in length with a maximum depth of approximately 1.10 m. Six strata were recorded as shown along a representative 2-m-long profile of the southwest-facing wall (Figure 17.4). Stratum I was loose sandy loam overburden containing rocks and small sandstone rocks. Strata II and III appeared to be natural sediment deposits, both consisting of the same soil color and texture; the only difference between the two strata is gravel content in Stratum II that is absent in Stratum III. Stratum IV was a very hard deposit of clay mixed with a deposit of calcium carbonate. Stratum V was a deposit of a different clay mixed with approximately 25% gravel content. Stratum VI comprised a deposit of clay, light olive brown in color, that is very sticky and very plastic. No buried features were encountered during excavation of SU 3.

Study Unit 4. SU 4 was placed on the west side of State Highway 602, with the northwest end located at site grid coordinates N89.17, E114.38, and the southeast end at N83.54, E122.65 (Figure 17.3). The trench is 9.15 m in length with a maximum depth of approximately 1.50 m. Four strata were recorded as shown along a southwest-facing wall profile (Figure 17.5). Stratum I consisted of a sandy loam with at least three pockets of charcoal deposits located at the lower boundary of the stratum. One flotation and one pollen samples were collected from the charcoal deposits and the base of Stratum I (results of analyses are discussed below). At the interface of Strata I and II a small drainage (80 cm wide by 20 cm deep) or ditch-like "feature" was observed. One radiocarbon sample from the fill of this "feature" returned a date of 3130 ± 90 BP (Beta-121235; wood charcoal; $\delta^{13}\text{C} = -21.9\text{‰}$; Appendix A). Stratum II was sandy loam with at least one quartzite cobble which may suggest the stratum to be an alluvial sediment. Stratum III comprised a clay deposit, olive brown in color with no roots or gravel. Stratum IV was a noncultural light yellowish brown loamy sand with no roots or gravel. No buried features were encountered during excavation of SU 4.

Study Unit 5. SU 5 was placed on the west side of State Highway 602, with the northwest end located at site grid coordinates N72.92, E124.20, and the southeast end at N62.00, E128.50 (Figure 17.3). The trench was 11.14 m in length with a maximum depth of approximately 1.10 m. Six strata were documented as shown along a southwest-facing wall profile (Figure 17.6). Stratum I was a disturbed soil sediment consisting of a dark brown sandy loam mixed with modern trash and gravel. This disturbance of trash and gravel also extended into Strata II and III. Stratum IV comprised a clay deposit, dark yellowish brown in color with less than 10% gravel and with a single piece of metal within the stratum. Stratum V was another deposit of clay, olive to pale olive in color. The trash that was observed in the upper four strata was not noticed at the depth of Stratum V. Stratum VI was located at the far southeast end at the bottom of the trench; it consisted of sand, suggesting that SU 5 may possibly be in the area of a buried drainage deposit. Samples from SU 5 were recovered in Strata IV and V. No features were encountered during excavation of SU 5.

Study Unit 6. SU 6 was placed on the west side of the highway at the southern end of the site, with the northwest end of the trench located at site grid coordinates N43.78, E136.00, and the southeast end at N40.54, E144.50 (Figure 17.3). The trench was 9.00 m in length with a maximum depth of approximately 1.40 m. A total of four strata were recorded as shown along a northeast-facing wall profile (Figure 17.7). Stratum I was located at the northwest end of the trench; it was a sandy loam disturbed by modern trash and less than 10% gravel. Stratum II also had evidence of disturbance with an aluminum can located at the lower boundary of the stratum. Stratum III was a very dark brown sandy loam mixed with approximately 30% gravel and sandstone rocks approximately 10 to 20 cm in size. The bottom boundary of Stratum III resembles a possible buried alluvial deposit. Stratum IV included a higher gravel content approximately 40%, mixed with a very dark brown sandy loam. Flotation and pollen samples were collected from Strata I, III, and IV.

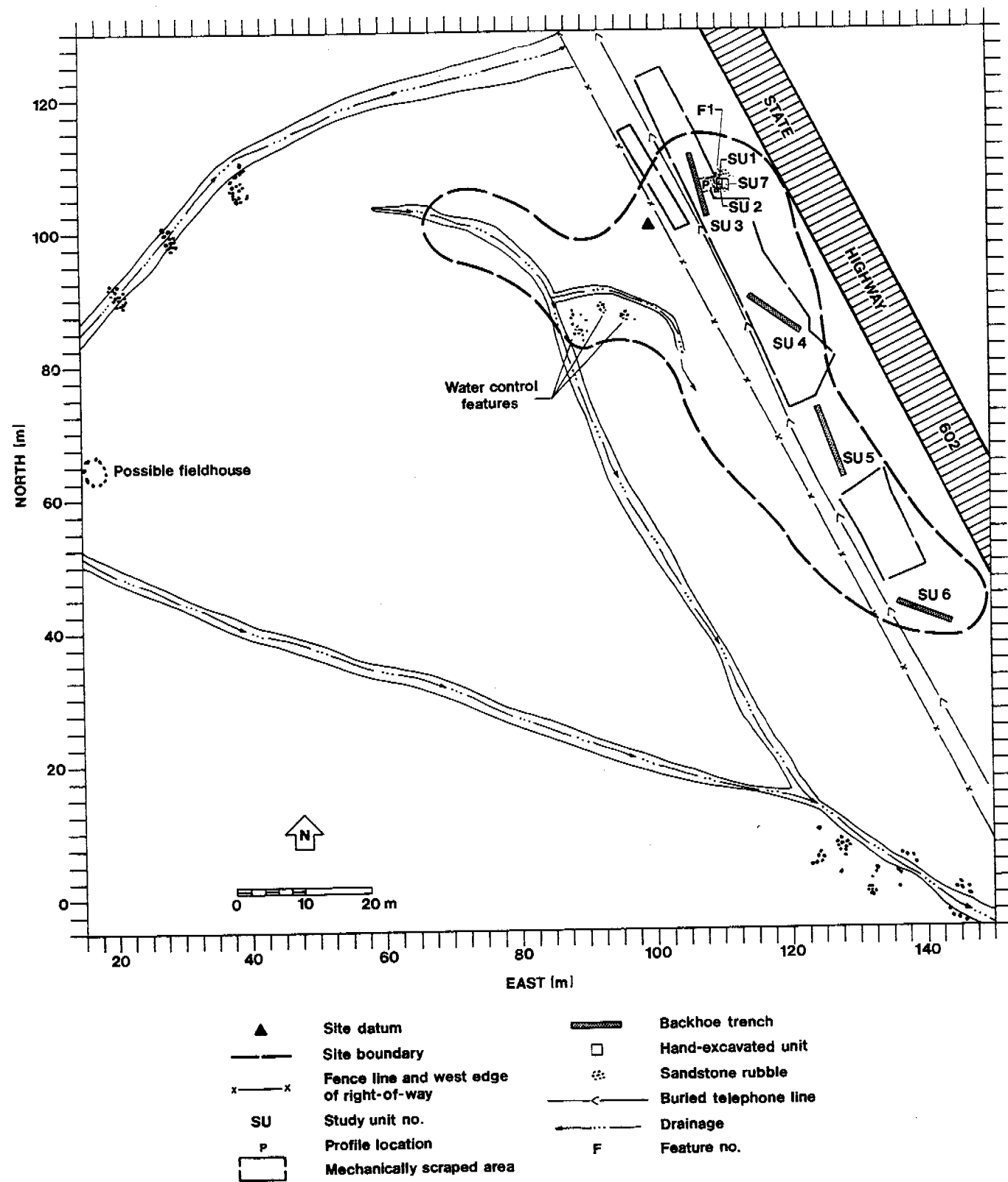
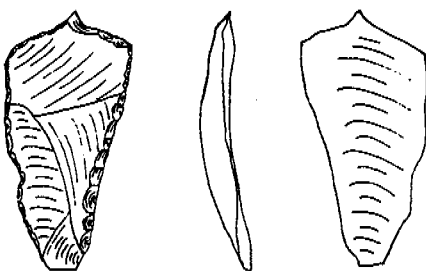


Figure 17.3. Site LA 115323 Data Recovery Site Map, Features, Study Units, and Mechanical Stripping.



Actual Size

Figure 19.18. Site LA 49838 Graver (Record Number 383).

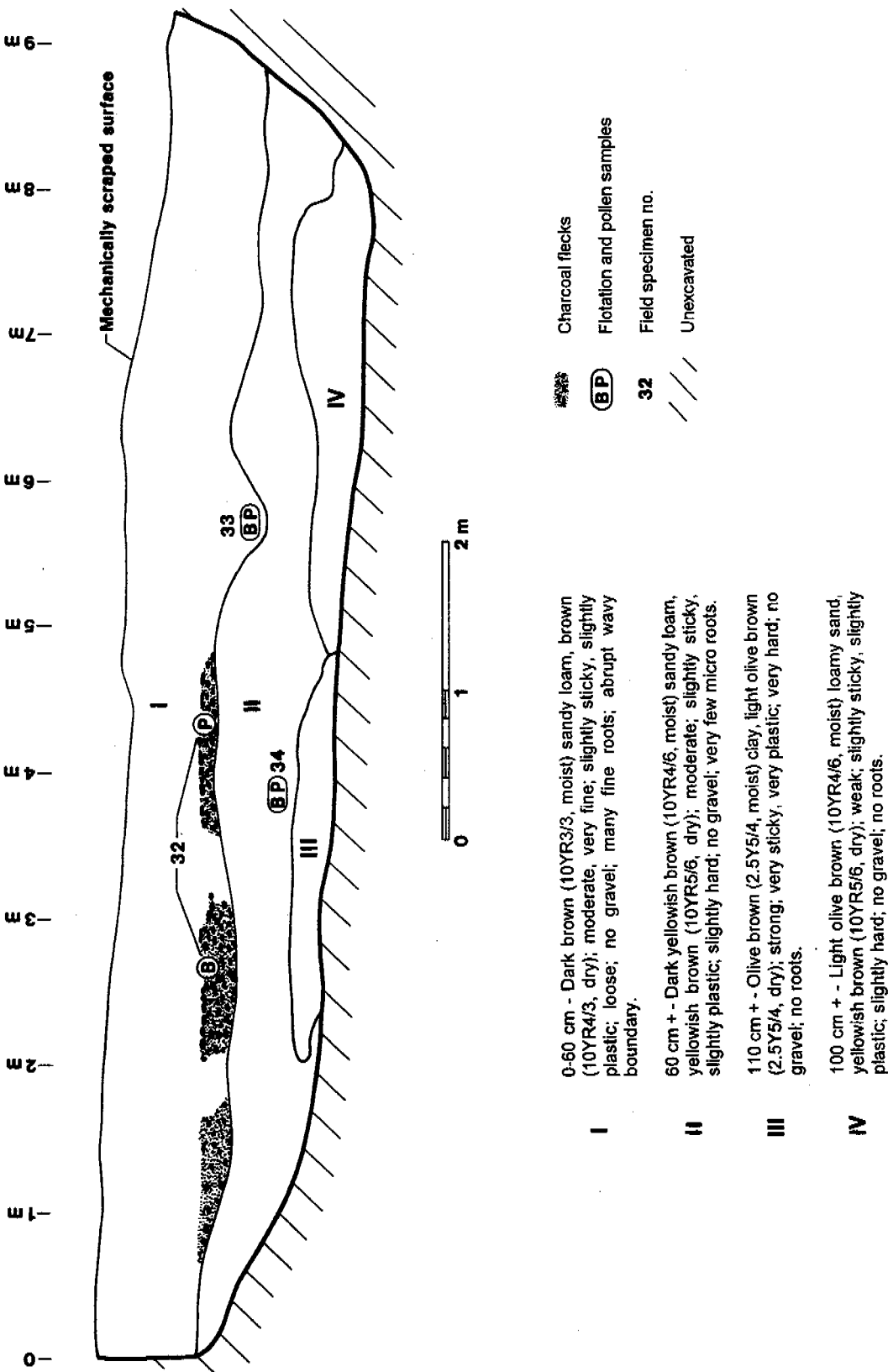
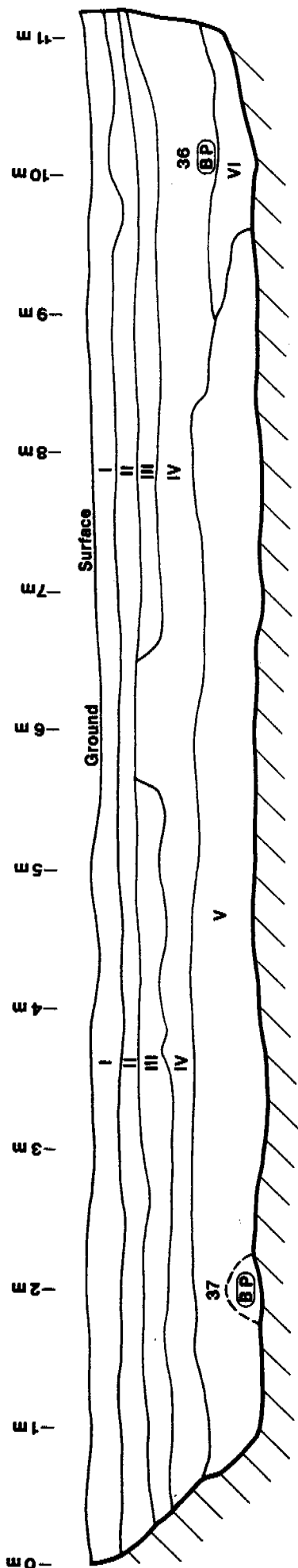


Figure 17.5. Site LA 115323 Study Unit 4, Southwest-facing Profile.



90 cm + - Strong brown (7.5YR4/6, moist) sand, strong brown (7.5YR5/6, dry); single grain; nonsticky, nonplastic; slightly hard; less than 10% gravel; no roots.

VI

- ⬤ Burned earth
- ⬤ Flotation and pollen sample
- ⬤ Unexcavated

Field specimen no.

0-20 cm - Dark brown (10YR3/3, moist) sandy loam; strong, medium; slightly sticky, slightly plastic; 25% gravel; many medium roots; abrupt smooth boundary.

I

20-30 cm - Dark yellowish brown (10YR3/6, moist) loamy sand; weak fine; slightly sticky, slightly plastic; 10% gravel; common fine roots; abrupt smooth boundary.

II

30-50 cm - Brown (10YR4/3, moist) sandy loam; weak; slightly sticky, slightly plastic; less than 10% gravel; few very fine roots; abrupt broken boundary.

III

30-70 cm - Dark yellowish brown (10YR4/6, moist) clay; strong; very sticky, very plastic; less than 10% gravel; very few, very fine roots; abrupt wavy boundary.

IV

70 cm + - Olive (5Y4/4, moist) clay, pale olive (5Y6/4, dry); strong; very sticky, very plastic; very hard; less than 10% gravel; no roots.

V

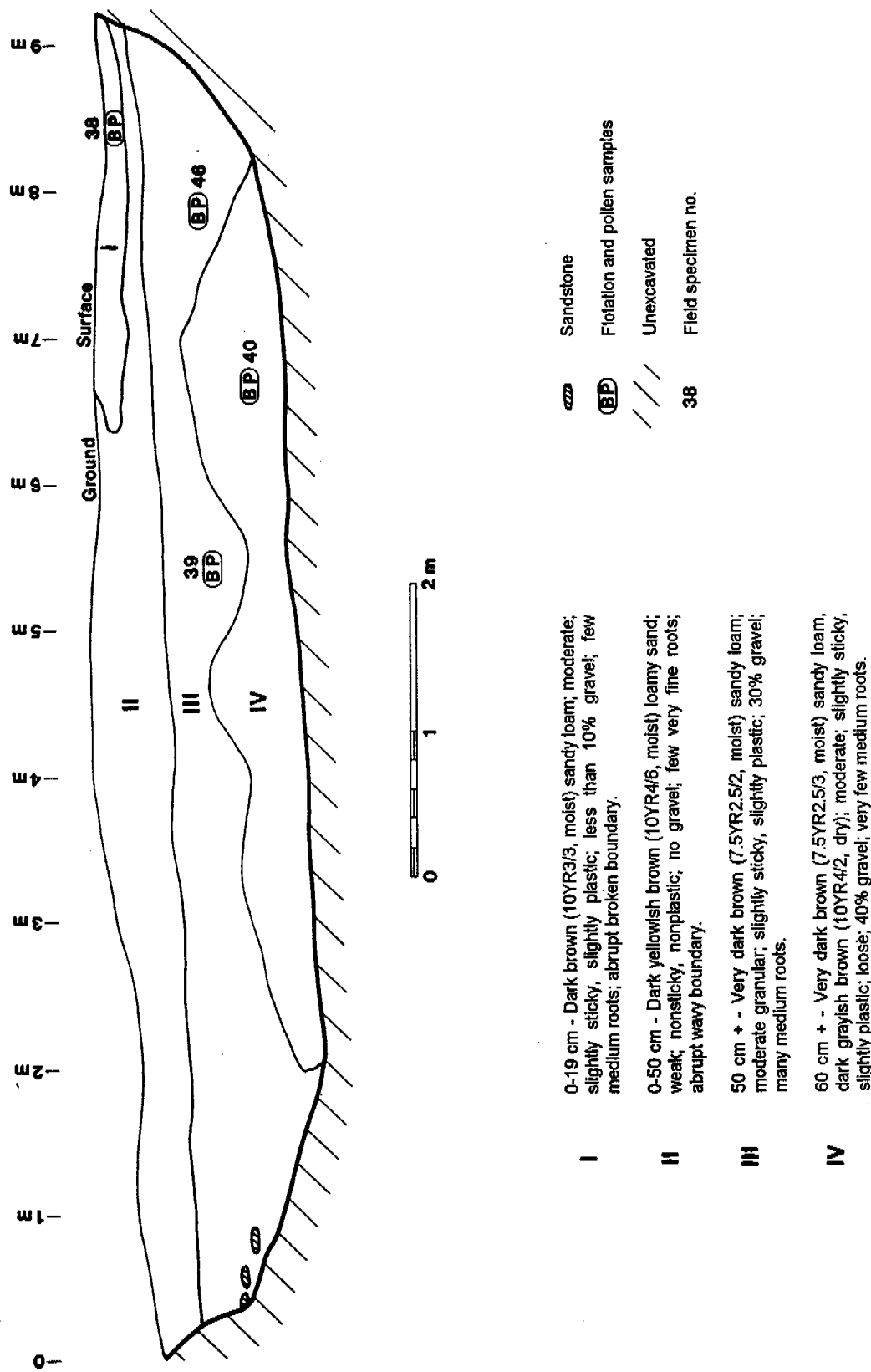


Figure 17.7. Site LA 115323 Study Unit 6, Northeast-facing Profile.

Mechanical Stripping

Mechanical stripping of three areas was accomplished on site LA 115323 (Figure 17.3), to an average depth of approximately 40 cm in the northern stripped area and approximately 80 cm within the southern portion of the site. The first area was located between the buried telephone cable and the existing fence line; it measured 17.5 m in length by 2 m in width (35 sq m). The second area measured 55 m in length by 7 m in width (385 sq m). The final area stripped measured 15 m in length by 7 m in width (105 sq m). A total area of 525 sq m was stripped. No additional features were encountered during these investigations.

Feature Description

Feature 1 was the remains of an isolated structure or fieldhouse located at site grid coordinates N105.60, E110.50 (Figure 17.3). The feature consisted of a surface scatter of sandstone rocks concentrated in an area measuring 3.00 m northwest-to-southeast by 3.50 m northeast-to-southwest (Figure 17.8). Excavations of the feature included four hand-excavated units placed within the feature, designated as SU 1, 2, 7, and 8. Results of these investigations follows.

Study Unit 1

SU 1 was a 1-by-1-m unit placed within the sandstone scatter of Feature 1, with the southwest corner of the unit located at site grid coordinates N105.59, E110.51 (Figure 17.8). A total of three 10-cm levels were excavated within SU 1. Cultural materials included ceramic and flaked stone artifacts collected in Level 2, and more chipped stone materials that were retrieved from Level 3. A single pollen sample was collected within Level 1. Excavations were halted at the base of Level 3, with the discovery of three to four large sandstone rocks located along the western edge of the unit.

Study Unit 2

SU 2 was a 1-by-1-m hand-excavated unit placed immediately south of SU 1, with the

southwest corner located at site grid coordinates N104.59, E110.51 (Figure 17.8). The placement of SU 2 was to expose and identify a possible wall alignment extending in a southerly direction. A total of four 10-cm levels were excavated. Sediments within the excavation included a dark brown to a dark yellowish brown sandy loam with charcoal deposits recorded only within the last excavation level. Dense sandstone rocks were observed within Level 3 and continued into Level 4, where another plan view map was drawn (Figure 17.9). Cultural materials included ceramic artifacts that were recovered in Level 4, along with flaked stone artifacts which were collected in Levels 1, 2, and 4. No artifacts were collected in Level 3. Samples included two pollen samples that were collected between the sandstone rocks within Level 3.

One radiocarbon sample from Level 4 within SU 2, floor context, was sent for analysis. The sample dated to 1170 ± 70 (Beta-121236; wood charcoal; $\delta^{13}\text{C} = -20.5\%$; Appendix A). The calibrated 2 sigma range for this date is AD 690 to 1010. Ceramic artifacts postdating this period (Tularosa Black-on-white, discussed below), along with pecked masonry within Feature 1 (implying a Pueblo III age) suggest this sample is "old wood" and does not accurately reflect the feature's age.

Study Unit 7

SU 7 was a 1-by-2-m hand-excavated unit placed over the east portion of Feature 1, with the southwest corner of the unit located at site grid coordinates N104.59, E111.51 (Figure 17.8). Placement of the unit was to further investigate the possibility of wall alignments or any type of architecture that may be associated with Feature 1. Two arbitrary levels were excavated in SU 7. Level 1's maximum depth was 24 cm at the southwest corner of the unit; the other corners depths ranged from 0 to 4 cm. Fill from the excavation consisted of a dark yellowish brown sandy loam mixed with low amounts of charcoal flecks, small sandstone rocks less than 10 cm in size, gravels, and many medium-sized roots. Other items observed within the sediment included glass fragments and modern

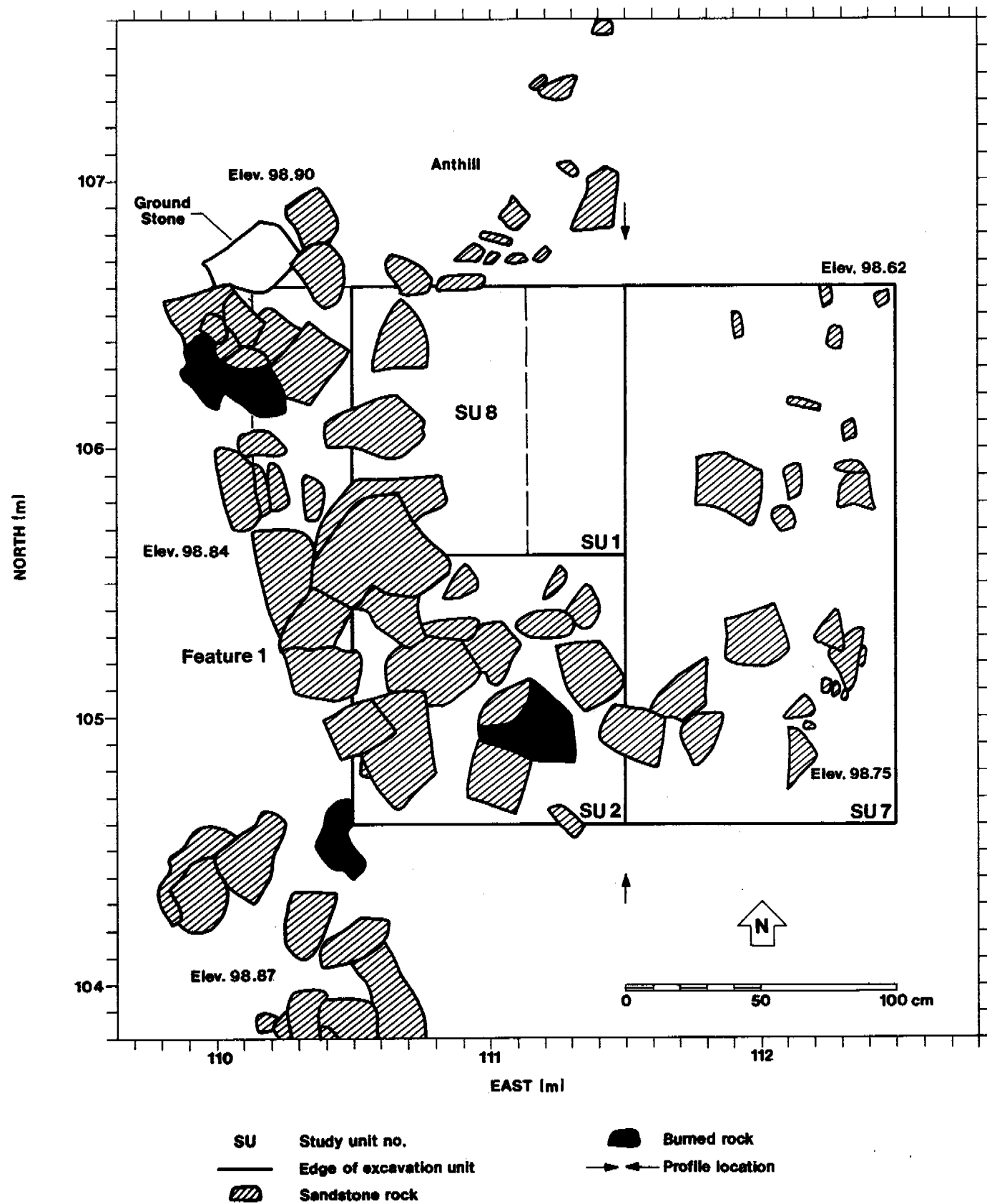


Figure 17.8. Site LA 115323 Feature 1, Plan View 1, Study Units 1, 2, 7, and 8.

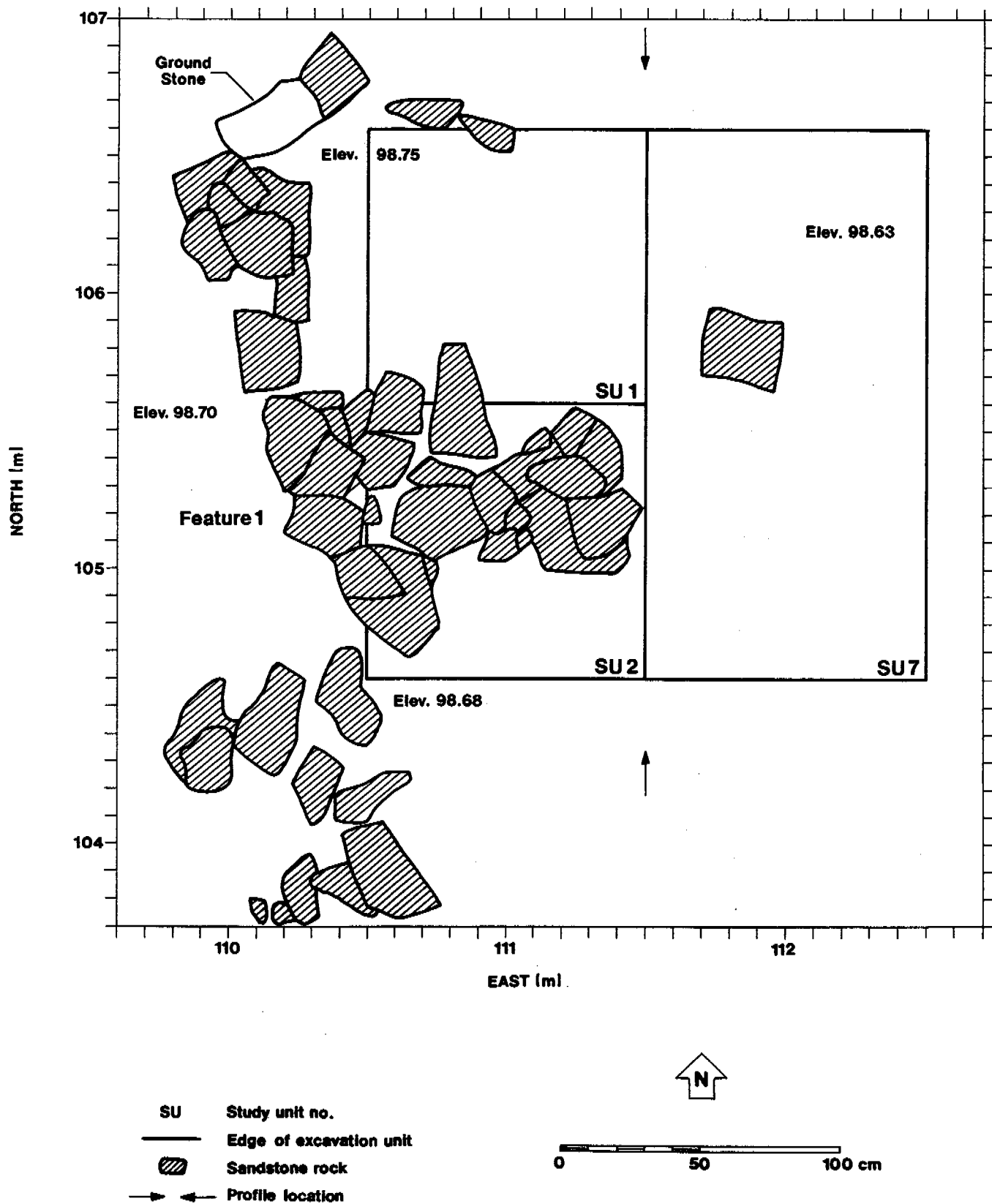


Figure 17.9. Site LA 115323 Feature 1, Plan View 2, Study Units 1, 2, 7, and 8.

trash. Cultural materials collected from the fill included flaked stone artifacts. A flotation sample was also retrieved from the lower portion of Level 1. At this point of the excavation no formal outline or architectural attributes were observed.

Level 2's maximum depth was 13 cm at the northwest corner of the unit; depths at the remaining corners of the unit ranged from 0 to 6 cm. Exposed fill was a dark yellowish brown sandy loam mixed with a moderate amount of charcoal flecks and less than 5% gravels. Root disturbance was also present along with small amounts of broken glass. The base of the level contained dark staining located within the middle of the unit. Cultural materials retrieved included ceramic and chipped stone artifacts. A radiocarbon sample was also collected towards the base of the level. Completion of Level 2 within SU 7 exposed a single sandstone rock approximately 20 to 25 cm in size (Figure 17.9), with no other visible rock alignments or additional features observed.

Study Unit 8

SU 8 was a 1-by-1-m hand-excavated unit placed over SU 1, with the southwest corner of the unit located at site grid coordinates N105.59, E110.15 (Figure 17.8). One 10-cm level was excavated revealing a surface described as the floor of Feature 1. The floor consisted of a dark yellowish brown hard surface. Along the west edge of the unit a possible wall alignment was recorded (Figure 17.9). Cultural material retrieved from the excavation consisted of a single ground stone artifact. Flotation and pollen samples were also collected.

Summary

Investigations of Feature 1 revealed architectural remains of a small masonry structure. Investigations did find a wall alignment which may have been the western portion of the structure (Figure 17.9). A minimum of two courses of sandstone were observed within an east-facing profile of Feature 1 (Figure 17.10). The remains of the structure included pecked sandstone rocks within the west wall ranging from

10 to 40 cm in size. Burned sandstone was also observed in the western wall. There was no evidence of bonding materials such as mortar. Only one floor was present in Feature 1 consisting of a slightly hard surface with no evidence of floor features of any kind. The remains of the north wall were also discovered, but were not fully excavated due to the presence of an occupied anthill. A single ground stone artifact was also present within the northwest wall of the structure.

The eastern portion of the structure is thought to have been destroyed during construction of State Highway 602 and subsequently continued to deteriorate by erosion and time. Additional features can also be found approximately 70 m northwest of the site datum. These three features are probably water-control features situated in a large drainage. There is also a possible fieldhouse located approximately 90 m southwest (upslope) of the site datum (Figure 17.3). It is unknown if these features are related to Feature 1 on site LA 115323 considering the distance and absence of surface artifacts between the features.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Ten sherds were analyzed from site LA 115323. No subsampling of the recovered ceramic assemblage was made for the attribute analysis as described in Chapter 21. Five sherds were recovered from the surface, and five sherds were recovered from excavation units in Feature 1 (SU 1, 2, and 7). Appendix D outlines the ceramic data by provenience. The assemblage contains two wares common to the Zuni area: Cibola White Ware and Cibola Gray Ware.

Chronometrics

One diagnostic ceramic artifact, recovered from Feature 1 (SU 7), was recorded. This sherd is a Cibola White Ware and was identified as a Tularosa Black-on-white. It is impossible to provide an accurate date range based on one diagnostic sherd. Tularosa Black-on-white was produced during the Pueblo III period (AD 1150 to 1300). The type has a mean ceramic date of

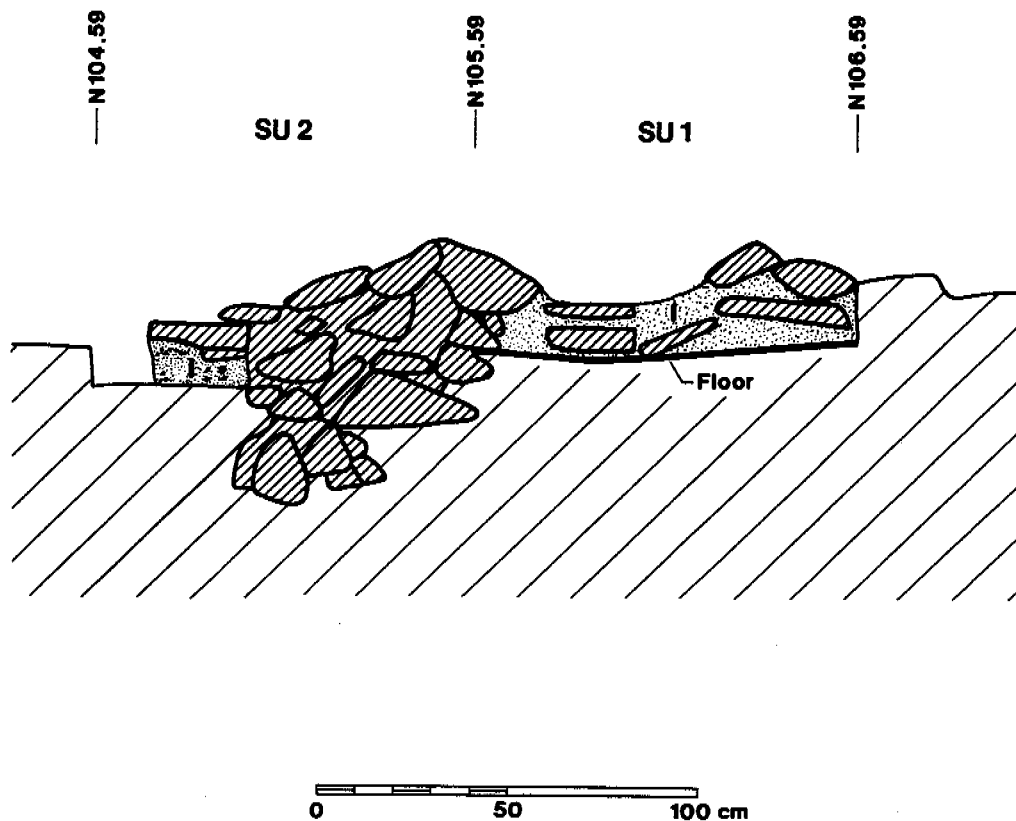


Figure 17.10. Site LA 115323 Feature 1, East-facing Profiles, Study Units 1 and 2.

AD 1225 \pm 37 years. Chapter 21 has a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of nine jar bodies and one bowl rim present in the assemblage. Both bowl and jar forms are represented in the whiteware sherds, while the grayware sherds are all jars. Overall, jars outnumber bowls by a ratio of 9/1. Sooting was recorded either on the exterior or on both surfaces of 20% of the sherds. The high jar-to-bowl ratio, along with the sooting, suggests that cooking may have been intensively practiced at the site. No modification was recorded for this assemblage. Chapter 21 offers a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for 10 sherds. Both the Cibola White Ware and Cibola Gray Ware are most commonly tempered with sherd. They are also tempered with a combination of sherd and sand. One Cibola Gray Ware is tempered with multilithic sand; this temper is not uncommon in Pueblo I or early Pueblo II Cibola Gray Ware, but it may also represent a vessel of nonlocal origins. It is impossible to tell without further analysis. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The ceramic assemblage from site LA 115323 is very small but comes from both surface and excavated collections. Two wares common to the area are present at the site: Cibola White Ware and Cibola Gray Ware. The presence of only one diagnostic sherd makes it impossible to provide a meaningful temporal range. A high jar-to-bowl ratio and sooting suggests cooking may have been intensively practiced at the site.

Flaked Stone Artifacts

A total of 28 artifacts were recovered from site LA 115323. Table 17.1 provides frequencies and percentages for the artifact classes present. Analyses of the flaked stone assemblage are discussed below.

Three artifact classes are represented among the 11 artifacts from Feature 1: cores (three), debitage (six), and debris (two). Seven (63.6%) of these artifacts are chert and four (36.4%) are quartzite. Two of the cores, a single and a multiplatform core, are chert and the remaining multiplatform core is quartzite. No formal or informal tools were recovered from Feature 1.

Of the six pieces of debitage in Feature 1, five (three quartzite and two chert) are primary flakes and one (chert) is a secondary flake. Five of the six have cortical platforms and none contain evidence of platform preparation.

A total of 17 artifacts were recovered from surficial contexts. Three artifact classes are represented among these 17 artifacts: debris (10), debitage (6), and hammerstone (1). Fifteen (88.2%) of the artifacts are chert and two (11.8%) are quartzite. The hammerstone and one piece of debris are quartzite.

Of the six pieces of debitage recovered from the surface, platform data could be obtained for four. Three of the pieces of debitage have cortical platforms. None contain evidence of platform preparation.

Ground Stone Artifacts

Two ground stone artifacts were recovered from site LA 115323. One item is a complete sandstone anvil recovered from the surface of this site. It is a small slab with concentrations of pitting and parallel striations on both sides. The other ground stone item is a sandstone abrader found within Feature 1, a one-room masonry structure. It is a slab with grinding on both sides and one edge was pecked. The grinding areas

Table 17.1. Summary Counts and Percentages of Site LA 115323 Flaked Stone Artifacts by Artifact Class.

Artifact Class	n	%
Core	3	10.7
Debitage	12	42.9
Debris	12	42.9
Hammerstone	1	3.5
Total	28	100.0

extend to the edge of the slab on both sides. One side was only minimally used. The other side shows moderate use and had multidirectional striations.

Macrobotanical Remains

Pine needles and one fragment of a nightshade family seed were the only charred nonwood floral materials recovered from the four flotation samples examined. The pine needles are probably artifacts of using pine branches for fuel that had needles still attached. The needles subsequently became part of the floral assemblage. While the fruits of several members of the Solanaceae family such as groundcherry (*Physalis* sp.) and wolfberry (*Lycium* sp.) were used as food, little can be said about a fragment that could not be identified to genus.

Wood charcoal taxa included unknown conifer, oak, pine, and cf. rose family. These fuel wood resources would have been available in the immediate vicinity of the site.

The fieldhouse was too badly compromised by highway construction and erosion to yield much information about subsistence at the site. The most that can be said is that site occupants used locally available wood for fuel.

Pollen

Three samples were analyzed from site LA 115323 from a fieldhouse floor (FS 44), a possible runoff ditch 70 cm below ground surface (FS 33), and an organic stain 40 cm below ground surface possibly associated with the runoff ditch (FS 32).

No cultigen pollen was identified in FS 44, the fieldhouse floor sample, but the pollen concentration was relatively high at 4100 gr/cc and weed pollen types were high with 42% Cheno-Am, 5% spurge, 3% buckwheat, 5% beeweed, and presence of knotweed (*Polygonum* sp.). These results are consistent with a field weed signature. The pollen results from FS 33, a runoff ditch, were characterized by a low concentration (1200 gr/cc) and weed types such as sunflower family (30%), ragweed/bursage (6%), spurge (2%), buckwheat (4%), and beeweed (11%). The sample from the organic stain (FS 32) contrasted with the other two pollen samples from site LA 115323 with moderate to high values of pinyon pine (8%), sagebrush (8%), grass (6%), and beeweed (11%). Except for the beeweed, the assemblage from FS 32 is more of an environmental or natural pollen signature.

STRATIGRAPHY

The stratigraphy of site LA 115323 is best illustrated in SU 4 (Figure 17.5). Stratum I comprises a dark brown sandy loam deposit with numerous charcoal flecks. Feature 1, the small one-room masonry structure, occurs within this stratum. At the interface of Strata I and II (a dark yellowish brown sandy loam), three distinct organic stains with charcoal flecks were observed. In addition, a small drainage or ditch-like "feature" (80 cm wide by 20 cm deep) was also observed along this interface. Analysis of pollen samples from the stains and the fill of the ditch-like feature revealed high Cheno-Am frequencies, suggesting a weedy environment nearby. Both the stains and the ditch-like feature occur in the same stratigraphic position (below a humic A horizon)

as Basketmaker II deposits elsewhere in the project area. The stains were not dated, however, and no other types of features (such as storage pits) were observed during the mechanical stripping. Stratum III consisted of an olive brown clay deposit, and Stratum IV consisted of a light yellowish brown loamy sand. Both of these strata were sterile of cultural material or features.

CHRONOMETRIC DATA

Chronometric data from site LA 115324 comprises two radiocarbon samples and the ceramic artifact assemblage. Radiocarbon dates were obtained for Feature 1, a small masonry structure, and a drainage feature in SU 4. Charred *Pinus* and unknown conifer from the floor of Feature 1 were dated to 1170 ± 70 BP with a calibrated intercept date of AD 885 (Beta-121236, Appendix A). Charred flecks of an unknown species of conifer from the drainage feature dated to 3130 ± 90 BP, with a calibrated intercept date of 1405 BC (Beta-121235, Appendix A).

The ceramic assemblage yielded one diagnostic sherds, a Tularosa Black-on-white. This type indicates use of the locality in the late AD 1100s or 1200s. Pecking on some of the masonry within Feature 1 suggests that the structure also dates to the Pueblo III period, and that the earlier radiocarbon date described above results from the use of old wood.

SUMMARY

Site LA 115323 is a small multicomponent site. Much of the site has been destroyed by prior road construction along State Highway 602, making interpretation difficult. The dominant feature at the site is a small masonry room which may have functioned as a fieldhouse. Based upon the radiocarbon date, the structure appears to date to the late Pueblo I to early Pueblo II period. Tularosa Black-on-white, however, was also recovered from the structure, indicating use during the Pueblo III period. Pecking was also observed on some of the masonry blocks, suggesting construction of the structure during the late Pueblo II to Pueblo III.

Chapter 18

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 115325

Jeffery Waseta and James W. Kendrick

with Analytic Contributions by

Jonathan C. Driver, Suzanne L. Eckert, Janet Hagopian, and Jeffrey E. Shokler

INTRODUCTION

Archaeological investigations were conducted at site LA 115325 between 4 and 9 March 1994. The site is located on a south-facing slope of a bedrock ridge, and entirely east of the existing highway at an elevation of 2137 m (7010 ft). The main portion of the site, an artifact (flaked stone, ceramic, and ground stone) scatter, is located outside the eastern right-of-way fence. No features were discovered during data recovery activities, which were limited to site boundaries within the right-of-way.

SURVEY RESULTS

Site LA 115325 had previously been recorded as a scatter of lithic and ceramic artifacts (Abbott 1997:23). No evidence of rubble or features of any kind could be discerned (Figure 18.1). Abbott dated the site to the Pueblo II period, based on Gallup, Escavada, Puerco, and Reserve black-on-whites, along with indented, exuberant, and clapboard corrugated sherds. Lithic artifacts observed included debitage, three hammerstones, and one core. Lithic raw materials observed were primarily chert, along with quartzite and silicified wood. The site had not been recorded prior to the inventory phase of this project.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to the excavations, a pedestrian survey was conducted in transects at 2-m intervals across the site to locate all surface artifacts and features. Each artifact was marked with a pin flag. Only those artifacts within the right-of-way were

collected and point located with a Sokkia Total Station. Ceramic, lithic, and ground stone artifact types were collected. As Figure 18.2 illustrates, these artifacts were concentrated in the southwestern portion of the site.

Excavation

Hand Excavation

A single 1-by-1-m unit was established on site LA 115325 in order to determine the nature and depth of possible buried cultural deposits. An artifact distribution map (Figure 18.2) generated from the controlled surface collection was used as a guide for placement of the study unit. The study unit was excavated in arbitrary 10-cm levels and all sediment deposits were screened through 1/4-in hardware mesh.

SU 1 was placed on the east side of State Highway 602, with the southwest corner of the unit located at site grid coordinates N62.30, E113.54 (Figure 18.2). The unit was situated within an area of high artifact concentration which was recorded during surface artifact collections. A total of seven 10 cm arbitrary levels were excavated, revealing two strata as shown along a 1-m-long west-facing wall profile (Figure 18.3). Levels 1 through 5 were included within Stratum I, and some areas of Levels 4 and 5 were in Stratum II. Soil deposits within these five levels included charcoal flecks, sparse amounts of possible fire-cracked rock recorded in Level 2, and root disturbance documented in all five levels. Cultural materials included ceramics, flaked stone, and faunal remains which were collected in Levels 1 through 3. Level 4 contained no artifacts. Within the upper portion of Level 5 ceramic

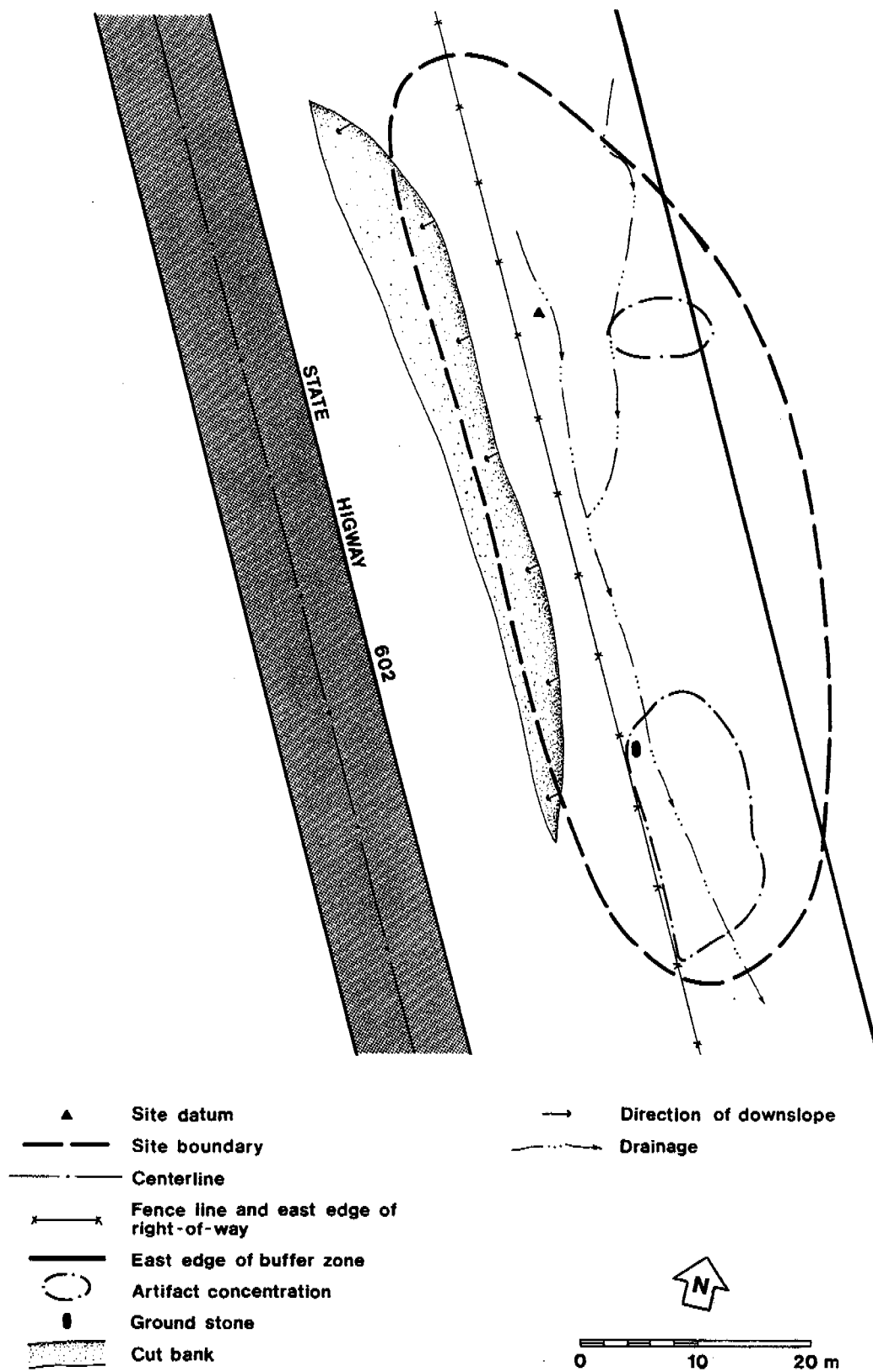


Figure 18.1. Site LA 115325 Survey Site Map.

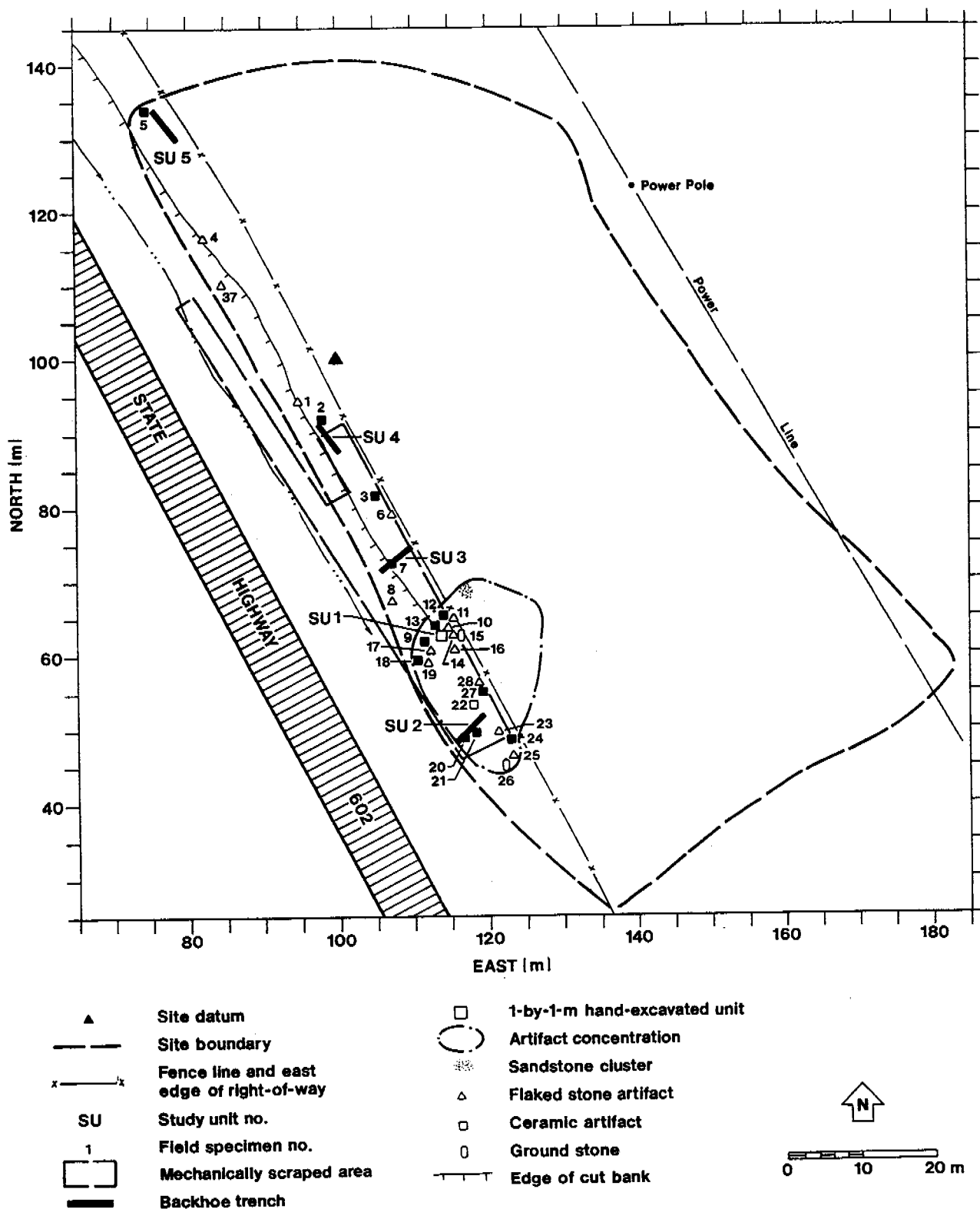
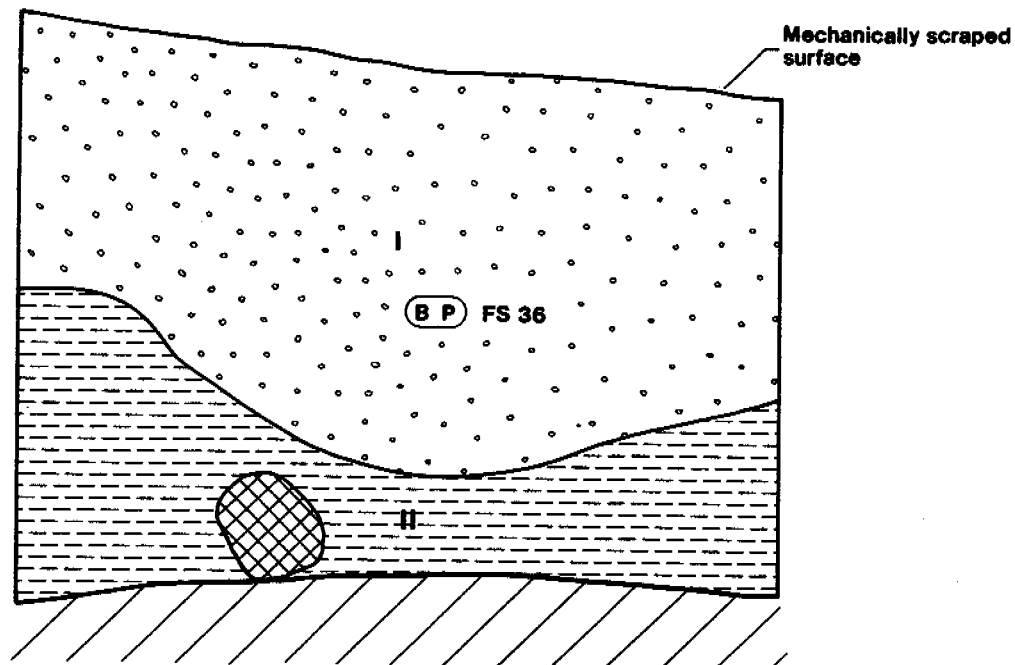


Figure 18.2. Site LA 115325 Data Recovery Site Map, Surface Artifacts, Features, Study Units, and Mechanical Stripping.



0 25 50 cm

I 0-50 cm - Dark grayish brown (2.5Y5/2, moist) sandy clay loam, grayish brown (2.5Y5/2, dry); strong; slightly sticky, slightly plastic; hard; 25% gravel; many fine roots; abrupt wavy boundary.

II 37 cm + - Olive brown (2.5Y4/3, moist) clay loam, light olive brown (2.5Y5/3, dry); strong; very sticky, very plastic; slightly hard; less than 10% gravel; few fine roots.




- Gravel
-  Rodent disturbance
-  Flotation and pollen samples
-  Unexcavated

Figure 18.3. Site LA 115325 Study Unit 1, West-facing Profile.

artifacts were recovered. Levels 6 and 7 were contained within Stratum II, a slightly hard clay loam deposit with rodent disturbance and few roots. No artifacts were collected within these two levels. Other than the artifacts within the upper levels of the unit no cultural remains were encountered during excavation of SU 1. Pollen and flotation samples recovered from the profile were not analyzed due to the lack of cultural context.

Mechanical Excavation

Mechanical excavation of four backhoe trenches was conducted in order to determine the nature and depth of possible cultural deposits on site LA 115325. The trenches were approximately 5 m in length with a maximum depth of approximately 1.70 m. A total of 20.20 m of trench was excavated on site.

Study Unit 2. SU 2 was placed in an area of high artifact concentration with the northeast end located at site grid coordinates N52.00, E119.60, and the southwest end at N48.30, E115.70 (Figure 18.2). The trench was 5.20 m in length with a maximum depth of approximately 1.70 m. Three strata were recorded along the entire southeast-facing wall profile of SU 2 (Figure 18.4). Stratum I comprised a sandy clay deposit mixed with a high amount of roots and 10% gravel content. Stratum II was a clay loam deposit but with less roots and gravel than Stratum I. Stratum III was a shale deposit. No features were encountered during excavation of SU 2.

Study Unit 3. SU 3 was placed with the northeast end located at site grid coordinates N74.90, E109.90, and the southwest end at N71.60, E105.90 (Figure 18.2). The trench was 5.00 m in length with a maximum depth of approximately 1.40 m. Three strata were documented along the entire northwest-facing wall profile (Figure 18.5). Stratum I consisted of a sandy clay loam deposit with an abundant amount of root disturbance and evidence of recent trash. Stratum II is identical to Stratum II described in SU 2. Stratum III also appeared identical to Stratum III of SU 2, suggesting that

the same type of shaley deposits are seen within this area of the site. No cultural deposits were encountered in excavation of SU 3.

Study Unit 4. SU 4 was placed approximately 16 m northwest of SU 3, with the northwest end located at site grid coordinates N91.40, E97.40, and the southeast end at N87.40, E100.40 (Figure 18.2). The trench was 5.00 m in length with a maximum depth of approximately 1.50 m. Three strata were drawn along the entire southwest-facing wall profile (Figure 18.6). The strata described within SU 2 and 3 were also observed within this trench. The only exception would be the boundary of Stratum II, which appears in SU 4 to be broken at near the middle of the profile. No cultural deposits were encountered in SU 4.

Study Unit 5. SU 5 was placed at the far northwest end of the site, with the northwest end located at site grid coordinates N134.00, E76.00, and the southeast end at N129.80, E79.0 (Figure 18.2). The trench was 5.00 m in length with a maximum depth of approximately 1.10 m. Two strata were recorded along the entire southwest-facing wall profile (Figure 18.7). Stratum I consisted of a sandy clay deposit mixed with sandstone rock inclusions and high root content. Stratum II revealed a hard deposit of shale that was mixed with decomposing sandstone. Both strata revealed no evidence of cultural deposits.

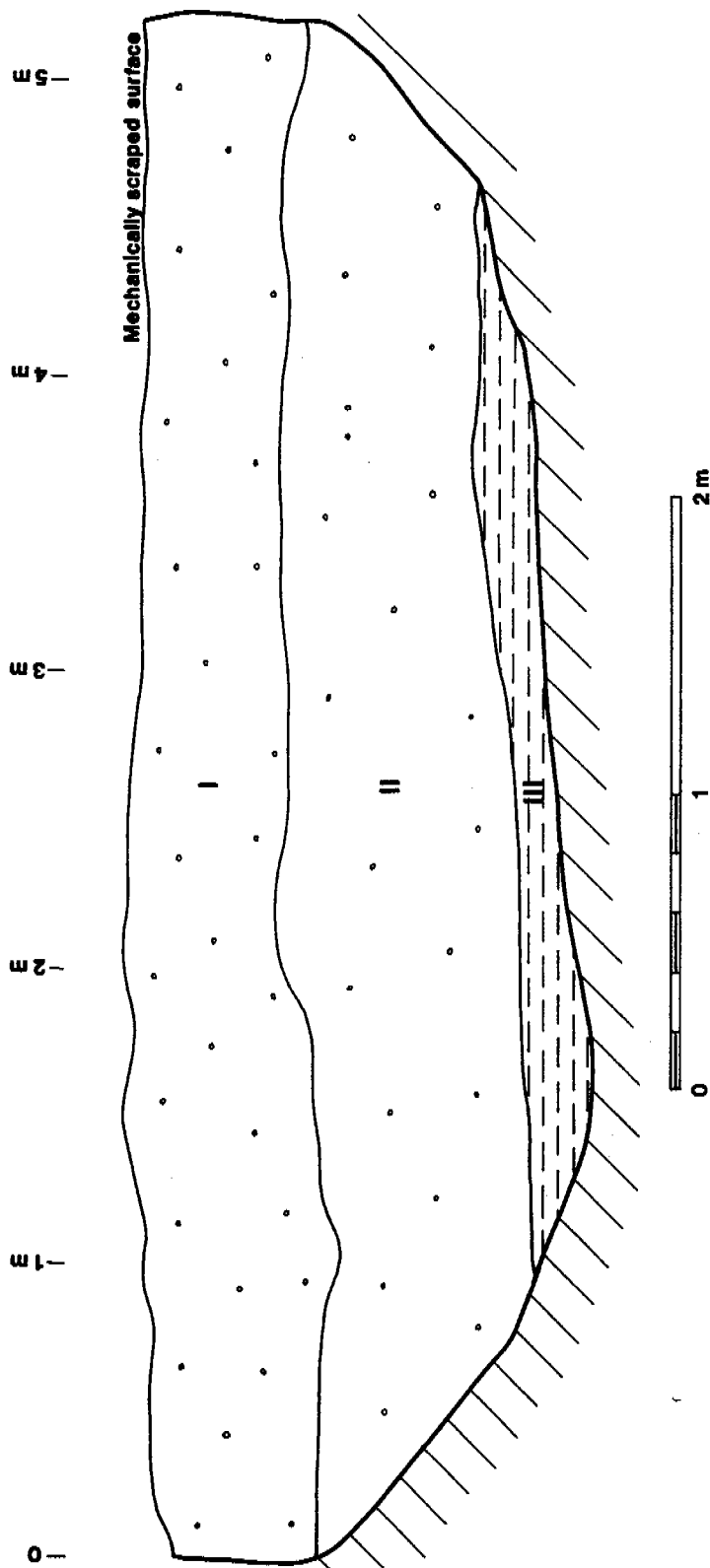
Mechanical Stripping

Approximately 20 to 50 cm of fill and vegetation was mechanically removed with a backhoe from a 73.00-by-10.00-m (497.00 sq m) irregular-shaped area; located between the east edge of State Highway 602 and the east fence line. No cultural features were discovered during these operations.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Eighty-five sherds were analyzed from site LA 115325. Twenty-nine sherds were recovered from within the right-of-way. Fifteen of these sherds



I - 0-50 cm - Dark grayish brown (2.5Y4/2, moist) sandy clay loam, grayish brown (2.5Y5/2, dry); strong; slightly sticky, slightly plastic; hard; 10% gravel; many medium roots; abrupt smooth boundary.

II - 50-120 cm - Dark grayish brown (2.5Y4/2, moist) clay loam, light olive brown (2.5Y5/3, dry); strong; very sticky, very plastic; hard; less than 10% gravel; very few fine roots; abrupt smooth boundary.

III - 120 cm + - Very dark gray (2.5Y3/1, moist) shale gray (2.5Y5/1, dry); strong, platy; very sticky, very plastic; hard; no gravel; very few roots.

Gravel

Unexcavated

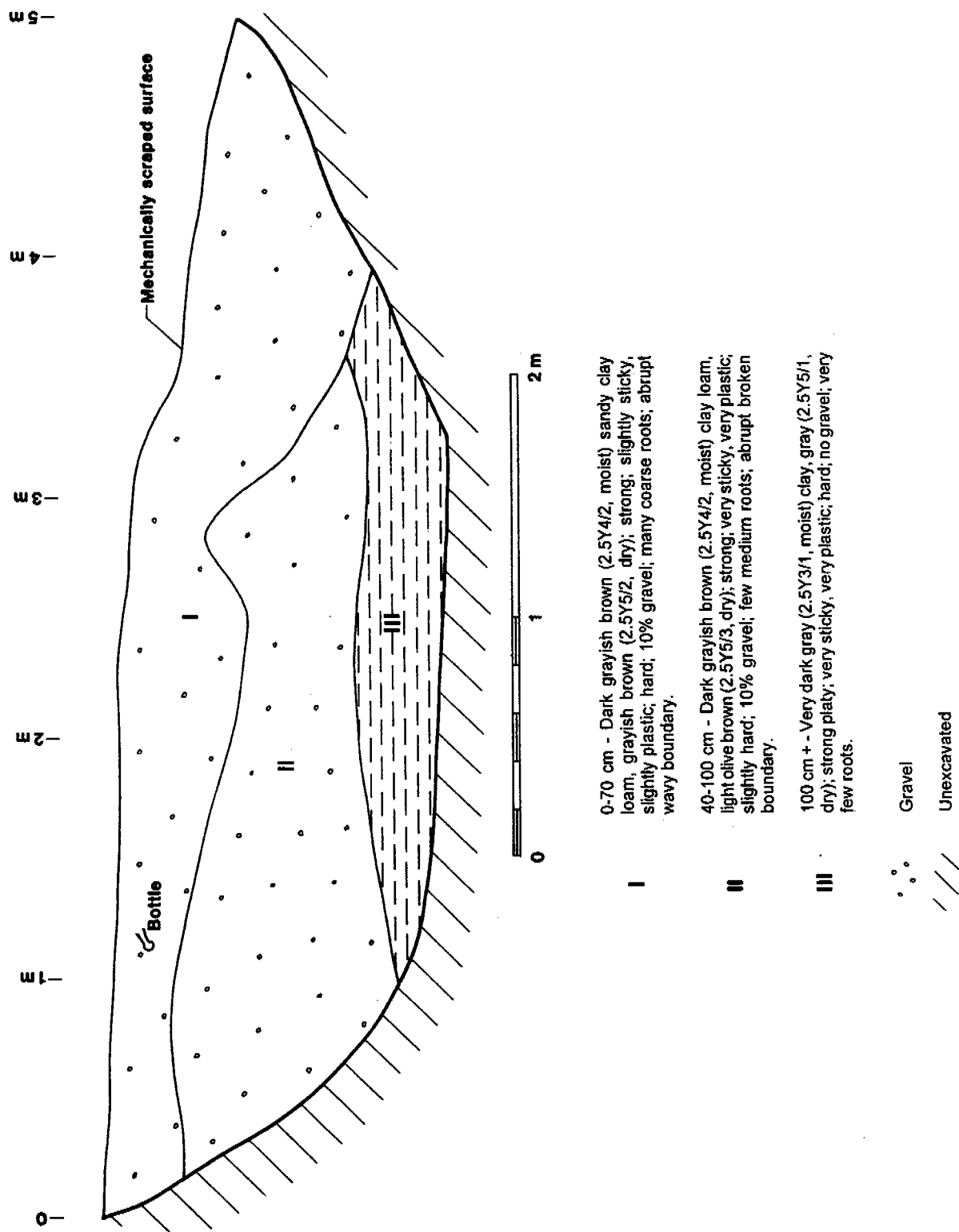
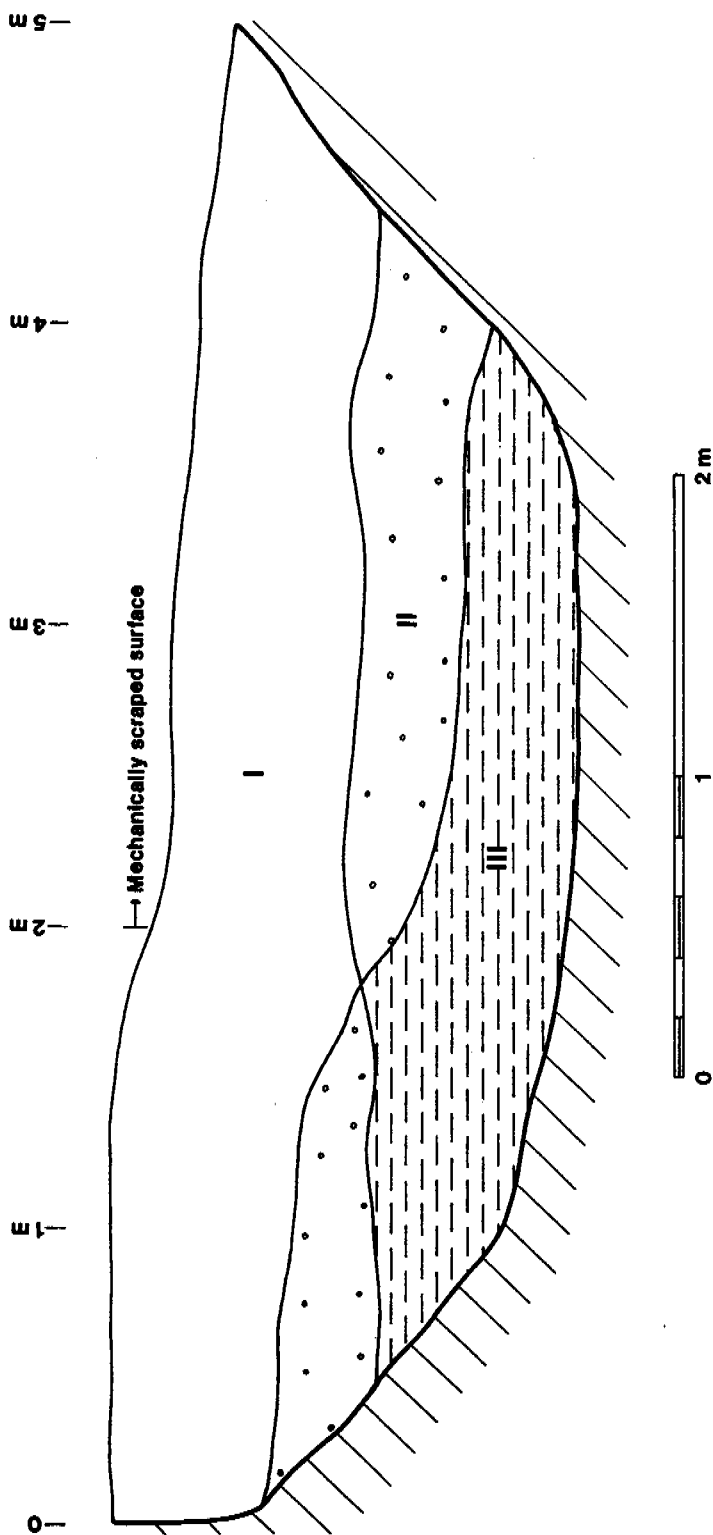


Figure 18.5. Site LA 115325 Study Unit 3, Northwest-facing Profile.



I - 0-60 cm - Dark grayish brown (2.5Y4/2, moist) sandy clay loam, grayish brown (2.5Y5/2, dry); strong; slightly sticky, slightly plastic; hard; no gravel; many medium roots; abrupt wavy boundary.

II - 60-90 cm - Dark grayish brown (2.5Y4/2, moist) clay loam, light olive brown (2.5Y5/3, dry); strong; very sticky, very plastic; hard; less than 10% gravel; very few medium roots; abrupt broken boundary.

III - 90 cm + - Very dark gray (2.5Y3/1, moist) clay, gray (2.5Y5/1, dry); strong platy; very sticky, very plastic; hard; no gravel; very few medium roots.

Gravel

Unexcavated

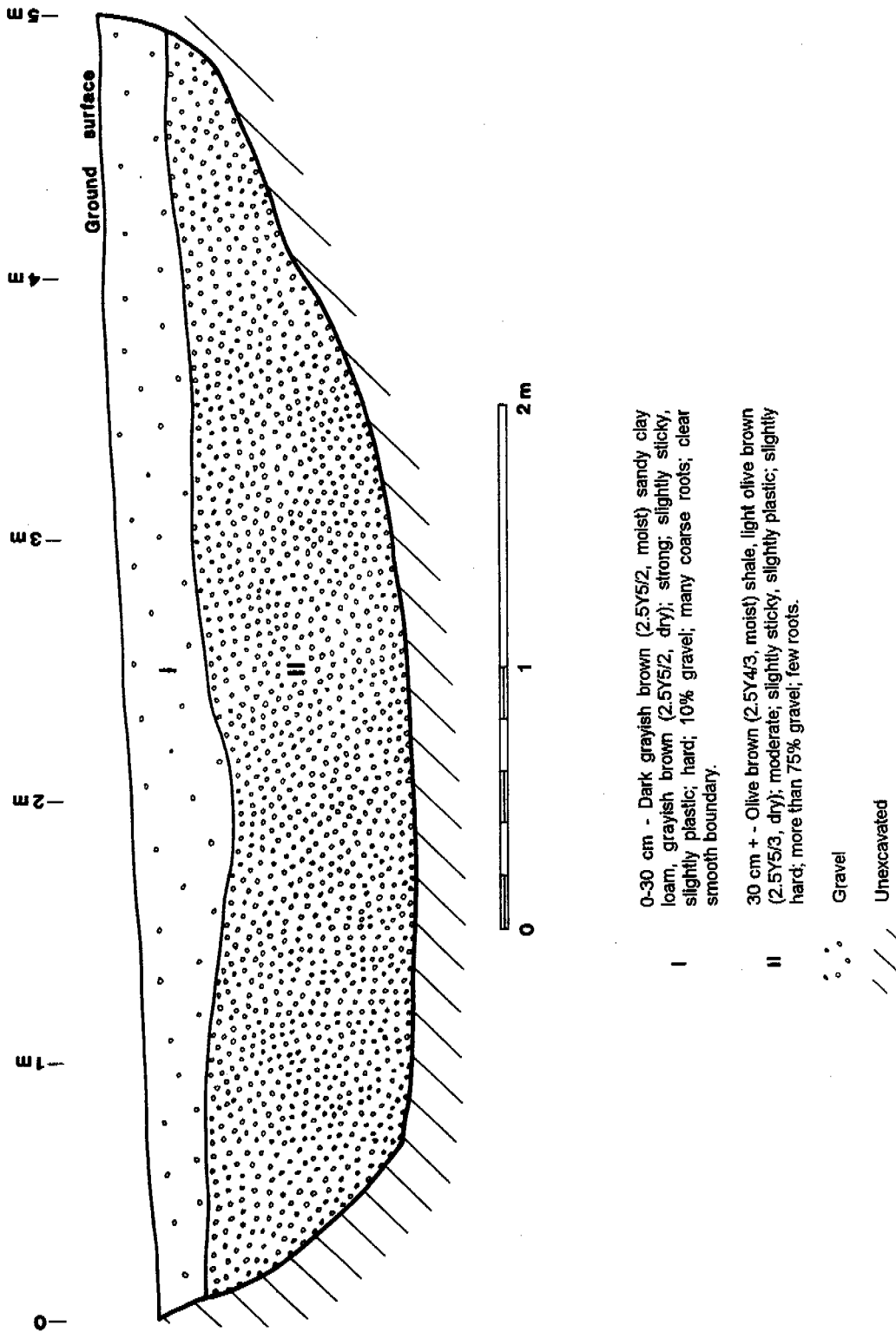


Figure 18.7. Site LA 115325 Study Unit 5, Southwest-facing Profile.

were recovered from excavations; the other 14 sherds were recovered from the surface. With the exception of three sherds which were too small to analyze, the artifacts from within the right-of-way received a complete attribute analysis as described in Chapter 21. The other 59 sherds were surface artifacts located outside the right-of-way. These sherds were not collected but, instead, analyzed in the field. As a result, the only two attributes recorded for these artifacts were form and type. Appendix D outlines the ceramic data by provenience. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware.

Chronometrics

Thirty-three diagnostic ceramic artifacts were recorded, all of which were Cibola White Ware. Among the types recorded are 6 Escavada, 18 Gallup, 4 Reserve, 5 Puerco black-on-white sherds, and 1 Red Mesa Black-on-white sherd. These types make up a ceramic assemblage that dates from the late Pueblo II period to the early Pueblo III period (AD 1050 to 1175).

A mean ceramic date of AD 1068 \pm 81 years was generated for the surface collection. This mean ceramic date supports the date range discussed above, suggesting that a late Pueblo II to early Pueblo III temporal designation is appropriate. Chapter 21 has a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of 72 jars, 13 bowls, and 3 indeterminate forms present in the assemblage. Most of the sherds were identified as coming from jar bodies, although 3 jar rims, 10 bowl bodies, and 3 bowl rims were also recorded. Both bowl and jar forms are represented in the whiteware sherds, while all grayware sherds are from jars. The one redware sherd is an indeterminate form. Overall, jars outnumber bowls by a ratio of almost 6/1. Neither sooting nor modification were recorded for this assemblage. The high jar-to-bowl ratio and lack of

sooting suggests that storage may have been an important activity at the site. Chapter 21 offers a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for the 26 sherds collected from within the right-of-way. The majority of sherds (83%) are tempered with either sherd or a combination of sand and sherd. Sherd is the most common tempering material for both Cibola Gray Ware and Cibola White Ware, while a combination of sherd and sand is not uncommon to either ware. Two Cibola Gray Ware sherds (16%) are tempered with sand. This temper is not uncommon to early Cibola Gray Ware, nor is it uncommon to graywares of nonlocal origins. It is impossible to distinguish between these two options without further analysis. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and inter-regional interaction.

Summary

The ceramic assemblage from site LA 115325 consists of 85 sherds from both surface and excavated collections. Three wares common to the area are present: Cibola White Ware, White Mountain Redware, and Cibola Gray Ware. Thirty-three diagnostic ceramics were identified in the overall assemblage. These diagnostics support a late Pueblo II to early Pueblo III temporal range. This temporal range is further supported by a mean ceramic date of AD 1086 \pm 81 years. A high jar-to-bowl ratio suggests storage may have been intensively practiced at the site.

Flaked Stone Artifacts

Site LA 115325 represents a low density Pueblo II flaked stone and ceramic scatter. Twenty-seven flaked stone artifacts were recovered during surface collection and excavations at the site. Five artifact classes are represented (in decreasing order of representation): debitage (14), debris (9), core (2), manuport (1), and retouched piece (1). Table 18.1 provides summary metric data for the flaked stone

Table 18.1. Summary Metric Data for Site LA 115325 Pueblo II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	2.3	2.1	0.9	27.3
10% trimmed mean	2.0	1.8	0.6	3.8
Median	1.6	1.6	0.5	-
Standard error	0.4	0.3	0.2	21.2
Standard deviation	1.9	1.7	1.3	110.0
Minimum	0.7	0.7	0.1	-
Maximum	10.2	7.7	6.3	572.0
Range	9.5	7.0	6.2	572.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

n = 27

artifacts in the collection. The core assemblage consists of one single-platform chert core weighing 78 g and a quartzite core fragment weighing 33 g. Both pieces are cortical (having over 50% cortex). The manuport is a 572 g quartzite cobble with one percussion mark present on its surface. Evidence for human action being responsible for its presence at the site can only be considered equivocal at best.

Of the 14 pieces of debitage, 4 are primary flakes, 9 are secondary flakes, and 1 is a tertiary retouch or trimming flake. Platform data could be obtained for nine of these pieces. Only one piece had a cortical platform. Two of the secondary flakes did contain evidence of platform preparation in the form of multifaceted platforms.

Chert comprises 63.0% of this assemblage. Quartzite (18.5%) and silicified wood (18.5%) are also represented. Of the 17 chert artifacts, 2 (a secondary flake and one piece of debris) were made of Zuni Yellow Spotted chert.

Ground Stone

One ground stone artifact was recovered from site LA 115325. It is a small indeterminate ground

stone fragment with at least one ground surface. No striations are visible. It was recovered from the surface of this site.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of faunal remains from the entire project can be found in Chapter 26, which covers methods and general conclusions. Detailed description of fauna is provided in Appendix I.

One unidentified bone fragment was recovered from SU 1. The specimen was burnt white.

STRATIGRAPHY

SU 2 is illustrative of the general stratigraphy at site LA 115325. SU 2 revealed limy shale of the Dakota Sandstone at its base (Goldstein 1998). Overlying this shale are two deposits: a clay loam (Stratum II), and sandy clay loam (Stratum I). Along the highest and northernmost portion of the site, SU 5 revealed sandstone bedrock of the Dakota Sandstone, overlain by a 20-to-30-cm-thick, dark grayish brown sandy clay loam. No subsurface cultural material or features of any kind were observed.

CHRONOMETRIC DATA

Chronometric data from site LA 115325 are only provided by the ceramic artifact assemblage. These are discussed by Eckert and Hagopian above, and in Chapter 21. To summarize, a mean ceramic date of AD 1086 \pm 81 years was calculated from the assemblage.

SUMMARY

Site LA 115325 is a late Pueblo II lithic and ceramic artifact scatter. Its function could

not be determined from the testing and data recovery activities, because only a small portion of the site extended into the project boundary. The concentration of artifacts recorded from the southwestern portion of the site, which included ceramic, flaked stone, and ground stone artifacts, suggest domestic activities took place. No obvious architectural remains were observed, however, suggesting the occupation was either short-term or seasonal.

Chapter 19

ARCHAEOLOGICAL INVESTIGATIONS AT SITE LA 49838

Jerome Zunie and James W. Kendrick

with Analytic Contributions by

**Jonathan C. Driver, Suzanne L. Eckert, Janet Hagopian,
Pamela McBride, Jeffrey E. Shokler, and Susan J. Smith**

INTRODUCTION

Archaeological investigations were conducted at site LA 49838 between 10 March and 13 April 1998. This site is located on both the east and west sides of the highway, and is the northernmost and highest site 2137 m (7010 ft above mean sea level) excavated during the project. It is situated on the southeast-facing slope of a bedrock ridge. Vegetation prior to data recovery activities included pinyon, juniper, sagebrush, narrowleaf yucca, rabbitbrush, grasses, prickly pear cactus, and Gambel oak.

The site is multicomponent, comprising both Basketmaker II features, and Pueblo II to early Pueblo III features and midden. One juvenile burial (designated Burial 49838.1) was excavated and reburied from this site, the details of which can be found in Confidential Appendix J. It is believed that prior road construction destroyed a Pueblo II to early Pueblo III rubble mound, and possibly Basketmaker II pitstructures. The thick midden deposits overlying the Basketmaker II features could only have been the result of habitation dating to the late Pueblo II to early Pueblo III.

SURVEY RESULTS

Site LA 49838 was first recorded by Davis and Windes (1975). Limited testing was later conducted by Gleichman (1984), who recorded the site as a late Pueblo II to early Pueblo III midden. Gleichman (1984), however, made no mention of the Basketmaker II component of the site. Abbott (1997:25) recorded the site as a "scatter of sandstone rubble associated with a dense scatter of lithics and ceramics." No rubble was observed during data recovery activities, or

mapped by Abbott (Figure 19.1). Ceramic types observed by Abbott (1997:25) included Kiatuthlanna Black-on-white, Gallup Black-on-white, Escavada Black-on-white, Reserve Black-on-white, plain whiteware, Puerco Black-on-red, Wingate Black-on-red, indented corrugated, plain grayware, and clapboard corrugated. Lithic artifacts recorded included debitage, cores, and hammerstones. Lithic raw materials included chert, silicified wood, quartzite, and Zuni Spotted chert. Clearly, the occupation of site LA 49838 was one of the longest and most intensive of any site within the project.

DATA RECOVERY ACTIVITIES

Surface Collection

Prior to the excavations, a pedestrian survey was conducted across the site in transects at 2-m intervals to locate all surface artifacts and features. Each artifact, or concentration of artifacts, was marked with a pin flag and point located. Only those artifacts within the right-of-way were collected. As shown in Figure 19.2, and as remarked upon by Abbott (1997:25), two distinct concentrations of artifacts were observed on the east side of the existing highway. Two other less obvious concentrations were also observed, one in the southwest portion of the site and one in the northwest portion (Figure 19.2).

Excavation

Hand Excavation

Hand excavation of one 3-by-3-m unit was conducted in order to determine the nature and depth of the cultural deposits on site LA 49838.

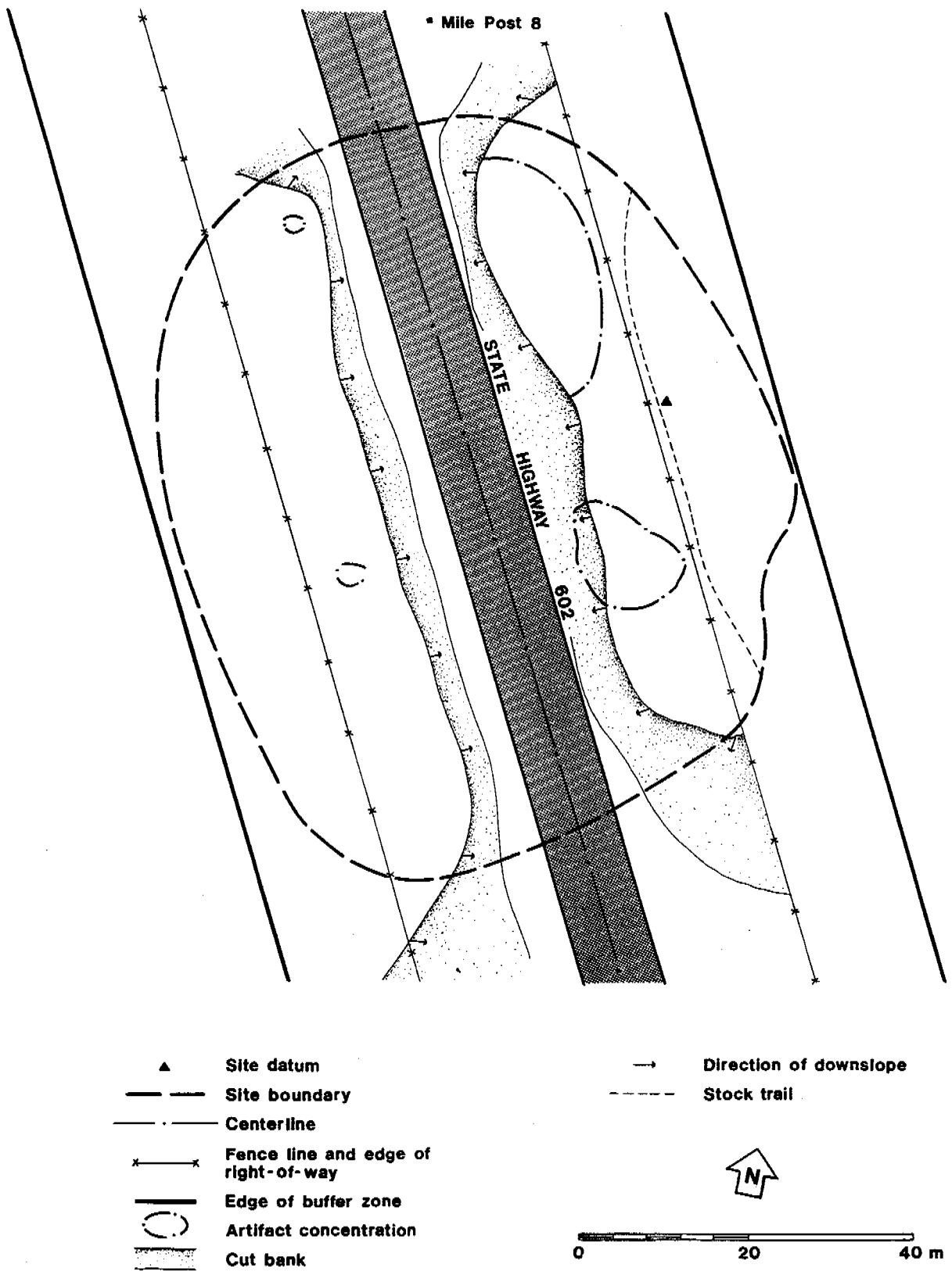


Figure 19.1. Site LA 49838 Survey Site Map.

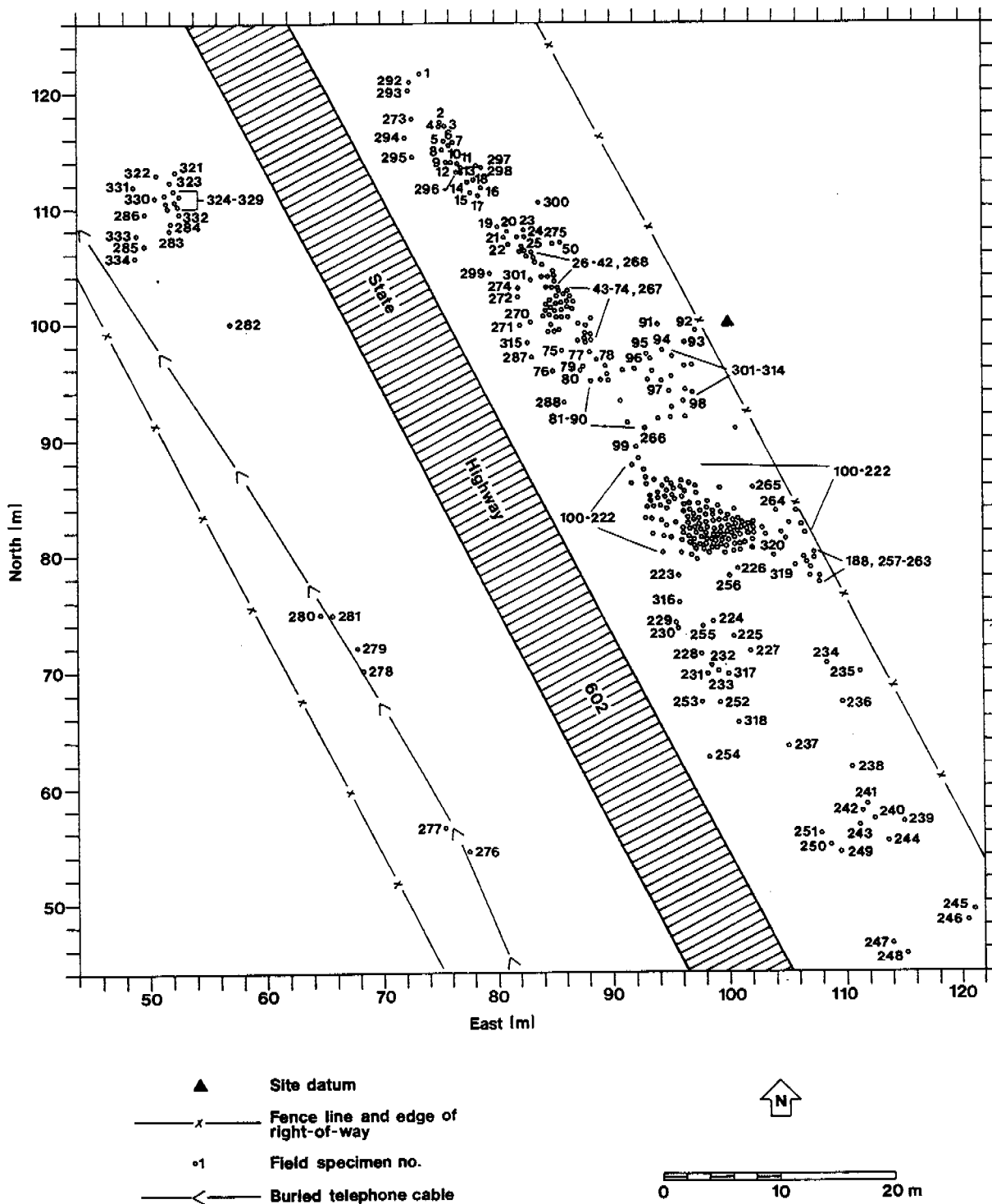


Figure 19.2. Site LA 49838 Data Recovery Site Map, Surface Artifacts.

An artifact distribution map (Figure 19.2) generated from surface collection was used as a guide for the placement of the unit. The unit was excavated in arbitrary 10-cm levels and all sediments were screened through 1/8-in hardware mesh.

SU 1 (3-by-3-m unit) was located on the east side of the existing State Highway 602. The grid coordinates for the southwest corner of SU 1 are N100.49, E85.80 (Figure 19.3). SU 1 was established parallel with State Highway 602. This unit was placed over Feature 1, a midden eroding out of a road cut. Feature 1 was originally thought to be possibly a shallow pit structure, because of its basin-shaped profile in the road cut. It is discussed in more detail with feature descriptions below.

SU 1 was excavated in five 10-cm levels. Two strata were identified within the unit. Materials recovered from Level 1 excavation consisted of ceramics, flaked stone, ground stone, and faunal remains. Other deposits within the level included charcoal and burned daub. Level 1 excavation was within Stratum I. Level 2 excavation was also within Stratum I and materials recovered from this level consisted of ceramics, flaked stone, ground stone, unmodified stone, and faunal remains. Charcoal was also observed from Level 2. Level 3 excavation was within Strata I and II. Artifacts from this level decreased and included ceramics, flaked stone, and ground stone. At the base of this level a thermal feature (Feature 2) was exposed and previous 1-by-1-m test unit was also exposed (Gleichman 1984). Level 4 was excavated in Stratum II. Artifacts recovered from this level consisted of ceramics and flaked stone. Level 5 excavation was also in Stratum II; no artifacts were recovered from this level. Excavation of SU 1 was terminated when a burial was exposed at the central portion of the south wall (discussed with Feature 1 below).

Hand Stripping

SU 6 was a hand stripped area on the west side of State Highway 602. This unit was placed in an area of very light artifact scatter. SU 6 was hand

stripped down to 10 cm. A total of 17.68 sq m was stripped. No features or cultural deposits were encountered.

Mechanical Excavation

Mechanical excavation of four trenches was conducted in order to determine whether additional buried cultural deposits or features were present on site LA 49838. The artifact distributions defined during the controlled surface collection, information recovered from the hand-excavated unit, and the possibility of buried deposits in the eastern and western portions of the site were used as guides for the placement of backhoe trenches.

The trenches were designated SU 2 through 5 (Figure 19.3). Trenches ranged from 5.00 to 9.60 m in length. The trenches were typically 0.70 m wide with a maximum depth of 1.25 m. A total of 26.40 m of trenches was excavated.

Study Unit 2. SU 2, located within the northeastern portion of the site boundaries and east of State Highway 602, began at coordinates N113.20, E77.45 and extended eastward 5.00 m to N115.84, E81.79 (Figure 19.3). This trench was established in an area of light artifact scatter and least ground disturbance by road construction. The maximum depth of the trench (near the middle) was 1.05 m.

On 1-m-long representative profile, located along the north-facing trench wall near the middle, was drawn of SU 2 (Figure 19.4). Two strata were identified within the trench. Stratum I consisted of dark yellowish brown sandy clay loam with no evidence of cultural materials or features within the stratum. Stratum II consisted of yellowish brown sandy loam with no evidence of cultural deposits within the stratum. Excavation of SU 2 revealed that Stratum I was a midden deposit within the eastern right-of-way of State Highway 602.

Study Unit 3. SU 3, located within the central portion of the site and east of the existing State Highway 602, began at coordinates N87.55,

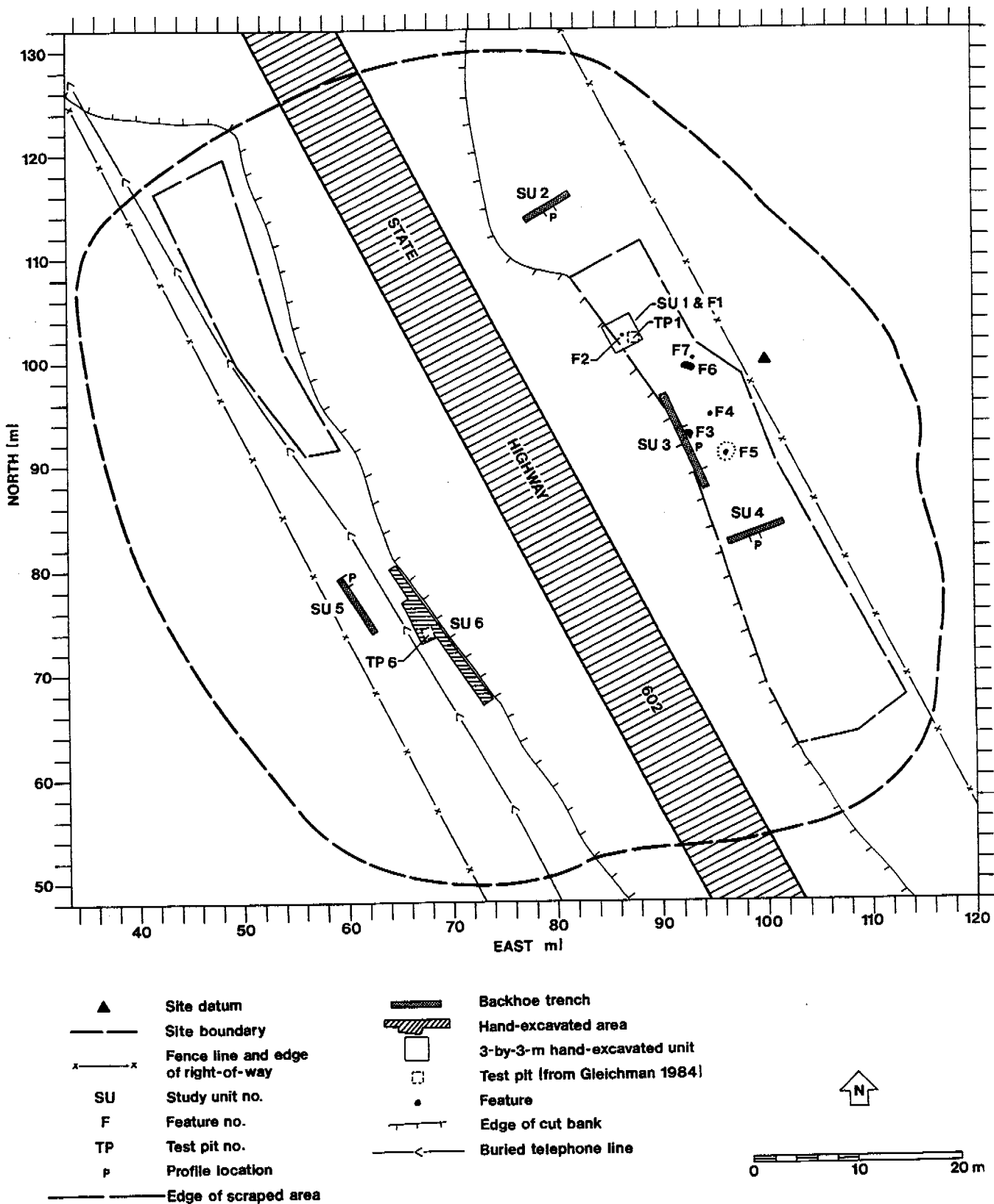
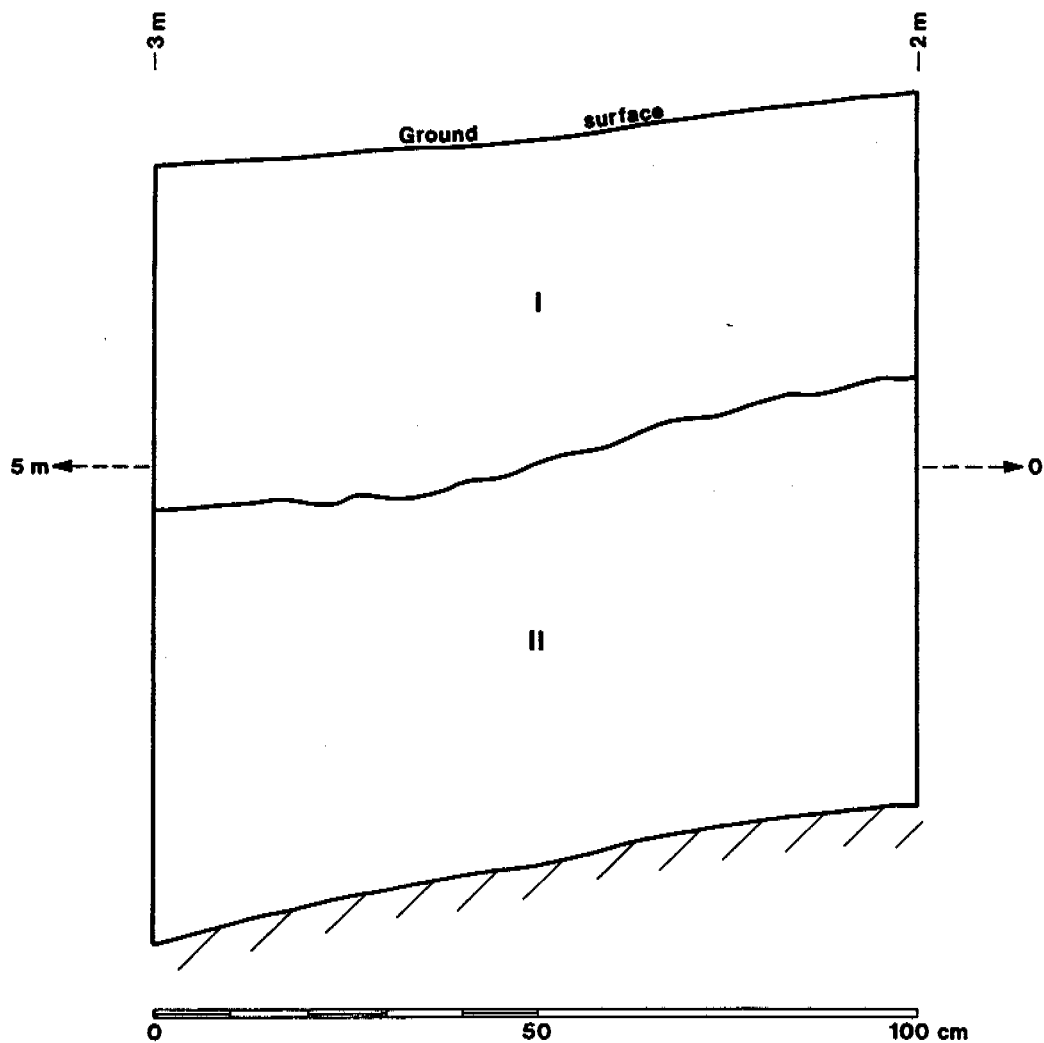


Figure 19.3. Site LA 49838 Date Recovery Site Map, Features, Study Units, and Mechanical Stripping.



I 0-46 cm - Dark yellowish brown (10YR4/4. moist) sandy clay loam; moderate, platy; sticky, plastic; very few fine roots; diffuse smooth boundary.

II 46-105 cm - Yellowish brown (10YR5/8. moist) sandy loam; strong, columnar; slightly sticky, slightly plastic; very few micro roots.

/// Unexcavated

Figure 19.4. Site LA 49838 Study Unit 2, North-facing Profile.

E94.08 and extended northward 10.00 m to N96.50, E90.16 (Figure 19.3). This trench was established in an area of high artifact density and minimal ground disturbance by road construction. The maximum depth of the trench (near the middle) was 1.25 m.

One 4.50-m-long representative profile located along the west-facing trench wall toward the southern end was drawn of SU 3 (Figure 19.5). Five strata and a possible roasting pit (Feature 3) were identified within the trench wall. Stratum I consisted of dark yellowish brown cultural deposits. Rodent disturbance was observed within the stratum. Stratum II was part of the cultural fill within Feature 3 and consisted of dark yellowish brown sandy loam with inclusions of charcoal and ash. Stratum III was also cultural fill within the feature and consisted of sandy loam with mottling of charcoal, ash, and daub. Stratum IV consisted of reddish yellow fine sand with rodent burrows and no evidence of cultural deposits. Stratum V consisted of light brown sterile silt loam with light deposits of calcium carbonates.

Study Unit 4. SU 4 was located within the southeastern portion of the site and east of the existing State Highway 602, beginning at coordinates N82.11, E96.62 and extending eastward 5.60 m to N84.19, E101.94 (Figure 19.3). This trench was established in an area of light artifact density and little ground disturbance by road construction. The maximum depth of trench at the middle was 1.22 m.

One 1-m-long representative profile, located along the north-facing trench wall near the middle, was drawn for SU 4 (Figure 19.6). Two strata were identified within the trench. Stratum I consisted of yellowish brown cultural deposits. One artifact, a hammerstone, was observed 15 cm below surface within the stratum. Stratum II consisted of light brown sterile matrix with evidence of rodent burrowing. No cultural deposits or features were defined within this stratum. Excavation of SU 4 revealed that cultural deposits were pinching out at this portion of the site.

Study Unit 5. SU 5, located within the site boundaries and west of the existing State Highway 602, began at coordinates N73.93, E62.25 and extended northward 6.20 m to N79.12, E59.00 (Figure 19.3). This trench was established in an area of very light artifact scatter and in an area where mechanical stripping was not done due to a buried telephone cable. The maximum depth of the trench at the north end was 0.63 m.

One 1-m long representative profile located along the west-facing trench wall at the north end of the trench was drawn for SU 5 (Figure 19.7). Two strata were identified within the trench. Stratum I consisted of a shallow deposit of sandy loam. No cultural deposits or features were defined within this stratum. Stratum II consisted of clay deposits with no cultural materials or features. Excavation of SU 5 revealed that subsurface cultural deposits were absent from the western portion of the site.

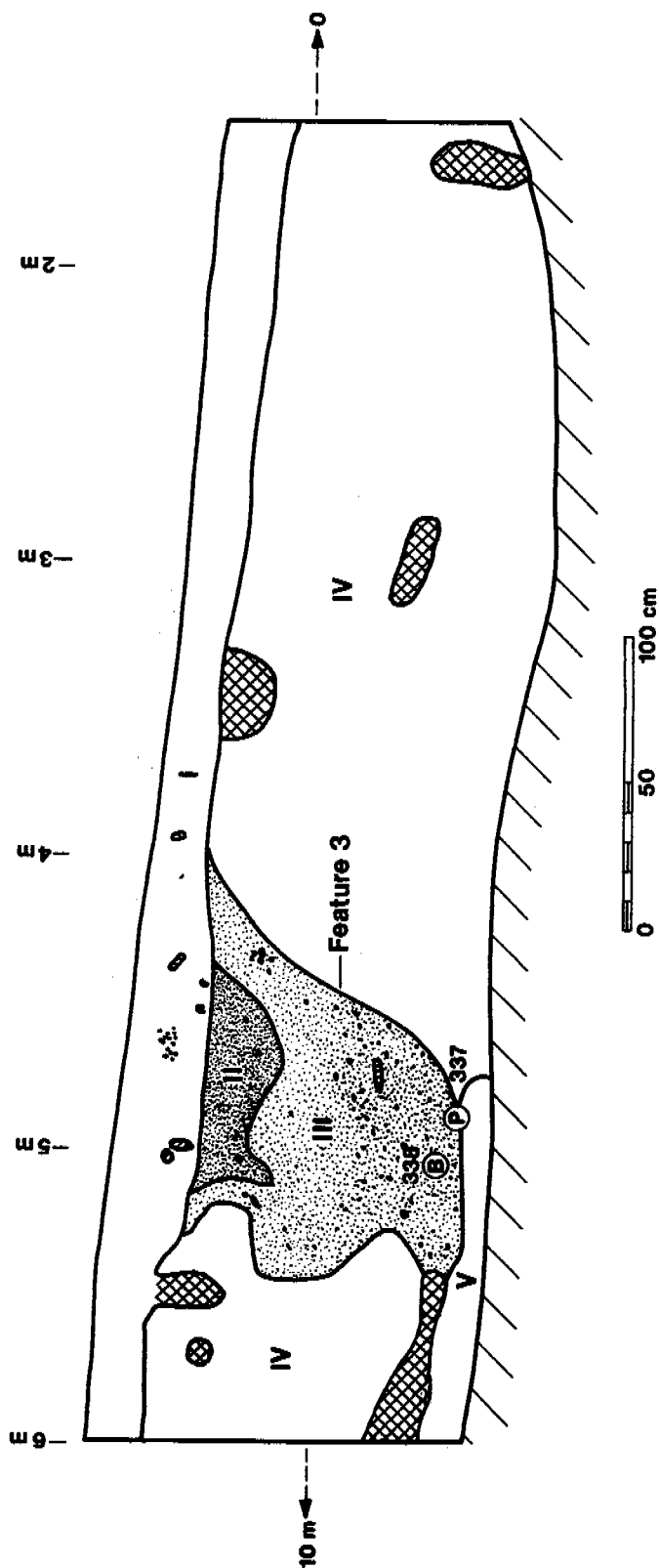
Mechanical Stripping

Mechanical stripping was conducted in order to investigate the possibility of buried features within the site boundaries and within eastern and western right-of-way of State Highway 602. A total of 556.96 sq m at an approximate depth of 50 cm was stripped using a backhoe machine. A total of 404.00 sq m was stripped on the east side of State Highway 602 and 152.96 sq m was stripped on the west side of the highway. A total of five features were identified during mechanical stripping on the east side of State Highway 602.

Feature Descriptions

Feature 1

Feature 1, located on the east side and at the limits of the eastern road cut bank, was determined to be a midden deposit. Feature 1 was originally thought to be possibly a shallow pitstructure. A large study unit (SU 1, N100.49, E85.80) was opened to determine its extent. Excavations revealed no evidence of a shallow pitstructure. Rather, the deposits were interpreted as midden.



- | | | | |
|-----|--|--|------------------------------|
| I | 0-28 cm - Dark yellowish brown (10YR4/4, moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; common fine roots; diffuse smooth boundary. | | Sandstone rock |
| II | 28-55 cm - Dark yellowish brown (10YR3/4, moist) sandy loam; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; diffuse irregular boundary. | | Rodent disturbance |
| III | 55-107 cm - Yellowish brown (10YR5/4, moist) sandy loam; moderate, medium, granular; slightly sticky, slightly plastic; less than 10% gravel; common fine roots; abrupt smooth boundary. | | Charcoal |
| IV | 21-130 cm - Reddish brown (7.5YR6/6, moist) fine sandy loam; weak, fine, granular; nonsticky, nonplastic; very few micro roots. | | Ash and charcoal |
| V | 116-125 cm - Light brown (7.5YR6/4, dry) silt loam; weak, very fine, granular; soft; less than 10% gravel; very few micro roots. | | Flotation and pollen samples |
- (B, P) Flotation and pollen samples
 337 Field specimen no.
 // Unexcavated

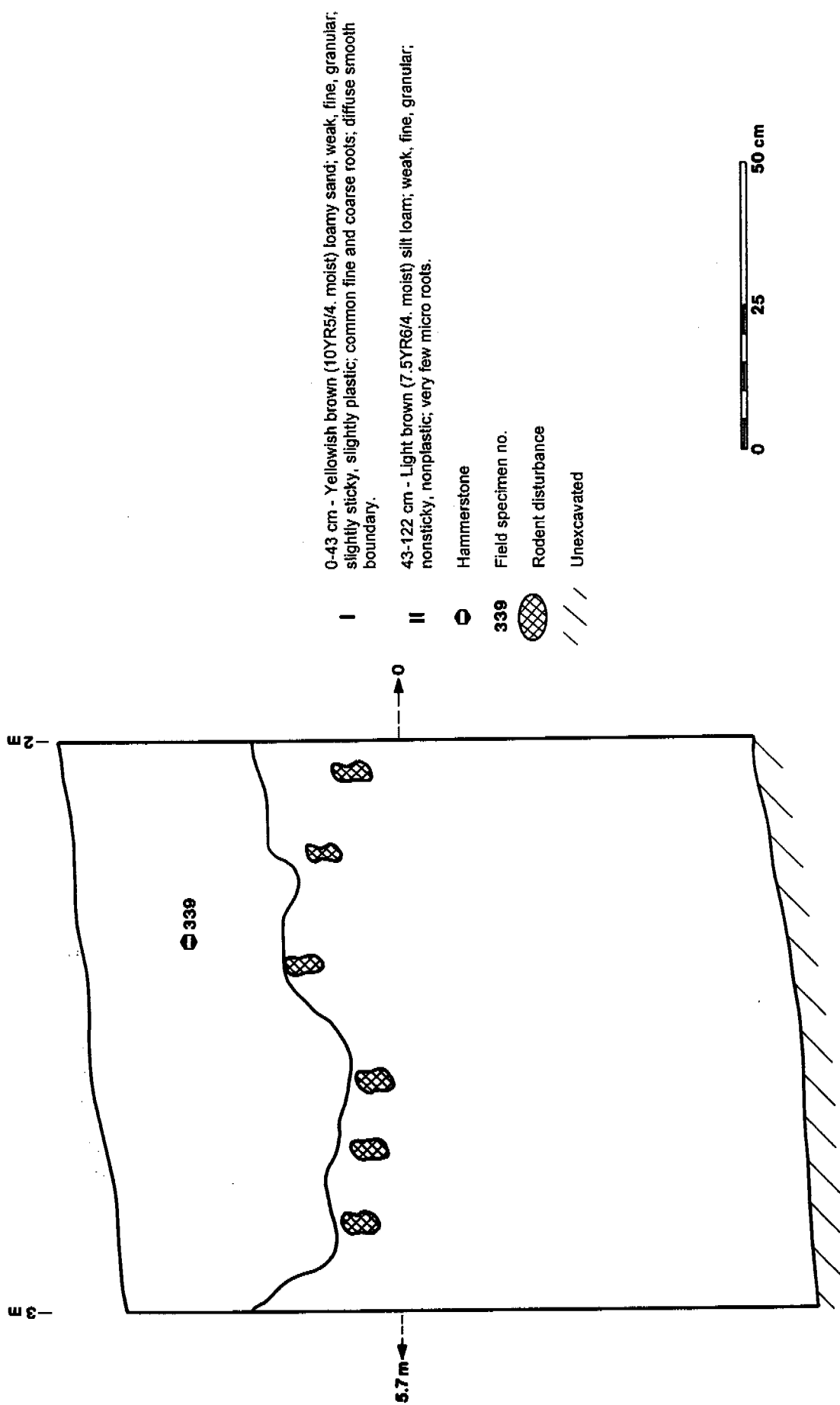


Figure 19.6. Site LA 49838 Study Unit 4, North-facing Profile.

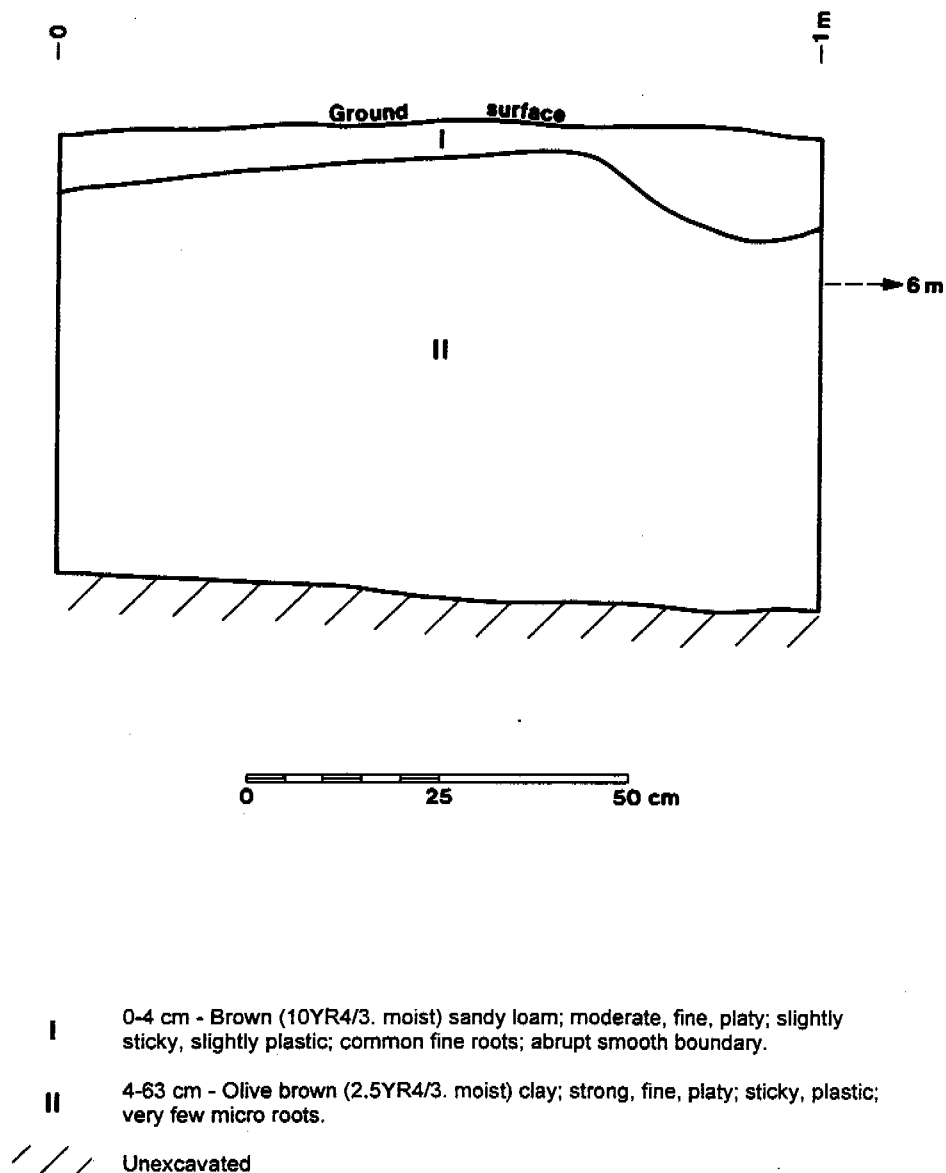


Figure 19.7. Site LA 49838 Study Unit 5, West-facing Profile.

Midden deposits consisted of two strata. Stratum 1 consisted of dark yellowish brown fine sandy loam with inclusions of cultural materials. Levels 1 and 2 and part of Level 3 were excavated in this stratum. Materials collected from Level 1 consisted of ceramics, flaked stone, ground stone, and faunal specimens. Recovered materials from Level 2 consisted of ceramics, flaked stone, ground stone, unmodified stone, and faunal specimens. Artifacts from Level 3, in the bottom of Stratum I, consisted of ceramics, flaked stone, and ground stone. Maize cupules were recovered from the flotation sample from this stratum. The density of artifacts, however, was lower than in the previous levels. Stratum II consisted of yellowish brown loamy sand with very few cultural materials. Levels 3, 4, and 5 were excavated within this stratum. The base of Level 3 was within Stratum II and artifacts recovered included ceramics, flaked stone, ground stone, and one feature was exposed at this level (Feature 2, a small thermal feature). Artifacts recovered from Level 4 diminished to only a few ceramics and flaked stone. No artifacts were recovered in Level 5. One burial was also exposed at the south end of SU 1 within Feature 1. Excavation of Feature 1 was halted after the discovery of human remains. The human remains were excavated and reburied at a location designated by the Zuni Heritage Historic Preservation Office (Confidential Appendix J).

Feature 2

Feature 2 was located on the east side of State Highway 602; the center point grid coordinates for Feature 2 are N102.62, E86.54 (Figure 19.3). Feature 2 was a small earthen basin shaped thermal feature measuring 40 cm in diameter and 11 cm deep (Figure 19.8). Feature fill consisted of loamy sand with charcoal inclusions and some ash. No artifacts were recovered from the excavation of Feature 2. Evidence of rodent burrowing was documented during the excavation. Samples collected from the feature fill included flotation, pollen (which was found to be sterile), and waterscreen samples. Ten charred maize cupules were recovered from the flotation sample.

Feature 3

Feature 3 was located on the east side of State Highway 602, along the eastern limit of the road cut bank; the center point grid coordinates for Feature 3 are N92.34, E92.83 (Figure 19.3). Feature 3 was identified during mechanical excavations and the west half was removed by the backhoe excavation. Feature 3 was a bellshaped earthen pit with two floors present. The top measurement of Feature 3 was 81 cm northwest-to-southeast by 49 cm northeast-to-southwest. At the bottom of the second floor, the pit measured 1.11 m northwest-to-southeast by 45 cm northeast-to-southwest. The measurements of the original floor were 1.19 m northwest-to-southeast by 48 cm northeast-to-southwest. A cross section of Feature 3 was taken 10 cm east of SU 3 west-facing wall (Figure 19.9).

Feature 3 was excavated in eight 10-cm levels. Backhoe excavations revealed three strata within the feature fill; each stratum is described above as part of SU 3 (Figure 19.5). Level 1 was excavated within Stratum I, artifacts recovered from this level included ceramic and flaked stone.

Level 2 was excavated within Stratum I; artifacts recovered from this level comprised only flaked stone and ground stone. Excavation of Level 3 was also within Stratum I; materials recovered from this level included ceramics, flaked stone, ground stone, and faunal specimens. Level 4 was excavated within Stratum II, with recovery of only ground stone and faunal specimens. Level 5 was excavated within Stratum II; artifacts recovered from this level included ceramics and flaked stone. Level 6 excavation was within Stratum III; no artifacts were recovered from this level. Level 7 excavation was within Stratum III, to the base of the second floor. The second floor was prepared with a sandstone slab and compacted sand. No artifacts were recovered from this level of excavation. Level 8 excavation was below the sandstone slab, and down to the original base of the pit. A few ceramic and flaked stone artifacts were recovered at this level. Rodent and insect burrowing were documented throughout the excavation of Feature 3.

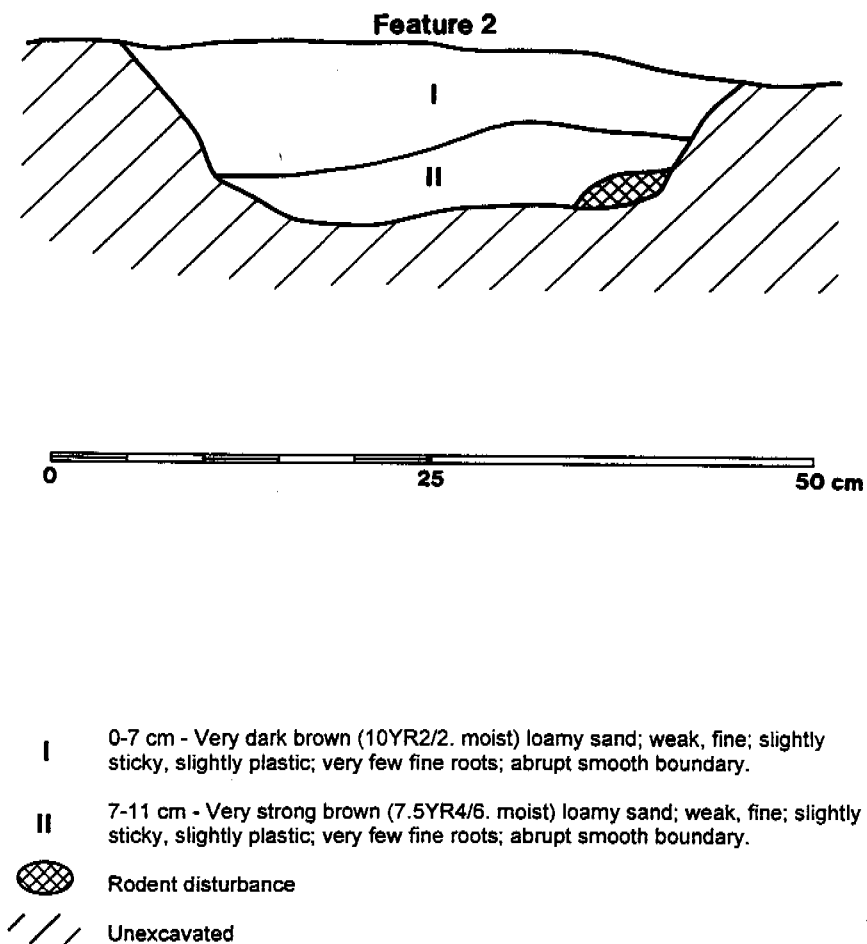


Figure 19.8. Site LA 49838 Feature 2, East-facing Profile.

Cross section

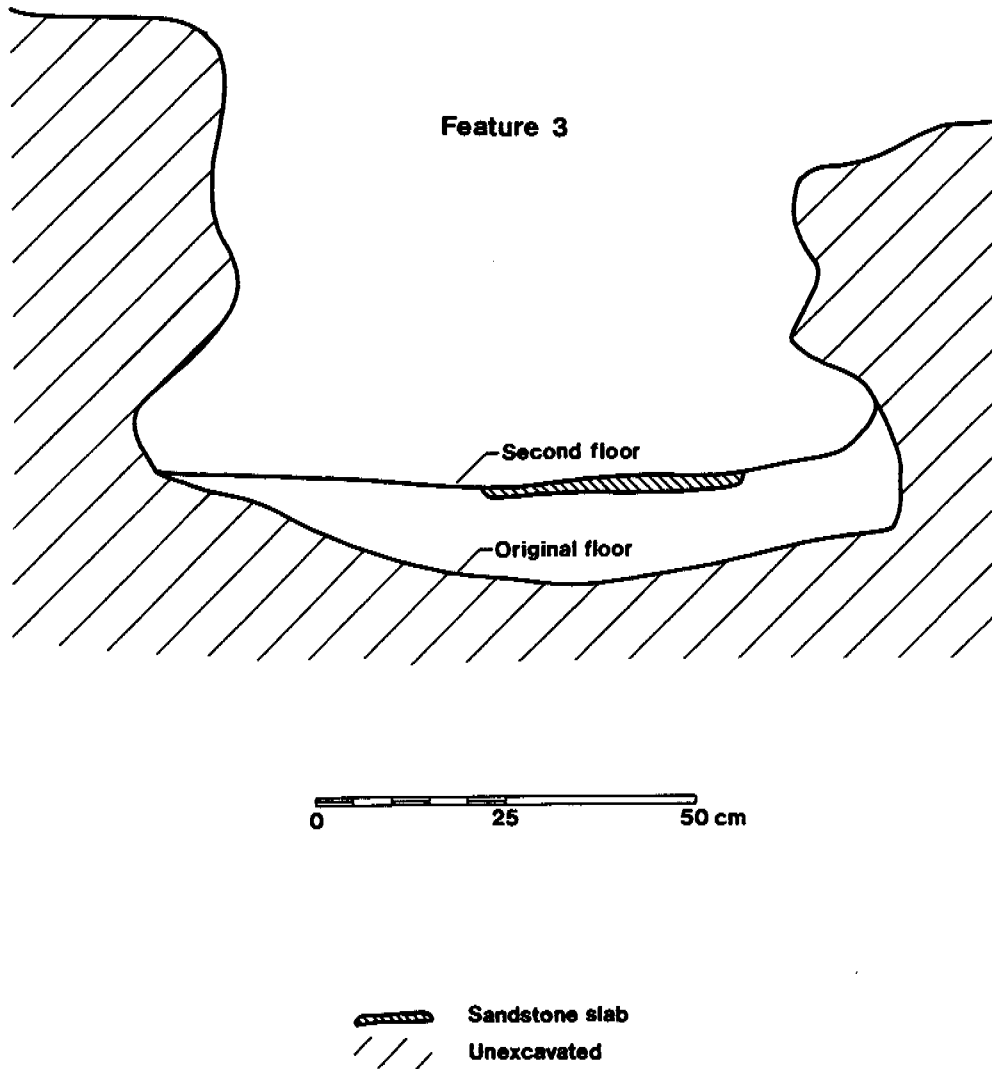


Figure 19.9. Site LA 49838 Feature 3, Cross Section.

Feature 3 may have functioned originally as a roasting pit and later as a storage bin. Evidence of oxidation of soils was observed throughout the original base and walls of the pit, indicating prolonged use of the pit at high temperatures. No evidence of remodeling of the walls during later use was documented. Maize cupules, a sunflower achene, and charred juniper and pine were some of the archaeobotanical material recovered from the flotation sample.

One radiocarbon sample returned a date of 880 ± 50 BP (Beta-121233; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A). This is the latest radiocarbon date for the entire project. This date is consistent with the late Pueblo II to early Pueblo III designation for the later component.

Feature 4

Feature 4 was located 2.5 m northeast of Feature 3, on the east side of State Highway 602. The center point grid coordinates for Feature 4 are N94.70, E94.67 (Figure 19.3). Feature 4 was an earthen bell-shaped storage bin measuring 68 cm north-to-south by 58 cm east-to-west at the top and 92 cm north-to-south by 84 cm east-to-west at the bottom of the pit. The height from the base to the mechanically stripped surface was 60 cm (Figure 19.10).

The east half of Feature 4 was excavated in seven 10-cm levels. Two strata were identified within the feature fill (Figure 19.11). Stratum I consisted of loamy sand deposits with artifact inclusions. Levels 1, 2, and 3 were excavated within Stratum I. Artifacts recovered from Level 1 included flaked stone and ground stone. No artifacts were recovered from Level 2. Only faunal specimens were recovered from Level 3. Stratum II consisted of loamy sand deposits with very few artifact inclusions. Levels 4, 5, 6, and 7 were excavated within Stratum II. No artifacts were recovered from Levels 4, 6, or 7. Materials recovered from Level 5 included a flaked stone, ground stone, and a faunal specimen. The west half of the feature was excavated in two levels. Level 1 was a 50-cm level, ending 10 cm above the base of the feature. Level 2 excavation

included the 10 cm above the floor. Materials recovered from Level 1 of the west half included flaked stone and faunal specimens. Only faunal specimens were recovered from Level 2.

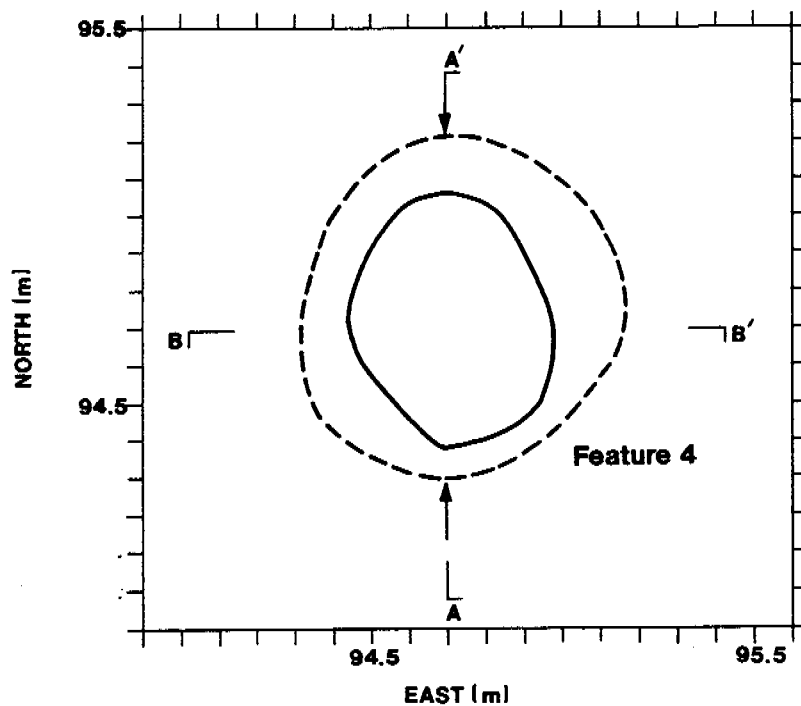
Excavations of Feature 4 identified light oxidation of soils at the base and along the walls of the feature. Oxidation of siliceous materials was most likely an effort to seal the interior of the pit for storage purposes rather than a result of a roasting function. This is supported by maize pollen identified from this feature by Smith, and by maize cupules and charred pricklypear cactus seeds identified by McBride (discussed below).

One radiocarbon date of 2280 ± 70 BP (Beta-121232; wood charcoal; $\delta^{13}\text{C} = -25\text{‰}$; Appendix A) indicates use during the Basketmaker II period.

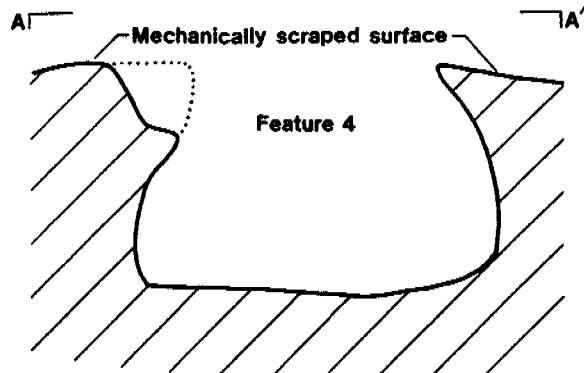
Feature 5

Feature 5 was located 3.5 m southeast of Feature 3 on the east side of State Highway 602. The center point grid coordinates for Feature 5 are N91.15, E96.54 (Figure 19.3). Feature 5 was a bell-shaped earthen pit. The top measurements were 73 cm north-to-south by 59 cm east-to-west; the bottom measurements were 1.28 m north-to-south by 1.05 m east-to-west; and the height from the base to the top of the mechanically stripped surface was 54 cm (Figure 19.12).

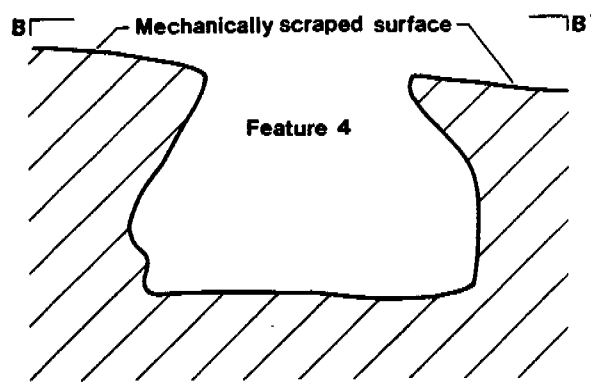
The west half of Feature 5 was excavated in six 10-cm levels. Excavations identified two strata within the feature fill (Figure 19.13). Stratum I consisted of loamy sand deposits with inclusions of charcoal and cultural materials. Levels 1 and 2 were excavated within this stratum. Flaked stone and faunal specimens were recovered from Level 1. No artifacts were recovered from Level 2. Stratum II consisted of loamy sand deposits with inclusions of charcoal and cultural material. Levels 3, 4, 5, and 6 were excavated within this stratum. Level 3 yielded only flaked stone. Level 4 contained flaked stone and faunal specimens. No artifacts were recovered from Level 5 excavation. Only flaked stone artifacts were recovered from Level 6. The east half of the feature was excavated in two levels. Level 1 was



Cross section A-A'



Cross section B-B'



- Top edge of Feature 4
- - - Base of Feature 4
- A' — A' Cross section
- /// Unexcavated
- ← Profile location

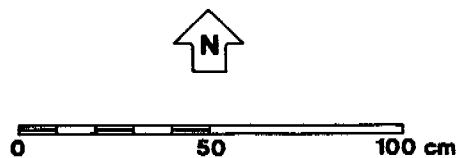
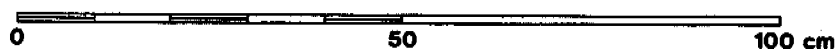
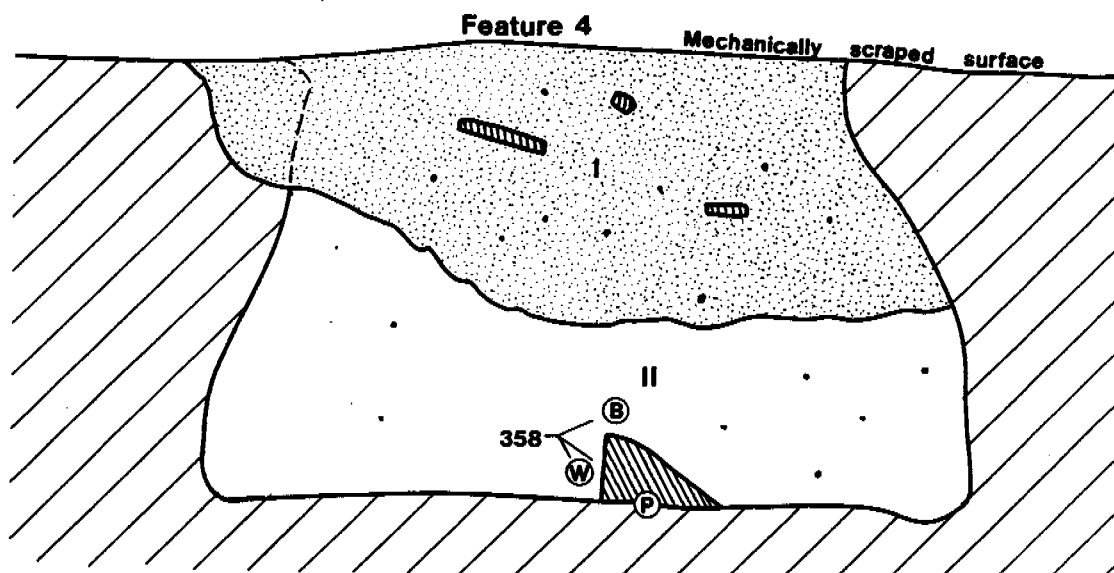


Figure 19.10. Site LA 49838 Feature 4, Plan View and Cross Section.









- I 0-37 cm - Yellowish brown (10YR3/4. moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few very fine roots; abrupt smooth boundary.
- II 37-60 cm - Dark grayish brown (10YR4/2. moist) loamy sand; moderate, very fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few micro roots; abrupt smooth boundary.
-  Sandstone rock
-  Charcoal flecks
-  Flotation sample
-  Waterscreen sample
-  Pollen sample
- 358** Field specimen no.
-  Unexcavated

Figure 19.11. Site LA 49838 Feature 4, East-facing Profile.

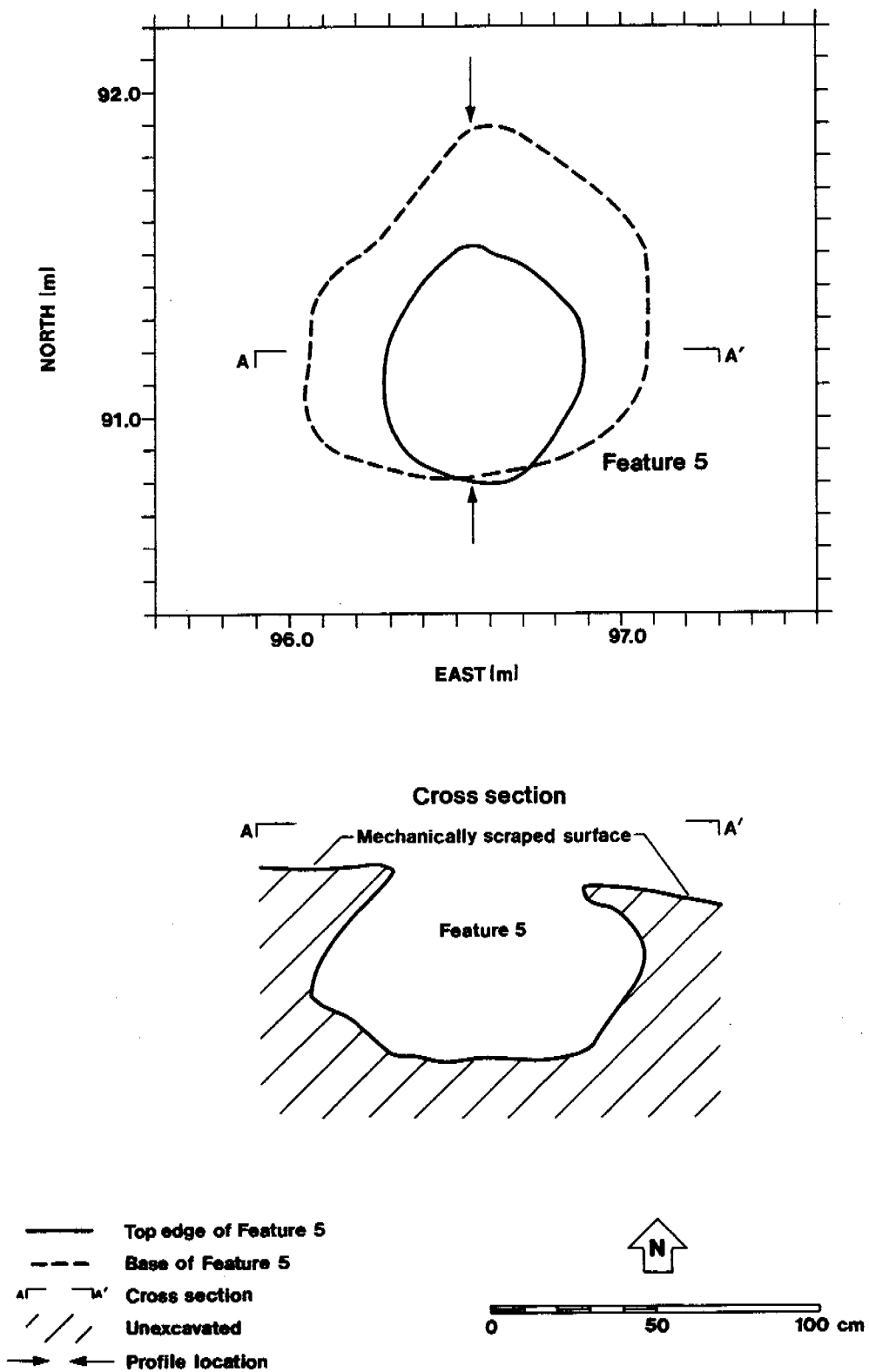
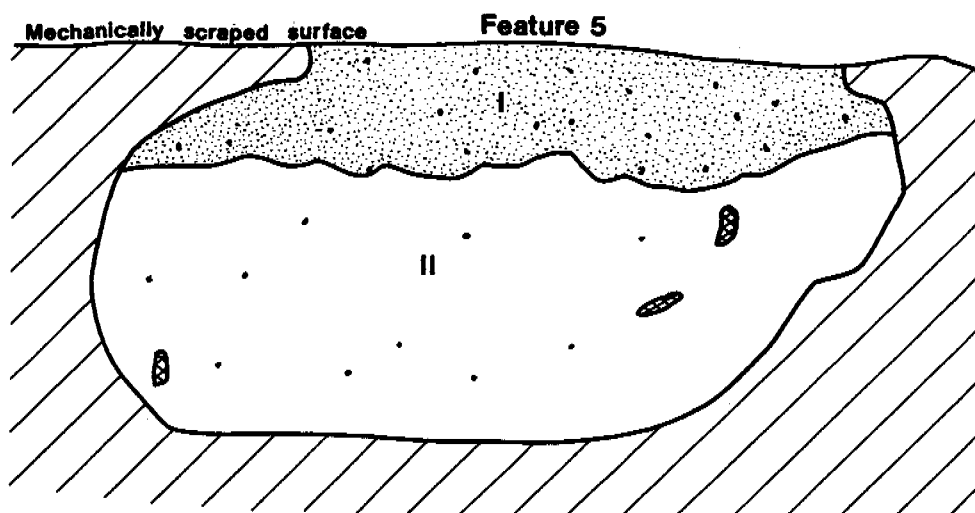


Figure 19.12. Site LA 49838 Feature 5, Plan View and Cross Section.



0 50 100 cm

I

0-14 cm - Dark yellowish brown (10YR4/4, moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; few fine roots; abrupt wavy boundary.

II

14-53 cm - Dark grayish brown (10YR4/2, moist) loamy sand; weak, very fine, granular; nonsticky, nonplastic; less than 10% gravel; very few micro roots; abrupt smooth boundary.



Rodent disturbance



Charcoal flecks



Unexcavated

Figure 19.13. Site LA 49838 Feature 5, West-facing Profile.

44 cm deep. Only flaked stone artifacts were recovered from Level 1 of the east half. Level 2 (10 cm of fill above the base of feature) yielded faunal specimens. Evidence of severe rodent and insect burrowing was documented during the excavations.

Feature 5 excavations revealed that the base and parts of the walls were heavily oxidized. This indicated that the feature was most likely used as roasting pit or the pit was burnt to seal the interior by oxidation of soils before use for storage purposes.

One radiocarbon date of 1990 ± 40 BP (Beta-121234; wood charcoal; $\delta^{13}\text{C} = -21.1\text{‰}$; Appendix A), indicates use during the Basketmaker II period.

Feature 6

Feature 6 was located 7 m north of Feature 3 on the east side of State Highway 602. The center point grid coordinates for Feature 6 are N99.29, E92.85 (Figure 19.3). This feature was a basin-shaped earthen pit. The measurements were 1.53 m northwest-to-southeast by 80 cm northeast-to-southwest and 32 cm deep (Figure 19.14).

The southwest half of the feature was excavated in three 10-cm levels. Excavations of the west half identified one stratum (Figure 19.15). Stratum I consisted of loamy sand with inclusions of charcoal. Only flaked stone artifacts were found in Level 1. No artifacts were recovered from Level 2 and 3 of the west half. Excavation of the east half of the feature recovered flaked stone and faunal specimens.

Excavation of Feature 6 documented severe rodent and insect disturbance. Due to this disturbance the function of Feature 6 could not be determined.

Feature 7

Feature 7 was located 50 cm northeast of Feature 6 on the east side of State Highway 602. The center point grid coordinates for Feature 7 are

N100.20, E93.04 (Figure 19.3). Feature 7 was a bell-shaped earthen pit, a possible small storage bin. The feature measurements at the top were 39 cm north-to-south by 41 cm east-to-west and the bottom measurements were 64 cm north-to-south by 56 cm east-to-west; the depth was 18 cm (Figure 19.16).

The east half of the feature was excavated in two 10-cm levels. The excavation of the east half identified two strata within the feature fill (Figure 19.17). Stratum I consisted of loamy sand with inclusions of small charcoal flecks. Level 1 was excavated within this stratum. No artifacts were recovered from Level 1. Stratum II consisted of loamy sand deposits. No artifacts were recovered from Level 2 excavations. Excavation of the west half of the feature recovered no artifacts. Evidence of root, insect, and rodent disturbance was documented during the excavation. Flotation samples were collected from the sediments of the west half of the feature. A pollen sample was scraped from the base of the feature.

Feature 7 excavations revealed an oblong shaped feature, with a depth of 31 cm. This suggests it may have functioned as a small storage bin.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

Six hundred twenty-four sherds were analyzed from site LA 49838. Of these 624, 192 were only partially analyzed due to their small size and, therefore, were eliminated from the data analysis. No other subsampling of the recovered ceramic assemblage was made, leaving 432 sherds for the attribute analysis as described in Chapter 21. The bulk of the ceramic artifacts were recovered from the surface; however, 159 sherds were recovered from excavation. Of the five units excavated, two yielded ceramics (SU 1 and SU 3). Appendix D outlines the ceramic data by provenience. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware,

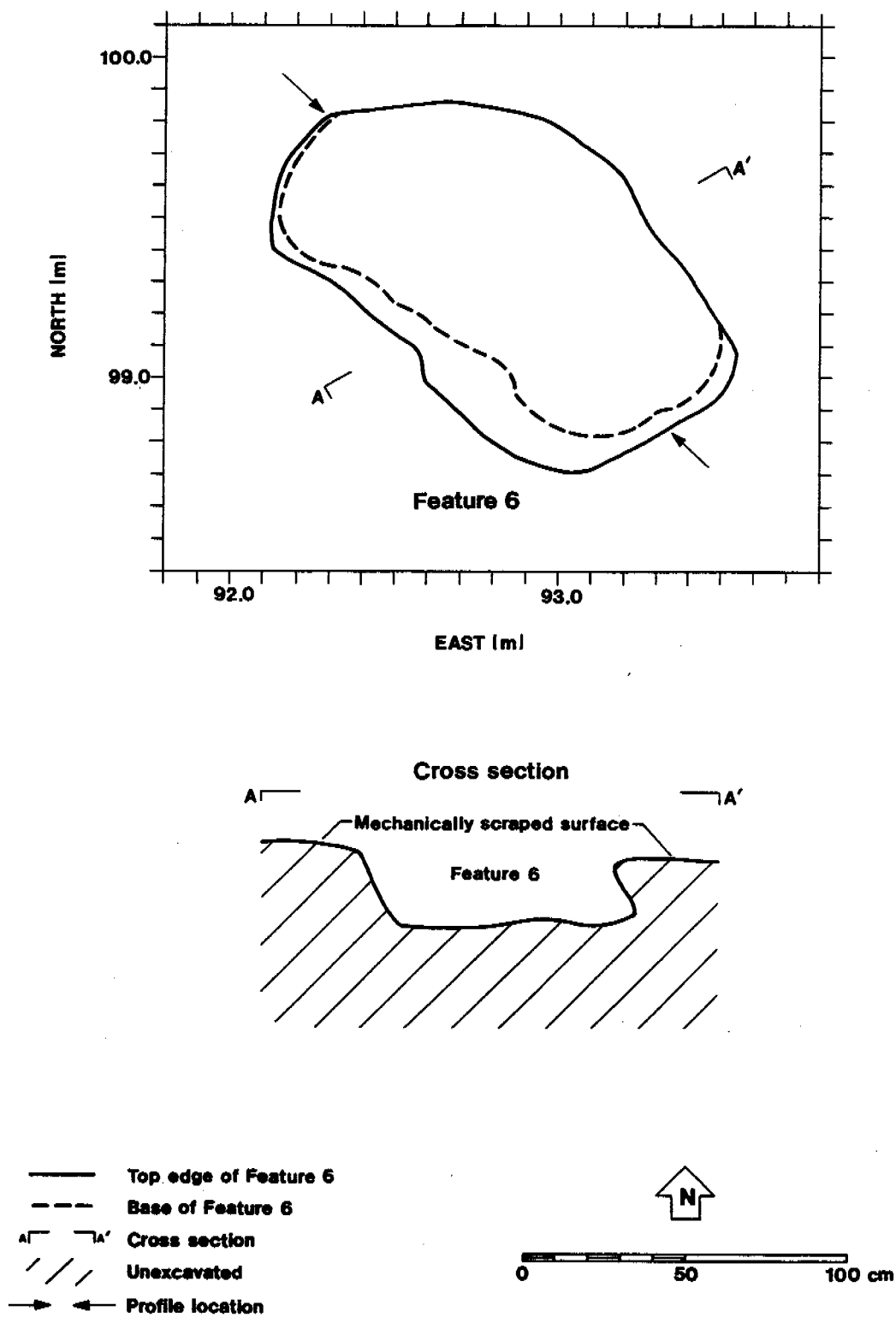
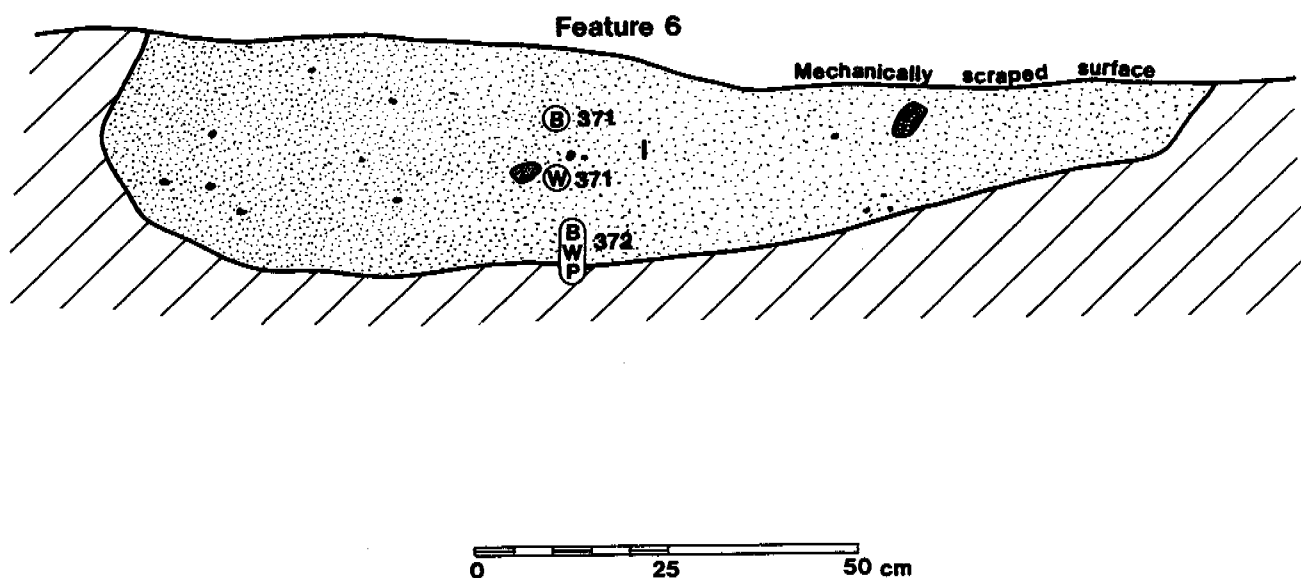


Figure 19.14. Site LA 49838 Feature 6, Plan View and Cross Section.






- I 0-32 cm - Dark yellowish brown (10YR3/6. moist) loamy sand; moderate, fine, granular; slightly sticky, slightly plastic; less than 10% gravel; very few fine roots; abrupt smooth boundary.
-  Fire-cracked rock
- (B) Flotation sample
- (P) Pollen sample
- (W) Waterscreen sample
- 371 Field specimen no.
-  Charcoal fleck
-  Unexcavated

Figure 19.15. Site LA 49838 Feature 6, West-facing Profile.

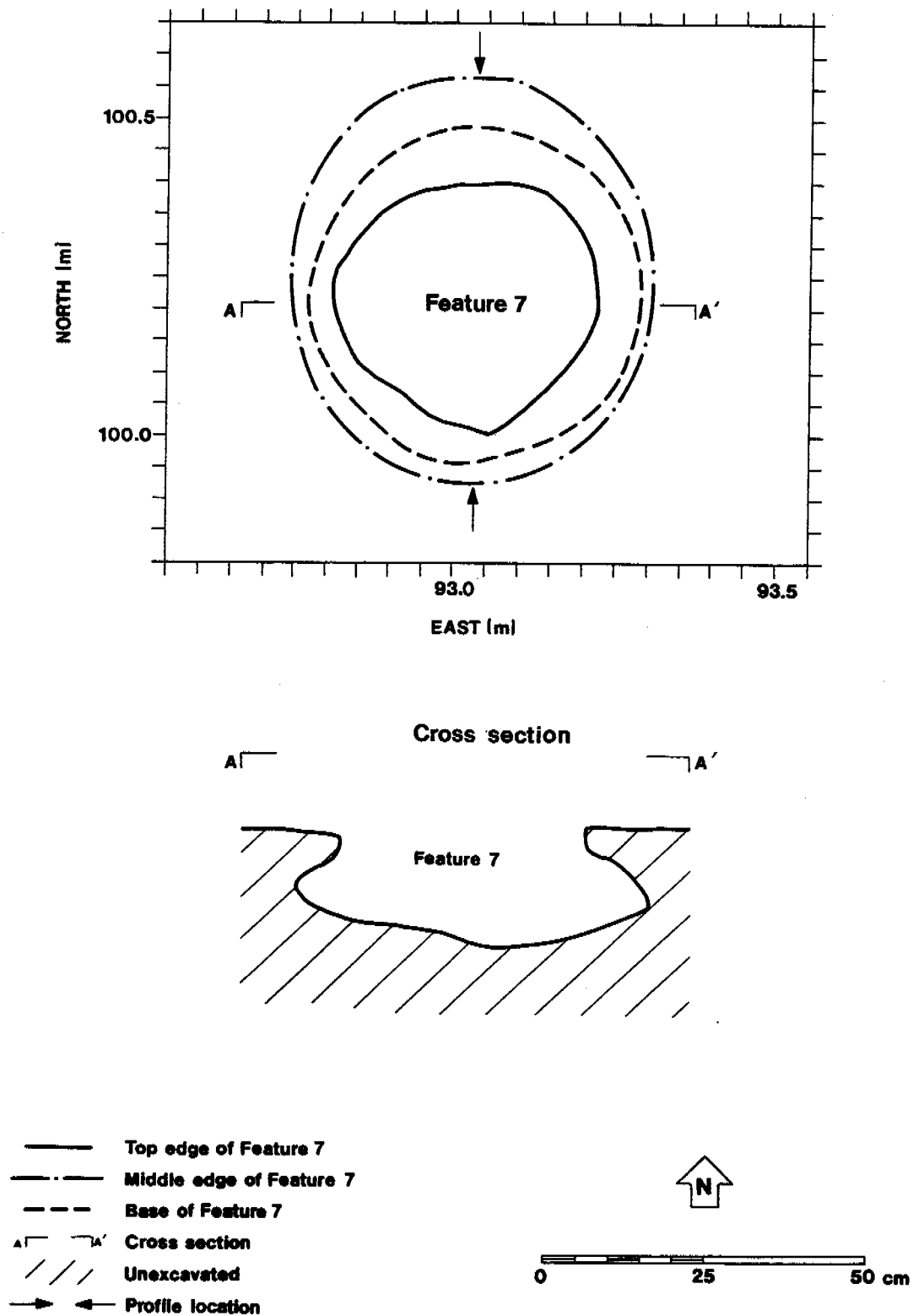
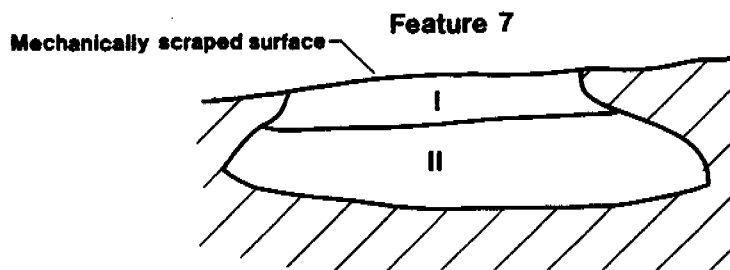


Figure 19.16. Site LA 49838 Feature 7, Plan View and Cross Section.



- I 0-7 cm - Dark brown (10YR3/3. moist) loamy sand; weak, fine, granular; nonsticky, nonplastic; less than 10% gravel; few fine roots; abrupt smooth boundary.
- II 7-18 cm - Brown (7.5YR5/4. moist) loamy sand; weak, fine granular; common medium roots; abrupt smooth boundary.
- /// Unexcavated

Figure 19.17. Site LA 49838 Feature 7, East-facing Profile.

and Cibola Gray Ware. The assemblage also contains wares less common to the Zuni area, including Mogollon Brown Ware.

Chronometrics

Seventy diagnostic ceramic artifacts were recorded, 24 of which were in excavation units. Among the 49 Cibola White Ware sherds were 8 Red Mesa, 2 Kiatuthlanna, 8 Escavada, 19 Puerco, 4 Reserve, 6 Gallup, 1 Transitional Reserve/Tularosa, and 1 Tularosa black-on-whites. Among the 21 White Mountain Redware sherds were 6 Puerco, and 13 Wingate black-on-reds, 1 Wingate Polychrome (Houck variety), and 1 St. Johns Black-on-red. These types make up a ceramic assemblage that dates from the late Pueblo I period to the middle Pueblo III period (AD 850 to 1250). A mean ceramic date of AD 1084 \pm 100 years was generated for the ceramic assemblage. This date supports a Pueblo II (AD 900 to 1150) temporal designation for the site.

The diagnostic ceramic assemblage was divided between surface and excavation collections; temporal ranges were then recalculated using these two subsamples. Forty-six diagnostic ceramic artifacts were identified among the surface collections including 31 Cibola White Ware sherds and 15 White Mountain Redware sherds. With the exception of Wingate Polychrome (Houck variety), all diagnostic types listed above are present in the surface collection. This assemblage dates from the late Pueblo I period to the middle Pueblo III period. A mean ceramic date of AD 1090 \pm 100 years was generated for the surface diagnostic assemblage. These recalculations support the temporal designation assigned to the entire diagnostic assemblage.

Twenty-four diagnostic ceramic artifacts were recovered from excavated units. Both Cibola White Ware sherds and White Mountain Redware sherds are present in the excavated assemblage. Among the Cibola White Ware are Red Mesa, Escavada, Puerco, and Reserve black-on-whites. Among the White Mountain Redware are Puerco, and Wingate black-on-reds, and Wingate

Polychrome (Houck variety). This assemblage dates from the late Pueblo I period to the early Pueblo III period (AD 850 to 1200). A mean ceramic date of AD 1074 \pm 87 years was generated for the excavated diagnostic assemblage. Both the assemblage and mean ceramic date support a temporal designation for the site that is somewhat earlier than the two discussed above. This is mostly due to the absence of Pueblo III ceramics (Tularosa Black-on-white and St. Johns Black-on-red) in the excavated collections. Chapter 21 offers a further discussion of dating ceramic assemblages and calculating mean ceramic dates.

Functional Variability

Ceramic forms in the assemblage are listed by ware and type in Appendix D. There is a total of 322 jars, 96 bowls, 14 ladles, and 1 indeterminate form present in the assemblage. Most of the sherds were identified as coming from jar bodies, although 7 jar rims, 76 bowl bodies, 20 bowl rims, and various ladle parts were also recorded. Both bowl and jar forms are represented in the whiteware and redware sherds, while all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of approximately 3/1. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site.

Six percent of the jars were recorded as having soot; sooting normally occurs on the exterior of jars, but interior sooting, as well as sooting on both surfaces, was also recorded. One modified sherd was recorded. This sherd had a hole drilled through it, probably for repair but possibly for hanging the vessel. Chapter 21 has a more in-depth discussion of functional variability between sites.

Compositional Variability

Tempering material was recorded for all 432 sherds. In this sample, 37% of the ceramic artifacts had a combination of sherd and sand temper and 23% of the sample had sherd temper.

The majority of the Cibola White Ware and the White Mountain Redware artifacts had only sherd temper, but a combination of sand and sherd was not uncommon. The majority of Cibola Gray Ware artifacts had a combination of sand and sherd temper, but sherd temper was not uncommon. Both sherd and a combination of sand and sherd temper probably represent local production. The Mogollon Brown Ware, although believed to be of nonlocal origin, also has a combination of sherd and sand temper. The remaining 40% of the ceramic artifacts can be divided into two temper types: quartz sand and multilithic sand. The majority of ceramic artifacts with these kinds of temper were Cibola Gray Wares; nonetheless, a small percentage of Cibola White Wares also had either quartz or multilithic sand temper. It is uncertain if quartz and multilithic sand represent local or nonlocal production without further analysis. Chapter 21 discusses variation in temper type by site in Y Unit Draw and outlines implications for intra- and interregional interaction.

Summary

The ceramic assemblage from site LA 49838 is large, consisting of 432 fully analyzed sherds. A variety of wares both common and uncommon to the area are present at the site, including Cibola White Ware, White Mountain Redware, Cibola Gray Ware, and Mogollon Brown Ware. Seventy diagnostic ceramics were identified in the overall assemblage. These diagnostics support a Pueblo II temporal range (AD 900 to 1150) with the possibility of a late Pueblo I and/or early Pueblo III component. Functional variation among ceramics suggests a variety of activities practiced at the site.

Flaked Stone Artifacts

The flaked stone assemblage from site LA 49838 consists of 357 artifacts. Five artifacts recovered from Features 1, 4, and 5 are Basketmaker II in age. The remaining 352 flaked stone pieces were recovered in Pueblo II contexts (surface and midden) at the site. The small Basketmaker II collection will be discussed

briefly below. The remainder of this section will focus on the Pueblo II flaked stone collection.

Basketmaker II Assemblage

The Basketmaker II assemblage from this site consists of three pieces of debitage and two pieces of debris. All five of these artifacts are chert. Of the three pieces of debitage, one is a primary flake, one is a secondary flake, and one is a distal bifacial thinning flake fragment. The secondary flake contains evidence of platform preparation in the form of multiple facets.

Pueblo II Assemblage

Eleven artifact classes (Table 19.1) are represented among the 352 flaked stone artifacts recovered from Pueblo II contexts at site LA 49838. The artifact classes are (in decreasing order of representation) debris (45.2%), debitage (34.1%), cores (8.2%), retouched pieces (4.3%), hammerstones (2.6%), scrapers (1.4%), other (1.4%), utilized pieces (1.1%), perforators (0.8%), manuports (0.6%), and a biface (0.3%). The five artifacts classified as "other" in this collection consist of two chert core trimming flakes, two chert potlids (products of thermal fracturing), and one 52-g quartzite hammerstone fragment. Table 19.2 provides summary metric data for the flaked stone artifacts in the collection.

The Pueblo II core assemblage at site LA 49838 consists of 24 complete cores and 5 core fragments. Of the 24 complete cores, 13 (54.2%) are single platform, 5 (20.8%) are multiple platform, 3 (12.5%) are amorphous, 2 (8.3%) are on flakes, and 1 (4.2%) is opposed platform. Eighteen (75.0%) of the complete cores are chert while only 4 (16.7%) are quartzite and 2 (8.3%) are silicified wood. The 24 complete cores have a mean weight of 72.9 g (10% trimmed mean of 49.8 g), a median weight of 41.0 g, a maximum of 604.0 g, and a minimum of 11.0 g. Of the five core fragments, four are chert and one is quartzite.

Debitage and debris account for 79.3% of the total Pueblo II collection from site LA 49838 (Table 19.1). Of the 120 pieces of debitage 56

Table 19.1. Summary Counts and Percentages of Site LA 49838 Pueblo II Flaked Stone Artifacts by Artifact Class.

Artifact Class	n	%
Biface	1	0.3
Core	29	8.2
Debitage	120	34.1
Debris	159	45.2
Hammerstone	9	2.6
Manuport	2	0.6
Other	5	1.4
Perforator	3	0.8
Scraper	5	1.4
Retouched piece	15	4.3
Utilized piece	4	1.1
Total	352	100.0

Table 19.2. Summary Metric Data for Site LA 49838 Pueblo II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	2.6	2.2	1.0	15.6
10% trimmed mean	2.4	2.0	0.8	5.1
Median	2.4	1.8	0.7	2.0
Standard error	0.1	0.1	0.1	3.0
Standard deviation	1.4	1.4	1.0	55.8
Minimum	0.6	0.3	0.1	-
Maximum	8.6	11.8	7.5	636.0
Range	8.0	11.5	7.4	636.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

n = 352

(46.7%) are classified as primary flakes, 62 (51.7%) as secondary flakes, and 2 (1.6%) as tertiary retouch or trimming flakes. The five bifacial thinning flakes present in the collection can also be considered secondary reduction products.

Platform data were obtained for 107 of the 120 pieces of debitage. Nineteen (17.8%) pieces showed evidence of platform preparation. Eight were single faceted, seven were multifaceted, and four were ground or abraded. Twenty-one (19.6%) pieces of debitage had cortical platforms. Eight (7.5%) had percussion marks on their platforms. Only five pieces of debitage showed evidence of thermal alteration (e.g. crazing or potlidding). This is consistent with the evidence for thermal alteration in the assemblage as a whole. Of the 352 artifacts in the collection, 24 (6.8%) were thermally altered.

The flaked stone artifacts in the Pueblo II component of this site were recovered in either in surface contexts or in the large midden present at the site. The large number of cores, debitage, and debris and the presence of nine hammerstones clearly show that lithic reduction occurred at the site during the Pueblo II occupation and may have been a major activity at the site. Primary, secondary, and tertiary reduction products and bifacial reduction debris indicate that all phases of reduction and tool production and maintenance occurred.

The formal and informal tool assemblage from this component includes 15 retouched pieces, 5 end scrapers, 4 utilized pieces, and 3 perforators. One of the perforators (Figure 19.18; record number 383 in Appendix E) can be classified as a graver and is a classic example of its type. One of the end scrapers (Figure 19.19; record number 346 in Appendix E) is a quartzite, heavy-duty end scraper weighing 65 g. Numerous percussion marks are present on its dorsal surface suggesting multiple attempts at reducing the piece.

Of the 352 artifacts in this collection, 274 (77.8%) are chert, 40 (11.4%) are quartzite, 36 (10.2%) are silicified wood, and 2 (0.6%) are

quartz. Ten of the chert artifacts are made of Zuni Yellow Spotted chert and three (one piece of debitage and two pieces of debris) have been attributed to Washington Pass chert. The amounts of chert (ca. 78.0%) and non-chert raw materials present in this assemblage are consistent with those of the other Pueblo II assemblages analyzed in this study. Pueblo II raw material economy is discussed in more detail in Chapter 22 of this report.

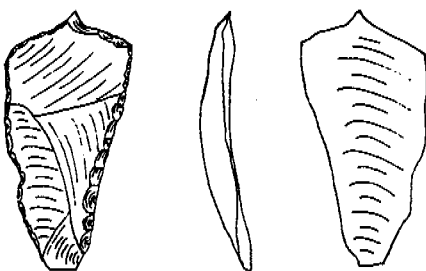
Ground Stone Artifacts

Site LA 49838 yielded 12 ground stone artifacts from surface and subsurface contexts. Four ground stone artifacts were recovered from the surface of this site: three indeterminate ground stone fragments and a one-hand mano blank (Table 19.3). The one-hand mano blank is rectangular in plan and in cross section, and was shaped by pecking. It appears to have been discarded after a large flake was knocked off one side during shaping. The removal of this flake makes this end of the mano much thinner than the rest of it, which would have resulted in an uneven grinding surface.

A one-hand mano was recovered from the backdirt pile. It is made of sandstone, is shaped, is ground on both surfaces, and has parallel striations visible.

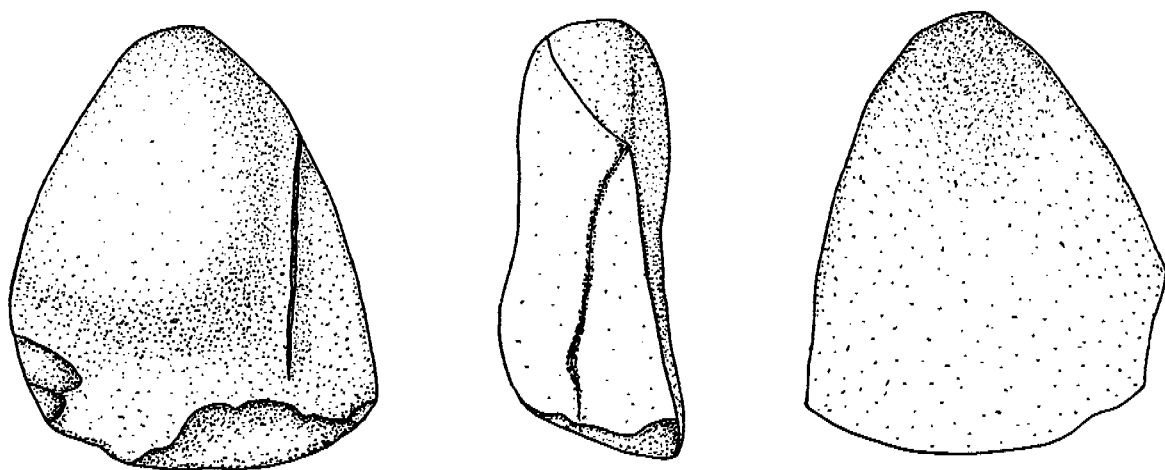
Feature 1, the midden, yielded five ground stone artifacts. These are an active abrader, a disc, a trough metate fragment, a two-hand mano, and an indeterminate ground stone fragment (Table 19.4). The active abrader is only slightly ground, suggesting it was used as an expedient tool. The disc was flaked to shape and was probably used as a pot lid. All four edges of the two-hand mano were pecked, creating an object that is rectangular in plan and in cross section. One side of this mano is slightly wedge-shaped in transverse cross section.

An indeterminate ground stone fragment was recovered from Feature 3, a bell-shaped earthen pit. Made of sandstone, it is ground flat on one surface only with no striations visible.



Actual Size

Figure 19.18. Site LA 49838 Graver (Record Number 383).



Actual Size

Figure 19.19. Site LA 49838 Quartzite, Heavy-duty End Scraper (Record Number 346).

Table 19.3. Ground Stone Artifacts Recovered from the Surface of Site LA 49838.

FS No.	Artifact Type	Raw Material	Description
FS 63-1	Indeterminate ground stone fragment	Sandstone	Parallel striations on one surface
FS 76-1	Indeterminate ground stone fragment	Sandstone	No striations; one surface ground; pecked
FS 254-1	Indeterminate ground stone fragment	Sandstone	Parallel striations on both surfaces; shaped; pecked
FS 257-1	One-hand mano blank - nearly complete	Sandstone	No striations or grinding; shaped; pecked

Table 19.4. Ground Stone Artifacts Recovered from Feature 1 of Site LA 49838.

FS No.	Artifact Type	Raw Material	Description
289	Active abrader - complete	Sandstone	No striations; one surface ground
289	Disc - complete	Sandstone	No striations or grinding; shaped
290	Trough metate fragment	Vesicular basalt	Parallel striations on one surface; shaped
290	Two-hand mano - complete	Sandstone	Parallel striations on both surfaces; shaped; pecked
291	Indeterminate ground stone fragment	Vesicular basalt	No striations; one surface ground

A sandstone trough metate fragment was recovered from Feature 4, an earthen bell-shaped storage bin. It is shaped, ground on both surfaces, and burned. No striations were visible. One surface consists of part of a shallow flat trough. The other surface is smoother and is ground across the entire surface. Rounding of the broken edges suggests that this fragment was reused as a mano or active abrader. The smooth flat surface is the one that was reused.

Miscellaneous Item

A chunk of vesicular basalt was recovered from the midden (Feature 1) at site LA 49838.

Faunal Assemblage

This section discusses the sample from this site; a more general discussion of faunal remains from the entire project can be found in Chapter 26. Detailed description of faunal remains is provided in Appendix I.

Faunal specimens were recovered from Features 1, 3, 4, 5, and 6. Two-thirds of the 55 specimens were unidentifiable (Table 19.5), and

many of these were small fragments of burnt bone. The identified specimens were mainly from lagomorphs—eight cottontail (*Sylvilagus* sp.) and nine jackrabbit (*Lepus* sp.). A single pocket gopher (*Geomyidae*) mandible was the only other identified specimen.

Macrobotanical Remains

Maize cupules were the most common plant remains, identified in four of six samples examined. Pinyon nutshell was recovered in the thermal feature and the bell-shaped storage pit. The fall-ripening pinyon nut crop is an exceedingly valuable wild food resource, especially given its nearby availability. The nuts are distinguished by a particularly high energy value (635 calories per 100 grams, higher than most other plant and animal foods used prehistorically, including corn; Ford 1968:158,160). Ethnographic references for the Tewa, Isleta, and Zuni indicate the prevalence of storing nuts in the shell, sometimes preceded by roasting (Castetter 1935:40-42; Jones 1930:37; Robbins et al. 1916:41). These accounts note how roasting the nuts benefits both flavor and preservation. A prickly pear seed, the only other

Table 19.5. Faunal Assemblage from Site LA 49838.

Taxon	NISP	MNI	Burnt
<i>Sylvilagus</i> sp.	8	2	-
<i>Lepus</i> sp.	9	1	-
Geomyidae	1	1	-
Unidentified	37	-	22
Total	55	4	22

Key: MNI = minimum number of individuals

NISP = number of identified specimens

evidence of perennial plant use, was recovered from the bell-shaped storage pit as well. The fruits of prickly pear cacti were eaten raw, boiled, or dried (Castetter 1935:35-37).

The bell-shaped pit/roasting pit, Feature 3, produced the greatest number of charred taxa including a maize cupule and sunflower, pigweed, Cheno-Am, and winged pigweed seeds. The Cheno-Am category refers to seeds that could be either in the genus *Chenopodium* or *Amaranthus*. This category is used when the condition of a seed prohibits a more specific identification. Documented economic uses of weedy annuals like Cheno-Ams and pigweed seeds abound in the ethnographic literature. Castetter (1935) described the use of these as a ground meal, either eaten as gruel or combined with other food such as cornmeal and made into cakes. Absolute abundance of the remains was extremely low (one or less of each taxon) and although the remains may represent remnants of roasting activities and/or storage contents of the feature, the scant numbers make them difficult to interpret as anything more than part of secondary trash fill.

Charred wood identified from the site was exclusively coniferous including unknown conifer, pine, pinyon, and juniper.

Prehistoric peoples who made use of site LA 49838 probably cultivated maize nearby and exploited at least five weedy annual taxa, prickly pear cactus, and pinyon nuts and gathered locally available woods for fuel. Wild plant resources used by the occupants of site LA 49838 produce seeds that mature in late

summer or nuts and fruits that can be gathered as late as October or November, indicating the site could have been occupied from at least late summer into the fall.

Pollen

Four pollen samples were submitted from site LA 49838 from one extramural thermal feature and three extramural pits that may have been fire-hardened or used as roasting pits or hearths. The sample from thermal Feature 2 was pollen sterile. The base sample from storage pit Feature 3 had the highest sample concentration of the four samples analyzed from this site at 1600 gr/cc and Cheno-Am was maximum at 57%. Pinyon and beeweed were high at 11% and 4% respectively and cholla pollen was identified. Maize was present in the base sample from pit Feature 4. High percentages of pinyon (14%) and grass (8%) were also calculated from the Feature 4 sample. The Feature 5 pit base was characterized by a low pollen concentration (400 gr/cc) and relatively high percentages of juniper (5%), ragweed/bursage (13%), and grass (5%).

These results are similar to the extramural pits sampled at site LA 26319 with a low representation of maize pollen and high representation of grass and weed types. The assemblages could be explained by pollen blown from nearby fields or disturbed ground around the pits, or harvests of Cheno-Am, beeweed, grass, and sunflower family were associated with the features. Husked maize may have been stored in the pits and would not have left a significant pollen signal (Geib and Smith 1998).

STRATIGRAPHY

The stratigraphy of the western portion of the site is illustrated best in SU 5. A thin (4-cm) brown sandy loam deposit (Stratum I) caps an underlying clay/shale deposit.

The stratigraphy of the eastern portion of the site comprises two main strata. SU 3 illustrates these strata well. Stratum I consists of a dark yellowish brown loamy sand and is nearly 30 cm thick. This stratum comprises the midden of the site's later component. Below this midden is a thick yellowish fine sandy loam. The occupation surface of the Basketmaker II component occurred on this deposit.

CHRONOMETRIC DATA

Chronometric data for site LA 49838 comprise three radiocarbon samples and the ceramic artifact assemblage. The radiocarbon samples are summarized in Table 19.6. The ceramic assemblage is described above. To summarize, Eckert calculated a mean ceramic date of AD 1084 \pm 100 years for the assemblage. Numerous types were identified, yielding a range of potential occupation for the later component between AD 850 and 1250.

SUMMARY

Site LA 49838 is a multicomponent site with occupations dating from the Basketmaker II to the late Pueblo II/early Pueblo III periods. The Basketmaker II occupation is believed to have functioned primarily as a storage/resource processing site. No Basketmaker II architecture, in the form of shallow or deep pitstructures, was observed (as it was at sites LA 26306 and LA 115330). Rather, this component seems consistent with sites such as sites LA 26319, LA 115327, and possibly LA 115324, where only earthen storage or thermal features were identified. Its environmental setting, on a bedrock ridge with well-drained soils, is consistent with habitations, however.

The later component dates primarily to the late Pueblo II, as demonstrated by the mean ceramic date in the late AD 1000s. Occupation may have spanned a longer period, as minor amounts of Kiatuthlanna Black-on-white (late Pueblo I) and Wingate Polychrome (Pueblo III) were recovered. No architectural remains were identified, though they must have been present prior to road construction, given such a high concentration of artifacts and a very dark and thick midden. We can, therefore, assume this component functioned as a habitation, though we do not know the nature and extent of the domestic features (such as activity areas, pitstructures, storage rooms, etc.).

Table 19.6. Summary of Radiocarbon Samples from Site LA 49838.

FS No.	Sample No.	Conventional Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Material	Context
350	121232	2280 \pm 70	BC 395 to 345 and BC 310 to 210	BC 415 to 175	BC 375	<i>Pinus</i> , <i>P. edulis</i>	F4, storage pit
354	121233	880 \pm 50	AD 1055 to 1090 and 1150 to 1225	AD 1030 to 1265	AD 1180	<i>P. edulis</i>	F3, roasting/storage pit
365	121234	1990 \pm 140	BC 165 to AD 160	BC 375 to AD 370	AD 25	<i>Pinus</i> , <i>Juniperus</i> , unknown conifer	F5, roasting/storage pit

Chapter 20

ARCHAEOLOGICAL INVESTIGATIONS AT SITES LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320

James W. Kendrick

**with Analytic Contributions by
Suzanne L. Eckert, Janet Hagopian, and Jeffrey E. Shokler**

INTRODUCTION

Analysis of surface artifacts at five sites (LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320) was conducted between 11 May 1998 and 15 May 1998. This chapter provides the types of analyses conducted, the methods used in those analyses, and their results. Although the sites were not excavated, they provide information regarding prehistoric settlement strategies in Y Unit Draw.

METHODS

At each of the five sites a pedestrian survey was conducted in order to make an initial assessment of site boundaries, and artifact and feature assemblages. Each artifact or feature was then marked with a pin flag, and its locational data collected with a Sokkia Total Station. Ceramic artifacts were analyzed for ware, type, temper, paste, vessel form, and vessel part. Ground stone artifacts were analyzed for type, raw material, striations, grinding, shaping, burning, completeness, length, width, and thickness. With the permission of the Zuni Heritage and Historic Preservation Office (ZHHPO) and the New Mexico State Highway Department, flaked stone artifacts were collected for analysis. This was conducted in order to make the data from these sites comparable to those from the excavated sites, as flaked stone is the largest single artifact class collected from the project sites.

SITE DESCRIPTIONS

Site LA 115333

On 11 May 1998 analysis of surface artifacts was conducted at site LA 115333. The site is located entirely on the west side of the highway

(Figure 20.1). A small sandstone alignment (Feature 1, Figure 20.2) was also recorded. Its function could not be determined.

Flaked Stone

One flaked stone artifact, a piece of chert debris weighing less than 1 g, was recovered from site LA 115333. This piece may be a natural chert fragment given its somewhat rolled appearance.

Ground Stone

One sandstone metate fragment was recorded. It is shaped and ground, displays parallel striations, and is burned. (Appendix F has more detailed information on all ground stone artifacts from the project.)

Ceramic Artifact

One ceramic artifact was observed, a Cibola Gray Ware indented corrugated jar body sherd with coarse quartz sand temper.

Summary and Interpretations

From the data collected, site LA 115333 may be interpreted as a limited-activity site. The metate fragment suggests food production activities may have been conducted at this locality. Too few ceramic artifacts were observed to establish a temporal estimate for when the site was occupied.

Site LA 115328

Analyses at site LA 115328 were conducted between 11 May 1998 and 13 May 1998. It was the largest of the surface analysis sites, extending across both sides of the highway (Figures 20.3

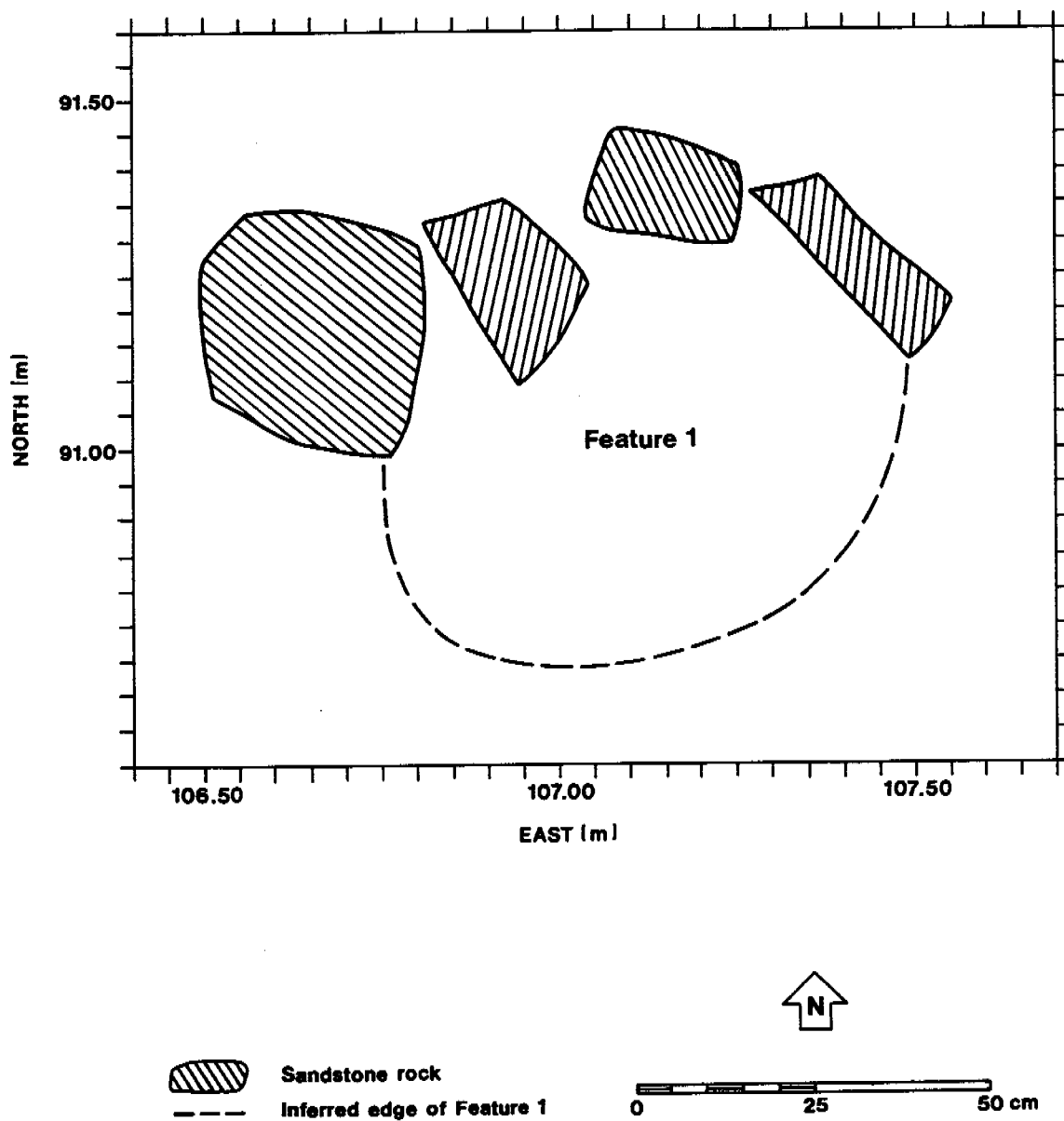


Figure 20.2. Site LA 115333 Feature 1, Plan View.

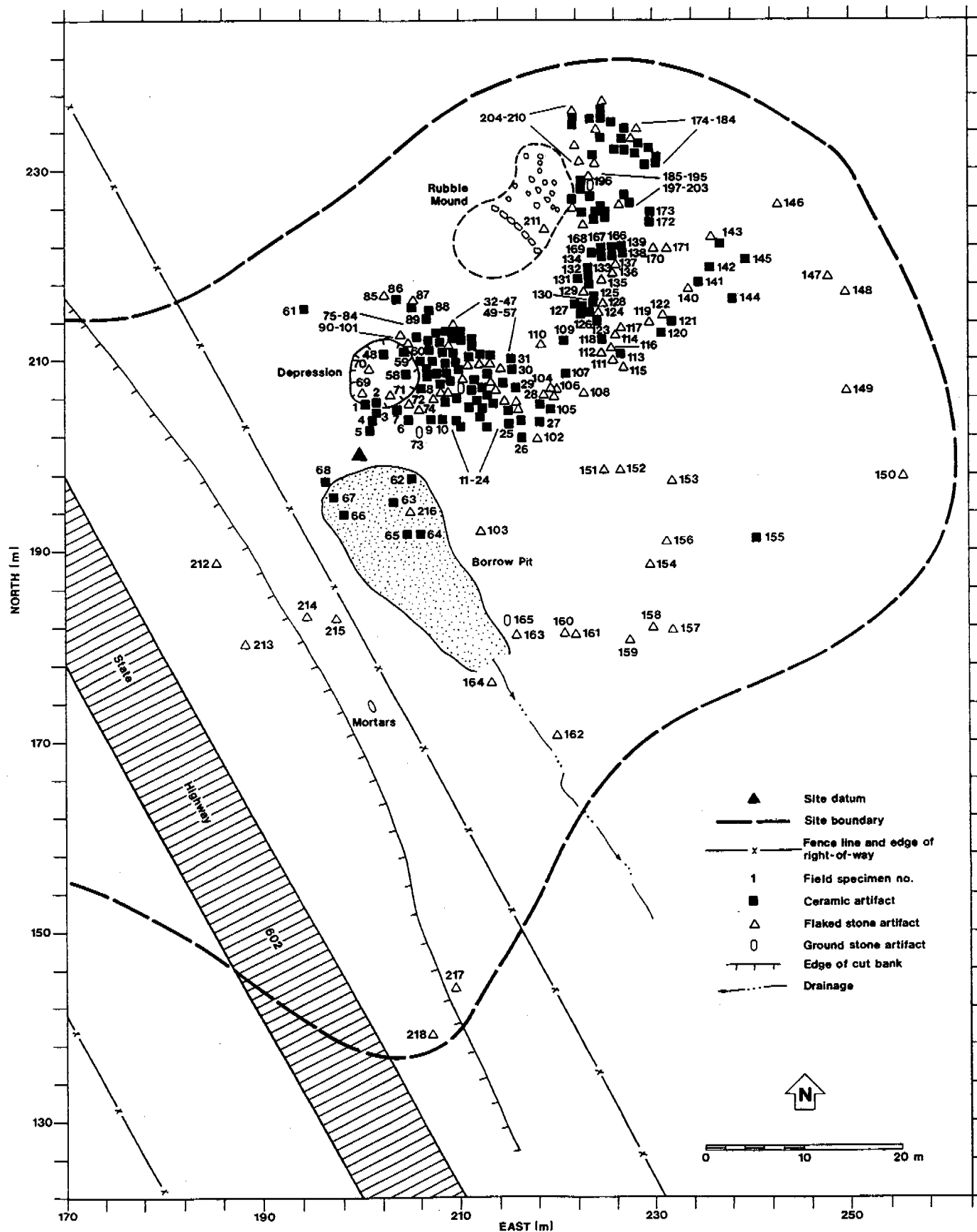


Figure 20.3. Site LA 115328 Data Recovery Site Map, Eastern Portion, Surface Artifacts, and Features.

and 20.4). It also represents one of the few (n=3) "large" habitation sites that we investigated during the project. Sites LA 26306 and LA 49838 represent two other sites with dense artifact concentrations dating to the later Puebloan periods (primarily Pueblo II). Site LA 115328 represents the only such site within the project area with architecture (a pitstructure on the eastern side of the highway) dating to the Pueblo II that was investigated. No excavation was carried out at this feature. This pitstructure is a different one than that identified during the inventory phase of the project (Abbott 1997), the other being located on the western side of the highway.

Examined from the east to the west (Figures 20.3 and 20.4), the site comprises at least five separate concentrations of artifacts. Two large concentrations can be seen along the eastern portion of the site. The easternmost is associated with rubble of unknown function, while the other is associated with a pitstructure. A recent borrow pit can also be discerned, near the eastern right-of-way fence.

The western portion of the site comprises at least three separate clusters of artifacts or architecture. Along the westernmost boundary is a pitstructure, with only flaked and ground stone observed in its general vicinity (FS 287 and 288). Given the extent of Basketmaker II occupation throughout the valley, this structure may date to that period. Another cluster of artifacts, however, is located to the north, containing numerous ceramic and flaked stone artifacts. It is not known whether this concentration is associated with the western pitstructure. Finally, the central portion of the site (yet on the western side of the right-of-way boundary) is a cluster of ceramic and flaked stone artifacts. This area also contains an upright sandstone slab.

Flaked Stone

A total of 89 flaked stone artifacts were recovered from site LA 115328. Seven artifact classes are represented (in decreasing order or representation): debitage (58.4%), debris (25.8%), core (9.0%), scraper (2.3%), retouched piece

(2.3%), denticulate (1.1%), and utilized piece (1.1%). Table 20.1 provides summary metric data for the flaked stone artifacts in this assemblage.

The site LA 115328 core assemblage consists of six complete cores and two core fragments. Of the complete cores, five are single platform and one is multiple platform. Five of the cores are chert and one (single platform) is quartzite. Both core fragments are chert and one (record number 740 in Appendix E) is Zuni Yellow Spotted chert. The six complete cores have a mean weight of 62.8 g (10% trimmed mean of 62.8 g), a median weight of 61.0 g, a maximum of 97.0 g, and a minimum of 19.0 g.

Debitage and debris account for 84.2% of the site LA 115328 flaked stone collection. Of the 52 pieces of debitage, 21 are primary flakes, 29 are secondary flakes, and 2 are bifacial thinning flakes. Platform data could be obtained for 48 of the 52 pieces of debitage. Only eight of these pieces show evidence of platform preparation. Four have single facets, one had multiple facets, two have ground or abraded platforms, and one had both multiple facets and a ground or abraded platform. Fourteen of the pieces of debitage have cortical platforms and six have percussion marks. Three pieces of debitage are thermally altered (oxidized, crazed, or pitted).

The tool assemblage from this site consists of two scrapers (one on Zuni Yellow Spotted chert), two retouched pieces, one denticulate, and one utilized piece.

The flaked stone assemblage is composed of 80.9% chert, 14.6% quartzite, 2.3% silicified wood, 1.1% quartz, and 1.1% obsidian. The obsidian artifact is a secondary flake weighing less than 1 g. A total of six Zuni Yellow Spotted chert artifacts are present in the collection. Two of these pieces are debitage, two are debris, one is a core fragment, and one is the scraper mentioned above.

Ground Stone

Six ground stone artifacts were observed and recorded at site LA 115328. Two of these (FS 73

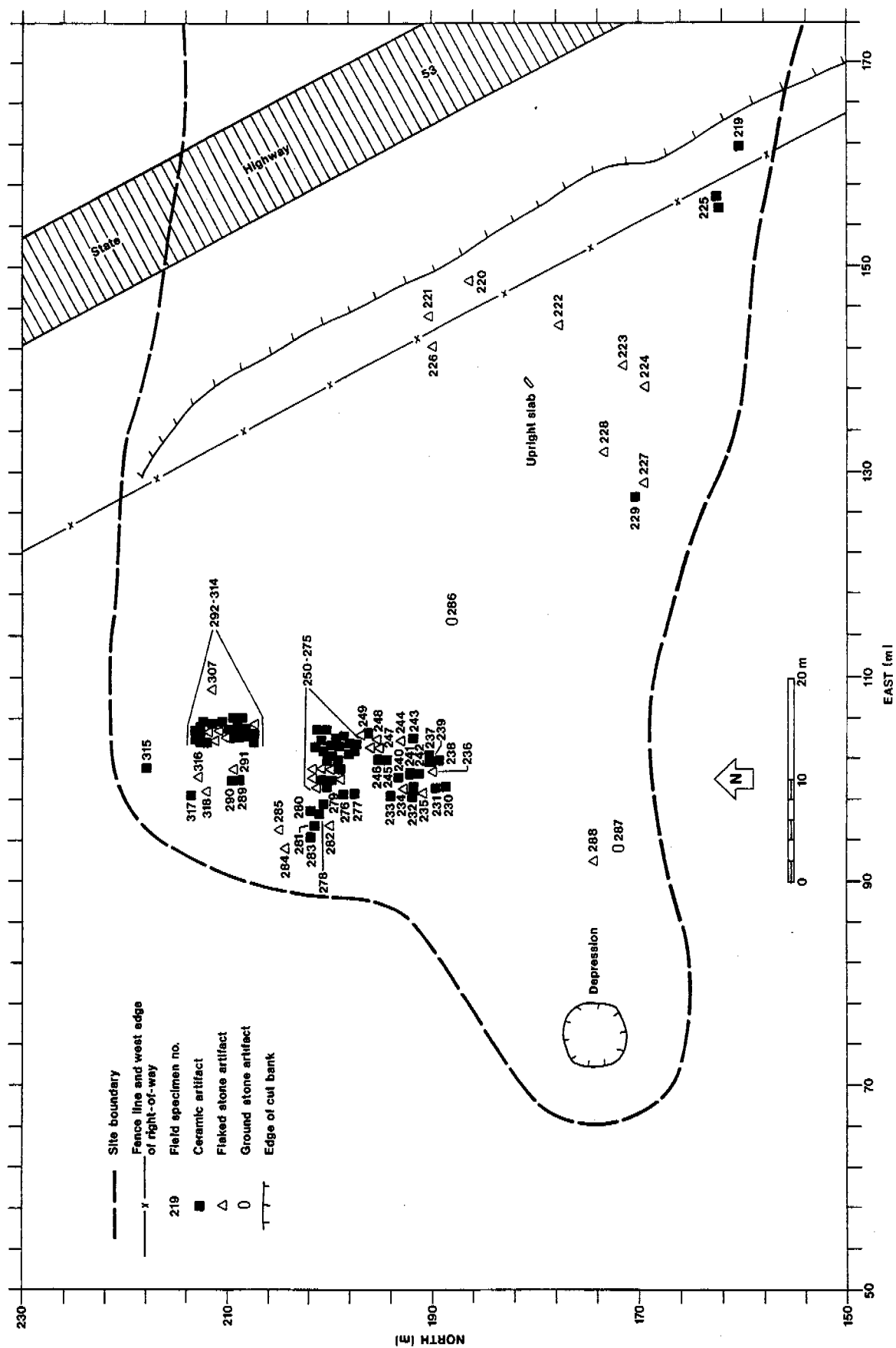


Figure 204 Site LA 115333 Data Recovery Site Map Western Portion Surface Artifacts and Features

Table 20.1. Summary Metric Data for Site LA 115328 Pueblo II Flaked Stone Assemblage.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	3.1	2.7	1.1	13.6
10% trimmed mean	3.0	2.5	1.0	8.4
Median	3.0	2.6	0.9	6.0
Standard error	0.1	0.1	0.1	2.2
Standard deviation	1.0	1.1	0.8	20.6
Minimum	1.1	0.8	0.3	-
Maximum	7.1	6.7	4.4	97.0
Range	6.0	5.9	4.1	97.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

n = 89

and FS 78) refit, and are indeterminate mano fragments made of vesicular basalt. Two other indeterminate mano fragments made of vesicular basalt were also observed (FS 196 and FS 286). In addition, two indeterminate metate fragments were also recorded.

Ceramic Artifacts

Two hundred fifty-five sherds were analyzed from site LA 115328. These sherds are surface artifacts located outside the right-of-way; therefore, they were not collected but, instead, analyzed in the field. As a result, the only attributes recorded for these artifacts were ware, type, form, part, temper, and paste color. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware. The assemblage also contains wares believed to have come from the Puerco Valley including Puerco Red Ware and Puerco Gray Ware.

Fifty-six diagnostic ceramic artifacts were recorded on the surface outside the right of way. Among the Cibola White Ware, 2 Kiatuthlanna Black-on-white sherds, 1 Red Mesa Black-on-white sherd, 7 Gallup, 29 Escavada, 2 Puerco, and 3 Reserve black-on-white sherds were identified. Among the White Mountain Redware, three

Puerco and nine Wingate black-on-red sherds were identified. These types make up a ceramic assemblage that dates from the late Pueblo I period to the early Pueblo III period (AD 850 to 1175). A mean ceramic date of AD 1067 \pm 81 years was generated for the surface collection.

There are a total of 46 bowls, 299 jars, and 2 ladles present. Both bowl and jar forms are represented in the whiteware sherds, while all redware sherds are from bowls and all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of more than 6/1 for the entire ceramic assemblage, suggesting storage may have been intensely practiced. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site.

Summary and Interpretations

Site LA 115328 is a large, multicomponent site located along a ridge overlooking the valley bottom of Y Unit Draw. Components of the site may date as far back as the Basketmaker II period (as represented by the pitstructure on the western portion of the site), although this could only be confirmed through excavation.

Site LA 115322

Analyses were conducted at site LA 115322 on 13 May 1998. The site is located entirely on the west side of the highway (Figure 20.5). A sandstone rubble mound measuring 10 by 4 m and comprising no more than an estimated four rooms was also recorded.

Flaked Stone

The flaked stone collection from site LA 115322 consists of 17 artifacts (in decreasing order of representation): 10 pieces of debitage, 5 pieces of debris, 1 scraper, and 1 retouched piece. Thirteen pieces (76.5%) are chert and four (23.5%) are silicified wood. The scraper in this collection (record number 574 in Appendix E) is made of Zuni Yellow Spotted chert. None of the artifacts in this collection contains evidence of thermal alteration.

Of the 10 pieces of debitage, 1 is a primary flake, 8 are secondary flakes, and 1 is a bifacial thinning flake. Platform data could be obtained for nine of the 10 pieces of debitage. None of these platforms shows evidence of preparation. Six of the artifacts have cortical platforms.

Ground Stone

One indeterminate sandstone metate fragment was observed and recorded. It is shaped and ground, yet displays no striations. (Appendix F has more detailed information on all ground stone artifacts from the project.)

Ceramic Artifacts

Eleven sherds were analyzed from site LA 115322. These sherds are surface artifacts located outside the right-of-way; therefore they were not collected but, instead, analyzed in the field. As a result, the only attributes recorded for these artifacts were ware, type, form, part, temper, and paste color. The assemblage contains wares common to the Zuni area, including Cibola White Ware, White Mountain Redware, and Cibola Gray Ware.

Three diagnostic ceramic artifacts were recorded on the surface outside the right-of-way. Among the Cibola White Ware, one Gallup Black-on-white sherd and one Escavada Black-on-white sherd were identified. Among the White Mountain Redware, one Puerco Black-on-red sherd was identified. These types make up a ceramic assemblage that dates to the middle Pueblo II period (AD 1050 to 1100). A mean ceramic date of AD 1078 \pm 13 years was generated for the surface collection.

There are a total of 10 jars and 1 bowl present. Both bowl and jar forms are represented in the whiteware sherds, while all redware and grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of 10/1 for the entire ceramic assemblage, suggesting storage may have been intensively practiced. However, the small sample size makes it difficult to speculate about activities practiced at the site.

Summary and Interpretations

Site LA 115322 is interpreted to have functioned as a short-term or seasonal habitation (fieldhouse) during the late Pueblo II period. Contemporaneous unit pueblos that may have served year-round domestic purposes are located approximately 200 m (656 ft) up the western slope of the valley.

Site LA 115321

Analyses were conducted at site LA 115321 on 13 May 1998. This site is located entirely on the western side of the highway (Figure 20.6). Site LA 115321 dates from the late Pueblo I to the early Pueblo II period. Burned adobe found within the highway right-of-way portion of the site suggests that jacal surface structures were once present at this site. It is also likely that one or more pitstructures are also present.

Flaked Stone

Fourteen flaked stone artifacts were recovered from site LA 115321. Eight of the artifacts are debitage, four are retouched pieces, and two are

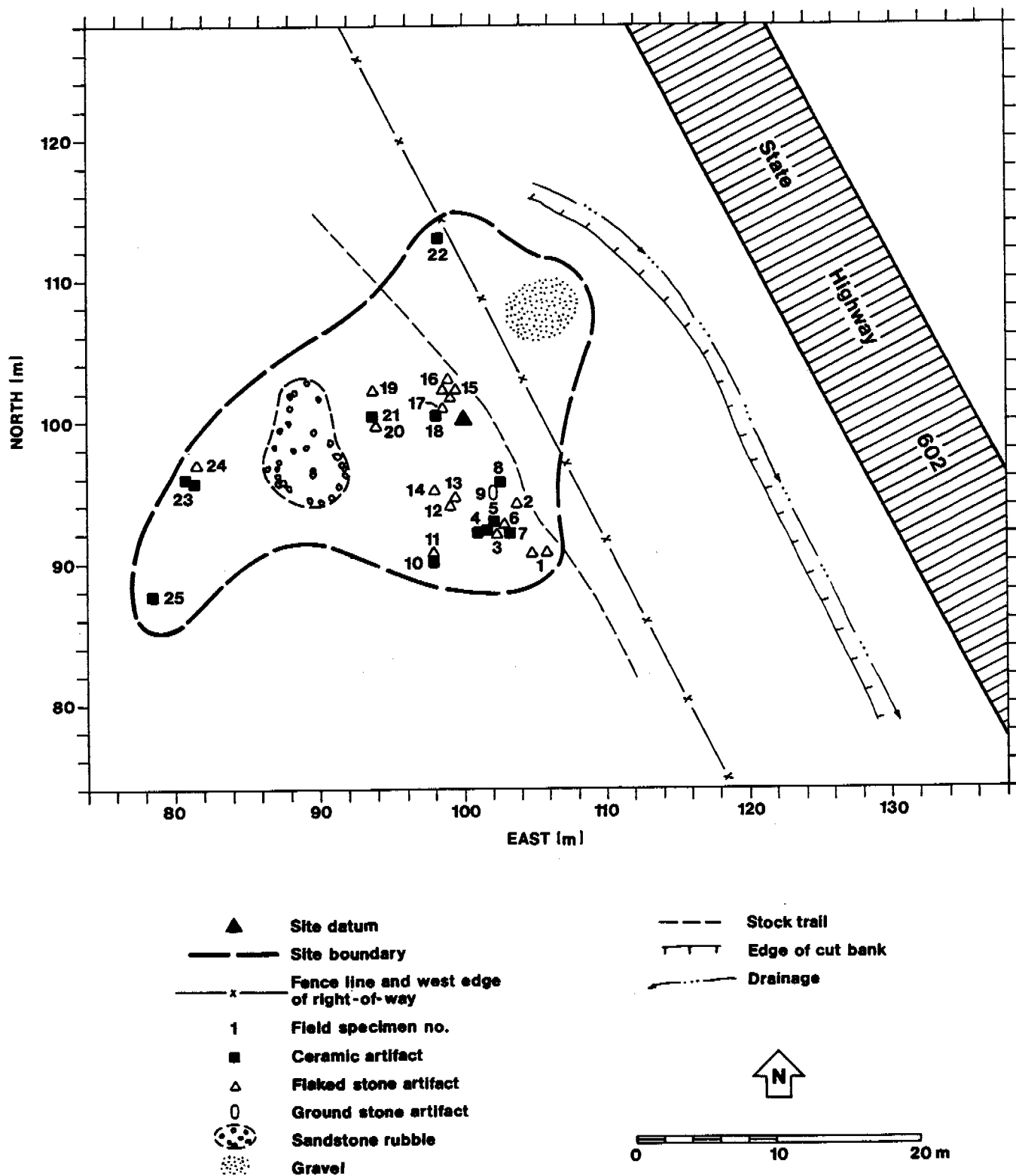


Figure 20.5. Site LA 115322 Data Recovery Site Map, Surface Artifacts and Features.

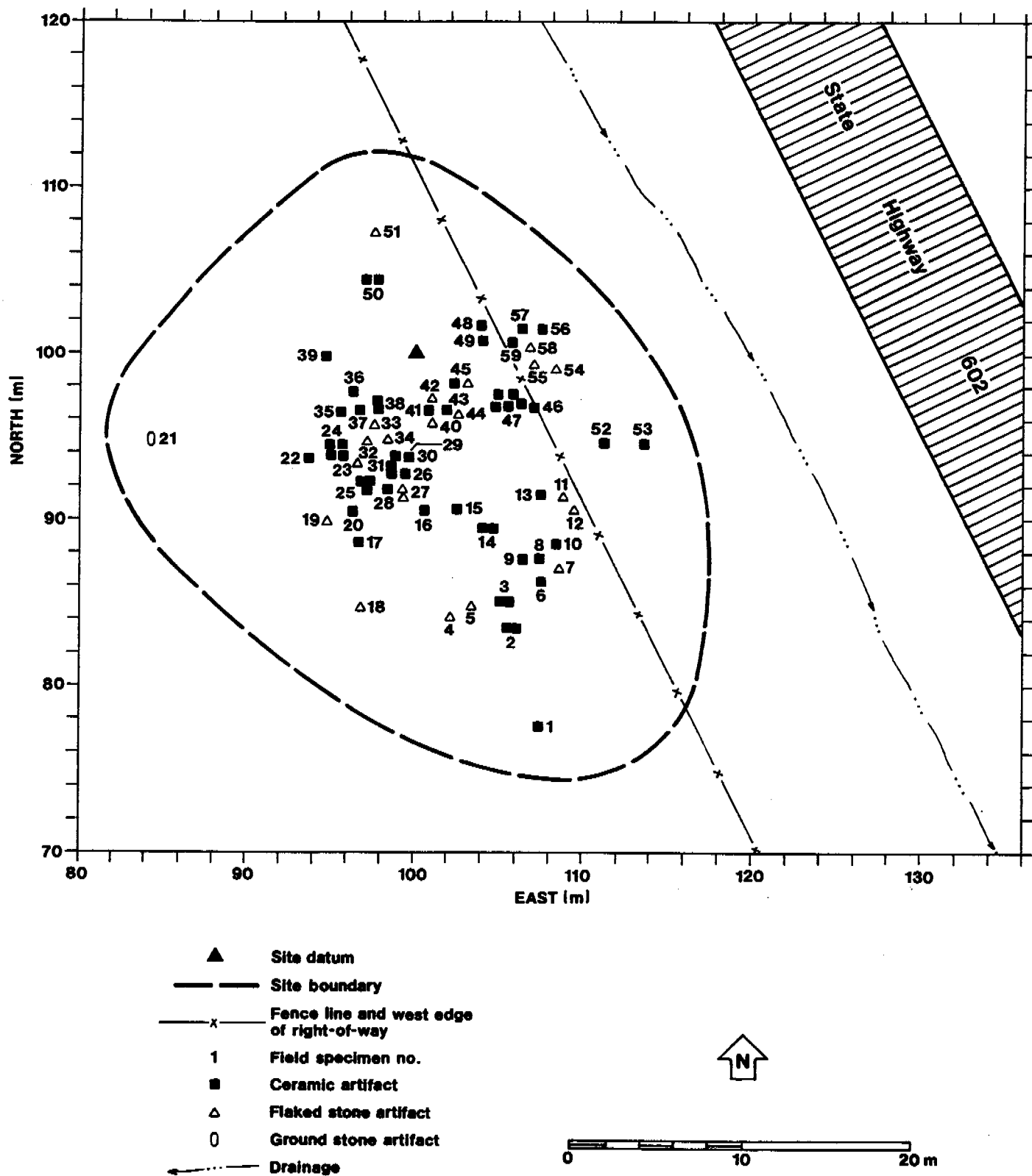


Figure 20.6. Site LA 115321 Data Recovery Site Map, Surface Artifacts.

debris. Eleven pieces are chert, 2 are silicified wood, and 1 is quartzite. Of the eight pieces of debitage, four are primary flakes and four are secondary flakes. Only one piece of debitage has a prepared platform. This piece is single faceted. Two of the pieces have cortical platforms.

Ground Stone

A single one-hand mano was observed, displaying grinding, shaping, but no striations. (Appendix F has more detailed information on all ground stone artifacts from the project.)

Ceramic Artifacts

Fifty-seven sherds were analyzed from site LA 115321. These sherds were surface artifacts located outside the right-of-way; therefore they were not collected but, instead, analyzed in the field. As a result, the only attributes recorded for these artifacts were ware, type, form, part, temper, and paste color. The assemblage contains wares common to the Zuni area, including Cibola White Ware, Cibola Gray Ware, and Puerco Gray Ware.

Eighteen diagnostic ceramic artifacts were recorded on the surface outside the right-of-way. Among the Cibola White Ware, nine Kiatuthlanna Black-on-white sherds, four Red Mesa Black-on-white sherds, and five Gallup Black-on-white sherds were identified. These types make up a ceramic assemblage that dates from the late Pueblo I period to the middle Pueblo II period (AD 850 to 1100). A mean ceramic date of AD 961 ± 62 years was generated for the surface collection.

There are a total of 37 jars and 14 bowls present. Both bowl and jar forms are represented in the whiteware sherds, while all grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of almost 3/1 for the entire ceramic assemblage. Assuming, in general, that bowls reflect food service, utility jars reflect cooking and storage, and decorated jars reflect storage, it seems that a variety of activities were practiced at this site.

Summary and Interpretations

Site LA 115321 is a late Pueblo I to early Pueblo II habitation. This interpretation is based on the artifact assemblage described above, along with the presence of burned adobe. Although no definitive pitstructures were observed, the burned adobe suggests surface structures were present at one time. Further investigations, however, would need to be conducted to better understand the nature and extent of the occupation at site LA 115321.

Site LA 115320

Analyses at site LA 115320 were conducted in two phases. The first phase of work was conducted between 13 and 14 May 1998 on the portion of the site located on the Zuni Indian Reservation (Figure 20.7). The second phase of work was conducted on 23 June 1998 on the portion of the site owned by the Navajo Nation. Investigations on the Navajo Nation portion were conducted once a permit was obtained (Navajo Nation Cultural Resources Inventory Permit Number B98137). No flaked stone artifacts were collected from the Navajo Nation portion of the site.

Flaked Stone

A total of 53 flaked stone artifacts were recovered from the portion of site LA 115320 within the Zuni Indian Reservation. Four artifact classes are represented (in descending order of representation): debitage (51.9%), debris (26.9%), core (19.3%), and hammerstone (1.9%). Table 20.2 summarizes the metric data for the artifacts in this assemblage. Three of the artifacts in this assemblage are thermally altered.

Nine cores and one core fragment are present in the collection. Of the nine complete cores, seven are single platform, one is opposed platform, and one is amorphous. Four cores are quartzite and the remaining five cores and core fragment are chert. The nine complete cores have a mean weight of 139.3

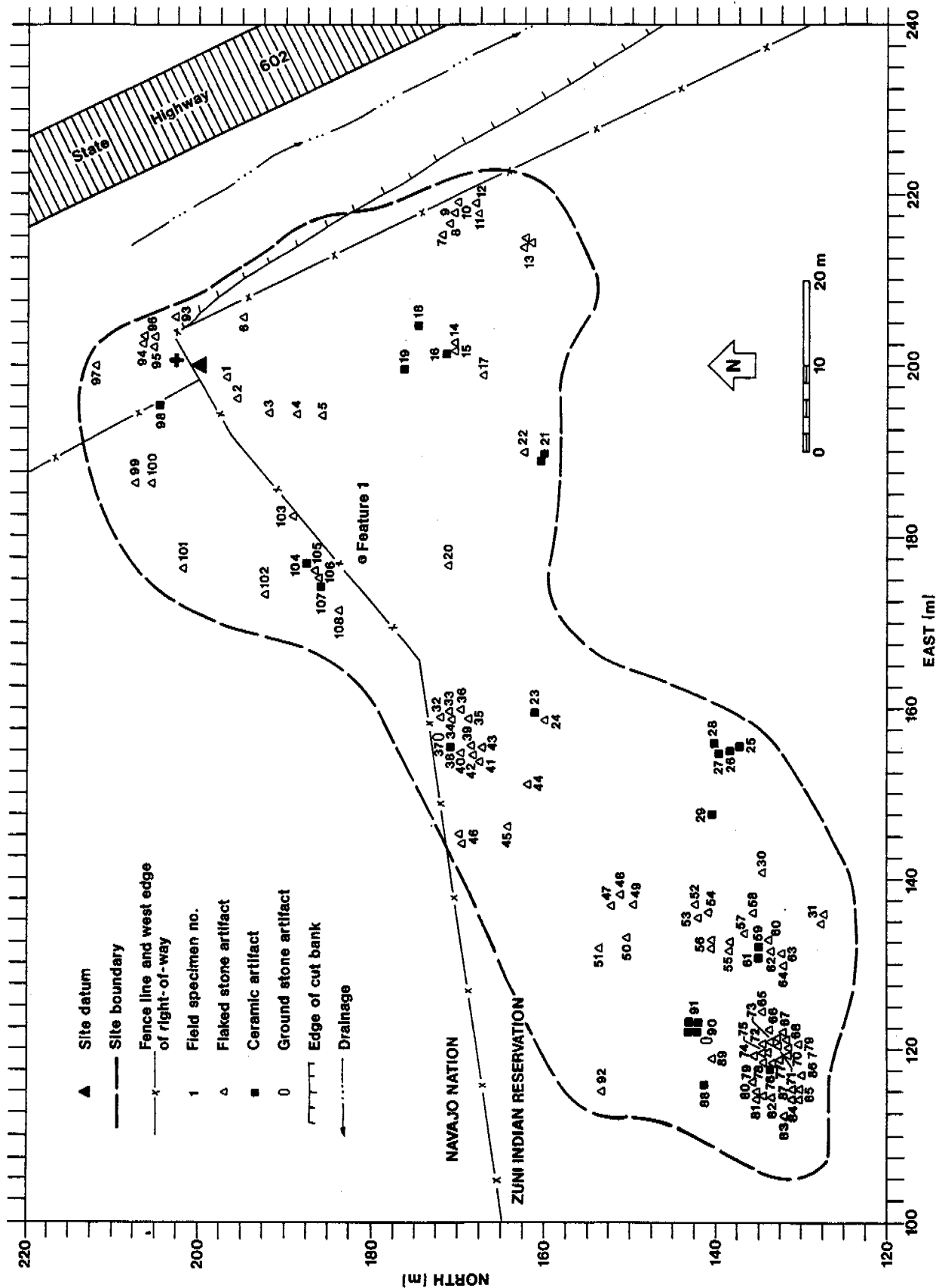


Table 20.2. Summary Metric Data for Site LA 115320 Pueblo II Flaked Stone Assemblage on the Zuni Indian Reservation.

Summary Statistic	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
Mean	3.2	2.9	1.6	36.5
10% trimmed mean	3.1	2.7	1.3	12.6
Median	3.0	2.4	1.1	6.0
Standard error	0.2	0.3	0.2	11.9
Standard deviation	1.5	1.8	1.4	86.8
Minimum	1.3	0.8	0.3	-
Maximum	8.2	8.7	6.2	468.0
Range	6.9	7.9	5.9	468.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

n = 53

g (10% trimmed mean of 139.3 g), a median weight of 54.0 g, a maximum of 468.0 g, and a minimum of 19.0 g.

Debitage and debris account for 78.8% of the site LA 115320 flaked stone assemblage. Of the 27 pieces ofdebitage, 17 (63.0%) are primary flakes and 10 (37.0%) are secondary flakes. Platform data were obtained for 25 of the 27 pieces ofdebitage. Only one has a prepared platform. The platform on this piece contains a single facet. Four artifacts have cortical platforms and two have platforms with percussion marks.

Seventy-five percent of the artifacts in this assemblage are chert (one is Zuni Yellow Spotted chert), 11 (21.2%) are quartzite, 1 (1.9%) is silicified wood, and 1 (1.9%) is quartz.

A total of 20 flaked stone artifacts were analyzed in the field on the portion of the site controlled by the Navajo Nation. The attributes recorded are provided in Appendix E, and briefly summarized here. Primary flakes are the dominant artifact type (50%), followed bydebitage (20%), microflakes (bifacial thinning flakes, 10%), utilized flakes (15%), and cores (n=1, or 5%). The assemblage comprises 50% chert and 50% quartzite. Only one of the artifacts examined

exhibits evidence of a prepared platform, consistent with the assemblage analyzed from the Zuni side of the site.

Ground Stone

Two ground stone artifacts were observed and recorded at site LA 115320; both were located on the Zuni Indian Reservation portion of the site. One of the ground stone artifacts (FS 37) is an indeterminate mano fragment made of vesicular basalt. It displays bifacial grinding and shaping, yet no striations. The other (FS 90) was classified as an indeterminate ground stone artifact. It is made of sandstone, ground on one face, and pecked on another face (this artifact comprises multiple faces). Its function could not be determined.

Ceramic Artifacts

Twenty-four sherds were analyzed from site LA 115320. These sherds were surface artifacts located outside the right of way; therefore they were not collected but, instead, analyzed in the field. As a result, the only attributes recorded for these artifacts were ware, type, form, part, temper, and paste color. The assemblage contains wares common to the Zuni area, including Cibola White

Ware, White Mountain Redware, Cibola Gray Ware, and Puerco Gray Ware.

Seven diagnostic ceramic artifacts were recorded on the surface outside the right-of-way. Among the Cibola White Ware, one Kiatuthlanna Black-on-white sherd, three Gallup Black-on-white sherds, and two Escavada Black-on-white sherds were identified. Among the White Mountain Redware, one Wingate Black-on-red sherd was identified. These types make up a ceramic assemblage that dates from the late Pueblo I period to the middle Pueblo II period (AD 850 to 1100). A mean ceramic date of AD 1051 ± 62 years was generated for the surface collection.

There are a total of 17 jars and 2 bowls present. All redware sherds are from bowls, while all whiteware and grayware sherds are from jars. Overall, jars outnumber bowls by a ratio of almost 9/1 for the entire ceramic assemblage, suggesting storage may have been intensely practiced.

Summary and Interpretations

Site LA 115320 is interpreted to be a middle Pueblo II limited-activity site.

SUMMARY

The data collected from surface artifacts at sites LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320 contribute to our understanding of the prehistory of Y Unit Draw. Site LA 115333 was interpreted as a limited-activity site whose age cannot be determined from the available data. Site LA 115328 provides information on a Pueblo II habitation, and may also comprise earlier habitation components. Sites LA 115320 and LA 115322 contribute to our understanding of limited-activity sites within Y Unit Draw during the Pueblo II. Site LA 115321 provides information on late Pueblo I to early Pueblo II settlement of the valley, which was also identified at site LA 26308.

SECTION III. ANALYTIC CONTRIBUTIONS

Chapter 21

THE CERAMICS FROM Y UNIT DRAW

Suzanne L. Eckert, Janet Hagopian, and James W. Kendrick

INTRODUCTION

A total of 1281 sherds were collected from both the surface and excavation units of sites within Y Unit Draw. Most of these sherds ($n=854$) were analyzed and coded for 30 attributes. The remaining sherds ($n=427$) were eliminated from the data analysis due to their small size. A total of 348 sherds from five sites were analyzed in the field (sites LA 115320, LA 115321, LA 115322, LA 115328, and LA 115333). In addition to ware and type, the attributes recorded for these were temper, paste, vessel form, and vessel part. Additional in-field analysis was conducted outside of the right-of-way on three of the excavated sites (LA 26319, LA 115325, and LA 115334) to increase the sample size of the ceramic assemblages and to maximize the research potential at these sites. A total of 123 sherds were analyzed at these sites. Ceramic ware and type, vessel form, and vessel part were recorded for the sherds at two of the sites (LA 26319 and LA 115325). At the third site (LA 115334) only ware, type, and vessel form were recorded. Overall, a total of 1325 sherds from the project sites were incorporated in the analysis for this chapter. Taken together, these attributes reflect provenience, functional, physical, material, technological, and stylistic properties of the ceramic assemblage. These various properties were considered in terms of chronological implications, changes in household organization and economy through time, and household economy and interaction on a local and regional level. Tabulations of excavated and surface-collected sherds and those from the in-field analysis are presented in Table 21.1 and in Appendix D.

A chronology based on mean ceramic dates suggests that the majority of the sites in Y Unit Draw date within the range of AD 1000 to 1200. An earlier cultural presence is suggested by three

sites, and a slightly later presence by one site, but support for these temporal interpretations must be sought in other types of data due to the small ceramic representation at each of these sites. An examination of ceramic form ratios suggests that there may have been a differentiation in site use after AD 1050 in the Draw. Comparison of these ratios with ratios from a Pueblo III site suggests that there was a stronger emphasis on storage during the Pueblo II in the Zuni area than in the Pueblo III. Finally, paste and temper analysis suggests that residents of Y Unit Draw were tied into an interregional network that emphasized the Puerco Valley and Middle Little Colorado areas, but may also have included the Mogollon and the Chuska Mountain areas.

Analysis of the ceramic assemblage from Village of the Great Kivas (site LA 631) was conducted in order to establish relationships between this site and those within the project area. Particularly important for this analysis was to establish contemporaneity between Village of the Great Kivas and the sites investigated within Y Unit Draw. This was accomplished by comparing ceramic assemblages from these sites. As outlined in the research design that has guided these investigations, we address the implications of the ceramic assemblages for great house models and community development.

METHODS

Each sherd collected from excavated sites within Y Unit Draw that was greater than 2 sq cm was coded for 30 attributes that, when taken together, reflect provenience, functional, physical, material, technological, and decorative properties of the ceramic assemblage. Although attributes are divided by these properties below, it is recognized that some attributes can, and do,

Table 21.1. Tabulation of Ceramics from Sites Along Y Unit Draw by Ware and Type.

Site	Ware	Type	Count
<u>LA 115334</u>	Cibola White Ware	Untyped, unpainted	2
		Untyped, painted	1
		Gallup Black-on-white	1
	Cibola White Ware, Puerco Valley variety	Untyped, unpainted	1
	White Mountain Redware	Wingate Black-on-red	8
	Cibola Gray Ware	Indented Corrugated	27
		Site Total	40
<u>LA 26319</u>	Cibola White Ware	Untyped, unpainted	2
		Untyped, painted	4
		Gallup Black-on-white	1
		Escavada Black-on-white	2
	White Mountain Redware	Untyped, unpainted	4
		Puerco Black-on-red	1
		Wingate Black-on-red	1
	Cibola Gray Ware	Plain Gray	1
		Indented Corrugated	15
		Site Total	31
<u>LA 115327</u>	Cibola White Ware	Untyped	3
		Gallup Black-on-white	1
		Escavada Black-on-white	1
	Cibola Gray Ware	Plain Gray	1
		Plain Corrugated	3
		Indented Corrugated	7
		Site Total	16
<u>LA 26306</u>	Cibola White Ware	Untyped	3
		Untyped, unpainted	14
		Untyped, painted	15
		Red Mesa Black-on-white	7
		Gallup Black-on-white	1
		Chaco Black-on-white	1
		Escavada Black-on-white	2
		Puerco Black-on-white	6
		Corrugated Reserve Black-on-white	1
	Little Colorado White Ware	Holbrook A Black-on-white	1
	Whiteware	Untyped ware	3
	White Mountain Redware	Untyped	3
		Untyped, unpainted	16
		Puerco Black-on-red	3
		Wingate Black-on-red	4

(continued)

Table 21.1. Continued.

Site	Ware	Type	Count
<u>LA 26306</u> <u>Continued</u>	Cibola Gray Ware	Untyped	4
		Plain Gray	34
		Indented Corrugated	125
	Puerco Valley Gray Ware	Indented Corrugated	2
	Chuska Gray Ware	Indented Corrugated	2
	Grayware	Untyped ware	4
	Mogollon Brown Ware	Untyped	1
		Site Total	252
<u>LA 115330</u>	White Mountain Redware	Wingate Black-on-red	1
	Cibola Gray Ware	Plain Gray	1
		Plain Corrugated	2
		Indented Corrugated	4
	Tusayan Gray Ware	Lino Gray	1
		Site Total	9
<u>LA 48695</u>	Cibola White Ware	Untyped	1
		Puerco Black-on-white	1
	Cibola Gray Ware	Indented Corrugated	1
		Site Total	3
<u>LA 115329</u>	Cibola White Ware	Gallup Black-on-white	1
	Cibola Gray Ware	Indented Corrugated	1
	Tusayan Gray Ware	Lino Gray	1
		Site Total	3
<u>LA 26308</u>	Cibola White Ware	Untyped	2
		Untyped, unpainted	13
		Untyped, painted	5
		Kiatuthlanna Black-on-white	4
		Red Mesa Black-on-white	10
		Gallup Black-on-white	3
		Chaco Black-on-white	2
		Puerco Black-on-white	1
	Cibola Gray Ware	Plain Gray	22
		Indented Corrugated	4
		Clapboard Corrugated	10
		Exuberant Corrugated	1
	Puerco Valley Gray Ware	Indented Corrugated	1
	Tusayan Gray Ware	Plain Gray	1
		Lino Gray	1
		Site Total	80

(continued)

Table 21.1. Continued.

Site	Ware	Type	Count
<u>LA 115324</u>	Cibola White Ware	Untyped, unpainted	3
		White Mound Black-on-white	1
		Reserve Black-on-white	1
	White Mountain Redware	Untyped	2
	Cibola Gray Ware	Plain Gray	1
		Indented Corrugated	6
		Zoned Corrugated	1
	Mogollon Brown Ware	Reserve Indented Corrugated, smudged	1
	Site Total		16
<u>LA 115323</u>	Cibola White Ware	Untyped, unpainted	2
		Untyped, painted	4
		Tularosa Black-on-white	1
	Cibola Gray Ware	Indented Corrugated	1
		Clapboard Corrugated	1
	Puerco Valley Gray Ware	Zoned Corrugated	1
	Site Total		10
<u>LA 115325</u>	Cibola White Ware	Untyped, unpainted	3
		Untyped, painted	11
		Red Mesa Black-on-white	2
		Gallup Black-on-white	18
		Escavada Black-on-white	6
		Puerco Black-on-white	4
		Reserve Black-on-white	4
	Cibola White Ware, Puerco Valley variety	Untyped, unpainted	1
	White Mountain Redware	Untyped, unpainted	1
	Cibola Gray Ware	Untyped	1
		Plain Gray	10
		Indented Corrugated	21
	Puerco Valley Gray Ware	Plain Corrugated	1
		Indented Corrugated	1
	Tusayan Gray Ware	Plain Gray	1
	Site Total		85
<u>LA 49838</u>	Cibola White Ware	Untyped, unpainted	25
		Untyped, painted	35
		Kiatuthlanna Black-on-white	2
		Red Mesa Black-on-white	8
		Gallup Black-on-white	6
		Chaco Black-on-white	3
		Escavada Black-on-white	8

(continued)

Table 21.1. Continued.

Site	Ware	Type	Count
<u>LA 49838</u> <u>Continued</u>		Puerco Black-on-white	19
		Reserve Black-on-white	4
		Transitional Reserve/Tularosa Black-on-white	1
		Tularosa Black-on-white	1
	Cibola White Ware, Puerco Valley variety	Untyped, unpainted	1
		Red Mesa Black-on-white	1
	White Mountain Redware	Untyped	2
		Untyped, unpainted	18
		Puerco Black-on-red	6
		Wingate Black-on-red	13
		Wingate Polychrome, Houck	1
		St. Johns Black-on-red	1
	Cibola Gray Ware	Plain Gray	19
		Plain Corrugated	1
		Indented Corrugated	219
		Clapboard Corrugated	3
	Puerco Valley Gray Ware	Plain Gray	4
		Indented Corrugated	25
		Zoned Corrugated	1
	Tusayan Gray Ware	Plain Gray	3
		Indented Corrugated	2
		Site Total	432
<u>LA 115328</u>	Cibola White Ware	Untyped, unpainted	7
		Untyped, painted	26
		Kiatuthlanna Black-on-white	1
		Red Mesa Black-on-white	1
		Gallup Black-on-white	7
		Escavada Black-on-white	28
		Puerco Black-on-white	2
		Reserve Black-on-white	3
	Cibola White Ware, Puerco Valley variety	Untyped, unpainted	2
		Kiatuthlanna Black-on-white	1
		Escavada Black-on-white	1
	White Mountain Redware	Untyped, painted	1
		Untyped, unpainted	5
		Puerco Black-on-red	3
		Wingate Black-on-red	9
	Puerco Valley Red Ware	Showlow Red	1
	Cibola Gray Ware	Plain Gray	15
		Plain Corrugated	16
		Indented Corrugated	109
		Neckbanded Corrugated	3

(continued)

Table 21.1. Continued.

Site	Ware	Type	Count
<u>LA 115328</u> <u>Continued</u>	Puerco Gray Ware	Exuberant Corrugated	1
		Indeterminate	2
		Plain Gray	5
		Indented Corrugated	4
		Clapboard Corrugated	1
	Grayware	Untyped Ware	1
		Site Total	255
<u>LA 115322</u>	Cibola White Ware	Untyped, unpainted	3
		Gallup Black-on-white	1
		Escavada Black-on-white	1
	White Mountain Redware	Puerco Black-on-red	1
	Cibola Gray Ware	Indented Corrugated	4
		Clapboard Corrugated	1
		Site Total	11
<u>LA 115321</u>	Cibola White Ware	Untyped, unpainted	1
		Untyped, painted	11
		Kiatuthlanna Black-on-white	9
		Red Mesa Black-on-white	4
		Gallup Black-on-white	5
	Cibola Gray Ware	Plain Gray	4
		Indented Corrugated	15
		Clapboard Corrugated	3
		Indeterminate	1
	Puerco Valley Gray Ware	Indented Corrugated	4
		Site Total	57
<u>LA 115320</u>	Cibola White Ware	Untyped, painted	7
		Kiatuthlanna Black-on-white	1
		Gallup Black-on-white	3
		Escavada Black-on-white	2
	White Mountain Redware	Untyped, painted	1
		Untyped, polychrome	1
		Wingate Black-on-red	1
	Cibola Gray Ware	Plain Gray	5
		Plain Corrugated	2
	Puerco Valley Gray Ware	Plain Gray	1
		Site Total	24
<u>LA 115333</u>	Cibola Gray Ware	Indented Corrugated	1
			1
		Overall Total	1325

crosscut categories. For example, the attribute "surface treatment" may reflect both technological and decorative properties (Herron 1986).

Provenience Attributes

Provenience attributes locate a ceramic artifact in its field context and/or laboratory space. These attributes include site number, lot, field specimen number, item, and count. *Site number* is the number given to the site by the Laboratory of Anthropology in Santa Fe, New Mexico. *Lot* is the number assigned to the artifact by the ceramic analyst at the time of analysis. *Field specimen number (FS)* is the number assigned by the field crew to a suite of artifacts from the same provenience at the time of collection. *Item* is the consecutive number assigned to each ceramic artifact within a field specimen number. *Count* is the number of artifacts that share the exact same suite of attributes; therefore, they have the same lot, FS, and item number. More often than not, when count exceeds 1, it is because the sherds were all too small for attribute analysis or they were refits.

Ceramic Function Attributes

Ceramic function attributes reflect use life of the vessel from which a sherd originated. These attributes include form, part, rim form, sooting, and modification. *Form* refers to bowl, jar, ladle, or some other complete vessel shape. Function can often be directly inferred from form (Rice 1987). *Part* refers the components of a vessel's anatomy (i.e., rim, body, or base). Part often provides information about vessel form; further, some parts provide evidence as to the size of a vessel. *Rim form* refers to the shape (Colton 1953:44) of all bowl and jar rims that had at least 3 cm of lip exposed on a sherd. *Sooting* refers to the presence of carbon residue on a sherd and is evidence that a vessel was exposed to fire; the location of soot (interior, exterior, etc.) may tell how the vessel was used (Hally 1983). Finally, *modification* refers to changes made to a vessel after it was fired. Large sherds from vessel breaks may also be modified, resulting in multifunction use life for some artifacts.

Physical, Material, and Technological Attributes

Physical attributes are quantitative measurements of a sherd and include size and weight. *Size* was measured in square-centimeter increments. Weight was measured in grams.

Material attributes reflect raw materials used to produce a vessel, while technological attributes reflect production methods in making and decorating a vessel. Material and technological attributes are often interrelated and difficult to distinguish from one another. For the purposes of this discussion, the two types of attributes are combined and include paste color, refired color, surface color, temper, and unoxidized core. Technological attributes are surface treatment, quality of polish, quality of slip, and paint type.

Paste color refers to the dominant matrix color of a vessel after it is fired by the potter. Assignment of paste color was by general impression and judgment of the analyst. *Refired color* refers to the matrix color of a vessel after a sherd chip has been fired to 900° C by the analyst. Assignment of refired color was by reference to a Munsell soil color chart. These two attributes are often related to clay sources. *Surface color* may reflect the clay used to form and/or slip a vessel. Assignment of surface color, like paste color, was by general impression. *Temper* is any material added to the clay, before it is formed into a vessel, to help with the workability and firing properties of the clay (i.e., sand, crushed rock, crushed sherds). Temper was identified using a binocular microscope. Most clays have organic material in them that often burns out during firing. However, the temperature, duration, and atmosphere of firing may result in the incomplete removal of organic materials. This results in a black band down the core, or middle, of the vessel wall. The presence or absence of such an *unoxidized core* was recorded for each sherd.

Finishing Techniques and Decorative Attributes

Finishing techniques are applied to the surface of a vessel before it is fired. Finishing technique attributes include surface treatment, quality of

polish, and quality of slip. *Surface treatment* is determined by the potter based on the vessel's form and intended function, the intended type of decoration, and the potter's technological knowledge. Surface treatment was recorded for both the interior and exterior surfaces of sherds. Polishing of a vessel surface is normally done with a smooth, hard object once the coils have been smoothed out and the vessel has dried. This technique provides a smooth, often lustrous, surface ideal for painting. Further, polishing a slipped vessel makes the slip adhere better to the vessel. The *quality of polish* was recorded for both interior and exterior surfaces of sherds. A slip is a watered-down clay applied to an unfired vessel to cover irregularities in its surface. On a decorated vessel, the slip becomes the background color. Slip can also reduce permeability in vessels (Rice 1987). The *quality of slip* was recorded for both interior and exterior surfaces of sherds.

Decorative attributes refers to various techniques that are, or are nearly, exclusively decorative. These attributes include decorated/undecorated, indentation alignment, width of corrugations, paint type, ratio of paint-to-slip, and motifs. *Decorated/undecorated* refers to whether or not a vessel was slipped and/or painted before firing. Once a vessel had been slipped and polished, it may have been decorated by applying paints. *Paint type* and the *ratio of paint-to-slip* was recorded for all painted vessels. Further, all recognizable *motifs* were recorded. Motifs are a combination of design elements and filler. Design elements are the breakdown of individual decorations within the overall design: triangles, dots, and squares are all design elements. Filler describes the contents of the design elements such as solid, opened, or hatched lines.

The majority of pottery from this study was corrugated. Corrugations are created through the coiling technique and then simply not smoothed. This creates a rough surface that may have been important as grips for transport, as well as providing more surface area for heat absorption during cooking (Rice 1987). Corrugation technical attributes, such as width or indentation, change through time in the Pueblo Southwest and

can be important temporal markers. *Indentation alignment* was recorded for all indented corrugated vessels. *Width of corrugations* was measured by recording the number of coils/3 sq cm.

TYOLOGY

Although type was recorded as an attribute, it actually refers to a specific combination of many of the attributes described above (such as slip color, vessel form, paste color, temper type, and/or surface treatment). A ceramic ware is a family of related ceramic types. This section groups types by wares, and then details the types commonly occurring in the Y Unit Draw. A briefer description of uncommon wares and types is also provided.

Cibola Gray Ware

The great majority of utility plain and corrugated pottery in Y Unit Draw consists of a light to medium gray paste. Paste tends to be hard. The temper is predominantly white or gray angular sherd fragments, often combined with quartz sand. All sooting noted in the assemblage occurred on grayware vessels, as well as occasional evidence of thermal shock cracks. These factors suggest that at least some of these vessels were used for cooking. Types are distinguished by surface treatment, which provides chronological information.

Plain Gray

No coils are present on vessel body sherds. Occasionally, the interior of bowls are smudged. The clay body is usually white to light gray, occasionally with a slightly darker core. Hays-Gilpin and van Hartesveldt (1995) dated most active production of this surface treatment from AD 400 to 1100s, but may be rarely present as late as AD 1350.

Plain Corrugated

This type has thin, rounded, unindented coils, usually 4 to 7 mm wide. The necks of these jars

are either plain corrugated or zoned (alternating bands of plain and indented). The clay body ranges from light to medium gray. Hays-Gilpin and van Hartesveldt (1995) dated most active production of this surface treatment from AD 900 to possibly the 1100s. They believed the treatment was used on necks from the AD 900s through 1100s, but on complete vessels only after 1030.

Indented Corrugated

This type has fingernail indented coils, generally 4 to 9 mm wide, usually diagonally patterned across the coils. These indentations can occur on just the neck band with a plain body or plain corrugated body, or on the entire vessel. The clay body is light to medium gray, sometimes with a darker core. Fowler (1989) dated the production of this surface treatment from AD 1000 to 1400; Hays-Gilpin and van Hartesveldt (1995) dated it to AD 1040 to 1300+. Neck corrugation appears earlier than all-over indented corrugation.

Neckbanded Corrugated

This type has wide flattened coils 9 to 13 mm wide around the neck, sometimes even the entire top half of the jar. The lower portion of the vessel looks like Plain Gray. The clay body is light to medium gray, sometimes with a darker core. Toll et al. (1997) dated this surface treatment to AD 450 to 900.

Clapboard Corrugated

This type has flattened, overlapping coils around the neck, sometimes even over the entire top half of the jar. The lower portion of the vessel looks like Plain Gray. The coils can be narrow (less than 1 cm wide) or wide (greater than 1 cm wide). The clay body is light to dark gray, sometimes with a darker core. Toll et al. (1997) dated this surface treatment to AD 850 to 925.

Exuberant Corrugated

This type has very deep, well defined indentations, usually around the neck. Coils are

greater than 1 cm wide. This treatment is not well recorded and its temporal range is not clearly defined (Hays-Gilpin and van Hartesveldt 1995).

Zoned Corrugated

This type has alternating bands of unindented clapboard corrugation and indented corrugation. Fowler (1989) and Hays-Gilpin and van Hartesveldt (1995) dated the production of this surface treatment from AD 1050 to 1300.

Incised Corrugated

This type has incised designs, usually zigzags, cut into the vessel body while the clay was still wet. Hays-Gilpin and van Hartesveldt (1995) suggested that this treatment was most common during the Pueblo II period, but is not a good temporal marker.

Indeterminate Corrugated

Cibola Gray Ware corrugated sherds that could not be assigned to a particular corrugation type, usually due to small size or erosion, were placed in the Indeterminate Corrugated category.

Cibola White Ware

The most common decorated ware recovered from Y Unit Draw was Cibola White Ware. This ware has a wide production area, and as a result paste color and temper types vary with geographic production zones. In general, Cibola White Ware has a mineral paint (the only exception is Chaco/McElmo Black-on-white) and a light to medium gray paste. Early Cibola White Ware has sand temper, while later types have sherd or a combination of sherd and sand. The quality of slip on Cibola White Ware varies greatly; often there is none on earlier types. Two varieties of Cibola White Ware were recognized in this study based on paste color. Cibola White Ware has a gray paste, normally light to medium in color but occasionally dark, that is normally hard. Cibola White Ware, Puerco Valley variety, has a dark gray-brown paste that is crumbly.

Untyped Cibola White Ware

Sherds with a white slip, mineral paint, hard gray paste, and sherd temper that could not be identified to type were placed in the Untyped Cibola White Ware category. These are presented in Table 21.1 as Untyped, Untyped unpainted, and Untyped painted.

La Plata Black-on-white

This type has a rough, unpolished surface with protruding, coarse sand temper. Its mineral paint is often mixed with some organic material. Design layout usually radiates from the center of the bowl; it is never banded. Design elements include straight or stepped parallel lines, dots, Zs, small triangles, barbs, and crosses. It is distinguished from White Mound Black-on-white by the latter's polished surface. La Plata Black-on-white is believed to have been produced from AD 550 to 850 (Toll et al. 1997).

White Mound Black-on-white

This type has no slip, but rather a good polished surface often creating a false slip. Exteriors of bowls occasionally have fugitive red slip. Temper is usually sand. Its mineral paint is often mixed with some organic material. Design layout is usually angled from the rim or banded around the body. There are often solid equilateral triangles pendant from the rim with two to five lines running parallel to the sides of the triangle. Design elements include straight or stepped parallel lines, dots, Zs, reverse Zs, small triangles, barbs, crosses, nested chevrons, solid triangles and interlocking solid triangles, checkerboard, bow ties, and occasional cross-ticked lines (railroad track). Rims are often painted. It is distinguished from Red Mesa Black-on-white by the latter's true slip. White Mound Black-on-white is believed to have been produced from AD 550 to 850 (Toll et al. 1997).

Kiatuthlanna Black-on-white

This type often has a very smooth, well-polished surface with a good white to light gray

slip. Temper is normally fine-grained sand, but may occasionally be mixed with sherd. The mineral paint is often mixed with some organic material and ranges in color from black to dark gray to reddish brown. Design layouts are often quadrilateral. Design elements include fine-line chevrons, thin solid triangles, occasional line elaboration (such as pendant dots), parallel lines often bordering other elements, parallel and single zigzag lines, single and parallel cross-ticked lines, reverse Fs, nested fine lines, and occasional solid elements. Rims are always painted with a solid line. Bowl rims are also straight, rounded and tapering. Kiatuthlanna Black-on-white is believed to have been produced from AD 850 to 925 (Toll et al. 1997)

Red Mesa Black-on-white

This type is often unevenly polished with a chalky slip. Temper is normally a combination of fine-grained sand and sherd. The mineral paint is often mixed with some organic material and ranges in color from matte black to dark gray to reddish brown. Design layout consists of large areas of solid geometric designs, often banded but sometimes meandering. Design elements include squiggly lines, dots, single scrolls (often with pendant elements), railway tracks and pendant dots, opposed triangles with associated pendant dots, chevrons, checkerboard, squiggly hatching, parallel line panel dividers, and widely spaced hatching. Rims are direct and tapering and almost always painted. Red Mesa Black-on-white is believed to have been produced from AD 875 to 1040 (Toll et al. 1997).

Gallup Black-on-white

Surface treatment on Gallup Black-on-white varies, but there is often a thin slip adhering poorly and leaving streaks. In rare instances, there is no slip. Surface may or may not be polished. Slip may be white to light gray and is often chalky. Temper is normally a combination of sherd and fine quartz sand. The type's mineral paint ranges in color from matte black to brown to reddish brown. Design layout is usually parallel bands with diagonal hatching. Design elements

are normally oblique, occasionally horizontal, hatching usually running in parallel bands or filling triangles and barbs. Occasionally a solid element is incorporated but is only a minor part or a filler in the hatched design. Gallup Black-on-white is believed to have been produced from AD 1040 to 1150 (Toll et al. 1997).

Chaco Black-on-white

Surface treatment on Chaco Black-on-white varies, but there is often a thin, streaky slip. Occasionally, there is no slip. In this study, temper is a combination of sherd and volcanic (trachyte) rock. The mineral paint ranges in color from matte black to brown to reddish brown. Design layout is usually parallel bands with diagonal hatching. Design elements are normally oblique, occasionally horizontal, hatching usually running in parallel bands or filling triangles and barbs. Occasionally a solid element is incorporated but is only a minor part or a filler in the hatched design. Although Gallup Black-on-white and Chaco Black-on-white may have subtle design differences, for this study they were distinguished by temper alone. Chaco Black-on-white is believed to have been produced from AD 1075 to 1150 (Toll et al. 1997).

Chaco/McElmo Black-on-white

This type often has a thin slip. Temper is sherd, sand, or crushed sandstone. The organic paint (this is the only Cibola White Ware with an organic paint) ranges in color from black to dull purple (Hays-Gilpin and van Hartesveldt 1995). Design elements include barbed lines, checkerboards, dots, parallel lines, sets of dotted parallel lines, banded lines, and hatched elements (rare). Rims are often squared with ticking. Chaco/McElmo Black-on-white is believed to have been produced from AD 1100 to 1150 (Toll et al. 1997).

Escavada Black-on-white

Decorated surfaces are often well smoothed or polished and usually slipped. Quality of slip varies from thin to thick, often adhering poorly

and leaving streaks. Slip color ranges from white to light gray. Temper is normally crushed sherd, often with fine-grained sand. Mineral paint ranges in color from matte black to dark gray to reddish brown. Design layout is normally parallel bands of bold, angular solid designs. Design elements include triangles occurring in many forms, the commonest being barbs or pennants hanging from a line. Negative lightning is common. Occasionally, steps and negative steps occur. It should be noted that Escavada Black-on-white is defined somewhat differently as a type by New Mexico and Arizona researchers (Hays-Gilpin and van Hartesveldt 1995). In this study, Escavada Black-on-white was used rather cautiously, being distinguished from Puerco Black-on-white as follows: Escavada Black-on-white design elements include bold solid designs that tend to be angular to one another and solid lines that tend to have barbs; Puerco Black-on-white design elements tend to run parallel or at right angles to one another. Escavada Black-on-white is believed to have been produced from AD 1000 to 1100 (Toll et al. 1997).

Puerco Black-on-white

Decorated surfaces are often well smoothed or polished and usually slipped. Quality of slip varies from thin to thick, often adhering poorly and leaving streaks. Slip color ranges from white to light gray, and may be chalky. Temper is normally crushed sherd, often with fine-grained sand, but varies greatly compared to other Cibola White Ware types. Mineral paint ranges in color from matte black to dark gray to reddish brown. Design layout usually consists of panels with bold solid designs. There are often three or four thin parallel lines running perpendicular to the rim used as panel dividers. Design layout may also be banded. Design elements include single or multiple broad solid lines running parallel to other elements, in rectangular scrolls or in nested boxes; vertical parallel lines used as panel dividers; opposed series of appended solid triangles creating bands of negative squares, diamonds, rectangles and parallelograms; checkerboards, cross hatching and dot-filled squares common. Solid triangles, rectangles, scrolls, and appended

dots occur alone or combined with other elements. Puerco Black-on-white is believed to have been produced from AD 1030 to 1200 (Toll et al. 1997).

Reserve Black-on-white

Decorated surfaces are smooth with a thin slip and an uneven polish; sometimes polish is absent altogether. Slip ranges in color from white to light gray and is often chalky. Temper is normally crushed sherds, often with sparse to fairly heavy amounts of sand. Mineral paint ranges in color from matte black to brown to reddish brown. Design layout consists of unbalanced opposed or interlocking hatched and solid designs. Design elements are primarily opposed solid and hatched designs, including both curvilinear scrolls and rectilinear bands and interlocking triangles; hatched design areas are normally at least twice as wide as solid design areas. There is often considerable spacing between elements. Design elements continue to the edge of the bowl rim (no framing line). Reserve Black-on-white is believed to have been produced from AD 1050 to 1125 (Fowler 1989).

Corrugated Reserve Black-on-white

This type is rare. It occurs only as bowls and is basically a combination of Cibola Gray Ware and Cibola White Ware. The exterior of the bowl is either Indented or Plain Corrugated. The interior of the bowl is Reserve-Black-on-white. No temporal range has been assigned to this type, but it is assumed to be the same as Reserve Black-on-white.

Transitional Reserve/Tularosa Black-on-white

Because Reserve Black-on-white grades into Tularosa Black-on-white, it is not unusual to find a sherd that is a combination of the two. It is possible that such a sherd represents either a later version of the prior, or an early version of the latter. Sherds that could not be easily categorized as one type or the other were called Transitional Reserve/Tularosa Black-on-white. This type was assigned a production range that reflects this transition. It is assumed to have been produced from AD 1100 to 1200.

Tularosa Black-on-white

This type has decorated surfaces with an excellent slip. This slip tends to be thick, well polished, and sometimes crackled. Slip ranges in color from white to light gray. Temper is finely crushed sherd, occasionally mixed with fine grained sand. Mineral paint ranges in color from matte black to greenish black to brown to red-brown to orange-red. Design layout tends to be a balanced mixture of opposed or interlocking hatched and solid elements. Design elements include primarily opposed solid and hatched designs, including curvilinear scrolls, rectilinear bands, and interlocking barbs; hatched design areas are balanced with solid design areas; designs tend to be tight and busy with elements close together; oblique fine-lined hatching is most common, and sometimes there is longitudinal hatching, occasional cross hatching or basket weave. Bowls have a framing line along the rim. Tularosa Black-on-white is believed to have been produced from AD 1175 to 1300 (Hays-Gilpin and van Hartesveldt 1995).

Snowflake Black-on-white

This type has decorated surfaces with a fairly well polished white slip. Temper consists of crushed sherd mixed with very fine sand. Mineral paint ranges in color from dull dark brown to black. Design layout consists of a combination of stepped elements and broad lines. Design elements include bold solid stepped elements, which are usually opposed, and broad lines that meet in right angles. Snowflake Black-on-white is distinguished from Escavada Black-on-white by having broad lines that meet at right angles. Snowflake Black-on-white is believed to have been produced from AD 1100 to 1250 (Hays-Gilpin and van Hartesveldt 1995).

White Mountain Redware

Untyped White Mountain Redware

Sherds with a classic White Mountain Redware slip, mineral paint, hard gray paste, and sherd temper that could not be identified to type were placed in the Untyped White Mountain Redware category.

Puerco Black-on-red

Decorated surfaces are usually smooth but have a streaky polish. The slip is thin to thick with a distinctive dark red color ("Puerco red"). The slip is often chalky and flakes off easily. Temper is a combination of coarsely ground sherds and sand. The mineral paint ranges in color from matte black to dark brown. Design layout is usually banded with long parallel lines for panel dividers running perpendicular to the rim. Design elements include single or multiple broad solid lines running parallel to other elements, in rectangular scrolls or in nested boxes; parallel solid bands often forming nested chevrons; running bands of pendant triangles, large triangles, flags, or pennants; vertical parallel lines used as panel dividers for solid designs; and opposed series of appended solid triangles creating bands of negative lightning, squares, diamonds, rectangles, and/or parallelograms. Checkerboards, cross hatching, and dot-filled squares are not uncommon. Solid triangles, rectangles, scrolls, and appended dots are used either alone or in combination with other elements. Steps and negative steps occur only occasionally. Puerco Black-on-red is believed to have been produced from AD 1030 to 1150 (Hays-Gilpin and van Hartesveldt 1995).

Wingate Black-on-red and Polychrome

Decorated surfaces are usually smooth. The slip ranges from thin to thick, and is often chalky and flakes off easily. The slip ranges in color from maroon to dark red to orange red. Wingate Polychrome has three varieties. The Wingate variety has large unslipped areas on bowl exteriors. These cream or white unslipped area are often used as a "paint" to form broad designs (and sometimes handprints). The Houck variety has large unslipped areas on bowl exteriors with a red slipped band. The Querino variety has red paint on a cream-colored slip on the exterior. Temper is a combination of coarsely ground sherds and sand with occasional rock inclusions. The mineral paint ranges in color from matte black to brown and is applied only to the interior on bowls. Design

layout is often quadrilateral with opposed or interlocking hatched and solid elements. Bowl interior and jar design elements are primarily opposed solid and hatched motifs, including both curvilinear scrolls and rectilinear bands and interlocking triangles. Hatched motifs are normally at least twice as wide as solid design areas, with considerable spacing between them. Design elements continue to the edge of the bowl rim with no framing line. Bowl exterior elements on polychromes are normally broad bands and/or bold geometrics; sometimes there are handprints. Wingate Black-on-red is believed to have been produced from AD 1050 to 1200 (Hays-Gilpin and van Hartesveldt 1995). All varieties of Wingate Polychrome are believed to have been produced from AD 1125 to 1200, possibly as late as AD 1225 (Hays-Gilpin and van Hartesveldt 1995).

St. Johns Black-on-red and Polychrome

Decorated surfaces are evenly slipped and polished. The slip ranges in color from red to orange. Temper is coarsely ground sherd and sand, occasionally with rock inclusions. The paint is normally mineral and ranges in color from black to brown. Occasionally, the paint is a glaze that ranges in color from black to greenish black to purple. Paint on the exterior of St. John Polychrome bowls and around the neck of polychrome jars is white. Design layout is often quadrilateral or banded with a balanced mixture of opposed or interlocking hatched and solid elements. Bowl interior and jar design elements are primarily opposed solid and hatched motifs, including curvilinear scrolls, rectilinear bands, and interlocking barbs. Hatched motifs are balanced with solid ones. Designs tend to be tight and busy with elements close together. Oblique fine-lined hatching is most common, but longitudinal hatching is not uncommon. There is always a framing line on the interior of bowls. Bowl exterior elements on polychromes are normally broad-lined geometrics. Both St. Johns Black-on-red and St. Johns Polychrome are believed to have been produced from AD 1150 to 1300 (Hays-Gilpin and van Hartesveldt 1995).

Uncommon Wares

Various ceramic types belonging to wares uncommon in the Zuni area were recognized in the Y Unit Draw ceramic assemblage. These wares will be briefly described, with reference to readings that provide a more specific description of the types found in these wares.

Mogollon Brown Ware

Brownware pottery is traditionally assumed to have been made in the Mogollon cultural district; however, based on the widespread discovery of brownwares north of the Mogollon Rim, this assumption needs to be seriously questioned (Hays-Gilpin and van Hartesveldt 1995). In this study, Mogollon Brown Ware refers more to a technological suite of attributes rather than a cultural tradition. Mogollon Brown Ware consists of a brown to red-brown paste. Paste tends to be of medium hardness and is sometimes crumbly. Two temper traditions are recognized. The Mogollon Highland series has volcanic rock inclusions, while the Woodruff series has predominantly quartz sand and/or sherd inclusions. Another characteristic widely used in the Mogollon Brown Ware tradition is extensive smudging on the interior of vessels. When not smudged, vessels often have a highly polished interior. When present, corrugations tend to be finely executed and may be polished over on bowl exteriors. Types are distinguished by surface treatment, which often provides chronological information. For a more detailed account of Mogollon Brown Ware, refer to Colton and Hargrave (1937), Rinaldo and Bluhm (1956), and Hays-Gilpin and van Hartesveldt (1995). Types within this ware recovered at the Village of the Great Kivas (site LA 631) include Reserve Corrugated Smudged, Woodruff Smudged, and Showlow Red Smudged. Reserve Indented Corrugated Smudged was recovered from site LA 115324.

Puerco Valley Red Ware

Puerco Valley Red Ware is tempered with a mixture of finely ground sherds and rounded quartz sand. It has a soft, porous, fine-grained paste that crumbles easily. Paste color ranges

from brown to gray. The slip is thin and is dark red in color. Designs are executed in organic paint. Types within this ware recovered at the Village of the Great Kivas (site LA 631) include Showlow Red, Showlow Black-on-red, and Showlow Polychrome. Puerco Valley Red Ware was defined at the 1995 Chambers-Sanders Trust Lands (CSTL) Conference, and "emphasizes the divergence of the local brownware tradition from undecorated smudged pottery to decorated pottery" (Hays-Gilpin and van Hartesveldt 1995:101).

Tusayan Gray Ware

Tusayan Gray Ware is distinguished from Cibola Gray Ware by temper. The utility plain and corrugated Tusayan Gray Ware pottery consists of a light to medium gray paste. Paste varies from crumbly to hard. The temper is predominantly coarse quartz sand with occasional multilithic inclusions. Types are distinguished by surface treatment, which provides chronological information. Although later Tusayan Gray Ware types were probably produced west of the Zuni area, early types were produced over a large geographic area. An important temporal marker in this study is the type Lino Gray. This type has no visible coils. Lino Gray is never slipped, polished, or painted. Its most distinctive feature is the conspicuously protruding coarse quartz temper. This type is believed to have been produced from AD 450 to 950 (Windes and McKenna 1989).

Chuska Gray Ware

Chuska Gray Ware is distinguished from Cibola Gray Ware by temper. This utility pottery usually consists of a dark gray paste which varies from crumbly to medium hard. The temper may have sherd, but must include the presence of trachyte inclusions. Types are distinguished by surface treatment, which provides chronological information. For a more detailed account of Chuska Gray Ware, refer to Windes (1977).

Puerco Valley Gray Ware

Puerco Valley Gray Ware is distinguished from Cibola Gray Ware by paste color. This utility pottery consists of a gray-brown paste that

is usually fairly crumbly. Temper includes fine quartz grains and coarse crushed sherd. Types are distinguished by surface treatment, which provides chronological information. This type was defined by Hays-Gilpin and van Hartesveldt (1995); also see Vint and Burton (1990) for a discussion of ceramics locally produced in the Puerco Valley.

Little Colorado White Ware

Little Colorado White Ware is distinguished from Cibola White Ware by its paint type and paste color. Surface treatment of this decorated ware varies, but there is usually a thick slip. This slip is often absent or washy on bowl exteriors. Paste is hard, and normally a dark, ashy gray in color. Temper is either sherd or a combination of sherd and sand. Paint is organic and ranges in color from gray to black. The organic paint soaks into the slip, resulting in a smooth texture and blurry look along the edges of design elements. Types are based on design layout and elements. For a more detailed discussion of Little Colorado White Wares, refer to Colton and Hargrave (1937) and Douglass (1980).

Tusayan White Ware

This ware is tempered with fine sand, has a white paste usually with a carbon streak, and has strong thin walls. Designs are executed in organic paint. Types within this ware are defined by design style. Types within this ware were recovered from the Village of the Great Kivas (site LA 631) and include Kana-a, Dogoszhi, and Tusayan black-on-whites. For a more detailed discussion of Tusayan White Ware, refer to Colton (1953) and Colton and Hargrave (1937).

Mesa Verde White Ware

Mesa Verde White Ware is identified primarily by the use of andesite/diorite for temper. It is also characterized by pearly white slip, light paste, and strong walls. Designs can be painted with organic or mineral paint, or a combination of the two. Only one type within this ware, Mesa Verde Black-on-white, was recorded from the Village of

the Great Kivas (site LA 631). For a more detailed discussion of Mesa Verde White Ware, refer to Colton and Hargrave (1937).

Tsegi Orange Ware

This ware is tempered with crushed sherd and occasionally small amounts of quartz sand. It is decorated with mineral paints, which can be black, white, or red in color. Types within Tsegi Orange Ware are based on the combination of slipped and plain surfaces, and the color of paint employed. One sherd from this ware was recovered from the Village of the Great Kivas (site LA 631) and was typed as Tusayan B Polychrome. The interior of this sherd has thick bands of red slip outlined in black paint on an orange surface. A hatched design element in black paint was painted on the orange surface. The exterior has a thick band of red slip along the rim.

A CHRONOLOGY FOR THE SETTLEMENTS IN Y UNIT DRAW

The Data Set

A total of 262 diagnostic ceramics from 16 sites were used to construct a chronology for the settlements in Y Unit Draw (Table 21.2). Unfortunately, the small sample size from most of the sites in the study severely limits the statistical techniques that can be appropriately applied to develop a chronology. Fortunately, the Zuni area has a well-developed chronology based on decorated ceramic type assemblages. Date ranges for various types were provided above and are used here to provide a general date range for each site. These ceramic date ranges were also used to calculate mean ceramic dates for each site as described below.

This analysis uses types, rather than attributes, to build a chronology for the sites in Y Unit Draw. There has been much debate in recent years over the use of types over attributes. Much of this debate has focused on the Zuni area. Attributes are mutually exclusive characteristics of a particular variable, while types are a collection of attributes whose presence or absence on a vessel

Table 21.2. Ceramic Temporal Data for Sites in Y Unit Draw.

Site	Count	Count by Type	Date Range	Mean Ceramic Date
LA 115334	9	1 Gallup Black-on-white 8 Wingate Black-on-red	AD 1050 to 1175	1122 ± 40
LA 26319	5	2 Escavada Black-on-white 1 Gallup Black-on-white 1 Puerco Black-on-red 1 Wingate Black-on-red	AD 1050 to 1175	1084 ± 50
LA 115327	2	1 Escavada Black-on-white 1 Gallup Black-on-white	AD 1025 to 1100	1072 ± 37
LA 26306	26	7 Red Mesa Black-on-white 2 Escavada Black-on-white 1 Gallup Black-on-white 1 Chaco Black-on-white 6 Puerco Black-on-white 1 Corrugated Reserve Black-on-white 3 Puerco Black-on-red 4 Wingate Black-on-red 1 Holbrook A Black-on-white	AD 950 to 1175	1111 ± 55
LA 115330	2	1 Lino Gray 1 Wingate Black-on-red	AD 450 to 1175	912 ± 187
LA 48695	1	1 Puerco Black-on-white	AD 1030 to 1200	1115 ± 42
LA 115329	2	1 Lino Gray 1 Gallup Black-on-white	AD 450 to 1150	897 ± 175
LA 26308	21	1 Lino Gray 4 Kiatuthlanna Black-on-white 10 Red Mesa Black-on-white 3 Gallup Black-on-white 2 Chaco Black-on-white 1 Puerco Black-on-white	AD 450 to 1100	<u>Surface</u> 931 ± 50 <u>Excavation</u> 985 ± 62
LA 115324	2	1 White Mound Black-on-white 1 Reserve Black-on-white	AD 550 to 1150	850 ± 150
LA 115323	1	1 Tularosa Black-on-white	AD 1150 to 1300	1225 ± 37
LA 115325	34	2 Red Mesa Black-on-white 6 Escavada Black-on-white 18 Gallup Black-on-white 4 Reserve Black-on-white 4 Puerco Black-on-white	AD 1050 to 1175	1068 ± 81
LA 49838	73	2 Kiatuthlanna Black-on-white 8 Red Mesa Black-on-white 8 Escavada Black-on-white	AD 850 to 1250	<u>Surface</u> 1090 ± 100

(continued)

Table 21.2. Continued.

Site	Count	Count by Type	Date Range	Mean Ceramic Date
LA 49838		6 Gallup Black-on-white		<u>Excavation</u>
continued		19 Puerco Black-on-white		1074 ± 87
		4 Reserve Black-on-white		
		1 Transitional Reserve/Tularosa Black-on-white		
		1 Tularosa Black-on-white		
		3 Chaco Black-on-white		
		6 Puerco Black-on-red		
		13 Wingate Black-on-red		
		1 Wingate Polychrome, Houck		
		1 St. Johns Black-on-red		
LA 115328	56	2 Kiatuthlanna Black-on-white	AD 850 to 1175	1067 ± 81
		1 Red Mesa Black-on-white		
		7 Gallup Black-on-white		
		29 Escavada Black-on-white		
		2 Puerco Black-on-white		
		3 Reserve Black-on-white		
		3 Puerco Black-on-red		
		9 Wingate Black-on-red		
LA 115322	3	1 Gallup Black-on-white	AD 1050 to 1100	1078 ± 13
		1 Escavada Black-on-white		
		1 Puerco Black-on-red		
LA 115321	18	9 Kiatuthlanna Black-on-white	AD 850 to 1100	961 ± 62
		4 Red Mesa Black-on-white		
		5 Gallup Black-on-white		
LA 115320	7	1 Kiatuthlanna Black-on-white	AD 850 to 1100	1051 ± 62
		2 Escavada Black-on-white		
		3 Gallup Black-on-white		
		1 Wingate Black-on-red		
Overall Total	262			

is used to categorize it. Previous research has found that chronology building by type sometimes works when chronology building by attribute does not, and vice versa (Duff 1996; Graybill and Doyel 1980; Hantman and Lightfoot 1978; LeBlanc 1975; Marquardt 1974, 1978; Plog 1977). The inability to detect subtle changes within types is often cited as the problem that limits archaeologists' ability to gain fine chronological control (Graybill and Doyel 1980; LeBlanc 1975; Plog 1977). In response, archaeologists turn to the often time-consuming, and frustrating, attribute analysis.

Recently, Duff (1996) argued that in some cases well-developed typologies are as successful as attributes in chronology building. The key is to have many different types with short time spans present in an assemblage. Using data from Pueblo de los Muertos (site LA 1585, a Pueblo IV site in the eastern Zuni area), Duff found that his seriation based on types was as temporally precise as the attribute-based seriation proposed earlier by LeBlanc (1975) for the same ceramic collection. Eckert (1995) used the same techniques as Duff to build a successful chronology for Pueblo II and III sites along the Lower Zuni River. The reason

these studies seem to work in the Zuni region is that the types important to Duff and Eckert incorporate the attributes important to LeBlanc. The success of these previous studies suggests that a type-based chronology would be appropriate for this study.

Calculating Mean Ceramic Dates

The low sample size for many of the sites in Y Unit Draw makes most of the statistical techniques used by Duff (1996) and Eckert (1995) inappropriate. However, mean ceramic dates can be calculated for each site, and should provide a more accurate date than the general ranges provided. This is because general date ranges simply rely on the presence or absence of certain ceramic types, while mean ceramic dates take into account the frequency of each type present on a site (South 1978). Mathematically, the mean ceramic date is the date median multiplied by the type frequency; this total is then divided by the sherd count. For a more in-depth mathematical discussion of the mean ceramic date formula, refer to South (1978). Mean ceramic dates for each site in Y Unit Draw are presented in Table 21.2. Accompanying the mean ceramic date is a \pm year range. This range represents the number of years in the interquartile of the general date range provided in the adjacent column of Table 21.2. This combination of mean ceramic dates and interquartile ranges should provide better temporal estimates for sites than either technique taken alone.

Chronological Relation Between Sites in Y Unit Draw

Figure 21.1 presents Y Unit Draw sites on a time line based on their mean ceramic dates. A couple of chronological patterns should be discussed. To begin with, Y Unit Draw was especially attractive to Pueblo residents from AD 1000 to 1200; 10 of the 16 sites have mean ceramic dates that cluster in these two centuries, and 15 of the 16 sites have part of their interquartile in this temporal range. It is possible

that some of these sites were contemporaneous and represent neighbors living and interacting together in the Draw. It is also highly probable that even if these sites were not absolutely contemporaneous, they represent a residential continuity and shared social knowledge within the immediate area.

An earlier cultural presence in Y Unit Draw, possibly starting as early as the AD 700s, is suggested by sites LA 115329, LA 115324, and LA 115330. Unfortunately, each of these sites is represented by only two diagnostic sherds. Similarly, an AD 1200s presence is suggested by site LA 115323, but this site is represented by only one diagnostic sherd. Such small sample sizes must be taken into consideration before relying on chronological data based on ceramics alone. Even if these earlier and later dates are supported by other data, a Pueblo II date range dominates the ceramic assemblage chronology.

HOUSEHOLD ACTIVITIES IN Y UNIT DRAW

This section examines the ceramic forms present at each site and then considers what differences between sites may mean in terms of household activities in Y Unit Draw during the Pueblo II period. Potential changes in time are then examined based on the chronology defined above. The results suggest that there may have been differentiation in site use after AD 1050. Finally, ceramic data from Y Unit Draw are compared with Pueblo III data from elsewhere in Zuni to discuss changes in household activities through time.

The Data Set and Analysis

Three ratios based on ceramic form data are examined for each site: slipped bowl to slipped jar (bowl/jar), decorated ware to undecorated ware (dec/undec), and slipped jar to unslipped jar (jar/util). These ratios are all related and, taken together, may supply evidence of either an excess or dearth in the presence of some forms. In

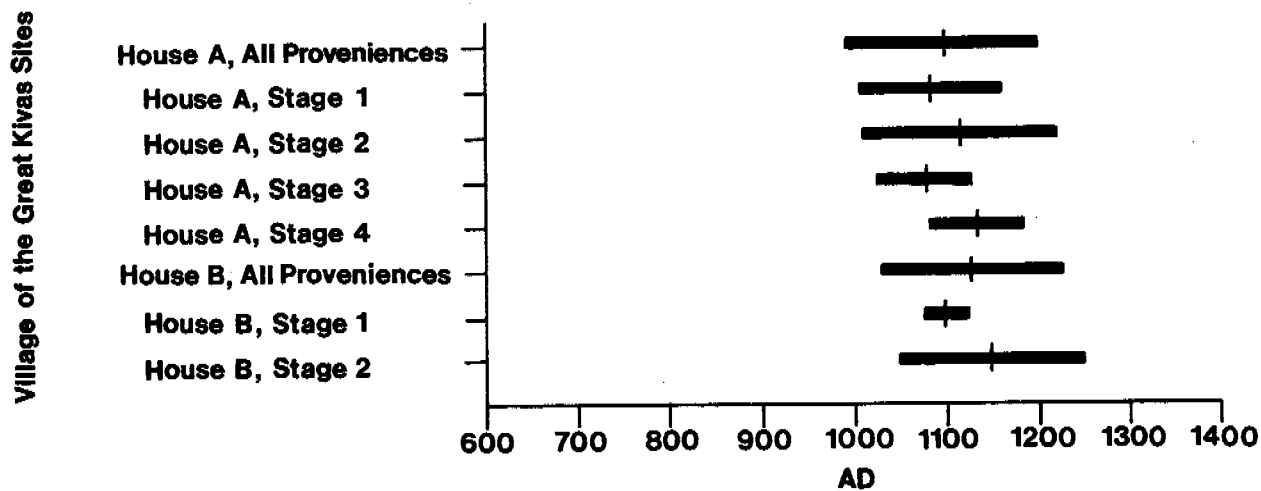
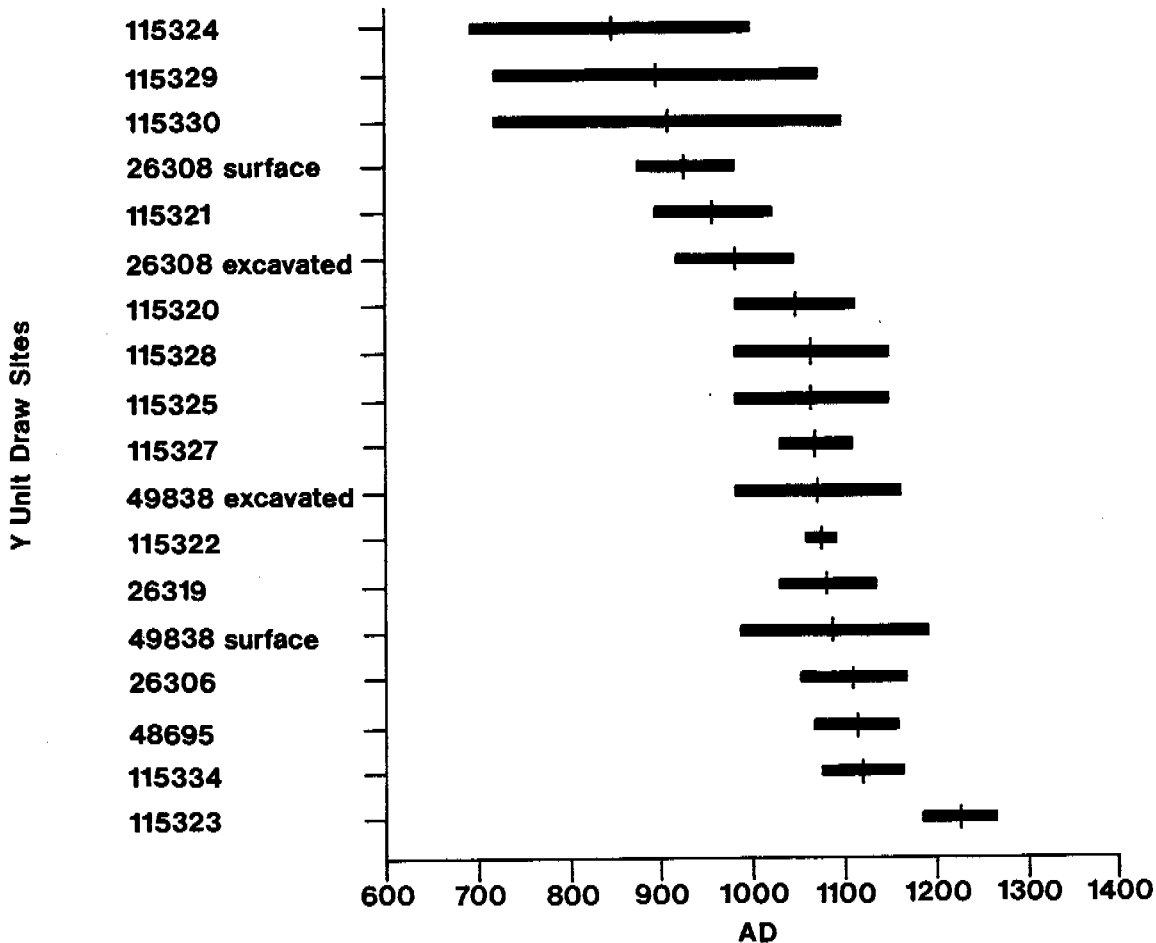


Figure 21.1. Time Line, Based on Mean Ceramic Dates, for Sites in Y Unit Draw and For Village of the Great Kivas.

general, bowls are associated with food service, decorated jars are associated with storage, and utility jars are associated with transport and cooking (Blinman 1989; Rice 1987). Although the presence of sooting is fairly uncommon in the Y Unit Draw assemblage, its exclusive association with utility vessels supports the assumption that these wares were used for cooking. Each ratio, by site, is presented in Table 21.3.

Three bowl/jar ratios are notable. Sites LA 115327, LA 115323, and LA 115322 all have relatively lower ratios than would be expected when compared to the other sites in Y Unit Draw. One interpretation of this pattern is that there was a relatively higher amount of storage over food service practiced at these three sites. However, the jar/util ratios do not bear this interpretation out. The jar/util ratios for all three sites are comparable to the rest of Y Unit Draw, suggesting that activities associated with storage, and cooking and transport were practiced at a similar scale. The second interpretation that may be made, then, is that rather than a surplus of storage jars, there is a dearth of bowls at these three sites. Although sample size should be kept in mind, this finding suggests that activities associated with food service were not practiced as commonly at these three sites as at other sites in the Y Unit Draw, or at least not in the areas that were sampled by this study.

Two dec/undec ratios are notable. Sites LA 26319 and LA 115330 both have much lower ratios than would be expected when compared to other sites in Y Unit Draw. However, both of these sites are represented by a total of less than 10 sherds and undecorated jars are the most common ceramic artifact class. Considering these two facts, the best interpretation of this finding is that it is a result of sample size.

Five jar/util ratios are notable. Sites LA 26319, LA 26306, LA 115330, LA 49838, and LA 115328 all have relatively lower ratios than would be expected when compared to the other sites in Y Unit Draw. As discussed above, this can be explained by sample size for sites LA 26319 and

LA 115330. It is interesting to note that sites LA 26306 and LA 49838 not only have relatively low jar/util ratios, but also have the highest bowl/jar ratios (although the difference is not as substantial as for the jar/util ratios). With their apparently strong emphasis on food preparation and/or transport, and somewhat higher emphasis on food service compared to other sites, it is possible that these two sites represent the most intense residential occupation in Y Unit Draw.

Changes in Household Activities Through Time

With the exception of site LA 115330, whose unusual ratios can be explained through small sample size, all sites with relatively low ceramic form ratios have mean ceramic dates later than AD 1050. This suggests that there may have been differentiation in site use after this date, with some sites (possibly fieldhouses) focused more on storage, while residential sites focused more on food preparation and service. Individual Pueblo II households may have been focusing their attentions on different parts of the landscape during different parts of the year, resulting in the upkeep of more than one activity locale. Such potential activity areas might include a residential house, one or more agricultural fields, and one or more fieldhouses. If this were the case, then an increase in the number of Pueblo II sites after AD 1050 may not represent an increase in the number of households, but rather a spreading out on the landscape of households already present in the Draw.

To understand potential changes in household activities in the Zuni area after approximately AD 1175, the Y Unit Draw ratios calculated above were compared with the same ratios calculated for 16 roomblocks from the Hinkson site, located just south of the Zuni Reservation (Eckert 1995). Two of the roomblocks, H09 and H17, are associated with both of the date ranges assigned to this site. These roomblocks are aggregated along a 1-km-long (0.6-mi-long) section of ridge overlooking the lower Zuni River, and surround what has been described as a post-Chacoan great house and an unroofed great kiva (Kintigh et al. 1996). Ceramic

Table 21.3. Ceramic Form Ratios For Sites in Y Unit Draw.

Site	Bowl/Jar	Dec/Undec	Jar/Util
LA 115334	0/1	1/0	1/0
LA 26319	0/0	0/6	0/6
LA 115327	1/4	1/2	1/1.5
LA 26306	1.5/1	1/2	1/5.5
LA 115330	1/0	1/7	0/7
LA 48695	1/1	2/1	1/1
LA 115329	0/1	1/1	1/1
LA 26308	1/1.5	1/1	1/1
LA 115324	1/1.5	1/1.5	1/2.5
LA 115323	1/6	1/1.5	2/1
LA 115325	1/2.5	1/1	1/1.5
LA 49838	1.5/1	1/2	1/5
LA 115328	1/1	1/1.5	1/3
LA 115322	1/5	1/1	1/1
LA 115321	1/1	1.5/1	1/1.5
LA 115320	1/2	1.5/1	2/1

Key: Bowl/Jar = slipped bowl to slipped jar

Dec/Undec = decorated to undecorated ware

Jar/Util = slipped jar to unslipped jar

ratios for the roomblocks are based on data from trash midden excavations (Eckert 1995). Excavation levels were assigned one of two date ranges based on ceramic dates. Ceramic ratio data for the Hinkson site are summarized in Table 21.4. All the roomblocks have been defined as residential. No fieldhouses have been identified in the area after AD 1200. Agricultural fields associated with the aggregated roomblocks have been identified across the wash (Kintigh et al. 1996).

A comparison between Tables 21.3 and 21.4 suggests a significant difference between sites in Y Unit Draw and the later site along the lower Zuni River. In general, the bowl/jar and dec/undec ratios are similar for all time periods. However, if ratios for each period are averaged, the bowl/jar ratio average for the Y Unit Draw ceramic assemblage is a bit lower (1/2 vs. 1/1 for both periods at the Hinkson site). This suggests either a decrease in the number of decorated jars

(associated with storage), or an increase in the number of bowls (associated with food service). The jar/util ratio decreases noticeably for the later site. This ratio is rarely lower than 1/2 for the Pueblo III site along the lower Zuni River, while it is rarely higher than 1/1.5 for Pueblo II sites in Y Unit Draw. This, combined with the somewhat lower average bowl/jar ratio for the Pueblo II period sites, suggests that there was a greater emphasis on storage for sites in Y Unit Draw.

SOCIAL INTERACTION IN Y UNIT DRAW

Social interaction can be examined through various techniques, such as paste color, refiring color, and temper. These were used here to provide suggestions of social interaction between the residents of Y Unit Draw and residents of areas outside the Draw. Any patterns discussed in this section should be considered preliminary, and

Table 21.4. Ceramic Form Ratios for Roomblocks from the Hinkson site, a Pueblo III Period Site Along the Lower Zuni River.

Period/Roomblock	Bowl/Jar	Dec/Undec	Jar/Util
<u>AD 1175 to 1225</u>			
H09	1/1	1/1	1/2
H15	1.5/1	1/3	1/8
H17	1/1	1/2	1/4
H20	1/1	1/1.5	1/2.5
H28	1.5/1	1/2.5	1/6
<u>AD 1200 to 1275</u>			
H06	1/1.5	1/1	1/1.5
H07	1/1.5	1/1	1/1.5
H08	1/1	1/1	1/2
H09	1/1	1/1	1/2
H11	1/1.5	1/1	1/2
H12	1/1	1/3	1/6
H14	1/1	1/1	1/2
H16	1/1	1/2.5	1/5
H17	1/1	1/1	1/2.5
H19	1/1.5	1/1.5	1/2.5
H23	1/1	1.5/1	1/1
H29	1/1	1/1.5	1/3
H31	1.5/1	1/1	1/3

Key: Bowl/Jar = slipped bowl to slipped jar
 Dec/Undec = decorated to undecorated ware
 Jar/Util = slipped jar to unslipped jar

be used in discussions of the Pueblo II in Zuni with some caution until further supported by more in-depth compositional studies. Certain of these compositional techniques require the destruction of artifacts, and were not pursued for this particular study.

Local vs. Nonlocal Paste

One means of distinguishing between locally and nonlocally produced pottery is through analysis of ceramic paste color. Paste color is the dominant matrix color of the vessel wall before refiring. In this study, it was determined by general impression of the analyst and does not

refer to the Munsell color chart. Unfortunately, the Zuni area is fairly homogenous in terms of geological formations that produce clays, resulting in homogenous paste colors in fired pottery. Although detecting intraregional interaction between residents of Y Unit Draw and other parts of the Zuni area seems unlikely based on studies of paste color, detection of interregional interaction may be possible.

Table 21.5 provides percentages of different paste colors for the sherds collected and analyzed from sites in Y Unit Draw. Quick inspection of this table confirms that most ceramics range in color from white-gray to dark gray, the expected

Table 21.5. Percentage of Paste Colors Present at Sites in Y Unit Draw.

Site	Count	Black		White-gray		Light Gray		Dark Gray		Gray-brown		Brown		Cream		Buff-tan		Pink	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
LA 115334	1	-	-	-	-	-	-	-	-	1	100	-	-	-	-	-	-	-	-
LA 26319	6	-	-	1	17	1	17	4	66	-	-	-	-	-	-	-	-	-	-
LA 115327	16	-	-	4	25	5	31	7	44	-	-	-	-	-	-	-	-	-	-
LA 26306	251	-	-	67	27	102	41	68	27	9	4	3	1	1	0.04	1	0.04	-	-
LA 115330	8	-	-	1	12	7	88	-	-	-	-	-	-	-	-	-	-	-	-
LA 48695	4	-	-	3	75	-	-	1	25	-	-	-	-	-	-	-	-	-	-
LA 115329	3	-	-	1	33	1	33	-	-	1	33	-	-	-	-	-	-	-	-
LA 26308	80	1	1	19	24	28	35	29	36	3	4	-	-	-	-	-	-	-	-
LA 115324	15	1	7	7	47	2	13	4	26	-	-	-	1	7	-	-	-	-	-
LA 115323	10	-	-	5	50	3	30	1	10	1	10	-	-	-	-	-	-	-	-
LA 115325	26	-	-	13	50	5	19	5	19	3	12	-	-	-	-	-	-	-	-
LA 49838	434	-	-	49	11	186	43	152	35	32	8	2	0.4	3	0.6	5	1	5	1
Total	854	2	0.2	170	20	340	40	271	32	50	6	5	0.5	5	0.5	6	0.5	5	0.5

range of paste colors in ceramic vessels produced in the Zuni area. There is a much smaller percentage of sherds from some sites that range in color from gray-brown to brown to tan to pink. These colors may be associated with misfired pottery, uncommonly used local clay sources, or vessels produced outside the Zuni area. Two paste colors are associated with specific geographic areas. While a brown paste color is traditionally associated with the Mogollon highlands, brown paste pottery is also commonly found on sites at least as far north of the Mogollon rim as the Petrified Forest (Burton 1991). The gray-brown paste color is associated with production of pottery in the Puerco Valley (Hays-Gilpin and van Hartesveldt 1995). If artifacts with this paste color found in Y Unit Draw were produced in the Puerco Valley, then it would appear that this was the most common source of nonlocally produced ceramic vessels in the Draw.

Another way of determining clay sources is through examining the paste color of refired ceramic chips. In this study, assignment of refired color was made by reference to a Munsell color chart. Various researchers have conducted refiring experiments in the Zuni area (Crown 1981; Duff 1993; Fowler 1991; Mills 1992; Mills and Vint 1991). Between these studies, seven color groups ranging from cream to red have been identified in the Zuni area. These groups were aggregated into three categories: cream, buff, and red. Cream refers to Munsell colors 5 YR 8/2 and 8/3, 7.5 YR 8/4, and 10 YR 8/2, 8/3, and 8/4. Buff refers to Munsell colors 5 YR 5/6, 6/6, and 7/6 and 7.5 YR 7/4 and 7/6. Red refers to Munsell colors 2.5 YR 4/6, 5/6, and 6/6.

A total of 496 sherds collected from sites in Y Unit Draw was refired. Small chips were removed from each sherd, placed in an electric kiln, and then fired at 900°C for 30 minutes. One small site, LA 115324, and the two large sites, LA 26306 and LA 49838, were sampled, ensuring that every ceramic type, paste color and temper type was represented. All of the sherds from the remaining sites were refired. Sherds that were destroyed during firing (one from site LA 48695

and one from site LA 115330) were not reported and are not included in the table.

Table 21.6 provides percentages of different refired paste colors found at each site in Y Unit Draw. Most ceramic chips refired to a buff color. The remainder of the assemblage refired to either cream or red. Mills and Vint (1991) and Fowler (1991) have related buff fired clays to Dakota Sandstone, one of the two common clay-bearing formations in the Zuni area. Cream fired clays may be related to Dakota Sandstone or possibly Mancos Shale, the second common clay-bearing formation in the Zuni area. Red fired clay is associated with iron-rich clays from the Chinle Formation (Fowler 1991; Mills and Vint 1991). The Chinle Formation is exposed in the area surrounding Y Unit Draw, to the west of Zuni Route 4. It is also exposed in other areas of the Zuni River valley and in the El Morro Valley. Further, ceramics produced in the Puerco Valley are all commonly made from Chinle Formation clays (Hays-Gilpin and van Hartesveldt 1995). It is possible that vessels that refired red were produced in Y Unit Draw.

Local vs. Nonlocal Temper

Another means of distinguishing between locally and nonlocally produced ceramic vessels is through temper analysis. Temper is any material added to the clay, before it is formed into a vessel, to help with the workability and firing properties of the clay; temper can also be natural inclusions found in a clay. In this study, temper was identified using a binocular microscope. Table 21.7 provides percentages of different temper types for the sherds collected and analyzed from sites in Y Unit Draw.

The most common temper types in pottery produced in the Zuni area are either sherd or a combination of sherd and quartz sand. Pottery produced in the Zuni area during the Pueblo I and early Pueblo II period may have exclusively quartz temper. Not surprisingly, these are the most common temper types present in the Y Unit

Table 21.6. Percentage of Refired Paste Colors Present at Sites in Y Unit Draw.

Site	Count	Red		Buff		Cream	
		n	%	n	%	n	%
LA 115334	1	-		1	100	-	
LA 26319	6	3	50	3	50	-	
LA 115327	16	-		12	75	4	25
LA 26306	152	24	16	106	70	22	14
LA 115330	7	-		7	100	-	
LA 48695	3	-		2	67	1	33
LA 115329	3	-		1	33	2	67
LA 26308	80	4	5	44	55	32	40
LA 115324	9	2	2	5	6	2	2
LA 115323	10	1	10	8	80	1	10
LA 115325	26	1	4	24	92	1	4
LA 49838	183	24	13	152	83	7	4

Table 21.7. Percentage of Tempers Present in Ceramics From Sites in Y Unit Draw.

Site	Count	Quartz Sand		Multilithic Sand		Quartz Sand & Sherd		Multilithic Sand & Sherd		Sherd		(With or Without Sherd)		Mica	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
LA 115334	1	-		1	100	-		-		-		-		-	
LA 26319	6	-		1	17	4	66	-		1	17	-		-	
LA 115327	16	1	6	-		3	18	5	31	7	43	-		-	
LA 26306	251	5	2	5	2	69	27	11	4	156	63	3	1	2	1
LA 115330	8	-		2	25	-		6	75	-		-		-	
LA 48695	4	1	25	3	75	-		-		-		-		-	
LA 115329	3	1	33	2	67	-		-		-		-		-	
LA 26308	80	11	14	1	1	24	30	3	4	41	51	-		-	
LA 115324	15	-		1	6	7	47	-		7	47	-		-	
LA 115323	10	1	10	-		5	50	1	10	3	30	-		-	
LA 115325	26	2	8	-		3	11	2	8	19	73	-		-	
LA 49838	434	50	12	62	14	110	25	8	2	204	47	-		-	
Total	854	72	8	78	9	225	26	36	4	438	52	3	0.3	2	0.2

Draw ceramic assemblage. The second most common temper type present in Y Unit Draw consists of either multilithic sand or a combination of sherd and multilithic sand. Multilithic sand is often present in utility wares from the middle Little Colorado and Hopi Buttes areas (Hays-Gilpin and van Hartesveldt 1995). A combination of sherd and multilithic sand is also not uncommon from ceramics in this area. There are a handful of sherds, including both decorated and utility, from site LA 26306 with trachyte temper. This temper is characteristic of the Chuska Mountains. Finally, there are two sherds with mica temper at site LA 26306. The source of these micaceous ceramics is unknown, but is undoubtedly from outside the Zuni area.

VILLAGE OF THE GREAT KIVAS

Introduction

Village of the Great Kivas (site LA 631) is a well-known archaeological site located at the mouth of Red Paint Canyon in the Nutria drainage (Figure 21.2). The site has long been known as a Chaco-style great house, or what is more commonly referred to as a Chacoan outlier (Marshall et al. 1979; Powers et al. 1983). It was one of the first such structures excavated outside of Chaco Canyon, and helped shape current thinking on the distribution and function of great houses. The site was excavated by Frank Roberts, Jr., in the summer of 1930, and comprises three main roomblocks (or houses) and two great kivas (Chapter 5 gives definitions of these types of structures). Two of the houses (Houses A and B) and only one of the great kivas (Great Kiva #1) were completely excavated by Roberts (Figure 21.3). One room in House C, however, was excavated. Refuse, or midden, areas were also excavated.

Prior to testing and data recovery activities at sites along Y Unit Draw, it was believed that many of the later components at those sites were contemporaneous with Village of the Great Kivas (Kendrick et al. 1997). One of our primary research goals, then, was to compare assemblages

(particularly ceramic artifact assemblages) between the project sites and Village of the Great Kivas. These comparisons, when combined with other data, would allow close examination of current great house models. In order to accomplish this goal, however, the artifact assemblage from Village of the Great Kivas needed to be analyzed, as our understanding of the ceramic wares and types have changed significantly since the 1930s.

Analysis of the Village of the Great Kivas ceramic assemblage was conducted by Kendrick, and incorporated into the larger project site data base by Eckert and Hagopian (the entire artifact assemblage from the site was examined by Kendrick and Damp and is discussed in Chapter 28). Below we provide a description of the assemblage, followed by a discussion of its implications for chronology, household economic production, and wider spheres of social interaction. Finally, we compare these data to the Y Unit Draw ceramic assemblages, and discuss the implications for great-house models and community development (which are more fully explored in Chapter 28).

Description of Ceramic Assemblage

Several attributes were recorded during analysis, including ceramic ware and type, temper, paste color, vessel form and part, and count. Provenience information was added to the data base during data analysis. The data base is provided in Appendix D.

A total of 365 vessels and sherds were analyzed. Several ceramic wares and types were identified, consisting of both local and nonlocal examples (Table 21.8). Wares in the assemblage include Cibola, Little Colorado, Tusayan, and Mesa Verde White Wares; White Mountain Redware; Tsegi Orange Ware; Cibola Gray Ware; Puerco Valley Red Ware, Puerco Valley Brown Ware and Mogollon Brown Ware. Prominent local types identified include Puerco, Reserve, and Escavada black-on-whites (Cibola White Ware); Wingate and Puerco black-on-reds, and

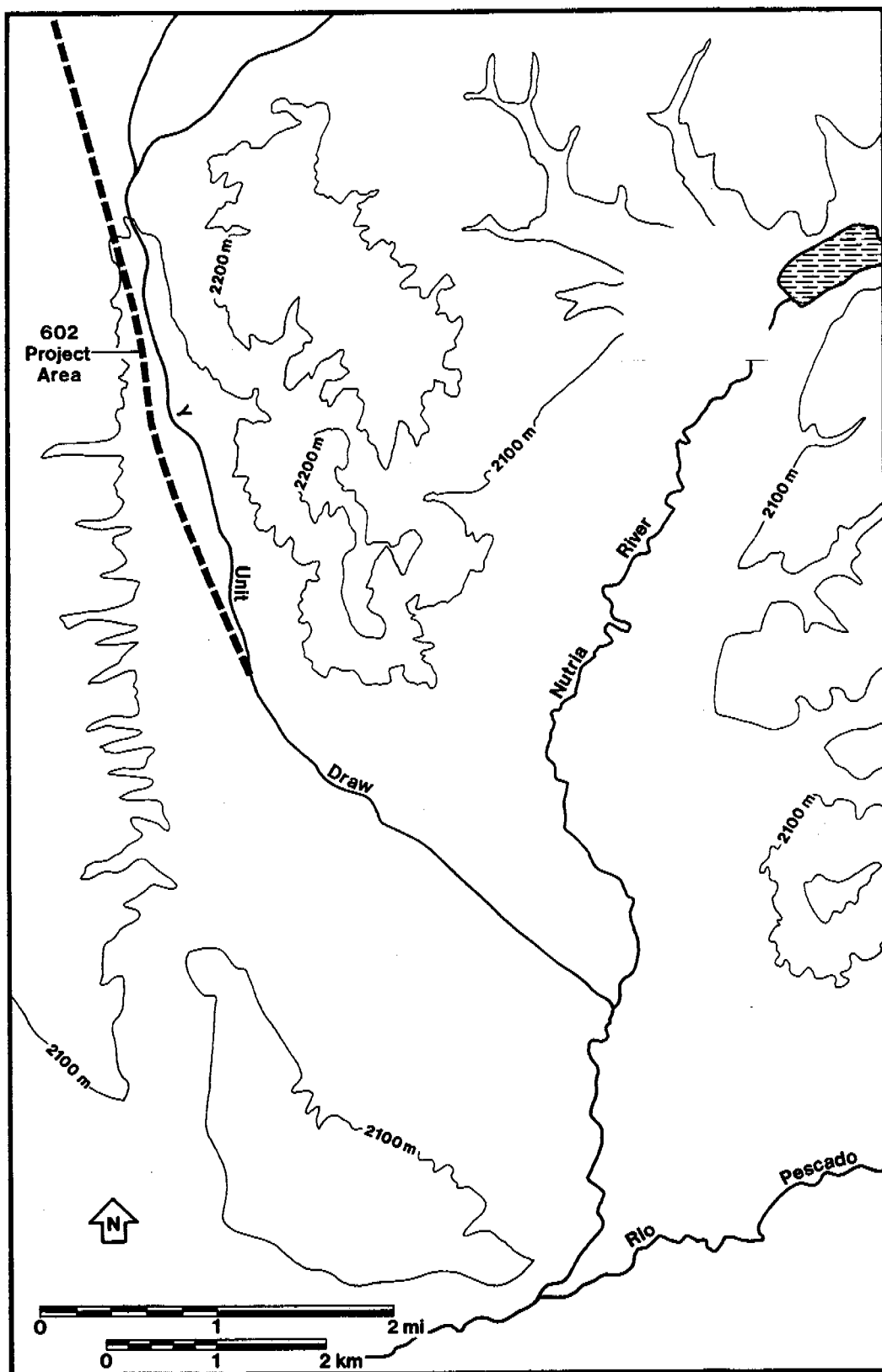
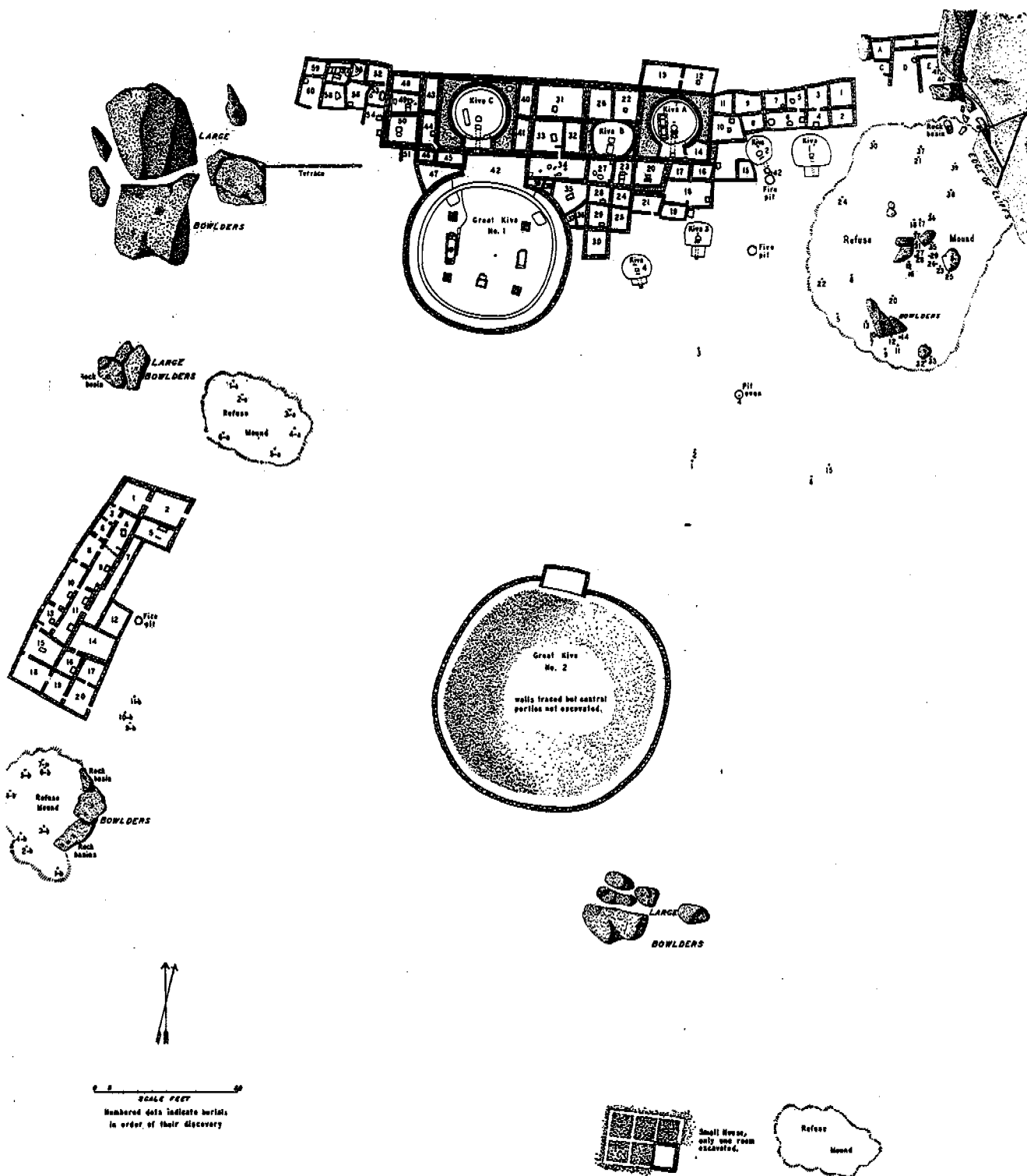


Figure 21.2. Map Showing the Location of Village of the Great Kivas.



MAP OF RUINS AT MOUTH OF RED PAINT CANYON

Numbered dots indicate burials

Figure 21.3. Plan Map of Village of the Great Kivas (after Roberts 1932).

Table 21.8. Tabulation of Ceramics From Village of the Great Kivas by Ware and Type.

Ware	Type	Count
Cibola White Ware	Red Mesa Black-on-white	8
	Transitional Red Mesa/Puerco Black-on-white	2
	Gallup Black-on-white	2
	Escavada Black-on-white	21
	Puerco Black-on-white	38
	Reserve Black-on-white	27
	Transitional Reserve/Tularosa Black-on-white	7
	Snowflake Black-on-white	1
	Tularosa Black-on-white	1
	Unidentified painted	14
	Subtotal	121
Little Colorado White Ware	Padre Black-on-white	6
	Holbrook B Black-on-white	5
	Holbrook B? Black-on-white	1
	Unidentified painted	1
	Subtotal	13
Tusayan White Ware	Kana-a Black-on-white	1
	Dogoszhi Black-on-white	1
	Tusayan Black-on-white	1
	Subtotal	3
Mesa Verde White Ware	Mesa Verde Black-on-white	2
	Subtotal	2
White Mountain Redware	Wingate Black-on-red	37
	Puerco Black-on-red	33
	Wingate Polychrome, Wingate	2
	Wingate Polychrome, Houck	17
	Wingate Polychrome, Querino	26
	St. Johns Polychrome	2
	Unidentified polychrome	1
	Unidentified unpainted	2
	Subtotal	120
Puerco Valley Red Ware	Showlow Red	1
	Showlow Red Smudged	1
	Showlow Black-on-red	5
	Showlow Polychrome	1
	Subtotal	8
Tsegi Orange Ware	Tusayan B Polychrome	1
	Subtotal	1
Cibola Gray Ware	Plain Gray	40
	Indented Corrugated	34

(continued)

Table 21.8. Continued.

Ware	Type	Count
	Indented Corrugated Neck	2
	Indented Corrugated, Applique	1
	Obliterated Indented Corrugated	1
	Zoned Corrugated	5
	Unidentified	1
	Subtotal	84
Puerco Valley Brown Ware	Woodruff Smudged	4
	Subtotal	4
Mogollon Brown Ware	Reserve Corrugated Smudged	5
	Subtotal	5
Indeterminate Brownware	Unidentified brownware	4
	Subtotal	4
	Total	365

Wingate Polychrome, both Houck and Querino varieties (White Mountain Red Ware); and Plain Gray and Indented Corrugated (Cibola Gray Ware). Nonlocal types include Padre and Holbrook B black-on-whites (Little Colorado White Ware); Kana-a, Dogoszhi, and Tusayan black-on-whites (Tusayan White Ware); Mesa Verde Black-on-white (Mesa Verde White Ware); and Tusayan B Polychrome (Tsegi Orange Ware).

Many of the vessels are at least 50% complete. Vessel forms consist primarily of bowls (n=154) and jars (n=122), but also include ladles (n=39) and pitchers (n=20). Other forms were recorded in significantly lower amounts and include effigies (n=6), seed jars (n=6), worked sherds (n=6), canteens (n=3), handles (n=2), mugs (n=2), and a plate (n=1). Vessel form could not be identified for four items and were recorded as indeterminate. Interestingly, the bowls of many of the ladles were intact but the handles were either partially or completely broken off.

The six effigies recorded include three animal heads, two complete animal figures, and one handle fragment. The animal heads are a bird

typed as an unidentified painted Cibola White Ware, an unidentified animal with wear on its nose also typed as an unidentified Cibola White Ware, and an unidentified animal typed as a Plain Gray (Cibola Gray Ware). One of the complete animal figures is a frog and is probably a handle to a vessel. This was typed as a Plain Gray (Cibola Gray Ware). The other complete figure is an unknown four-legged animal also typed as a Plain Gray (Cibola Gray Ware). The handle fragment has a small unidentified animal applied to it. This fragment was typed as Puerco Black-on-red.

The worked sherds are four disks and two possible scrapers. Two of the disks were identified as Puerco Black-on-red. One of these is a rim sherd that was flaked into a disk. The other was ground into a circular shape. The ground edge was slipped, suggesting that this sherd was shaped and slipped prior to firing. The third disk was identified as Late Woodruff Smudged. It is a rim sherd that was flaked into a disk. The fourth disk was identified as an indeterminate brownware, with sand and sherd temper, smudged interior, and corrugated exterior. The edges of this disk were

ground. The edges of the two possible scrapers were ground. One has a red pigment or material on the interior and exterior of one of its edges. These were typed as Reserve Black-on-white. A sample of prepared raw clay with sherd temper added was also recorded in the assemblage. Its provenience is unknown. The presence of scrapers, raw clay, and other items such as polishing stones and paint mortars suggests that ceramic production occurred at the Village of the Great Kivas.

Chronology

All but one vessel were ascribed to either House A, House B, Great Kiva, or Kiva. In this analysis, it is assumed that Kiva referred to the Great Kiva. Those items attributed to the Kiva were grouped with those from the Great Kiva. Some of the proveniences identified where the ceramics were located with respect to the house they were recovered from, such as refuse area, room number, kiva number, or burial number. The proveniences were grouped based on the construction sequence outlined by Roberts (1932), allowing for tighter temporal control for discussing occupation duration.

Mean ceramic dates for House A, House B, and temporal units within each house are provided in Table 21.9 and Figure 21.1. Based on diagnostic ceramics, House A was occupied sometime between AD 992 and 1204. However, if each stage is examined separately, it appears that the occupation extends to approximately AD 1222. The large interquartile range for Stage 2 is due to the large number and variety of ceramics associated with this stage. This can be attributed to the Great Kiva's being associated with this stage. If the Great Kiva is considered as public architecture, it is likely that its use continued independently of any of these stages outlined by Roberts. Smaller numbers of ceramics are associated with Stages 1, 3, and 4, providing a much narrower interquartile range.

Based on the ceramic assemblage, House B was occupied from AD 1027 to 1227. The single

sherd associated with Stage 1 provides a very narrow interquartile range of AD 1100 \pm 25. The range for Stage 2 extends the date of occupation of this house to AD 1246.

Overall, House A and House B are contemporaneous. The ceramic assemblage indicates that House A was constructed first with House B constructed approximately a generation later. In addition, House B continued to be occupied approximately a generation after House A was no longer in use. This suggests that the occupants of Houses A and B worked together, and probably consisted of related households. An extended lineage such as this would have maintained control over production and resources in the surrounding area.

Household Economic Production

As stated above, the assemblage from the Village of the Great Kivas was dominated by bowls, jars, ladles, and pitchers, suggesting an emphasis on food preparation and service. However, the large numbers of whitewares and redwares identified precludes examination of vessel form and function in relation to site function and economic activities at this site. This is due, in part, to the large number of vessels from burial associations ($n=110$; 30% of total assemblage). These were primarily decorated whitewares and redwares with a few graywares and brownwares.

Another factor contributing to this bias is that whitewares and redwares appear to have been selected for collection during excavation. This is seen in the relatively high number of whitewares ($n=139$; 38%) and redwares ($n=129$; 35%) identified, as compared to graywares ($n=84$; 23%) and brownwares ($n=13$; 4%). A quick comparison with the three habitation sites in Y Unit Draw (LA 26306, LA 49838, and LA 115328) shows that over 60% of these assemblages consisted of graywares. Presuming that Village of the Great Kivas functioned, in part, as a habitation site, a considerably higher percentage of graywares, at least over 50%, would be expected.

Table 21.9. Ceramic Temporal Data for Village of the Great Kivas.

Provenience	Count	Count by Type	Date Range	Mean Ceramic Date
House A	181	18 Escavada Black-on-white	AD 875 to 1300	1098 ± 106
all proveniences		2 Gallup Black-on-white		
		30 Puerco Black-on-white		
		8 Red Mesa Black-on-white		
		1 Transitional Red Mesa/Puerco Black-on-white		
		18 Reserve Black-on-white		
		5 Transitional Reserve/Tularosa Black-on-white		
		1 Tularosa Black-on-white		
		4 Holbrook B Black-on-white		
		3 Padre Black-on-white		
		5 Reserve Corrugated Smudged		
		2 Mesa Verde Black-on-white		
		4 Woodruff Smudged		
		3 Showlow Black-on-red		
		1 Showlow Red		
		1 Showlow Red Smudged		
		1 Dogoszhi Black-on-white		
		1 Tusayan Black-on-white		
		1 Tusayan B Polychrome		
		21 Puerco Black-on-red		
		27 Wingate Black-on-red		
		8 Wingate Polychrome, Houck		
		16 Wingate Polychrome, Querino		
House A	7	4 Puerco Black-on-white	AD 875 to 1200	1085 ± 81
Stage 1		1 Red Mesa Black-on-white		
		2 Puerco Black-on-red		
House A	54	6 Escavada Black-on-white	AD 875 to 1300	1116 ± 106
Stage 2		6 Puerco Black-on-white		
		2 Red Mesa Black-on-white		
		9 Reserve Black-on-white		
		4 Transitional Reserve/Tularosa Black-on-white		
		1 Tularosa Black-on-white		
		1 Tusayan B Polychrome		
		6 Puerco Black-on-red		
		7 Wingate Black-on-red		
		4 Wingate Polychrome, Houck		
		8 Wingate Polychrome, Querino		
House A	6	1 Escavada Black-on-white	AD 1000 to 1200	1078 ± 50
Stage 3		1 Reserve Black-on-white		
		1 Showlow Red		
		1 Showlow Red Smudged		
		1 Puerco Black-on-red		
		1 Wingate Black-on-red		
House A	3	2 Puerco Black-on-white	AD 1050 to 1250	1135 ± 50
Stage 4		1 Mesa Verde Black-on-white		

(continued)

Table 21.9. Continued.

Provenience	Count	Count by Type	Date Range	Mean Ceramic Date
House B	77	3 Escavada Black-on-white	AD 1000 to 1400	1127 ± 100
all proveniences		8 Puerco Black-on-white		
		1 Transitional Red Mesa/Puerco Black-on-white		
		9 Reserve Black-on-white		
		2 Transitional Reserve/Tularosa Black-on-white		
		1 Snowflake Black-on-white		
		1 Holbrook B Black-on-white		
		3 Padre Black-on-white		
		2 Showlow Black-on-red		
		1 Showlow Polychrome		
		1 Kana-a Black-on-white		
		12 Puerco Black-on-red		
		10 Wingate Black-on-red		
		9 Wingate Polychrome, Houck		
		10 Wingate Polychrome, Querino		
		2 Wingate Polychrome, Wingate		
		2 St. Johns Polychrome		
House B Stage 1	1	1 Reserve Black-on-white	AD 1050 to 1150	1100 ± 25
House B Stage 2	21	1 Escavada Black-on-white	AD 1000 to 1400	1146 ± 100
		2 Puerco Black-on-white		
		4 Reserve Black-on-white		
		1 Snowflake Black-on-white		
		1 Padre Black-on-white		
		2 Showlow Black-on-red		
		1 Showlow Polychrome		
		1 Puerco Black-on-red		
		1 Wingate Black-on-red		
		2 Wingate Polychrome, Houck		
		2 Wingate Polychrome, Querino		
		1 Wingate Polychrome, Wingate		
		2 St. Johns Polychrome		

Nevertheless, evidence of economic production was present at Village of the Great Kivas. Evidence for ceramic production was seen in the prepared clay, scrapers, polishing stones, and paint mortars recovered from this site. The provenience of the clay was unknown. The scrapers were from House B. The polishing stones and paint mortars were found in association with both houses but were primarily from House A.

The importance of storage is seen by the extremely large grayware jars and stone jar lids present at this site. Nine large jars, each measuring well over 30 cm in diameter, were

recorded, all of which were Cibola Gray Wares. Six of these were located in Room 4 of House B with two typed as Zoned Corrugated and four typed as Indented Corrugated jars. Another Zoned Corrugated vessel was located in Room 2 of House B. The remaining two jars were associated with House A; one was from Room 6 and the other from Room 10. Both were typed as Indented Corrugated. Four stone jar lids were also recorded in the assemblage, but none were in association with these large vessels.

The large number of vessels within one room (House B, Room 4) suggests that storage was

important and that part of this room was used for storage. A closer inspection of the data base shows that there is a total of 21 vessels associated with this room, 10 jars, 8 bowls, 2 ladles, and 1 seed jar, the largest number of vessels found in any of the rooms. In addition to the six large grayware vessels stated above, one large whiteware jar, a Padre Black-on-white, was also present. The number of bowls, all of which are White Mountain Redwares, and ladles, one Reserve Black-on-white and one Showlow Black-on-red, suggests that tasks related to food preparation and service also were performed. This is supported by Roberts' observation of Room 4 which states that "... a large number of pottery vessels were found sitting along the base of the wall ... and culinary jars were in place in the fire pit(s)..." (1932:100). This room and the one adjacent to it (Room 9) were destroyed by a fire. The contents of the rooms appeared to have been sealed by the roofing material, providing a glimpse of the use of these rooms.

Social Interaction

An examination of the ceramic wares and types present at Village of the Great Kivas can shed light on social interaction with groups within and outside the Cibola region. Cibola White and Gray Wares and the White Mountain Redwares are local to the Cibola region. The Puerco Valley Red and Brown Wares are believed to be manufactured in the Puerco Valley just west of the Cibola region. Wares considered nonlocal are Little Colorado, Tusayan, and Mesa Verde White Wares; Tsegi Orange Ware; and Mogollon Brown Ware, suggesting interaction with the regions to the north, northwest, and south. The ceramic assemblage does not suggest interaction with regions to the east.

House A, by far, had more nonlocal wares and types associated with it than did House B. Nonlocal types associated with House A include Padre Black-on-white, Holbrook B Black-on-white, Dogoszhi Black-on-white, Tusayan Black-on-white, Tusayan B Polychrome, Mesa Verde Black-on-white, Reserve Corrugated Smudged, and Woodruff Smudged. Those associated with

House B include Padre Black-on-white, Holbrook B Black-on-white, and Kana-a Black-on-white. Based on this, it appears that interaction, in general, was occurring with the Little Colorado and Tusayan regions to the northeast. Interestingly, the Mesa Verde Black-on-white found at House A also suggests interaction with the Mesa Verde region to the north. The House A assemblage also includes wares from the Mogollon region to the south.

A Comparison of Ceramic Assemblages from Village of the Great Kivas and Y Unit Draw Sites

As stated above, sites within Y Unit Draw were occupied between AD 1000 to 1200. Ten of the sites have mean ceramic dates within this range and five additional sites have part of their interquartile within this range. From this, it is believed that many of these sites were contemporaneous and that many of the residents of these sites were interacting with each other.

Those not appearing to be contemporaneous, the five sites with only part of their interquartile within this range, either have small ceramic assemblages (sites LA 115323, LA 115329, and LA 115330), may have multiple components (site LA 26308), or may have been occupied earlier (site LA 115321). The three sites with small ceramic assemblages can be deceptive and usually offer little temporal information. Site LA 26308 has a late Pueblo I to early Pueblo II component and a late Pueblo II component, which is not readily apparent in the mean ceramic date and interquartile range. The late Pueblo II component is outside of the right-of-way and was not investigated. Site LA 115321 is a late Pueblo I to early Pueblo II habitation site and is earlier than most of the sites within the Y Unit Draw. Evidence of burned adobe suggests that a jacal structure was present at this site.

Y Unit Draw contains both large and small sites. Large sites, such as sites LA 26306, LA 49838, and LA 115328, are believed to be habitation sites and consist of several structures,

features, middens, and sizable ceramic assemblages. The smaller sites, such as sites LA 26308, LA 26319, LA 115320, LA 115321, LA 115322, LA 115325, and LA 115334, are believed to be seasonal occupations and consist of either a small rubble mound and associated artifact scatter or a dense artifact scatter. These smaller sites usually have relatively small ceramic assemblages. Seven sites (LA 48695, LA 115323, LA 115324, LA 115327, LA 115329, LA 115330, LA 115333) are not included in this discussion due to their extremely small ceramic assemblages.

The quantity and variety of ceramic wares and types present at sites can be used to illustrate the degree of interaction between and among sites both within and outside a region. Both the larger and smaller sites within Y Unit Draw yielded local wares, such as Cibola White Ware and Cibola Gray Ware. Many of these sites also contained White Mountain Redwares, which are also considered local. Nonlocal wares were recorded at only one of the larger sites, LA 26306, and included Little Colorado White Ware, Chuska Gray Ware, and Mogollon Brown Ware in its ceramic assemblage.

The types identified within each of the local wares are consistent with those expected and are listed in Table 21.1. Prominent local types include Kiatuthlanna, Red Mesa, Gallup, Escavada, Puerco, and Reserve black-on-whites (Cibola White Ware); Wingate and Puerco black-on-reds (White Mountain Red Ware); and Plain Gray and Indented Corrugated (Cibola Gray Ware). However, a type within the Cibola White Ware, Chaco Black-on-white, is not local to the Y Unit Draw region. It is associated more with the Chaco region to the north. Six Chaco Black-on-white sherds were identified from sites along Y Unit Draw (sites LA 26306, $n=1$; LA 49838, $n=3$; LA 26308, $n=2$). Two of these sites, LA 26306 and LA 49838, are considered to be large and one, site LA 26308, is considered to be small, as defined above. Nonlocal types include Holbrook A Black-on-white (Little Colorado White Ware), Indented Corrugated Chuska Grayware, and untyped Mogollon Brownware.

Known as a Chaco-style great house, Village of the Great Kivas consists of three main roomblocks (or houses) and two great kivas. The ceramic assemblage is quite large and consists of both local and nonlocal wares, including Cibola, Little Colorado, Tusayan, and Mesa Verde White Wares; White Mountain Redware; Tsegi Orange Ware; Cibola Gray Ware; Puerco Valley Red Ware; Puerco Valley Brown Ware; and Mogollon Brown Ware. Prominent local types identified include Puerco, Reserve, and Escavada black-on-whites (Cibola White Ware); Wingate and Puerco black-on-reds, and Wingate Polychrome, Houck and Querino varieties (White Mountain Redware); and Plain Gray and Indented Corrugated (Cibola Gray Ware). Nonlocal types include Padre and Holbrook B black-on-whites (Little Colorado White Ware); Kana-a, Dogoszhi, and Tusayan black-on-whites (Tusayan White Ware); Mesa Verde Black-on-white (Mesa Verde White Ware); and Tusayan B Polychrome (Tsegi Orange Ware).

A wider variety of ceramic wares and types, both local and nonlocal, are identified at Village of the Great Kivas as compared to sites along Y Unit Draw. In addition, evidence of ceramic production, as seen in the raw clay, ceramic scrapers, polishing stones, and paint mortars, is present at Village of the Great Kivas. No conclusive evidence, however, of ceramic production was found for the sites along Y Unit Draw. This suggests that Village of the Great Kivas had greater access to resources, both within and outside of the immediate region.

A comparison of site function, based on the ceramic assemblage, between the large and small sites within Y Unit Draw and Village of the Great Kivas was difficult because the assemblage from Village of the Great Kivas is biased towards decorated bowls. However, it is suggested that food preparation, service, and storage were important at Village of the Great Kivas and the large sites along Y Unit Draw, whereas storage was important at the small sites along Y Unit Draw.

**BASKETMAKER II AND PUEBLO II FLAKED STONE TECHNOLOGY
AND LITHIC RAW MATERIAL ECONOMY**

Jeffrey E. Shokler

INTRODUCTION

The State Highway 602 Project provided an unusual opportunity to explore diachronic variability in lithic technology and raw material economy in the San Juan Basin. Over 2000 Basketmaker II and more than 1000 Pueblo II flaked stone artifacts were recovered from 13 sites in Y Unit Draw (Table 22.1). These collections provide an opportunity to investigate several questions regarding the nature of the transition from hunting and gathering to more agricultural subsistence economies in the San Juan Basin, trends toward decreasing residential mobility from the Archaic to later ceramic periods, and the possible shift from curated to more expedient lithic reduction strategies as residential mobility decreased with the appearance of sedentary village lifeways in the region.

Vierra, in his 1994 study of Basketmaker II flaked stone technology from sites excavated during the Transwestern Pipeline Expansion Project (Vierra 1994), provided an excellent synthesis of current views concerning the nature of the Basketmaker II period adaptation and its relationship to flaked stone technology and raw material economy. Vierra noted that much of the research on stone tool technology in the Southwest during the 1980s focused on attempts to differentiate Archaic from ceramic period lithic assemblages (Vierra 1994). From this research, an apparent dichotomy was noted in which Archaic period lithic technology was characterized by bifacial reduction strategies. In contrast, later ceramic period assemblages were defined as technologically "simple," emphasizing unifacial reduction (Cameron 1997; Vierra 1994). This difference has primarily been explained in terms of the impact of decreasing residential mobility as subsistence strategies shifted from hunting and gathering to corn agriculture. Reduced residential

mobility was argued to be the principal factor behind the apparent switch from curated (bifacial) to more expedient (unifacial) reduction technologies in the Southwest. The exact timing of that switch as well as its correlation with the appearance of an agricultural lifeway in the region has yet to be resolved. Data from both this study and Vierra's (1994) suggest significant changes in lithic technology, raw material economy, and mobility may have begun at least as early as the Basketmaker II period.

Cameron (1997) noted a trend toward the increased importation and use of nonlocal raw materials during the period AD 1020 to 1120 in Chaco Canyon. While locally available cherts and non-chert raw materials were being expediently reduced during this period, certain types of nonlocal raw materials (Washington Pass chert, Morrison Formation material, "Zuni wood", Zuni Yellow Spotted chert, and obsidian) were being brought to the canyon in both unfinished and finished form (Cameron 1997). These materials also showed differential patterns of distribution within the canyon, particularly between the great houses (some of which contained over 25% nonlocal rock) and the small sites (which generally contained only small quantities). As will be discussed in detail below, a similar trend can be seen in the raw material economy of the sites in Y Unit Draw. While apparently playing only a minor role in either period, nonlocal raw materials are present in greater abundance during the Pueblo II period than during the earlier Basketmaker II period. This pattern may reflect the impact of sedentary village life or the effects of increasing regional integration on local raw material procurement practices.

Chapters 7 through 20 in this volume provide detailed analyses of the flaked stone assemblages recovered from 17 of the 18 sites investigated

Table 22.1. Flaked Stone Artifact Frequencies by Site and Archaeological Component.

Site	Basketmaker II	Late Basketmaker III/ Early Pueblo I	Late Pueblo I/ Early Pueblo II	Pueblo II	Pueblo III	Total
LA 115334	-	-	-	4	-	4
LA 26319	12	-	-	8	-	20
LA 26309	-	-	4	*	-	4
LA 115327	7	-	-	16	-	23
LA 26306	110	-	-	385	-	495
LA 115330	2185	-	-	-	-	2185
LA 48695	*	-	-	*	-	0
LA 115329	-	-	27	-	-	27
LA 26308	-	6	-	88	-	94
LA 115324	*	-	-	37	-	37
LA 115323	-	-	-	-	28	28
LA 115325	-	-	-	27	-	27
LA 49838	5	-	-	352	-	357
LA 115333	-	-	-	1	-	1
LA 115328	-	-	-	89	-	89
LA 115322	-	-	-	17	-	17
LA 115321	-	-	14	-	-	14
LA 115320	-	-	-	52	-	52
Total	2319	6	45	1076	28	3474

Note: Artifact frequencies include hammerstone and natural (manuport) artifact classes.

*Indicates a component is recognized at the site, but no flaked stone was recovered.

during this project. Fifteen of these sites contained either a Basketmaker II component, a Pueblo II component, or both (Table 22.1). The Pueblo II component of site LA 26309, the Basketmaker II and Pueblo II components of site LA 48695, and the Basketmaker II component of site LA 115324 yielded no flaked stone artifacts during the data recovery project and will, therefore, be excluded from this analysis. This chapter will focus on documenting lithic reduction strategies and patterns of raw material procurement and exploitation in the study area and on exploring general trends and changes in lithic technology and raw material economy between the Basketmaker II and Pueblo II periods.

THE COLLECTION

A total of 2319 flaked stone artifacts or artifacts related to flaked stone reduction (i.e., hammerstones and manuports) were recovered in Basketmaker II contexts from sites in Y Unit Draw. The Basketmaker II habitation of site LA 115330 accounts for 94.1% (2183) of all of the Basketmaker II flaked stone artifacts recovered during the project. The Pueblo II flaked stone assemblage is considerably smaller by comparison consisting of 1076 artifacts. The midden deposits associated with Pueblo II habitation debris at site LA 26306 yielded 385 artifacts—the largest proportion (35.8%) of the

Pueblo II artifacts in the study. Another 32.7% (352) of the Pueblo II artifacts were recovered from surficial and midden contexts at site LA 49838. Combined, these two sites account for 68.5% of the Pueblo II flaked stone artifacts found in Y Unit Draw. Table 22.1 provides frequencies of flaked stone artifacts recovered during the project by both site and archaeological component.

The analytical approach taken toward the Basketmaker II and Pueblo II collections in this study was primarily technological, focusing on aspects of flaked stone reduction strategies, reduction intensity, reduction technology, and raw material exploitation. Typological investigations were organized around artifact classes which were further broken down into artifact types. Marks (1976:371) defined artifact classes as "groupings of artifacts which share similar gross morphology and are commonly recognized as being distinct." Useful information regarding lithic reduction practices and site function can be obtained by examining the proportional representation of artifact classes in a collection (Marks 1976). Fourteen artifact classes and 31 artifact types were identified in the project collections (Table 22.2). One artifact class, utilized piece, should be defined here. Utilized pieces were defined in this study as unmodified flakes bearing *discontinuous*, normal and inverse edge damage along one or more edges of a flake. The edge damage needed to be identifiable either macroscopically or with the aid of a 10x hand lens. Discussion of analyses at the level of the artifact type in this chapter will generally be limited to those in the debitage, core, and projectile point artifact classes (Table 22.2).

THE ANALYSIS

Data collected during analysis of the 3474 flaked stone artifacts recovered from the Y Unit Draw sites included observations of as many as 21 variables for unifacial or bifacial artifacts, 18 variables for cores, and 17 variables for projectile points. A list of the variables and attributes recorded during this study is provided in Table 22.3. Metric (length, width, thickness, and weight), raw material, alteration, and typological data were acquired for all artifacts in the study.

All of the artifacts were assigned unique record numbers for the purpose of the analysis. The record numbers will be used in the remainder of the chapter when specific artifacts are referred to in the text or in figures (e.g., record number 2144). These numbers correspond to the artifact record numbers in Appendix E of this report which provides all of the data and notes recorded for the flaked stone artifacts in this study.

Before beginning the discussion of the results of the analysis of the Basketmaker II and Pueblo II period flaked stone assemblages, it would be useful to clarify how some of the measurements were taken and the nature of a few of the variables.

1. Following long-standing convention and procedures outlined by Inizan, Roche, and Tixier (1992), artifacts were oriented according to their debitage axis, cores with the major platform at the top and flakes (retouched or not) with the butt or bulb end down and dorsal surface facing up. For unifacial artifacts the left, right, proximal, and distal edges were assigned and observations were recorded according to this orientation.
2. Length, width, and thickness measurements were recorded for cores using the major platform axis for length, with width and thickness being measured at maximum points perpendicular to the length. For flakes and unifacial tools, length was measured along the morphological axis from the platform to the most distal edge of the flake, whether or not that point lay along the debitage axis. Width and thickness measurements were measured perpendicular to the length. Using the morphological axis for measuring length makes it possible (and it was often the case) for the length of a flake to be shorter than its width. This method for measuring the dimensions of flaked stone artifacts provides greater technological information than simply taking maximum measurements regardless of orientation.

Table 22.2. Artifact Classes and Types Identified During Analysis of the Basketmaker II and Pueblo II Period Flaked Stone Collections of Y Unit Draw.

Artifact Class	Artifact Type Within Class
Biface	Biface (complete) Biface fragment
Bifacially battered piece	None
Core	Amorphous core Dihedral core Discoidal core Multiple-platform core Core on flake Opposed-platform core Single-platform core Core fragment
Debitage	Primary reduction debitage Secondary reduction debitage Tertiary reduction debitage Bifacial thinning flake Bipolar flake
Debris	Chips and chunks
Denticulate	None
Hammerstone	None
Manuport	None
Other	Core front Core trimming flake Hammerstone fragment Potlid
Perforator	Perforator Graver
Projectile point	Corner-notched point Side-notched point Projectile point fragment Preform
Scraper	Endscraper Sidescraper Transverse sidescraper
Retouched piece	Other
Utilized piece	None

Table 22.3. Variables and Attributes Recorded for Flaked Stone Artifacts.

General Variables	Variables Recorded for Cores	Variables Recorded for Projectile Points
Length (cm)	Length (cm)	Length (cm)
Width (cm)	Width (cm)	Width (cm)
Thickness (cm)	Thickness (cm)	Thickness (cm)
Weight (g) ²	Weight (g) ²	Weight (g) ²
Percent cortex (%)	Percent cortex (%)	Percent cortex (%)
Exterior platform angle (degrees)	Alteration	Alteration
Interior platform angle (degrees)	Raw material	Raw material
Platform thickness (cm)	Raw material attribution	Raw material attribution
Blank profile	Artifact class	Artifact class
Blank termination	Artifact type	Artifact type
Blank shape	Core type	Position of retouch
Blank condition	Product	Type of retouch
Blank type	Number of platforms	Blade length (cm)
Alteration	Length of major platform axis (cm)	Base length (cm)
Raw material	Last platform angle (degrees)	Shoulder width (cm)
Raw material attribution	Platform type(s)	Minimum stem diameter (cm)
Platform	Initial block	Base width (cm)
Artifact class	Defects	
Artifact type		
Position of retouch		
Type of retouch		

Note: All metric variables were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

- Values for percent cortical coverage were estimated visually. Flügel (1982) noted that such semiquantitative methods, with or without the use of comparison charts, lead to values that correspond well with more quantitative methods. In this study, the estimation of cortical coverage on the dorsal surface of an artifact using frequency ranges (none, 1 to 5%, 5 to 25%, 25 to 50%, 50 to 75%, and over 75%) is essentially the same process and provides similarly consistent and reproducible results.
- The types of alteration recorded for this study include thermal alteration (oxidation, potlidding, crazing, calcining), patination, rolling, and edge damage (due to tool or machine action).
- Comparative geologic samples of two nonlocal raw materials, Zuni Yellow Spotted chert and Washington Pass chert, were provided to the analyst for the purpose of assigning raw material attributions to the flaked stone artifacts recovered during the project. Due the small size of the comparative collection, the raw material attributions given artifacts in this study are proposed only tentatively and may need to be reviewed pending future research.
- Finally, several technological attributes were recorded for flake platforms. These data provide insight into reduction stage, reduction intensity, and reduction technology (hard- versus soft-hammer reduction, for example). The platform types

and attributes documented are cortical, flat or unfacetted, single facet, multifacetted, ground or abraded, linear, punctiform, crushed, percussion marks, dorsal lipping, ventral lipping, and missing (broken or snapped).

The remainder of this section of the chapter will focus on the specific results of analyses conducted on the Basketmaker II and Pueblo II flaked stone assemblages. Table 22.4 provides frequencies and percentages, in total and by period, for the artifact classes recovered during the project. Table 22.5 provides summary metric data (length, width, thickness, and weight) by artifact class for the Basketmaker II and Pueblo II periods.

The Basketmaker II Flaked Stone Assemblage

A total of 2319 Basketmaker II period flaked stone artifacts and artifacts related to lithic reduction (hammerstones and manuports) were recovered from 5 of the 18 archaeological sites investigated during the project. These artifacts came from sites LA 26319, LA 115327, LA 26306, LA 115330, and LA 49838 with the bulk of the pieces (94.2%) coming from the single-component Basketmaker II residential site LA 115330.

The Basketmaker II occupations in Y Unit Draw have been interpreted (Chapter 28) as representing both cold- and warm-season residences (sites LA 115330 and LA 26306), an agricultural field (site LA 48695), and storage or resource processing loci (sites LA 115327, LA 26319, and possibly LA 115324). It appears likely that a significant portion of the Basketmaker II settlement system may, in fact, be represented by these sites. Chapter 28 also summarizes evidence that the presence of the agricultural field at site LA 48695 in conjunction with possible water control features may reflect more intensive agricultural practices than previously expected, increased reliance on agricultural products for subsistence, and, potentially, a concomitant decrease in residential mobility during the Basketmaker II period. What are the implications

of such organizational changes for the lithic technology of the Basketmaker II period? How might the raw material economy have been impacted by a decrease in residential mobility? How similar or different is the Basketmaker II flaked stone technology from the later Pueblo II period and what might those similarities or differences tell us about the timing or nature of the shift from hunting and gathering to an agricultural lifeway in the region?

The large, diverse Basketmaker II and Pueblo II flaked stone assemblages recovered from the sites in Y Unit Draw provide a rich opportunity to address these questions. Fourteen artifact classes are represented in the Basketmaker II collection (Table 22.4). They comprise the following (in decreasing order of representation): 1184 pieces of debris (51.0%), 990 pieces of debitage (42.7%), 43 cores (1.9%), 40 retouched pieces (1.7%), 16 bifaces or biface fragments (0.7%), 10 utilized pieces (0.4%), 9 projectile points or point fragments (0.4%), 8 hammerstones (0.3%), 5 perforators (0.2%), 5 manuports (0.2%), 3 scrapers (0.1%), 2 other (0.1%), 2 bifacially battered pieces (0.1%), and 2 denticulates (0.1%). The two artifacts classified as "other" consist of two core fronts. Illustrations of selected Basketmaker II flaked stone artifacts (a core, projectile points and preforms, perforators, a scraper, a denticulate, and a bifacially battered piece) are provided in Figures 22.1 through 22.3.

Six complete or partial projectile points are illustrated in Figure 22.1. The Basketmaker II projectile point assemblage from Y Unit Draw follows the pattern noted by Lekson in his 1997 study of Chaco Canyon projectile points, knives, and drills. Stemmed, corner-notched, and side-notched points are not restricted to specific time periods. Rather, all three types of projectile points are found in periods ranging from Basketmaker III to Pueblo III in Chaco Canyon. This also appears to be the case for the Basketmaker II period in Y Unit Draw. Corner-notched (Figure 22.1a and b), side-notched (Figure 22.1c and d), and stemmed (Figure 22.1e and f) projectile points or bifacial knives are represented in the collection. The two unifacial, stemmed projectile points (record

Table 22.4. Summary Counts and Percentages of Basketmaker II and Pueblo II Period Flaked Stone Artifacts by Artifact Class.

Artifact Class	Basketmaker II		Pueblo II		Total	
	n	%	n	%	n	%
Biface	16	0.7	7	0.7	23	0.7
Bifacially battered piece	2	0.1	1	0.1	3	0.1
Core	43	1.9	88	8.2	131	3.9
Debitage	990	42.7	435	40.4	1425	42.0
Debris	1184	51.1	447	41.5	1631	48.0
Denticulate	2	0.1	2	0.2	4	0.1
Hammerstone	8	0.3	17	1.6	25	0.7
Natural (manuport)	5	0.2	7	0.7	12	0.4
Other	2	0.1	8	0.7	10	0.3
Perforator	5	0.2	3	0.3	8	0.2
Projectile point	9	0.4	4	0.4	13	0.4
Retouched piece	40	1.7	36	3.3	76	2.2
Scraper	3	0.1	11	1.0	14	0.4
Utilized piece	10	0.4	10	0.9	20	0.6
Total	2319	100.0	1076	100.0	3395	100.0

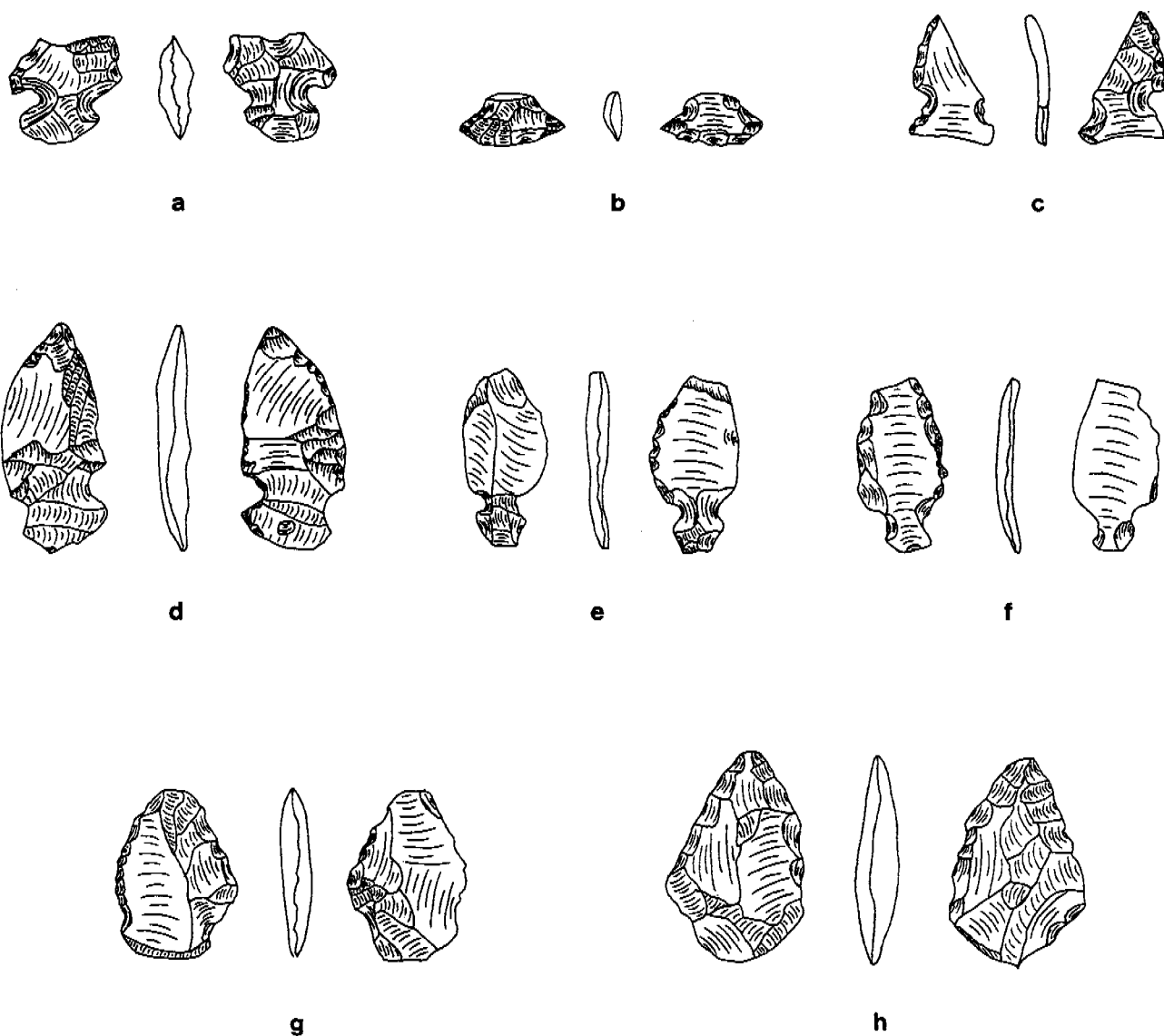
Table 22.5. Summary Metric Data for Basketmaker II and Pueblo II Period Flaked Stone Assemblages.

Summary statistic	Basketmaker II (n = 2319)				Pueblo II (n = 1076)				Total (n = 3395)			
	Length	Width	Thick.	Weight	Length	Width	Thick.	Weight ¹	Length	Width	Thick.	Weight ²
Mean	1.7	1.3	0.4	3.6	2.6	2.2	1.0	15.5	2.0	1.6	0.6	7.4
10% trimmed mean	1.5	1.1	0.3	0.4	2.5	2.0	0.8	5.01	1.8	1.4	0.4	1.3
Median	1.4	1.1	0.3	-	2.3	1.8	0.7	2.0	1.6	1.2	0.4	-
Standard Error	0.02	0.02	0.01	0.4	0.04	0.04	0.03	1.61	0.02	0.02	0.01	0.6
Standard Deviation	1.0	0.9	0.6	20.1	1.4	1.4	1.0	52.9	1.3	1.2	0.8	34.5
Minimum	0.3	0.2	-	-	0.5	0.3	0.1	-	0.3	0.2	-	-
Maximum	8.3	9.7	7.7	423.0	10.2	11.8	7.5	636.0	10.2	11.8	7.7	636.0
Range	8.0	9.5	7.7	423.0	9.7	11.5	7.4	636.0	9.9	11.6	7.7	636.0

Note: Length, width, and thickness measurements were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

¹Two missing cases for Pueblo II weight (n = 1075).

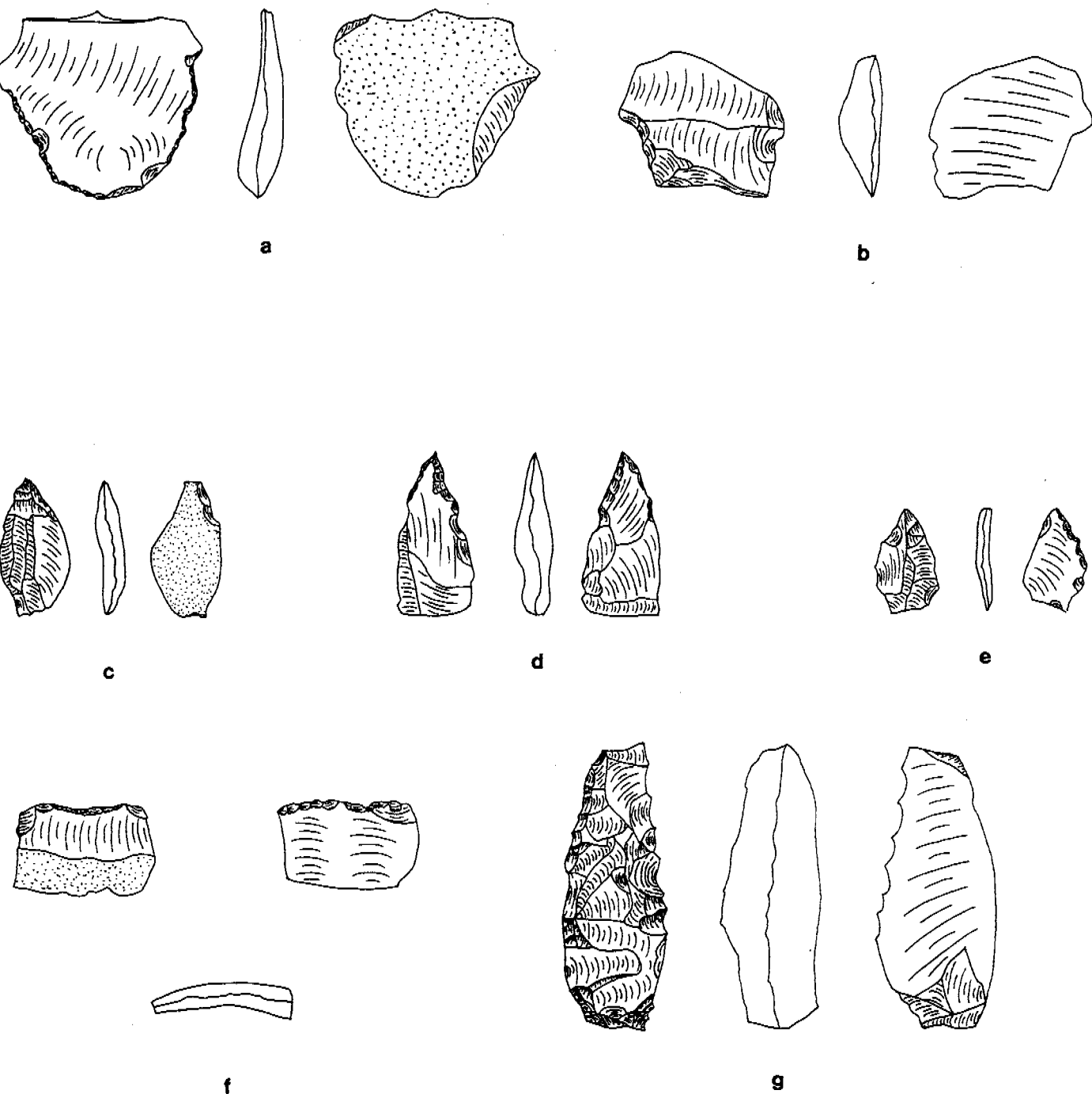
²Two missing cases for Total weight (n = 3395).



Actual Size

Figure 22.1. Selected Basketmaker II Flaked Stone Artifacts:

- (a) corner-notched projectile point, site LA 115330, record number 2443;
- (b) corner-notched projectile base, site LA 26306, record number 1255;
- (c) side-notched projectile point, site LA 115330, record number 2301;
- (d) side-notched projectile point or asymmetric knife, site LA 26306, record number 1258;
- (e) unifacial stemmed projectile point, site LA 115330, record number 3142;
- (f) unifacial stemmed projectile point, site LA 115330, record number 3159;
- (g) preform, site LA 115330, record number 1950;
- (h) preform, site LA 115330, record number 2867.



Actual Size

Figure 22.2. Selected Basketmaker II Flaked Stone Artifacts:

- (a) perforator, site LA 115330, record number 1639;
- (b) perforator, site LA 115330, record number 1604;
- (c) perforator, site LA 115330, record number 2101;
- (d) perforator, site LA 115330, record number 2956;
- (e) perforator, site LA 115330, record number 3614;
- (f) end scraper, site LA 115330, record number 1512;
- (g) denticulate, site LA 115330, record number 2153.

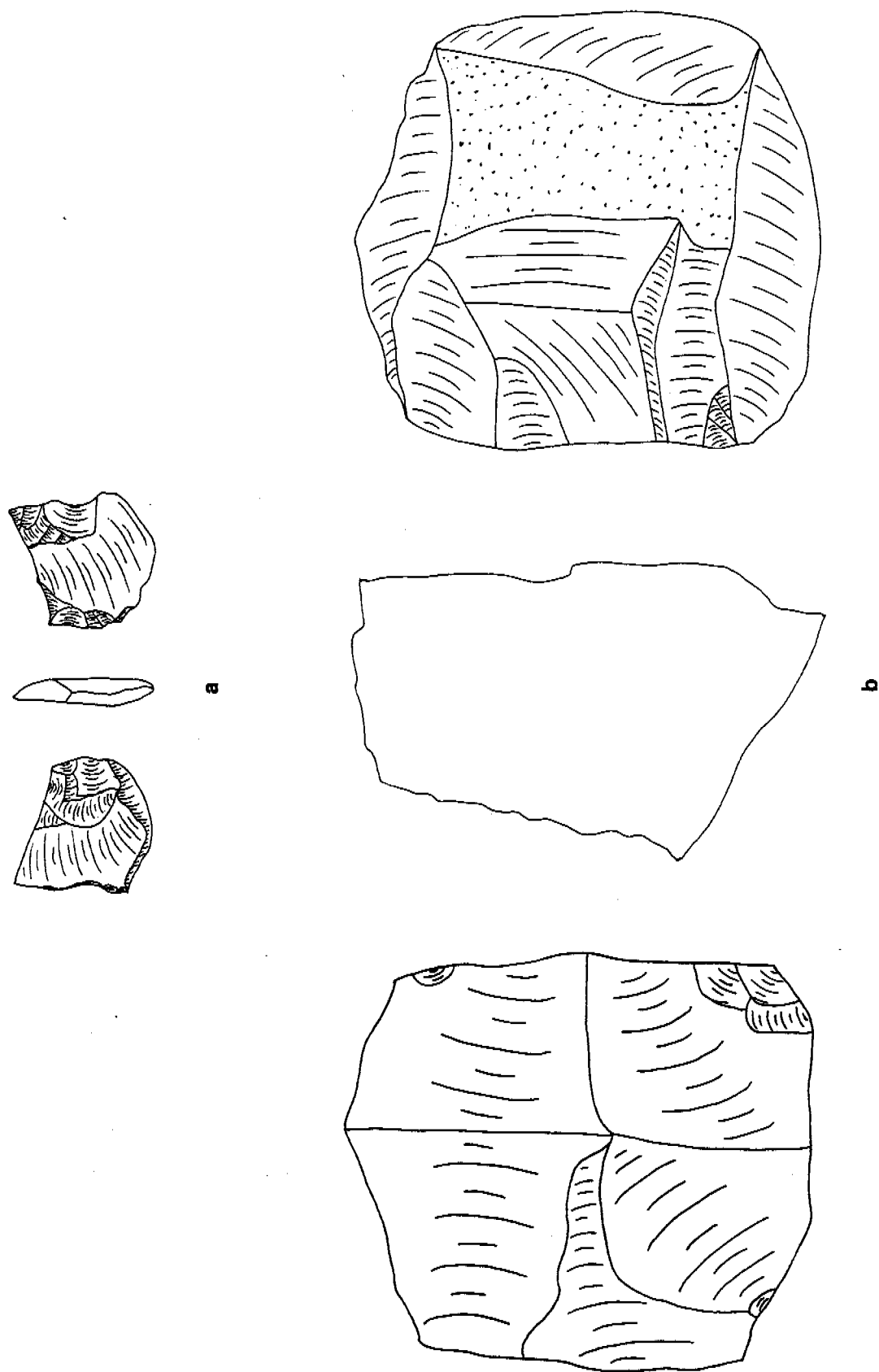


Figure 22.3. Selected Basketmaker II Flaked Stone Artifacts:
 (a) bifacially battered piece, site LA 115330, record number 1622;

numbers 3142 and 3159 respectively in Appendix E) are rather problematic in that they appear to be unique to the Basketmaker II occupation of site LA 115330. These points are described in detail in Chapter 12 of this report. The analyst was unable to find descriptions or illustrations of any similar point types in the available literature. The side-notched point (record number 1258) depicted in Figure 22.1d, is also unusual in that it is asymmetrical about its long axis. As noted in Chapter 11 of this report, this artifact may actually have functioned as an asymmetric, hafted knife similar to those documented by Lekson (1997:Figure 4.12A) in Chaco Canyon.

Significantly, only 19 (0.8%) of the 2319 Basketmaker II period artifacts can be considered formal tools (projectile points, perforators, scrapers, and denticulates). Sixty-one others, 2.6% of the collection, are classifiable as informal tools including the retouched, utilized, and bifacially battered pieces. Bifacially battered pieces are considered informal tools in this analysis because they are the product of use rather than intentional modification carried out to produce a desired form. Fully 95.9% of the collection (2225 pieces), however, are lithic reduction products (cores, debitage, and debris) or artifacts directly associated with flaked stone reduction such as hammerstones. The few bifaces and biface fragments can also be considered lithic reduction debris given that they represent unfinished formal tools either broken during manufacture or abandoned prior to completion (possibly due to material flaws or reduction errors). The dearth of bifaces in the collection (25 pieces including bifaces, biface fragments, projectile points, and projectile point fragments) stands in contrast to the past generalization noted by Vierra (1994) of Archaic period lithic technology's being primarily bifacial and later ceramic period technology's being unifacial and expedient. The 65 bifacial thinning flakes in the collection along with the above noted bifaces provide unequivocal evidence, however, that bifacing did take place during the Basketmaker II occupation. This patterning is consistent with that noted by Vierra (1994) which suggests the shift from curated, bifacial technology to more expedient, generally

unifacial technology appears to have begun at least as early as the Basketmaker II period rather than later during the ceramic periods characterized by sedentary village life and dependence on corn agriculture.

It is clear from the above data that lithic reduction not only was taking place during the Basketmaker II occupations, but also appears to have been a major activity—one performed largely at the residential sites (LA 115330 and LA 26306). Debitage analysis reveals that all stages of the reduction process are well represented in the collection. One hundred forty-one primary flakes, 687 secondary flakes, 97 tertiary retouch or trimming flakes, and 65 bifacial thinning flakes were identified during analysis. In this study primary flakes were defined as having 50 to 100% cortex and secondary flakes as having no cortex to 50% cortex. Tertiary (retouch or trimming) flakes are identified on the basis of platform and blank morphology. Figure 22.4 presents percent cortical coverage data for Basketmaker II and Pueblo II period debitage. It is worth noting at this point the contrast between the two periods. The Basketmaker II debitage, most having no or very little cortex, represents late reduction stage products while much of the Pueblo II debitage is cortical, early (primary) reduction products.

Platform data were obtained for 871 of the 990 pieces of debitage recovered in Basketmaker II contexts during the project. Table 22.6 shows that platform preparation (facetting and grinding or abrading) was relatively uncommon during the Basketmaker II period. Most of the platforms were cortical, unfacetted, or linear and were unmodified. Evidence for use of hard-hammer percussion during lithic reduction is relatively minor given the low incidence of percussion marks on platforms, dorsal lipping, punctiform platforms, or crushing. This pattern likely reflects the fact that primary reduction was a relatively minor component of the lithic reduction activities which took place at the Basketmaker II sites in the study. Primary reduction could also have occurred off-site or at loci within the sites which were not sampled during the project. The more common occurrence of linear platforms (some with ventral

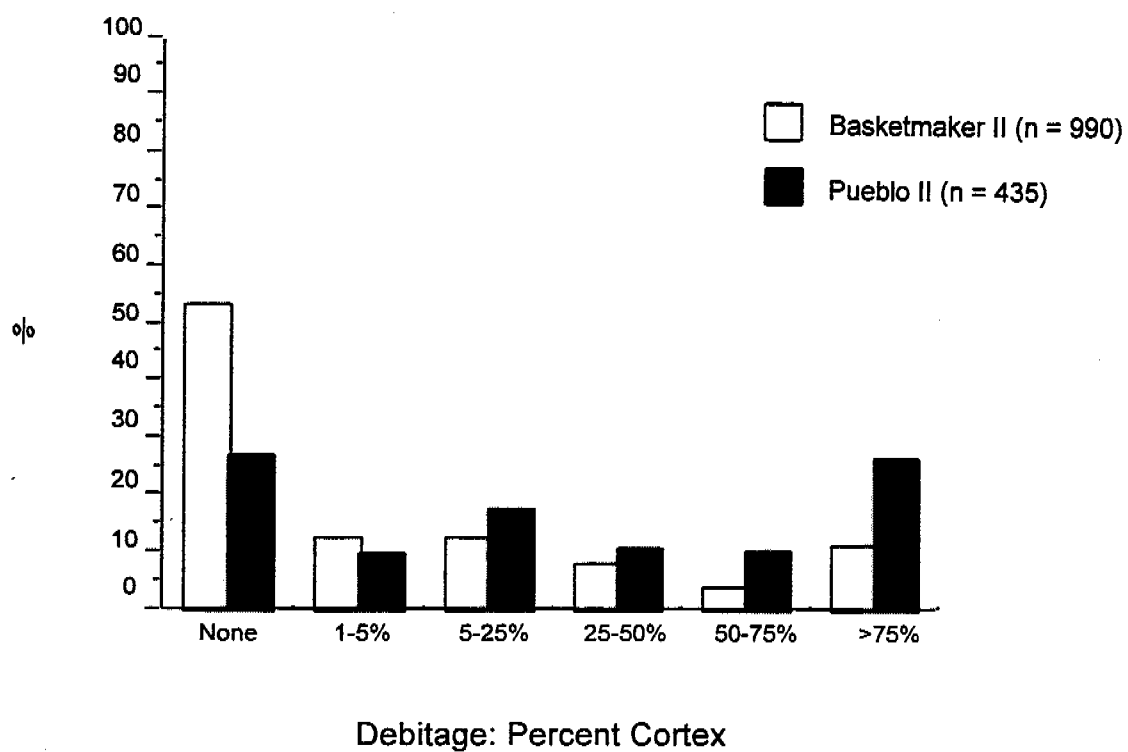


Figure 22.4. Percent Cortical Coverage of Basketmaker II and Pueblo II Debitage.

Table 22.6. Platform Data for Basketmaker II and Pueblo II Period Debitage.

Platform Type or Property	Basketmaker II (n = 871)		Pueblo II (n = 382)	
	Frequency*	%	Frequency*	%
Cortical	214	20.8	143	28.7
Flat or unfacetted	172	16.7	102	20.4
Single facet	40	3.9	19	3.8
Multiple facets	64	6.2	23	4.6
Ground or abraded	70	6.8	24	4.8
Linear	282	27.4	70	14.0
Punctiform	51	5.0	43	8.6
Crushed	73	7.1	26	5.1
Ventral lipping	25	2.4	10	2.0
Dorsal lipping	2	0.2	6	1.2
Percussion marks	37	3.5	33	6.6

*Frequencies reflect occurrences of platform types or properties. Any single platform may contain one or more of the above (e.g., unfacetted platform with percussion marks).

lipping) in the assemblage likely reflects the use of soft-hammer techniques during secondary reduction and tool manufacture and upkeep.

The large number of secondary, tertiary, and bifacial thinning flakes in this collection suggests tool production and maintenance was an important activity during the Basketmaker II occupation. The relatively small number of formal and informal tools found indicates that tool use may have occurred at loci outside the project area, or it occurred in unsampled parts of the sites investigated during the project. If the first case is true, then a significant element of the Basketmaker II settlement system, possibly a residential but more likely a logistical component or components, may not be represented among the sites in Y Unit Draw.

Seven core types were represented in the Basketmaker II core assemblage (in decreasing

order of representation): 19 (44.1%) single-platform cores, 7 (16.3%) multiple-platform cores, 6 (14.0%) cores on flakes, 5 (11.6%) amorphous cores, 3 (7.0%) opposed-platform cores (Figure 22.3b, for example), 2 (4.7%) discoidal cores, and 1 (2.3%) dihedral core. All 43 of the cores in this collection contain hinge fractures, multiple hinge fractures, material flaws, and/or crushed platforms. Any or all of these flaws may have led to the ultimate abandonment of the artifacts.

The majority of the cores, 33 (76.7%), have cortical platforms. Only five cores (11.6%) have prepared (facetted or multifaceted) platforms while 17 (39.5%) are unmodified or flat. Thirty (69.7%) of the cores are chert, 10 (23.3%) are quartzite, and only 3 (7.0%) are silicified wood. Basketmaker II cores are relatively small (Table 22.7) with a mean weight of 84.3 g (10% trimmed mean of 68.7 g), a median weight of 59.0 g, a

Table 22.7. Debitage-to-Tool Ratios for the Basketmaker II and Pueblo II Periods.

	Basketmaker II	Pueblo II
Debitage to Formal Tools	52.1	21.8
Debitage to Informal Tools	16.2	9.3
Debitage to Tool*	12.4	6.5

*Includes both formal and informal tools.

maximum of 423.0 g, and a minimum of 7.0 g. Over 80% of the cores have greater than 50% cortical coverage (Figure 22.5). In combination, the simple core types, small core size, dominance of cortical platforms, lack of platform preparation, and heavy cortical coverage all suggest a nonintensive, expedient core reduction strategy during the Basketmaker II period. The Pueblo II period cores show much the same pattern.

The Basketmaker II flaked stone assemblage is overwhelmingly dominated by chert (Figure 22.6). Chert comprises 92.8% of the collection. Quartzite (4.2%), silicified wood (2.5%), quartz (0.3%), and obsidian (<0.1%) are also represented. The two obsidian artifacts in the collection were recovered from site LA 115330 (Chapter 12, this volume). One is a secondary flake and the other is a tertiary retouch or trimming flake. Both pieces are quite small weighing less than 1 g each. Beyond these two obsidian artifacts, other nonlocal raw materials, specifically Zuni Yellow Spotted chert, are barely represented in this assemblage. Only eight pieces of Zuni Yellow Spotted chert (0.3%) were identified in the collection. Four of these artifacts aredebitage and four are debris.

Of the 2319 Basketmaker II flaked stone artifacts, only 43 (1.9%) show any evidence of thermal alteration (oxidation, potlidding, crazing, or calcining). There is no evidence for intentional thermal alteration, heat-treatment, of lithic raw materials during the Basketmaker II period in Y Unit Draw. Other processes such as inadvertent burning of the materials (i.e., flakes falling during reduction into or near a fire), exposure to grass or shrub fires after abandonment either on the surface or in near-surface contexts, and root burns can account for the presence of thermally altered flaked stone artifacts in the assemblage.

The Pueblo II Flaked Stone Assemblage

A total of 1076 flaked stone artifacts were recovered from the Pueblo II period components of 12 sites in Y Unit Draw (Table 22.1). Seven hundred thirty-seven (68.5%) of these artifacts were recovered from just two of these sites, LA

26306 and LA 49838. Fourteen artifact classes are represented in the Pueblo II assemblage (in decreasing order of representation): debris (41.5%),debitage (40.4%), core (8.2%), retouched piece (3.4%), hammerstone (1.6%), scraper (1.0%), utilized piece (0.9%), other (0.7%), biface (0.7%), manuport (0.7%), projectile point (0.4%), perforator (0.3%), denticulate (0.2%), and bifacially battered piece (0.1%). Eight artifacts were classified as "other" in the Pueblo II assemblage. Three of the artifacts are core trimming flakes, four are potlids, and one is a hammerstone fragment. Illustrations of a variety of Pueblo II flaked stone artifacts are provided in Figures 22.7 through 22.11.

The Pueblo II lithic assemblage is equally as diverse as that of the Basketmaker II period in terms of the artifact classes represented. Like the Basketmaker II collection, the Pueblo II assemblage is also dominated by lithic reduction products (cores,debitage, and debris) which comprise 90.1% of the assemblage. When artifacts related to lithic reduction are included (i.e., hammerstones and manuports), that proportion increases to 92.3%.

Formal tools make up a very small part of the total Pueblo II assemblage, a pattern also noted by Cameron (1997) in the Pueblo period collections from Chaco Canyon. Only 20 formal tools (1.9% of the assemblage) are present in the collection. Informal tools (bifacially battered pieces, retouched pieces, and utilized pieces) are more than twice as abundant in the collection than formal tools. A total of 47 informal tools (4.4%) were recovered from Pueblo II contexts in Y Unit Draw. This pattern is remarkably similar in kind but perhaps not in degree to that seen during the earlier Basketmaker II period. While still only minor components of the overall lithic assemblages and remarkably similar in frequency, the total of formal and informal tools are *proportionally* almost two times more abundant in the Pueblo II collection than in the Basketmaker II collection (Table 22.4). Because the same formal and informal tool classes are present in both collections and they represent such very small percentages of those collections, it is

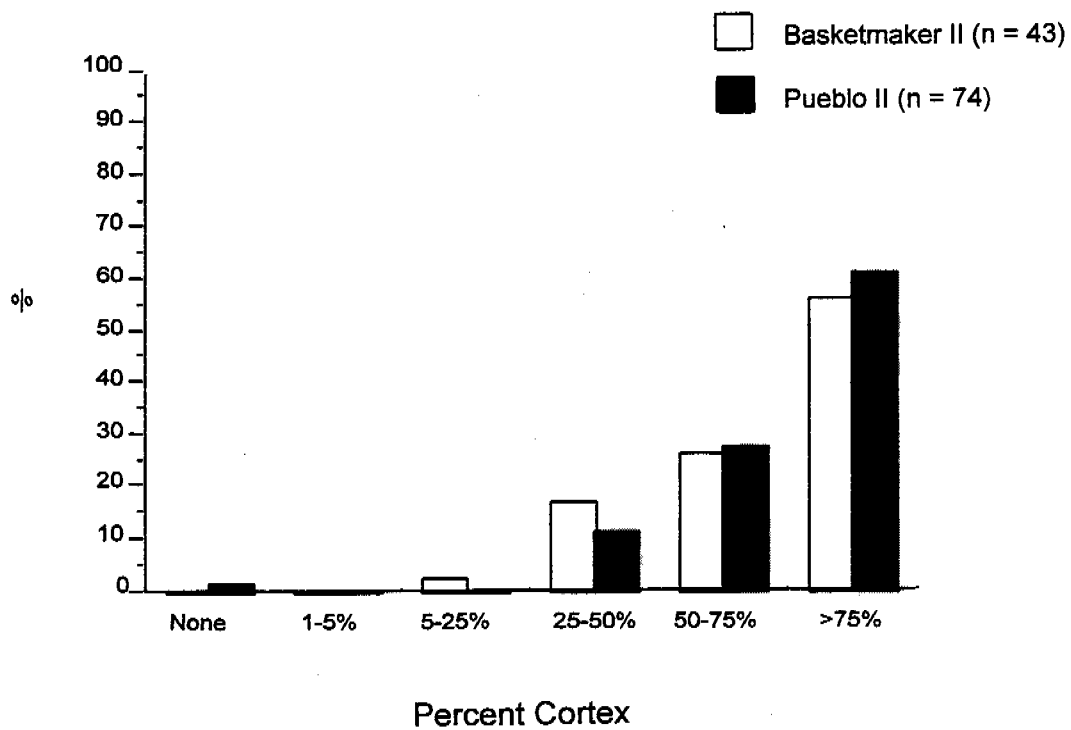


Figure 22.5. Percent Cortical Coverage of Complete Basketmaker II and Pueblo II Cores.

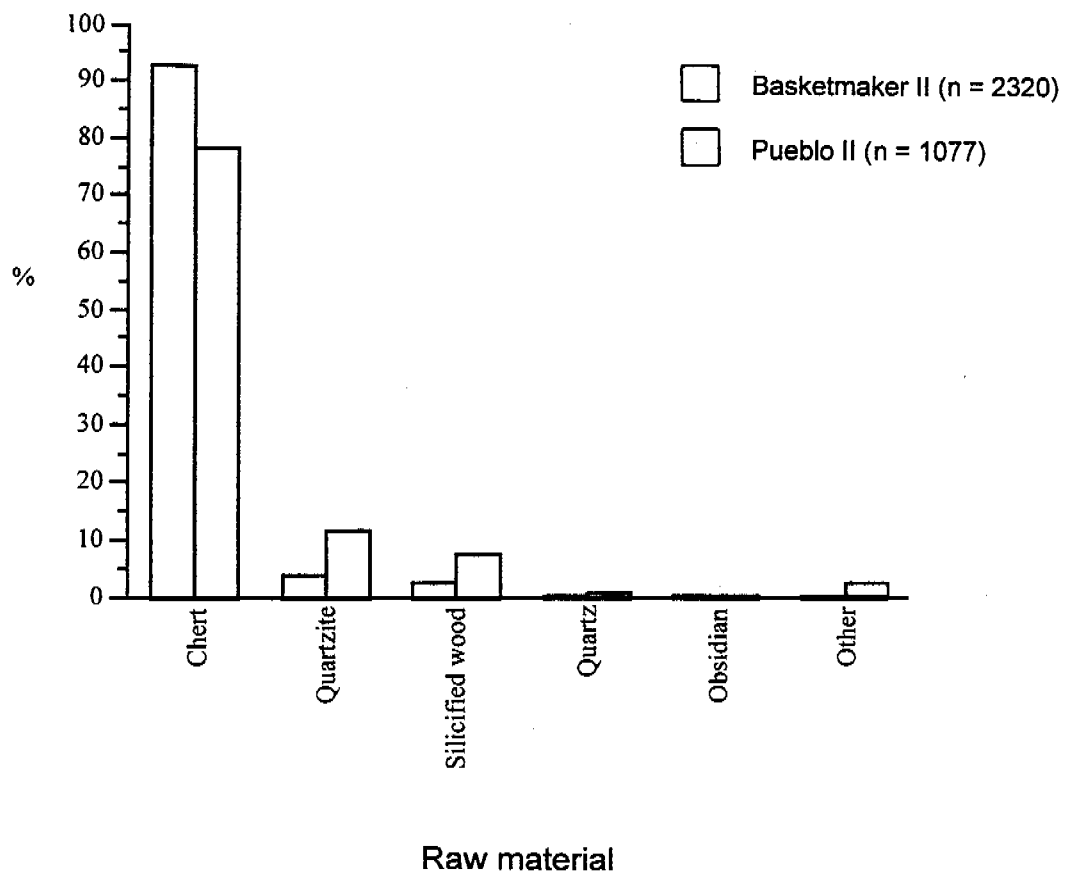


Figure 22.6. Raw Material Composition of Basketmaker II and Pueblo II Flaked Stone Artifacts.

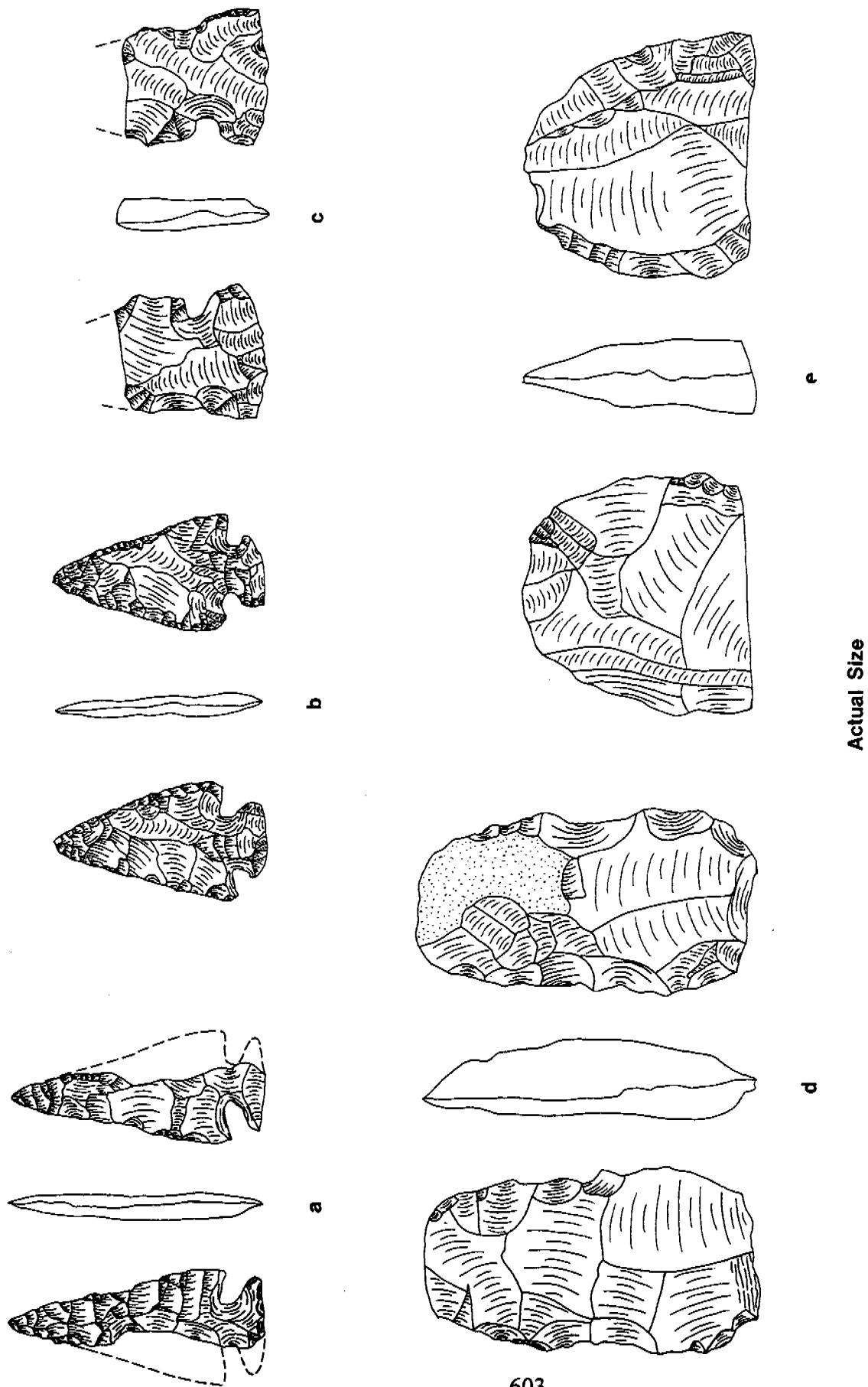
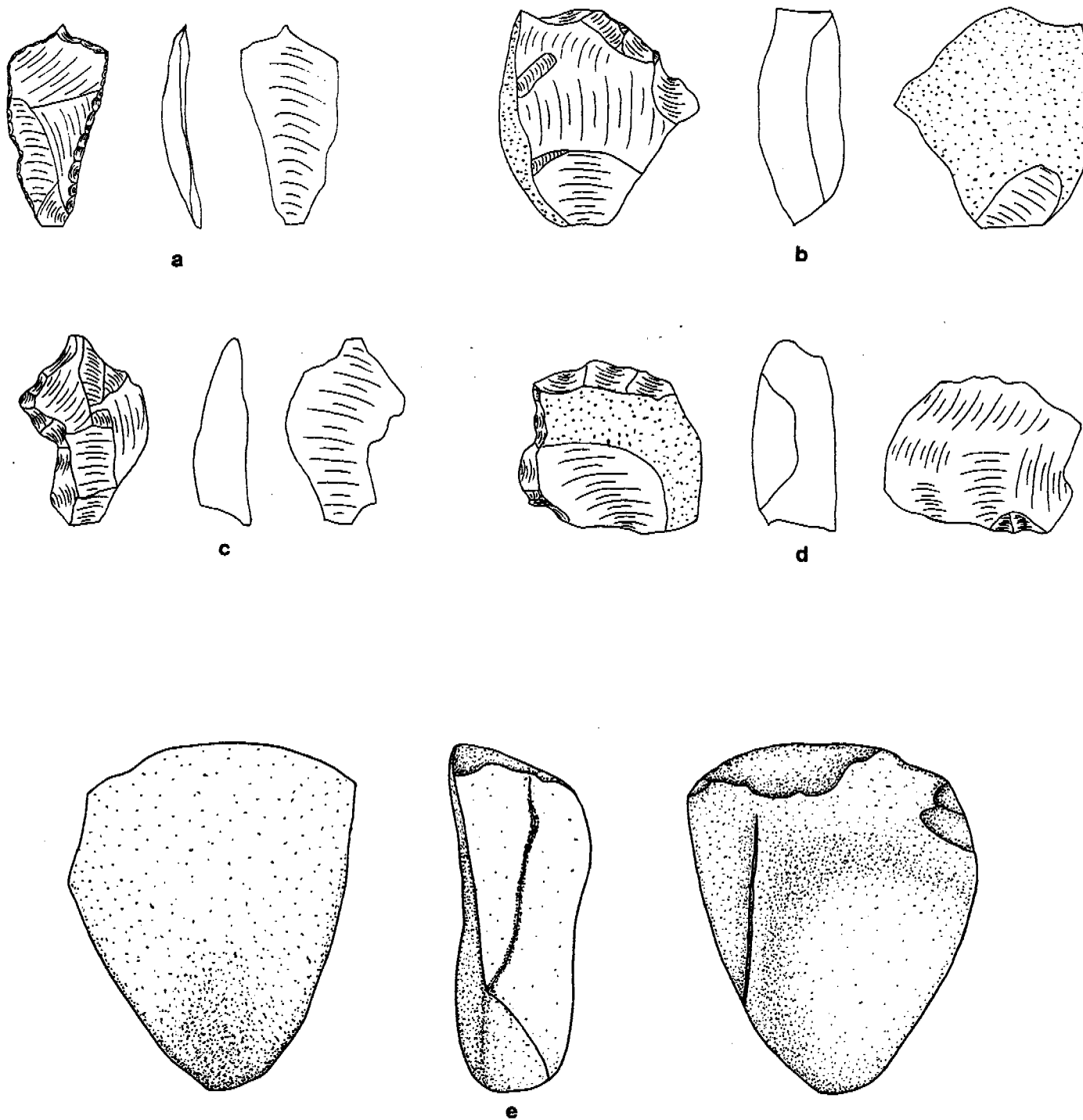
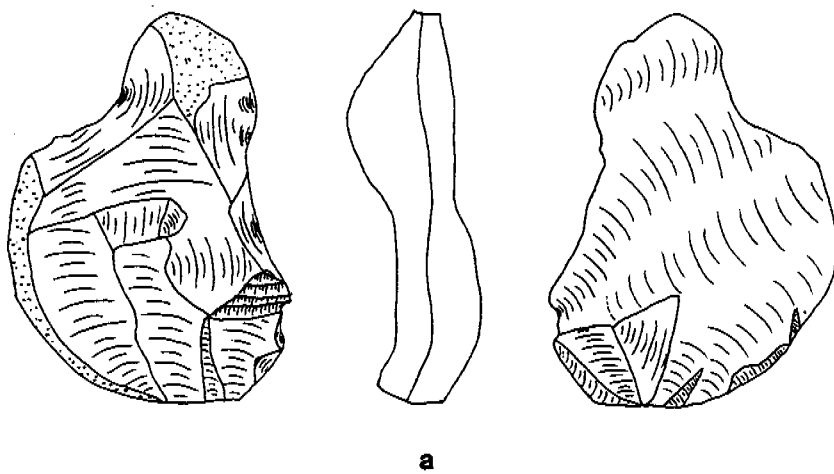


Figure 22.7. Selected Pueblo II Flaked Stone Artifacts:
 (a) corner-notched projectile point, site LA 26306, record number 1256;
 (b) corner-notched projectile point, site LA 26306, record number 1414;
 (c) side-notched projectile point base, site LA 26308, record number 1491;
 (d) biface, site LA 26306, record number 1413;
 (e) biface fragment, site LA 49838, record number 278.



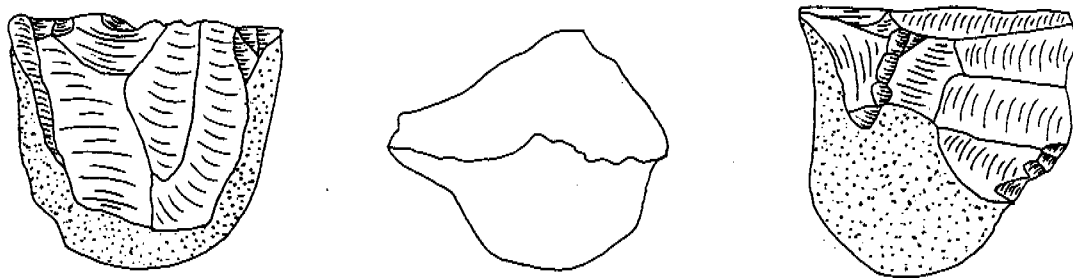
Actual Size

Figure 22.8. Selected Pueblo II Flaked Stone Artifacts:
 (a) graver, site LA 49838, record number 383;
 (b) perforator, site LA 49838, record number 308;
 (c) perforator, site LA 49838, record number 220;
 (d) end scraper, site LA 26306, record number 930;
 (e) end scraper, site LA 49838, record number 346.

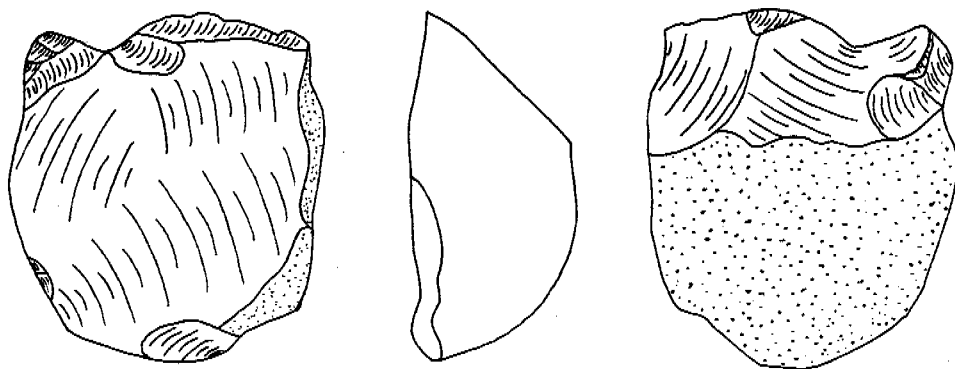


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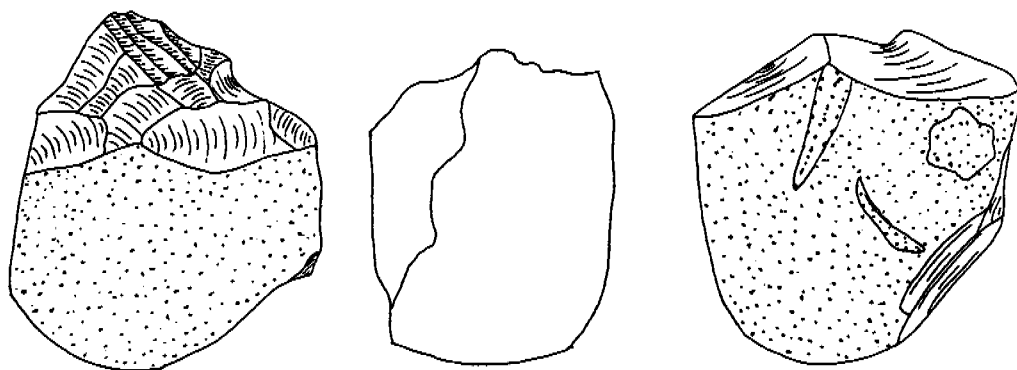
Figure 22.9. Site LA 49838, Pueblo II Endscraper (Record Number 396).



a



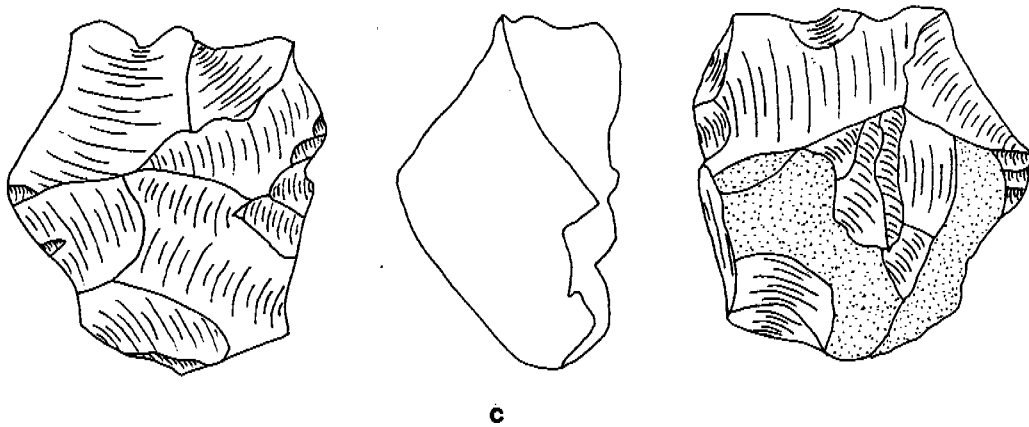
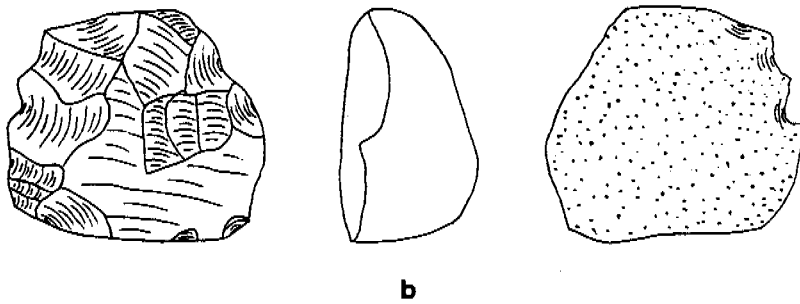
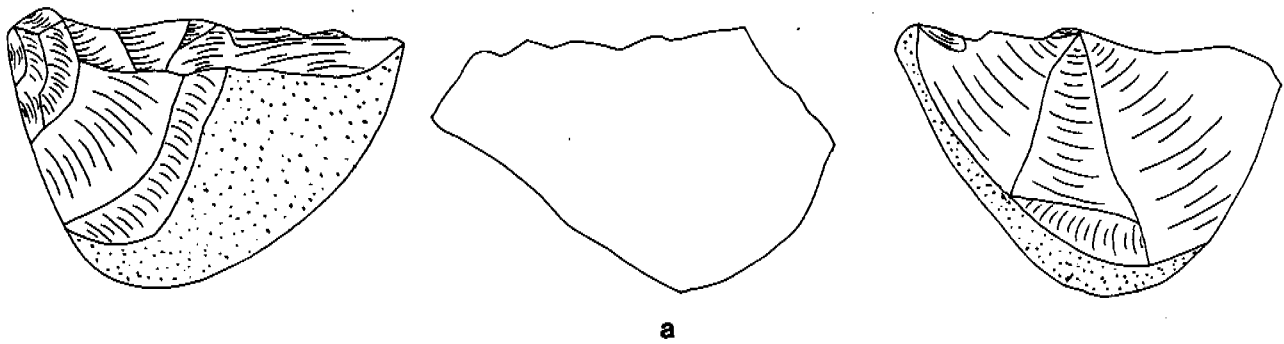
b



c

Actual Size

Figure 22.10. Selected Pueblo II Single-Platform Cores.



Actual Size

Figure 22.11. Selected Pueblo II Cores:
 (a) multiplatform core, site LA 49838, record number 448;
 (b) discoidal core, site LA 26306, record number 1036;
 (c) discoidal core, site LA 26306, record number 1191.

unlikely that this difference is significant in any technological or adaptive sense. As shown in Table 22.7 which provides debitage-to-tool ratios for both the Basketmaker II and Pueblo II periods, this pattern more likely reflects the fact that considerably more lithic reduction occurred at the Y Unit Draw sites during the Basketmaker II period than during the Pueblo II period.

Bifaces, biface fragments, and projectile points are poorly represented in the Pueblo II assemblage (Table 22.4). Interestingly, the Basketmaker II and Pueblo II periods have *exactly* the same low proportion of these artifacts in their lithic assemblages (0.7% bifaces or biface fragments and 0.4% projectile points, point fragments, and preforms). The three Pueblo II projectile points and point fragments illustrated in (Figure 22.7a through c) show that both corner-notched and side-notched projectile points were produced and used during this period. Lekson (1997) observed the same pattern in the Pueblo II projectile point assemblages from Chaco Canyon. In Lekson's study, 13% of the Pueblo II period projectile points were stemmed, 49.3% were corner notched, and 37.7% were side notched (Lekson 1997:665, Table 4.3). The trends in Lekson's data acquired from 400 well-dated points recovered from Chaco Canyon suggest a shift from stemmed points, more common during the Basketmaker III to Pueblo I periods, to side-notched points which come to dominate (79.4%) the Pueblo III period collections. All three point forms are represented over the entire span from Basketmaker III through Pueblo III.

A total of 435 pieces of debitage were recovered in Pueblo II contexts: 163 (37.5%) primary flakes, 237 (54.5%) secondary flakes, 15 (3.5%) tertiary retouch or trimming flakes, 18 (4.1%) bifacial thinning flakes, and 2 (0.5%) bipolar flakes. As Figure 22.4 shows, the Pueblo II period debitage consists of more early stage reduction products (cortical and subcortical flakes) than the Basketmaker II debitage. The presence of reduction products from all stages indicates lithic reduction, tool production and maintenance, and bifacing occurred during the Pueblo II occupation of Y Unit Draw. However,

the paucity of tertiary flakes and bifacial thinning flakes, particularly when compared with the Basketmaker II assemblage, suggests tool production and maintenance was a minor component of the activities which occurred during the Pueblo II period in the draw. This is consistent with the low frequency of formal tools in the Pueblo II collection noted above. Retouched pieces, however, are better represented in the collection. Although expedient tools, their production and maintenance should have contributed to the tertiary flakes in the assemblage.

Platform data were obtained for 382 of the 435 pieces of debitage in the collection. Table 22.6 reveals that platform preparation occurred on roughly 13% of the platforms. This compares with about 17% in the Basketmaker II debitage. From the Basketmaker II to the Pueblo II periods, there was a slight decrease in platform preparation during reduction. The incidence of percussion marks on debitage platforms in the Pueblo II period assemblage is roughly double that of the Basketmaker II period suggesting hard-hammer, direct percussion was more commonly employed for lithic reduction during the Pueblo II period. This observation is not overly surprising given the abundance of early stage reduction products in the collection. Primary, particularly core testing and initial reduction, and early secondary reduction are more likely to have been conducted using hard-hammer techniques whereas bifacing or tool production and maintenance would require combinations of hard- and soft-hammer techniques and, potentially, pressure flaking.

Seventy-four complete cores were recovered from the Pueblo II components in Y Unit Draw. Six types of cores are represented in the collection (in decreasing order of abundance): 47 (63.5%) single-platform cores, 10 (13.5%) multiple-platform cores, 6 (8.1%) cores on flakes, 4 (5.4%) discoidal cores, 4 (5.4%) amorphous cores, and 3 (4.1%) opposed-platform cores. Examples of Pueblo II single-platform, multiplatform, and discoidal cores are illustrated in Figures 22.10 and 22.11. Fifty-three (71.6%) of the cores in this

assemblage contain either material flaws or evidence of reduction errors (e.g., hinge fractures or crushed platforms).

Only 12 of the 74 complete cores (16.2%) contain any platform preparation. Six have faceted platforms and six have multifaceted platforms. Fifty-three of the cores (71.6%) have cortical platforms and 19 (25.7%) also contain flat or unfaceted platforms. Proportionally, more of the Pueblo II cores show evidence of platform preparation than the Basketmaker II period cores. As Table 22.8 reveals, the Pueblo II cores are slightly smaller than the Basketmaker II cores. Their 10% trimmed mean weight is 58.0 g compared to 68.7 g for the Basketmaker II period.

Since the percent cortical coverage of Pueblo II cores is generally high (Figure 22.5), the cores were not heavily reduced and, therefore, provide a good proxy of the size of the raw materials selected for reduction. The original package size of the raw materials selected for reduction was generally small, averaging about 4.5 cm in diameter. Like the Basketmaker II core assemblage, the Pueblo II cores are simple (generally one or two platforms), small, show little platform preparation, have high cortical coverage, and commonly have cortical platforms—all suggesting a nonintensive, expedient core reduction strategy.

The Pueblo II flaked stone assemblage is dominated by chert (Figure 22.6). Chert comprises 78.6% of the collection. Non-chert raw materials play a more important role in the Pueblo II raw material economy than that of the Basketmaker II period. Thirteen percent of the Pueblo II collection is quartzite, 7.5% is silicified wood, 0.7% is quartz, and 0.2% is obsidian. Nonlocal raw materials, particularly Zuni Yellow Spotted chert, are well represented in the Pueblo II collection. Fifty-two pieces of Zuni Yellow Spotted chert (4.8 %) were identified in the assemblage including cores, debitage, debris, scrapers, a retouched piece, and a manuport. Three possible pieces of Washington Pass chert (debitage and debris, 0.3%) were also found. This is the same pattern Vierra (1994) recognized in

his study of four sites in the Upper Puerco River and Wide Ruin areas. Vierra (1994:416) noted "...a general decrease in the use of cherts through time, with a subsequent increase in the use of silicified wood and nonlocal materials."

Seventy-six (7.1%) flaked stone artifacts in the Pueblo II assemblage contain evidence of thermal alteration. Roughly 84% of the thermally altered artifacts (64) were damaged due to their exposure to heat or fire. These pieces are pottlidded, crazed, or even calcined. The remainder of the thermally altered pieces are oxidized. Based on the flaked stone assemblage, there is no evidence for the controlled thermal alteration, heat-treatment, of lithic raw materials during the Pueblo II period in Y Unit Draw.

Comparing Basketmaker II and Pueblo II Lithic Technology

In the broadest sense, the Basketmaker II and Pueblo II flaked stone assemblages were found to be remarkably similar in terms of their technology. Dramatic differences in reduction strategies, intensity of reduction, and assemblage diversity were simply not found. The differences that were documented tended to be subtle and generally matters of scale or degree.

The Basketmaker II assemblage is larger than the Pueblo II assemblage, yet both are equally diverse in terms of the artifact classes present in the collections. While both assemblages contain debitage representing all reduction stages and evidence of bifacing and tool production and maintenance, they also contain far fewer tools than would be expected for sites representing the major portion of fully sedentary settlement systems. Less than 20% of the debitage from both periods contain evidence of platform preparation. Similarly, the core assemblages show little evidence of platform preparation. About 16% of the Pueblo II and 11% of the Basketmaker II cores have prepared platforms. Over 70% of the total 131 complete cores from both periods have cortical platforms (76.7% of the Basketmaker II cores and 71.6% of the Pueblo II cores), and another 20% have flat or unfaceted platforms.

Table 22.8. Summary Statistics for Basketmaker II and Pueblo II Period Complete Core Weights.

Summary Statistic	Basketmaker II (n = 43)	Pueblo II (n = 74)
	Weight (gm)*	Weight (gm)*
Mean	84.3	77.7
10% trimmed mean	68.7	58.0
Median	59.0	50.0
Standard error	12.6	11.1
Standard deviation	82.7	95.6
Minimum	7.0	5.0
Maximum	423.0	604.0
Range	416.0	599.0

*Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

What, then, can be said concerning technological differences between the two periods? The Basketmaker II period appears to have been characterized by more *intensive* reduction than the following period. This is evident from the dominance of non-cortical and subcortical flakes in the Basketmaker II debitage assemblage and, in contrast, by the greater representation of cortical and early stage subcortical flakes in the Pueblo II collection. During the Pueblo II period, this relatively lower-intensity reduction was also reflected in the core assemblage which contained a significantly higher proportion of simple (single- or two-platform) cores than the Basketmaker II collection. These cores are also slightly smaller than the Basketmaker II cores—more similar in weight to the pebbles and cobbles available in the immediate vicinity of the sites in Y Unit Draw (as discussed under Raw Material Economy below).

Debitage platform morphology and attribute evidence suggests soft-hammer, direct percussion technology may have been more commonly employed during the Basketmaker II period and hard-hammer percussion during the later Pueblo II period. This would be consistent with bifacial reduction being more common during the Basketmaker II period as reflected by the relative abundance of bifacial thinning flakes in the collection. Soft-hammer percussion would be the preferred technique during the later stages of bifacial preform production and finishing. As

noted earlier, bifacial reduction was still only a minor component of the lithic reduction activities at Basketmaker II sites in the study.

The overall lithic reduction strategies of both periods can be characterized as expedient. The clearest and most significant differences between the two periods lie in the realm of raw material economy. Chert dominates the Basketmaker II flaked stone assemblage. Chert exploitation decreases during the Pueblo II period as non-chert raw materials, particularly silicified wood and quartzite, play an increasing role in the economy. The Pueblo II period also sees a dramatic increase in the representation of nonlocal Zuni Yellow Spotted chert over that seen during the Basketmaker II.

RAW MATERIAL ECONOMY

Geologic Context and Raw Materials

The project area lies within the Gallup-Zuni Basin between the Zuni Mountains and Nutria monocline to the north and east and the Galetina monocline to the south and west (Anderson et al. 1989). Geologically very complex, this region is defined by Jurassic age strata which dip off the uplifts to the east and west forming the two long hogbacks of the Nutria and Galetina (formerly Defiance) monoclines (Anderson et al. 1989; Saucier 1967). Saucier (1967) noted that exposures of Jurassic rocks are present in the

region, but are generally limited to outcrops located along the monoclines and to those located on the northern flank of the Zuni uplift.

South of the project area and just east of Dowa Yalanne are exposures of Middle Jurassic sandstones (Chamberlin et al. 1989). The stratigraphic sequence at this locality consists of the Rock Point Member (a fine-grained silty sandstone) of the Chinle Formation at the base, overlain by 152 m (500 ft) of the massive, crossbedded Zuni Sandstone, and topped by the Cretaceous age Dakota Sandstone (Chamberlin et al. 1989). Chamberlin et al. (1989:45) noted: "In the Zuni area and southward, chert and quartzite conglomeratic beds at several levels within the Zuni Sandstone suggest a source of coarse clastics to the south and west during Middle Jurassic time." Chert- and quartzite-bearing conglomeratic beds up to 11.8 m (6 ft) thick are documented in the Zuni Sandstone in the area (Chamberlin et al. 1989).

Since the Zuni Sandstone thins toward the west and southwest, it is likely that other conglomeratic outcrops could occur further north toward the State Highway 602 project area. Anderson et al. documented a rather spectacular example of such an outcrop roughly 17.5 km (11 mi) northeast of the project area:

The interesting feature of the Jurassic section here is the 20-ft-thick chert- and quartzite-pebble conglomerate at the base. It forms a mini-hogback, 0.2 mi NE of the stop locality and may be examined on the walk to the second part of the stop. We refer to the facies here informally as the Nutria conglomerate bed of the Zuni Ss. Conglomerates similar to this have been noted in Jurassic Ss at other localities... [Anderson et al. 1989:58].

This secondary chert and quartzite source as well as that noted above located near Dowa Yalanne provide evidence of locally available point

sources of raw materials suitable for flaked stone reduction.

Kendrick (Chapter 2) noted that chert, silicified wood, and quartzite "cobbles" are present in the alluvial deposits located within Y Unit Draw. These materials would have been immediately available for reduction by the inhabitants of Y Unit Draw. It is likely that pebble conglomerates similar to those documented above for the Zuni Sandstone but located north and east of the draw served as sources for the materials present in the alluvial deposits within the draw.

Sources for the two nonlocal cherts identified in the Basketmaker II and Pueblo II flaked stone assemblages in this study, Zuni Yellow Spotted chert and Washington Pass chert, are respectively located in the Zuni Mountains northeast of the project area and in the Narbona Pass (formerly Washington Pass) in the Chuska Mountains on the western margin of the San Juan Basin (Cameron 1997).

There are no known sources of obsidian in the immediate region surrounding the project area. The four obsidian artifacts recovered during this project were considered nonlocal raw materials during analysis.

During surface survey and excavation of the Y Unit Draw sites, 210 naturally occurring chert, quartzite, and silicified wood pebbles and cobbles were recovered and sent to the analyst. While not a systematic raw material survey, the collected pebbles and cobbles provide a sample of the available raw materials present within the alluvial deposits of the draw itself. Figure 22.12 provides boxplots of the weights of these natural rocks by raw material. The mean weight for the entire collection is 45.4 g (10% trimmed mean 24.9 g, maximum 739.0 g); for the chert pieces 31.2 g (10% trimmed mean 15.4 g, maximum 739.0 g); for the quartzite 85.5 g (10% trimmed mean 64.8 g, maximum 553.0 g); and for the silicified wood 72.9 g (10% trimmed mean 48.9g, maximum 713.0 g). These data will be used below to compare with artifact weights from the Basketmaker II and Pueblo II periods.

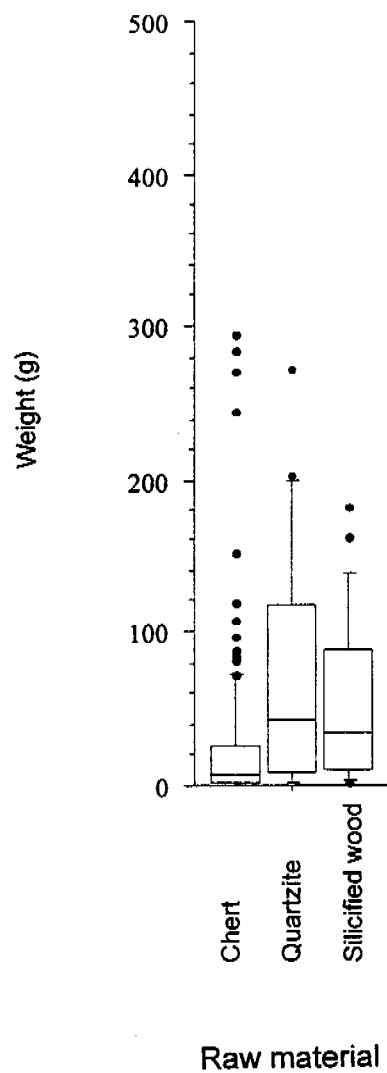


Figure 22.12. Boxplot of Natural Pebble and Cobble Weights by Raw Material.

Comparing Basketmaker II and Pueblo II Raw Material Economies

Details of the raw material composition of the Basketmaker II and Pueblo II collections have been provided above. This section is intended to provide a comparison of the two collections and an exploration of trends or changes in flaked stone raw material economy between the two periods. As shown in Figure 22.6, chert clearly dominates both collections. This figure also reveals one of the few significant differences seen between the Basketmaker II and Pueblo II periods. Non-chert raw materials, quartzite and silicified wood, play a much more important role in the Pueblo II lithic raw material economy.

Besides hammerstones, which are almost universally quartzite in both assemblages, the non-chert raw materials do not appear as formal tools (these are all chert); they sometimes appear as informal tools (3 or 30% of the Pueblo II utilized flakes), and they are primarily represented in the artifact classes associated with lithic reduction (cores, debitage, and debris) during both periods. As both Vierra (1994) and Cameron (1997) note for the Pueblo II period, non-chert raw materials appear to be selected for reduction and utilized on an expedient basis. Flakes are removed from cores for the purpose of acquiring fresh, sharp edges for use in activities rather than for producing blanks for further reduction and modification into formal tools.

Figures 22.13 and 22.14 provide boxplots of artifact weights by artifact class (including all raw materials) for the Basketmaker II and Pueblo II periods respectively. When compared to the boxplots of the naturally occurring pebbles and cobbles found in the Y Unit Draw (Figure 22.12), several patterns are apparent. First, both the median Basketmaker II and Pueblo II core weights fall within one standard deviation of each other. The core weights for both periods would fall within the one standard deviation range for the natural pieces when chert, quartzite, and silicified wood are considered together. The Basketmaker II period cores weight slightly more than those of the Pueblo II period. This may indicate preferential

selection for larger raw material packages during this period. The smaller, cortical, lightly reduced cores of the Pueblo II period suggest Pueblo II procurement practices were more expedient with materials being selected for reduction from among those available in the immediate area of the residences or activity areas.

The increase in the representation of nonlocal chert, particularly Zuni Yellow Spotted chert, seen during the Pueblo II period remains one of the few major differences documented between the two flaked stone assemblages. If we conclude that both periods are characterized by fully sedentary, year-round occupations, what mechanism can account for this increase in the presence of nonlocal chert during the Pueblo II period?

If a sedentary lifeway was a relatively new phenomenon during the Basketmaker II period, and if population densities remained low, it would not be unreasonable to conclude that the small, early agricultural settlements may have been organized at the household or possibly at a multihousehold level. Indeed, the apparent *lack* of nonlocal chert during the Basketmaker II period argues for decreased mobility, if not sedentism, in that even seasonally mobile foraging peoples would likely be able to *directly* procure nonlocal materials from their primary or secondary sources.

In contrast, sedentary agricultural communities in combination with higher population densities during the Pueblo II period would be expected to produce an increase in regional integration and contact between those communities. Thus, the presence of a greater proportion of nonlocal chert in the Pueblo II flaked stone collection is argued to reflect increased *indirect* procurement of these materials resulting from increased regional, social, and economic integration between Pueblo II communities.

SUMMARY

This project has provided an unusual opportunity to explore and to compare the nature

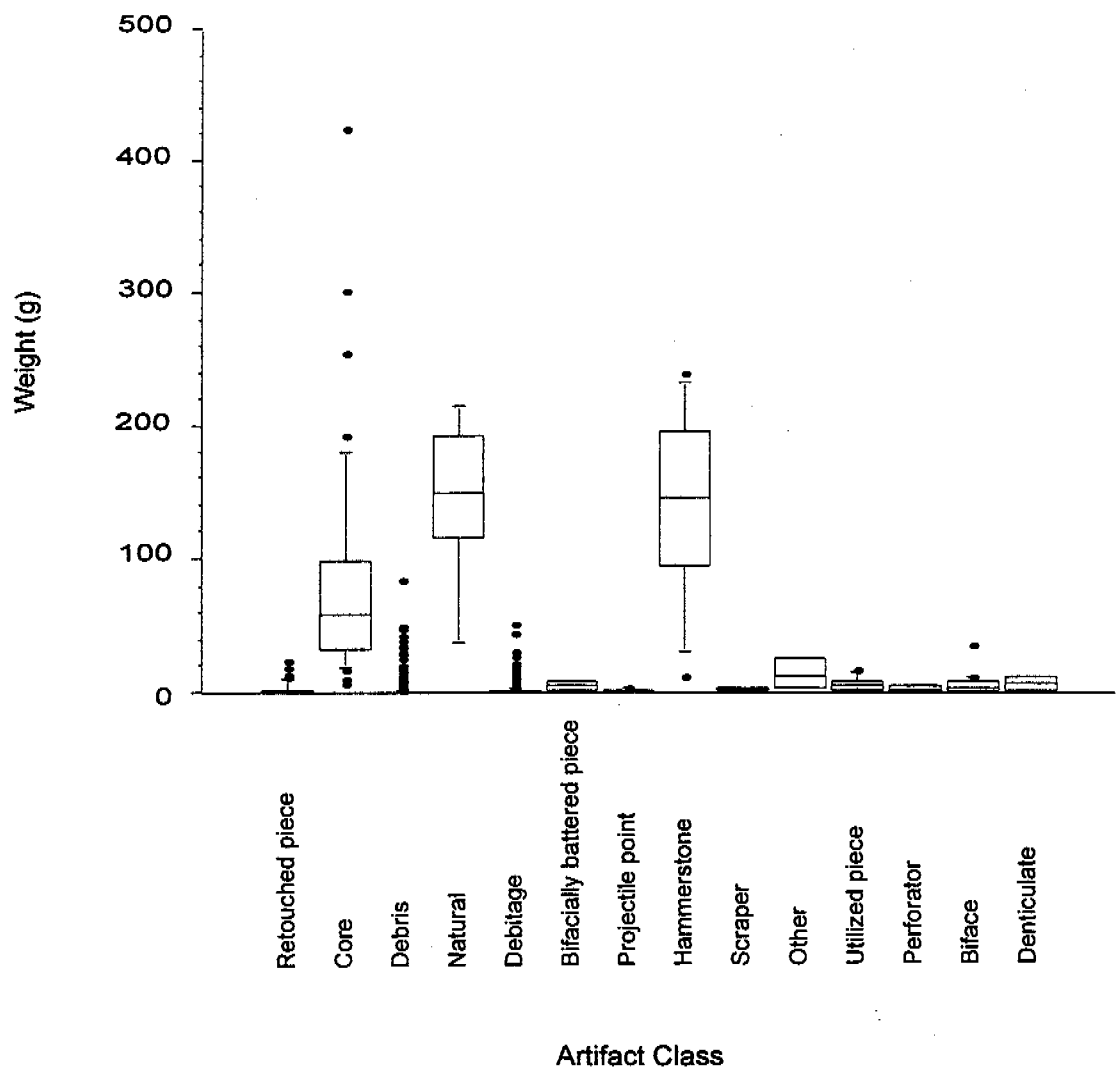


Figure 22.13. Boxplot of Basketmaker II Flaked Stone Artifact Weights by Artifact Class.

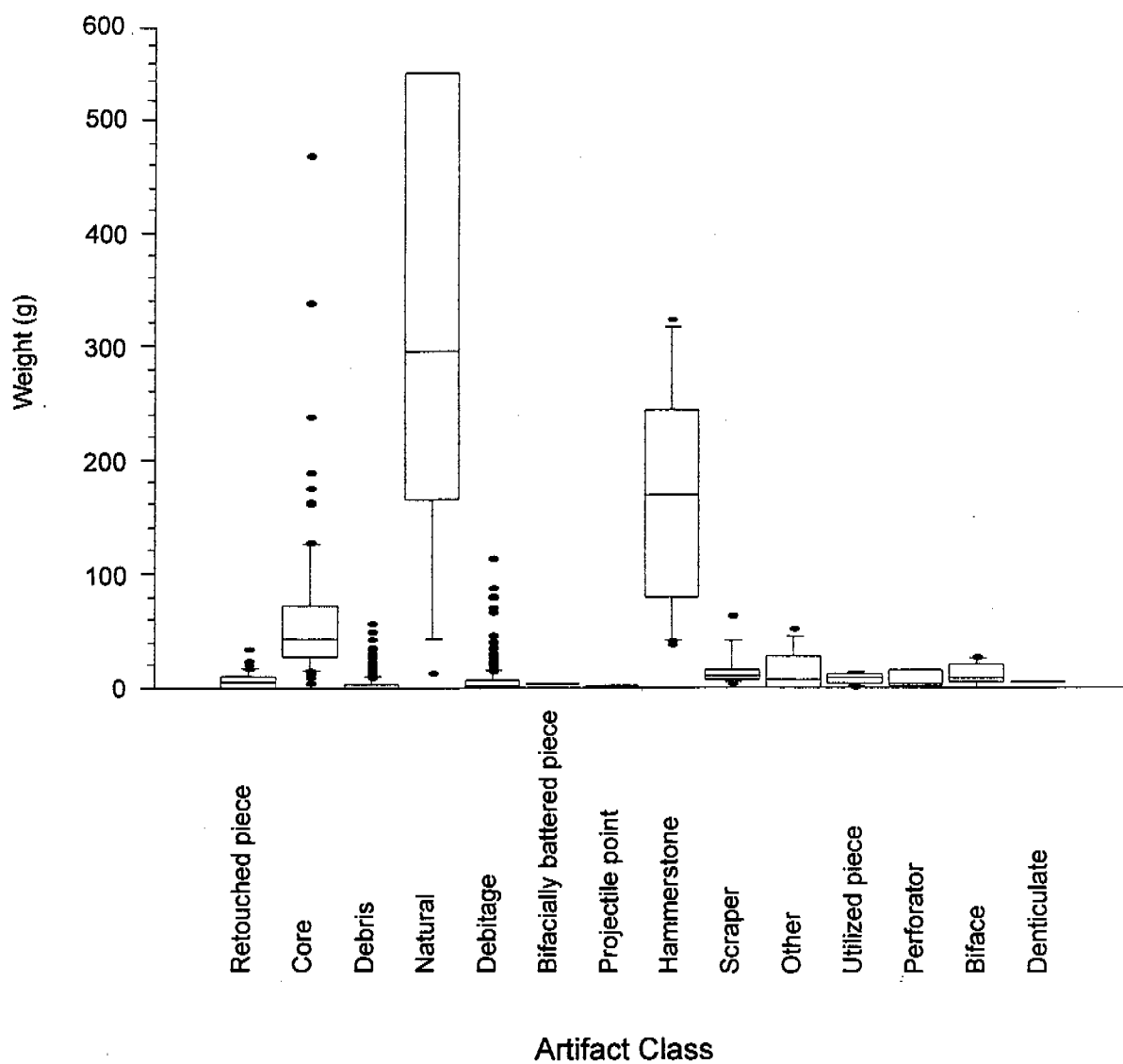


Figure 22.14. Boxplot of Pueblo II Flaked Stone Artifact Weights by Artifact Class.

of Basketmaker II and Pueblo II flaked stone technology and raw material economies. Perhaps unexpectedly, more similarities than differences were found to exist between the two periods. These similarities and the few significant differences in raw material economy documented support the interpretation proposed in this report that the Basketmaker II adaptation appears to be one characterized by year-round sedentism and

increasing reliance on and intensification of corn agriculture for subsistence. Following trends begun at least as early as the Basketmaker II period, increasing population density, sedentary village life and limited logistical mobility, and possibly greater regional social and economic integration appear to be reflected in the lithic technology and raw material economy of the Pueblo II period in Y Unit Draw.

Chapter 23

GROUND STONE ARTIFACTS

Jonathan E. Damp

INTRODUCTION

Analysis of the flaked, ground, and miscellaneous stone material was carried out in order to obtain information regarding procurement, modification, and use of stone at the project area sites. This information is intended to assist in determining site function, economic orientation, chronological placement, and activity area patterning. The recorded information includes raw material type, artifact type (mano, metate, ground slab, etc.), completeness, evidence of modification other than grinding (shaping, burning, etc.), and presence and direction of striations.

METHODOLOGY

Technological and functional attributes were recorded for each of the artifacts recovered during the project including raw material type, weight, length, width, thickness, and type of artifact. Much of this information along with site-specific context is provided in the site description chapters of this report.

Identification of raw material for this project was performed macroscopically, by comparing the characteristics of artifact materials with known primary and secondary sources both within and outside of the project area.

Raw Material Categories

The identifying characteristics of each raw material are as follows:

Argillite — a metamorphic rock, intermediary between shale and slate.

Basalt, vesicular — a fine-grained igneous rock of volcanic origin have small concavities formed by the entrapment of gas during solidification.

Limestone — a sedimentary rock formed of calcium carbonate.

Mudstone — a fine-grained, dark gray sedimentary rock, formed from silt and clay and similar to shale but without laminations.

Sandstone — a sedimentary rock made up of sand and compacted with clay or cemented by silica, carbonates, clay, or iron oxides.

Shale — a sedimentary rock formed by the consolidation of mud or clay and having the property of splitting into thin layers parallel to its bedding planes.

Siltstone — any stone predominately composed of silt. Siltstone tends to lack the finely laminated structure of many sedimentary rocks and is identified primarily by grain size.

Slate — a fine-grained rock formed by the metamorphism of shale. Slate splits into perfectly cleaved, broad, thin layers.

Unidentified — a material that can not, given the represented sample, be identified in terms of material type.

Artifact Type Categories

The identifying characteristics of each artifact type are as follows:

Abraders — hand-held tools in a variety of shapes used to shape other objects by abrasion.

Abrader, active — As defined by Judd (1954:119; see also Akins 1997) these abraders were held in the hand and used in the manner of a file.

Abrader, indeterminate — abraders in which no criteria could be recorded for determining type.

Abrader, passive — As defined by Judd (1954:119; see also Akins 1997), a passive abrader remains stationary as the object being altered is moved back and forth upon it.

Anvils — a stationary object upon which another object is projected against it with sufficient force to cause fracture or other modification to the moving object.

Manos — upper stones that are moved across the surface of a metate, or lower stone, and used to grind or pulverize the material placed on the metate.

Mano, one-hand — small grinding stone; often exhibits evidence of circular striations associated with basin metates and the processing of wild foods (Martin 1972; Nelson 1991).

Mano, one-hand/anvil — small grinding stone used as above but also may be used as an anvil.

Mano, one-hand/blank — small grinding stone blank.

Mano, two-hand — large handstone used in association with trough metates for the processing of maize. Striations are parallel.

Mano, two-hand/anvil — large hand stone used as above but also may be used as an anvil.

Mano, unidentified — large or small grinding stone that is not identifiable with respect to specific properties.

Metate — a large ground stone used on the bottom with a prepared surface on which a mano is rubbed. Metates are generally characterized as either trough (open-ended) or basin. Metate morphology is frequently associated with specialized plant processing (trough for domesticates and basin for wild foods; Adams 1988; Cordell 1984; Lancaster 1986).

Metate, Basin — bottom grinding stone with a round or oval depression produced from grinding with a small mano in a rotary or reciprocal motion. The use surface does not extend across the entire upper surface of the stone.

Metate, slab — bottom grinding stone on which the grinding surface extends across the entire upper surface of the stone.

Metate, trough — bottom grinding stone on which the grinding surface does not extend across the entire upper surface. The trough-type metate is produced by using a mano that is shorter than the metate is wide. The resulting grinding produces a trough in the middle of the metate with sides that are higher than the grinding surface.

Metate, unidentified — bottom grinding stone that is not identifiable with respect to specific properties.

Non-utilitarian items — items with no known functional use, manufactured primarily for adornment or religious need.

Disc — a thin, flat, circular object.

Ornament — an item that decorates or adorns.

Pendant — an ornament that is suspended when worn.

Sphere — a circular solid object whose surface consists of points all the same distance from the center. These stone objects have been intentionally shaped.

Unidentified — an unidentifiable piece of ground stone with no characteristics of specific artifact types.

RESULTS OF ANALYSIS

Site-by-site analysis of the ground stone assemblage from the project is discussed in the

site-specific chapters. This chapter will not attempt to duplicate this effort. Rather, this chapter's focus is on identifying trends or patterns brought out during the analysis of the ground stone material from the project. These trends or patterns focus mainly on the Basketmaker II and Pueblo II assemblages as they were best represented. While not exhaustive or comprehensive because of sample size, the total assemblage does provide a slice through time and place for ground stone tool use. This use was primarily in economic production by household groups located either within their vernacular architecture or in special activity areas. The descriptive portion presented within the site description chapters is followed here by a summation of patterns present within the artifact assemblages and an additional discussion of which scientific questions can be posed given this ground stone data base. The final part is intended not only to pose questions but to generate new questions that may guide future investigations at Zuni area sites.

THE SAMPLE

The entire ground stone assemblage from the project area sites includes 108 pieces (Table 23.1). Of these pieces, the largest categories of ground stone include manos ($n=30$, 28%) and metates ($n=26$, 24%) followed by unidentified specimens ($n=25$, 23%). Abraders ($n=17$, 16%) and two anvils (2%) are also represented. Finally, a category including discs, ornaments, pendants, and spheres comprise probable non-utilitarian objects ($n=8$, 7%).

Sandstone ground stone artifacts dominate the assemblage ($n=89$, 82%; Table 23.2). Vesicular basalt is the next most common material type ($n=11$, 10%). Two pieces of slate were recovered and single pieces of argillite, limestone, mudstone(?), shale, and siltstone are also represented in the analyzed ground stone assemblage. One unidentified piece is included.

The ground stone assemblage derives from 15 sites. Of these 15 sites, 10 were excavated as part of this project (sites LA 26306, LA 26308, LA 26319, LA 48695, LA 49838, LA 115323, LA

115324, LA 115325, LA 115329, and LA 115330). The other five sites were subject to in-field analysis (sites LA 115320, LA 115321, LA 115322, LA 115328, and LA 115333). Eleven ground stone artifacts (10% of the entire ground stone sample) were observed and analyzed during the in-field analysis at the five sites.

The artifact context is largely restricted to either Basketmaker II sites or later Pueblo II or III sites. The majority of the ground stone artifacts ($n=61$, 56%) were collected from the two Basketmaker II habitation sites (sites LA 26306 and LA 115330). The rest of the assemblage pertains to unidentified surface contexts or buried features belonging to the Pueblo II or III periods.

Artifact diversity within the entire ground stone assemblage is represented by six major categories of artifact types: abraders, anvils, manos, metates, non-utilitarian items, and unidentified (Table 23.1). Of the major categories of artifact types, sites LA 26306 and LA 115330 are represented in six and five of the categories, respectively (Table 23.3). Sites LA 49838 and 115324 are represented in four categories each. Two sites (sites LA 26308 and LA 26319) are represented in three categories each. Three sites (sites LA 115320, LA 115323, and 115328) are represented in two categories each. The six remaining sites have ground stone artifacts in only one category each. All sites with specimens from three or more categories have Basketmaker II components. This relationship includes the two sites with the most conspicuous presence of Basketmaker III residential units within the project area (sites LA 26306 and LA 115330).

Artifact diversity is also expressed within the six major categories. For abraders, the largest number of specimens and highest representation of subcategories (active, passive, and indeterminate) is found at site LA 115330 (Table 23.1). Manos and metates occur most frequently and in several different forms at sites LA 26306 and LA 115330, but also at sites LA 26319 and LA 49838. Non-utilitarian artifacts including discs, ornaments, pendants, and spheres occur at only four sites. At two of the sites (sites LA 49838 and LA 115324) this occurrence is restricted to

Table 23.1. Ground Stone Artifact Types by Site.

Artifact Type	Site LA #															Total
	26306	26308	26319	48695	49838	115320	115321	115322	115323	115324	115325	115328	115329	115330	115333	
Abrader, active	1	-	-	-	1	-	-	-	-	3	-	-	-	5	-	10
Abrader, indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Abrader, passive	-	-	1	1	-	-	-	-	1	-	-	-	1	2	-	6
Anvil	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2
Mano	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Mano, one-hand	6	-	-	-	1	-	1	-	-	-	-	-	-	2	-	10
Mano, one-hand/anvil	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Mano, one-hand/blank	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Mano, two-hand	2	-	1	-	1	-	-	-	-	1	-	-	-	1	-	6
Mano, two-hand/anvil	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Mano, unidentified	2	1	-	-	-	1	-	-	-	-	-	4	-	2	-	10
Metate, basin	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Metate, slab	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Metate, trough	2	-	1	-	2	-	-	-	-	1	-	-	-	4	-	10
Metate, unidentified	3	-	1	-	-	-	-	1	-	-	-	2	-	2	1	10
Disc	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	2
Ornament	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Pendant	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sphere	1	-	-	-	-	-	-	-	-	-	-	-	-	3	-	4
Unidentified	5	5	-	-	5	1	-	-	-	-	1	-	-	8	-	25
Total	27	8	5	1	12	2	1	1	2	6	1	6	1	34	1	108

Table 23.2. Ground Stone Material Types by Site.

Raw Material	26306	26308	26319	48695	49838	115320	115321	115322	115323	115324	115325	115328	115329	115330	115333	Total
Argillite	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Basalt, vesicular	2	-	-	-	2	1	-	-	-	1	1	4	-	-	-	11
Limestone	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Mudstone (?)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Sandstone	23	8	5	1	10	1	1	1	2	5	-	2	1	28	1	89
Shale	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Siltstone	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Slate	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
Unidentified	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Total	27	8	5	1	12	2	1	1	2	6	1	6	1	34	1	108

Table 23.3. Number of Represented Categories of Ground Stone by Site.

Site	Number of Represented Categories
LA 115333	1
LA 26319	3
LA 26306	6
LA 115330	5
LA 48695	1
LA 115328	2
LA 115329	1
LA 26308	3
LA 115324	4
LA 115323	2
LA 115322	1
LA 115321	1
LA 115325	1
LA 49838	4
LA 115320	2

single specimens. However, at site LA 26306 two specimens were recovered, a pendant and a sphere. At site LA 115330, four specimens (one ornament and three spheres) were retrieved. Artifact diversity and frequency appear to correlate with sites that are interpreted as habitation sites.

As noted in the research design, artifact diversity and density may suggest occupation duration (Lightfoot and Jewett 1984) when population size and artifact use-lives are consistent (Schiffer 1975; Schlanger 1990). A higher diversity of artifacts is assumed to show a wider range of activities and longer residential stability. Greater artifact density also is expected to result from greater residential stability. Similarly, the size and depth of a midden are expected to be greater at sites with longer use duration. Artifact assemblage diversity may also provide data pertinent to interpretations of site function (Leonard and Jones 1989; Reid 1982a, 1982b). Assemblage diversity should be related to

the range of activities conducted at individual sites. Highly diverse assemblages are associated with a wide range of activities, while less diverse assemblages are associated with specialized activities.

From this review of the project area data, it appears that the two sites with the greatest diversity in the ground stone assemblage (sites LA 26306 and LA 115330) are also those with the largest and most diverse number of activity areas (as discussed in individual site descriptions). Sites with less diversity in the ground stone assemblage may be those reflecting specialized activities. In this case we could argue that sites LA 26306 and LA 115330 represent possibly year-round habitation areas associated with a number of activities involving economic production and consumption. Specialized activities at later Pueblo II and III fieldhouses may only include tasks necessary for maintaining agricultural fields while consumption and nonagrarian productive strategies were practiced at larger residential sites

that lie outside the project area and were probably tied into community-based networks typified by sites such as the Village of the Great Kivas.

Manos and metates dominate the ground stone assemblage (Table 23.1). Diversity within the two categories is not significant. A dimensional analysis of both manos and metates (Tables 23.4 and 23.5) show that most manos cluster (Figure 23.1). Those manos not clustering are typically incomplete fragments. Mano size, as measured by length and width, is of little value in interpreting differences in tool use. That is, we cannot predict that small manos (one-hand) were used to grind wild vegetal resources and larger manos (two-hand) were used to grind maize. That evidence is not incumbent in the sample. Similarly, apart from the large number of Basketmaker II manos in the sample, there is no dimensional separation of these manos from later Pueblo II or Pueblo III manos. If anything the Basketmaker II manos are slightly more robust with slightly greater individual widths than their later counterparts. However, this observation is probably not statistically significant because of sample size.

Some clustering does occur within the metate assemblage (Figure 23.2). The metates on the right side of the figure are all trough metates found at sites LA 26306 and LA 115330, the two Basketmaker II habitation sites. The next cluster towards the center combines trough, basin, and indeterminate metates. Finally, the cluster on the bottom left includes mainly slab metates but all other types as well with the exception of basin metates. This analysis does more than show that trough metates are normally larger than other metates within the sample. Table 23.5 (as well as Table 23.1) indicates that trough-shaped metates, presumably used for heavy grinding of maize, are predominately found at the two Basketmaker II habitation sites. This evidence from the ground stone assemblage corroborates the data and conclusions derived from an analysis of the pollen and the macrobotanical specimens for this project. Indeed, apart from indications that ground stone tools were employed for abrading, the major role of ground stone tools was clearly for the grinding of particular substances, some of which were vegetal. The ground stone assemblage data

indicate, in conjunction with other project-related data, that a major component of the ground vegetal substances was maize and most of this processing was done at sites LA 26306 and LA 115330.

Non-utilitarian items, which include two discs, an ornament, a pendant, and four spheres, are restricted to four sites. Sites LA 26306 and LA 115330 yielded 75% of the non-utilitarian items, including all four spheres. Spheres from the project area are small round objects manufactured from sandstone, limestone, or mudstone (Table 23.6). The spheres have average dimensions of 4.33 cm (length), 4.15 cm (width), 3.88 cm (thickness), and 92.90 g (weight). What these spheres were used for (that is, if they were utilitarian) remains a mystery. As non-utilitarian items, the role of a sphere in Basketmaker II life also remains a mystery. Spheres have been found in a number of sites in the Southwest and are thought by some to have been used as gaming pieces. Other gaming pieces such as bone counters from the nearby site of Village of the Great Kivas were found by Roberts (1932) in later Pueblo II to Pueblo III contexts.

CONCLUSIONS: SITE FUNCTION AND ECONOMIC PRODUCTION

This project examined a number of sites through both excavation and in-field analysis. Because of the difference in strategies employed in the field, the data and interpretations are not necessarily comparable. Fifteen sites yielded ground stone artifacts. When ground stone assemblages are examined from a perspective of site function several patterns are observable. These patterns have important ramifications on our interpretation of Zuni culture history as viewed from a perspective of household economies and farming strategies in the Y Unit Draw area. There are two categories to be made from a site-specific perspective. On one side are the two Basketmaker II pitstructure sites that contain most of the ground stone artifacts, including 57% of the manos and metates and 75% of the non-utilitarian items. These two sites also contain the highest diversity of ground stone tool types. On the other side are the rest of the sites

Table 23.4. Material Types and Dimensions of Manos.

Artifact Type	Site No.	FS No.	Raw Material	Completeness (%)	Length (cm)	Width (cm)	Thickness (cm)
Mano	LA 115330	215	Sandstone	76 to 99	10.40	9.20	5.00
Mano, One-hand	LA 26306	22	Sandstone	76 to 99	9.30	7.40	4.10
	LA 26306	133	Sandstone	1 to 50	8.00	6.20	3.30
	LA 26306	174	Sandstone	100	14.90	9.70	4.60
	LA 26306	149	Sandstone	100	11.80	7.20	3.20
	LA 26306	174	Sandstone	100	16.00	10.30	3.30
	LA 26306	174	Sandstone	100	12.60	12.40	3.80
	LA 49838	377	Sandstone	100	13.00	10.30	3.60
	LA 115321	21	Sandstone	100	14.00	12.00	1.50
	LA 115330	184	Sandstone	100	12.30	9.70	3.60
	LA 115330	136	Sandstone	76 to 99	12.80	12.00	7.10
Mano, One-hand/Anvil	LA 115330	146	Sandstone	100	13.20	10.00	3.90
Mano, One-hand/Blank	LA 49838	257	Sandstone	76 to 99	17.90	7.80	3.90
Mano, Two-hand	LA 26306	175	Sandstone	100	18.20	9.50	6.00
	LA 26306	252	Sandstone	51 to 75	10.70	10.20	3.50
	LA 26319	37	Sandstone	1 to 50	8.60	6.40	3.30
	LA 49838	290	Sandstone	100	25.20	12.40	4.10
	LA 115324	47	Vesicular basalt	1 to 50	12.20	10.30	5.70
	LA 115330	203	Sandstone	100	19.30	11.20	5.70
Mano, Two-hand/Anvil	LA 115330	201	Sandstone	51 to 75	11.80	11.30	4.10
Mano, Unidentified	LA 26306	142	Sandstone	1 to 50	11.20	9.90	3.60
	LA 26306	267	Sandstone	1 to 50	11.40	9.20	4.20
	LA 26308	99	Sandstone	51 to 75	12.60	7.40	3.30
	LA 115320	37	Vesicular basalt	1 to 50	9.50	5.00	3.50
	LA 115328	73	Vesicular basalt	1 to 50	11.00	7.50	3.00
	LA 115328	78	Vesicular basalt	1 to 50	8.00	4.50	3.00
	LA 115328	196	Vesicular basalt	1 to 50	12.00	8.00	3.00
	LA 115328	286	Vesicular basalt	1 to 50	10.00	6.50	4.50
	LA 115330	146	Sandstone	1 to 50	10.50	6.90	3.20
	LA 115330	146	Sandstone	1 to 50	9.10	6.00	4.20

Table 23.5. Material Types and Dimensions of Metates.

Artifact Type	Site No.	FS No.	Raw Material	Completeness (%)	Length (cm)	Width (cm)	Thickness (cm)
Metate, Basin	LA 26319	29	Sandstone	1 to 50	27.00	19.30	7.80
Metate, Slab	LA 26306	121	Vesicular basalt	1 to 50	10.70	8.80	4.10
	LA 26306	149	Sandstone	1 to 50	11.80	10.90	2.00
	LA 26306	256	Sandstone	1 to 50	6.20	5.60	2.30
	LA 26308	61	Sandstone	1 to 50	11.60	10.60	4.30
	LA 26308	74	Sandstone	1 to 50	11.50	8.30	3.30
Metate, Trough	LA 26306	172	Sandstone	51 to 75	46.90	51.60	12.40
	LA 26306	236	Sandstone	1 to 50	25.20	15.10	1.20
	LA 26319	9	Sandstone	1 to 50	14.80	11.60	6.40
	LA 49838	290	Vesicular basalt	1 to 50	8.60	7.00	5.40
	LA 49838	343	Sandstone	1 to 50	13.80	10.90	1.70
	LA 115324	42	Sandstone	1 to 50	22.80	16.90	5.00
	LA 115330	178	Sandstone	1 to 50	49.30	29.90	9.20
	LA 115330	187	Sandstone	76 to 99	40.20	37.60	14.70
	LA 115330	203	Sandstone	100	45.30	34.50	10.90
	LA 115330	146	Sandstone	1 to 50	21.00	15.70	3.20
Metate, Unidentified	LA 26306	235	Sandstone	1 to 50	4.70	3.10	1.20
	LA 26306	251	Sandstone	1 to 50	12.90	11.70	3.00
	LA 26306	235	Sandstone	1 to 50	10.70	6.00	3.30
	LA 26319	36	Sandstone	1 to 50	11.10	7.40	5.20
	LA 115322	9	Sandstone	1 to 50	13.00	8.00	3.00
	LA 115328	165	Sandstone	1 to 50	11.50	9.50	5.00
	LA 115328	287	Sandstone	1 to 50	18.00	13.50	5.00
	LA 115330	176	Sandstone	1 to 50	10.10	6.10	3.30
	LA 115330	201	Sandstone	1 to 50	21.10	18.10	4.80
	LA 115333	4	Sandstone	1 to 50	10.00	6.50	3.50

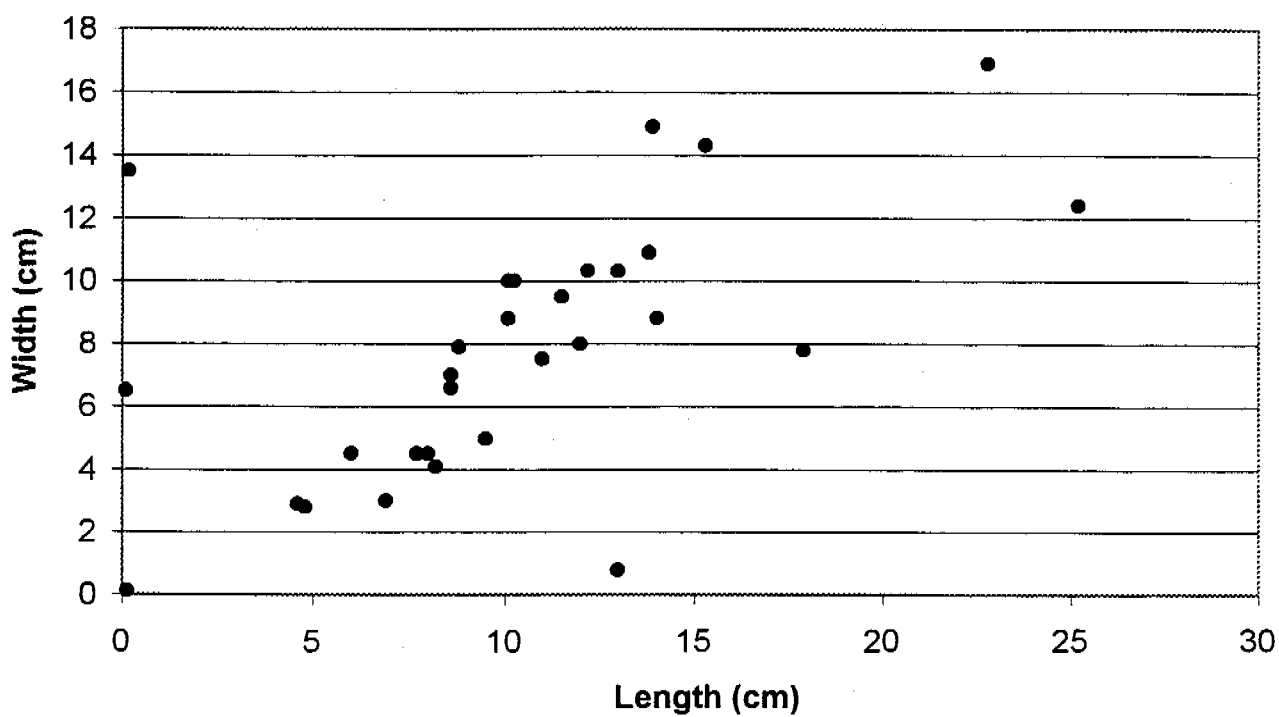


Figure 23.1. Mano Dimensions.

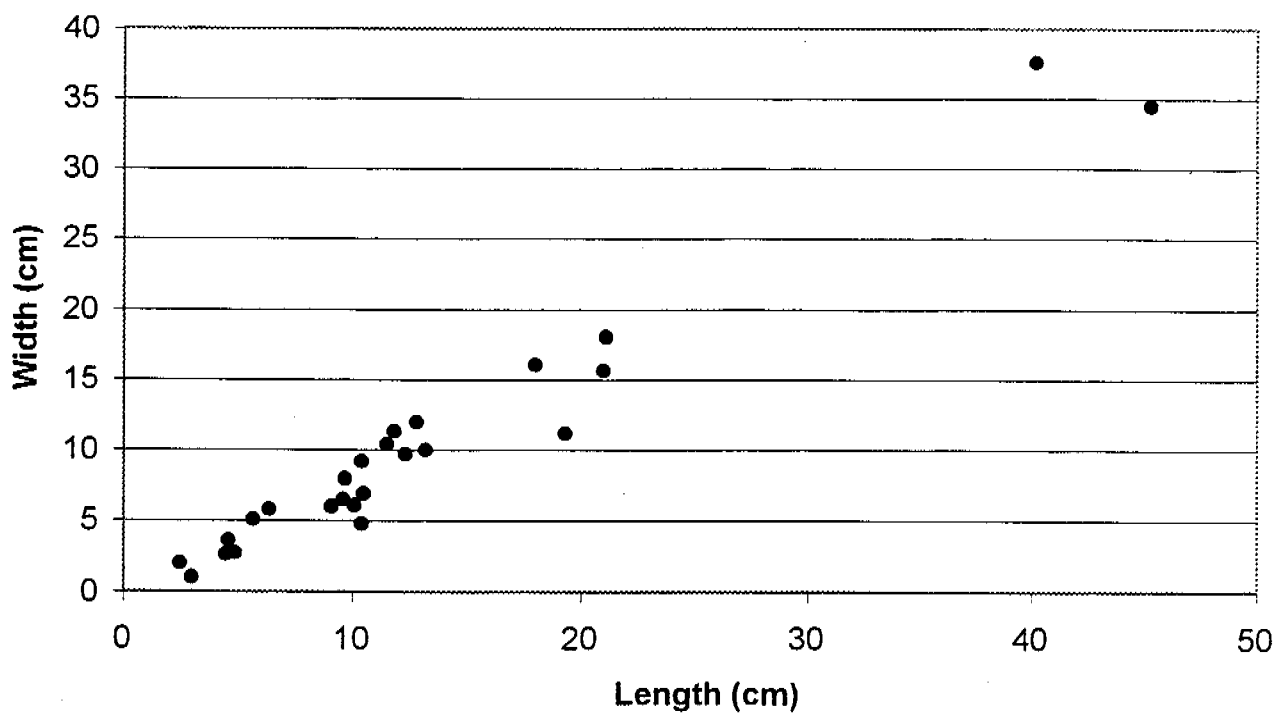


Figure 23.2. Metate Dimensions.

Table 23. 6. Material Types and Dimensions of Spheres.

FS No.	Site	Material	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)
259	LA 26306	Sandstone	4.00	3.80	3.60	75.60
201	LA 115330	Sandstone	3.80	3.60	3.50	50.00
209	LA 115330	Mudstone?	5.30	5.01	4.32	146.80
171	LA 115330	Limestone	4.20	4.20	4.10	99.20
Average			4.33	4.15	3.88	92.90

with smaller assemblages and less tool type diversity. Some of the sites in the second category have Basketmaker II components and some have Pueblo II or Pueblo III components. The larger Basketmaker II sites are interpreted as residential,

permanent settlements whereas the other sites were either fieldhouses related to agrarian pursuits or storage and/or processing areas near farms. More selective activities were carried out at these smaller site types.

Chapter 24

PALYNOLOGY

Susan J. Smith

INTRODUCTION

This chapter presents a synthesis of the analysis results from 56 pollen samples from nine Basketmaker II sites excavated as part of the State Highway 602 Data Recovery Project. Modern vegetation in the project area is pinyon and juniper woodland and transition ponderosa pine to pinyon and juniper. Table 24.1 lists the sites, the pollen samples submitted, and for each site, the range of calibrated radiocarbon intercept dates and a general description of vegetation. The sites are listed in a south-to-north and lower-to-higher elevation order. The goal of this analysis was to discern subsistence resources used at the sites and to investigate for cultigen pollen in samples from the agricultural field site LA 48695. Two other research questions were also examined: what differences exist between styles or forms of extramural pits and what comparisons can be made between the two sites with substantial structures and extramural features (sites LA 26306 and LA 115330)?

METHODS

Sample bag contents were thoroughly mixed and 20-cc subsamples were extracted. A known concentration (25,084 grains) of tracer spores (*Lycopodium*) was added to estimate pollen concentration. Sediments were treated with 10% hydrochloric acid (to remove carbonates), screened (0.18-mm mesh), and treated for approximately 20 hours with hydrofluoric acid (to dissolve silicates). After the hydrofluoric step, samples were floated in zinc bromide (specific gravity 1.9), followed by acetolysis to reduce organics.

Pollen assemblages were documented by counting slide transects at 400x magnification to a 200-grain pollen sum, if possible, and then scanning the entire slide at 100x magnification to record additional taxa. Aggregates (clumps of the

same taxon) were counted as one grain per occurrence, and the taxon and size were recorded separately. Pollen aggregates are assumed to reflect deposition of flower anthers (Gish 1991), but not every aggregate occurrence is significant, depending on the taxon and aggregate size. Maize was tallied if monoporate grains were greater than 60 µm diameter with pore plus annulus greater than 10 µm diameter (Kurtz et al. 1960; Tsukada and Rowley 1964). A large grass type was identified if grains were greater than 30 µm but less than 60 µm. The large grass category is probably Indian ricegrass (*Stipa hymenoides*), based on recovery of Indian ricegrass seeds from macrobotanical samples (McBride, Chapter 25). However, other possible large grass pollen types include reed grass (*Phragmites*) and little barley grass (*Hordeum*). The broad sunflower family group was divided into hi-spine and low-spine types, based on the length of spines using 2.0 µm as a cutoff. The low-spine are referable to ragweed and bursage (*Ambrosia* spp.), and the hi-spine encompass a broad range of genera, including rabbitbrush, snakeweed, aster, and groundsel. A long-spine sunflower family type was also differentiated, which may represent the sunflower genus (*Helianthus*).

The absolute abundance of pollen in each sample (pollen concentration) was estimated by relating the sample pollen count to the tracer count, calculated by the following formula:

$$\text{Pollen Concentration} = \frac{\frac{\text{Pollen Counted}}{\text{Tracers Counted}} \times 25,084 \text{ Tracer Concentration}}{20 \text{ cc Sample Volume}}$$

Concentration is expressed as the number of pollen grains per cubic centimeter of sample sediment, abbreviated gr/cc. Concentrations are an index to the abundance of plant material that may have been associated with cultural activities, and provide the first level of sample comparisons, followed by comparison of

Table 24.1. Summary of Pollen Samples and Contexts by Site.

Site	Number of Pollen Samples	Contexts Sampled	Modern Vegetation
LA 26319	4	One extramural hearth and three extramural pits	Juniper and pinyon with sagebrush, prickly pear, and rabbitbrush
LA 115327	5	Five extramural pits	Juniper and pinyon with sagebrush and grass
LA 26306	10	Features 1, 28, and 29 pitstructures, two extramural pits, one extramural thermal feature	Pinyon and juniper with rabbitbrush and yucca
LA 115330	11	Feature 2 pitstructure, Feature 9 possible ramada, five extramural pits	Transition ponderosa pine to pinyon and juniper with sagebrush, yucca, and rabbitbrush
LA 48695	14	Field area near site LA 115330 with subsurface rock alignment	Pinyon and juniper with sagebrush and rabbitbrush
LA 26308	2	Two extramural pits	Transition ponderosa pine to pinyon and juniper with sagebrush, yucca, and prickly pear
LA 115324	3	Two extramural pits and one runoff ditch	Pinyon and juniper with sagebrush, yucca, and rabbitbrush
LA 115323	3	Fieldhouse and two runoff ditches	Pinyon and juniper with sagebrush and yucca
LA 49838	4	One extramural thermal feature and three extramural pits	Pinyon, juniper, and oak with sagebrush, yucca, rabbitbrush, and prickly pear

Note: Sites are ordered south to north, lower to higher elevations.

pollen percentages or sample frequency. Pollen percentages normalize sample counts to 100 ($[\text{taxon count}/\text{pollen sum}] * 100$), so that each taxon is expressed as a proportion of the sample pollen sum.

EXTENDED MICROSCOPY METHOD FOR SITE LA 48695 FIELD SAMPLES

Agricultural pollen evidence from fields is generally more difficult to recover than pollen from habitation or processing context where pollen from harvested plants was concentrated. Generally, conventional pollen microscopy goals are to describe the pollen population on one microscope slide. Dean (1998) has developed an Intensive Scanning Microscopy (ISM) method that is based on increasing the probability of finding a rare pollen type by looking at more than one microscope slide, but at lower magnification, usually 100x or 200x versus the conventional 400x. If preservation is moderate, pollen greater

than 30 μm in size can be easily identified at 100x magnification, including corn, squash, cotton, bean, agave, yucca, cholla, cacti, and some herb types. The ISM method is also designed to quantify the abundance (or absence) of scan-identified taxa by documenting the number of tracer grains encountered during scans. The option to quantify pollen during ISM is an advantage, because the analysis can be evaluated as to whether it was adequate to find a rare pollen type, and provides a basis to compare pollen representation from different fields. ISM was used to analyze eight pollen samples from site LA 48695, an agricultural field with evidence of irrigation ditches.

Previous pollen studies of old fields have documented maize pollen, if present, typically occurs at concentrations of 2.0 gr/gm or greater (Dean 1991, 1994). To find one grain of maize pollen occurring at a concentration of 2.0 grains in the site LA 48695 field samples, 600 tracer grains

would have to be passed during scans, and 1200 tracers would have to be observed to analyze the sample to a level of 1.0 grains/cc. These numbers are derived by solving the concentration equation included in the Methods section for one pollen grain counted. In this analysis after the conventional 400x magnification counts, one to five slides were scanned at 100x magnification until either maize pollen was identified or the sample was analyzed to a level of 1.0 grains/cc. Analysis was stopped on one sample at a concentration level of 1.5 grains/cc, after five slides had been examined.

POLLEN TYPES

Thirty-one taxa were identified from the 56 samples. Table 24.2 lists the pollen taxa with common names and summarizes possible ethnobotanical uses for each type. Cultural plant uses were extracted from ethnographic information primarily from Dunmire and Tierney (1997), Elmore (1943), Mayes and Bayless Lacy (1989), Stevenson (1915), Vestal (1952), and Whiting (1939). Pollen types are discussed by common names except for Cheno-Am. The broad Cheno-Am category encompasses two plant families, the Chenopodiaceae and Amaranthaceae, that include several important Southwest subsistence resources, such as saltbush and shadscale (*Atriplex* spp.), winterfat (*Eurotia*), bugseed (*Corispermum*), pigweed (*Amaranthus*), and goosefoot (*Chenopodium*). Cheno-Am plants are also common in modern vegetation, especially as weeds on disturbed ground.

The pollination mode, wind or insect, and the flowering season are shown in Table 24.2. Wind-pollinated taxa (trees, grasses, and some shrubs) tend to be overrepresented in pollen assemblages because the reproductive strategy is to produce abundant aerodynamic pollen that can disperse hundreds of kilometers. The insect-pollinated taxa (herbs and cacti) are generally underrepresented in natural pollen assemblages because these species produce small amounts of poorly dispersed pollen. As a result, the presence of insect-pollinated taxa, especially in any abundance,

can signal cultural use, whereas even high representation of wind-pollinated types can result from natural pollen deposition. Flowering season can be used to infer seasons of occupation when there is enhanced representation of specific types; however, seasonal interpretations are more solid if pollen is combined with architecture, macrobotanical, and other material evidence (Adams and Bohrer 1998).

RESULTS: PATTERNS BETWEEN FEATURES AND SITES

Four samples lacked sufficient pollen for a complete analysis and these are excluded from interpretations. The sterile samples were at site LA 115330, Feature 6, FS 180, a pit base sample; site LA 115330, Feature 8, FS 196, a basin-shaped pit; site LA 115327, Feature 3, FS 55, a base sample from a bell-shaped pit; and site LA 49838, Feature 2, FS 336, a base sample from a thermal feature. The raw counts from all samples are documented in Appendix G; individual site reports in this volume include results by feature.

The dominant taxa in all samples were Cheno-Am and the sunflower family, followed by pinyon and juniper, ragweed/bursage, grass, and sagebrush. There was slightly more pine, juniper, and oak in the north half of the project area, which was probably related to the environment (Table 24.1). The most striking pattern in the results was the low abundance of pollen from archaeological contexts. In the 38 productive archaeological samples, pollen concentrations ranged from less than 200 to 5900 gr/cc with a median of 1100 gr/cc. If concentrations are a reliable index to pollen abundance and therefore, plant abundance, then concentrations can provide a crude measure of the degree of cultural subsistence activities or the quantities of plant materials and harvests processed. The low pollen abundance in the Highway 602 samples suggests that sites were used seasonally or that in some way less plant material was manipulated at these sites compared to year-round habitation sites or substantial villages. The site LA 48695 field samples contrasted with the archaeological samples. Pollen

Table 24.2. Pollen Types Identified with Common Names, Ethnographic Uses, and Ecological Characteristics.

Taxa Name	Common Name	Ethnobotanical Uses	Pollination and Season					
TREES AND SHRUBS								
<i>Abies</i>	Fir	wd, lv, pitch			C	O	w	Summer
<i>Pinus</i>	Pine	nuts, wd, lv, pitch	F	M	C	O	w	Summer
<i>Pinus</i> pinyon-type	Pinyon pine	nuts, wd, lv, pitch	F	M	C	O	w	Summer
<i>Juniperus</i>	Juniper	berries, wd, lv	F	M	C	O	w	Spring
<i>Quercus</i>	Oak	nuts, wd	F	M	C	O	w	Spring
Rosaceae	Rose family: cliffrose, serviceberry, antelopebrush, and others	fruit, lv, wd	F	M	C	O	i	Spring to fall
<i>Celtis</i>	Hackberry	berries, wd					i	Spring
<i>Ephedra</i>	Mormon tea	lv, wd	F	M	C	O	w	Spring
<i>Artemisia</i>	Sagebrush	lv, wd		M	C	O	w	Summer
HERBS, FORBS, GRASSES, CULTIGENS, AND CACTUS								
Hi-spine compositae	Sunflower family: rabbitbrush, snakeweed, cota, groundsel, and others	sds, lv, wd	F	M	C	O	i	Spring to fall
Liguliflorae	Liguliflorae: wire lettuce, dandelion, and others	sds, lv, rts	F	M		O	i	Spring to fall
<i>Ambrosia</i>	Ragweed, bursage	sds, lv	F	M			w	Summer
Long-spine compositae	Sunflower-type	sds	F				i	Summer to fall
Poaceae	Grass	sds, lv, rts	F	M	C	O	w	Spring/summer
Large grass	Indian ricegrass, little barley, reed grass, and others	sds, lv, rts	F	M	C	O	w	Spring/summer
<i>Sphaeralcea</i>	Globemallow	sds, lv	F	M	C	O	i	Summer
Brassicaceae	Mustard: tansy, desert plume, bladder pod, and others	sds, lv	F	M			i	Spring
<i>Eriogonum</i>	Buckwheat	sds, rts, pollen	F	M	C	O	i	Spring/summer
Onagraceae	Evening primrose	rts	F	M	C	O	i	Spring/summer
Euphorbiaceae	Spurge	sds, rts		M			i	Spring/summer
Fabaceae	Pea family: locoweed, lupine, and others	sds, rts	F	M		O	i	Spring/summer
Polemoniaceae	<i>Phlox</i> , <i>Eriastrum</i> , <i>Gilia</i> , <i>Leptodactylon</i> , and others	lv, flowers		M	C		i	Spring/summer
Caryophyllaceae	Pink family	sds, lv, rts		M				Summer
Lamiaceae	Mint family	sds, lv	F	M				Summer
<i>Polygonum</i>	Knotweed	lv, rts	F	M			w	Summer
Cheno-Am	Cheno-Am: goosefoot, bugseed, pigweed, saltbush, shadscale, and others	sds, lv, wd	F	M	C	O	w/i	Spring to fall
Liliaceae	Lily family: yucca, onion, mariposa/sego lily	fruit, flowers, lv, rts	F	M	C	O	i	Spring
<i>Cleome</i>	Beeweed	sds, lv	F		C	O	i	Summer
<i>Portulaca</i>	Purslane	sds, lv	F				i	Summer
Cholla	Cholla	fruit, flowers	F		C	O	i	Spring/summer
<i>Zea</i>	Maize	whole plant	F	M	C	O	w	Summer
Key:	lv=leaves sds=seeds	wd=wood/bark rts=roots	w= wind-pollinated i= insect-pollinated	F= Food C= Ceremonial	M= Medicinal O= Other (fuel, tools, etc.)			

was more abundant in the 24 subsurface field samples and the values were more variable, ranging from 800 to 66,500 gr/cc. The difference is attributed to the open-air natural setting of the field surface that collected more atmospheric pollen rain.

Economic pollen types were rare with the exception of maize, which occurred in 26 of 52 samples. Economic taxa are interpreted to include cholla, which occurred in three samples, lily family in two samples, a large grass type that could be Indian ricegrass in six samples, and purslane pollen, identified in two feature samples and two field samples. Purslane seeds were evident in the macrobotanical data (McBride, Chapter 25); the seeds were probably a food resource. The lack of purslane pollen makes sense if seeds, not greens, were the food product, because pollen does not persist on purslane seeds (Laboratory of Paleoecology, experimental data). Other pollen types identified that may represent cultural resources, but are also weeds, include beeweed, sunflower family, evening primrose, mustard family, globemallow, buckwheat, pea family, and a long-spine type (probably sunflower). Grass values were high in some samples (15% maximum) and Cheno-Am was high in most samples (median 31%, range 6 to 62%); the high values in both of these pollen categories probably relate to cultural use.

FEATURE COMPARISONS

The scarcity of cultural pollen evidence could be a function of a context bias. Most of the samples were from extramural pits ($n = 20$) with 11 samples collected from structure floors or intramural pits, 6 samples from thermal features, and 14 samples from a field area. Table 24.3 summarizes average pollen concentrations and percentages and sample frequencies of select economic types across feature groups. Three unique pit samples were omitted from Table 24.3: a trough-shaped pit (FS 168, site LA 115330), a cylindrical pit (FS 82, site LA 115324), and an irregular-shaped pit (FS 66, site LA 115327).

Table 24.3 shows that bell-shaped pits and generic pits had the least evidence of economic plants. Even maize was low in these contexts; however, Cheno-Am was high in both feature types and beeweed was highest in bell-shaped pits. Generic pits may have served a variety of functions not necessarily related to plants. The lack of maize pollen in bell-shaped pits seems incongruous because these features are thought to have been used for maize storage. Husked and dried maize cobs were probably stored in bell pits, based on ethnographic examples (Bohrer 1960; Stevenson 1915) and the fact that maize left in the husk will rot. Experimental pollen washes of different parts of maize has shown that maize pollen is left only on the outer husks; there is essentially no pollen on inner husks, cobs, or kernels (Geib and Smith 1998). Thus, the results are consistent with the use of bell pits for maize storage, but in a dried and husked state that is not likely to have left pollen.

Extramural basin-shaped pits stand out in Table 24.3 because of minimal concentration values but high frequency of maize and high relative values of grass and beeweed. Storage pits are also interesting, with more evidence of economic pollen types than any other feature type and high concentration values. The higher frequency of maize in basin-shaped and storage pits suggests that maize in the husk or green maize was associated with these features, perhaps in some intermediate phase of harvest processing. Storage pits may have served to stockpile or store a variety of plant materials.

The highest pollen concentrations (excluding field samples) were from structure floors and the highest frequency of maize was from intramural pits, with moderate maize frequency from structure floors. The high pollen concentration from floor samples is undoubtedly driven by the maximum percentages of Cheno-Am pollen on floors, which could reflect both subsistence use and weed plants around structures. Generally, there is a greater probability for pollen from subsistence plants to be preserved in structures where human activity was concentrated and use surfaces were protected by roofs, versus

Table 24.3. Pollen Abundance and Economic Pollen by Feature Type.

Context	No. of Samples	Average Pollen Concentration grains/cc (rounded to nearest 100)	Average Values			Sample Frequency Economic Types				
			Average Cheno-Am %	Average Grass %	Average Beeweed %	% of Samples with Maize	% of Samples with Cholla	% of Samples with Purslane	% of Samples with Lily Family	
Pits	7	1300	36	4	2	29	-	-	-	-
Storage pits	4	1700	31	6	3	50	50	25	25	25
Basin-shaped pits	3	500	26	5	4	67	-	-	-	-
Belt-shaped pits	3	1000	38	2	6	33	-	-	-	-
Pits inside structures	4	900	39	4	3	100	25	-	25	25
Structure floors (includes one ramada floor)	7	3400	48	2	4	57	-	14	-	-
Runoff ditches	3	1500	25	4	7	-	-	-	-	-
Agricultural field	14	8900	29	1	1	42*	7	14	-	-
Thermal features	3	1600	41	3	2	33	-	-	-	-

*Include intensive scanning microscopy results.

extramural contexts where cultural pollen evidence could be diluted by natural pollen rain.

Three thermal features were analyzed: an intramural hearth in pitstructure Feature 28 and an extramural cobble-filled feature (Feature 10) from site LA 26306, and from site LA 26319, one extramural hearth (Feature 2). The only pattern between all three features was high to moderate Chen-Am percentages. Beeweed was high (7%) in the extramural hearth at site LA 26319 and grass was high (6%) in the intramural hearth at site LA 26306. Pollen in hearths is difficult to interpret when compared to macrobotanical data, where charred materials have a high probability of being related to hearth use. In these pollen results, the enhanced Chen-Am values, especially in the intramural hearth, indicate a subsistence resource such as Chen-Am shrubs used for fuel or Chen-Am greens or seeds for food. Maize was also probably roasted in the extramural, cobble-filled Feature 10 at site LA 26319.

The features described as runoff ditches at sites LA 115324 and LA 115323 contrasted with samples from discrete features. No enconomic pollen types were identified from the ditches, and average concentration and Chen-Am percentages appear low for outside contexts, but beeweed was high. The ditches were probably ephemeral features designed to capture storm runoff, and the pollen results support this interpretation. If ditches held perennial water then riparian plants would have grown in the depressions, but no wet ground indicators such as willow or cattail were identified.

The agricultural field at site LA 48695 produced maize pollen, and the representation was relatively high for a field. Maize was identified in 6 of the 14 samples (42% sample frequency) and maize pollen aggregates were identified in two of the samples (14%). The results of the extended ISM analysis on 11 of the field samples documented maize concentrations at 1.0 to 2.0 gr/cc with a maximum concentration of 4.1 gr/cc in sample 148 from SU 12. Sinagua fields near Flagstaff, Arizona have produced maize pollen at concentration levels of less than 2.0 gr/cc with

samples frequencies of 14% to 33% (Berlin et al. 2000). In New Mexico along the rich Rio Grande Valley, pollen studies of fields believed to date to AD 1300s have resolved maize pollen at concentration levels generally less than 3 gr/cc with sample frequencies typically between 11% to 45%, but up to 72% (Smith 1998).

All of the maize pollen occurred in samples taken from the surface or just above the surface of buried soil Unit III. Four samples submitted from the base of Unit III did not produce maize. This representation of maize at site LA 48965 is strong evidence that there was a productive maize field that apparently was ditch-irrigated, and dating indicates the field was farmed during the Archaic around BC 60 or earlier.

SITE COMPARISONS: SITES LA 115330 AND LA 26306

Most of the pollen samples analyzed were from a few extramural features at seven sites. Comparisons between these sites would not be credible because there are not enough samples from each site for a statistical population, extramural features are less reliable than intramural contexts as records of human activity, and based on the results in Table 24.3, different styles of extramural pits apparently had different uses. Half of the productive pollen samples were from sites LA 26306 and LA 115330, and these sites had structures that spanned approximately the same time period: 350s BC to AD 350s (Table 24.1).

Contexts sampled for pollen at site LA 26306 included three pitstructures, two extramural pits, and a cobble-filled extramural thermal feature. At site LA 115330, samples were analyzed from one pitstructure, a possible ramada or shallow pitstructure, and five extramural pits. Site LA 115330 was near the field at site LA 48695. The main contrast between the two sites was that pollen concentrations were about four times higher at site LA 26306 than at site LA 115330, but maize occurred more frequently and with higher values at site LA 115330. Aggregates of maize pollen (which are significant as an

indication of husks, green maize, or maize tassels) were documented only at site LA 115330 in three pit samples. Maize macrobotanical remains were also more frequent at site LA 115330 (76% of 26 samples had maize) than at site LA 26306 (41% of 17 samples contained maize; McBride, Chapter 25).

The higher abundance of pollen from site LA 26306 was a result of high values of Chenopodium pollen. The average concentration from four floor samples at site LA 26306 was 4200 gr/cc and the average percentage of Chenopodium was 56%. At site LA 115330, two floor samples (one from a possible ramada) averaged 1300 gr/cc concentration with an average of 35% Chenopodium. Pollen types unique to site LA 26306 were purslane, which occurred in two samples and lily family (one intramural storage pit sample). Pinyon was high with values greater than 10% in three samples (two pits and a hearth). Pollen types that were unique to site LA 115330 or that had high representations were cholla (intramural pit sample), legume family (pit sample from ramada), and beeweed. Two samples at site LA 115330 produced beeweed percentages greater than or equal to 14%, which were the maximum values out of all 52 project samples.

The contrasts between the two sites indicate real differences in plant resources or in the technology of how plant materials were handled and processed. The greater maize representation at site LA 115330 is interesting since there were more structures sampled at site LA 26306, presumably the larger, more substantial site. Site LA 115330 was clearly an agriculture site, perhaps the field house for the site LA 48695 field. Harvests at site LA 115330 may have been processed inside the pit structure and ramada; cholla and beeweed may have been food resources at the site. The larger site LA 26306 was also a farming site, but apparently less maize and more Chenopodium, purslane, and pinyon were utilized there. It is possible that site LA 115330 was a farmstead supplying site LA 26306 with a refined maize product such as meal or dried kernels, which would not leave pollen.

CONCLUSIONS

The maize pollen identified in more than half of the samples provides evidence that the sites along State Highway 602 were farming sites. The pollen results from site LA 48695 showed maize farming has been practiced at this site since the Archaic. However, there was also evidence for use of a variety of other plant resources.

All of the Basketmaker II sites analyzed showed a consistent pattern of economic pollen types, including Chenopodium, grass, beeweed, and maize with rare occurrences of cholla, purslane, lily family, and a large grass type thought to represent Indian ricegrass. The pollen representation of this suite of plants was weighted to the annuals, especially Chenopodium. The annuals were an important ethnobotanical group useful for spring greens and summer seeds and were also weed plants characteristic of field borders and sites. Weedy Chenopodium, such as goosefoot, bugseed, and amaranth, may have been encouraged, conserved, or deliberately cultivated. Chenopodium agriculture has been interpreted from archaeobotanical data collected from across the Colorado Plateau (Berlin et al. 1990; Brandt 1996; Hunter 1997). Grass pollen was notable in this analysis, which may reflect both subsistence use of grass seeds and use of leaves for lining and layering material in pits, on house roofs, and for baskets. Perennial plants, such as cacti and conifers, had a surprising low representation, and there was an overall low abundance of pollen as measured by pollen concentration values. These results are the basis for the conclusion that sites were generally not occupied year-round, but were used primarily during the farming season for growing and harvesting maize.

Two research themes were explored in this analysis: possible functional differences between categories of contexts and comparison between sites LA 26306 and LA 115330, the two sites with substantial structures and extramural features. Specific uses for different pit styles are supported by the pollen results. Bell-shaped pits may have been specialized maize storage units, other

storage pits may have had more general storage uses, and generic pits may have served several purposes not necessarily related to plants. Basin-shaped pits and pits inside structures were probably maize processing features used in some phase of harvest stockpiling, husking, and drying. Intramural pits also showed evidence that other resources were associated with the pits. Cheno-Am stood

out in hearths, which could be related to food processing, fuel use of Cheno-Am shrubs, or postoccupation weeds finding a favorable substrate. Contrasts in the pollen results between sites LA 26306 and LA 115330, the two sites with structures, were interpreted to reflect a primarily maize farming focus at site LA 115330 and greater use of purslane, Cheno-Am, and perhaps pinyon at site LA 26306.

Chapter 25

ARCHAEOBOTANICAL REMAINS

Pamela McBride

INTRODUCTION

Flotation, radiocarbon, and vegetal samples were examined from nine sites along State Highway 602 between the intersection of State Highway 602 and Zuni Route 4 and the boundary of the Zuni Reservation in McKinley County, New Mexico. Basketmaker II occupation is evident at most sites with reuse of sites during Pueblo II times. Exceptions are sites LA 26308 and LA 115323 that date to the Pueblo I/II periods.

Sites overlook Y Unit Draw, a tributary of the Rio Nutria that forms a wide valley that drains into the Zuni River. The valley bottomland would have provided ample arable land for prehistoric inhabitants. The project area is in the Great Basin conifer woodland (Brown 1994:52-57) where the dominant evergreen species are juniper (*Juniperus* sp.) and pinyon (*Pinus edulis*). Isolated stands of ponderosa pine (*Pinus ponderosa*) occur at sites LA 49838 and LA 115334 where elevations exceed 7000 ft. Shrubby species include oak (*Quercus* sp.), yucca (*Yucca glauca*, *Y. baccata*), and sage (*Artemisia tridentata*). Understory consists largely of grasses like blue grama (*Bouteloua gracilis*), dropseeds (*Sporobolus* sp.), Indian ricegrass (*Oryzopsis hymenoides*), or muhleys (*Muhlenbergia* sp.). Cacti include the prickly pear *Opuntia polycantha*, observed at site LA 49838 and other prickly pears, hedgehogs (*Echinocereus* sp.), and chollas (*Opuntia* sp.).

The method followed and results obtained from archaeobotanical analysis of flotation, radiocarbon, and vegetal samples from the nine sites are presented in this chapter. The goals of this report are (1) to describe plant taxa exploited by prehistoric populations; (2) to address research questions such as season of occupation, diet, and subsistence practices; and (3) to compare resource use patterns with other archaeobotanical analysis results from sites in the region.

METHODS

Archaeobotanical analysis of material from the project involved vegetal sample analysis, radiocarbon sample analysis, flotation processing, full-sort analysis, and quantification, as described below.

Identification was aided by the use of a modern comparative collection. Scientific nomenclature and common names followed those presented in Martin and Hutchins (1980). Identifications were made to different taxonomic levels: families (e.g., Gymnospermae), genus (e.g., *Corispermum*), species (e.g., *Pinus edulis*) and non-Linnaean categories (e.g., Cheno-Am). The Cheno-Am category refers to seeds that could be either in the genus *Chenopodium* or *Amaranthus*. This category is used when the condition of a seed prohibits a more specific identification. Pollen analysts are more restricted in their ability to distinguish these genera - they can only identify to the Family level.

Table 25.1 lists the Latin and common name, plant part, and plant category (annuals, perennials, etc) of all charred plants recovered from the project. For ease of reporting, taxa in all other tables are recorded using the common name only. Plant remains designated as "unknown" indicate remains that might be identified later using a more extensive comparative collection. "Indeterminate" plant remains are unidentifiable due to erosion or fragmentation.

Vegetal Sample Analysis

Macrobotanical field samples are fortuitous plant specimens collected as they are encountered in the field either during excavation or the screening of fill and are not necessarily associated with an exact provenience. In spite of this, vegetal specimens can offer further insight into the diet and subsistence of prehistoric populations.

Table 25.1. Charred Plant Taxa from Vegetal, Radiocarbon, and Flotation Samples.

Scientific Name	Common Name	Plant Part
ANNUALS		
<i>Amaranthus</i> sp.	Pigweed	Seed
<i>Chenopodium</i> sp.	Goosefoot	Seed
<i>Chenopodium berlandieri</i>	Pitseed goosefoot	Seed
<i>Chenopodium</i> sp./ <i>Amaranthus</i> sp.	Cheno-Am	Seed
<i>Corispermum</i> sp.	Bugseed	Seed
<i>Cycloloma</i> sp.	Winged pigweed	Seed
<i>Euphorbia glyptosperma</i>	Spurge	Achene
<i>Helianthus</i> sp.	Sunflower	Achene
<i>Portulaca</i> sp.	Purslane	Seed
DOMESTICATES		
<i>Zea mays</i>	Maize	Cob, cupule, cupule segment, embryo, glume,
GRASSES		
Gramineae	Grass family	Caryopsis
<i>Sporobolus</i> sp.	Dropseed grass	Caryopsis
OTHER		
Indeterminate	Indeterminate	Plant part, seed, wood
Rosaceae	Rose family	Wood
Solanaceae	Nightshade family	Seed
Unknown	Unknown	Plant part
PERENNIALS		
<i>Atriplex</i> sp./ <i>Sarcobatus</i> sp.	Saltbush/greasewood	Wood
Cyperaceae	Sedge family	Achene
<i>Echinocereus</i> sp.	Hedgehog cactus	Seed
Gymnospermae	Unknown conifer	Wood
<i>Juniperus</i> sp.	Juniper	Leaflet, wood
<i>Pinus</i> sp.	Pine	Bark scale, needle, umbo, wood
<i>Pinus edulis</i>	Pinyon pine	Nutshell, wood
<i>Pinus ponderosa</i>	Ponderosa pine	Wood
<i>PlatyOpuntia</i> sp.	Pricklypear cactus	Seed
<i>Quercus</i> sp.	Oak	Wood
<i>Yucca baccata</i>	Banana yucca	Seed

Vegetal specimens are identified, counted and weighed, and placed in protective containers such as film canisters or polypropylene vials, depending on specimen size. The taxon, plant part, confidence of the identification, condition, count, and weight of the specimen are recorded along with any observations that may be important in the interpretation of the material. Ten samples from three sites were analyzed. Sample proveniences are given in Appendix G.1.

Radiocarbon Sample Analysis

The goal of radiocarbon analysis is to obtain at least 5 g of material for dating from good contexts. Many archaeologists still send wood specimens for dating without regard to species identification. This can be problematic for several reasons.

Smiley (1985) discusses the importance of ranking the quality of sample materials before

dating. Annuals like maize usually rank highest because of the direct link between cultigens and human subsistence, followed by structural beams with outer growth rings, although there can be a problem with old wood. Small shrubs rank third because of their limited lifespan. Other materials can be ranked down to the least desirable material. The ranking cannot take place if the material has not been previously identified.

Thirty-five radiocarbon samples were submitted by ZCRE for macrobotanical analysis. All material from the radiocarbon samples was identified and weighed when possible. The taxon, plant part, confidence of the identification, and condition of each specimen was recorded. Wood was weighed, but not counted. Weights of <0.1g indicate specimens were too small to register on the scale. Plant materials other than wood that were identified were counted and weighed when possible. Each taxon was placed in an appropriate container such as a foil packet or polypropylene vial. Proveniences for radiocarbon samples are given in Appendix G.2.

Flotation Sample Analysis

Flotation Processing

The Zuni Cultural Resource Enterprise (ZCRE) uses a standard decant flotation system as described by Hammett and McBride (1993). The 83 flotation samples ranged in volume from 0.75 to 4.0 liters (Appendix G.3). One sample (FS 229, LA 26306) was devoid of cultural plant remains. Each flotation sample was poured into a bucket of water, agitated gently until the botanical material floated to the surface, and then decanted onto a clean piece of chiffon material to dry. The residue at the bottom of the bucket (called the heavy fraction) was rinsed to eliminate soil matrix, dried, and examined by ZCRE personnel in order to recover lithic and bone material.

Full-sort Analysis

The floated material was passed through a series of graduated screens (U.S. Standard Sieves with 4-mm, 2-mm, 1-mm, and 0.5-mm mesh

sizes). The material from each screen size was then examined using a binocular microscope at a magnification of 0.7x to 4.5x. Charred reproductive plant parts like seeds and fruits were identified and counted. Charred nonreproductive plant parts (bark, needles, etc.) and uncharred plant parts were also identified and quantified as an estimate of abundance per liter.

If more than 20 pieces of wood charcoal were present in a sample, then 20 pieces (selected randomly from the 4-mm and 2-mm screens) were identified, separated by taxon, counted, and weighed. Then the remainder of each fraction was scanned to identify any taxa that might have been missed. Otherwise, all identifiable wood charcoal from a sample was analyzed.

All wood and reproductive plant parts that were counted and identified from each sample were placed in polypropylene capsules or plastic bags and labeled for future reference. An example of each uncharred or nonreproductive charred plant part encountered during analysis was also separated and placed in a polypropylene capsule or plastic bag.

Noncultural remains such as roots and insect parts observed during flotation analysis were also recorded. These observations are reported along with sample volumes (before flotation) and sample weights (after flotation) in Appendix G.3. Provenience information is listed by feature number and Field Specimen (FS) number in Appendix G.4.

In addition to taxon, plant part, and quantity, the confidence of the identification (positive, fairly certain, resembles taxon) and condition of the plant part (charred, partially charred, or uncharred) were recorded by site and FS number (Appendix G.5).

Quantification

Three forms of quantification were used during the Highway 602 flotation analysis: abundance, ubiquity, and minimum number of individuals (MNI). Each of these is described below.

Abundance

To determine the estimated abundance of charred nonreproductive plant parts and uncharred taxa present in a sample, an estimate of the number of these materials per liter of soil is recorded. This allows for an approximate quantification of nonreproductive plant parts and an estimation of the degree of contamination.

Ubiquity

Many factors can affect the number and type of taxa recovered from flotation samples including differential preservation of plant remains, plant processing techniques, and archaeological sampling strategies. Seeds and nuts with hard testa will preserve, while tubers and leafy greens rarely, if ever, preserve. Plants that were parched during processing are more likely to preserve due to "kitchen accidents" than those that do not require this step during food preparation. A 5-liter flotation sample has a greater probability of yielding a diverse number of plant taxa than a 1-liter sample.

When the first two factors are considered, it can be difficult or impossible to determine the exact composition of the prehistoric diet or the degree of dependence on one plant as compared to another. The latter problem of differential sample size can be resolved by standardizing flotation sample volumes or by applying statistical analyses to determine the effects of sample size on archaeobotanical analysis results. Ubiquity is a quantification method used by archaeobotanists to identify possible trends or patterns that can lead to the identification of plant processing or storage loci or changes in plant exploitation through time.

To determine which plant remains were most common in samples, ubiquity tables were created for nonwood plant taxa recovered from the project. Ubiquity tallies the presence or absence of a taxon in each sample. The number of remains of a particular taxon found in a sample is not reported in this method of quantification.

Presence is recorded for one specimen of a taxon or 200. Therefore, ubiquity measures the frequency of occurrence of taxa as opposed to absolute counts that measure abundance. The flotation analysis results are reported in ubiquity tables as a count (the number of samples in which the taxon is present) and percent presence (the number of samples in which the taxon is present expressed as a percentage of the total number of samples) as Popper describes (1988). For example, if bugseed occurs in two of ten samples, the count would be two and the percent presence would be 20%.

Absolute Counts and MNI

Absolute counts measure the absolute counts of taxa in a sample and become especially useful in situations where the absolute counts of taxa change over time, but the frequency of those taxa does not. During full-sort, flotation, radiocarbon, and vegetal sample analyses, absolute counts and minimum number of individuals (MNI) were recorded for charred seeds and other reproductive plant parts. Absolute counts and MNI were recorded for charred and uncharred reproductive plant parts during vegetal sample analysis. The absolute count includes fragments as well as whole reproductive plant parts. The MNI count was used effectively by Hammett and McBride (1993) on the Transwestern Pipeline Project. This is a quantification measure borrowed from faunal analysts and osteologists, which allows the archaeobotanist to clearly distinguish between the presence of whole or fragmented remains when reporting results. An MNI value of 1 was given to a seed or fruit if more than one-half of that reproductive unit was present. Plant material from the current project was often fragmented, indicating a high degree of abrasion and erosion.

RESULTS OF FLOTATION, RADIOCARBON, AND VEGETAL SAMPLE ANALYSES

The following sections describe the results of analysis of charred and uncharred plant remains,

including wood, from flotation samples. Full-sort flotation sample analysis results are itemized by FS number in Appendix G.5. Radiocarbon samples are also discussed, followed by results of vegetal sample analysis.

Uncharred Plant Remains from Flotation Samples

Archaeobotanists have struggled with the interpretation of uncharred seeds recovered from subsurface samples. The uncertainty as to whether uncharred seeds were deposited because of cultural activity, from rodent and insect activity, or from seed rain, precludes their clear interpretation. Minnis (1981) discussed problems inherent in interpreting uncharred seeds recovered from open-air sites. He tested a modern facsimile of an archaeological site to compare the presence of taxa known to have been used (called "economic taxa") to the number of contaminants. Three economic taxa were recovered, as well as 16 taxa that had been deposited by nonhuman processes such as seed rain or rodent movement. Because of these kinds of questions about the origins of uncharred seeds found in open-air sites, this report will focus on charred plant remains. Therefore, when present, uncharred remains were recorded during full-sort analyses, but were considered more as a representation of the local vegetation than a reflection of cultural activities.

Uncharred plant material included 15 taxa (Table 25.2). Only 9 of the 18 charred taxa recovered from the project were not recovered uncharred. This suggests a significant degree of contamination by noncultural intrusives. However, over half of the flotation samples examined had no evidence of uncharred intrusives, indicating the level of contamination was actually moderate.

Charred Plant Remains from Flotation Samples

Maize cupules and weedy annual seeds dominate the floral assemblage from the project (Table 25.3). The adaptive advantage that weedy annuals have of proliferating in the disturbed ground around habitation sites, agricultural fields,

and middens make them a readily available resource and their seeds have been recovered from a wide array of prehistoric assemblages. Not only is maize a nutritious food resource, but also cobs, minus the edible kernels, are a good source of fuel, and cob fragments (such as cupules) usually comprise a large percentage of archaeobotanical assemblages.

Perennial species are represented by low frequencies of banana yucca, hedgehog cactus, prickly pear cactus, and pinyon. Grass family and dropseed grass grains are also present in low frequencies.

Site LA 26306

Site LA 26306 is on a bedrock ridge in pinyon and juniper woodland. The site consists of 3 pitstructures and 11 extramural pits. Features are located on both sides of State Highway 602 with occupation associated with the Basketmaker II period. The Feature 28 pitstructure was slightly deeper than the other two structures and showed evidence of more complex features such as the two benches, four postholes, and hearth that were defined during data recovery. A midden associated with the Pueblo II period is above the Basketmaker II deposits on the eastern side of State Highway 602.

Maize cupules, goosefoot, and Chenopodium seeds were the most common plant remains identified from flotation samples (Table 25.4). Documented economic uses of weedy annuals like goosefoot and pigweed seeds abound in the ethnographic literature. Castetter (1935) described the use of these as a ground meal, either eaten as gruel or combined with other food such as cornmeal and made into cakes. Harrington (1967) cited the same uses and said the seeds can be parched and eaten partly raw, although he found the seeds too small to chew easily.

Absolute abundance was extremely low, with the highest number of plant remains per liter of soil recovered from the extramural bell-shaped pit. The five taxa identified from the bell-shaped pit along with pine bark and juniper, pinyon, pine,

Table 25.2. Ubiquity of Uncharred Plant Remains from Flotation Samples.

Common Name/Plant Part	Count*	%**
Dicot leaf	2	6
Doveweed seed	2	6
Dropseed grass caryopsis	8	24
Evening primrose seed	1	3
Goosefoot seed	8	27
Grass family floret	1	3
Grass family panicle	1	3
Hedgehog cactus seed	1	3
Indeterminate seed	1	3
Juniper twig	8	24
Juniper wood	3	9
Knotweed family achene	2	6
Mint family seed	2	6
Pigweed seed	3	9
Pine male cone	2	6
Pine needle	4	12
Pine wood	1	3
Pinyon pine needle	4	12
Pinyon pine wood	1	3
Pitseed goosefoot seed	1	3
Purslane seed	10	30
Ricegrass caryopsis	1	3
Spurge achene	3	9
Unknown flower	1	6
Unknown leaf	1	3
Unknown plant part	2	6

*Count = Number of samples with common name/plant part present.

**% = Number of samples with common name/plant part divided by total number of samples with uncharred remains from project (33) x 100.

Table 25.3. Ubiquity of Charred Nonwood Plant Remains from Flotation Samples.

Common Name/Plant Part	Count*	%**
Banana yucca seed	2	3
Bugseed seed	22	35
Cheno-Am seed	31	49
Dropseed grass caryopsis	3	5
Goosefoot seed	27	43
Grass family caryopsis	2	3
Hedgehog cactus seed	1	2
Indeterminate plant part	7	11
Indeterminate seed	8	16
Juniper leaflet	2	3
Maize cupule	37	59
Maize cupule segment	1	2
CF. Maize embryo	1	2
Maize kernel	3	5
Nightshade family seed	1	2
Pigweed seed	9	14
Pine bark scale	5	8
Pine needle	2	3
Pine umbo	1	2
Pinyon pine nutshell	3	5
Pitseed goosefoot seed	13	21
Pricklypear cactus seed	1	2
Purslane seed	8	13
Sedge family achene	1	2
Spurge achene	1	2
Sunflower achene	8	13
Winged pigweed seed	2	3

*Count = Number of samples with common name/plant part present.

**% = Number of samples with common name/plant part divided by total number of samples with charred nonwood remains from project (63) x 100.

Table 25.4. Site LA 26306, Ubiquity of Charred Nonwood Plant Remains from Flotation Samples.

Common Name/Plant Part	Count*	%**
Bugseed seed	4	36
Cheno-Am seed	7	64
Goosefoot seed	7	64
Hedgehog cactus seed	1	9
Indeterminate seed	1	9
Indeterminate unknown	2	18
Maize cupule	7	64
Maize kernel	1	9
Pigweed seed	1	9
Pine bark scale	3	27
Pinyon pine nutshell	1	9
Pitseed goosefoot seed	2	18
Purslane seed	2	18
Sunflower achene	2	18

*Count = Number of samples with common name/plant part present.

**% = Number of samples with common name/plant part divided by total number of samples with charred nonwood remains from site (11) x 100.

and undetermined conifer woods probably represent part of the secondary trashy fill of the feature rather than the primary storage contents. Plant remains identified from extramural indeterminate pits and the rock pile do not contribute to the identification of feature function. Floral remains from three (Features 6, 9, and 10) were limited to wood charcoal and Feature 14 was sterile, containing only uncharred rootlets.

Segregation of three taxa was apparent; pinyon nutshell and hedgehog cactus only occurred in extramural features, while sunflower achenes were restricted to Feature 28 pitstructure contexts. Hedgehog cactus fruits were eaten fresh, baked, or made into a cake by cooking the pulp with sugar (Castetter 1935:26). The spines were removed by burning and perhaps this procedure was conducted outside along with processing of the fruits and may explain why the hedgehog seeds were restricted to the extramural feature.

The fall-ripening pinyon nut crop is an exceedingly valuable wild food resource, especially given its nearby availability. The nuts

are distinguished by a particularly high energy value (635 calories per 100 g, higher than most other plant and animal foods used prehistorically, including corn; Ford 1968:158,160). Ethnographic references for the Tewa, Isleta, and Zuni indicate the prevalence of storing nuts in the shell, sometimes preceded by roasting (Castetter 1935:40-42; Robbins et al. 1916:41, Jones 1930:37). These accounts note how roasting the nuts benefits both flavor and preservation. Possibly, roasting pinyons was also an outdoor activity.

The oil-rich seeds of the sunflower were an important source of food and oil. The ground seeds could be boiled until the oil rose to the surface and could then be skimmed off. The seeds were parched and eaten whole, hull and all, or ground into a meal (Harrington 1967:314). The Zuni used pulverized ray flowers of the sunflower along with blossoms of paper daisy (*Psilostrophe tagetina*) for ceremonial purposes (Stevenson 1915:59). Preservation conditions in Feature 28, the deepest of the pitstructures, may have been

better than for the other two structures and may account for the isolated occurrences of sunflower from this feature.

Archaeobotanical remains from site LA 26306 indicate site occupants were cultivating maize and gathering wild annuals like goosefoot and purslane along with the perennial resources, pinyon nuts and hedgehog cactus fruits.

Site LA 26308

Site LA 26308 is a site whose excavated features consist of four hearths, three indeterminate pits, and one bell-shaped storage pit on a bedrock ridge approximately 300 m from the extant stream channel on the west side of State Highway 602. Vegetation is dominated by sagebrush with scattered juniper and pinyon. Radiocarbon dates indicate a Pueblo I/early Pueblo II occupation of the site. Five of the eight features defined during data recovery were sampled for floral remains.

Cheno-Ams and banana yucca seeds comprised the evidence of potential food resources used by site occupants. Frequent references to the use of yucca can be found in the ethnographic literature (Harrington 1967:335, 339). Every part of the yucca was used either for food, fiber, or soap. The pulp of banana yucca fruit was used in a variety of ways including gruel, dumplings, bread, and conserve (Harrington 1967:334).

Site LA 26319

Excavation of site LA 26319 included four features, three pits and a hearth, situated on a bedrock ridge on the eastern side of State Highway 602. Radiocarbon dates indicate a Basketmaker II occupation of the site. A late Pueblo II fieldhouse is on the western side of State Highway 602, but is outside the right-of-way and therefore was not part of the data recovery.

The floral assemblage consisted of maize, weedy annuals, and an unknown grass. The hearth produced the richest array of plant remains

including maize cupules and goosefoot, pitseed goosefoot, Cheno-Am, and unknown grass seeds. Grasses were used extensively by Southwestern groups (Doebley 1984) and it is no surprise that these resources, rich in carbohydrates, are usually part of archaeobotanical assemblages from all time periods. Occupants of site LA 26319 were probably cultivating maize nearby and collecting weedy annual and grass seeds to enrich their diet.

Site LA 48695

Four indeterminate sandstone rock scatters and one water control feature were recorded during survey work at site LA 48695. A flotation sample from the water control feature (Feature 4) that is inside the right-of-way was analyzed. The water control feature is probably associated with Pueblo II farming activities in the bottomlands of the Y Unit Draw and seemed to be oriented to check water from an axial stream. A flotation sample from an undefined feature (Feature 12) outside the right-of-way containing upright sandstone slabs that is probably contemporaneous with the water control feature was also examined as well as samples from the top of the buried A horizon, well below the Pueblo II deposits.

Nine uncharred taxa were recovered from the water control feature including pigweed, goosefoot, dropseed grass, pitseed goosefoot, spurge, purslane, and mint family seeds along with juniper twigs and dicot leaves; these should be considered intrusives. Charred wood, goosefoot seeds, and a possible maize embryo fragment were recovered from Feature 12 (dating to the Pueblo II period). Samples from the top of the buried A horizon yielded charred wood and goosefoot, purslane, goosefoot, Cheno-Am, and pigweed seeds.

The presence of charred wood and seeds from the water control feature (the radiocarbon sample from Feature 4 contained undetermined conifer and pine charcoal), Feature 12, and the buried A horizon is somewhat puzzling. How charred remains were deposited is questionable. Charred remains only have an opportunity of appearing in the record when food preparation activities have

taken place and an accident occurs or when fire of some kind was involved. Cultural remains could have washed in from sites to the west (site LA 115330) or the charred remains could be present as a result of a slash and burn type strategy to clear land of vegetation for agricultural purposes.

Maize pollen was identified 70 cm below the surface in laminated alluvial deposits northwest of the water control feature. A radiocarbon date of 60 BC was obtained from the deposits, indicating that use of the area for agricultural pursuits began in Basketmaker II times and was renewed during the Pueblo II period.

Site LA 49838

Site LA 49838 is on a low hill in predominately pinyon/juniper woodland. A small stand of ponderosa pine grows on the north side of the site and yucca, prickly pear cactus, sage, and oak can also be found growing in the vicinity. The site consists of seven features: a midden, a thermal feature, two bell-shaped pits, and two bell-shaped pits/roasting pits. Radiocarbon dates indicate use of the site took place during the Basketmaker II period. A late Pueblo II/early Pueblo III midden overlying the Basketmaker II deposits attests to use of the site later in time. Flotation samples were collected from six of the features.

Maize cupules were the most common plant remains, identified in four out of six samples examined. Pinyon nutshell was recovered in the thermal feature and the bell-shaped storage pit. A prickly pear seed, the only other evidence of perennial plant use was recovered from the bell-shaped storage pit as well. The fruits of prickly pear cacti were eaten much the same way as those of the hedgehog cactus—raw, boiled, or dried (Castetter 1935:35-37).

The Feature 3 bell-shaped pit/roasting pit produced the greatest number of charred taxa including a maize cupule and sunflower, pigweed, Cheno-Am, and winged pigweed seeds. Absolute abundance of the remains was extremely low (one or less of each taxon)

and although the remains may represent remnants of roasting activities and/or storage contents of the feature, the scant numbers makes them difficult to interpret as anything more than part of secondary trash fill.

Prehistoric peoples who made use of site LA 49838 probably cultivated maize nearby and exploited at least five weedy annual taxa, prickly pear cactus, and pinyon nuts and gathered locally available woods for fuel.

Site LA 115323

The site, consisting of a fieldhouse constructed of pecked sandstone rocks, is on a low rise among juniper and pinyon woodland on the western side of State Highway 602. Road construction and maintenance have destroyed much of the structure. The fieldhouse was in use during Pueblo I/II times. Four flotation samples were examined from four contexts in the structure.

Pine needles and one fragment of a nightshade family seed were the only charred nonwood floral materials recovered. The pine needles are probably artifacts of using pine branches for fuel that had needles still attached. The needles subsequently became part of the floral assemblage. While the fruits of several members of the Solanaceae family such as groundcherry (*Physalis* sp.) and wolfberry (*Lycium* sp.) were used as food, little can be said about a fragment that could not be identified to genus.

The fieldhouse was too badly compromised by highway construction and erosion to yield much information about subsistence at the site.

Site LA 115324

Four earthen pits, two of which might be storage features, comprise the cultural features encountered during data recovery at site LA 115324. The site is on a bedrock ridge, approximately 100 m (328 ft) from the current stream channel in pinyon and juniper woodland on the eastern side of State Highway 602.

Extreme water movement has washed artifacts downslope of the site and excavation of the backhoe trench removed an unknown portion of the site.

A sample was examined from each pit. Features 3 and 4 produced uncharred purslane and dropseed grass seeds. These should be considered as modern intrusives. Features 1 and 2 yielded the only charred nonwood remains. A charred purslane seed was identified from Feature 1 and a possible maize cupule fragment was recovered from Feature 2. The size of the possible cupule fragment prohibited any positive identification of the specimen. Although there are numerous documented uses of purslane in the ethnographic literature (Castetter 1935:43; Harrington 1967:87-89; Kirk 1970:32), interpretation of a single seed is difficult.

Extensive root and/or rodent disturbances were documented during excavation of all features. These disturbance factors, along with the destruction of part of the site, contributed to the poor preservation and recovery of plant remains. Maize and purslane could have been part of the diet of prehistoric peoples who utilized site LA 115324.

Site LA 115327

Nine pits were defined during data recovery at this site on a low rise where sagebrush and grass are the major ground cover plants. One of the pits was reused as a human burial pit and was not sampled for archaeobotanical remains. A radiocarbon date from the Feature 4 pit indicates a Basketmaker II occupation of the site. A Pueblo II artifact scatter was present on the surface of site LA 115327.

Uncharred goosefoot, dropseed grass, and mint family seeds were identified in four of the eight samples examined and should be considered as modern intrusives. Samples from Features 1 and 4 yielded the only charred nonwood remains including maize cupules and a bugseed seed. Although bugseed has no documented ethnobotanical uses, it was no doubt used in much

the same way as goosefoot. Charred bugseed has been recovered from southeast Utah (Reed 1983), the Chaco area (Donaldson and Toll 1982), Tsaya Wash (Minnis 1978) and the San Juan Basin (Hammett and McBride 1993). These data along with bugseed that was found in coprolites at Cowboy Cave (Hogan 1980) provide convincing evidence that bugseed was a source of food for prehistoric populations.

Similar disturbance factors to those found at site LA 115324 were noted during excavation at site LA 115327. Extensive root, insect, and/or rodent disturbances were present in all features, seriously impacting preservation of fragile plant material. The most that can be said is that site occupants were probably growing maize nearby and bugseed could have been part of the wild resources collected for food.

Site LA 115330

Site LA 115330 was the most extensive site excavated during State Highway 602 data recovery. The site consisted of seven extramural features, a pitstructure with 12 floor and wall features, and an activity area northwest of the pitstructure that contained five pits and a posthole. The site is just south of site LA 48695, on the western side of State Highway 602 on the eastern slope of a bedrock ridge in piñon and juniper woodland. Radiocarbon dates range from 200 BC to AD 390, indicating a Basketmaker II occupation of the site.

Twenty-seven flotation samples were analyzed, yielding 15 charred taxa including banana yucca, bugseed, dropseed grass, goosefoot, grass family, juniper, maize, pigweed, pine, pitseed goosefoot, purslane, sedge family, spurge, sunflower, and winged pigweed. Maize cupules were the most common plant remain recovered followed by Chenopodium, bugseed, and goosefoot seeds (Table 25.5). The ground seeds of dropseed grass were used by the Navajo to make dumplings, rolls, and griddle cakes and the Hopi ground the seeds and mixed them with cornmeal (Castetter 1935:28). Even though dropseed grass grains are very small, the positive qualities of abundant seed production

Table 25.5. Site LA 115330, Ubiquity of Charred Nonwood Plant Remains from Flotation Samples.

Common Name/Plant Part	Count*	%**
Banana yucca seed	1	4
Bugseed seed	16	59
Cheno-Am seed	19	70
Dropseed grass caryopsis	3	11
Goosefoot seed	15	56
Grass family caryopsis	1	4
Indeterminate plant part	3	11
Indeterminate seed	6	22
Juniper leaflet	2	7
Maize cupule	21	78
Maize cupule segment	1	4
Maize kernel	2	7
Pigweed seed	6	22
Pine needle	1	4
Pine umbo	1	4
Pitseed goosefoot seed	6	22
Purslane seed	3	11
Sedge family achene	1	4
Spurge achene	1	4
Sunflower achene	5	19
Winged pigweed seed	1	4

*Count = Number of samples with common name/plant part present.

**% = Number of samples with common name/plant part divided by total number of samples with charred nonwood remains from site (27) x 100.

and the retention of the grains by the plant after maturation, preventing their loss before harvesting, (Doebley 1984) outweigh the problem of small seed size. The juniper leaflets that were recovered in two samples are probably an artifact of using juniper twigs for fuel and the same can be said about the presence of pine needles.

At least one member of the sedge family, bulrush, was used extensively by many Native American groups. The young shoots were eaten raw or cooked, the pollen was collected when the plant was in flower and mixed with meal, the stems were used to make baskets or mats, and the seeds were ground into a meal (Harrington 1967:212). Stevenson (1915:17) reported medicinal uses of two species of spurge for the

Zuni and one of the same taxa was documented by Kirk (1970:31-32) for treating various ailments. However, neither of the species documented was the spurge *Euphorbia glyptosperma* that was found in flotation samples from site LA 115330.

The interior Feature 13 storage pit dates to 50 BC and was contemporaneous with the agricultural field at site LA 48695. Unusual numbers of maize kernels and cupules were recovered from flotation and radiocarbon samples from the pit. Several fused masses of kernels and 470 loose kernels (absolute count) along with 195 cupules (including fragments) and four measurable cobs were part of four radiocarbon samples from the feature. Absolute counts of maize remains from the flotation samples

amounted to 99 cupules and 57 kernels. The excavation notes characterize the upper fill of the feature (where samples were collected) as a possible isolated refuse episode. The presence of fused kernel masses indicate that a cache of shelled kernels burned and were either stored in the feature and burned in situ or were burned elsewhere and deposited in the feature along with faunal and other floral remains recovered in the upper fill.

Eight taxa were identified from extramural contexts at site LA 115330 versus 12 from interior contexts. The difference in plant assemblage richness between exterior and interior contexts could indicate that the majority of plant processing and consumption took place indoors. However, differential preservation could be a factor here. Deeper deposits and structure walls protect fragile plant parts from erosive elements better than exposed, shallow extramural features.

Radiocarbon Samples and Wood from Flotation

Caution should be used when interpreting wood taxa ubiquity. Smart and Hoffman (1988) point out that ubiquity records only the presence of wood taxa and certain taxa may be missing from the record if they burned to ash, did not preserve, or could not be identified, or if field sampling constraints (only rarely is an entire site excavated) preclude their presence.

Several problems that arise consistently during wood identification in the Southwest are addressed by placing specimens in more general categories. The identification of unknown conifer is used when a specimen is too fragmentary to enable the analyst to differentiate between juniper and other conifers such as pinyon or fir. Pine is designated when resin ducts are present, but the fragmentary nature of a specimen does not allow for identification to species. Several species of shrubs that are in the *Chenopodiaceae* (goosefoot) family are impossible to distinguish from each other (fourwing saltbush, greasewood, winterfat, etc.). For this reason, identification to species is impossible and specimens are placed in the combined saltbush/greasewood taxon.

Table 25.6 presents radiocarbon sample analysis results. The flotation full-sort results (Appendix G.5) present flotation wood counts and weights by site and FS number. Unknown conifer and pine were the most common wood taxa identified in flotation and radiocarbon samples from the current project, followed by juniper (Tables 25.7 and 25.8). Oak was identified in 19% of flotation samples and pinyon in 13% of flotation samples. Oak and pinyon were recovered in a higher percentage of radiocarbon samples (22% and 41% respectively).

Saltbush/greasewood wood was restricted to the extramural activity area and the pitstructure at site LA 115330, and rose family wood was recovered in a single flotation sample from the fieldhouse at site LA 115323. Ponderosa was identified from a floor-fill radiocarbon sample from pitstructure Feature 29 at site LA 26306 and wood that compares to ponderosa was identified in two samples from the top of the buried A horizon at site LA 48695. The coniferous woods along with saltbush/greasewood were available growing on or near the sites. Shrubs of the rose family like mountain-mahogany (*Cercocarpus montanus*) and Saskatoon serviceberry (*Amelanchier alnifolia*) would have been found growing along with oak upslope where montane conifer forest contacts with Great Basin conifer woodland (Brown 1994:55).

A comparison of wood taxa ubiquity from interior and exterior contexts at sites LA 26306 and LA 115330 resulted in no noteworthy differences. Unknown conifer is the dominant wood type from all contexts, followed by pine and juniper. The only exceptions were that the percent presence of juniper was higher than pine, and oak was absent from exterior contexts at site LA 26306.

Five measurable maize cob fragments were analyzed from the radiocarbon sample collected from the storage pit in the pitstructure at site LA 115330. Measurements from the cob fragments were recorded and are reported in Table 25.9. This is a very small sample to be able to say much about;

Table 25.6. Radiocarbon Sample Analysis Results.

Site/FS No.	Common Name	Confidence	Count*	Weight (g)
<u>LA 26306</u>				
144	Juniper	Positive	-	0.2
144	Pinyon pine	Positive	-	0.1
144	Oak	Positive	-	1.2
215	Juniper	Positive	-	0.6
215	Pine	Positive	-	0.1
215	Pinyon pine	Positive	-	0.1
228	Ponderosa pine	Fairly certain	-	7.1
232	Unknown conifer	Positive	-	0.5
232	Juniper	Positive	-	1.3
232	Pine	Positive	-	1.5
232	Pinyon pine	Positive	-	2.3
232	Oak	Positive	-	<0.1
265	Juniper	Positive	-	1.3
265	Pine	Positive	-	4.3
265	Pinyon pine	Positive	-	4.9
271	Juniper	Positive	-	0.3
271	Pine	Positive	-	3.4
271	Pinyon pine	Positive	-	8.8
<u>LA 26308</u>				
89	Unknown conifer	Positive	-	<0.1
89	Juniper	Positive	-	0.1
89	Pine	Positive	-	0.2
99	Unknown conifer	Positive	-	0.5
99	Pine	Positive	-	2.2
99	Pinyon pine	Fairly certain	-	0.6
99	Oak	Positive	-	0.9
101	Unknown conifer	Positive	-	0.2
101	Juniper	Positive	-	0.2
101	Pine	Positive	-	5.2
101	Pinyon pine	Positive	-	1.1
<u>LA 26319</u>				
36	Unknown conifer	Positive	-	0.1
36	Pine	Positive	-	4.8
36	Pinyon pine	Fairly certain	-	1.2
<u>LA 48695</u>				
2	Unknown conifer	Positive	-	<0.1
22	Unknown conifer wood	Positive	-	0.1
23	Unknown conifer wood	Positive	-	0.1
23	Pine wood	Positive	-	<0.1
<u>LA 49838</u>				
350	Pine	Positive	-	5.5
350	Pinyon pine	Positive	-	1.9
354	Pinyon pine	Positive	-	13.2
365	Unknown conifer	Positive	-	0.6
365	Juniper	Positive	-	0.6
365	Pine	Positive	-	0.8
<u>LA 115323</u>				
32	Unknown conifer	Positive	-	<0.1
33	Unknown conifer	Positive	-	<0.1
45	Unknown conifer	Positive	-	0.2
45	Pine	Positive	-	0.2

(continued)

Table 25.6. Continued.

Site/FS No.	Common Name	Confidence	Count*	Weight (g)
<u>LA 115324</u>				
82	Unknown conifer	Positive	-	<0.1
82	Pine	Positive	-	<0.1
86	Unknown conifer	Positive	-	<0.1
<u>LA 115327</u>				
50	Unknown conifer	Positive	-	0.1
50	Pine	Positive	-	0.9
56	Unknown conifer	Positive	-	0.2
56	Pine	Positive	-	1.7
<u>LA 115330</u>				
148	Unknown conifer	Positive	-	0.6
148	Juniper	Positive	-	11.6
148	Pine	Positive	-	1.3
168	Unknown conifer	Positive	-	1.4
168	Juniper	Positive	-	2.4
168	Pine	Positive	-	6.6
168	Pinyon pine	Fairly certain	-	0.1
188	Unknown conifer	Positive	-	2.7
188	Juniper	Positive	-	3.7
188	Pine	Positive	-	3.1
188	Pinyon pine	Fairly certain	-	4.3
188	Oak	Positive	-	0.3
192	Maize cupule	Positive	1(1)	<0.1
192	Maize kernel	Positive	6(2)	0.1
194	Saltbush/greasewood	Positive	-	<0.1
194	Sunflower	Positive	4(1)	<0.1
194	Maize cupule	Positive	37(9)	<0.1
194	Maize cupule segment	Positive	5(5)	0.2
194	Maize embryo	Positive	2(0)	<0.1
194	Maize glume	Positive	28(20)	<0.1
194	Maize kernel	Positive	111(66)	2.9
205	Unknown conifer	Positive	-	0.1
205	Pine	Positive	-	0.1
205	Oak	Positive	-	0.2
207	Unknown conifer	Positive	-	0.1
207	Juniper	Positive	-	3.1
207	Pine	Positive	-	0.3
207	Oak	Positive	-	0.5
207	Maize cob	Positive	4	0.5
207	Maize cupule	Positive	35(28)	0.8
207	Maize cupule segment	Positive	7(7)	0.7
207	Maize kernel	Positive	240(137)	7.2
210	Maize cupule	Positive	45(15)	0.7
210	Maize cupule segment	Positive	9(9)	0.9
210	Maize kernel	Positive	8(1)	0.2
211	Unknown conifer	Positive	-	<0.1
211	Sunflower achene	Positive	1(1)	<0.1
211	Juniper	Positive	-	<0.1
211	Maize cupule	Positive	84(33)	0.7
211	Maize embryo	Positive	12(12)	<0.1

(continued)

Table 25.6. Continued.

Site/FS No.	Common Name	Confidence	Count*	Weight (g)
<u>LA 115330 (Continued)</u>				
211	Maize glume	Positive	5(4)	<0.1
211	Maize kernel	Positive	103(37)	2.2
214	Maize cupule	Positive	31(16)	0.4
214	Maize cupule segment	Positive	1(1)	0.1
214	Maize kernel	Positive	142(69)	3.9
218	Unknown conifer	Positive	-	0.5
218	Juniper	Positive	-	0.7
218	Pine	Positive	-	3.8
218	Pinyon pine	Fairly certain	-	0.6
218	Oak	Positive	-	<0.1
221	Unknown conifer	Positive	-	0.1
221	Juniper	Positive	-	5.6
221	Pine	Positive	-	0.2

*Numbers in parentheses represent minimum number of individuals (MNI), recorded for charred reproductive plant parts.

Table 25.7. Ubiquity of Charred Wood Taxa from Flotation Samples.

Common Name	Count*	%**
Indeterminate	1	1
Juniper	29	38
Oak	15	19
Pine	54	70
Pinyon pine	10	13
CF. Ponderosa pine	2	3
Rose family	1	1
Saltbush/greasewood	2	3
Unknown conifer	70	91

*Count = Number of samples with common name present.

**% = Number of samples with common name divided by total number of samples with charred wood from project (77) x 100.

Table 25.8. Ubiquity of Charred Wood Taxa from Radiocarbon Samples.

Common Name	Count*	%**
Juniper	15	47
Oak	7	22
Pine	21	66
Pinyon pine	13	41
Ponderosa pine	1	3
Saltbush/greasewood	1	3
Unknown conifer	24	75

*Count = Number of samples with common name present.

**% = Number of samples with common name divided by total number of radiocarbon samples with wood from project (32) x 100.

Table 25.9. Site LA 115330, Maize Cob Measurements.

Row Number	Row Type	Cob Length (mm)	Rachis Segment Length (mm)	Rachis Diameter (mm)
12	Irregular	11.0	3.4	8.2
14	Straight	8.8	4.0	9.3
Incomplete	Straight	21.2	3.8	-
14	Straight	13.2	4.0	10.1
12	Straight	11.7	4.0	8.1

the sample is obviously not representative. However, percentages of cob row numbers recorded for Basketmaker III and Basketmaker III/Pueblo I sites in Chaco Canyon and the Ram Mesa (east of Zuni) and Wide Ruin Wash (west of Zuni) communities are listed in Table 25.10 for comparison. Similarities between data sets are distinctly lacking, but Chaco Canyon and Ram Mesa are really the only areas where a statistically valid comparison can be made. Row number seems to be dominated by 8- and 10-row cobs at Ram Mesa or at least there are fewer 12- and 14-row cobs at Ram Mesa than at Chaco Canyon. Toll (1993), through comparisons of maize cob measurements at Chaco Canyon, found that 12-row cobs were predominant from Basketmaker III/Pueblo I sites and 10-row cobs dominated maize assemblages from the Pueblo II period. Cobs with eight rows were few in number from the earlier sites, but occurred in significant numbers from Pueblo II sites. A similar pattern could be present at Zuni and other areas outside of Chaco Canyon. Further research and a larger data set for the Basketmaker period would contribute to our ability to document changes in row number percentages through time.

Measurements of maize kernels from four radiocarbon samples and one flotation sample are presented in Appendix G.6. The average height of kernels from the project was 4.7 mm, average width was 5.3 mm, and average thickness was 3.9 mm. Embryos were absent in the majority of kernels (80%) and swelling was noted in only 40% of the kernel assemblage.

King (1987) discusses the relationship between processing techniques and kernel distortion. From

experimental replication, she found that kernels that had been boiled or treated with alkali before carbonization displayed a greater change in size but less distortion than unprocessed kernels. King goes on to say that the increase in size, together with a usually missing embryo, results in a crescent shape, seen in many of the archaeological kernels examined from eastern North America. Although most of the kernels from Highway 602 were missing embryos, the distinctive crescent shape described by King was not apparent in the majority of specimens. The high percentage of kernels with embryos missing and the lack of distortion could indicate kernels were boiled or treated with alkali before they were accidentally charred, but it is impossible to determine with any certainty. Maize kernel attributes and measurements from other regional populations are not available for comparison.

Results of Vegetal Sample Analysis

Site LA 26306

Charred and partially charred juniper was recovered from the floor fill of Feature 29 pitstructure (Table 25.11). Charred juniper was also recovered in the flotation sample from floor fill. Samples examined from a posthole and a primary roof support posthole from the Feature 28 pitstructure produced fragments of uncharred pine, indicating that pine was the preferred conifer used for roof support posts. Unfortunately, the fragments could not be identified as ponderosa or pinyon. Uncharred wood is difficult to identify in the best of situations because a clean cross section is nearly impossible to get, unlike charcoal that is easy to snap. To distinguish between ponderosa

Table 25.10. Comparison of Maize Cob Row Number Percentages.

Project, Time Period	Number of samples	Number of Rows			
		8 or less	10	12	14+
LA 115330 (Basketmaker II)	4			50%	50%
Chaco Canyon 29SJ628 (Basketmaker III) ¹	51	14%	33%	37%	16%
Ram Mesa (Basketmaker III) ²	4	25%	75%		
Ram Mesa (Basketmaker III/Pueblo I?) ²	57	40%	40%	17%	2%
Wide Ruin Wash (Basketmaker III/Pueblo I) ²	2			100%	

¹Toll 1985²Winter 1993

Table 25.11. Sites LA 26306, LA 26319, and LA 115330, Vegetal Sample Analysis Results.

Site /FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)
<u>LA 26306</u>						
242	Juniper	Wood	Positive	Charred	30	20.8
242	Juniper	Wood	Positive	Partially Charred	4	0.9
274	Pine	Wood	Positive	Uncharred	18	11.9
281	Pine	Wood	Positive	Uncharred	8	1.3
281	Unknown conifer	Wood	Positive	Charred	2	<0.1
<u>LA 26319</u>						
32	Pine	Umbo	Positive	Charred	1	0.1
<u>LA 115330</u>						
181	Doveweed	Seed	Fairly certain	Uncharred	1(0)	<0.1
193	Maize	Kernel	Positive	Charred	7(0)	0.1
197	Juniper	Wood	Positive	Charred	1	<0.1
197	Pine	Umbo	Fairly certain	Charred	1	<0.1
197	Pine	Wood	Positive	Charred	2	0.1
197	Pinyon pine	Wood	Positive	Charred	1	0.1
230	Doveweed	Seed	Fairly certain	Uncharred	29(1)	<0.1
235	Unknown	Plant part	Positive	Charred	1(1)	<0.1
236	Pine	Wood	Positive	Uncharred	13	1.0

*Numbers in parentheses represent minimum number of individuals (MNI), recorded for charred and uncharred reproductive plant parts.

and pinyon, the specimen must be large enough to have several growth rings to determine whether the transition from early to late wood is gradual or abrupt and if the distribution of resin ducts is primarily in the late wood or throughout the growth ring. These distinguishing characteristics were not clearly visible in the fragmented uncharred specimens. Two fragments of charred

unknown conifer were also recovered from the primary support posthole.

Site LA 26319

The vegetal specimen from the hearth was identified as a charred scale or umbo from a pinecone (Table 25.11). The umbo could represent

fuel residue or, if the cone fragment came from a pinyon tree, debris from roasting pinyon nuts in the cone. Reagan (1928:146-147) refers to this method of roasting pinyon nuts by the White Mountain Apache of Arizona: "The females go in large numbers to gather piñon nuts every fall.... The nuts are gathered in the cone which is either burned off the nuts near where gathered or after the return home. In this process of charring the cones, the nuts are roasted." However, a lack of pinyon nutshell from the floral assemblage suggests the umbo is more likely to be residue from fuel wood use rather than nut roasting activities.

Site LA 115330

Modern doveweed seeds were identified in two samples (Table 25.11) and should be considered as intrusives. As in results from flotation and radiocarbon sample analysis, maize kernel fragments were recovered from the pitstructure. A charred pine umbo and pinyon, pine, and juniper woods were identified in the sample from Feature 10, an extramural possible storage pit, representing trash fill of the feature. A charred unknown plant part recovered from possible storage pit Feature 25 in the structure does not contribute to the understanding of the feature function. The presence of uncharred pine from posthole Feature 26 provides further evidence that pine was the preferred material for roof support posts.

DISCUSSION

Research Issues and the Archaeobotanical Assemblage

The major research issue that can be addressed by the archaeobotanical assemblage is the relationship between humans and the environment. Looking at subsistence can reveal which plants were exploited in the local environment. The degree of mobility/sedentism present in a community can be partially addressed by determining the possible seasons when a site was occupied. Comparing archaeobotanical assemblages from sites dating to similar time

periods in the area can contribute to our understanding of regional and temporal subsistence patterns.

Subsistence

The archaeobotanical assemblages from sites LA 26306 and LA 115330 (the two Basketmaker II habitation sites) indicate that prehistoric people living in the Y Unit Draw Valley were using a wide array of annual plants, cultivating maize, and targeting a limited number of perennials and grasses. Grasses were actually absent from the record at site LA 26306. This may be a factor of sample size or preservation differences between the two sites.

Fourteen taxa were recovered from site LA 115330 and eight from site LA 26306. However, maize and four weedy annuals were the only taxa unrelated to firewood use with presence values above 20%. Taxa with low frequencies like Sedge Family, winged pigweed, and banana yucca are difficult to interpret. Low ubiquity may be a reflection of differential preservation and preparation methods rather than the actual degree of plant utilization.

A comparison of plant class relative frequencies between sites LA 26306, LA 115330, and all sites are presented in Table 25.12. Ubiquity in this case is based on the number of occurrences of each plant class. The relative frequencies of maize and annuals compared to other plant classes do not differ greatly between the two sites. The relative frequency of annuals is equal at both sites and almost equal to that of maize, and it is inferred that multiple cropping practices may have occurred. When relative frequencies for plant class categories are calculated for all sites in the project, there is only a 9% difference in the relative frequency of annuals and domesticates.

Weedy annuals such as pigweed and goosefoot germinate prolifically in disturbed habitats. Bye (1981) suggested that weedy annuals that germinated in the disturbed ground of cultivated fields were probably encouraged and harvested as

Table 25.12. Comparison of Plant Class Relative Frequencies.

Plant Class	LA 26306	LA 115330	All Sites
Annuals	50%	50%	49%
Perennials	11%	2%	7%
Grasses	-	6%	4%
Domesticates	39%	42%	40%
Total Occurrences	n = 18	n = 48	n = 91

Note: % is based on the number of occurrences of each plant class divided by the total number of occurrences.

potherbs or for their seeds prehistorically just as they are today in the cultivated fields of the Tarahumara of northern Mexico. Bye indicated that the Tarahumara management of weedy annuals in cultivated fields demonstrates multiple cropping ecological theory.

Evidence may exist for the encouragement of weedy annuals in cultivated fields prehistorically. If the occurrence of weedy annuals is comparable to that of domesticates, as it is for sites LA 26306 and LA 115330, then the use of a similar multiple cropping system may be indicated.

The comparison of plant class relative frequencies indicates that maize and weedy annuals were the mainstays of the diet of prehistoric inhabitants of the Y Unit Draw Valley during Basketmaker II and early Puebloan times.

Seasonality

It is important to realize that inferences concerning seasonality should be made using a combination of data from faunal, pollen, archaeobotanical, and archaeological analysis results. As Brandt (1992:11) states, "Inferring seasonality of site occupation based solely on the presence of plant remains is difficult for several reasons. First, certain plants do not follow calendric cycles. Second, climate may affect the production of seed and fruit by influencing abundance; flowering and fruiting can be delayed or stimulated. Finally, seeds and nuts may be stored through several seasons."

Maize was probably grown in the bottomlands of Y Unit Draw. It would be reasonable to assume

that prehistoric people who farmed the valley would have occupied sites from late spring when planting began and into the fall during harvest and preparation of plant foods for storage. However, important spring seed crops like tansy mustard and ricegrass are missing from the record. While the young leaves of tansy mustard and goosefoot can be collected in early April, such fragile plant parts do not preserve in open-air sites. We are left with a wild plant assemblage that consists of plants with seeds or fruits that could only have been gathered during late summer and into the fall (Knight 1982). The seeds of goosefoot, pigweed, and bugseed can be collected in late summer, while cactus fruit, yucca fruit, and pinyon nuts can be collected as late as October or November. Based on archaeobotanical evidence alone, sites appear to have been occupied only from late summer into the fall, possibly as late as November.

Comparative Perspectives: Y Unit Draw Plant Remains in a Regional Context

Table 25.13 presents a comparison of charred flotation plant remains recovered from projects in the Zuni and Chaco Canyon areas. Weedy annuals and maize were the most common plant remains recovered from projects. Maize was recovered from all projects except at site LA 112681. This may be because maize was not an important component of the diet at that site and/or because of poor preservation, low number of samples analyzed (5), and differences in the types of contexts sampled. *Cucurbita* remains recovered from Chaco Canyon comprise the only evidence of other cultigens.

Table 25.13. Comparison of Nonwood Plant remains from Flotation Samples in the Chaco Canyon and Zuni Areas.

Class/Taxon	Time Periods and Project Sites				
	BM II	BM II/III	BMIII/PI	Late PI/PII	P II
	Highway 602: LA 26306, LA 26319, LA 49838, LA 115323, LA 115327, LA 115330	Pia Mesa Road, Zuni Pueblo ¹ NM:12:K3:201, NM:12:K3:202	Chaco Canyon ² 29SJ299, 29SJ423, 29SJ628, 29SJ721, 29SJ724, 29SJ1659	Black Rock Road, north of Black Rock Dam ³ LA 112681	Pia Mesa Road, Zuni Pueblo ¹ NM:12:K3:252
<u>ANNUALS:</u>					
<i>Amaranthus</i> pigweed	+	+	+	-	+
<i>Chenopodium</i> goosefoot	+	+	+	+	+
<i>Chenopodium berlandieri</i> pitseed goosefoot	+	-	-	+	-
<i>Cleome/Polanisia</i> beeweed/clammy weed	-	+	-	-	-
<i>Corispermum</i> bugseed	+	-	+	+	-
<i>Cycloloma</i> winged pigweed	+	-	+	-	-
<i>Descurainia</i> tansy mustard	-	-	+	-	-
<i>Helianthus</i> sunflower	+	-	-	-	-
<i>Nicotiana</i> tobacco	-	-	+	-	-
<i>Portulaca</i> purslane	+	-	+	+	-
<i>Xanthium</i> cocklebur	-	-	+	-	-
<u>CULTIGENS:</u>					
<i>Cucurbita</i> squash	-	-	+	-	-
<i>Zea mays</i> maize	+	+	+	-	+
<u>GRASSES:</u>					
Gramineae grass family	+	-	-	+	+, culms+
<i>Oryzopsis hymenoides</i> Indian ricegrass	-	+	+	+	+
<i>Sporobolus</i> dropseed grass	+	-	-	-	-

(continued)

Table 25.13. Continued.

Class/Taxon	Time Periods and Project Sites				
	BM II	BM II/III	BMIII/PI	Late PI/PII	P II
	Highway 602: LA 26306, LA 26319, LA 49838, LA 115323, LA 115327, LA 115330	Pia Mesa Road, Zuni Pueblo ¹ NM:12:K3:201, NM:12:K3:202	Chaco Canyon ² 29SJ299, 29SJ423, 29SJ628, 29SJ721, 29SJ724, 29SJ1659	Black Rock Road, north of Black Rock Dam ³ LA 112681	Pia Mesa Road, Zuni Pueblo ¹ NM:12:K3:252
OTHER:					
Compositae composite family	-	+	-	-	-
Cruciferae mustard family	-	+	-	-	-
Cyperaceae sedge family	+	-	-	-	-
<i>Euphorbia</i> spurge	+	-	-	-	-
Fabaceae bean family	-	-	-	+	-
<i>Lepidium</i> pepperweed	-	+	-	-	-
Solanaceae nightshade family	+	-	-	-	-
PERENNIALS:					
<i>Atriplex</i> saltbush	-	-	+	-	-
<i>Echinocereus</i> hedgehog cactus	+	-	-	-	-
<i>Juniperus</i> juniper	-	-	+	-	+
<i>Mammillaria</i> pincushion cactus	-	-	-	+	-
<i>Pinus edulis</i> pinyon	nutshell+	-	+	-	-
<i>PlatyOpuntia</i> pricklypear cactus	+	-	-	-	-
<i>Sphaeralcea</i> globemallow	-	-	+	+	+
<i>Yucca baccata</i> banana yucca	+	-	-	-	-
Total No. of samples	62	9	91	5	11
Total taxa	17	8	15	9	7

Note: + = taxon present.

¹ Ruppé 1990² Toll 1993³ McBride 1998

Grasses were not abundant, but Indian ricegrass, an important resource because of its large grain size, was recovered at all projects except those in the State Highway 602 data recovery project. There is no clear explanation for this as Indian ricegrass would have been available prehistorically in the area as it is today. Taxa in the "other" category are all isolated occurrences and absolute abundance is low enough to make equivocal the interpretation of these taxa as part of the prehistoric diet. The same could be said of many of the perennial taxa, but these seeds, particularly from yucca and cactus fruits, are less likely to become accidentally charred than composite family or mustard seeds that are much more easily dispersed by wind or animal vectors. Perennial taxa, similar to the grasses, are not abundant and are absent entirely from the record at the Basketmaker sites from Pia Mesa Road.

The richest array of plants was recovered from the Basketmaker sites of the current project that yielded 17 taxa, followed by the Chaco Canyon sites with 15 taxa. The differences in the number of taxa recovered from projects probably have more to do with extreme sample size differences than any real variations in subsistence. Archaeobotanical assemblages from State Highway 602 and Chaco Canyon are similar, but evidence of cactus and yucca exploitation is absent from the Chaco sites and seems to represent a decided difference in dietary components between the two periods.

Wood taxa recovered from the same sites in the Zuni area and Chaco Canyon are listed in Table 25.14. Juniper and unknown conifer were the most common taxa identified in flotation samples, followed by oak and pinyon. Unknown conifer fragments were the most numerous wood type identified from the two earliest sites. Saltbush/greasewood was most numerous at Chaco Canyon and the Pueblo II site at Pia Mesa Road, while oak had its highest percentage at site LA 112681.

With the exception of site LA 112681 where the percentage of conifers and nonconifers is equal, distinct differences between early and later

sites can be discerned. Conifer presence is high at the two early sites and nonconifer presence is extremely low, while nonconifer presence is higher than conifers at Chaco Canyon and the Pueblo II site at Pia Mesa Road. Much of the patterning seen in wood use has to do with site function, size, and location as well as population pressure, making it difficult to know whether patterns seen in intersite comparisons are reliable or not.

SUMMARY AND CONCLUSIONS

Seventy-six flotation samples, 10 vegetal samples, and 35 radiocarbon samples were analyzed from 9 sites along State Highway 602 in McKinley County, New Mexico. Two Basketmaker II habitation sites, LA 26306 and LA 115330, yielded the most information about subsistence. Maize was the only cultigen identified in samples and was the most abundant plant remain recovered from the two sites, suggesting a subsistence regime in which maize was the major component. Possible maize fields at site LA 48695 lend support to this argument. The fields are contemporaneous with a storage pit in the Feature 2 pitstructure at site LA 115330, where maize remains numbered in the hundreds.

The abundance of weedy annuals like goosefoot, pigweed, and bugseed is nearly equal to that of maize at the two sites, suggesting a multiple cropping system could have been in use. Presence of perennial and grass species was extremely low, suggesting efforts were focused on maize agriculture and the encouragement of annuals that volunteer in the disturbed ground of cultivated fields.

Plant assemblage richness was greater in interior contexts than exterior contexts at sites LA 26306 and LA 115330 and could indicate that the majority of plant processing and consumption took place indoors. However, differential preservation could be a factor affecting the distribution of plant remains.

The floral record at two of the nonstructural sites (LA 26319 and LA 49838) document the

Table 25.14. Comparison of Wood Identified from Flotation Samples in the Chaco Canyon and Zuni Areas.

Class/Taxon	Time Periods and Project Sites				
	BM II	BM II/III	BMIII/PI	Late PI/PII	P II
	Highway 602: LA 26306, LA 26319, LA 49838, LA 115323, LA 115327, LA 115330	Pia Mesa Road, Zuni Pueblo ¹ NM:12:K3:201, NM:12:K3:202	Chaco Canyon ² 29SJ299, 29SJ423, 29SJ628, 29SJ721, 29SJ724, 29SJ1659	Black Rock Road, north of Black Rock Dam ³ LA 112681	Pia Mesa Road, Zuni Pueblo ¹ NM:12:K3:252
CONIFERS:					
<i>Juniperus</i> juniper	13%	7%	29%	1%	13%
<i>Picea</i> spruce		7%			
<i>Pinus</i> pine	24%	8%		18%	
<i>Pinus edulis</i> pinyon	3%	16%	6%	25%	
<i>Pinus ponderosa</i> ponderosa pine			2%		
<i>Pseudotsuga menziesii</i> Douglas fir		5%			2%
Unknown conifer	55%	47%	3%	6%	17%
Total conifer	95%	90%	40%	50%	32%
NONCONIFERS:					
cf. <i>Acer</i> maple		<1%			
<i>Artemisia</i> sagebrush			7%		2%
<i>Atriplex/Sarcobatus</i> saltbush/greasewood	<1%		32%	1%	24%
Chenopodiaceae goosefoot family					2%
<i>Chrysothamnus</i> rabbitbrush			1%	14%	
Dicotyledonae dicot					26%
<i>Eurotia</i> winterfat			<1%		
<i>Gutierrezia</i> snakeweed			<1%		
<i>Lycium</i> wolfberry			1%		
Monocotyledonae monocot					2%
<i>Populus/Salix</i> cottonwood/willow		5%	8%		
<i>Quercus</i> oak	4%	5%		35%	9%
Ring porous					2%
Rosaceae rose family	<1%		2%		
Undetermined non- conifer			9%		
Total non-conifer	4%	10%	60%	50%	67%
Total pieces	932	122	520	100	46
Total taxa	7	9	13	7	10

Note: Taxon percentages are based on percentage of total pieces from project per time period.

¹Ruppé 1990

²Toll 1993

³McBride 1998

use of weedy annuals, grasses, pinyon, prickly pear, and maize, reflecting a subsistence regime similar to that at the two habitation sites.

The lack of substantial numbers of plant remains from the two Pueblo I/II sites (LA 26308 and LA 115323), site LA 115324, and one Basketmaker II site (LA 115327) makes interpretation difficult. Maize was found at site LA 115324 (possible cupule) and at site LA 115327, but was absent from the Pueblo I/II sites. A purslane seed and a bugseed seed comprise the rest of the floral assemblage from the Basketmaker II site. Plant remains from the Pueblo I/II sites consisted of banana yucca, Cheno-Am, and nightshade family seeds, and pine bark and needles.

Comparative data from sites in the Zuni area and Chaco Canyon indicate an ongoing

dependence on maize agriculture and weedy annual plants. Grasses and perennial species do not seem to have played a major role in the subsistence regime of either area. A major shift in wood procurement practices from heavily coniferous to shrubby woods may have begun in the Pueblo I period.

Very little was known about Basketmaker sites in the Zuni area before this study was undertaken. The project data have added to our understanding of Basketmaker subsistence and introduced a tantalizing question of how and why Pueblo II people reused Basketmaker II sites in the Y Unit Draw Valley. The excavation and research of more Basketmaker sites and Pueblo II sites in the area could add valuable information to a growing body of data for these two time periods.

Chapter 26

FAUNAL REMAINS

Jonathan C. Driver

INTRODUCTION

Appendix H provides the recorded information on vertebrate faunal remains from seven excavated sites: LA 26306, LA 48695, LA 49838, LA 115325, LA 115327, LA 115329, and LA 115330. A few gastropod shell fragments were also recovered, but are not considered here. The assemblages discussed include all of the bone artifacts.

This section of the report provides a general introduction to the methods used in description of faunal materials, discusses some aspects of the taphonomy of the assemblages, and then attempts some interpretation of the animal bones. However, assemblages from all sites are quite small, and this places considerable limitations on what can be said about individual sites and on intersite comparisons.

RESEARCH DESIGN AND METHODS

Research Design

The data recovery plan for the project defined certain goals for the analysis of animal remains (Kendrick et al. 1997). Because of the small size of the assemblages, most of the goals cannot be met. Assemblages are too small to study subsistence change through time, and there are insufficient data to assess the seasonality of site occupation. Excavation areas and faunal assemblages are too small to allow intrasite variability studies which might provide information on site structure or social organization.

This report is therefore mainly descriptive, and its value lies in adding to the data base of faunal assemblages for small sites in the Zuni region. Compilation of small data sets will eventually allow comparison and synthesis of the small site

assemblages, thus providing useful comparative information against which to set larger assemblages.

The data recovery plan specified six categories of faunal data for the project: taxon, skeletal element, minimum number of individuals, minimum number of species, number of identified specimens, and weight. Taxon and skeletal element are reported, as these are basic to zooarchaeological studies. Minimum number of individuals is a derived measure from basic data, and the way in which this was calculated is presented later. Minimum number of species is not used in zooarchaeology and is not discussed in this report; anyone interested in calculating this could do so easily from the data tables. Number of identified specimens is a standard quantification method for presentation of basic data. Weight is rarely used in zooarchaeological studies, and weight data were not recorded.

In my opinion there are a number of important data fields which are usually included in zooarchaeological analyses but which were omitted from the data recovery plan. These include element side, element part, fusion, breakage, modification, and size. Data were collected for these fields, as discussed below.

Methods

Lab Procedures

Specimens were presented to the analyst after dry brushing, which removed most of the adhering sediment. Specimens were separated by site and by provenience (in this case the FS number). Specimens were not catalogued individually, but each specimen was described separately in the data base. Specimens which were broken in excavation, or which were recovered as numerous conjoinable pieces were treated as

single specimens, provided that fragmentation was likely to have occurred after deposition. For example, antler has not survived very well in the sites reported here, and typically consists of dozens of pieces of one specimen; a bag of numerous antler fragments would be recorded as a single specimen. No specimens were glued together, and no conservation of specimens was attempted.

Site assemblages were examined sequentially by LA number, but within the site proveniences were examined randomly. Analysis was undertaken using comparative specimens at the Department of Archaeology, Simon Fraser University. For a few specimens Lawrence's (1951) guide to identification of Southwestern artiodactyls was used in conjunction with comparative material. It was not necessary to take any specimens for further identification to another comparative collection.

For each specimen the following information was recorded directly on an Excel spreadsheet: site (LA number), provenience (FS number), taxon, element, part of element, side, state of fusion, breakage, modification, length, thickness, and comments (optional). These descriptors are discussed below. The first part of Appendix H provides complete description of all specimens from all sites. The second part of Appendix H provides the coding system used to record the data.

Data Recording

Identification of Taxon. Ideally, taxonomic identification would be made to the species level, but in most cases this is not possible because skeletal anatomy does not permit easy discrimination between closely related species. For example, the morphology of most elements in cottontail rabbit (*Sylvilagus* sp.) skeletons is not distinct across species. Thus many zooarchaeological identifications will be made to the genus or family level. In addition to using the hierarchical taxonomic system employed by zoologists, zooarchaeologists also create categories which reflect size of the animal. For

example, the category "small mammal" might include specimens which in fact derive from quite widely separated taxonomic groups such as rodents and carnivores. The use of these categories results from the inability of zooarchaeologists to find sufficiently distinctive characteristics on fragmentary specimens. Finally, some specimens are so fragmented or exhibit so few distinctive characteristics that they must be regarded as unidentifiable.

Identification procedures in zooarchaeology require careful thought. In this analysis I have followed the rule that all specimens for which an element identification cannot be made are automatically considered "unidentifiable". All specimens for which an element identification can be made must be assigned some taxonomic descriptor, even if the descriptor is as general as "large mammal". The reasons for this are outlined in Driver (1992).

Element and Part of Element. Element refers to the particular component of the skeleton from which the archaeological specimen derives (e.g., humerus, cervical vertebra). Many different systems have been developed by zooarchaeologists to describe which part of an element is represented. These can range from the very simple ("complete" versus "fragment") to highly complex estimates of what proportion of a bone is present. The system used here (Appendix H) is one which I have applied (with some modifications) to a number of zooarchaeological studies in New Mexico and Colorado.

Side. Side (left or right) is applied to paired bones. In this study side was assessed for all limb bones, scapula, innominate, mandible, and maxilla.

Side is recorded primarily to assist in calculation of minimum number of individual statistics, although some cultural practices (usually ritual) may result in the deposition of bones from one side of an animal's body.

Fusion. Immature bones consist of a number of parts which fuse together as the animal matures.

By recording whether bones are fused or unfused the analyst obtains a rough estimate of the proportion of the assemblage which derives from immature and mature animals.

Breakage. The way in which a bone is broken can provide information on human activity or range of taphonomic processes, such as carnivore chewing or postdepositional fracturing. Breakage was recorded for each end of a specimen.

Modification. This field describes any modification to the bone observable under a low power (10x) microscope. As with breakage, modification provides information about a variety of human and natural processes experienced by the specimen.

Size. All specimens were measured for their length along the long axis. All long bone specimens (i.e., bones with a tubular cross section, cortical bone, and a marrow cavity) were measured for thickness of cortical bone.

Comments. This field was used for nonstandardized description of specimens. For example, brief descriptions of bone artifacts were placed here. If a specimen was composed of more than one fragment, this was also noted.

Measures of Abundance

Two measures of taxonomic abundance are reported. Number of identified specimens (NISP) is the most commonly used and the most fundamental method of quantification. It is simply a count of all specimens (complete elements or fragments) identified to a particular taxon by the analyst. Minimum number of individuals (MNI) is a calculation of the smallest number of animals required to produce the bones of a particular taxon. (It should be noted that one can also report maximum number of individuals, which is the same as NISP). MNI is a derived measure of abundance, and can be calculated in many different ways. In this study MNI was calculated for the entire site assemblage (as opposed to calculating MNI separately for each feature). The following criteria were used to discriminate

individuals when looking at a particular skeletal element: side of body and maturity (fusion) of specimen. Grayson (1984) provides a thorough discussion of the problems of quantifying faunal assemblages.

Tables of MNI and NISP values for each taxon have been reported for each site in Chapters 10, 11, 12, and 19.

TAXA IDENTIFIED

Given the small sample sizes, it is not surprising to find a fairly limited range of taxa. As in many Southwestern sites, mammals are more common than birds, and small mammals are numerically the most important. This section lists the taxa identified, and provides brief notes about the identification process. Olsen (1983) has described the relevance of many of these taxa for the Zuni, and Gnabasiak (1981) has compiled information gathered throughout the Southwest. The number of identified specimens by taxa and site is given in Table 26.1.

Gruiformes

Apart from a few specimens identified as "medium sized bird" or "large bird," the only identified bird bone was from the order Gruiformes, which includes the cranes and the smaller coots and rails. The specimen is larger than comparative specimens of sandhill crane, and may be a whooping crane (*Grus americana*). This identification should be considered provisional until a direct comparison can be made with a modern skeleton.

Lagomorpha

Two genera were identified. *Sylvilagus* is today represented in the Zuni region by *S. floridanus* (eastern cottontail) and *S. auduboni* (desert cottontail). Although it may be possible to distinguish these species on the basis of cranial and mandibular dimensions (Neusius and Flint 1985), this requires a larger sample of specimens than is available from the assemblages reported here.

Table 26.1. Faunal Assemblage by Site.

Taxon	Sites								Total
	LA 26306	LA 48695	LA 49838	LA 115325	LA 115327	LA 115329	LA 115330		
Gruiiformes	1	-	-	-	-	-	-	1	
Medium bird	-	-	-	-	-	-	1	1	
Large bird	1	-	-	-	-	-	2	3	
<i>Sylvilagus</i> sp.	4	-	8	-	2	-	66	80	
<i>Lepus</i> sp.	2	-	9	-	-	-	17	28	
<i>Sciuridae</i>	2	-	-	-	-	-	-	2	
<i>Cynomys</i> sp.	1	-	-	-	-	-	5	6	
Geomyidae	-	-	1	-	-	-	-	1	
Muridae	-	-	-	-	-	-	1	1	
<i>Neotoma</i> sp.	1	-	-	-	-	-	14	15	
<i>Dipodomys ordii</i>	-	-	-	-	-	-	4	4	
Small rodent	-	-	-	-	1	-	2	3	
Carnivore	1	-	-	-	-	-	-	1	
<i>Canis familiaris</i>	-	-	-	-	3	-	-	3	
<i>Canis</i> sp.	6	-	-	-	40	3	-	49	
<i>Odocoileus</i> sp.	1	-	-	-	-	-	2	3	
<i>Antilocapra americana</i>	-	-	-	-	-	-	1	1	
Medium artiodactyl	2	-	-	-	-	-	1	3	
Small mammal	1	-	-	-	-	-	13	14	
Unidentified	18	1	37	1	1	-	121	179	
Total	41	1	55	1	47	3	250	398	

Lepus includes jackrabbits and hares. All identified specimens are in the size range of modern jackrabbits, and are probably from *L. californicus*, the black-tailed jackrabbit, which is found in the region today.

Sylvilagus and *Lepus* are sympatric, but the former tends to occupy woodlands, while the latter prefers more open environments. Both were commonly hunted in the Southwest, using snares, individual hunting, and communal hunting.

Rodentia

Rodents pose problems for faunal studies, because many species burrow and can be incorporated into archaeological deposits if they die underground. Rodent disturbance is reported for many of the contexts from which faunal specimens were recovered on the State Highway 602 sites. Rodents were also trapped and consumed in the Southwest. The rodents found on the State Highway 602 sites are typical of those found on other sites in this region.

The squirrel family (Sciuridae) is represented by *Cynomys*, the prairie dog. Because of the small sample size, species identifications were not made, but it is very likely that *C. gunnisoni* is represented. *Neotoma* (packrat) occurs as four distinct species in the region, and no attempt was made to identify faunal specimens to species. The only rodent identified positively to species is Ord's kangaroo rat (*Dipodomys ordii*). Bones from one individual were recovered from a pit feature in the floor of a pitstructure at site LA 115330. Pocket gophers (Geomyidae) are represented by a single specimen from site LA 49838.

Carnivora

All of the carnivores identified to genus or species are Canidae. A cranium and two mandibles were identified as domestic dog (*Canis familiaris*), based mainly on tooth crowding and the relationship of tooth size to mandible size. All other specimens of *Canis* would fit comfortably into domestic dog skeletons, but have been identified only to the

genus level because of the possibility that coyote (*C. latrans*) might be represented.

Artiodactyla

In the Zuni region in pre-Hispanic times three genera of artiodactyls were present — deer, pronghorn antelope, and bighorn sheep. Because of considerable similarity between artiodactyl skeletons, some specimens are recorded only as "medium sized artiodactyls." Deer (*Odocoileus*) was identified at two sites, but species could not be identified positively. Pronghorn (*Antilocapra americana*) was identified in one assemblage.

TAPHONOMY

Before attempting to derive useful cultural information from animal bone assemblages, one must consider the origin and history of assemblages. There is a large literature concerning taphonomic study of archaeological assemblages (Lyman 1994), but most methods are best applied to large assemblages, and all of the State Highway 602 assemblages are too small for detailed analysis.

One way of assessing the taphonomic history of specimens is to examine them visually for evidence of modification. Using data from the "breakage" and "modification" fields of the assemblage data base, the following conclusions can be drawn.

There is no evidence for butchery on any specimen from any site. This is not surprising in view of the relatively small number of specimens and the preponderance of small mammals in the assemblage. Small mammals rarely display evidence of butchery in Southwestern sites, probably because small mammals were not butchered prior to cookery. The only deliberate human modifications observed were on bone artifacts at sites LA 26306 and LA 115330.

Burning is not necessarily deliberate, and in most cases does not result from cooking. Burned bone was recorded as either black or white (including gray). This intensity of burning results

from prolonged exposure to fire, and may be caused either accidentally (lighting a fire over sediments containing bone) or deliberately (e.g., burning a midden). Burned bone preserves better than unburnt bone under some soil conditions, so high frequencies of burning might indicate that unburnt bone has been destroyed. Excluding the very small assemblages, we find that the percentage of fragments which were burned ranges from none (site LA 115327) to 40% (site LA 49838; Appendix H). There is no simple correlation between frequency of burnt bone and site characteristics, suggesting that local preservation conditions may be responsible.

Breakage of fragments may result from butchery and creation of bone artifacts, from natural processes prior to burial (trampling, carnivore scavenging, desiccation, etc.), or from natural processes during and after burial (sediment pressure, excavation by archaeologists). Except for specimens which had been broken into numerous fragments, two breakage observations were recorded for each specimen to denote the breakage at either end of the bone. Table 26.2 summarizes these data for all sites and all breakage codes. Breakage types are defined in detail in Appendix H. Using data from the three largest assemblages, and excluding bones broken during excavation, Figure 26.1 shows the relative frequency of different breakage types for the three largest assemblages. Site LA 115327 is notable for high frequency of specimens with one or both ends recorded as "intact," and this results from the recovery of parts of a dog burial. The other two sites both show fairly high percentages of "intact," probably the result of the high proportion of small mammals in the assemblage. More fragmented small mammal bones would pass through screens during excavation, and it is the more complete specimens which tend to be recovered and identified. The high frequency of bones with transverse fractures is partly an attribute of burnt bone, which typically breaks in this manner, and also reflects the relatively poor preservation conditions which weaken bones and make them more susceptible to postdepositional breakage.

Other methods of taphonomic analysis rely on examination of the relative frequency of skeletal elements (Lyman 1994). For example, assemblages which have been transported and deposited by fluvial action tend to contain skeletal elements which have similar hydrodynamic properties; assemblages which have been heavily impacted by carnivores tend to contain high frequencies of the most dense bones (Binford 1981). The assemblages from this project are generally too small for this type of analysis. However, one should note relatively high frequencies of tibiae of both jackrabbits (*Lepus*) and cottontails (*Sylvilagus*). These bones were often selected for the production of awls, and the high frequency of tibiae (not all of which are worked) may result from saving certain bones for raw material.

HUMAN SUBSISTENCE

Grayson (1984) has argued that no quantification methods in zooarchaeology produce anything better than ordinal data. Certainly, one cannot calculate any relative dietary values from zooarchaeological information, and most zooarchaeological studies rely on intersite comparisons to make relative statements about trends in faunal use. The very small sample sizes from the State Highway 602 project do not allow detailed comparisons between assemblages.

If we assume that all the canid specimens are from domestic dog, then human hunting and trapping along Y Unit Draw seems to have been oriented towards small game. This suggestion is supported by data from sites LA 115330 (Basketmaker II), LA 26306 (Pueblo II to Pueblo III) and LA 49838 (Pueblo II to Pueblo III). This focus on small game (especially cottontails and jackrabbits) may be linked to the apparently small size of the sites, and their possible function as fieldhouses (at least in later periods). Hunting of large game in the Southwest often involved groups of people in communal activities, and would be best coordinated either from a central

Table 26.2. Type and Frequency of Bone Breakage by Site.

Site	Intact	Excavator		Artifact	Carnivore		Rodent	Spiral	Jagged	Stepped	Transverse		Eroded
		Damage			Damage			Fracture	Fracture	Fracture	Fracture		
LA 26306	24	9		4	1		-	7	2	3	22		9
LA 48695	-	-		-	-		-	-	-	1	1		-
LA 49838	20	12		-	-		-	10	4	4	60		-
LA 115325	-	-		-	-		-	-	1	-	1		-
LA 115327	32	45		-	-		2	-	-	-	7		2
LA 115329	6	-		-	-		-	-	-	-	-		-
LA 115330	139	100		11	-		-	52	28	6	163		1

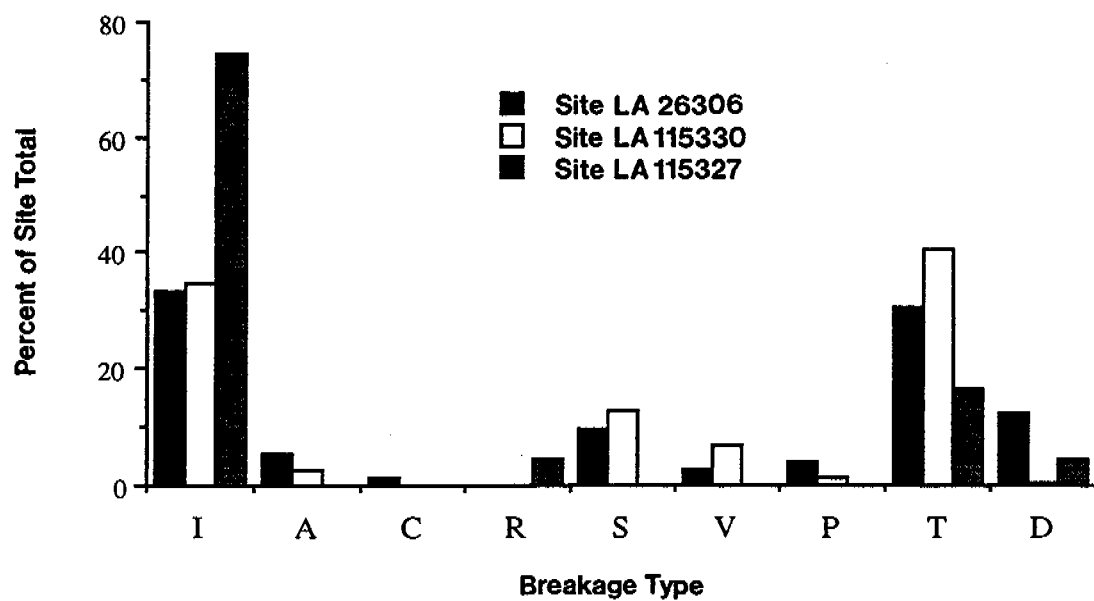


Figure 26.1. Relative Frequencies of Bone Breakage Categories for Sites LA 26306, LA 115327, and LA 115330.

place or an aggregated site. Small, relatively isolated settlements are less likely to be the place from which large mammal hunting occurred and to which large mammal bones would be returned.

Furthermore, small game would be attracted to fields and gardens which are likely to have been established in the alluvial deposits of the wash near which the sites are situated. Small game hunting would reduce crop loss while supplying meat, fur, and bone.

The case against large mammal hunting is further strengthened when we examine which skeletal elements make up the small collection of artiodactyl bones. At site LA 26306, unidentified artiodactyls are represented by a femur and a scapula, and deer is represented by an antler. Of these the scapula is an artifact and the antler cannot represent food debris (it is too fragmentary to assess whether it was modified by people). At site LA 115330 there is another antler in very poor condition, a deer scapula, a pronghorn scapula and an unidentified artiodactyl scapula. I suspect that these scapulae were brought to the site as raw material, and not as food remains, a hypothesis strengthened by the scapula artifact at site LA 26306.

INTRASITE ANALYSIS OF SITE LA 115330

Site LA 115330 produced the largest faunal assemblage reported here, and has a relatively complex set of features, many of which produced faunal material. It is therefore the best site at which to examine the possibility of significant intrasite variation in the distribution of faunal assemblages. Table 26.3 summarizes the distribution of faunal remains by feature. A number of features (11, 13, 14, 19, 23 and 26) were located within Feature 2, a pitstructure. These are reported separately in Table 26.3, and then combined as a group of features. Feature 2 contains two major stratigraphic components—an upper layer of fill and a lower layer associated with the structure's use. These are separated on Table 26.3 as "Feature 2 (fill)" and "Feature 2 (floor)."

Site LA 115330 illustrates the problem of attempting intrasite analysis of small assemblages. Only 129 specimens were identified, and spreading these over numerous features means that sample sizes are too small to have any confidence in differences in relative frequencies.

COMPARISON WITH ZUNI ROUTE 4 SITES

A similar project to the State Highway 602 study was undertaken along Zuni Route 4 (Z4) in the 1970s (Gratz 1977), and resulted in the excavation of similar types of sites spanning roughly the same time period as the State Highway 602 project. As on State Highway 602 sites, faunal remains from the Z4 sites were fairly sparse (Kriegh 1977). Kriegh's analysis contains two types of bone counts, in addition to MNI estimates. He identified a lot of bone fragments to the level of order (Artiodactyla, Rodentia, etc.) mainly on the basis of fragment size. These specimens would be considered unidentifiable in this study. He also reported number of elements, which is the equivalent of what I would consider identifiable specimens. Using the counts derived from number of elements, we can compare his data with data from State Highway 602 sites.

Not surprisingly, the range of taxa is very similar, with artiodactyls, rodents, and lagomorphs dominating the assemblages, and very similar genus identifications within each order. State Highway 602 sites have more carnivores because of the common occurrence of *Canis*. The ratio of *Sylvilagus* to *Lepus* is very similar (3.13/1 at Z4 and 2.86/1 at State Highway 602). Artiodactyls are more common on the Z4 sites (32%) than along State Highway 602 (5%), but this may be due to different excavation procedures. There is no description of screening procedures at the Z4 sites, and it is possible that screening was not applied to all deposits; this would account for the preferential recovery of the larger artiodactyl bones.

There are also similarities in bone artifacts. Awls are common (although this is probably true for most Southwestern sites), and one specimen

Table 26.3. Site LA 115330 Faunal Assemblage (NISP) by Feature.

	Bird ¹		Rodent And Small Mammal ²		Lagomorphs ³		Artiodactyls ⁴		Total
	n	%	n	%	n	%	n	%	
Feature 2 fill	-		16	26	45	73	1	2	62
Feature 2 floor	-		1	8	12	92	-		13
Feature 2 internal features									
Feature 11	-		1	33	2	67	-		3
Feature 13	1	4	14	50	12	43	1	4	28
Feature 14	-		-		-		-		-
Feature 19	-		-		-		-		-
Feature 23	-		-		-		-		-
Feature 26	-		-		1	100	-		1
Subtotal internal features	1		15		15		1		32
Feature 2 subtotal excluding fill	3	2	16	36	27	60	1	2	45
Feature 9	1	13	2	25	3	38	2	25	8
Feature 9 internal feature									
Feature 24	-		-		-		-		-
Feature 9 subtotal	1	13	2	25	3	38	2	25	8
Extramural features									
Feature 1	-		3	43	4	57	-		7
Feature 4	1	25	1	25	2	50	-		4
Feature 8	-		-		-		-		-
Feature 10	-		-		1	100	-		1
Extramural features subtotal	1	8	4	33	7	59	-		1
Study Unit 9	-		1	50	1	50	-		2
Total	3	2	39	30	83	64	4	3	129

¹Bird = medium bird + large bird²Rodents and small mammals = *Cynomys* + *Dipodomys ordii* + Muridae + *Neotoma* + small rodents + small mammals³Lagomorphs = *Sylvilagus* + *Lepus*⁴Artiodactyls = *Antilocapra americana* + *Odocoileus* + medium artiodactyl

Note: All percentages are based on total bones in feature, excluding unidentified specimens.

from the Z4 sites was made on a jackrabbit tibia. Artiodactyl scapula tools were also present at the Z4 sites.

CONCLUSIONS

Small sample size reduces the potential contribution of zooarchaeological analysis to the study of the State Highway 602 sites. Eventually data from small assemblages in the Zuni region might be combined to present a better understanding of the economy of small sites, and it is therefore important that faunal data be analyzed and reported.

The very small size of some assemblages suggests that conditions at some sites have not been conducive to bone preservation. This is true

for sites LA 48695, LA 115325, and LA 115329. It may also be the case for site LA 115327, where most of the faunal remains derive from a dog burial which might be later than the main occupation at the site.

Overall, the faunal assemblages suggest that inhabitants of all sites in the study area hunted and trapped a variety of small mammals. Birds were used infrequently. Larger mammals hunted included pronghorn antelope and deer, but the skeletal elements preserved suggest that bones were brought to these sites as raw material for artifact production rather than as the byproducts of local hunting. Hunting and trapping may have been a minor activity associated with pest control and opportunistic activities around fields and gardens.

SECTION IV. SYNTHESIS

Chapter 27

SUMMARY

This chapter summarizes the general findings of the archaeological investigations conducted at 18 sites along New Mexico State Highway 602 by Zuni Cultural Resource Enterprise for the New Mexico State Highway and Transportation Department (NMSHTD Contract No. J00310). These investigations were conducted in anticipation of future road construction by the NMSHTD along 8.5 km (5.3 mi) of State Highway 602 starting just south of the Zuni Route 4 and continuing north beyond the Zuni Indian Reservation boundary onto the Navajo Nation (NMSHTD Project No. NH-602(27)04, CN3286; ZCRE Project No. 015-97). Testing and data recovery phases were combined for thirteen of these sites: LA 115334, LA 26319, LA 26309, LA 115327, LA 26306, LA 115330, LA 48695, LA 115329, LA 26308, LA 115324, LA 115323, LA 115325, and LA 49838. Analysis of surface artifacts was conducted on five additional sites: LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320. Field investigations took place between 2 February and 30 June 1998. Additional investigations took place during the summer and fall of 1998 at site LA 48695. These investigations consisted of remote sensing outside of the highway right-of-way followed up by "groundtruthing" excavations of noted geophysical anomalies.

The following section summarizes when the sites were investigated, the level of effort at each site, and provides information regarding site type, chronology, and function to the extent they were determined during the investigations.

ARCHAEOLOGICAL INVESTIGATIONS

Preliminary activities at all 13 of the excavated sites included topographic mapping, a pedestrian survey of the site to locate all surface artifacts, followed by collection of each artifact within the

project boundaries (the right-of-way) and its locational information. Specific levels of effort varied at each site according to the data recovery plan, and the nature of the cultural deposits observed.

Site LA 115334

Level of Effort

Investigations at site LA 115334 were conducted between 3 March and 6 March 1998, and again on 19 May 1998. The site comprises a small masonry structure, or fieldhouse, and an associated artifact scatter that are, for the most part, outside of the right-of-way. The site is located on a ridge spur overlooking an alluvial fan and the valley bottom of Y Unit Draw. Two hand-excavated study units totaling 2.00 sq m in area and 0.82 cu m in volume, two mechanically excavated trenches totaling 41.90 m in length and approximately 43.16 cu m in volume, and 399.75 sq m of mechanical stripping to an average depth of 0.50 m were excavated across the boundaries of the site within the western right-of-way (Table 27.1). No cultural deposits or features were observed during these excavations.

Chronology and Function

Although no subsurface deposits or features were observed, tallies of surface ceramic artifacts associated with the fieldhouse indicate the site was most likely occupied during the late Pueblo II period. A potential range of occupation from AD 1050 to 1175, and a mean ceramic date of AD 1122 \pm 40 years, were determined from the ceramic assemblage. Approximately 200 to 250 m (656 to 820 ft) up the western slope from site LA 115334 are undocumented unit pueblos (rubble mounds, kivas, and associated midden) that comprise contemporaneous ceramic assemblages.

Table 27.1. Summary of Data Recovery Activities at Site LA 115334.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.42	N122.14, E112.54
	SU 4	1.00 sq m	0.40	N134.05, E105.88
Total:	2	2.00 sq m	0.82	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	21.40 m	23.07	N132.99, E111.36 N151.37, E100.51
	SU 3	20.50 m	20.09	N113.24, E123.73 N130.55, E112.91
Total:	2	41.90 m	43.16	-
<u>Mechanical Stripping</u>				
	-	317.50 sq m	-	East of St. Hwy. 602
	-	82.25 sq m	-	East of St. Hwy. 602
Total:	-	399.75 sq m	-	-

Site LA 26319Level of Effort

Investigations at site LA 26319 began on 13 February and were completed on 3 March 1998. In many respects similar to site LA 115334, site LA 26319 comprises a small masonry structure and associated artifact scatter located (on both sides of State Highway 602) on a ridge spur overlooking an alluvial fan and the valley bottom of Y Unit Draw. One 1-by-1-m hand excavated unit totaling 1.00 cu m, and four mechanically excavated trenches totaling 40 m in length and 35.42 cu m in volume, were excavated to determine the nature and depth of any buried cultural features or deposits. These excavations revealed the possibility of buried cultural deposits approximately 0.50 m below the surface. Following these excavations, 693 sq m at an average depth of 0.50 m were mechanically stripped on the eastern side of the highway (Table 27.2). The mechanical stripping revealed four features.

Chronology and Function

The small masonry structure dates to the late Pueblo II period based on the associated ceramics. The ceramic assemblage returned a mean ceramic date of AD 1084 \pm 50 years, and a potential range of occupation from AD 1050 to 1175. Contemporaneous unit pueblos are located within 200 m (656 ft) to the west of site LA 26319.

The four features discovered during mechanical stripping on the east side of the highway were determined to date to the Basketmaker II period, and were not associated with the later (Pueblo II) component of the site. Chronological assessment is based on the stratigraphic position of the features and one radiocarbon date of 2350 \pm 80 BP (Beta-121230, Appendix A). The features are representative of both storage and resource processing activities during the Basketmaker II period. Maize, Chenopodium, and grass remains discovered in the features indicate subsistence pursuits in this locality. The nearby alluvial fans would have been conducive

Table 27.2. Summary of Data Recovery Activities at Site LA 26319

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	1.00	N111.01, E168.16
Total:	1	1.00 sq m	1.00	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	10.00 m	8.75	N128.07, E155.54 N133.41, E172.12
	SU 3	10.00 m	9.24	N115.45, E113.91 N120.64, E179.31
	SU 4	10.00 m	9.45	N104.10, E171.18 N108.47, E179.31
	SU 5	10.00 m	7.98	N99.09, E180.26 N90.22, E184.94
Total:	4	40.00 m	35.42	-
<u>Mechanical Stripping</u>				
	-	693.00 sq m	-	East of St. Hwy. 602
Total:	-	693.00 sq m	-	-

for runoff farming, and possibly for more intensive agricultural strategies (as seen at site LA 48695).

Site LA 26309

Level of Effort

Testing and data recovery activities were conducted at site LA 26309 between 9 March and 11 March 1998. The site comprises two small masonry structures and an artifact scatter that encompasses both sides of the highway. The structures are located on the western side of the highway outside the right-of-way, while a lithic artifact scatter occurs on the east side of the highway. The site is located on a ridge spur overlooking an alluvial fan and the valley bottom of Y Unit Draw, much like other sites in the project area. To examine the possibility of subsurface cultural deposits or features, one 1-by-1-m hand-excavated study unit totaling 0.37 cu m, and four mechanically excavated trenches totaling 28.2 m in length and 17.29 cu m in volume, were excavated prior to mechanical stripping. These

excavations suggested that prior road construction along State Highway 602 had destroyed all intact cultural deposits. This was confirmed after a total of 633.75 sq m of mechanical stripping to an average depth of 0.20 m across the eastern portion of the site (within the right-of-way) revealed no features or cultural deposits of any kind (Table 27.3).

Chronology and Function

Given the tendency for sites within the project area to comprise both Basketmaker II and Pueblo II components, the lithic artifact scatter on the eastern portion of the site may in fact be preceramic in age. No determination, however, could be discerned for its function. In addition, too few artifacts were located in association with the two small masonry structures to determine their age. They may, however, date to the Pueblo II period based upon the initial assessment by Abbott (1997). They may have functioned as seasonal structures or fieldhouses during this period.

Table 27.3. Summary of Data Recovery Activities at Site LA 26309.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.37	N262.00, E229.00
Total:	1	1.00 sq m	0.37	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	3.50 m	2.25	N212.87, E243.14 N214.53, E245.19
	SU 3	3.10 m	2.04	N218.98, E249.62 N220.61, E252.19
	SU 4	12.00 m	6.55	N222.80, E250.77 N244.90, E233.26
	SU 5	9.60 m	6.45	N266.18, E225.93 N273.06, E219.27
Total:	4	28.20 m	17.29	-
<u>Mechanical Stripping</u>				
	-	150.50 sq m	-	East of St. Hwy. 602
	-	131.25 sq m	-	East of St. Hwy. 602
	-	352.00 sq m	-	East of St. Hwy. 602
Total:	-	633.75 sq m	-	-

Site LA 115327Level of Effort

Site LA 115327 was one of the first sites investigated (both testing and data recovery) during the project, beginning on 2 February and continuing through 23 February 1998. Located at the base of an east-facing slope near the valley bottom, the site comprises an artifact concentration on both sides of the highway. Artifact density is higher on the western side of the highway (which will be fenced and avoided during construction) than the eastern side. Investigations, however, focused on the eastern side of the highway, and were hampered by poor weather conditions. Nevertheless, two 1-by-1-m hand-excavated study units totaling 1.00 cu m, and four mechanically excavated trenches totaling 35.85 m in length and 33.02 cu m in volume, were excavated to examine the nature of subsurface deposits. These excavations revealed the possibility of buried cultural

deposits and features, but did not locate any features. Nine features were located during mechanical stripping, which encompassed 777.20 sq m (to an approximate depth of 0.50 m) across the eastern portion of the site (Table 27.4).

Chronology and Function

The nine features were determined to be Basketmaker II in age, considerably older than the late Pueblo II artifact scatter on the surface. This assessment is based upon stratigraphy and two radiocarbon dates. All of the features were located below Stratum I, a humic A horizon. Throughout the project area, features and cultural material below this horizon were determined to be Basketmaker II or older. Confirming this estimate were radiocarbon dates of 2450 ± 90 BP (Beta-121237) for Feature 4, and 2070 ± 40 BP (Beta-121238; Appendix A) for Feature 1, both of which are storage features. Agricultural pursuits at site LA 115327 are indicated by the presence of maize and storage features.

Table 27.4. Summary of Data Recovery Activities at Site LA 115327.

Type of Unit	Unit Number	Area or Length		Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.50	N130.00, E140.00
	SU 2	1.00 sq m	0.50	N100.00, E149.00
Total:	2	2.00 sq m	1.00	-
<u>Mechanically Excavated Trenches</u>				
	SU 3	8.80 m	7.39	N72.60, E149.60 N73.70, E158.30
	SU 4	9.20 m	9.02	N90.60, E143.80 N90.60, E153.20
	SU 5	9.20 m	9.34	N109.90, E144.00 N119.40, E144.00
	SU 6	8.65 m	7.27	N120.60, E133.90 N122.60, E142.20
Total:	4	35.85 m	33.02	-
<u>Mechanical Stripping</u>				
	-	777.20 sq m	-	East of St. Hwy. 602
Total:	-	777.20 sq m	-	-

The late Pueblo II occupation of site LA 115327 was more intensive along the western (unexcavated) portion of the site. High artifact density suggests the site functioned for habitation, and agricultural pursuits were likely conducted nearby. This conclusion is also indicated by the presence of a small rubble concentration outside the eastern right-of-way (and therefore not excavated) that may have been a masonry structure or fieldhouse. A potential range of occupation from AD 1025 to 1100, with a mean ceramic date of AD 1072 \pm 37 years, was determined from ceramic artifacts collected from the eastern portion of the site.

Site LA 26306

Level of Effort

Site LA 26306 was one of the most complex sites in the entire project. Testing and data recovery activities took place in two phases due to poor weather conditions. The initial phase of work was conducted between 2 and 12 February 1998. Activities during this phase comprised initial mapping, collection of artifacts, the excavation of

three 1-by-1-m hand-excavated study units totaling 1.70 cu m in volume, and five mechanically excavated trenches measuring 39.3 m in length and 27.33 cu m in volume. Due to frozen earth and the presence of a dark midden, high densities of artifacts, and the very high potential for subsurface features on the eastern side of the highway, further activities (namely mechanical and hand stripping) were postponed until spring. Frozen earth proved very difficult to mechanically strip at site LA 115327, and it was determined the site could be better investigated once the earth thawed.

Data recovery activities resumed for the second phase of work on 14 April and continued through 26 May 1998. A total of 716.50 sq m at an approximate depth of 0.20 to 0.50 m were mechanically stripped on the eastern side of the highway, while an additional 138.36 sq m at an approximate depth of 0.10 to 0.15 m was stripped by hand on the western side of the highway (Table 27.5). The western side was stripped by hand because the very steep cut bank would not safely support heavy machinery. A total of fifty-one features were discovered during these activities.

Table 27.5. Summary of Data Recovery Activities at Site LA 26306.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.70	N130.00, E166.00
	SU 2	1.00 sq m	0.54	N115.40, E169.40
	SU 3	1.00 sq m	0.46	N74.00, E148.14
	SU 9	1.00 sq m	0.40	N138.36, E165.64
	SU 10	1.00 sq m	0.20	N137.36, E165.64
	SU 11	1.00 sq m	0.30	N139.36, E165.64
	SU 12	1.00 sq m	0.40	N84.08, E139.78
	SU 13	2.5 sq m	2.00	N90.82, E137.65
	SU 14	1.00 sq m	0.10	N85.00, E138.80
Total:	9	10.50 sq m	5.10	-
<u>Mechanically Excavated Trenches</u>				
	SU 4	9.00 m	7.06	N68.40, E185.80 N77.70, E183.70
	SU 5	6.50 m	4.59	N83.50, E177.30 N85.00, E184.50
	SU 6	13.50 m	9.64	N98.10, E176.30 N120.10, E170.20
	SU 7	4.70 m	3.85	N123.30, E167.40 N124.80, E171.80
	SU 8	5.60 m	2.19	N135.40, E165.20 N140.50, E163.40
Total:	5	39.30 m	27.33	-
<u>Mechanical Stripping</u>				
	-	516.40 sq m	-	East of St. Hwy. 602
	-	200.10 sq m	-	West of St. Hwy. 602
Total:	-	716.50 sq m	-	-
<u>Hand Stripping</u>				
	-	138.36 sq m	-	West of St. Hwy. 602
Total:	-	138.36 sq m	-	-

Five additional hand-excavated study units totaling 6.5 sq m in area and 5.00 cu m in volume were required to excavate the larger of these features.

Chronology and Function

Fifty-one features (which includes the internal features of pitstructures) were located on both the east and west sides of the highway. The site comprises multiple components dating from the

Basketmaker II to the late Pueblo II/early Pueblo III period. This later component was recorded by Abbott (1997) during the survey phase of the project. A substantial Basketmaker II component, however, was discovered during testing and data recovery activities. There were no obvious surface indications that this early component was present at site LA 26306.

Table 27.6 summarizes the radiocarbon dates returned for site LA 26306. The dates range from

Table 27.6. Radiocarbon Results from Site LA 26306.

FS	Conv. Age BP	1 sigma cal	2 sigma cal	Cal intercept	Context
144	1920 ± 120	BC 35 to AD 240	BC 185 to AD 395	AD 90	F1, pitstructure floor
215	2230 ± 80	BC 385 to 180	BC 405 to 50	BC 355 and BC 290 and BC 230	F10, thermal rock feature
228	1990 ± 70	BC 45 to AD 90	BC 165 to AD 160	AD 25	F29, pitstructure floor
232	1700 ± 90	AD 245 to 435	AD 130 to 560	AD 380	F27, storage
265	2090 ± 60	BC 180 to 20	BC 345 to 310 and BC 210 to AD 55	BC 75	F28, pitstructure floor
271	1940 ± 70	AD 5 to 135	BC 60 to AD 240	AD 75	F35 (pit in F28)

Key: Cal = calibrated

Conv. = conventional

2230 ± 80 BP (Beta-121223) to 1700 ± 90 BP (Beta-121225; Appendix A), with intercept dates ranging from 355 BC to AD 380. These dates all fall within the Basketmaker II period. In addition, Feature 44 (the hearth to Feature 28) was sampled for archaeomagnetic dating (Appendix B). Results of this sample indicated the feature may either date to the first centuries BC or to approximately AD 600. Given the radiocarbon results, the earlier archaeomagnetic results are interpreted here to be the more accurate reading.

The Basketmaker II occupation of site LA 26306 is believed to represent year-round habitation. Feature 28, the deep pitstructure, is believed to have functioned as a cold-season residence. Features 1 and 29, shallow pitstructures, are believed to have functioned as warm-season residences. Site reuse is indicated by Feature 2, where earthen pits have been excavated into one another. This does not, however, indicate seasonal occupation.

The potential range of occupation for the later component ranges from AD 950 to 1175. This is based upon the ceramic artifact assemblage, which has a mean date of AD 1111 ± 55 years. This later component is interpreted to have been a habitation. This interpretation is based upon the high artifact density and midden located above the Basketmaker II component. In addition, a small

fieldhouse is located downslope from the right-of-way, an arrangement consistent with the general pattern of late Pueblo II settlement of Y Unit Draw, where fieldhouses are located downslope from permanent residences. Any architecture within the right-of-way, however, has been destroyed by earlier construction efforts along State Highway 602.

Site LA 115330

Level of Effort

Testing and data recovery activities at site LA 115330 were conducted between 27 April and 12 June 1998. Site boundaries extend across both the west and east sides of the highway. A total of five study units were hand excavated, totaling 8.90 sq m in area and 5.28 cu m in volume. In addition, 116 sq m were hand stripped across the area of the site with the highest artifact densities to locate additional features. This excavation was conducted in 2-by-2-m units. Six mechanically excavated trenches totaled 39.60 m in length and 35.30 cu m in volume. A total of 1277.20 sq m were mechanically stripped at an average depth of 0.20 to 0.40 m below surface (Table 27.7). No cultural deposits were discovered on the east side of the highway, while 28 features (which includes internal pitstructure features) were discovered on the west side of the highway.

Table 27.7. Summary of Data Recovery Activities at Site LA 115330.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.80	N101.00, E106.00
	SU 2	1.00 sq m	0.23	N102.00, E108.00
	SU 9	1.90 sq m	0.46	N96.40, E107.80
	SU 10	1.00 sq m	0.31	N97.00, E104.00
	-	4.00 sq m	3.48	N96.00, E112.00
Total:	5	8.90 sq m	5.28	-
<u>Mechanically Excavated Trenches</u>				
	SU 3	11.00 m	10.01	N91.00, E112.50 N81.00, E118.50
	SU 4	5.00 m	3.50	N74.80, E121.00 N77.20, E125.60
	SU 5	4.40 m	3.85	N108.20, E104.50 N110.20, E108.40
	SU 6	9.40 m	8.55	N100.00, E100.00 N107.80, E104.00
	SU 7	5.00 m	4.69	N119.20, E96.80 N121.40, E101.60
	SU 8	4.80 m	4.70	N129.00, E92.80 N129.60, E97.40
Total:	6	39.60 m	35.30	-
<u>Mechanical Stripping</u>				
	-	48.00 sq m	-	West of St. Hwy. 602
	-	29.20 sq m	-	West of St. Hwy. 602
	-	1200.00 sq m	-	East of St. Hwy. 602
Total:	-	1277.20 sq m	-	-
<u>Hand Stripping</u>				
	-	116.00 sq m	-	West of St. Hwy. 602
Total:		116.00 sq m	-	-

Chronology and Function

Five radiocarbon dates from five different features firmly place the occupation of site LA 115330 in the Basketmaker II period (Table 27.8). In addition, the occupational surface of site LA 115330 was below the humic A horizon (Stratum I) as seen at other Basketmaker II sites. In terms of architecture, the site exhibits pitstructure styles that are not typical of the later periods.

The occupation of site LA 115330 is interpreted as a year-round habitation. Agricultural pursuits were a focus of subsistence

strategies, with several large internal and external storage features present. Smith (Chapter 24) suggested site LA 115330 was a farmstead, producing processed maize products to sites such as site LA 26306. This suggestion is supported by the discovery of a possible maize field nearby at site LA 48695.

Site LA 48695Level of Effort

Testing activities were conducted at site LA 48695 between 9 March and 17 March 1998 again

Table 27.8. Radiocarbon Results from Site LA 115330.

FS	Conv. Age BP	1 sigma cal	2 sigma cal	Cal intercept	Context
168	2190 ± 60	BC 365 to 165	BC 385 to 50	BC 200	F4, storage
188	1750 ± 60	AD 235 to 390	AD 135 to 425	AD 265 and AD 290 and AD 320	F2, pitstructure floor
205	2190 ± 60	BC 365 to 165	AD 385 to 50	BC 200	F12, hearth in F2
207	2070 ± 60	BC 165 to AD 5	BC 200 to AD 70	BC 50	F13, storage pit in F2
221	2210 ± 60	BC 375 to 180	BC 390 to 75	BC 345 and BC 310 and BC 210	F15, posthole within activity area F9

Key: Cal. = calibrated

Conv. = conventional

during the summer and fall of the same year. The site is located entirely on the east side of the highway, and comprises multiple sandstone features. Only one of these features (Feature 4), however, is located within the highway right-of-way. One 2-by-2-m hand-excavated study unit was placed within Feature 4, and was later reduced to a 1-by-2-m study unit. A total of 2.20 cu m was excavated within this study unit. In addition, 15.7 m of mechanically excavated trenches were placed throughout the site. A total of 13.62 cu m was excavated in this manner (Table 27.9). No mechanical stripping was conducted at this site.

Subsequent to this work and completion of the original final draft technical report for the entire project, ZCRE carried out at its own expense remote sensing of a 40-by-40-m area outside of the right-of-way. Dr. Lewis Sommers of Geoscan Research provided the necessary expertise. Remote sensing was intended to investigate the possibility that the trough-like features exposed during mechanical trenching in March 1998 might be related to agricultural pursuits. Archaeomagnetic and electrical resistivity studies were carried out as a component of the remote sensing study. As a consequence of the remote sensing studies and the revelation of three curvilinear anomalies emanating from the

previously identified trough-like features, ZCRE petitioned the New Mexico State Highway and Transportation Department for permission to use remaining funding to "ground truth" the remote sensing interpretations. Accordingly, ZCRE excavated nine hand-excavated trenches across the curvilinear anomalies and, in almost every case, located trough-like features that are now interpreted as irrigation ditches. ZCRE was also able to stimulate the interest of Dr. Stephen Hall of the University of Texas, Austin who assisted in the geomorphological interpretation of Y Unit Draw in general and the irrigation features specifically.

Chronology and Function

Initial use of this location took place during the Basketmaker II period, as indicated by a number of radiocarbon dates. The first date to be submitted from the original data recovery excavation, 2080 ± 80 BP (Beta-121231; Appendix A), was obtained from wood charcoal within Stratum III of SU 3. Additional dates obtained from the second round of excavations outside of the highway right-of-way, confirmed this date and amplified the overall contextual and stratigraphic relationships. These additional dates include two for Feature 13, the irrigation ditch observed in the arroyo profile of Y Unit Draw

Table 27.9. Summary of Data Recovery Activities at Site LA 48695.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	4.00 sq m	2.20	N70.74, E98.47
Total:	1	4.00 sq m	2.20	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	5.50 m	5.01	N68.70, E106.71 N67.70, E94.63
	SU 3	4.80 m	3.70	N82.15, E96.81 N85.27, E94.50
	SU 4	5.40 m	4.91	N95.09, E92.63 N92.68, E87.55
Total:	3	15.70 m	13.62	-

adjacent. The first date was obtained on organic material and yielded a reading of 4110 ± 40 BP and the second date was obtained from small charcoal flecks within the ditch stratigraphic units and resulted in a date of 2960 ± 40 BP. The first date is considered too early and probably reflects contamination of the organic material. The second date is in accordance with dates from the Las Capas site in southern Arizona where similar ditches have been excavated (Mabry 1999:14).

Additional dating of the stratigraphy in the hand-excavated trenches yielded a series of eight dates spanning the period from 1800 ± 50 BP to 870 ± 40 BP. The last date was retrieved from a Pueblo II feature well above the irrigation features. The entire series of dates brackets the irrigation features at site LA 48695 to a period extending back approximately 3000 years and ending by approximately 1000 years ago. One obviously aberrant date was also obtained and was the result of contamination, $36,720 \pm 320$ BP.

As discovered in other sites within the project area, the Basketmaker II presence is located below Stratum I, a humic A horizon. The results of the radiocarbon dating indicate that the period of time represented under this humic A horizon extended from the early Basketmaker II period to the Pueblo I period. Cultural modification of the landscape is indicated by maize pollen from

throughout the site. These deposits are interpreted as Basketmaker II to Pueblo I field systems. Features found within the buried irrigation ditches include check dams composed of boulders placed to impede the flow of water within the ditches, a posthole that probably functioned in association with the check dams, and a footprint that probably dates to the Basketmaker III period.

A single Puerco Black-on-white ceramic sherd located within Feature 4, along with its stratigraphic position within Stratum I, indicate that it most likely dates somewhere between AD 1030 and 1200. Two Cibola Gray Ware ceramic artifacts along with the Puerco Black-on-white provide a mean ceramic date of $AD\ 1115 \pm 42$ years. One radiocarbon date of the Pueblo II period was obtained during the subsequent work at the site (see discussion above). This date pertains to a small pit feature that post-dates the irrigation activities at the site. Archaeomagnetic results show the presence of rectangular patterning of subsurface material. Many basalt boulders were retrieved during the final excavations from the upper, or Pueblo II period, deposits. The most likely interpretation of the patterning is that it results from the purposeful distribution of basalt for check dams similar to those reported during the last century by Cushing in Zuni. This patterned field system seemingly relates to the Pueblo II period and

marks a significant departure in agricultural strategies when compared to the Basketmaker and early Puebloan irrigation strategies.

Site LA 115329

Level of Effort

Testing and data recovery activities at site LA 115329 were conducted between 23 February and 4 March 1998. The level of effort at this site included three 1-by-1-m hand-excavated study units encompassing 1.70 cu m, five mechanically excavated trenches measuring 38.4 m in length and 41.48 cu m in volume, and 210.00 sq m of mechanical stripping to an average depth of 0.70 to 1.00 m (Table 27.10). No cultural features were observed during these investigations.

Chronology and Function

The chronological assessment of site LA 115329 is based entirely on ceramic artifacts. The mean ceramic date of the entire assemblage is AD 897 \pm 175 years. The potential range of occupation occurs between AD 450 and 1150. The function of site LA 115329 is unclear. The location may have functioned as a limited-activity area. On the other hand, its topographic location suggests artifacts at the site may have washed down from site LA 26308 (identified as generally contemporaneous) or from site LA 115328. Both of these sites are located upslope from site LA 115329.

Site LA 26308

Level of Effort

Testing and data recovery activities at site LA 26308 were conducted between 26 May and 4 June 1998. Eight study units were hand excavated totaling 9.00 sq m and 4.01 cu m. Four trenches were mechanically excavated, which measured 42.40 m in length and 32.83 cu m in volume. Approximately 688.00 sq m were mechanically stripped to an approximate depth of 0.50 m below the surface (Table

27.11). These activities revealed eleven features, ranging in function from storage pits to hearths.

Chronology and Function

Chronological assessment of site LA 26308 is based upon the assessment of two radiocarbon dates, the stratigraphy, and the ceramic artifacts. Radiocarbon dates for Features 10 and 11 were 970 \pm 60 BP (Beta-121228) and 1320 \pm 50 BP (Beta-121229; Appendix A), respectively. Stratigraphic analysis indicates three distinct occupations at the site. The ceramic artifacts indicate a potential range of occupation between AD 850 and 1100, which is consistent with the cultural stratigraphy. A mean ceramic date of AD 931 \pm 50 was determined from the assemblage. These occupations most likely occurred during the late Basketmaker III/ early Pueblo I period, the early Pueblo II, and the late Pueblo II (as suggested by the rubble mound located upslope along the western portion of the site's boundaries. Based upon stratigraphy, however, Feature 7 (a thermal feature) most likely dates to the late Pueblo II period. The artifact concentrations observed on the surface within the right-of-way are associated with the earlier components, however.

Site LA 115324

Level of Effort

Testing and data recovery activities at site LA 115324 were conducted between 8 April and 27 April 1998. The site is located on both the east and west sides of the highway. A single 1-by-1-m study unit was hand excavated on the west side, totaling 0.50 cu m in volume. Seven trenches were mechanically excavated, totaling 40.90 m in length and 30.79 cu m in volume. In addition, 955.00 sq m were mechanically stripped to an approximate depth of 0.40 to 0.50 m (Table 27.12). No features were observed on the western portion of the site, where a majority of the artifacts were recovered. Four features, however, were located on the eastern side of the highway.

Table 27.10. Summary of Data Recovery Activities at Site LA 115329.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.50	N89.00, E98.00
	SU 2	1.00 sq m	0.60	N102.00, E92.00
	SU 3	1.00 sq m	0.60	N94.52, E89.40
Total:	3	3.00 sq m	1.70	-
<u>Mechanically Excavated Trenches</u>				
	SU 4	11.00 m	10.78	N77.30, E104.80 N87.20, E100.20
	SU 5	10.00 m	11.90	N89.10, E95.40 N99.20, E96.00
	SU 6	2.00 m	2.41	N94.00, E86.00 N95.20, E87.90
	SU 7	5.00 m	3.29	N100.20, E91.00 N100.20, E96.00
	SU 8	10.40 m	13.10	N104.10, E86.70 N114.50, E88.60
Total:	5	38.40 m	41.48	-
<u>Mechanical Stripping</u>				
	-	210.00 sq m	-	East of St. Hwy. 602
Total:	-	210.00 sq m	-	-

Table 27.11. Summary of Data Recovery Activities at Site LA 26308.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.43	N94.00, E117.00
	SU 2	1.00 sq m	0.44	N97.00, E115.00
	SU 3	1.00 sq m	0.42	N105.50, E110.50
	SU 4	1.00 sq m	0.38	N109.00, E110.00
	SU 5	2.00 sq m	0.84	N117.50, E103.00
	SU 6	1.00 sq m	0.36	N129.00, E101.00
	SU 7	1.00 sq m	0.80	N131.00, E100.00
	SU 8	1.00 sq m	0.34	N129.00, E102.00
Total:	8	9.00 sq m	4.01	-
<u>Mechanically Excavated Trenches</u>				
	SU 9	12.40 m	9.29	N96.19, E117.96 N106.00, E113.46
	SU 10	9.06 m	7.86	N113.84, E104.26 N117.33, E112.81
	SU 11	10.40 m	7.28	N117.76, E107.74 N126.77, E102.39
	SU 12	10.00 m	8.40	N131.29, E95.26 N135.90, E104.6
Total:	4	42.40 m	32.83	-
<u>Mechanical Stripping</u>				
	-	688.00 sq m	-	West of St. Hwy. 602
Total:	-	688.00 sq m	-	-

Table 27.12. Summary of Data Recovery Activities at Site LA 115324.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.50	N93.56, E110.71
Total:	1	1.00 sq m	0.50	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	8.00 m	7.84	N130.14, E139.91 N122.28, E141.69
	SU 3	8.50 m	5.95	N68.80, E163.60 N68.50, E173.04
	SU 4	5.65 m	3.95	N41.81, E147.89 N39.11, E143.22
	SU 5	6.10 m	4.27	N62.94, E136.44 N60.07, E131.73
	SU 6	3.20 m	2.46	N78.63, E126.98 N77.20, E123.91
	SU 7	5.30 m	3.71	N90.84, E115.72 N86.03, E118.40
	SU 8	4.15 m	2.61	N101.87, E110.36 N103.89, E113.89
Total:	7	40.90 m	30.79	-
<u>Mechanical Stripping</u>				
	-	309.00 sq m	-	East of St. Hwy. 602
	-	119.00 sq m	-	West of St. Hwy. 602
	-	527.00 sq m	-	West of St. Hwy. 602
Total:	-	955.00 sq m	-	-

Chronology and Function

Site LA 115324 comprises multiple components dating from the Late Archaic to the late Pueblo II. The Late Archaic component consists of the four storage features located on the eastern side of the highway. One radiocarbon date obtained from a combined sample of a possible maize cupule and *Pinus* wood charcoal from Feature 2 returned an AMS date of 4870 ± 40 BP (Beta-123604; Appendix A). Maize pollen was also recovered from this feature. The other three features, based upon stratigraphic position, are believed also to date to the Late Archaic.

A later component dating to the late Pueblo I to Pueblo II period is based upon ceramic artifacts. These artifacts were located primarily on the western side of the highway, and provide a mean

ceramic date of $AD 850 \pm 150$ years, and indicate a potential range of occupation for this component between AD 550 and 1150. This is not surprising due to the presence of several Pueblo II sites upslope and to the west.

Site LA 115323

Level of Effort

Testing and data recovery activities at site LA 115323 were conducted between 19 March and 6 April 1998. One feature was known prior to excavations (Feature 1). Feature 1 was a small masonry structure, possibly a fieldhouse; it was excavated by using a series of hand-excavated study units totaling 5 sq m in area, and an estimated 1.54 cu m in volume. Four trenches were mechanically excavated totaling 39.59 m in

length and 34.94 cu m in volume. This was followed by mechanical stripping across 525.00 sq m of the site (Table 27.13). No other features were located.

Chronology and Function

Chronological assessment of site LA 115323 is based upon two radiocarbon dates, ceramic artifacts, and architecture. A radiocarbon date of 1170 ± 70 BP (Beta-121236; Appendix A) was returned from a *Pinus* wood charcoal sample recovered from the floor of Feature 1. Wood charcoal from an unknown species of conifer, recovered from the fill of a possible ditch feature in SU 4, returned an AMS date of 3130 ± 90 BP (Beta-121235; Appendix A). This date seems out of place, and possibly indicates the feature may simply be a natural drainage. On the other hand, nearby at site LA 115324 the possibility of very early maize agriculture is suggested by the presence of maize pollen and possible maize cupules within a storage pit (dated to 4870 ± 40 BP; Beta-123604, Appendix A). The presence of runoff irrigation ditches and maize pollen was also identified at site LA 48695.

The masonry structure may date to the early Pueblo III period (a single Tularosa Black-on-white was discovered within the structure, and pecked masonry blocks were observed within the structure). Although the associated radiocarbon date (Beta-121236) would appear to indicate a late Pueblo I to early Pueblo II occupation, the chronological discrepancy between the radiocarbon date and the ceramic presence may be attributable to sampling, dating of old wood, or some other unresolved circumstance.

Site LA 115325

Level of Effort

Testing and data recovery activities were conducted at site LA 115325 between 4 and 9 March 1998. A single 1-by-1-m hand-excavated study unit totaling 0.70 cu m in volume was excavated prior to mechanical excavations. A total of four mechanically excavated trenches were

located throughout the site totaling 20.20 m in length and 20.19 cu m in volume. These excavations, along with approximately 497.00 sq m of mechanical stripping to an average depth of 0.50 m, revealed no subsurface cultural deposits or features. Mechanical stripping was conducted to a depth of approximately 0.75 m below the surface in the vicinity of the artifact concentration (Table 27.14).

Chronology and Function

Chronological assessment of site LA 115325 is based solely on ceramic artifacts recovered or tallied from the surface, most of which are located outside the right-of-way. A mean ceramic date of $AD 1068 \pm 81$ years was calculated for the assemblage. A potential range of occupation based upon these ceramic artifacts is between AD 1050 and 1175. Functional interpretations are difficult to make, because most of the site is located outside of the project area. The absence of surface architecture may indicate that the occupation of site LA 115325 was limited in some way or was seasonal.

Site LA 49838

Level of Effort

Testing and data recovery activities at site LA 49838 were conducted between 10 March and 13 April 1998. The site is located on both sides of the highway, with the majority of artifacts, however, on the eastern side. A single 3-by-3-m hand-excavated study unit (totaling 3.60 cu m) was excavated over Feature 1, which was originally thought to be a shallow pit structure. Feature 1 originally appeared as a basin-shaped stain within the road cut of the existing highway. It was determined, however, to be an anomaly within the general midden of the site. One feature (Feature 2) and one human burial were found below the midden within this study unit (Appendix I, Confidential). These were the first indications of multiple components at site LA 48695. Additional testing activities included four mechanically excavated trenches totaling 26.40 m in length and 18.80 cu m in volume. One feature

Table 27.13. Summary of Data Recovery Activities at Site LA 115323.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	1.00 sq m	0.30	N105.59, E110.51
	SU 2	1.00 sq m	0.40	N104.59, E110.51
	SU 7	2.00 sq m	0.74	N104.59, E111.51
	SU 8	1.00 sq m	0.10	N105.59, E110.15
Total:	4	5.00 sq m	1.54	-
<u>Mechanically Excavated Trenches</u>				
	SU 3	10.30 m	7.93	N111.21, E105.96 N101.21, E108.62
	SU 4	9.15 m	9.61	N89.17, E114.38 N83.54, E127.65
	SU 5	11.14 m	8.58	N72.92, E114.22 N55.65, E114.63
	SU 6	9.00 m	8.82	N43.78, E126.41 N40.54, E134.95
Total:	4	39.59 m	34.94	-
<u>Mechanical Stripping</u>				
	-	35.00 sq m	-	East of St. Hwy. 602
	-	385.00 sq m	-	West of St. Hwy. 602
	-	105.00 sq m	-	West of St. Hwy. 602
Total:	-	525.00 sq m	-	-

Table 27.14. Summary of Data Recovery Activities at Site LA 115325.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-excavated Units</u>				
	SU 1	1.00 sq m	0.70	N62.30, E113.54
Total:	1	1.00 sq m	0.70	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	5.20 m	6.19	N48.30, E115.70 N52.00, E119.60
	SU 3	5.00 m	4.90	N71.60, E105.90 N74.90, E109.90
	SU 4	5.00 m	5.25	N91.40, E97.40 N87.40, E100.40
	SU 5	5.00 m	3.85	N134.00, E76.00 N129.80, E79.00
Total:	4	20.20 m	20.19	-
<u>Mechanical Stripping</u>				
	-	497.00 sq m	-	East of St. Hwy. 602
Total:	-	497.00 sq m	-	-

was identified within the trenches (Feature 3). A total of 404.00 sq m was mechanically stripped to an average depth of 0.50 m on the east side of the highway revealing five additional features. Due to the steep angle of the road cut on the western side of the highway, a total of 17.68 sq m were hand excavated to an average depth of 0.20 m. Along more stable portions of the western side, however, a total of 152.96 sq m were mechanically stripped to an approximate depth of 0.30 to 0.40 m below the surface (Table 27.15).

Chronology and Function

Chronological assessment of site LA 49838 is based upon three radiocarbon dates, stratigraphy, and ceramic artifacts. These data identify multiple components at the site, dating from the Basketmaker II to early Pueblo III periods. The earliest component comprises Basketmaker II storage features, two of which were radiocarbon dated. Charred pinyon recovered from Feature 4 returned a date of 2280 ± 70 BP (Beta-121232). Charred juniper, pine, and unknown conifer recovered from Feature 5 returned a date of 1990 ± 140 BP (Beta-12123, Appendix A). Based upon stratigraphic position, Features 2, 6, and 7 also date to this period.

Overlying the Basketmaker II component was a very thick (approximately 0.40 m) and dark midden. This occupation comprised a single storage feature (Feature 3), yet numerous ceramic and flaked stone artifacts. Charred pinyon recovered from Feature 3 returned a date of 880 ± 50 BP (Beta-121233, Appendix A). The ceramic assemblage from site LA 49838 yielded a potential range of occupation for this component between AD 850 and 1250. The mean ceramic date from the assemblage is $AD\ 1090 \pm 100$ years.

This component is interpreted as a year-round habitation, although no surface or subsurface architecture was discovered during testing and data recovery activities at site LA 49838. Previous road construction likely destroyed pitstructures and surface rooms associated with this later component. Additionally, it is highly likely (given the nature of Basketmaker II sites within Y Unit Draw) that Basketmaker II pitstructures were also destroyed.

Sites LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320

Artifacts observed on the surface were analyzed at sites LA 115333, LA 115328, LA 115322, LA 115321, and LA 115320. Analyses at all five sites were conducted during the week of 11 May 1998. Chronological assessment of each site is based upon ceramic artifacts, and summarized in Table 21.2.

The five sites analyzed range in function from habitations to limited-activity sites. Sites LA 115328 and LA 115321 represent habitations. The western pitstructure at site LA 115328 may possibly be preceramic in age, yet without excavation it is difficult to assess its true antiquity. The eastern portion of site LA 115328 is late Pueblo II in age. Site LA 115322 may represent a seasonal habitation, as evinced by the small rubble mound observed. Sites LA 115320 and LA 115333 represent limited activity sites.

Level of Effort Summary

Table 27.16 summarizes the level of effort in terms of hand-excavated and mechanically excavated study units, and mechanical and hand stripping at each of the testing and data recovery sites along State Highway 602. Area and volume for all study units are provided in this table. Volume for mechanically excavated trenches was calculated by assuming a 0.70-m width for all trenches. A standard bucket 2 ft (0.61 m) wide was used on for all trenches; however, after scraping trench faces clean, each averaged approximately 0.70 m in width.

Site Chronology Summary

Table 27.17 summarizes the radiocarbon dates obtained from sites within the project area. A total of nine project sites were radiocarbon dated. Ceramic artifacts were also used as a guide to the chronology of sites within the project area. Those data are illustrated in Figure 21.1 and summarized in Table 21.2. Provided below is a brief summary of the dominant components represented in the project sites.

Table 27.15. Summary of Data Recovery Activities at Site LA 49838.

Type of Unit	Unit Number	Area or Length	Volume (cu m)	Provenience
<u>Hand-Excavated Units</u>				
	SU 1	9.00 sq m	3.60	N100.49, E85.80
Total:	1	9.00 sq m	3.60	-
<u>Mechanically Excavated Trenches</u>				
	SU 2	5.00 m	3.36	N113.20, E77.45 N115.84, E81.79
	SU 3	9.60 m	7.93	N96.50, E90.16 N87.55, E94.08
	SU 4	5.60 m	4.78	N82.11, E96.62 N84.19, E101.94
	SU 5	6.20 m	2.73	N73.93, E62.25 N79.12, E59.00
Total:	4	26.40 m	18.80	-
<u>Mechanical Stripping</u>				
	-	404.00 sq m	-	East of St. Hwy. 602
	-	152.96 sq m	-	West of St. Hwy. 602
Total:	-	556.96 sq m	-	-
<u>Hand Stripping</u>				
	-	17.68 sq m	-	West of St. Hwy. 602
Total:	-	17.68 sq m	-	-

Table 27.16. Summary of Data Recovery Activities at Excavated Sites.

Site No.	Hand-Excavated Units			Mechanically Excavated Trenches			Area Mechanically Stripped (sq m)	Area Hand Stripped (sq m)
	Total	Area (sq m)	Volume (cu m)	Total	Length (m)	Volume (cu m)		
LA 115334	2	2.00	0.82	2	41.90	43.16	399.80	-
LA 26319	1	1.00	1.00	4	40.00	35.42	693.00	-
LA 26309	1	1.00	0.37	4	28.20	17.29	633.75	-
LA 115327	2	2.00	1.00	4	35.85	33.02	777.20	-
LA 26306	8	9.50	6.70	5	39.30	27.33	716.50	138.36
LA 115330	5	8.90	5.28	6	39.60	35.30	1277.20	116.00
LA 48695	1	4.00	2.20	3	15.70	13.62	-	-
LA 115329	3	3.00	1.70	5	38.40	41.48	210.00	-
LA 26308	8	9.00	4.01	4	42.40	32.83	688.00	-
LA 115324	1	1.00	0.50	7	40.90	30.79	955.00	-
LA 115323	4	5.00	1.54	4	39.59	34.94	525.00	-
LA 115325	1	1.00	0.70	4	20.20	20.19	497.00	-
LA 49838	1	9.00	3.60	4	26.40	18.80	556.96	17.68
Total:	38	56.40	29.42	56	448.44	384.17	7929.41	272.04

Table 27.17. Summary of Radiocarbon Results and Contexts.

Beta No.	Site/FS No.	Conv. Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Context	Material
121222	26306-144	1920 ± 120	BC 35 to AD 240	BC 185 to AD 395	AD 90	F1, pitstructure floor	<i>Juniperus</i> , <i>P. edulis</i> , <i>Quercus</i>
121223	26306-215	2230 ± 80	BC 385 to 180	BC 405 to 50	BC 355 and BC 290 and BC 230	F10, thermal rock feature	<i>Juniperus</i> , <i>P. edulis</i> , <i>Quercus</i>
121224	26306-228	1990 ± 70	BC 45 to AD 90	BC 165 to AD 160	AD 25	F29, pitstructure floor	<i>P. ponderosa</i>
121225	26306-232	1700 ± 90	AD 245 to 435	AD 130 to 560	AD 380	F27, storage pit	<i>Juniperus</i> , <i>Quercus</i> , <i>P. edulis</i>
121226	26306-265	2090 ± 60	BC 180 to 20	BC 345 to 310 and BC 210 to AD 55	BC 75	F28, pitstructure floor	<i>Pinus</i> , <i>P. edulis</i> , <i>Juniperus</i>
121227	26306-271	1940 ± 70	AD 5 to 135	BC 60 to AD 240	AD 75	F35, storage pit in F28	<i>P. edulis</i>
121228	26308-99	970 ± 60	AD 1010 to 1165	AD 980 to 1215	AD 1035	F10 hearth	<i>Pinus</i> ; <i>P. edulis</i> <i>Quercus</i> ; Unknown conifer
121229	26308-101	1320 ± 50	AD 665 to 770	AD 645 to 800	AD 685	F11 hearth	<i>Pinus</i> , <i>P. edulis</i> , <i>Juniperus</i>
121230	26319-36	2350 ± 80	BC 485 to 465 and BC 425 to 375	BC 765 to 615 and BC 600 to 200	BC 395	F2 hearth	<i>Pinus</i> , <i>P. edulis</i> , Unknown conifer
121231	48695-23	2080 ± 80	BC 185 to AD 15	BC 360 to 280 and BC 250 to AD 90	BC 60	SU 3, Stratum III	<i>Pinus</i> Unknown conifer
121232	49838-350	2280 ± 70	BC 395 to 345 and BC 310 to 210	BC 415 to 175	BC 375	F4, storage pit	<i>Pinus</i> <i>P. edulis</i>
121233	49838-354	880 ± 50	AD 1055 to 1090 and 1150 to 1225	AD 1030 to 1265	AD 1180	F3, roasting/storage pit	<i>Pinus</i> <i>P. edulis</i>

(continued)

Table 27.17. Continued.

Beta No.	Site/FS No.	Conv. Age BP	1 Sigma Cal	2 Sigma Cal	Cal Intercept	Context	Material
121234	49838-365	1990 ± 140	BC 165 to AD 160	BC 375 to AD 370	AD 25	F5, roasting/storage pit	<i>Juniperus</i> <i>Pinus</i> , Unknown conifer
121235	115323-33	3130 ± 90	BC 1490 to 1285	BC 1590 to 1580 and BC 1540 to 1135	BC 1405	Ditch-like ft., poss. drainage	Unknown conifer
121236	115323-45	1170 ± 70	AD 785 to 975	AD 690 to 1010	AD 885	F1, fieldhouse floor	<i>Pinus</i> , Unknown conifer
121237	115327- 50&56	2450 ± 90	BC 780 to 400	BC 805 to 375	BC 515	F4, storage	Unknown conifer, <i>Pinus</i>
123604	115324-82	4870 ± 40	BC 3685 to 3640	BC 3715 to 3630	BC 3655	F2, storage pit	Possible maize cupule, <i>Pinus</i>
123605	115327-49	2070 ± 40	BC 115 to 20	BC 180 to AD 25	BC 50	F1, storage	Maize cupule
121238	115330-168	2190 ± 60	BC 365 to 165	BC 385 to 50	BC 200	F4, extramural storage pit	<i>Juniperus</i> , <i>P. edulis</i> , Unknown conifer
121239	115330-188	1750 ± 60	AD 235 to 390	AD 135 to 425	AD 265 and AD 290 and AD 320	F2, pitstructure floor	<i>P. edulis</i> , <i>Juniperus</i> , Unknown conifer
121240	115330-205	2190 ± 60	BC 365 to 165	BC 385 to 50	BC 200	F12, hearth in F2	<i>Pinus</i> , Unknown conifer, <i>Quercus</i>
121241	115330-207	2070 ± 60	BC 165 to AD 5	BC 200 to AD 70	BC 50	F13, storage pit in F2	Maize kernels
121242	115330-221	2210 ± 60	BC 375 to 180	BC 390 to 75	BC 345 and BC 310 and BC 210	F15, posthole within activity area F9	<i>Juniperus</i> , <i>Pinus</i> , Unknown conifer

Key: Cal = calibrated

Conv. = conventional

One possible Late Archaic component is present within the project area. This is at site LA 115324. Stratigraphically, the component, located on the east side of the highway, is preceramic (pre-AD 400 in Zuni). Additional dating is required before this component can be confidently assigned to the Late Archaic.

The Basketmaker II period comprises six sites (LA 26319, LA 115327, LA 26306, LA 115330, LA 48695, and LA 49838). These sites consist of habitations, storage/resource processing sites, and an agricultural field. Site LA 115328 may include a Basketmaker II pitstructure, but testing is required to more confidently establish this component.

Basketmaker III/Pueblo I components were identified at site LA 26308 (the earliest component on that multiple-component site) and site LA 48695 (irrigation ditches). Small amounts of Pueblo I ceramic artifacts (Kiatuthlanna Black-on-white) were recovered from sites LA 49838, LA 115320, LA 115321, and LA 115328, but these may also indicate early Pueblo II components. A single White Mound Black-on-white sherd was recovered from site LA 115324, and may indicate use of that locality in early Pueblo I times. However, a Reserve Black-on-white sherd was also recovered (indicative of a Pueblo II component).

Pueblo II components were identified at 15 of the 16 sites comprising ceramic artifacts (only sites LA 115333 and LA 115323 do not have diagnostic Pueblo II ceramic artifacts). Early Pueblo II components are represented at sites LA 115320, LA 115321, LA 26308, and possibly sites LA 49838, 115329, and LA 26306 (based upon the ceramic artifact assemblage). Late Pueblo II components were identified at sites LA 115334, LA 26319, LA 115327, LA 26306, LA 115330 (a single Wingate Black-on-red), LA 48695 (a single Puerco Black-on-white), LA 26308, LA 115324 (a single Reserve Black-on-white), LA 115325, LA 49838, LA 115328, LA 115322, and LA 115320 (which is actually more a middle Pueblo II assemblage).

One Tularosa Black-on-white sherd was recovered at site LA 115323 from the masonry structure; its presence places occupation at that site to the Pueblo III period. Three Pueblo III ceramic types were recovered from site LA 49838.

For most sites with ceramic artifact assemblages, the potential range of occupation does not extend beyond AD 1175. A minor number of Pueblo III ceramic types extends the potential occupation of sites LA 115323 and LA 49838 into the AD 1200s, but, again, there are only a handful of these types present. It appears, then, that following the Pueblo II, settlement patterns within Y Unit Draw changed dramatically. This is consistent with our understanding of settlement strategies within the Zuni area.

ANALYTIC CONTRIBUTIONS

Ceramic Artifacts

A total of 1281 ceramic artifacts were analyzed from 17 project sites. Ceramic artifacts were recovered from both surface and subsurface contexts. A total of 256 diagnostic ceramic artifacts were identified from 16 sites. This assemblage indicates most of the sites comprise components dating between AD 1000 and 1200, with three sites indicating a slightly older presence, and one indicating a later presence within Y Unit Draw. Of course, the Basketmaker II, or non-ceramic sites, that are well represented throughout the project area, are not included in this discussion of ceramics. One of the most intriguing patterns observed in the was the greater reliance on storage during the Pueblo II, when compared to Pueblo III assemblages from elsewhere in the Zuni area.

Analysis of the ceramic artifact assemblage of Village of the Great Kivas was also conducted in order to examine its relationships with the project sites, as well as to more fully examine great house models and household economic production. A total of 365 ceramic artifacts from Village of the Great Kivas was analyzed. Using the date ranges

provided by Eckert et al. (Chapter 21, Table 21.2), all of the later (ceramic) components at the project sites were contemporaneous with Village of the Great Kivas.

Ware diversity was found to be much higher at Village of the Great Kivas than at the project sites. In addition, direct evidence for ceramic production (as evidenced by prepared clay, worked sherds, polishing stones, and paint mortars) was also observed within the general artifact assemblage from Village of the Great Kivas.

Lithic Artifacts

A total of 3470 flaked stone artifacts were analyzed from 18 sites along State Highway 602. Approximately 62% of these artifacts were recovered from site LA 115330. A total of 2320 flaked stone artifacts were attributed to Basketmaker II components within the project sites, with 1077 attributed to a general Pueblo II classification. Shokler (Chapter 22) compared these two assemblages, which in large measure are quite similar. A notable difference, however, is the increased use of Zuni Spotted chert during the Pueblo II, even though chert usage in general is decreasing during this period.

Shokler also examined raw material economies during these two periods. He observes from the flaked stone assemblage, that "early agricultural settlements may have been organized at the household, or possibly at a multihousehold level" (Chapter 22). The Pueblo II assemblage, on the other hand, reflects greater regional interaction on the part of sedentary agricultural communities. In general, though, the Basketmaker II and Pueblo II assemblages were remarkably similar. Importantly, the Basketmaker II assemblage is consistent with the interpretation of the habitation sites as year-round residences. This assemblage also suggests that, consistent with Vierra's (1994) study, the transition from bifacial (curated) to unifacial (expedient) reduction technologies began at least as early as the Basketmaker II period.

Ground Stone and Miscellaneous Items

Ninety-seven ground stone artifacts were recovered from 10 excavated sites, and 11 ground stone artifacts were analyzed from the 5 surface-analysis sites. The small sample size precludes any broad generalizations regarding the ground stone. The Basketmaker II sites yielded trough-shaped metates located on the floors of pitstructures at site LA 115330 (Feature 2) and site LA 26306 (Feature 1).

Miscellaneous items include various types of minerals used for pigment, and a gaming piece. Minerals used for pigments include azurite, malachite, hematite, and limonite.

Pollen

Fifty-six samples from nine sites were analyzed for pollen. Four samples were pollen sterile, leaving a total of 52 productive samples. Twenty-nine different taxa were identified from these samples. Cheno-Am and sunflower family pollen dominated the assemblage. Maize pollen was observed in approximately half of the samples, yet other economic pollen was rare.

Smith (Chapter 24) compared pollen assemblages from different feature types and identified possible functional differences. Bell-shaped and generic pits had little evidence of economic plants, while extramural basin-shaped pits had high frequencies of maize, grass, and beeweed pollen. This relationship is interpreted to indicate that bell-shaped and generic pits functioned to store dried or husked maize, while the basin-shaped pits served to store maize in the husk. Smith interpreted this as a possible intermediate step in the harvesting process.

Significant differences in the pollen assemblage were observed between sites LA 115330 and LA 26306, contemporaneous Basketmaker II habitations. Site LA 115330 contained more maize than did site LA 26306. Maize was present at site LA 26306, yet more Cheno-Am, purslane, and pinyon were utilized

here than at site LA 115330. Smith (Chapter 24) suggested site LA 115330 may have functioned as a farmstead, supplying site LA 26306 with refined maize products (which would not leave pollen).

The agricultural field system at site LA 48695 produced maize pollen. The concentration of maize pollen was relatively high when compared to other field systems studied in the Southwest. All of the maize pollen originated from the surface or just above the surface of the buried A horizon (Unit III). The presence of maize pollen in this context is considered strong evidence for the use of the site as a maize field watered by irrigation ditches and dating to perhaps 3000 years ago.

Macrobotanical Remains

Three types of analysis were conducted on the macrobotanical remains from nine project sites. These included analysis of potential radiocarbon samples, vegetal remains recovered separately from flotation samples, and remains recovered from flotation samples.

McBride (Chapter 25) suggested a possible multiple cropping system of maize and weedy annuals (such as goosefoot, pigweed, and bugseed) was present during the Basketmaker II. Plant processing appears to have primarily been conducted indoors, as the diversity of species was higher within interior rather than exterior contexts. A shift in wood procurement practices from heavy conifers to woody shrubs may have taken place between the Basketmaker II and Pueblo I periods.

Faunal Remains

A total of 395 pieces of faunal remains were recovered and analyzed from seven sites.

Approximately 63% of the entire assemblage was recovered from site LA 115330. Sites LA 48695 and 115325 each had one unidentified specimen, while the faunal assemblage at sites LA 26306, LA 49838, and LA 115327 each comprised between 41 and 55 specimens. Very few faunal remains were recovered from the project sites. As Driver (Chapter 26) pointed out, the small sample size limits the zooarchaeological analysis for the project sites. Hunting and trapping of small animals, however, appears to have taken place at many of the sites. Birds were occasionally used, as were large mammals (pronghorn antelope and deer).

SUMMARY

Testing and data recovery activities were conducted during the late winter and spring of 1998 at 13 sites along State Highway 602 and extended at one site (LA 48695) during the last half of 1998. Analysis of surface artifacts at five additional sites was also carried out. All of these sites are located within Y Unit Draw, a tributary to the Nutria River. The sites range in age from the Late Archaic to early Pueblo III, and represent the changing nature of settlement and subsistence strategies in the Zuni region. Evidence for maize agriculture was recovered from many different contexts within Late Archaic and Basketmaker II sites, including pitstructures, extramural storage pits, and fields. Although wild resources were also targeted, a focus on maize agriculture was the dominant subsistence strategy during the Basketmaker II period along Y Unit Draw. During the Pueblo II to early Pueblo III periods the project sites, along with other site within Y Unit Draw, were likely integrated in some manner to the use of Village of the Great Kivas (this relationship is explored in Chapters 21 and 28).

CONCLUSIONS: EARLY ZUNI SUBSISTENCE AND SETTLEMENT PATTERNS IN Y UNIT DRAW

INTRODUCTION

The State Highway 602 project refocused archaeological inquiry on subsistence strategies in Zuni area prehistory. Specifically, the project allowed for an examination of the emergence of agricultural production in the Zuni area during the Basketmaker II period and the reorganization of that production during the Pueblo II period. The Basketmaker II period agricultural field sites and their accompanying habitation sites and storage areas provide evidence for a major reinterpretation of the archaeological record as it pertains to the introduction of maize agriculture. The patterns identified during this project dovetail nicely with the emerging record from the northern Sonoran Desert where 3000 year old irrigation systems have also been identified (Mabry et al. 1997).

This new knowledge appears to refute the slow, diffusionary scheme for the introduction of agriculture into the Southwest (Irwin Williams 1973; Wills 1985). We now can explain the emergence of maize agriculture into the Zuni area as representing a movement of people into the relatively well-watered Zuni area. These people brought with them the technological means for growing corn — involving runoff irrigation and, as we have more recently learned from the New High School site on the Zuni River floodplain (Damp and Waseta, in preparation), stream fed irrigation systems. This new technology thus prompted a transported landscape that imposed upon the Zuni area an agroeconomic system developed elsewhere. The ramifications of this introduction were critical to cultural development in the Zuni area.

Ultimately, irrigation technology in Y Unit Draw was doomed because of down cutting of the

arroyo. Other technologies were implemented within Y Unit Draw in order to support the residents of the area during the time that the site of Village of the Great Kivas was inhabited. The intricacies of the relationships of great houses such as Village of the Great Kivas to the outlying (and supporting?) populations have not yet been worked out but this study provides a direction through an examination of subsistence strategies and settlement patterns. Although irrigation technology appears to have continued on in diminished form up to the arrival of the Spanish in AD 1540, many Pueblo II and later period sites appear to have reoriented economic pursuits to upland rainfall farming and floodplain runoff farming. The later strategy, *akchin*, may involve placing fields at the end of incised channels so that when the rains come a natural form of irrigation is involved with moisture distributed across fields as it emerges from an incised arroyo channel. Y Unit Draw possesses many examples of this geomorphological circumstance. Today, the areas where an incised channel opens up onto the floodplain are always associated with an agricultural field.

Most of the previous archaeological research conducted in the Zuni region focused on events and processes following the wide-scale residential aggregation of the late thirteenth and early fourteenth centuries AD. The large, plaza-oriented pueblos of late Zuni prehistory dominate the region's archaeological landscape and reflect a period of significant social and cultural changes. Yet, without a better understanding of settlement and subsistence strategies prior to the large pueblos, our understanding of the processes that contributed to these changes will remain limited. Over 2000 years of prehistory are represented in the archaeological record of Y Unit Draw, allowing an extensive examination of these processes through time.

This chapter presents conclusions drawn from the data presented in the previous sections of this report. These conclusions are organized in such a way as to follow the research design by the two major periods of occupation in Y Unit Draw: the Basketmaker II and the Pueblo II. Each discussion is followed by a general model of settlement and subsistence and household economy for that period.

BASKETMAKER II

The original Pecos Classification (Kidder 1927:490) defined the Basketmaker II period as an "agricultural, atlatl-using, non-pottery-making stage." The chronological framework for the Basketmaker II period in the Zuni region has not been well established. To do so requires several excavated sites. Ceramic artifacts appear at approximately AD 450 in the Zuni region (Fowler 1988; Varien 1990). The earliest possible date in Y Unit Draw for the Basketmaker II is approximately BC 805. Thus, a general temporal frame for the Basketmaker period II ranges from approximately BC 800 to AD 400. This is consistent with other temporal ranges for the Basketmaker II period (Baugh et al. 1998; Irwin-Williams 1973) and subsumes previously excavated Basketmaker II sites in the Zuni region (Gratz 1977; Wiseman 1977).

Environment and Economy

Mobility/Sedentism

As mentioned in the research design (Chapter 5), mobility and sedentism can be addressed by examining two aspects of occupation duration (residential stability and use duration), along with an examination of site spatial structure, season(s) of occupation, site reuse, and modes of abandonment.

These research issues have not been addressed for the Basketmaker II period to any great degree in the Zuni region prior to this project. The results of our analyses indicate a more intensive and focused settlement and subsistence strategy than once thought.

Occupation Duration. This research issue is difficult to examine with radiocarbon data. Nonetheless, some interesting patterns were observed. Three radiocarbon dates from pitstructure Feature 2 at site LA 115330 have calibrated (2 sigma) results ranging from BC 385 to AD 425. Since very little indication of site reuse was observed at site LA 115330, the occupation duration is not believed to have been this long. Additionally, earthen pitstructures have been found to typically have a use-life of approximately 20 years, if no renovations are made (Ahlstrom 1985). The calibrated intercept dates for the three samples from Feature 2 range from BC 200 to AD 320, which slightly narrows the range. Only one of the samples was taken from an annual, Beta-121241, which returned a calibrated intercept date of BC 50, and a 2 sigma range from BC 200 to AD 70 (Appendix A). Both Features 4 and 15, located outside the deep pitstructure, have calibrated intercept dates around BC 200 (BC 210 for Feature 15 and BC 200 for Feature 4). Their 2 sigma range is similar to the pitstructures dates, ranging from BC 395 to 50.

It appears, then, that occupation of site LA 115330 occurred within the first and second centuries BC. Given calibrated intercept dates at sites LA 48695, LA 115327, and LA 26306 ranging from BC 75 to 50, the height of Basketmaker II occupation of Y Unit Draw was during the first century BC.

This chronological assessment is supported by the archaeomagnetic date from the hearth (Feature 44) within Feature 28 (the deep pitstructure) at site LA 26306 (Appendix B). Blinman reported that the archaeomagnetic results indicated use of the hearth either in the first century BC or around AD 600. Two radiocarbon dates from this pitstructure provide 2 sigma calibrated ranges from BC 345 to AD 240, overlapping the range for the Feature 2 at site LA 115330. The calibrated intercept dates for the two samples (one from the floor, the other from a storage pit, Feature 35) from the deep pitstructure range from BC 75 to AD 75.

Nearby, the floor of Feature 29 (a shallow pitstructure) provided a wood charcoal sample that was dated from BC 165 to AD 160 (2 sigma calibrated; Beta-121224; Appendix A). The calibrated intercept date was determined to be AD 25. Feature 27, a bell-shaped storage pit north of the deep pitstructure, provided a radiocarbon sample dating from AD 130 to 560 (2 sigma calibrated; Beta-121225; Appendix A), with an intercept date of AD 380. Again, no obvious evidence of site reuse was identified from the Basketmaker II features along the west side of site LA 26306.

The shallow pitstructure (Feature 1) on the east side of site LA 26306 provided a radiocarbon sample that was dated from BC 185 to AD 395 (2 sigma calibrated; Beta-121222; Appendix A), with a calibrated intercept date of AD 90. Site reuse is indicated by Feature 2, as described in Chapter 11, and is the only evidence of site reuse at this site. The roasting pit of Feature 10 provided a date range from BC 405 to 50 (2 sigma calibrated; Beta-121223; Appendix A), with multiple calibrated intercept dates ranging from BC 355 to 230.

The data from site LA 26306 are consistent with those from site LA 115330. The potential occupation duration at these sites ranges from approximately BC 400 to AD 425. This is consistent with the use of sites LA 115327, LA 26319, LA 49838, and LA 48695 during the Basketmaker II period. These data are not sufficient, however, to examine site use-life in any meaningful manner. Most of the sites do not indicate evidence of reuse, particularly not the pitstructures.

Site Spatial Structure. Three distinct Basketmaker II site types were identified within the project area. These types included habitations, storage/resource processing sites, and agricultural fields. Basketmaker II habitations are represented by components at sites LA 115330,

and LA 26306. Storage/resource processing sites are represented by sites LA 26319, LA 115327, possibly site LA 115324 (although it may date to the late Archaic), and site LA 49838. Agricultural fields were identified at site LA 48695 and were likely very near each of the sites listed above.

Basketmaker II habitations in Y Unit Draw have a distinct spatial structure. Two types of pitstructures were used, one that is large (approximately 4 m in diameter) and deep (approximately 1 m or more below the surface) with sizable internal storage features and a central hearth. The other type is shallow with fewer internal pits for storage, but still with a large floor area (over 15 sq m). This pattern is seen at both site LA 115330 (if Feature 9 is interpreted as a shallow pitstructure) and at site LA 26306. In addition to these two types of pitstructures, extramural storage pits or thermal features are present. At site LA 115330 these occur to the north of the pitstructures; they are on the western side of site LA 26306.

Storage/resource processing sites are typified by clusters of storage pits or thermal features. These sites occur on both ridges at the valley margin in Y Unit Draw. Although it is possible that these sites represent habitations (the evidence of which may be located outside the project boundary), the low artifact density associated with these components suggests they are seasonal or of short duration (compare site LA 115330 flaked stone assemblage with sites LA 115327, LA 26319, or LA 49838). Data indicate that agricultural pursuits were a focus of activities at these sites. Smith (Chapter 24) identified possible specialization of feature function from analysis of pollen remains. She found that bell-shaped pits may have been used specifically for maize storage, while other pits had more general storage uses. She also identified basin-shaped pits and pits inside structures as maize processing features. These would have been used in harvest stockpiling, husking, and drying activities.

Subsurface deposits found at site LA 48695 indicate that its location was used as an agricultural field during the Basketmaker II period, contemporaneous with each habitation and some storage sites (such as LA 115327). Maize pollen was located in laminated, fine sand deposits approximately 0.75 m below the surface. Small charcoal (unknown conifer) flecks are distributed throughout this deposit, and were used for dating the deposit. The charcoal may have been the result of natural forest fires within the area. Intentional burning, however, to clear vegetation for agricultural fields may be another explanation.

Indications of irrigation ditches at site LA 48695 are represented in most of the hand- and mechanically-excavated trenches. These irrigation features are also evident in the remote sensing (electrical resistivity) study carried out at the site. The ditch features provide vivid evidence of irrigation technology that can be dated to the Basketmaker II (or Late Archaic) period and that continued through the Pueblo I period in Y Unit Draw. The association of a footprint, check dams, and post holes with these irrigation ditches points to a clear cultural association. The cultural and not natural origin of these ditch features has already been discussed but local hydrological regimes would not have been able to deposit the cobbles and boulders identified in the check dams. Similarly, footprints and postholes are difficult to attribute to any natural agency. The antiquity of these features was established with the dating of Feature 13 at site LA 48695, where charcoal from near basal sediments dates to 1190 BC. This date is similar to the dates from the Las Capas site in the Tucson area of Arizona (Mabry 1999; Mabry et al. 1997). Indeed, the overall morphology of the two irrigation ditches appears identical. Other dates from the irrigation ditches provide a framework for the use of irrigation in Y Unit Draw that spans a period from before 1000 BC to approximately 900 AD. The use of space for agricultural pursuits changed during this time period as new strategies evolved. Interestingly,

agrarian adaptations appeared to have shifted from irrigation strategies to rainfall dependent systems, a transition that would otherwise appear to be the reverse of expected strategies in cultural evolution.

Season(s) of Occupation. The two Basketmaker II habitations are believed to have been occupied during the entire year. The large, deep pitstructures with internal storage features are interpreted as cold-season residences. The shallow pitstructures are believed to represent warm-season residences. Use of these two different types of structures was likely not so simplistic, though. Schmader (Personal Communication 1999) has studied the specialized use of early pitstructures. He suggests the large, deep pitstructures are used primarily for storage and sleeping, while the shallow pitstructures are used for specialized domestic purposes, such as cooking. In addition, the ground stone artifacts from the project (Damp, Chapter 23) and the flaked stone (Shokler, Chapter 22) each suggest year-round occupation of the habitation sites.

Storage and resource processing sites are believed to have been used during the growing and harvesting seasons. The agricultural field at site LA 48695 would, of course, have been in use during the growing season. In the Zuni area, this would be from spring (April or May) and continue into fall (September or October).

Site Reuse. Site reuse is evidenced by feature superimposition at site LA 26306 in Feature 2. Here, two different features cut into each other, both of which appear to be fire-hardened cists. No similar evidence for site reuse was observed at site LA 115330, the other Basketmaker II habitation. Site reuse is well established for site LA 48695 where a series of dates traces the use of the area from before 1000 BC to the Pueblo II period. Although site LA 48695 was the only field situation examined during the course of the project, it is to be expected that agricultural field environments located along the floodplain of Y

Unit Wash could and will reveal similar if not more complex histories of use.

Modes of Abandonment. Each of the Basketmaker II pitstructures appears to have been "cleaned" prior to abandonment, as few artifacts were observed on the floors. Large, nonportable metates and other ground stone appear to have been the only types of artifacts left on the floors of these residences. Little, if any, de facto refuse, other than the ground stone, was left within the pitstructures, indicating that abandonment was planned.

Land Use

Environmental Location. The three types of sites identified for the Basketmaker II period occur in distinct environmental locations in Y Unit Draw. Habitations are located on ridges typified by sandy, well-drained soils overlooking the valley bottom. Storage and resource processing sites occur at the base of the western slope at the valley margin, as exhibited by the locations of sites LA 115327 and LA 26319. Site LA 49838 is tentatively classified as a storage/processing site; however, it is located on a bedrock ridge. It is possible that the extant features at this site represent a habitation with all of its architectural remains destroyed by road construction. Site LA 115324, which yielded a late Archaic date, fits into this category (storage/resource processing) and also occurs at the valley margin.

The agricultural field of site LA 48695 is also located at the valley margin and along the floodplain of Y Unit Draw. Farming of such locales was probably carried out since at least 1000 BC and it continues today. Changes in farming strategies occurred but all strategies were dependent upon tapping into the available water and moisture along Y Unit Draw.

Site Function. This category has been discussed above. To reiterate, however, three

distinct types of Basketmaker II sites were identified in Y Unit Draw during testing and data recovery activities. These include habitations, storage/resource processing sites, and agricultural fields.

Diet and Subsistence Practices. Maize agriculture was a focus of subsistence during the Basketmaker II period. Maize pollen, cupules, kernels, or cobs were recovered from all of the sites dating to this period. Wild plant resources that were likely used for subsistence include Cheno-Am, sunflower, and probably pinyon. The faunal assemblage recovered from all of the project sites is very small, precluding any detailed discussion regarding its significance in the general Basketmaker II diet. The small sample size suggests, though, that hunting was not a focus of subsistence strategies of the Basketmaker II residents of Y Unit Draw.

Population and Demography

Population and Demography

Population level and density for the Basketmaker II are difficult to determine without more data. Within the project area, it appears that at least two households were occupied at approximately the same time (sites LA 115330 and LA 26306). Although agricultural strategies were fairly intensive (as indicated by the early irrigation ditches at site LA 48695 and numerous storage features at the other Basketmaker II sites), there does not appear to have been a labor pool sufficient to process the agricultural products upon harvest. This is supported by Smith's (Chapter 24) hypothesis that basin-shaped earthen pits were used as intermediate storage facilities during the harvest process. Taking this one step further, one reason to store green maize, or maize in the husk, is due to insufficient labor to process it once it is taken from the field.

Pooling of labor must have taken place during the construction of the irrigation ditches. This

pooling of labor would not necessarily have entailed the use of a large population. Rather, the cooperation of households located within the confines of Y Unit Draw would have afforded the labor requirements for ditch construction. As such, these households, although spatially distinct from one another, would have functioned together as a virtual irrigation community capable of planning and planting annual crops and also carrying out all other roles of socioeconomic success.

Local and Regional Population Growth and Abandonment

Traditionally, the Basketmaker II has been considered a period that was characterized by low population densities. Recent project such as this one, others in the Chuska region (Baugh et al. 1998) of northwest New Mexico (see also Reed 2000), and southern Arizona (Mabry et al. 1997), indicate specific localities may have been characterized by higher population levels during the Basketmaker II than previously considered. Data from the project sites, however, do suggest mobility was not as restricted as it was in later periods (such as the Pueblo II).

Population Growth and Decline. There are simply too few data to discuss population growth and decline during the Basketmaker II in the Zuni region. The lack of well-defined pre-Basketmaker II sites in this area, however, suggests that the occupations within Y Unit Draw reflect agriculturalists moving into the region from elsewhere.

Processes of Abandonment. Again, too few data are available to discuss processes of abandonment in any great detail. One intriguing possibility for abandonment of site LA 115330 is found at site LA 48695. Above the laminated fine sands of Stratum III in most of the excavated trenches was a thick layer of unsorted gravels and large sandstone clasts

(Stratum II, Chapter 13). Stratum II is composed of sandstone clasts and gravels deposited upon the irrigation field system and, as such, this stratum may have been a very high-energy event that covered the topsoil of the fields and thus impaired if not destroyed productivity.

Social Organization

Social Organization

During the Basketmaker II, the basic level of organization appears to have been the household, although all households must have been integrated into an overall community. The community in this case was probably predicated upon the socioeconomic demands of irrigation technology. The otherwise dispersed residential pattern, as represented by the habitations during this period in Y Unit Draw, was seemingly organized through participation as members of an irrigation community but also through identity with individual household. Household control over agricultural production may be manifest in the isolated storage/resource processing sites.

Community Development

The distribution of Basketmaker II sites throughout Y Unit Draw and the evidence for irrigation farming combine to provide evidence that a suprahousehold level of integration was in play during this time period. As such, household may have been integrated into a community based on cooperation in maintaining agricultural production through irrigation. This so-called irrigation community would, therefore, have managed social, economic, and political decision-making.

Patterns of Intersite Integration. Smith (Chapter 24) suggested that the residents of site LA 115330 provided the residents of site LA 26306 with processed maize products. She based this on the pollen signatures within various types of features. This is one potential pattern of

intersite integration. Similar site spatial structure, and architectural styles, suggest further interaction, along with the short (approximately 0.5-km) distance between the two sites.

Horizontal and Vertical Organization.

Horizontal organization is, again, believed to have been primarily focused on the household level, but as mediated through the irrigation community.

Regional Relationships

The Basketmaker II sites along Y Unit Draw are among the oldest known in this region of the American Southwest that comprise pitstructures. Recent investigations by Kearns (Baugh et al. 1998) along the Chuska Slope, new data available for the Basketmaker III period (Reed 2000), and the synthesis provided by Vivian (1990) allow some discussion of regional relationships during this period. Material recovered from our investigations at many of the Basketmaker II sites indicate widespread, and potentially formal, interaction with groups in distant regions of the American Southwest.

Cultural Affiliation and Boundaries

Style. Baugh et al. (1998) located Basketmaker II populations along the Chuska Slope. Shallow pitstructures and varying sizes of storage cists are very similar to those used by the residents of Y Unit Draw during Basketmaker II. Morris and Burgh (1954) also identified shallow pitstructures and clusters of storage cists at Basketmaker II sites in the Durango area. These sites, however, were restricted spatially by the confines of rockshelters. On the other hand, the Y Unit Draw sites also comprise deep, formal pitstructures with large internal storage features.

The closest example to the architecture of sites LA 26306 and LA 115330 can be found in the Hardscrabble Wash area, approximately 32 km (20 mi) north of St. Johns, Arizona. Here, the Museum of Northern Arizona excavated site

NA14, 646, which comprised a Basketmaker II component that is essentially contemporaneous with the Y Unit Draw sites (Berry 1982). A single pitstructure dating to the Basketmaker II from this site is similar in many ways to the deep pitstructures at sites LA 26306 and LA 115330. This pitstructure was roughly circular, approximately 4.5 m in diameter with a central fire pit. Its floor was characterized by unplastered sterile sand, and was located approximately 0.70 m below the original surface.

Exchange. Procurement of resources from distances as far as the Pacific coast (primarily shell of *Olivella* sp.) was attained during the Basketmaker II. Whether this was direct procurement or down-the-line exchange is not known. Each of the Basketmaker II habitations yielded a distinctive blue pigment believed to be azurite. Known azurite sources are located in the Zuni Mountains and in the San Pedro valley of southern Arizona.

In terms of general cultural affiliation and boundaries (if those are even possible to assess with these data), the Basketmaker II sites within Y Unit Draw are not consistent with the two predominant regional variants of this time period as identified by Vivian (1990). These two variants are the Los Pinos and late En Medio. Rather, the sites within Y Unit Draw may tentatively be considered a regional Basketmaker II, distinct from their surrounding neighbors.

Modeling the Basketmaker II Period in the Zuni Area

Based on the discussion of research issues above, a general model of Basketmaker II (ca. BC 800 to AD 400) settlement and subsistence can now be provided. The basic settlement pattern comprises three types of sites distributed throughout the project area with respect to specific environmental locations. These three types of sites are habitations, storage/resource processing sites, and agricultural fields.

Habitations are located on ridges with deep, well-drained sandy soils conducive for pitstructure construction. Storage/resource processing sites are located at the valley margin, adjacent to the base of the western slope in Y Unit Draw. Agricultural fields are also located at the valley margin, yet extend into the floodplain proper.

Habitations comprise both deep and shallow pitstructures, each with numerous internal storage features. Each type of pitstructure was roofed, yet the shallow ones appear to have had formal internal support posts, while the deep pitstructure at site LA 115330 likely had its roof supports located along surface and possibly set into the walls, not on the floor. Along with pitstructures, the habitations also have extramural storage features and sometime roasting pits. In two instances, extramural features occur north of the pitstructures. Habitations typically include numerous and diverse artifact assemblages. Formal flaked stone tools, however, are not abundant, which indicates either a component of the settlement system is missing or tasks and activities requiring formal tools were not required. Ground stone tools are diverse, though, and indicate maize agriculture was a subsistence focus during this period. This is consistent with the numerous storage pits, most with evidence of maize pollen, kernels, cupules, or cobs. Based upon these characteristics, these habitations are interpreted here as being permanent, year-round residences.

Storage/resource processing sites comprise clusters of earthen pits that functioned for subsistence-related purposes. Earthen storage features that are often fire-hardened dominate the types of features found in these sites. These may be basin-shaped, bell-shaped, or simply generic earthen pits. These are believed to have been primarily storage features for maize, but may have stored other foodstuffs as well. Smith (Chapter 24), based upon variation in pollen signatures, suggested the basin-shaped pits stored green maize, or maize still in the husk, while bell-

shaped pits stored processed maize. This should be explored further in future investigations of Basketmaker II sites. Thermal features are also present at these sites. Although the data are few, these features may have functioned to roast maize or other types of food (such as pinyon nuts). Thermal features may be formally within pits or as more general rock-filled features.

Agricultural fields are located near habitations. Irrigation ditches were excavated and served to funnel water onto fields near the habitation areas. Intensive endeavors for agricultural production are not surprising, given the numerous storage features in the habitations and storage/resource processing sites. All of these aspects indicate that households were expecting high agricultural yields.

This model of settlement and subsistence interprets maize agriculture as a focus of economic production. Control over economic production appears to have been vested in the domain of the household (e.g., Damp and Kendrick 1998) but integrated through the local irrigation community that may have consisted of three to five households within Y Unit Draw.

PUEBLO II

The data recovered from Pueblo II (approximately AD 900 to 1150) contexts was limited in many ways. Primarily, these contexts were surficial or from middens (such as at sites LA 26306 and LA 49838). Any conclusions drawn, then, should necessarily be considered tentative. When possible, the patterns observed outside the project boundary but within Y Unit Draw in general have been included in the following discussion. These observations, when combined with our understanding of Village of the Great Kivas, allows an examination of current models for the development of great houses during the Pueblo II. Provided below is a review of the research issues presented in Chapter 5. This is followed by a model for Pueblo II settlement

and subsistence that focuses on households and changes in household economic autonomy to better understand this period.

Environment and Economy

Mobility/Sedentism

Aspects of mobility and sedentism outlined in the research design included occupation duration of site, along with site spatial structure.

Occupation Duration. Two main types of Pueblo II sites were identified within the project area: large sites (habitations) and small sites (fieldhouses). One possible fieldhouse at site LA 115323 was excavated; however, this structure may date to the Pueblo III period. The other small sites investigated provided a hint at occupation duration through their ceramic artifact assemblages.

Each of the small sites with Pueblo II components (sites LA 115334, LA 26319, LA 115330 [the Pueblo II component], LA 48695, LA 115325, LA 115329, LA 26308 [the earlier components are considered small], LA 115324, LA 115322, and LA 115320) have very small ceramic artifact assemblages that comprise few diagnostic types (Table 21.2). Three of these sites (LA 115334, LA 26319, and LA 115322) comprise small masonry structures whose mean ceramic dates fall in the late 1000s to early 1100s. These sites typically only have between two and four diagnostic ceramic types. This situation may indicate a relatively short occupation duration for these small sites.

The large sites within the project area with Pueblo II components are sites LA 26306, LA 115328, and LA 49838. Site LA 115321 may be an early Pueblo II habitation, based upon the presence of burned adobe. This site has a relatively small artifact assemblage compared to the sites listed above, however. The three largest sites, then, contain numerous diagnostic types (ranging from 8 to 12) within their ceramic

artifact assemblages. The larger sites also include a more diverse artifact assemblage, indicative of long occupation spans. Without additional data, however, very little can actually be said about the occupation duration of these sites.

Site Spatial Structure. No data on site spatial structure relevant to such a discussion were recovered from the excavated portions of the project sites. When combined with other sites in Y Unit Draw, however, a discussion regarding spatial structure can be attempted.

Small masonry structures (fieldhouses) or unit pueblos form a suite of types that are a component of a larger household landscape. This patterning begins with the western slope of Y Unit Draw where unit pueblos overlook or are near alluvial fans. Downslope, and typically on ridge spurs at the mouth of the alluvial fans and/or the valley bottom, are fieldhouses and limited-activity areas. In addition, agricultural features such as check dams are present within or at the mouths of the alluvial fans. This arrangement appears to mark the basic pattern for the domestic landscape during the Pueblo II period (particularly the late Pueblo II period).

A model for the domestic landscapes is also typified by cultural deposits at site LA 115328, a late Pueblo II habitation. At this site, a small masonry structure is located east of the main site at the terminus of the ridge on which that site is located. This positioning follows the same basic household layout of the late Pueblo II. Site LA 115322, a small masonry structure located at the base of the western slope dating to the late Pueblo II, may, then, be associated with the undocumented contemporaneous unit pueblos located upslope.

Other aspects within the mobility and sedentism research issue, such as season(s) of occupation, site reuse, and modes of abandonment cannot be addressed from the data collected during the project.

Land Use

A brief discussion of land use is provided below. This discussion is premised on the acceptance of the general and overall layout of Pueblo II domestic architecture as discussed above.

Environmental Location and Site Function.

Within the project area, both Pueblo II habitations and fieldhouses (smaller masonry structures) were encountered. Typically within Y Unit Draw, habitations are located upslope from the fieldhouses. The fieldhouses, in general, are located at the tips of ridge spurs overlooking the valley floor. They are also often located adjacent to alluvial fans, which would have been conducive to farming that tapped into runoff moisture. There are, of course, other aspects of the settlement system not encountered within the project area. These types of sites include public integrative facilities such as great kivas, as well as smaller esoteric features such as shrines. The environmental locations of habitations and fieldhouses reflect a certain control over economic production at the household level. The implications of this are discussed further below.

Diet and Subsistence Practices. Presumably Pueblo II diet and subsistence strategies would have focused on maize, along with beans and squash, and supplemented by wild floral and faunal species. This conclusion is indirectly supported by the locations of households discussed above. Other than Feature 3 (an earthen storage pit) at site LA 49838, little to no direct data regarding Pueblo II subsistence was recovered. Feature 4 at site LA 48695 is believed to be a water control feature dating to the Pueblo II period. This location was also selected for agricultural practices 1000 to 2000 years earlier by Basketmaker II households within Y Unit Draw.

Ruppe' (1987) recovered maize cupules or kernels in 55 to 70% of the samples from site

NM:12:K3:4, a small Pueblo II habitation east of Yellowhouse in the Pescado valley. Pinyon, goosefoot, and amaranth were other common economic plants recovered from the site. Interestingly, though, no cactus or beeweed seeds or sunflower achenes were recovered from this site. These types of plants were not only found in many of the Basketmaker II contexts within the project sites, but they have also been recorded in later sites in the El Morro valley by Miksicek (1973).

Population and Demography

The dynamics of population and demography are very important to understand if we are to develop more sophisticated models for the Pueblo II, and even Pueblo III, periods. Pueblo II sites are among the most common across the Zuni Indian Reservation, yet we still are unclear about the timing of possible increases in population or the potential that these sites reflect immigration into this region. Still harder to determine are intentional efforts at social production during the Pueblo II and later periods.

Local and Regional Population Growth and Abandonment

Population growth and abandonment throughout the Four Corners region during the Pueblo II is characterized by extreme variation through time and across space. Leonard (1989) linked population distribution in the Zuni area to agricultural production. Leonard and Reed (1993:655-656) saw population "aggregation as the product of changing labor requirements of specialized agricultural systems in the context of a changing environment." In this scenario, "fluctuations in available moisture during the late thirteenth century dictated that agriculture could not as easily be practiced in as many settings." This change in climate combined with more-labor-intensive strategies of production and more-labor-intensive strategies to allow for only certain areas of the Southwest to be effectively farmed.

Areas such as Zuni became "labor sinks" with growth in the labor pool required to maintain agricultural production at previous levels. The aggregated pattern of settlement distribution on the Zuni landscape came to be dictated "by the requirements of the organization of corporate labor related to maintaining specialized agricultural production" (Leonard and Reed 1993:655).

Population density increases in the northern San Juan region in the late Pueblo II and early Pueblo III, while it decreases in other areas. In Chaco, although the canyon was not abandoned, the latest construction date is AD 1130. For the Zuni region, the late Pueblo II is very dynamic. For example, Fowler (1980) noted occupation of the Cheama Canyon area until approximately AD 1125, after which the area was abandoned for residential purposes. In Y Unit Draw and the Nutria and Pescado valleys, no such abandonment occurs. Rather, numerous sites dating to this period occur throughout these valleys.

That settlement was widespread in the Zuni region in the Pueblo II is significant for better understanding the dramatic changes that took place during the Pueblo III. That is, dispersed households of the Pueblo II would have had access rights to critical resources such as productive agricultural land. Depending on the mobility opportunities for households, any increase in population would have created competition for these critical resources.

Population Growth and Decline. There are no data to suggest that population was in decline during the Pueblo II period in the Zuni region. On the contrary, the numerous Pueblo II sites discovered by Fowler (1980) in Cheama Canyon and Hunter-Anderson (1978) during the Yellowhouse Dam survey suggest Pueblo II population levels were high. Leonard and Reed (1993) suggested that following the abandonment of other regions in the late Pueblo III (AD 1225 to 1300) the Zuni region became a labor sink

because it remained suitable for agricultural practices. It is likely, though, that Pueblo II population density could adequately account for Pueblo III population estimates.

Processes of Abandonment. The Zuni region is one of the few in the Puebloan world of the thirteenth century not to be abandoned. Numerous small valleys, though, such as Y Unit Draw, were abandoned in terms of settlement during the Pueblo II and Pueblo III periods. Abandonment of households within Y Unit Draw appears to have occurred between AD 1150 and 1200. Numerous social and environmental factors must have contributed to the abandonment of the valley. If population was increasing during the late Pueblo II and early Pueblo III periods, this would have reduced the mobility of any particular household. We might also expect more intensive agricultural strategies. Paleoclimatic data, however, demonstrate that a severe drought occurred between AD 1133 and 1161 (Figure 2.3; Grissino-Mayer et al. 1997). This drought was followed by improved conditions beginning in the late 1100s. These climatic fluctuations, severe drought followed by wetter conditions, are one way in which arroyo development may begin (Wells 1987). As noted by Gellis (1998), a radiocarbon sample obtained from a rooted tree within the stream channel of Y Unit Draw dated to 680 ± 90 years BP (no laboratory number or other data regarding the sample are provided by Gellis). Goldstein (1998) believed this date suggests the timing of the culmination of the last incisional event in Y Unit Draw.

Calibrated data are not provided by Gellis (1998) for this radiocarbon date. Using the one sigma range, however, suggests that the most recent incision of the current stream channel began by AD 1180. As discussed in Chapter 21 (Eckert et al.), the ceramic assemblage of nearly every site (save for site LA 49838 [located at the head of the valley],

site LA 115323 [one sherd], and site LA 48695 [one sherd]) ends by AD 1175. Arroyo cutting, then, may have been a contributing factor to the abandonment of Y Unit Draw.

Social Organization

Pueblo II households must have been integrated into some form of community organization. Large integrative structures such as great kivas are known near the confluence of Y Unit Draw and the Nutria River, and at Village of the Great Kivas. These facilities suggest a form of organization above the household level, although individual households may still have controlled certain access rights to resources throughout the Pueblo II period.

Community Development

Patterns of Intersite Integration. This research issue can be examined through the spatial distribution of sites within the project area. The large sites are dispersed, and occur on prominent bedrock ridges that overlook the valley bottom. Undocumented late Pueblo II unit pueblos upslope and to the west of the project are generally dispersed, often occurring near or overlooking alluvial fans. Ceramic assemblages for these sites suggest contemporaneity, and establish the possibility that these households were more formally integrated into some form of community organization. Individual households may have retained relative control over most aspects of economic and social production during the Pueblo II period.

Horizontal Organization. Based upon spatial distribution of household landscapes in Y Unit Draw and the Nutria valley, control of economic production appears to be within the realm of the household. Control, then, would fall upon household leaders. As competition for critical resources increased during the late Pueblo II to early Pueblo III, possibly due to decreased mobility and increased population, some

household leaders would have had the opportunity to increase their status within the community.

Vertical Organization. This cannot be distinguished within the project area; however, sites within Y Unit Draw and within the larger Nutria drainage possibly reflect some degree of social differentiation taking place during the Pueblo II. A moderate-sized (with an estimated 20 to 30 rooms) undocumented ruin is located upslope from site LA 115324. It was occupied into the early Pueblo III based upon its ceramic assemblage, so it is difficult to assess its size during the Pueblo II period. Nonetheless, it represents organizational changes taking place in Y Unit Draw during these time periods. Traditionally, Village of the Great Kivas would be interpreted as representing status differentiation within the local community (Powers et al. 1983).

Regional Relationships

Various types of information can be used to infer regional relationships among the households of Y Unit Draw. Ceramic artifacts, architecture, and flaked stone raw material are a few of these types that are examined here.

Cultural Affiliation and Boundaries

The ceramic assemblage, not surprisingly, is dominated by local wares. Nonlocal wares were identified, however, that reflect Y Unit Draw households were integrated into a network of interaction that included the Little Colorado River and Puerco River valleys, and possibly the Mogollon and Chuska Mountain regions as well. The ceramic assemblage from Village of the Great Kivas indicates its residents were active in even broader realms of interaction. Nonlocal wares in this assemblage indicate interaction with the Little Colorado, Tusayan, Mesa Verde, Puerco Valley, and Mogollon regions.

Architectural styles also offer information regarding various aspects of cultural affiliation

and possible boundaries that ceramic artifacts may not provide. Unfortunately, no architecture postdating the Basketmaker II, other than the small one-room structure at site LA 115323, was excavated during this project. Chaco-style architecture is incorporated into early construction episodes at Village of the Great Kivas. The first construction episode at Village of the Great Kivas incorporated Type II Chaco-style masonry (see Judd 1954 and Vivian 1990 for examples of this style). Great kivas are often associated with Chacoan style architecture. Various features in the excavated great kiva at this site are identical to those in great kivas elsewhere. For example, the construction technique of the support pillars (of which there were four) is identical to that found in the great kivas at the Aztec West Ruin (Morris 1921) and at Lowry (Martin 1936). This distinctive technique included alternating courses of wooden poles and sandstone masonry blocks to build the support pillars. These architectural styles indicates familiarity, and potentially formal interaction, with other communities throughout the Four Corners region.

Processes on the Peripheries of Regional Systems

The presence of Village of the Great Kivas has been used to define the boundaries of the Chaco System (e.g., Judge 1989; Lekson 1991; Marshall et al. 1979; Powers et al. 1983). From this perspective, both the residents of Village of the Great Kivas and the households of Y Unit Draw were active participants in a far-reaching system of interaction centered on the great houses of Chaco Canyon. The population of the Nutria drainage would have been on the periphery of this regional system. The function of the system, however, has been the focus of great debate among Southwestern archaeologists for some time. The research design of this project put forth as one of its primary goals the examination of models related to the development of Chaco-style great houses in the Zuni region. Interestingly, the data collected suggest the impact to the residents

of the Nutria valley of the Chaco system was minimal and brief.

As outlined in Chapter 5, great house models can be generalized into two broad categories: local development and colonization. As the labels indicate, local development models attribute the development of Chaco-style great houses primarily to local processes and developments, such as local elites (Powers et al. 1983), political competition (e.g., Kantner 1996; Sebastian 1992), or community integrative forces (e.g., Varien et al. 1996). Colonization models focus on the intrusive and nonlocal character of great houses, and attribute their development to external processes, such as expansion of Chaco Canyon populations (Vivian 1990), Chacoan priests or missionaries (e.g., Bradley 1993; Warburton and Graves 1992), or Chacoan armies (Wilcox 1993).

Data collected during this project do not support any of the colonization models. Even though these models are inherently difficult to examine (or falsify) in any area, the data show that any influence on households in Y Unit Draw from Chaco was not significant. In fact, the ceramic assemblage from Village of the Great Kivas demonstrates no formal interaction with the great houses of Chaco Canyon. The architecture, though, is quite similar to that found in Chaco during the same time period. The use of stylistic data, however, is intrinsically problematic. The simple notion that great kivas are "Chacoan" in architectural style biases great-house models, particularly when such structures likely developed in the Mesa Verde region rather than Chaco.

Pueblo II Household Economic Autonomy and Great-House Development

Models of household economic autonomy and its significance for great house development have recently been provided by Kendrick and Judge (1998) for the Montezuma Valley of southwestern Colorado, and by Damp and Kendrick (1998) for the Zuni region. Autonomy is defined here as

control. Thus, the basic premise for the model is that control, or autonomy, over economic production during the Pueblo II was vested in the domain of the individual household. Furthermore, access to critical resources such as productive and predictable agricultural land was controlled by households. Economically autonomous households may have been socially integrated into a community level of organization, while still maintaining control over their own economic pursuits.

Evidence for household economic autonomy during the Pueblo II, relative to later Pueblo III period households, is manifest in several ways. The dispersed spatial distribution of Pueblo II residences suggests households controlled access rights to resources within their immediate surroundings. Eckert et al. (Chapter 21) indicate that the ceramic assemblages tentatively suggest storage was more intensive during the Pueblo II than the Pueblo III in the Zuni region. This pattern suggests that households controlled economic production more so during the Pueblo II than in later periods.

As discussed above, a distinct household landscape is evident during the Pueblo II in Y Unit Draw and the general Nutria valley. Important aspects of this landscape are environmental settings conducive for farming areas receiving runoff precipitation, such as alluvial fans or bases of slopes. Small masonry structures that were likely fieldhouses are also a part of this household landscape, and are often located on ridge spurs overlooking alluvial fans or valley bottoms. These structures may not have functioned just to facilitate agricultural pursuits. They may have also acted as symbols of exclusionary land tenure practices by individual households.

Population density was generally high during the Pueblo II period in the Zuni region. Increasing population would have resulted in decreased household mobility, thus increasing competition for access to critical resources. Incipient residential aggregation, which begins

early at Village of the Great Kivas, not only reflects a loss of household economic autonomy, but attempts by larger corporate groups such as lineages to organize larger labor pools. Control of more producers (e.g. Damp and Kendrick 1998) would have provided greater ability to intensify economic production and thus gain competitive advantages over other households or lineages.

Incorporation of great-house architecture, then, can be seen as precocious attempts by households to pull in kin groups (lineage members) to aggregate labor in order to be more competitive vis-a-vis other lineages. Interestingly, the location of Village of the Great Kivas is between two of the largest alluvial fans in the Nutria drainage. A single individual household would not provide sufficient labor to efficiently exploit this extremely productive location. Thus, the development of Village of the Great Kivas involves increasing integration of economic production and larger corporate groups above the household level, rather than a Chacoan colony.

SUMMARY AND CONCLUSION

This project has made significant contributions to our understanding of early Zuni prehistory. Identification of the Basketmaker II presence in the Zuni region has always been problematic. In Y Unit Draw, and probably in the entire Nutria drainage, Basketmaker II sites are typically located below a humic A horizon or thick colluvium, or both. Generally, this may be as much as 0.50 m below the present ground surface. In other settings, Basketmaker II components are as much as 1.00 to 2.00 m below the surface. The identification of Basketmaker II homes and gardens in Y Unit Draw greatly advances our understanding of this time period. Conventional wisdom, up to the beginning of this project posited that Late Archaic (or Basketmaker II) populations were organized in small, mobile groups. As such, it was unlikely that the labor pool existed that could have supported intensive agricultural production. Furthermore, the lack of evidence for water control systems or formal fields was viewed as consistent with this

interpretation. This scenario fits well with the body of data that existed for the Zuni area until the beginning of this project. Our current understanding reveals a rapid and dramatic introduction of irrigation-based agriculture perhaps 3000 years ago.

It has been assumed for the Zuni area that elaborate irrigation technologies were developed around AD 1300 and this factored in the restructuring of the settlement system. The pattern of change in agricultural technology that is often invoked not only for Zuni but also for the Southwest and most of the world implies increasing elaboration of agricultural technology through development of irrigation systems. Our studies provide evidence that irrigation technology was imported as either a transfer of technology to Archaic populations of the Zuni area or, more likely, it was a component of a transported landscape introduced by expanding agricultural populations from the south. In this last scenario, we see movements of people and agroeconomic systems from the southern Arizona area onto the Colorado Plateau.

Ongoing investigations in the Zuni area beyond the current project provide further evidence of early agricultural production that dates to over 3000 years. This evidence comes from earlier studies that gathered pollen and macrobotanical data, the comprehensive study in Y Unit Draw specifically at site LA 48695, and the overwhelming data recently obtained at the Zuni New High School site (Damp and Waseta, in preparation).

Early speculations that Basketmaker II peoples exploited the high country and practiced a generalized economy based on hunting and gathering must now yield to a new model that posits sedentary Basketmaker households operated within a community structure. This community structure must have managed irrigation systems on the river bottomlands for the production of maize agriculture. Within the Zuni River Valley the distribution of Basketmaker

period sites indicates a strong preference for bottomland locations. We have not observed aggregation above the household level for the early introduction of irrigation agriculture in the Zuni area. Physical aggregation may not have been a factor, rather individual households dispersed along the drainages, including both Y Unit Draw and the Zuni River, were probably united through their incorporation into a system of cooperation through irrigation farming. These "irrigation communities" formed the basis for the emergence of agriculture in the Zuni area and possibly throughout most of the Colorado Plateau.

From our investigations at the Pueblo II sites in the project area, in Y Unit Draw in general, and at Village of the Great Kivas we not only have a better understanding of this period, but also a new perspective from which to examine the dramatic changes of the Pueblo III period. Although paleoethnobotanical evidence for this time period was meager for this project, an analysis of settlement distribution and settlement hierarchies as seen in the relationships of Chaco period great houses such as Village of the Great Kivas, to fieldhouses and unit pueblos within the project area is illuminating. Households within the confines of Y Unit Draw were apparently able to maintain some autonomy from the great house community at Village of the Great Kivas. At the same time they must have been pulled into the sphere of social, economic, and political influence that was exerted by the residents of Village of the Great Kivas. At this time, there also appears to have been a restructuring of agricultural pursuits in the Zuni area. Irrigation technology, while not abandoned, was deemed less productive perhaps because of arroyo downcutting. Was then the distribution and character of Pueblo II sites within the project area a reflection of changing moisture distribution and, consequently, new forms of agrarian production? As such was this a society's attempt to deal with changes in economic production by creating a community whose households interacted according to new norms of social production?

SECTION V. APPENDICES

APPENDIX A

Radiocarbon Results

REPORT OF RADIOCARBON DATING ANALYSES

Ms. Janet Hagopian

August 18, 1998

Pueblo of Zuni

September 23, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-121222	1920 +/- 120 BP	-25.0* o/oo	1920 +/- 120* BP
SAMPLE #: LA26306-FS144 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			
Beta-121223	2170 +/- 80 BP	-21.5 o/oo	2230 +/- 80 BP
SAMPLE #: LA26306-FS215 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121224	1990 +/- 70 BP	-25.0* o/oo	1990 +/- 70* BP
SAMPLE #: LA26306-FS228 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121225	1700 +/- 90 BP	-25.0* o/oo	1700 +/- 90* BP
SAMPLE #: LA26306-FS232 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121226	2090 +/- 60 BP	-25.0* o/oo	2090 +/- 60* BP
SAMPLE #: LA26306-FS265 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950 A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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REPORT OF RADIOCARBON DATING ANALYSES

Ms. Janet Hagopian

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Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-121227	1940 +/- 70 BP	-25.0* o/oo	1940 +/- 70* BP
SAMPLE #: LA26306-FS271 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121228	970 +/- 60 BP	-25.0* o/oo	970 +/- 60* BP
SAMPLE #: LA26308-FS99 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			
Beta-121229	1320 +/- 50 BP	-25.0* o/oo	1320 +/- 50* BP
SAMPLE #: LA26308-FS101 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121230	2350 +/- 80 BP	-25.0* o/oo	2350 +/- 80* BP
SAMPLE #: LA26319-FS36 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121231	2030 +/- 80 BP	-22.1 o/oo	2080 +/- 80 BP
SAMPLE #: LA48695-FS23 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

REPORT OF RADIOCARBON DATING ANALYSES

Ms. Janet Hagopian

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Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-121232	2280 +/- 70 BP	-25.0* o/oo	2280 +/- 70* BP
SAMPLE #: LA49838-FS350 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121233	880 +/- 50 BP	-25.0* o/oo	880 +/- 50* BP
SAMPLE #: LA49838-FS354 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121234	1930 +/- 140 BP	-21.1 o/oo	1990 +/- 140 BP
SAMPLE #: LA49838-FS365 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			
Beta-121235	3080 +/- 90 BP	-21.9 o/oo	3130 +/- 90 BP
SAMPLE #: LA115323-FS33 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121236	1100 +/- 70 BP	-20.5 o/oo	1170 +/- 70 BP
SAMPLE #: LA115323-45 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.



BETA ANALYTIC INC.

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REPORT OF RADIOCARBON DATING ANALYSES

Ms. Janet Hagopian

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Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-121237	2450 +/- 90 BP	-25.0* o/oo	2450 +/- 90* BP
SAMPLE #: LA115327-FS50 and 56 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			
Beta-121238	2190 +/- 60 BP	-25.0* o/oo	2190 +/- 60* BP
SAMPLE #: LA115330-FS168 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121239	1750 +/- 60 BP	-25.0* o/oo	1750 +/- 60* BP
SAMPLE #: LA115330-FS188 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121240	2150 +/- 60 BP	-22.3 o/oo	2190 +/- 60 BP
SAMPLE #: LA115330-FS205 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-121241	1850 +/- 60 BP	-11.3 o/oo	2070 +/- 60 BP
SAMPLE #: LA115330-FS207 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By international convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

REPORT OF RADIOCARBON DATING ANALYSES

Ms. Janet Hagopian

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Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
eta-121242	2210 +/- 60 BP	-25.0* o/oo	2210 +/- 60* BP
SAMPLE #: FS115330-FS221			
ANALYSIS: radiometric-standard			
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121222

Conventional radiocarbon age*: 1920 ± 120 BP

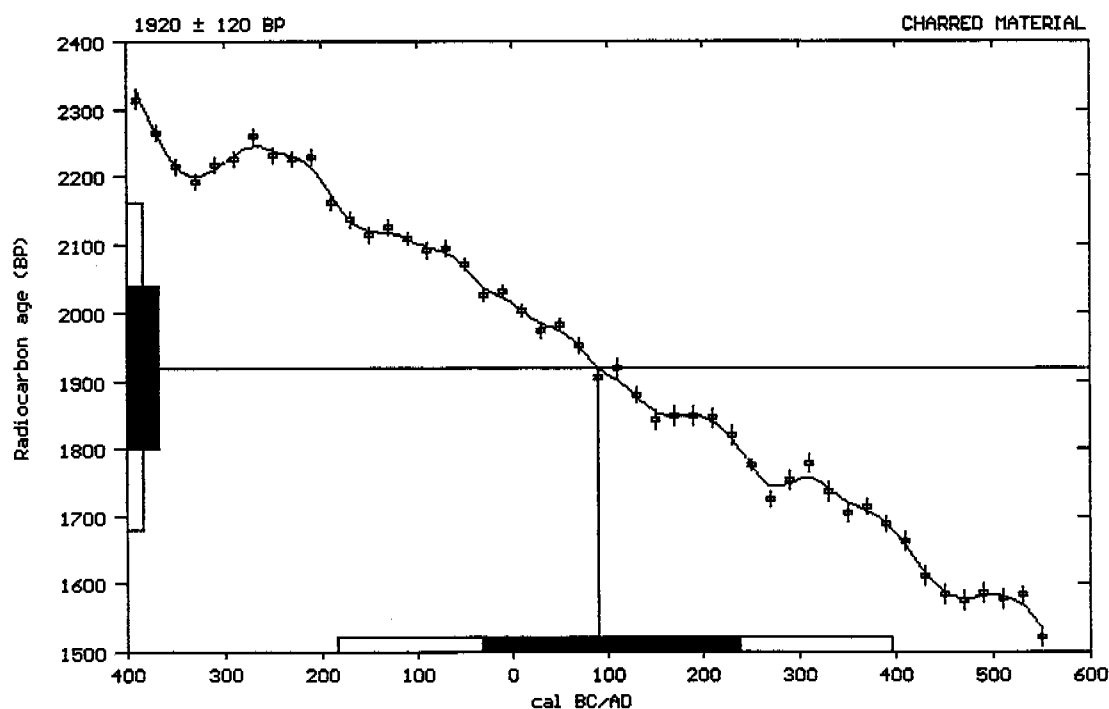
Calibrated results: cal BC 185 to cal AD 395
(2 sigma, 95% probability)

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 90

1 sigma calibrated results: cal BC 35 to cal AD 240
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-21.5; lab mult.=1)

Laboratory Number: Beta-121223

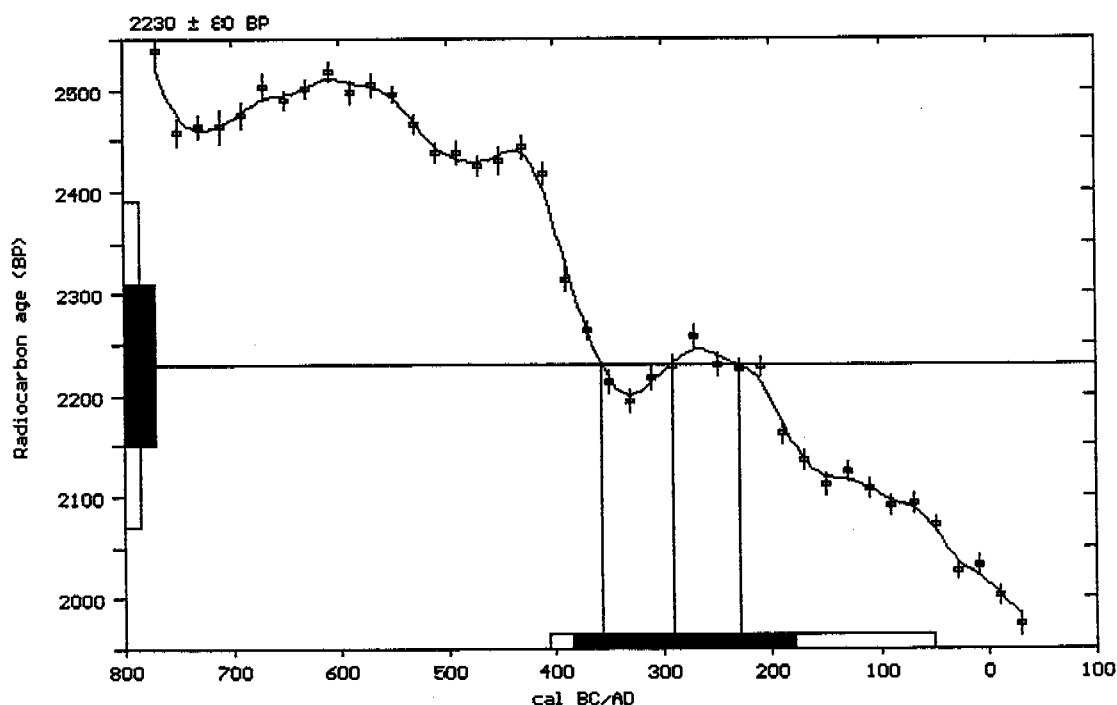
Conventional radiocarbon age: 2230 ± 80 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 405 to 50

Intercept data:

Intercepts of radiocarbon age
with calibration curve: cal BC 355 and
cal BC 290 and
cal BC 230

1 sigma calibrated results:
(68% probability) cal BC 385 to 180



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121224

Conventional radiocarbon age*: 1990 ± 70 BP

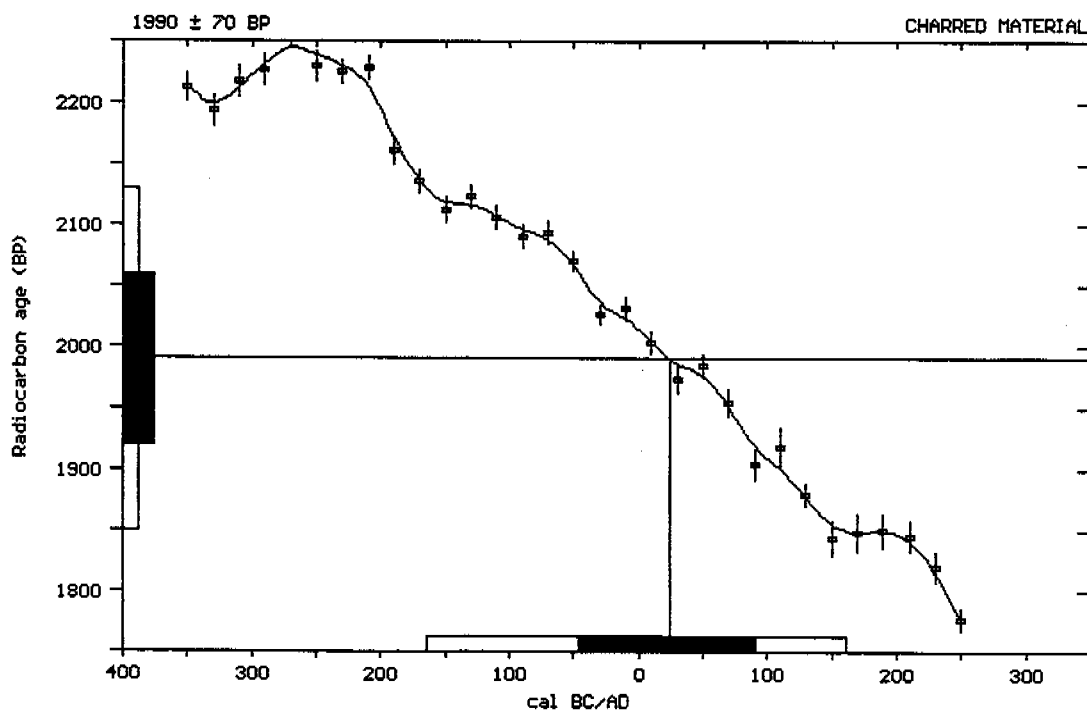
Calibrated results:
(2 sigma, 95% probability) cal BC 165 to cal AD 160

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 25

1 sigma calibrated results:
(68% probability) cal BC 45 to cal AD 90



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121225

Conventional radiocarbon age*: 1700 ± 90 BP

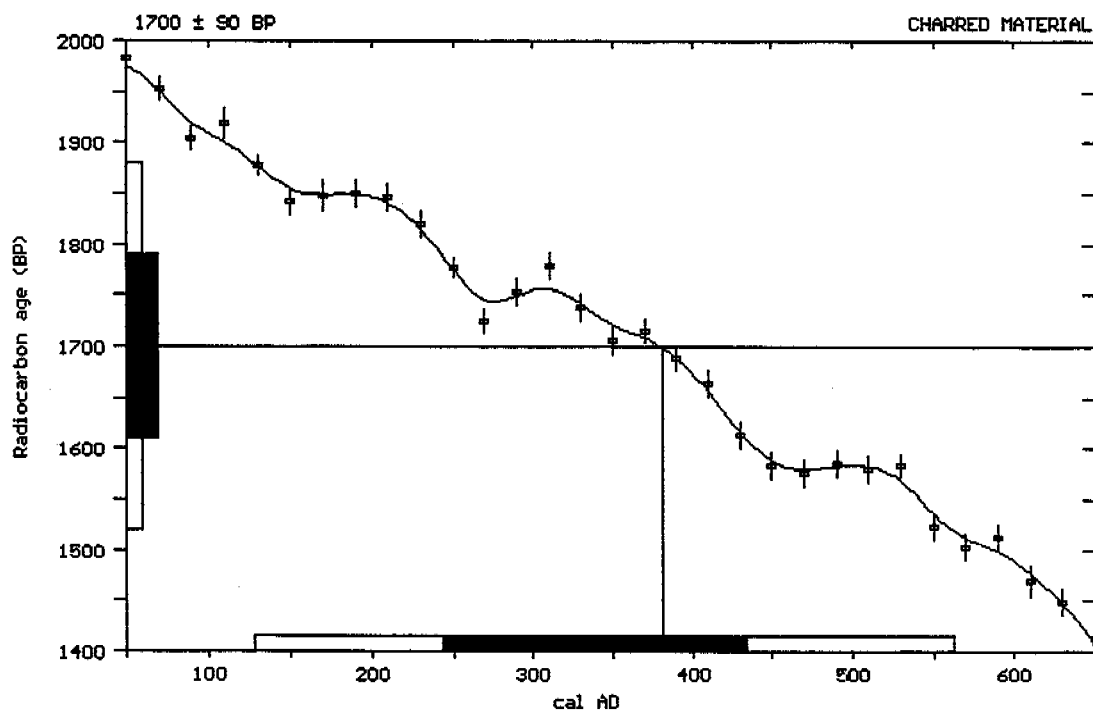
Calibrated results:
(2 sigma, 95% probability) cal AD 130 to 560

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 380

1 sigma calibrated results: cal AD 245 to 435
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121226

Conventional radiocarbon age*: 2090 ± 60 BP

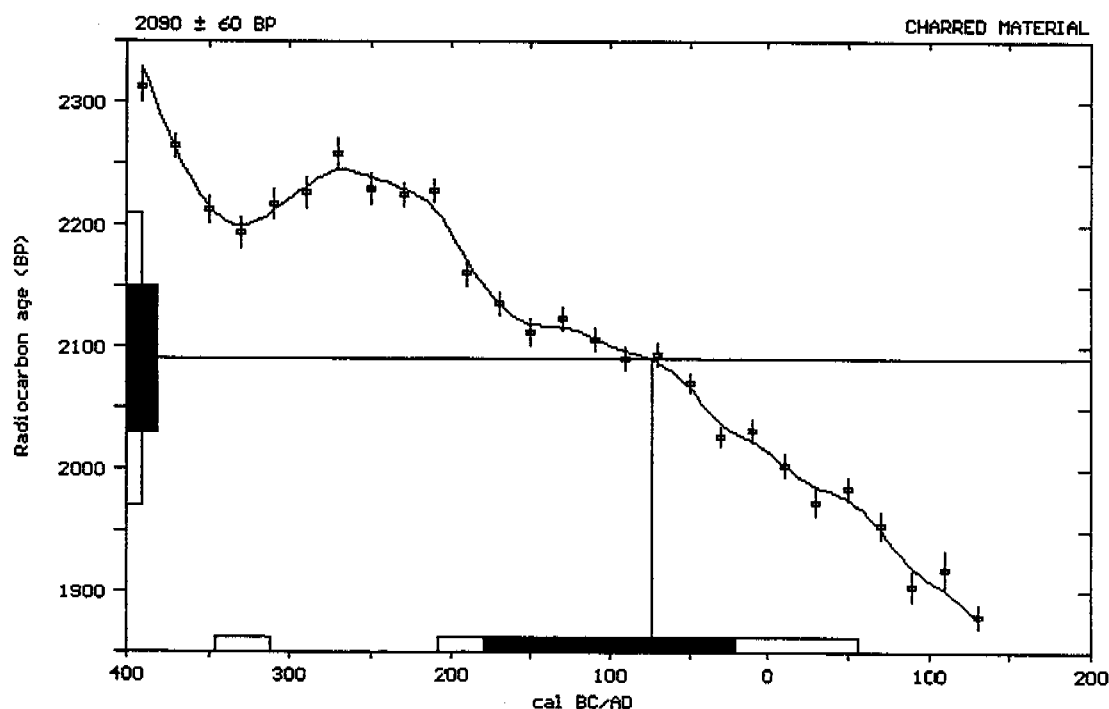
Calibrated results:
(2 sigma, 95% probability) cal BC 345 to 310 and
cal BC 210 to cal AD 55

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 75

1 sigma calibrated results: cal BC 180 to 20
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121227

Conventional radiocarbon age*: 1940 ± 70 BP

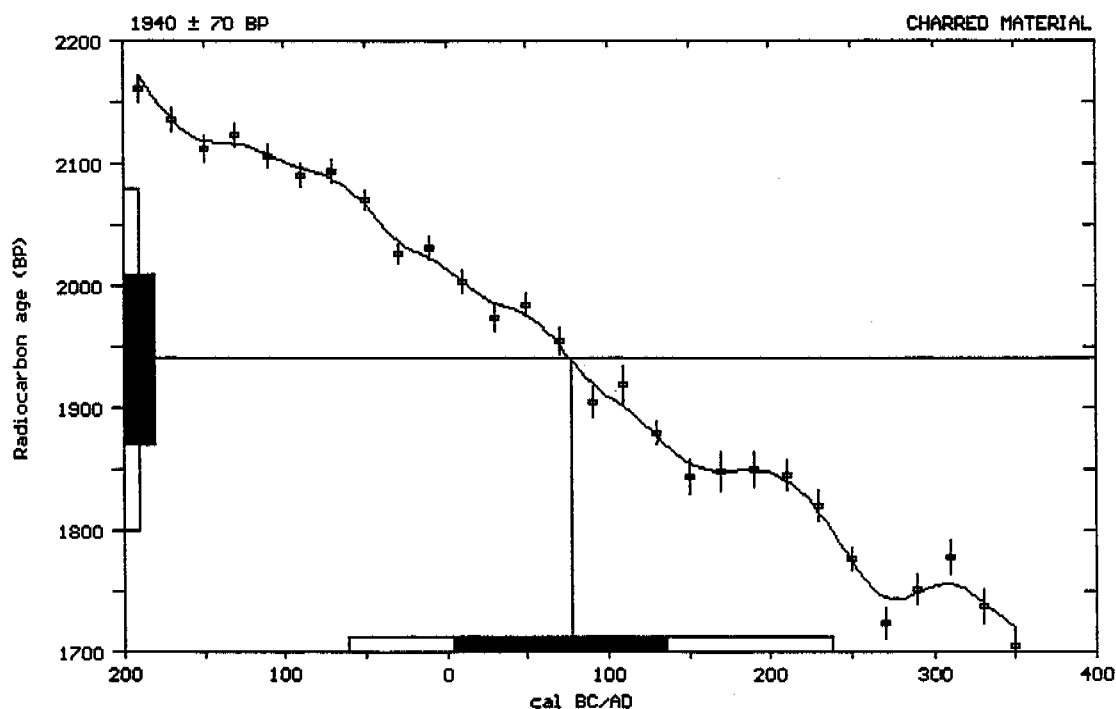
Calibrated results: cal BC 60 to cal AD 240
(2 sigma, 95% probability)

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 75

1 sigma calibrated results: cal AD 5 to 135
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121228

Conventional radiocarbon age*: 970 ± 60 BP

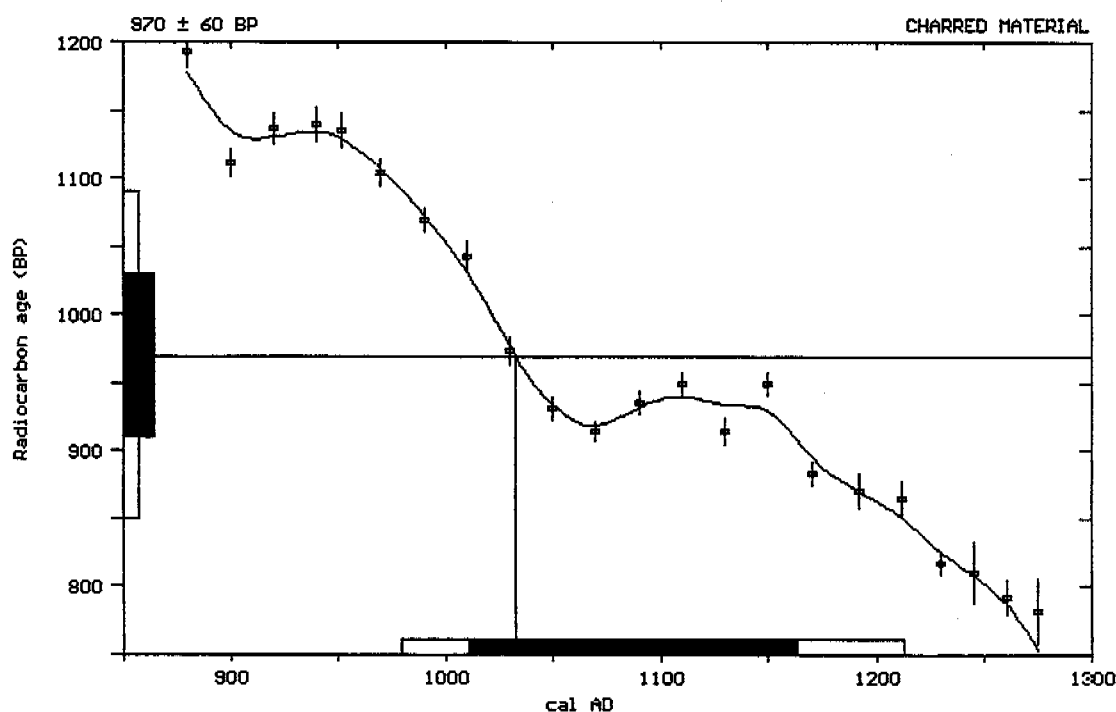
Calibrated results: cal AD 980 to 1215
(2 sigma, 95% probability)

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 1035

1 sigma calibrated results: cal AD 1010 to 1165
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121229

Conventional radiocarbon age*: 1320 ± 50 BP

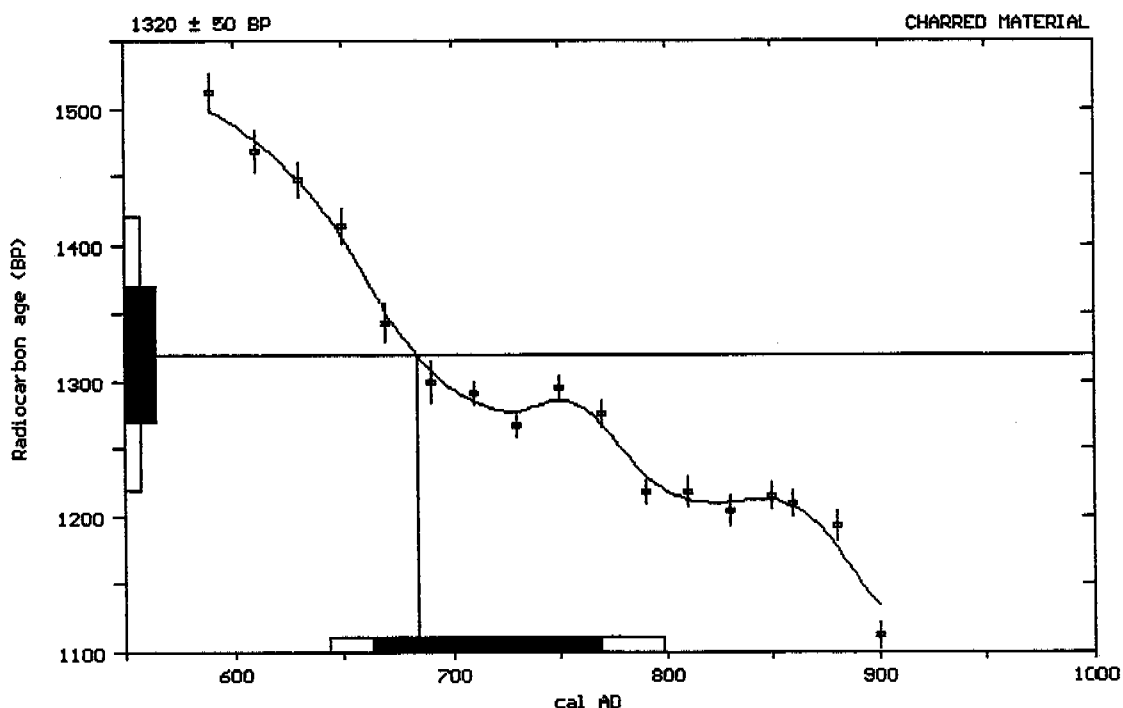
Calibrated results:
(2 sigma, 95% probability) cal AD 645 to 800

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 685

1 sigma calibrated results:
(68% probability) cal AD 665 to 770



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121230

Conventional radiocarbon age*: 2350 ± 80 BP

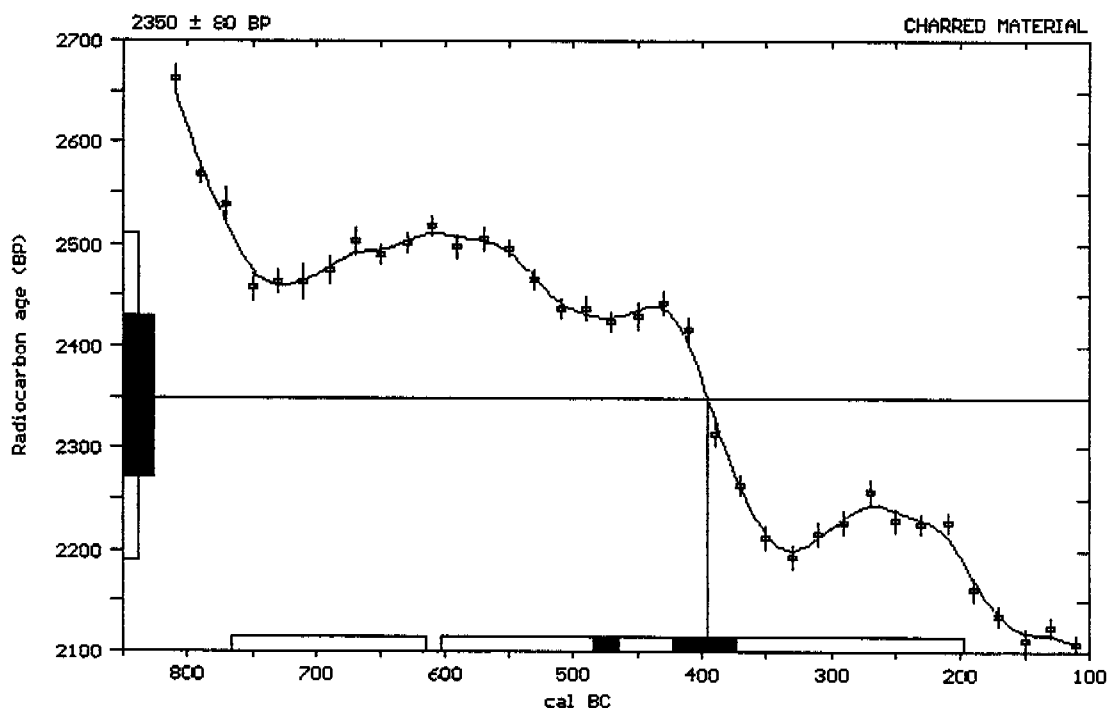
Calibrated results:
(2 sigma, 95% probability) cal BC 765 to 615 and
cal BC 600 to 200

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 395

1 sigma calibrated results: cal BC 485 to 465 and
(68% probability) cal BC 425 to 375



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -22.1; lab mult. = 1)

Laboratory Number: Beta-121231

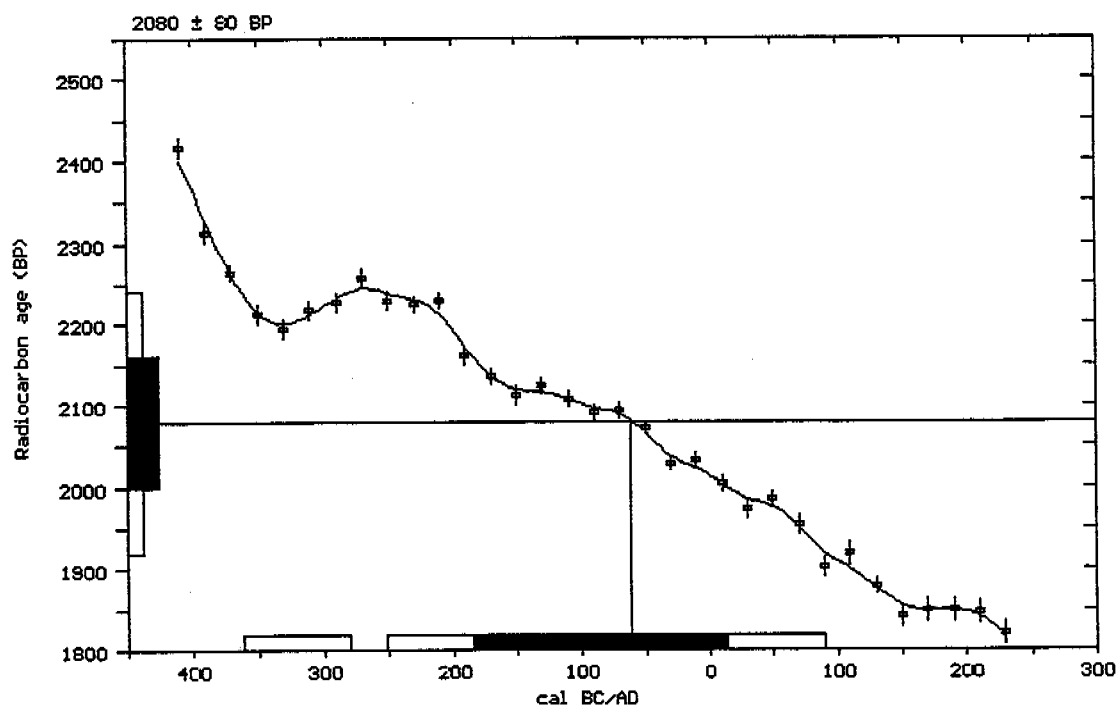
Conventional radiocarbon age: 2080 ± 80 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 360 to 280 and
cal BC 250 to cal AD 90

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 60

1 sigma calibrated results:
(68% probability) cal BC 185 to cal AD 15



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121232

Conventional radiocarbon age*: 2280 ± 70 BP

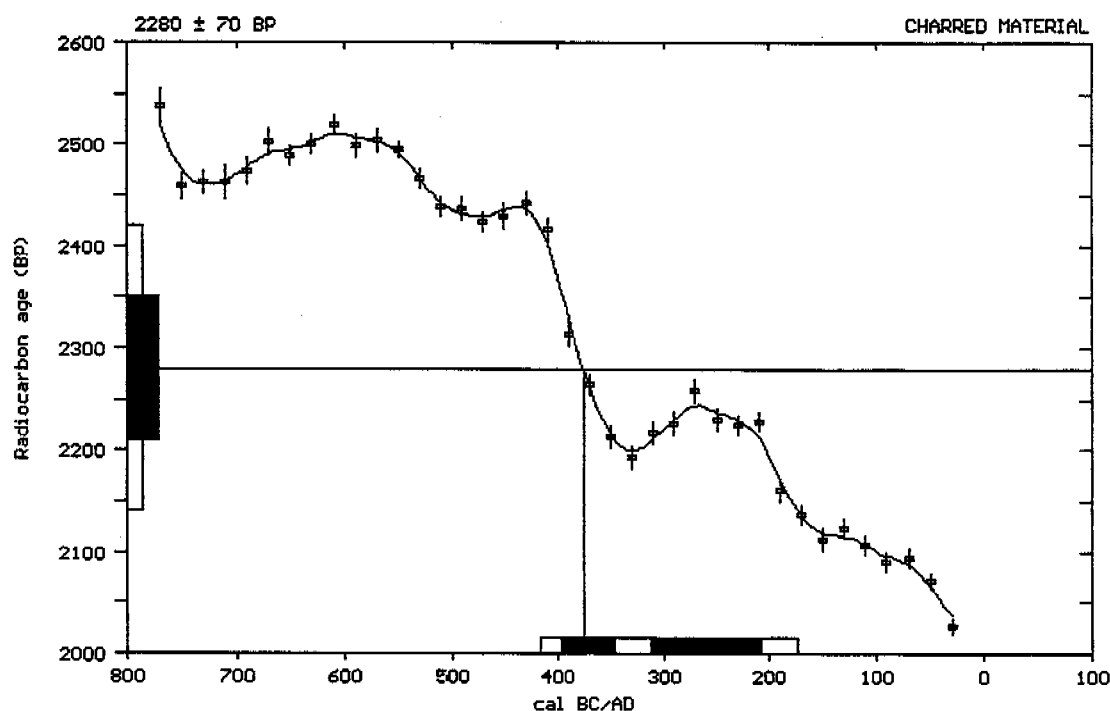
Calibrated results:
(2 sigma, 95% probability) cal BC 415 to 175

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 375

1 sigma calibrated results:
(68% probability) cal BC 395 to 345 and
cal BC 310 to 210



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121233

Conventional radiocarbon age*: 880 ± 50 BP

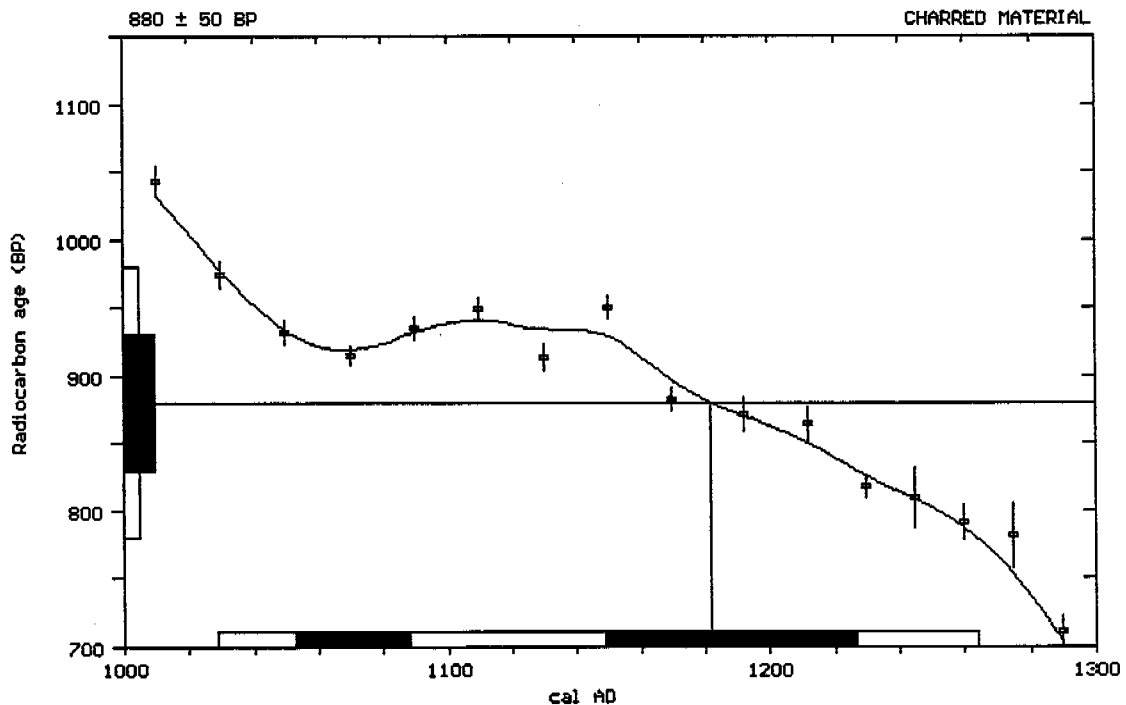
Calibrated results: cal AD 1030 to 1265
(2 sigma, 95% probability)

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 1180

1 sigma calibrated results: cal AD 1055 to 1090 and
(68% probability) cal AD 1150 to 1225



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-21.1:lab mult.=1)

Laboratory Number: Beta-121234

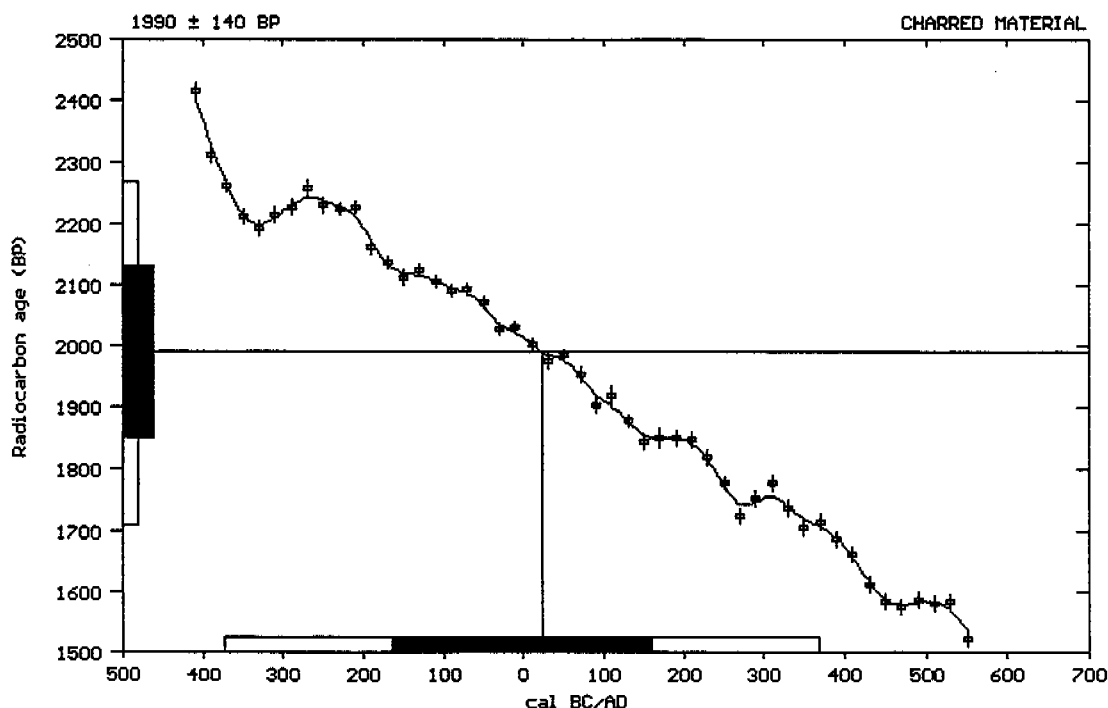
Conventional radiocarbon age: 1990 ± 140 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 375 to cal AD 370

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 25

1 sigma calibrated results:
(68% probability) cal BC 165 to cal AD 160



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-21.9; lab mult.=1)

Laboratory Number: Beta-121235

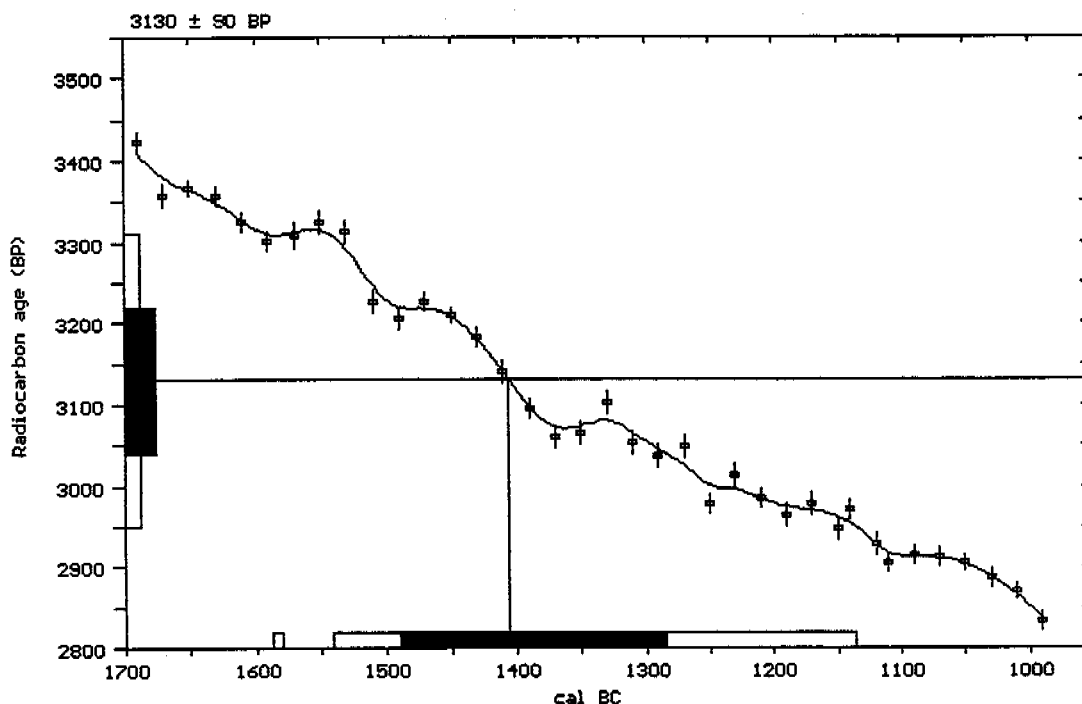
Conventional radiocarbon age: 3130 ± 90 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 1590 to 1580 and
cal BC 1540 to 1135

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 1405

1 sigma calibrated results:
(68% probability) cal BC 1490 to 1285



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-20.5; lab mult.=1)

Laboratory Number: Beta-121236

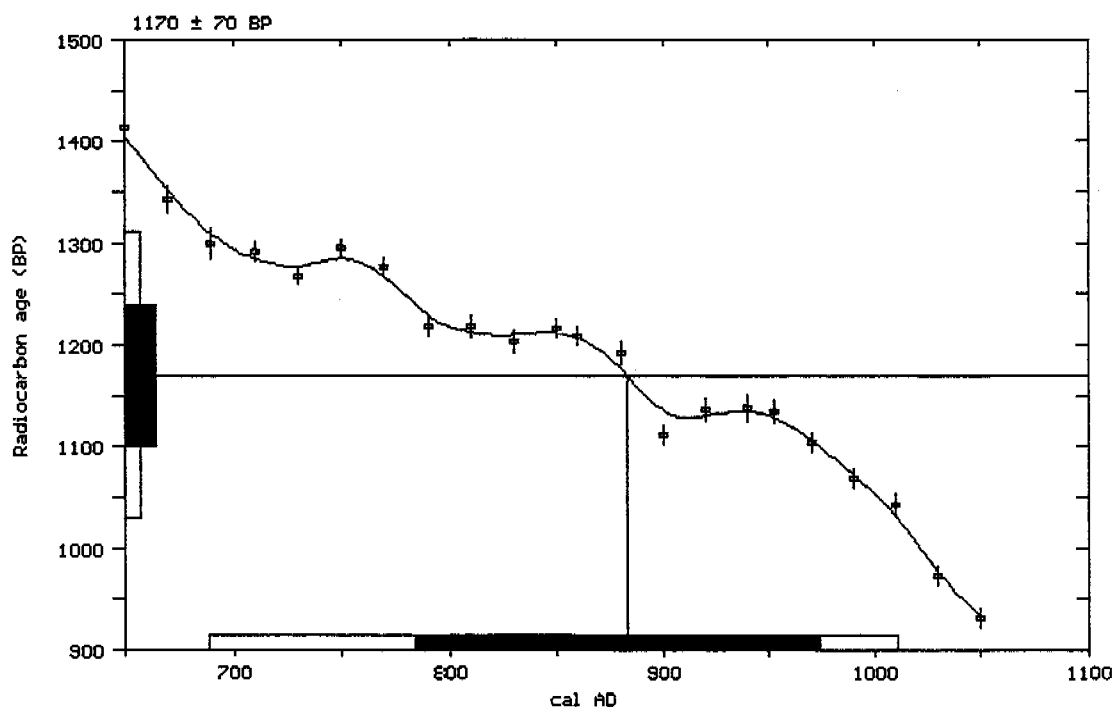
Conventional radiocarbon age: 1170 ± 70 BP

Calibrated results:
(2 sigma, 95% probability) cal AD 690 to 1010

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal AD 885

1 sigma calibrated results:
(68% probability) cal AD 785 to 975



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121237

Conventional radiocarbon age*: 2450 ± 90 BP

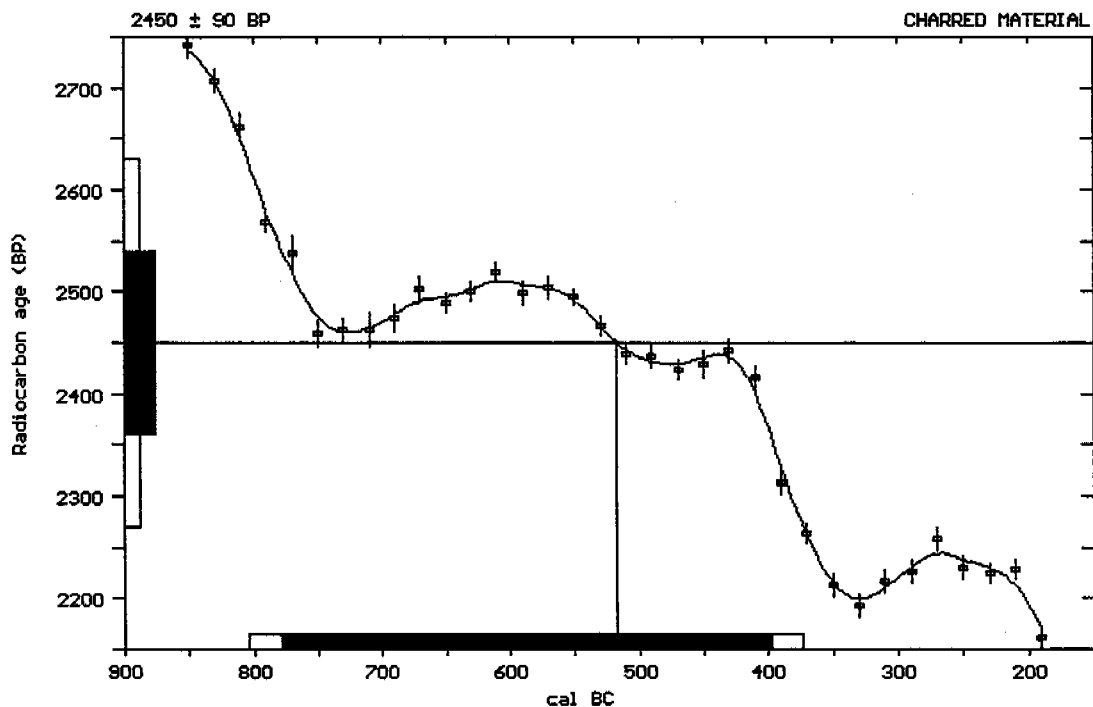
Calibrated results:
(2 sigma, 95% probability) cal BC 805 to 375

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 515

1 sigma calibrated results:
(68% probability) cal BC 780 to 400



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121238

Conventional radiocarbon age*: 2190 ± 60 BP

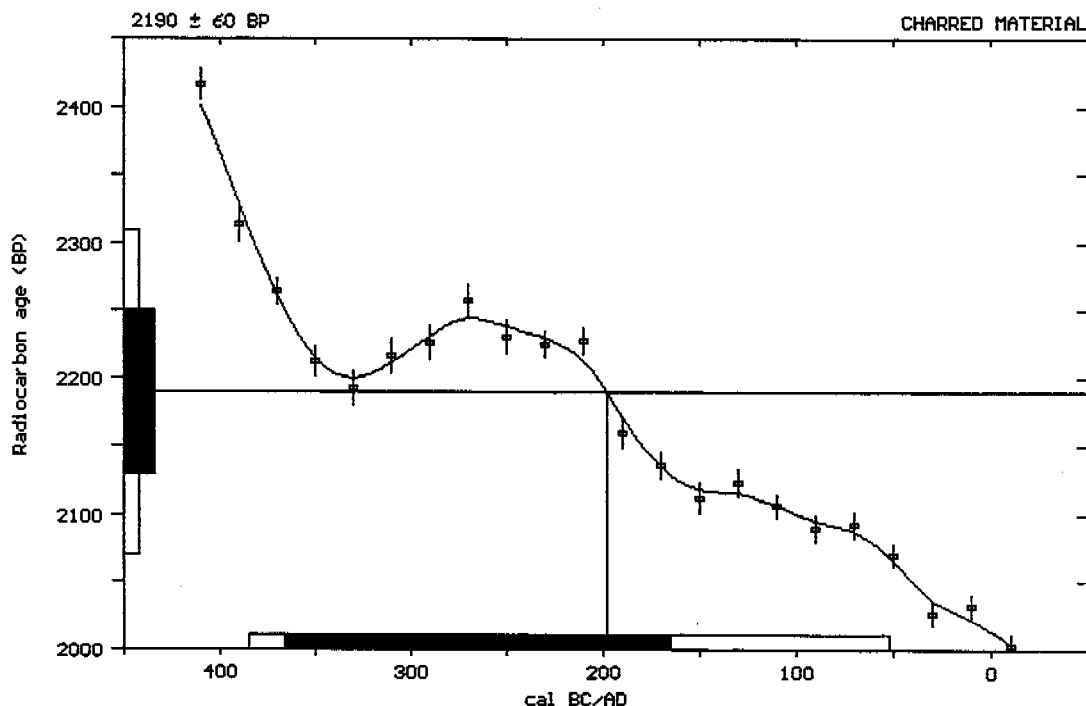
Calibrated results:
(2 sigma, 95% probability) cal BC 385 to 50

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 200

1 sigma calibrated results:
(68% probability) cal BC 365 to 165



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25:lab mult.=1)

Laboratory Number: Beta-121239

Conventional radiocarbon age*: 1750 ± 60 BP

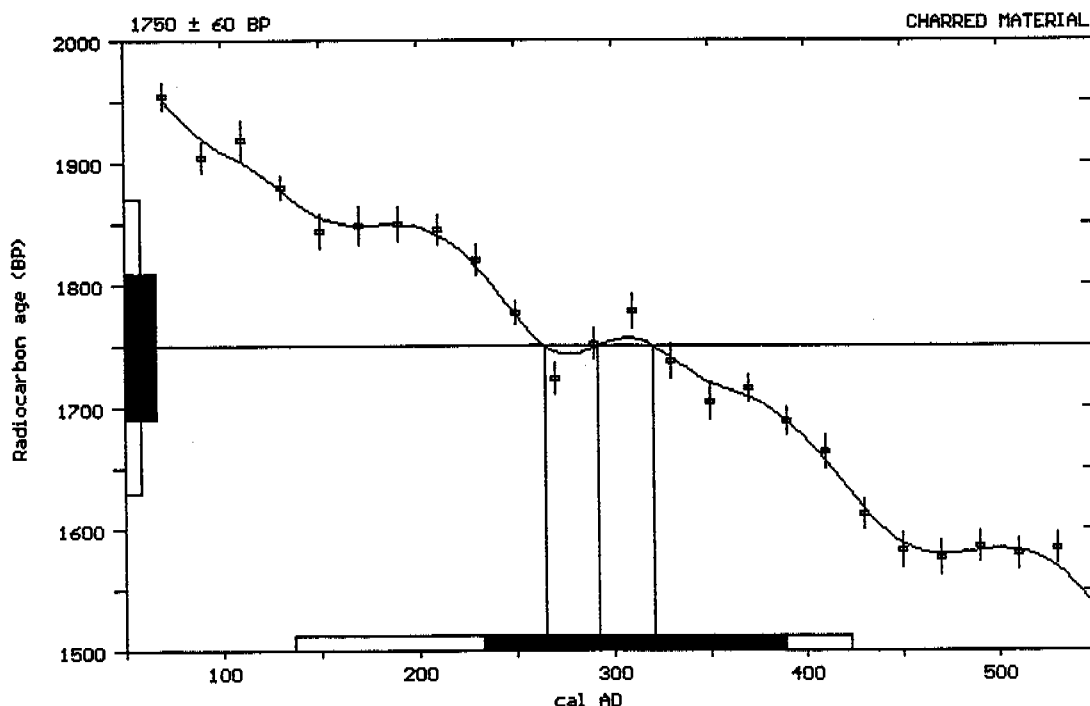
Calibrated results:
(2 sigma, 95% probability) cal AD 135 to 425

* C13/C12 ratio estimated

Intercept data:

Intercepts of radiocarbon age
with calibration curve: cal AD 265 and
cal AD 290 and
cal AD 320

1 sigma calibrated results:
(68% probability) cal AD 235 to 390



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.3; lab mult.=1)

Laboratory Number: Beta-121240

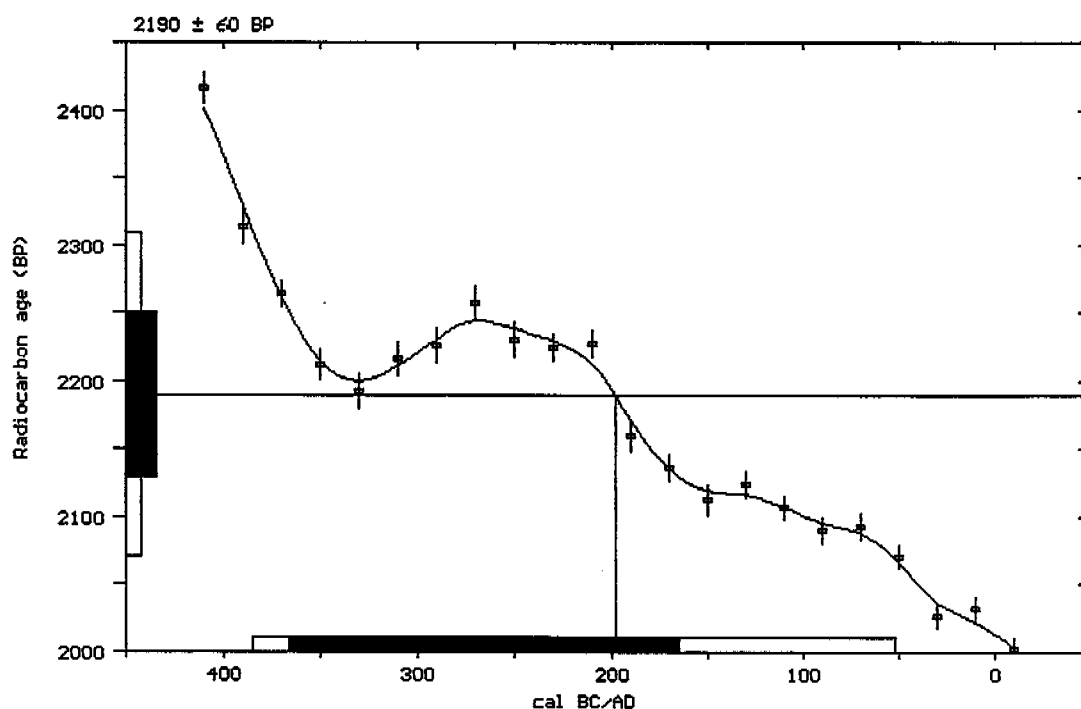
Conventional radiocarbon age: 2190 ± 60 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 385 to 50

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 200

1 sigma calibrated results:
(68% probability) cal BC 365 to 165



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Suiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.3:lab mult.=1)

Laboratory Number: Beta-121241

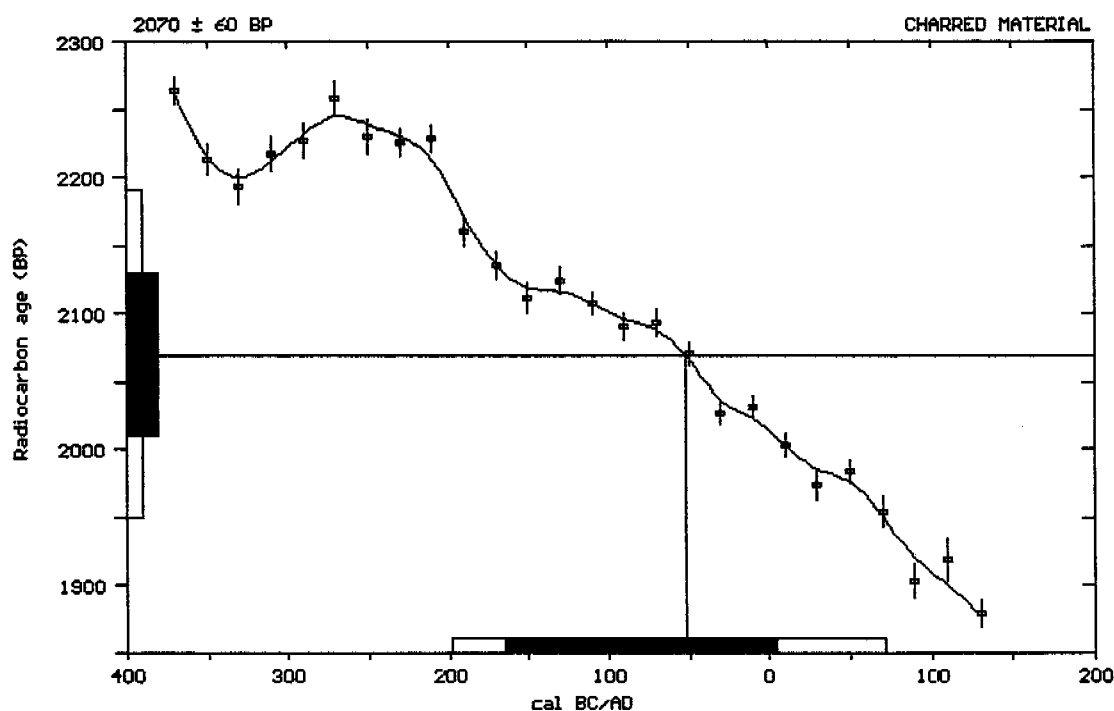
Conventional radiocarbon age: 2070 ± 60 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 200 to cal AD 70

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 50

1 sigma calibrated results:
(68% probability) cal BC 165 to cal AD 5



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: estimated C13/C12=-25; lab mult.=1)

Laboratory Number: Beta-121242

Conventional radiocarbon age*: 2210 ± 60 BP

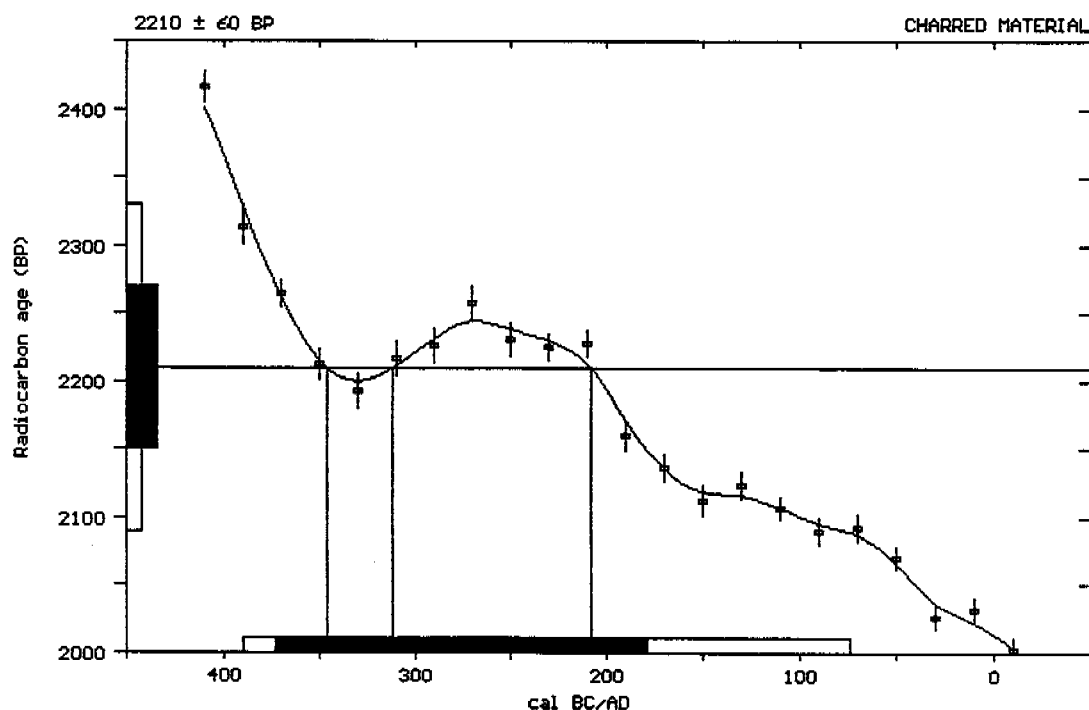
Calibrated results:
(2 sigma, 95% probability) cal BC 390 to 75

* C13/C12 ratio estimated

Intercept data:

Intercepts of radiocarbon age
with calibration curve: cal BC 345 and
cal BC 310 and
cal BC 210

1 sigma calibrated results: cal BC 375 to 180
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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REPORT OF RADIOCARBON DATING ANALYSES

Ms. Janet Hagopian

October 23, 1998

Pueblo of Zuni

December 3, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-123604	4810 +/- 40 BP	-21.6 o/oo	4870 +/- 40 BP
SAMPLE #: LA 115324-FS82 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-123605	1840 +/- 40 BP	-10.7 o/oo	2070 +/- 40 BP
SAMPLE #: LA115327-FS49 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-21.6; lab mult.=1)

Laboratory Number: Beta-123604

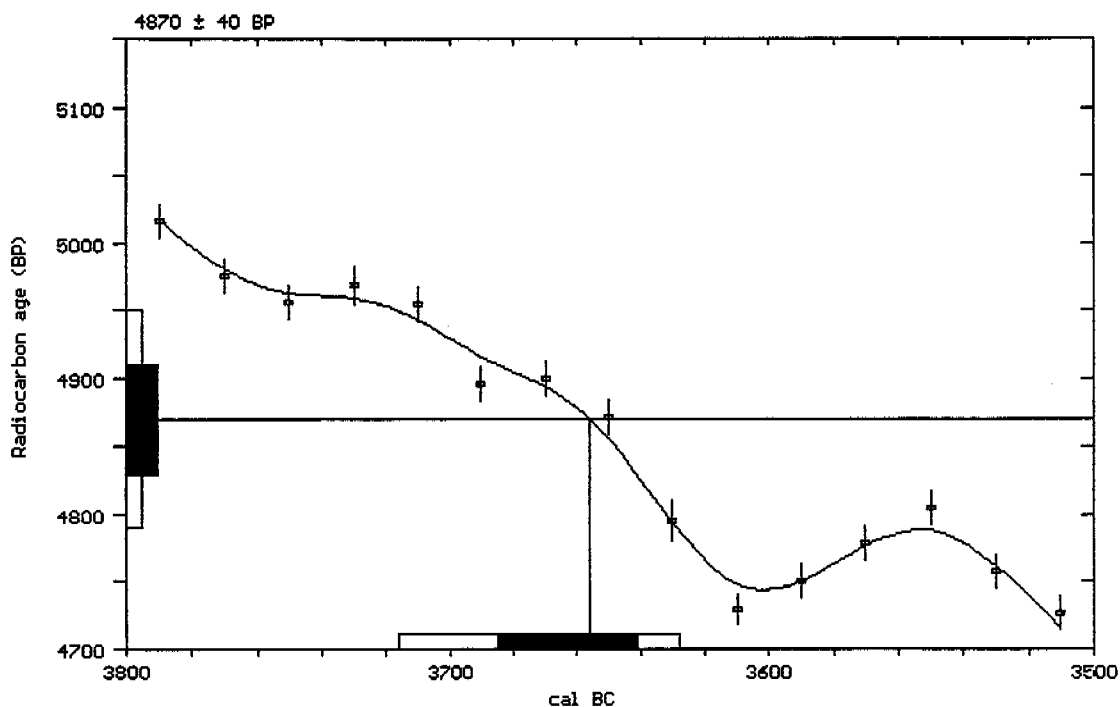
Conventional radiocarbon age: 4870 ± 40 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 3715 to 3630

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 3655

1 sigma calibrated results:
(68% probability) cal BC 3685 to 3640



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -10.7; lab mult. = 1)

Laboratory Number: Beta-123605

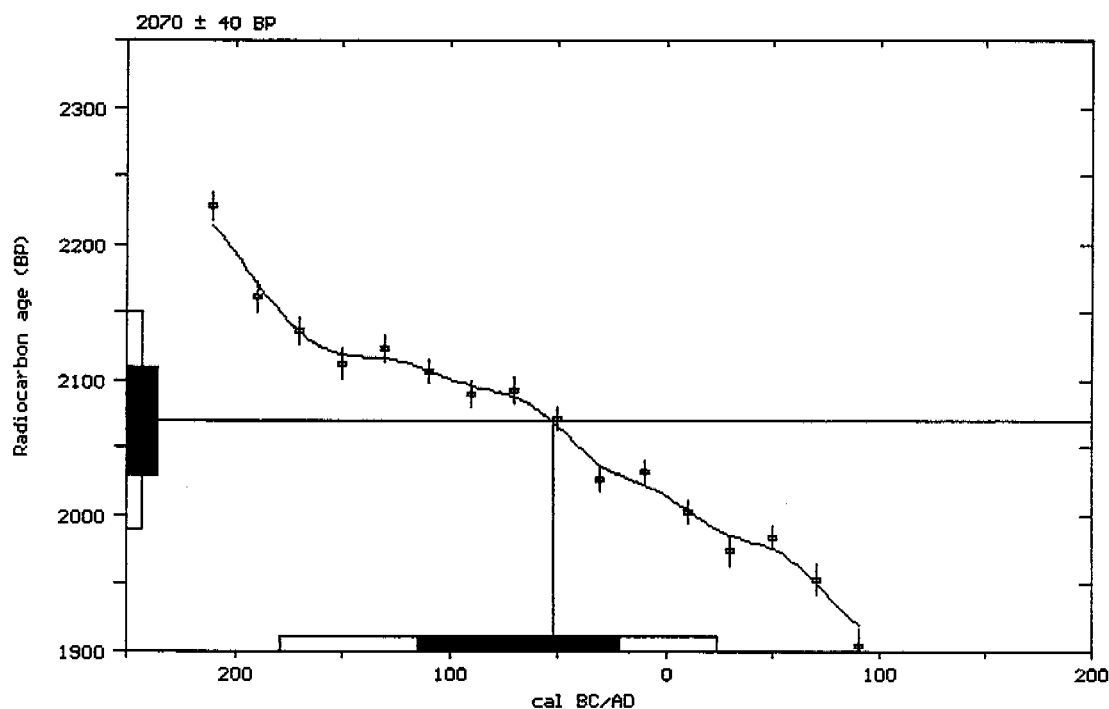
Conventional radiocarbon age: 2070 ± 40 BP

Calibrated results:
(2 sigma, 95% probability) cal BC 180 to cal AD 25

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 50

1 sigma calibrated results:
(68% probability) cal BC 115 to 20



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, *Radiocarbon* 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, *Radiocarbon* 35(1)

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REPORT OF RADIOCARBON DATING ANALYSES

Ms. Rachel Smith Gebauer

Report Date: September 19, 1999

Pueblo of Zuni

Material Received: August 26, 1999

Sample Data	Measured Radiocarbon Age	$^{13}\text{C} / ^{12}\text{C}$ Ratio	Conventional Radiocarbon Age (*)
ta-133644	1800 +/- 50 BP	-24.7 o/oo	1800 +/- 50 BP

SAMPLE #: LA48695-12

ANALYSIS: Standard-AMS

MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

ta-133645	1240 +/- 40 BP	-23.7 o/oo	1260 +/- 40 BP
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SAMPLE #: LA48695-16

ANALYSIS: Standard-AMS

MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.7;lab. mult=1)

Laboratory number: **Beta-133644**

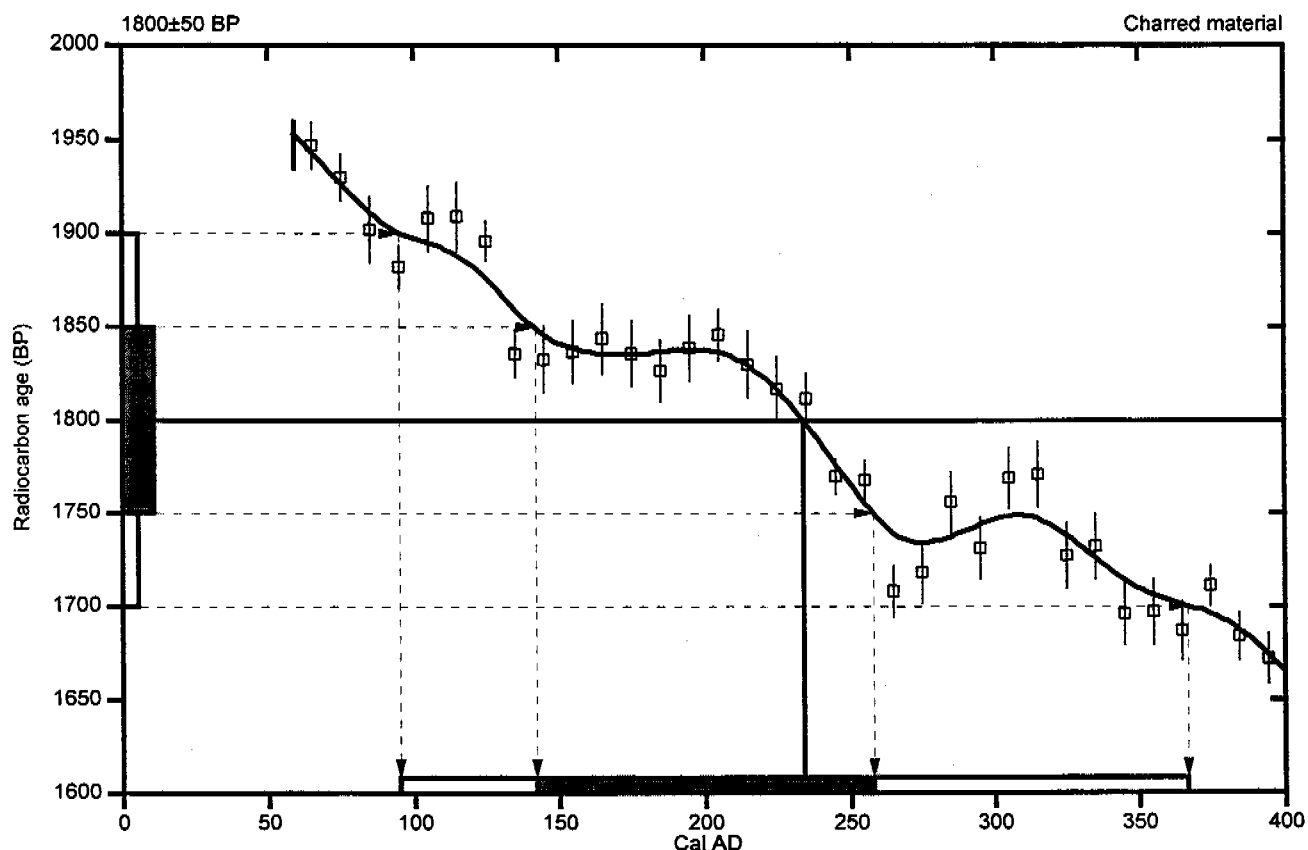
Conventional radiocarbon age: **1800±50 BP**

2 Sigma calibrated result: Cal AD 95 to 365 (Cal BP 1855 to 1585)
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: **Cal AD 235 (Cal BP 1715)**

1 Sigma calibrated result: Cal AD 140 to 260 (Cal BP 1810 to 1690)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxi-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23.7;lab. mult=1)

Laboratory number: **Beta-133645**

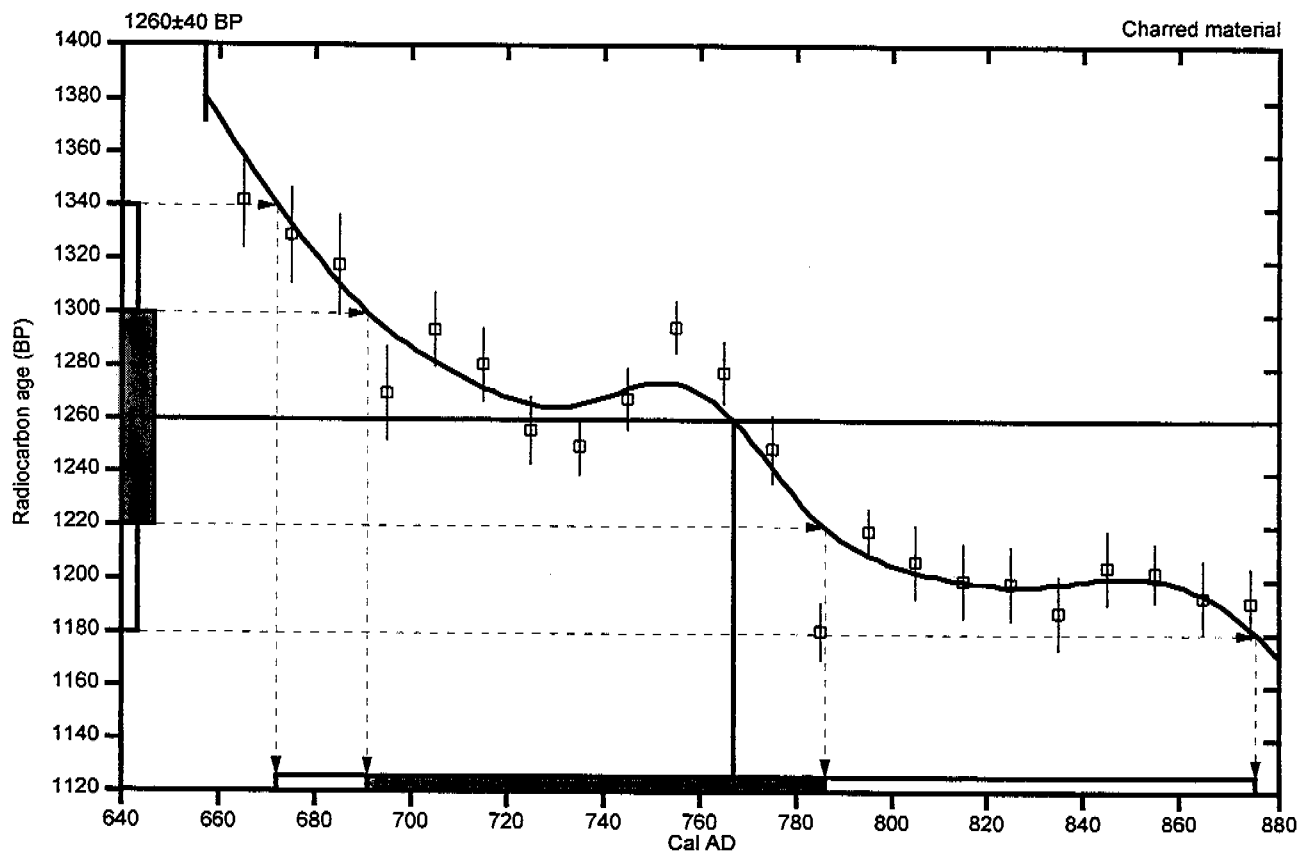
Conventional radiocarbon age: **1260±40 BP**

2 Sigma calibrated result: **Cal AD 670 to 875 (Cal BP 1280 to 1075)**
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: **Cal AD 765 (Cal BP 1185)**

1 Sigma calibrated result: **Cal AD 690 to 785 (Cal BP 1260 to 1165)**
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

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**BETA ANALYTIC INC.**

DR. M.A. TAMERS and MR. D.G. HOOD

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MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Ms. Rachel Smith Gebauer

Report Date: December 18, 1999

Pueblo of Zuni

Material Received: November 19, 1999

Sample Data	Measured Radiocarbon Age	$^{13}\text{C} / ^{12}\text{C}$ Ratio	Conventional Radiocarbon Age (*)
eta-136524 AMPLE #: LA48695-100 NALYSIS: Standard-AMS ATERIAL/PRETREATMENT:(charred material): acid/alkali/acid	1170 +/- 50 BP	-22.0 o/oo	1220 +/- 50 BP
eta-136525 AMPLE #: LA48695-108 NALYSIS: Standard-AMS ATERIAL/PRETREATMENT:(charred material): acid/alkali/acid	1580 +/- 50 BP	-22.1 o/oo	1620 +/- 50 BP
eta-136526 AMPLE #: LA48695-120 NALYSIS: Standard-AMS ATERIAL/PRETREATMENT:(charred material): acid/alkali/acid	1230 +/- 50 BP	-22.8 o/oo	1270 +/- 50 BP
eta-136527 AMPLE #: LA48695-122 NALYSIS: Standard-AMS ATERIAL/PRETREATMENT:(wood): acid/alkali/acid	36740 +/- 320 BP	-26.5 o/oo	36720 +/- 320 BP
eta-136528 AMPLE #: LA48695-139 NALYSIS: Standard-AMS ATERIAL/PRETREATMENT:(charred material): acid/alkali/acid	860 +/- 40 BP	-22.0 o/oo	910 +/- 40 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.



BETA ANALYTIC INC.

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REPORT OF RADIOCARBON DATING ANALYSES

Ms. Rachel Smith Gebauer

Page 2 of 2

Sample Data	Measured Radiocarbon Age	$^{13}\text{C} / ^{12}\text{C}$ Ratio	Conventional Radiocarbon Age (*)
Beta-136529 SAMPLE #: LA48695-146 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid	830 +/- 40 BP	-22.1 o/oo	870 +/- 40 BP
Beta-136530 SAMPLE #: LA48695-150 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid	1430 +/- 40 BP	-22.7 o/oo	1470 +/- 40 BP

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

NOTE: Sample LA48695-151 was submitted but not analyzed.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22;lab. mult=1)

Laboratory number: **Beta-136524**

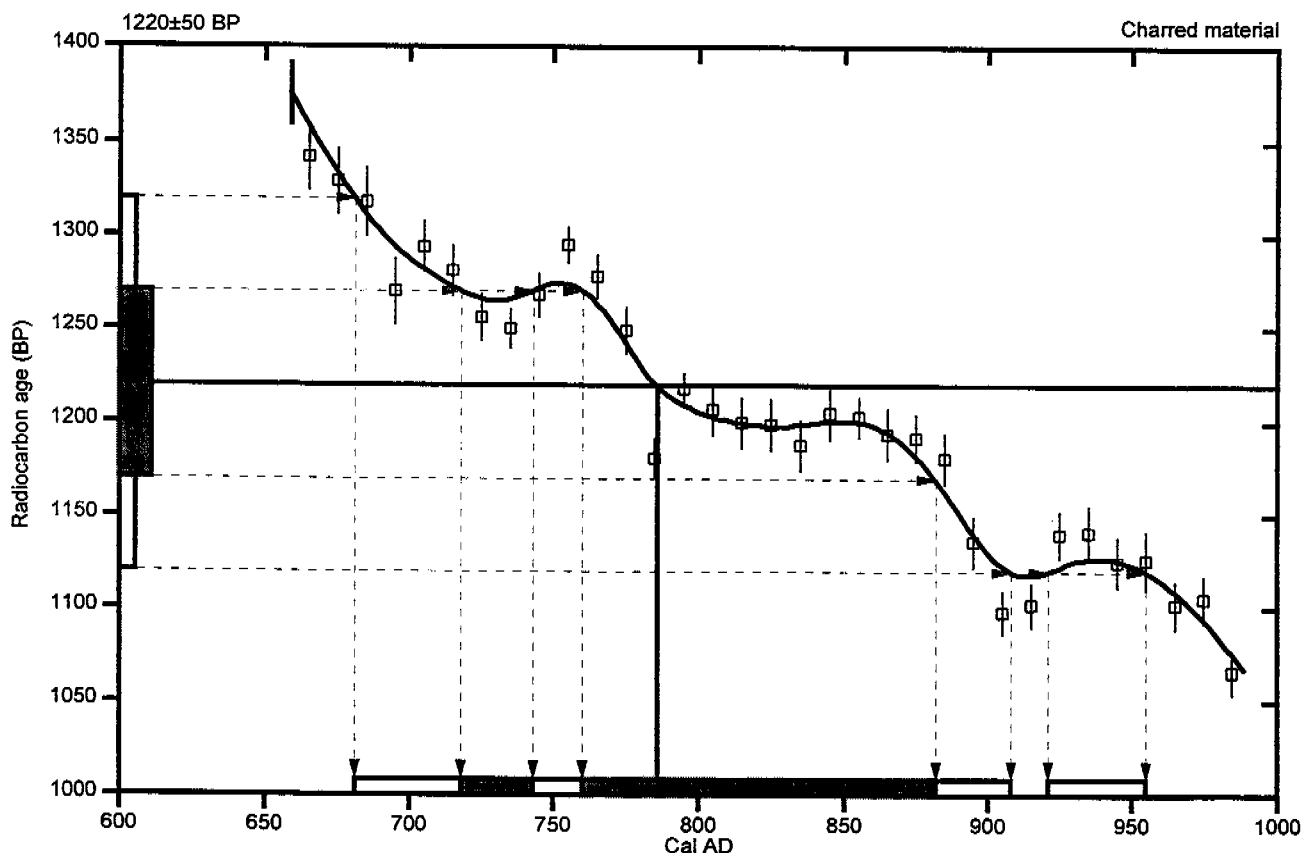
Conventional radiocarbon age: **1220±50 BP**

2 Sigma calibrated results: **Cal AD 680 to 910 (Cal BP 1270 to 1040) and
(95% probability) Cal AD 920 to 955 (Cal BP 1030 to 995)**

Intercept data

Intercept of radiocarbon age
with calibration curve: **Cal AD 785 (Cal BP 1165)**

1 Sigma calibrated results: **Cal AD 720 to 745 (Cal BP 1230 to 1205) and
(68% probability) Cal AD 760 to 880 (Cal BP 1190 to 1070)**



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.1;lab. mult=1)

Laboratory number: Beta-136525

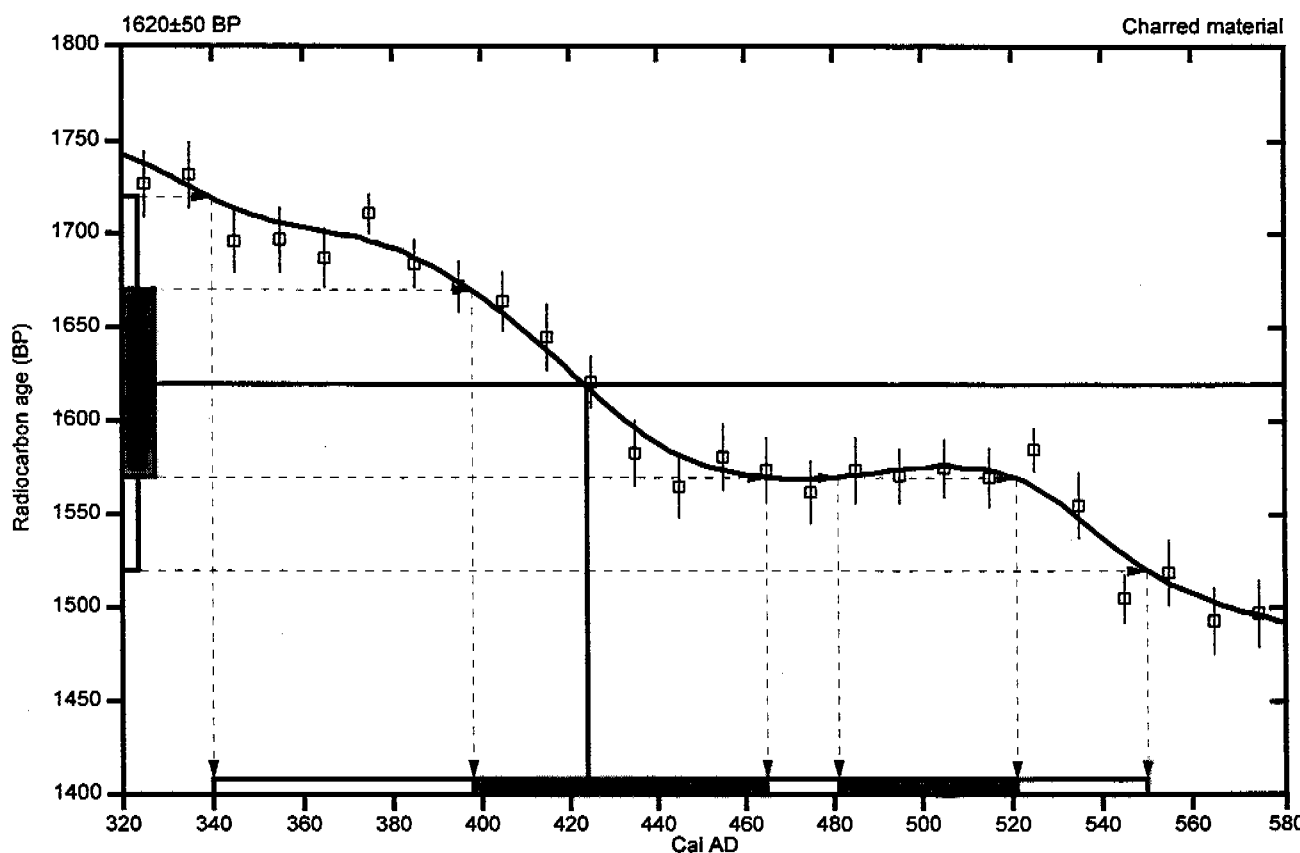
Conventional radiocarbon age: 1620±50 BP

2 Sigma calibrated result: Cal AD 340 to 550 (Cal BP 1610 to 1400)
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 425 (Cal BP 1525)

1 Sigma calibrated results: Cal AD 400 to 465 (Cal BP 1550 to 1485) and
(68% probability) Cal AD 480 to 520 (Cal BP 1470 to 1430)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, *Radiocarbon* 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, *Radiocarbon* 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.8:lab. mult=1)

Laboratory number: Beta-136526

Conventional radiocarbon age: 1270±50 BP

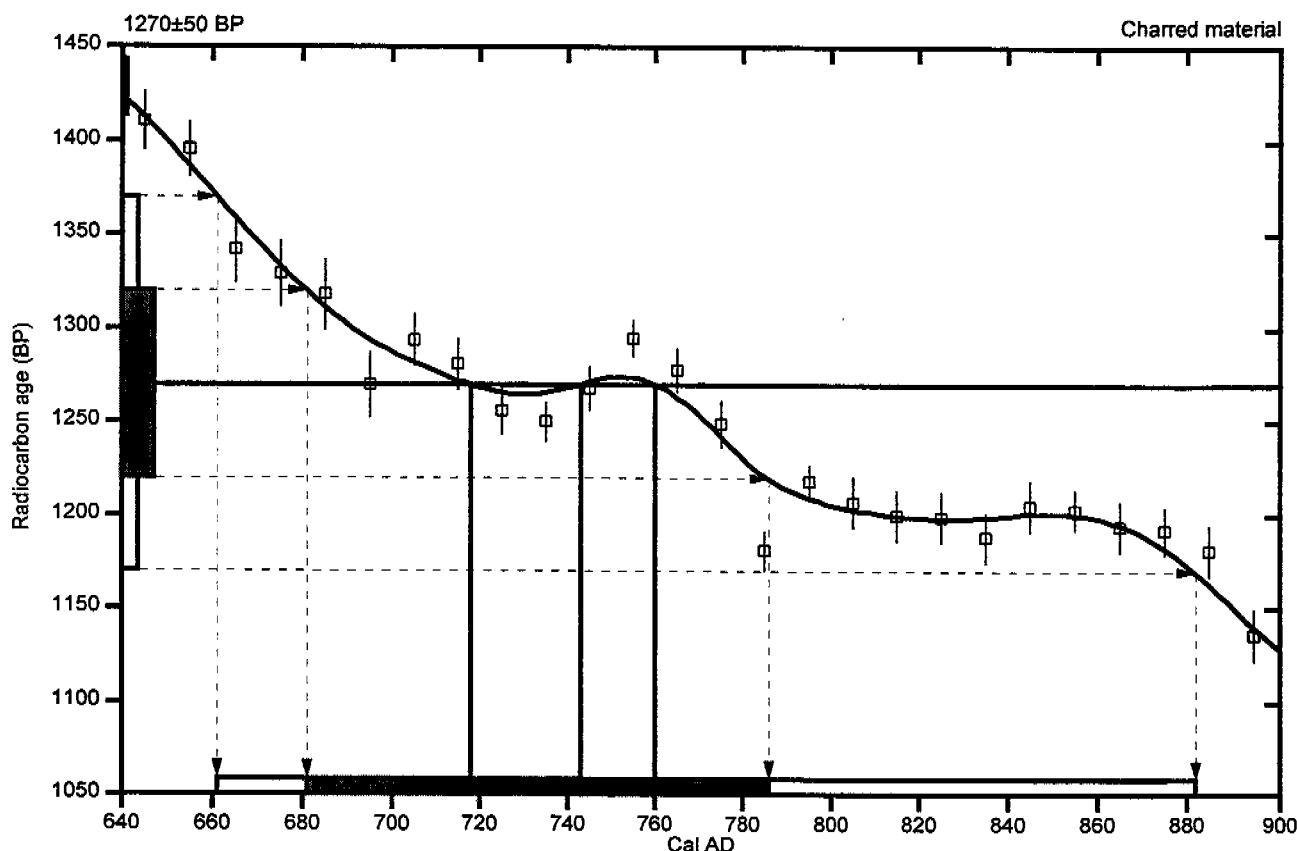
2 Sigma calibrated result: Cal AD 660 to 880 (Cal BP 1290 to 1070)
(95% probability)

Intercept data

Intercepts of radiocarbon age
with calibration curve:

Cal AD 720 (Cal BP 1230) and
Cal AD 745 (Cal BP 1205) and
Cal AD 760 (Cal BP 1190)

1 Sigma calibrated result: Cal AD 680 to 785 (Cal BP 1270 to 1165)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, *Radiocarbon* 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Tálma, Á. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22;lab. mult=1)

Laboratory number: Beta-136528

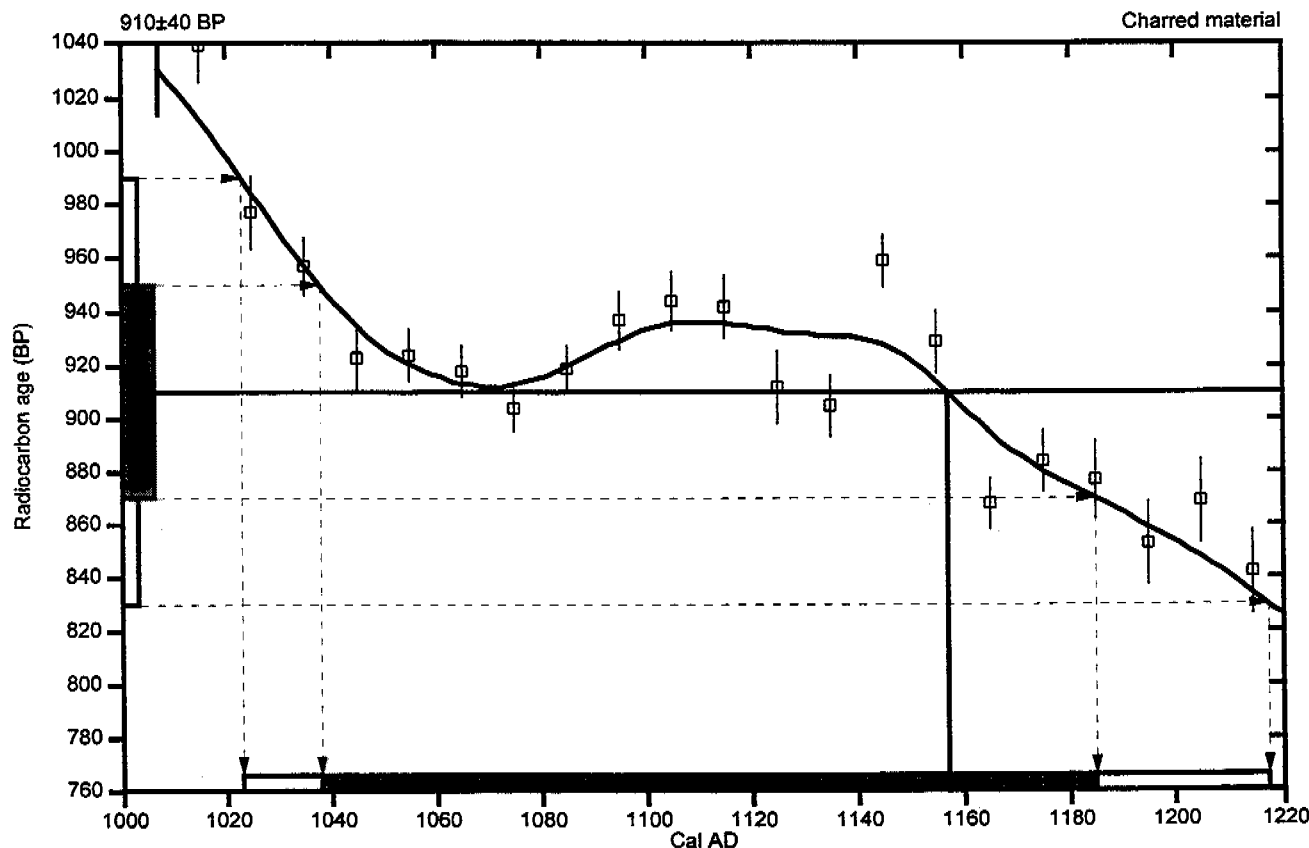
Conventional radiocarbon age: 910 ± 40 BP

2 Sigma calibrated result: Cal AD 1025 to 1220 (Cal BP 925 to 730)
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 1155 (Cal BP 795)

1 Sigma calibrated result: Cal AD 1040 to 1185 (Cal BP 910 to 765)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Suiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxi-xiii

INTCAL98 Radiocarbon Age Calibration

Suiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.1;lab. mult=1)

Laboratory number: Beta-136529

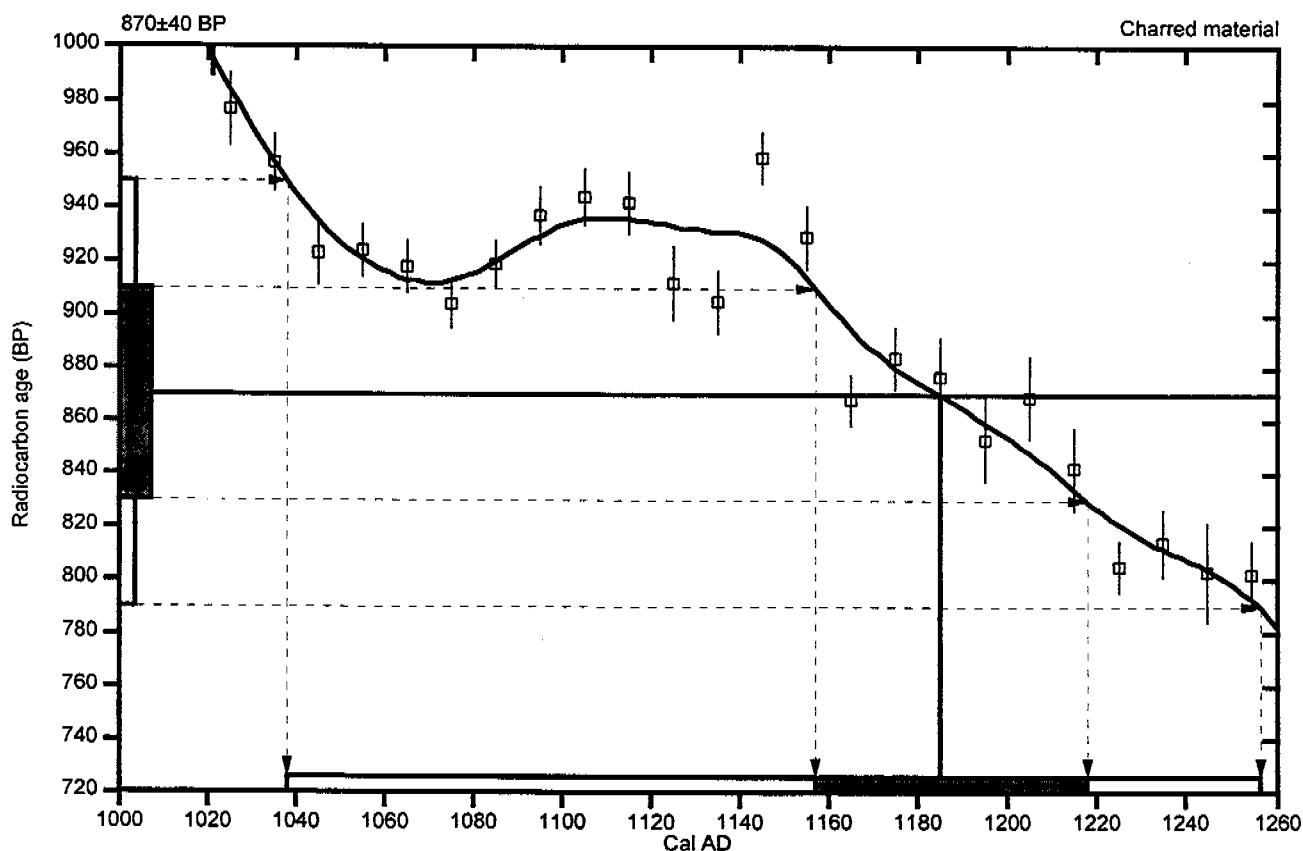
Conventional radiocarbon age: 870±40 BP

2 Sigma calibrated result: Cal AD 1040 to 1255 (Cal BP 910 to 695)
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 1185 (Cal BP 765)

1 Sigma calibrated result: Cal AD 1155 to 1220 (Cal BP 795 to 730)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, *Radiocarbon* 40(3), pxi-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, *Radiocarbon* 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.7;lab. mult=1)

Laboratory number: Beta-136530

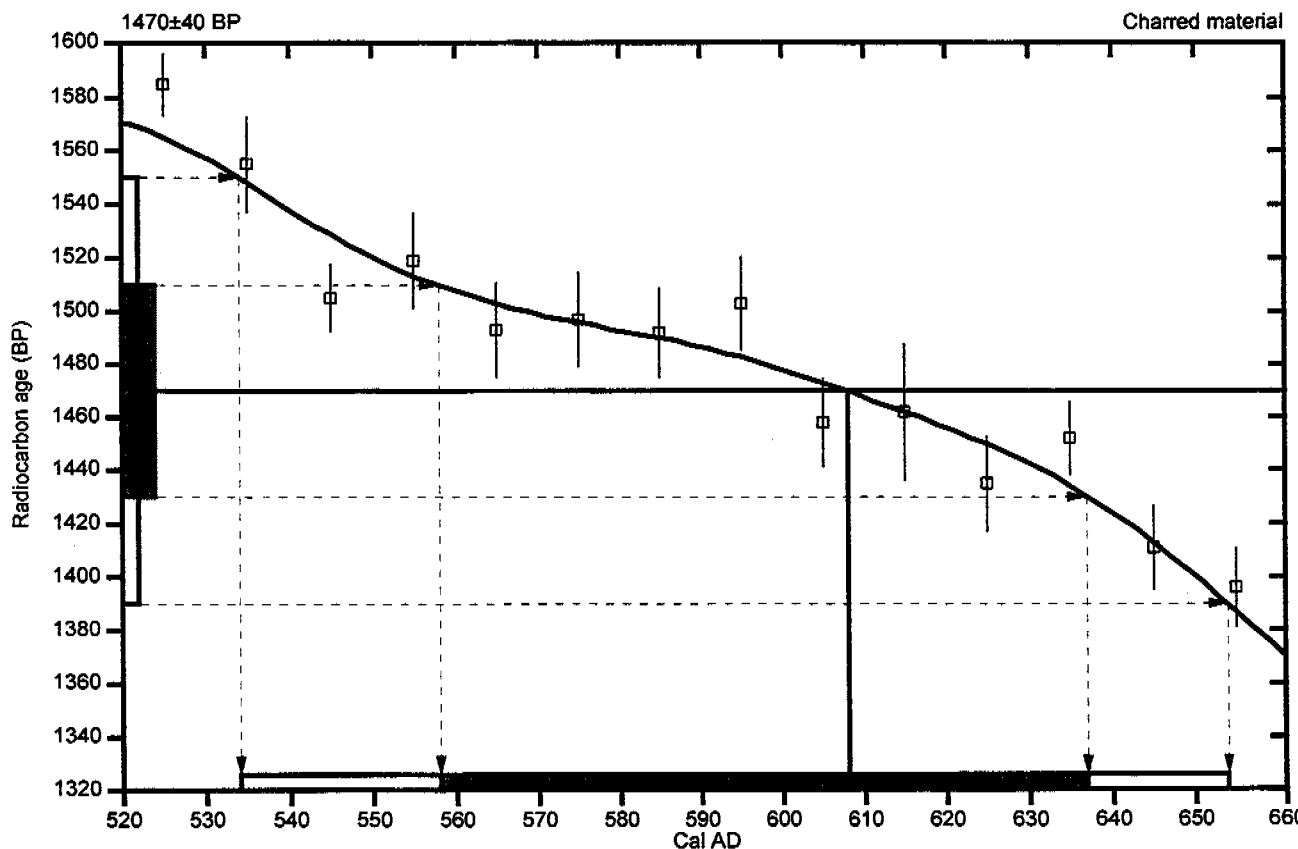
Conventional radiocarbon age: 1470±40 BP

2 Sigma calibrated result: Cal AD 535 to 655 (Cal BP 1415 to 1295)
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 610 (Cal BP 1340)

1 Sigma calibrated result: Cal AD 560 to 635 (Cal BP 1390 to 1315)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, *Radiocarbon* 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, *Radiocarbon* 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

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BETA**BETA ANALYTIC INC.**

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4985 S.W. 74 COURT
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PH: 305/667-5167 FAX: 305/663-0964
E-MAIL: beta@radiocarbon.com**REPORT OF RADIOCARBON DATING ANALYSES**

Ms. Rachel Smith Gebauer

Report Date: February 14, 2000

Pueblo of Zuni

Material Received: January 3, 2000

Sample Data	Measured Radiocarbon Age	$^{13}\text{C} / ^{12}\text{C}$ Ratio	Conventional Radiocarbon Age (*)
eta-138516	2940 +/- 40 BP	-23.8 o/oo	2960 +/- 40 BP
AMPLE #: LA48695-158			
NALYSIS: Standard-AMS			
ATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

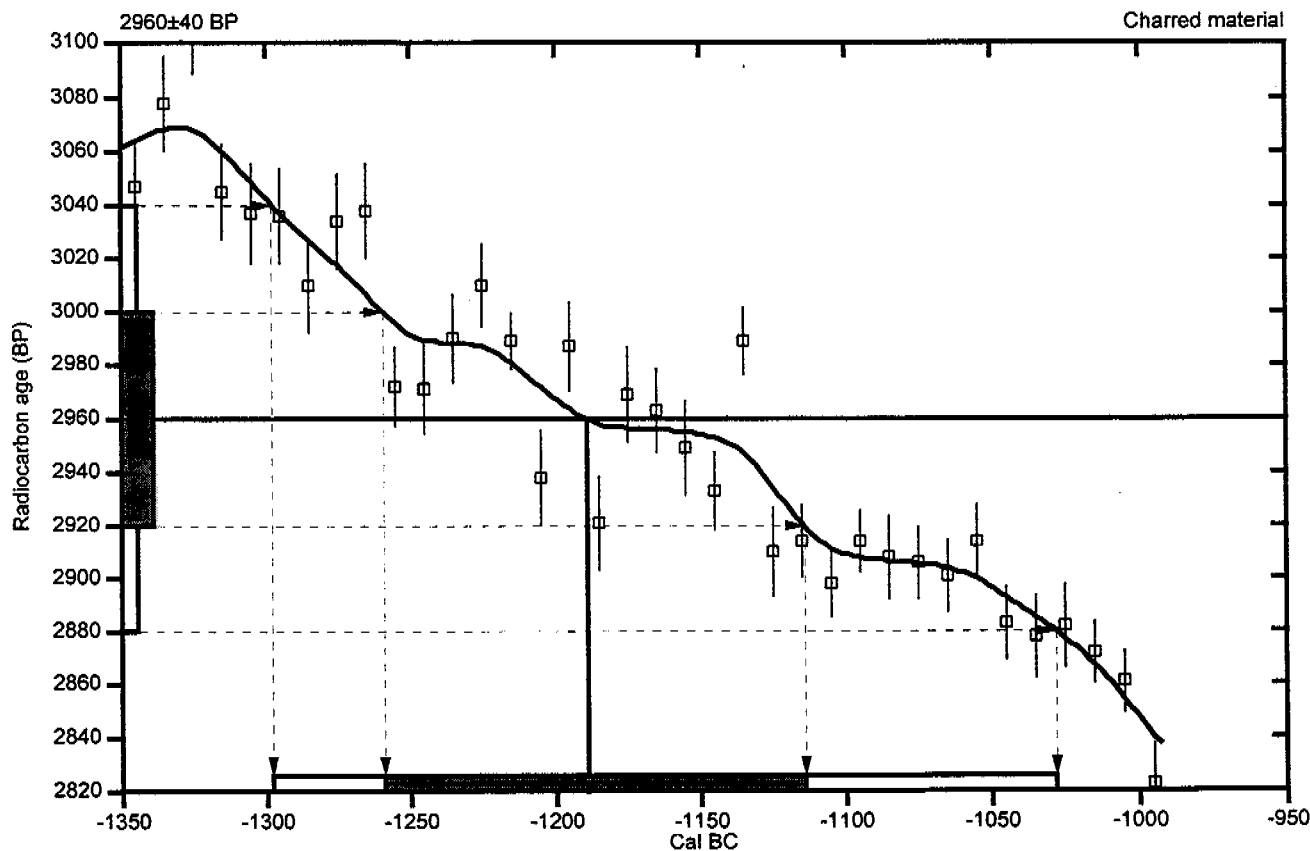
OTE: It is important to read the calendar calibration information and to use the calendar
librated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

(Variables: C13/C12=-23.8:lab, mult=1)

1 Sigma calibrated result: Cal BC 1260 to 1115 (Cal BP 3210 to 3065)
(68% probability)



Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

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REPORT OF RADIOCARBON DATING ANALYSES

Ms. Rachel Smith Gebauer

Report Date: January 13, 2000

Pueblo of Zuni

Material Received: January 3, 2000

Sample Data	Measured Radiocarbon Age	$^{13}\text{C} / ^{12}\text{C}$ Ratio	Conventional Radiocarbon Age (*)
sta-138517	4050 +/- 40 BP	-21.2 o/oo	4110 +/- 40 BP

SAMPLE # LA48695-160

ANALYSIS: Standard-AMS

MATERIAL/PRETREATMENT:(organic sediment): acid washes

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-21.2;lab. mult=1)

Laboratory number: Beta-138517

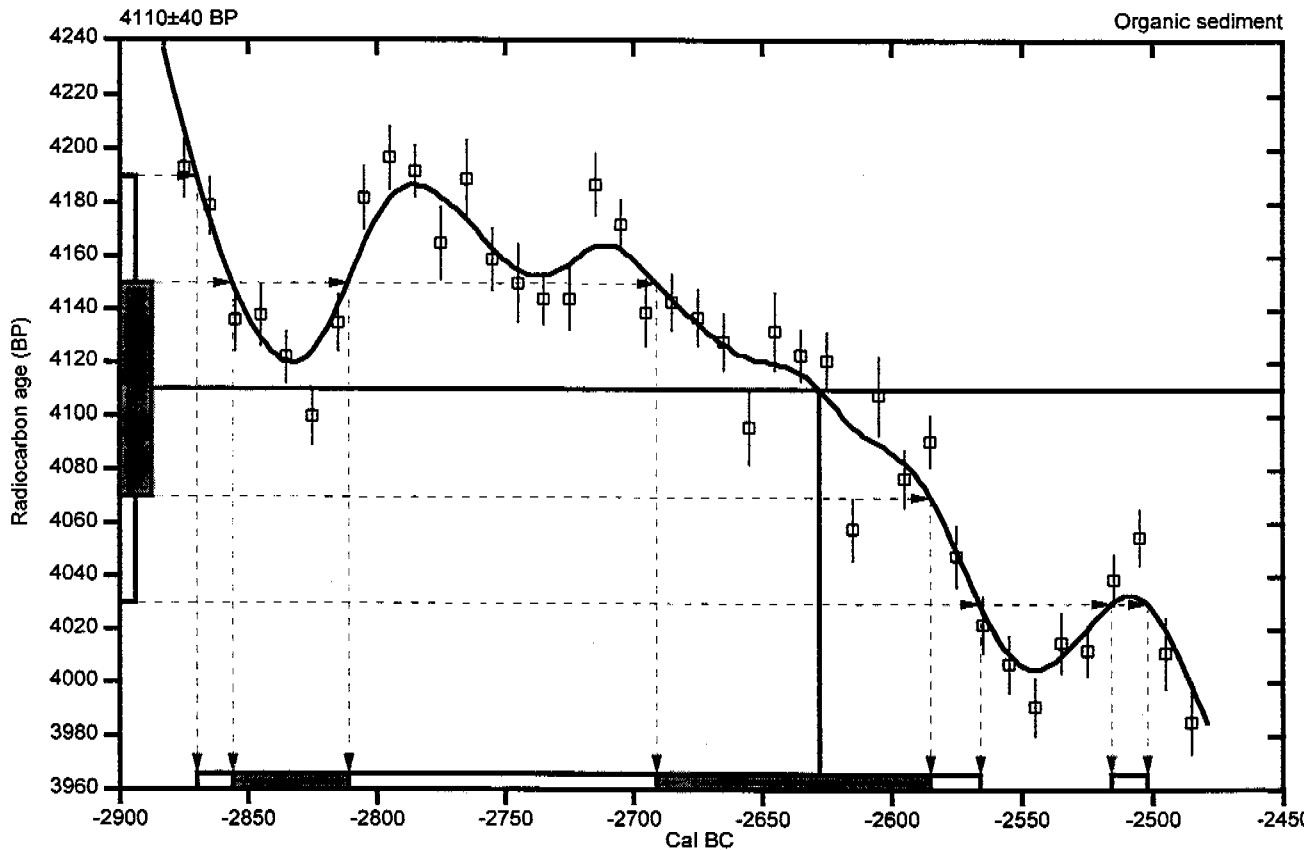
Conventional radiocarbon age: 4110±40 BP

2 Sigma calibrated results: Cal BC 2870 to 2565 (Cal BP 4820 to 4515) and
(95% probability) Cal BC 2515 to 2500 (Cal BP 4465 to 4450)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal BC 2630 (Cal BP 4580)

1 Sigma calibrated results: Cal BC 2855 to 2810 (Cal BP 4805 to 4760) and
(68% probability) Cal BC 2690 to 2585 (Cal BP 4640 to 4535)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, *Radiocarbon* 40(3), pxi-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et al., 1998, *Radiocarbon* 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

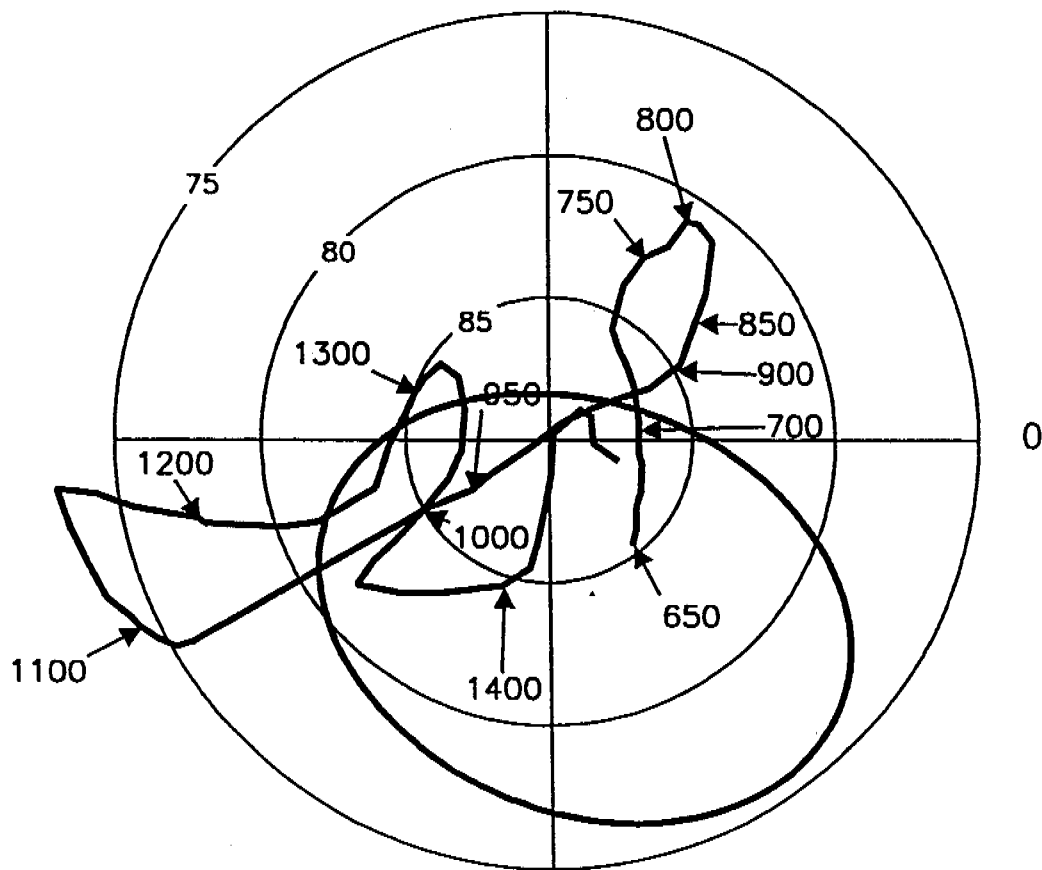
Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2), p317-322

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APPENDIX B

Archaeomagnetic Dating Results



VGP plot and oval of confidence ($p=0.95$) for archaeomagnetic sample ZU 1129. The result is plotted on the SWCV90 and Wolfman VGP curves for the circa A.D. 650-1450 time period.

Table 1. Zuni (LA26306) Archaeomagnetic Set Result

Sample number	Site number (LA)	FS No.	Feature	Inc.	Dec.	VGP lat.	VGP long.	α_{95}	I_p	I_m	N	Demag. level	Estimated date	AM date estimates	Col.
ZU 1129	26306	292	Plastrure hearth, Feature 44	59.0	4.1	84.4	285.4	6.4	7.1	9.5	8/7	200	AD 600's-700's	N/A	JH

APPENDIX C

Results of Tree-ring Analysis

12 August 1998

Jim Kendrick
Project Director
Zuni Cultural Resource Enterprise
P. O. Box 1149
Zuni, New Mexico 87327

Re: Accession A-1388

Dear Jim,


Here are the results of our analysis of four archaeological tree-ring samples from Project ZCRE-015-97, State Highway 602 Data Recovery, Site LA 26306. Enclosed is a species identification form.

Unfortunately, none of the samples could be dated. The two pinyon samples have too few rings to be matched to the local master chronology. The two juniper samples do not date because they have erratic ring series fraught with false ring problems. Nonetheless, they have enough dendrochronological potential to be added to our collection for future reference.

The samples (including parts of the catalogued specimens) are being returned to you separately.

If you have any questions about these results, please let me know.

Sincerely,


Jeffrey S. Dean

cc: Janet Hagopian

LA 26306 - Species ID by DOB - reported 11 August 1998 - Accession A-1388

	FIELD NUMBER	TRLNO	DF	PP	PNN	JUN	S/F	POP	QUER	NONCON	COMMENTS
	-----	-----	--	--	---	---	---	---	---	-----	-----
1	98-1				1						
	98-2	ZUN-1711				1					
	98-3	ZUN-1712				1					
	98-4				1						
					-----	---					
					Total:	2					
					-----	---					

APPENDIX D

Ceramic Codes and Data Base

Appendix D.1. Ceramic Code Sheet.

SITE	Record Site Number found on bag of artifacts	
LOT	Lot Number: consecutive for each line of data	
FS#	Field Specimen Number: found on each bag of artifacts	
ITEM	Item Number: consecutive within FS. It is not necessary to assign item numbers to sherds that will receive no further analysis.	
SIZE	Size of sherds measured in 2-cm ² increments	
WEIGHT	Total weight (gs) of all sherds included in Lot Number	
DEC/UND	Record decorated or undecorated (utility) ware	
	1. Undecorated	
	2. Decorated	
TYPE	Ceramic Ware and Type: see list below. Note that codes for sherds that can only be identified at the ware level end in 00 (i.e., 2100 = Cibola Gray Ware) and that many type names allowable are informal types. When in doubt, only the ware code is entered.	
INT	Interior Surface Treatment	
	1. Rough	Temper protrudes, no effort at modification
	2. Scraped	Scraping marks, scratches, drag lines where temper protrudes
	3. Smoothed	Smooth but not shiny. Can have a few wiping marks, pits, or burnishing marks (smooth or shiny streaks). Temper for the most part does not protrude but may be visible
	4. Polished	Reflects some light
	5. Smudged	Black, shiny, usually well-polished. Must penetrate core
	6. Slipped	Fine layer of clay on the surface, usually contrasts with paste
	7. Fugitive Red	Temper is usually sand and the mineral paint is often mixed with some organic material.
	15. Other	Note in comments.
	20. Indeterminate	Cannot tell due to burning, small size, or uncertainty about treatment
	95. Surface missing	Surface spalled, eroded, or abraded away. Also use for items with no interior surface (i.e., figurines)
EXT	Exterior Surface Treatment	
	1. Rough	Temper protrudes, no effort at modification
	2. Scraped	Scraping marks, scratches, drag lines where temper protrudes
	3. Smoothed	Smooth but not shiny. Can have a few wiping marks, pits, or burnishing marks (smooth or shiny streaks). Temper for the most part does not protrude but may be visible
	4. Polished	Reflects some light
	5. Smudged	Black, shiny, usually well-polished. Must penetrate core
	6. Slipped	Fine layer of clay on the surface, usually contrasts with paste

Appendix D.1. Continued.

- | | | |
|-----|---------------------------------------|---|
| 7. | Fugitive Red | Temper is usually sand and the mineral paint is often mixed with some organic material. |
| 15. | Other | Note in comments. |
| 20. | Indeterminate | Cannot tell due to burning, small size, or uncertainty about treatment |
| | | |
| 40. | Clapboard Corrugated Wide (> 10 mm) | |
| 41. | Clapboard Corrugated Narrow (< 10 mm) | |
| 42. | Indented Corrugated | |
| 43. | Zoned Corrugated | |
| 44. | Obliterated Corrugated | |
| 45. | Incised Corrugated | |
| 46. | Scored Corrugated | |
| 47. | Tooled (Engraved) Corrugated | |
| 48. | Punctate Corrugated | |
| 49. | Plain Corrugated | |
| 50. | Neckbanded Wide (> 10 mm) | |
| 51. | Neckbanded Narrow (< 10 mm) | |
| 52. | Indented Neck Corrugated | |
| 53. | Zoned Neck Corrugated | |
| 60. | Indeterminate Corrugated | |
| | | |
| 80. | Appliqué | |
| 81. | Basket Impressed | |
| 95. | Surface missing | Surface spalled, eroded, or abraded away. Also use for items with no interior surface (i.e., figurines) |

POL/I Polishing Interior. Reflects at least some light (has luster), may be poor or streaky to fine and shiny

- 1. Not polished
- 2. Streaky, or striations visible
- 3. Low luster
- 10. High luster
- 95. Surface missing or indeterminate

POL/E Polishing Exterior: same codes as Polishing Interior (above).

SLIP/I Slipped Interior. Has a layer of fine clay on the surface. Slip is usually of contrasting color to the paste; may be thin and watery or thick and visible in cross section. Most will also be polished.

- 1. False slip
- 2. Thin slip: temper visible
- 3. Thick slip: not temper visible
- 4. Crackled slip: thin
- 5. Crackled slip: thick
- 6. Fugitive Red Slip
- 10. Not slipped
- 95. Surface missing or Indeterminate

Appendix D.1. Continued.

SLIP/E Slipped Exterior: same codes as Slipped Interior (above)

IA Indentation Alignment. Indented Corrugated sherds only.

1. Aligned
2. Not Aligned
10. Not Indented
20. Indeterminate

#CORR Record number of corrugations/ 3 cm². Corrugated sherds > 3 cm² only.

SOOT Sooting. Recognized as gritty black deposit or carbon residue.

1. Present on exterior only
2. Present on interior only
3. Present on both surfaces
4. Present on edge or edges only
10. None
20. Indeterminate

FORM Vessel Shape

1. Bowl
2. Jar
3. Seed Jar
4. Ladle
5. Scoop
6. Figurine/Effigy Vessel
7. Pitcher
8. Worked Sherd
15. Other: Note in Comments
20. Indeterminate

PART Part of vessel represented

1. Rim
 2. Neck
 3. Body
 4. Handle
 5. Neck and body
 6. Handle and body
 7. Complete
 15. Other
 20. Indeterminate
- Note in comments if part of jar neck is included
- Note kind in comments
- Note in comments. Use for figurines where part is same as form.

RIM FORM Bowl Rim Forms after Colton 1953:44

1. Rim A Lip 1
2. Rim A Lip 2
3. Rim A Lip 3
4. Rim A Lip 4
5. Rim A Lip 5
6. Rim A Lip 6
7. Rim A Lip 7
8. Rim A Lip 8
9. Rim A Lip 9
10. Rim A Lip 10
11. Other Rim (describe in notes, include lip form)
99. No Rim

PASTE Paste Color: dominant or most oxidized of dominant colors, warmest colors. Assignment to these categories is by general impression and judgment of analyst, Munsell equivalents are not implied.

1. Black
2. White
3. Off-white, white-gray
4. Light gray (cold gray)
5. Dark gray (charcoal colored)
6. Gray-brown
7. Brown
8. Orange
9. Red
10. Cream
11. Yellow
12. Buff, tan
13. Pink
15. Other (note in comments)
20. Indeterminate (clouded, sooted, etc.)

REFIRE Refired Color

1. Red
2. Buff, tan
3. Cream

CARB Unoxidized Core

1. Absent
2. Present
20. Indeterminate

SC/I Surface Color, Interior: same codes as Paste Color (above). Record color of slip for slipped sherds.

Appendix D.1. Continued.

SC/E	Surface Color, Exterior: same codes as Paste Color (above). Record color of slip for slipped sherds.	
TEMPER	Temper inclusions: record majority. If other inclusions present in minority, record in comments. <ol style="list-style-type: none">1. None (usually only Hopi yellowwares)2. Coarse quartz sand3. Fine quartz sand4. Coarse multilithic sand5. Fine multilithic sand6. Quartz sand and sherd7. Sherd8. Sherd and volcanic9. Volcanic10. Mica11. Fiber12. Multilithic sand and sherd15. Other (note in comments)20. Indeterminate	
MOD	Modification: indicates use or changes after firing <ol style="list-style-type: none">1. One ground edge2. Two or more ground edges3. Flaked edge or edges4. Drill (repair) hole5. Abraded6. Use-wear15. Other. Note in comments.20. Indeterminate99. None	
PT	Paint Type <ol style="list-style-type: none">1. Organic Blurry edges; often has watery appearance; usually black; soaks into clay body; no surface relief.2. Mineral Usually dense; may be crackled or blistered; hard edges; often sits up on surface; often a brown or reddish brown or warm black3. Mineral Red4. Mineral/organic Often brown but soaked into clay body and somewhat blurry at edges; parts may sit up on surface or be crackled5. Kaolin White clay paint6. Matte Polychrome7. Glaze Polychrome8. Glaze20. Indeterminate99. Absent	

Appendix D.1. Continued.

RATIO	Ratio of black-to-white or black-to-red
	<ol style="list-style-type: none">1. Low (much more white/red than black)2. Medium (fairly even)3. High (much more black than white/red)20. Indeterminate (burnt, etc.)99. Not a black-on-white or black-on-red sherd or no visible paint
MOTIF#	Motif. Specific elements visible on sherd, see list below. Motif1, Motif2, and Motif3 used to record up to three elements; additional ones noted in comments.
	<ol style="list-style-type: none">01. rim design -- solid02. rim design -- ticking03. rim design -- checkerboard04. rim design -- dot - dash10. thin parallel lines11. thick parallel lines12. squiggly lines13. thin curved lines14. thick curved lines15. single line (may occur with other element)20. single, solid triangle21. attached triangles22. indeterminate triangle23. opposed solid triangles24. indeterminate solid triangle25. indeterminate open triangle26. opposed, mirrored, solid triangles27. offset and opposed triangles28. attached, opposed and oblique triangles30. rectilinear element -- solid fill31. rectilinear element -- hatched fill32. interlocking rectilinear scroll -- hatched fill33. interlocking rectilinear scroll -- solid fill34. interlocking rectilinear scroll -- opposed hatched and solid fill35. opposed rectilinear elements -- hatched fill36. opposed rectilinear elements -- solid fill37. opposed rectilinear elements -- opposed hatched and solid fill40. circular scroll -- solid fill41. circular scroll -- hatched fill42. interlocking circular scroll -- hatched fill43. interlocking circular scroll -- solid fill44. interlocking circular scroll -- opposed hatched and solid fill45. circular scroll -- opposed hatched and solid fill

Appendix D.1. Continued.

- 50. single stepped element -- solid fill
- 51. single stepped element -- hatched fill
- 52. opposed stepped elements -- solid fill
- 53. opposed stepped elements -- hatched fill
- 54. opposed stepped elements -- opposed solid and hatched fill

- 60. open circle
- 61. open circle with dot
- 62. solid circle
- 63. negative circle
- 64. negative circle with dot
- 65. concentric circles

- 70. open square
- 71. open square with dot
- 72. solid square
- 73. negative square
- 74. negative square with dot

- 80. open diamond
- 81. open diamond with dot
- 82. solid diamond
- 83. negative diamond
- 84. negative diamond with dot

- 90. dots
- 91. pendant dots or ticks
- 92. ticked flag
- 93. zigzag
- 94. parallel zigzags
- 95. X
- 96. barbs

- 100. concentric sunburst
- 101. nested chevrons
- 102. checkerboard
- 103. diamond checkerboard
- 104. crosshatched diamonds
- 105. squiggly hatch fill

- 120. humanoid figure
- 121. face/mask
- 122. hand
- 123. bird
- 124. feather
- 125. mammal (note in comments)
- 126. arrow

Appendix D.1. Continued.

- 150. indeterminate element
- 151. indeterminate solid element
- 152. indeterminate hatched element
- 153. indeterminate opposed element
- 154. indeterminate interlocking element

COUNT For sherds in one bag number that are identical in all attributes; count number of sherds and enter number.

COMMENT

Appendix D.2. Ceramic Type Codes.

White Wares

- 01 Cibola White Ware** (mineral paint, white slip). 01 for sherds with classic white to gray paste
- 0100 Untyped Cibola White Ware
 - 0101 Untyped, unpainted
 - 0102 Untyped, painted
 - 0110 La Plata Black-on-white (quartz sand temper)
 - 0111 White Mound Black-on-white (quartz sand temper)
 - 0112 Kiatuthlanna Black-on-white (quartz sand temper)
 - 0113 Red Mesa Black-on-white (sand-and-sherd or sherd temper)
 - 0114 Gallup Black-on-white (sand-and-sherd or sherd temper)
 - 0115 Chaco Black-on-white (volcanic-and-sherd or volcanic temper)
 - 0116 Chaco/McElmo Black-on-white (sand-and-sherd or sherd temper)
 - 0117 Escavada Black-on-white (sand-and-sherd or sherd temper)
 - 0118 Puerco Black-on-white (sand-and-sherd or sherd temper)
 - 0119 Corrugated Reserve Black-on-white (sand-and-sherd or sherd temper)
 - 0120 Reserve Black-on-white (sand-and-sherd or sherd temper)
 - 0121 Tularosa Black-on-white (sand-and-sherd or sherd temper)
 - 0122 Pinedale Black-on-white (sand-and-sherd or sherd temper)
 - 0123 Klagetö Black-on-white
 - 0124 Transitional Reserve/Tularosa Black-on-white (sand-and-sherd or sherd temper)
- 02 Puerco Valley Varieties (of Cibola White Ware).** 02 for sherds with gray-brown paste.
- 0200 Untyped Cibola White Ware
 - 0201 Untyped, unpainted
 - 0202 Untyped, painted
 - 0210 La Plata Black-on-white (quartz sand temper)
 - 0211 White Mound Black-on-white (quartz sand temper)
 - 0212 Kiatuthlanna Black-on-white (quartz sand temper)
 - 0213 Red Mesa Black-on-white (sand-and-sherd or sherd temper)
 - 0214 Gallup Black-on-white (sand-and-sherd or sherd temper)
 - 0215 Chaco Black-on-white (sand-and-sherd or sherd temper)
 - 0216 Chaco/McElmo Black-on-white (sand-and-sherd or sherd temper)
 - 0217 Escavada Black-on-white (sand-and-sherd or sherd temper)
 - 0218 Puerco Black-on-white (sand-and-sherd or sherd temper)
 - 0220 Reserve Black-on-white (sand-and-sherd or sherd temper)
 - 0221 Reserve Black-on-white corrugated (Black-on-white interior, corrugated exterior)
 - 0222 Tularosa Black-on-white (sand-and-sherd or sherd temper)
 - 0223 Tularosa Black-on-white corrugated (Black-on-white interior, corrugated exterior)
 - 0224 Pinedale Black-on-white (sand-and-sherd or sherd temper)
 - 0225 Klagetö Black-on-white
- 03 Little Colorado White Ware** (dark gray paste, white sherd temper, white slip, organic paint)
- 0300 Untyped Little Colorado White Ware
 - 0301 Untyped PII Little Colorado White Ware (Holbrook)
 - 0302 Untyped PII Little Colorado White Ware (Walnut)
 - 0311 Holbrook A Black-on-white
 - 0312 Holbrook B Black-on-white

Appendix D.2. Continued.

- 0313 Padre Black-on-white
- 0314 Walnut A Black-on-white
- 0315 Walnut B Black-on-white
- 0316 Leupp Black-on-white

- 04 Tusayan** (sand temper, organic paint, usually unslipped)
- 0400 Untyped Tusayan White Ware
- 0401 Untyped Basketmaker III to Pueblo I
- 0402 Untyped Pueblo II to Pueblo III
- 0411 Lino Black-on-Gray
- 0412 Kana-a Black-on-white
- 0413 Wepo Black-on-white
- 0414 Black Mesa Black-on-white
- 0415 Sosi Black-on-white
- 0416 Dogoszhi Black-on-white
- 0417 Flagstaff Black-on-white

0900 Untyped White Ware

Red and Orange Ware

- 10 White Mountain Redware** (sherd temper, thick slip, mineral paint, hard paste)
- 1000 Untyped White Mountain Redware
- 1001 Untyped Polychrome
- 1002 Untyped, unpainted
- 1011 Puerco Black-on-red
- 1012 Wingate Black-on-red
- 1013 Wingate Polychrome, Houck variety (red slipped band)
- 1014 Wingate Polychrome, Querino variety (red paint on cream slip)
- 1015 Wingate Black-on-red Corrugated (Black-on-red int, corrugated ext)
- 1016 St. Johns Black-on-red
- 1017 St. Johns Polychrome
- 1018 Springerville Polychrome
- 1019 Heshotauthla Black-on-red
- 1020 Heshotauthla Polychrome
- 1021 Kwakina Polychrome
- 1022 Pinedale Black-on-red
- 1023 Pinedale Polychrome

- 11 Puerco Valley (Showlow) Red Ware** (sherd temper, thin slip, carbon paint, soft paste)
- 1100 Untyped Showlow Red Ware
- 1111 Showlow Red
- 1112 Showlow Black-on-red
- 1113 Showlow Black-on-red Corrugated
- 1114 Showlow Red Corrugated
- 1115 Showlow Red Smudged
- 1116 Showlow Red Corrugated Smudged
- 1117 Showlow Black-on-Red Smudged

Appendix D.2. Continued.

12 Tsegi Orange Ware (sherd temper)

- 1200 Untyped Tsegi Orange Ware
- 1211 Medicine Black-on-red
- 1212 Tusayan Black-on-red
- 1213 Cameron Polychrome
- 1214 Citadel Polychrome
- 1215 Tsegi Red-on-Orange
- 1216 Tsegi Black-on-Orange
- 1217 Tusayan Polychrome
- 1218 Kiet Siel Polychrome
- 1219 Kayenta Polychrome

13 San Juan Red Ware (sand temper)

- 1300 Untyped San Juan Red Ware
- 1311 Abajo Red/Orange
- 1312 Bluff Black-on-red
- 1313 Abajo Polychrome
- 1314 La Plata/Deadmans Black-on-red

Gray Wares

20 Cibola Gray Ware

- 2000 Cibola Gray Ware (sherd or sherd-and-sand temper, hard paste)
- 2002 Plain Gray Ware
- 2005 Plain Corrugated
- 2006 Indented Corrugated
- 2007 Neckbanded Corrugated
- 2008 Clapboard Corrugated
- 2010 Exuberant Corrugated
- 2011 Incised Corrugated
- 2029 Indeterminate Corrugated

21 Puerco Valley Gray Ware (Previously Puerco Valley Gray-Brown Ware. The late types probably are synonymous with most of the Little Colorado Gray Ware. The early types overlap somewhat with Fowler's broad definition of Woodruff Brown. Temper is opaque white or multilithic sand, sherd, or sand-and-sherd. Surface and paste color is gray to brown. Paste is soft, with a crumbling or powdery fracture).

- 2100 Cibola Gray Ware (sherd or sherd-and-sand temper, hard paste)
- 2102 Plain Gray Ware
- 2105 Plain Corrugated
- 2106 Indented Corrugated
- 2107 Neckbanded Corrugated
- 2108 Clapboard Corrugated
- 2110 Zoned Corrugated
- 2129 Indeterminate Corrugated

22 Little Colorado Gray Ware (sherd temper)

Appendix D.2. Continued.

- 23 Tusayan Gray Ware** (coarse quartz and sand temper, hard paste)
2300 Untyped Tusayan Gray Ware
2302 Plain Tusayan Gray Ware
2303 Plain Tusayan Gray Ware, Fugitive Red Slip
2305 Tusayan Plain Corrugated
2306 Tusayan Indented Corrugated
2307 Kana-a Gray Neckbanded Corrugated
2308 Tusayan Clapboard Corrugated
2310 Tusayan Zoned Corrugated
2315 Lino Gray
2316 Lino Gray Fugitive Red
2320 Moenkopi Corrugated (clapboard, sometimes obliterated)
- 24 Chuska Gray Ware** (volcanic inclusions in temper)
2400 Untyped Chuska Gray Ware
2402 Chuska Plain Gray
2405 Chuska Plain Corrugated Gray
2406 Chuska Indented Corrugated
2408 Chuska Clapboard Corrugated
- 2900 Untyped Gray Ware**

Brownwares

- 30 Mogollon Brown Ware**
3000 Untyped Mogollon Brown Ware
3001 Plain Mogollon Brown Ware
3002 Smudged Mogollon Brown Ware
3003 Corrugated Smudged Mogollon Brown Ware
3004 Corrugated Mogollon Brown Ware, not smudged
3011 Woodruff Brown (same as Forestdale)
3012 Woodruff Smudged (same as Forestdale)
3013 Alma Plain
3014 Reserve Indented Corrugated, smudged
3015 Woodruff Red (Woodruff Brown with red slip)
3018 McDonald Corrugated
- 3900 Untyped Brown Ware**
- 9999 Untyped Ware**

APPENDIX E

Flaked Stone Codes and Data Base

Appendix E.1. Artifact Classes and Types Identified During Analysis of the Basketmaker II and Pueblo II Period Flaked Stone Collections of Y Unit Draw.

Artifact Class	Artifact Type Within Class
Biface	Biface (complete) Biface fragment
Bifacially battered piece	None
Core	Amorphous core Dihedral core Discoidal core Multiple-platform core Core on flake Opposed-platform core Single-platform core Core fragment
Debitage	Primary reduction debitage Secondary reduction debitage Tertiary reduction debitage Bifacial thinning flake Bipolar flake
Debris	Chips and chunks
Denticulate	None
Hammerstone	None
Manuport	None
Other	Core front Core trimming flake Hammerstone fragment Potlid
Perforator	Perforator Graver
Projectile point	Corner-notched point Side-notched point Projectile point fragment Preform
Scraper	Endscraper Sidescraper Transverse sidescraper
Retouched piece	Other
Utilized piece	None

Appendix E.2. Variables and Attributes Recorded for Flaked Stone Artifacts.

General Variables	Variables Recorded for Cores	Variables Recorded for Projectile Points
Length (cm)	Length (cm)	Length (cm)
Width (cm)	Width (cm)	Width (cm)
Thickness (cm)	Thickness (cm)	Thickness (cm)
Weight (g) ²	Weight (g) ²	Weight (g) ²
Percent cortex (%)	Percent cortex (%)	Percent cortex (%)
Exterior platform angle (degrees)	Alteration	Alteration
Interior platform angle (degrees)	Raw material	Raw material
Platform thickness (cm)	Raw material attribution	Raw material attribution
Blank profile	Artifact class	Artifact class
Blank termination	Artifact type	Artifact type
Blank shape	Core type	Position of retouch
Blank condition	Product	Type of retouch
Blank type	Number of platforms	Blade length (cm)
Alteration	Length of major platform axis (cm)	Base length (cm)
Raw material	Last platform angle (degrees)	Shoulder width (cm)
Raw material attribution	Platform type(s)	Minimum stem diameter (cm)
Platform	Initial block	Base width (cm)
Artifact class	Defects	
Artifact type		
Position of retouch		
Type of retouch		

Note: All metric variables were recorded to the nearest 0.1 cm. Weight measurements were recorded to the nearest 1.0 g (values less than 1.0 g were recorded as 0.0 g).

PUEBLO OF ZUNI CULTURAL RESOURCE ENTERPRISE Hwy 602 Data Recovery Project: James W. Kendrick, PD Jeffrey E. Shokler, Consultant	Site: <input style="width: 100px;" type="text"/> Entered: <input style="width: 100px;" type="text"/> Date SU/F/S/L: <input style="width: 100px;" type="text"/> / <input style="width: 100px;" type="text"/> / <input style="width: 100px;" type="text"/> Period: <input style="width: 100px;" type="text"/>
	<div style="display: flex; justify-content: space-around;"> FS Number Record Number </div>

METRICS

Length: cm
 Width: cm
 Thickness: cm
 Weight: g
 % Cortex: %
 Exterior Plat. Angle: degrees
 Interior Plat. Angle: degrees
 Plat. Thickness: cm

BLANK MORPHOLOGY/ATTRIBUTES

Blank Profile:
 Blank Termination:
 Blank Shape:
 Blank Condition:
 Blank Type:
 Alteration:
☐ Thermal (oxidized) ☐ Patinated
☐ Thermal (pot lids) ☐ Rolled
☐ Thermal (crazed) ☐ Edge damage
☐ Thermal (calcined)
 Raw Material:
 Raw Material Attribution:

BUTTONS

PLATFORM MORPHOLOGY/ATTRIBUTES

Platform: ☐ cortical ☐ multifaceted ☐ Punctiform ☐ Dorsal lipping
☐ flat/unfaceted ☐ Ground/abraded ☐ Crushed ☐ Ventral lipping
☐ single facet ☐ Linear ☐ Percussion marks ☐ Missing (broken/snap)

TYPOLOGY/MODIFICATION

Artifact Class:
 Artifact Type:

Position of Retouch:
☐ Distal ☐ Left ☐ Right
☐ Proximal ☐ LDist ☐ RDist
☐ LMed ☐ RMed
☐ LProx ☐ RProx

Type of Retouch:
☐ Normal ☐ Peripheral ☐ Abrupt
☐ Inverse ☐ Invasive ☐ Pressure
☐ Alternate ☐ Shallow ☐ Bifacial
☐ Alternating ☐ Semi-abrupt

CORE ATTRIBUTES

Core Type:
 Product:

Defects:

Number of Platforms:
 Length of Major Platform Axis: cm
 Platform Angle: degrees
 Platform Type(s):

 Initial Block:

NOTES: Notes/Comments

Draw/photo

☐ Yes ☐ No

APPENDIX F

Ground Stone and Miscellaneous Items Codes and Data Base

Appendix F.1. Ground Stone Analysis Coding Sheet Terminology.

FS No. - Number assigned to bag to identify context.

Item No. - Sequential number assigned to artifacts per FS No.

Artifact Type

Mano

- One-hand
- Two-hand
- Blank/preform
- Indeterminate

Metate

- Basin
- Trough
- Slab/flat
- Indeterminate

- Anvil
- Active Abrader
- Passive Abrader
- Disk
- Fetish
- Mortar
- Ornament
- Pendant
- Pestle
- Polishing Stone
- Sphere (stone "ball")
- Indeterminate slab (shaped but not ground)
- Unidentified ground stone

Raw Material

- Argillite
- Basalt, fine-grained
- Basalt, vesicular
- Granite
- Limestone
- Mudstone
- Quartzite
- Sandstone
- Shale
- Silicified Wood
- Slate

Striations - Evidence of use-wear on artifact.

- None
- Circular
- Multidirectional
- Parallel

Appendix F.1. Continued.

Grinding - The number of use-wear surfaces.

Unifacial

Bifacial

Shaped - Evidence that artifact was shaped either by flaking, grinding, or pecking..

Yes

No

Burned - Evidence of burning on an artifact.

Present

Absent

Complete - completeness of artifact recorded as a percentage.

1 - 50%

51 - 75%

76 - 99%

100%

Length - the length of the longest axis in centimeters (to the nearest tenth of a centimeter).

Width - the second longest axis (measured at a 90° angle to the long axis) in cm.

Thickness - the length of the axis that is perpendicular to the plane of the length and width in cm.

Weight - weight of the artifact in grams (to the nearest tenth of a gram)

Comments - Anything of importance that should be noted. Plan and cross-section shapes, evidence of residues or pigments (if present, what type, etc.), direction of striations, amount of use-wear, etc.. For trough metates it is noted if the ends are opened or closed, and if there is a shelf.

APPENDIX G

Macrobotanical Remains Data Base

Appendix G.1. Vegetal Sample Proveniences.

Site No./Feature No.	Feature Description	Number of Samples	FS Numbers
<u>LA 26306</u>			
29	Circular pitstructure	1	242
36	Posthole in northeast quad of F28 pitstructure	1	274
43	Primary roof support posthole in F28 pitstructure	1	281
Subtotal 3 features		3 samples	
<u>LA 26319</u>			
2	Hearth	1	32
Subtotal 1 feature		1 sample	
<u>LA 115330</u>			
2	Pitstructure	2	181, 193
10	Extramural possible storage pit	1	197
22	Indeterminate pit in pitstructure	1	230
25	Possible storage pit in pitstructure	1	235
26	Posthole along southern edge of pitstructure	1	236
Subtotal 5 features		6 samples	
Total 9 features		10 samples	

Appendix G.2. Radiocarbon Sample Proveniences.

Site No./Feature No.	Feature Description	Number of Samples	FS Numbers
<u>LA 26306</u>			
1	Irregular-shaped pitstructure	1	144
28	Circular pitstructure	1	265
29	Circular pitstructure	1	228
35	Storage pit in F. 28 pitstructure	1	271
<u>Extramural</u>			
10	Thermal rock feature	1	215
27	Bell-shaped storage pit	1	232
Subtotal 6 features		6 samples	
<u>LA 26308</u>			
9	Bell-shaped storage pit	1	89
10	Hearth	1	99
11	Hearth	1	101
Subtotal 3 features		3 samples	
<u>LA 26319</u>			
2	Hearth	1	36
Subtotal 1 feature		1 sample	
<u>LA 48695</u>			
4	Water control feature	3	2, 22, 23
Subtotal 1 feature		3 samples	
<u>LA 49838</u>			
3	Bell-shaped pit/roasting pit	1	354
4	Bell-shaped storage pit	1	350
5	Bell-shaped pit/roasting pit	1	365
Subtotal 3 features		3 samples	
<u>LA 115323</u>			
SU 4*	Charcoal deposit and possible ditch	2	32, 33
1	Fieldhouse	1	45
Subtotal 2 features		3 samples	
<u>LA 115324</u>			
2	Possible storage pit	1	82
4	Possible storage pit	1	86
Subtotal 2 features		2 samples	
<u>LA 115327</u>			
4	Possible storage pit reused as dog burial pit	2	50, 56
Subtotal 1 feature		2 samples	

(continued)

Appendix G.2. Continued.

Site No./Feature No.	Feature Description	Number of Samples	FS Numbers
<u>LA 115330</u>			
2	Pitstructure	4	148, 188, 192, 194
4	Extramural possible thermal feature reused for storage	1	168
12	Hearth in F2	1	205
13	Storage pit in F2	4	207, 210, 211, 214
14	Kidney-shaped linear pit in F2	1	218
15	Posthole in F9 activity area	1	221
Subtotal 6 features		12 samples	
Total 25 features		35 samples	

*Sampled contexts in SU 4 at site LA 115323 are not numbered features.

Appendix G.3. Flotation Sample Summary Data by Site.

FS No.	Sample Volume (liters)	Sample Weight (grams)	Roots	Insects	Other
<u>LA 26306</u>					
144	2.00	3.6	+	+	-
151	1.75	2.0	+	-	-
167	2.00	1.0	+	-	-
169	2.75	0.5	+	-	-
185	1.75	1.9	+	+	-
186	1.75	0.6	+	+	-
188	1.00	1.1	+	-	-
191	1.50	1.3	+	-	-
193	1.75	1.4	+	-	-
195	1.75	1.5	+	+	-
212	1.25	0.8	+	+	-
229	2.00	0.6	+	+	-
232	1.50	6.5	+	+	-
235	1.75	1.1	+	+	-
236	1.75	2.1	+	+	-
265	2.25	2.8	+	-	-
275	1.75	2.1	+	-	-
<u>LA 26308</u>					
79	1.75	2.2	+	+	-
94	2.25	26.9	+	+	-
98	1.75	3.0	+	+	-
100	2.00	0.7	+	+	-
102	2.50	15.0	+	-	-
<u>LA 26319</u>					
28	2.00	1.5	+	+	-
30	1.75	4.1	+	+	-
33	2.00	0.9	+	+	-
35	1.75	4.3	+	-	-
<u>LA 48695</u>					
2	3.75	7.0	+	+	-
<u>LA 49838</u>					
289	1.75	8.4	+	+	-
336	3.00	53.1	+	+	-
351	2.00	6.9	+	-	-
358	1.75	12.5	+	+	-
366	1.75	2.0	+	+	-
374	1.50	3.6	+	+	-
<u>LA 115323</u>					
31	2.0	1.9	+	+	-
43	2.0	2.1	+	+	-
44	1.5	3.6	+	+	-
45	2.5	1.4	+	+	-
<u>LA 115324</u>					
81	2.5	1.1	+	+	-
82	4.0	0.8	+	+	-

(continued)

Appendix G.3. Continued.

FS No.	Sample Volume (liters)	Sample Weight (grams)	Roots	Insects	Other
84	3.00	1.2	+	+	-
86	2.00	1.7	+	+	-
<u>LA 115327</u>					
49	1.75	0.6	+	+	-
55	1.75	1.0	+	-	-
56	1.50	0.5	+	-	-
58	2.50	0.5	+	+	-
62	1.75	1.2	+	+	Rodent feces
64	2.00	0.6	+	+	-
66	2.00	0.8	+	+	-
69	2.00	0.3	+	+	-
<u>LA 115330</u>					
164	1.50	1.9	+	+	-
168	1.75	2.0	+	-	-
172	2.00	2.8	+	+	-
177	1.75	3.1	+	+	-
180	1.75	1.6	+	+	-
183	1.25	2.6	+	+	-
188	1.75	3.1	+	+	-
193	1.25	2.6	+	+	-
196	1.75	3.3	+	+	-
198	2.00	6.2	+	-	-
203	2.00	2.9	+	-	-
204	1.75	3.3	+	-	-
206	1.25	2.9	+	+	-
208	1.75	13.7	+	+	-
214	1.25	7.8	+	-	Rodent feces
221	1.75	1.7	+	+	-
222	1.75	1.2	+	+	-
223	2.00	2.7	+	+	-
225	1.50	3.3	+	+	-
228	2.00	2.5	+	+	-
230	2.00	13.6	+	+	Rodent feces
231	2.00	2.7	+	+	Rodent feces
232	1.75	9.0	+	-	-
234	2.00	1.7	+	+	-
235	1.25	1.3	+	+	-
237	1.75	3.0	+	+	-
240	1.75	2.4	+	+	-

Note: + = present \ - = absent

Appendix G.4. Flotation Sample Proveniences.

Site No./Feature No.	Feature Description	Number of Samples	FS Numbers
<u>LA 26306</u>			
1	Irregular-shaped pitstructure floor, SU 9	1	144
19	Storage bin in Feature 1 pitstructure	1	185
20	Indeterminate pit in Feature 1 pitstructure	1	188
21	Storage bin in Feature 1 pitstructure	1	191
22	Storage bin in Feature 1 pitstructure	1	193
28	Circular pitstructure, level 3, SU 13	1	265
29	Circular pitstructure floor, SU 12	1	236
35	Storage pit in Feature 28 pitstructure	1	275
<u>Extramural Features</u>			
2	Roasting/storage pit	1	151
3	Indeterminate pit	1	167
5	Indeterminate pit	1	195
6	Indeterminate pit	1	212
9	Indeterminate pit	1	169
10	Thermal rock feature	1	235
11	Indeterminate pit	1	186
14	Indeterminate pit	1	229
27	Bell-shaped storage pit	1	232
Subtotal 17 features		17 samples	
<u>LA 26308</u>			
2	Basin-shaped pit	1	98
7	Hearth	1	79
9	Bell-shaped storage pit	1	100
10	Hearth	1	94
11	Hearth	1	102
Subtotal 5 features		5 samples	
<u>LA 26319</u>			
1	Basin-shaped pit	1	28
2	Hearth	1	35
3	Bell-shaped pit	1	30
4	Oblong pit	1	33
Subtotal 4 features		4 samples	
<u>LA 48695</u>			
4	Water control feature	1	2
Subtotal 1 feature		1 sample	
<u>LA 49838</u>			
1	Midden	1	289
2	Thermal feature	1	336
3	Bell-shaped pit/roasting pit	1	351
4	Bell-shaped storage pit	1	358
5	Bell-shaped pit/roasting pit	1	366
7	Bell-shaped pit	1	374
Subtotal 6 features		6 samples	

(continued)

Appendix G.4. Continued.

Site No./Feature No.	Feature Description	Number of Samples	FS Numbers
<u>LA 115323</u>			
1	Fieldhouse, SU 7, level 1 of east portion	1	31
1	Fieldhouse, N104.01 E110.46	1	43
1	Fieldhouse, SU 8, level 1 <10cm above floor	1	44
1	Fieldhouse, SU 2, level 4	1	45
Subtotal 1 feature		4 samples	
<u>LA 115324</u>			
1	Indeterminate earthen pit	1	81
2	Possible storage pit	1	82
3	Indeterminate earthen pit	1	84
4	Possible storage pit	1	86
Subtotal 4 features		4 samples	
<u>LA 115327</u>			
1	Possible storage pit/thermal feature	1	49
3	Indeterminate earthen pit	1	55
4	Possible storage pit reused as dog burial pit	1	56
5	Thermal feature	1	58
6	Indeterminate earthen pit	1	62
7	Possible thermal feature	1	64
8	Indeterminate earthen pit	1	66
9	Indeterminate earthen pit	1	69
Subtotal 8 features		8 samples	
<u>LA 115330</u>			
2	Pitstructure	3	183, 188, 193
11	Possible storage pit in Feature 2	1	203
12	Hearth in Feature 2	1	206
13	Storage pit in Feature 2	1	214
14	Kidney-shaped linear pit in Feature 2	1	222
16	Indeterminate pit in Feature 2	1	223
20	Indeterminate pit in Feature 2	1	228
22	Indeterminate pit in Feature 2	1	230
23	Indeterminate pit in Feature 2	1	232
25	Possible storage pit in Feature 2	1	235
<u>Extramural Features</u>			
1	Possible storage pit	1	172
3	Indeterminate pit	1	164
4	Possible thermal feature reused for storage	1	168
5	Shallow pit	1	177
6	Shallow pit	1	180
8	Indeterminate pit	1	196
10	Possible storage pit	1	198
9	Activity area	2	204, 208
15	Posthole in Feature 9 activity area	1	221
18	Indeterminate pit in Feature 9 activity area	1	225

(continued)

Appendix G.4. Continued.

Site No./Feature No.	Feature Description	Number of Samples	FS Numbers
21	Indeterminate pit in activity area	1	231
24	Indeterminate pit in activity area	1	234
27	Indeterminate pit in activity area	1	237
28	Indeterminate pit in activity area	1	240
Subtotal 24 features		27 samples	
Total 70 features		76 samples	

Appendix G.5. Flotation Sample Full-sort Results for Sites LA 26306, LA 26308, LA 26319, LA 48695, LA 49838, LA 115323, LA 115324, LA 115327, and LA 115330.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
LA 26306							
144	Cheno-Am	Seed	Positive	Charred	1(0)	-	-
144	Goosefoot	Seed	Positive	Charred	2(2)	-	-
144	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
144	Juniper	Wood	Positive	Charred	4	0.1	-
144	Maize	Cupule	Positive	Charred	4(0)	-	-
144	Pine	Bark scale	Positive	Charred	-	-	1-10/liter
144	Pine	Wood	Positive	Charred	8	0.1	-
144	Pitseed goosefoot	Seed	Positive	Charred	3(3)	-	-
144	Unknown conifer	Wood	Positive	Charred	5	0.1	-
151	Goosefoot	Seed	Positive	Charred	2(2)	-	-
151	Maize	Cupule	Positive	Charred	1(0)	-	-
151	Unknown conifer	Wood	Positive	Charred	4	<0.1	-
167	Juniper	Wood	Positive	Charred	3	<0.1	-
167	Maize	Cupule	Positive	Charred	5(0)	-	-
167	Pine	Wood	Positive	Charred	2	<0.1	-
167	Pinyon pine	Fruit	Fairly certain	Charred	-	-	1-10/liter
167	Unknown conifer	Wood	Positive	Charred	10	<0.1	-
169	Juniper	Wood	Positive	Charred	1	<0.1	-
169	Unknown conifer	Wood	Positive	Charred	5	<0.1	-
185	Cheno-Am	Seed	Positive	Charred	4(3)	-	-
185	Goosefoot	Seed	Positive	Charred	1(1)	-	-
185	Juniper	Wood	Positive	Charred	5	0.1	-
185	Maize	Cupule	Positive	Charred	1(0)	-	-
185	Pine	Wood	Positive	Charred	1	<0.1	-
185	Pigweed	Seed	Positive	Charred	1(1)	-	-
185	Unknown conifer	Wood	Positive	Charred	14	0.1	-
186	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
186	Goosefoot	Seed	Positive	Charred	2(2)	-	-
186	Unknown conifer	Wood	Positive	Charred	5	<0.1	-
188	Bugseed	Seed	Positive	Charred	1(1)	-	-
188	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
188	Pine	Wood	Positive	Charred	3	<0.1	-
188	Purslane	Seed	Positive	Charred	1(1)	-	-
188	Unknown conifer	Wood	Positive	Charred	17	0.1	-
191	Indeterminate	Unknown	Positive	Charred	1(0)	-	-
191	Indeterminate	Wood	Positive	Charred	1	<0.1	-
191	Juniper	Wood	Positive	Charred	5	0.1	-
191	Unknown conifer	Wood	Positive	Charred	10	0.1	-
193	Juniper	Wood	Positive	Charred	3	<0.1	-
193	Pine	Wood	Positive	Charred	2	<0.1	-
193	Unknown conifer	Wood	Positive	Charred	15	0.1	-
195	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
195	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
195	Grass family	Pannicle	Positive	Uncharred	-	-	1-10/liter

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
LA 26306 (continued)							
195	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
212	Unknown conifer	Wood	Positive	Charred	5	<0.1	-
229	No data	No data	No data	No data	-	-	-
232	Cheno-Am	Seed	Positive	Charred	12(12)	-	-
232	Goosefoot	Seed	Positive	Charred	12(12)	-	-
232	Hedgehog cactus	Seed	Positive	Charred	1(1)	-	-
232	Juniper	Wood	Positive	Charred	4	0.1	-
232	Maize	Cupule	Positive	Charred	8(0)	-	-
232	Maize	Kernel	Fairly certain	Charred	2(0)	-	-
232	Pine	Bark scale	Positive	Charred	-	-	1-10/liter
232	Pine	Wood	Positive	Charred	7	0.1	-
232	Pinyon pine	Wood	Positive	Charred	1	<0.1	-
232	Pitseed goosefoot	Seed	Positive	Charred	5(5)	-	-
232	Unknown conifer	Wood	Positive	Charred	8	<0.1	-
235	Juniper	Wood	Positive	Charred	1	<0.1	-
235	Unknown conifer	Wood	Positive	Charred	18	0.1	-
236	Bugseed	Seed	Fairly certain	Charred	2(0)	-	-
236	Bugseed	Seed	Positive	Charred	2(2)	-	-
236	Cheno-Am	Seed	Positive	Charred	3(3)	-	-
236	Goosefoot	Seed	Positive	Charred	5(5)	-	-
236	Juniper	Wood	Positive	Charred	3	0.1	-
236	Maize	Cupule	Positive	Charred	1(0)	-	-
236	Pine	Wood	Positive	Charred	7	0.1	-
236	Purslane	Seed	Positive	Charred	2(2)	-	-
236	Unknown conifer	Wood	Positive	Charred	10	0.1	-
265	Bugseed	Seed	Positive	Charred	1(0)	-	-
265	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
265	Goosefoot	Seed	Positive	Charred	2(2)	-	-
265	Indeterminate	Unknown	Positive	Charred	1(0)	-	-
265	Juniper	Wood	Positive	Charred	6	<0.1	-
265	Maize	Cupule	Positive	Charred	1(1)	-	-
265	Oak	Wood	Positive	Charred	4	<0.1	-
265	Pine	Bark scale	Positive	Charred	-	-	1-10/liter
265	Pine	Wood	Positive	Charred	3	<0.1	-
265	Pinyon pine	Wood	Positive	Charred	1	0.3	-
265	Sunflower	Achene	Positive	Charred	1(1)	-	-
265	Unknown conifer	Wood	Positive	Charred	6	<0.1	-
275	Indeterminate	Seed	Fairly certain	Charred	2(2)	-	-
275	Oak	Wood	Positive	Charred	11	0.1	-
275	Pine	Wood	Positive	Charred	5	<0.1	-
275	Pinyon pine	Wood	Positive	Charred	2	0.1	-
275	Sunflower	Achene	Positive	Charred	3(0)	-	-
275	Unknown conifer	Wood	Positive	Charred	2	<0.1	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 26308</u>							
79	Indeterminate	Seed	Positive	Charred	1(0)	-	-
79	Juniper	Wood	Positive	Charred	4	<0.1	-
79	Pine	Wood	Positive	Charred	5	<0.1	-
79	Unknown conifer	Wood	Positive	Charred	11	0.1	-
94	Cheno-Am	Seed	Positive	Charred	2(2)	-	-
94	Oak	Wood	Positive	Charred	8	1.1	-
94	Pigweed	Seed	Positive	Uncharred	-	-	1-10/liter
94	Pine	Wood	Positive	Charred	12	0.8	-
94	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
98	Banana yucca	Seed	Fairly certain	Charred	1(0)	-	-
98	Pine	Wood	Positive	Charred	4	0.1	-
98	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
98	Unknown conifer	Wood	Positive	Charred	7	<0.1	-
100	Unknown conifer	Wood	Positive	Charred	2	<0.1	-
102	Banana yucca	Seed	Positive	Charred	2(2)	-	-
102	Juniper	Wood	Positive	Charred	2	0.1	-
102	Oak	Wood	Positive	Charred	1	<0.1	-
102	Pine	Bark scale	Positive	Charred	-	-	1-10/liter
102	Pine	Wood	Positive	Charred	13	1.1	-
102	Pinyon pine	Wood	Positive	Charred	2	1.0	-
<u>LA 26319</u>							
28	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
28	Goosefoot	Seed	Fairly certain	Uncharred	-	-	1-10/liter
28	Maize	Cupule	Positive	Charred	3(0)	-	-
28	Pine	Wood	Positive	Charred	2	<0.1	-
28	Unknown conifer	Wood	Positive	Charred	18	0.1	-
30	Cheno-Am	Seed	Positive	Charred	3(3)	-	-
30	Bugseed	Seed	Positive	Charred	12(3)	-	-
30	Goosefoot	Seed	Positive	Charred	2(2)	-	-
30	Pine	Wood	Positive	Charred	17	0.3	-
30	Purslane	Seed	Fairly certain	Charred	1(1)	-	-
30	Unknown conifer	Wood	Positive	Charred	3	<0.1	-
33	Pine	Wood	Positive	Charred	3	0.1	-
33	Unknown conifer	Wood	Positive	Charred	10	<0.1	-
35	Cheno-Am	Seed	Positive	Charred	4(4)	-	-
35	Goosefoot	Seed	Positive	Charred	14(14)	-	-
35	Grass family	Caryopsis	Positive	Charred	1(1)	-	-
35	Maize	Cupule	Positive	Charred	3(0)	-	-
35	Pine	Bark scale	Positive	Charred	-	-	1-10/liter
35	Pine	Wood	Positive	Charred	8	0.1	-
35	Pitseed goosefoot	Seed	Positive	Charred	6(6)	-	-
35	Unknown conifer	Wood	Positive	Charred	12	0.2	-
<u>LA 48695</u>							
2	Dicot	Leaf	Positive	Uncharred	-	-	1-10/liter
2	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 48695 (continued)</u>							
2	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
2	Indeterminate	Seed	Positive	Uncharred	-	-	1-10/liter
2	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
2	Mint family	Seed	Positive	Uncharred	-	-	1-10/liter
2	Pigweed	Seed	Positive	Uncharred	-	-	1-10/liter
2	Pitseed goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
2	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
2	Spurge	Achene	Positive	Uncharred	-	-	1-10/liter
<u>LA 49838</u>							
289	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
289	Maize	Cupule	Fairly certain	Charred	1(0)	-	-
289	Pine	Male cone	Positive	Uncharred	-	-	1-10/liter
289	Pine	Wood	Positive	Charred	1	<0.1	-
289	Pinyon pine	Needle	Positive	Uncharred	-	-	1-10/liter
289	Pinyon pine	Wood	Positive	Uncharred	-	-	1-10/liter
289	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
289	Ricegrass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
336	Maize	Cupule	Positive	Charred	10(6)	-	-
336	Pine	Wood	Positive	Charred	7	0.1	-
336	Pinyon pine	Nutshell	Positive	Charred	-	-	1-10/liter
336	Pinyon pine	Wood	Positive	Charred	10	3.3	-
336	Unknown conifer	Wood	Positive	Charred	3	<0.1	-
351	Juniper	Wood	Positive	Charred	9	0.3	-
351	Juniper	Wood	Positive	Uncharred	-	-	1-10/liter
351	Maize	Cupule	Positive	Charred	1(1)	-	-
351	Pigweed	Seed	Positive	Charred	1(0)	-	-
351	Pine	Wood	Positive	Charred	6	0.2	-
351	Pinyon pine	Wood	Positive	Charred	3	0.2	-
351	Sunflower	Achene	Positive	Charred	1(1)	-	-
351	Unknown conifer	Wood	Positive	Charred	2	0.1	-
351	Winged pigweed	Seed	Positive	Charred	1(0)	-	-
358	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
358	Maize	Cupule	Positive	Charred	7(0)	-	-
358	Pine	Wood	Positive	Charred	16	0.7	-
358	Pinyon pine	Nutshell	Fairly certain	Charred	-	-	1-10/liter
358	Pinyon pine	Wood	Positive	Charred	4	0.1	-
358	Pricklypear cactus	Seed	Positive	Charred	1(1)	-	-
366	Bugseed	Seed	Positive	Part. charred	1(1)	-	-
366	Goosefoot	Seed	Positive	Charred	1(1)	-	-
366	Pine	Wood	Positive	Charred	2	<0.1	-
366	Pinyon pine	Wood	Positive	Charred	2	<0.1	-
366	Unknown conifer	Wood	Positive	Charred	16	<0.1	-
374	Indeterminate	Unknown	Positive	Charred	1(0)	-	-
374	Unknown conifer	Wood	Positive	Charred	4	0.1	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 115323</u>							
31	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
31	Knotweed family	Achene	Positive	Uncharred	-	-	1-10/liter
31	Pine	Needle	Positive	Charred	-	-	1-10/liter
31	Pinyon pine	Needle	Positive	Uncharred	-	-	1-10/liter
31	Spurge	Achene	Positive	Uncharred	-	-	1-10/liter
31	Unknown	Flower	Positive	Uncharred	-	-	1-10/liter
31	Unknown conifer	Wood	Positive	Charred	2	<0.1	-
43	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
43	Unknown conifer	Wood	Positive	Charred	1	<0.1	-
44	Hedgehog cactus	Seed	Positive	Uncharred	-	-	1-10/liter
44	Knotweed family	Achene	Positive	Uncharred	-	-	1-10/liter
44	Nightshade family	Seed	Positive	Charred	1(0)	-	-
44	Oak	Wood	Positive	Charred	1	<0.1	-
44	Pine	Wood	Positive	Charred	1	<0.1	-
44	Unknown conifer	Wood	Positive	Charred	1	<0.1	-
45	Oak	Wood	Positive	Charred	1	<0.1	-
45	Pinyon pine	Needle	Positive	Uncharred	-	-	1-10/liter
45	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
45	Rose family	Wood	Fairly certain	Charred	1	<0.1	-
45	Unknown conifer	Wood	Positive	Charred	8	<0.1	-
<u>LA 115324</u>							
81	Pine	Wood	Positive	Charred	3	<0.1	-
81	Purslane	Seed	Positive	Charred	1(1)	-	-
81	Unknown conifer	Wood	Positive	Charred	12	0.1	-
82	Maize	Cupule	Resembles taxon	Charred	1(0)	-	-
82	Pine	Wood	Positive	Charred	3	<0.1	-
82	Unknown conifer	Wood	Positive	Charred	1	<0.1	-
84	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
86	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
86	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
<u>LA 115327</u>							
49	Bugseed	Seed	Positive	Charred	1(1)	-	-
49	Maize	Cupule	Positive	Charred	4(1)	-	-
49	Unknown conifer	Wood	Positive	Charred	11	<0.1	-
55	Unknown conifer	Wood	Positive	Charred	1	<0.1	-
56	Indeterminate	Unknown	Positive	Charred	1(0)	-	-
56	Maize	Cupule	Positive	Charred	4(0)	-	-
56	Pine	Wood	Positive	Charred	1	<0.1	-
56	Unknown conifer	Wood	Positive	Charred	7	<0.1	-
58	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
58	Pine	Wood	Positive	Charred	1	<0.1	-
62	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
62	Pine	Wood	Positive	Charred	1	<0.1	-
62	Unknown conifer	Wood	Positive	Charred	1	<0.1	-
64	Unknown conifer	Wood	Positive	Charred	1	<0.1	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 115327</u> (continued)							
66	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
66	Pine	Wood	Positive	Charred	1	<0.1	-
66	Unknown conifer	Wood	Positive	Charred	6	<0.1	-
69	Mint family	Seed	Positive	Uncharred	-	-	1-10/liter
<u>LA 115330</u>							
164	Juniper	Wood	Positive	Charred	4	<0.1	-
164	Maize	Cupule	Positive	Charred	1(0)	-	-
164	Pine	Wood	Positive	Charred	3	<0.1	-
164	Pitseed goosefoot	Seed	Positive	Charred	2(2)	-	-
164	Unknown conifer	Wood	Positive	Charred	13	0.1	-
168	Bugseed	Seed	Positive	Charred	1(1)	-	-
168	Cheno-Am	Seed	Positive	Charred	5(4)	-	-
168	Goosefoot	Seed	Positive	Charred	3(3)	-	-
168	Juniper	Wood	Positive	Charred	2	<0.1	-
168	Maize	Cupule	Positive	Charred	3(0)	-	-
168	Pine	Umbo	Positive	Charred	-	-	1-10/liter
168	Pine	Wood	Positive	Charred	8	0.2	-
168	Sunflower	Achene	Fairly certain	Charred	1(0)	-	-
168	Unknown conifer	Wood	Positive	Charred	10	0.2	-
172	Cheno-Am	Seed	Positive	Charred	2(2)	-	-
172	Indeterminate	Unknown	Positive	Charred	1(0)	-	-
172	Juniper	Wood	Positive	Charred	6	0.1	-
172	Maize	Cupule	Positive	Charred	4(0)	-	-
172	Pine	Wood	Positive	Charred	6	<0.1	-
172	Pitseed goosefoot	Seed	Positive	Charred	2(2)	-	-
172	Unknown conifer	Wood	Positive	Charred	8	0.1	-
177	Bugseed	Seed	Positive	Charred	13(8)	-	-
177	Cheno-Am	Seed	Positive	Charred	7(7)	-	-
177	Goosefoot	Seed	Positive	Charred	11(11)	-	-
177	Maize	Cupule	Positive	Charred	1(0)	-	-
177	Pine	Wood	Positive	Charred	15	0.3	-
177	Spurge	Achene	Positive	Charred	1(1)	-	-
177	Unknown conifer	Wood	Positive	Charred	5	<0.1	-
180	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
180	Dropseed grass	Caryopsis	Positive	Uncharred	-	-	1-10/liter
180	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
180	Juniper	Wood	Positive	Charred	2	<0.1	-
180	Maize	Cupule	Positive	Charred	2(0)	-	-
180	Pine	Needle	Positive	Uncharred	-	-	1-10/liter
180	Pine	Wood	Positive	Charred	3	0.1	-
180	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
180	Sunflower	Achene	Positive	Charred	1(0)	-	-
180	Unknown conifer	Wood	Positive	Charred	15	0.1	-
183	Bugseed	Seed	Positive	Charred	1(1)	-	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
LA 115330 (continued)							
183	Cheno-Am	Seed	Positive	Charred	4(2)	-	-
183	Doveweed	Seed	Fairly certain	Uncharred	-	-	1-10/liter
183	Goosefoot	Seed	Positive	Charred	7(7)	-	-
183	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
183	Pigweed	Seed	Positive	Charred	1(1)	-	-
183	Pine	Needle	Positive	Uncharred	-	-	1-10/liter
183	Pine	Wood	Positive	Charred	13	0.4	-
183	Purslane	Seed	Positive	Charred	1(1)	-	-
183	Unknown # 1	Unknown	Positive	Uncharred	-	-	1-10/liter
183	Unknown conifer	Wood	Positive	Charred	7	0.1	-
188	Bugseed	Seed	Positive	Charred	3(3)	-	-
188	Goosefoot	Seed	Positive	Charred	3(3)	-	-
188	Juniper	Wood	Positive	Charred	10	0.1	-
188	Pine	Needle	Positive	Charred	-	-	1-10/liter
188	Pine	Needle	Positive	Uncharred	-	-	1-10/liter
188	Pine	Wood	Positive	Charred	7	0.2	-
188	Pitseed goosefoot	Seed	Positive	Charred	2(2)	-	-
188	Unknown conifer	Wood	Positive	Charred	3	0.1	-
193	Bugseed	Seed	Fairly certain	Charred	1(1)	-	-
193	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
193	Goosefoot	Seed	Positive	Charred	2(1)	-	-
193	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
193	Juniper	Wood	Positive	Charred	1	0.1	-
193	Maize	Cupule	Positive	Charred	4(0)	-	-
193	Pigweed	Seed	Positive	Charred	1(1)	-	-
193	Pine	Wood	Positive	Charred	17	0.7	-
193	Pinyon pine	Wood	Positive	Charred	2	0.2	-
196	Maize	Cupule	Positive	Charred	1(0)	-	-
196	Pine	Wood	Positive	Charred	9	0.3	-
196	Sunflower	Achene	Positive	Charred	1(0)	-	-
196	Unknown conifer	Wood	Positive	Charred	11	0.2	-
198	Goosefoot	Seed	Positive	Charred	1(0)	-	-
198	Goosefoot	Seed	Positive	Uncharred	-	-	1-10/liter
198	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
198	Juniper	Wood	Positive	Charred	3	<0.1	-
198	Maize	Cupule	Positive	Charred	1(0)	-	-
198	Pine	Wood	Positive	Charred	3	0.1	-
198	Pinyon pine	Needle	Positive	Uncharred	-	-	1-10/liter
198	Unknown conifer	Wood	Positive	Charred	14	0.1	-
203	Banana yucca	Seed	Fairly certain	Part. Charred	1(0)	-	-
203	Bugseed	Seed	Positive	Charred	5(2)	-	-
203	Cheno-Am	Seed	Positive	Charred	4(4)	-	-
203	Dropseed grass	Caryopsis	Fairly certain	Charred	1(1)	-	-
203	Goosefoot	Seed	Positive	Charred	14(12)	-	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 115330 (continued)</u>							
203	Indeterminate	Seed	Positive	Charred	3(2)	-	-
203	Juniper	Leaflet	Fairly certain	Charred	-	-	1-10/liter
203	Maize	Cupule	Positive	Charred	2(0)	-	-
203	Pigweed	Seed	Positive	Charred	1(0)	-	-
203	Purslane	Seed	Positive	Charred	1(1)	-	-
203	Unknown conifer	Wood	Positive	Charred	16	0.1	-
204	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
204	Dicot	Leaf	Positive	Uncharred	-	-	1-10/liter
204	Indeterminate	Unknown	Positive	Charred	2(0)	-	-
204	Juniper	Wood	Positive	Charred	3	<0.1	-
204	Maize	Cupule	Positive	Charred	1(0)	-	-
204	Pine	Wood	Positive	Charred	3	<0.1	-
204	Saltbush/ greasewood	Wood	Fairly certain	Charred	1	<0.1	-
204	Unknown # 1	Leaf	Positive	Uncharred	-	-	1-10/liter
204	Unknown conifer	Wood	Positive	Charred	13	0.1	-
206	Bugseed	Seed	Positive	Charred	26(19)	-	-
206	Bugseed	Seed	Positive	Part. Charred	3(0)	-	-
206	Cheno-Am	Seed	Positive	Charred	3(3)	-	-
206	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
206	Juniper	Wood	Positive	Charred	7	<0.1	-
206	Maize	Cupule	Positive	Charred	1(0)	-	-
206	Oak	Wood	Positive	Charred	1	<0.1	-
206	Pine	Wood	Positive	Charred	1	<0.1	-
206	Pitseed goosefoot	Seed	Positive	Charred	1(1)	-	-
206	Purslane	Seed	Positive	Charred	2(2)	-	-
206	Unknown conifer	Wood	Positive	Charred	7	<0.1	-
208	Bugseed	Seed	Positive	Charred	1(1)	-	-
208	Cheno-Am	Seed	Positive	Charred	1(0)	-	-
208	Indeterminate	Seed	Positive	Charred	2(2)	-	-
208	Juniper	Wood	Positive	Charred	1	<0.1	-
208	Maize	Cupule	Positive	Charred	2(0)	-	-
208	Pine	Male cone	Positive	Uncharred	-	-	1-10/liter
208	Pine	Wood	Positive	Charred	2	<0.1	-
208	Saltbush/ greasewood	Wood	Positive	Charred	2	<0.1	-
208	Sunflower	Achene	Positive	Charred	1(1)	-	-
208	Unknown conifer	Wood	Positive	Charred	15	0.1	-
214	Bugseed	Seed	Positive	Charred	5(4)	-	-
214	Cheno-Am	Seed	Positive	Charred	7(7)	-	-
214	Goosefoot	Seed	Positive	Charred	20(19)	-	-
214	Indeterminate	Seed	Positive	Charred	1(1)	-	-
214	Maize	Cupule	Positive	Charred	99(36)	1.2	-
214	Maize	Cupule segment	Positive	Charred	1(1)	-	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 115330</u> (continued)							
214	Maize	Kernel	Positive	Charred	57(17)	1.1	-
214	Oak	Wood	Positive	Charred	1	<0.1	-
214	Pigweed	Seed	Positive	Charred	2(2)	-	-
214	Pine	Wood	Positive	Charred	1	<0.1	-
214	Sedge family	Achene	Fairly certain	Charred	1(1)	-	-
214	Sunflower	Achene	Positive	Charred	14(6)	-	-
214	Unknown conifer	Wood	Positive	Charred	18	0.1	-
214	Winged pigweed	Seed	Positive	Charred	3(2)	-	-
221	Bugseed	Seed	Positive	Charred	4(4)	-	-
221	Cheno-Am	Seed	Positive	Charred	2(2)	-	-
221	Maize	Cupule	Fairly certain	Charred	1(0)	-	-
221	Pine	Wood	Positive	Charred	2	<0.1	-
221	Unknown conifer	Wood	Positive	Charred	12	<0.1	-
222	Bugseed	Seed	Positive	Charred	1(0)	-	-
222	Cheno-Am	Seed	Positive	Charred	3(3)	-	-
222	Cheno-Am	Seed	Positive	Part. Charred	1(1)	-	-
222	Goosefoot	Seed	Positive	Charred	1(0)	-	-
222	Indeterminate	Seed	Positive	Charred	1(0)	-	-
222	Oak	Wood	Positive	Charred	1	<0.1	-
222	Unknown conifer	Wood	Positive	Charred	9	<0.1	-
223	Bugseed	Seed	Positive	Charred	9(3)	-	-
223	Cheno-Am	Seed	Positive	Charred	4(4)	-	-
223	Dropseed grass	Caryopsis	Fairly certain	Charred	2(2)	-	-
223	Goosefoot	Seed	Positive	Charred	3(1)	-	-
223	Indeterminate	Seed	Fairly certain	Charred	1(0)	-	-
223	Juniper	Twig	Positive	Uncharred	-	-	1-10/liter
223	Pigweed	Seed	Positive	Charred	1(1)	-	-
223	Pine	Wood	Positive	Charred	5	<0.1	-
223	Unknown # 1	Unknown	Positive	Uncharred	-	-	1-10/liter
223	Unknown conifer	Wood	Positive	Charred	15	0.1	-
225	Maize	Cupule	Positive	Charred	6(0)	-	-
225	Pine	Wood	Positive	Charred	1	<0.1	-
225	Unknown conifer	Wood	Positive	Charred	14	0.1	-
228	Juniper	Wood	Positive	Charred	2	<0.1	-
228	Maize	Cupule	Positive	Charred	1(0)	-	-
228	Oak	Wood	Positive	Charred	1	<0.1	-
228	Pine	Wood	Positive	Charred	2	<0.1	-
228	Unknown conifer	Wood	Positive	Charred	8	<0.1	-
230	Bugseed	Seed	Fairly certain	Charred	1(0)	-	-
230	Cheno-Am	Seed	Positive	Charred	3(1)	-	-
230	Doveweed	Seed	Fairly certain	Uncharred	-	-	1-10/liter
230	Evening primrose	Seed	Positive	Uncharred	-	-	1-10/liter
230	Goosefoot	Seed	Positive	Charred	2(2)	-	-
230	Indeterminate	Seed	Positive	Charred	3(2)	-	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
LA 115330 (continued)							
230	Juniper	Wood	Positive	Charred	2	<0.1	-
230	Juniper	Wood	Positive	Uncharred	-	-	1-10/liter
230	Maize	Cupule	Positive	Charred	1(1)	-	-
230	Oak	Wood	Positive	Charred	9	<0.1	-
230	Pigweed	Seed	Positive	Uncharred	-	-	1-10/liter
230	Pitseed goosefoot	Seed	Positive	Charred	3(3)	-	-
230	Purslane	Seed	Positive	Uncharred	-	-	1-10/liter
230	Spurge	Achene	Positive	Uncharred	-	-	1-10/liter
230	Unknown conifer	Wood	Positive	Charred	9	<0.1	-
231	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
231	Goosefoot	Seed	Positive	Charred	2(2)	-	-
231	Juniper	Wood	Positive	Charred	8	0.2	-
231	Maize	Cupule	Positive	Charred	1(0)	-	-
231	Maize	Kernel	Fairly certain	Charred	1(0)	-	-
231	Oak	Wood	Fairly certain	Charred	1	<0.1	-
231	Pine	Needle	Positive	Uncharred	-	-	1-10/liter
231	Pine	Wood	Positive	Charred	7	0.2	-
231	Unknown conifer	Wood	Positive	Charred	4	<0.1	-
232	Bugseed	Seed	Positive	Charred	1(1)	-	-
232	Cheno-Am	Seed	Positive	Charred	6(6)	-	-
232	Goosefoot	Seed	Positive	Charred	2(2)	-	-
232	Indeterminate	Unknown	Positive	Charred	1(0)	-	-
232	Juniper	Wood	Positive	Charred	11	0.1	-
232	Juniper	Wood	Positive	Uncharred	-	-	1-10/liter
232	Oak	Wood	Fairly certain	Charred	1	<0.1	-
232	Pine	Wood	Positive	Charred	2	<0.1	-
232	Pine	Wood	Positive	Uncharred	-	-	1-10/liter
232	Pitseed goosefoot	Seed	Positive	Charred	1(1)	-	-
232	Unknown conifer	Wood	Positive	Charred	4	<0.1	-
234	Cheno-Am	Seed	Positive	Charred	1(1)	-	-
234	Maize	Cupule	Positive	Charred	3(0)	-	-
234	Oak	Wood	Positive	Charred	1	<0.1	-
234	Pine	Wood	Positive	Charred	3	<0.1	-
234	Unknown conifer	Wood	Positive	Charred	16	0.1	-
235	Bugseed	Seed	Positive	Charred	1(1)	-	-
235	Cheno-Am	Seed	Positive	Charred	2(2)	-	-
235	Goosefoot	Seed	Positive	Charred	3(3)	-	-
235	Juniper	Leaflet	Positive	Charred	-	-	1-10/liter
235	Juniper	Wood	Positive	Charred	3	<0.1	-
235	Pigweed	Seed	Positive	Charred	1(0)	-	-
235	Pine	Wood	Positive	Charred	6	<0.1	-
235	Unknown conifer	Wood	Positive	Charred	11	<0.1	-
237	Bugseed	Seed	Positive	Charred	1(1)	-	-
237	Dropseed grass	Caryopsis	Positive	Charred	2(2)	-	-

(continued)

Appendix G.5. Continued.

Site/FS No.	Common Name	Plant Part	Confidence	Condition	Count*	Weight (g)	Abundance
<u>LA 115330</u> (continued)							
237	Goosefoot	Seed	Positive	Charred	1(1)	-	-
237	Grass family	Caryopsis	Positive	Charred	1(1)	-	-
237	Grass family	Floret	Positive	Uncharred	-	-	1-10/liter
237	Juniper	Wood	Positive	Charred	10	0.2	-
237	Maize	Cupule	Positive	Charred	5(0)	-	-
237	Pine	Wood	Positive	Charred	3	0.1	-
237	Pinyon pine	Wood	Positive	Charred	3	<0.1	-
237	Unknown conifer	Wood	Positive	Charred	4	<0.1	-
240	Maize	Cupule	Positive	Charred	3(2)	-	-
240	Oak	Wood	Positive	Charred	4	<0.1	-
240	Pine	Wood	Positive	Charred	1	<0.1	-
240	Unknown conifer	Wood	Positive	Charred	13	0.1	-

*Numbers in parentheses represent minimum number of individuals (MNI), recorded for charred reproductive plant parts.

Appendix G.6. Site LA 115330, Maize Kernel Attributes and Measurements.

FS No.	Embryo	Swollen	Height (mm)	Width (mm)	Thickness (mm)
FLOATATION SAMPLE					
214	A	N	4.8	4.8	3.6
214	A	Y	3.4	3.7	4.0
214	A	Y	4.6	5.6	5.2
214	A	N	3.2	4.0	2.6
214	A	N	5.6	5.7	3.4
RADIOCARBON SAMPLES					
194	P	N	4.8	4.9	3.7
194	P	N	4.3	4.5	3.6
194	P	N	3.8	3.6	3.3
194	A	N	5.3	4.7	3.5
194	A	N	4.4	4.6	3.1
194	A	Y	4.4	5.3	4.1
194	P	N	3.9	4.2	3.7
194	A	N	4.0	4.9	4.1
194	A	N	4.8	5.6	3.9
194	P	N	3.7	4.8	2.6
194	A	N	4.9	4.9	4.2
194	A	N	4.7	5.6	3.5
194	A	N	5.2	5.6	3.8
194	A	N	5.5	5.8	3.7
194	A	N	3.9	4.5	3.7
194	A	N	4.3	3.9	3.8
194	A	N	4.2	4.5	3.4
194	A	N	5.5	5.1	3.4
194	A	N	4.0	3.4	2.6
194	A	N	5.3	5.6	3.6
194	A	N	3.8	4.8	3.6
194	A	N	5.3	5.4	3.4
194	A	N	4.6	5.4	3.8
194	A	Y	2.9	4.5	4.0
194	A	N	3.7	4.5	3.5
194	A	N	4.1	4.1	3.7
194	P	N	4.4	3.7	3.0
194	P	N	6.1	5.2	3.5
194	P	N	5.5	6.3	3.9
194	P	N	4.3	4.7	3.8
194	P	N	5.0	5.0	3.1
194	P	Y	5.2	6.0	4.2
194	P	N	4.8	4.7	3.8
194	P	N	4.0	3.9	2.9
194	P	N	5.6	4.6	3.4
194	P	N	3.9	4.6	3.8
194	A	N	4.4	4.2	3.5
207	A	Y	4.7	5.4	5.5
207	A	Y	4.0	5.6	4.4

(continued)

Appendix G.6. Continued.

FS No.	Embryo	Swollen	Height (mm)	Width (mm)	Thickness (mm)
207	A	Y	4.3	5.6	4.5
207	A	Y	5.2	6.0	4.9
207	A	Y	4.0	5.7	5.6
207	A	Y	4.2	5.6	4.1
207	A	Y	5.0	6.0	4.0
207	A	N	4.4	5.0	3.8
207	A	N	4.6	4.6	3.9
207	A	Y	3.6	5.8	4.7
207	A	Y	4.0	5.9	4.1
207	A	Y	3.6	5.1	3.8
207	P	N	5.8	5.7	4.1
207	P	Y	4.6	5.4	4.4
207	P	N	4.9	5.1	5.4
207	P	Y	4.9	6.2	4.4
207	A	N	6.3	5.3	4.6
211	A	N	5.8	5.8	3.6
211	A	Y	4.1	5.3	3.9
211	A	Y	3.8	5.1	3.7
211	A	N	5.4	5.0	4.0
211	A	Y	3.6	4.8	3.9
211	A	N	5.5	5.4	4.1
211	A	N	5.7	5.4	3.9
211	A	Y	4.2	5.2	3.7
211	A	Y	3.6	5.2	3.6
211	A	Y	4.9	6.1	3.9
211	A	N	4.8	4.9	3.1
211	A	N	5.1	5.5	4.1
211	A	N	5.4	5.8	3.2
211	A	N	4.3	5.4	3.5
211	A	N	5.9	5.2	3.8
211	A	N	5.2	5.0	4.5
211	A	Y	4.0	5.5	3.9
211	A	Y	4.2	5.1	4.0
211	A	N	5.2	4.5	3.7
211	A	Y	3.8	4.9	3.3
211	P	N	5.5	5.0	4.5
211	P	Y	5.4	5.8	3.9
211	P	N	5.7	5.4	3.7
211	P	N	5.4	5.2	3.5
211	P	N	5.4	5.8	4.0
211	P	N	4.6	5.1	3.5
214	P	N	5.8	4.7	3.8
214	A	N	4.9	5.0	3.4
214	A	Y	5.3	7.3	3.9
214	A	Y	6.5	6.4	4.3
214	A	Y	4.3	5.1	4.0

(continued)

Appendix G.6. Continued.

FS No.	Embryo	Swollen	Height (mm)	Width (mm)	Thickness (mm)
214	A	Y	6.2	7.2	4.2
214	A	Y	4.3	7.2	3.7
214	A	N	6.4	5.1	4.3
214	A	Y	4.5	7.2	5.5
214	A	Y	3.8	5.1	3.9
214	A	N	5.0	5.3	4.2
214	A	Y	4.7	6.0	4.3
214	A	Y	4.5	5.7	3.5
214	A	Y	3.7	5.5	3.9
214	A	Y	4.6	5.6	3.9
214	A	N	5.4	5.8	4.5
214	A	Y	5.8	6.7	4.1
214	A	N	4.8	4.7	3.9
214	A	Y	5.1	5.9	3.8
214	A	N	5.6	5.7	3.8
214	A	N	5.3	5.0	3.4
214	A	Y	4.3	5.6	4.0
214	A	Y	5.3	5.8	4.3
214	A	N	5.7	6.0	3.8
214	A	N	5.1	5.2	4.6
214	A	Y	5.1	5.5	4.7
214	A	Y	4.5	5.4	4.3
214	A	Y	4.9	5.6	5.1
214	A	N	5.1	4.3	4.4
214	A	N	4.9	4.9	3.8
214	A	N	5.2	4.6	4.3
214	A	N	4.1	4.5	4.2
214	A	N	5.1	5.1	3.8
214	A	Y	4.2	5.4	3.3
214	A	Y	4.1	6.4	5.2
214	A	N	5.5	5.8	4.6
214	A	N	4.2	4.6	5.1
214	A	Y	4.5	5.9	4.8
214	A	Y	5.7	6.5	4.6
214	A	Y	4.4	5.7	3.9
214	A	N	4.3	5.2	3.9
214	A	Y	5.2	5.7	4.2
Total	101A, 26P	76N, 51Y	$M = 4.7$	$M = 5.3$	$M = 3.9$

Key: A = absent P = present N = no Y = yes M = arithmetic mean.

APPENDIX H

Faunal Assemblage Codes and Data Base

Appendix H.1. Data Recovery Faunal Assemblage.

Taxon	NISP	MNI	Burnt
<u>Site LA 48695</u>			
Unidentified	1	-	-
<u>Site LA 115325</u>			
Unidentified	1	-	1
<u>Site LA 115329</u>			
<i>Canis</i> sp.	3	1	-
<u>Site LA 26306</u>			
Gruiformes	1	1	-
Large Bird	1	-	-
<i>Sylvilagus</i> sp.	4	2	-
<i>Lepus</i> sp.	2	1	-
<i>Neotoma</i> sp.	1	1	-
<i>Cynomys</i> sp.	1	1	-
Sciuridae	2	-	-
<i>Canis</i> sp.	6	1	-
Carnivore	1	-	-
<i>Odocoileus</i> sp.	1	-	-
Medium artiodactyl	2	1	-
Small Mammal	1	-	-
Unidentified	18	-	3
Subtotal	41	8	3
<u>Site LA 49838</u>			
<i>Sylvilagus</i> sp.	8	2	-
<i>Lepus</i> sp.	9	1	-
Geomyidae	1	1	-
Unidentified	37	-	22
Subtotal	55	4	22
<u>Site LA 115327</u>			
<i>Sylvilagus</i> sp.	2	1	-
Small rodent	1	1	-
<i>Canis familiaris</i>	3	-	-
<i>Canis</i> sp.	40	-	-
Unidentified	1	-	-
Subtotal	47	2	-
<u>Site LA 115330</u>			
Medium bird	1	1	-
Large bird	2	1	-
<i>Sylvilagus</i> sp.	66	5	5
<i>Lepus</i> sp.	17	4	-
<i>Cynomys</i> sp.	5	2	-
<i>Dipodomys ordii</i>	4	1	-
Muridae	1	-	-
Small Rodent	2	-	-
<i>Neotoma</i> sp.	14	4	-
<i>Antilocapra americana</i>	1	1	-
<i>Odocoileus</i> sp.	2	1	-
Medium artiodactyl	1	-	1
Small Mammal	13	-	1
Unidentified	121	-	30
Subtotal	250	20	37
TOTAL	396	35	63

Appendix H.2. Recording And Coding System.

Introduction

The following codes have been used when creating the data base of faunal remains for each site. A specimen was considered identifiable if the skeletal element could be identified. If the skeletal element could not be identified, the specimen was automatically considered unidentifiable.

Every specimen was described in a separate line of the data base. Information on site, FS number, taxon, element, part of element, side of body, fusion, breakage, and specimen length was always recorded. Information on modification, cortical bone thickness, and "comments" were only recorded when necessary. No record was kept of bone weight, as this is of little analytical value. The recording procedures and codes are presented below. These have been abstracted from a master code list developed by the author for work in the northern Southwest. The codes listed here for taxon and element apply only to the data bases submitted as part of this project; more comprehensive code lists would be required if a larger or more diverse set of assemblages was being reported. Codes for part, side, fusion, breakage, modification, length, and thickness are given in their entirety.

Taxon

In zooarchaeology most researchers attempt to use standard zoological nomenclature. These standard descriptions are listed first, followed by nonstandard descriptions.

Standard Zoological Descriptions for Mammals

Most of the following designations are taken from *The Mammals of North America* (2nd edition), by E. Raymond Hall. However, *Odocoileus* is retained over *Dama* as the generic name for North American deer, conforming to general opinion that the former term is correct.

<i>Sylvilagus</i> sp.	Cottontail	SYL
<i>Lepus</i> sp.	Jackrabbit or hare	LEP
Sciuridae	Squirrel	SCI
<i>Cynomys</i> sp.	Prairie dog	CYN
Geomyidae	Pocket gopher	GEO
<i>Dipodomys ordii</i>	Ord's kangaroo rat	DPO
Muridae	Deer mouse, vole, etc.	MUR
<i>Neotoma</i> sp.	Wood rat	NEO
Carnivora	Carnivore	CRN
<i>Canis</i> sp.	Dog, wolf, coyote	CNS
<i>Canis familiaris</i>	Dog	CAF
<i>Odocoileus</i> sp.	Deer	ODO
<i>Antilocapra americana</i>	Pronghorn	ANT

Nonstandard Descriptions for Mammals

Unidentifiable		UNI
Jackrabbit size or smaller	Small mammal	SMA
Woodrat or smaller rodent	Small rodent	SMR
Deer size artiodactyl	Medium artiodactyl	MDA

Appendix H.2. Continued.

Standard Zoological Descriptions for Birds

Gruiformes	Cranes etc.	GRU
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Nonstandard Descriptions for Birds

Birds larger than mallard	Large birds	LBI
Mallard to robin size	Medium bird	MBI

Taxon Codes in Alphabetical Order

<i>Antilocapra americana</i>	Pronghorn	ANT
<i>Canis familiaris</i>	Dog	CAF
<i>Canis</i> sp.	Dog, wolf, coyote	CNS
Carnivora	Carnivore	CRN
<i>Cynomys</i> sp.	Prairie dog	CYN
<i>Dipodomys ordii</i>	Ord's kangaroo rat	DPO
Geomyidae	Pocket gopher	GEO
Gruiformes	Crane etc.	GRU
Birds larger than mallard	Large bird	LBI
<i>Lepus</i> sp.	Jackrabbit or hare	LEP
Mallard size and smaller	Medium bird	MBI
Deer size artiodactyl	Medium artiodactyl	MDA
Muridae	Deer mouse, vole, etc.	MUR
<i>Neotoma</i> sp.	Wood rat	NEO
<i>Odocoileus</i> sp.	Deer	ODO
Sciuridae	Squirrel	SCI
Jackrabbit size or smaller	Small mammal	SMA
Woodrat or smaller rodent	Small rodent	SMR
<i>Sylvilagus</i> sp.	Cottontail	SYL
Unidentifiable		UNI

Element

Bone fragments which cannot be identified to element must be recorded as :

UN UNIDENTIFIED

Mammalian element codes arranged anatomically

AN	ANTLER
CR	CRANIAL
BS	BASISPHEOID
BU	BULLA
MX	MAXILLA
PE	PETROSA
PM	PREMAXILLA

Appendix H.2. Continued.

MN MANDIBLE

AT ATLAS

AX AXIS

CE CERVICAL

TH THORACIC

RI RIB

LU LUMBAR

UR CAUDAL

SC SCAPULA

HU HUMERUS

RA RADIUS

UL ULNA

CP CARPAL

MC METACARPUS

IN INNOMINATE

FE FEMUR

FI FIBULA

TI TIBIA

AS ASTRAGALUS

CA CALCANEUS

TA OTHER TARSALS

MT METATARSUS

MP METAPODIAL

1P PROXIMAL PHALANX (FIRST PHALANX)

2P MEDIAL PHALANX (SECOND PHALANX)

Coding system for mammalian teeth

The only teeth to be coded are loose teeth. Teeth which can be fitted back into mandibles and maxillae should not be coded. Each tooth is assigned a two-letter code. The first letter defines the type of tooth (incisor, premolar, etc.). The second letter describes the tooth as either deciduous or permanent.

Tooth name codes (first letter)

Y INCISOR

K CANINE

X PREMOLAR

Z MOLAR

T UNKNOWN TOOTH FRAGMENT

Age codes (second letter)

D DECIDUOUS

P PERMANENT

N NOT KNOWN

Examples :

KP is a permanent canine; XD is a deciduous premolar

Coding system for avian elements

Birds have skeletons similar to mammals, with similarly named elements. For bird bones, use all applicable mammalian codes, with the following additions.

SS SYNSACRUM
PH ANY FOOT PHALANX

Side

A one-letter code is provided for each fragment.

L Left
R Right
I Irrelevant (i.e., for elements which cannot be sided, such as vertebrae)
U Unknown (i.e., for elements which can be sided but are too fragmentary or too difficult to assess; examples of this might be phalanges, rib fragments etc.)

Part

A one-, two-, or three-digit code is used to describe the portion of the element represented. All possible codes are reported here, although some will not have been used for this particular set of site assemblages.

Mammal Element Part Codes

Antler

1 Complete
2 Fragment

Cranial

The cranium is composed of individually named bones. If the cranial fragment consists only of a single bone, the element is named and the following codes used:

1 Complete
2 Fragment

If the specimen is a complete cranium, or if it is a fragment made up of more than one cranial bone (e.g., the temporal and the zygomatic), the following codes are used:

1 Complete
3 Posterior fragment
4 Anterior fragment
5 Ventral fragment
6 Dorsal fragment
7 Other fragment
20 Complete posterior to nasals
21 Fragment with complete maxilla and premaxilla
22 Fragment with complete maxilla
23 Fragment with partial maxilla
24 Fragment with complete premaxilla
25 Fragment with partial premaxilla

Appendix H.2. Continued.

- 26 Fragment with maxilla and partial premaxilla
- 27 Fragment with partial maxilla and premaxilla
- 28 Fragment with partial maxilla and partial premaxilla

Mandible

- 1 Complete
- 30 Molar and premolar toothrow
- 31 Molar row with partial premolar row
- 32 Premolar row with partial molar row
- 33 Fragment of molar row
- 34 Fragment of premolar row
- 35 Anterior to premolars
- 36 Posterior to molars
- 37 Anterior through molar row
- 38 Anterior through partial molar row
- 39 Anterior through partial premolar row
- 40 Premolar and molar row plus ascending ramus
- 41 Partial premolar row, molar row, and ascending ramus
- 42 Partial molar row plus ascending ramus
- 43 Ventral fragment of horizontal ramus

Loose teeth

- 1 Complete
- 2 Fragment

Hyoid

- 1 Complete
- 2 Fragment

Vertebrae

- 1 Complete
- 50 Complete centrum
- 51 Centrum fragment
- 52 Unfused epiphysis of centrum
- 53 Centrum plus neural arch
- 54 Neural arch fragment
- 55 Transverse process, complete or fragment
- 56 Spinous process, complete or fragment
- 57 Anterior or posterior zygapophysis
- 58 Vertebra split along anterior/posterior axis
- 59 Vertebra split along medio/lateral axis
- 7 Other fragment

Ribs

- 1 Complete
- 5 Ventral fragment
- 6 Dorsal fragment
- 70 Shaft fragment

Appendix H.2. Continued.

Sternum

- 1 Complete
- 2 Fragment

Scapula

- 1 Complete
- 80 Glenoid area plus part of blade
- 81 Blade fragment

Innominate (pelvis)

- 1 Complete
- 90 Fragment with ilium, acetabulum, pubis, and ischium
- 91 Ilium fragment
- 92 Ilium plus acetabulum
- 93 Ischium and/or pubis fragment
- 94 Ischium and/or pubis fragment plus acetabulum
- 95 Acetabulum fragment

Long bones (includes humerus, radius, ulna, metacarpus, femur, fibula, tibia, metatarsus and phalanges)

- 1 Complete
- 100 Proximal end complete, plus >50% of shaft
- 101 Proximal end present but incomplete, plus >50% of shaft
- 102 Proximal end complete, plus <50% of shaft
- 103 Proximal end present but incomplete, <50% of shaft
- 104 Unfused proximal epiphysis
- 105 Distal end complete, plus >50% of shaft
- 106 Distal end present but incomplete, plus >50% of shaft
- 107 Distal end complete, plus <50% of shaft
- 108 Distal end present but incomplete, plus <50% of shaft
- 109 Unfused distal epiphysis
- 110 Diaphysis (Shaft)

Other bones (includes carpals, tarsals, sesamoids, patella, clavicle, baculum)

- 1 Complete
- 2 Fragment

Unidentifiable

- 1 Complete
- 2 Fragment

Bird Element Part Codes

As far as possible, bird codes will follow mammal codes. Differences are defined below :

Mandible

Sternal ribs

- 1 Complete
- 2 Fragment

Appendix H.2. Continued.

Sternum

- 1 Complete
- 4 Anterior fragment
- 7 Other fragment

Furculum

- 1 Complete
- 5 Ventral fragment
- 6 Dorsal fragment
- 7 Other fragment

Coracoid

- 1 Complete
- 4 Fragment with anterior end (end which articulates with scapula)
- 6 Fragment with posterior end (end which articulates with sternum)
- 7 Other fragment

Fusion

Every fragment must receive a two-letter code, even if it is not possible to define fusion states. The fusion code is designed to record the state of fusion for the entire element, not simply for the fragment described. The first letter is used to define the state of fusion for the proximal end (in the case of limb bones) or the anterior end (in the case of axial elements). The second letter refers to the distal or posterior end. As many fragments will be incomplete, it will often be necessary to code one or both ends as "unknown."

Codes :

- F Fused. No gap between the epiphysis and diaphysis. A line of fusion may be present.
- J Just fused. Fusion has begun, but spaces can still be seen between the epiphysis and diaphysis.
- U Unfused. Epiphysis separate from rest of bone. This will be used to describe an isolated epiphysis, or a diaphysis which displays an unfused end, or a separate epiphysis which can be fitted back to a diaphysis.
- B Fetal or neonatal. Very small with poor development of cortex. This designation may be applied to fetal elements with no well defined epiphyses, such as carpals, tarsals, etc.
- N Cannot be coded because the end of the bone is absent.

Examples :

Complete cottontail humerus, with an unfused proximal end (epiphysis missing) and a fused distal end: UF

Isolated proximal unfused epiphysis of a jackrabbit tibia: UN

Fetal metapodial of deer, lacking epiphyses: BB

Immature deer femur diaphysis, with unfused epiphyses which can be fitted to proximal and distal ends: UU

Breakage

A two-letter code must be provided for each bone fragment. The first letter refers to the proximal or dorsal or anterior end; the second letter refers to the distal or ventral or posterior end. For tooth fragments the first letter refers to the occlusal surface and the second to the root.

Codes:

- I Intact. The end of the bone has suffered no significant damage.

Appendix H.2. Continued.

- E Broken during excavation. Break surface should be markedly different in color from the rest of the bone, usually lighter.
- A Made into an artifact, i.e., this end of the bone was purposefully worked by humans. (This includes offcuts, waste from bone tool manufacture, unfinished artifacts, etc.)
- C Chewed by carnivores. Scoring, furrowing, and punctures.
- D Eroded. The end of the bone has been worn smooth or rounded by natural processes such as sand abrasion or water. A useful clue for this condition is the exposure of cancellous bone on a smooth surface.
- P Splintered. The bone exhibits a series of transverse fractures, terminating at different points. This is the result of weathering, and is often associated with weathering cracks.
- R Gnawed by rodents. Many shallow parallel grooves.
- S Spiral fracture. As well as exhibiting a spiral morphology, the break surfaces should be fairly smooth.
- T A transverse fracture, essentially a simple snap break running perpendicular to the long axis of the bone. Typical of fragments which have been heavily weathered or broken when dry. Often seen on burnt bone.
- V Irregular fractures, not perpendicular to or parallel with the long axis of the bone. "Zig-zag" appearance at the end of the bone fragment.

Modification

These codes apply to any alterations defined below which can be observed on the specimen. In some cases the alteration will have already been described in the breakage code because the alteration affects an end of the bone fragment. In such cases, the alteration will also be coded in this field. However, there will be many cases in which the alteration does not affect the end of a fragment.

- A Modified as an artifact. Include in this category finished artifacts and waste material such as grooved and snapped offcuts from making bird bone tubes. Also includes any bone which exhibits polish, abrasion, etc.
- B Burnt black.
- C Carnivore damage, including scoring, grooving, furrowing, punctures.
- K Humanly produced cutmarks.
- L Localised burning. One good indicator that small mammals and birds were cooked is localized burning on bones. (Burning over the entire specimen is not a good indicator of cooking). Localized burning seems to occur when a bone is partially exposed during roasting. The exposed part is charred black but the remainder of the bone, which is covered by the meat, is unburnt. Localized burning is defined by a black area of burning, usually quite sharply defined, and often surrounded by a dark brown zone grading into the normal color of unburnt bone. Such areas are seen most often on mandibles and long bones, but can occur elsewhere.
- P Pathological condition present.
- R Rodent gnawing.
- W Burnt white, gray or blue gray.

Length

The length of each fragment is measured on a simple scale, and the following coding system used:

- 1 less than 1 cm
- 2 1 to 1.99 cm

Appendix H.2. Continued.

- 3 2 to 2.99 cm
- 4 3 to 3.99 cm, etc.

Cortical thickness

This is to be used only for long bones, including identified and unidentified specimens. As cortical thickness varies, use the thickest portion of cortex to define the thickness. The measurement is taken perpendicularly from the outside to the inside (marrow cavity) of the fragment. The following codes should be used :

- 1 less than 2 mm
- 2 2 to 3.99 mm, etc.

APPENDIX I

Human Remains

Confidential Appendix - Bound Separately

SECTION VI. REFERENCES CITED

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