MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

THE SANTA FE TO POJOAQUE CORRIDOR TESTING PROJECT:

ARCHAEOLOGICAL TESTING RESULTS FROM FIVE SITES AND A DATA RECOVERY PLAN FOR THE PREHISTORIC SITES ALONG U.S. 84/285 NORTH OF SANTA FE, NEW MEXICO

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ADMINISTRATIVE SUMMARY

Between September 21 and October 29, 1999, the Office of Archaeological Studies (OAS), Museum of New Mexico, conducted test excavations at archaeological sites LA 388, LA 389, LA 391, LA 835, and LA 3119. These investigations were undertaken at the request of the New Mexico State Highway and Transportation Department (NMSHTD) in conjunction with proposed highway improvements and construction along U.S. 84/285 between Santa Fe and Pojoaque, Santa Fe County, New Mexico. Portions of these five previously identified sites extended into the proposed project limits and required evaluation beyond the archaeological survey level of investigation.

Prior to field investigations, landowner permission agreements, permits from state and federal agencies, and underground utility locations were obtained. In addition, proposed and existing rights-of-way limits at each site location were identified and staked. Archaeological testing investigations were conducted within existing or proposed rights-of-way. Archaeological testing identified intact surface and subsurface remains within existing and proposed project limits at each site. Additional data recovery investigations are recommended at sites LA 388, LA 389, LA 391, LA 835, and LA 3119.

This report presents site descriptions, site histories, testing procedures, results, and recommendations for the five prehistoric sites located within the northern portion of the proposed project area. In addition, this report contains a plan for data recovery investigations at all prehistoric sites within the proposed project area that are or will be recommended for additional investigations. Test excavations and data recovery efforts at all prehistoric sites within the proposed project area are linked to a common research orientation and to common field and laboratory data recovery methods. This research will focus on, but not be limited to, inter- and intraregional social and ideological relationships, community formation, economic and subsistence strategies, and ethnic identities in the Tewa Basin.

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PART 1. PROJECT INTRODUCTION AND DESCRIPTION
1. INTRODUCTION

Steven A. Lakatos

At the request of the New Mexico State Highway and Transportation Department (NMSHTD), the Office of Archaeological Studies (OAS), Museum of New Mexico, conducted archaeological test excavations at five prehistoric archaeological sites along U.S. 84/285 between Santa Fe and Pojoaque, Santa Fe County, New Mexico. These investigations were undertaken in conjunction with proposed improvements and construction associated with NMSHTD project MIP-084-6(59)177.

Although the entire project involves improvements to U.S. 84/285 between Santa Fe and Pojoaque (Fig. 1.1), the NMSHTD determined that the middle portion of the project crossing Pueblo of Tesuque lands required redesign. Accordingly, the potential impact to archaeological sites in that portion of the project area could not be defined or addressed. Therefore, only sites located in the northern section of the project, an area between the north Tesuque Pueblo grant boundary and County Road 89D (Fig. 1.1), were investigated and are discussed in this report. These sites are located on private land, within existing highway right-of-way, and on land belonging to Pojoaque Pueblo (Appendix 1).

At the request of Mr. Michael Dussinger, NMSHTD Environmental Section project coordinator during the testing phase of the project, the OAS staged test investigations, implemented an aggressive testing program, and clarified site histories and locations. Staged test investigations were intended to correlate with approved construction plans. The OAS focused test excavations on the northern portion of the project area, based on approved construction plans prepared by Louis Berger and Associates, Inc. Test excavations in the middle section of the project area, designed by Bohannon Houston, Inc., will be conducted following approval of construction plans by the NMSHTD.

Following the directive of the NMSHTD, an aggressive testing program was carried out by the OAS. Testing methods followed a generalized testing plan developed by the OAS for NMSHTD projects (Testing and Site Evaluation Proposal, HPD Log No. 43678) and a specific testing plan for sites in the project area (Boyer 1999). They were designed to secure a commanding knowledge of nature, depth, and extent of archaeological deposits within the proposed project area. The testing program would offer accurate estimates on the level of effort needed to treat each site, should additional data recovery investigations be necessary. These estimates would allow the OAS to develop a data recovery strategy that would address construction priorities, staffing requirements, and time schedules.

After the notification that duplicate Laboratory of Anthropology site numbers had been identified during the early stages of testing, the NMSHTD requested that the OAS identify the correct site number and location for each previously recorded site within the northern section of the proposed project area. This research was requested to obtain an accurate count of archaeological sites within the project area and revealed that three of the five prehistoric sites investigated during this stage of testing had duplicate numbers. Of those, two were mislocated in the site records maintained by the Archeological Records Management Section (ARMS) of the New Mexico Historic Preservation Division (HPD). ARMS was notified of discrepancies and determined the appropriate site number and location. Corrected site numbers were subsequently used in field activities and are used in this report.
Figure 1.1
Project vicinity map

Adapted from NMSHTD Española, Santa Fe Quad, NAD 1927
Sites LA 388, LA 389, LA 391, LA 835, and LA 3119 had been previously identified within the proposed project limits and required evaluation beyond the archaeological survey level. Test excavations were conducted by the OAS between September 21 and October 29, 1999, with Timothy D. Maxwell acting as principal investigator. Field work was supervised by Steven A. Lakatos, project co-director, assisted by Richard Montoya, Marcy Snow, Susan Moga, Brenda Baletti, and Christy Davis. In the laboratory, Laura Rick, Brenda Baletti, and Christy Davis processed the artifacts and other materials collected. Richard Montoya, Brenda Baletti, and Christy Davis assisted Dean Wilson in analyses of ceramic artifacts. Sonya Urban assisted James Moore in examining the chipped stone artifacts. Susan Moga and Nancy Akins examined the faunal materials. Robin Gould edited this report, while Robert Turner and Steven Lakatos produced the figures. Appendix 1 shows the locations of the five tested sites in the northern portion of the project area (removed from copies in general circulation). Test investigations revealed that all five sites would require specific data recovery efforts.

This report is organized into three main sections. The first section, Part 1, presents descriptions of the project, the project area, and general field procedures common to all sites investigated. Part 2 presents site-specific testing procedures, results, and recommendations for the prehistoric sites in the northern portion of the project area. Part 3 presents a data recovery plan for all prehistoric sites within the proposed project area. Site-specific and regional research questions will be addressed using common theoretical and methodological approaches. Data gathered should offer important information on the appearance of ceramic-bearing populations in the Northern Rio Grande during the latter centuries of the first millennium and the early centuries of the second millennium A.D.
2. PHYSICAL ENVIRONMENT

James L. Moore

Physiography and Geology

The Santa Fe to Pojoaque Corridor project area is situated in the Española Basin, one of six or seven downwarped basins that formed along the continental rift now occupied by the Rio Grande between southern Colorado and southern New Mexico (Chapin and Seager 1975; Kelley 1979). Three episodes of deformation contributed to the development of these depressions, including formation of the ancestral Rocky Mountains during the late Paleozoic and the Laramide uplifts of late Cretaceous to middle Eocene times (Chapin and Seager 1975:299). These events created a north-trending tectonic belt, along which the Rio Grande rift formed. Chapin and Seager (1975:299) note that:

The Rio Grande rift is essentially a "pull-apart" structure caused by tensional fragmentation of western North America. Obviously, a plate subjected to strong tensional forces will begin to fragment along major existing zones of weakness and the developing "rips" will reflect the geometry of the earlier structure.

The early deformations weakened the continental plate, causing it to split along the Rio Grande depression and resulted in the formation of downwarped basins as the plate pulled apart.

The Española Basin is considered an extension of the Southern Rocky Mountain Province (Fenneman 1931), and is enclosed by mountains and uplifted plateaus (Kelley 1979:281). The Rio Grande flows through the long axis of the basin, entering through a gorge on the north and exiting through a gorge on the south (Kelley 1979). Boundaries for this physiographic feature include the Taos Plateau on the north, the Brazos and Tusas mountains on the northwest, the Sangre de Cristo Mountains on the east, the Cerrillos Hills and north edge of the Galisteo Basin on the south, the La Bajada fault escarpment and Cerros del Rio hills on the southwest, and the Jemez volcanic field on the west.

The Rio Chama is the main tributary of the Rio Grande in the Española Basin, and the confluence of these rivers is near the center of that feature (Kelley 1979). The Rio Tesuque and Rio Pojoaque are the principal drainages in the study area, and originate in the Sangre de Cristo Mountains. Both streams flow through narrow valleys and merge northwest of Pojoaque Pueblo, then trend west to empty into the Rio Grande (Anschuetz 1986).

As subsidence proceeded, sediments were eroded into the Española Basin from the highlands to the north, northwest, and east, forming the Santa Fe group of formations. The Santa Fe group consists of thick deposits of poorly consolidated sands, gravels, conglomerates, mudstones, siltstones, and volcanic ash beds (Lucas 1984). At one time, the Tesuque Formation of the Santa Fe group was covered by the Ortiz Pediment gravels, but severe erosion removed most of the latter, leaving only isolated remnants on high ridges and hilltops. Subsequent gravel deposition occurred as channel deposits along the Rio Grande.

In places, the Santa Fe group sediments were covered by volcanic deposits, especially in the north and northwest parts of the basin. There, the Puye fanglomerate, which formed after erosion of the Ortiz Pediment began, was covered by a thick layer of Bandelier tuff and local basalt flows.
These igneous deposits form the Pajarito Plateau and Black Mesa.

Climate

Temperature is determined by latitude and elevation, though the latter is the more powerful determinant in New Mexico. The temperature decreases more rapidly with a rise in elevation than with an increase in latitude (Tuan et al. 1973). Mean annual temperature for Española is 9.7 to 10.4 degrees C (49.4 to 50.7 degrees F; Gabin and Lesperance 1977). Summers tend to be warm, while winters are cool, and the Española area averages 152 frost-free days during the growing season (Reynolds 1956).

Cold-air drainage is a common feature of deep New Mexico valleys. Night-time down-valley winds are cool, but reverse to warm up-valley winds during the day (Tuan et al. 1973:69). While narrow canyons and valleys create their own temperature regimens by channeling air flow in this way, temperatures on broad valley floors are influenced by local relief (Tuan et al. 1973:69). A study of these patterns has shown that temperature drops before sunrise are gradual or at least not extreme when winds are relatively stable throughout the night during spring and fall (Hallenbeck 1918:364-373). However, on clear nights accompanied by gentle horizontal gradients, sudden dips in temperature are not uncommon, and resultant crop damage is possible (Tuan et al. 1973:70). Studies at Hopi and Mesa Verde demonstrate that cold air drainage can significantly shorten the length of the growing season in valleys (Adams 1979; Cordell 1975). This phenomenon may be responsible for a shorter growing season in the Española area than in the Santa Fe area, which is higher in elevation (Anschueitz 1986).

New Mexico is one of three places in the United States that receives over 40 percent of its annual rainfall during the summer months (Tuan et al. 1973). Summer rainfall in the Southwest follows a true monsoon pattern (P. S. Martin 1963). Moisture-laden winds flowing north from the Gulf of Mexico are the main source of summer moisture, and their movement is controlled by a high pressure system situated over the Atlantic Ocean. The amount of summer precipitation in the Southwest depends on the positioning of this system. When it is in a northern position, moist tropical air flows into the Southwest and the summer is wet. When it is positioned to the south the summer can be dry, a condition that may be caused by abnormally cold years in north temperate latitudes (P. S. Martin 1963).

Winter precipitation is derived from air masses originating in the extratropical regions of the Pacific Ocean or in Canada. While summer storms are generally short and intense, winter precipitation usually falls as snow, which melts slowly and soaks into the soil rather than running off as does most summer rain. Though all precipitation is beneficial to local biota, winter precipitation is more effective because it soaks into the ground and recharges soil moisture reserves.

This is not to say that precipitation patterns are consistent across the Southwest. Indeed, great variation in rainfall patterns has been found between different parts of the region. Dean and Funkhouser (1995:92) suggest that a bimodal precipitation pattern prevails in much of the southern Colorado Plateau (northwest component) with maxima in both winter and summer. Conversely, a unimodal pattern with a summer maxima seems to prevail in the San Juan Basin and Northern Rio Grande Valley (southeast component). This pattern has prevailed since at least A.D. 966 (Dean and Funkhouser 1995:92). There have been disruptions of the pattern since that time, but they have mostly occurred in the northwest component (Dean and Funkhouser 1995:94).
Annual precipitation records from Española indicate that the study area receives a mean of 237 to 241 mm (9.3 to 9.5 inches) of precipitation per year (Gabin and Lesperance 1977). However, precipitation levels can be quite variable from year to year. July through September are the wettest months in the area, receiving about 45 percent of the annual precipitation (Gabin and Lesperance 1977). However, the violence of summer storms results in a great deal of runoff, reducing the amount of moisture actually available for plant growth. Quite a bit of moisture is also lost through evaporation from plants and the soil surface, resulting in an annual moisture deficit of 691 mm (27.2 inches) in Española (Anschuetz 1986). Climatological data suggest that the inner Española Basin is a high-risk area for dry farming (Anschuetz 1986).

Soils

Soils in the study area can be divided into two groups based on geomorphology—soils of the Dissected Piedmont Plain—are most common in the area. Soils of the Recent Alluvial Valleys also occur (Folks 1975). The Pojoaque-Rough Broken Land association comprises the former group and is derived from Quaternary sediments and alluvium of the Tesuque Formation of the Santa Fe group (Lucas 1984). These deep soils are well drained and occur on rolling to hilly uplands dissected by intermittent gullies and arroyos, though a few nearly level to gently sloping valley bottoms and floodplains next to intermittent streams are also included in the association. Most of these soils are forming in unconsolidated coarse to medium-textured and gravelly old alluvium, which is usually calcareous and contains sandy clay loam, sandy loam, or gravelly sandy loam surface layers. Lag gravel deposits often cover the surface of these soils (Folks 1975:4; Maker et al. 1974:33).

Soils of the Rough Broken Land association occur on broken topography, steep slopes, and rock outcrops. This association is dominated by rock outcrops and small areas of highly variable soils (Maker et al. 1974:24). Rough Broken Land soils are intermingled with Pojoaque soils, and together tend to occur on ridgetops between drainages.

The El Rancho-Fruitland association dominates the soils of the Recent Alluvial Valleys. They are deep and loamy like the Pojoaque soils, but unlike them tend to occur on low terraces along the Rio Tesuque and Rio Pojoaque. El Rancho-Fruitland soils are derived from sedimentary rocks of the Tesuque Formation and granites from the Sangre de Cristo Mountains (Folks 1975:3). They are currently used for irrigated crops, while the Pojoaque soils are not used in modern agriculture.

Flora and Fauna

The study area contains juniper-piñon grasslands, dry riparian, and riparian/wetland habitats. The former is most common and supports an overstory dominated by juniper and piñon pine, with an understory containing muhly grass, grama grass, other less common grasses, four-wing saltbush, sagebrush, rabbitbrush, prickly pear, and cholla. A recent invader that occurs in the north part of the project area is Russian knapweed.

The dry riparian habitat occurs in arroyo bottoms, on arroyo banks, and on floodplains adjacent to some of the wider drainages (Anschuetz 1986). Plants commonly found in this habitat include rabbitbrush, four-wing saltbush, mountain mahogany, scrub oak, Rocky Mountain beeweed, Indian ricegrass, three-awn grass, side-oats grama, and flax (Pilz 1984). The riparian/wetland habitat occurs
only along perennial streams such as the Rio Tesuque and Rio Pojoaque (Anschuetz 1986). Today, this habitat supports willow, cottonwood, tamarix, rushes, and sedges (Pilz 1984).

Animals commonly found in the study area include coyote, badger, porcupine, blacktailed jackrabbit, desert cottontail, spotted ground squirrel, and various birds. Small numbers of mule deer now occur in the region, as do black bears (Pilz 1984). Indeed, bear scat was noted during testing at LA 4968 and showed that black bears still come down from adjacent highlands to take advantage of plants that ripen in the late summer and early fall, such as juniper berries and domestic fruits. Animals that are common in higher elevations of the region include mule deer, wolf, coyote, bobcat, mountain lion, squirrel, various species of mouse, chipmunk, prairie dog, woodrat, jackrabbit, cottontail, skunk, raccoon, black bear, and elk (Anschuetz et al. 1985; Fiero 1978).
3. TESTING FIELD METHODS

James L. Moore

Introduction

General field methods were standardized for this project. A manual describing the methods, to be used in most situations that would potentially be encountered, and explaining how forms were to be completed, was prepared prior to entering the field (Boyer and Moore 1999). Thus, the same general field methods were applied to all sites examined during this study, with the exception of LA 835 (see Chapter 8). These procedures were used to guide data collection in compatible formats. However, there were specific differences in how certain methods were instituted and particular types of data were recorded. Such examples include variations in site structure, nature of the deposits, and previous research. Differences in these procedures are detailed in individual site reports. This chapter describes general testing methods used at all sites examined during this project. For a detailed discussion of the field methods used during this project the reader is referred to the field manual.

Preparation for Testing

The initial step in testing was to dispatch a crew to layout grid systems established through a series of datums for each site. A location for a main site datum was selected for each site, and was marked by a length of rebar. The main site datum was assigned an arbitrary elevation of 10 m below datum, which allowed us to avoid negative elevations. All subsequent horizontal and vertical measurements were maintained relative to this point.

A grid system was established and oriented to magnetic north relative to this point. For ease of recording, the main datum was designated as the intersection of the 500N and 500E grid lines, except at LA 835 where it was tied to previous investigations (see site description). Subdatums were placed at 5, 10, and 20 m intervals along grid lines, providing a framework for site mapping and testing activities.

Testing Procedures

The surface of each site was inspected to locate potential structural remains, features, artifact clusters, and horizontal limits. Plans maps were produced for each site using a transit and stadia rod, and included test pit locations, potential structures, features, artifact concentrations, and current cultural and topographic features within proposed project limits. Topographic contours were mapped to provide an accurate depiction of site structure in relation to immediate physical environment.

Auger Holes
Initial subsurface testing was completed using soil augers. Auger holes were placed in areas that contained surficial artifact concentrations or were suspected of containing subsurface features. Soil was removed from auger holes in 10 cm vertical units and screened through ¼-inch hardware cloth. Approximate depths at which cultural materials were encountered were recorded, and any artifacts recovered in screens were retained for analysis. For each auger hole, a standard form was completed that recorded its location, associated cultural materials and the depths at which they were found, a description of each soil layer encountered, and maximum depth.

Test Pits

Test pits were used to examine areas containing dense artifact scatters, discolored soil that might be indicative of cultural deposits, and at times augmented the results of auger tests when potential features or other cultural deposits were encountered. The use of test pits in these cases allowed a more detailed examination of subsurface deposits and a more exact definition of cultural remains. Test pits were excavated by hand in 1-by-1-m-grid units. Grid units were dug in arbitrary 10-cm levels. Soil removed from test pits was screened through ¼-inch hardware cloth and all artifacts recovered were retained for analysis.

Each excavated grid unit was assigned a provenience according to the grid lines that intersected at its southwest corner. A standard form was completed for each level of excavation in a grid unit, including the surface designated level 0. Data recorded on each form included the grid provenience, ending depths, a description of the soil matrix, and a list of artifacts recovered. Profiles were drawn when more than one cultural stratum was encountered, and soil strata were described on separate forms. Plans were completed for test pits that contained features or structural remains. Test pits ended when sterile strata were encountered, and auger holes were sometimes used to verify that sterile strata had been reached. Following completion of all necessary records, test pits were backfilled.

Mechanically Excavated Trenches

The final technique used to examine some sites during testing was the excavation of trenches using mechanical equipment, in this instance a backhoe. This method of examination was primarily used to provide a more detailed look at natural soil stratigraphy in off-site areas or areas that did not contain visible cultural remains on the surface, such as developed areas. At times they were also used to examine certain topographic or vegetational features to verify that they were not of cultural derivation.

A standard form was completed for each mechanically excavated trench, which included information on trench location and dimensions, descriptions of the soil strata encountered, and summaries of any cultural materials noted during excavation. Profiles were completed when cultural strata or features were encountered, otherwise they were considered unnecessary unless the natural soil stratigraphy was too complex to be adequately described in narrative form.

Artifacts

All artifacts recovered from test excavations were collected for analysis. Different artifact types
recovered from the same horizontal and vertical provenience (excavation unit, arbitrary level, or auger level), were assigned the same field specimen (FS) number. Recovered material was counted and bagged by artifact type. For example, if a level yielded pottery, chipped stone, and bone, each class of artifact was counted and placed in separate bags, but received the same FS number. Field specimen information was recorded in a separate catalog, and the FS number was placed on all bags and related excavation forms so that artifacts could be tracked back to the location from which they were recovered.

Photographs

Photographs were taken when necessary. However, no standardized format for this procedure was implemented during testing. In general, testing was aimed at extracting enough information to develop an adequate data recovery plan. This means that the verification of a feature or structure location was considered to be sufficient, and no attempt was made to define their exact limits during this study. Thus, photographs were sometimes necessary for documentation because the types of remains that were typically encountered were not completely defined. Therefore, 35 mm color slides and black and white prints were taken to complement plan maps and profiles, and aid in site interpretations.

Curation of Records and Artifacts

Following the completion of all phases of this study, testing records will be on file at the ARMS. Artifacts will be curated at the Museum of New Mexico in Santa Fe, unless ownership is retained by private land owners.
PART 2: SITE DESCRIPTIONS AND TESTING RESULTS

Steven A. Lakatos
4. INTRODUCTION: TESTING GOALS FOR LATE DEVELOPMENTAL PERIOD SITES

Survey descriptions indicate that a wide range of Late Developmental period materials existed within the project area (Hohmann et al. 1998). Based on the survey data, several testing goals, presented in the form of questions, can be addressed related to the Late Developmental period in the Northern Rio Grande. Although these goals address specific issues related to this project and area, data recovered may provide information for addressing regional and interregional studies. While this is not an exhaustive list of goals or questions, they helped focus test investigations and provided information for a data recovery plan. The testing goals relate to defining the natures of surface and subsurface deposits and remains at each site and assessing their integrity.

1. Do intact subsurface deposits remain within the proposed project area? What is the nature, extent, and depth of intact deposits?

2. Do the nature of the deposits reflect residential or limited activities at these locations?

3. If residential areas are identified, what types of structures are present? What are the functions of different structure types?

4. Can the relative ages of structures be determined? Can occupation or construction sequences be identified?

5. Is there evidence of interaction with other population groups? If so, can the extent, duration, and intensity of the interaction be assessed?

6. Are nonstructural or extramural features, such as hearths, storage pits, and middens, present? If so, can the relative ages of the features be determined? Can they be associated with particular occupations?

7. What types of activities are reflected in nonstructural features? Are those activities consistent with the inferred nature of the site?
5. TEST EXCAVATIONS AT LA 388

Introduction

LA 388 is a Late Developmental period, multicomponent habitation site located on a gentle south-facing slope adjacent to a large, unnamed, intermittent tributary of the Rio Tesuque, which is 400 m to the west. An unknown portion of LA 388 has been affected by highway construction and earthwork associated with erosion control activities. The site measures 120 m southeast-northwest by 25 m southwest-northeast and is located within existing right-of-way and proposed project limits (Fig. 5.1). Intact subsurface deposits are limited to an area 10 to 25 m wide (Fig. 5.1). The portion of the site within the proposed right-of-way, which includes a portion of LA 388, will be acquired from private sources.

Survey identified two prehistoric artifact concentrations associated with charcoal-stained soil. Ceramics suggested the site was occupied during the Late Developmental period (Hohmann et al. 1998). Test excavations at LA 388 were conducted to determine the depth, extent, and nature of archaeological deposits identified during survey.

History of the Site Record

An examination of New Mexico Cultural Resource Information System (NMCRIS) records housed at ARMS revealed a confusing site history. LA 388 was originally recorded by H. P. Mera in the 1930s. A search of the Archeological Research Collections (ARC) at the Laboratory of Anthropology (LOA) indicated that Mera mapped the site and made limited surface collections. Following Mera’s visit, LA 388 was inventoried as part of the Highway Cultural Inventory Project (HWCI; Alexander 1964). Subsequently, LA 388 was reassigned number LA 84928 by Evaskovich (1991). In 1997, the survey for this project also identified LA 388 by number LA 84928 (Hohmann et al. 1998). ARMS was notified of the duplication of site numbers and abandoned the newer number. Archaeological investigations conducted by the OAS at this location identified the site by its original number, LA 388.

Testing Procedures

Prior to field investigations the proposed project area and all subsurface utilities were identified. Excavation procedures followed those detailed in the testing plan (Boyer 1999) and in the field manual (Boyer and Moore 1999) and discussed in Chapter 3. A main site datum, assigned grid coordinates 500N/500E, was established and was used to maintain vertical and horizontal control at LA 388 and LA 391, located across the highway. The site limits and surface manifestations, including artifact and charcoal-stained soil concentrations were identified and mapped. Subsurface testing focused on the artifact and charcoal-stained soil concentrations to determine if these areas were associated with structural remains. Two subsurface testing methods were used to investigate LA 388: auger tests and excavation of 1-by-1-m test units.
Figure 5.1. LA 388: site map.

Auger tests, conducted in transects parallel to the existing right-of-way and along the established grid system within proposed project limits (Fig. 5.1) were used to define horizontal and vertical limits of cultural material. Auger transects were spaced 2 m apart. Auger tests were placed every 4 m and offset every other transect, by 2 m, to maximize systematic coverage. Test unit locations were determined by surface manifestations, such as charcoal-stained soil, and by auger tests that identified buried cultural material. Test units were excavated in arbitrary 10-cm levels. All fill was screened through ¼-inch hardware cloth.

Testing Results

A total of 95 auger tests and 12 1 m by 1 m test units were excavated during test investigations at LA 388. These excavations identified two adobe surface structures, two shallow pit structures, and
associated refuse areas. The majority of these deposits are located in the northern portion of the site and indicate that LA 388 had a minimum of two Late Developmental period occupations. Table 5.1 lists artifact types and counts from auger tests, while Table 5.2 lists artifact types and counts from test units.

### Table 5.1. LA 388: Artifact Type and Count by Auger Test Levels

<table>
<thead>
<tr>
<th>AUGER TEST LEVEL</th>
<th>ARTIFACT TYPE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ceramic</td>
<td>Chipped Stone</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
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<tr>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td>13</td>
</tr>
</tbody>
</table>

### Stratigraphic Descriptions

Test excavations identified five stratigraphic layers associated with the two occupations. The nature, depth, and interpreted character of these deposits are presented below.

Stratum 1: Brown (10YR 5/3 dry), fine, silty sand containing charcoal, artifacts, adobe, cobbles, and friable sandstone. A poorly consolidated, post-abandonment, colluvial layer containing secondary refuse, Stratum 1 is homogeneous in color and texture, and has a maximum thickness of 50 cm. This layer is mixed extensively by rodent activity.

Stratum 2: Grayish brown (10YR 5/2 dry), coarse, silty sand containing charcoal, artifacts, and gravel. A moderately consolidated colluvial layer of secondary refuse, Stratum 2 is homogeneous in color and texture, and had a maximum thickness of 50 cm. This layer represents a midden deposit associated with the last occupation of the site. A moderate amount of mixing by rodent activity was identified.

Stratum 3: Light gray (7.5YR 7/4 dry), fine, silty sand containing charcoal and artifacts. Stratum 3 is a moderately consolidated, post-abandonment, colluvial deposit. It is homogeneous in color and texture, and has weak laminar structure. This layer has a maximum thickness of 40 cm and was moderately mixed by rodent activity.

Stratum 4: Light reddish brown (5YR 6/3 dry), coarse, silty sand containing charcoal, artifacts, and pockets of gravel. Stratum 4 is a moderately consolidated, post-abandonment, colluvial deposit. It is homogeneous in color, has a maximum thickness of 50 cm, and represents the initial post-abandonment fill layer of a structure. Moderate mixing by rodent activity was identified.

Stratum 5: Very pale brown (10YR 8/4 dry), coarse, silty sand containing gravel and few cobbles, but no cultural materials. Stratum 5 is a moderately consolidated, alluvial sand and gravel terrace deposit and is the culturally sterile stratum at the site.

### Table 5.2. LA 388: Artifact Type and Count by Test Excavation Unit and Level
<table>
<thead>
<tr>
<th>UNIT LEVEL</th>
<th>ARTIFACT TYPE</th>
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<th>TOTAL</th>
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<td>East</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>0</td>
<td>Ceramic</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Ceramic</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Chipped stone</td>
<td>4</td>
<td>10</td>
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<td>2</td>
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<tr>
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<td>Ceramic</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Chipped stone</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Bone</td>
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<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Ceramic</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Chipped stone</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Ground stone</td>
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<td></td>
</tr>
<tr>
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<td>Mineral</td>
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</tr>
<tr>
<td>6</td>
<td>Ceramic</td>
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<td></td>
</tr>
<tr>
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<tr>
<td></td>
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<tr>
<td></td>
<td>Mineral</td>
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</tr>
<tr>
<td></td>
<td>Chipped stone</td>
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<tr>
<td>9</td>
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</tr>
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<td>----------------</td>
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</tr>
<tr>
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<tr>
<td>Bone</td>
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<td></td>
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</tr>
<tr>
<td>10 Ceramic</td>
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<td></td>
</tr>
<tr>
<td>Chipped stone</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>11 Ceramic</td>
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</tr>
<tr>
<td>12 Ceramic</td>
<td>2</td>
<td></td>
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<td>Chipped stone</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14 Ceramic</td>
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</tr>
<tr>
<td>Chipped stone</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>15 Ceramic</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>22</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>96</td>
<td>158</td>
<td>57</td>
</tr>
</tbody>
</table>
Auger Tests

Auger tests conducted between two artifact concentrations identified a mantle of charcoal- and artifact-bearing soil (Stratum 3) that ranged in thickness from 20 to 50 cm below modern ground surface.

Auger tests conducted across the northern artifact concentration indicated the presence of two shallow pit structures and a dense layer of secondary refuse. Auger tests 487N/501E and 488N/503E recovered cultural material down to 1.2 m below modern ground surface. Spacing and depth of these tests indicated the presence of a pit structure. The structure is estimated to be a minimum of 1.2 m deep and 4.0 m in diameter. Auger tests 487N/507E and 489N/507E yielded similar results, suggesting the presence of another filled pit structure. Test unit excavations were conducted at this location to confirm the presence of structural remains. Test unit excavation results are presented below.

Auger test 484N/505E recovered dense charcoal-stained soil down to 60 cm below modern ground surface. Test unit excavations were conducted at this location to determine the nature of the deposit. Test unit excavation results are presented below.

Test Units

Test units were established at several locations across the site (Fig. 5.1) to define stratigraphy and investigate the nature of cultural deposits identified through auger tests. Test units consisted of single or contiguous 1-by-1-m grid units.

Test Units 481N/497E and 482N/497E were excavated to investigate an area of gray soil identified on the surface within existing right-of-way. These units were excavated to a maximum depth of 1.1 m below modern ground surface. Stratigraphy within these units consisted of Strata 3 and 6. These excavations demonstrated that the gray soil was a natural deposit and that artifact-bearing deposits (Stratum 3) were limited to the upper 20 cm of Test Unit 482N/497E. Cultural material from Test Unit 481N/497E may have been removed during highway construction and routine right-of-way maintenance.

Test Units 483N/504E and 484N/504E were excavated to determine the source and depth of charcoal-stained soil identified on the surface. These units were excavated to a maximum depth of 90 cm below modern ground surface and contained a variety of material (Table 5.2). Stratigraphy within these units consisted of Strata 2, 3, and 5. Stratum 2, the charcoal-stained soil identified on the surface, had a maximum thickness of 50 cm. This deposit is interpreted to represent a secondary refuse area or midden associated with the last occupation of the site.

Test Units 487N/507E and 488N/507E were excavated to identify the source of buried cultural material recovered in auger tests 487N/507E and 489N/507E. These test units were excavated to a maximum depth of 1.2 m below modern ground surface and contained a variety of material (Table 5.2). Stratigraphy within these units consisted of Strata 2, 3, 4, and 5 (Fig. 5.2). These excavations identified intact subsurface deposits that are interpreted to represent a filled pit structure. The walls and floor of the structure were constructed of sterile Stratum 5 and were difficult to define. Following
abandonment, the structure filled with Strata 3 and 4. These strata represent the initial post-
abandonment filling process. Stratum 2, representing a subsequent occupation, was deposited after
this structure had filled.

Test Unit 497N/505E was excavated to a maximum depth of 30 cm below modern ground
surface. Stratigraphy within the unit consisted of Stratum 1. Excavations identified an adobe surface
structure represented by a floor feature and a possible wall segment. The floor feature appears to be
a subfloor pit or posthole. This feature was defined by an adobe collar and measured 40 cm in
diameter. The possible wall segment measured 60 cm long, 15 cm wide, and 15 cm high and was
oriented north-south. The wall segment was constructed of unshaped quartzite and sandstone cobbles
cast in adobe at irregular intervals (Fig. 5.3).

Test Units 442-443N/535-536E were excavated to a maximum depth of 20 cm below modern
ground surface. Stratigraphy within these units consisted of Stratum 1. Excavations identified a
concentration of unshaped cobbles, adobe, and ground stone fragments. A possible wall alignment,
comprised of three upright cobbles, was present in the northeast portion of the unit. Wall dimensions,
orientation, and construction methods were difficult to determine due to the limited amount of
excavated area. However, the remains appear to represent a collapsed surface structure.

Test Unit 443N/538E was excavated to a depth of 1.7 m below modern ground surface.
Stratigraphy consisted of Strata 1 and 5 (Fig. 5.4). Excavations identified a horizontal layer of adobe
containing unshaped sandstone and quartzite cobbles placed at regular intervals, 20 cm to 30 cm
apart. This feature, located 50 cm below modern ground surface, measured a 1.6 m long and was an
average of 20 cm thick. The feature defined the boundary between the cultural (Stratum 1) and non-
cultural (Stratum 5) deposits. The feature is interpreted to represent a fallen wall or the floor of a

Figure 5.2. LA 388: profile of Test Units 487-488N/507E.
Figure 5.3. LA 388: plan view and profile of Test Unit 497N/505E, showing possible floor feature and wall segment.

Figure 5.4. LA 388: profile of Test Unit 443N/538E.

surface structure, perhaps associated with the remains revealed in units 442-443N/535-536E. Although a noncultural horizon was identified below this feature, these excavations were not void of cultural material (Table 5.2). Therefore, excavations continued at this location until the source of these materials could be identified. These materials appear to be the result of mixing due to extreme rodent activity (Fig. 5.4)

Summary of Testing Results

Excavations at LA 388 were successful in recovering data needed to address most of the proposed testing goals. These excavations identified intact subsurface cultural deposits that extend into the proposed project limits. Although these deposits are relatively shallow, the nature of the deposits suggests this was a Late Developmental period, multicomponent, habitation site. Structural remains include two adobe surface structures and two shallow pit structures. Nonstructural features include refuse areas or middens associated with the occupation of these
structures.

One surface structure and two pit structures were identified in the northern portion of the site and one surface structure was identified in the southern portion of the site. The pit structures are estimated to be 4 m in diameter by a minimum of 1.2 m deep. These structures appear to have been constructed by excavating a steep-sided basin into the culturally sterile substrate. The floors and walls were the limits of the original excavation and do not appear to have been lined or plastered.

The size of the surface structures cannot be accurately determined based on testing data. However, excavations of other Late Developmental period sites in the area identified 10 to 20 contiguous surface rooms. The northern structure, LA 388, contained a subfloor pit or posthole defined by an adobe collar and a possible wall segment. The structure wall was constructed of unshaped quartzite and sandstone cobbles cast in adobe at irregular intervals. The southern structure was constructed of unshaped quartzite and sandstone cobbles cast in adobe at regular intervals. The difference in cobble spacing within the surface structures may be related to preservation or excavation, rather than construction technique.

Nonstructural features identified include a dense midden located in the northern portion of the site and an extensive sheet midden extending across the entire site. The sheet midden, identified through auger tests, had a maximum depth of 30 cm below modern ground surface. The midden feature, defined within the northern portion of the site, was a dense layer of charcoal-stained soil. The midden is visible on the surface and measures about 15-by-15 m. Test excavations determined this feature has a maximum depth of 50 cm below modern ground surface.

Stratigraphic relationships within the test excavations provided evidence for two occupations during the Late Developmental period. The midden deposit was identified over an abandoned, and subsequently filled, pit structure. These stratigraphic relationships indicate that some time elapsed between occupations. The site appears to have been reoccupied only after the structures and debris from the initial occupation had faded.

Decorated pottery types recovered from LA 388 support the stratigraphic evidence that this site had been reoccupied. The majority of these types were imported from nearby regions with a small percentage of the assemblage displaying characteristics typical of local manufacture. The highest percentage of imported decorated pottery appears to have originated from the Cibola region followed by equal percentages of pottery from the Upper San Juan and Jornada Mogollon regions (see Table 13.6). Although the number of sherds from these regions are few, their presence does suggest established interaction with these regions.

The occurrence of Cibola types, such as Gallup Black-on-white and Escavada Black-on-white, with locally made Kwahe’e Black-on-white suggest the site was initially occupied during the 1000s and again during the 1100s. Although there may be overlap in the manufacture dates for these types, the relatively low amount of refuse combined with the stratigraphic data indicate this remaining portion of LA 388 was reoccupied rather than continually occupied. However, more refined ceramic seriation and chronometric data are needed to address the duration, intensity, and extent of these relationships.
6. TEST EXCAVATIONS AT LA 389

Introduction

LA 389 is a multicomponent habitation site located on a gentle southeast-facing slope 400 m east of the Rio Tesuque. It measures 80 m north-south by 60 m east-west (Fig. 6.1). An unknown portion of LA 389 was previously excavated, while other portions may have been affected by road construction. Nonetheless, intact subsurface deposits were identified within the project area.

Although few artifacts were recovered within the project area, a dispersed artifact scatter was defined adjacent to the project area. Ceramics indicate that four temporal components—Late Developmental, Coalition, Classic, and historic Tewa—are or were present at this location. Based on surface ceramics, the major component dates to the Late Developmental period.

History of Site Record

An examination of NMCRIS records at ARMS revealed that LA 389 was originally recorded by H. P. Mera in the 1930s. Mera mapped the site and made limited surface collections (ARC, LOA; ARMS site files). Following Mera’s visit, LA 389 was inventoried as part of the Highway Cultural Inventory Project (HWCI; Alexander 1964). This project also appears to have made limited surface collections, although no reference of this visit is in the final HWCI report (Alexander 1964).

A brief site description is presented in El Palacio (Jarcho et al. 1965). This brief description is in reference to a fragmentary burial reported to have been recovered from the site. It is unclear if the burial was recovered as part of formal excavation or removed during highway construction.

During the survey for this project, LA 389 was reassigned the number LA 111326 (Hohmann et al. 1998). ARMS was notified of the duplication and abandoned the newer number. Archaeological investigation conducted by the OAS at this location identified the site by its original number LA 389.

Testing Procedures

Test excavations were conducted to determine the depth, extent, and nature of the archaeological deposits identified during survey. Prior to field investigations the proposed project area and all utilities were identified. Excavation procedures followed those detailed in the testing plan (Boyer 1999) and the field manual (Boyer and Moore 1999) and discussed in Chapter 3. Prior to subsurface investigations, site limits and surface manifestations, including artifact concentrations and proposed project limits, were identified and mapped. Three excavation methods were used to investigate LA 389: auger tests, excavation of 1-by-1-m test units, and backhoe trenching.

Auger tests were used within the existing right-of-way to locate subsurface cultural materials. Auger transects were established parallel to the existing right-of-way and spaced 2 m apart (Fig. 6.1). Auger tests were conducted every 4 m and offset by 2 m every other transect to maximize systematic coverage. Auger test were numbered from north to south, starting from number 1 in each transect.
Testing Results

Two 1-by-1-m test excavation units, 24 auger tests, and one backhoe trench were used to investigate LA 389. Test excavations identified one subsurface feature. Test excavations defined the
limits of this feature but did not recover any material culture directly associated with the feature. Therefore, cultural and temporal affiliation cannot be addressed.

Stratigraphic Descriptions

Excavations identified two stratigraphic layers and intact subsurface cultural deposits. The nature, depth, and interpreted character of these deposits are presented below.

Stratum 1: Pale brown (10YR 6/3 dry), coarse, silty sand containing gravel. Stratum 1 is a compacted layer of redeposited material associated with road construction and a gravel road. Stratum 1 is homogeneous in color and texture and has a maximum thickness of 10 cm. Limited rodent activity was identified.

Stratum 2: Very pale brown (10YR 7/4 dry), coarse, clay loam containing a few pieces of charcoal, one artifact, and gravel. A moderately consolidated colluvial layer, homogeneous in color and texture with a minimum thickness of 20 cm, Stratum 2 displays minimal mixing by rodent activity.

Auger Tests

Auger tests were conducted within and parallel to the existing highway right-of-way. Auger tests identified the remains of one subsurface feature and an area of deeply buried dispersed charcoal flecks.

Auger Test 3 in Transect 1 recovered dense charcoal-stained soil down to 40 cm below modern ground surface. Test unit excavations conducted at this location identified the remains of a thermal feature. Test unit excavation results are presented below.

Auger Test 1 in Transect 2 recovered dispersed charcoal flecks down to 140 cm below modern ground surface. Due to the depth and dispersed nature of these remains, mechanical excavations were used to investigate the source of these materials. Mechanical excavation results are presented below.

Test Units

Test units were established to identify the source of the cultural deposits identified through auger tests and to define stratigraphy. Test units consisted of two contiguous 1-by-1-m grid units.

Test Unit 497N/500E was excavated to a maximum depth of 40 cm below modern ground surface. Stratigraphy within the unit consisted of Strata 1 and 2. Excavations recovered one sherd from an upper fill level and identified an intact thermal feature, Feature 1. Feature 1 was identified in the south profile of the test unit 15 cm below modern ground surface (Fig. 6.2).

Test Unit 496N/500E was excavated to define the limits of Feature 1. The unit was excavated to 30 cm below modern ground, exposing Stratum 1.
Mechanical Excavations

A single backhoe trench was excavated within the existing right-of-way (Fig. 6.1) to determine the source of deeply buried charcoal flecks identified in auger tests. The trench, excavated through Stratum 1 and 2, was 15.0 m long, .65 m wide, and a maximum of 1.4 m deep. Although occasional charcoal flecks were identified during these excavations, their source could not be determined. No intact subsurface cultural remains were encountered within the excavated trench.

Feature Description

Feature 1 is a thermal feature measuring 1.3 m north-south by 90 cm east-west and has a maximum depth of 20 cm (Fig. 6.2). Feature 1 was constructed by excavating a shallow basin with steep sloping sides into Stratum 2, the culturally sterile substrate. The base of the feature was lined with quartzite cobbles that appear to have been subsequently burned. The edges of the feature are oxidized or fire-reddened, suggesting intense, prolonged heat. Feature fill consisted of a heavily charcoal-stained, silty sand containing large charcoal fragments and pieces of fire-cracked rock.

Summary of Testing Results

Excavations at LA 389 were minimally successful in addressing the proposed testing goals. These excavations identified intact subsurface deposits that extend into proposed project limits. Although these deposits are relatively shallow, the nature of the deposits and the published description (Jarcho et al. 1965) suggest that LA 389 was a multicomponent habitation site. No structural remains were encountered during test excavations, but these investigations did identify a thermal feature. Lack of material cultural directly associated with this feature made it difficult to assign cultural or temporal affiliation, although the published description of the site, Mera’s site record, and surface artifacts at the site suggest that the feature is prehistoric. Data needed to address regional interaction during the Late Developmental period were not obtained from investigations within the project limits, although artifacts relevant to this issue are present adjacent to the project area.
7. TEST EXCAVATIONS AT LA 391

Introduction

LA 391 is a Late Developmental period habitation site that measures 80 m north-south by 60 m east-west (Fig. 7.1). The site is located on a gentle southeast-facing slope 400 m east of the Rio Tesuque. An unknown portion of LA 391 has been affected by road construction and development. The proposed right-of-way, which includes a portion of LA 391, will be acquired from private sources.

Survey identified two prehistoric artifact concentrations associated with charcoal-stained soil. Ceramics suggested the site was occupied during the Late Developmental period. Test excavations were conducted at LA 391 to determine the depth, extent, and nature of archaeological deposits identified during survey.

History of the Site Record

An examination of NMCRIS records at ARMS revealed that LA 391 was originally recorded by H. P. Mera in 1930s. Mera mapped the site and made limited surface collections (ARC, LOA; ARMS site files). Following a later visit, McCrary (1983) described the site as a dispersed artifact scatter with two artifact concentrations and three hearths. A subsequent site visit during the survey for this site (Hohmann et al. 1998) relocated the artifact concentrations but could not relocate the hearths.

Testing Procedures

Excavation procedures followed those detailed in the testing plan (Boyer 1999) and the field manual (Boyer and Moore 1999) and discussed in Chapter 3. Three excavation methods were used to investigate LA 391: auger tests, excavation of 1-by-1-m test units, and backhoe trenching. Auger transects were established parallel to the existing right-of-way and spaced 2 m apart. Auger tests were placed every 4 m and offset by 2 m every other transect to maximize systematic coverage. All fill, excavated by hand, was processed through ¼-inch hardware cloth. Backhoe trenches were used within the developed portion of the site to identify the extent of the cultural materials. Test excavation units focused on undeveloped portions of the site, primarily along the Tesuque Pueblo Grant boundary fence, which runs through the site.

Testing Results

A total of 25 auger tests, two 1-by-1-m test excavation units, and four backhoe trenches were excavated during test investigations at LA 391. Test excavations identified four subsurface features and a dense layer of intact secondary refuse. These deposits were clearly defined in the southern
Figure 7.1. LA 391: site map.

A portion of the site and gradually become less well defined toward the north. Auger tests identified that the mantle of cultural material extends east into the existing right-of-way. These deposits suggest that LA 391 had an intensive or long-term occupation during the Late Developmental period. Although no structural remains were identified during testing, the density of charcoal-stained soil, the quantity of artifacts, and the number of nonstructural features suggest this was a habitation site. Table 7.1 lists artifact types and counts by excavation area.

Table 7.1. LA 391: Artifact Type and Count by Test Excavation Unit and Level
<table>
<thead>
<tr>
<th>UNIT LEVEL</th>
<th>ARTIFACT TYPE</th>
<th>GRID UNIT</th>
<th>TOTAL</th>
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</thead>
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<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>Ceramic</td>
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<td>16</td>
</tr>
<tr>
<td></td>
<td>Chipped stone</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Ceramic</td>
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<tr>
<td></td>
<td>Chipped stone</td>
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<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Ceramic</td>
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<td>10</td>
<td>5</td>
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<tr>
<td></td>
<td>Bone</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Macrobotanical</td>
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</tr>
<tr>
<td>4</td>
<td>Ceramic</td>
<td>19</td>
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</tr>
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<td></td>
<td>Chipped stone</td>
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<td>Bone</td>
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<td>5</td>
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<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>149</td>
<td>101</td>
</tr>
</tbody>
</table>

*Stratigraphic Descriptions*

Four stratigraphic layers were identified during test excavations. Cultural deposits were found at depths of 10 cm to 60 cm below modern ground surface (Figs. 7.2 and 7.3). Examination of these deposits and associated ceramics suggest this site had a minimum of one Late Developmental period occupation. The nature, depth, and interpreted character of these deposits are presented below.

Stratum 1: Pale brown (10YR 6/3 dry), coarse, silty sand containing gravel. Stratum 1 is a compacted layer of redeposited material used to construct a gravel road and parking area. It is homogeneous in color and texture and has a maximum thickness of 10 cm. Limited rodent activity was identified.

Stratum 2: Brown (10YR 5/3 dry), fine, silty sand containing charcoal flecks, artifacts, and gravel. A poorly consolidated, post-abandonment, colluvial layer containing secondary refuse, Stratum 2 is homogeneous in color and texture, and has a maximum thickness of 30 cm. A minimal amount of mixing by rodent activity was identified.

Stratum 3: Grayish brown (10YR 5/2 dry), coarse, clay loam containing charcoal, artifacts, and gravel. A moderately consolidated, colluvial layer of secondary refuse, Stratum 3 is homogeneous in color and texture, and has a maximum thickness of 40 cm. This layer represents an intact deposit of secondary refuse. A minimal amount of mixing by rodent activity was identified.

Stratum 4: Very pale brown (10YR 8/4 dry), coarse, silty sand containing gravel and few cobbles. A moderately consolidated alluvial sand and gravel terrace deposit, this layer represents culturally sterile substrate.
Auger Tests

Auger tests identified a mantle of charcoal- and artifact-bearing soil at depths of 10 to 50 cm below modern ground surface, extended into the existing right-of-way. This layer has the potential for containing nonstructural features such as hearths.

Test Units

Test units were placed in undeveloped portions of the site to determine whether intact cultural deposits exist within the project area. These units were also used to investigate the nature and depth of deposits and to define stratigraphy. Test units consisted of single 1-by-1-m grid units.

Test Unit 374N/495E was excavated to a maximum depth of 80 cm below modern ground surface. Stratigraphy within this unit consisted of Strata 1, 2, and 3. Stratum 2 represents an intact subsurface layer of secondary refuse. The layer was identified 10 cm below modern ground surface, had a maximum thickness of 30 cm, and contained a variety of cultural material (Table 7.1).

Test Unit 377N/511E was excavated to a maximum depth of 70 cm below modern ground surface. Stratigraphy within this unit also consisted of Strata 1, 2, and 3. Stratum 2 represents an intact subsurface layer of secondary refuse. This layer was identified 20 cm below modern ground surface and had a maximum thickness of 25 cm. Excavation of this unit identified a thermal feature, Feature 1 (Fig. 7.2).

Figure 7.2. LA 391: profile of Test Unit 377N/511E, showing Feature 1.

Mechanical Excavations
Four backhoe trenches were excavated within developed portions of the site (Fig. 7.1, Table 7.2). These trenches were used to define the condition and limits of the cultural horizon identified through auger and test excavations. The excavations determined that the cultural layer was well-defined and intact. Three subsurface features were identified within these trenches (Fig. 7.3). These features were similar in size, construction, and content to Feature 1.

**Table 7.2. LA 391: Descriptions of Backhoe Trenches**

<table>
<thead>
<tr>
<th>TRENCH NO.</th>
<th>LENGTH (m)</th>
<th>WIDTH (m)</th>
<th>MAX DEPTH (m)</th>
</tr>
</thead>
<tbody>
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<td>.70</td>
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<tr>
<td>BT-2</td>
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<td>.70</td>
</tr>
<tr>
<td>BT-3</td>
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<tr>
<td>BT-4</td>
<td>6.0</td>
<td>.60</td>
<td>.50</td>
</tr>
</tbody>
</table>

*Feature Descriptions*

Feature 1 was identified 25 cm below modern ground surface in the east profile of test unit 377N/511E (Fig. 7.2). This feature measured 45 cm in diameter and had a maximum depth of 20 cm. Feature 1 was constructed by excavating a shallow basin with gently sloping sides into Stratum 2. The sides of the basin were lined with unshaped quartzite cobbles that were subsequently fire-cracked. Feature fill consisted of heavily charcoal-stained silty sand that contained large charcoal fragments and pieces of fire-cracked rock.

Feature 2 was identified 30 cm below modern ground surface in the west profile of Backhoe Trench 1 (Fig. 7.3). This feature measured 40 cm in diameter and had a maximum depth of 20 cm. Feature 2 was constructed by excavating a shallow basin with gently sloping sides into Stratum 2. The base of the feature was lined with quartzite cobbles that were subsequently fire-cracked. Feature fill consisted of heavily charcoal-stained silty sand and contained large charcoal fragments and pieces of fire-cracked rock.

377N/511E (Fig. 7.2). This feature measured 45 cm in diameter and had a maximum depth of 20 cm. Feature 1 was constructed by excavating a shallow basin with gently sloping sides into Stratum 2. The sides of the basin were lined with unshaped quartzite cobbles that were subsequently fire-cracked. Feature fill consisted of heavily charcoal-stained silty sand that contained large charcoal fragments and pieces of fire-cracked rock.

Feature 2 was identified 30 cm below modern ground surface in the west profile of Backhoe Trench 1 (Fig. 7.3). This feature measured 40 cm in diameter and had a maximum depth of 20 cm. Feature 2 was constructed by excavating a shallow basin with gently sloping sides into Stratum 2. The base of the feature was lined with quartzite cobbles that were subsequently fire-cracked. Feature fill consisted of heavily charcoal-stained silty sand and contained large charcoal fragments and pieces of fire-cracked rock.
Feature 3 was identified 10 cm below modern ground surface in the west profile of Backhoe Trench 1 (Fig. 7.3). This feature measured 1.4 m in diameter and had a maximum depth of 20 cm. Feature 3 was constructed by excavating a shallow basin with gently sloping sides into Stratum 2. Portions of the basin were lined with quartzite cobbles that were subsequently fire-cracked. Feature fill consisted of heavily charcoal-stained silty sand and contained large charcoal fragments and pieces of fire-cracked rock.

Feature 4 was identified 20 cm below modern ground surface in the west profile of Backhoe Trench 3 (Fig. 7.3). This feature measured 60 cm in diameter and had a maximum depth of 25 cm. Feature 4 was constructed by excavating a shallow basin with gently sloping sides into Stratum 2. The base of the feature was lined with unshaped quartzite cobbles that were subsequently fire-cracked. Feature fill consisted of heavily charcoal-stained silty sand and contained large charcoal fragments and pieces of fire-cracked rock.

Summary of Testing Results

Excavations at LA 391 were successful in recovering data needed to address most of the proposed testing goals. These excavations identified intact subsurface deposits that extend into proposed project limits. Although the deposits were relatively shallow, the quantity of cultural material, combined with heavily charcoal-stained soil and several features, suggest that the deposits were generated from a habitation location. Although no structural remains were identified during test excavations, several nonstructural features, including an intact layer interpreted as habitation refuse, and thermal features were found.

Nonstructural features identified include a dense layer of habitation refuse and four thermal features. The dense layer of charcoal-stained soil and artifacts (Stratum 2) resembles a midden deposit that would be associated with a habitation location. Testing shows that Stratum 2 measures 90 m north-south by 70 m east-west and has a maximum depth of 50 cm below modern ground surface.

Stratigraphy revealed by the test excavations provided evidence for an intensive or long-term occupation during the Late Developmental period. The culturally rich layer that included several thermal features supports this inference. The stratigraphic relationship between these features and the cultural horizon suggests that this area was intensively used during the later stages of site occupation or was reoccupied shortly after the site was abandoned.

The majority of decorated pottery types recovered from LA 391 appear to have originated from the Cibola region (see Table 13.6). Although the number of sherds from this region are few, their presence does suggest established interaction with these regions. The occurrence of Red Mesa Black-on-white, Gallup Black-on-white, and Escavada Black-on-white suggests that the site was initially occupied during the 900s with little evidence for occupation into the 1100s. However, more refined ceramic seriation and chronometric data are needed to address the duration, intensity, and extent of these relationships.
8. TEST EXCAVATIONS AT LA 835, AREA 6  
(THE POJOAQUE GRANT SITE)

Introduction

LA 835 is a large, Late Developmental period, multicomponent habitation site. This site is located at the base of a prominent sandstone mesita 400 m east of the Rio Tesuque. The site measures 850 m north-south by 850 m east-west and is comprised of 20 to 21 house units and a great kiva (Fig. 8.1). The great kiva is located at the base of the mesita, while the house units are scattered along low ridges that trend southwest from the mesita. LA 835 is webbed with abandoned roads, several of which have developed into deep arroyo channels.

The proposed right-of-way, which includes Area 6 of LA 835, will be acquired from private sources and Pojoaque Pueblo (Fig. 8.2). Test excavations were conducted in this portion of the site to determine the presence, depth, extent, and nature of archaeological deposits.

History of Site Record

LA 835 was originally recorded by H. P. Mera in the 1930s (NMCRIS files, ARMS). Mera mapped the site and made limited surface collections (ARC, LOA). Mera also recorded two smaller sites in this area, LA 833 and LA 834. Due to their proximity to LA 835, subsequent studies have them recorded as part of LA 835 (Peckham 1984; Levine 1987; Wiseman 1995) (Fig. 8.1).

LA 835 was partially excavated in 1953 by Stanley Stubbs of the Laboratory of Anthropology (Stubbs and Stallings 1953; Stubbs 1954). Stubbs organized the site into house groups, which he identified by letter. House groups typically consisted of a room block consisting of 10 to 20 rooms, pit structure or kiva, and an associated midden. Stubbs identified 12 to 15 such house groups and a great kiva. He completely or partially excavated three house groups and dug several test trenches at four other locations, including the great kiva. Stubbs estimated that the site was occupied between A.D. 950 and 1100 (Stubbs and Stallings 1953). Unfortunately, he died before publishing the excavation details.

Since Stubbs made his preliminary estimate of the occupation dates of LA 835, many of the tree-ring samples he collected have been dated (Ahlstrom 1985; Robinson et al. 1972). Although most samples did not produce cutting dates, the few cutting dates identified suggested the site was occupied between A.D. 1000 and 1150. A reassessment of the tree-ring data from House Groups A and B suggest the site was occupied between A.D. 750 and 1150 (Wiseman 1995).

In 1997, archaeological excavations at LA 835 were resumed by the OAS in conjunction with road improvements along U.S. 84/285 (Wiseman 1996). These investigations involved excavating two pit structures and nearby extramural areas (Boyer and Lakatos 1997). Additionally, sample areas were established at each house group to record surface ceramics to obtain data complementary to those collected during the excavations.
Figure 8.1. LA 835: site map.
Preliminary ceramic and archaeomagnetic data from these excavations suggest that the pit structures were occupied between 1050 and 1150. Ceramic data indicate that a large portion of the site was occupied during this time period, although absolute contemporaneity cannot be established. Although the preliminary ceramic data do not support occupation dates as early as Wiseman has suggested, they do suggest that portions of the site were occupied earlier than the reported cutting dates. House groups located at the base of the mesita, including the great kiva, appear to be used by A.D. 900.

In 1999, LA 835 was resurveyed by the Bureau of Indian Affairs (McKenna, pers. comm. 2000). This detailed inventory identified 21 prehistoric house groups, several artifact scatters, and historic artifact scatters (Peter McKenna, pers. comm. 1999). Ceramic data from this re-survey support the notion that house groups located at the base of the mesita and the great kiva were occupied by A.D. 900 (Peter McKenna, pers. comm. 1999).

Testing Procedures

Because the OAS conducted earlier investigations at LA 835 (Wiseman 1996; Boyer and Lakatos 1997), it was important to link the investigations during this project to the earlier work. Field investigations began by establishing vertical and horizontal control relative to the previously established grid system. Grid unit coordinates were determined relative to a main datum designated 0N-S/0E-W. The grid was oriented to grid north, parallel to the existing right-of-way, and grid units were identified by the coordinates of their northeast corners.

Three subsurface testing methods were used to investigate this portion of LA 835: auger tests, excavation of 1-by-1-m grid units, and backhoe trenching. Auger tests, placed in transects along the established grid system, were used to define horizontal and vertical limits of cultural material. Auger transects were spaced 2 m apart. Auger tests were placed every 4 m and offset every other transect by 2 m to maximize systematic coverage. Test unit excavations focused on areas that produced cultural material during auger tests. Test units were excavated in arbitrary 10-cm levels and all fill was screened through ¼-inch hardware cloth.

Testing Results

A total of 141 auger tests, four 1-by-1-m test excavation units, and seven backhoe trenches were excavated during test investigations at LA 835, Area 6. Auger tests identified the presence of two shallow historic pit features and an area of redeposited prehistoric refuse. Test units and mechanical excavation were used to define the limits of these features and deposits. They are located on the west side of U.S. 84/285 within the proposed project limits. Preliminary artifact analysis indicates that this portion of LA 835 has two temporal components. The earliest component dates to the Late Developmental period, while the later component is historic, dating after about 1850. Tables 8.1 and 8.2 list artifact types and counts from the site.
Figure 8.2. LA 835, Area 6: excavation overview.
Table 8.1. LA 835: Artifact Type and Count by Auger Test Level

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<tr>
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</tbody>
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Table 8.2. LA 835: Artifact Type and Count by Test Excavation Unit and Level

<table>
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<th>UNIT LEVEL</th>
<th>ARTIFACT TYPE</th>
<th>GRID UNIT</th>
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<td>12</td>
<td>Ceramic</td>
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</table>
Stratigraphic Descriptions

Six stratigraphic layers were identified through these tests. Cultural deposits ranged in depth from 10 cm to 1.2 m below modern ground surface. The nature, depth, and interpreted character of these deposits are presented below.

Stratum 1: Light yellowish brown (10YR 6/4 dry), fine, silty sand containing few charcoal flecks and artifacts. A poorly consolidated, post-abandonment, colluvial layer, Stratum 1 is homogeneous in color and texture, and has a maximum thickness of 20 cm. This layer is extensively mixed by rodent activity.

Stratum 2: Light yellowish brown (10YR 6/4 dry), coarse, silty sand containing 20 to 30 percent gravel. Stratum 2 is a redeposited layer of gravel similar in consistency and content to base coarse. Stratum 2 is homogeneous in color and texture, and has a maximum thickness of 10 cm.

Stratum 3: Very pale brown (10YR 7/4 dry), fine, silty sand containing few charcoal flecks and artifacts. Stratum 3 is a poorly consolidated, post-abandonment, colluvial layer. It is homogeneous in color and texture and displays a weak laminar structure. This layer has a maximum thickness of 45 cm and is moderately mixed by rodent activity.

Stratum 4: Light yellowish brown (10YR 6/4 dry), coarse, silty sand containing charcoal, artifacts, and gravel. Stratum 4 is a poorly consolidated deposit of secondary refuse. It is homogeneous in color and has a maximum thickness of 25 cm. This layer represents feature fill. Limited mixing by rodent activity was identified.

Stratum 5: Light yellowish brown (10YR 6/4 dry), coarse, silty sand containing charcoal, artifacts, and gravel. A poorly consolidated, colluvial deposit containing secondary refuse, Stratum 5 is homogeneous in color, contains pockets of coarse gravel and artifacts, and has a maximum thickness of 50 cm. This layer represents post-abandonment slope-wash. Limited mixing by rodent activity was identified.

Stratum 6: Very pale brown (10YR 7/3 dry), coarse, silty sand containing gravel. A moderately consolidated, colluvial deposit, homogeneous in color, and containing pockets of coarse gravel, this layer represents the culturally sterile substrate. Limited mixing by rodent activity was identified.

Auger Tests

Auger tests identified the remains of two historic features and an area of redeposited prehistoric refuse. These tests indicated that the historic features were relatively shallow while the prehistoric refuse was deeply buried.

Auger test 10N/99W recovered cultural material down to 50 cm below modern ground surface. The quantity of cultural material, associated with dense, charcoal-stained soil, indicated that this may be a filled pit. Test unit excavations were conducted at this location to identify the source and nature of the cultural material. Test unit excavation results are presented below.

Auger test 54N/124W yielded similar results, indicating the presence of another historic pit.
feature. Mechanical excavations were used to define this deposit. Mechanical excavations results are presented below.

Auger 20N/94W recovered cultural material, primarily charcoal, down to 1.2 m below modern ground surface. The test indicated that this may be a refuse area associated with the Late Developmental period component at this site. Test unit excavations were conducted at this location to identify the source of these cultural materials. Test unit excavation results are presented below.

Test Units

Test units consisting of contiguous 1-by-1-m grid units were established at two locations to define stratigraphy and investigate the nature of cultural deposits identified through auger tests. Test unit excavations identified intact subsurface cultural deposits that represent two historic refuse pits and redeposited prehistoric refuse.

Test Units 11N/98W and 11N/99W were excavated to a maximum depth of 35 cm below modern ground surface. Stratigraphy within these units consisted of Strata 1, 2, 3, and 4. These units defined the northern half of Feature 65, a historic refuse pit (Fig. 8.3). Feature 65 was constructed by excavating a steep sided basin into the native sterile substrate. The exposed portion of the feature measured 70 cm by 60 cm and contained burned rock, charcoal, metal, and glass. These materials may have been redeposited from another location. Preliminary artifact analysis suggests that this deposit represents domestic refuse dating between about 1850 and 1930.

Test Units 19N/95W and 20N/95W were excavated to identify the source of deeply deposited prehistoric refuse identified in auger tests. These units were excavated to a maximum depth of 1.2
Strata 1, 2, 3 and 5. Excavations identified a high energy colluvial deposit containing redeposited cultural material transported from upslope.

Mechanical Excavation

Seven backhoe trenches were excavated within the project area (Table 8.3). With the exception of Backhoe Trench 7, all mechanical excavations were void of cultural material. Backhoe Trench 7 defined the extent of a domestic refuse area identified by auger tests. The deposit was identified 10 cm below modern ground surface in the southwestern portion of the trench and measured 30 cm deep by 70 cm long. No discernable pit or feature was identified in the trench profile. Preliminary artifact analysis suggests this deposit represents historic domestic refuse dating between about 1850 and 1930.

Table 8.3. LA 835: Descriptions of Backhoe Trenches

<table>
<thead>
<tr>
<th>TRENCH NO.</th>
<th>LENGTH (m)</th>
<th>WIDTH (m)</th>
<th>MAX DEPTH (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT-1</td>
<td>19.5</td>
<td>.60</td>
<td>1.40</td>
</tr>
<tr>
<td>BT-2</td>
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<td>BT-3</td>
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<td>1.30</td>
</tr>
<tr>
<td>BT-4</td>
<td>9.0</td>
<td>.60</td>
<td>.90</td>
</tr>
<tr>
<td>BT-5</td>
<td>10.0</td>
<td>.60</td>
<td>.90</td>
</tr>
<tr>
<td>BT-6</td>
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<tr>
<td>BT-7</td>
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<td>.60</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Summary of Testing Results

Excavations at LA 835 were minimally successful in addressing the proposed testing goals. These excavations identified intact subsurface deposits that extend into proposed project limits. Although these deposits are relatively shallow, their natures suggest that this portion of LA 835 contains Late Developmental period and historic period components. No structural remains were encountered during test excavations, but nonstructural remains were identified.

Nonstructural features identified include two historic refuse pits and an area of redeposited prehistoric refuse. The historic refuse pits contain burned rock, charcoal, metal, glass and ceramics. These features appear to represent secondary deposits of domestic refuse or areas where refuse was repeatedly disposed and burned. They cannot be associated with a distinct habitation location. Test excavations also identified an area of redeposited prehistoric refuse consisting of ceramics, chipped stone artifacts, and charcoal flecks. This refuse is present in a high-energy colluvial deposit that appears to have transported these materials from upslope.

Limited data for addressing regional interaction during the Late Developmental period were recovered. Materials associated with this temporal component are redeposited and, therefore, offer limited data potential for addressing these issues.
9. TEST EXCAVATIONS AT LA 3119

Introduction

LA 3119 is a Late Developmental period, multicomponent, habitation site. The site is located on a southeast-facing knoll 260 m east of the Rio Tesuque. LA 3119 measures 120 m north-south by 230 m east-west and is present on both sides of U.S. 84/285 (Fig. 9.1). An unknown portion of LA 3119 has been affected by highway construction, routine right-of-way maintenance, recent off-road traffic, and arroyo cutting. Although the cultural deposits investigated during testing are located on the west side of U.S. 84/285, widely dispersed cultural materials were present on the east side of the highway. The proposed project area, which includes a portion of LA 3119, is within existing highway right-of-way.

History of Site Record

An examination of NMCRIS records at ARMS revealed a confusing site history. LA 3119 was originally inventoried as part of the Highway Cultural Inventory Project (HWCI; Alexander 1964). The site location on ARMS maps does not match the site description, site map, and location description provided in the original site records, suggesting that the site was mislocated on the ARMS maps. A site whose description and location match those of LA 3119 was assigned the number LA 111327 during the survey for this project (Hohmann et al. 1998). ARMS was notified of the duplication and they abandoned the newer number. Archaeological investigations conducted by the OAS at this location identified the site by its original number, LA 3119.

Testing Procedures

Prior to field investigations, the proposed project area and all subsurface utilities were identified. Excavation procedures followed those detailed in the testing plan (Boyer 1999) and the field manual (Boyer and Moore 1999). Field investigations began by establishing a site datum assigned grid coordinates 500N/500E and an arbitrary elevation of 10 m below datum, at GPS location 1998 PS11599, and a grid system oriented to magnetic north. Vertical and horizontal controls were maintained relative to this point.

Prior to subsurface investigations, site limits and surface manifestations, including artifact and charcoal-stained soil concentrations and proposed project limits, were defined and mapped. Subsurface testing focused on locations of artifact concentrations and charcoal-stained soil to determine if these areas were associated with structural remains. Two subsurface testing methods were used to investigate LA 3119: auger tests and excavation of 1-by-1-m grid units.

Auger tests were conducted in transects along the established grid system to define horizontal and vertical limits of cultural deposits. Auger transects were spaced 2 m apart. Auger tests were placed every 4 m and offset every other transect by 2 m to maximize systematic coverage. Test unit locations were determined by surface manifestations and by auger tests that identified buried cultural material. Test units were excavated in arbitrary 10-cm levels. All fill was screened through ¼-inch hardware cloth.
Testing Results

A total of 110 auger tests and seven 1 m by 1 m test excavation units were excavated during test investigations at LA 3119. These excavations identified one adobe surface structure, two shallow pit structures, and two associated refuse areas or middens. The remains and deposits represent two residential loci from two Late Developmental period occupations. Tables 9.1 and 9.2 list artifact types and counts from the site.

Table 9.1. LA 3119: Artifact Type and Count by Auger Test Level

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</tr>
<tr>
<td>2</td>
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Table 9.2. LA 3119: Artifact Type and Count by Test Excavation Unit and Level
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<td>TOTAL</td>
<td></td>
<td>378</td>
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</table>

**Stratigraphic Descriptions**

Ten stratigraphic layers were identified through these tests. Cultural deposits ranged in depth from 10 cm to 80 cm below modern ground surface. The nature, depth, and interpreted character of these
deposits are presented below.

Stratum 1: Grayish brown (10YR 5/2 dry), coarse, silty sand containing charcoal, artifacts, and structural debris. A poorly consolidated, post-abandonment, colluvial deposit, Stratum 1 is homogeneous in color and texture, and has a maximum thickness of 50 cm. This layer is extensively mixed by rodent activity.

Stratum 2: Grayish brown (10YR 5/2 dry), coarse, silty sand containing charcoal, artifacts, and cobbles. Stratum 2 is a poorly consolidated deposit of secondary refuse mixed with post-abandonment colluvial material. Stratum 2 is homogeneous in color and texture, and has a maximum thickness of 50 cm. This layer represents the latest occupation of the site and is moderately mixed by rodent activity.

Stratum 3: Pale brown (10YR 6/3 dry), coarse, silty sand containing charcoal, artifacts, adobe, cobbles, and friable sandstone. Stratum 3 is a moderately consolidated layer of post-abandonment structural collapse material. This deposit is irregular, discontinuous, and has a maximum thickness of 25 cm. Minimal mixing by rodent activity was identified.

Stratum 4: Very pale brown (10YR 7/2 dry), fine, ash and charcoal. Stratum 4 is a moderately consolidated secondary deposit of ash and charcoal that displays numerous horizontal substrata suggesting post-depositional pooling. This deposit is homogeneous in color and texture, and has a maximum thickness of 15 cm. Minimal mixing by rodent activity was identified.

Stratum 5: Light grayish brown (10YR 6/2 dry), coarse, silty sand containing charcoal, artifacts, adobe, and friable sandstone. A poorly consolidated, post-abandonment, colluvial deposit with weak laminar structure, this deposit is homogeneous in color and texture, and has a maximum thickness of 25 cm. The deposit represents the initial fill layer within a structure. Moderate mixing by rodent activity was identified.

Stratum 6: Grayish brown (10YR 5/2 dry), coarse, silty sand containing charcoal, artifacts, and friable sandstone. Stratum 6 is a poorly consolidated colluvial deposit mixed with secondary refuse. This deposit is homogeneous in color and texture, and has a maximum thickness of 55 cm. It represents a sheet midden deposit. Minimal mixing by rodent activity was identified.

Stratum 7: Light brown (7.5YR 6/3 dry), coarse, silty sand containing few charcoal flecks and artifacts. A poorly consolidated, mixed deposit of secondary refuse and culturally sterile substrate, this deposit is homogeneous in color and texture, and has a maximum thickness of 40 cm. Moderate mixing by rodent activity was identified.

Stratum 8: Light brown (7.5YR 6/3 dry), coarse, silty sand containing gravel, cobbles, and friable sandstone. A moderately consolidated colluvial deposit, this layer is the culturally sterile substrate.

Stratum 9: Light grayish brown (10YR 6/2 dry), coarse, silty sand containing charcoal, artifacts, adobe, ash, friable sandstone, and dense concentrations of ash, charcoal, and artifacts (dark gray 10YR 4/1 dry). A poorly consolidated deposit of secondary refuse, Stratum 9 has a maximum thickness of 50 cm and represents numerous discrete refuse deposit events. Moderate mixing by rodent activity was identified.

Stratum 10: Pinkish gray (7.5YR 6/2 dry), coarse, silty sand containing charcoal, artifacts, and adobe. Stratum 10 is a poorly consolidated, post-abandonment, colluvial layer of secondary refuse and structural collapse material. This deposit is homogeneous in color and displays numerous substrata of sorted sand and silt. Stratum 10 has a maximum thickness of 25 cm and represents the initial noncultural fill layer within a structure. Moderate mixing by rodent activity was identified.
Auger Tests

Auger tests identified the remains of two habitation locations and their associated refuse areas. The structural remains were 10 m to 15 m apart, a spatial distinction that was not as clear between the associated midden locations. Although refuse areas were defined for each loci, they are mixed at their intersecting margins (Fig. 9.2).

Auger test 490N/504E recovered cultural material down to 50 m below modern ground surface. The quantity of cultural material, associated with dense charcoal-stained soil and structural debris, indicated that this was a filled pit structure. Test unit excavations conducted at this location identified a trash filled pit structure. Test unit excavation results are presented below.

Auger tests 480N/526 and 486N/508E recovered cultural material, primarily charcoal, down to 1.2 m and 1.0 m below modern ground surface, respectively. These tests indicated a refuse area associated with the structure identified in auger test 490N/504E. Test unit excavations were conducted at this location to identify the source and nature of this cultural material. Test unit excavation results are presented below.

Auger test 460N/510E yielded similar results as did tests 480N/526 and 486N/508E, suggesting the presence of another refuse area. This refuse area appears to be associated with the pit structure identified in Test Unit 470N/500E.

Test Units
Test units were established at several locations to define stratigraphy and to investigate the nature of cultural deposits identified through auger tests. Test units consisted of single or contiguous 1-by-1-m grid units. Test unit excavations identified intact subsurface cultural deposits representing one surface structure, two pit structures, and associated refuse areas. These remains appear to be associated with two habitation loci.

Locus 1 is located in the western portion of the area investigated during testing. It consists of an adobe surface structure, a shallow pit structure, and an associated midden. The surface structure was identified in Test Units 485N/495E and 486N/495E. These units were excavated to a maximum depth of 30 cm below modern ground surface. Stratigraphy within the units consisted of Stratum 1.

Test excavations identified three rows of upright, unshaped, tabular sandstone fragments and an upright metate. The alignments are oriented northwest to southeast and spaced 25 cm to 30 cm apart. These rocks appear to have been incorporated into the construction of an adobe wall that collapsed and melted away, leaving the rocks in situ. The alignments are similar to wall fall patterns seen in collapsed masonry structures (Fig. 9.3).

A shallow pit structure was identified in Test Unit 475N/500E, 6 m down-slope from the surface structure (Fig. 9.1). Test unit 475N/500E was excavated to a maximum depth of 80 cm below modern ground surface. Stratigraphy within the unit consisted of Strata 1, 2, 3, 4, and 5. The floor of the structure consisted of sterile substrate (Stratum 8) and was difficult to define. Following abandonment, this structure filled with a mixed colluvial deposit containing secondary refuse (Stratum 5) and structural collapse material (Stratum 3). Subsequent to filling, evidence of a later occupation is represented by Strata 2 and 4.

A refuse area associated with this habitation locus was identified in Test Unit 464N/511E. This unit was excavated to a maximum depth of 90 cm below modern ground surface. Stratigraphy within this unit consisted of Strata 1, 6, and 7. Stratum 6 was a layer of mixed secondary refuse that defined the cultural horizon. Since the cultural material within this layer was not stratified, these materials cannot be securely associated with a distinct occupation.

Figure 9.3. LA 3119: plan view of Test Units 485-486N/495E, showing possible surface structure wall fall pattern.
Locus 2 is located in the eastern portion of the area investigated during testing. It consists of a pit structure and associated refuse area. The pit structure was identified in Test Unit 490N/504E. This unit was excavated to a maximum depth of 90 cm below modern ground surface. Stratigraphy within the unit consisted of Strata 1, 3, 7, 9, and 10. These strata indicated the presence of two occupations. The floor of the structure (Stratum 7) was compact with one floor feature, a subfloor pit or posthole (Fig. 9.4).

Following abandonment, the structure filled with a mixed colluvial deposit containing secondary refuse (Stratum 10) and structural collapse material (Stratum 3). Evidence of a later occupation is represented by Stratum 9, a deposit of secondary refuse. This deposit displayed distinct refuse depositional events, suggesting that this structure was intentionally filled. The integrity of the deposit indicates that an additional structural location may be nearby. Although the occupants of the Locus 1 structure may have been the source of this deposit, it is also possible that the materials are associated with an unidentified structural location outside the project area.

Test Units 485N/507E and 475N/526E identified a refuse area associated with this habitation locus. These units were excavated to a maximum depth of 60 cm and 1.1 m below modern ground surface, respectively. Stratigraphy within these units consisted of Strata 1, 6, and 7. Stratum 6 was a layer of mixed, secondary refuse that defined the cultural horizon. Since the cultural material within this layer was not stratified, these materials cannot be securely associated with a distinct occupation.

**Summary of Testing Results**

Excavations at LA 3119 were successful in recovering data needed to address most of the proposed testing goals. The excavations identified intact subsurface deposits that extend into proposed project limits. Although these deposits are relatively shallow, they show that this was a Late Developmental period, multicomponent habitation site. Structural remains include one adobe surface structure and two shallow pit structures. Nonstructural features include refuse areas or middens.
associated with the occupation of these structures.

The structural and nonstructural features appear to be associated with two distinct habitation loci separated by 10 to 15 m. Locus 1 contains a surface structure, pit structure, and refuse area. Locus 2 contains a pit structure, refuse area, and, possibly, a surface structure. Each habitation loci provided evidence for reoccupation following short periods of abandonment.

The pit structures appear to be similar in size and depth, about 4 m in diameter and at least 80 cm deep. These structures appear to have been constructed by excavating steep-sided basins into the culturally sterile substrate. Limited evidence of plastering on walls and floors was identified. A single floor feature, identified in the Locus 2 pit structure, consists of a posthole or subfloor pit. Construction materials identified include adobe and unshaped sandstone and quartzite cobbles. These materials appear to have been used as closing material or in upper portions of the pit structure walls. Similar construction materials were identified in surface structure construction.

Based on testing data, the size of the surface structure cannot be accurately determined. However, construction materials and techniques were identified. Test excavations identified three rows of upright, unshaped, tabular sandstone fragments and an upright metate. Rather than stone wall footers, it appears that these rocks were originally incorporated horizontally in wall construction. The wall subsequently collapsed and the adobe melted away, leaving the rocks in situ. The vertical orientation of these stones is similar to wall-fall patterns seen in collapsed masonry structures.

Nonstructural features include two refuse areas, each probably associated with one of the habitation loci. Combined, the refuse areas measure 25 m north-south by 50 m east-west. Test excavations determined that these features have a maximum depth of 60 cm below modern ground surface. Each of these features could be associated, horizontally, with one of the distinct habitation loci, but mixing has occurred at their margins, obscuring clear distinctions and definite associations with the habitation loci at this level of investigation.

Stratigraphy and pottery types recovered provide evidence for two occupations during the Late Developmental period. Following abandonment, each pit structure filled with a mixed colluvial deposit containing secondary refuse and structural collapse materials. In the Locus 1 pit structure, evidence of a later occupation is represented by a second colluvial deposit mixed with secondary refuse. Two layers are distinct and separated by a layer of structural collapse material. Evidence of a later occupation within the Locus 2 structure is represented a deposit of secondary refuse. This deposit displayed distinct refuse deposition events, suggesting the structure was intentionally filled.

Stratigraphy also indicated these structures were not maintained, and that sufficient time elapsed between occupations for them to fall into disrepair. The site appears to have been reoccupied shortly after collapse of the structures.

Decorated pottery types recovered from LA 3119 support the stratigraphic evidence that a portion of the site had been reoccupied. The majority of these types were imported from nearby regions. A lower percentage display characteristics typical of local manufacture. The highest percentage of imported decorated pottery appears to have originated from the Cibola region followed by the Jornada Mogollon region (see Table 13.6). Although the number of sherds from these regions are few, their presence does suggest established interaction with these regions.

The occurrence of Cibola types, such as Red Mesa Black-on-white, Gallup Black-on-white, and Escavada Black-on-white, with the locally made Kwahe-e Black-on-white suggests portions of this site were initially occupied during the 900s and again during the 1100s. Although there may be overlap in the manufacture dates for these types, the stratigraphic data indicate LA 3119 was reoccupied rather than continually occupied. However, a more refined ceramic seriation and chronometric data are needed to address the duration, intensity, and extent of these relationships.
10. RECOMMENDATIONS

Test excavations conducted at LA 388, LA 389, LA 391, LA 835, and LA 3119 identified intact subsurface, and in some instances stratified cultural deposits. These sites have the potential for providing important information on the prehistory of the region. Therefore, LA 388, LA 389, LA 391, LA 835, and LA 3119 are recommended for data recovery. Although each site may not be able to address every aspect of the data recovery plan, each site has the potential to address one or more facets of the plan.

Test excavations at LA 388, LA 391, and LA 3119 revealed evidence of Late Developmental period habitation areas within the project limits. Testing at LA 388 identified two adobe surface structures, two shallow pit structures, an area of dense refuse associated with a minimum of two occupations during this time period. Test excavations at LA 391 identified four subsurface features and a dense layer of intact secondary refuse. These deposits were clearly defined and suggest that LA 391 had an intensive or long-term occupation during the Late Developmental period. Although no structural remains were identified during testing, the density of charcoal-stained soil, quantity of artifacts, and the number of nonstructural features suggest that LA 391 was a habitation site. Test excavations at LA 3119 identified one adobe surface structure, two shallow pit structures, and two associated refuse areas or middens. These deposits represent two distinct Late Developmental period residential loci with a minimum of two occupations during this time period.

LA 388, LA 391, and LA 3119 have the potential to provide information on Late Developmental architecture, site structure, ideological practices, community structure, and integration (see Chapters 13 and 20). These sites may be expected to provide important chronometric information, not only useful for addressing site occupation and reoccupation, but for developing a tightly controlled ceramic seriation (see Chapters 14 and 19). In addition to identifying temporally sensitive characteristics, ceramic artifacts will inform on regional and interregional interaction patterns. Furthermore, these sites have the potential to contribute important chipped stone, ground stone, floral, and faunal information for addressing the economic structure and strategies of the Northern Rio Grande inhabitants during the Late Developmental period (see Chapters 13, 14, 15, 16, and 17). Finally, the probable presence of human remains at these sites points to the potential to inform directly on the diet, health, and population relationships of these inhabitants (see Chapter 21).

Test excavations at LA 389 identified one subsurface thermal feature. Although limited material culture was recovered from this site, LA 389 has potential to provide chronometric information. The preservation of this feature, in addition to its oxidized rind, suggests this site could yield an archaeomagnetic date. In addition, there is limited documentation on previous work conducted at LA 389. Therefore, chronometric data would provide a basis for addressing cultural and temporal affiliation of this site.

Test excavations at a portion of LA 835 identified two temporal components. The earliest component dates to the Late Developmental period, while the later component is historic, dating after about 1850. These components are represented by an area of redeposited prehistoric refuse and two shallow historic pit features, respectively. Although the historic features do not relate to the prehistoric research design, LA 835 is addressed here since it is the largest recorded Late Developmental site in the Northern Rio Grande. Since the major component and previous research have focused on the Late Developmental period, the historic component at LA 835 has been under-reported. Much of the site is webbed with historic roads and contains historic refuse scatters. This area of LA 835 has the potential to provide information on this underreported component. In addition, this information may complement the research orientation used to address other historic sites being investigated on this project (Moore 2000).
PART 3: A PLAN FOR DATA RECOVERY AT PREHISTORIC SITES ALONG THE U.S. 84/285 SANTA FE TO POJOAQUE CORRIDOR
11. IN SEARCH OF WENDORF AND REED: A FRAMEWORK FOR DATA RECOVERY INVESTIGATIONS

Jeffrey L. Boyer and Steven A. Lakatos

Introduction to the Data Recovery Plan

This section of the report, Part 3, is a plan for data recovery investigations at prehistoric sites in the Santa Fe to Pojoaque Corridor project area. Although Part 2 of the report presents the results of testing investigations at five prehistoric sites in the northern portion of the project area, the emphasis of Part 3 is not limited to the northern sites. Instead, following a precedent set in the project testing plan (Boyer 1999), the data recovery plan in Part 3 is intended to apply to all prehistoric sites that will be recommended for data recovery investigations within the project area. We are able to present a data recovery plan with a broader scope than just the sites reported in the testing results section, based on the familiarity of OAS staff with the prehistoric sites in the project area as well as the results of several projects in the southern Tewa Basin (Anschuetz 1986; Akins, in press a, in press c, n.d.a; Boyer and Lakatos 1997; Hannaford 1986; Lent et al. 1994a, 1994b; Moore 1989a, n.d.; Ware et al. 1994; Wiseman 1996), and in nearby areas (Post 1996; Hannaford, in press; Boyer et al. 1994; Boyer and Urban 1995; Boyer 1997; Lent 1991; Wiseman 1992; Anschuetz et al. 1985; Maxwell 1997).

In this chapter, we present the general research direction for investigations at prehistoric sites in the project area (In Search of Wendorf and Reed). Following that is a summary of prehistoric archaeology in the Northern Rio Grande region (Regional Chronology, Settlement Patterns, and Material Culture in the Northern Rio Grande). Although not exhaustive in scope, this summary is intended to present a review of project results since Wendorf and Reed summarized regional archaeology 45 years ago. Finally, we connect issues raised by Wendorf and Reed with chapters that follow in the data recovery plan.

In Search of Wendorf and Reed

In 1955, Fred Wendorf and Eric Reed published their “alternative reconstruction” of the prehistoric cultural sequence of the Northern Rio Grande region of New Mexico (Wendorf and Reed 1955), based on negotiated alterations to Wendorf’s (1954) earlier “reconstruction.” They defined the region as bounded approximately by the New Mexico-Colorado border on the north, the pueblo of Isleta on the south, the Canadian River on the east, and the drainages of the Rio Puerco of the East and the Rio Chama on the west. Regarding the region’s prehistory, Wendorf and Reed (1955:133) state:

Although the Spanish accounts indicated that this area was one of the major centers of Pueblo population in 1540, it seems clear that such conditions were a comparatively recent development in the prehistoric past. Archaeological surveys indicate that during much of the time that the great population and cultural centers of the San Juan and Little Colorado drainages were developing and reaching a climax, the Northern Rio Grande was a peripheral area in both population and cultural development.

Their perception of the “peripheral” nature of the Northern Rio Grande region, relative to the San Juan and Little Colorado regions, led Wendorf and Reed (1955:133-134) to the following conclusion:
... many of the diagnostic criteria used in chronologically arranging the sites found farther west in New Mexico and Arizona appear late or not at all in the Rio Grande. It is apparent, therefore, that the existing conditions ... generally employed to categorize the San Juan Anasazi remains in the Four Corners area could be used in the Northern Rio Grande only with considerable modification ... 

This conclusion is echoed by Peckham, whose review of the history of Rio Grande archaeology and of differences between archaeology in the Rio Grande region and the Four Corners leads him to state:

It was a matter of some controversy, and the problem was more than just terminological. The Pecos classification worked moderately well in the San Juan Basin of northwestern New Mexico where ruins were abundant and, with the notable exception of Chaco Canyon, fairly consistently reflected the scheme developed at Pecos. The Rio Grande region just didn’t fit. No matter how hard Rio Grande archaeologists tried to adjust their interpretations to the Pecos classification, their field work suggested that prior to Pueblo IV evidence of cultural development was either missing, truncated, or inconsistent, and only occasionally corresponded to that in the west. (Peckham 1984:275-276)

Perhaps Wetherington (1968:71) makes the point most succinctly:

With the archeological revelation of a distinct Anasazi pattern of culture along the Rio Grande, as well as unique enclaves in more peripheral areas, the Pecos Classification has reached the limit of area-wide applicability and its growing pains have become afflictions of senility.

With this situation in mind, Wendorf and Reed (1955:134) proposed “a chronological framework designed specifically for the developments” in the prehistory of the Northern Rio Grande. This framework is the core of their “alternative reconstruction.” A review of recent synthetic and project-specific literature suggests that the Wendorf and Reed framework has been dealt with in three ways. Some researchers have accepted the framework, either as-is or with some modifications (see, for instance, Wetherington 1968; Dickson 1979; McNutt 1969; Skinner et al. 1980; Peckham 1984 [who calls it the Rio Grande Classification]; Cordell et al. 1994; Post 1996; Crown et al. 1996 [but only for the Pajarito Plateau]; Powers and Orcutt 1999).

Others have rejected the Wendorf and Reed framework. Some refer only to the Pecos Classification, with modifications to conform the periods to temporal data from the Rio Grande Valley (see, for instance, Ellis 1975; Cordell 1978, 1979, 1984; Fosberg 1979; Hunter-Anderson 1979a, 1979b; Franklin 1992). Glassow’s (1980) sequence for the Cimarron District assigns phase names to the periods of the Pecos Classification. Cordell and Plog (1978) argue against using any “normative” classification. Later, Cordell (1989; Cordell and Gumerman 1989) proposes an entirely different framework based on a macro-regional, pan-Southwest perspective. This framework has not gained acceptance in the region.

Finally, some researchers have attempted to correlate the Wendorf and Reed framework with the Pecos Classification. In these attempts, the Wendorf and Reed framework is usually identified by reference to the Pecos Classification rather than as a different temporal and developmental framework (see, for instance, Biella and Chapman 1977a, 1977b; Biella 1979; Quinn 1980; Stuart and Gauthier 1981; Anschuetz 1995; Anschuetz et al. 1997).

By implication, researchers who accept the Wendorf and Reed framework appear to also accept their notion that developments in the Northern Rio Grande region were sufficiently different from
those in the San Juan Basin and Four Corners regions to justify examining them within a different framework. In contrast, those who reject the Wendorf and Reed framework, appear to reject the same notion. The latter position suggests that developments in the Northern Rio Grande region were sufficiently similar to those in regions to the west to warrant examining them all within the same framework. In this position, the Rio Grande is an Anasazi subregion and developments in the subregion are viewed in light of regional trends. The same position is taken by those researchers who correlate the Wendorf and Reed framework with the Pecos Classification. In essence, these researchers also see the Northern Rio Grande as an Anasazi subregion. They appear to be willing to accept some differences in subregional trends, as described by subregional frameworks such as the Wendorf and Reed framework. At the same time, they attempt to correlate the trends, particularly their timing, with the Pecos Classification, which, by inference, describes and integrates developments across the entire region.

It is apparent, however, that the Wendorf and Reed framework involves more than a chronological framework within which to describe local or regional trends. The patterns that Wendorf and Reed observed in the archaeological record reflect more than archaeological trends needed to merely define chronological sequences. They also reflect regional and intraregional trends in social relations, community structure, architectural structures and features, economy and subsistence strategies, artifact assemblage compositions, and material technologies. As such, the Wendorf and Reed framework potentially provides the bases for testable models of northern New Mexican prehistory. However, the framework, and particularly the archaeological patterns on which it is based, has not been well tested. None of the references cited above present a systematic examination of the observed patterns to determine their validity or assess their relationships to the framework.

Instead, a review of the literature cited above suggests to us that disagreements about the applicability of the reconstruction are more often based on apparently conflicting paradigms. Within these paradigms, data gathered both before and since Wendorf and Reed presented their reconstruction are interpreted to represent different conclusions: “Archaeological knowledge of the past is totally dependent upon the meanings which archaeologists give to observations on the archaeological record” (Binford and Sabloff 1982:149). It seems apparent to us that modifying, rejecting, or ignoring the Wendorf and Reed framework falls less on purposeful testing of the patterns on which the framework was predicated than on perceived paradigmatic disagreements.

It is certainly true that archaeology as a field of scholarship has undergone significant paradigmatic changes since the mid 1950s. The most profound change was the rejection, beginning in the 1960s, of cultural-historical studies in favor of explicitly theoretical and, often, nonhistorical interpretations of data. We see this as the root of the perceived paradigmatic conflicts, in that the Wendorf and Reed reconstruction is clearly cultural-historical in nature, and invoking cultural-historical causes for patterns in the archaeological record has been seen as unexplanatory since the beginning of the theoretical “revolution” in the 1960s. In the Northern Rio Grande region, research since the 1960s has most often been guided by cultural-ecological and processual paradigms.

We would not pretend to denigrate the contributions made by research directed by these or other paradigms. However, we view in the more recent (post-1965) research, including our own (see, for instance, Boyer et al. 1994; contributions in Boyer and Urban 1995), a usually implicit, sometimes explicit accepting as-is or with modifications, rejecting, and even ignoring the Wendorf and Reed framework (see the references cited above). At the same time we see a noticeable absence in the same research, including our own, of explicit testing of the patterns documented by Wendorf and Reed. We find this a confusing situation.

Those who accept the reconstruction as-is or with modifications apparently do so as a viable
(pre)historical sequence without considering the implications. Accepting the interpretations of data and the cultural-historical sequence based on one paradigm without explicitly testing the validity of the data or the relationships of the data to the original paradigmatic model is incoherent. Similarly, those who explicitly reject, by ignoring or by correlating the framework apparently do so on the basis of paradigmatic disagreement, also without explicitly testing the validity of the data or the relationships of the data to the original paradigmatic model.

This is certainly not to argue that other paradigms should be rejected in favor of a return to a strict cultural-historical research. We would argue, however, that:

if the archaeological record as it was understood in 1955 was such that Wendorf and Reed saw the need to differentiate the Northern Rio Grande region from the San Juan Basin and Four Corners regions, and

if explicit testing of the archaeological patterns observed by Wendorf and Reed and fundamental to their reconstruction has not been performed, but

additional data have been gathered in the 45 years since presentation of their reconstruction, then

responsible scholarship should include attempts to examine data gathered before and after publication of the reconstruction. Examination of these data should focus on determining:

whether the data patterns observed by Wendorf and Reed are specific to and embedded in their cultural-historical paradigm and cannot be verified with the addition of more recent data. If this is the case then their framework lacks validity, particularly in light of the paradigm within which it was defined, because its historical-temporal bases would be invalid. Alternatively, examination of the data might reveal

that the data patterns can be verified, independently of the paradigm within which they were first observed. If so, then they can profitably be interpreted within the frameworks of other paradigms. In this scenario, we are also concerned about whether the data patterns retain temporal patterning, as observed by Wendorf and Reed.

Toward that end, archaeological data recovery efforts at prehistoric sites in the Santa Fe to Pojoaque Corridor project area will be aimed at testing the Wendorf and Reed framework by examining the accuracy of the data patterns that they observed. It is beyond the scope of any single project to definitively gather, analyze, and interpret all the data needed for an undertaking of this nature. However, data recovery at the prehistoric sites in the project area provides an opportunity, particularly when combined with the results of other nearby projects, to address the validity of the framework.

We admit that this approach has a certain cultural-historical emphasis, in that we would seek to validate or refute the Wendorf and Reed framework. Their framework is, at its heart, the definition of regional chronological periods using patterns of artifact assemblages, architectural structures and construction, and site structure that were presumed to be normative for the periods they defined. As we noted earlier, however, we are not calling for a return to strictly cultural-historical research, nor will the data recovery efforts in the Santa Fe to Pojoaque Corridor project area focus on normative interpretations of data or data patterns. The point made by Binford and Sabloff (1982:147) is well taken:
When doing culture-historical research, one normally needs only to recover a sufficient sample of artifacts to permit a “cultural” assessment of the remains. This means that no real understanding of internal differentiation or organizational variability among components of a single system will be revealed by carrying out normal, traditional archaeological work.

Rather, we are concerned with evaluating the data patterns observed by Wendorf and Reed in order to determine whether those patterns can profitably be used to examine questions other than regional chronology—questions of inter- and intraregional social relationships, community formations and structures, architectural structures, economic strategies, ideological practices, ethnic identities, and other issues. Those issues can be addressed using a variety of paradigmatic and theoretical perspectives.

**Regional Chronology, Settlement Patterns, and Material Culture in the Northern Rio Grande**

*Introduction*

As we noted earlier, two developmental/chronological frameworks, and alternative or revisions to them, are commonly used to order and classify archaeological sites and materials in the Northern Rio Grande region (Table 11.1). One is the Pecos Classification, stemming from the first Pecos conference (Kidder 1927; see Rouse 1962:35-42; Cordell 1984:55-59). Roberts’ (1935) revision of the Pecos Classification has not gained acceptance or use in the region, or elsewhere in the northern Southwest (but see Rouse 1962; Wormington 1961). On the other hand, Glassow (1980) assigns phase names to the Pecos Classification periods for use in the Cimarron District (Table 11.1).

The other framework is the Wendorf and Reed reconstruction, which Peckham (1984) refers to as the Rio Grande Classification. Table 11.1 shows the framework as proposed by Wendorf and Reed (1955). Following excavations at LA 3294, McNutt (1969) proposed revisions to the Wendorf and Reed framework, as did Dickson (1979), following his survey across the Rio Grande Valley from Arroyo Hondo pueblo to Cochiti. Both are also shown in Table 11.1. McNutt’s revisions have not gained wide acceptance in the region, although his division of the earliest Puebloan period into two components or phases is now commonly used (see discussion later in this chapter; see Chapter 13). Dickson’s divisions are less commonly used. However, the importance of the McNutt and Dickson revisions in terms of dividing the Wendorf and Reed periods into smaller phases cannot be minimized, because they have encourage other researchers to search for finer temporal periods and associated materials changes (see Chapter 13).

In the following discussion, we summarize the current understanding of temporal, settlement, and material patterns in the archaeological record of the Northern Rio Grande region. Because the project is located in the southern Tewa Basin, we focus primarily on the Tewa Basin and the
Table 11.1. Chronological Frameworks Used in the Northern Rio Grande Region, for the Years between A.D. 400 and 1600

<table>
<thead>
<tr>
<th>YEARS A.D.</th>
<th>PECOS</th>
<th>RIO GRANDE¹</th>
<th>RIO GRANDE²</th>
<th>RIO GRANDE³</th>
<th>SANTA FE DISTRICT⁴</th>
<th>TAOS DISTRICT⁵</th>
<th>RIO CHAMA DISTRICT⁶</th>
<th>CIMARRON DISTRICT⁷</th>
<th>YEARS A.D.</th>
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<tbody>
<tr>
<td>1600</td>
<td>Pueblo IV Period</td>
<td>Classic Period</td>
<td>Unnamed Period</td>
<td>Classic Period (Late Phase)</td>
<td>Unnamed Phase (corresponds to the Vadito Phase at Picuris)</td>
<td>Unnamed Phase</td>
<td>Occupational hiatus?</td>
<td>Cojo Phase (Apache)</td>
<td>1600</td>
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<tr>
<td>1500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Biscuit Period</td>
<td></td>
<td>Occupational hiatus?</td>
<td>1500</td>
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<tr>
<td>1400</td>
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<td></td>
<td></td>
<td>Wiyo Period</td>
<td>1400</td>
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<tr>
<td>1300</td>
<td>Pueblo III Period</td>
<td>Coalition Pd* (Pindi &quot;Stage&quot;)</td>
<td>Coalition Period</td>
<td>Coalition Pd** (Middle Phase)</td>
<td>Coalition Period</td>
<td>Galisteo Phase</td>
<td>Talpa Phase</td>
<td>Pot Creek Phase</td>
<td>Cimarron Phase</td>
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<tr>
<td>1200</td>
<td>Developmental Period</td>
<td>Colonization Pd (Kwahe’e Component at LA 3294)</td>
<td>Developmental Period (Late or Tesuque Phase)</td>
<td>Developmental Period (Late or Tesuque Phase)</td>
<td>Developmental Period (Late or Tesuque Phase)</td>
<td>Tesuque Phase</td>
<td>Valdez Phase</td>
<td>Unnamed Period</td>
<td>1200</td>
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<tr>
<td>1100</td>
<td>Pueblo II Period</td>
<td>(Middle or Red Mesa Component at LA 3294)</td>
<td>(Midden at LA 3294)</td>
<td>(Midden at LA 3294)</td>
<td>(Middle or Red Mesa Phase)</td>
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<td>Escritores Phase</td>
<td>1100</td>
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<td>1000</td>
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<td>Red Mesa Phase</td>
<td>1000</td>
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<tr>
<td>Year</td>
<td>Period</td>
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<td>800</td>
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<tr>
<td>400</td>
<td>Basketmaker II</td>
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1Wendorf and Reed 1955; Peckham 1984 (“Rio Grande Classification”). 2McNutt 1969. 3Dickson 1979. 4Wetherington 1968. 5Wetherington 1968; Crown 1990 and Boyer 1997 have revised and fine-tuned the dates. Dates in the Picuris Valley are slightly, but not appreciably, different - see Adler and Dick 1999. 6Hibben 1937; Wetherington 1968; Cordell 1978; Most researchers in the Rio Chama and Rio Ojo Caliente valleys use the Wendorf and Reed sequence. 7Glassow 1980.

adjacent Santa Fe and Pajarito Plateau areas.

*Preceramic Period (ca. 9500 B.C. to A.D. 600)*

The Preceramic period, as defined by Wendorf and Reed (1955), can be subdivided into Paleoindian (ca. 9500 B.C. to 6000 B.C.) and Archaic periods (ca. 6000 B.C. to A.D. 600).

**Paleoindian Period.** Evidence of Paleoindian occupation in the Northern Rio Grande region is rare, and typically consists of diagnostic projectile points and butchering tools found on the modern ground surface or in deflated settings (Acklen et al. 1990).

Recently, two Clovis period components have been reported in the Jemez Mountains (Evaskovich et al. 1997; Turnbow 1997). Data recovery at one component identified two medial Clovis point fragments associated with a single thermal feature and tool manufacture debitage (Evaskovich et al. 1997). Identification of Paleoindian occupations within a montane setting may suggest a changing subsistence adaptation. An increased focus on hunting smaller game and gathering wild plants than in previous periods may reflect changes in climate toward the end of the Paleoindian period (Haynes 1980; Wilmsen 1974).

In 1961, Alexander (1964) found a “late Paleo-Indian point” on a Puebloan site near the mouth of Taos Canyon. The site was revisited in 1981 (Wood and McCrary 1981), but the point could not be relocated. Bases of Belen-Plainview points have been found on sites with later components at Guadalupe Mountain (Seaman 1983) and south of Carson (Boyer 1985). Boyer (1988) found a reworked obsidian Folsom point north of Red Hill on the northwest side of the Taos Valley. The point was submitted for hydration dating, but the material source could not be determined, so no date could be obtained (Condie and Smith 1989).

Two isolated late Paleoindian Cody complex artifacts have been reported from the Galisteo Basin (Lang 1977; Honea 1971), and Boyer (1987) reports an isolated Cody knife found in the mountains southeast of Taos. In addition, Peckham (1984) reports that Paleoindian projectile points have been found in the Santa Fe area and on the Pajarito Plateau. He suggests these items may have been deposited by Paleoindian, or more likely, found elsewhere and brought into the area by later inhabitants.

The paucity of reported Paleoindian remains in the Santa Fe area may be attributed to low visibility of these remains rather than a lack of occupation. Paleoindian remains may be masked by later Archaic and Puebloan occupations. Poor visibility of these remains may also be attributed to geomorphological factors. Surfaces or strata containing Paleoindian remains may be deeply buried and only visible in settings where these geological deposits are exposed. Cordell (1978) contends that the locations of known Paleoindian sites correspond to those areas of New Mexico where erosion has exposed ancient soil surfaces and brought the artifacts to light. If so, it may not be surprising that Paleoindian sites have not been found in the Tewa Basin, an area of regional soil accumulation and only local erosion (see Chapter 2). Paleoindian materials in their own contexts, rather than mixed with later materials, may be expected in areas of regional erosion, such as the Great Sand Dunes of the southern San Luís Valley (Hurst 1941; Jodry and Stanford 1992) or at high elevations where soil accumulation is less pronounced (Wendorf and Miller 1959; Boyer 1987; Evaskovich et al. 1997; Turnbow 1997).

Although limited Paleoindian remains have been identified in the Northern Rio Grande region, extensive evidence of Paleoindian occupations is reported from southeastern New Mexico. This evidence is commonly associated with large kill and butchering sites (Stuart and Gauthier 1981).
These sites tend to have higher archaeological visibility and are therefore reported more often. Common interpretations of Paleoindian lifeways have been derived from the investigation of these large kill and butchering sites. The Paleoindian culture has been viewed as highly mobile, nomadic hunters of now-extinct megafauna. This interpretation can be attributed to the widespread association of Paleoindian-age artifacts and long-distance transport of lithic materials.

**Archaic Period.** The Archaic period is generally described in terms of two major material culture traditions: the Oshara tradition (Irwin-Williams 1973) and the Cochise tradition (Sayles 1983). These traditions are typically distinguished by morphologically and temporally distinct projectile points and are subdivided into phases based on temporal changes in material culture, site structure, and settlement patterns. In the Northern Rio Grande, projectile point styles similar to both traditions have been identified (see, for instance, Turnbow 1997; Biella and Chapman 1977c; Lang 1977; Post 1996; Thoms 1977). Diagnostic projectile points commonly associated with Early and Middle Archaic sites include those similar to and identified with the Jay (ca. 6000 to 4800 B.C.), Bajada (4800 to 3200 B.C.), and San Jose (3200 to 1800 B.C.) phases of the Oshara tradition (Irwin-Williams 1973). Diagnostic projectile points associated with Late Archaic sites include materials similar to and identified with the Armijo (1800 to 800 B.C.) and En Medio (800 B.C. to A.D. 400-600) phases of the Oshara tradition, and the Chiricahua (6000 to 1000 B.C.) and San Pedro (1000 B.C. to A.D. 1) phases of the Cochise tradition (Sayles 1983).

Most Archaic sites in the region date from the Bajada phase (4800 to 3200 B.C.) to the En Medio phase (800 B.C. to A.D. 1). A relatively low number of Early and Middle Archaic period sites have been identified in this area. These occupations are commonly represented by widely dispersed sites and isolated occurrences (Anschuetz and Viklund 1996; Doleman 1996; Lang 1992; Post 1996, 1999b). Early and Middle Archaic assemblages represent brief occupations with an emphasis on hunting. Materials associated with these sites are typically mixed with deposits of later temporal components. Early and Middle Archaic sites have been recorded along the Santa Fe River and its primary tributaries (Post 1999). Until recently, temporal information for this period was derived from obsidian hydration dating (Lang 1992). Recent excavations in the Santa Fe area have identified thermal features that yielded radiocarbon dates between 6000 B.C. and 5000 B.C. (Larson and Dello-Russo 1997; Anschuetz 1998; Post 1999b). The limited amount of associated material from these excavations indicates brief occupations geared toward hunting by small, highly mobile groups.

Although several Middle Archaic sites were identified during the OLE project in the Jemez Mountains (Larson and Dello-Russo 1997), archaeological evidence for Middle Archaic occupations in the Santa Fe area is rare. A single, hafted, San Jose scraper was recovered from a site in the Dos Griegos Subdivision southeast of Santa Fe (Lang 1992). This find was mixed with Late Archaic and Pueblo period materials, making it difficult to associate an obsidian hydration date with a discrete component of the lithic assemblage. The Las Campanas project identified a late San Jose phase site that yielded one temporally diagnostic point, tool production debris, and ground stone artifacts (Post 1996). These dispersed materials were associated with one thermal feature, but no datable charcoal was obtained.

Recently, excavations along the Santa Fe Relief Route identified four Middle Archaic sites. Radiocarbon dates, obtained from thermal features, ranged between 3200 and 1800 B.C. Two sites consisted of shallow structures associated with chipped and ground stone artifacts (Stephen Post, pers. comm. 2000). Although associated materials are not abundant, they may indicate a longer and more formal site occupation than discerned at earlier sites (Post 1999b).

The increased number of Late Archaic occupations in the Santa Fe area is consistent with the regional data (Acklen et al. 1997). An increase in Late Archaic sites may be attributed to changes in
settlement and subsistence patterns identified during the Armijo phase (1800 to 800 B.C.; Irwin-Williams 1973). Changes in settlement patterns include evidence of seasonal aggregation, longer periods of occupation, and the exploitation of a broader range of environmental settings. Subsistence changes include the adoption of horticulture, identified at sites south of La Bajada. In the Santa Fe area, Armijo phase sites have been identified in the piedmont area around the Santa Fe River (Post 1996, 1999a; Schmader 1994). These sites range from small foraging camps to larger base camps with shallow structures. Radiocarbon dates, obtained from thermal features, suggest these sites were occupied between 1750 and 900 B.C. (Post 1996, 1999a; Schmader 1994).

En Medio phase (800 B.C. to A.D. 400) sites are the most numerous Archaic period sites in the Santa Fe area. These sites are widely distributed across riverine, piedmont, foothill, and montane settings (Acklen et. al.1997; Kennedy 1998; Lang 1993; Miller and Wendorf 1955; Post 1996, 1997, 1999b; Scheick 1991; Schmader 1994; Viklund 1988). En Medio phase sites range from isolated occurrences to limited activity sites to base camps with structures and formal features. Increased diversity in settlement patterns and site types suggest population increase, longer occupation or reduced time between occupations, and truncated foraging range.

A wide range of En Medio phase habitation and special activity sites have been identified north of La Bajada, in the Santa Fe area, and in the Tewa Basin. Although many of these sites contained structures, formal features, and grinding implements, evidence of horticulture remains absent. Excavated En Medio sites from the Las Campanas project (Post 1996) indicated a overlap in diagnostic projectile point types defined by Irwin-Williams (1973) and Thoms (1977). The date ranges overlap between A.D. 500 and 850. This temporal observation and the paucity of sites with evidence of horticulture indicate that Archaic subsistence strategies (generalized foraging) may have extended into the early or middle 900s north of La Bajada (Dickson 1979; McNutt 1969; Post 1996).

Pueblo Period

The Pueblo period chronology follows the framework presented by Wendorf and Reed (1955). This chronology was coined the “Rio Grande Classification” by Peckham (1984:275). Wendorf and Reed (1955) define the Pueblo period from A.D. 600 to 1600 (Table 11.1). The Pueblo period is subdivided into the Developmental (A.D. 600-1200), Coalition (A.D. 1200-1325), and Classic (A.D. 1325-1600) periods. The Developmental and Coalition periods are again subdivided, based on observed changes in pottery types and architectural characteristics. Wendorf and Reed subdivide the Developmental period into Early Developmental (A.D. 600-900) and Late Developmental (A.D. 900-1200), and the Coalition period into the Pindi “stage” and Galisteo “stage” (Table 11.1). Although they coin names for these stages, they do not assign dates, but do infer dates.

Modifications to the terminology and temporal divisions of the Wendorf and Reed framework have been proposed by Wetherington (1968), McNutt (1969), and Dickson (1979), some with revered caveat. Wetherington assigned phase names to the periods in the Santa Fe and Taos districts and slightly modified the dates. McNutt renamed one period, preferring Colonization to Developmental, included divisions of that period into “components” as seen at LA 3294, the Tesuque By-Pass site, and changed the dates for the Coalition period. Dickson subdivided each period into three phases.

Terminology aside, each of these researchers found the need to subdivide each period of the Pueblo period into subperiods suggesting early and late, and, for one researcher, middle components. Again, subdivisions were based on perceived changes in pottery types and architecture. For each researcher, these subdivisions may have been appropriate and useful for addressing the goals of their study.
Although pottery types and architecture do appear to change through time, subdivisions within the Pueblo period, beyond those proposed by Wendorf and Reed, will not be addressed in the following section. This is not to say that these subdivisions are not valid or do not exist, merely that additional data have been gathered and more refined chronometric methods have been developed (see Chapter 13). Choosing one particular sequence over another may further confuse terminology and associated temporal subdivisions. For example, if recent ceramic and chronometric data do not fall neatly into a subdivision of the chosen version of the sequence, the terminology and temporal subdivision would need to be again refined. Therefore, using the model proposed by Wendorf and Reed (1955) may minimize confusion in terminology and associated temporal subdivisions until more refined chronometric data are obtained.

**Developmental Period (A.D. 600-1200).** The Developmental period in the Northern Rio Grande spans between A.D. 600 and A.D. 1200. This period is further subdivided into Early Developmental (A.D. 600 to 900) and Late Developmental (A.D. 900 to 1200) periods.

**Early Developmental Period (A.D. 600 to 900).** Early Developmental period sites dating prior to A.D. 900 are relatively rare in Northern Rio Grande. Although sites dating between A.D. 900 and 1200 are more numerous, they are typically represented by limited activity areas and small settlements (Wendorf and Reed 1955). Most reported Early Developmental sites are located south of La Bajada, primarily in the Albuquerque area, with a few reported at higher elevations along the Tesuque, Nambe, and Santa Fe river drainages (Lang 1995; McNutt 1969; Peckham 1984; Skinner et al. 1980; Wendorf and Reed 1955). Early Developmental period sites tend to be situated along low terraces overlooking primary and secondary tributaries of the Rio Grande. These locations may have been chosen for their access to water and arable farming land (Cordell 1978). Terrace locations may also have provided access to environmental zones with a wide range of foraging resources (Anschuetz et al. 1997).

Reported Early Developmental habitation sites typically consist of one to three shallow, circular pit structures with little or no evidence of associated surface structures (Allen and McNutt 1955; Peckham 1954, 1957; Stuart and Gauthier 1981). One exception is a settlement, identified by Lang (1995) north of Santa Fe, which apparently contains of 5 to 20 structures. However, the actual contemporaneity of the structures has not been established.

Excavation data indicate that a suite of construction methods were employed to construct these early structures. Typically, structures were excavated up to 1 m below ground surface and were commonly 3 to 5 m in diameter. Walls were sometimes reinforced with vertical poles and adobe (Allen and McNutt 1955; Condie 1987, 1996; Hammack et al. 1983; Peckham 1954; Skinner et al. 1980). Walls, floors, and internal features commonly lacked plastered. Ventilators were located on the east to southeast sides of the structures. One exception was a ventilator identified on the north side by Peckham (1954).

Common floor features include central hearths, ash-filled pits, upright “deflector” ventilators, ladder sockets, and four postholes. Other, less common floor features include features identified as sipapus, warming pits, and pot rests, as well as subfloor pits of various sizes and depths (Allen and McNutt 1955; Condie 1987, 1996; Hammack et al. 1983; Peckham 1957).

Ceramics associated with Early Developmental sites include plain gray and brown wares, red slipped brown wares, and San Marcial Black-on-white (Allen and McNutt 1955). These types persist through the Early Developmental phase, with the addition of neck-banded types similar to Alma Neckbanded and Kana’a Gray, and Kiatuthlana Black-on-white, La Plata Black-on-red, and Abajo Red-on-orange through time (Wendorf and Reed 1955). The accumulation of pottery types and
surface textures, as opposed to sequential types and textures, appears to be characteristic of the Developmental period, as well as of the Mogollon area (see Chapter 13; Wilson et al. 1999).

Decorated pottery at Developmental period sites may suggest cultural affiliation with people to the west and northwest. However, Early Developmental inhabitants also obtained red and brown wares through trade with Mogollon people to the south and southwest (Cordell 1978). Although cultural affiliation may seem more secure in assemblages clearly dominated by specific ware groups, cultural affiliation is difficult to determine at Early Developmental sites that exhibit various frequencies of gray, brown, and white wares.

Late Developmental Period (A.D. 900 to 1200). Late Developmental period sites have been identified from the Albuquerque area to the Taos Valley. This period is marked by an increase in the number and size of residential sites, habitation of a broader range of environmental settings, and the appearance of Kwahe’e Black-on-white (Cordell 1978; Mera 1935; Peckham 1984; Wendorf and Reed 1955; Wetherington 1968). Late Developmental residential sites expanded into higher elevations along the Rio Grande, Tesuque, Nambe, and Santa Fe river drainages (Allen 1972; Ellis 1975; McNutt 1969; Peckham 1984; Skinner et al. 1980; Wendorf and Reed 1955). These sites are commonly located along low terraces overlooking primary and secondary tributaries of these rivers. These locations provided access to water, arable farming land (Cordell 1978), and a variety of foraging resources (Anschuetz et al. 1997). Although Late Developmental period sites are more common at higher elevations than Early Developmental period sites, there is little evidence for Late Developmental occupation of the Pajarito Plateau (Kohler 1990; Orcutt 1991; Steen 1977).

Reported Late Developmental period sites typically consist of a residential unit comprised of one to two pit structures, sometimes associated with a surface structure having 5 to 20 rooms, and a shallow midden (Ellis 1975; Lange 1968; Peckham 1984; Stubbs 1954; Stuart and Gauthier 1981; Wendorf and Reed 1955). These habitation locations occur as single units or in clusters of units referred to as communities (Anschuetz et al. 1997; Wendorf and Reed 1955). LA 835 (Pojoaque Grant site) is often used to illustrate this example.

LA 835 is comprised of 20 to 22 house groups consisting of 10 to 20 rooms each, their associated pit structures, and a great kiva (see Chapter 13; Peter McKenna, pers. comm. 2000; Stubbs 1954; Wiseman 1995). House groups are located along low ridges that trend southwest from a prominent sandstone mesita. House groups A, B, and C were partially or completely excavated, as were test trenches at four other locations, including the great kiva (Stubbs 1954). Although LA 835 is comprised of numerous Late Developmental residential units, these units may not be contemporaneous.

Stubbs (1954) estimated LA 835 was occupied between 950 and 1100. Recovered tree-ring samples produced few cutting dates, but suggested that the site was occupied between 1000 and 1150 (Ahlstrom 1985; Robinson et al. 1972). A reassessment of tree-ring data from House Groups A and B suggests that these house groups were occupied between 800 and 1150 (Wiseman 1995).

Additional archaeological excavations, conducted by the OAS, identified two pit structures and an extramural area of redeposited refuse (Boyer and Lakatos 1997). In addition to excavation, project investigations consisted of mapping and recording surface ceramic data from each house group. Although preliminary ceramic data do not support occupation dates as early as Wiseman (1995) has suggested, they do indicate that portions of the site were occupied earlier than the reported tree-ring cutting dates. House groups located at the base of the mesita and near the great kiva appear to have been occupied by A.D. 900. The remaining house groups appear to have been occupied at different times during the Late Developmental period (see Chapter 13).
An array of construction techniques are identified in surface and subsurface structures at LA 835 and other Late Developmental residential sites (Ahlstrom 1985; Allen 1972; Boyer and Lakatos 1997; Ellis 1975; Lange 1968; McNutt 1969; Stubbs 1954; Stubbs and Stallings 1953; Skinner et al. 1980). Surface structures were commonly constructed of adobe; little evidence of actual masonry has been reported. Evidence of masonry is limited to examples of rock being incorporated into the adobe walls or upright slabs used as foundations or footers for adobe walls (Lange 1968; McNutt 1969; Stubbs 1954). Walls were constructed with multiple courses of adobe, with or without rock, waddle and daub (jacal), or combinations of these techniques. When present at the time of excavation, walls are typically less than 30 cm tall.

Contiguous rectangular rooms are most common; subrectangular and D-shaped rooms are also reported. Floors are often unplastered, with a few reported examples of adobe, cobble, or slab floors (Ahlstrom 1985; Boyer and Lakatos 1997; Ellis 1975; McNutt 1969; Stubbs 1954; Skinner et al. 1980). Floor features are not common in surface rooms. When present, they typically consist of hearths and postholes.

Variety in size, shape, depth, and construction techniques is typical of Late Developmental pit structure construction. Circular pit structures are the most common, followed by subrectangular structures. Pit structure depths range from 30 cm to 2 m below ground surface and ranged between 3 and 5 m in diameter. Walls of subsurface structures vary from the unplastered surface of the original pit excavation to construction techniques using multiple courses of adobe, with or without rock, waddle and daub, upright slabs used as foundations, adobe reinforced with vertical poles, or combinations of these techniques (Ahlstrom 1985; Boyer and Lakatos 1997; Allen and McNutt 1955; Lange 1968; Stubbs 1954; Stubbs and Stallings 1953).

Floors range from compact use surfaces to well prepared surfaces. Common floor features include central hearths, upright “deflector” stones, ash-filled pits, ventilator complexes, ladder sockets, and four postholes located toward the interior of the structure. Other, less common floor features include sipapus, sub-floor channels, pot rests, and subfloor pits of various sizes and depths. Ventilators were constructed by connecting the exterior vent shaft to the interior of the structure with a tunnel or a narrow trench. This trench was subsequently roofed using latillas, effectively creating a tunnel. Exteriors of shallow structures were connected to the interior through an opening in the wall. Ventilators were commonly oriented to the east and southeast (Boyer and Lakatos 1997; Allen and McNutt 1955; Lange 1968; Stubbs 1954; Stubbs and Stallings 1953).

Utility ware ceramics associated with Late Developmental sites include types with corrugated and incised exteriors in addition to the plain gray, brown, and neck-banded types associated with the Early Developmental period. Decorated white wares are both imported and manufactured locally. Common types include Red Mesa Black-on-white, Gallup Black-on-white, Escavada Black-on-white, and Kwahe’e Black-on-white. Less common types include Soccorro Black-on-white, Chupadero Black-on-white, Chaco Black-on-white, and Chuska Black-on-white (Allen 1972; Franklin 1992; Lange 1968; Peter McKenna, pers. comm. 2000). Although decorated red wares are present on Late Developmental sites, they are found in low frequencies. Common decorated red wares include types from the Upper San Juan, Tusayan, and Cibola regions (see Chapter 13).

The quantity of imported decorated pottery (Wiseman and Olinger 1991) and appearance of Kwahe’e Black-on-white, a locally made type similar to white wares produced in the northern San Juan region (Mera 1935; Gladwin 1945), is believed to illustrate a continued affiliation between the Northern Rio Grande and San Juan Basin regions (Warren 1980). Although the majority of imported decorated pottery suggests a continued relationship with people to the west and northwest, Late Developmental inhabitants also obtained decorated ceramics and brown wares from the Mogollon
region to the south and southwest (see Chapter 13; Cordell 1978).

**Coalition Period (A.D. 1200 to 1325)**

Several researchers assert that the Coalition period is marked by three major changes reflected in the archaeological record: an increase in number and size of residential sites, contiguous surface rooms used more often as domiciles than during the previous period, and a shift from mineral paint to vegetal-based paint for decorating pottery (Cordell 1978; Peckham 1984; Stuart and Gauthier 1981; Wendorf and Reed 1955).

An increase in the number and size of residential sites during this period would suggest population increase and extension of village-level community organization identified during the Late Developmental period. Although there is an apparent increase in the number of Coalition period sites in upland areas that had limited occupation during the Developmental period, like the Pajarito Plateau, other areas such as the Tewa Basin, occupied during the Late Developmental period, seem to be partly abandoned by 1200. Therefore, the increase in site numbers appears to be a function of the areas investigated by archaeologists, and points to the amount of work on the Pajarito Plateau.

Coalition period sites are commonly located at higher elevations along terraces or mesas overlooking the Rio Grande, Tesuque, Nambe, Santa Fe, and Chama river drainages (Cordell 1978; Dickson 1979). These locations provided access to water, arable farming land, and a variety of foraging resources (Cordell 1978). Although inhabiting higher elevations provided reliable water and arable farming land, innovative methods were needed for producing crops in these cooler settings (Anschuetz et al. 1997), including intensification of water management and agricultural practices. The use of check dams, reservoirs, and grid gardens, especially during the later part of this period and the succeeding Classic period, are examples of this intensification (Anschuetz et al. 1997; Maxwell and Anschuetz 1992; Moore 1981).

Coalition period residential units typically consist of one to two pit structures associated with 10 to 20 surface rooms, and a shallow midden (Peckham 1984; Stuart and Gauthier 1981; Wendorf and Reed 1955). Surface structures often consist of small linear or L-shaped room blocks oriented approximately north-south. These room blocks are one or two rooms deep, with a pit structure or kiva incorporated into or located east of the room block (Kohler 1990; Steen 1977, 1982; Worman 1967). Sites that exhibit this layout are generally considered to date earlier in the Coalition Period. Although most Coalition period sites are relatively small, some are reported to contain up to 200 ground floor rooms (Stuart and Gauthier 1981). These larger sites are commonly U-shaped, enclosing a plaza(s) to the east. Generally, large Coalition period sites with an enclosed plaza(s) are considered to be a later development (Steen 1977; Stuart and Gauthier 1981).

Various construction techniques are identified in excavated Coalition period surface and subsurface structures. Walls of surface and subsurface structures were constructed with adobe, with or without rock, masonry, or combinations of these techniques. On the Pajarito Plateau, adobe construction incorporated unshaped tuff into the adobe walls (Kohler 1990; Steen 1977, 1982; Steen and Worman 1978; Worman 1967). Masonry consists of unshaped or cut tuff block fastened with adobe mortar and sometimes chinked with small tuff fragments (Kohler 1990). Contiguous, rectangular rooms are the most common, with a few reported examples of subrectangular and D-shaped rooms (Kohler 1990; Steen 1977, 1982; Steen and Worman 1978; Worman 1967).

Variety in size, shape, and depth of pit structure construction is common during the Coalition period. Circular pit structures are most common, followed by subrectangular structures. Pit structure
depths range from 30 cm to 2 m below ground surface and were commonly 3 to 5 m in diameter. Walls of pit structures were constructed using the techniques described for surface room construction. Common floor features include central hearths, upright “deflector” stones, ash-filled pits, ventilator complexes, and four postholes located toward the interior of the structure. Other, less common floor features include sipapus, entryways, pot rests, and subfloor pits of various sizes and depths. Ventilators were constructed by connecting the exterior vent shaft to the interior of the structure with a tunnel. Exteriors of shallow structures were connected to the interior through an opening in the wall. Ventilators were commonly oriented to the east or southeast (Kohler 1990; Steen 1977, 1982; Steen and Worman 1978; Stuart and Gathier 1981; Stubbs and Stallings 1953; Wendorf and Reed 1955; Worman 1967).

Utility ware ceramics include types with corrugated, smeared corrugated, and plain exteriors. Less common utility ware types include striated, incised or tooled exteriors. Decorated white wares include Santa Fe Black-on-white, Galisteo Black-on-white, and Wiyo Black-on-white, and very low percentages of Kwahe’e Black-on-white. Few trade wares are reported from Coalition period sites; those that are found are White Mountain Redwares (Kohler 1990; Steen 1977, 1982; Steen and Worman 1978; Worman 1967).

In the Santa Fe area, large villages such as the Agua Fria School House ruin (LA 2), LA 109, LA 117, LA 118, and LA 119, were established during the early Coalition period. Other large Coalition sites, such as Pindi (LA 1) and Tsogue (LA 742), appear to have been established during the Late Developmental period and grew rapidly during the Coalition period (Franklin 1992; Stubbs and Stallings 1953).

**Classic Period (A.D. 1325 to 1600)**

Wendorf and Reed (1955:53) characterize the Classic period as “a time of general cultural fluorescence.” Occupation shifted away from the uplands and began to concentrate along the Rio Grande, Chama, and Santa Cruz rivers, as well as in the Galisteo Basin. Large villages containing multiple plazas and room blocks were built and regional populations peaked. The construction of large, multiplaza communities supersedes the village-level community organization identified during the late Developmental and Coalition periods. In the Santa Fe area, large villages such as the Agua Fria School House ruin (LA 2), Arroyo Hondo (LA 12), Cieneguilla (LA 16), LA 118, LA 119, and Building Period 3 at Pindi (LA 1), flourished during the early part of this period. Although these large villages grew rapidly during the early Classic, only Cieneguilla remained occupied after A.D. 1425.

Regional ceramic trends shifted to the use of carbon-painted Biscuit wares in the north, including the Tewa Basin and Rio Chama Valley, polychrome glaze wares in southern areas, such as the Galisteo Basin, and Jemez Black-on-white in the Jemez Mountains. Along with the development of large aggregated sites, Glaze A, a red slipped locally manufactured pottery type, was introduced. Glaze painted pottery is common on Classic period sites south of Santa Fe, while Biscuit ware pottery is common on Classic period sites north of Santa Fe. Although reasons for the appearance and proliferation of glaze painted pottery are ambiguous, many researchers believe it developed from White Mountain Redwares. Similarities between types in the two regions are viewed as evidence for large-scale immigration into the Northern Rio Grande from the Zuni region and the San Juan Basin (Hewett 1953; Mera 1935, 1940; Reed 1949; Stubbs and Stallings 1953; Wendorf and Reed 1955). Other researchers attribute the changes seen during this period to expanding indigenous populations (Steen 1977) or the arrival of populations from the Jornada branch of the Mogollon in the south (Schaafsma and Schaafsma 1974).
For whatever reason, this was a time of village reorganization. Sites such as Pindi and Arroyo Hondo experienced reoccupation of older portions of the pueblo during this time (Lang and Scheick 1989; Stubbs and Stallings 1953). Intracommunity changes are also suggested by decreasing kiva to room ratios (Stuart and Gauthier 1981) and the revival of circular subterranean pit structures with an assemblage of floor features reminiscent of the Late Developmental period (Peckham 1984). Clearly defined plaza space and “big kivas” (Peckham 1984:280) suggest social organization that required centrally located communal space. Defined communal space may have been used to integrate aggregated populations through ceremonial functions.

The need for defined communal space may also be related to the introduction of the Katsina cult into the Northern Rio Grande during this time (Schafsma and Schafsma 1974). A shift from geometric designs to masked figures and horned serpents in kiva murals (Hayes et al. 1981; Dutton 1963; Hibben 1975) and the occurrence of shield-bearing anthropomorphic rock art figures (Schafsma 1992) suggest the acceptance of new ideological concepts. Changes in community structure and settlement patterns during the Classic period may reflect indigenous inhabitants adapting to or adopting new populations, ideological elements, and organizational systems.

The Plan for Data Recovery in the Santa Fe to Pojoaque Corridor

Typically, data recovery plans consist of a research design comprised of a theoretical foundation or model with questions or expectations of the archaeological record. This framework is intended to guide field and laboratory examination of the sites, artifacts, and other cultural and environmental materials involved. These models are followed by the specific field and laboratory methods to be used to recover and interpret data from the sites, artifacts, and other collected materials. Often, most or all of the data recovery plan is written by one person and reflects that person’s individual research interests and methods, even though a number of crew and staff members will likely be involved during various stages of the project.

For the Santa Fe to Pojoaque Corridor project, we feel this approach would limit the scope of the research goals and research interests. Therefore, the data recovery plan for all prehistoric sites in the Santa Fe to Pojoaque Corridor project area consists of a series of chapters contributed by those staff members who will ultimately be responsible for portions of the final product. The advantage to this approach is that these contributors may use their interests and expertise to broaden the project’s research design. This is not to say that the project does not have a general theme or perspective, for it does.

Specifically, data recovery investigations at the prehistoric sites are intended to begin the process of systematically evaluating observations and interpretations made by Fred Wendorf and Eric Reed (1955) some 45 years ago. For the Santa Fe to Pojoaque Corridor data recovery investigations, the contributors were asked to consider the implications of the Wendorf and Reed “reconstruction” and the results of past research in the Tewa Basin and the Northern Rio Grande region for their individual areas of expertise and interest.

The result is a series of chapters that reflects our diversity of expertise, interest, and authorship, and our varied views of regional prehistory and archaeological manifestations. Specifically, the project involves the investigation of the five sites discussed in this report (LA 388, LA 389, LA 391, LA 835, and LA 3118) and other prehistoric sites in the project area. The data recovery plan is intended to address the data potential of these sites. However, it is also intended to assess the positions of those sites within local and regional temporal, ethnic, structural, and economic contexts.
and issues pointed out to us 45 years ago by Wendorf and Reed.

As we noted earlier, the impetus for the Wendorf and Reed “reconstruction” was their perception that the archaeological record in the Rio Grande region was sufficiently different from that of the San Juan and Four Corners regions to justify examining the record within a different framework. A review of their paper (Wendorf and Reed 1955) shows that the differences they observed can be grouped into seven major areas of concern or research issues. The chapters that follow address aspects of these research issues and the potential of sites in the project area to provide data relevant to these research issues. Table 11.2 list the research issues and the relevant chapters in this data recovery plan.

**Table 11.2 Wendorf and Reed Research Issues and Relevant Chapters in the Data Recovery Plan**

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12. DEVELOPMENTAL PERIOD PUEBLOAN COMMUNITIES
IN THE NORTHERN RIO GRANDE REGION

Jeffrey L. Boyer

An important issue for research in the Northern Rio Grande region involves understanding prehistoric Puebloan social structure. Archaeologists working in the region discuss and debate the changing natures and levels of Puebloan social structure, including processes and results of community formation and population aggregation (see, for instance, contributions in the volume edited by Wills and Leonard [1994], and Crown et al. 1996). However, much of this work centers on Coalition and Classic period communities, and definitive research into the nature(s) of Developmental period (and earlier) communities has been lacking (see Adler 1993; Boyer 1994, 1995).

Understanding the dynamics of Developmental period Puebloan society is critical if we are to address the changes that seem evident between the numerous small pithouse and surface structure sites at Developmental period sites; the small, and sometimes large, pithouse and room block Coalition period sites, and the large, compact, aggregate communities of the Classic period. The Santa Fe to Pojoaque Corridor project area provides an excellent opportunity to explore the structure and dynamics of Developmental period Puebloan society and search for evidence of early Puebloan community structure.

Defining Prehistoric Communities

Wills and Leonard (1994:xiii) state that “southwestern archaeologists understand ‘community’ to mean a residential group whose members interact with one another on some regular basis.” This broad definition, they argue, has led to two perspectives. In one, individual sites are studied as single communities. In the second, individual sites are grouped into "political communities" defined by "intersettlement mechanisms for making social or economic decisions." They go on to state, in archaeologically practical terms, that "Although political communities are conceived of as socioeconomic systems, they are generally recognized by spatial clusterings of sites" (Wills and Leonard 1994:xiv). Following Breternitz and Doyel (1987), Wills and Leonard suggest that within these clusters of (contemporaneous) sites, there should be a hierarchy of sites with different functions within the community. However, they observe that "clear-cut" evidence of functional site hierarchies has been hard to come by, particularly in terms of artifactual assemblages, and that as a consequence, archaeologists have tended to focus on architectural forms and features thought to represent communal facilities (Wills and Leonard 1994:xiv).

Following Johnson's (1982, 1984) scalar stress model of community decision-making structure, Kintigh (1994) describes two community forms: nonaggregated and aggregated communities. The difference between the two is not in residential proximity, but in the size of the community in number of households and the consequent level of community decision-making structure. Smaller, nonaggregated communities should consist of no more than about 6 to 14 households and be characterized by consensus decision making. Above this number of households, consensus decision making is unwieldy and these larger, aggregated communities are characterized by decision-making structures involving leadership. The development of such higher level community structures should be accompanied, Kintigh (1994:137-138) argues, by clusters of sites and types of communal architecture. One might presume, then, that nonaggregated communities may not be as easily distinguished by site clusters and should not have communal architecture, although Kintigh does not
make these characterizations.

Adler (1994:98) defines communities as "the consistently highest level of integrative organization on the social landscape" and "the most consistent resource access institution on the local level." He then argues that we must distinguish between communities and settlements. Settlements are "spatially identified cluster(s) of habitation features" (Adler 1994:99) that can consist of single or multiple households (Adler 1993:337). Settlements are internally integrated through the use of "low-level" integrative facilities: "... the term 'low-level'... refer[s] to those facilities that serve to integrate only a portion of a community" (Adler 1993:335; also Adler and Wilshusen 1990:135). In contrast, "high level facilities are utilized for social activities involving larger groups and are often used to integrate one or more communities" (Adler 1993:335; Adler and Wilshusen 1990:135).

There appears to be a correlation between Kintigh's nonaggregated communities and Adler's settlements. Nonaggregated communities are small, generally less than 14 households, and are characterized by low-level consensus decision making. Settlements are characterized by low-level integrative facilities, which are, cross-culturally, most common in population groups of 4 to 12 households (Adler 1993:338). These facilities are usually used both for residential and ritual integrative activities. There is correspondence in the sizes of these two types of household groups and they are characterized by low-level integrative and group decision-making activities and facilities. We see, then, that a presumption that nonaggregated communities are not necessarily spatially clustered and do not have communal facilities is probably false. Adler describes settlements as spatially defined and as having integrative facilities.

If nonaggregated communities can be correlated with settlements, then Kintigh's aggregated communities may be correlated with Adler's communities. Remember that aggregation, in Kintigh's terms, does not necessarily reflect residential proximity. Instead, aggregation refers to community integration through formal, "higher-level" (Kintigh's term) decision-making structure involving leadership. Whatever form this structure takes, it "probably requires a substantial population aggregate for its persistence" (Kintigh 1994:133), although Kintigh also states that "communities composed of substantially more than six households must have some higher-level decision-making structure." In Adler's model, communities are the highest level of consistent integration of settlements. Integration is accomplished through "high-level" (Adler's term) facilities, which are likely to be used almost exclusively for ritual, integrative activities and rarely for residential activities (Adler 1993). Adler (1993:336) states that ritually specialized facilities appear when a community surpasses about 200 individuals. If we arbitrarily assume a range of five to ten individuals in a household, Adler's figures translate to communities of 20 to 40 households, substantially more than Kintigh's maximum figure of 14 households in nonaggregated communities. Thus, we see a possible size correlation between Kintigh's aggregated community and Adler's community and a correlation between the need for high-level decision making and the presence of high-level community integration facilities.

Archaeological Evidence: Defining Puebloan Community Structure in the Taos Valley

Using his model of community structure and facilities, Adler (1993) examined excavated Late Developmental period sites in the Taos Valley for evidence pointing to community organization:

... because from early on in the prehistoric sequence, the Anasazi of the Northern Rio Grande appear to have inhabited dispersed settlements that were parts of larger, scattered
communities, we should expect some form of integrative facility during the Developmental phase. (Adler 1993:336)

Based on ethnographic data from dispersed agricultural groups similar to those residing in the Taos area prior to A.D. 1200, as well as archaeological investigations of dispersed Anasazi settlement systems elsewhere in the Southwest, it is likely that each pit structure settlement was integrated into a larger, local community and that several such communities may have existed in the Taos area during this time. (Adler 1993:337)

Adler's review of published data revealed that about 25 percent of excavated pithouses had floor features identified as sipapus, features "commonly assigned a ritual function" by archaeologists (Adler 1993:338). Adler's argument is that, if these features were associated with ritual activity, then structures containing them may be assumed to have had different functions than structures without them. Since the excavated pithouses with sipapus have no other "ritually-significant" (Adler's term) features that distinguish them from pithouses without sipapus, Adler classifies the pithouses with sipapus as low-level integrative facilities, which is to say that they probably served as habitations and part-time integrative facilities. His figures suggest that 25 to 30 percent of Developmental period pithouses contained "ritually associated" features and, therefore, probably served as "integrative spaces" (Adler 1993:338).

The implications of Adler's argument for Developmental period sites are twofold. First, "the pre-A.D. 1200 Anasazi in the Taos area did not lack social integrative facilities. Certain of the early pit structures were utilized for a range of ritually integrative and domestic activities" since "early general-use integrative pit structures probably did double duty as domestic structures, but as is borne out by a cross-cultural perspective, it is not unusual for domiciles to serve as ritual and social integrative spaces" (Adler 1993:341, 342). Adler is arguing that the presence of "ritually-associated" features at some pithouses points to the use of these pithouses as low-level, part-time, social integrative facilities and that, since such facilities are characteristic of communities or portions of communities ("settlements") having some minimal internal integration, they are evidence for low-level community integration during the Developmental period. Although his argument may run afoul of Wills and Leonard's (1994:xiv-xv) concern over tautological identification of communities and integrative features, in this case, Adler's perspective provides important corroboration for Boyer's (1994) identification of two Developmental period communities based on architectural and artifactual patterns.

Boyer’s (1995) review of published data from the Taos Valley shows that sipapus are present at about 19 percent of excavated pithouses, a slightly lower ratio than Adler's. Further, those pithouses are divided between the two "communities." The two in the northern community have not been remodeled; that is, they were built, occupied, and abandoned. This is also true of two in the southern community. The other two in the southern community had sipapus associated with one of two floors in the pithouse. At one site, the sipapu was associated with the upper, second floor; no sipapu was found associated with the first floor. At the other site, the sipapu was associated with the lower, first floor, but no sipapu was present in the second floor. This suggests a change in the functions of both of these pithouses. If Adler's model is correct, one pithouse was used as an integrative facility prior to but not after its remodeling, while the other pithouse was used as an integrative facility after but not before its remodeling. Interestingly, the two sites, which are located across a small arroyo from each other, are the only two pithouse sites in the southern community that have yielded evidence of substantial remodeling. Although we do not know whether the two sites were contemporaneous, their proximity to one another and their similar remodeling episodes begs the question: were the two sites related in some way so that, during remodeling, their "ritually-associated" features and functions were exchanged? Obviously, we cannot answer the question, but the possibility is tantalizing. If
Adler's model is correct, we may be seeing that, at least in some cases, these low-level integrative facilities were treated differently than "regular" pithouses (Boyer et al. 1994).

Boyer's (1995) review also suggests that some pithouse sites were treated differently than others in terms of abandonment and post-abandonment processes. Importantly, they are the sites whose pithouses had sipapus. In addition, the structures of some sites indicate that Adler is incorrect when he contends that "specialized ritual facilities that served as integrative spaces for entire communities" were not present in the Taos Valley during the Developmental period (Adler 1993:341). Evidence that includes differential site complexity, presence of substantial surface structures, pithouse remodeling or replacement, and presence of storage vessels points to

the development of facilities integrating larger portions of communities than those integrated by single pithouses with sipapus. Further, in the possible evidence for remodeling and integrative functional replacement of structures . . . we may be seeing the development of relatively long-term use of specific locations for community integrative activities. (Boyer 1995:118)

The second implication of Adler's argument for Developmental period sites is that "the archaeological record does not indicate the construction of specialized ritual facilities that served as integrative spaces for entire communities during the pre-A.D. 1220 period in the Taos area . . ." (Adler 1993:341). In this regard, examination of published data on two sites, one in the northern community and the other in the southern community, reveals several similarities between sites.

First, they are the most sites (multiple pithouses, surface structures, other features) in their respective communities found during excavation. The fact that no other sites of similar complexity have been excavated, either by choice (academic field schools) or by chance (contract/salvage projects), suggests that such sites are not common. Second, at both sites, there is evidence for the replacement of pithouse and surface structures. Third, multiroom adobe surface structures are present at both sites, in contrast to other excavated sites from this phase.

The dearth of hearths in surface rooms probably precludes their use, with one exception in each case, for habitation. The presence of cists and ceramic jars suggests room use, instead, as storage facilities (see Chapter 19). Finally, a later, large pithouse at one site has a sipapu, while there is evidence that the later features at the other site are associated with a circular adobe floor. This does not, of course, clearly identify the adobe floor as a "ritual" feature (nor are "sipapu" holes clearly identified as such), but the feature's description as a large, bounded, prepared surface suggests an open public area whose function was certainly different than other extramural activity areas and whose presence was not common at similar sites (see Adler and Wilshusen 1990:135). In turn, this suggests that the activities that took place there were not common to all Developmental period sites, including those sites with pit structures and sipapus.

Finally, the later features at both sites include features that may be considered unusual: a much larger than average pithouse with a sipapu at one and an extramural, prepared adobe surface at the other. Taken together, these patterns indicate that the two sites functioned in ways not common to Developmental period sites, even those with sipapas. We may suggest that these sites served as integrative facilities for communities or portions of communities larger than those served by single pithouses with sipapas. This is not to suggest that either site included "ritually-specialized facilities" (Adler's term), since the artifactual assemblages recovered from the sites do not seem to differ significantly from other Developmental period sites. However, Adler seems to argue not for a complete dichotomy between low-level generalized and high-level specialized integrative facilities but for a continuum between them.
As the size of communities increased, we should expect both an increase in the number of smaller, generalized integrative facilities and the addition of larger, ritually specialized facilities, the latter appearing when community populations surpassed 200 individuals. Additionally, if the size of use-groups associated with the smaller integrative facilities increased through time, we should see an increase in the average size of this class of general-use facility. (Adler 1993:336; see Adler and Wilshusen 1990:143)

Thus, although Adler may not see evidence of Developmental period ritually specialized facilities integrating entire communities, we may, at the two “different” sites, see evidence for the development of facilities integrating larger portions of communities than those integrated by single pithouses with sipapus. Further, in the possible evidence for remodeling and integrative functional replacement of structures, we may be seeing the development of relatively long-term use of specific locations for community integrative activities. This is in keeping with expectations for the establishment of communities on frontiers. In a diachronic view of the colonization gradient of frontier settlement (Casagrande et al. 1964), some locations begin as dispersed settlements and, for a variety of reasons, change from level to level of community establishment and stability. The relatively lengthy use a specific location as a community facility points to a degree of community stability not seen at single pithouse sites with short occupations, no remodeling, and no reoccupations. The latter are indicative of considerable mobility among frontier households while the former may represent focal points for communities or portions of communities of mobile households.

In this regard, the presence of adobe surface structures that were probably used for storage rather than for habitation is interesting. Boyer (1994) observes that internal storage features are not common in Taos area Developmental period pithouses. On the other hand, since Taos Gray sherds far outnumber painted sherds at these sites and since Taos Gray vessels are usually jars, it is possible that ceramic jars were the most common storage feature at single-pithouse sites (Boyer 1994:462). This is consistent with fairly mobile households prepared to move their stored goods with them. However, it is hard to reconcile with the long-term food storage needs being addressed at later large pueblos where households are thought to have occupied "suites" of 2 to 25 rooms, depending on the size and make-up of the household. Most of these rooms were storage rooms (Holschlag 1975; Lowell 1991; Lightfoot 1992). Thus, we may speculate that the number of ceramic jars found at Developmental period sites might not accommodate the long-term food storage needs of the households occupying those sites. If so, then perhaps the surface structures at Developmental period sites represent storage facilities for multiple households. This would suggest that these sites served to integrate communities or portions of communities through more than decision-making and ritual-social activities.
Ethnographic Evidence: Population and Community Organization at Picuris Pueblo

In 1965, Bernard Siegel reported on his observations of changing social organization at Picuris Pueblo, a small Tiwa-speaking community in north-central New Mexico (Siegel 1965; also Siegel 1959). The community was apparently quite large in the sixteenth and seventeenth centuries A.D. (see Schroeder 1974 for a historical overview of the community). However, its population began to drop following the Pueblo Revolt of 1680, the reoccupation of New Mexico by Europeans in the 1690s, and self-imposed exile at El Cuartelejo in what would become western Kansas between 1696 and 1706. From an estimated, and probably somewhat exaggerated, high of 2,000 to 3,000 residents before the 1680 revolt, only about 360 Picuris returned from Kansas in 1706. In the 1700s, the population fluctuated between a high of about 400 (in 1744) and a low of 212 (1788) and climbed back to 320 by 1821. By the mid 1800s, however, population had dropped to 143 (1860) and into the 120s in the 1870s. Between 1890 and 1940, the population stayed between about 90 and 110. Since then, the population of the Picuris community has climbed slightly, although the number of residents is not as high as the number of enrolled tribal members. As an example, Schroeder (1974) records the population in 1974 as 164, while Brown (1974) states that the population, in the same year, was only 75.

Siegel summarizes the impact of continued population decrease as follows:

. . . it is not surprising that one should find, in relation to these events, much evidence of sharply reduced organizational efficiency in social life and a corresponding increase in the abandonment or curtailment of fundamental institutionalized activities. (Siegel 1965:199)

Siegel then describes several aspects of mid-late twentieth-century Picuris community structure that reflect decreasing population:

1. Complexity of community socioreligious structure decreased. Specifically, fewer kivas (Adler’s “integrative facilities”) were in use through time, apparently because fewer people were involved in kiva activities and because kinship in the smaller community became more integrated (Siegel 1965:200, 202). Associated with this situation was a dramatic decrease in the number and kind of ritual ceremonies performed (compare Parsons [1939:216-222] to Siegel [1965:202]).

2. Decreased complexity also involved lessened importance and authority placed on community structural authority and hierarchy. Specifically, the authority of the cacique (“highest ranking priest-head”—Siegel’s term) eroded, and the community council, which had consisted of elder members of the kivas, was changed to include all male household heads, even those who were young and relatively inexperienced in community affairs (Siegel 1965:200, 202). Associated with this situation was a significant lack of division and factionalism within the Picuris community, particularly when compared to the much larger and more complex community at Taos Pueblo (compare Siegel [1965:204-205] with Katz [1974]).

Brown (1974; see also Brown 1999) reports the same changes in twentieth-century Picuris community structure, although he ascribes them to changing economic forces and strategies, particularly the impact of wage labor and national government welfare programs and the attendant loss of subsistence agricultural and foraging strategies. By reconstructing Picuris community organization prior to 1900, using archaeological and ethnohistorical data, Brown is able to contrast late nineteenth-century and late twentieth-century community structure. With regard to decreasing complexity in socioreligious structure, as observed by Siegel (1965), Brown (1974:334-335) notes
that late nineteenth-century Picuris was characterized by a significant degree of ritual specialization. This was evident in the presence of directional moiety groups and several “ceremonial groups” (Brown’s term; kiva and interkiva groups), their facilities (kivas), and their activities throughout the year. After about 1910, membership in the “ceremonial groups” began to decrease and the groups finally dissolved as young men left the village and older men died (which resulted in population decrease, despite Brown’s objections). Interestingly, as the kiva groups dissolved, “ownership” (Brown’s term) of the facilities, which had been vested in the members of each group, passed to the community as a whole. The number of kivas in use decreased through time, as did the number and variety of ritual ceremonies (Parsons 1939; Siegel 1965; Brown 1974, 1999).

With regard to changing community structural authority and hierarchy, Brown (1974:335-336) argues that pre-1900 Picuris had a relatively complex authority structure, with both sacred and secular hierarchies (although secular authority—the governor and his officers—was legitimized by sacred authorities). As the community decreased in size during the 1900s, authority became vested in a council of household heads rather than in the headmen of the kiva groups. Finally, the cacique died and was not replaced. Instead, community authority passed from the sacred head (the cacique) to the secular head (the governor). This diminished the division between sacred and secular authority. Although it may appear that this marked the end of sacred authority in the Picuris authority, we should note that (1) the governor was still selected by the council, as he had been in the past, and (2) the governor acquired responsibility for the community’s ritual features and structures.

In addition to these aspects of community structure, Brown (1974) also observed two other changes at Picuris. First, he points out that, “Law and order, which was maintained through such traditional sanctions as fines, community work, public whippings, and banishment, is now possible only with the assistance of federal and state law enforcement agencies” (Brown 1974:320). Second, he records a significant change in settlement and land use:

In 1900, two places of residence were maintained by many households, a house within the pueblo occupied during the winter months and a second house in the fields occupied during the farming season. This settlement pattern, compact for the winter and dispersed for the summer, reflected the economic activities of the community. With a shift in emphasis from subsistence farming and hunting to wage work in the 1930s, many of the summer houses were abandoned and only the residences were maintained. With the growing importance of the welfare programs since 1948, the few summer houses which were occupied between 1930 and 1948 have been abandoned also and are only for storage today. (Brown 1974:331-332)

In contrast to Brown’s assertion that these changes were the result of shifting economic forces and strategies, Katz (1974) ascribes the same aspects of community organization at Taos Pueblo to responses to population density and frequency of interaction within the village. Concerning sanctions used to maintain order in the community, Katz describes them as parts of a community-wide “posture of restraint”:

Any personal assertiveness is disapproved; unanimity in government decisions is assumed. A Taos who distinguishes himself in any way, in dress, speech, accumulation of wealth, or who seeks prestigious positions within the pueblo, earns disapproval and becomes the subject of sanctions such as gossip, accusations of witchcraft, whipping, vandalism of his property, or “accidental” death. (Katz 1974:309)

Another series of mechanisms for coping with crowded conditions at Taos involves different ways to maintain personal privacy, including using land outside the village:
One other way that the Taos use the space outside the wall is by retreating to their summer houses. Traditionally, there have always been a few one-room houses which were used by some Taos families for several weeks in the summer when their agricultural activities demanded a large part of their time. These houses were located within the pueblo land, but most were outside the wall. In the past fifty years, however, more and more Taos have used the land to build summer houses. Frequently these houses would be built with a large number of more spacious rooms than existed in their residences within the wall. In the past ten years, it has become increasingly popular for some Taos to use these “summer” residences throughout the year, although they never relinquish their ownership in their original residences. (Katz 1974:312-313)

The residents of Taos were subjected to the same sorts of external forces impacting their economic-subsistence strategies as were the residents of Picuris during the twentieth century. How, then, do we rectify Brown’s observations that community sanctions against inappropriate behavior and the use of summer/field houses both decreased at Picuris during the same years that Katz argues they were firmly in place and, in the case of summer/field houses, became more prevalent at Taos? The obvious answer is that the population of Picuris declined during this time, while that of Taos did not (see Bodine 1979). As population density at Picuris declined, so did frequency of personal interaction. Consequently, social mechanisms used to cope with relatively high population density fell into disuse through time.

**Implications for Defining Simple Puebloan Communities**

Both Siegel (1965) and Brown (1974) see the changes evident in Picuris community structure since about 1900 as symptomatic of the “disorganization” (Siegel’s term) of traditional Picuris society. In this view, the features of the larger, more complex, form of the pre-1900 Picuris community, including large, multistory buildings in the village (like Taos), summer/field houses near farming fields, subsistence agricultural and foraging economic strategies, a directional moiety structure, multiple kivas with several kiva and interkiva societies, numerous ritual activities throughout the year organized and maintained by the different societies, a community council consisting of the elder members of the kiva societies and a **cacique**, “secular” community officers selected by the council, and community mechanisms for enforcing appropriate behavior, were the norm. Consequently, the changes since 1900 represent the lamentable disintegration of normal, traditional Picuris society and community structure.

An alternative view is that the changes observed by Siegel and Brown reflect only the disintegration of the most complex forms of Picuris society and community structure, and that they reflect reversion to simpler social structural forms. This view is supported by a significant statement made by Brown:

In spite of these dramatic changes, the residents of Picuris continue to speak their own language, along with Spanish and English, and are able to maintain an identity independent of their Spanish-American neighbors and an orientation separate from the surrounding dominant Anglo-American culture. (Brown 1974:320)

That is, while the students of Picuris see in the twentieth-century changes the disintegration of the Picuris community, the Picuris have maintained their language and their cultural “orientation” (a point also made by Siegel [1965:204]), two factors that distinguish them from their Euroamerican neighbors. In other words, the Picuris community has changed dramatically in size, architecture,
settlement, ritual complexity, and social structure, but has maintained its identity. This suggests that cultural identity is not as strongly tied to community and social structural forms as anthropologists might expect.

More significantly, for this discussion, it reveals that Puebloan communities can have much simpler structural forms than we might expect based on the forms of historic and modern Pueblo communities. If we take the view that as Picuris’ population declined, the community maintained its identity while reverting to simpler forms (see Hegmon et al. [1998] and Nelson [1999] for archaeological examples of the same argument from the Mimbres region), then the Picuris example provides us with several possible characteristics of simpler Puebloan community forms. In turn, those characteristics can be expected to be revealed archaeologically.

The most significant characteristic is that simple communities will be small and relatively unorganized in form, particularly when compared to larger, more complex communities. When we consider the Picuris example in combination with the conclusions drawn by Kintigh (1994) and Adler (1993), also from ethnographic data, we should expect to see this situation reflected in the following ways:

Simple communities should have relatively dispersed settlement patterns. Both Siegel and Brown point out that twentieth-century residence at Picuris changed from mostly matrilocal and patrilocal to neolocal and that the practice of building houses directly adjoining those of family members has been replaced by the practice of building new, unadjoined houses within the village.

Archaeologists consistently refer to communities as spatial clusters of sites (Breternitz and Doyel 1987; Adler 1993; Wills and Leonard 1994). That is, communities are characterized by relative residential proximity; the actual measure of proximity and, so, the spatial size of a community is conditioned by the degree of sedentism, the economic and population stability of the households comprising the community, the structure and integration of the community, and location(s) of available arable land and other resources. Still, it should be possible to identify clusters or concentrations of sites making up a community.

For the Developmental period, we may expect to see clusters of pithouse sites. The geographical definition of such clusters may be difficult to ascertain. However, following Adler’s (1994:99) assertion that communities reflect “consistent resource access . . . on a local level,” we may expect that sites in clusters representing communities will have similar suites of structural, feature, and artifactual characteristics (Boyer 1994), and be located with similar access to arable land.

Simple communities should show a relative lack of standardization in community form (placement of residential and other sites) and size (number of contemporaneous residential and other sites). Archaeologically, we should not expect to see standardized forms such as plazas (even without contiguous structures). We should expect that there will be large clusters of sites or structures and small clusters of sites or structures. Bearing in mind Kintigh’s (1994) and Adler’s (1994) apparent limits on community size, we can expect simple communities to consist of less than 14 contemporaneous residential structures. Assessment of these conditions requires chronometric establishment of contemporaneity.

Simple communities should contain relatively few “integrative facilities,” simply because the communities consist of relatively few people that need to be integrated. Archaeologically, we should expect to see few facilities that we would define as kivas (by presence of features or suites
of features and by evidence for differential treatment during use and abandonment), relative to the number of associated, contemporaneous, residential structures or sites.

Further, simple communities should show a relative lack of standardization in the presence and form of ritual-related features and structures associated with community integrative facilities. In the terms of Rappaport (1979) and Buikstra et al. (1998), standardization in these features and structures should be related to the kind of information (canonical or indexical) contained in them and the kind of messaging (inscriptive or incorporative) used to access and convey that information.

Simple communities should show little evidence of intracommunity hierarchical authority and of ritual specialization. This is related to the expectation, mentioned earlier, of finding relatively few integrative facilities in a community. Additionally, we should expect to see few examples of “high-level integrative facilities” (Adler’s term), facilities that served full-time ritual and integrative functions, and may have integrated multiple communities.

Finally, simple communities should show little or no evidence of intercommunity integration or hierarchical authority. This is related to the absence of high-level integrative facilities. However, as Boyer (1995) suggests, repeated or long-term use of certain locations, including feature and structural remodeling or replacement as well as relatively high frequencies of noncontemporaneous residential and other sites or structures, may indicate the growth of communities and community centers and the development of high-level integrative facilities. In effect, evidence for repeated or long-term use of specific locations may show that the location itself was an established community center and functioned as a high-level integrative facility.

Studying Puebloan Communities in the Tewa Basin

The preceding discussions of the identification of puebloan communities suggest a series of questions concerning the Santa Fe to Pojoaque Corridor sites.

1. Do the project area Puebloan sites represent spatial clusters or parts of spatial clusters of sites?

   This is an important issue for defining Developmental period Puebloan communities and points to the significance of the project area sites. At these sites, we have the opportunity to explore two sides of this issue. Comparing the results of other survey and excavation projects in the southern Tewa Basin will provide data on site distributions. These data will be used to determine whether the project area sites are site clusters or parts of site clusters. At the same time, we will use architectural and artifactual data obtained from excavation to define and assess similarities and differences between the individual sites in the project area and between the project area sites and those examined in nearby project areas. Specific discussions of the analyses of architectural and artifactual materials are found in following chapters of this data recovery plan. If survey and excavation data point to spatial distributions representing site clustering, and if clustering of architectural and artifactual data can be defined, we will be seeing evidence of community organization during the Developmental period.

2. Do the Santa Fe to Pojoaque Corridor sites provide evidence of integrated access to resources?

   Adler (1994:99) describes the community as "the most consistent resource access institution on the local level." If the project area sites were parts of communities that functioned, at least in part,
to integrate access to resources, we should expect to see significant similarities in access to and use of local and regional resources within site clusters and differences between site clusters. We may also expect to see significant differences in access to and use of local and regional resources between the project area site clusters and those in nearby project areas, if there are actual differences in availability of specific resources. Examples of resource access include raw materials for chipped stone and ground stone tools, while examples of resource use include the kinds of tools made from these materials, the extent of expedient versus purposeful tool manufacture and use, and the extent of tool reuse and recycling. Raw materials for ceramic manufacture is another example, as is the use of local and regional faunal and floral resources. Specific discussions of the analyses of these materials are found in following chapters.

3. Do the Santa Fe to Pojoaque Corridor sites show evidence of community integration?

Several questions are involved here. First, do some sites show evidence of low-level integrative use? Adler’s (1993) research suggests that this should be seen primarily in the presence of pithouse features recorded as sipapus, and that these features should not be common at contemporaneous structures or sites. If more than one have sipapus, we may be seeing evidence for more than one subcommunity group or for use of different integrative facilities through time. Accurate chronometric dates are critical in this regard; collecting chronological materials is discussed in a following chapter.

The next question is: do some sites show evidence of higher level integrative use? Specifically, based on the earlier discussion of sites with increased architectural and site structural complexity, do sites that have surface structures yield evidence of a level of community integration above that served by a single pithouse with a sipapu? Do these sites show evidence of both habitation and “ritual” use? Do the artifactual assemblages from these sites differ from other site assemblages in terms of the activities represented at the sites? Are there intrasite differences in the architecture, features, and artifacts that point out functional differences? And, is there structural and artifactual evidence that the surface structures at these sites were used as community storage locations (storage cists, bins, buried jars, high frequencies of jar sherds)? How many rooms are present, how many have hearths, and how many have internal storage features? How do the room-with-hearths/room-without-hearths ratios compare with studies of sizes of households and “architectural suites” at larger pueblos (Holschlag 1975; Lowell 1992; Lightfoot 1992)?

Finally, are integrative facilities distinguishable by differences in treatment both during and after use? Based on evidence from the Taos area (Moore et al. 1994; Boyer 1995; see earlier discussion) and from excavations at LA 835 (Boyer and Lakatos 1997), we may expect that structures serving as integrative facilities were more likely to have been remodeled or replaced on-site or nearby, and that they are less likely to have been systematically cleaned and stripped of usable materials at the time of abandonment than those structures that were apparently used only as habitation sites. Further, we may expect that integrative facilities, having been “abandoned” or placed into disuse, may be identified by evidence for distinctive closure and “post-abandonment” activities and processes.

Conclusions

Taken together, data obtained in pursuit of answers to these questions will be valuable for defining Developmental period communities by providing information on several aspects of communities. They will also be valuable in examining the level(s) of community integration during the Developmental period. Understanding Developmental period communities, their sizes, levels of integration, and natures of integration, is critical for accurately examining post-Developmental period
For instance, the transition from dispersed pithouses to small pueblos has often been characterized as a process of population aggregation (see Crown and Kohler 1994; Crown et al. 1996; Powers and Orcutt 1999). However, if dispersed pithouses were, in fact, integral parts of communities, then the transition from a community of, let us say, 12 pithouse households to 3 households in a 10-room pueblo could represent, in a certain sense, population fragmentation. If the 3 households in the 10-room pueblo actually continue to be part of a larger community comprised of several small pueblos, then we have a potentially significant change in community integration and structure. Why do some households congregate in a single location? If remodeling and structure replacement at integrative sites show relatively long-term use of a specific location for integrative activities, do the locations of small pueblos reflect the locations of earlier pithouse-community integrative facilities? Do the number of households congregated in a small pueblo represent the number of households formerly integrated in a small pithouse community? Does population congregation represent fragmentation of an earlier community or formalization of earlier integrative relationships? In order to begin to answer these questions, we must understand the natures of Developmental period communities, their sizes, and levels of integration. These issues are a primary research focus for the Santa Fe to Pojoaque Corridor sites.
A total of 2,207 native sherds were recovered from the five prehistoric sites investigated as part of the testing phase of the Santa Fe to Pojoaque Corridor project. They include 425 sherds from LA 388, a single sherd from LA 389, 180 sherds from LA 391, 169 sherds from LA 835, and 1,432 sherds from LA 3119. Data from analysis of these sherds are discussed here and are used to develop a strategy of analysis and investigation of the large numbers of pottery expected to be collected during data recovery investigations. In addition, low numbers of prehistoric pottery types were collected at the two historic Hispanic sites tested as part of the project (23 sherds from LA 4968 and one sherd from LA 160). Data from the testing phase at these sites indicate, however, this pottery may represent contaminants possibly collected from nearby sites and discarded by the historic occupants of these settlements, and it is presently considered unlikely that either of these sites contains distinct prehistoric components (James Moore, pers. comm. 2000). Still, the distribution of prehistoric pottery at both of these sites will be closely monitored in order to determine if earlier components exist. If evidence of prehistoric contexts are identified, data on the distribution of prehistoric types from these sites will be reported along with those from the prehistoric sites.

The sherds collected from prehistoric sites investigated during the testing phase are used here to examine various patterns that will allow for the development of strategies for ceramic analysis and investigations planned for data recovery investigations. Thus, the following sections discuss analytical procedures used and basic ceramic distributions and trends noted for pottery collected, as well as proposing a series of research questions, reporting procedures, and detailed ceramic studies that will be implemented during the next stages of investigations.

Ceramic Categories and Typology

Ceramic data from prehistoric sites within the project area provide clues concerning the time of occupation of various sites and contexts as well as the examination of trends relating to the production, decoration, use, and exchange of pottery vessels. In order to examine various issues, the analysis incorporated a wide variety of data in the form of both attribute classes and ceramic type categories.

Attributes utilized during this study are similar to those employed in other recent OAS projects in this area (Wilson, in press). Attribute classes recorded for sherds recovered during the testing phase include temper type, paint type, surface manipulation, modification, and vessel form. These attributes will be recorded for all sherds examined during the data recovery phase of the project. In addition, more detailed studies, such as refiring analysis, petrographic characterizations, stylistic, and technological studies, may provide additional information. More detailed information that will be recorded for whole vessels include precise form, measurements of vessel dimension, thickness, modification, and sooting patterns.

Other trends will be examined using ceramic type categories. Ceramic types, as used here, refer to groups identified by various combinations of paste and surface characteristics with known temporal, spatial, and functional significance. Ceramics are initially assigned to a specific tradition.
based on probable regions of origin as reflected by paste and temper characteristics. Ceramic items are then assigned to a ware group based on general surface manipulation and form. Finally, sherds are assigned to temporally distinctive types based on surface texture or painted design styles.

Prehistoric pottery types identified from sites in the Pojoaque area include a wide range of local gray and decorated types as well as intrusive types associated with various regional ceramic traditions. Local pottery types include both Tewa White Ware and Rio Grande Utility Ware types. They include pottery forms known to have been produced from the tenth century to today. A wide range of types and forms have been described within both of these ware groups (Amsden and Kidder 1931; Habicht Macuche 1993; Mera 1935; McKenna and Miles 1990; Stubbs and Stallings 1953; Warren 1979), although descriptions of early Northern Rio Grande types are limited to a few studies (McNutt 1969; Mera 1935; Wilson, in press; Wiseman 1989).

Gray ware forms dominating Developmental period assemblages in the Tewa Basin are characterized by high iron pastes, abundant mica fragments, and granite temper indicative of local sources. Despite the uniformity in paste and temper characteristics, a very wide range of surface treatments and textures have been noted for utility ware pottery from sites in the Pojoaque area. This has resulted in the recognition of a large number of gray ware types based on surface variation noted in various plain, neck-banded, and corrugated forms. Utility ware types, recognized for various traditions, incorporate information with temporal implications relating to exterior surface texture primary using descriptive names such as "Rio Grande plain body" or "indented corrugated."

Prehistoric white ware pottery from sites examined during the present study include a mixture of intrusive pottery from other regions and local types produced in the Northern Rio Grande country. Local white wares, characterized by fine dark paste with tuff or ash temper long employed in the Northern Rio Grande, were assigned to types of the Tewa White Ware series. The series refers to a very long-lived tradition of painted white ware pottery manufactured with local clays and tempers found along the Northern Rio Grande (Fallon and Wening 1987; Harlow 1973; Wendorf 1954). The earliest types of this tradition exhibit decorations in mineral paint and design styles similar to and perhaps adapted from Pueblo II groups to the west. Mineral painted sherds with Rio Grande pastes are usually assigned to Kwahe'e Black-on-white, the earliest type commonly defined for the Tewa series (Fallon and Wening 1987; Wendorf 1954). Almost all prehistoric local white ware sherds identified during the present study appear to be derived from mineral-painted Kwahe'e Black-on-white vessels. Kwahe'e Black-on-white sherds were also assigned to several categories based on design style (such as hatched or solid designs). An important change in Tewa series pottery is the shift to decorations in organic paint, which occurred around A.D. 1200 and characterized Tewa series pottery into historic times.

Pottery exhibiting pastes or other characteristics indicating production in other regions were assigned to types belonging to various traditions using criteria and descriptive names similar to those employed for local utility wares (Goetz and Mills 1993; Windes 1977). Most of the nonlocal pottery from the Developmental period sites in the Pojoaque area represents Cibola White Wares, thought to have been produced over wide areas of the San Juan Basin to the west and much lower frequencies of pottery types belonging to other Four Corner Anasazi traditions, as well as to the Mogollon and Jornada Mogollon traditions to the south. Pottery traditions already defined for these types will be utilized. Any differences in pottery assigned to these traditions as described in previous studies will be noted in future ceramic descriptions.

Detailed pottery type descriptions will be presented in the final report for the data recovery project. These descriptions will include discussions of distributions of various traits for each type identified, and nuances concerning the definition and separation of various types. Photographs of
good type examples will be illustrated. These descriptions will be presented and disseminated in a manner so that they may serve as an important source of definitions of Late Developmental period ceramic types.

**Testing Results and Research Issues**

*Temporal Patterns*

Frequencies and distributions of ceramic types and ware groups are used to estimate the time of occupation reflected at a particular site or context. Distributions of the relatively small pottery sample collected during testing phase investigations indicate occupations sometime during the Late Developmental period, as defined for the Northern Rio Grande Valley (Wendorf 1954; Wendorf and Reed 1955). Pottery distributions from these late Developmental occupations appear to be contemporaneous with those noted for Pueblo II and early Pueblo III period assemblages from various areas of the Colorado Plateau.

Various investigations indicate the presence of a substantial number of Late Developmental period occupations in the Tewa Basin (Akins n.d.a; Ellis 1975; Lentz, in press; Mera 1935; Skinner, et al. 1980; Stubbs 1954; Wendorf 1954; Wiseman 1996). Some studies provide ceramic criteria for the recognition and division of these occupations into two distinct phases (McNutt 1969; Dickson 1979; Wilson, in press). Assemblages dating to the Red Mesa phase are identified by the presence of Red Mesa Black-on-white as the dominant white ware type, and utility ware assemblages dominated by plain gray and neck-banded sherds. Assemblages dating to the slightly later Kwae’e phase are identified by the presence of local (Kwae’e Black-on-white) and intrusive black-on-white pottery, the latter mostly from the Cibola region. These early white wares are easily distinguished from those associated with the later Coalition period by decorations in mineral rather than organic pigments (Lang 1982; McKenna and Miles 1990; McNutt 1969). A wide range of surface treatments on gray ware sherds also characterizes Kwae’e phase assemblages, including neck-banded and corrugated textures, although plain forms usually dominate these assemblages.

The assignment of ceramic-based dates to the Late Developmental period sites in this study is still extremely tentative. It is based on documentation of ceramic distributions from the very few independently dated contexts in the Tewa Basin and other areas of the Northern Rio Grande region (Robinson et al. 1972; Smiley et al. 1953; Wendorf 1954; Wiseman 1989, 1995; Boyer 1997), and on cross-dating using intrusive ceramic types and stylistic distributions from other regions where the associated time spans have been determined. Dating assignments based on cross-dating may vary considerably depending on one’s views concerning the transfer of traits or styles between the Colorado Plateau and the Northern Rio Grande. The view that stylistic change in the Northern Rio Grande Valley lagged behind that noted in Anasazi regions to the west has influenced the ceramic dating of Developmental period sites in the Northern Rio Grande (Cordell 1978; Wendorf and Reed 1955; Stubbs 1954). Thus, ceramic types or forms in the Northern Rio Grande Valley are often placed into dating periods that are significantly later than those used on the Colorado Plateau. Unfortunately, the general lack of ceramic descriptions from dated Northern Rio Grande Valley sites and inconsistencies in descriptions, make it difficult to evaluate assumptions of cultural lag. Recent evaluations of numerous noncutting dates have resulted in a reinterpretation of the dating of LA 835 (the Pojoaque Grant site), in which the timing and sequence of ceramic stylistic change are thought to have roughly corresponded to that noted at Pueblo II sites on the Colorado Plateau (Ahlstrom 1985; Wiseman 1995). This interpretation is supported by examinations indicating very similar stylistic changes and distributions throughout much of the Anasazi region during the Pueblo II period.
(Toll et al. 1992). Still, some lag seems to be reflected by the late persistence and dominance of plain and neck-banded utility pottery at a time when the overwhelming majority of utility ware from sites in the Colorado Plateau was corrugated (Toll et al. 1992).

The dating scheme proposed here assumes roughly contemporaneous, although not completely parallel, developments in pottery styles between the Four Corners and Northern Rio Grande country. This seems to be particularly true for white ware forms. Thus, I tend to assign slightly earlier dates than some proposed in other studies in the Tewa Basin. Here, the Red Mesa phase, as defined by Red Mesa Black-on-white as the dominant white ware and with utility wares dominated by plain gray types along with lower frequencies of neck-banded types, is postulated to date between about A.D. 875 and 1025. Thus, ceramic assemblages from this phase are assigned dates similar to assemblages from the Colorado Plateau. The Kwahe’e phase, as defined by the presence of Kwahe’e Black-on-white and stylistically similar intrusive Cibola types such as Gallup Black-on-white and Escavada Black-on-white along with a mixture of plain, neck-banded, and corrugated utility ware types, is assumed to date between about A.D. 1025 and 1200.

Late Developmental period occupations at the prehistoric sites reported here are clearly indicated by pottery collected during testing (Table 13.1). However, our examination of pottery collected from four of these sites (LA 388, LA 389, LA 391, and LA 835) by Mera (1934), presently stored at the Laboratory of Anthropology, appear to indicate longer occupations.

Distributions associated with the 425 sherds collected from LA 388 during testing indicate a Kwahe’e phase occupation. The 98 sherds from this site in the Mera collection also indicate a dominant Kwahe’e phase component, although some of the pottery recovered may indicate other components. A small number of Red Mesa Black-on-white sherds may indicate an earlier Red Mesa phase occupation, while the occurrence of one Santa Fe Black-on-white and two Tewa Polychrome series sherds represent material associated with later Coalition and historic periods.

Only a single plain gray ware sherd was recovered during the testing phase of LA 389. Examination of 149 sherds from the Mera collection indicates that the main component dates to the Red Mesa phase. A very small number of sherds present also indicate possible occupations during the Kwahe’e phase, and Coalition, Classic, and historic periods.

The 180 sherds recovered from LA 391 indicate an occupation sometime during the Late Developmental period, although it is difficult to determine the specific time of occupation given the small number of white ware sherds recovered. The mixture of white ware types seems to indicate occupations dating to both the Red Mesa and Kwahe’e phases. Examination of the 55 sherds from the Mera collection indicates an assemblage overwhelmingly dominated by Red Mesa Black-on-white, and thus assumed to date to the Red Mesa phase.

LA 835 (the Pojoaque Grant site) represents the largest known and most studied Late Developmental period site in the Tewa Basin (Stubbs 1954; Wiseman 1995). Distributions associated with the 174 sherds collected during the testing phase at LA 835, as well as with sherds collected during earlier excavations as part of the Pojoaque South project (Boyer and Lakatos 1997), show that western areas of the site near the highway right-of-way date to the Kwahe’e phase. Large areas of this site were excavated in the 1950s and very briefly described (Stubbs 1954). Further evidence of dating and associated ceramic distributions are reported by Wiseman (1995). These
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<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Unpainted (white ware)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>22.2</td>
<td>11.1</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>Mineral paint (white ware)</td>
<td>1</td>
<td>1</td>
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<tr>
<td></td>
<td>20.0</td>
<td>20.0</td>
<td>40.0</td>
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<td></td>
<td>0.6</td>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Kwahe'e B/w (solid designs)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>20.0</td>
<td>20.0</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Kwahe'e B/w (thin parallel line)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Kwahe'e B/w (hatched designs)</td>
<td>3</td>
<td>3</td>
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<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Kwahe'e B/w (solid and hatchure)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Kwahe'e B/w (other design)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Mineral Paint Undifferentiated</td>
<td>1.2</td>
<td>3.9</td>
<td>2.4</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>2</td>
<td>15.4</td>
<td>7.7</td>
<td>76.9</td>
</tr>
<tr>
<td>0.5</td>
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<td>0.7</td>
<td>0.6</td>
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<tr>
<td>Pueblo II (Indeterminate Mineral)</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11.1</td>
<td>16.7</td>
<td>22.2</td>
<td>50.0</td>
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<tr>
<td>0.5</td>
<td>1.7</td>
<td>2.4</td>
<td>0.8</td>
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<td>Red Mesa B/w</td>
<td>6</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>1</td>
<td>50.0</td>
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</tr>
<tr>
<td>1.7</td>
<td>0.6</td>
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<td></td>
</tr>
<tr>
<td>Red Mesa B/w (squiggle hatchure)</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>50.0</td>
<td>4.3</td>
<td>0.1</td>
</tr>
<tr>
<td>0.9</td>
<td>0.6</td>
<td></td>
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<tr>
<td>Escavada B/w (solid designs)</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>40.0</td>
<td>10.0</td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>0.9</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Mesa B/w (thin parallel lines)</td>
<td>2</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>18.2</td>
<td>18.2</td>
<td>45.5</td>
</tr>
<tr>
<td>0.1</td>
<td>1.1</td>
<td>1.2</td>
<td>0.5</td>
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<tr>
<td>Gallup B/w</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>1</td>
<td>0.1</td>
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<td></td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaco McElmo B/w</td>
<td>1</td>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td>1</td>
<td>0.1</td>
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<td></td>
</tr>
<tr>
<td>0.1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Reserve B/w</td>
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</tr>
<tr>
<td>1</td>
<td>0.1</td>
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<td></td>
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<tr>
<td>Upper San Juan Unpainted red ware</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Mogollon Chupadero B/w</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100.0</td>
<td></td>
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<td>0.2</td>
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<td></td>
<td></td>
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<tr>
<td>Plain slipped red</td>
<td>1</td>
<td>1</td>
<td>100.0</td>
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<tr>
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<td>0.1</td>
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<tr>
<td>Jornada Brown body</td>
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<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td>1</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td>7.6</td>
</tr>
<tr>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(Numbers in each cell are actual count, percent of row, percent of column.)
examinations indicate occupations covering a long span of the Developmental Period, possibly from as early as the late ninth century until the end of the twelfth century. Other information concerning the dating of this site is provided by our examinations of sherds from the Mera collections, as well as my own recent in-field analysis of pottery from this site and that of Peter McKenna of the Bureau of Indian Affairs (BIA) (Peter McKenna, pers. comm. 2000). These examinations confirm Wiseman’s observation of a long Developmental period occupation. Areas near the mesita and great kiva (see Fig. 8.1) appear to date to the Red Mesa phase, possibly as early as the late ninth century. Areas downslope to the west seem to date slightly later in the Kwahe’e phase. Such distributions further indicate that most areas of this site along the right-of-way should date to the Kwahe’e phase, confirming our conclusions based on sherds collected during testing and earlier excavations.

While previous collections from LA 3119 could not be located, the 1,422 sherds recovered during testing indicate an occupation during the Late Developmental period. The presence of Kwahe’e Black-on-white and late Pueblo II Cibola White Ware forms indicate a definite occupation during the Kwahe’e phase, although the low frequency of corrugated pottery and some Red Mesa Black-on-white could also indicate a Red Mesa phase occupation.

Ceramic distributions from all five prehistoric sites investigated during this testing phase of the Santa Fe to Pojoaque Corridor project indicate occupations in the Late Developmental period. While most of the contexts probably date to the Kwahe’e phase, some sites may have Red Mesa phase components. Data from this project should provide the opportunity to examine changes within the Late Developmental period.

Other data that will be incorporated during the present study relate to pottery recovered during the excavation of the prehistoric component at LA 6579 during the Pojoaque South project (Boyer and Lakatos 1997). An archaeomagnetic date from one structure falls between A.D. 1010 and 1080, while a date from another structure falls between A.D. 1170 and 1220. Ceramic data from this site may be particularly important in that they may provide an opportunity to characterize the span associated with the end of Kwahe’e phase. So far, examinations from various dated contexts indicate that occupations late in the phase appear to be distinguished from slightly earlier occupations by the clear dominance of Kwahe’e Black-on-white over Cibola White Ware types.

Studies planned for the data recovery phase will try to substantiate and fine-tune present dating schemes. Ceramic distributions from these investigations will be compared with those noted at other Developmental period sites in the Tewa Basin (McNutt 1968; Skinner et al. 1980; Wiseman 1989). They will also be compared with large ceramic samples from Developmental period sites excavated during the Pojoaque South Project. Pottery from these sites was analyzed by the same personnel using the same techniques as have been and will be used during the Santa Fe to Pojoaque Corridor project, so that ceramic data are comparable.

Initial dating assignments will focus on utilizing ceramics to distinguish Red Mesa and Kwahe’e phase components. Such distinctions will be based on frequencies of Red Mesa Black-on-white relative to later styles and to corrugated utility ware forms. Comparison of distributions of various ceramic traits from assemblages assigned to different phases will provide an initial opportunity to examine basic trends associated with the initial ceramic production and use in the Tewa Basin.

Subsequent examinations will attempt to further subdivide the fairly long temporal spans associated with these two phases. If tree-ring dates are recovered, they may provide for a finer resolution that should allow for the examination of short-term changes. Otherwise, assignments of finer dates will probably concentrate on contexts associated with archaeomagnetic dates. The potential for dated contexts can be seen in recent investigations at LA 835. The two excavated
pithouse structures dating to the Kwahe'e phase yielded distinct archaeomagnetic dates. One of these structures dated between A.D. 1025 and 1090, and the other between A.D. 1140 and 1200. Thus, while these two structures may date to the same phase as normally defined, they were occupied a century apart. Careful comparisons of assemblages from these two structures should provide clues concerning ceramic changes during the Kwahe’e phase.

It is likely that similar situations will be encountered at other sites. These should provide the opportunity to examine ceramic changes within previously defined phases. Even in the absence of many independent dates, comparisons of pottery from contexts within a stratigraphic sequence may provide an opportunity to document various changes over short periods. The wide variety of decorated and textured forms encountered at Late Developmental period sites in the Northern Rio Grande indicate the potential for finer dating periods. Consistent associations of frequencies of different types with various painted decorations and textures may provide for the recognition and definition of temporally distinct assemblages. It may be possible, then, to ultimately arrange these defined assemblages into relative sequences. Differences in frequencies of different types noted between different sites or contexts will be evaluated using logical inferences and various statistical tests. These comparisons may result in more refined ceramic dating schemes that can be evaluated as further evidence becomes available.

While all the prehistoric sites investigated during the Santa Fe to Pojoaque Corridor project appear to reflect Developmental period occupations, the Tewa Basin was continuously occupied into the historic period. Thus, it is possible that some assemblages may contain pottery reflecting later occupations. White wares dating after the Developmental period are easily distinguished from earlier types by organic paint and later decoration styles and rim shapes. Later types also tend to have distinct surface manipulations and greater thickness. Later utility wares are more difficult to distinguish but may be identified by textural differences and highly micaceous pastes. The occurrence of glaze ware types also reflects later occupations.

Investigations conducted during the Pojoaque South project also included excavation of a small site (LA 101410), which may have had a long occupational span (Boyer and Lakatos 1997). The 125 sherds recovered from this site suggest a long occupation post-dating the Developmental period. Evidence of components dating to the Coalition period (ca. A.D. 1200 to 1350) is indicated by the presence of Santa Fe Black-on-white, Wiyo Black-on-white, and smeared corrugated sherds. A Classic period occupation (ca. A.D. 1350 to 1600) is indicated by the presence of Biscuit Ware, Glaze Ware, and Sapawe Utility sherds. Types associated with a historic Spanish Colonial period occupation include Ogapoge Polychrome, plain buff ware, and slipped micaceous pottery. If data from LA 101410 are included in the final report for this project or if distinct later components are encountered during this project, it may be necessary to extend the scope of the research design to include these later developments. If prehistoric components dating after the Developmental period are encountered during the Santa Fe to Pojoaque Corridor project, ceramic distributions will be compared to those noted in Developmental period assemblages to determine the degree of similarity. Similarities between ceramic assemblages associated with Developmental period and subsequent occupations would support current models of occupational continuity. It is also expected that such comparisons will indicate that Coalition populations were not drawn from or even dramatically influenced much by Four Corners groups. This is based on current evidence that the Rio Grande culture had largely diverged from the San Juan culture by the beginning of the thirteenth century.

*Regional and Interregional Interactions*

The dating of various contexts will allow for the examinations of issues relating to the earliest
ceramic-bearing occupations of the Tewa Basin. Given the nature and location of Developmental period settlements in Northern Rio Grande country, previous examinations by the OAS have applied frontier models to Developmental period and historic occupations in this region (Moore 1989b; Boyer et al. 1994; Boyer and Urban 1995; Moore et al. n.d.; Moore 2000).

The application of a frontier model to this area seems to be initially supported by evidence indicating the Tewa Basin was not occupied by ceramic-producing groups prior to the Late Developmental period, and that the earliest ceramic sites in this area have Red Mesa Black-on-white. Both pastes and designs of Red Mesa Black-on-white pottery from Tewa Basin sites bear close resemblance to the pottery produced in Chaco Canyon and other areas of the Four Corners area. Because of the lack of evidence of previous occupation and the similarity of the earliest material culture in the Tewa Basin to that from Four Corners, McNutt (1969) postulated that initial occupations in the Tewa Basin could be more accurately described as Colonization rather than Developmental period.

Alternatively, the spread of populations or traits into the Tewa Basin may be part of a larger phenomenon. Similar Red Mesa pottery appeared over much of the Southwest during the early tenth century. This type has sometimes been postulated to have initially developed in the San Juan Basin or Chaco area. In addition, the Late Developmental occupations noted in the Tewa Basin are contemporaneous with the large-scale appearance and expansion of large great house communities in the San Juan Basin. These great houses are often assumed to have formed part of a widespread and expansive Chaco system that included communities displaying architectural and stylistic elements thought to have been ultimately influenced and organized through the centralized communities at Chaco Canyon (Judge 1991; Judge et al. 1981; Lekson 1991).

Despite the presence of some complex architectural traits at LA 835, formalized great houses and other traits typical of sites associated with the Chacoan system do not appear to be represented at Developmental period sites in the Tewa Basin or other areas of the Northern Rio Grande. This area does not appear to be part of the Chacoan system or network as normally defined. Thus, these sites may reflect the selective spread of some elements and trade goods characteristic of the San Juan system, while other traits seem to have originated in other regions or are distinct to Northern Rio Grande occupations.

It is important to note that the earliest ceramic occupations in the Tewa Basin may not simply represent a movement of populations from Chaco or elsewhere in the San Juan region. The actual population may represent the integration of local populations who still practiced mobile hunting and gathering life styles with others from the San Juan Basin and other areas. The recovery of certain pottery types and stylistic distributions at sites in the Northern Rio Grande indicates some influences from groups in the Jornada Mogollon and Mogollon Highland country to the south and southwest. Another possible source of influence and interaction is the Middle Rio Grande just south of La Bajada. Recent investigations during the Peña Blanca project near Cochiti indicate fairly large pithouses during the eighth and ninth centuries. A third source of populations and influences is the Gallina region, just to the northwest, as indicated by certain textured utility ware forms. In addition, it is possible that the later use of organic paint during the Coalition period may have been derived from the Gallina region where organic pigments were always employed. Thus, the Northern Rio Grande during the Developmental period may be seen as an area where several distinct groups interacted with each other. Such interaction may have quickly resulted in new cultural and adaptive patterns that may have provided the populations and strategies associated with the distinct cultures of the Coalition, Classic, and Historic periods.

The early Rio Grande frontier as described here, then, reflects occupations in the Tewa Basin that
were influenced by larger, sometimes more complex occupations in the San Juan Basin as well as in the Jornada Mogollon, Mogollon Highlands, Middle Rio Grande, and Gallina regions. Unique aspects of these complexes reflect traits that may have been derived from local, mobile, populations native to this area as well as subsequent adaptations to the distinct local conditions encountered by early ceramic-producing groups. The term frontier seems appropriate for prehistoric Developmental period cultures to describe local adaptation that appears to have been loosely connected to and partly derived from the San Juan Basin. This adaptation may have incorporated elements of earlier strategies practiced by smaller groups in the San Basin and groups in other more sparsely occupied areas. Developmental period settlements would have reflected a more extensive adaptive strategy revolving around small self-sufficient households common in frontier situations. Consequently, the frontier concept does provide a framework to examine and explain both similarities and differences between Pueblo II Anasazi groups in the Four Corners area and Developmental period groups in the Northern Rio Grande.

Similarities in ceramic traits between groups in the Tewa Basin and elsewhere may provide clues to the origin of local populations as well as their participation in larger regional systems. Unique characteristics of ceramic assemblages may provide clues to the acquisition of distinct adaptive strategies and group identities. Finally, a frontier approach also allows for comparisons of Puebloan trends with those noted for the historic Spanish and American frontiers, which also expanded into the Tewa Basin.

Trends associated with ceramic distributions at Developmental period sites in the Tewa Basin can only be interpreted in the context of those from other sites. Differences in distributions of traits from different assemblages may provide important clues relating to changes in the use of ceramics through time or strategies of use across space. During data recovery analytical investigations, ceramic trends documented will be continually compared to those noted during other studies.

In order to define connections between Developmental period groups and those in other areas it is important to accumulate data that can be used to compare a variety of ceramic trends. Information concerning local ceramic production may also provide clues to the nature of local technology and degree of self-sufficiency of groups in the Tewa Basin and the nature of interactions with other areas. Distributions of various ceramic traits may indicate the presence and nature of influences and interaction with surrounding areas. Finally, distribution of ceramic functional classes and forms may provide information concerning the ranges of ceramic-related tasks associated with Late Developmental period economies.

Patterns of Interaction and Exchange for Prehistoric Occupations

Relationships between ceramic technology and design styles may provide clues concerning interactions between the Tewa Basin and other regions. For example, if early ceramic-producing populations in the Tewa Basin were derived from the San Juan Basin, we can assume that potters would have continued to produce similar decorated and utility ware pottery. If this area remained somehow connected to the Chaco system, stylistic developments should parallel those noted at sites to the west. On the other hand, if the Northern Rio Grande represented an area where several groups and adaptive systems were merged into a new adaptive pattern, a distinct combination of stylistic and technological elements may be expected.

The recording of a range of decorated and textured pottery styles may provide for stylistic comparisons between sites investigated during the Santa Fe to Pojoaque Corridor Project and elsewhere. Preliminary studies comparing ceramic traits from sites in the Tewa Basin with those sites
in the San Juan Basin and Mogollon Highlands seem to indicate a merging of traditions. Some traits, such as white ware design styles and the production of gray utility wares, most closely resemble patterns noted in the San Juan Basin. Distributions of textured treatments and frequencies of white wares more closely resemble patterns in the Mogollon Highlands.

Other studies attempting to identify differences in pottery that may reflect cultural or ethnic differences include recent examinations of construction of utility ware textured treatments. These studies were initially interpreted as suggesting that early Rio Grande pottery was produced using a distinct technique of manufacture in which coils were joined on the interior surface. This difference was described as reflecting a regionally distinct method of ceramic manufacture that could reflect ethnic differences. These interpretations, however, are presently very tentative, and much more study is needed.

Various studies will examine the possibility that unique combinations of ceramic traits at Developmental period sites indicate that, from the onset of occupation by ceramic-producing groups, this area was characterized by a distinct material culture. While influence from various regions is reflected, the Northern Rio Grande may be best conceived as neither Anasazi nor Mogollon as both are commonly characterized, but as a unique cultural development in its own right. Although the overall adaptive system in the Tewa Basin during the Developmental period included interactions with the Anasazi and Mogollon, it seems unlikely that this area reflects a margin or periphery of the Anasazi, as it is sometimes characterized. Rio Grande cultural sequences may be better understood as reflecting borrowing stylistic and adaptive elements from other areas, and incorporating them into a new and distinct pattern suitable to the exploitation of the Rio Grande by expanding populations. These adaptations included the retention of certain traits and elements that were earlier widely common in the Four Corners area, especially during the Basketmaker III period, but had since been largely replaced by other decorative elements. Populations and conditions in the Northern Rio Grande during the Developmental period may have been such that these elements continued to play an important role in Rio Grande pottery technology and decoration.

Refined temporal resolution is critical for understanding the relationship between separate areas. For example, dating schemes that incorporate cultural lag in stylistic elements have very different connotations than do those that assume synchronous change and development in these elements. Thus, continual dating improvements are critical for understanding the nature of regional connections and interaction.

Information relating to pottery production also provides important clues concerning exchange and regional interaction. Production and exchange of ceramic vessels are closely related phenomena, and they cannot be investigated independently of each other. Detailed examination of factors influencing local pottery production forms the basis for identification of local versus nonlocal ceramics, as well as for understanding causes for the differences noted and the nature of local technologies. As part of data recovery investigations, raw clay material from sources in the Pojoaque area will be collected. Raw materials collected from this area will be compared with pastes commonly occurring in the prehistoric pottery. Such comparisons provide criteria for the recognition of locally produced ceramics, and the influences of local resources on the development of the unique Tewa ceramic tradition. Examination by binocular microscopy and petrographic analysis provides the basis for temper comparisons. The main technique for basic clay comparisons involves firing clays and sherds to similar conditions, as previously described for refiring analysis. This allows comparison of clays based on the influence of mineral content on color.

Previous ceramic studies conducted in the general area (Wilson, in press) have provided criteria by which the origin of pottery found at sites in the Tewa Basin can be determined. Such distinctions
are possible because of the unique geology of the Española Basin, whose boundaries largely overlap those described for archaeologically and ethnographically based definitions of the Tewa Basin. This geology is characterized by Quaternary alluvial deposits from the Rio Grande floodplain, which are interbedded with ash layers from volcanic fields in the Jemez Mountains and Pajarito Plateau. The most abundant types of clays found in the Tewa Basin are alluvial clays, largely derived from granites in the surrounding mountains. These clays tend to have high iron content and often contain fine mica inclusions. Local (Rio Grande tradition) utility ware forms are identified by the use of micaceous alluvial clays along with crushed granite temper, which commonly occur in the surrounding terraces. Another source of clays is weathered tuff or ash deposits. Most of the white ware pottery reflects the use of self-tempered clays derived from volcanic deposits. Thus, the unique qualities of these sources allow for the distinction of local pottery (Tewa or Northern Rio Grande Series) pottery from that originating in other Southwestern regions (Colorado Plateau and Mogollon Highlands) with very different geological settings.

Data relating to both the distribution of attributes reflecting the use of specific clay and temper materials (Tables 13.2 through 13.5) and ceramic types assigned to various traditions based on observed pastes (Table 13.6) indicate that the great majority of pottery from the Santa Fe to Pojoaque Corridor sites could have been produced locally. For example, 93.3 percent of pottery recovered represents Rio Grande Utility Ware types, with similarly high frequencies at all sites examined. This contrasts with the very low frequency (1.0 percent of the total frequency) of pottery assigned to the local Tewa White Ware tradition. In part, this reflects the relative rarity of white ware sherds, although types assigned to nonlocal traditions outnumber Tewa White Wares at all sites. Clearly, the dynamics of production of Rio Grande Utility Ware was very different from those of white ware production.

Unfortunately, the areal scale of resource availability and use of pottery assigned to the Tewa tradition is sufficiently large that pottery assumed to be local could have been produced over an area that includes the Tewa Basin, much of the Pajarito Plateau, and other parts of the Northern Rio Grande region. Thus, other studies will be conducted as part of the Santa Fe to Pojoaque Corridor project in order to provide distinction of pottery production at a finer scale. These studies will examine and compare various attributes related to paste composition and temper inclusions noted within Rio Grande types from different sites in the area. Differences in pottery pastes and raw clay sources between sites may provide clues for understanding the nature of local pottery production and exchange. Such examinations may ultimately provide clues to the dynamics between communities and households that may have resulted in long-distance interactions and pottery exchange.
Table 13.2. LA 388: Prehistoric Ceramic Temper by Tradition

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<th>TEMPER MATERIAL</th>
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<td>Sand</td>
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<td>Mica, quartz, and feldspar fragments (schist granite)</td>
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<td>Quartz and feldspar fragments (no mica)</td>
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<td>Table Total</td>
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</table>

Numbers in each cell are actual count, percent of row, percent of column.
Table 13.3. LA 391: Prehistoric Ceramic Temper by Tradition

<table>
<thead>
<tr>
<th>TEMPER MATERIAL</th>
<th>CERAMIC TRADITION</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rio Grande</td>
<td>Cibola</td>
</tr>
<tr>
<td>Sand</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>35.0</td>
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</tr>
<tr>
<td>Mica, quartz, and feldspar</td>
<td>159</td>
<td>159</td>
</tr>
<tr>
<td>fragments (schist granite)</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>99.4</td>
<td>88.5</td>
</tr>
<tr>
<td>Sherd</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>10.0</td>
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<tr>
<td>Sherd and sand</td>
<td>11</td>
<td>11</td>
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<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>55.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Fine tuff or ash</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
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</tr>
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<td></td>
<td>88.9</td>
<td>11.1</td>
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Numbers in each cell are actual count, percent of row, percent of column.

Table 13.4. LA 835: Prehistoric Ceramic Temper by Tradition

<table>
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<th>CERAMIC TRADITION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Rio Grande</td>
<td>Cibola</td>
</tr>
<tr>
<td>Sand</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>53.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Mica, quartz, and feldspar</td>
<td>152</td>
<td>152</td>
</tr>
<tr>
<td>fragments (schist granite)</td>
<td>100.0</td>
<td>100.0</td>
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<tr>
<td></td>
<td>97.4</td>
<td>89.9</td>
</tr>
<tr>
<td>Sherd</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>7.7</td>
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<td>Sherd and sand</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
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<td>100.0</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Fine tuff and sand</td>
<td>2</td>
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<td>1.3</td>
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<td>Total</td>
<td>156</td>
<td>13</td>
</tr>
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<td></td>
<td>92.3</td>
<td>7.7</td>
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Numbers in each cell are actual count, percent of row, percent of column.
Table 13.5. LA 3119: Prehistoric Ceramic Temper by Tradition

<table>
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<th>CERAMIC TRADITION</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Indeterminate</td>
<td>Rio Grande</td>
</tr>
<tr>
<td></td>
<td>Actual Count</td>
<td>Percent</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>50.0</td>
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<tr>
<td>Sand</td>
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<tr>
<td></td>
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<td>15.0</td>
</tr>
<tr>
<td>Mica, quartz, and feldspar fragments (schist granite)</td>
<td>1347</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>99.9</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>98.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Quartz and feldspar fragments</td>
<td>3</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Sherd</td>
<td>8</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>13.3</td>
<td></td>
</tr>
<tr>
<td>Sherd and sand</td>
<td>39</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>65.0</td>
<td></td>
</tr>
<tr>
<td>Fine tuff or ash</td>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Fine tuff and sand</td>
<td>5</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Fine sandstone</td>
<td>2</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Fine Jornada temper</td>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sand and mica</td>
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<td>100.0</td>
</tr>
<tr>
<td></td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Fine sand, silt, and mica</td>
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<td>100.0</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Self-tempered</td>
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<td>100.0</td>
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<tr>
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</tr>
<tr>
<td>Total</td>
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<td>0.1</td>
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Numbers in each cell are actual count, percent of row, percent of column.
Table 13.6. Distribution of Ceramic Traditions and Wares by Site

<table>
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<th>CERAMIC TRADITION</th>
<th>CERAMIC WARE</th>
<th>SITE NUMBER</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>LA 160</td>
<td>LA 388</td>
</tr>
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<td>Indeterminate</td>
<td>Gray</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.2</td>
<td>81.8</td>
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<tr>
<td></td>
<td></td>
<td>0.1</td>
<td>39.1</td>
</tr>
<tr>
<td>Rio Grande</td>
<td>White</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td>399</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>93.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Cibola</td>
<td>White</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>Gray</td>
<td>3</td>
<td>5</td>
</tr>
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<td></td>
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<td></td>
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<td></td>
<td>0.7</td>
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</tr>
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<td>Upper San Juan</td>
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<td>15</td>
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<td>16.0</td>
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<td></td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Jornada Mogollon</td>
<td>White</td>
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<td>1</td>
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<tr>
<td></td>
<td></td>
<td>100.0</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Brown plain</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>425</td>
<td>180</td>
</tr>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Numbers in each cell are actual count, percent of row, percent of column.
Identification of locally produced pottery will facilitate examination of long-distance exchange through the identification of pottery that was produced elsewhere. Because of the widespread utilization of certain ceramic styles (Toll et al. 1992), vessels produced in other areas are usually identified by distinct local temper or paste resources. The presence of nonlocal pottery may have stemmed from several causes, including seasonal movements, long-distance migration, informal reciprocal exchange, perhaps between kin-related groups, and formalized trade.

Previous definitions of types belonging to various traditions include observations of paste and temper associations. These descriptions provide criteria allowing for the identification of ceramics associated with the various traditions. Sherds from Late Developmental period sites in the Pojoaque area belonging to several distinct regional traditions are indicated by the strong association between paste clay color and temper type in both utility and decorated ceramic types assigned to different traditions.

A small proportion of gray ware pottery from Developmental period sites in the Pojoaque area is tempered with rounded sand grains. This pottery tends to fire to lighter colors than the pottery dominating local assemblages. Pastes of this pottery are similar to that noted in gray ware forms from much of the Four Corners area tend to have blocky paste and fire to lighter buff and pink colors in oxidizing atmospheres. The buff and pink firing pastes dominating these white wares are very similar to those noted for similar ceramics from contemporaneous sites on the Colorado Plateau. These pastes reflect the use of low iron shale clays available and exploited in these regions. Previous studies indicate that while some of the sherds with this paste definitely originated in regions of the San Juan Basin, the occasional presence of tuff temper in sherds exhibiting light paste and originally described as containing sherd temper and assigned to the Cibola region may have originated elsewhere in the Rio Grande region either to the west or south.

In addition, low frequencies of pottery displaying traits indicating production in other Southwest regions have been noted during other projects in the Tewa Basin (McNutt 1969; Wilson, in press). Pottery associated with a number of distinct traditions from Four Corners has been previously identified from Developmental period sites, including types belonging to the Chuska, Tusayan, San Juan, and White Mountain Red Ware traditions. Examples of such pottery recovered during the testing phase of Santa Fe to Pojoaque Corridor project was limited to two San Juan Red Ware sherds that may have originated in southeast Utah. A low frequency of types associated with traditions of the Jornada Mogollon and Mogollon Highland regions to the south have also been identified. Three sherds recovered during the project were assigned to Jornada Mogollon types and a single sherd was assigned to a Mogollon type. There is little doubt that pottery assigned to nonlocal regional traditions is underrepresented in these analyses, and the increased scrutiny of Developmental period assemblages in the Tewa Basin should result in identification of a broader range and higher frequency of intrusive types. Information regarding these pottery types may be used to monitor the maximum extent of interactions with other regions.

**Trends in Vessel Use at Prehistoric Sites**

Trends associated with vessel use or function may provide important clues concerning the role of pottery vessels in various activities by Developmental period groups. The presence of sherds or vessels in a particular archaeological context ultimately reflects the production of vessels intended to be used for a given activity. Attributes relating to vessel shape, size, material resources, surface manipulation, firing technology, and wear patterns reflect intended or actual uses of ceramic vessels in various activities. Many aspects of vessel function are also strongly reflected by ceramic ware. Thus, combinations of ware and vessel form distributions provide information concerning activities
Tables 13.7 through 13.10 illustrate the distribution of vessel forms for each ware group recovered during the testing phase of the Santa Fe to Pojoaque Corridor project. The overwhelming majority (about 95 percent) of sherds from all these sites represent gray ware types. Most of these sherds appear to have been derived from jar forms that are most commonly associated with cooking or storage activities. The remaining sherds are mostly from white ware types. White ware sherds are derived by a wider variety of bowl and jar forms.

The dichotomy of gray and white ware types and vessel forms at Tewa Basin sites is similar to those noted at sites in the Colorado Plateau. Similarities in gray utility wares include the use of vessels with added temper, gray pastes, and unpolished surfaces (Wilson et al. 1996). Almost all gray utility wares identified reflect similar forms probably used for cooking and storage activities. These utility ware forms contrast with Mogollon brown utility ware, which is commonly polished and may be smudged on at least one surface. This type was usually made with self-tempered clays, which commonly fire to brown or reddish colors. While 25 to 50 percent of all pottery from sites in the Four Corners consist of white wares, only about 5 percent of pottery from Tewa Basin sites are represented by white ware types. This indicates that while the forms utilized at sites in the Tewa Basin were similar to and perhaps influenced by ceramic technologies from the west, gray ware vessels were much more commonly utilized and discarded. The overall frequency of utility ware, however, is more similar to that noted from earlier Basketmaker III sites in the Four Corners area, and from contemporary sites in the Mogollon Highlands, Gallina region, and Taos Valley.

Another significant functional difference between Developmental period assemblages in the Northern Rio Grande and contemporary assemblages at Anasazi sites in the Four Corners region is reflected by distributions of surface treatments. The great majority of gray ware pottery from Four Corners Anasazi assemblages dating after A.D. 1000 displays corrugated exteriors. In contrast, the majority of gray wares from Late Developmental period assemblages in the Tewa Basin display plain, smoothed exteriors. These plain wares are accompanied by gray wares exhibiting a wide variety of textured forms, including neck-banded and corrugated treatments. Thus, changes in surface textures noted for the Northern Rio Grande gray wares contrast with the sequential changes noted for Four Corners Anasazi gray wares, where plain gray vessels were first replaced by neck-banded, and then by corrugated forms. Texture changes noted at Tewa Basin sites appear to be similar to those noted at sites in the Mogollon Highlands, where the majority of utility wares associated with all periods exhibit plain exteriors and are classified as Alma Plain (Wilson, in press). Change in utility wares in these assemblages can be described as cumulative, with increasing frequencies and varieties of textures in assemblages otherwise dominated by plain forms (Wilson, in press). Thus, the sequence of change consists first of assemblages with plain utility wares, followed by those dominated by plain and neck-banded textures, and finally by those with plain, neck-banded, and corrugated textures. Changes in utility ware forms from Developmental period sites in the Tewa Basin more closely resemble the accumulative type of change noted in the Mogollon Highlands rather than sequential change described for most of the Four Corners country.

Differences in overall gray ware frequencies and texture distributions at contemporaneous sites in different Anasazi and Puebloan regions may ultimately reflect demographic pressures, including influences associated with mobility on construction, form, and decoration of ceramic vessels. Characteristics of pottery vessels may be seen as reflecting their production for use as facilities that function to even out spatial and temporal heterogeneity in subsistence resources (Mills 1989).
### Table 13.7. LA 388: Prehistoric Ceramic Ware by Vessel Form

<table>
<thead>
<tr>
<th>CERAMIC WARE</th>
<th>VESSEL FORM</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indeterminate</td>
<td>Bowl body</td>
</tr>
<tr>
<td>Gray</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>White</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>50.0</td>
<td>100.0</td>
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<tr>
<td>Red</td>
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<td></td>
<td>20.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Brown plain</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>2.4</td>
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</table>

Numbers in each cell are actual count, percent of row, percent of column.

### Table 13.8. LA 391: Prehistoric Ceramic Ware by Vessel Form

<table>
<thead>
<tr>
<th>CERAMIC WARE</th>
<th>VESSEL FORM</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indeterminate</td>
<td>Bowl rim</td>
</tr>
<tr>
<td>Gray</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>9.8</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>White</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>25.0</td>
<td>12.5</td>
</tr>
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<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
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</tr>
<tr>
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<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
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</tr>
</tbody>
</table>

Numbers in each cell are actual count, percent of row, percent of column.

### Table 13.9. LA 835: Prehistoric Ceramic Ware by Vessel Form

<table>
<thead>
<tr>
<th>CERAMIC WARE</th>
<th>VESSEL FORM</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Indeterminate</td>
<td>Bow rim</td>
</tr>
<tr>
<td>Gray</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>7.1</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>White</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>7.1</td>
<td>50.0</td>
</tr>
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<td>100.0</td>
</tr>
<tr>
<td>Total</td>
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<td>7</td>
</tr>
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<td>0.6</td>
<td>4.1</td>
</tr>
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<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Numbers in each cell are actual count, percent of row, percent of column.
Table 13.10. LA 3119: Prehistoric Ceramic Ware by Vessel Form

<table>
<thead>
<tr>
<th>CERAMIC WARE</th>
<th>VESSEL FORM</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indeterminate</td>
<td>Bowl rim</td>
</tr>
<tr>
<td>Gray</td>
<td>2</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>13.7</td>
</tr>
<tr>
<td>White</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>19.1</td>
</tr>
<tr>
<td>Red</td>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

Numbers in each cell are actual count, percent of row, percent of column.
While aceramic groups dealt with resource heterogeneity through mobility, pottery provided technological alternatives to full-scale mobility. One model for understanding potential changes in ceramic production and manufacture involves the distinction between maintainable and reliable systems (Mills 1989). Maintainable systems sacrifice durability for other factors such as modularity and portability, while reliable systems are designed for increased durability. Containers resulting from maintainable systems are characterized by relative ease of manufacture and repair, little time involved in manufacture and use, lack of backup systems, portability, use in a limited number of tasks, and easily transferrable construction and firing techniques. Containers resulting from reliable production systems tend to be abundant and sturdy, involving more specialized forms with resistance to failure during a specific task, and can require more specialized manufacturing and firing techniques that may be relatively time consuming. Mills (1989) notes widespread trends involving a shift from reliable to maintainable production systems in the Four Corners from the Basketmaker III to Pueblo II periods. In contrast, the continual dominance of plain utility wares in the Tewa Basin and elsewhere in Rio Grande country may reflect the continued utilization of a more maintainable technology that may have been more suitable for activities associated with mobile and dispersed economic and settlement strategies practiced on the Northern Rio Grande frontier. While basic design styles characteristic of Pueblo II groups, such as corrugated utility wares and white ware design styles, were known and utilized by Developmental period groups in the Northern Rio Grande, they were incorporated into an overall vessel tool kit comparable to that noted in earlier Anasazi ceramic assemblages in the Four Corners.

Examination of characteristics of various vessels may also provide information concerning specific uses of various vessel forms and shapes. Information critical to evaluations of vessel form includes data concerning vessel size and shape as well as patterns of wear and sooting resulting from their use. It is fairly difficult to evaluate these data, so these examinations are best accomplished using data from whole vessels. While whole vessels were not recovered during the testing phase, given the nature of the sites and contexts identified, it is likely that whole vessels may be recovered during future investigations. Attempts will be made to reconstruct all whole vessels and to record detailed information about these vessels. This information can be compared with similar data obtained from vessels recovered from sites in other areas to determine if they were utilized for similar ranges and functions. Patterns of sooting and oxidation on vessel surfaces should also indicate if gray ware vessels were commonly utilized for cooking, or were more often associated with storage activities. A comparison of wear, shape, and size may also provide clues concerning the use of gray ware jars from sites in different areas. Examinations of the contents and information from pollen washes taken from such vessels may also provide information concerning the use of various forms.

A comparison of vessel ware groups and forms from different sites and proveniences may also provide clues concerning the use of vessels in different contexts. Relatively high frequencies of gray ware jars in contexts associated with storage activities may indicate their use as storage vessels, where higher frequencies associated with food preparation locations and activities may indicate their use in cooking.

Distributions of size and wear of various vessel forms may also allow comparison of the functions and associated uses of these forms and of potential differences in distributions noted at contemporaneous sites in other Anasazi and Puebloan regions. The frequency and range of sherds and vessels from different sites and types of contexts may also provide information concerning the structures of activities between different sites and activities. Activities for which various vessel forms were used include cooking (wide-mouth gray ware jars) and serving (bowls and dippers) of food, storing dry or perishable goods (seed jars and narrow-mouth gray ware jars), storing and transporting water (pitchers and ollas usually belonging to white wares), and ritual activities (effigies and figurines). Evidence for the modification of pottery items may also provide clues concerning a wider
range of uses as well as the value and recycling of certain items.

Data concerning vessel forms provide clues concerning the nature and structure of activities occurring at a given context or site. For example, different frequencies of certain ceramics wares and forms from pithouse versus surface structure floor contexts may indicate that certain types of structures were the focus of specific activities. Differences in frequencies of ceramic forms from particular contexts may also indicate specialization of activities within and between sites.
14. CHIPPED STONE ARTIFACTS: RESEARCH ISSUES AND ANALYSIS

James L. Moore

Introduction

Assemblages from prehistoric sites in the project area should contain large numbers of chipped stone artifacts. Our study of these materials will parallel analyses of assemblages recovered by the OAS from sites in the Tewa Basin and other parts of New Mexico, and will be directed toward addressing several questions. One of the most important of these concerns is residential mobility, or how often people moved around the landscape. Hunter-gatherers tend to move their camps often, occupying many residential sites during the course of a year. In contrast, farmers tend to occupy a single residential site for one or more years at a time, though they may also use logistical camps to collect resources that occur at some distance from the main village. Analysis of chipped stone assemblages should allow us to examine mobility patterns exhibited by the occupants of these sites, and define degrees of residential mobility. This line of inquiry may be important in helping to determine whether the Developmental period occupants of the Tesuque Valley were hunter-gatherers that were beginning to settle down, or farmers with a comparatively long history of residential stability. In turn, these data and interpretations will bear on issues and questions of the origins and development of early Puebloan populations raised in Chapter 11 and of community structure and organization raised in Chapter 12.

Other topics that will be addressed by these data include ties to other regions, site function, and site structure. By tracking the occurrence of materials that are not native to the Pojoaque area, we should be able to define some of the ties this population had to other regions. Such ties can include indirect acquisition of lithic raw materials through exchange or direct procurement by logistical expedition. The condition of materials when they were brought to sites can provide information that will allow us to determine which of these processes is most likely, but will need to be augmented with data from other types of artifacts (see Chapter 13). The variety of tools in an assemblage provides information on the range of activities performed at a site, and an assessment of these data can help determine how a site functioned in the settlement and subsistence system. The distribution of various classes of chipped stone artifacts across a site often provides clues concerning how different areas were used, and can augment data provided by other analyses.

Reduction Strategies

An assessment of strategies used to reduce lithic materials at a site often provides evidence of residential mobility or stability. Two basic reduction strategies have been identified in the Southwest. Efficient (also termed curated) strategies entail the manufacture of bifaces that served as both unspecialized tools and cores, while expedient strategies were based on the removal of flakes from cores for use as informal tools (Kelly 1985, 1988). Technology was usually related to lifestyle. Efficient strategies tended to be associated with a high degree of residential mobility, while expedient strategies were typically related to sedentism. The reason for this type of variation is fairly simple:

Groups on the move tended to reduce the risk of being unprepared for a task by transporting tools with them; such tools were transportable, multi-functional, and readily modifiable. Sedentary groups did not necessarily need to consolidate tools into a multi-functional, lightweight configuration. (Andrefsky 1998:38)
Of course there are exceptions to this general statement. Highly mobile groups living in areas that contained abundant and widely distributed raw materials or suitable substitutes for stone tools would not need to worry about efficiency in lithic reduction (Parry and Kelly 1987). Where lithic materials suitable for chipping occurred only in the form of small nodules, efficient reduction may have been impossible and another strategy would have been used (Andrefsky 1998; Camilli 1988; Moore 1996). Neither of these exceptions applies to the study area.

Southwestern biface reduction strategies were similar to the blade technologies of Mesoamerica and Europe in that they focused on efficient reduction with little waste. While the initial production of large bifaces was labor intensive and resulted in much waste, the finished tools were easily and efficiently reduced. Efficient strategies allowed flint knappers to produce the maximum length of useable edge per biface. By maximizing the return from cores they were able to reduce the volume of raw material required for the production of informal tools. This helped lower the amount of weight transported between camps. Neither material waste nor transport cost were important considerations in expedient strategies; flakes were simply struck from cores when needed. Thus, analysis of the reduction strategy used at a site allows us to estimate whether site occupants were residentially mobile or sedentary.

Research Questions

Analysis of the chipped stone assemblage from Developmental period pithouse sites near Pot Creek Pueblo in the Taos area (Moore 1994) focused on three basic questions, which are also of interest to this study. The first is concerned with where the Developmental period population came from, and how their manipulation of chipped stone artifacts can be modeled. Were these people hunter-gatherers who had occupied the region for a considerable amount of time and were finally settling down, or are they farmers that moved in from elsewhere? The first premise entails rapid change from a mobile to a sedentary lifestyle, while the second involves the movement of a sedentary population from one region to another. If the former is correct, we should see the initial retention of a high degree of residential mobility and associated technologies. This suggests that an efficient reduction technology might continue in use, at least during the early part of this transition. If the early pithouse dwellers represent immigrants with a long history of residential stability, an expedient reduction strategy would be expected from the outset.

The second question is more closely related to frontier modeling. People inhabiting a frontier maintain social and economic ties with the core area, and this linkage should be visible in the material culture of frontier sites. We would expect ties with the core to appear in the array of materials used in the chipped stone assemblage. Materials from the core should occur in relatively high frequencies, especially during the early years of settlement. While this relationship should continue as the frontier population becomes established, it will taper off as people become less dependent on the core.

The third question is technological in nature, but is also related to the level of mobility. Even though Pueblo populations mostly resided in sedentary villages, they still moved around the landscape to exploit resources that were not within the immediate vicinity of their community. Was an expedient reduction strategy used at all times, or was there some use of a curated strategy when people occupied temporary camps? In the former case, we should be able to discern little variation between assemblages from villages and limited activity sites. There should be significant variation in the latter case, with debitage from large bifaces dominating at limited activity sites and expediently reduced debitage at villages.
It is likely that the Developmental period sites along U.S. 84/285 represent one or more closely integrated communities. This is not to say that every pithouse was occupied at the same time. It is more likely that small communities containing only a few families are mostly represented. Old pithouses were probably abandoned as they deteriorated, were infested with vermin, or became unsuitable for less tangible reasons. New pithouses would have continued to be built in the same general area as long as local resources were sufficient to provide for a community's needs. Thus, there should be a range of occupational dates represented in the sample of sites available for study. Hopefully, the periods of occupation will provide us with a cross section of sites occupied during the Developmental period.

Analysis of chipped stone assemblages from these sites should allow us to more fully evaluate the origin of this population. We should also be able to evaluate the second question in more detail, especially if a wide range of occupational dates is represented. However, in order to address this question and to assess the meaning of reduction strategy in relation to mobility we must have a better understanding of the types and conditions of available raw materials. This will be done by examining the lithic resources of the study area. Samples of materials will be obtained from accessible outcrops and gravel deposits, and evaluated for quality and size. This will allow us to determine which materials are native to the area and which may be a physical expression of ties to other regions. Thus, an examination of the types and qualities of materials available will be important in our assessment of two research questions.

The third question may be more difficult to address with data from this project. None of the sites for which further studies are currently planned seem to represent limited activity locales. It may be necessary to go farther afield to examine this question, using data from other regions where similar settlement systems are represented. However, enough information should be available from this and earlier studies in the region to allow us to at least cursorily examine this question.

**Chipped Stone Analytical Methods**

All chipped stone artifacts will be examined using a standardized analysis format developed by the OAS (1994a). Standardization is aimed at increasing comparability between projects completed across the state. Hopefully, this will eventually allow analysts to investigate specific problems with a much larger database representing sites distributed through both time and space. The OAS chipped stone analysis format includes a series of mandatory attributes that describe material, artifact type and condition, cortex, striking platforms, and dimensions. In addition, several optional attributes have been developed that are useful for examining specific questions. This analysis will include both mandatory and optional attributes.

The main areas that will be explored are material selection, reduction technology, and tool use. These topics provide information about ties to other regions, mobility patterns, and site function. While material selection studies cannot reveal how materials were obtained, they can usually provide some indication of where they were procured. By studying the reduction strategy employed at a site it is possible to compare how different cultural groups approached the problem of producing useable chipped stone tools from raw materials, and how the level of residential mobility affected reduction strategies. The types of tools present on a site can be used to help assign a function, define the range of tasks accomplished with this artifact class, and examine the structure of work areas. Chipped stone tools can sometimes provide temporal data, but they are unfortunately usually less time-sensitive than other artifact classes, like pottery and wood.
It may be necessary to sample if very large assemblages are recovered. If this becomes necessary, a rough sort will first be performed to provide a characterization of entire assemblages. Any rough sort will include, but will not necessarily be limited to, assessing each provenience unit for counts of artifact and material types. Macroscopic examination will be used to assign artifacts to categories included in the rough sort. While such an approach does not provide the precise information available from intensive analysis, it will allow us to determine whether or not samples are representative of the assemblages from which they were drawn.

Intensive analysis will include the examination of each chipped stone artifact under a binocular microscope to aid in defining morphology and material type, examine platforms, and determine whether it was used as a tool. The level of magnification will vary between 20x and 100x, with higher magnification used for wear pattern analysis and identification of platform modifications. Utilized and modified edge angles will be measured with a goniometer; other dimensions will be measured with a sliding caliper. Analytical results will be entered into a computerized database for more efficient study and comparison with data from other sites.

General Chipped Stone Analytical Methods

Four classes of chipped stone artifacts will be recognized: flakes, angular debris, cores, and tools. Flakes are debitage exhibiting one or more of the following characteristics: definable dorsal and ventral surfaces, bulb of percussion, and striking platform. Angular debris are debitage that lack these characteristics. Cores are nodules from which debitage have been struck, and on which three or more negative flake scars originating from one or more platforms are visible. Tools can be divided into two distinct categories: formal and informal. Formal tools are artifacts that were intentionally altered to produce specific shapes or edge angles. Alterations take the form of unifacial or bifacial flaking, and artifacts are considered intentionally shaped when flake scars obscure their original shape or significantly alter the angle of at least one edge. Informal tools are debitage that were used in various tasks without being purposely altered to produce specific shapes or edge angles. This class of tool is defined by the presence of marginal attrition caused by use. Evidence of informal use is divided into two general categories—wear and retouch. Retouch scars are 2 mm or more in length, while wear scars are less than 2 mm long. While formal tools are morphologically distinguished from the byproducts of chipped stone reduction, informal tools are morphologically classified as debitage or cores.

Attributes that will be recorded on all artifacts include material type and quality, artifact morphology and function, amount of surface covered by cortex, portion, evidence of thermal alteration, edge damage, and dimensions. Platform information will be recorded for flakes only. Following are descriptions of attributes included in the standardized OAS analysis.

Material type. This attribute is coded by gross category unless specific sources are identified. Codes are arranged so that major material groups fall into sequences progressing from general undifferentiated materials to named materials with known sources. The latter are given individual codes.

Material texture and quality. Texture is a subjective measure of grain size within rather than across material types. Within most materials texture is scaled from fine to coarse, with fine materials exhibiting the smallest grain sizes and coarse the largest. Obsidian is classified as glassy by default, and this category is applied to no other material. Quality records the presence of flaws that can affect flaking characteristics, including crystalline inclusions, fossils, cracks, and voids. Inclusions that do not affect flaking characteristics, such as specks of different colored material or dendrites, are not
considered flaws. These attributes are recorded together.

Artifact morphology and function. Two attributes are used to provide information about artifact form and use. The first is morphology, which categorizes artifacts by general form. The second is function, which categorizes artifacts by inferred use.

Cortex. Cortex is the weathered outer rind on nodules; it is often brittle and chalky and does not flake with the ease or predictability of unweathered material. The amount of cortical coverage is estimated and recorded in 10 percent increments.

Cortex type. The type of cortex present on an artifact can be a clue to its origin; thus, cortex type is identified, when possible, for any artifacts on which it occurs.

Portion. All artifacts are coded as whole or fragmentary; when broken, the portion is recorded if it can be identified.

Flake platform. This attribute records the shape and any alterations to the striking platform on whole flakes and proximal fragments.

Thermal alteration. When present, the type and location of evidence for thermal alteration are recorded to determine whether an artifact was purposely altered.

Wear patterns. Cultural edge damage denoting use as an informal tool is recorded and described when present on debitage. A separate series of codes are used to describe formal tool edges, allowing measurements for both categories of tools to be separated.

Edge angles. The angles of all modified informal and formal tool edges are measured; edges lacking cultural damage are not measured.

Dimensions. Maximum length, width, and thickness are measured for all artifacts.

Summary

Analysis of chipped stone assemblages will aid in examining questions related to the occupation of prehistoric frontiers as well as the basic characteristics of life in the Pojoaque area. The general questions that will be addressed by chipped stone data include:

1. How can the process of selecting raw materials be characterized? Were certain materials and qualities selected for, and can any differences in this process be seen between sites? Is there variation in the types and amounts of exotic materials used through time?

2. What do the types of tools tell us about the range of activities that occurred at these sites?

3. How were raw materials reduced? Were there purposeful attempts to enhance their flaking characteristics, or were materials left unmodified?

4. Can the range of materials found on a site tell us anything about the size of the area being exploited on a regular basis?

5. Can the distribution of chipped stone artifacts provide information on where activities occurred
on a site, or were most of these materials redeposited in specific discard areas?

Analysis of the chipped stone artifacts will focus on providing data that can be used to characterize the assemblages from these sites and address these general questions. It will also provide information that can be used to deal with more complicated issues concerning characteristics of the region’s prehistoric Puebloan occupations.
15. GROUND STONE ARTIFACTS: RESEARCH ISSUES AND ANALYSIS

James L. Moore

Introduction

We expect to recover numerous ground stone artifacts from excavated sites along U.S. 84/285. These artifacts are often used to provide data on subsistence. Such information can be derived either indirectly or directly. Tool size, form, and other general characteristics have been used in the past to infer function. However, many assumptions are made when such attributes are used to assign function to an artifact. A better way to determine how ground stone tools functioned is to collect data that are directly related to use. The most commonly used methods of doing this include the recovery of residues (especially pollen) and analysis of wear patterns on grinding surfaces. But, while ground stone artifacts can provide information on subsistence, can they tell us anything about how a region is occupied?

Theoretical Perspectives

Like other classes of artifacts, ground stone tools might be able to provide information that will aid in determining whether the Developmental period population in the Pojoaque area were hunter-gatherers in the process of settling down, farmers migrating in from elsewhere, or a combination of both. They should also provide data on how sites were abandoned.

That there are differences between the types of ground stone tools used by residentially mobile and sedentary peoples should come as no great surprise. Archaic hunter-gatherers tended to use one-hand manos, basin or slab metates, and mortars. These are fairly generalized tools that can be used to grind a variety of wild and domestic plant foods. However, these forms were not designed to rapidly and efficiently process large quantities of food. Ground stone tools used by Southwestern farmers were more specialized toward the processing of corn, and usually included trough or through-trough metates and two-hand manos. Such tools allow foods like corn to be processed more rapidly and efficiently (Lancaster 1983). But what happens when a group is in transition between dependence on hunting-gathering and farming, or people have moved into a new area that produces enough wild foods to allow them to decrease their dependence on cultigens? This is an important distinction, since being able to differentiate between these types of occupations is an important research issue for the Northern Rio Grande (see Chapter 11).

Measures of Grinding Efficiency and Dependence on Cultigens

In studying grinding tools from the Mimbres area, Lancaster (1983, 1986) determined there was a steady rise in efficiency over time. This took the form of increasingly large grinding areas, and the use of materials of variable texture. Experiments showed that efficiency was enhanced by enlarging the size of the grinding surface (Lancaster 1983:81), which appeared in his sample as an increase in the size of metate grinding surfaces through time (Lancaster 1983:88). While the popularity of basin and slab metates seemed to fluctuate, and these types may have been used as utility grinding implements, trough metate varieties clearly reflect this tendency (Lancaster 1983:48-49). Trough metates were the most popular form during the Early Pithouse period, but through time were mostly replaced by the through-trough type (Lancaster 1983:47). The former are open at only one end, while the latter are open at both. This modification increased the length of the grinding surface, and consequently its area. Thus, trough metates had an average grinding surface of 758 sq cm, while
through-trough metates averaged 1,123 sq cm, a 33 percent increase (Lancaster 1983:42-43). Apparent functional differences between trough and basin/slab metates were based on wear patterns. Both varieties of trough metate exhibited striations parallel to the long axis of the tool, while striation patterns on a large percentage of basin and slab metates were random (Lancaster 1983:45).

There was also variation in the types and textures of materials used; trough metates were primarily made from vesicular basalt, and basin/slab metates from nonvesicular basalt and rhyolite. Medium-coarse materials dominated the assemblage before the Classic period, while during that period the assemblage contained nearly equal amounts of coarse- and fine-grained materials. This is interpreted as a shift from a single-stage to a multistage grinding process (Lancaster 1983:87).

Though Lancaster (1983) was unable to discern any similar patterning in manos, a study by Hard (1986) shows that these tools vary correspondingly. This may be due to the nature of the samples examined. Lancaster did not look at Archaic sites from the Mimbres area, concentrating on sites occupied by people who were more or less dependent on farming. Hard examined a considerable amount of data on the use of ground stone tools by both hunter-gatherers and farmers. Thus, his sample was broader and patterning was undoubtedly easier to discern.

Hard (1986:105) feels that as reliance on cultigens increases, there is a corresponding increase in both mano length and mean metate grinding surface area. Only manos were examined by his study, though Lancaster's (1983) study supports the latter pattern. After an examination of ethnographic and archaeological materials, Hard (1986:161) determined that degree of reliance on agriculture can be measured by mano length. The break between hunting and gathering and dependence on cultigens appears to occur between average lengths of 10 and 13 cm. Hunter-gatherer manos average 10.6 cm long, while a mean length of 13 cm corresponds with a substantial dependence on cultigens (Hard 1986:161). The longest mean in his sample was 25 cm, which appears to equate with about a 70 percent dependence on cultigens (Hard 1986:161). The mean length of Tarahumara manos is 20.8 cm, and they depend on cultigens for about 60 percent of their diet (Hard 1986:161).

While these conclusions are considered tentative, they may have important implications for our study. Hunter-gatherers who are just beginning to settle down as farmers would not be expected to be highly dependent on cultigens. While their grinding tools should exhibit an increase in processing efficiency over those used by pure hunter-gatherers, it should not approach the level of efficiency demonstrated in the assemblages of groups whose dependence on cultigens was long term and continuously increasing. In other words, we would expect manos from our sites to be shorter and metates to have smaller grinding surfaces than is the case in areas that exhibit a long history of agricultural dependence. A single-stage grinding system would be expected and trough metates should occur, though basin and slab forms may dominate the assemblages. Through-trough metates are not expected.

Conversely, if our sites represent sedentary farmers who moved in from elsewhere we would expect a continuation of traditional grinding forms. A short-term decrease in dependence on cultigens may be indicated by slightly shorter manos or the occurrence of larger percentages of slab/basin forms. However, mano length should indicate a fairly high dependence on cultigens, and metates should be of efficient types. Thus, trough metates are expected, and through-trough types should be common.

Ground Stone Tools and Abandonment Processes

Analysis of ground stone tools from two Valdez phase sites near Pot Creek suggested there was a
relationship between how a site was abandoned and the assemblage of tools left behind (Boyer et al. 1994; Moore et al. 1994). A pithouse at LA 2742 was sealed when abandoned, perhaps because its occupants planned to return but never did, or because goods were stored there. The structure began to deteriorate almost immediately, and useable building materials were salvaged after the structure was partly destroyed by fire. Unbroken ground stone tools were recovered from the floor of the structure and its fill, and included eight metates and ten manos. These artifacts probably represent tools that were cached for later use or retrieval. In contrast, a pithouse at LA 70577 was stripped when or soon after it was abandoned, and useable roofing materials and other goods were removed. Whole ground stone tools at this site included only three metates and seven manos, most of which seemed to have been discarded rather than left behind as site furniture.

A study by Schlanger (1991) suggests that other processes related to abandonment could also have been at work. She feels that the length of time materials were accessible for salvaging conditions the structure of both floor and general site assemblages (Schlanger 1991:470). In her study of ground stone tools from the Dolores Project in southwest Colorado, Schlanger (1991:470) found significant differences between assemblages on sites that remained accessible after abandonment when compared to those whose post-abandonment accessibility was limited. Two abandonment modes were identified—some pithouses appear to have collapsed and filled slowly, and in some cases were dismantled and roofing materials salvaged (Schlanger 1991:470). Other pithouses burned when they were abandoned or soon after. Interesting variation was found between these groups in the structure of their assemblages. While frequencies of certain types of ground stone tools are very similar, there are significant differences in proportions of whole tools recovered (Schlanger 1991:470). The floors of longer-access sites, represented by those that collapsed naturally or were salvaged after abandonment, contained fewer whole tools than did the floors of sites with shorter post-abandonment access time, represented by the set of burned structures. This is attributed to the amount of time available for recovery of materials left in abandoned structures, with more whole tools being salvaged from structures that remained accessible after abandonment.

Thus, abandonment processes can affect the structure of floor assemblages. A planned, orderly abandonment allows the salvaging of materials from a structure, among which are useable ground stone tools. Abandonments that are rapid and unplanned or involve the purposeful destruction of a structure and its contents tend to prevent salvaging. This can create differences in floor assemblages that may seem meaningful, but which are actually a product of post-abandonment processes rather than an indication of activities. But, as seen at LA 2742, planned and orderly abandonments do not always result in the immediate salvaging of all useable materials. Sometimes that process may be delayed, resulting in the retention of tools that might otherwise have been removed.

By examining the distribution of ground stone tools on floors and in contexts that suggest caching it may be possible to estimate whether a structure remained accessible after abandonment. In combination with other information, particularly evidence of architectural dismantling, we should be able to assess the degree to which materials were salvaged from particular structures. While there is no way to quantify the amount of materials that may have been removed, we may be able to determine which structures were most impacted by this process. As we pointed out in Chapter 12, differential abandonment processes may provide us with information on structural function, which can be important as we assess levels of community integration and organization.

**Ground Stone Tools and Prehistoric Foodways**

Analysis of ground stone assemblages may also provide information about the range of foods consumed by site occupants. Pollen often adheres to some of the types of plants that are processed
with ground stone tools, and can be recovered by a washing procedure. The material acquired in this way can be analyzed like other pollen samples. A study of this nature can potentially provide two types of information. The first is economic in nature. Recovery of pollen that adhered to materials processed by ground stone tools can help determine what those foods were. Of course, our ability to accomplish this depends on whether pollen is preserved in pores in the rock, and the condition of preserved pollen. Like many other analyses, the examination of economic pollen recovered from ground stone tools is a hit-or-miss proposition. Thus, our study of the use of plants for food will not focus on this analysis, but any information derived will be used to expand and amplify other sources of data. Grains of corn starch can also sometimes be identified on ground stone, and will be monitored to supplement and amplify pollen information.

A study of this type also has the potential to provide corroborative data concerning differential uses of ground stone tools. As discussed earlier, researchers have suggested that various types of metates were used for different purposes. Pollen analysis could potentially provide data that will either help corroborate or refute such arguments.

Of course, several potential problems should be kept in mind. Recovery of economic pollen from ground stone tools is not a given, particularly if they have been exposed to the elements. Thus, tools that appear to have been buried since discard or abandonment, preferably within structures, will be the focus of this analysis. Tools from extramural trash deposits will also be considered, depending on their condition, position, and evidence of weathering. In all likelihood, only a sample of tools will be studied, and examples of each type defined (e.g., slab, basin, trough, or through-trough) should be included in the sample.

Ground Stone Analytical Methods

Ground stone artifacts will be examined using the OAS (1994b) standardized methodology, which is designed to provide data on material selection, manufacturing technology, and use. Artifacts will be examined macroscopically, and results will be entered into a computerized data base for analysis and interpretation. Several general attributes will be recorded for each ground stone artifact, and specific attributes will be recorded for certain tool types. Attributes that will be recorded for all ground stone artifacts include material type, material texture and quality, function, portion, preform morphology, production input, plan view outline form, ground surface texture and sharpening, shaping, number of uses, wear patterns, evidence of heating, presence of residues, and dimensions. Specialized attributes that will be recorded include mano cross-section form and ground surface cross section.

By examining function(s), it is possible to define the range of activities in which ground stone tools were used. Because these tools are usually large and durable, they may undergo a number of different uses during their lifetime, even after being broken. Several attributes are designed to provide information on the life history of ground stone tools, including dimensions, evidence of heating, portion, ground surface sharpening, wear patterns, alterations, and presence of adhesions. These measures can help identify post-manufacturing changes in artifact shape and function, and describe the value of an assemblage by identifying how worn or used it is. Such attributes as material type, material texture and quality, production input, preform morphology, plan view outline form, and texture provide information on raw material choice and the cost of producing various tools. Mano cross-section form and ground surface cross section are specialized measures aimed at describing aspects of form for manos and metates, since as these tools wear they undergo regular changes in morphology that can be used as relative measures of age.
Pollen washes will be conducted in the laboratory, necessitating certain precautions. Ground stone tools from trash deposits will be placed in plastic bags after removal from the ground, and will be lightly brushed to remove loose soil. A thin cover of dirt will be left on tools found on floors or in mealing bins until they are ready for photographing. Loose dirt will be removed prior to photographing, and the artifacts will be placed in plastic bags as soon as is feasible after that procedure is completed.

Laboratory processing will proceed as follows: the entire surface of tools will be brushed before samples are collected. Grinding surfaces will be scrubbed to collect embedded materials using distilled water and a tooth brush. The size of the area sampled will be measured and noted. Wash water will be collected in a pan placed under the sample and packaged for storage. Samples selected for analysis will receive a short (10 minute) acetolysis wash. Under certain circumstances, this may help preserve the cytoplasm in some modern pollen grains, allowing recent contaminants to be distinguished from fossil pollen.

Pollen samples from ground stone artifacts will be subjected to a full analysis to attempt to distinguish economically used wild plants as well as cultigens. The occurrence of broken and whole grains and clumps of grains will be monitored during counting. In addition, evidence for the presence of corn starch in samples will be noted.

**Summary**

Ground stone artifacts will be used to provide data in three general areas. We have suggested that there will be differences in the types of tools used by hunter-gatherers in the process of settling down and farming, and those used by farmers with a long history of sedentary life. Both the types of metates found in assemblages and the average lengths of associated manos can be used to address this question. Recently settled hunter-gatherer assemblages should be dominated by metates designed to grind corn with moderate efficiency, and manos of moderate length. In contrast, farmers that have recently migrated into an area should possess an assemblage dominated by metates that are highly efficient for corn processing and manos that are relatively long. Both Lancaster's (1983) and Hard's (1986) analyses should provide useful comparisons.

The second general area of information being sought from this artifact category concerns abandonment processes. Did structures at these sites remain accessible for salvaging long after abandonment, or were they sealed soon after people moved on? How did the abandonment process affect the assemblage left behind, especially the distribution of materials on floors? We will be particularly interested in determining whether we can replicate the patterning found by Schlanger (1991) for the Dolores Project. Evidence of salvaging in one or more data sets should be taken into account when discussing the structure of floor assemblages.

Finally, ground stone tools will be sampled to try to determine what foods they were used to process. In particular, we will try to determine whether basin/slab and trough metates were used to grind different suites of materials. Of course, this study is dependent on the range of ground stone tools recovered, how well pollen is preserved on grinding surfaces, and whether or not post-depositional processes have damaged or removed pollen from economic uses. Unfortunately, we will not be able to determine this until at least a sample of specimens have been examined by analysis.
16. BOTANICAL REMAINS: RESEARCH ISSUES AND ANALYSIS

Mollie S. Toll and Pamela McBride

Research Directions for Floral Studies

Botanical data from the Santa Fe to Pojoaque Corridor project will provide information particularly useful in considering subsistence strategies in the prehistoric era. Several lines of evidence suggest that the practice of farming in the Northern Rio Grande Valley during the Developmental period approached a model of mixed horticulture with hunting and gathering, rather than intensive agriculture. Sites often located on low terraces over major tributaries suggest settlement in relation to water and arable land. Limited activity sites and small settlements in a variety of site types and settings imply a diversity of economic pursuits, and not a single-minded focus on agriculture. At the few local sites with botanical analyses, remains of crop plants are widespread—occurring in two-thirds or more of flotation samples—but not abundant. Faunal remains are indicative of hunting a broad range of local fauna (see Chapter 17). It is not until after the Developmental period that more aggregated settlements and agricultural features such as check dams and extensive gravel mulch fields suggest a determined effort to support significant human populations by farming in a region with marginal growing season length. Our meager floral database reveals no significant differences between Developmental and Coalition period flotation remains in the Northern Rio Grande Valley. Careful pursuit of such information should disclose continuities or shifts in adaptive emphases.

Analysis Methods

Botanical analyses of archeological deposits from the Santa Fe to Pojoaque Corridor project will include flotation analysis of soil samples, species identification, morphometric measurement of macrobotanical specimens (where appropriate), and species identification of wood specimens from both flotation and macrobotanical samples. Flotation is a widely used technique for separation of floral materials from the soil matrix. It takes advantage of the simple principle that organic materials (and particularly those that are carbonized or no longer viable) tend to be less dense than water, and will float or hang in suspension in a water solution. Each soil sample is immersed in a bucket of water. After a short interval, heavier soil and sediment particles settle out, and the solution is poured through a screen lined with “chiffon” fabric (approximately 0.35 mm mesh). The floating and suspended materials are dried indoors on screen trays, then separated by particle size using nested geological screens (4.0, 2.0, 1.0, and 0.5 mesh), before sorting under a binocular microscope at 7-45x. This basic method was used as long ago as 1936 (see Watson 1976), but did not become widely used for recovery of subsistence data until the 1970s. Seed attributes, such as charring, color, and aspects of damage or deterioration, are recorded to help in distinguishing cultural affiliation from post-occupational contamination. Relative abundance of insect parts, bones, rodent and insect feces, and roots help to isolate sources of biological disturbance in the ethnobotanical record.

All macrobotanical remains collected during excavation will be examined individually, identified, repackaged, and catalogued. Condition (carbonization, deflation, swelling, erosion, damage) will be noted as clues to cultural alteration, or modification of original size dimensions. When less than half of an item is present, it will be counted as a fragment; more intact specimens will be measured as well as counted. Corn remains will be treated in greater detail. Width and thickness
of kernels, cob length and mid-cob diameter, number of kernel rows, and several cupule dimensions will be measured, following Toll and Huckell (1996). In addition, the following attributes will be noted: over-all cob shape, configuration of rows (straight versus spiral), presence of irregular or undeveloped rows, and post-discard effects (compression, erosion). Corn morphometrics will be of considerable value in fleshing out the meager extant record of farming difficulties and successes in the late prehistoric era in the Northern Rio Grande Valley.

**Botanical Sampling Guidelines**

The potential contribution of botanical analyses to the prehistoric component of the project, while necessarily limited by the sampling universe of proveniences and preservation conditions located within project limits, is maximized by attention to reasonable and appropriate sampling in the field. It is helpful to recognize a fundamental difference between floral data collected in soil samples and virtually every other artifact category. Standard field procedure now dictates collection and curation with provenience information of every sherd, bone, and lithic artifact encountered during excavation of most cultural proveniences; sampling of this universe may take place later in the lab. Doing the equivalent for botanical materials would mean bringing home the entire site, a ludicrous proposition. This makes every soil sample collected in the field a sampling decision. Samples not taken are generally gone forever. On the other hand, a systematic decision to sample widely and intensively (such as alternate meter grid units in every cultural stratum) to guard against such information loss can generate hundreds or even thousands of unanalyzed samples. Lacking infinite time and resources, we must try to garner maximal information from judicious sampling. Two aspects hallmark the most effective sampling protocols: awareness of depositional contexts that are most productive for floral remains, and recognition of site areas from which subsistence data will be of most interpretive use for the research foci of the project. Both are, fundamentally, selection processes.

The following general sampling guidelines and tips for sampling specific provenience categories provide some simple directives for field personnel to choose flotation sampling locations. Table 16.1 serves as a review of the number of instances in which the target sampling contexts are likely to be encountered in the Santa Fe to Pojoaque Corridor project, based on the tested sites discussed in this report.

**Flotation Sampling Guidelines**

1. Concentrate on coverage of most informative contexts. By coping with less informative proveniences by minimal sampling (a small number of well-placed samples), we can maintain the option of sampling more complex and informative proveniences in greater detail, generating finer scale information where it will be appropriate and helpful.

Prime among differentiated, potentially informative contexts are intact interior floor surfaces protected by fill and roof fall. Sampling multiple locations on interior floors contributes data for mapping cultural activities involving plant materials. This patterning informs on the organization of economic and cultural behavior on a household level. Analogous exterior surfaces, such as extramural work areas with associated cooking and storage features, are of equal interpretive

**Table 16.1. Provenience Categories Where Botanical Remains Are Likely to Be Encountered at Tested Sites**
<table>
<thead>
<tr>
<th>SITE NO.</th>
<th>PROVENIENCE CATEGORY</th>
<th>CONDITION OF DEPOSITS AND POTENTIAL FOR FLORAL RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interior Structures</td>
<td>Extramural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Midden</td>
</tr>
<tr>
<td>LA 388</td>
<td>2 adobe surface</td>
<td>refuse area</td>
</tr>
<tr>
<td></td>
<td>structures,</td>
<td>good potential for recovery of useful floral data in</td>
</tr>
<tr>
<td></td>
<td>2 shallow pit</td>
<td>context</td>
</tr>
<tr>
<td></td>
<td>structures</td>
<td></td>
</tr>
<tr>
<td>LA 389</td>
<td>Feature 1 (intact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cobble-lined basin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>hearth)</td>
<td></td>
</tr>
<tr>
<td>LA 391</td>
<td>4 cobble-lined basin</td>
<td>dense layer of intact secondary refuse</td>
</tr>
<tr>
<td></td>
<td>hearths</td>
<td>good potential for recovery of useful floral data in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>context</td>
</tr>
<tr>
<td>LA 835</td>
<td>refuse redeposited</td>
<td>poor potential: disturbed, out of context</td>
</tr>
<tr>
<td></td>
<td>from up slope</td>
<td></td>
</tr>
<tr>
<td>LA 3119</td>
<td>1 adobe surface</td>
<td>2 sheet middens</td>
</tr>
<tr>
<td></td>
<td>structure,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 shallow pit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>structures</td>
<td></td>
</tr>
</tbody>
</table>

interest, but tend to have very poor preservation of perishable remains, and consequently do not merit intensive sampling.

Trash fill and roof fall, though voluminous and originating from cultural behavior, are of considerable interest, but as an entity. Except in the rare case of a burned roof falling intact on the floor below and quickly covered by protective fill, horizontal differences in floral debris are really only a sampling problem.

2. Focus on primary deposits. Minimize sampling from contexts without good cultural affiliation (for example, room or structure fill, unless well linked to a later occupation elsewhere at the site; disturbed areas).

3. Take large samples. Take full 2 liter samples where possible. We know from other projects in north-central New Mexico (Carter 1980; Cummings 1989a, 1989b; Toll 1995, 1996; Toll and McBride 1995; McBride and Toll 1999) that smaller samples are minimally adequate or inadequate for optimal recovery of data.

Sampling Specific Provenience Categories for Flotation

**Structures**

Floors. Samples from fill immediately overlying an intact living or storage floor are very important. We want to know about central work areas near thermal features. We also want to know about other work areas that may be encountered away from any central activity areas. For a clearer picture of what plant materials are associated with specific work areas, we also need samples from floor contents that are not associated with feature concentrations. The best way to insure adequate sample coverage is to take samples from alternate grid units. Later, samples from floor loci that will represent major activity areas, as well as one or more control samples, can be selected for analysis.

Features. Take a single sample from near the bottom of primary deposits. Take multiple samples only when primary deposits are clearly stratified. Samples can be taken from secondary deposits but do so with the understanding that these do not reflect the function of the feature itself, but are most often trash fill similar to floor fill.
Roof fall. Take a single sample. An extensive, intact roof fall level within a structure should be sampled from alternate grid units, like an intact floor.

Post-occupational trash fill. Sample only if well linked to a later occupation elsewhere at the site. Take a single sample from each distinct stratum.

Extramural Features

Surfaces. Intact surfaces of ramada or outdoor activity areas are not common. If present, they should be sampled like intramural floors.

Pits and hearths. Take a single sample from near the bottom of primary deposits. Take multiple samples only when primary deposits are clearly stratified.

Middens. Take a single sample from each clearly definable cultural stratum. If the sample is big enough and taken accurately from the provenience it is meant to represent, multiple samples from the same stratum are redundant.

Pollen Sampling

Pollen analysis should be considered complementary rather than parallel to flotation. Pollen is preserved in very different contexts than carbonized seeds, and has different contributions to make to the biological data corpus that informs on subsistence and environmental parameters. Whereas primary and secondary deposits from thermal features make up much of the useful flotation record (along with far less frequent catastrophic burn events), pollen does not survive burning or deposition in alkaline, water-holding features. Pollen's particular gift lies in locating plant utilization activities that are not likely to involve burning, in places such as milling bins, ground stone artifacts, storage features, coprolites, interior floors. On well-preserved interior floors, systematic intensive sampling (such as alternate grid units) of pollen and flotation can work well together to produce relatively detailed mapping of activity areas of household space. With emphasis on site and household economic organization, we see floors of domestic structures as a ripe area for investigation. The potential contributions of pollen analysis are generally wasted on strata such as trash fill, roof fall, and middens.

An important aspect of the Santa Fe to Pojoaque Corridor study will be to compare provenience categories from this project to similar categories found at other sites in the Rio Grande Valley. To this end, Table 16.2 lists sites with potential comparative proveniences.
Table 16.2. Northern Rio Grande Prehistoric Sites with Late Developmental Period Occupations and Comparative Floral Remains

<table>
<thead>
<tr>
<th>SITE NO. AND REFERENCE</th>
<th>LOCATION</th>
<th>COMPONENTS</th>
<th>CONDITIONS OF DEPOSITS</th>
<th>COMPARATIVE BOTANICAL ANALYSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 101412; Toll 1996</td>
<td>Pojoaque interchange</td>
<td>3 hearths, 2 stains, 1 test pit</td>
<td>6 flotation samples</td>
<td>5 charcoal identified</td>
</tr>
<tr>
<td>LA 103919E; Toll 1997</td>
<td>Nambe</td>
<td>2 rooms, 13 extramural features, 2 human burials</td>
<td>largely fragmentary corn remains concentrated in extramural pits of slightly earlier, disturbed LA 103919W</td>
<td>19 flotation samples</td>
</tr>
<tr>
<td>X29SF17, X29SF45; Carter 1980</td>
<td>Nambe Falls</td>
<td></td>
<td>2 flotation samples</td>
<td></td>
</tr>
<tr>
<td>KP Site; Cummings 1989b</td>
<td>Santa Fe</td>
<td></td>
<td>6 flotation samples</td>
<td></td>
</tr>
<tr>
<td>LA 65006; Toll 1993</td>
<td>Otowi Bridge, near San Ildefonso</td>
<td>F.1 charcoal stain, F.3 hearth</td>
<td>site has been eroded and flooded</td>
<td>6 flotation samples</td>
</tr>
<tr>
<td>LA 2742, LA 70577; Toll 1994</td>
<td>Pot Creek, Taos Valley</td>
<td>pithouse &amp; midden; pithouse</td>
<td>31 flotation samples</td>
<td>17 charcoal identified</td>
</tr>
<tr>
<td>LA 53681; Toll 1995</td>
<td>Blueberry Hill, Taos Valley</td>
<td></td>
<td>6 charcoal identified, fragmentary corn specimens</td>
<td></td>
</tr>
<tr>
<td>Dos Griegos; Cummings and Puseman 1992</td>
<td>Cañada de los Alamos, SE of Santa Fe</td>
<td></td>
<td>5 flotation samples</td>
<td>5 charcoal identified</td>
</tr>
</tbody>
</table>

Table 16.3. Cultural Strata Likely to Produce Fuel Wood and Construction Materials

<table>
<thead>
<tr>
<th>FUEL WOOD CONTEXTS</th>
<th>CONSTRUCTION MATERIAL CONTEXTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary deposits in thermal features</td>
<td>Architectural elements, roof fall, intact roofs</td>
</tr>
<tr>
<td>Trash and trash fill: floor fill, room fill, secondary deposits in pits and structures, middens</td>
<td>Posts in place</td>
</tr>
</tbody>
</table>

Macrobotanical Wood and Charcoal

Attentive field collection of wood and charcoal can greatly increase the interpretive value of this artifact category. Charcoal samples should be directed towards those proveniences that can most clearly represent fuel wood, roofing material, or construction timbers (Table 16.3). To the degree that such deposits can be confidently identified, species composition data will provide far more detailed and accurate pictures of prehistoric wood utilization. We know from the detailed wood data from Chaco that fuel and construction wood are likely to have very different selection trajectories (Toll 1985, 1987; Windes and Ford 1991). Consequently, some of the most interesting aspects of wood utilization emerge when these functional contexts are differentiated and compared. The number of charcoal loci that are clearly one functional context or another may be few, but excavation surely constitutes the best opportunity for identifying suitable samples.

Opportunities for subsampling include proveniences with large numbers of wood specimens. A maximum of 30 identifiable specimens from a given functional context and provenience will be considered an adequate sample.
Table 16.4. Macrobotanical Remains Recovered During Testing, with Estimates for Date Recovery

<table>
<thead>
<tr>
<th>MACROBOTANICAL REMAINS CATEGORY</th>
<th>NO. RECOVERED DURING TESTING</th>
<th>NO. ESTIMATED DURING DATA RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonized corn cobs</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Miscellaneous macrobotanical</td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>

Other Macrobotanical Remains

Floral materials visible with the naked eye are usually collected in the field and treated as artifacts. Estimating the quantity of these plant remains and analysis time is difficult. Recovery of macroremains from the project’s testing phase is used as a rough guide to what might be expected from excavation of these same sites (Table 16.4).
17. FAUNAL REMAINS: RESEARCH ISSUES AND ANALYSIS

Nancy J. Akins

Farmers as Hunters

A growing body of data indicates that the initial strategy of Southwestern farmers was one of garden hunting. The garden hunting model, as proposed by Linares (1976:331), suggests that the abundance of some taxa found in archaeological assemblages is the direct result of farmers hunting in gardens and cultivated fields. Disturbing the primary vegetation for agricultural plots not only attracts and increases the biomass of some animals, but hunting in fields eliminates seasonality and scheduling conflicts while protecting fields from crop predators. As horticultural activity increases, so do the habitats that support higher densities of small mammals and their availability for human procurement. When communities become larger, more residentially stable, and more committed to horticulture, large animals increase in importance as hunters turn to scheduling hunting activities. Reliance on maize, which is low in two essential amino acids and niacin, increases the need for high-quality animal protein, at least seasonally (Speth and Scott 1989:71, 74).

Sedentary groups generally exploit a wider variety of animals than do mobile ones. They also depend more on smaller animals, and use more traps, ambushes, and long-distance hunts (Kent 1989:3). When hunting close to home, a wider range of animals is taken, including less-preferred smaller animals. To maximize their return, the farther a group travels to hunt, the narrower the range of species and the larger the size of the animal sought. Once the locally available large game has been depleted, hunters must travel greater distances to acquire these resources, relocate their settlements closer to more productive areas, or reduce their commitment to horticulture (Speth and Scott 1989:75, 78).

Pojoaque Area Faunal Data

Conventional views of Northern Rio Grande prehistory generally hold that Developmental period populations depended primarily on agriculture (Wendorf and Reed 1955:142). However, there is a growing recognition that data from Early Developmental sites indicate that economies were still predominantly hunting and gathering, with increasing dependence on horticulture (Anschuetz et al. 1997:94). Yet the data to test either proposition are slim and they remain largely untested.

Few excavations in the Tewa Basin have resulted in detailed reporting of faunal data. An exception is LA 103919, near Nambé, where the presence of two Developmental components allowed an assessment of changing animal utilization at one site. Excavations revealed a small pit structure, two or three surface rooms, and a number of pits, burials, and stains. While faunal samples are fairly small (n = 774 and 1,044 from the two components, respectively) and the condition of the bone is poor, both components produced a diverse array of animals with essentially equal numbers of rodent, small mammal, carnivore, artiodactyl, and bird species. Even though the number of species exploited was generally similar, the emphasis seems to have changed. When only those animals with enough breakage and burning to suggest they represent food animals are considered, the earlier sample has a significantly larger proportion of bones from smaller animals (41.5 compared to 16.9 percent) while the later sample has considerably more from larger forms (83.1 compared 58.1 percent) (Akins, in press a). An even smaller sample (n = 184) from a wide range of proveniences at LA 835 produced similar results. A diverse array of taxa—at least 12 species including both rabbits, dog, coyote, fox, bear, bobcat, elk, deer, pronghorn, mountain sheep, bison, and turkey - were
recovered, but 75 percent are artiodactyl remains (Akins n.d.b).

Faunal remains were recovered during testing at four of the Santa Fe to Pojoaque Corridor sites, generally in small numbers. A preliminary assessment of the assemblages indicates that, in all instances, larger forms predominate. For LA 391 (n = 2), all are from large forms, for LA 388 (n = 16), large forms are over twice as common as small, for LA 835 (n = 5), all are large, and for LA 3119 (n = 355) large forms comprise over 90 percent. No birds were found.

While the data are scant, some aspects consistently disagree with the garden-hunting model outlined above. The number of taxa exploited is relatively high, consistent with exploitation of the immediate environment. However, the paucity of cottontail rabbits, which are the hallmark of the Southwestern garden-hunting strategy, and the relative abundance of artiodactyl remains, may suggest a different strategy. In areas where the garden-hunting model fits well, artiodactyl indices (measurements of relative proportions of lagomorphs and artiodactyls calculated by dividing the combined counts of artiodactyls and large mammals by this sum plus the counts for lagomorphs) start low and increase over time, presumably with respect to agricultural commitment. For Chaco Canyon, the indices begin at 0.13 in early Basketmaker III assemblages and increase to 0.39 in Pueblo III assemblages (Akins 1999:11). For the Dolores Project sites from southwestern Colorado, the index starts higher at 0.58 for the A.D. 600 to 720 period, falls dramatically to 0.20 between A.D. 720 and 800, and eventually rises to 0.42 (Neusius 1986:214-253). Sites excavated in San Juan Basin and Rio Puerco drainage for the Transwestern Pipeline project have indices that fall between 0.00 and 0.03 for all periods (Brown and Brown 1993:354-366). On the West Mesa of Albuquerque, Basketmaker sites have low indices (0.04) increasing to 0.08 and 0.32 at the Coors Road site (Akins n.d.b; Sullivan and Akins 1994:141).

Indices for LA 103919 near Nambé start at 0.67 and increase to 0.97. The index for LA 835 is 0.94. Figures in this range are more typical of sites where agriculture was not the primary subsistence strategy or where the area was fairly marginal for agriculture and a greater emphasis was placed on hunting and gathering. An example of the former is LA 3333 in the Galisteo Basin, with an index of 0.83. The excavated portion of the site, which dates about A.D. 1200, consists of expedient pit structures that were maintained with minimal effort, abandoned, and filled with trash, suggesting intermittent, probably seasonal use by relatively mobile groups who used maize but not to the extent found in most Anasazi sites. Rabbits comprise only 10.4 percent of the assemblage, compared to 28.9 percent artiodactyl and 31.2 percent unidentified large forms (Akins, in prep.). San Antonio (LA 24) in Tijeras Canyon east of Albuquerque is probably an example of the latter. Assemblages dominated by late black-on-white wares and a few early glaze wares have a fairly high artiodactyl index at 0.59, decreasing to 0.42 in deposits dominated by middle glaze wares, and increasing to 0.91 in those containing late glazes mixed with Hispanic occupation deposits dominated by domestic sheep (Akins, in press b).

**Research Issues**

It is clear that our information on faunal subsistence practices in the Tesuque-Pojoaque area does not support a model of even moderately intensive agricultural dependence at an early date. While it is possible that this is entirely an artifact of the small number of assemblages studied and poor preservation of small animal remains, the consistency within these samples suggests otherwise. The data may support Cordell’s (1989:307) view that during the Developmental period the region was inhabited by groups pursuing a mixed strategy comprised of hunting, gathering, and horticulture with little constraint on group mobility, rather than an assumption of heavy reliance on agriculture (e.g.,
Faunal data can be used to evaluate some of the questions regarding the development of Puebloan communities, especially those concerning the impermanence of settlements, the lack or loss of complexity, and the need to successfully adapt to a new environment. Foremost, however, is our need for the basic data that the Santa Fe to Pojoaque Corridor sites should produce. High quality data from a number of sites and site contexts will enable us to confirm or better explain the faunal information from LA 103919 and LA 835. Comparing newly generated data with the patterns observed in assemblages characteristic of agricultural communities and more mobile groups will add considerably to our understanding of the Developmental period occupation of this area.

Methodology

Sampling may be necessary if large amounts of bone are recovered. If sampling is necessary, proveniences analyzed will include not only those with the potential to contribute the highest quality information on species utilization through time, and those that will inform on site structure. This should include most, if not all, of the C-inch screened stratigraphic samples, a diversity of deposits, and all occupational contexts.

Specimens chosen for analysis will be identified using the Office of Archaeological Studies comparative collection supplemented by those at the Museum of Southwest Biology when necessary. Recording will follow an established OAS computer-coded format that identifies the animal and body part represented, how and if the animal and part was processed for consumption or other use, and how taphonomic and environmental conditions have affected the specimen. The following briefly describes the variables.

Provenience Related Variables

Field Specimen (FS) numbers are the primary link to more detailed proveniences within the site. Each line is also assigned a lot number that identifies a specimen or group of specimens that fit the description recorded in that line. It also allows for retrieving an individual specimen if questions arise concerning coding or for additional study. The count identifies how many specimens are described by that data line.

Taxon

Taxonomic identifications are made as specific as possible. When an identification is less than certain, this is indicated in the certainty variable. Specimens that cannot be identified to the species, family, or order are assigned to a range of indeterminate categories based on the size of the animal and whether it is a mammal, bird, other animal, or cannot be determined. Unidentifiable fragments often constitute the bulk of a faunal assemblage. By identifying these as precisely as possible, the information can supplement that from the identified taxa.

Each bone (specimen) is counted only once, even when broken into a number of pieces by the archaeologist. If the break occurred prior to excavation, the pieces are counted separately and their articulation noted in a variable that identifies conjoinable pieces, parts that were articulated when
found, and pieces that appear to be from the same individual. Animal skeletons are considered as single specimens so as not to vastly inflate the counts for accidentally and intentionally buried taxa.

**Element (Body Part)**

The skeletal element (e.g., cranium, mandible, humerus) is identified and then described by side, age, and the portion recovered. Side is recorded for the element itself or for the portion recovered when it is axial, such as the left transverse process of a lumbar vertebra. Age is recorded at a general level: fetal or neonate, immature, young adult (near or full size with unfused epiphysis or young bone), and mature. Further refinements based on dental eruption or wear are noted as comments. The criteria used for assigning an age is also recorded. This is generally based on size, epiphysis closure, or texture of the bone. The portion of the skeletal element represented in a particular specimen is recorded in detail to allow determining how many individuals are present in an assemblage.

**Completeness**

Completeness refers to how much of that skeletal element is represented by the specimen. It is used in conjunction with the portion represented to determine the number of individuals represented. It also provides information on whether a species is intrusive, and on processing, environmental deterioration, animal activity, and thermal fragmentation.

**Taphonomic Variables**

Taphonomy is the study of preservation processes and how these affect the information obtained by identifying some of the nonhuman processes that affect the condition or frequencies found in an assemblage (Lyman 1994:1). Environmental alteration includes degrees of pitting or corrosion from soil conditions, sun bleaching from extended exposure, checking or exfoliation from exposure, etching from the acids excreted by roots, and polish or rounding from sediment movement. Animal alteration is recorded by source or probable source and where it occurs. Choices include carnivore gnawing and punctures, scatological or probable scat, rodent gnawing, and agent uncertain. Burning, when it occurs after burial, is also a taphonomic process.

**Burning**

Burning can occur as part of the cooking process, part of the disposal process, when bone is used as fuel, or after burial. The color, location, and presence of crackling or exfoliation are recorded. Burn color is a gauge of burn intensity. A light tan color or scorch is superficial burning, while charred or blackened bone becomes black as the collagen is carbonized, and when the carbon is oxidized, it becomes white or calcined (Lyman 1994:385, 388). Burns can be graded over a specimen reflecting the thickness of the flesh protecting portions of the bone, or light on the exterior and black at the core, reflecting burns that occur when the bone is dry. Graded burns can indicate a cooking process, generally roasting, while completely charred or calcined bone do not. Uniform degrees of burning are possible only after the flesh has been removed and generally indicate a disposal practice (Lyman 1994:387). Potential boiling or cooking brown is also recorded as brown and rounded, brown with no rounding, rounding only, and waxy.
**Butchering**

Evidence of butchering is recorded as orientation of cuts, grooves, chops, abrasions, saws, scrapes, peels, and intentional breaks. The location of the butchering is also recorded. A conservative approach is taken to the recording of marks and fractures that could be indicative of processing animals for food, tools, or hides since many natural processes result in similar marks and fractures.

**Modification**

Other types of modification are indicated through this variable. Manufacturing debris and tool forms are one option as are potential use wear and pigment stains.
18. DATING: COLLECTION AND ANALYSIS OF CHRONOMETRIC SAMPLES

James L. Moore

Introduction

Accurate dates are needed in every archaeological study to place sites in the proper context, both locally and regionally. Inaccuracies are inherent in many chronometric techniques, or perhaps more properly phrased, some methods may not actually reflect the event they are being used to date. In order to assign accurate occupation dates to a site, it is usually desirable to obtain as many types of chronometric data as possible. That way they can be used to cross-check one another and permit the researcher to identify and eliminate faulty dates.

Accurate dates are critical for understanding settlement patterns and community structure. For example, clusters of pithouses may represent integrated communities containing many households. However, some research has suggested that pithouses were only occupied for relatively short periods of time, perhaps as little as 10 or 15 years (Cameron 1991). Thus, clusters of pithouses could also represent a succession of structures used as residences by a few families over a long span of time. For this reason, accurate and precise dates are necessary to assess the contemporaneity of structures to determine which pattern they might reflect.

Several categories of chronometric data are potentially available from these sites, including dateable artifacts, radiocarbon samples, archaeomagnetic samples, and tree-ring samples. Each category can provide useful and important temporal information, but there are also problems associated with each. Various types of samples will be collected under different circumstances, as detailed below.

Dateable Artifacts

At least three categories of artifacts have the potential to provide dates, including pottery, chipped stone, and bone. However, it is likely that only one will provide any usable information. Collection procedures for these artifact categories are detailed in Chapter 21. Pottery has the best potential for providing accurate chronometric information. Ceramic types that have been dated by tree-ring correlations may be useful for seriating the local ceramic sequence. If successful, this should help fine-tune the Developmental period ceramic sequence, and may improve the accuracy of dates assigned by pottery associations. This is discussed in more detail in Chapter 13.

Some chipped stone artifacts also have the potential to provide relative dates. Projectile points, in particular, are often used for this type of dating (see, for instance, Thoms 1977; Turnbow 1997). Unfortunately, dates for specific projectile point styles are usually not well anchored. In most cases they can only be assigned to time spans measured in centuries or millennia rather than years or decades. Some styles were used for long periods of time, often overlapping a wide range of ceramic types and styles. In addition, projectile points were frequently collected from earlier sites and reused, "contaminating" later sites with earlier styles. Thus, this artifact category can only be used to provide very gross dates.

Certain chipped stone materials are somewhat more useful for dating sites. The physical properties of obsidian allow it to be dated, but the results are often questionable and open to
interpretation. This type of analysis is based on the tendency of obsidian to absorb moisture at a relatively constant rate, depending on certain factors. The first of these factors is source. Obsidians from different flows vary in composition and absorb moisture at different rates. This problem can be overcome by certain tests (such as x-ray refraction) that provide information on the elemental makeup of obsidians, allowing them to be assigned to sources with known hydration rates (if a match exists). Temperature and soil moisture also effect the rate at which obsidian absorbs moisture. By placing sensors on or next to sites to monitor variations in soil moisture and temperature over time, enough information can be gathered to take these effects into consideration.

However, even when obsidians are sourced and environmental information gathered, this dating method is fraught with potential problems (see Boyer [1997] for an examination of obsidian hydration dates from Developmental period sites). Foremost among them is determining what event is being dated. Obsidian is perhaps the best material available in the Southwest for production of chipped stone tools, and does not occur naturally in the Pojoaque area. Obsidian had to be imported, and therefore represents a desirable resource on abandoned sites. Thus, much of the obsidian on our sites may potentially have been salvaged from earlier sites in the area. Depending on where an artifact is sampled, analysis could date period of use.

Many problems are associated with obsidian hydration analysis. This method may be used, but only when other types of chronometric data are unavailable. Since it appears that obsidian found on the surface or at shallow depths hydrates at different rates than deeply buried specimens where soil temperature and moisture content are more constant, analysis of samples from less than a meter deep is considered undesirable. If cultural deposits are that deep, it is unlikely that obsidian will be the only temporally sensitive material present. Thus, this material will only be used to provide chronometric information in extreme cases.

Bone is the third category of artifacts that can potentially provide temporal information. Like wood, bone contains a radioactive isotope of carbon that is amenable to accurate dating. However, floral specimens are better suited for this type of analysis, and it is unlikely that we will need to submit any bone for radiocarbon dating.

**Chronometric Techniques**

**Radiocarbon Dating**

Radiocarbon analysis has been used to date archaeological sites since the 1950s. While this process was initially thought to provide accurate absolute dates, several problems have cropped up over the years that now must be taken into account. The three most pervasive problems have to do with the ways in which wood grows and is preserved. Both animals and plants absorb a radioactive isotope of carbon ($^{14}C$) while they are alive. Immediately following death, $^{14}C$ begins decaying into $^{13}C$ at a known rate. Ideally, by simply measuring the proportion of each carbon isotope it should be possible to determine how long ago that entity stopped absorbing radioactive carbon. Since plant parts are often available on sites, this technique is usually applied to those types of materials. However, more recent research has tossed a few bugs into the system. For example, some plants use carbon in different ways. This variation can be taken into account by determining the type of plant being dated.

A more serious problem is encountered when wood or wood charcoal is submitted for dating (Smiley 1985). Only the outer parts of trees continue to grow through the life of the plant, hence only the outer rings and bark absorb carbon. Samples of wood submitted for dating may contain numerous rings, each representing growth in a different year. Thus, rather than measuring a single event (when
the tree died or was cut down), the dates of a series of growth years are averaged. This often tends to overestimate the age of the material. Smiley (1985:385) notes that a large error in age estimation can occur in arid or high-altitude situations, where tree-ring density may be high and dead wood can preserve for long periods of time. Disparities as large as 1,000+ years were found in dates from Black Mesa, and there was an 80 percent chance that dates were overestimated by over 200 years and a 20 percent chance that the error was over 500 years (Smiley 1985:385-386).

The disparity in dates was even greater when fuel wood rather than construction wood was used for dating (Smiley 1985:372). This is because wood can be preserved for a long time in the Southwest, even when it is not in a protected location. Thus, wood used for fuel could have been lying on the surface for several hundred years before it was burned. Again, the event being measured is the death of the plant, not when it was used for fuel.

One other problem with the use of this method is caused by solar activity. Sunspots cause fluctuations in atmospheric $^{14}$C levels, and hence in the amount of radioactive carbon absorbed by living entities. This introduces error into the calculations, which is currently corrected by using a calibration based on decadal fluctuations in atmospheric $^{14}$C as measured from tree-ring sequences (Suess 1986). While this problem may no longer be as significant as the others mentioned, it indicates that we are still learning about how this isotope is absorbed and decays, and that it is affected in many ways that were not originally considered.

Even considering these problems, radiocarbon analysis can provide relatively sensitive dates when properly applied. For example, annuals or twigs from perennials represent short periods of growth and can often be confidently used. Construction wood can also be sampled in a way that measures the approximate cutting date rather than a series of growth years. This can be accomplished by obtaining only bark and outer rings instead of sending in a large lump of charcoal. This is often difficult and time consuming, but provides dates that are much more reliable.

We will only obtain radiocarbon samples in certain circumstances. Samples of fuel woods will not be submitted unless there are no other temporally sensitive materials available. Construction wood is the best type of material for radiocarbon dating, especially when it comes from small elements like latillas and lintels. Large elements, like vigas and posts, may be sampled, but it must be remembered that they were often salvaged from older structures and reused. Thus, they may be dating the occupation of another structure and not the one being investigated. Construction wood would be sampled as outlined above. Only bark (if available) and outer rings will be obtained. In general, these materials are more accurately dated by dendrochronology. However, deteriorated wood often does not survive the process of removal in good enough shape or with enough rings to make that type of analysis possible, and not all types of wood can be used for tree-ring dating. Radiocarbon samples may be obtained in these cases. The only other samples that may be considered for radiocarbon analysis are those that contain materials from annuals, or twigs and leaves from trees.

**Archaeomagnetic Dating**

Archaeomagnetic dating analyzes the remanent magnetization in materials that were fired prehistorically. Those materials must contain particles with magnetic properties (ferromagnetic minerals), usually iron compounds like magnetite and hematite. Ferromagnetic minerals retain a remanent, or permanent, magnetization, which remains even after the magnetic field that caused it is removed (Sternberg 1990:13-14). When ferromagnetic materials are heated above a certain point (which varies by the type of compound), the remnant magnetization is erased and particles are remagnetized (Sternberg 1990:15). Samples of that material can be analyzed to determine the direction of magnetic north at the time of firing. Since magnetic north moves over time and the
pattern of its movement has been plotted for about the last 1,500 years in the Southwest, comparison with the archaeomagnetic plot can provide a reasonably accurate date. However, it should be remembered that only the last event in which the material was heated to the point where remagnetization could occur is being dated. Thus, a feature could have been in use over a span of decades, but only the last time that it was fired to the proper heat can be dated by this method.

Archaeomagnetic analysis can potentially contribute good temporal data for sites, providing the proper fired materials are encountered. Boyer’s (1997) examination of chronometric dates from Developmental period sites in the Taos Valley showed that archaeomagnetic dating provided the best control for determining the ages of individual and groups of sites. When a structure burns it occasionally attains the necessary heat for remagnetization to occur, and these events can also be dated. However, as noted above, one must keep in mind the event that is actually being dated. An archaeomagnetic date from a pithouse hearth can not be used to place the construction of that structure in a temporal perspective, because that is not the event being dated. Thus, archaeomagnetic samples can provide dates for the last use of certain features at a site, but cannot be used to determine when they were built.

Archaeomagnetic samples will be taken whenever possible. In most cases only hearths will be amenable to this type of analysis. However, if other burned soils are found in situ, samples of them may also be taken if they appear related to events that occurred during the time of occupation.

Tree-Ring Dating

This method was developed in the early twentieth century, and is based on the tendency of growth rings in certain types of trees to reflect the amount of moisture available during a growing season. In general, tree rings are wide in years with abundant rainfall, and narrow when precipitation levels are low. These tendencies have been plotted back in time from the present, in some cases extending over several thousand years. An absolute date can be obtained by matching sequences of tree rings from archaeological samples to master plots. This is the most accurate dating technique available because it can determine the exact year in which a tree was cut down. However, once again it is necessary to determine what event is being dated.

Because the reuse of wooden roof beams was common in the prehistoric Southwest, it is not always possible to determine whether a date derived from a viga is related to the construction of the structure within which it was found, or to a previous use. Clusters of similar dates in roofing materials are usually, but not always, a good indication that the approximate date of construction is represented. Isolated dates may provide some information, but are often of questionable validity.

Another problem associated with tree-ring dating concerns the condition of the sample being analyzed. In order to apply an accurate date to an event (in this case, the year in which a tree stopped growing), the outer surface of the tree is needed. An exact date can be obtained only when the outer part of a sample includes the bark covering of the tree, or rings that were at or near the tree's surface. In addition, enough rings must be present to allow an accurate match with the master sequence. It is often possible to provide a date when only inner rings are present, but this will not be a cutting date.

Even considering the potential problems associated with this technique, it represents the best method available for dating sites in the Southwest. Samples of construction materials that appear to contain enough rings for analysis will be collected. Latilla and lintel fragments would be the best specimens for collection, since it is less likely that they were salvaged from earlier dwellings and reused. Since building materials were often salvaged from pithouses at the time of abandonment or soon after that event, few tree-ring samples will probably be available from these sites.
As in every archaeological endeavor, chronological control is critical to our examination of these sites. We will attempt to obtain as many samples of diverse types as feasible, because it is impossible to accurately predict whether certain types of materials will be encountered. Thus, while tree-ring samples would provide the most accurate information concerning building dates, and archaeomagnetic samples are useful in determining when structures were abandoned, we will also collect other types of samples in case optimal materials are not recovered. This will include samples for radiocarbon and obsidian hydration dating. It is likely that not all samples of these materials will be processed.
18. STRUCTURES AND FEATURES: ANALYSIS OF ARCHITECTURAL MATERIALS

James L. Moore

Introduction

Analysis of the techniques and materials used to build a structure can provide interesting and potentially important data on construction technology and occupational history. A study of construction techniques is integral to provide basic site descriptive information. We feel that it is not enough to simply characterize how a structure looked. Archaeologists should also collect information on how structures were built, the types of materials used in construction, and modifications made during occupation.

Theoretical Considerations

Architectural data can provide information that should be useful in examining certain aspects of our model. In particular, they could help determine whether clusters of sites represent discrete communities. Boyer (1994) compared architectural data from two clusters of excavated pithouses in the Taos area, a northern group centered on the Rio Hondo, and a southern group along the Rio Grande del Rancho. Variation in construction detail was used to propose that these clusters represent different Pueblo populations and evidence the existence of separate communities. A similar analysis of the structure of pithouses at Developmental period sites in the Pojoaque area should help determine whether more than one Pueblo population is represented in that area. Comparisons with other areas should also help determine whether the Developmental period population of the Tewa Basin migrated in from outside the Northern Rio Grande region, or represents a local development.

Structural Variation and Associations

Another interesting problem that might be approached using architectural information concerns the relationship between surface and subsurface structures. What do the surface rooms represent? Was there a seasonal variation in the occupation of adjacent subsurface and surface rooms, or was there a functional difference? We may be able to approach this problem using architectural data. If these types of structures represent residences occupied during different seasons, both similarities and differences might be expected. Features indicative of a residential function should be associated with both types of structure, including cooking and food processing facilities. Features may occur either within or just outside surface structures, and they should resemble those found in pithouses in construction style, materials, and techniques. Features in surface structures should be built as substantially as those in pithouses. However, we do not expect to find evidence of this pattern, because it tends to suggest a highly structured system of bilocal residence that entails houses in widely separated resource zones rather than immediately adjacent to one another.

Instead, we expect to find that most surface structures and associated features were built less substantially and with less standardization than pithouses. This may suggest one of two possibly overlapping functions. Surface structures may have been used for domestic tasks when shelter from the elements was not critical. They could also have served as storage facilities. While it is possible that pits and ceramic containers were used for most food storage, stockpiling a large harvest inside
pithouses would not have left much floor space to live in. Thus, surface structures could have been used for storage, freeing space inside pithouses for other residential activities (see Chapter 12).

These functions are not mutually exclusive. Stored foods from the previous year's harvest were probably exhausted or nearly so by spring or early summer. Thus, surface structures would have been empty and available for other domestic purposes. Tasks that were more pleasant to perform in an environment with better lighting and ventilation may have been moved to exterior work areas, both inside and outside of surface structures. As harvest time arrived and surface structures were once again used for storage, these activities moved back inside pithouses.

The main differences between these models are in the level of formalization in the cycling of tasks between structure types. Formal seasonal movement from subsurface to surface houses would suggest the virtual abandonment of one type of structure for a time, and the focusing of all activities on the other. A less formal pattern would see the shifting of some tasks, but not all, from surface to subsurface structures and vice-versa. Both types of structures should have been used for domestic activities at certain times (spring and summer), while domestic tasks should focus on pithouses at other times (fall and winter).

Yet another pattern must be discussed, though it will be more difficult to test. Not all pithouses have associated surface structures. When surface structures occur, they occasionally contain multiple rooms—more than would be expected if the structure was related to only a single pithouse. These structures may have had a communal function. Rather than each household storing its harvest individually, larger and more substantial surface structures may have been used to store the harvests of larger corporate groups, perhaps at the lineage or clan level. In turn, this would denote significant ties between households that transcend simple ceremonial cooperation, and would indicate a higher level of group integration (see Chapter 12).

The latter two models are related to patterns of frontier occupation. If sites containing pithouses and ephemeral surface structures date earlier than those with larger and more substantial surface structures, then a pattern of developing integration may be evidenced. Such a pattern could be an indication of hunter-gatherers settling down and becoming farmers, and the concurrent development of new group integrative mechanisms. However, if they date concurrently, different functions could be suggested. Ephemeral surface structures could have been used seasonally for some domestic tasks, but not necessarily for storage. That function could have been centered on larger and more substantial structures, and may be an expression of preexisting ties between households. Thus, settlement by groups rather than individual families could be indicated. Conversely, migrants could have been from the same general area, and a cooperative relationship was developed at the time of arrival or soon after.

While all of these possibilities are speculative, we should be able to use data from this study to assess their validity. Both inter- and intrasite variability in types of surface structures present, construction techniques, and associated features may have different meanings. While archaeologists often consider only ceremonial structures and features to be good evidence of group integration on more than a household level, we feel that storage facilities could serve a similar purpose under the proper circumstances. This may be in addition to religious integration, and could help improve group cooperation and prospects for survival.

*Structures, Features, and Food Processing Activities*

Information on the use of plant foods may also be available from architectural features at these sites.
While not directly related to analysis of building techniques, the samples needed for this type of study will come from construction elements and are thus discussed here.

Analysis of pollen samples from floors and features can often provide information on the types of plants processed on or in them. This was done successfully at Chaco Canyon (Cully 1982, 1985), producing evidence for the use of cultigens as well as the probable use of wild plants in rooms at several sites, and complementing other botanical analyses:

\[ \ldots \] many taxa found in one form of botanical analysis were often not found in the others. In order to gain a more complete understanding of the plant resources used \ldots the different botanical analyses should all be used. (Cully 1985:237)

Thus, pollen samples collected from architectural features should complement other botanical analyses rather than providing redundant information. Some functional differentiation was observed in Cully's (1985) samples from Chaco Canyon, suggesting that we might be able to draw similar conclusions, depending on the quality of information available. This could help in our examination of the functions of surface and subsurface rooms, as well as supplementing subsistence data.

**Collection and Analysis Methods**

We will collect a series of standard samples and observations to enable us to analyze construction methods and structure use. Hopefully, this will allow us to address most, if not all, of the questions raised above. Plans and profiles will be drawn for every feature and structure investigated. All such drawings will be tied into the Cartesian grid system. Standard forms will be completed for each feature, room, and structure excavated. They will include information on contents, construction techniques, and associated artifacts and samples.

In order to gather information on building techniques, structures will be partly dismantled after they are photographed, plans are drawn, and associated features are excavated and documented. We will trench through walls and floors of pithouses to determine the original size and shape of the pit and to look for evidence of artificial fill behind walls or beneath floors. Floors in surface structures will be similarly trenched to examine building methods and determine if they resemble those used in pithouses. This will also enable us to gather samples of the native soil and construction materials.

Samples of adobe will be obtained from each room, and from associated features when deemed necessary. It is likely that not all samples will be processed because of time and financial constraints. Since surface structures and pithouses were usually built differently, vary significantly in their configuration, and walls are generally preserved to different heights, sampling procedures may vary. Whenever possible, approximately 2 liters of material will be obtained. Specimens will be as large as possible when this is not feasible. Samples of native soil are necessary for all structures, and will act as controls, allowing us to compare them with the adobe used in construction. Different courses of adobe in structure walls will be sampled, if they can be defined. We will attempt to isolate samples of building materials when surface structures contain jacal walls, but may not be able to do so in a standardized fashion.

Samples will also be taken from floors. If multiple floors are encountered, each will be sampled separately. If possible, specimens of wall plaster will also be collected. Individual features will be sampled when they evidence remodeling. Samples of artificial fill under floors and behind adobe walls will be collected, if present, for comparison with native soils. Variables that will be examined
include color, particle size distribution, plasticity, and soluble salts. These analyses should provide information that will allow us to assess similarities and differences between samples, and determine whether soil from on-site was used for construction. If so, these studies may provide data on how they were altered by the addition of other materials to achieve the proper amount of plasticity. They will also allow us to look at remodeling episodes, if any such are reflected in the construction sequence, and determine whether there are temporal relationships between episodes of feature or floor modification.

Wooden architectural elements will be sampled and described, if encountered. Diameter measurements will be taken for all wooden building elements found, focusing on those with relatively intact cross sections. If suitable specimens are available we will collect samples of posts, vigas, latillas, and lintels. Analysis of these specimens will be aimed at identifying types of woods used for building and collection of chronometric data. The latter will consist of cross sections of tree-rings and suitable radiocarbon samples, as discussed in Chapter 18.

Pollen samples will be taken from alternate grids on floors, complementing those collected for macrobotanical analysis. To prevent inadvertent contamination from modern pollen rain, these samples will be obtained immediately upon uncovering a floor. Processing and analysis will proceed using the same techniques applied to samples obtained from ground stone artifacts.

Summary

Architectural samples and construction data should be useful in three general areas of investigation. First, they will allow us to produce a complete description of each structure, including building techniques, material sources, and relationship between modifications made during remodeling. Second, they have the potential to provide chronometric data, especially pertaining to construction sequence. Finally, pollen samples obtained from floors can provide basic subsistence data as well as information on the use of internal space.

When used to compare construction styles between site clusters, this information should help in an examination of community structure. Analysis of variation in surface structure construction style and configuration may also allow us to deal with questions of community integration. Were some surface structures used seasonally by individual households and others for communal storage by larger corporate groups, or is some other pattern indicated? Information on community structure and integration can be critical to our assessment of Developmental period settlement patterns.
20. HUMAN REMAINS: RESEARCH ISSUES, TREATMENT, AND ANALYSIS

Nancy J. Akins

Introduction

While human remains are often recovered from prehistoric sites, rarely is the information gained from their study integrated into broader research perspectives, even when the topics relate to subsistence, diet, and demography (Martin 1994:88-89). Descriptions of mortuary treatment are fairly standard, but few go beyond placing the individual burial into the site context. The potential for understanding social behavior and organization gained from mortuary practices, which change in response to social, demographic, and economic conditions (Brown 1995:7; Larsen 1995:247), is rarely pursued.

Studies of human remains have shifted from constructing cultural sequences and identification of racial groups to identifying broad patterns of social organization and change. Mortuary remains are often highly patterned and reflect social organization more directly than other classes of archaeological remains (Trinkaus 1995:53). Recent mortuary analyses have approached a variety of topics, ranging from individual, gender, ethnic, political, and social identity to interpersonal conflict, resource control, labor and organization, ritual and meaning, social inequality, trade, population dynamics, and residential patterning (Larsen 1995:260).

Advances in the study of human remains provide important insights on health, diet, genetic relationships, microevolution, and population characteristics. Inherited skeletal features are being used to address conflicting land claims by indigenous groups and studies of past human populations have provided information on inherited predispositions for diseases like diabetes and anemia (Buikstra and Ubelaker 1994:1).

Even the most basic analyses of human remains have the potential to contribute significant information on life during prehistory. Human bones and teeth record conditions during life as well as at death (Goodman 1993:282). Several indicators of physiological stress are routinely monitored to assess general health. These include adult stature, which may result from undernutrition, and subadult size, which can indicate the timing of stress events. Sexual dimorphism tends to decrease with increased stress, or over time, with greater divisions of labor. Enamel defects, hypoplasias or pitting, are associated with specific physiological disruptions and can be relatively accurately assigned an age of onset. Dental asymmetry begins in utero and reflects developmental stress while dental crowding can be nutritional or genetic. Dental caries reflect refined carbohydrates in the diet and can lead to infection and tooth loss. Dental abscessing can become systemic and life-threatening. Osteoarthritis and osteophytosis can indicate biomechanical stress. Osteoporosis, related to calcium loss and malnutrition, can be acute to severe during pregnancy and lactation and can affect the elderly. Porotic hyperostosis is related to iron deficiency anemia and leaves permanent markers. Periosteal reactions result from chronic systemic infections (Martin 1994:94-95).

Pojoaque Area Data

There are little data on prehistoric populations in the Pojoaque-Tesuque area that can serve as a starting point for developing questions related to the overall research design for the Santa Fe to Pojoaque Corridor project. A small population of human burials was found at LA 103919, a Developmental period site with a pit structure, surface rooms, and a number of pits, located near
The human burials include two children (about 6 and 9 years of age), three adult females (ages 20 to 25, about 40, and about 48 years of age), an adult male (about 48 years of age), and several unassociated bones. The biological information on this small population is consistent with a settled group, largely dependent on agriculture. Rates of porotic hyperostosis, considered an indication of nutritional deficiency, infectious disease, or parasitism (Buikstra and Ubelaker 1994:120) are high (50 percent for the children and 71 percent for the combined population plus an orbit that was not from any of the burials). Dental hypoplasias are generally attributed to stressful episodes such as those caused by malnutrition and infectious disease, but can also be hereditary anomalies or result from localized trauma (Buikstra and Ubelaker 1994:56). All but one of the LA 103919 individuals have one or more teeth with up to three lines, suggesting that episodic stress was fairly common. Timing of the stress episodes is slightly later than usually found. Peak line formation generally falls between the ages of 2.5 and 4.0 years and is often interpreted as resulting from weaning stress (Stodder 1984:78). In this population, over half the lines were developed after age three, possibly suggesting prolonged weaning or low resistance to infection. Dental caries, which are considered diagnostic of carbohydrate quality and quantity, dental abscesses, and the amount of attrition are all high in this population. Rates generally increase along with the horticultural component of the diet (Stodder 1989:181). In stature, the females fall within the range reported for the Southwest. The male, however, is larger than the means reported for a number of sites (Stodder 1989:185). All three females have healed cranial lesions. Degenerative joint disease (DJD) is prevalent in the three oldest individuals. All three have slight to moderate amounts of DJD in most joints and two have considerable development of osteophytes in the lower spine and disc herniations in the lower thoracic spine.

Metric observations indicate that the females spent a good deal of their time grinding corn as two of the three have greater maximum diameters of the humerus than the male, a large individual. Femur shaft shape is an indication of strength and of mobility. Smaller, more circular indices (midshaft anterioposterior diameter, midshaft mediolateral diameter) are associated with decreased mobility while higher ratios are characteristic of hunter-gatherers (Bridges 1996:118). All three females have essentially round femoral cross sections (1.04, 1.00, 1.07) while the male’s is flattened mediolaterally (0.67), suggesting a sedentary group committed to agriculture.

Mortuary treatment was similar in that all were found in pits, all were flexed or semiflexed, and all but one had their head oriented to the east. Other details differed and suggest no standard treatment.

Research Issues

One of the primary issues to be addressed by the Santa Fe to Pojoaque Corridor studies concerns the nature of the late Developmental occupation. Were they a fairly mobile group who were seasonally sedentary or more settled agriculturalists who inhabited the area on a permanent or a seasonal basis? If they were relatively mobile but seasonally sedentary, was this a recent adaptation to the Rio Grande environment or part of a long-term strategy modified by increasing population, acceptance of domestic plants as part of the subsistence system, or other factors? If they were relatively settled, but new to the area, what can the human burials tell us about their previous strategies and contemporary adaptations?

Data from LA 103919, which is near the Santa Fe to Pojoaque Corridor project area, are somewhat contradictory, indicating a complex and interesting situation. The human burials have all the hallmarks of a long-settled agricultural group. Yet other kinds of data, particularly the fauna, are
more consistent with a relatively mobile strategy where hunting large mammals played a larger role than is found at most settled agricultural communities. Reconciling these divergent interpretations will require detailed comparisons with a variety of populations where the human adaptation is more straight forward. Populations from the La Plata area (settled agriculturalists), the Galisteo Basin (a late but mobile population), Peña Blanca (an Early Developmental population), San Antonio (an agricultural group who relied more on hunting), and published summary information (e.g., Stodder 1989) will provide the basis for these comparisons.

To address the nature of Late Developmental adaptation in the Northern Rio Grande region, the study of any human remains recovered will be addressed as four basic areas of inquiry. The first concerns the evidence for mobility or the degree of sedentism and agricultural commitment of the groups who lived at the project area sites. Mortuary practices, simple metric measurements, demographic structure, indications of general health and nutrition, and dental wear and carries frequencies all can give us some indication of the diet and mobility. Other methods, that require destruction of small pieces of bone can provide fairly accurate indications of the diet of prehistoric populations. Strontium/calcium ratios characterize the amount of meat consumed by individuals, as does a broad spectrum of trace elements found in bone. Stable carbon isotope ratios in bone and tooth apatite are used to measure the dietary importance of maize (Buikstra and Ubelaker 1994:168-169).

The second question concerns whether the prehistoric inhabitants were recent migrants into the area, if so, from where, and who they were related to. Eric Reed (Wendorf and Reed 1955:153, 161) believed that the type of cranial deformation provided a clue to population movements. He suggested that because vertical occipital deformation rarely appeared in populations from the Rio Grande until fairly late, after A.D. 1300, its origin was to the west or from the Mesa Verde area and its presence was a mark of the arrival of immigrants from those areas.

Since Reed’s time, the focus of study has shifted from cultural modifications such as cranial deformation to studies of genetic similarities based on metric and nonmetric variation. Interest in determining the genetic relationships among prehistoric groups has a long history in the Southwest. As early as 1931, Alex Hrdlička published cranial measurements for a number of Southwestern prehistoric populations. Relying on population means, he concluded that there were two basic groups but no physical subdivisions related to “cultural taxonomic divisions” (Corruccini 1972:373).

A few of the more recent studies utilizing multivariant techniques have included groups that are later in time but could be related to the Developmental period population in the Rio Grande. Mackey’s study of cranial measurements from 14 widely distributed Southwestern archaeological populations found relatively close relationships between those from Puye (n = 28, A.D. 1350-1600), Hopi (n = 14, A.D. 1200-1700), and Jemez (n = 24, A.D. 1400-1800), while a population from the Cochiti area (n = 31, A.D. 1300-1550) was quite distant (Mackey 1977:480-481). A slightly later study with additional populations found Puye most closely related to those from San Cristobal (n = 38, late A.D. 1500s-1800s) and Kuaua (n = 40, A.D. 1500s), while an Arroyo Hondo population (n = 33, A.D. 1300-1425) was closest to those from Pindi (n = 28, A.D. 1250-1350) and Pecos Mission (n = 24, historic) (Mackey 1980:175, 178). Schillaci and colleagues (1998, table 2, fig. 4) find that burials from Otowi (n = 9, A.D. 1400+) are most closely related to Neil Judd’s Pueblo Bonito burials (n = 15, A.D. 920-1120), followed by those from Pot Creek near Taos (n = 8, A.D. 1250-1320).

These studies suggest that cranial morphometrics have the potential to provide data on the origins and affinities of any human burials recovered by this project. Data collected by the author and by Michael A. Schillaci on additional populations will be used to assess these relationships. Data on nonmetric variation will be collected, but at present so little comparative material is published, it will serve mainly to provide baseline data for the area.
DNA analysis, also a destructive method, is a more precise method to determine affinities among modern, historic, and prehistoric groups (Buikstra and Ubelaker 1994:170). However, the limited application to other prehistoric populations makes it difficult to reach any conclusions. Collection of samples for future studies should be considered.

Another method, which takes but a small amount of bone and dental enamel (1 g each), compares stable strontium isotope ratios to assess whether individuals were raised in the area in which they were buried. Strontium signatures in the teeth reflect the time when the tooth was developed while the signature in bone constantly changes as bone remodels. If the signatures are different, movement from an isotopically distinct location can be inferred (Buikstra and Ubelaker 1994:172).

A third objective is to assess the overall success of the group in terms of general health patterns within a comparative framework. Basic data will be compared to other populations, particularly those from the Southwest, to assess the relative success of these individuals and this particular adaptation.

Finally, a regional view of Northern Rio Grande mortuary practices, beyond that outlined by Wendorf and Reed (1955), will be developed. According to Wendorf and Reed, burial during the Developmental period was flexed inhumation (1955:142). During the Coalition period, it was usually flexed inhumation, with some extended burial recorded but not precisely dated (1955:146). The same pattern was found during the Classic period: flexed inhumation with minor percentages or exotic examples of extended burials (1955:153). Surely, the shifting influences and population influxes proposed by Wendorf and Reed (1955:161), as well as changes in settlement pattern and population densities, should be reflected in the burial practices.

Consultation Procedures

Consultation procedures for human remains depend on land status. For sites on Tesuque or Pojoaque tribal land, the Native American Graves Protection and Repatriation Act (§ 25 U.S.C. 3002, 1990) states that any human remains and associated funerary objects, sacred objects, or objects of cultural patrimony belong to the lineal descendants or if the lineal descendants cannot be ascertained, to the tribe on whose land the objects were discovered. These groups must be consulted before any items are excavated or removed. The criteria for determining lineal descent (43CFR10.14) are fairly rigorous. Lineal descendants are individuals who can trace their ancestry directly without interruption by means of the traditional kinship system of the appropriate tribe. Given the antiquity of the Santa Fe to Pojoaque Corridor sites, consultations will be with the tribes on whose land there is the potential to discover human remains, funerary objects, sacred objects, or objects of cultural patrimony. All aspects of discovery, recovery, analysis, and final disposition will be agreed on before excavation begins.

On state and private land, state law (NMSA § 18-6-11.2, 1989 and HPD Rule 4 NMAC 10.11) requires a permit for excavation of unmarked burials. Human remains on state or private land will be excavated under annual burial permits issued to the OAS. Following the permit provisions, if human remains are discovered, the intent to use the annual permit, including a legal description of the location of the burial, the written authorization to remove the burial from the landowner, a description of the procedures to be implemented to identify and notify living relatives of the burials, certification that the law enforcement agency having jurisdiction in the area has been notified, a list of personnel supervising and conducting excavations of the human burial, and the NMCRIS Project/Activity Number for the permitted excavation will be submitted in writing to the State Historic Preservation Officer (SHPO) before excavation of the burial begins. The local law
enforcement agency with jurisdiction over the area will be notified to contact the state medical investigator who will determine if the burial is of legal significance. Within 45 days of completing the permitted excavation, recommendations for the disposition of human remains and funerary objects will be made to the SHPO. These recommendations will take into consideration the comments of living persons who may be related to the burial and the wishes of the landowner. The plan will provide a proposed location for reburial or approved curatorial facilities and an inventory of funerary objects, other artifacts found in association, or collected in the course of excavation. The SHPO, after consulting with the State Office of Indian Affairs, will determine the appropriate disposition of the human remains and associated funerary objects. If a final report cannot be completed within a year of the completion of fieldwork, an interim report will be submitted along with an estimated completion date for a final report.

**Excavation Procedures**

Excavation of human burials will be consistent with current professional archaeological standards (see Chapter 21). This generally includes the identification of a burial pit and careful removal of fill within the pit. When possible, half the fill will be removed to provide a profile of the fill in relation to the pit and the burial. The pit, pit fill, burial goods, and burial will be examined and recorded in detail on an OAS burial form with special attention paid to any disturbance that may have taken place. Scaled plans and profiles and photographs will further document the burial and associated objects. Flotation and pollen samples will be taken from all burials.

Disarticulated or scattered remains will be located horizontally and vertically, drawn, and photographed. Any associated materials and the potential cause of disturbance or evidence of deliberate placement will be recorded in detail.

**Analysis Methods**

The human analysis will follow the procedures set out in *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994). This comprehensive system focuses on the need to gain the maximum amount of comparable information by recording the same attributes using the same standards. A series of 29 attachments and documentation on how these should be recorded include the following information:

1. A coding procedure for each element that makes up a relatively complete skeleton is provided. Diagrams of skeletons and anatomical parts allow for the location of any observations concerning these parts. Another form records commingled or incomplete remains.

2. Adult sex is determined by examining aspects of the pelvis and cranium. Age changes are documented on the pubic symphysis using two sets of standards, on the auricular surface of the ilium, and through cranial suture closure.

3. For immature remains, the age at death is determined by scoring epiphyseal union, union of primary ossification centers, and measurements of elements.

4. Recording of dental information includes an inventory, pathologies, and cultural modifications. Each tooth is coded and visually indicated for presence and whether it is in place, unobservable, or damaged, congenitally absent, or lost premortem or postmortem. Tooth development is
assessed, occlusal surface wear is scored, caries are located and described, abscesses are located, and dental hypoplasias and opacities are described and located with respect to the cemento-enamel junction. Any premortem modifications are described and located.

5. The secondary dentition is measured and dental morphology scored for a number of traits.

6. Measurements are recorded for the cranium (n = 35), clavicle, scapula, humerus, radius, ulna, sacrum, innominate, femur, tibia, fibula, and calcaneus (n = 46).

7. Nonmetric traits are recorded for the cranium (n = 21), atlas vertebra, seventh cervical vertebra, and humerus.

8. Postmortem changes or taphonomy are recorded when appropriate. These include color, surface changes, rodent and carnivore damage, and cultural modification.

9. The paleopathology section groups observations into nine categories: abnormalities of shape, abnormalities of size, bone loss, abnormal bone formation, fractures and dislocations, porotic hyperostosis/cribra orbitalia, vertebral pathology, arthritis, and miscellaneous conditions. The element, location, and other pertinent information is recorded under each category.

10. Cultural modifications such as trepanation and artificial cranial deformation are recorded in another set of forms.

Buikstra and Ubelaker (1994:174) recommend curating the following samples for future analysis of burials that will be repatriated:

1. The middle portion of a femur midshaft (at least 100 g) that can be used for radiocarbon dating, trace element analysis (diet), stable isotope ratios (climate and diet), strontium (population movement), bone geometry (activity patterns), histomorphometry (age and health), and aspartic acid analysis (age and health);

2. Several teeth (the upper central incisor, lower canines and premolars, and lower second molar) for histomorphometric analysis, cementum annulation (root), aspartic acid (dentin), isotope studies (enamel), and future studies of linear hypoplasias and enamel microwear patterning;

3. Five grams of trabecular bone for DNA extraction, the middle third of a clavicle and rib six for age at death, health studies, and morphological age assessments;

4. Two sections of the right femur and one section each of the humerus or CT scans of both to assess the level and type of behavior. Although the OAS will plan to collect and curate these samples from burials that will be repatriated, no samples will be collected without the express permission of the landowner or tribe.
21. DATA RECOVERY FIELD METHODS

James L. Moore

Introduction

The same general methods will be used to examine each site, although, since all sites have unique characteristics, it will be necessary to tailor our investigative techniques to individual cases. This may include selecting certain areas for excavation, how areas around features are treated, and whether or not mechanical equipment is used. This chapter provides a general overview of the techniques that will be used during data recovery. For more comprehensive coverage of excavations methods the reader is referred to the field manual (Boyer and Moore 1999).

In order to fully document the extent of cultural material, sites will be completely mapped. If necessary, this procedure will include areas that are both within and outside proposed project limits. However, unless requested by a land-managing agency or the NMSHTD, field work will be limited to areas within the proposed right-of-way.

General Excavation Procedures

Horizontal Provenience: The Grid System

The first step in excavation will be to redefine the Cartesian grid systems that were established during testing. Main site datums will be used to reference all horizontal and vertical measurements. This will either be the main datum established during testing or a new datum placed outside the excavation area. The main datum will only be moved if it is in an area that will be affected by excavation, or was removed or damaged during the time between investigation phases. A plan of each site will be prepared, illustrating the locations of excavation areas, structures, and features.

Surface collection and excavation units will be linked to the Cartesian grid system. These units will be identified by the grid lines that intersect at their southwest corners. The 1-by-1-m grid unit will be the basic excavation unit used unless they are not the most efficient unit of excavation. This is particularly true in structures. Removing fill from structures, except when on or just above floor, by grid units may provide greater levels of horizontal and vertical control than are needed nor desired. In addition, it is very time consuming, which is an important consideration in cultural resource management. While it is necessary and important to know what soil stratum is represented, the grid location may not be as meaningful. Of course, both horizontal and vertical controls are important when deposits reflect specific cultural activities. Thus, excavation units may differ in size depending on the nature of the deposits being investigated.

It must also be remembered that grid systems are artificially imposed over sites. They are simply constructs used to provenience cultural materials and features so that their original relationships can be preserved for later study. Rarely do features conform to a grid system. When features are large it may be desirable to excavate by grid unit to obtain detailed data on placement of materials within them. However, excavation in grid units is often awkward in small features, especially when they extend into one or more units. Thus, features, rather than the grid units in which they occur, will usually be treated as independent excavation units.

Vertical Provenience: Strata and Levels
Two methods will be used to record vertical excavation units: strata and levels. Soil strata will be assigned unique numeric designations as they are encountered, and descriptions of each will be recorded on individual forms. Since the surface represents an arbitrary layer with no thickness, it will be designated Stratum 0 at each site. In order to track the sequence of strata from one area to another, each vertical excavation unit will also be assigned a level number, beginning with the surface. Again, since the surface is an arbitrary level with no thickness, it will be designated Level 0. The first vertical excavation unit to be dug will be labeled Level 1, the second Level 2, and so on. Since stratum and level numbers represent two completely different series, stratum numbers may not be in sequence as excavation proceeds downward, while level numbers will always be in sequence.

Just as the grid system will be linked to the main datum, so will all vertical measurements. All measurements will be made in meters below datum (mbd) to avoid problems encountered when dealing with both positive (below datum) and negative (above datum) measurements. In this case, vertical measurements will be made consistent by assigning the main datum at each site an arbitrary elevation of 10.00 mbd. Since it is often difficult to provide vertical control for an entire site with one datum, subdatums will be established. Horizontal and vertical control of these points will be maintained relative to the main datum.

Before it is possible to delimit the extent and nature of soil strata it is usually necessary to examine them in cross section. This requires the excavation of exploratory units, which will consist of 1-by-1-m grid units excavated in arbitrary 10-cm vertical levels. When natural divisions—soil strata—have been defined, they will be used to delimit the boundaries of a level. Outside exploratory grid units, soil strata will be used as the main units of vertical excavation. Exceptions may include noncultural deposits and cultural strata that are very thick and need to be subdivided to make excavation easier.

Vertical treatment of deposits will vary according to their nature. Cultural deposits will be carefully excavated to preserve as much of the vertical relationship between materials as possible. Although the relationship between artifacts in noncultural deposits is rarely meaningful, horizontal and vertical control will be maintained when appropriate. For example, abandoned structures were sometimes used for trash disposal, filling with debris discarded by the inhabitants of nearby houses that were still occupied. Conversely, others were simply left open to the elements, filling naturally with a combination of wind-blown soil and colluvial sediments. Cultural materials will usually be present in both cases, yet they have completely different meanings. Trash represents materials that were purposely discarded, and can often be separated by strata to determine the sequence of deposition. This may allow researchers to look for minute changes in the artifact assemblage. Artifacts in naturally deposited strata rarely have any similar meaning. Cultural deposits require careful excavation to preserve the relationship between artifacts discarded at different times. Noncultural deposits tend to be jumbled, and relationships between artifacts are almost always obscured because they were moved from their original contexts and redeposited.

Thus, accurate vertical controls may be unnecessary in some cases. While we will always attempt to excavate cultural deposits by stratum, that level of control will only be attempted in noncultural strata if it appears that it will provide data of potential importance to site interpretation. Excavation by strata is considered optimal in cultural deposits because soil layers tend to represent specific depositional episodes.

**Augering**

Soil augers can be effectively used to examine areas with minimal effort and impact on the
archaeological record. Thus, we may make use of this technique to examine parts of sites to
determine whether features or structures are present. In particular, augers may be used to examine
parts of sites that exhibit no surface signs of structures or features. When such are encountered, more
intensive excavation techniques can then be applied to investigate them. Soil removed from auger
holes will be screened to determine whether cultural materials are present. Auger tests will be
recorded on individual forms.

**Recording Excavation Units**

The excavation of a grid unit, or any other type of excavation unit, will begin by filling out a form
for the surface that provides initial depths (mbd) and other pertinent information. Ending depths in
mbd for each succeeding level will be recorded on relevant forms, providing a record of all
excavations. A Grid Unit Excavation Form will be completed for each level, including the surface,
and will describe soils, inventory cultural materials recovered, and provide other observations
considered important by the excavator or site supervisor, including depths, stratum, and level. A
description of soil matrix will also be provided, and should include information on cultural and
noncultural inclusions, presence of building rubble, evidence of disturbance, and how artifacts are
distributed if variations are noticed.

**Recovery of Cultural Materials**

Most artifacts will be recovered in two ways: visual inspection of levels as they are excavated, and
screening though variable-sized hardware cloth. Other materials may be collected as bulk samples
that can be processed in the laboratory rather than the field. Regardless of how cultural materials are
collected, they will all be inventoried and recorded in the same way. Collected materials will be
assigned a field specimen (FS) number, which will be listed in a catalog and recorded on all related
excavation forms and bags of artifacts. Field specimen numbers will be tied to provenience, so that
all materials collected from the same horizontal and vertical provenience units will receive the same
FS number. For instance, if chipped stone, ceramic, and bone artifacts are recovered from the same
level in the same grid unit or the same stratum in the same room quadrant, they will all be identified
by the same FS number. Any samples taken from that level or stratum will also receive the same
number. The FS number will be the primary tool that will allow for maintenance of the relationships
between recovered materials and associated spatial information.

Most artifacts will be recovered by systematically screening soil removed from excavation units.
All soil from exploratory grids and features will be passed through screens, as will at least a sample
of soil from both cultural and noncultural strata in structures, as detailed later. Two sizes of screen,
\( \frac{1}{4} \)-inch and \( \frac{3}{8} \)-inch hardware cloth, will most often be used. While most artifacts are usually large
enough to be recovered by \( \frac{1}{4} \)-inch mesh hardware cloth, some are too small to be retrieved by that
size screen. These remains can also provide important clues about the activities that occurred at a site.
However, there is a tradeoff in gaining this additional information. As the size of mesh decreases,
the amount of time required to screen soil and recover artifacts increases. Sampling is a way to
balance these concerns; thus, smaller mesh will only be used under certain circumstances. Rather than
establishing specific guidelines for sampling by \( \frac{3}{8} \)-inch mesh screens, it is considered better to leave
this to the discretion of the site supervisor. However, as a minimum, all soil in certain types of
features (such as hearths and ash pits) should be screened through \( \frac{3}{8} \)-inch mesh, as should all soil
at floor or living surface contacts. Other potential applications of this recovery method include
culturally deposited strata and activity areas.
Cultural materials from certain types of strata will only be recovered by visual inspection. As discussed in more detail later, only a sample of soil from noncultural strata will be screened to recover cultural materials. Rather than simply ignore artifacts from unscreened strata, however, cultural materials observed during excavation will be collected for analysis. While this will not yield a statistically valid sample, it will increase the number of artifacts recovered and provide more detailed data.

Other cultural materials, such as macrobotanical samples, will be recovered from bulk soil samples. In general, samples for flotation analysis will be collected from culturally deposited strata and features, and should contain at least 2 liters of soil. Macrobotanical materials like corn cobs, piñon shells, wood samples for identification, charcoal, etc., will be collected as individual samples whenever found. All botanical samples will be cataloged separately, and noted on pertinent excavation forms. Sampling methods for these materials are discussed in Chapter 16.

Specific Excavation Methods

The excavation of various parts of a site will be approached in different ways, even though the mechanics of excavation will be the same. Most excavation will be accomplished using hand tools. However, in some cases it may be preferable to use mechanical equipment to expedite the removal of noncultural deposits. Thus, it is possible that mechanical equipment will be used to strip noncultural overburden from buried extramural cultural strata, or in areas lacking surface remains. However, fill will be removed from structures by hand to avoid potential damage to remaining architectural elements. Methods of excavation will vary depending upon whether a structure, a feature, or an extramural area is being examined.

Structures

Individual numeric designations will be assigned to structures on a site, as well as to the rooms they contain. Excavation within rooms will begin by digging an exploratory trench from one wall to the center of, or completely across a room. Due to safety concerns, exploratory trenches will not exceed 1 m in depth. Below 1 m, adjacent unit(s) or quadrant(s) may be removed to provide room to evade collapse. Exploratory trenches will be excavated by grid units to provide controlled samples and cross sections of the deposits. In some cases, this procedure will be repeated, perpendicular to the initial trench, to provide additional information on the filling processes. The exploratory cross section(s) will be profile mapped and the nature of the fill defined. Remaining fill will be excavated by quadrant. Quadrant boundaries will be determined by the locations of grid lines or exploratory trench(es) and, thus, may not always be the same size.

At least one quadrant, whether cultural or noncultural in nature, will be excavated by the defined strata. This method will provide a sample of materials associated with these strata, allowing for a more comprehensive understanding of the filling sequence. The quadrant(s) selected will be left to the discretion of the site supervisor, although in most cases it will be the quadrant that is assumed to provide the most information. For example, if a structure is filled with cultural deposits, more than one quadrant might be sampled. Remaining fill will be removed without screening, though artifacts will be collected when observed.

Excavation will halt between 5 and 10 cm above the floor to prevent damage to its surface during excavation. At this time, the grid system will be reestablished to permit more systematic sampling.
of materials near or in direct contact with the floor. This arbitrary layer, commonly referred to as floor fill, will be removed by grid unit and screened through \( \frac{3}{8} \)-inch hardware cloth. Finer control in recovering materials from these contexts is necessary since they are the most likely to have been deposited at or soon after the time of abandonment.

Following complete excavation of a structure, architectural details will be recorded on a series of forms. Building elements encountered during excavation should also be included. In particular, any roof elements found during excavation should be mapped and described. As discussed in Chapter 19, samples of roof material, if encountered, should be collected for species identification. Descriptions of individual rooms will include information on wall dimensions, construction materials and techniques, and associated features. Structure descriptions will include information on size and dimensions. In addition, scaled plan and profile maps of each structure will be drawn, detailing the locations of rooms and internal features, artifacts found in direct contact with floors, and any other details considered important. A series of 35 mm black-and-white photographs will be completed for each structure showing its overall form, individual rooms, construction details, and the relationship of features with other architectural elements. In addition, photographs may be taken during excavation when warranted and 35 mm color slides may be taken at the discretion of the site supervisor.

**Features**

Features will constitute individual horizontal provenience units. Features will be assigned sequential numbers as they are encountered at a site. Feature numbers will be recorded on a feature log. Prior to excavation, features will be mapped and photographed. Features less than 2 m in diameter may be excavated differently than features greater than 2 m in diameter. After defining the horizontal extent of a feature less than 2 m in diameter, such as a hearth or ash pit, it will be bisected. One half will be excavated in 10-cm arbitrary levels to define internal stratigraphy, and a scale profile will be drawn. The second half will be removed by internal strata. All soil removed from small features will be screened through \( \frac{3}{8} \)-inch hardware cloth. After the fill has been removed a second cross section illustrating the feature’s vertical form perpendicular to the soil profile will be drawn. In addition, a scale plan of the feature showing the grid location, size, and location of profile lines will be drawn. Feature information will be recorded on a feature form describing, in detail, its shape, content, use history, construction detail, and inferred function.

Features greater than 2 m in diameter, such as trash middens, may be excavated by grid unit. The number of excavated grid units will be kept to a minimum and excavated by defined soil strata whenever possible. A sample of the feature fill, in this case one or more grid units, will be screened through \( \frac{3}{8} \)-inch hardware cloth; otherwise ¼-inch hardware cloth will be used. At least two perpendicular scale profiles will be drawn, and forms that describe, in detail, the shape and content will be completed. Features greater than 2 m in diameter that are not treated in this way will be excavated using the same methods applied to features less than 2 m in diameter. The method of excavation selected for a particular feature will be left to the discretion of the site supervisor. All features will be documented using 35 mm black-and-white photographs before and after excavation. Other photographs, including 35 mm color slides, showing construction or excavation details, may be taken at the discretion of the excavator.

**Extramural Excavation Areas**

Areas outside structures or around features like hearths, were often used as work areas. Thus, certain
zones may be examined to determine whether work areas can be defined. Excavation in these zones will proceed by grid unit. Most soil encountered during these investigations will be screened through ¼-inch mesh hardware cloth, though a smaller-sized mesh may be used to sample certain areas. Plans of each extramural area investigated will be drawn, detailing the excavation limits and location of any features.

Special Situations

Sensitive Materials

This category pertains to the discovery of culturally sensitive materials or objects of religious importance. At this time, the only special situations we can anticipate are human burials, which may be present at some or all of the prehistoric sites (see Chapter 20 for a detailed discussion). Human remains will be excavated using standard archaeological techniques after consultations with appropriate review authorities and interested groups have been completed. They include definition of the burial pit, use of hand tools to expose skeletal materials, mapping and photographing the position of the skeleton and grave goods, and retrieval of soil for pollen analysis.

Field treatment of human remains and other sensitive cultural discoveries will be based on laws and regulations covering such finds in New Mexico (Sec. 16-6-11.2 NMSA 1978; HPD Rule 89-1), as well as Museum of New Mexico policy adopted 3-20-86, “Collection and Display of Sensitive Materials” (SRC Rule 11). Should human remains be encountered, local law enforcement officers and the State Historic Preservation Division will be notified, and necessary consultations will be completed before the remains are excavated. After human remains or other sensitive materials are uncovered, no person will be allowed to handle or photograph them except as part of data recovery efforts. Photographs of sensitive materials related to data recovery efforts will not be released to the media or general public. Interested parties will be informed, and will be consulted concerning disposition of the remains and grave goods.

Unexpected Discoveries

There is always a risk of finding unexpected deposits or features during an archaeological excavation, and the project outlined in this plan is no exception. The procedure that will be followed in the event of an unexpected discovery will vary with the nature and extent of the find. Small features, structures, or cultural deposits that were not located during testing will be excavated according to the procedures outlined above. On the other hand, finds that have the potential to significantly alter the scope and intent of this plan will require consultation with the NMSHTD, the State Historic Preservation Division, and other agencies involved in permitting.
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