A DATA RECOVERY PLAN FOR FIVE ARCHAEOLOGICAL RESOURCES ALONG U.S. 666, NEAR TWIN LAKES, MCKINLEY COUNTY, NEW MEXICO

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MUSEUM OF NEW MEXICO
OFFICE OF ARCHAEOLOGICAL STUDIES
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by
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Submitted by
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ADMINISTRATIVE SUMMARY

The New Mexico State Highway and Transportation Department (NMSHTD) has requested that the Office of Archaeological Studies (OAS), Museum of New Mexico, prepare a data recovery plan for five archaeological sites located adjacent to planned construction activities along U.S. 666, McKinley County, New Mexico. The prehistoric cultural resources are identified as LA 103446 (NM-Q-18-121), LA 103447 (NM-Q-18-122), LA 103448 (NM-Q-18-123), LA 104106 (NM-Q-18-130), and LA 116035. All of the sites are on Navajo Nation Tribal Trust Lands, within the Twin Lakes Chapter. These cultural resources are believed to be eligible for inclusion on the *National Register of Historic Places* based on their potential to contribute to the understanding of regional history or prehistory, and portions are within or immediately adjacent to the limits of the proposed NMSHTD reconstruction activities for U.S. 666. This data recovery plan is consistent with *Treatment of Archaeological Properties: A Handbook* (Advisory Council on Historic Preservation 1980), and Navajo Nation policies and procedures for the treatment of archaeological sites and human remains.

MNM Project No. 41.640 (Emergency Highway Projects)
NMSHTD Project No. NH-666-1(48)12, CN 2354, JPA D04040

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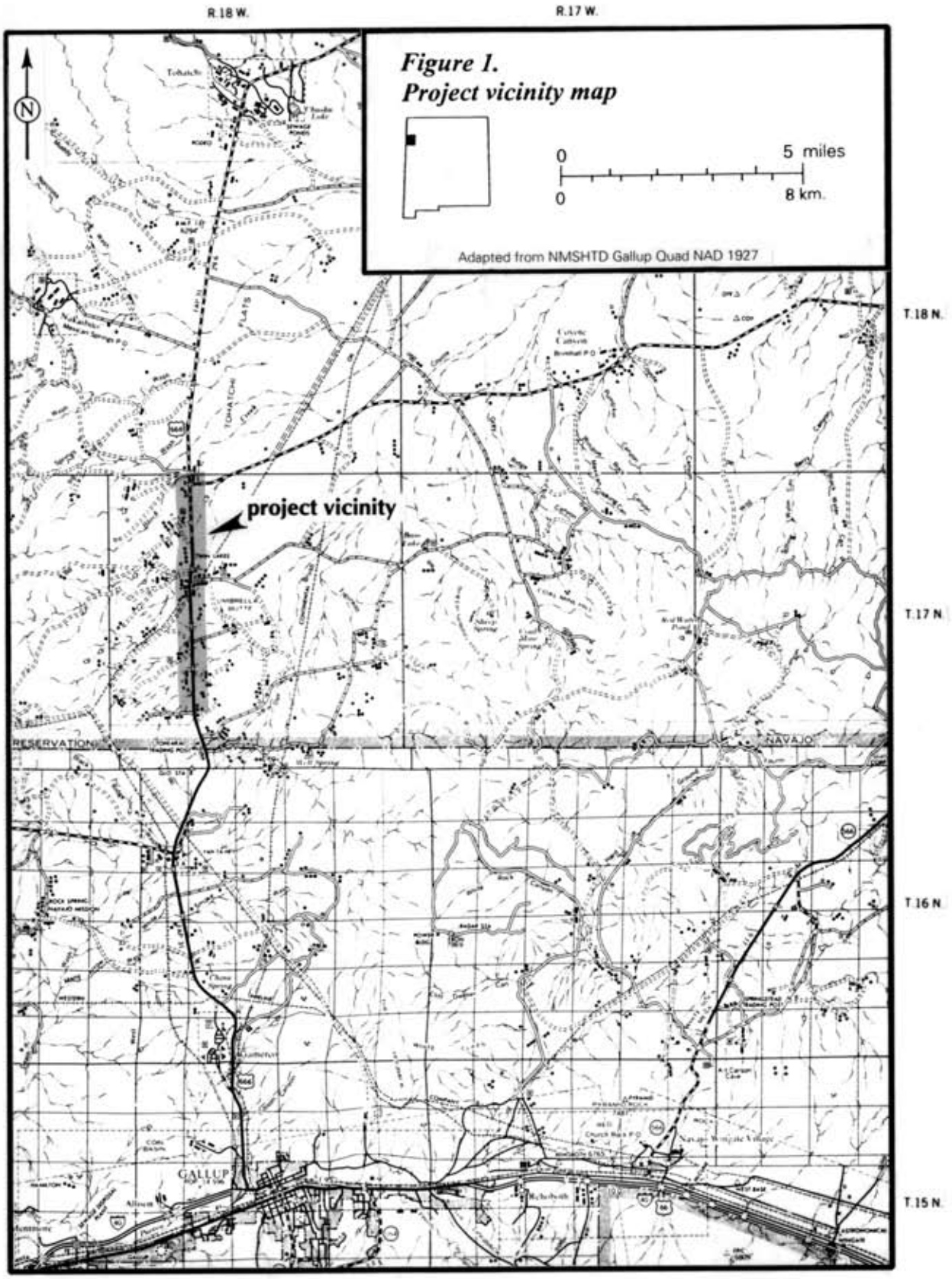
INTRODUCTION

At the request of Mr. Gregory D. Rawlings of the Environmental Section of the New Mexico State Highway and Transportation Department (NMSHTD), the Office of Archaeological Studies (OAS), Museum of New Mexico, has prepared this data recovery plan for five cultural resources along U.S. 666 in McKinley County, New Mexico. The resources are identified as LA 32964 (NM-Q-18-123), LA 103446 (NM-Q-18-121), LA 103447 (NM-Q-18-122), LA 104106 (NM-Q-18-130), and LA 116035. All of the resources are on Navajo Tribal Trust Land within the Twin Lakes Chapter (Francisco 1994; Mensel 1997), all are prehistoric archaeological sites, and all are believed to have the potential to contribute to our understanding of regional prehistory. The sites lie within or immediately adjacent to the proposed construction limits of improvements to U.S. 666, and the sites are recommended for data recovery prior to construction. Construction will include road bed realignments within the existing right-of-way, limited expansions of the existing right-of-way, construction maintenance easements, and temporary construction permit locations. This construction phase is only one part of a much larger construction project along U.S. 666, and this data recovery plan applies only to portions of sites that overlap with the proposed construction limits of this phase (CN 2354).

This data recovery plan describes the cultural resources and their context, defines a research framework for the data recovery effort, and proposes a strategy for recovering information from the cultural resources. Site location information is provided in Appendix 1.


R.18 W.
R.17 W.
Figure 1.
Project vicinity map
0
5 miles
0
8 km.
Adapted from NMSHTD Gallup Quad NAD 1927
project vicinity
T.18 N.
T.17 N.
T.16 N.
T.15 N.
RESERVATION
NAVAJO
GALLUP

BACKGROUND

The project area is located in west-central New Mexico, approximately 20 km (12.4 miles) north of Gallup, McKinley County (Fig. 1). The sites are along an approximately 2.5-mile stretch of U.S. 666, centered on the community of Twin Lakes. All of the sites are on Navajo Tribal Trust Land, within the Twin Lakes Chapter. Inventory activities that identified the sites were carried out by the Navajo Nation Archaeology Department (NNAD) (Francisco 1994), with supplemental inventory by the Office of Archaeological Studies (Mensel 1997). Engineering plans had not been completed at the time the NNAD inventory was conducted, and inventory was carried out within a wider corridor than would have been required by the size of the final construction zone.

Environment

All sites are at the extreme southern limits of the Chuska Valley, along the eastern slope of the Chuska Mountains where drainages flow east and north as part of the San Juan Basin drainage system. Just to the south of the project area, drainages are part of the Rio Puerco system. Although occurring within a relatively short distance of each other, the sites are located in slightly different physiographic settings. The southernmost sites (LA 103446 and LA 104106) are nestled within the slightly more dissected topography of the Twin Lakes area, while the northern three sites (LA 116035, LA 103447, and LA 32964) are on more gently rolling terrain at the western margin of Tohatchi Flats. Elevations range from 1,919-1,942 m (6,295-6,370 ft), with the lower elevations at the north end of the project area.

Underlying bedrock consists of sandstones of the Menefee Formation (USGS 1968). These sandstone beds weather to sand, and eolian deposits (both stable and active) mantle much of the area. Thickness of this mantle does not appear to exceed 1 m on topographic high points, but greater alluvial and eolian accumulations are present in drainages. A formal Soil Conservation Service soil survey is in preparation, and formal soil characterizations for the project area are not yet published. Slopes and most alluvial drainages are moderately well drained, but infiltration is restricted enough in the lowest areas to support temporary playa formation.

The regional climate is semi-arid, with hot summers and cold winters. Annual precipitation is less than 30 cm (12 in), most of which falls during the summer monsoon season from July through September (Tuan et al. 1973, figs. 2, 9-12). This amount of rainfall is marginal for corn agriculture today, but there are indications that the climate was more mesic during some periods of human occupation of the area (McVickar 1996a). Also, there is evidence for prehistoric water control features in the Chuska Valley (Wiseman 1980:12), concentrating runoff and improving local agricultural potential as compared to reliance on rainfall alone. The average frost-free period is more than 160 days (Tuan et al. 1973, fig. 38), long enough to accommodate the less than 130-day growing seasons of most native corn varieties (Bradfield 1971).

Vegetation is influenced by both climate and land use. The project area is a snakeweed grassland (scrubland), further modified by grazing in some areas to an annual weed barren zone (Whitford 1978, as adapted by Binford and Amsden 1992a, fig. 5). Better-watered landscapes at higher elevations to the south and east support piñon-juniper woodland, and the Chuska Mountains

to the northwest support ponderosa pine and fir forests. Currently, livestock augment a native fauna that is dominated by small mammals (jackrabbit, cottontail, prairie dog, and others) and coyotes.

Culture History and Research Context

Human occupation in New Mexico may extend back into the late Pleistocene (Chrisman et al. 1996), but the majority of accepted archaeological evidence falls within the past 12,000 years. A comprehensive review of this entire time span is beyond the scope of this data recovery plan, and an outline will be presented in this section, with greater detail provided for those periods that are relevant to the five sites that are dealt with in this data recovery plan. This outline has been assembled from summaries presented by Binford and Amsden (1992b), Blinman (1997b), Cordell (1982), Judge (1989), Kearns and McVickar (1996), Skinner and Gilpin (1997); and Wilson et al. (1996). Included are the results of several recent and extensive archaeological excavation projects in the vicinity of the project area: the Transwestern Pipeline Expansion Project (ENRON) (Sullivan 1994) and the El Paso Natural Gas North System Expansion Project (NSEP) (Kearns and McVickar 1996).

Paleoindian Period

The Paleoindian period (circa 12,000-7,500 B.P.) marks the first extensive occupation of west-central New Mexico. Populations were thinly distributed, exploiting large territories in the changing post-glacial environment. Hunting is the most visible activity because of the association of many Paleoindian sites with extinct megafauna, but resource exploitation was broad in scope as indicated by grinding tools in some assemblages (such as Wilmsen and Roberts 1978, fig. 115). Site recognition is dependent on the discovery of distinctive spear point types (such as Clovis and Folsom), but even these are not clear indicators of Paleoindian sites. Scavenging and recycling of Paleoindian artifacts by later Archaic and Formative populations is common, resulting in spurious associations. Similarly, a large proportion of Paleoindian sites and components are unrecognizable as such because diagnostic artifacts have been removed or were never left behind. Geomorphic processes over the millennia have also affected the distribution and recognition of Paleoindian sites; many sites have been eliminated or covered on active landscapes. No Paleoindian sites or components have been documented in the immediate vicinity of the U.S. 666 project area (Francisco 1994, table 2), but a Paleoindian site (Folsom and Plano components) is recorded in the vicinity of Peach Springs to the east of the project area (Skinner and Gilpin 1997:8).

Archaic Period

The Archaic period spans the end of the Paleoindian period through the adoption of pottery (circa 7,500 B.P. to A.D. 200-400). Relative environmental stability followed post-glacial warming, with the disappearance of the last of the Pleistocene megafauna and the development of modern semi-arid vegetation distributions. Although stable in global terms, the Archaic period experienced cycles of changing aridity, alluviation, and the expansion and contraction of vegetation zones (McVickar 1996a). Hunting is the most visible component of the Archaic lifeway, but it was clearly a broad-spectrum gathering and hunting economy, with a distinctive basin-metate grinding complex. Mobility was relatively great, with the exploitation of targeted resources over wide areas

during the course of a year. Maize was introduced at circa 3,500-4,000 years B.P., supplementing wild resources and accelerating the cycle of increasing population density and increasing economic intensification. The Archaic period is subdivided into phases based on stylistic change in dart points (Irwin-Williams 1973), although some portions of the dart point stylistic sequence appear to overlap significantly rather than being sequential (Hogan 1996).

Compared with Paleoindian sites, Archaic sites are abundant in west-central New Mexico, but they suffer some of the same limitations on visibility and interpretability. Aceramic sites without stylistically diagnostic dart points are difficult to assign to a phase with confidence. Also, although there have been fewer landscape changes through and subsequent to the Archaic period, a proportion of Archaic sites has suffered the same geomorphic destruction and burial as Paleoindian sites. Although better known than the Paleoindian period, archaeological knowledge of Archaic period cultures is spotty.

Archaic sites have been common in surveys of the northern Chuska Valley (Hogan and Winter 1983; Moore and Winter 1980; Reher 1977), however, they are scarce in the southern valley. No confidently identified Archaic sites have been previously recorded within the immediate vicinity of the U.S. 666 project area, and there are only five archaeological sites of unknown age and cultural affiliation that could be Archaic sites (Francisco 1994, table 2). A similar scarcity is reflected in recent surveys of adjacent portions of the southern valley. Only one Archaic site and two sites of unknown date have been identified along Navajo 9 adjacent to the project area, and only one Archaic site was excavated as part of the southern leg of the NSEP project near Twin Lakes (Kearns 1996b:3.19). In both the northern and southern Chuska Valley, Archaic sites tend to be short-term camps and logistic procurement loci.

Formative Period

Increasing sedentism and population density mark the transition from the aceramic Archaic period to the Anasazi cultural sequence. Maize is present sporadically in the Archaic subsistence mix by 3,500 B.P., leading slowly to alterations of seasonal movement patterns and subsistence emphases that culminate in the Basketmaker II pattern of the first millennium B.C. (Matson 1991). Anasazi sites reveal trends toward greater sedentism, more investment in facilities, and the concentration of settlements in agricultural settings. Coupled with shallower time depth and relative geomorphic stability, Anasazi sites are highly visible and have been preserved on the landscape in higher proportions than sites dating to the earlier periods. Visibility is not absolute, however, as evidenced by the occasional discovery of buried cultural materials dating to this period. Most Anasazi residential sites that postdate A.D. 600 can be dated with precision based on patterns of stylistic change in ceramics, including the potential to distinguish individual components within sites that have complex occupation histories.

Basketmaker II. By 500 B.C., many populations on the Colorado Plateau were heavily reliant on agriculture, including residents of the southern Chuska Valley (Kearns 1996b:4.10-4.19). These Basketmaker II site types range from camps with features and ephemeral structures, to storage locations with many fired storage pits, to pithouse habitations. No Basketmaker II sites are known to be present in the immediate vicinity of the project area, but several sites dating to this period were excavated within the Twin Lakes locality of the NSEP project, immediately to the east of the project area. Dating imprecision and the small number of excavated sites do not allow broad community characterizations, but long duration use of some sites, including sites with multiple

burials, hints at the presence of stable social groups and stable patterns of landscape use for at least part of the Basketmaker II period.

Basketmaker III. Over the course of several centuries beginning about A.D. 200, a brown ware pottery technology was incorporated into the agricultural complex of the Colorado Plateau (Wilson and Blinman 1994). From this foundation, the brown ware pottery technology was slowly modified to make use of the abundant shale clays of the Colorado Plateau, resulting in the development of the Anasazi pottery tradition by A.D. 600. Brown ware sites dating to this early Basketmaker III or transitional Basketmaker period are absent from the project area, but they have been identified both on survey and through excavation to the northeast on Tohatchi Flats in the vicinity of Coyote Canyon (Kearns 1996a; Skinner and Gilpin 1997). Sites include both residential and limited activity components, and clusters of structures suggest the presence of a stable community, either in the sense of sequential occupation of the same area by succeeding generations or in the sense of a contemporary neighborhood (or both). Basketmaker III architecture consists of shallow pit structures and surface jacal rooms, with little or no use of masonry. These structures can leave few traces of their presence, and coupled with sparse material culture accumulations, Basketmaker III habitations can leave only subtle traces of their presence.

The late Basketmaker III period spans A.D. 600-725 in the southern Chuska Valley (Kearns 1996a). Population density increased, as reflected by larger numbers of both recorded and excavated sites. Habitation sites are small hamlets of one or two pithouses, and hamlets can occur singly or in loose clusters or communities. One community to the northeast of Tohatchi (Fig. 2) includes an oversized pit structure with a central floor vault and paired sipapus (Kearns 1996a:5.8-5.9). Similar feature complexes have been interpreted as evidence for intracommunity ritual integration in Pueblo I contexts (Wilshusen 1989). In addition to habitations, late Basketmaker III limited activity sites have been identified. These include a probable fieldhouse, as indicated by habitation refuse without evidence of habitation architecture in a setting that is adjacent to potential agricultural land. At least 10 potential Basketmaker III components have been identified in the immediate vicinity of the project area (Francisco 1994, table 2). Most are habitations, and several are multicomponent sites where the accuracy of the Basketmaker component definition is uncertain.

Pueblo I. Beginning in the early eighth century, changes take place in Basketmaker III organization and architecture that constitute the beginning of the Pueblo I period. Transitions occur along a trajectory from more isolated and independent settlements to more clustered and interdependent communities. These transitions are not unilinear or perfectly synchronous, but by the beginning of the tenth century there are many aggregated communities throughout the Colorado Plateau. In the northern Anasazi region, two discrete periods of Pueblo I aggregation and agricultural intensification are closely correlated with periods of benign agricultural climate, and village and regional abandonments are correlated with significant droughts (Orcutt et al. 1990). Diverse regional pottery styles tend to converge somewhat into the Red Mesa style by the end of the Pueblo I period, coinciding with a noticeable increase in the volume of interregional exchange (Blinman and Wilson 1993). The cultural dynamics of this period are strongly associated with social and economic adaptations to higher human population densities, including the development of intracommunity ritual hierarchies (Orcutt et al. 1990).

The record from the southern Chuska Valley synthesized as part of the NSEP report suggests three discrete settlement reorganizations within the Pueblo I period (Kearns 1996a). The early Pueblo I period encompasses only a small number of sites compared with Basketmaker III

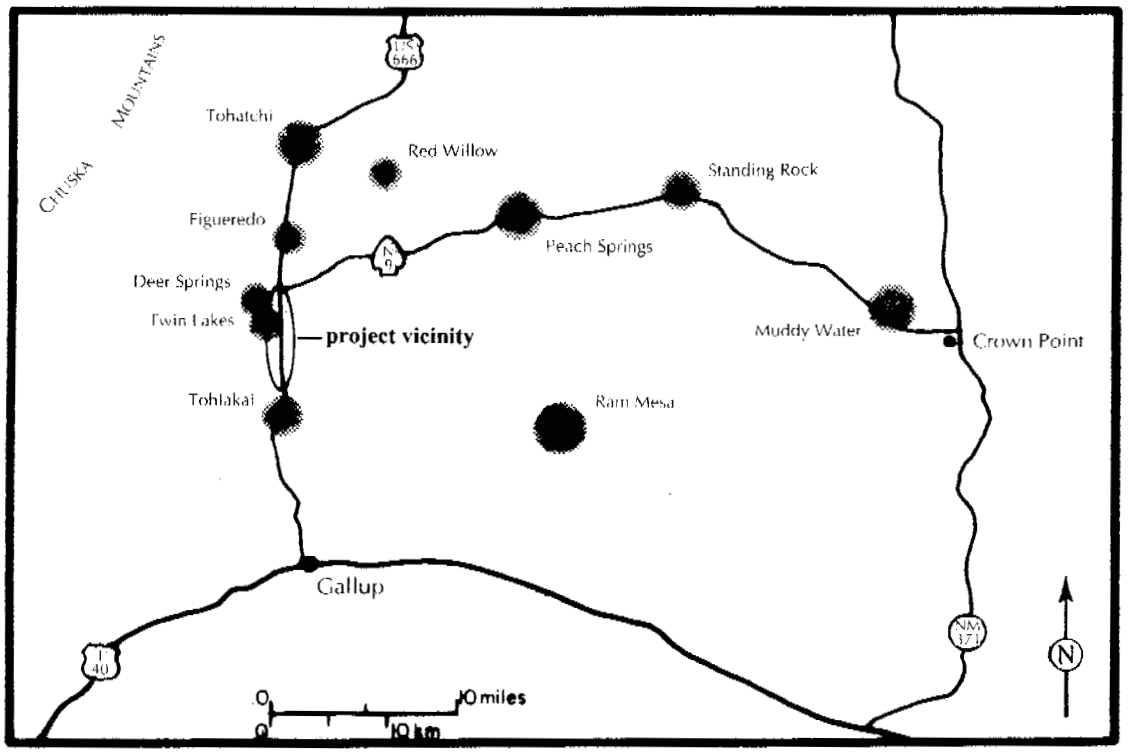


Figure 2. Selected communities within the southern Chuska Valley and adjacent regions.

period, but site size is extremely variable. In addition to several small homesteads, Kearns assigns Tohatchi Village to the early Pueblo I period, a settlement that includes more than 30 pit structures, a great kiva, and more than 40 surface structures, crowded on top of a steep-sided isolated butte near Tohatchi (Marshall et al. 1979). By A.D. 775, the start of the middle Pueblo I period, population has again dispersed across Tohatchi Flats, with many more but smaller settlements. Loose aggregations or communities can still be defined, but they are considerably less compact than Tohatchi Village. Numbers of sites occupied during the late ninth century (the late Pueblo I period) decline markedly with no local increase in aggregation at the few remaining sites. This presumably reflects movement of people out of the Tohatchi Flats area, perhaps comparable to the concentration of population at higher elevations in other areas of the Colorado Plateau at this time (such as summarized in Wilshusen and Blinman 1992). Although local population declines, there is a detectable increase in interregional exchange and interaction.

A community survey was carried out in the Standing Rock area (see Fig. 2), about 23 miles east of U.S. 666, as part of the ENRON project (Marshall 1994). The definition of Pueblo I used in the Standing Rock Survey extends into the tenth century, and only the Basketmaker III-Early Pueblo I period of the ENRON discussion is directly comparable with the NSEP dating framework. Prior to the tenth century, the Standing Rock community consisted of five components with an estimated 41 rooms (Marshall 1994, table 57). Individual sites were slab-based jacal unit houses, with no clear surface evidence for pit structures, but one site included three pit houses upon excavation. The community does not include any definable center, and there is no discussion of other site types than the probable habitations represented by the unit houses.

Within the immediate vicinity of the U.S. 666 project area, at least 13 sites may have

Pueblo I components (Francisco 1994, table 2). Ambiguity stems from small pottery assemblages that are often difficult to distinguish either from Basketmaker III assemblages (similar to early and middle Pueblo I components) or from early Pueblo II assemblages (similar to late Pueblo I components). None of the sites is identified as a large or aggregated village site (although Tohatchi Village is included in the list), and both habitations and artifact scatters are included. One of these sites, LA 104106, overlaps the proposed construction zone for the U.S. 666 improvements. The pottery assemblage has characteristics that place it in the middle Pueblo I period or perhaps spanning the early to middle periods.

Pueblo II. The Pueblo II period represents an expansion of the greater regional consciousness that was noted at the end of the Pueblo I period. Population increase, settlement reorganization, community centralization, and participation in the Chaco phenomenon all characterize the regional Anasazi adaptation during this period from about A.D. 900 to 1140. Dating is relatively reliable based on pottery assemblage changes, but multiple componency is common, and debris from later occupations often obscures the presence and nature of earlier occupations.

Pueblo II settlement in the southern Chuska Valley has been subdivided into pre- and post-A.D. 1020 patterns as part of the synthesis of the NSEP excavations (Kearns 1996c). The earlier period is distinguished by pottery assemblages dominated by Red Mesa Black-on-white and earlier black-on-white design styles, neckbanded utility wares, and a lack of indented corrugated as an all-over utility surface treatment (although indented corrugation is present as a neck decoration technique). This assemblage persists as late as A.D. 1010 based on association with tree-ring construction dates at LA 2701 (Kearns 1996c:6.5; Olson and Wasley 1956). Population increased through the early decades of the A.D. 900-1020 time span, probably through both internal growth and the return of populations to the valley after their emigration during the late Pueblo I period. Settlement organization appears to have continued the middle Pueblo I pattern of dispersed households within loosely defined communities, but more formal community organization emerges by A.D. 1020. The pottery-based chronology is obscured somewhat by the intensity of later occupation, but, based on their pottery assemblages, several great houses were established prior to A.D. 1020. Other great houses may also have been established this early, although later occupation debris dominates the surface assemblages. These great houses were the nuclei of community development, surrounded by loose aggregations of households ("small houses") that had been more dispersed during the previous generations.

Between A.D. 1020 and 1140, the process of aggregation in the vicinity of great houses culminated in a series of relatively well defined communities. Regional population density reached its highest level, and named Pueblo II communities in the southern Chuska Valley include Red Willow, Tohatchi, Figueredo, Deer Springs, Peach Springs, Twin Lakes, and Tohlakai (see Fig. 2). The Whirlwind Lake community, about 40 km to the northeast of the project area, is representative of the range of site types that constitute these social units (Kearns 1996c, table 6.1). Of the 72 sites recorded in the vicinity of the great house, 56 include Pueblo II components. These include the great house, a great kiva, many masonry small houses (habitations), masonry and jacal single-room structures (probable fieldhouses), possible shrines, water control features, artifact scatters with hearths and cists, and artifact scatters without apparent features. Less detail is available for the description of the Peach Springs and Standing Rock communities to the east of the U.S. 666 project area (Marshall 1994; Powers et al. 1983), but pottery type summaries document a similar growth history, and the relationships between the great houses and small houses are similar.

In addition to conforming with the regionwide pattern of great house community development, residents of the southern Chuska Valley appear to conform with other measures of Chacoan agricultural intensification and regional interaction (Kearns 1996c:1.13-6.23). These include the stylistic progression from a unified Red Mesa design style early in the Pueblo II period to a more diverse suite of styles that includes Dogoszhi- or Gallup-style hatchure, Puerco-Escavada solid designs, and Chaco-style hatchure by the end of the Pueblo II period (Toll et al. 1992). Milling equipment is augmented by slab metates and formal mealing bins, believed to reflect a progressively greater reliance on maize. Incidences of jewelry, including manufacturing debris, rise during this period, and tchamahias and sandal lasts appear as artifact types; these latter artifacts have both functional and ceremonial connotations. Chuskan pottery, originating to the northwest, increases in frequency through the Pueblo II period, and obsidian (from sources to the southeast and northeast) declines in frequency while Washington Pass (Narbona Pass) chert from sources to the northwest increases in abundance. Although there are strong stylistic and architectural links to the central aspects of the Chacoan phenomenon, excavations within the Whirlwind Lake community revealed no mortuary evidence for social hierarchies beyond what would be expected in terms of age-related status achievement (Kearns 1996c).

Within the vicinity of the U.S. 666 project area, as many as 24 sites include Pueblo II components (Francisco 1994, table 2). Some ambiguity results from sites where surface observations include only corrugated utility ware sherds or nondiagnostic but technologically late white ware sherds. These sites have been characterized as Pueblo II or Pueblo III in age, but most were probably occupied during the Pueblo II period. No sites are identified as great houses in the project vicinity (Francisco 1994, table 2), but the Tohlakai Great House (LA 11234) lies immediately to the south (Marshall et al. 1979), and the Deer Springs and Twin Lakes great houses are adjacent to the project area to the west (Kearns 1996c, fig. 6.11). The Deer Springs and Twin Lakes communities have not been defined by formal surveys, and they could include some of the sites within the project area. Of the five sites that are considered in this data recovery plan, four have primary components that date to the Pueblo II period (LA 103446, LA 116035, LA 103447, and LA 32964), and all of these fall within the late Pueblo II period as defined by the NSEP synthesis.

Pueblo III. In contrast with the large population that characterizes the Pueblo II period, there is a sharp drop in southern Chuska Valley population during the Pueblo III period (after A.D. 1140) (Kearns 1996c). Sites reviewed as part of the NSEP synthesis do not include any components that can be assigned to the A.D. 1140-1180 span, suggesting a total abandonment of the southern valley. This abandonment reflects massive emigration from the large late Pueblo II communities, coincident with the cessation of great house construction and maintenance in Chaco Canyon to the northeast. Environmental records document severe drought conditions between A.D. 1120 and 1150, at the beginning of what has been called the Medieval Warm Period that extends to circa A.D. 1250 (McVickar 1996a). This drought, exacerbated by the high agricultural subsistence demands of the dense Pueblo II population, is believed to have disrupted the formerly stable agricultural adaptation of Pueblo II communities throughout the northern Southwest.

The few Pueblo III sites identified in the NSEP synthesis have been assigned to the post-A.D. 1180 period (Kearns 1996c). They are diverse in architecture and layout, ranging from formal room blocks with enclosed kivas, to informal pit structures that are better described as shelters than habitations, to artifact scatters. The architectural sites are usually in defensible settings, suggesting that strife was a causal factor in settlement decisions. However, the sites are also small, suggesting that any response to threat in the southern Chuska Valley did not include the

aggregation into larger communities that is seen elsewhere in the Pueblo III period (such as Haas and Creamer 1996). There are overlays of Pueblo III occupation (as evidenced by Pueblo III pottery types) at most of the great houses in the region, suggesting the possibility of some continued occupation or reoccupation of these structures.

Some Anasazi sites in the project vicinity may have Pueblo III components, but these components are defined only by ambiguous ceramic assemblages ("Pueblo II or Pueblo III") rather than by firm evidence of Pueblo III occupations. One of the five sites included in this data recovery plan (LA 103447) may include use during the Pueblo III period, but evidence is weak. A single sherd of St. Johns Polychrome was noted during survey, but the surface assemblage is otherwise dominated by late Pueblo II pottery types.

Pueblo IV. The end of the Pueblo III period marks a transition from Anasazi to Puebloan settlement and provides the setting for the start of the historic period. Global patterns of climate change known as the Little Ice Age modified the rainfall regime on the Colorado Plateau (Ahlstrom et al. 1995; McVickar 1996a; McVickar and Brown 1996; Petersen 1995). This modification began in the mid-thirteenth century and persisted until about A.D. 1500, correlating with the cessation of Anasazi farming to the north of the Puerco River and Rio San Jose valleys in west- central New Mexico. Anasazi populations migrated to the south of these valleys, reorganizing into communities, some of which are ancestral to the modern Pueblo Indian communities of Zuni and Acoma. Puebloan landscape use of the southern Chuska Valley probably continued for purposes other than agriculture and residence, but no Pueblo IV sites are known in the project area vicinity. The only traces of Pueblo occupation in the region are occasional finds of Eastern Pueblo and Western Pueblo pottery, but these are commonly found in association with early Navajo pottery, and their presence probably reflects Navajo rather than Pueblo use of the landscape.

Protohistoric and Historic Periods

Hunting and gathering peoples exploited the Colorado Plateau after the Anasazi farmers had withdrawn. Shoshonean ancestors of the Utes were at the northeastern margins of the Anasazi world, and by A.D. 1500, these peoples were joined by the Athapaskan ancestors of the Navajo (McVickar 1996b). The strongest early record of Navajo prehistory is in the Dinétah area of northwestern New Mexico, with subsequent spread to the west and south (Towner and Dean 1996). Perhaps as early as the late seventeenth century, Navajo people had moved west of the Chuska Mountains, and by the mid-eighteenth century there were large Navajo settlements and communities in that area (Gilpin 1996). Early (Dinétah or Gobernador phase) Navajo sites are not reported for the project vicinity itself, but Gobernador phase sites are present to the east and in the uplands to the south (Blinman 1997b; Skinner and Gilpin 1997; Winter 1993:77-81). Although Gobernador phase designations imply a pre-A.D. 1772 age (Hester 1962; Brugge 1996), at least some of these occupations are poorly dated and may be as late as the mid-nineteenth century.

Historic influences on the region began with military campaigns, gradually making a transition to the broader economic forces of the railroad, trading posts, and industrialization (Bailey and Bailey 1982; Kelley 1986; Skinner and Gilpin 1997; Spivey 1997). Prior to 1864, interaction between European colonists and southern San Juan Basin residents was primarily in the contexts of raids and reprisals. Navajo and Ute raids on the Spanish, Mexican, and American communities in the Rio Grande Valley and along the Rio San Jose prompted a series of military expeditions into Navajo country. Most of these expeditions circled the southern Chuska Valley, traveling through

Chaco Canyon, over the Chuska Mountains at Narbona Pass, seeking out Navajo settlements in the Canyon de Chelly area, crossing the Defiance Plateau to the southwest, and traveling through Zuni and the Rio San Jose Valley. These military operations culminated in Kit Carson's scorched earth campaign and the forced relocation of most of the Navajo to Bosque Redondo in 1864.

The return of the Navajos to their homes in 1868 marks the beginning of the Reservation period. After families and communities were reestablished, the next major influence consisted of the building of the railroad in 1881. The railroad provided unprecedented access to manufactured goods and commercial foodstuffs, while also opening access to markets for livestock, wool, and weavings. Trading posts served as important intermediaries during the first decades of the twentieth century, both expanding and exploiting the interactions between the traditional and national economies. Population growth and weakening of the subsistence economy increased Navajo susceptibility to the ups and downs of the world economy, and Great Depression and erosion problems prompted a livestock reduction program that undermined both economic and traditional foundations of Navajo culture. New economic opportunities opened with World War II and subsequent industrialization on the reservation. After the war, external development continued with the extraction of coal, oil, gas, and uranium from Navajo-owned lands.

Prior surveys in the immediate vicinity of the project area had identified 17 historic Navajo sites, including BIA structures and the locations of traditional ceremonies (Francisco 1994, table 2). Several traditional cultural uses of the landscape and 38 in-use and occupied structures were also identified during the survey (Francisco 1994:118-124). None of these sites lies within the proposed construction zone for the U.S. 666 improvements.

PREHISTORIC SITE DESCRIPTIONS

Five prehistoric sites have been identified as candidates for data recovery in advance of highway construction. The following summaries are based on the original survey descriptions (Francisco 1994; Mensel 1997) augmented by observations during a brief reconnaissance in 1997 in preparation for the development of this data recovery plan. The sites are described from south to north along the proposed construction zone.

LA 103446

This site is located on the top and southern slope of a southeast-northwest trending low ridge in the Twin Lakes area, southwest of Tohatchi Flats. The site overlooks an unnamed east-west trending shallow valley whose drainage has been diverted historically to feed into a shallow but extensive stock reservoir. As defined by survey, the site covers approximately 1,800 sq m, and it consists of a small area of masonry rubble within a larger artifact scatter (Fig. 3). The rubble covers an area that may be as large as 10-by-7 m, but no alignments are visible, and the rubble occurs on a natural sandstone outcrop, so that the exact volume of cultural vs. natural rock is difficult to discern. There are no surface indications of a pit structure, and the shallow depth of soil over the sandstone ridge would seem to preclude the presence of a pit structure within the site area. Pottery types noted in the original survey include corrugated and plain gray wares, Red Mesa

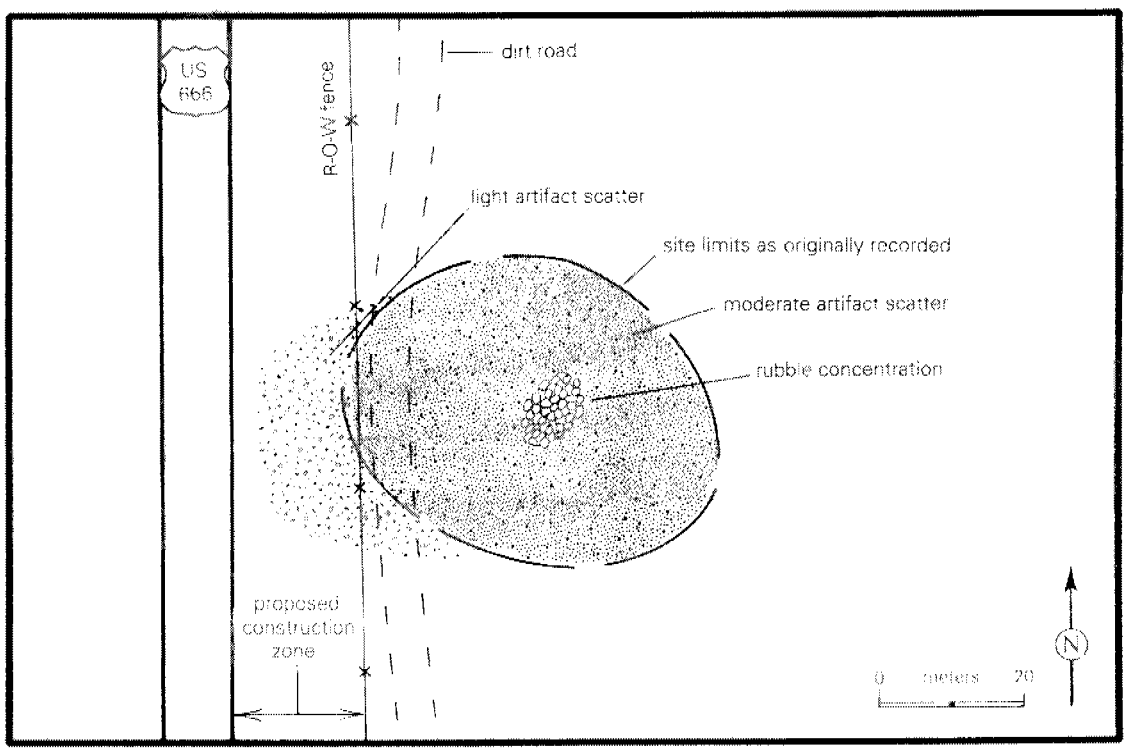


Figure 3. LA 103446 site plan.

Black-on-white, Gallup Black-on-white, Puerco Black-on-white, Escavada Black-on-white, and Chaco Black-on-white. Unidentified red wares were also present, and the entire ceramic assemblage appears to be consistent with a single component late Pueblo II occupation within the A.D. 1020-1140 period. In addition to pottery, flaked and ground stone artifacts were noted in small quantities. Total surface artifacts are estimated to be less than 1,000.

As defined by survey, the majority of the site lies to the east of the limits of the proposed highway construction zone, overlapping with the right-of-way by 2 m or less. Revisitation identified a more extensive artifact scatter within the construction zone, but no surface evidence of structures or features. Site condition is variable. Most of the site area has been affected by grazing only, but immediately outside of the right-of-way, a bladed road and a waterline pass through a portion of the site. Within the right-of-way, erosion has exposed disarticulated sandstone bedrock within much of the site area. The bladed road bed cuts below the surface, and there is no suggestion of subsurface cultural deposits within the road bed or cuts.

The site setting is close to potential farmland with water control possibilities as indicated by the modern capture of runoff for livestock use. Based on its architectural features, the site appears to be a fieldhouse or a small habitation. In either case, the relatively large and diverse amount of material culture suggests a multi-year use span. As such, this site is probably an element of a larger Pueblo II community within the region.

LA 104106

This site is located in the Twin Lakes area, at the southwest margin of Tohatchi Flats, and it occupies the northeast-facing slope of a low ridge that projects toward the flats. As defined during survey, the site covers about 2,100 sq m, consisting of an artifact scatter, a small amount of rubble, and a feature (Fig. 4). Some of the rubble is burned, and the feature is described as a sandstone hearth near the center of the site area. The hearth could not be relocated when the site was revisited. There are no indications of alignments in the rubble, and it may be the dispersed remains of features rather than structures. The landform consists of sandstone mantled with a thick layer of relatively stable eolian sand, and there appears to be sufficient depth to accommodate pit structures, although there is no surface evidence of depressions. Surface artifacts are sparse (less than 100) but include pottery, flaked lithics, and ground stone. The light scatter of surface artifacts extends to the north and west of the site boundary as originally recorded. Pottery types include plain gray, Lino Gray, Lino Black-on-gray, and a San Juan Red Ware sherd. The gray and white ware pottery is consistent with a Basketmaker III through middle Pueblo I occupation, and the San Juan Red Ware sherd would place the date of the occupation after A.D. 780, within the middle Pueblo I period or later.

The site lies within the existing right-of-way (the slope limits of the current roadway form the eastern boundary of the site), and the site extends to the west of the existing fence at least 15 m. Construction plans call for enlargement of the right-of-way in this area, and approximately 80 percent of the site as currently defined will be within the proposed construction zone. A buried cable has been installed along the current right-of-way fence, and portions of the site surface within the right-of-way have been bladed, apparently in association with utility installation. Outside of the current right-of-way, grazing has affected the ground surface, and a ditch and berm have been bladed roughly parallel to the highway just outside the western margin of the current site definition.

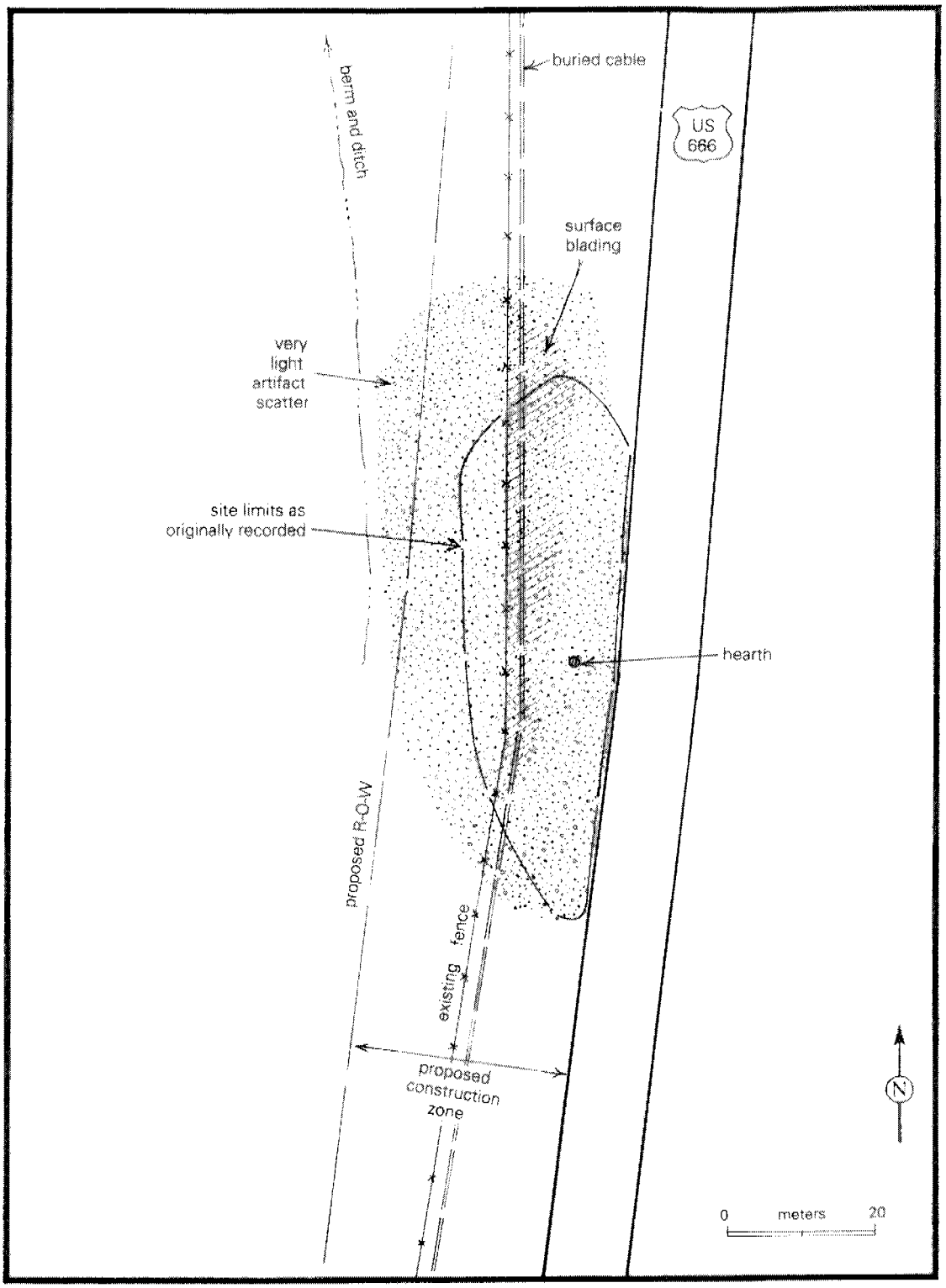


Figure 4. LA 104106 site plan.

Eolian activity seems to have deposited more sands than it has eroded, and most of the cultural material is visible in the areas of the utility line installation.

The site setting is close to potential farmland and commands a clear view of Tohatchi Flats to the north and northeast. Although the rubble is not clearly architectural and although there are no visible pit structure depressions, Basketmaker III and early-middle Pueblo I architectural remains are often only weakly expressed on site surfaces. Habitations dating to these periods often have relatively little material culture on their surfaces, and the depositional setting of this site would exaggerate the apparent scarcity of artifacts. Given the diversity of the artifacts, structures are probably present, and this site probably represents a small early-middle Pueblo I habitation.

LA 116035

This site is located at the margin of Tohatchi Flats, on gently rolling topography toward the foot of an isolated butte and ridge. As defined during survey, the site covers approximately 4,800 sq m and consists of an artifact scatter and several features (Fig. 5). The features are five concentrations of burned sandstone rocks that appear to be the remains of hearths. These features are exposed within the central portion of the site, where wind and sheetwash erosion have severely deflated the site. In adjacent areas, bedrock outcrops of sandstone suggest that the mantle of eolian sand is rarely more than 0.5 m deep. The artifact scatter includes pottery, flaked lithics, and ground stone, and the total number of surface artifacts is estimated to be less than 100. Pottery types include plain gray, La Plata Black-on-white, corrugated gray, and Gallup Black-on-white sherds, with the latter types more abundant. This assemblage reflects the presence of at least two components, one dating to the Basketmaker III or early-middle Pueblo I period and one dating to the late Pueblo II period. Flaked lithic artifacts are more abundant in the western portion of the site and pottery is more abundant to the east, suggesting that there may be a third aceramic component at the site. However, no stylistically early flaked lithic artifacts were observed during survey, so there is no independent confirmation of this possibility. Also, the types of flaked lithic artifacts (angular debris and core flakes) are compatible with Anasazi lithic technology, and the distribution of artifact types may simply be a function of Anasazi activity segregation.

Only the eastern 20 percent of the site surface overlaps with the existing right-of-way and the planned construction zone. This area is outside of the severely deflated portion of the site, and no features are visible on the surface. Bedrock exposures are common, and soil depth is variable but appears to be less than that evident elsewhere on the site. Some vehicle traffic has passed over the site along the right-of-way fence, and there are localized deflated areas between the right-of-way fence and the slope limits of the existing highway.

The portion of the site within the proposed construction zone appears to include cultural remains both from Basketmaker III-early Pueblo I and from late Pueblo II occupations. These occupations do not appear to be related to habitation use of the site area; rather the uses were probably as temporary camps or as resource procurement and processing stations. Although no features are exposed within the proposed construction zone, their presence beneath the discontinuous eolian mantle is likely.

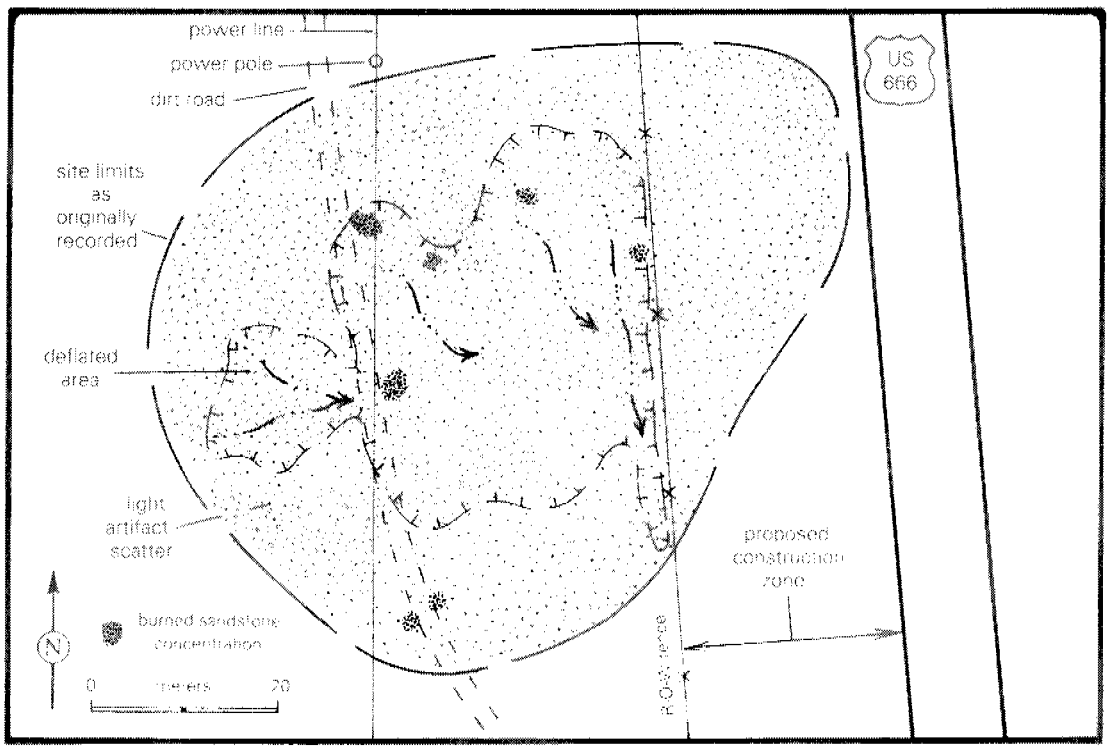


Figure 5. LA 116035 site plan.

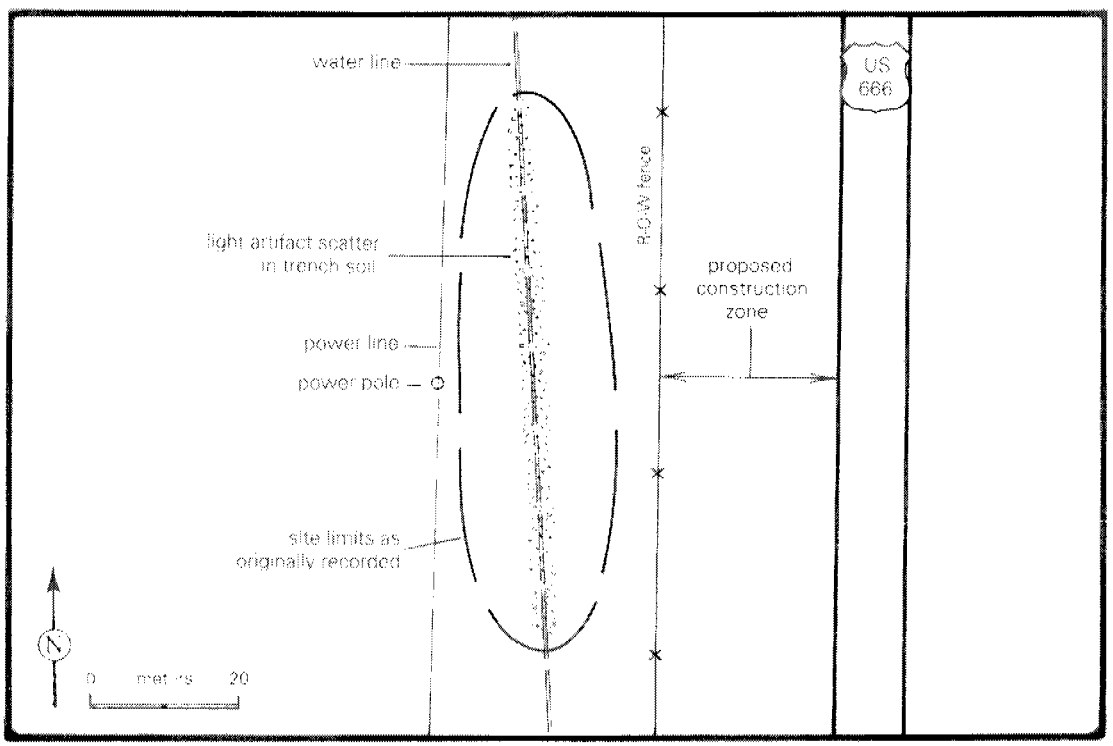


Figure 6. LA 103447 site plan.

LA 103447

This site is located on a broad southeastern-trending slope at the margin of Tohatchi Flats. Although there are sandstone outcrops in the vicinity, the slope appears to have been formed by the deposition of eolian and slopewash sediments that have been brought down from the higher terrain to the northwest. As defined by survey, the site covers about 1,500 sq m and consists of an artifact scatter (Fig. 6). The scatter is linear and is restricted to the ridge of spoil resulting from the installation of a waterline across the slope. There are no surface artifacts outside of the spoil area, implying that the waterline trench encountered and brought to the surface cultural material from a site that is otherwise completely buried. Depth of the cultural material and the depth of the mantle of sediments enclosing the site are unknown. Surface artifacts number less than 100 and are dominated by pottery with only a few flaked lithics. Some sandstone spalls are present with the artifacts. This density is low given the survey definition of the site area, but considering that the artifacts are limited to the immediate area of the trench, the density is relatively high. Pottery types include plain and corrugated gray wares, Lino Black-on-gray, Puerco Black-on-white, Gallup Black-on-white, and St. Johns Polychrome, but the Pueblo II types form the majority of the assemblage. Assuming the accuracy of these type classifications, the site includes multiple components ranging from Basketmaker III through at least early Pueblo III. The sandstone spalls are not necessarily indicative of subsurface architecture, but the depositional setting does not preclude the presence of either surface rooms or pit structures within the site area.

The site boundary is outside of the highway right-of-way by about 10 m to the west, and the actual area of the artifact scatter within the spoil ridge is circa 20 m from the right-of-way fence. The proposed construction zone is wholly within the existing right-of-way, and as currently defined, construction activity will not overlap with the site boundary. However, given the subsurface nature of the cultural materials, the site could extend downslope and into the construction zone, outside of the area of surface visibility. Apart from the waterline installation, there are no apparent sources of site disturbance, and the existing highway prism is filled over the local topography rather than being cut into the landform.

Pieces of sandstone are exposed with artifacts on the site surface in the area of the trench, and they may or may not be evidence of subsurface architectural remains. However, the volume of material culture exposed by the trench is sufficient to suggest a substantial accumulation, potentially related to habitation use of the area. Whether or not similar habitation refuse extends within the construction zone is unknown due to the local accumulation of a slopewash mantle in that area.

LA 32964

This site is located on the southwest-facing slope of a low ridge that projects northeastward into Tohatchi Flats. As defined by survey, the site is relatively extensive, covering in excess of 16,000 sq m. The central site area includes a small (10-by-8 m) rubble concentration with some burned rock but without alignments that would clearly indicate the presence of architectural remains (Fig. 7). Three small sandstone concentrations are also exposed on the site surface, each including some burned rock that suggests that these concentrations are hearths or are remains of structures that include hearths. Most of the site surface has been affected by eolian activity,

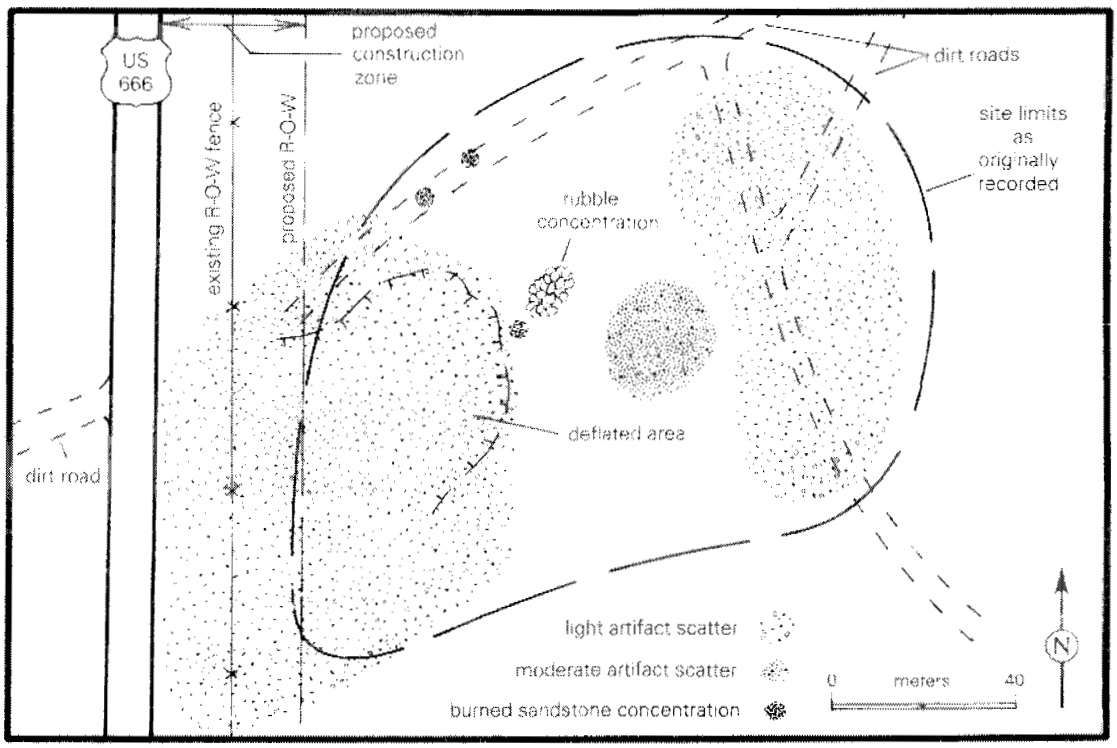


Figure 7. LA 32964 site plan.

including extensive deflated areas and areas of both active and stabilized dunes. In addition to natural surface modification, several in-use and abandoned dirt roads have been bladed through the site area. Artifacts include pottery, flaked lithics, and ground stone, lightly scattered throughout the site area with one concentration to the east-southeast of the rubble scatter. Total surface artifact quantity is estimated to be greater than 500 artifacts. Pottery types include plain and corrugated gray wares, Lino Black-on-gray, Puerco Black-on-white, Escavada Black-on-white, Gallup Black-on-white, Wingate Black-on-red, and San Juan Red Ware. These types indicate at least two components: one minor Basketmaker III or early-middle Pueblo I occupation, and a more substantial component dating to the late Pueblo II period.

As defined by the original survey, the site lies approximately 15 m outside of the existing right-of-way to the east. Revisitation located a light scatter of additional artifacts extending from the site limits into the existing right-of-way. Proposed construction plans include a 50 ft (15 m) expansion of the existing right-of-way to the east, toward the site limits. Construction will intersect the artifact scatter, with perhaps as much as 15 percent of the enlarged site area within the existing right-of-way. Much of the site area within the construction zone has been deflated, and the remainder is mantled with less than 0.5 m of eolian sand over degraded sandstone bedrock. The mantle could be covering features, but the mantle is sufficiently discontinuous that any features are unlikely to be extensive.

The nature of the Basketmaker III or early-middle Pueblo I component is unknown, but the few sherds suggests that it is relatively minor compared with the extent of the late Pueblo II component. Based on the rubble area and the associated artifact concentration, this later component appears to have an architectural focus, but there is no indication as to whether it represents

habitation or a long duration seasonal use of the area. The relation of the small features to the site as a whole is unknown.

Summary

The five sites have major components that are attributable to several discrete periods in the occupation of the southern Chuska Valley. LA 104106 appears to be an early-middle Pueblo I habitation. Although no structures can be defined based on surface remains, the habitation nature of the occupation is inferred from the diversity of the surface artifact assemblage, the presence of a hearth feature, and the presence of some rubble in disturbed context. An unknown portion of the site was removed during the earlier construction of U.S. 666, a utility line has been installed within the site, and portions of the site surface have been affected during utility installation. The existing right-of-way will be enlarged by a 30 to 50-ft-wide wedge-shaped area by the planned highway improvements along this portion of U.S. 666, overlapping with a considerable portion of the site area as defined by the original survey.

The remaining four sites all have primary components that fall within the late Pueblo II period. Two of these sites, LA 32964 and LA 103446, consist of rubble areas within artifact scatters. Neither has surface evidence of pit structures, and their landscape setting suggests shallow soils that would not accommodate an undetected pit structure. Surface artifact frequencies are relatively high, and the implication of the surface evidence is that both sites represent fieldhouses that were used over moderately long durations. In both cases, planned construction activity overlaps only with the peripheries of the artifact scatters. No known structures or features fall within the construction zone, but the soil mantle could be obscuring features.

One of the Pueblo II sites, LA 116035, lacks structural evidence but consists of multiple hearth features and a light but extensive artifact scatter. The site is analogous to field camps or limited activity areas encountered by the NSEP project elsewhere in the southern Chuska Valley. Only a portion of the site area overlaps with the proposed construction zone, and the overlap does not include any surface evidence of features. However, most of the visible features elsewhere on the site are only visible because they have been exposed by deflation, and the portion of the site area within the construction zone is relatively unaffected by erosion, so that subsurface features may be present.

The final Pueblo II site, LA 103447, is poorly known from surface evidence, and its presence would have been undetected if subsurface deposits had not been exposed by utility line installation. The abundance and diversity of cultural materials exposed by the utility excavation would be consistent with either a habitation or fieldhouse component, but its exact nature cannot be inferred. The exposed cultural material is upslope and outside of the proposed construction zone, but the subsurface extent of the site is unknown, and extension into the construction zone is possible.

Additional minor components may be present at several of the sites. LA 116035 is interpreted as a late Pueblo II field camp or limited activity site, but a single early potsherd suggestions that some uses fall within the Basketmaker III or early-middle Pueblo I period. There is also a possibility of an earlier aceramic component based on a lower frequency of pottery toward the eastern portion of the site, but this portion is well outside of the proposed construction zone.

Surface ceramics at both sites LA 103447 and LA 32964 are dominated by late Pueblo II types, but individual sherds were observed that could be from Basketmaker III or early-middle Pueblo I and early Pueblo III uses of the sites. These occurrences of small amounts of early or late pottery may reflect minor components, longer durations for the primary components, or inconsequential artifact drops from regional landscape use during the early and late time periods.

The importance of these sites lies in their potential contributions to the understanding of the prehistoric communities within the southern Chuska Valley. These communities have economic and social dimensions, and the prior work within the region suggests that there is dynamic change through time in the nature of the functional elements (sites and components) that constitute the communities and change in the roles of the elements within the broader community and ultimately regional organization.

Research Orientation

Community studies are an outgrowth of research on settlement patterns (Adler 1996a; Chang 1972). The underlying assumption is that people pursue economic and social goals in patterns that have consistency in both spatial and temporal dimensions. Economic pursuits can be summarized in terms of resource catchments, extractive technology, scheduling, and labor organization (Benson 1984). Social pursuits can involve social and biological reproduction (Wobst 1974), integration (Adler 1990, 1996b; Johnson 1982), and interaction (exchange). The latter is an important dimension of community studies, encompassing the broad concepts of exchange, cooperation, and raiding as articulated by Ford (1972).

In addition to these generic aspects of communities, there is a specific implementation of the community concept in the archaeology of the Chaco Anasazi (Judge 1989, 1991; Toll and Hannaford 1987). Outside of Chaco Canyon itself, investigations of eastern Anasazi Pueblo II settlement patterns have been primarily couched within the framework of great house communities (Breternitz et al. 1982; Lekson 1991; Marshall et al. 1979; Powers et al. 1983). Most attention has been paid to the dichotomy between great houses and small houses, but nonhabitation elements of community settlement patterns are receiving more attention (Kantner 1996; Kearns 1996c).

Necessary elements of settlement pattern (community) studies include the establishment of contemporaneity, complementarity, and redundancy (Benson 1984). The demonstration of *contemporaneity* is a necessary step in any community study. This is especially true in the dynamic context of Anasazi settlement patterns, in which residential and community change and stability can be played out at different tempos (Hannaford 1993), often with residential mobility cycling at an extremely rapid pace of less than 20 years (Ahlstrom 1985). *Complementarity* concerns the roles or functions of elements of the community. Anasazi settlement patterns are usually broken down into ceremonial sites, habitations, fieldhouses, and various types of specialized processing and procurement sites. *Redundancy* is a necessary part of community studies in that partial or complete redundancy distinguishes the elements or territory of one community from another.

The existence of communities is generally accepted at a theoretical level, but the degree of success in dealing with them at a practical level is subject to qualification (Toll 1993). Although considerable survey and some excavation have been carried out in the southern Chuska Valley, the regional data are as yet inadequate for community synthesis. The sites that are included within this data recovery plan are part of a narrow linear transect, and they are unlikely to be representative of the range of temporal and functional variety of their parent communities. Further, excavation

will be limited to portions of the sites that overlap with the construction zone, so that site characterizations must be inferred from arbitrarily defined samples. Because of these constraints, the data recovery efforts of this project must focus on contributions to our understanding of generic community structure in the southern Chuska Valley as opposed to the characterization or identification of a specific community. As such, the goal this data recovery effort is to build on the picture of functional complementarity that has been started for the region by the NSEP.

Chronology: Date and Duration

Two questions of chronology are important to the goals of the research design: **When did the activities take place that resulted in a particular component?** and **How long a period of time (duration) is represented by the component?** The former question establishes contemporaneity between components or elements of a community, while the latter contributes to both functional interpretations and interpretations of the stability of the community structure.

A wide variety of dating techniques can be applied to Southwestern archaeological sites. Each has strengths and limitations within given contexts, some of which can be anticipated in the case of the U.S. 666 sites. Tree-ring dating is the most precise of the available dating techniques, but strong interpretations are dependent on the harvesting of fresh timbers for substantial architectural construction, the use of datable woods, and the preservation and recovery of samples of those timbers (Ahlstrom 1985). Earthen architecture (surface rooms and pit structures) such as that used during the Basketmaker III and Pueblo I periods results in decay and relatively rapid cycles of remodeling or abandonment, with relatively little reuse of timbers. Masonry architecture such as is characteristic of Pueblo II and later Anasazi buildings tends to lessen the overall incidence of decay, resulting in fewer building and remodeling episodes and resulting in more frequent reuse of old timbers in new construction. This reuse complicates Pueblo II tree-ring chronologies, increasing the need for corroborating information and decreasing the independence of tree-ring dates. Tree-ring dating is less appropriate for nonarchitectural sites. Datable samples can be obtained from fuel wood charcoal, but these samples are subject to some of the same "old wood" interpretive constraints that affect radiocarbon dates from the same materials (Schiffer 1986), and they are likely to predate the target cultural activity by as much as 500 years (Smiley 1985). LA 104106 is the only site where substantial architectural wood may be preserved, and this only if structures burned.

Archaeomagnetic dating is applicable only to well-burned earthen structures or features that have not been physically displaced between the time of burning and the time of sampling (Wolfman 1984). This technique can be used in a wide range of contexts, and it is especially useful at nonarchitectural sites and sites where timbers have not been preserved. An additional strength of archaeomagnetic dating is that it provides "last use" dates, with the potential to inform about site use duration (Wolfman 1990). Dating resolution is variable, and at times when movement of the earth's geomagnetic pole is either slow or is in the process of reversing direction, error terms can be so large as to render dates unhelpful. Based on the current calibration curves, such low resolution periods include A.D. 775-825, A.D. 1125-1175, and A.D. 1275-1325 (Cox and Blinman 1996, fig. 1). In contrast, potential resolution is good within the A.D. 900-1125 span, encompassing most of the Pueblo II period. Another limitation of archaeomagnetic dating is that the calibration curves overlap, so that there may be more than one valid date interpretation for an individual sample result. Because of this, archaeomagnetic dates are partially dependent, often requiring some other source of chronology to identify the relevant portion of the curve for date

interpretation. Archaeomagnetic dating is potentially applicable to all of the sites.

Radiocarbon dating generally lacks the precision and accuracy required for the interpretation and discrimination of Anasazi contexts, but this is not absolute. Weaknesses of radiocarbon dating include error terms that usually span more than 120 years, and questions concerning the relevance of the carbon within an individual sample to the context being dated (such as the prehistoric selection of old dead wood for fuel) (Schiffer 1986). Despite these weaknesses, the advent of accelerator dating of extremely small samples and calendric calibration (Stuiver and Pearson 1986; Stuiver and Reimer 1993) have created specific uses for radiocarbon dating in the Anasazi period. Annual plant materials from well-defined cultural contexts (such as charred twigs or seeds in hearth flotation samples) can provide strong and defensible radiocarbon dates. Kearns provides a detailed and effective example of this approach to radiocarbon dating of features on nonarchitectural sites (1996d). Radiocarbon dating will be considered in all cases where there are inadequate bases of chronology from the other dating techniques.

Stone and ceramic artifacts can support dating inferences based on documented changes in style. Although most applicable to the coarse time frame of the preceramic period, many styles of flaked and ground stone artifacts have discrete temporal implications. These stone materials are only marginally useful in Anasazi contexts, but they can support identifications of earlier components. Most Anasazi artifact chronologies in the Southwest are based on ceramics, exploiting aspects of style and technology that are codified in pottery types (Blinman 1997c). Individual pottery types often have imprecise dating implications, but assemblages of types can support extremely fine temporal distinctions (such as described in Blinman 1988b). The ceramic chronology for the southern Chuska Valley has recently been refined as part of NSEP investigations (Kearns 1996d, table 3.2; Reed and Hensler 1996). However, systemic weaknesses in ceramic dating include the confounding effects of component mixtures (Kohler and Blinman 1987) and weak inferences that result from small samples. Also, all artifact-based dating techniques have an inherent circularity in chronology construction, and the collection and curation of chronologically distinctive artifacts (especially projectile points) by later peoples has been well documented. Despite its weaknesses, pottery assemblages will be the primary source of dating inferences, including the detection of minor components.

Only rarely can duration be addressed by direct dating methods, usually when tree-ring samples provide construction dates that can be contrasted with pottery, archaeomagnetic, or radiocarbon samples that provide closing dates. Another approach to duration studies involves the analysis of the accumulation of materials (Kohler and Blinman 1987; Varien and Mills 1997). Several common types of material culture, such as pottery vessels, have relatively rapid turnover in their cultural context. Discarded materials accumulate relatively predictably as part of the site fabric through stochastic processes. These accumulations can then be used to infer occupation duration or intensity (expressed as household-years), independent of architectural or dating measures of the same values. Best suited to entire site excavation or to sampling based on probabilistic models, these approaches can still be applied to nonprobabilistic samples in the sense of establishing minimum values.

Function: Activities and Roles

Communities involve functional differentiation in both social and economic activities. These different activities often correlate with geographic distributions of resources, resulting in discrete

site types. Two questions of function are important to the goals of the research design: **What functions or activities took place at each particular location?** and **How do suites of activities define the role of the site within the settlement system or community?** The former question encompasses activities as specific as a single lithic reduction episode or as general as the capability to store foodstuffs; while the latter question is comparative, contrasting suites of activities with information from other sites or with models of social and subsistence organization. Both of these questions require control of time so that answers are relevant to particular components.

Within the context of Anasazi settlement patterns, function (role) is usually generalized within several recognized site types that include habitations, fieldhouses, and specialized activity loci, with the addition of great houses as ceremonial sites during the Pueblo II period. Distinctions between these site types are best viewed as arbitrary partitions of functional continua, patterns that hold as generalizations but that may deviate from the norm in many individual cases. Also, site functions need not have been consistent through time. This behavioral variability has been acknowledged through the concept of palimpsests, in which sites are formed by overlays of many activity episodes (Binford 1981). The archaeological perception of site function is further complicated by the recognition that the same place may play distinctly different roles in the same cultural system at different times, leading to palimpsests of disparate activity suites (Binford 1982). These within-component dynamics are further qualified in that geographic places may play different roles in different cultural systems or in sequential temporal components of the same system (Schlanger 1992). As an example, hunting and gathering activities may be overlain on abandoned habitation sites due to the attractiveness of the habitation refuse as a source of raw materials; or field camp use of a location may be superseded by the establishment of a fieldhouse as a community matures and land tenure relationships solidify. Dating information and stratigraphic relationships can be used to unravel some of these complications, but in other cases we must acknowledge our inability to differentiate fine-scale episodes. However, even if we cannot segregate some activities that were originally differentiated by year or by season within a component, the aggregate archaeological record still reflects the generalized role of the place or site within the community.

Initial characterization of the five sites is based on surface observations only, and the presence of habitation components is suspected at LA 104106 and LA 103447 (early-middle Pueblo I and late Pueblo II). Habitations are usually defined by the presence of substantial structures, indicating a relatively sedentary adaptation, on at least a seasonal basis. Investigations at habitations focus first on defining the architectural facilities of the component (including processing and storage features). These facilities define a basic range of potential activities at the site, and the fortuitous preservation of strong patterns of primary and defacto refuse can occasionally define instances of actual activities (activity areas) within these. However, despite poor resolution resulting from mixing, the best record of the relative intensity of particular activities is preserved in the characteristics of habitation refuse (Blinman 1988a:156-160; Varien and Mills 1997). As tools are used, wear and breakage occur at predictable rates (flake edges get dull, pots break, grinding surfaces are rejuvenated and get thinner). These materials then follow recycling and discard paths until they ultimately leave systemic context and are permanently deposited as refuse (Schiffer 1972). Refuse is often deposited in formal middens, but it also can be found in a variety of less formal fill and sheet trash contexts.

Two sites appear to have primary components that include fieldhouses (LA 103446 and LA 32964). Fieldhouses are usually defined as one or two-room surface structures without evidence of associated pit structures (Kohler 1992). Fieldhouses tend to be peripheral to habitation clusters, especially in Chacoan communities (Kantner 1996). The presence of fieldhouses within settlement

systems is usually explained in terms of travel efficiency and crop security gained through seasonal residence near field locations, whether part of an aggregated habitation settlement pattern or not (B. Moore 1978; Russell 1978; Wilcox 1978). However, arguments also have been presented suggesting that land tenure considerations are as important as economic efficiency and security. In contexts where there is competition for field space, fieldhouses may serve as a physical validation of use rights over land, regardless of distance from habitations (Kohler 1992). Architectural characteristics play a greater role in fieldhouse definition than do activity suites, in part because activity suites at field locations may be highly variable. These suites then can be used to refine our understanding the role of the fieldhouse in the broader community structure. Variables of interest in fieldhouse investigations include social group size and composition, range of activities, seasonality of use, intensity of use, and duration of use.

Limited activity sites are the locations of specialized procurement and processing activities. One site, LA 116035, appears to fall within this category, and the number of features on the site surface suggest that it is palimpsest of many episodes. Another site, LA 32964, is classified as a fieldhouse due to the presence of surface architecture, but it may also contain a limited activity component that was sequenced with fieldhouse use. This possibility is inferred from the large site area and the dispersion of features. The existing dating information indicates use within the Basketmaker III through late Pueblo II periods at both sites, and since the sites are located in proximity to arable land, the expected roles of these sites in their communities are as field camps or harvest processing areas. These limited activity uses fall toward one end of a mobility continuum that encompasses fieldhouses and extends to habitations. Several models have been proposed to explore this continuum (Kent 1992; J. Moore 1989, 1991), taking advantage of tool kit expectations based on decreasing mobility (increasing residence time and increasing activity diversity). Information of interest includes the range of activities, the redundancy or consistency in the use of space, dates of uses, and seasonality of use. Of particular interest are functional differences between the limited activity and fieldhouse uses of the landscape within what appear to be the same community context.

Interaction: Intra- and Intercommunity

Two questions of interaction are important to the goals of the research design: **What was the geographic and social scale of the community of which each site is a part?** and **What was the geographic and social scale of interaction between the community and other communities within the region?** These questions presuppose a distinction in the scale of interaction between local and regional communities, a distinction that does not necessarily exist for all time periods. However, the NSEP investigations in the southern Chuska Valley have demonstrated the probable existence of local communities within the early-middle Pueblo I period, and the Chacoan phenomenon provides a well-defined context for intercommunity interaction within the late Pueblo II period.

Archaeological studies of Anasazi interaction are dominated by studies of exchange (Blinman and Wilson 1992, 1993; Mathien 1993), but they can include studies of style as well. Stylistic studies by themselves are ambiguous in their interpretation, but the data sets are complementary and together can yield insights into the inclusive vs. exclusive nature of intra- and intercommunity interaction (Hegmon 1995). The southern Chuska Valley is surrounded by several distinctive raw material sources for both flaked lithic tools and pottery (Washington or Narbona Pass chert, Jemez and Mt. Taylor obsidian, and trachybasalt temper for Chuskan pottery). These

allow the detection of changes in both volume and direction of exchange. Recent characterizations of exchange in the region have been developed for both the NSEP and ENRON projects (Reed and Hensler 1996; Winter 1994), providing an excellent framework for the interpretation of interaction involving the U.S. 666 sites and communities.

The sites included in the data recovery plan do not represent all elements of any single prehistoric community, and there are insufficient regional data to identify their specific community affiliations. This limits intracommunity interaction studies somewhat, but the proximity of the sites is close enough to assume that the sites may be contemporary elements of the same community for heuristic purposes. Under this assumption, contemporary components can be used to compare the effect of site role on the perception of community interaction. The sites are better suited to the investigation of the role of the regional community in intercommunity interaction. Data from the sites will be directly comparable to the diachronic trends noted for communities investigated as part of the NSEP and ENRON studies.

Summary

Surface evidence suggests that the five sites included in this data recovery plan are elements within at least two communities: an early-to-middle Pueblo I community and a late Pueblo II community. The Pueblo I community is represented by a probable habitation only (LA 104106). Data recovery goals will be to determine the date and duration of habitation use, the range of activities that occurred at the site, and evidence for interaction between the residents and others within and without the southern Chuska Valley. Minor components at other sites may be contemporary with this habitation, but they are less likely to contribute significantly to our knowledge of the Pueblo I community due to the high probability of mixture.

Late Pueblo II community affiliation is suggested for two probable fieldhouse sites, a possible habitation, and at least portions of a limited activity site. Data recovery goals will be to determine the dating and specific contemporancity of these components, to confirm the site types and document the range and intensities of activities represented at each of the components, and to gather information on interaction. Although the geographic scale of the U.S. 666 project is too small to define specific late Pueblo II communities, the sites can be assumed to be representative of generic community structure within this portion of the southern Chuska Valley, and the data from these sites can be compared with community structure data from the pipeline projects that have been conducted to the east within the valley.

Field Methods

Field investigations will include detailed surface recording and mapping for entire site areas and excavation within the proposed construction zones. Field strategies will be adapted for the unique characteristics of the individual sites, but they will proceed from gridding, to detailed mapping and surface artifact recording, to surface collection within the construction zone, and then to staged excavation. None of these sites has been subject to test excavations, and the staged excavations will be designed to first determine site content and integrity and second to focus on those portions of the site that will contribute to the goals of the research design. If an initial stage of augering and hand excavation does not reveal the presence of subsurface archaeological deposits

that will contribute to the research goals, mechanical equipment will be used in some cases to rapidly determine if any such deposits are present within the site area. General field methods are described below, followed by site-specific strategies. The strategies are subject to amendment as the specific natures of the subsurface deposits are identified. All field activities will conform to requirements of the Occupational Safety and Health Administration (OSHA) as summarized in the *Safety Manual for Field Archaeology in New Mexico* (OAS 1995).

Provenicncing precision will be scaled to the data potential of the cultural materials and deposits, from point location to grid collection, and from cultural surfaces and strata to arbitrary levels in fill. All proveniences will be located on detailed plan maps of site areas.

Surface recording outside of the construction zone will include mapping and artifact recording. On smaller sites, all surface artifacts will be recorded. On larger sites where artifact frequencies are high enough that total recording would result in redundant information, the site surface will be stratified by cultural features and artifact density, and samples of surface artifacts will be recorded to characterize each feature or concentration. A sample of potsherds will be "nipped" at a place on the sherd that will not compromise other diagnostic features, and paste cross sections will be examined at 10X or 20X for temper classification. Stone tools will be described in terms of raw material and reduction stage, and any retouched or utilized items will be further described for macroscopic attributes that relate to potential use.

Excavation will be conducted by hand, with the exceptions noted below. Where cultural strata have not been or cannot be defined, arbitrary levels will be 10 cm in thickness. If thick cultural strata are encountered, they will be subdivided into levels not to exceed 20 cm in thickness. Where systematic recovery from stratigraphic units is warranted by the needs of the research goals (most proveniences), screening will be carried out through ¼-inch mesh, with the option of using ⅛-inch mesh where more precise recovery is warranted. Flotation samples will be collected from all features and strata with the potential to yield interpretable macrobotanical remains, both to allow the identification of economic taxa (subsistence and fuel) and to recover samples of annual plant materials for radiocarbon dating. Pollen samples will be collected from selected proveniences, and artifacts will be identified for laboratory pollen sampling. These samples will be taken when they appear likely to yield information relevant to the functional interpretations of the features or artifacts. Other chronometric samples will be collected as opportunities arise, with the goal of dating component episodes, ranging from individual features and strata to stratigraphically associated feature and structure complexes. Documentation will include plan and profile drawings of features and structures, photography, stratigraphic descriptions, and detailed descriptions of nonrecoverable cultural materials (such as features and architecture).

If burials are encountered during any of the data recovery investigations, they will be handled in accordance with the *Navajo Nation Policy for the Protection of Jishchaa': Gravesites, Human Remains, and Funerary Items* (8 February 1996 revision), the Native American Graves Protection and Repatriation Act, and the Museum of New Mexico's *Policy on Collection, Display and Repatriation of Culturally Sensitive Materials* (Appendix 2). Following the approval of this data recovery plan by the Navajo Nation Historic Preservation Department (NNHPD), field excavation personnel will follow the procedures outlined in section VII, C of the Navajo Nation policy. These include notification of the (NNHPD) upon the discovery of human remains, consultation on reburial location and specific treatment, disinterment, and reinterment of both human remains and any associated funerary objects. No samples will be taken from the burial, and documentation and field cleaning will be limited to that needed for basic descriptive reporting.

Photographs will be taken of funerary objects for the management needs of NNHPD. Location of the reburial site and all documentation of the human remains will be turned over to the NNHPD.

LA 103446

This site consists of a small rubble area within an artifact scatter, and it is believed to be a late Pueblo II fieldhouse. Investigations will begin by flagging surface artifacts, artifact concentrations, and features, establishing a site datum, and laying out a grid system for horizontal provenience control. Surface artifacts outside of the construction zone will be recorded but not collected, and all visible structures and features will be mapped. Augering will be used to confirm the apparent shallowness of cultural deposits and to confirm the absence of a pit structure within the site area.

Surface artifacts and artifact concentrations within the proposed construction zone will be flagged and any features will be mapped. Artifacts will be collected within a grid or point provenience system, depending on artifact density. Any features will be excavated along with adjacent areas in an effort to define cultural surfaces. Excavation units (1-by-2 m, minimum) will be placed systematically within areas of artifact concentrations, and excavation will proceed by cultural stratigraphy or 10 cm levels until culturally sterile deposits or bedrock are reached. These units will be expanded if cultural surfaces or features are encountered. Additional 1-by-2-m units will be placed in areas of low artifact density in order to systematically investigate the nature of subsurface deposits across the site. If no cultural surfaces or features are encountered, excavation will cease after at least 40 percent of the site surface within the construction zone has been investigated to culturally sterile substrate. If cultural surfaces and features are encountered, they will be completely excavated.

The surface mapping and augering will confirm and better define the architectural identification of the site as a fieldhouse. Typological data from surface and excavated ceramics will establish the site date, suggest the presence of single or multiple components, and will provide information on minimum site occupation duration. Sherd quantities and vessel form information, and flaked and ground stone artifact descriptions, will allow characterization of the range of activities carried out at the site. Any features encountered during excavations will yield samples and morphologic information relevant to site function and chronology. Stone artifact raw materials and pottery tradition assignments will provide information relevant to the interpretation of community interaction.

LA 104106

This site consists of a light artifact scatter with surface evidence of features. The nature of the artifacts and features suggests the possible presence of an early to middle Pueblo I habitation component, but the site has not been tested to confirm either the age or the site type. There is no surface evidence of structures, but the soil mantle appears to be sufficiently deep to contain a pit structure. Investigations will begin by flagging surface artifacts, artifact concentrations, and features, establishing a site datum, and laying out a grid system for horizontal provenience control. Surface artifacts outside of the construction zone will be recorded but not collected, and all visible structures and features will be mapped. Augering will be used to investigate the nature and depth of subsurface deposits within the site area.

Within the proposed construction zone, surface artifacts and artifact concentrations will be flagged and any features will be mapped. Artifacts will be collected within a grid or point provenience system, depending on artifact density. Auger transects at 2-3 m intervals will be used to investigate the nature of subsurface deposits. Surface features will be excavated, and any evidence of subsurface deposits resulting from the augering will be investigated by excavation units (1-by-2 m, minimum). Excavation units also will be placed systematically within areas of low artifact density in order to examine subsurface deposits in all areas of the site. All excavations will proceed by cultural strata or by 10 cm levels until cultural sterile deposits or bedrock are reached. Excavation units will be expanded if cultural surfaces or features are encountered. If deep structures are encountered during this phase of investigation, mechanical equipment may be used to remove a portion of the fill (up to a maximum of 50 percent), but only if the field director determines that the information potential of the mechanically removed portion will be redundant with the information gathered from the hand-excavated portion. If cultural surfaces and features are encountered, they will be completely excavated; mechanical equipment may be used to remove surficial deposits overlying cultural surfaces. If no cultural surfaces or features are encountered by augering or test excavations, hand excavation will cease after at least 10 percent of the site surface within the construction zone has been investigated to culturally sterile substrates. After hand excavation is completed, mechanical scraping and trenching will be used to explore the possibility of subsurface cultural features within the remainder of the site area. If no additional cultural surfaces or features are encountered, investigations will cease after hand and mechanical excavations have reached culturally sterile deposits over at least 60 percent of the site area within the construction zone.

The surface mapping and augering will confirm or revise the architectural identification of the site as a habitation. Typology of surface and excavated ceramics will establish the site date, suggest the presence of single or multiple components, and will provide information on minimum site occupation duration. Vessel form information, and flaked and ground stone artifact descriptions, will allow characterization of the range of activities carried out at the site. Any structures or features encountered during excavations will yield samples and morphologic information relevant to the interpretation of site function as well as providing potential sources of chronometric samples. Stone artifact raw materials and pottery tradition assignments will provide information relevant to the interpretation of community interaction.

LA 116035

This site consists of an artifact scatter with features, and it is believed to be a late Pueblo II limited activity site or field camp. Additional components may be present but are only weakly expressed in the available description of the site. Investigations will begin by flagging surface artifacts, artifact concentrations, and features, establishing a site datum, and laying out a grid system for horizontal provenience control. Surface artifacts outside of the construction zone will be recorded but not collected, and all visible structures and features will be mapped. Augering will be used to confirm the apparent shallowness of cultural deposits.

Surface artifacts and artifact concentrations within the proposed construction zone will be flagged, and any features will be mapped. Artifacts will be collected within a grid or point provenience system, depending on artifact density. Any features will be excavated, along with adjacent areas, in an effort to define cultural surfaces. Excavation units (1-by-2-m, minimum) will be placed systematically within artifact concentrations, and excavation will proceed by cultural

stratigraphy or 10 cm levels until culturally sterile deposits or bedrock are reached. These units will be expanded if cultural surfaces or features are encountered. Additional 1-by-2 m units will be placed in areas of low artifact density in order to systematically investigate the nature of subsurface deposits across the site area. If cultural surfaces and features are encountered, they will be completely excavated. If no cultural surfaces and features are encountered, excavation will cease after at least 40 percent of the site surface within the construction zone has been investigated to culturally sterile substrate.

The surface mapping and augering will confirm and better define the classification of the site as a limited activity locus. Surface and excavated ceramic typology will establish the site date, establish whether single or multiple components are present, and will provide information on minimum site occupation duration. Vessel form information, and flaked and ground stone artifact descriptions, will allow characterization of the range of activities carried out at the site. Any features encountered during excavations will yield samples and morphologic information relevant to site function as well as potentially providing sources of chronometric samples. Stone artifact raw materials and pottery tradition assignments will provide information relevant to the interpretation of community interaction.

LA 103447

This site consists of a linear artifact scatter along the spoil of a waterline. The surface evidence of the site is well outside of the construction zone, but there is a chance that subsurface cultural materials are buried by slopewash and extend into the construction zone. The nature of the artifacts suggests the possible presence of a late Pueblo II habitation component, but the site has not been tested to confirm this possibility. There is no surface evidence of structures, but some sandstone rocks are present in the waterline spoil. The soil mantle on the landform appears to be sufficiently deep to contain subsurface architecture. Investigations will begin by flagging surface artifacts, establishing a site datum, and laying out a grid system for horizontal provenience control. Surface artifacts outside of the construction zone will be recorded but not collected, and all visible structures and features will be mapped. Augering will be carried out to determine the depth and subsurface extent of the cultural deposits. At least three auger transects will be placed between the spoil pile and the construction zone, with auger holes spaced no more than 3 m apart.

If augering does not encounter any cultural material between the site boundary and the construction zone, a single trench will be dug at the edge of the construction zone using mechanical equipment to confirm that cultural deposits are not present. If augering or the trench reveals that the cultural deposit extends within construction zone, at least two 1-by-2-m units will be placed within the construction zone to confirm the extent and nature of the subsurface deposits. Overlying culturally sterile slopewash deposits may be removed with mechanical equipment, if warranted by their thickness, prior to initiation of any hand excavation. After the nature and extent of the deposits are determined, 1-by-2-m excavation units will be systematically placed within the construction zone. All excavations will proceed by cultural stratigraphy or by 10-cm levels until cultural sterile deposits or bedrock are reached. Excavation units will be expanded if cultural surfaces or features are encountered. If deep structures are encountered during this phase of investigation, mechanical equipment may be used to remove a portion of the fill (up to a maximum of 50 percent), but only if the field director determines that the information potential of the mechanically removed portion will be redundant with the hand excavated-portion in comparison with the research goals. If no cultural surfaces or features are encountered, hand excavation will

cease after at least 30 percent of the site surface within the construction zone has been investigated to culturally sterile substrate. After hand excavation is completed, mechanical scraping and trenching will be used to explore the possibility of subsurface cultural features within the remainder of the site area. If no additional cultural surfaces or features are encountered, investigations will cease after hand and mechanical excavations have reached culturally sterile deposits over at least 60 percent of the site area within the construction zone. OSHA safety requirements may restrict the spatial extent of data recovery efforts due to the narrow area of the construction zone outside of the existing highway prism and to the potential depth of the deposits.

The surface mapping and augering will confirm or revise the expectation that the site is a habitation. Typology of the pottery will establish the site date, suggest the presence of single or multiple components, and will provide information on minimum site occupation duration. Vessel form information, and flaked and ground stone artifact descriptions will allow characterization of the range of activities carried out at the site. Any structures or features encountered during excavations will yield samples and morphologic information relevant to the interpretation of site function as well as potentially providing sources of chronometric samples. Stone artifact raw materials and pottery tradition assignments will provide information relevant to the interpretation of community interaction.

LA 32964

This site consists of a small rubble area and several features within a large artifact scatter. The primary component is believed to be a late Pueblo II fieldhouse, but trace amounts of earlier and later pottery are present. Investigations will begin by flagging surface artifacts, artifact concentrations, and features, establishing a site datum, and laying out a grid system for horizontal provenience control. Outside of the proposed construction zone, surface artifact concentrations and surface artifacts in the vicinities of structures and features will be recorded but not collected, and all visible structures and features will be mapped. Augering will be used to confirm the apparent shallowness of cultural deposits and to confirm the apparent absence of a pit structure in the vicinity of the surface structure remains.

Surface artifacts and artifact concentrations within the proposed construction zone will be flagged, and any features will be mapped. Artifacts will be collected within a grid or point provenience system, depending on artifact density. Any features will be excavated along with adjacent areas in an effort to define cultural surfaces. Excavation units (1-by-2 m, minimum) will be placed systematically within areas of artifact concentrations, and excavation will proceed by cultural stratigraphy or 10-cm levels until cultural sterile deposits or bedrock are reached. These units will be expanded if cultural surfaces or features are encountered. Additional 1-by-2-m units will be placed in areas of low artifact density in order to systematically investigate the nature of subsurface deposits across the site. If no cultural surfaces or features are encountered, excavation will cease after at least 40 percent of the site surface within the construction zone has been investigated to culturally sterile substrates. If cultural surfaces and features are encountered, they will be completely excavated.

The surface mapping and augering will evaluate and better define the architectural identification of the site as a fieldhouse. Typological data from surface and excavated ceramics will establish the site date, suggest the presence of single or multiple components, and will provide information on minimum site occupation duration. Sherd quantities and vessel form information,

and flaked and ground stone artifact descriptions will allow characterization of the range of activities carried out at the site. Any features encountered during excavations will yield samples and morphologic information relevant to site function and chronology. Stone artifact raw materials and pottery tradition assignments will provide information relevant to the interpretation of community interaction.

Laboratory Analysis

All artifacts and samples collected as part of data recovery investigations will be returned to the OAS offices and laboratories in Santa Fe for analysis and for distribution to specialists. Materials will be cleaned in preparation for analysis, and any fragile artifacts requiring conservation or stabilization will be treated by the Conservation Unit of the Museum of New Mexico. Chronometric samples will be prepared for shipment or storage, and selected samples will be transmitted to specialists for evaluation and dating.

Ceramics will be analyzed in accordance with standard practice for Anasazi collections in the region (such as Blinman 1997a; Blinman et al. 1984; Goff and Reed 1996b; Wilson 1988). Tradition assignments and typology will follow precedents set by Goetze and Mills (1993), Goff and Reed (1996a), and Wilson (1997). Technological attributes of temper, slip, surface manipulation, and paint will be observed, along with vessel form and any evidence of use or modification. These attributes will support the dating, functional interpretations, and exchange inferences that are necessary for the goals of the research design.

Flaked lithic and ground stone artifacts will be analyzed following guidelines of the Office of Archaeological Studies *Standardized Lithic Artifact Analysis* manual (OAS 1994b) and *Standardized Ground Stone Artifact Analysis* manual (OAS 1994a). These analysis systems record information on raw material classification and form, reduction and production technology, maintenance, morphology, and use. These observations will support the inferences of function, mobility, and exchange that are necessary for the goals of the research design.

Animal bone identifications will be carried out using OAS and University of New Mexico comparative collections. Observations will include taxonomy, body part, age, and evidence of processing (butchering, breakage, and heat alteration). This information will support inferences of hunting catchments and strategies, seasonality, butchering practices, and the intensity of nutrition extraction. These inferences will in turn contribute to the questions of site function, mobility, and interaction that are important elements of the research goals for the project.

Plant materials will be collected as macrobotanical samples, flotation samples, and pollen samples. Macrobotanical samples will be submitted to the OAS Ethnobotany Laboratory for identification. Flotation samples will be processed at the OAS, and selected samples will be submitted to the Ethnobotany Laboratory for either full sorting or scan analysis, depending on the type of provenience and the needs of the research design. Cultivars will be identified and will be given detailed analysis intended to provide information on crop varieties. Seeds, fruits, and wood will be identified to the most specific taxa possible. Charring and other characteristics will be recorded to support inferences of cultural vs. natural origin for the materials. Pollen samples will be selected for submission to a specialist for analysis. Samples will be processed after doping with a known quantity of tracer spores so that abundance can be quantified in absolute terms. Depending

on the provenience characteristics and the specific needs of the research goals, some samples will be submitted for economic taxa scans while others will be submitted for full taxa analysis. Together, the plant materials will provide information for the description of local and regional vegetation, foodstuffs, food preparation techniques, fuel use, and construction material selection. This information will support a range of inferences that will contribute to the research goals: diet, site function, economic catchment size, and potentially seasonality.

Chronometric samples will be submitted to specialists for analysis. Any tree-ring samples will be submitted to the Laboratory of Tree-Ring Research at the University of Arizona for taxonomic identification and dating. Archaeomagnetic samples will be processed at the OAS Archaeomagnetic Dating Laboratory. Radiocarbon samples that are selected for analysis will be submitted first to the OAS Ethnobotanical Laboratory for taxonomic identification, and then appropriate materials will be submitted for radiocarbon assay. Assays will be by standard counting techniques or by accelerator mass spectrometry, as warranted by the amount of material available for analysis.

Any other artifact types (such as textiles) will be analyzed by specialists, as warranted.

Research Results

A final report will be published in the Museum of New Mexico, Office of Archaeological Studies *Archaeology Notes* series. The report will present all important excavation, analysis, and interpretive results. Included will be photographs, maps, and tables. Records such as field notes, maps, photographs, and artifact analysis data, will be submitted to the New Mexico State Historic Preservation Division, Archeological Records Management Section for curation. Artifacts and samples are the property of the Navajo Nation and will be curated with the Museum of New Mexico, Archaeological Research Collections, or with another qualified repository as directed by the Navajo Nation Historic Preservation Department.

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