Archaeological Testing for the Kyrene Expansion Project

T. Kathleen Henderson

Contributions by

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Kevin G. Frison
Gregson Schachner

Technical Report No. 2000-09
Desert Archaeology, Inc.

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Submitted to

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ABSTRACT

Archaeological testing was conducted at the Salt River Project Kyrene Generating Station located east of Kyrene Road between Guadalupe and Elliot roads in Tempe, Maricopa County, Arizona. The testing took place at the site of a proposed new natural gas-fired generating station adjacent to the existing generating station in the Pole and Tank yards of the Kyrene facility. A proposed new and realigned gas line route was investigated also. The purpose of testing was to determine if significant subsurface archaeological remains were present in the proposed plant site and its related facilities.

One hundred and twenty-three archaeological features were documented in 2,774 m of backhoe trenches placed strategically across the project area. One hundred and twenty-one of the features are prehistoric and affiliated with the Hohokam culture. Identified types include pithouses, cremation burials, roasting pits and ovens, borrow pits, other small and large pits, and a settling basin. All appear to date to the late pre-Classic or Classic Hohokam periods. A review of previous archaeological research in the project vicinity indicates the prehistoric features are a part of the site of Los Guanacos, AZ U:9:116 (ASM), a National Register-eligible historic property. Two archaeological features of modern age, an irrigation ditch and the remains of a tool shed, were identified also.

The prehistoric archaeological remains contain information important to prehistory and are considered contributing elements to the National Register-eligible property. Some form of treatment is recommended to mitigate the impact of proposed development in the project area. Appropriate treatment options include site preservation through avoidance of any construction activities at the locations of the archaeological remains; mitigation of potential adverse effects of construction and development through a program of archaeological data recovery; or a program that combines elements of avoidance and data recovery for selected portions of the property. A data recovery plan is presented that identifies actions to mitigate adverse effects on archaeological features in areas that will be developed. The plan includes a research design and work plan that will provide for the recovery of significant data values from the site.

ACKNOWLEDGMENTS

The testing project could not have been accomplished effectively without the ready support of Richard Anduze, Archaeologist, and John Keane, Executive Environmental Analyst, of the Environmental Planning and Technology Initiatives division of Salt River Project (SRP). Rick's quick responses to questions regarding mobilizing and coordinating the fieldwork across the myriad facilities of the Kyrene Station were essential to the project's completion. His enthusiasm, patience, and interest are greatly appreciated.

Sincere thanks are extended to SRP staff who facilitated the progress of various segments of the project. These individuals include: Dave Marsh, Foreman, and Mike Hitt, Manager, for their roles in coordinating activity in the Tank Yard; Greg Klippel, Material Handler, Rick Lott, Manager, and Michael Voda, Electrical System Engineer, who facilitated the fieldwork in the Pole Yard; Floyd Stewart, Manager, and Dudley Harris, Senior Engineering Technician, who oversaw fieldwork in the 500 kV Switchyard; and George Murray, Manager, and Wayne Wisdom, for facilitating trench excavations in Central Reclamation and the Tempe Service Center, respectively. Peter Kandaris, Senior Engineer, and Lori Trout, Environment, provided useful information and oversight. Special gratitude is conveyed to Greg Klippel and his staff, for their long, harried effort in removing poles and other equipment from the Pole Yard, and to Dudley Harris, who provided cheerful escort and oversight of excavations and backfilling in the 500 kV Switchyard. Also appreciated are those SRP employees who visited the excavations and expressed both astonishment and wonder upon seeing what lay beneath their facility.

The fieldwork was accomplished by an able crew consisting variously of Tiffany Clark, Casey Counts, Kevin Frison, Umberto Fuentes, Tom Prang, John Rockhill, Greg Schachner, and Caroline Shurrab. Ellen Ruble is especially thanked not only for her role as Field Director of the Tank Yard testing, but also for her effort in mobilizing the project. Backhoe trenches were cut and backfilled by Gene Jenstad, Mark Myers, and Robert Ybarra of Desert Diggers Backhoe Service, Inc. Special thanks to Ron Freestone of Desert Diggers for his alacrity in attending to our backhoe needs.

Stephanie Sherwood and Brian Fisher of Compass Rose Technical Services provided field mapping and computer cartography. The illustrations in this report were skillfully prepared by Stephanie Sherwood.

Support from the Desert Archaeology office was an essential element of this project. Lisa Eppley processed the recovered artifacts and flotation samples, and Sara Lely entered the data from the many field forms. Lisa also undertook an inventory-level analysis of the flaked and ground stone artifacts, and Mike Diehl performed an analysis of several flotation samples. Dena McDuffie and her team produced this report. Tiffany Clark conducted the ceramic analysis under my supervision; James Heidke provided valuable comment about coding variables for this effort. Thanks go to these individuals, as well as Henry Wallace, Beth Miksa, Jenny Adams, and Jane Sliva for their insight on research issues that might be relevant to data recovery investigations of the project's archaeological remains. David Abbott, a private consultant, is also thanked in this regard. A debt is finally owed to Trish Castalia and Bill Doelle for their interest, comment, and general support in the project's completion.

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CHAPTER 1

INTRODUCTION

T. Kathleen Henderson

The Salt River Project (SRP) is proposing to construct a new natural gas-fired generating station adjacent to the existing Kyrene Generating Station in Tempe, Arizona. Prior to full project commitment and any governmental involvement, SRP sponsored an archaeological testing program to determine the extent and National Register of Historic Places eligibility of any cultural resources present in the proposed plant site and related facilities. Archaeological testing was conducted because of the high potential for cultural resources to be present in the project area. Not only is the Kyrene Generating Station located near the mapped boundaries of several prehistoric sites, including the large Hohokam village known as Los Guanacos, AZ U:9:116 (ASM) (Figure 1.1), but prehistoric artifacts had been observed eroding from berms surrounding fuel oil tanks in the Kyrene complex. The presence of these artifacts indicated the likelihood that archaeological features related to the prehistoric site might occur within the area.

Desert Archaeology, Inc., under contract to SRP, completed the archaeological testing in three phases between 14 February and 5 May 2000. One hundred person-days were expended in the effort, directed by Kathleen Henderson and Ellen Ruble. In total, 2,774 m of trench were excavated by backhoe, 123 archaeological features were documented in trench profile, and five cremation burials were excavated. All fieldwork was conducted in accordance with a testing plan prepared by Desert Archaeology for the project (Ruble 2000).

The initial phase consisted of testing in and immediately south of the existing 11-acre Tank Yard of the Kyrene Generating Station (Figure 1.2). Thirty-three person-days were expended in this effort, accomplished between 14 and 29 February 2000. A total of 767 m of trench was excavated, resulting in the discovery of 38 archaeological features, all prehistoric. Feature types included 9 pithouses, 2 hornos, 1 roasting pit, 25 small and large pits, and 1 settling basin. Diagnostic artifacts recovered from backdirt and feature profiles indicate the remains date primarily to the Classic period (A.D. 1150-1450).

The second phase involved testing along the proposed new gas line for the new generating station. Testing for this segment commenced on 21 February 2000 and was concluded on 8 March 2000. Four hundred and forty-two meters of trench were excavated for this stage, and four archaeological features were discovered. The features were all prehistoric pits probably dating to the Sacaton phase (A.D. 950-1150). A total of nine person-days was expended in the effort.

The third phase consisted of testing in the 10-acre Pole Yard. This work was accomplished in 58 person-days between 12 April and 5 May 2000. Eighty-one archaeological features were recorded in the 1,565 m of trench cut during this phase. In addition to standard backhoe trenching and feature recording, excavations were conducted to recover materials associated with five cremation burials encountered during the trenching. These materials were repatriated to the Gila River Indian Community immediately following their excavation, pursuant to Agreement A.R.S. §41-844, Case #00-14. All but two of the identified archaeological features were prehistoric; these included 35 pithouses, 1 horno, 3 roasting pits, 1 hearth, 33 small and large pits, and the 5 cremations previously mentioned. Decorated ceramics obtained from these features suggest the remains date primarily to the Sacaton phase. The two features that were not prehistoric included a historic-period/modern irrigation ditch and an extramural surface later determined to be the remnants of a modern tool shed.

Desert Archaeology also completed archaeological testing of a proposed cellular telecommunications site located east of the Pole Yard in a separate project (Henderson 2000a). A roughly .4-acre parcel was examined, resulting in the discovery of two archaeological features. The details of this work are described in a separate report (Henderson 2000a), but the results are mentioned to provide a broader perspective on cultural activity at the Kyrene Generating Station.

The 121 prehistoric features found during testing indicate a substantial portion of a Hohokam village is present in the Pole and Tank yards of the Kyrene Generating Station. The village is undoubtedly a part of Los Guanacos, a National Register-eligible site (Fedick 1986a; Howell 1993). Given that further study of these remains has a high potential to contribute important information about the prehistoric past, it is recommended that a data recovery program be implemented if construction of the proposed generating station proceeds in the Pole and Tank yards.

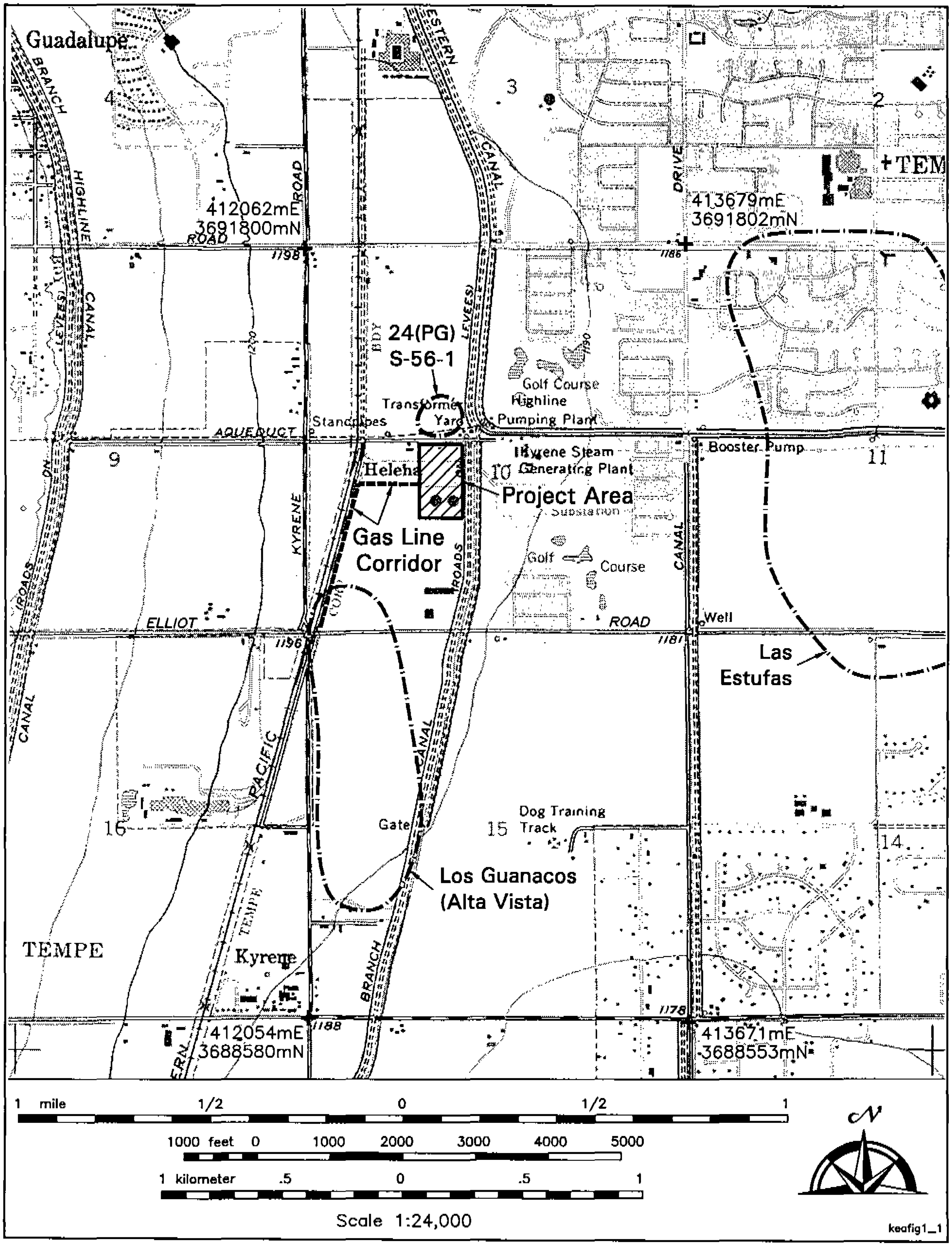


Figure 1.1. Project area location and nearby archaeological sites on photocopy of USGS 7.5′ topographic quad Guadalupe, Ariz. (U:9 [SW]). Site locations are based on Howard (1991a).

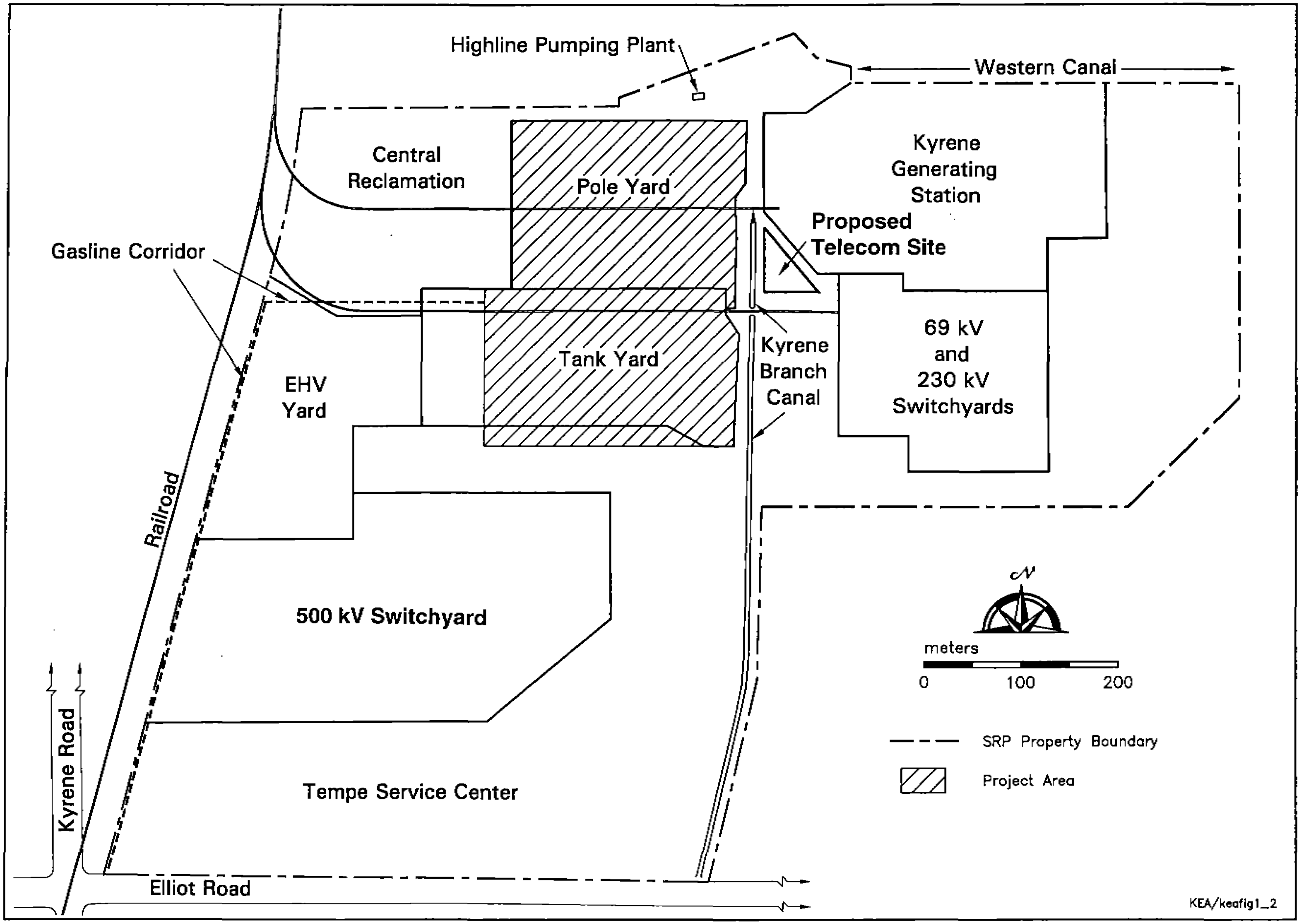


Figure 1.2. Map of the Kyrene Generating Station and related facilities.

This report describes the archaeological testing program for the proposed new Kyrene Generating Station. The report includes background information for the project area, detailed descriptions of the project methods and results, and an assessment of the significance of the archaeological remains. A data recovery plan for the treatment of significant resources is provided. Before continuing, though, the project area's location and its relevant characteristics are described, followed by a more thorough summary of the report's contents.

PROJECT AREA LOCATION AND DESCRIPTION

The Kyrene Generating Station is located in Maricopa County in the S ½ of Section 10, Township 1 South, Range 4 East, east of Kyrene Road between Guadalupe and Elliot roads in Tempe, Arizona (Figure 1.1). The station, residing on land owned by SRP, is subdivided into several parcels that reflect the multiple activities associated with the operation of the Kyrene plant (Figure 1.2). Archaeological testing was conducted in two of the parcels, the Pole and Tank yards, and along the proposed new gas line route that runs along the station's western boundary and then turns east toward and around the Tank Yard.

The landscape of the project area is typical of a modern industrial complex. Most of the area has been graded or leveled to some degree, many portions are paved, and there are surface structures and facilities of one type or another scattered across the station's parcels. A maze of underground utilities services these facilities. Throughout the project, the underground utilities and standing structures were avoided, which reduced the amount of area that could be examined archaeologically.

Whereas most of the land in the Pole Yard was available for testing, the exception being a roughly 17-m-wide, east-west corridor containing a railroad spur and underlying utilities, the testable area of the Tank Yard was considerably restricted. Existing structures in the Tank Yard included two large fuel oil tanks, dikes or berms that surround the tanks, paved access roads, a railroad spur, fuel oil pumps, fire water valves and boxes, and a myriad of underground utility lines. Although it was possible to maintain a systematic placement of trenches in the Pole Yard, trench placement in the Tank Yard was conditioned by those tracts of land that were free of utilities or existing structures. Similarly, the testing plan for the gas line called for 40-m trenches being cut at 40-m intervals along the proposed pipeline corridor, but given the presence of utilities, fences, and other obstructions, trenches were placed where it was advantageous while at the same time maintaining some regularity in their spacing.

ORGANIZATION OF THE REPORT

This report is divided into eight chapters. This first chapter has provided an introduction to the Kyrene Expansion archaeological testing project, along with a discussion of the project area location and description. The next two chapters provide additional background information for the project. Chapter 2 describes the project's environmental setting, summarizes the archaeological background of the region, and includes a section on modern land use within the Kyrene station. As part of the project, SRP requested that a Class I cultural resources inventory be completed for the area within 1 mi of the project area. The results of this literature and records search are described in Chapter 3. Particular attention is given to previous archaeological research conducted at the site of Los Guanacos.

The subsequent four chapters concern the essentials of the testing phase fieldwork. In Chapter 4, project tasks are summarized, field methods are described, and the field results presented. Descriptions of the archaeological features documented by the project are provided in Chapter 5, and Chapter 6 presents analyses of recovered artifacts. The project findings are then pulled together in Chapter 7, interpretations are offered and the significance of the remains assessed.

The report concludes with Chapter 8, which presents a data recovery design and work plan for implementation if the Kyrene Expansion Project proceeds to construction.

CHAPTER 2

ENVIRONMENTAL AND CULTURAL SETTING

T. Kathleen Henderson and Tiffany C. Clark

The purpose of this chapter is to provide a broad perspective on the environmental and cultural setting of the Kyrene Expansion Project. Characteristics of the regional environment are described first, followed by a summary of the region's cultural history. The chapter concludes with a history of modern land use at the Kyrene Station. This section serves to identify changes which have occurred in the project area landscape that may have affected what is preserved in the archaeological record.

ENVIRONMENTAL SETTING

The Kyrene Generating Station is located in the Lower Salt River Valley in the north-central portion of the Phoenix Basin. The valley extends west from the confluence of the Salt and Verde rivers to the junction of the Gila and Salt rivers, and is bounded by the Phoenix Mountains to the north, and the South and Sierra Estrella mountains to the south. The specific project locale is situated at an elevation of 1,195 ft and is south of the Salt River on an alluvial terrace extending east from the foot of the South Mountains.

The project location is found within the Basin and Range physiographic province of south-central Arizona. The region as a whole is characterized by isolated fault-block mountain ranges separated by broad alluvial valleys. These valleys are filled with several thousand meters of unconsolidated sediments that originate from the surrounding mountains (Péwé 1978:1). The Lower Salt River Valley is a relatively flat valley in the province, with bottom elevations ranging from 1,500 ft along its northern and eastern margin, to 1,000 ft along its western edge. Elevations of the mountain ranges that surround the valley vary from 2,600 ft in the South and Phoenix mountains, to slightly over 4,000 ft in the McDowell and White Tank Mountains. The lengths of these low parallel mountain ranges tend to be oriented from the southeast to the northwest.

The Salt River dominates the natural and cultural landscape of the northern Phoenix Basin. The river, which originates in the mountains of eastern Arizona, enters the Phoenix Basin through a canyon flanked by the Goldfield and Superstition mountains. Prior to construction of Roosevelt Dam, the Salt River flowed perennially through the Phoenix area, displaying a pattern of biseasonal flow. The maximum discharge peak of the Salt River occurred between March and April, following widespread regional winter storms and subsequent snow melt. A secondary discharge peak occurred in August that coincided with summer thunderstorms. The period of least flow occurred during June and July (Graybill and Nials 1989).

The importance of the Salt River cannot be understated for the prehistoric peoples of the northern Phoenix Basin. The combination of dependable water and a broad, flat, slightly sloping, alluvial plain were the paramount factors that permitted the construction of extensive irrigation systems that once existed in the valley. In turn, the irrigation systems allowed the long, comparatively stable and dense occupation of the Salt River Valley by the prehistoric Hohokam people.

The project area is approximately 5 mi from the Salt River and sits outside the flood zone, providing land appropriate for permanent habitation and irrigation agriculture. The broad expanse and low gradient of the alluvial terrace that characterizes this area affords excellent terrain for the construction and use of prehistoric and historic canals. The prehistoric inhabitants of Los Guanacos were served by one of the main branches of Canal System 1, so named by Omar Turney (1929), located roughly a quarter-mile east of the project area. The Western Canal, constructed in 1911 to provide irrigation water to the lands south of the Salt River, is situated immediately north of the Kyrene Generating Station.

Depending on local topographic and physiographic conditions, the precipitation in the Sonoran Desert averages 8 to 10 in annually. During the winter, slow-moving weather fronts deposit nearly half of the annual rainfall over broad segments of the desert. The winter storms originate in the west and are accompanied by moderate temperatures (Sellers and Hill, eds. 1974). The region generally remains frost-free from early March until mid-November, providing a lengthy growing season. The other half of the annual precipitation typically occurs during the summer months as brief local thunderstorms. These storms ameliorate the intense heat that occurs during the summer time as temperatures often average well over 90 degrees F, and afternoon temperatures on most days from mid-June to mid-September exceed 100 degrees F. The localized thunderstorms often generate torrential downpours that cause flash flooding in intermittent flowing streams.

Native vegetation of the region is part of the Lower Colorado River Valley subdivision of the Sonoran Desertscrub biotic community (Turner and Brown 1982). Although historic and modern land use practices have extensively altered the Salt River Valley, originally the valley was characterized by a zonal distribution of native plant and animal populations conforming to water availability. A blend of riparian species would have been found along the Salt River, including dense mesquite bosques, cottonwood and willow stands, and intermittent mixtures of reeds, saltbush, and annual and perennial grasses. On the river terrace that typifies the project area, accounts from the turn of the twentieth century indicate the prevalence of extensive, dense mesquite bosques (Brunson and Fedick 1988). The presence of riparian species reflects a high water table that, if present prehistorically, may have allowed the inhabitants of Los Guanacos to readily access an underground water source. As one moved off of the river terraces and toward the South Mountains, the vegetation would have become more xeric and shrubby. Paloverde, ironwood, acacia, and mesquite would have been present along the intermittent washes that drained the mountains. Ridges between the washes supported strands of creosotebush and saltbush that were intermixed with saguaro, prickly pear, and barrel cacti. A wide variety of wild fauna are supported by these vegetative communities, including deer, rabbit, coyote, beaver, squirrels, rats, mice, tortoise and turtle, rattlesnakes, toads, lizards, quail, dove, hawk, eagle, heron, and duck.

ARCHAEOLOGICAL BACKGROUND

Archaeologists do not know when the Lower Salt River Valley, particularly the valley bottoms and river margins, was first occupied. To date, no Paleoindian (10,000-7500 B.C.) remains have been found, and it is only recently that cultural traces of the Archaic (7500 B.C.-A.D. 1) period have been encountered in the region (Hackbarth 1998; Montero and Hackbarth 1992; Stubing and Mitchell 1999; Wright 1999) (Table 2.1). The scarcity of Archaic remains in the Salt River Valley may reflect one of two possibilities (Wilcox 1979:86). First, Archaic hunter-gatherers may have never occupied or extensively used the lowland river valleys as these areas were considered marginal relative to the upland areas of Arizona. This proposition has been expanded by Cable (1988), who argues that the "marginality" hypothesis is supported by the abundance of Archaic sites that have been identified in the upland areas (Ackerly 1986; Bayham et al. 1986; Bostwick 1988; Dart 1986; Doelle 1985; Haury 1950; Huckell 1984), and by the presence of similar patterns elsewhere in Arizona (Plog 1980:15). Cable proposes that the major drainages were an "open or empty niche," and that expansion into this area was a consequence of an adaptive radiation made possible through the development of floodwater farming techniques and small-scale canal irrigation (Cable and Mitchell 1988:426). The expansion into the low basin is proposed to have taken place around A.D. 1.

Table 2.1. Periodization and chronology for the Lower Salt River Valley.

Periods	Phases	Date Ranges
Historic		A.D. 1865-1950
Protohistoric/ Abandonment?	Bachi(?) Polvorón	A.D. 1450?-1650? A.D. 1350?-1450?
Hohokam Classic	Civano Soho	A.D. 1300-1450? A.D. 1150-1300
Hohokam Sedentary	Sacaton	A.D. 950-1150
Hohokam Colonial	Santa Cruz Gila Butte	A.D. 850-950 A.D. 750-850
Hohokam Pioneer (late)	Snaketown Estrella/ Sweetwater	A.D. 700-750 A.D. 650-700
Hohokam Pioneer (early)	Vahki Red Mountain	A.D. 500-650 A.D. 1-500
Archaic	Cienega? San Pedro Chiricahua	800 B.C.-A.D. 1 1200-800 B.C. 3000-1200 B.C.

An alternative possibility is that Archaic populations may have occupied the valley bottoms, but archaeologists have yet to encounter evidence of their occupation. Although archaeological excavations have been conducted across the breadth of the Salt River Valley, most in conjunction with highway and development projects, investigations of the floodplain and margins of the lowest river terrace are underrepresented in the sample (cf. Cable 1988). Because this area is subject to episodic flooding, this zone has not been intensively examined. Additionally, sediment deposition and scouring of floodplain deposits is an ongoing process, and would have been particularly so before the damming of the Salt River. The result of this natural process would be either burial or removal of archaeological remains in the floodplain and along the lower terrace margin. In light of these processes, it is not unexpected that certain cultural material may be rare or absent (Waters and Kuehn 1996).

Although the extent of Archaic occupation is still largely unknown, occupation of the Salt River Valley by precursors of the Hohokam by A.D. 1 is now well established. The sites of Pueblo Patricio (Cable et al., eds. 1985; Henderson 1995a), La Cuenca del Sedimento (Henderson 1989), and La Escuela Cuba (Hackbarth 1992) have yielded archaeological remains that date between 200 B.C. and A.D. 200 and later. All three sites contained a variety of pithouses, some which were fairly substantial in construction, indicating occupational continuity over some period of time. As is common at this time across central and southern Arizona (Ciolek-Torrello 1995; Elson and Lindeman 1994; Mabry, ed. 1998; Whittlesey 1995), the people occupying these sites were pottery-making agriculturists. The pottery was plain and brown, and generally rendered in small bowl and seed jar forms; maize was the dominant cultivated crop, although cotton and dye and grain amaranth have also been recorded (Elson and Lindeman 1994; Miksicek 1992; Smith 1995). Cable and Doyel (1985, 1987) speculate that settlement at this time was characterized by a pattern of movement between winter habitations located on upper terraces and summer seasonal camps along river margins. The occurrence of a canal firmly dated to this interval at La Cuenca del Sedimento shows that irrigation canal technology, albeit on a small scale, was in place at this time (Henderson 1989; Marmaduke and Henderson 1995:99).

The time at which the shift from a biseasonal settlement pattern to what might be termed a "super-sedentary" pattern (see Kent 1991:37) is unknown, but it is likely related to when large-scale canal irrigation became widespread in the valley. Notwithstanding the early canal discovered at La Cuenca del Sedimento, most Hohokam canals have been convincingly dated no earlier than the late Snaketown phase of the Pioneer period (Ackerly et al. 1987; Masse 1976; Wilcox et al. 1981). Because of this circumstance, many archaeologists have suggested that large-scale irrigation probably occurred at this time (Cable and Doyel 1985:229; Henderson 1987:124, 1995a; Howard 1991b:5.6, 5.10; Masse 1987:13; Plog 1980:13). Although further work is necessary to establish the exact timing of this transition, it seems likely that sedentary villages and large-scale irrigation were in place by the end of the Pioneer period, circa A.D. 650-750.

The succeeding Colonial period, circa A.D. 750-950, is characterized by the rapid expansion of both irrigation systems and habitation centers (Howard 1991b), with concomitant increases in population and diversification of agricultural production (Cable and Mitchell 1988). New settlements appeared and earlier Pioneer period villages grew even larger. Increasing social complexity, as inferred from the appearance of large, basin-shaped features with earthen embankments called ballcourts, also characterizes the period. The construction of ballcourts at many large villages in southern Arizona is thought to represent the beginning of a regional cultural system whose religious, economic, and political systems cross-cut geographical boundaries (Wilcox and Sternberg 1983:47). Exchange of ceramics, marine shell, and foodstuffs documents the region-wide expansion of this system (Doyel 1977:127, 1991b; Haury 1976:305d; Howard 1983:84). Alternately, the ballcourts, in concert with the regional use of red-on-buff pottery and cremation burial, may mark the appearance of a ceremonialism or shared ideology aimed at the mitigation of conflict arising from greater residential density (Marmaduke and Henderson 1995:120; Wallace et al. 1995). In either case, household domains within the growing villages become recognized after circa A.D. 850 as clusters of houses surrounding a central yard (Elson 1986; Henderson 1987; Mitchell, ed. 1988; Wilcox et al. 1981). Furthermore, associations of these units with cemeteries suggest a suprahousehold organization, and possibly development of a tribal or segmentary social structure (Henderson 1987; Rice 1987; Wilcox 1984).

Settlements along the Salt River increased in both size and number during the Sedentary period (circa A.D. 950-1150). In addition, populations at this time expanded out into non-riverine environs in the northern and eastern margins of the Phoenix Basin (Wilcox and Sternberg 1983). Although functionally specific seasonal sites and permanent habitations were situated away from the river, the largest settlements continued to be located on major canal systems. It is during this time that many canal systems were reconfigured (Howard 1991b), with some, such as Canal System 1, reaching their greatest extent (Nicholas 1981; Nicholas and Neitzel 1984:173). This reconfiguration and expansion coincided with a more developed settlement hierarchy (Doyel 1980; Upham and Rice 1980), whereby each canal system had at least one large village, in addition to smaller ones (Gregory and Nials 1985; Nicholas 1981:35). Doyel (1980) posits the occurrence of a single large village within each canal system as a fundamental administrative unit. Nicholas and Neitzel (1984:173) further suggest that, because all of the canal systems appear to have remained separate entities, they are likely to represent autonomous organizational units. This view has received support by the findings of Abbott (1995; ed. 1994) in his studies of ceramic manufacture and exchange within and between canal systems. By late Sedentary times, house clusters were arranged in more formalized rectangular patterns that forecast the development of suprahousehold compounds in the Classic period (Gregory et al. 1988; Sires 1987; Wilcox et al. 1981). At the settlement level, fieldhouses, farmsteads, hamlets, villages, and multi-settlement "communities" have been distinguished

(Cable et al., eds. 1984; Cable and Mitchell 1988; Gregory 1991; Henderson 1989; Mitchell 1988). One of the major focal points of these communities continued to be the ballcourt, which functioned as an integrative facility (Wilcox and Sternberg 1983). The distribution and spacing of Sedentary period ballcourts within the Phoenix Basin suggests regularities in the size of integrated areas and indicates the presence of a hierarchical settlement structure. Toward the end of the period, settlement shifts are evident as many large villages were abandoned (Haury 1976; Wilcox et al. 1981), while others in the basin appear to have increased in size (Gregory et al. 1988).

Marked changes in architectural styles, burial practices, and ceramic distributions signal the beginning of the Classic period, circa A.D. 1150-1450. Aboveground adobe architecture appeared for the first time, supplementing, but not replacing, the traditional semisubterranean pithouse architecture (Haury 1928; Wallace 1995). Villages in the Classic period consist of clusters of houses and mounds, which were often surrounded by rectangular-shaped, adobe-walled enclosures called compounds (Doyel 1991a). Burial modes also changed in the Classic period with an increasing dominance of inhumation over cremation burial. Similarly, buff ware pottery diminished in frequency across the period, being replaced by red ware pottery and later polychrome types. Ballcourts were largely abandoned by the early Classic period (see Wilcox and Sternberg 1983:Table 6.1) and possibly replaced functionally by a number of platform mounds that were constructed between A.D. 1275 and 1300 (Gabel 1931; Gregory 1987). These features are found throughout southern and central Arizona and consist of a central structure that was deliberately filled to support an elevated room upon a platform. The function of the elevated room is unclear; some platform mounds were probably used for residential purposes while others appear to have been built for ceremonial functions. A clearly definable settlement hierarchy can be observed in the Phoenix Basin during the Classic period with primary and secondary centers containing platform mounds, villages without mounds, hamlets, farmsteads, fieldhouses, and special function sites (Doyel 1991a). As the period progressed into the Civano phase, the Hohokam abandoned many of the smaller sites in the settlement system and populations further aggregated into large village centers. Cable and Mitchell (1988) posit that this nucleation resulted from the need for increased agricultural intensification and the redistribution of goods to compensate for unequally dispersed resources. Others point to irrigation management and water distribution as a key factor in these changes (Gregory and Nials 1985; Nicholas and Neitzel 1984). Gregory and Nials (1985:384) argue that the platform mound communities reflect sociopolitical units that functioned primarily in the operation and maintenance of associated canals. Still others have suggested that causes of these changes include environmental deterioration due to natural or cultural processes (Dove 1984; Masse 1991; Weaver 1972); ethnic migrations (Masse 1980:304; Schroeder 1965, 1966); internecine warfare (Doelle and Wallace 1991; Marmaduke and Henderson 1995); or the abandonment of a belief system centered on ballcourts in favor of one centered on platform mounds (Doyel 1977:136; Wilcox and Sternberg 1983:242-243, 255).

The end of the Hohokam culture is not a precisely defined event, nor can its material expression be described with certainty. Some have suggested evidence for post-Classic period occupations in the form of the Polvorón phase (Chenault 1993; Crown and Sires 1984; Sires 1984a), but the dating and the behavioral significance of material culture variability of this period remain problematic (Henderson and Hackbarth 1999; Marmaduke and Henderson 1995:137). What is evident from the data is that the population of the Phoenix Basin declined steadily after the mid-fourteenth century A.D., a decline that may have been precipitated by catastrophic floods (circa A.D. 1380-1382) and consequent destruction of the canal systems in the latter part of that century (Gregory 1991:187; Masse 1991:222). In any case, at some point around A.D. 1450, those materials that defined the Hohokam disappeared from the archaeological record of the Lower Salt River Valley.

The passing of the Hohokam marks the end of the prehistoric era in the Salt River Valley, and after circa A.D. 1450-1500 there is a break in the occupational record until the 1860s and the incursion of American settlers. This break coincides with the Protohistoric period, a time of general depopulation across southern Arizona, as suggested by the scarcity of archaeological remains assignable to this period. Based on documents provided by early Spanish explorers (e.g., Fray Marcos de Niza, Father Eusebio Francisco Kino, Captain Juan Mateo Manje, Father Jacobo Sedelmayr) (Bolton 1948; Dunne 1955; Hammond and Rey, eds. 1953; Karns 1954; Riley 1987), it is known that Piman groups populated the area along the Gila and lower Santa Cruz rivers, but the Salt River Valley seems to have been largely uninhabited. Although there are reports of Pima fishing parties using the area, and Piman and Cocomaricopa villages at and below the junction of the Salt-Gila confluence (Bostwick et al. 1996), the valley seems to have served chiefly as a buffer zone between Pima and Cocomaricopa farmers and their traditional enemies, the Yavapai and Apache, to the north (Bartlett 1854:241; Dunne 1955:20-24; Hackenberg 1974:104; Spier 1933:18).

The earliest historic accounts of the Salt River Valley are provided by American beaver trappers who hunted along the Salt River in the 1820s (Dobyns 1981:110-113; Quaife, ed. 1930; Weber 1971). Despite their favorable accounts of the landscape, settlement of the area was not initiated until 1865 when Fort McDowell was established on the Verde River near its confluence with the Salt. Drawn to the region by the same thing that sustained the Hohokam centuries before, early settlers soon recognized the agricultural potential of the Salt River Valley. The demand for food and fodder by miners in the Prescott and Wickenburg areas, and soldiers brought in to protect them from the Apache, was the main stimulus for settlement in the valley (Hackbarth 1995; Trimble 1986). The ability of the early historic-period settlers to produce foodstuffs was facilitated by canal irrigation. In 1867, Jack Swilling and his irrigating company reexcavated several Hohokam canals in the Phoenix area (Luckingham 1989; Zarbin 1979). Three years later, Swilling dug another canal near Tempe Butte as part of the Tempe Canal Company in order to expand irrigation agriculture in the central portion of the Salt River Valley (Barnes 1988:439). In that same year, Charles Trumbull Hayden started a flour mill, general store, and ferry service at Tempe Butte on the south side of the river. Hayden was also a leading advocate for irrigation on the south side of the Salt River, no doubt a reflection of his desire to secure business for his flour mill. Although not among the initial founders of the Tempe Canal Company, he was instrumental to its organization, as well its successor in 1871, the Tempe Irrigating Canal Company (Lewis 1963).

Informally called Hayden's Ferry, the area was officially named Tempe in 1879. The agricultural potential of irrigated land, combined with the end of Apache hostilities in the early 1870s, encouraged the growth and expansion of farmlands in this and other agricultural communities of the Lower Salt River Valley. Prior to the 1900s, Tempe developed as a cattle shipping point, railroad junction, and important agricultural area (Trimble 1986:192). The historic canals, which were often built in or along the same courses as prehistoric canals, allowed the farmers of Tempe to grow alfalfa, grains, and fruits, and eventually cotton and citrus (Janus and Associates 1989). Located approximately 6 mi south of the historic townsite of Tempe, the small town of Kyrene was established originally as a station on the Maricopa branch of the Arizona-Eastern Railroad. According to Barnes (1988:237), between 1888 and 1896, Kyrene functioned as a major hay and cattle shipping point. Tempe continued to grow throughout the 1900s with the development of a downtown area on Mill Avenue and the expansion of the state Normal School, which had been established in 1885. The population of Tempe remained relatively small (3,000 people) until after World War II, when the town and the Salt River Valley in general experienced an extended period of dramatic growth.

MODERN USE OF THE PROJECT AREA

Over the past century, the project area has experienced substantial modification involving the replacement of the native Sonoran Desertscrub biome by historic agricultural fields and modern industrial facilities that correspond to the expanding needs of the Kyrene Generating Station. As mentioned above, early reports indicate that at the turn of the twentieth century, the project area was characterized by dense mesquite bosques typical of riparian communities along the Salt River (Brunson and Fedick 1988). As the presence of these species indicates a high water table, the project area in the early 1900s may have been particularly attractive to early Anglo-American settlers looking for cultivable land.

The first recorded historic use of the project area derives from a homestead claim by Paul Jungermann in 1907 for the 160 acres in the SW ¼ of Section 10, Township 1 South, Range 4 East (SRP Research Archives Staff 1999). Although the land that incorporates the project area was not irrigated until after the completion of the Western Canal and the Highline Pumping Plant in 1912 and 1914, respectively, the presence of a high water table may have allowed for the cultivation of agricultural crops without a formal irrigation system. In any case, once irrigation water became available, Jungermann filed a water right application in 1917 for the irrigable portion of his land. In the following year, the subsequent owner, Edith Wesson, also filed an application to secure water rights for the E ½ of the SW ¼ of Section 10.

Over the next quarter of a century, the parcel in question was primarily used for irrigation agriculture. Beginning in the 1950s, however, a series of construction events sponsored by Salt River Project (SRP) was undertaken in the immediate vicinity of the project area East (SRP Research Archives Staff 1999). Between 1951 and 1952, SRP built and completed the Kyrene Steam Generating Plant at the southeast junction of the Western and Kyrene canals (Figure 1.2). Construction of a new Highline Pumping Plant also began in 1952 on the west side of the Western Canal to the north of the project area. To meet the growing land needs of these and other projects, SRP began to acquire property in the N ½ of the SW ¼ of Section 10 in the current project area. The first land transaction occurred in 1951 and involved the acquisition of the north 40 ft of the SW ¼ of Section 10, which was needed to build an access road from Kyrene Road to the Kyrene Generating Station, as well as to create an embankment for a railroad siding. This tract of land bounds the northern side of the project area. In 1953, a second parcel of property that incorporates the northern portion of the project area was acquired that consisted of an 11-acre tract in the south 310 ft of the north 350 ft of the SW ¼ of Section 10. This land was originally needed for the construction of a railroad spur to serve the Kyrene Steam Plant as well for future transmission lines from the plant. The railroad spur was constructed along the southern periphery of the district property.

In 1958, a 300-ft by 313-ft section of land just west of the Kyrene plant's west fence was cleared for the construction of a new pole storage yard (Figure 1.2). In the creation of this facility, the land was graded and surfaced, and culverts and drainage ditches installed. The area was scarified, watered, and rolled with a sheeps-foot roller before workers installed a decomposed granite surface. Additionally, in this same year, a 12-ft by 10-ft steel building was erected on a concrete slab in the northeast corner of the Pole Yard that replaced a small structure that had been present since the initial clearing of the property. In the spring of 1961, an additional 300-ft by 150-ft area west of the original Kyrene Pole Yard was filled and surfaced with aggregate material to increase storage capacity. At this time, the drainage ditches along the access road and to the west of the area were also improved. Finally, in 1965, the Pole Yard was expanded westward for a third time; a 300-ft by 800-ft area was cleared and surfaced with aggregate base course material.

The purchase of an additional 36-acre tract of land south of the existing pole and warehouse yard in 1968 allowed for the future expansion of SRP storage facilities. Much of this property remained leased for agricultural use until late 1972, when the land south of the pole and warehouse yards was cleared in order to construct two fuel oil storage tanks for the Kyrene Generating Station. In constructing the foundation for the storage tanks, the ground was first sprayed with a soil sterilant and then graded. A dike was raised around the tanks, a fire line around the perimeter of the dike was constructed, and a 20-ft-wide pit was dug for safety purposes. The dike surfaces and slopes were dampened with water, a soil stabilizer was applied, and the area was sealed with emulsified asphalt. Once the foundation was completed and both tanks were installed, a second railroad spur was built to add rail access to the fuel tanks. This track ran along the northern border of the tank yard and paralleled the earlier railroad spur.

The clearing of the area south of the original Pole Yard for the construction of the tank farm in 1972 created an open space between the two railroad spurs. An aerial photograph taken in 1973 indicates there was no extensive pole storage in the area at the time, although a few pieces of equipment were found to be stored in this cleared space. The Pole Yard did experience modification during this period with the dismantling of the tool shed in the northeast portion of the Pole Yard sometime between 1973 and 1974. A later aerial photograph shows that, by 1984, the expansion of the Pole Yard had occurred and the eastern portion of the land between the railroad spurs was being used for the storage of wooden poles. Although further modifications to the Pole Yard have taken place since the early 1970s, most of this activity involves the construction of warehouse and office structures to the west of the parcel in question.

In the past two decades, urban growth has rapidly surrounded the Kyrene Generating Station. By 1984, a golf course located on land donated by SRP to the City of Tempe to mitigate environmental effects of the generating station and residential houses constructed around the links, had been developed immediately to the north of the Pole Yard. Further urbanization occurred in late 1980s and early 1990s, with the commercial development at the entrance of the Kyrene access road. Additionally, a housing development on the west side of Kyrene Road has also been completed within the last decade. The aerial photograph from 1999 indicates that today little undeveloped land now exists in the immediate vicinity of the Kyrene Generating Station.

CHAPTER 3

PREVIOUS RESEARCH

T. Kathleen Henderson and Kevin G. Frison

A records search of archaeological and historical archives and published reports was conducted to identify previously recorded sites and archaeological projects located within 1 mi of the project area. Records at Arizona State University (ASU), the Arizona State Museum (ASM), the Museum of Northern Arizona (MNA), Pueblo Grande Museum (PG), Mesa Southwest Museum, the State Historic Preservation Office (SHPO), and the Bureau of Land Management General Land Office were examined. Records examined at ASU included the site files of the Department of Anthropology, the statewide electronic database AZSITE, and the Midvale files housed at the ASU Hayden Library. Personal contacts were also made with local archaeologists who were known to have worked in the area or might have information relevant to documented sites. Persons contacted include Todd Bostwick, Judy Brunson-Hadley, Cory Breternitz, J. Simon Bruder, Matthew Hill, Jerry Howard, Johna Hutira, Shereen Lerner, Glen Rice, and K. J. Schroeder. The records search built upon information already compiled by Salt River Project (SRP).

This chapter presents the results of this task. The first section provides an overview of archaeological research conducted during the late-nineteenth and early-twentieth centuries. These early investigations provided the first glimpse of the extensive set of prehistoric remains in the Kyrene area, including initial site descriptions, names, numbers, and locations. The subsequent sections concern work conducted during the latter half of the twentieth century. This work was accomplished primarily as cultural resource management projects, ranging from archaeological monitoring and small-scale surveys to data recovery excavations (Table 3.1). Archaeological projects conducted outside the Kyrene property are discussed first, followed by work accomplished within the Kyrene facility.

EARLY ARCHAEOLOGICAL RESEARCH

The first archaeological research in the vicinity of the project area was conducted in the late 1800s by the Hemenway Southwestern Archaeological Expedition, led by Frank Hamilton Cushing (Brunson 1989; Haury 1945; Wilcox and Hinsley 1995). Cushing's work started in 1887 and, through the next 15 months, excavations took place at some of the premier Hohokam sites on the south side of the Salt River: Los Muertos, Las Acequias, Los Hornos, and, one of the last to be investigated, Los Guanacos. According to Brunson (1989:26), Cushing originally named the latter site Pueblo del Cameno, but later changed its name based on the discovery of a cache of small llama-looking figurines during the original excavations. Los Guanacos was described as a prehistoric town of "deeply buried huts" (pithouses) with a "Sun Temple" (ballcourt) (Cushing 1890:177).

Although Haury (1945:13) placed the occupation of Los Guanacos primarily in the Colonial and Sedentary periods, Brunson's (1989; Brunson and Fedick 1988) recent examination of the Hemenway notes indicates the site included several components dating to the Classic period. Cushing identified multiple mounds within the site area, some of which were undoubtedly trash mounds associated with pithouses, but others were apparently adobe compounds. A sketch map accompanying one of Cushing's reports shows an excavated portion of a compound with several rectangular rooms (Brunson 1989); these were apparently the source of several red ware vessels, identified by Haury (1945:174) as Gila and Salt Red. In addition, inhumations as well as cremations were recovered from Los Guanacos (Brunson 1989:26), providing further evidence to suggest the site's occupation spanned the pre-Classic and Classic periods.

Artifacts recovered from Los Guanacos reflect the range of items to be expected in a Hohokam village (Haury 1945:173-179). Ceramics of the Colonial and Sedentary period (Gila Butte , Santa Cruz, Sacaton Red-on-buff) were most prevalent, but, as mentioned above, several Classic period red ware vessels were obtained also. Other clay objects included several heavy-walled vessels or censers, spindle whorls, a pipe, and animal figurines, including the 15 "guanacos" that lent the site its name. Projectile points, a pestle, axes and adzes, a slate palette, an assortment of pulverized pigments, and several rolled paint "crayons" were among the stone artifacts recovered. Preservation of the excavated remains must have been excellent, as the assemblage also contained wooden paddles and pieces of woven textile (Haury 1945), including a bag that contained green and white pigment (Brunson and Fedick 1988).

There is confusion as to the location of the site worked by the Hemenway Expedition. In his map of sites worked by the expedition, Haury (1945:Figure 1) shows Los Guanacos east of the point where the

Table 3.1. Summary of published reports and other project findings for the Kyrene property and vicinity.

Source	Project	Size and Location	Findings
Turney 1929	Prehistoric Irrigation Map	Lower Salt River Valley	Alta Vista mapped in Sections 15 and 16, T1S, R4E; unnamed "prehistoric buildings" mapped in Sections 10 and 11, T1S, R4E; Los Muertos mapped as covering 3+ mi diameter centered on Sections 23 and 24, T1S, R4E.
Haury 1945	Hemenway Southwestern Archaeological Expedition, 1887-1888	2 mi north and slightly west of Los Muertos; 2 mi southeast of Los Hornos.	Los Guanacos; a Colonial-Sedentary period village, some Classic period material.
Antieau 1977	TNF to Kyrene Transmission Line Survey	Line parallels south bank of Western Canal in E ½ of Section 10 and entire length of Section 11, T1S, R4E.	AZ U:9:71 (ASU); Hohokam habitation site, Sedentary period age.
Grove 1978	Knoell Tempe Unit 9 Survey	320-acre parcel, S ½ of Section 11, T1S, R4E.	AZ U:9:71 (ASU); linear artifact scatter running north-south through E ½, SW ¼ of Section 11; extension of site previously mapped by Antieau (1977); recommended archaeological testing.
Blank 1978	Knoell Tempe Unit 9 Testing	79-acre parcel, E ½, SW ¼ of Section 11, T1S, R4E.	AZ U:9:71 (ASU); sample surface collections and trenching; a pit and two possible canals found; Colonial to Sedentary period age; author suggests remains related to Los Guanacos.
Rice 1980	Knoell Tempe Unit 9 Monitoring	30-acre parcel central portion of S ½ of Section 11, T1S, R4E.	AZ U:9:71 (ASU); monitoring during grading reveals canals, an horno, and several midden areas; Sedentary period age.
Effland and Green 1980	Kyrene EHV Transmission Line Survey	1-mi transect along the north boundary of Section 4; four east-west, 1-mi transects in Section 10; two SE-NW, 1-mi transects in Section 16, T1S, R4E.	No sites identified, but recommendation was made to avoid some corridor alternatives because of potential for encountering cultural resources.
Kisselburg and Horton 1990	El Paso Natural Gas Line Monitoring	Gas line along north edge of S ½ of Section 11, east edge of SE ¼ of Section 10, north edge of Section 15, and east side of Southern Pacific RR in Sections 15 and 16, T1S, R4E.	Seven prehistoric canals recorded; four in vicinity of AZ U:9:71 (ASU); two in vicinity of AZ U:9:48 (ASU).
Stubing et al. 1995	Pascua Yaqui Tribe Survey	23 acres contained mostly in the N ½, SW ¼, NW ¼ of Section 9, T1S, R4E.	AZ U:9:147 (ASM), low-density sherd and lithic scatter considered a Hohokam gathering or collecting camp; considered ineligible for NRHP.
Tweedy 1998	South Hardy Drive and West Grove Parkway Survey	22 acres contained mostly in the S ½, NW ¼, SE ¼ of Section 9, T1S, R4E.	SHPO inventory #3432-I; no report on file. Use of inventory number without a report number indicates no cultural remains were found.
Aguila 1998	SRP Canals	Western Canal in Sections 3, 10, and 11; Kyrene Branch Canal in Sections 10 and 15, T1S, R4E.	Artifacts were found in the vicinity of previously recorded sites AZ U:9:71 (ASU), NA15, 779, AZ U:9:24 (PG), and AZ U:9:116 (ASM).
Hill and Davies 2000	McDonald Golf Course Irrigation Line Monitoring and Testing	Adjacent to Western Canal, north of Highline Pumping Plant in middle of Section 10, T1S, R4E.	AZ U:9:24 (PG); test trenches cut prior to boring under the Western Canal; one prehistoric pit found.

Table 3.1. Continued.

Source	Project	Size and Location	Findings
SRP Kyrene Property			
Fortier 1979	Kyrene Tank Yard Monitoring	11.9-acre parcel in the S ½, NE ¼, SW ¼ of Section 10, T1S, R4E.	1 prehistoric feature (roasting pit/oven) and artifacts; suggested to be a component of AZ U:9:24 (PG).
Keller 1979	Kyrene 500 kV Receiving Station Survey	55 acres in the S ½, SW ¼ of Section 10, T1S, R4E.	NA 15,779; a late Colonial or Sedentary period site with some late Classic activity. Artifacts were concentrated in northern half of the survey area but found across the parcel. Testing of artifact concentrations was recommended.
Stone 1986	Sanitary Sewer Line, Kyrene Steam Plant Monitoring	350-m-long trench along west side of Kyrene Branch Canal in S ½, SE ¼, SW ¼ of Section 10, T1S, R4E.	Artifacts observed on surface and subsurface, but no features. If site was present, it has been substantially disturbed by earthwork associated with canal construction.
Fedick 1986b	SRP Central Support Complex Survey	103 acres in the NW ¼ of Section 15, T1S, R4E.	AZ U:9:48 (ASU), artifact scatter measuring 457 x 91 m along Kyrene Canal in eastern third of survey parcel. Recommended avoidance or testing for eligibility.
Fedick 1986a	SRP Central Support Complex Testing	14-acre parcel paralleling west side of Kyrene Branch Canal in the NW ¼ of Section 15, T1S, R4E.	AZ U:9:48 (ASU), Los Guanacos; 25 archaeological features identified in trenches, including a house floor, borrow pits, burials, an horno, and trash-filled pits. Remains are potentially eligible, data recovery program is recommended.
Howell 1993	Los Guanacos Data Recovery	10-acre parcel paralleling west side of Kyrene Branch Canal in the NW ¼ of Section 15, T1S, R4E.	AZ U:9:116 (ASM), Los Guanacos; data recovery of area previously tested by Fedick (1986a); 72 archaeological features examined including adobe compound rooms, wall segments, pit structures, hornos, and burials; occupation dated between late Sedentary and late Classic period.

Southern Pacific Railroad turns from a southwest-northeast trajectory to a north-south one, with "ruins" straddling the historic Wormser Ditch which coursed west along the southern edge of Section 11 and eastern quarter mile of Section 10 where it turned northwest, paralleling the present-day Western Canal. A second map of irrigation canals (Haury 1945:Figure 24) places the site in Section 14, T1S, R4E, only about a mile northwest of Los Muertos. This second map seems clearly in error since Haury (1945:173) states that Los Guanacos was "2 miles north and slightly to the west of Los Muertos" and it is inconsistent with all other recordings of the site. A third map of the Hemenway Expedition sites, published in Matthews and others (1893), indicates Los Guanacos covered most of Section 15, T1S, R4E and extended into Sections 16 and 22. Brunson (1989) observes, however, that Washington Matthews, a member of the original expedition, left before Los Guanacos was excavated and it is not known when or by whom the map was prepared. The reader is referred to Brunson and Fedick (1988) for additional detail about the problems involving the site's location.

In the 1910s, Omar A. Turney, an irrigation engineer who served as City Engineer in Phoenix for many years (Wilcox 1993), began to integrate maps of prehistoric irrigation canals prepared by various individuals (e.g., Goodwin 1887; Patrick 1903) with maps he had prepared independently. First released in 1922 and later published in 1929, the map Turney (1922, 1929) produced has become the classic representation of the Hohokam canal system in the lower Salt River Valley (Figure 3.2). Prehistoric sites and ruins are also shown on this map and, as such, it has become a primary source examined by archaeologists seeking to identify prehistoric remains at any given location in the valley.

Turney's map shows a site named "Alta Vista" in Sections 15 and 16, T1S, R4E, consistent with the location of Los Guanacos as plotted by Matthews and others (1893). In his accompanying report, Turney (1929:15) states that the two names apply to the same site. Shown at the location of Alta Vista is a large solid square surrounded by smaller dots. Turney's key does not differentiate between the various symbols, describing them only as "prehistoric buildings," but in practice, archaeologists associate the larger squares with

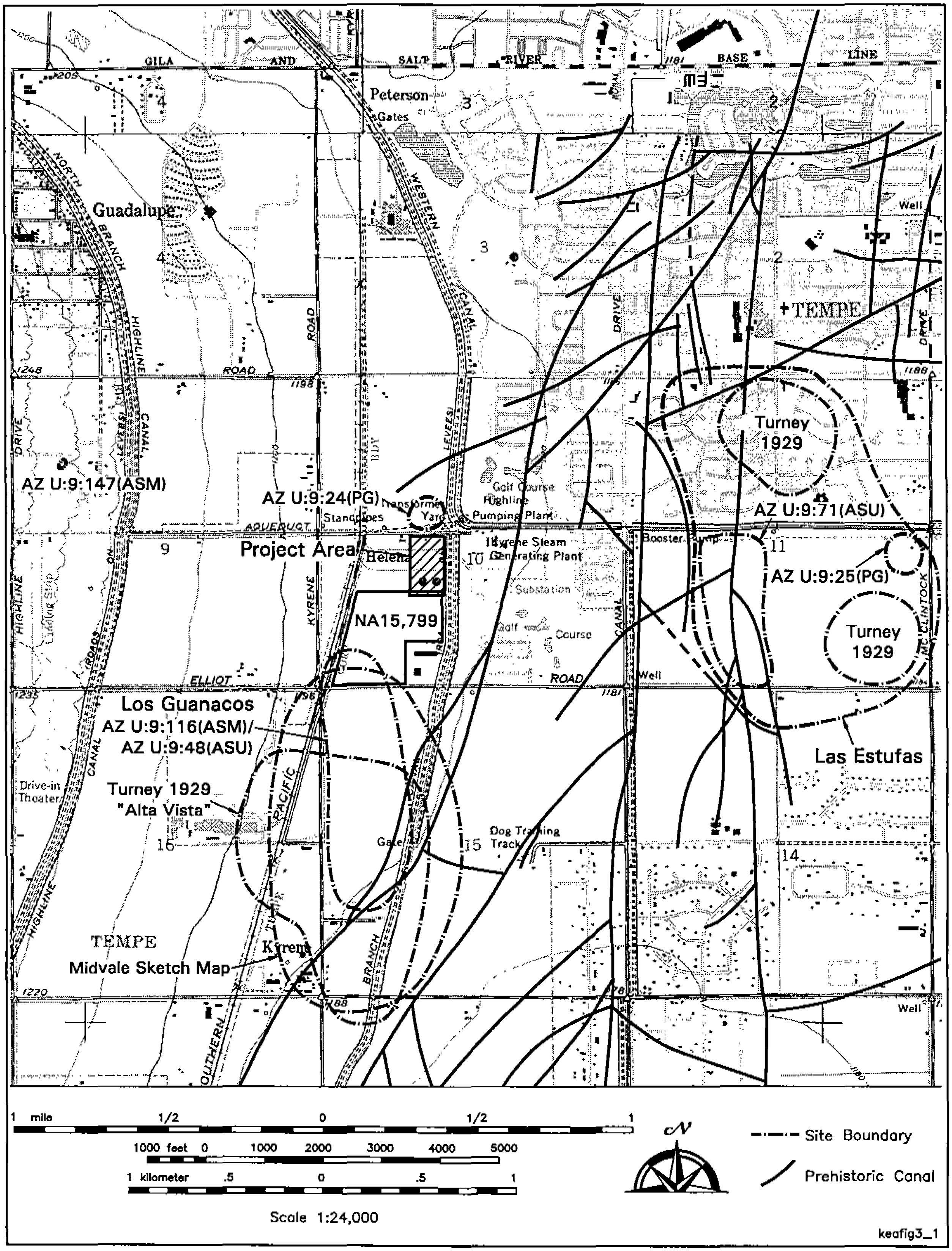


Figure 3.1. Archaeological sites mapped in and near the Kyrene facility.

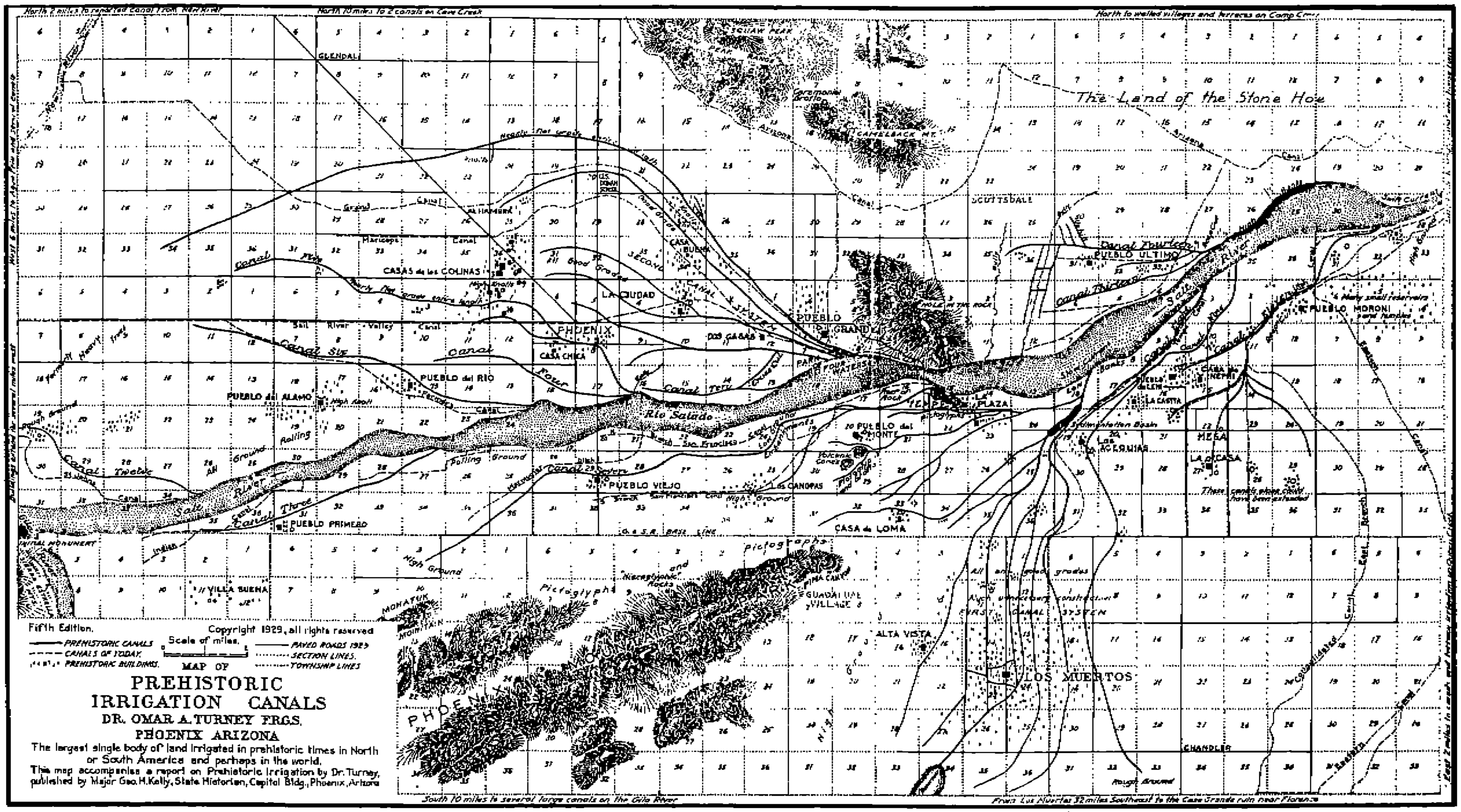


Figure 3.2. Omar Turney's map of Salt River Valley canals.

platform mounds, smaller dots with compounds or trash mounds, and open circles with ballcourts. The large square at Alta Vista thus suggests the presence of a platform mound, surrounded by smaller mounds or compounds. Turney's map also shows clusters of "prehistoric buildings" in the north half and southeast quarter of Section 11, T1S, R4E (Figure 3.2); note that the northern cluster includes an open circle (i.e. possible ballcourt). These two clusters have been circumscribed on the USGS Guadalupe 7.5' quad at the SHPO and identified as unnamed sites mapped by Turney (see Figure 3.1).

Frank Midvale, an avocational archaeologist who worked with Turney and continued to map prehistoric canals and sites in later years, provides additional detail regarding Alta Vista. A sketch map of the site, reproduced in Fedick (1986b), shows a compound mound surrounded by smaller mounds and a canal identified as "Ancient Canal Vista." The canal runs along the eastern edge of the site in the west half of Section 15, T1S, R4E; the compound mound and other structures lie between the canal and the Southern Pacific Railroad in Section 16. As sketched, the site covers most of the western half of Section 15 and extends to the Southern Pacific Railroad tracks in Section 16 (Figure 3.1). A re-recording of the site by ASU in 1963, then designated AZ U:9:48 (ASU), shifts Midvale's compound mound farther north into the northeast quarter of Section 15 (Fedick 1986b).

Two sites, AZ U:9:24 (PG) and AZ U:9:25 (PG), were recorded in the vicinity of the Kyrene property by the Salt River Valley Stratigraphic Survey (SRVSS) originally directed by Albert Schroeder under the auspices of Pueblo Grande Museum. The purpose of this project, sponsored by the U.S. Works Progress Administration (WPA) between 1938 and 1940, was to determine if the chronological phases and material culture changes identified during the Snaketown excavations in the middle Gila River Valley (Gladwin et al. 1937) also applied to the lower Salt River Valley (Bostwick 1993). The stratigraphic survey consisted of locating and mapping sites, then excavating a trench through one of its trash mounds to obtain a controlled sample of artifacts. The project resulted in not only verifying that the cultural sequence held (Schroeder 1940), but also in identifying and describing a multitude of sites in the Salt River Valley. Schroeder left the SRVSS after a year due to disagreements with Odd Halseth, Pueblo Grande's museum director, and was replaced by Audie R. Kelley (Bostwick 1993). It was Kelley who prepared the site cards for 24 (PG) and 25 (PG), originally designated Site No. 56-1 and 56-2, respectively.

AZ U:9:24 (PG) is described as a trash mound located along the roadside and extending into a field in the SE¼ of the NW ¼ of Section 10, T1S, R4E (Figure 3.1). The recorder notes that the mound was in good condition, although the south side was cut by a pressure pipe from the Western Canal. The mound's dimensions are not provided. The presence of worked cardium and plentiful chips of diorite is noted on the site card. Artifacts recovered from the mound included 319 ceramics: 187 plain ware, 131 buff ware, and 1 Gila Red. Seventy-seven of the buff ware sherds were typed, with 56 identified as "Late Sacaton," 1 as "Soho," and 20 as "Santa Cruz." Collectively, the ceramics suggest the mound is primarily Sedentary period in age. It bears mentioning that both the SHPO and Howard (1991a) maps of the USGS Guadalupe 7.5' quad show a second location for 24 (PG) in the SE ¼ of the NE ¼ of Section 11, T1S, R4E. No documentation was found by this records search to indicate why 24 (PG) has also been plotted at this location.

The site card for AZ U:9:25 (PG) is more terse, mentioning the presence of trash mounds, firepits, and "etc." A map provided on the back of the card shows a "sherd area," presumably the tested mound, in the NE ¼ of the SE ¼ of Section 11, T1S, R4E. Of note, this varies from the location provided on the front of the card: "Sec 11 - NE ¼ of SW ¼." Later archaeological surveys in Section 11 by Antieau (1977) and Grove (1978) suggest the latter location rather than the map is correct, consistent with the site identified as AZ U:9:71 (ASU). If this is the case, 25 (PG) is incorrectly plotted on the SHPO and other later maps (e.g., Howard 1991a, Figure 3.1). Diorite tools are mentioned as being plentiful at 25 (PG), and shell, bone, and chert are noted. The attached analysis sheet indicates 118 ceramics were collected: 63 plain, 2 decorated red-on-buff, 31 Salt Red, and 22 Pueblo Grande Red. One of the buff ware sherds was Santa Cruz; all the red ware sherds were assigned to the Civano phase.

RECENT ARCHAEOLOGICAL RESEARCH

A gap of almost 40 years exists between the archaeological work accomplished by the SRVSS and later investigations in the vicinity of the Kyrene Expansion Project (KEP). Almost all of this later work has been conducted for the purpose of cultural resource management, and much of it has been sponsored by SRP. The various projects that have been undertaken are described below; Figure 3.3 shows their locations. In order to hone in more directly on accomplishments relevant to the project area, archaeological projects conducted outside the Kyrene facility are discussed first, and then those undertaken inside the Kyrene property. Land once owned by SRP in the northern half of Section 15 is included here as part of the larger facility. The projects are discussed in roughly chronological order.

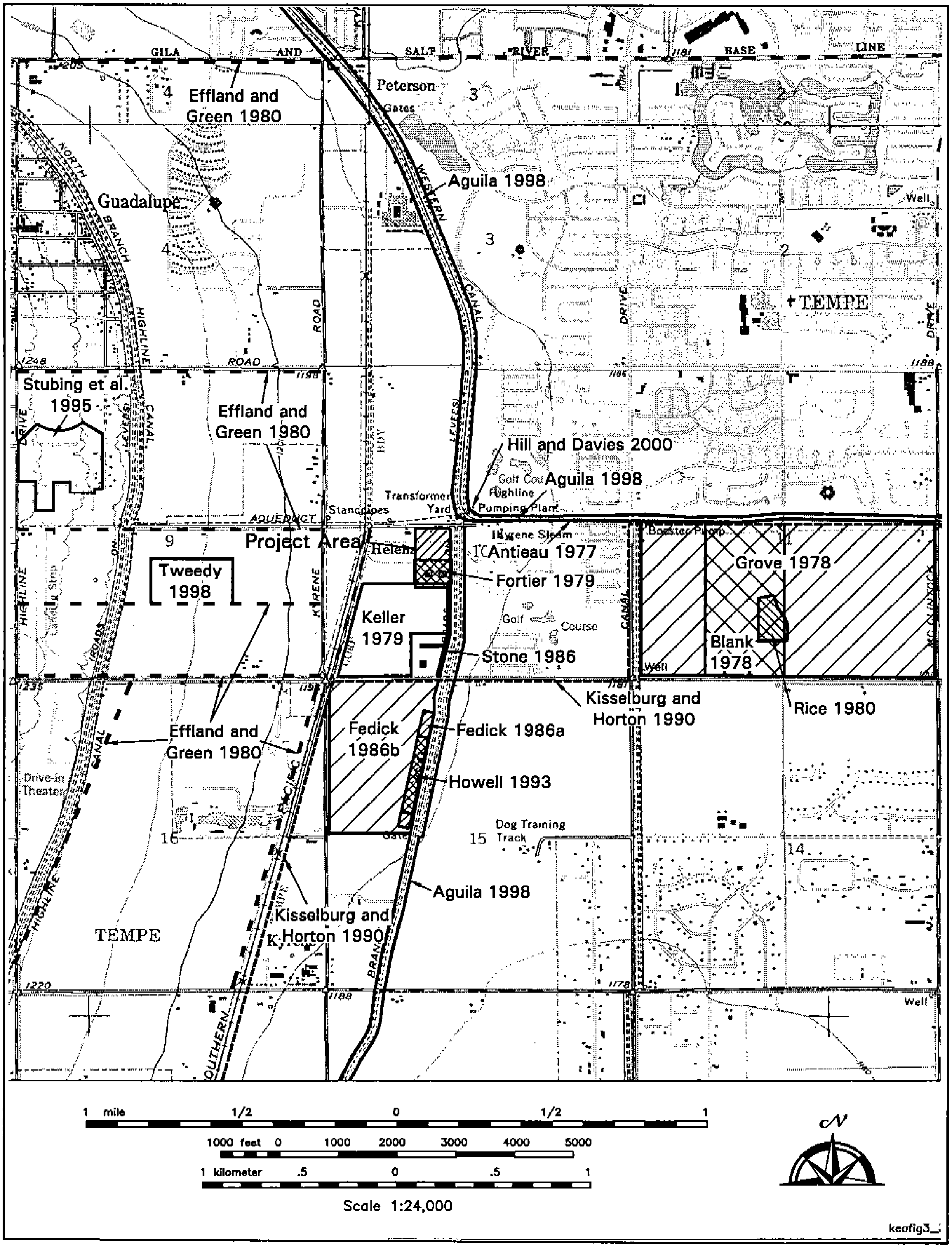


Figure 3.3. Locations of archaeological projects in and near the Kyrene facility.

Investigations outside the Kyrene Facility

In the late 1970s, ASU undertook several projects in Section 11, T1S, R4E relating to the discovery and exploration of AZ U:9:71 (ASU), later called Las Estufas (see below). The first of these was Antieau's (1977) survey for a 500 kV transmission line from the Tonto National Forest boundary to the Kyrene Generating Station. Obviously, most of the survey took place outside the 1-mi-wide area of current concern. Relevant here is that portion of the survey corridor running parallel to and along the southern side of the Western Canal where it roughly bisects Section 11. Along this transect, Antieau recorded AZ U:9:71 (ASU), an artifact scatter extending 400 m west from the midsection point along the south side of the canal. He observed that ceramic sherds were abundant, outnumbering lithics four to one, and that buff ware was relatively prevalent among these sherds (35 percent of assemblage). All identifiable decorated sherds were Sacaton Red-on-buff. Antieau concluded the scatter indicated a Hohokam habitation site of some size.

The section was revisited by ASU in 1978 for the purpose of archaeological clearance. Grove (1978) conducted a survey of the entire southern half of Section 11 for Knoell Homes, in advance of the proposed Tempe 9 Community Development. The entire parcel, essentially a plowed field cut by several irrigation ditches, was examined using survey transects spaced 20 m apart. The area of an existing house in the northeastern corner and a power substation near the center of the southern boundary were avoided. An artifact concentration was encountered running north-south through the eastern half of Section 11's western half. The scatter was considered an extension of AZ U:9:71 (ASU), the site recorded by Antieau (1977) along the northern edge of the parcel. Notably, Grove (1978:3) observed that there was no trace of the mounds recorded previously by Turney (1929) or Pueblo Grande Museum (AZ U:9:25 [PG]) in the southern half of Section 11 (see Figure 3.1). Archaeological testing was recommended in the area of the artifact scatter, as well as in the areas recorded by Turney and Pueblo Grande Museum.

Archaeological testing in the Knoell Tempe Unit 9 parcel commenced roughly a month later (Blank 1978). Fieldwork was accomplished only in the area of the artifact scatter identified by Grove (1978). Blank (1978) offered the opinion that surficial evidence should be detectable if cultural remains were present elsewhere in the original survey parcel. The testing methods included a sample surface collection and backhoe trenching. Surface artifacts were collected from 273 1.8-m-diameter units, spaced systematically across the roughly 400-m by 800-m project area. A contour map of artifact densities generated from these collections was used to guide the placement of backhoe trenches. Nineteen trenches (length unspecified) were dug to an approximate depth of 1.1 m; 12 were placed randomly and seven judgmentally. Archaeological features were encountered in three of the trenches. A possible prehistoric ditch was located in the north-central portion of the project area, and two pits were in the southeastern portion just north of Elliot Road. Blank (1978) observed that the large size and shape of one of the pits resembled a Hohokam canal, but it lacked the laminations or cross-bedding of sediments expected in these features. Blank also reported that Fred Plog had observed a pithouse in the side walls of a ditch bordering Elliot Road in this same area. Based on the ceramic analysis, it was concluded that the site was inhabited from the Colonial through Sedentary periods. Notably, Santa Cruz Red-on-buff sherds outnumbered Sacaton Red-on-buff by a factor of three to one suggesting occupation peaked during the late Colonial period. Blank (1978) concluded that AZ U:9:71 represented the remains of a complex of prehistoric trash middens and associated village areas, and speculated the site might be a part of Los Guanacos, as identified by Haury (1945). Recommendations were made to either avoid or bury the site prior to development, or undertake a data recovery program if these options were unacceptable.

ASU's last involvement at AZ U:9:71 (ASU) entailed monitoring of grading by Knoell Homes for the development of the present-day Corbell Park. Based on the map provided by Rice (1980), this activity took place only in the eastern half of the park, overlapping the project area previously investigated by Blank (1978) (Figure 3.3). A prehistoric canal and lateral ditch, an horno, several middens, and a cremation were encountered. Rice (1980) emphasized that there was no surface evidence to indicate any of the features existed, and it was only after the graders had removed approximately 1 m of sediment that they became visible. Test units were excavated over the midden areas, the horno and cremation were excavated, and trenches were cut to expose the canals in profile. Rice (1980) observed that a number of warped basalt artifacts (manos and broken metates) were recovered from the horno, indicating extreme temperatures in its use. He further reported that sherds from the middens were very large, sometimes representing halves of vessels, and suggested pots were discarded into the midden because of breakage during the firing process. He speculated that the horno was used to fire the ceramic vessels. The ceramic artifacts were attributed to the Sacaton phase.

An additional archaeological project was conducted at AZ U:9:71 (ASU) in the early 1980s, but no report documenting the work has yet been located. The work consisted of salvage excavations conducted by volunteers as Knoell Homes was building an additional development about a quarter mile east of the intersection of Rural and Elliot roads. Shereen Lerner, then the State Historic Preservation Officer, directed the excavations and among the participants were Jerry Howard, Johna Hutira, and K. J. Schroeder. The project also marks the founding of the Southwest Archaeological Team (SWAT), a group of avocational archaeologists now affiliated with the Mesa Southwest Museum. Lerner (personal communication 2000) indicates trenches were cut systematically across their project area and that some pithouses and a few pits were excavated. She also said a summary report, including analyses of the recovered artifacts, was written and stored at the SHPO. The artifacts and field notes are apparently now stored at the ASU Department of Anthropology. Perhaps the most significant outcome of this project was the naming of AZ U:9:71 (ASU) as "Las Estufas." The site boundary shown on Figure 3.1 was drawn by Jerry Howard (personal communication 2000) when compiling his map of Salt River Valley prehistoric sites and canals for the East Papago Freeway project (Howard 1991a). He intentionally drew the boundary to include all earlier recordings of prehistoric remains in the vicinity of AZ U:9:71 (ASU).

Las Estufas, or AZ U:9:71 (ASU), was revisited in 1990 by Archaeological Consulting Services, Ltd. (ACS). The ACS project entailed archaeological monitoring of trenching for an El Paso Natural Gas pipeline through the cities of Mesa, Tempe, and Chandler (Kisselburg and Horton 1990). Near the KEP vicinity, the gas line bordered the southern side of the Western Canal in Sections 11 and 12, T1S, R4E, turned south along the eastern edge of Section 10, turned again to the west along the northern edge of Section 15, where it turned southward and paralleled the eastern edge of the Southern Pacific Railroad (Figure 3.3). Kisselburg and Horton (1990) identified seven prehistoric canals and one archaeological feature in this transect. Five of the canals were located in Section 12 and two in Section 11; all appear to have had roughly north-south trajectories. One of the Section 11 canals essentially bisects AZ U:9:71 (ASU) as mapped by Antieau (1977) and Grove (1978); the other canal was located near the western corner of the section. The locations of both features correspond roughly with the courses of previously mapped canals (see Figure 3.1). The archaeological feature was observed just east of the Kyrene Branch Canal on the south side of Elliot Road. This feature consisted of a 1-m-long, 20-cm-thick lens of ashy, black soil located below a layer of recent fill. Kisselburg and Horton (1990) offered the opinion that the lens was relatively recent in origin.

The earliest cultural resource management project accomplished west of the Kyrene property occurred in late 1979 and early 1980. Effland and Green (1980) conducted an archaeological survey of alternative corridors for a proposed high-voltage transmission line to the Kyrene station. The survey crew examined 15 roughly 70-m-wide, 1-mi-long transects, seven of which occur within 1 mi of the Kyrene property. These include one east-west transect along the north edge of Section 4, four east-west transects in Section 9, and two transects that parallel the Highline Canal and Southern Pacific Railroad in Section 16, T1S, R4E (Figure 3.3). No sites were identified by the survey, but based on the results of a records search, it was recommended that corridors in the vicinity of Los Guanacos be avoided.

In 1995, SWCA, Inc. conducted an archaeological survey of a 23-acre parcel owned by the Pascua Yaqui Tribe in the northwest quarter of Section 9, T1S, R4E. One prehistoric site, AZ U:9:147 (ASM), and four isolated occurrences were recorded (Stubing et al. 1995). The site was a small, low-density artifact scatter. The presence of plain ware sherds and a single unidentifiable red-on-buff sherd indicated its Hohokam affiliation. The isolated finds included a core scraper, plain ware sherds, and some historic period trash. Stubing and others (1995) did not consider the site to be significant and recommended that no further archaeological work was necessary in the parcel.

SHPO records indicate that Archaeological Research Services, Inc. (ARS) completed an archaeological survey of a 22-acre parcel in the southern half of Section 9, T1S, R4E (Figure 3.3). This survey was identified only by an inventory number (#3432-I) on the SHPO map. Use of an inventory number without an accompanying report number indicates no cultural remains were found. A report title was provided on the inventory list (Tweedy 1998).

In the late 1990s, ACS conducted a Class III cultural resources survey of SRP-maintained canals in the Salt River Valley for the Bureau of Reclamation (Aguila 1998). The project included an overview of archaeological resources located along the canals, and a pedestrian survey. The survey inspected the 25-m right-of-way along each side of the canals, measured from the existing canal berms. Canals examined included the Arizona and Grand canals on the north side of the Salt River, and the South, Eastern, Tempe, Consolidated, Western, Kyrene Branch, and Highline canals on the south side of the Salt. Relevant for this report are results obtained along the course of the Western and Kyrene Branch canals. Aguila (1998) reports that 14 ceramic sherds were found on the surface of the Western Canal berm within the boundaries reported by Antieau (1977) for AZ U:9:71 (ASU). Although artifacts were sparse, it was observed that Kisselburg and Horton (1990) had located a canal in the same area, and testing was recommended if subsurface disturbance was to occur in this area. Artifacts were also observed along a .3-mi segment of the Western Canal where it turns to the north in Section 10, adjacent to the area of AZ U:9:24 (PG). The portion of the Kyrene Branch

Canal running through the Kyrene facility was not examined, but artifacts were found along a .2-mi segment south of Elliot Road, in the area of Los Guanacos, AZ U:9:116 (ASM). Again, recognizing the high potential for subsurface cultural remains to be present at these locations, Aguila (1998) recommended testing before any further disturbance is undertaken along the right-of-way.

The most recent project outside the Kyrene facility is Dames & Moore's work adjacent to the Highline Pumping Plant north of the facility proper (Hill and Davies 2000). This project was initiated in response to proposed boring for an irrigation line under the Western Canal. Investigations involved digging three backhoe trenches in the area of the bore pits, two on the eastern side of the Western Canal, and the other on the western side of the canal. A prehistoric pit containing numerous artifacts, mainly plain ware sherds, was found in one of the east-side trenches. Matthew Hill (personal communication 2000) stated that a radiocarbon date, A.D. 795-1000, was obtained on a piece of charcoal from the pit. A concrete foundation, probably a foundation for an older pump, was encountered in the west-side trench. Preparation of the report for this project is ongoing.

Investigations inside the Kyrene Facility

The records search revealed that there has been a surprising number of archaeological projects inside the Kyrene facility. The earliest and most enigmatic of these is the monitoring of the construction of the dike around the two fuel oil tanks in the Tank Yard (Fortier 1979). The work was accomplished by ARS for the purpose of determining if cultural resources were present and to undertake mitigation measures if necessary. Fortier (1979) indicates that the monitoring consisted of observing the progress of the land modification and construction activities. A grab-sample of surface artifacts was collected (21 sherds, 2 flakes), ostensibly to determine the nature and date of prehistoric occupation and to aid in defining concentrations of artifactual material that might indicate the presence of subsurface remains. No surface artifact concentrations were noted; artifacts were reported to be spread thinly and evenly across the surface of the project area. One archaeological feature, a roasting pit or oven, was identified in the wall of a water line trench. The feature is described as a circular basin-shaped pit, containing greenish-white to deep red "caliche nodules" (probably thermally altered rock), and having a charred or carbonized edge and base (Fortier 1979). Fortier also provides a description of the project area's stratigraphy, noting the occurrence of three soil zones: a uniform plowzone of brownish loam in which cultural material "appears infrequently, but consistently"; a reddish-brown clay and silt layer; and a caliche base. The two lower layers contained no cultural material. Three subsurface artifacts, a plain ware sherd and two unidentified red-on-buff sherds, were recovered from the plowzone. One smudged Salt Red sherd was collected from the excavated pit fill. The author concluded that a major portion of a previously existing archaeological site, a component of AZ U:9:24 (PG), had been destroyed by historic plowing. He also ventured that monitoring was a poor means of mitigation and recommended archaeological testing as an alternative procedure prior to construction.

Troubling about this report is what was evidently missed, particularly in light of the results of the current project. Furthermore, Fortier's (1979:8) statement that subsurface artifactual material was scarce is belied by the high density of artifacts that now can be seen eroding from the berms of the tank dike. The density ranges from roughly 10 artifacts per square meter north and south of the western tank to several hundred per square meter along the perimeter of the eastern tank. Fortier did observe that the use of large earth-moving equipment–bulldozers, large front-end loaders, backhoes, trenchers, dump trucks, and soil compactors–considerably reduced the opportunity of locating archaeological features through monitoring. In addition, the fuel oil tanks were present at the time of the monitoring, so some land modification had undoubtedly occurred in the preparation of their foundations. Perhaps the ground surface was in such a continual state of disturbance that Fortier was unable to perceive the archaeological features now known to be (or were) present in the Tank Yard.

Shortly after the monitoring for the dike construction, MNA conducted an archaeological survey of most of the SRP-owned land between the Tank Yard and Elliot Road (Keller 1979). At the time, the 55-acre parcel was a plowed field. East-west transects spaced 25 m apart were used to accomplish the survey, observed artifacts were marked on an aerial photograph of the field, and a representative sample of ceramics was collected. Three artifact concentrations were found, one located in the center of the parcel and the other two near its northeast and northwest corners. Keller (1979) observed a higher density of artifacts in the two northern concentrations, which included ceramics, lithics, and pieces of burned adobe or jacal. The soil of the central concentration was ash-stained and contained a relative abundance of river cobble lithic material. Ceramics from the site included Gila Plain, Wingfield Plain, Salt Red, and either Santa Cruz or Sacaton red-on-buff. The buff ware sherds were more closely associated with the artifact concentrations than the red ware. The artifact concentrations were surmised to be the locations of structural units, and the parcel was assigned an MNA site number, NA 15,799. Keller (1979) further suggested that the cultural remains were associated with the "Alta Vista" site complex recorded by Turney (1929) to the south, and speculated that the small Pueblo Grande site, AZ U:9:24 (PG), to the north was also a part of this site complex. Backhoe trenching was recommended to establish the presence and condition of subsurface cultural deposits.

In 1986, ARS undertook archaeological survey and monitoring for the construction of a sanitary sewer line at the Kyrene facility (Stone 1986). The sewer line extended roughly 350 m along the west side of the Kyrene Branch Canal between a pump station and Elliot Road in the southwest quarter of Section 10, T1S, R4E (Figure 3.3). The survey examined a 3-m-wide corridor along the sewer line alignment; monitoring consisted of inspecting the walls of the trench excavated for the line. More than 150 prehistoric sherds, mostly plain ware and a few Santa Cruz or Sacaton red-on-buff, along with 15 to 20 basalt flakes and 1 vesicular basalt grinding stone, were reported by the survey. No archaeological features were located during subsequent monitoring, but approximately 40 sherds were observed within a 6-cm-thick disturbed zone just below the ground surface. Stone (1986) concluded that disturbed subsurface archaeological remains were likely present in the vicinity of the sewer line.

Between 1986 and 1993, three interrelated projects were undertaken within the boundary of Los Guanacos ("Alta Vista"), as recorded by Turney (1929) and Midvale (n.d.). Fedick (1986b) performed the first of these projects, an archaeological survey for the proposed SRP Central Support Complex. The 103-acre survey parcel was located south of the present-day Kyrene facility in the northwest quarter of Section 15, T1S, R4E (Figure 3.3). At the time of survey, the parcel was a plowed field that had been recently disced. It was examined using parallel north-south transects spaced 15 m apart. A well-defined, prehistoric artifact scatter containing abundant quantities of ceramic sherds (500-1,000) and lithics (100-200) was identified in the eastern third of the survey area. Ceramic types represented in the artifact scatter were predominately Salt Red and Gila Plain, with a few Casa Grande Red-on-buff and one Gila Polychrome sherds. Most of the lithics were flakes, with at least six hammerstones also recorded. Only five isolated sherds or lithics were found in the western two-thirds. Fedick (1986b) further observed that there was no evidence of the mound or canal mentioned by Midvale (n.d.) in this area; this absence was attributed to plowing activity. Fedick concluded that the scatter was a portion of the Hohokam village designated AZ U:9:48 (ASU), and recommended archaeological testing in the scatter's area, if avoidance was not an option.

The recommended testing program was conducted several months later (Fedick 1986a). Forty-seven trenches totaling 1,155 m were cut to a depth of 1.5 m inside the 610-m by 91-m project area. Forty percent of the trenches were positioned randomly and 60 percent were placed judgmentally. Surface artifact collections were made along the length of each trench prior to its excavation, as well as in randomly placed units. Diagnostic artifacts outside these locations were collected also. Twenty-five subsurface prehistoric features were identified in trench profile, including 1 pithouse, 2 inhumations, 1 possible inhumation, 1 horno, 1 roasting pit, 1 plaster-lined pit, 2 borrow pits, 14 pits, and 2 refuse deposits or middens. Most of the features occurred in two clusters inside the central two-thirds of the project area, in an area identified as the "core zone" (Fedick 1986a). The northern cluster contained the range of features commonly associated with a Hohokam residential area (e.g., pithouse, roasting pit, trash-filled pits, burials), whereas the southern cluster contained only pits and the possible inhumation. Use of this area for borrowing activity was speculated. Relatively abundant quantities of red ware sherds with fewer Casa Grande Red-on-buff and Gila Polychrome sherds indicated the remains dated primarily to the Classic period. A few Santa Cruz and Sacaton red-on-buff were collected as well, suggesting some use of the area during the Colonial and Sedentary periods. Fedick (1986a) concluded that the tested area of AZ U:9:48 (ASU) was likely to represent one of a number of spatially associated habitation/activity areas collectively recorded in the historical records as Los Guanacos (a.k.a. Alta Vista). He observed that large Hohokam sites often contain clusters of features that have been occupied differentially through time. Data recovery was recommended if construction of the SRP Central Support Complex were to proceed at the tested location.

Northland Research, Inc. implemented a data recovery program within ARS's test parcel in late 1992 (Howell 1993). The work was sponsored by SRP, prior to the sale of the parcel to a private party. The site was identified as Los Guanacos, AZ U:9:116 (ASM), by this project. An initial phase of work involved backhoe trenching, horizontal stripping, and excavation of a sample of features. A second phase was initiated when several previously unidentified adobe walls and oblong pits suggestive of human burials were encountered. By project's end, 72 features had been documented, including 2 pit structures, 7 adobe rooms, 4 adobe wall segments, 6 hornos, 3 extramural hearths, 7 indeterminate thermal pits, 20 nonthermal pits, 16 inhumations, and 1 cremation. Notably, in most cases, only a few centimeters of the adobe room and wall foundations remained, indicating severe truncation of cultural deposits through historic and modern plowing. Also, a number of the inhumations were superimposed or "stacked," suggesting both that graves bore some form of marking and that the deceased were familially related (Howell 1993). Ceramic and chronometric evidence indicated occupations ranging from the late Sacaton (circa A.D. 1150) through the Polvorón phases (circa A.D. 1450-1500). Howell (1993) examined several models of Classic period settlement abandonment and found the project's evidence implicated a collapse of the canal system as a prime cause for the late Classic period population decline. He offered the caveat, however, that additional research was needed to definitively address this problem.

Historic Resources

The Kyrene Branch, Western, and Highline canals all date to the historic era (Andersen 1990a, 1990b). Of these, the Kyrene Branch, also known as the Orange Belt Canal, was the earliest. This canal was built in the 1880s as an extension of the Wormser Canal, running first parallel to the Wormser and then south to the boundary of the Gila River Indian Reservation. The construction of the Western Canal originated in the failed attempt on part of the U.S. Reclamation Service to acquire the Tempe Canal (Andersen 1990b). The "attempted merger" (between Tempe Canal shareholders and Reclamation) came out of the desire of the Tempe Canal shareholders to improve drainage on their lands. Ultimately the Western Canal, constructed between 1911 and 1913, was built in order to expand the irrigable acreage of the SRP and to supply water to the Highline Canal, constructed between 1912 and 1914. All three canals have been extensively renovated and modernized over the years so it is doubtful that much remains of their historical integrity. The reader is referred to the Historic American Engineering Records that have been completed for the Western and Highline canals for additional detail (Andersen 1990a, 1990b).

Summary and Discussion

Three Hohokam sites have been identified in proximity to the Kyrene facility: Los Guanacos (AZ U:9:116 [ASM], AZ U:9:48 [ASU]); Las Estufas (AZ U:9:71 [ASU]); and AZ U:9:24 (PG). The reported presence of pithouses, adobe compounds, or trash mounds at each of the three sites indicates all are the locations of prehistoric villages. Recovered diagnostic artifacts further indicate that both Los Guanacos and Las Estufas contain components ranging from the late Colonial through the Classic periods. AZ U:9:24 (PG) appears to have been occupied primarily during the Sedentary period.

Although there are inconsistencies in the location reported for Los Guanacos, the cumulative evidence indicates that the cultural remains identified by the current testing project are a part of this site. First, the surveys by Keller (1979), Stone (1986), Fedick (1986b), and Aguila (1998) demonstrate that there is a fairly continuous spread of surface artifacts, including artifact concentrations suggestive of subsurface habitation units, between AZ U:9:24 (PG) and the location of Los Guanacos mapped by Turney (1929) and Midvale (n.d.). In contrast, few artifacts or archaeological features were reported by Antieau (1977), Grove (1978), Kisselburg and Horton (1990), and Aguila (1998) between the western boundary of Las Estufas and the Kyrene plant. The near absence of cultural material suggests there is a definite gap between the two sites. Second, the earliest investigators of Los Guanacos describe the site as a prehistoric pithouse village of the Colonial and Sedentary period (Cushing 1890; Haury 1945). Fedick (1986a) and Howell (1993), however, uncovered archaeological remains inside the site's mapped boundary that were mostly Classic period, with little hint of a substantial pre-Classic component. The place where pre-Classic period material has been found in abundance is to the north (site card for AZ U:9:24 [PG]; Hill and Davies 2000; Keller 1979; Stone 1986). Brunson's (1989) review of the Hemenway Expedition notes suggests that multiple locations within the confines of Los Guanacos were investigated. The speculation is offered that the expedition's excavations of the Colonial-Sedentary pithouse village took place somewhere inside or very close (e.g., AZ U:9:24 [PG]) to the Kyrene facility. There is little surprise that the present evidence suggests residential shifts occurred at Los Guanacos across time, as this pattern is a common aspect of many large Hohokam villages.

FIELD METHODS AND RESULTS

T. Kathleen Henderson and Gregson Schachner

The objectives of archaeological testing for the Kyrene Expansion Project (KEP) were to determine if buried cultural remains were present, and if they were found, to evaluate them in terms of their preservation, extent, and potential to yield information that could contribute to existing knowledge of the history or prehistory of the region. In this chapter, the methods used to seek and identify cultural remains and the general results of the fieldwork are described. Additional detail about the archaeological features found by the project and an assessment of their significance is provided in subsequent chapters.

FIELD METHODS

The fieldwork for this project was conducted in three phases between 14 February and 5 May 2000, with a total of 100 person-days expended in the effort. The phases were distinguished according to areas that will contain different elements of the proposed expansion project. These include the Pole Yard where the new generating station will be built, the Tank Yard which will contain an associated switchyard, and the route of the proposed new gas line for the new generating station. Standard archaeological testing methods were used during the exploration of these areas, including backhoe trenching, feature profiling, artifact collections, and mapping. Excavations also were conducted to recover materials associated with five prehistoric cremation burials encountered during the trenching.

Backhoe Trenching

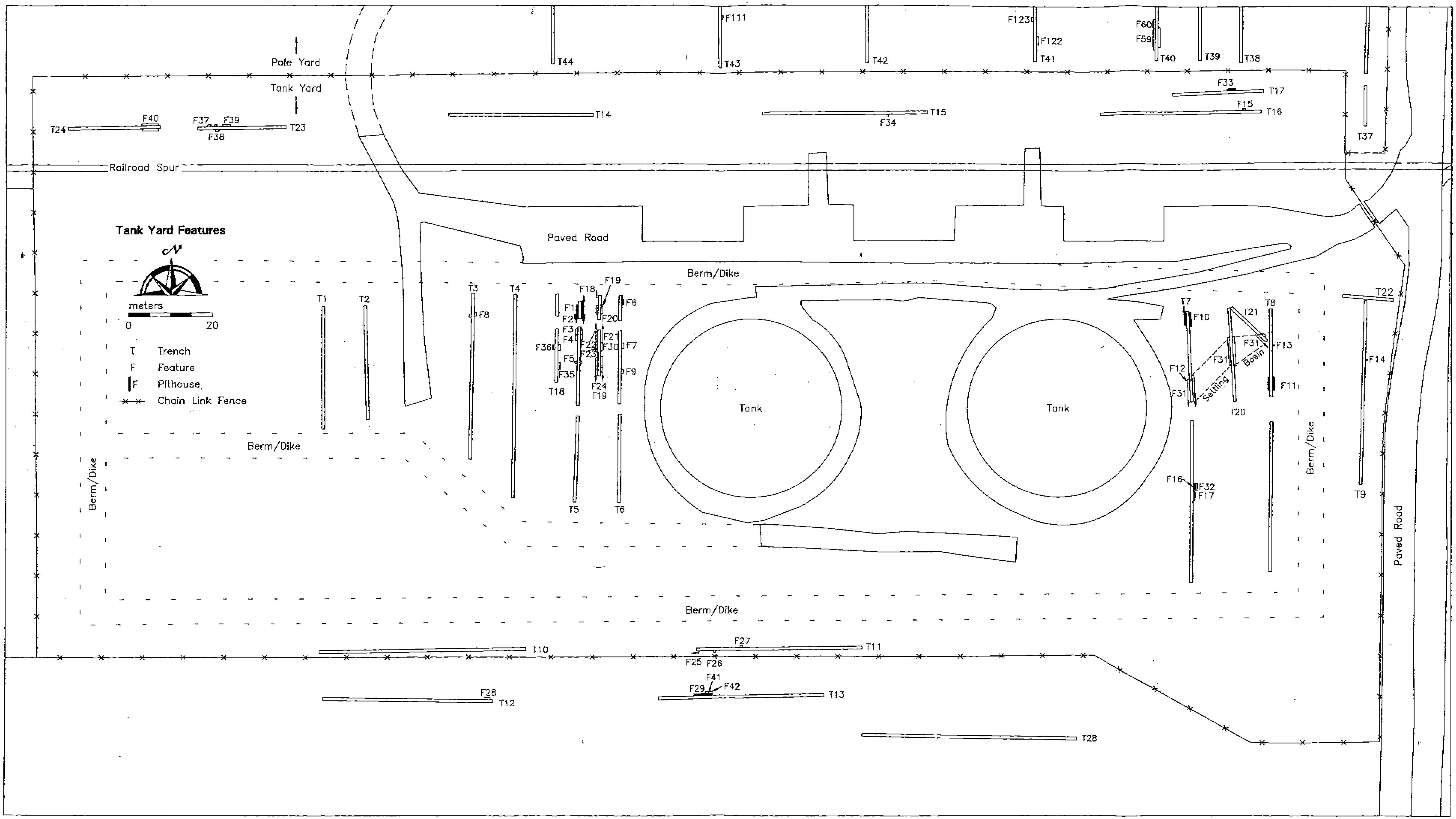
Backhoe trenching was the primary field method used to acquire information during testing. The testing plan for the Pole and Tank yards called for a set of trenches to be placed systematically to cover a minimum of 2 percent of the testable area in each project parcel, with an additional set of judgmentally placed trenches to be used to better define feature distributions when cultural remains were encountered. The combined trench sample for the two yards was not to exceed 3.5 percent of the testable area. The recommended sample fraction for testing in the linear corridor of the new and realigned gas lines was 50 percent, to be accomplished using 40-m-long trenches placed at 40-m intervals along the corridor. The eventual trench pattern in each area was conditioned by the placement of permanent structures, underground utilities, and other obstructions, all of which were avoided.

A 2-ft-wide backhoe bucket was used to dig the trenches to a maximum depth of 5 ft. Once the trench was excavated, the field crew scraped the walls with hand tools to provide a clear exposure of subsurface cultural material. Any artifacts and changes in sediment texture or color were noted, and a trench form describing the stratigraphy was completed. When features were encountered, standard forms were completed, profile maps were drawn, and photographs taken. The locations of all trenches and features were mapped. All archaeological excavations were backfilled once the assessment and recording of trench and feature profiles was completed.

Tank Yard Trenching

The 11-acre Tank Yard is the site of the proposed switchyard for the new generating station. At the initiation of testing, Salt River Project (SRP) archaeologist Richard Anduze indicated the footprint of this facility would begin roughly 85 m west of the westernmost of the two fuel oil tanks located in the yard, and extend to the south 20 m beyond the southern Tank Yard fence. The area to be tested was to be generally confined to the 122-m by 140-m footprint; portions of the eastern Tank Yard were included due to potential impacts stemming from other construction-related activities.

At the time of testing, the Tank Yard contained two 5-million gallon fuel oil tanks surrounded by dikes or berms designed to prevent spillage if the tanks ever collapsed (Figure 4.1); the western tank has since been demolished. A railroad spur ran east-west across the northern portion of the yard, and most of the area between the northernmost berm and the railroad tracks east of the Tank Yard's northern access road was paved. Within the paved area were fuel oil pumps mounted on concrete pads. A series of fire water boxes and valves occurred at systematic intervals on the north and south side of the yards, and area lighting fixtures were present inside and all around the perimeter of the yard. A web of underground utility lines, including water, fire water, electrical, and fuel oil line,


Tank Yard Features
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20
T Trench
F Feature
F Pithouse
Chain Link Fence
Pole Yard
Tank Yard
Railroad Spur
Paved Road
Berm/Dike
Berm/Dike
Berm/Dike
Berm/Dike
Berm/Dike
Tank
Tank
Settling Basin
Paved Road
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serviced the various facilities. In addition, the El Paso gas line that services the current Kyrene Generating Station ran parallel to and north of the railroad spur. The presence of the existing structures and utilities not only reduced the area available for examination (i.e., "testable area"), but also strongly conditioned the placement of trenches Testing commenced in the Tank Yard on 14 February 2000 under the direction of Kathleen Henderson and Ellen Ruble and was completed, including backfilling of all trenches, on 29 February 2000. Thirty-three person-days were expended in the effort. For the systematic sample, north-south oriented trenches were placed at 10- to 20-m intervals within the bermed area of the yard, and 40-m-long, east-west trenches were positioned at 40-m intervals outside the bermed area (Figure 4.1). The judgmental sample consisted of shorter trenches placed at 5-m intervals adjacent to those systematic trenches where features were found. In total, 767 linear meters of trench was cut (Table 4.1), and 38 archaeological features were found (Table 4.2). The trenching provides a 3.5 percent sample of the testable area of the Tank Yard, extending east from the proposed new switchyard's western boundary. Excluded from the total area (39,600 m^2) were the immediate area of the fuel tanks (approximately 9,779 m^2) and the paved area between the railroad spur and the northern fuel tank berm (approximately 6,664 m^2).

Pole Yard Trenching

The 10-acre Pole Yard is the site of the proposed new generating station. The facility is estimated to extend 255 m west from the east fence of the Pole Yard and 194 m south from the Pole Yard's north fence. As such, the footprint extends roughly 20 m into the area of SRP's Central Reclamation facility and 20 m south into the Tank Yard. Unlike the Tank Yard, once the poles and other equipment had been removed, the Pole Yard was relatively free of obstructions. The primary area unavailable for examination was a 17-m-wide, east-west, paved corridor containing a railroad spur and underlying utilities (Figure 4.2). Other utility lines were present in the yard, but these could be avoided by adjusting the specific location or length of a trench. The area in the southwestern corner of the new generating station's footprint also was not tested because it was being used for parking, storage, and access in and around Central Reclamation.

Testing of the Pole Yard began on 12 April 2000 under Kathleen Henderson's direction, and was completed, including backfilling of all trenches, on 5 May 2000. Fifty-eight person-days were expended in this effort. The systematic sample for this phase consisted of parallel, north-south oriented trenches excavated at 40-m intervals across the Pole Yard. In a few cases, the interval was altered by 5 m to avoid a utility line or other obstruction. The judgmental sample also used parallel, north-south oriented trenches, generally positioned 10 or 20 m distant from those systematic trenches yielding archaeological features (Figure 4.2). Intervals of 5 m between the systematic and judgmental trench were used in those situations where cremation burials had been encountered. In total, 1,565 linear meters of trench were cut during testing (Table 4.1), and 81 archaeological features were found (Table 4.2). The trenching provides a 2.9 percent sample of the testable area of the Pole Yard, extending east from the proposed new generating station's western boundary. Excluded from the total area (44,370 m^2) were the corridor containing the railroad spur and underground utilities (3,825 m^2), and the paved area extending west of the Pole Yard entrance road that is presently used for parking and Central Reclamation access (2,375 m^2).

Gas Line Trenching

The proposed new gas line for the new generating station will extend 595 m north from the northeastern corner of Kyrene and Elliot roads along the western boundary of the Kyrene facility, and then turn east paralleling the existing El Paso gas line and run an estimated 240 m to the northern access road into the Tank Yard (Figure 4.3). A possible route for the realignment of the existing gas line into the present Kyrene Generating Station will run adjacent to the western and southern edges of the proposed new switchyard. Because portions of the realignment route were included in the Tank Yard testing, the only area of concern was the 230-m-long corridor roughly 20 m south of the Tank Yard fence. The combined distance of the proposed lines is approximately 1,065 m. The right-of-way corridor in which the line will be placed is estimated to be 3 to 6 m wide.

Major encumbrances to testing along the gas line corridors were the numerous fences that subdivide the SRP property into its component facilities, asphalt-paved areas, and grounding wires in the 500 kV Switchyard. Although saw-cutting of the asphalt pavement was permitted, it was deemed more efficient to cut fewer, longer trenches than the 40-m-long trenches agreed to in consultation with the SRP archaeologist. Testing for the gas line was initiated on 21 February 2000 and completed, including backfilling of all but one trench, on 8 March 2000. Nine person-days were expended in the effort. A total of 442 linear meters of trench was cut (Table 4.1) and four archaeological features were discovered (Table 4.2). All four features occurred at the northwestern end of the Tank Yard (Figure 4.2); no features, artifacts, or other material of cultural significance were observed in any of the trenches farther west. The trenching provides a 41.5

Table 4.1. Trench characteristics.

Task	Trench Number	Length (m)	Maximum Depth (m)	Direction	Location	Features Present
Tank Yard	1	29.0	1.00	N-S	West Tank Yard	-
Tank Yard	2	27.0	1.27	N-S	West Tank Yard	-
Tank Yard	3	39.5	1.22	N-S	West Tank Yard	8
Tank Yard	4	48.5	1.00	N-S	West Tank Yard	-
Tank Yard	5	42.3	1.00	N-S	West Tank Yard	1, 2, 3, 4, 5
Tank Yard	6	44.1	.88	N-S	West Tank Yard	6, 7, 9
Tank Yard	7	58.3	1.20	N-S	East Tank Yard	10, 12, 16, 17, 32
Tank Yard	8	56.7	1.27	N-S	East Tank Yard	11, 13
Tank Yard	9	44.3	1.40	N-S	East Tank Yard	14
Tank Yard	10	48.8	1.10	E-W	South Tank Yard	-
Tank Yard	11	39.0	1.32	E-W	South Tank Yard	25, 26, 27
Tank Yard	12	39.5	1.35	E-W	South Tank Yard	28
Tank Yard	13	39.4	1.30	E-W	South Tank Yard	29, 41, 42
Tank Yard	14	33.5	1.40	E-W	North Tank Yard	-
Tank Yard	15	38.0	1.31	E-W	North Tank Yard	34
Tank Yard	16	38.5	1.32	E-W	North Tank Yard	15
Tank Yard	17	21.6	1.20	E-W	North Tank Yard	33
Tank Yard	18	18.0	1.15	N-S	West Tank Yard	35, 36
Tank Yard	19	16.1	1.20	N-S	West Tank Yard	18, 20, 21, 22, 23, 24, 30
Tank Yard	20	22.0	1.25	N-S	East Tank Yard	31
Tank Yard	21	11.0	1.45	NW-SE	East Tank Yard	31
Tank Yard	22	11.7	1.54	E-W	East Tank Yard	-
Gasline	23	20.7	1.25	E-W	North Tank Yard	37, 38, 39
Gasline	24	20.5	1.25	E-W	North Tank Yard	40
Gasline	25	39.5	1.30	E-W	Central Reclamation	-
Gasline	26	41.0	1.20	E-W	EHV Yard	-
Gasline	27	49.8	1.30	N-S	EHV Yard	-
Gasline	28	50.0	1.30	E-W	South of Tank Yard	-
Gasline	29	67.8	1.22	N-S	EHV Yard	-
Gasline	30	73.0	1.55	N-S	500kV Switchyard	-
Gasline	31	45.1	1.25	N-S	Tempe Service Center	-
Gasline	32	19.7	1.15	N-S	Tempe Service Center	-
Gasline	33	14.9	1.30	N-S	Tempe Service Center	-
Pole Yard	37	78.7	1.42	N-S	SE Pole Yard	-
Pole Yard	38	67.2	1.46	N-S	SE Pole Yard	55, 56, 57, 58, 62, 63
Pole Yard	39	67.1	1.55	N-S	SE Pole Yard	43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 64
Pole Yard	40	67.2	1.58	N-S	SE Pole Yard	59, 60, 61, 65
Pole Yard	41	67.5	1.42	N-S	SE Pole Yard	122, 123
Pole Yard	42	71.0	1.31	N-S	SW Pole Yard	120
Pole Yard	43	72.9	1.33	N-S	SW Pole Yard	111, 112, 113, 114, 115, 116, 117, 118, 119
Pole Yard	44	71.9	1.30	N-S	SW Pole Yard	109, 110
Pole Yard	45	72.0	1.43	N-S	NE Pole Yard	66, 67
Pole Yard	46	74.0	1.36	N-S	NE Pole Yard	-
Pole Yard	47	75.0	1.49	N-S	NE Pole Yard	71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83
Pole Yard	48	75.7	1.33	N-S	NW Pole Yard	97, 98
Pole Yard	49	76.6	1.25	N-S	NW Pole Yard	100, 101, 102, 103
Pole Yard	50	77.6	1.23	N-S	NW Pole Yard	-
Pole Yard	51	48.9	1.22	N-S	SE Pole Yard	70
Pole Yard	52	35.0	1.31	N-S	NE Pole Yard	-
Pole Yard	53	71.8	1.43	N-S	NE Pole Yard	68, 69
Pole Yard	54	73.2	1.40	N-S	NE Pole Yard	84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 124
Pole Yard	55	72.4	1.27	N-S	NE Pole Yard	95
Pole Yard	56	72.8	1.22	N-S	NE Pole Yard	96
Pole Yard	57	19.5	1.25	N-S	SW Pole Yard	121
Pole Yard	58	19.5	1.27	N-S	SW Pole Yard	-
Pole Yard	59	28.2	1.30	N-S	NW Pole Yard	99
Pole Yard	60	10.1	1.23	N-S	NW Pole Yard	-
Pole Yard	61	28.4	1.28	N-S	NW Pole Yard	104, 105, 106, 107
Pole Yard	62	9.7	1.23	N-S	NW Pole Yard	108
Pole Yard	63	61.5	1.24	N-S	NW Pole Yard	-

Table 4.2. Features identified during the testing phase.

Feature Number	Feature Type	Trench Number	Trench Side	Depth BGS (m)[a]	Max Feature Length (m)	Max Feature Depth (m)	General Location
1	Pithouse	5	Both	.05	2.85[b]	.18	West Tank Yard
2	Pithouse	5	Both	.05	.77[b]	.37	West Tank Yard
3	Pit, large	5	Both	.25	1.45	.30	West Tank Yard
4	Pit, small	5	Both	.32	1.45	.63	West Tank Yard
5	Pit, small	5	Both	.23	.60	.46	West Tank Yard
6	Possible pithouse	6	East	.31	1.27	.14	West Tank Yard
7	Pit, small	6	East	.17	1.30	.29	West Tank Yard
8	Pit, small	3	Both	.25	.83	.60	West Tank Yard
9	Pit, bell-shaped	6	East	.15	.90	.69	West Tank Yard
10	Possible pithouse	7	Both	.19	3.40[b]	.34	East Tank Yard
11	Possible pithouse	8	Both	.09	3.21	.30	East Tank Yard
12	Pit, small	7	West	.42	.91	.34	East Tank Yard
13	Pit, small	8	East	.14	.25	.30	East Tank Yard
14	Pit, small	9	East	.60	.30	.10	East Tank Yard
15	Pit, small	16	North	.44	.64	.33	North Tank Yard
16	Possible pithouse	7	East	.25	1.65	.20	East Tank Yard
17	Borrow pit	7	East	.40	2.15	.75	East Tank Yard
18	Pit, small	19	West	.40	.33[b]	.22	West Tank Yard
19	Pit, small	19	East	.29	.35	.25	West Tank Yard
20	Horno	19	Both	.25	2.10	.95	West Tank Yard
21	Borrow pit	19	Both	.26	2.84[b]	.87	West Tank Yard
22	Pit, small	19	West	.19	.24	.21	West Tank Yard
23	Roasting pit	19	West	.80	.26	.13	West Tank Yard
24	Borrow pit	19	Both	.44	4.75[b]	.77	West Tank Yard
25	Pit, small	11	South	.38	.49[b]	.32	South Tank Yard
26	Pit, small	11	South	.51	.42	.06	South Tank Yard
27	Pit, small	11	North	.33	.58	.38	South Tank Yard
28	Horno	12	North	.54	1.46	.48	South Tank Yard
29	Pithouse	13	North	.55	2.75	.21	South Tank Yard
30	Borrow pit	19	Both	.45	2.60	.62	West Tank Yard
31	Settling basin	7, 20, 21	Both[c]	.22	27+	.73	East Tank Yard
32	Borrow pit	7	East	.35	1.70	.80	East Tank Yard
33	Pithouse	17	North	.30	2.15	.08	North Tank Yard
34	Pit, small	15	South	.45	.32	.38	North Tank Yard
35	Pit, large	18	East	.47	1.70	.41	West Tank Yard
36	Pit, small	18	Both	.39	1.40	.51	West Tank Yard
37	Pit, small	23	Both	.31	.85	.25	NW Tank Yard
38	Pit, small	23	Both	.17	.80	.49	NW Tank Yard
39	Pit, large	23	Both	.29	2.08	.73	NW Tank Yard
40	Pit, large	24	Both	.38	3.95	.69	NW Tank Yard
41	Pithouse	13	North	.60	1.55	.10	South Tank Yard
42	Borrow pit	13	North	.80	1.48	.50	South Tank Yard
43	Pithouse	39	Both	.49	2.07	.23	SE Pole Yard
44	Pithouse	39	West	.70	2.98	.16	SE Pole Yard
45	Pit, small	39	Both	.63	1.40	.52	SE Pole Yard
46	Pithouse	39	Both	.62	3.27	.37	SE Pole Yard
47	Pithouse	39	Both	.62	3.50	.30	SE Pole Yard
48	Pit, small	39	West	.64	.68	.33	SE Pole Yard
49	Pit, small	39	West	.63	.70	.39	SE Pole Yard
50	Possible pithouse	39	East	.67	2.17	.37	SE Pole Yard
51	Pithouse	39	Both	.62	2.28	.18	SE Pole Yard
52	Pithouse	39	West	.73	1.40	.15	SE Pole Yard
54	Pithouse	39	Both	.70	4.85	.15	SE Pole Yard
55	Pithouse	38	Both	.60	5.09	.32	SE Pole Yard
56	Pithouse	38	Both	.66	1.20	.20	SE Pole Yard
57	Secondary cremation	38	West	.72	.35	.21	SE Pole Yard
58	Horno	38	Both	.68	1.20	.50	SE Pole Yard
59	Pit, large	40	Both	.66	5.05	.90	SE Pole Yard
60	Pit, large	40	West	.48	2.30	.62	SE Pole Yard
61	Pit, large	40	West	.59	1.94	.69	SE Pole Yard
62	Pithouse	38	East	.66	3.11	.04	SE Pole Yard
63	Hearth	38	West	1.12	.30	.13	SE Pole Yard
64	Pithouse	39	Both	.50	2.50[b]	.32	SE Pole Yard

Table 4.2. Continued.

Feature Number	Feature Type	Trench Number	Trench Side	Depth BGS (m)[a]	Max Feature Length (m)	Max Feature Depth (m)	General Location
65	Pit, small	40	West	.55	.53	.37	SE Pole Yard
66	Pithouse	45	Both	.48	5.66	.20	NE Pole Yard
67	Historic/modern surface	45	Both	.24	6.37	.17	NE Pole Yard
68	Roasting pit	53	West	.38	.95	.13	NE Pole Yard
69	Pithouse	53	Both	.55	4.75	.25	NE Pole Yard
70	Pit, large	51	Both	.67	1.55	.32	SE Pole Yard
71	Pithouse	47	Both	.43	3.11	.25	NE Pole Yard
72	Pithouse	47	Both	.70	3.36	.22	NE Pole Yard
73	Pit, small	47	East	.57	.35	.22	NE Pole Yard
74	Pit, small	47	East	.57	.61	.16	NE Pole Yard
75	Pit, large	47	East	.57	2.70	.45	NE Pole Yard
76	Pithouse	47	West	.62	1.59	.25	NE Pole Yard
77	Pithouse	47	West	.54	2.10	.16	NE Pole Yard
78	Pithouse	47	Both	.49	2.03	.17	NE Pole Yard
79	Pit, small	47	East	.64	.73	.34	NE Pole Yard
80	Pithouse	47	Both	.30	3.86	.26	NE Pole Yard
81	Pithouse	47	Both	.20	3.90	.08	NE Pole Yard
82	Pit, small	47	East	.43	.80	.31	NE Pole Yard
83	Pit, small	47	East	.40	1.20	.30	NE Pole Yard
84	Roasting pit	54	Both	.46	.88	.20	NE Pole Yard
85	Pithouse	54	West	.34	2.23	.11	NE Pole Yard
86	Pithouse	54	Both	.37	2.51	.09	NE Pole Yard
87	Bell pit	54	Both	.60	1.31	.51	NE Pole Yard
88	Pithouse	54	Both	.45	3.38	.40	NE Pole Yard
89	Pithouse	54	Both	.43	3.38	.11	NE Pole Yard
90	Pithouse	54	Both	.38	2.54	.09	NE Pole Yard
91	Pithouse	54	Both	.40	4.52	.15	NE Pole Yard
92	Pit, small	54	East	.38	.95	.46	NE Pole Yard
93	Pithouse	54	Both	.35	4.98	.13	NE Pole Yard
94	Pithouse	54	Both	.46	3.35	.16	NE Pole Yard
95	Pithouse	55	East	.64	4.35	.38	NE Pole Yard
96	Roasting pit	56	West	.55	.97	.20	NE Pole Yard
97	Historic/modern ditch	48	West	.26	75.7[b]	.33	NW Pole Yard
98	Pit, large	48	West	.58	1.43	.18	NW Pole Yard
99	Pit, large	59	Both	.53	2.45	.13	NW Pole Yard
100	Pithouse	49	Both	.54	3.42	.26	NW Pole Yard
101	Pithouse	49	Both	.55	5.39	.27	NW Pole Yard
102	Secondary cremation	49	West	.54	.68	.29	NW Pole Yard
103	Possible pithouse	49	West	.33	1.38	.28	NW Pole Yard
104	Possible pithouse	61	Both	.44	4.39	.24	NW Pole Yard
105	Borrow pit	61	Both	.48	1.82	.50	NW Pole Yard
106	Pithouse	61	Both	.58	2.55	.22	NW Pole Yard
107	Borrow pit	61	Both	.45	3.41	.59	NW Pole Yard
108	Secondary cremation	62	East	.60	.35	.30	NW Pole Yard
109	Pit, small	44	East	.42	1.15	.88	SW Pole Yard
110	Borrow pit	44	Both	.43	11.95	.79	SW Pole Yard
111	Borrow pit	43	East	.52	.97	.62	SW Pole Yard
112	Borrow pit	43	East	.56	.74	.68	SW Pole Yard
113	Borrow pit	43	East	.52	1.34	.72	SW Pole Yard
114	Borrow pit	43	Both	.47	1.90	.73	SW Pole Yard
115	Pit, small	43	East	.44	.48	.23	SW Pole Yard
116	Pit, small	43	West	.76	.51	.57	SW Pole Yard
117	Pit, small	43	East	.75	.27	.43	SW Pole Yard
118	Borrow pit	43	East	.76	1.13	.53	SW Pole Yard
119	Borrow pit	43	West	.80	2.05	.50	SW Pole Yard
120	Secondary cremation	42	West	.67	.25	.18	SW Pole Yard
121	Secondary cremation	57	East	.74	.25	.20	SW Pole Yard
122	Pit, large	41	East	.50	1.92	.35	SE Pole Yard
123	Extramural surface	41	West	.48	.90	.14	SE Pole Yard
124	Pit, small	54	Both	.37	.49	.17	NE Pole Yard

[a]BGS = below ground surface.

[b]Feature is truncated by the end of the trench.

[c]Only a small remnant of Feature 31 is apparent on the northeast side of Trench 21.

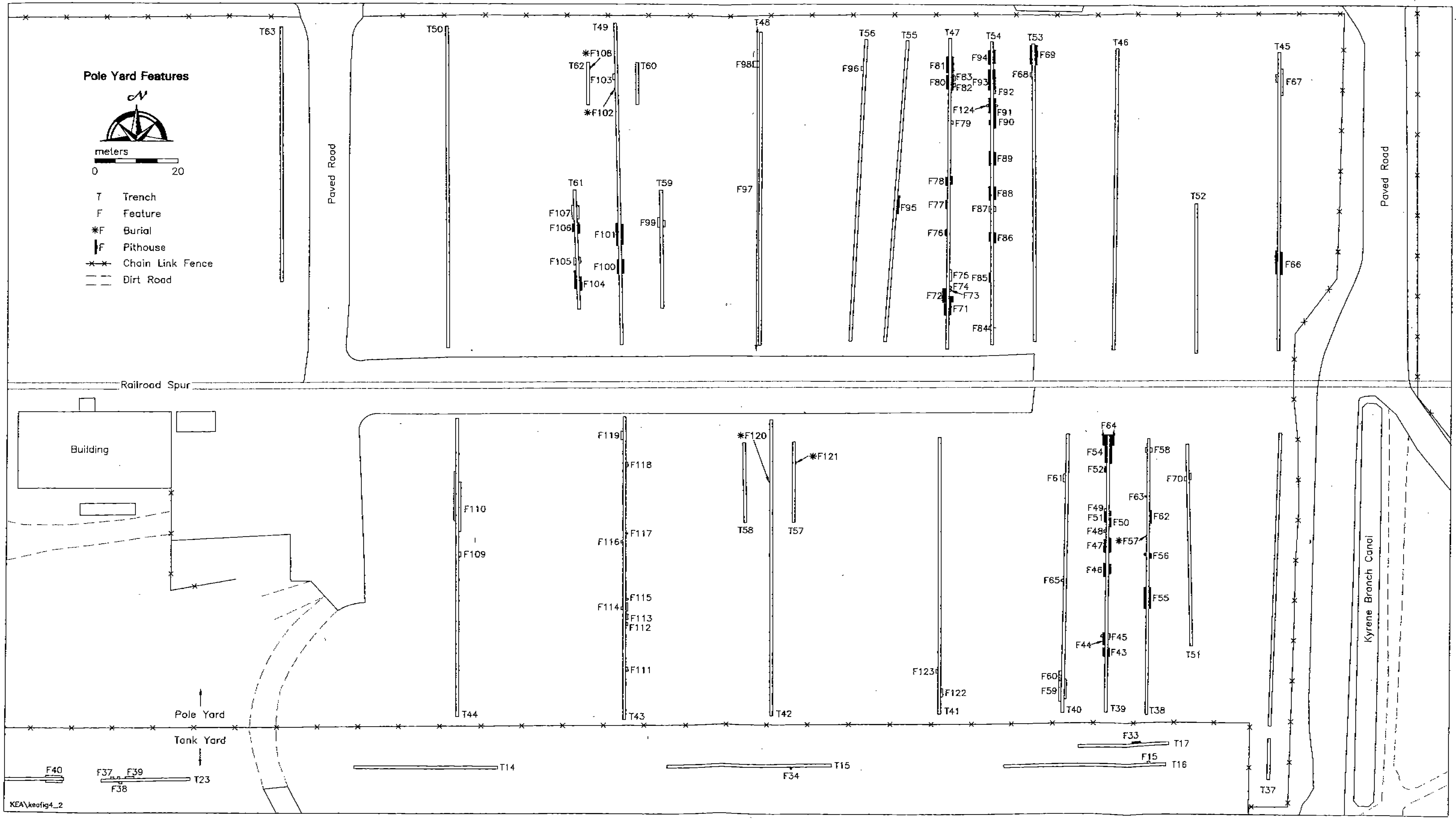

Figure 4.2. Map of test trenches and feature locations in the Pole Yard.

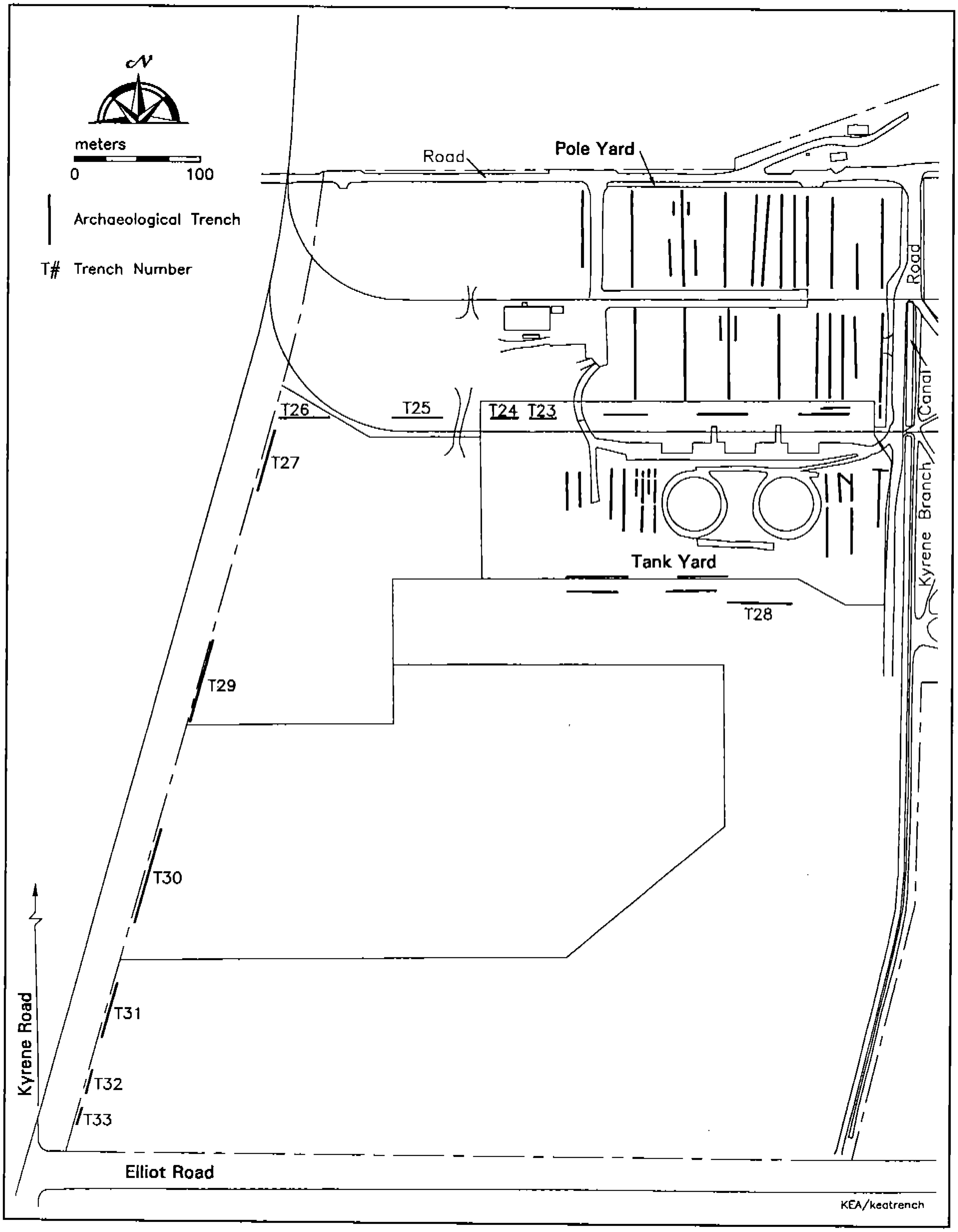

Figure 4.3. Map of test trenches for the gas line corridor (numbered trenches only).

percent sample of the gas line's route. Although the recommended sample fraction for the gas line testing was 50 percent, achieving this sample proved difficult given the presence of utilities and other obstructions. It was clear from the negative results being obtained along the western boundary of the Kyrene property, however, that additional trenching to meet a 50 percent goal was unnecessary.

Feature Recording

A feature profile form was completed for each feature located during backhoe trenching. Each form records feature length on the profiled (drawn) and opposite wall, the depth of the feature below modern ground surface and the site datum, confidence in feature classification and an alternative feature type, evidence of burning, the number of fire-cracked rocks and artifacts visible in profile, and an estimate of the amount of disturbance. When examining pithouses or possible pithouses, field personnel also noted the presence of floor artifact assemblages, floor and wall preparation, and internal hearths. The forms also include a written description of each feature and surrounding soils. Finally, a profile drawing was made of each feature. Scale drawings were made of most pithouses and possible pithouses and for selected extramural features (e.g., hornos, bell pits, extramural surfaces). Most profile drawings for pit features were sketched on the feature profile forms themselves, with detailed measurements of pit dimension and stratigraphic relationship to surrounding sediments.

Collections

Artifacts were collected primarily to determine the age of deposits. For this reason, decorated ceramics were emphasized, although plain ware sherds were also collected, often because they were too dirty in the field to be distinguished from decorated ones. Formal and a few informal tools were collected as well. The collections were made generally from within features in the trench exposures, or when artifacts observed in backdirt piles could be closely associated with a feature. The backdirt pile in the area of a pithouse with two floor pits, each containing a large red-on-buff olla, was raked and sifted to retrieve additional fragments of the vessels.

A small number of flotation and pollen samples were obtained using standard methods. The samples were taken from the interior of an horno bisected by a trench and from the two vessels in the pithouse floor pits described above. In addition, a suite of flotation, pollen, and clay samples were drawn from strata in the settling basin identified by this project.

Excavations

Excavations were conducted to recover materials associated with five cremation burials encountered during the trenching. In each case, a trench profile was drawn, backdirt in the vicinity of the feature was sifted through ⅛-in mesh screen to recover any human remains unearthed by the backhoe, and then overburden was removed by backhoe to a depth of roughly 15 cm above where the feature was visible in profile. The outline of the burial pit was sought during this activity, but none could be discerned. Hand-excavation of the feature proceeded from this point. All feature fill was sifted through ⅛-in mesh screen and all artifacts and bone were collected. When a vessel was encountered containing cremated remains, it was removed with the contents intact. Similarly, when the burial fill contained abundant tiny bone fragments, the entire matrix was removed without screening and placed into a paper bag. Upon completion of the excavation, pit profile and plan view maps were drawn and a standard Desert Archaeology burial form was completed. Any artifacts from the excavations were analyzed in the field, with attributes noted in as much detail as possible. At day's end, all materials, including artifacts and the human remains, were turned over to a representative of the Gila River Indian Community.

Mapping

Horizontal and vertical survey control and instrument mapping were provided by Compass Rose Technical Services using a total station and global positioning system (GPS). A site datum horizontally tied to the modified Arizona State Plane System was established for the project. Compass Rose mapped all backhoe trenches and the depths and locations of all trench and feature datums. A computer-assisted-design (CAD) map of the Kyrene complex also was obtained from SRP, allowing direct correlation of this project's maps with those of the Kyrene station.

FIELD RESULTS

Sixty backhoe trenches, totaling 2,774 linear meters, were excavated during testing of the Kyrene property. One hundred and twenty-three archaeological features were recorded, all but two of which are prehistoric. The prehistoric features include 37 pithouses, 7 possible pithouses, 1 extramural surface, 3 hornos, 4 roasting pits, 1 extramural hearth, 2 bell-shaped pits, 15 borrow pits, 12 indeterminate large pits, 33 indeterminate small pits, 5 secondary cremations, and 1 settling basin. The two features that are not prehistoric include what were identified as a possible historic ditch and a possible historic surface. Review of aerial photographs and other documents supplied by SRP accomplished after the fieldwork indicate both of these features are modern, and the surface is the remains of a tool shed.

Roughly two-thirds of the features are located within the Pole Yard, while the remaining one-third occur inside the adjacent Tank Yard (Table 4.3). The four features found during testing of the gas line corridor are also located in the Tank Yard. Although the quantity of features in the Pole Yard is almost double that of the Tank Yard, the actual frequency of occurrence is similar. The tested area of the Pole Yard is 9.4 acres, which by division provides an occurrence rate of 8.6 features per acre. A much smaller area (6.1 acres) was examined by testing in the Tank Yard (acreage includes the gas line corridor in the northwest corner of the yard), with the occurrence rate here being 6.9 features per acre. Note, though, that differences in feature density may yet exist. Trenches are more closely spaced inside the bermed area of the Tank Yard, increasing the chance of intersecting features at these locations.

Pithouse features are spatially clustered within the project area. The two largest clusters of pithouses are located near the eastern end of the Pole Yard, one to the north of the railroad spur, and the other to the southeast (Figure 4.2). Although these clusters appear spatially distinct, this may largely be an artifact of the lack of backhoe trenching in the vicinity of the railroad spur and adjacent pavement. It is quite possible that these two clusters are actually a large band of pithouses running from north to south through the project area. It is also probable that the northern cluster continues north toward the vicinity of AZ U:9:24 (PG), a trash mound located just north of the project area (see Figure 3.1). Two smaller pithouse clusters were also indicated during testing. One includes four structures near the west-central end of the Pole Yard. The other includes a few pithouses and a number of extramural features northwest of the western tank in the Tank Yard. A few scattered structures are also present. Interestingly, these often occur near the project boundaries, possibly indicating connections with other remains outside the tested area (note the location of Features 10, 11, 29, 41, 66, and 103 in Figures 4.1 and 4.2).

Four of the five cremations also cluster. Two occur in closely spaced Trenches 49 and 62 north of the northwest pithouse cluster in the Pole Yard, and two others are in Trenches 42 and 57 roughly midway between the northwest and southeast pithouse clusters in the Pole Yard. The fact that two cremations–relatively small features whose chance of being intercepted by a trench are low–were encountered in the same area strongly suggests the presence of distinct cemetery areas. A third cemetery may also occur in the area of cremation Feature 57. While collecting artifacts on the last days of fieldwork, a ceramic vessel was found in the west wall of Trench 28, just beyond the north end of pithouse Feature 56, roughly 3 m south of Feature 57. Although no calcined bone or pit outline was observed, the proximity and depth of the vessel relative to Feature 57 suggests it may represent another secondary cremation. Alternately, the vessel is associated with the pithouse, although it appeared to be outside the house's edge. The vessel was too deeply embedded in the trench wall to be removed or investigated further.

Table 4.3. Feature types identified by area.

Feature Type	Pole Yard	Tank Yard	Gas Line[a]	Total
Pithouse	32	5	-	37
Possible pithouse	3	4	-	7
Extramural surface	1	-	-	1
Horno	1	2	-	3
Roasting pit	3	1	-	4
Extramural hearth	1	-	-	1
Bell-shaped pit	1	1	-	2
Borrow pit	9	6	-	15
Large pit	8	2	2	12
Small pit	15	16	2	33
Secondary cremation	5	-	-	5
Settling basin	-	1	-	1
Historic/modern ditch	1	-	-	1
Historic/modern surface	1	-	-	1
Total features	81	38	4	123

[a]All features found along the gas line are located in the Tank Yard.

For the most part, pit features occur in and around the pithouses. A number of borrow pits were found, however, at the western end of the project area (Trenches 23, 24, 43, and 44), suggesting activities aimed at mining caliche were somewhat spatially localized in this area.

The prehistoric features appear generally to date to the late pre-Classic and Classic Hohokam periods. Temporal differences among the yards are evident, however, within this broad timespan (see also Chapter 6). Abundant quantities of buff ware ceramics, many rendered in the Sacaton style, in combination with an occasional red ware sherd from the fill of features in the

Pole Yard, indicate a Sedentary period age for these remains. In contrast, lesser quantities of buff ware, of both the Sacaton and Casa Grande type, along with increased frequencies of red ware ceramics among the Tank Yard features, suggest a late Sedentary to early Classic period component is expressed at this location. A few Gila Polychrome sherds were collected also, further suggesting an overlay of late Classic period material in this yard.

Modern and historic land use has impacted cultural features in both yards. These impacts are most pronounced in the Tank Yard, where significant land modification occurred in its construction and use. To better reveal factors that have impinged upon archaeological preservation of the cultural remains, the project area's stratigraphy and observed disturbances are reviewed.

Project Area Stratigraphy and Disturbances

A consistent set of stratigraphic units is encountered across the Kyrene property (Table 4.4), allowing easy recognition of those locations where units are missing or substantially disturbed. The uppermost layer is a modern deposit laid down by SRP to level and compact the surface of the various Kyrene facilities. Materials used for this purpose range from coarse gravel in the Pole Yard to finer gravel in the area of the 500 kV Switchyard, Central Reclamation, and EHV Yard. Asphalt pavement covers a thin layer of gravel in the Tempe Service Center. Below this recently disturbed surface horizon is a layer of Holocene age sediment, the upper portion of which has been modified through historic and modern agricultural plowing. All the prehistoric features originate in this unit, typically at or

Table 4.4. General project area stratigraphy.

Soil Profile: Trench 61, Pole Yard
Location: West wall, 2 m north of south trench end
Described by: Kevin Frison, 2 May 2000

Stratum Type	Sediment Description	Comment
Modern fill	0-25 cm. Redeposited, imported grayish-brown (10 YR 5/2) gravel (80% overall matrix) with sandy loam; gravel subangular to rounded; consistence is (dry): loose and not coherent, (moist): very friable, (wet): not sticky and not plastic; boundary to the lower horizon is very abrupt and irregular.	Modern cultural deposit laid down by SRP to level and compact the area.
Agricultural plowzone	25-37 cm. Fine, yellowish-brown (19 YR 5/4) sandy loam containing (< 29%) well-sorted, mostly subrounded small granules; consistence is (dry): soft, (moist): friable, (wet): slightly sticky; not plastic; very few roots or pores observed; boundary to lower horizon is clear and smooth.	Stratum contains prehistoric artifacts that may have originated at this level, or have been drawn from the stratum below; some charcoal flecks are present.
B horizon	37-57 cm. Fine, well-compacted, brown to dark brown (10 YR 4/3) sandy loam containing mostly subrounded (< 20%), well-sorted small granules; consistence is (dry): soft, (moist): friable, (wet): slightly sticky; not plastic; very few roots or pores present; boundary to the lower horizon is abrupt and smooth.	Horizon is not present across entire project area having been truncated or thoroughly destroyed by plowing, or generated into a cultural horizon through anthropogenic processes. Very light charcoal flecking is reported, and the horizon contains an occasional artifact outside any feature context.
Bt (argillic) horizon	57-82 cm. Well-compacted, yellowish-brown (10 YR 5/6) sandy clay loam containing mostly subrounded (< 20%), well-sorted small granules; consistence is (dry): slightly hard to hard, (moist): firm, (wet): slightly sticky to sticky; Stage I carbonate development, especially toward bottom of horizon; carbonates and clay content increase with depth; boundary to the lower horizon is clear and smooth.	Charcoal flecking was not observed, nor were any artifacts. This horizon appears to be culturally sterile and probably is Pleistocene in origin. Many features across the site were excavated prehistorically into this horizon.
Bk (calcic) horizon	82+ cm. Compact, very pale brown (10 YR 7/3) sandy loam to sandy clay loam containing subangular to subrounded (< 20%), well-sorted small granules to small pebbles; consistence is (dry): slightly hard, (moist): firm, (wet): slightly sticky; not plastic; Stage III carbonate development; extends below trench base.	No charcoal or artifacts were noted in this horizon.

just below the plowzone. Prehistoric artifacts, charcoal, and pieces of daub observed in the plowzone indicate the probability that some prehistoric features have been truncated or destroyed through plowing. The next unit consists of the Pleistocene argillic horizon. Although many of the cultural features cut into this unit, no charcoal flecking or artifacts were observed in the sediment, indicating the horizon is culturally sterile. Also culturally sterile is the underlying, lowermost zone of caliche or the Bk horizon; this unit extends below the bases of the trenches. Detailed sediment descriptions and average depths for these units are provided in Table 4.4.

Three locations were found in the KEP project area where there has been removal of one or more of these stratigraphic units. The first location is in the Tempe Service Center. All the units are missing below the asphalt pavement in the lower two-thirds of the tested center (Trenches 32, 33, and the southern half of 31). In their place is a sandy loam containing gravel, as well as fragments of plastic, glass, styrofoam, and metal. The sediment is clearly of recent origin, and presumably was deposited to fill depressions resulting from the removal of a grove of trees (evident in a 1961 aerial photograph of the Kyrene property) during construction of the service center.

The second location occurs in the vicinity of Trenches 9, 22, and 37 along the eastern edge of the Pole and Tank yards. A massive, compact, dark brown clay of variable depth was found immediately below the modern disturbed zone in each of these trenches. Charcoal staining was present below the clay, prompting initial concern that it might be of prehistoric origin; on later examination, fragments of rusted metal and a steel nut were found, indicating its modern age. The clay deposit extends down into the argillic and calcic horizons in Trenches 37 and 22; it has a similar depth at the north end of Trench 9, but tapers toward ground surface as one moves south along the trench. The configuration of the sediment suggests a large trough or basin was cut along the edge of the Pole and Tank yards, and subsequently filled with the clay. Given the proximity of the Kyrene Branch Canal, it is speculated that the origin of this material is related to its construction or use (e.g., clean-out).

The last location is the Tank Yard itself. Disturbance here derives primarily from the 1970s grading for the tank foundations and the dike that surrounds the tanks. Additional impact comes in the form of extreme compaction of the Tank Yard's sediments. The upper 10- to 20-cm layer has been so compressed, especially inside the dike, that the soil actually fractures in laminar planes.

The extent of grading across the Tank Yard can be tracked by the stratigraphic units. Less soil appears to have been removed to the north and south of the dike's berms; although the upper sediment is heavily compacted, the agricultural plowzone and all lower units are present. Inside the berms, it is unclear if any portion of the plowzone is present because it cannot be distinguished from prehistorically modified cultural fill due to the compaction. Regardless, some portion of this Holocene age horizon is present, but mostly in the northern two-thirds of the bermed tank area, east of the access road to the tanks. As one moves to the south, grading went increasingly deeper, resulting first in the removal of the Holocene (B) horizon and eventually the argillic (Bt) horizon. Caliche rises to modern ground surface at the ends of Trenches 3-8, and along the entire length of Trenches 1 and 2. In fact, no attempt was made to cut trenches inside the dike south of Trenches 1 and 2 (see Figure 4.1), because it was clear that the ground surface coincided with the culturally sterile horizon.

There is little doubt that prehistoric features were impacted, if not removed, during the grading process. The key piece of evidence here is the many artifacts and other cultural materials (e.g., daub, charcoal) that can be seen eroding from the berms, particularly around the tanks. The question that arises, though, is the degree to which features were affected. To pursue this question, the graph in Figure 4.4 was prepared. The graph plots ground surface elevations along north-south transects on the west and east sides of the project area. Two transects were drawn because it is evident the ground slopes downward from west to east, consistent with the natural ground slope (.003 percent from western to eastern yard boundary; .004 percent in a mile-long, east-west transect centered on the Kyrene property). Additional inspection of the elevation data indicated: 1) an average surface elevation of 10.10 m below datum (mbd) outside the west-end bermed area and average elevation of 10.82 mbd inside the bermed area, hence on average 72 cm of sediment has been removed; and 2) an average surface elevation of 10.87 mbd outside the east-end bermed area with an average elevation of 11.47 mbd inside the berms, hence an average 60 cm of fill has been removed.

Now what must be taken into account is that portion of the archaeological remains that may have already been truncated or destroyed through agricultural plowing. To accomplish this, the average upper depths at which features occurred in the Pole Yard were calculated (Table 4.5). The calculations reveal that on the west side of the Pole Yard, features occur an average 55 cm below ground surface. The average depth of sediment lost on the west side of the tanks is 72 cm, which, by subtraction, means roughly 17 cm of the preserved cultural horizon was removed. There has been less impact on the east side. Although there is

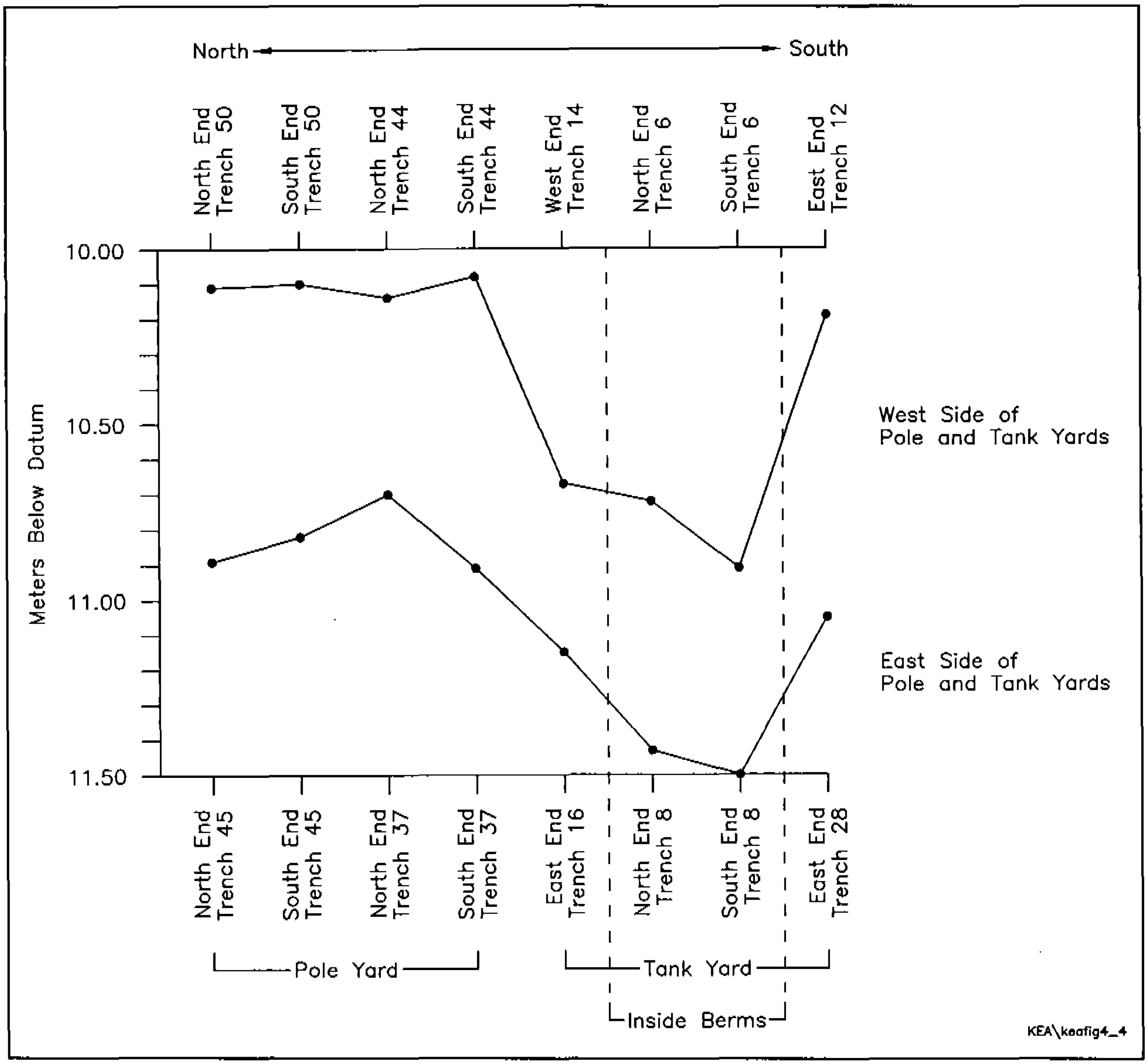

Figure 4.4. Plot of modern ground surface elevations across the project area.

more variation among the eastern Pole Yard features relative to upper depth, on average they occur at 54 cm below ground surface. Within the berms on the east side of the tanks, an average 60 cm was removed, so only about 6 cm of preserved fill has been impacted by grading. Considering that Hohokam house pits average between 20 and 30 cm deep (Craig 1999; Henderson and Morgan 1989), a substantial portion of pithouse architecture (e.g., the floor) may yet be preserved in the Tank Yard.

Summary

Archaeological testing conducted for the KEP located many prehistoric features throughout the project area. Large proportions of these features were pithouses situated in well-defined spatial clusters suggestive of multiple courtyard groups. A large number of extramural features, most of which were spatially associated with habitation structures, were also found. At least one cluster of extramural features,

Table 4.5. Upper depths of archaeological features in the project area.

	Meters below Ground Surface (mbgs)			Meters below Datum (mbd)		
Location	Minimum Depth	Average Depth	Median Depth	Minimum Depth	Average Depth	Median Depth
NW Pole Yard	.26	.49	.54	10.55	10.73	10.73
SW Pole Yard	.42	.60	.56	10.51	11.00	11.06
West Tank Yard	.05	.30	.26	10.76	11.02	10.97
South Tank Yard	.33	.52	.51	10.85	11.01	11.01
NE Pole Yard	.20	.46	.45	10.53	11.22	11.17
SE Pole Yard	.26	.62	.63	11.10	11.38	11.35
North Tank Yard	.17	.33	.31	10.23	10.78	10.46
East Tank Yard	.09	.30	.25	11.49	11.63	11.63

mainly borrow pits, is located at some distance from the main residential areas of the site. The density of pithouses and the presence of cemetery areas indicate the project area was resided in for a lengthy period of time, primarily during the late pre-Classic and early Classic periods. A few later ceramics suggest the area was also occupied to some as-yet undetermined extent during the late Classic period. The relative lack of distinct late Classic period features may be the result of modern and historic disturbance. Only two non-prehistoric features were noted in the area, an irrigation ditch deriving from agricultural use of the Pole Yard area just prior to 1958, and the remains of a tool shed constructed for use as part of the Pole Yard complex sometime between 1954 and 1958.

FEATURE DESCRIPTIONS

Gregson Schachner and T. Kathleen Henderson

In total, 123 cultural features were revealed during backhoe trenching (Table 4.2), five of these containing human remains were later excavated by hand. Approximately two-thirds of the features were located within the boundaries of the Pole Yard, while the remaining one-third were identified during the archaeological testing of the adjacent Tank Yard. In both areas, modern and historic land use has heavily impacted cultural features located near modern ground surface. These impacts are most pronounced in the Tank Yard, which has witnessed significant land modification as part of its construction and use. The large majority of features appear to be prehistoric, dating to the late pre-Classic or Classic Hohokam periods. Recorded features include pithouses, extramural pits of various sizes and types, hornos and roasting pits, a hearth, an extramural surface, a settling basin, and secondary cremations. Two modern features were also located during backhoe trenching, including a possible irrigation ditch and a surface with associated firepit and utility line posthole. Examination of a series of aerial photographs taken over the last 70 years and Salt River Project's (SRP) record of construction on the property indicates these features were most likely created within the last 50 years. A summary of the features uncovered, as well as more detailed discussions of a few notable examples, is presented below.

PITHOUSES

Forty-four pithouses or possible pithouses were noted in backhoe trench profiles within the project area (Table 5.1). Of this total, thirty-seven (84 percent) were recorded as pithouses by field personnel, while seven (16 percent) were designated possible pithouses. The designation of a feature as a pithouse or possible pithouse depended on a number of criteria. The pithouse designation was reserved for features exhibiting such characteristics as plastered or unprepared, level, bottom surfaces; relatively well-defined edges or walls; floor features such as hearths, postholes, and wall trenches; artifacts resting upon the floor; or fill containing structural material such as daub or burned wood (Figure 5.1). Features recorded as possible pithouses generally have less level, unplastered bottom surfaces, do not possess internal features, lack significant artifact assemblages, and do not contain fill characteristic of structural collapse (Figure 5.2).

Visibility seems to have played a role in feature designation. Four of the possible pithouses (57 percent) are visible in only a single trench face. In contrast, only nine pithouses (24 percent) are visible in one profile (Table 5.2). Disturbance by modern activities may have also impacted our ability to confidently assign the pithouse designation. Four of the eight (50 percent) pithouse or possible pithouse features in the more heavily disturbed Tank Yard were recorded as possible pithouses, while only three of 37 (8 percent) of the pithouses or possible pithouses in the Pole Yard were recorded as possible pithouses. Despite the disturbance throughout the project area, pithouse features are very well defined compared to others in the Hohokam area, and could be quite easily and confidently identified and recorded.

Pithouses range in profile length from .63 to 5.66 m, while possible pithouses have a smaller range of 1.27 to 4.39 m. The tops of pithouses were noted between .05 and .73 m below modern ground surface while bottom depths range between .23 and 1.02 m below modern ground surface. Possible pithouses have a similar range of .09 to .67 m for top depths and .33 to 1.04 m for bottom depths. Feature depths are generally shallower in the Tank Yard, undoubtedly due to recent modification of the ground surface. Twenty-two of the 33 (67 percent) pithouses for which the variable was recorded have plastered floors. Only a single pithouse, Feature 77, possesses plastered walls. In many cases, historic and modern agricultural and industrial activities have disturbed all but the floor and a few centimeters of fill, making the assessment of wall preparation especially difficult. None of the possible pithouses exhibit evidence of wall or floor preparation (Table 5.2). For the pithouses for which evidence of burning was recorded, 15 (42 percent) appear burned, 12 (33 percent) are possibly burned, and 9 (25 percent) have no evidence of burning. Possible pithouses exhibit a different pattern, with only one (17 percent) appearing burned, two (29 percent) being possibly burned, and four (57 percent) with no evidence of burning. Of the 31 pithouses for which the variable was recorded, 15 (48 percent) have possible floor artifact assemblages, 11 (35 percent) have none, and 5 (16 percent) were recorded as having floor assemblages. Possible pithouses are

Table 5.1. Pithouse profile information.

Feature Number	Trench	Profile Length (m)	Profile Length (Opposite Wall) (m)	Depth (cm below Ground Surface)	Confidence	Alternate ID	Burning	Floor Preparation	Hearth
1	5	2.33	2.85	5-23	Moderate	Trash conc.	Yes	-	No
2	5	.77[b]	.75	5-42	High	-	Possible	-	No
6[a]	6	1.27	-	31-45	High	-	No	No	No
10[a]	7	3.34	3.40	19-53	High	Large pit	No	No	No
11[a]	8	3.21	3.20	9-39	Moderate	Large pit	No	No	No
16[a]	7	1.65	-	25-45	Moderate	Large pit	Yes	-	No
29	13	2.75	-	55-76	High	-	No	-	No
33	17	2.15	-	30-38	High	-	No	No	Yes
41	13	1.55	-	50-66	Moderate	Large pit	No	-	No
43	39	2.14	2.07	49-72	High	-	Yes	Yes	No
44	39	2.98	-	70-86	High	-	Yes	Yes	No
46	39	3.27	2.35	26-63	High	-	Yes	Yes	No
47	39	3.25	3.50	62-92	High	-	Yes	No	No
50[a]	39	2.17	-	67-104	Moderate	Large pit	Possible	No	No
51	39	2.28	1.17	62-80	High	-	Yes	No	No
52	39	1.40	-	73-88	High	-	Yes	Yes	No
54	39	4.85	4.40	70-85	High	-	Yes	Yes	Yes
55	38	5.09	5.07	60-92	High	-	Yes	Yes	No
56	38	1.20	.63	66-86	High	-	No	Yes	No
62	38	3.11	-	66-70	High	-	Possible	Yes	No
64	39	2.50[b]	2.40	50-86	High	-	Yes	Yes	Yes
66	45	5.46	5.66	48-68	High	-	No	Yes	No
69	53	4.75	4.55	55-80	High	-	Yes	Yes	No
71	47	3.11	2.86	43-68	High	-	Possible	No	No
72	47	3.36	1.34	70-92	High	-	No	No	No
76	47	1.59	-	62-87	Moderate	Large pit	Unknown	No	No
77	47	2.10	-	54-70	High	-	Possible	Yes	No
78	47	4.03	2.00	49-66	High	-	Possible	Yes	No
80	47	3.34	3.86	30-56	High	-	Possible	Yes	No
81	47	3.89	3.90	20-28	High	-	Possible	Yes	No
85	54	2.23	-	34-45	High	-	No	Yes	No
86	54	2.51	2.09	37-46	High	-	No	Yes	Yes
88	54	3.09	3.44	45-85	High	-	Possible	Yes	No
89	54	3.11	3.38	43-54	Moderate	Large pit	Possible	No	No
90	54	2.54	1.06	38-47	High	-	Yes	Yes	No
91	54	4.52	3.57	40-55	Moderate	Large pit	Possible	No	No
93	54	4.85	4.98	35-48	High	-	Yes	Yes	No
94	54	3.35	3.30	46-62	High	-	Yes	Yes	No
95	55	4.35	4.05	64-102	High	-	No	No	No
100	49	3.45	3.42	54-80	High	-	Possible	No	No
101	49	5.39	4.96	55-82	High	-	No	Yes	No
103[a]	49	1.38	-	33-67	Moderate	Large pit	No	No	No
104[a]	61	3.28	4.39	44-68	Moderate	Large pit	Possible	No	No
106	61	2.55	1.90	58-80	High	-	Yes	No	No

[a]Possible pithouse.
[b]Feature extends beyond the end of the trench.

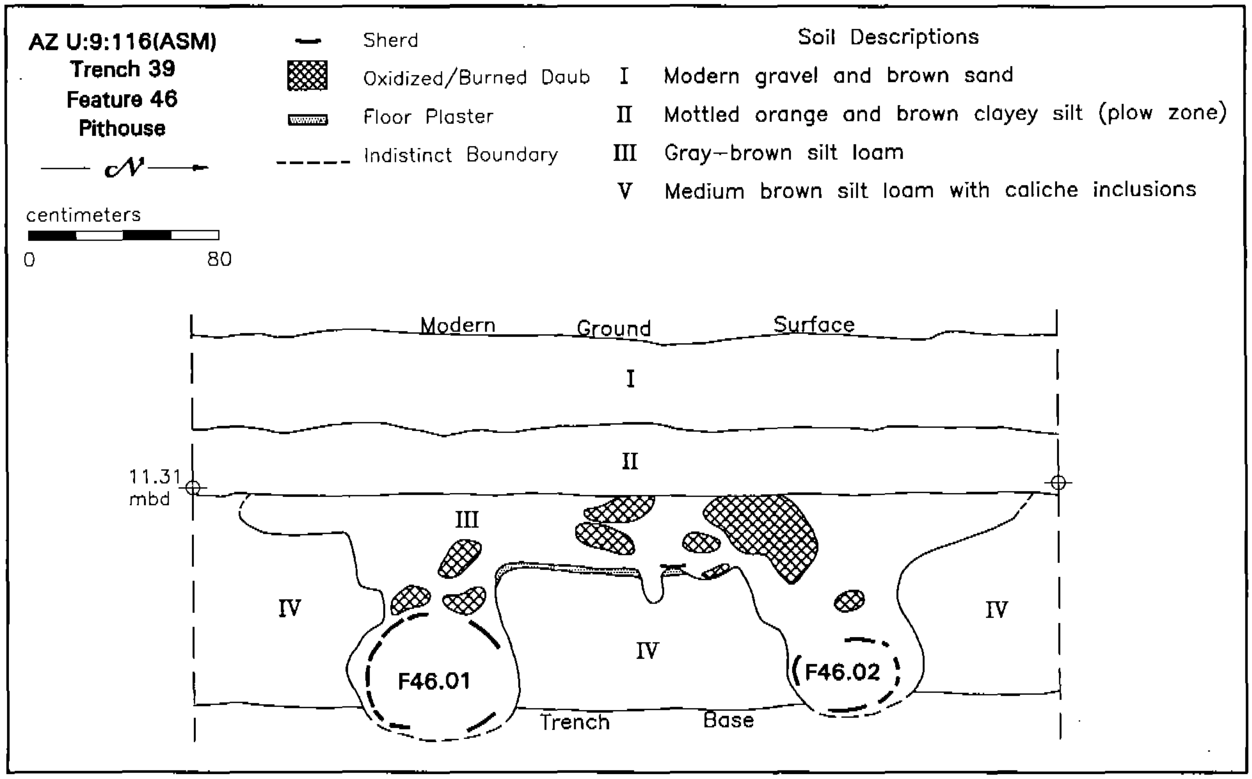

Figure 5.1. Profile of Feature 46, pithouse.

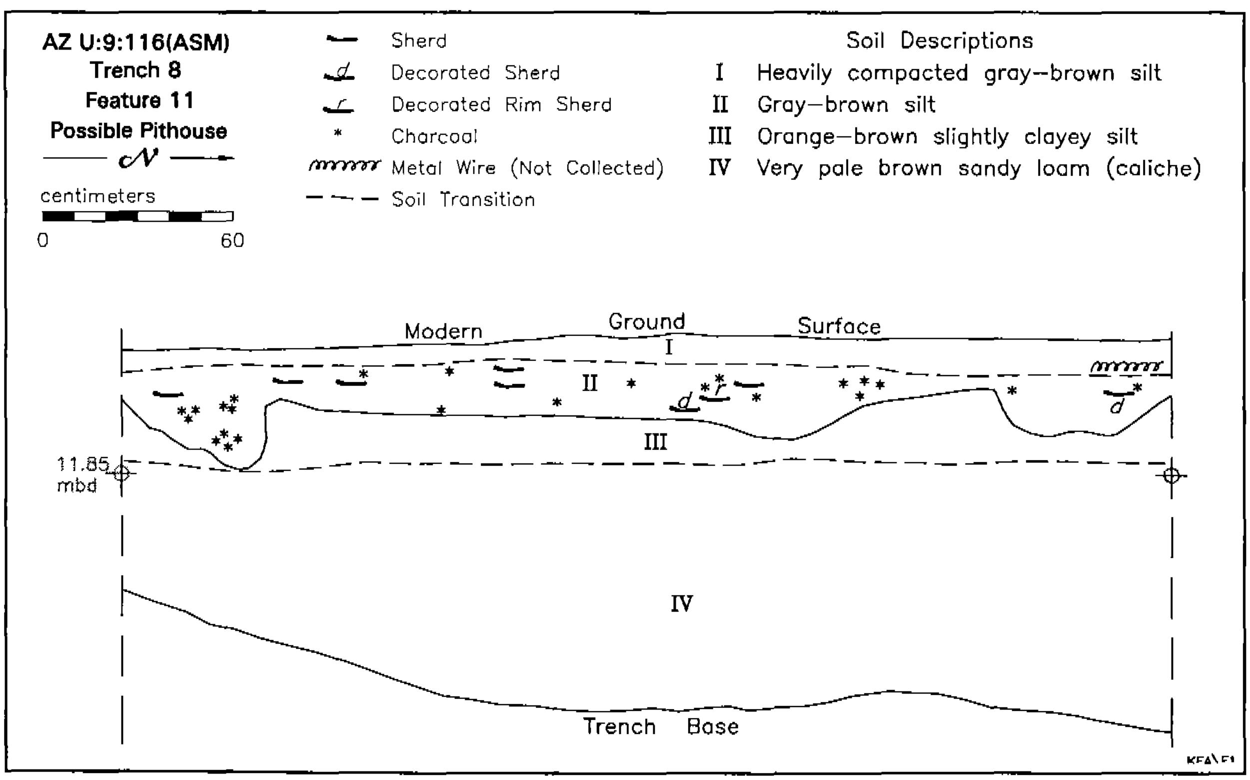

Figure 5.2. Profile of Feature 11, possible pithouse.

Table 5.2. Pithouse and possible pithouse attribute comparison.

		Pithouse		Possible Pithouse	
Attribute		Frequency	Percent	Frequency	Percent
Visibility	Both trench walls	28	75.7	3	42.9
	One trench wall	9	24.3	4	57.1
Floor preparation	Plastered floor	22	59.5	0	0
	No preparation	11	29.7	6	85.7
	Indeterminate	4	10.8	1	14.3
Wall preparation	Plastered wall	1	2.7	0	0
	No preparation	36	97.3	7	100.0
Burned	Yes	15	40.5	1	14.3
	Possible	12	32.4	2	28.6
	No	9	24.3	4	57.1
	Indeterminate	1	2.7	0	0
Floor assemblage	Yes	5	13.5	0	0
	Possible	15	40.5	2	28.6
	No	11	29.7	4	57.1
	Indeterminate	6	16.2	1	14.3
Hearth	Present	4	10.8	0	0
	Absent	33	89.2	7	100.0

again quite different, with four (67 percent) having no floor assemblage, and two (33 percent) having possible assemblages where the attribute could be determined. Only four internal hearths were visible within pithouses, none within the possible pithouses. Although generally similar in size, the possible pithouse features rarely have characteristics often associated with Hohokam pithouses (i.e., burning, prepared floors, hearths). A few pithouses and possible pithouses are discussed below to illustrate the variability present within the project area.

Pithouse Descriptions

Feature 11

Feature 11 is a good example of a possible pithouse (Figure 5.2). The feature is visible in both the east and west walls, being 3.20 m long in the former and 3.21 m long in the latter. Thus it is likely the feature is oriented either perpendicular or parallel to Trench 8. The exact orientation of the house is difficult to estimate as Feature 11 is not located near any other pithouses. The feature is only 9 cm below modern ground surface, and is highly disturbed. The approximately 30 cm of fill is grayish-brown silt with flecks of charcoal and a number of sherds. The recorder noted no conclusive evidence of burning or structural collapse. The bottom surface of the feature is unprepared and irregular. It is conceivable that dips near either end of the feature could be the remains of wall trenches, but this is unclear as rodent activity was noted in both profiles. The feature was alternatively identified as a large shallow pit.

Feature 46

This feature is one of the most impressive pithouses in the project area. It was clearly burned at abandonment and contains two large, in situ Sacaton Red-on-buff storage jars within two separate pits (Figure 5.1). The feature was visible for a length of 3.25 m in the west wall, while only 2.35 m was visible in the east wall. The east profile begins 57 cm north of the west profile. This suggests that the feature either is round or oval and narrowing to the east, or more likely, oriented at an angle to the trench. The distribution of nearby pithouses indicates Feature 46 is probably oriented to the eastern portion of the compass. Feature fill is roughly 30 cm thick, and is mottled, gray-brown silty loam containing a high density of charcoal flecking and large chunks of orange-brown burned daub suggestive of an intense fire and structural collapse. The fill of the feature is slightly intermixed with the overlying plowzone, the feature having been partially impacted by modern activities. The floor of the house is covered in a thin 1- to 2-cm-thick layer of white plaster. Five floor features were visible in profile: a posthole and wall trench in the east profile, and a small posthole and two large subfloor pits in the west profile. Within each pit are large Sacaton Red-on-buff storage jars that were broken by the backhoe during trenching. The vessel in the northern pit has a Gila shoulder near the base. The jar mouth was not visible as it is still within the trench wall. The jar in the southern pit is also Gila-shouldered but more rounded in shape, and possesses a wide mouth with a sharply everted rim. Both jars contain large amounts of structural debris, suggesting they were open to the floor surface during the fire that destroyed the pithouse.

Feature 81

This pithouse is relatively clear in profile despite significant disturbance by plowing (Figure 5.3). Feature 81 is typical of many of the shallower pithouse features in that its visibility derives primarily from its level, well-plastered floor rather than distinctive feature fill or floor features. The profile lengths are 3.89 m on the west and 3.90 m on the east, and mirror one another, indicating the house is oriented roughly parallel or perpendicular to the trench. The direction the pithouse is facing is difficult to determine as Feature 81 is located next to the northern boundary of the project area. The feature is very shallow, located only 20 cm below ground surface and continuing down another 10 cm or so. Much of the feature fill appears to have been removed by plowing. The fill is gray-brown silty loam and is very similar to the overlying plowzone. A low to moderate density of charcoal indicates the structure was possibly burned, but no evidence of structural materials was noted. A distinct, level line of white plaster, 2 to 3 cm thick, marks the floor of the structure. A few sherds near the floor are possibly part of a floor assemblage.

Feature 94

Feature 94 is a moderately disturbed, burned pithouse in which a number of floor features are visible in profile (Figure 5.4). The west profile is 3.35 m long, while the east profile is similar, at 3.30 m long. The locations of the profiles in relation to one another suggest the pithouse is roughly parallel or perpendicular to the trench. The orientation of the structure is unknown, as it is located near the northern boundary of the project area (close to Feature 81). The small rise near the central part of the profile may be a lip or step that is part of an entry to the north. This seems unlikely, as the area of the entry contains some of the densest deposits of structural material, and if it were the entry, the pithouse would only be approximately 1.75 m wide. It is possible that this lip marks the boundary between overlapping pithouses, but the homogeneous nature of the fill north and south of this area contradicts this conjecture. The upper fill of Feature 94 has been disturbed by plowing, leading to some mixing at the interface between the plowzone and the feature itself. The fill of the feature is gray-brown silty loam with a moderate density of charcoal and patches of orange-brown burned daub. Patches of ash are present near the north end of the feature. This type of fill is similar to most of the pithouses exhibiting evidence of burning. Only a small area of floor plastering is visible in profile, possibly indicating the floor of Feature 94 was heavily impacted by use. A large posthole is visible in the west profile and wall trenches are visible in both the east and west trench faces. No artifacts are present in either profile.

Feature 95

This pithouse is unburned, lacks a prepared floor surface, contains a relatively high number of artifacts in fill and near-floor contexts, and is deeper than almost all of the other pithouses in the project area (Figure 5.5). Feature 95 is 4.35 m long on the east wall, and 4.05 m long on the west wall. The profiles mirror one another, indicating the pithouse is most likely parallel or perpendicular to the trench. Most other pithouses in the vicinity are to the east, suggesting Feature 95 may be oriented in that direction. The feature is approximately 40 cm deep, beginning 64 cm below the surface. Despite its depth, Feature 95 is partly impacted by the plowzone. Feature fill is mottled, dark brown to gray-brown sandy loam grading into a grayer deposit near the unprepared floor. Some bits of burned daub and charcoal are present in the fill. Two possible postholes were noted in the east profile. A number of sherds are visible in fill or near-floor contexts, indicating a possible floor assemblage or maybe later use of the pithouse as a trash deposit (which is rare in the project area).

Feature 101

This feature is an unburned pithouse with a long profile and well-plastered floor (Figure 5.6). Feature 101 is located in a small cluster of structures west of the main pithouse concentration in the project area. The west profile is 5.39 m long and begins 18 cm south of the east profile that is 4.96 m long. The similarity in size and length of the profiles may indicate the pithouse was cut along its long axis. Feature 101 probably faced nearby structures to the south and west. This pithouse was partly disturbed by plowing and contains gray-brown silty loam largely devoid of charcoal and lacking any evidence of structural materials. A single small sherd in the fill is the only visible artifact. A poorly preserved, 1- to 2-cm-thick layer of white plaster is present along the floor of the structure. A small wall trench is visible near the south end of the profile. The lack of structural material in the fill and patchy character of the floor indicates this house may have been dismantled or was left open for a period of time at abandonment. The lack of artifacts in the fill suggests it probably was open while that area of the site was unoccupied.

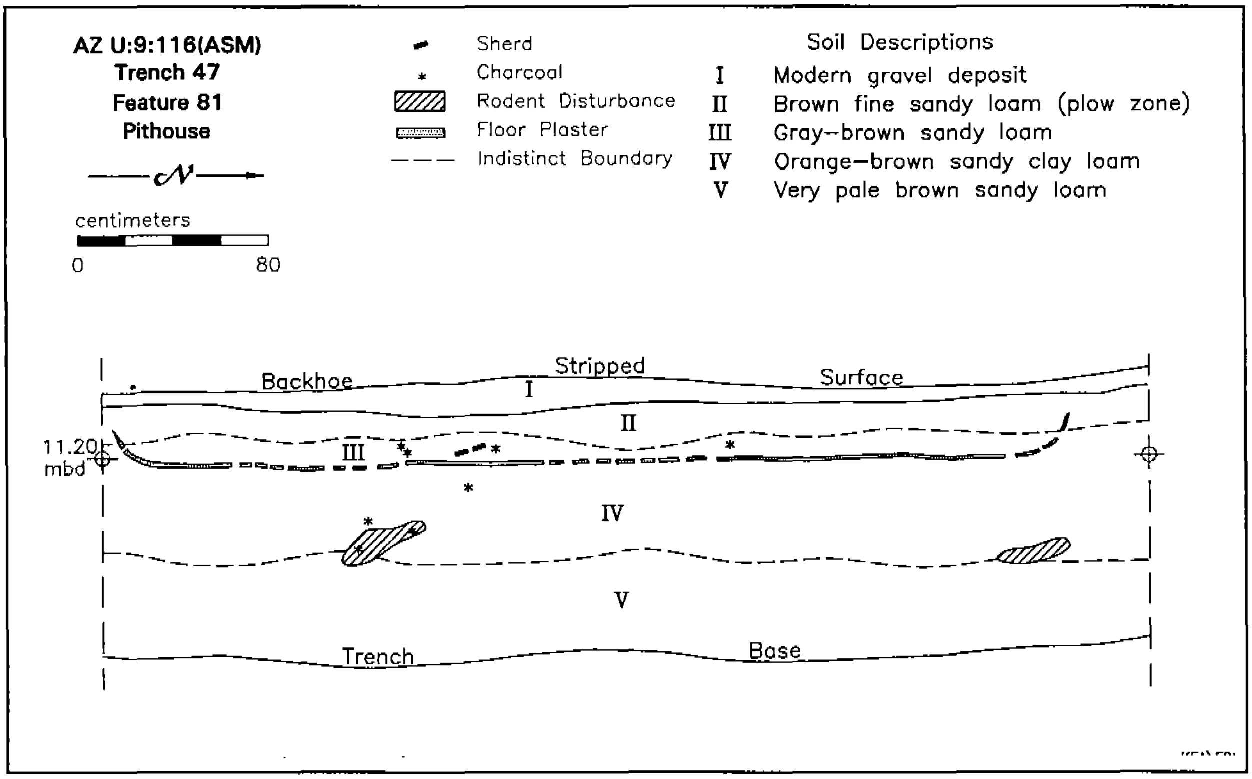

Figure 5.3. Profile of Feature 81, pithouse.

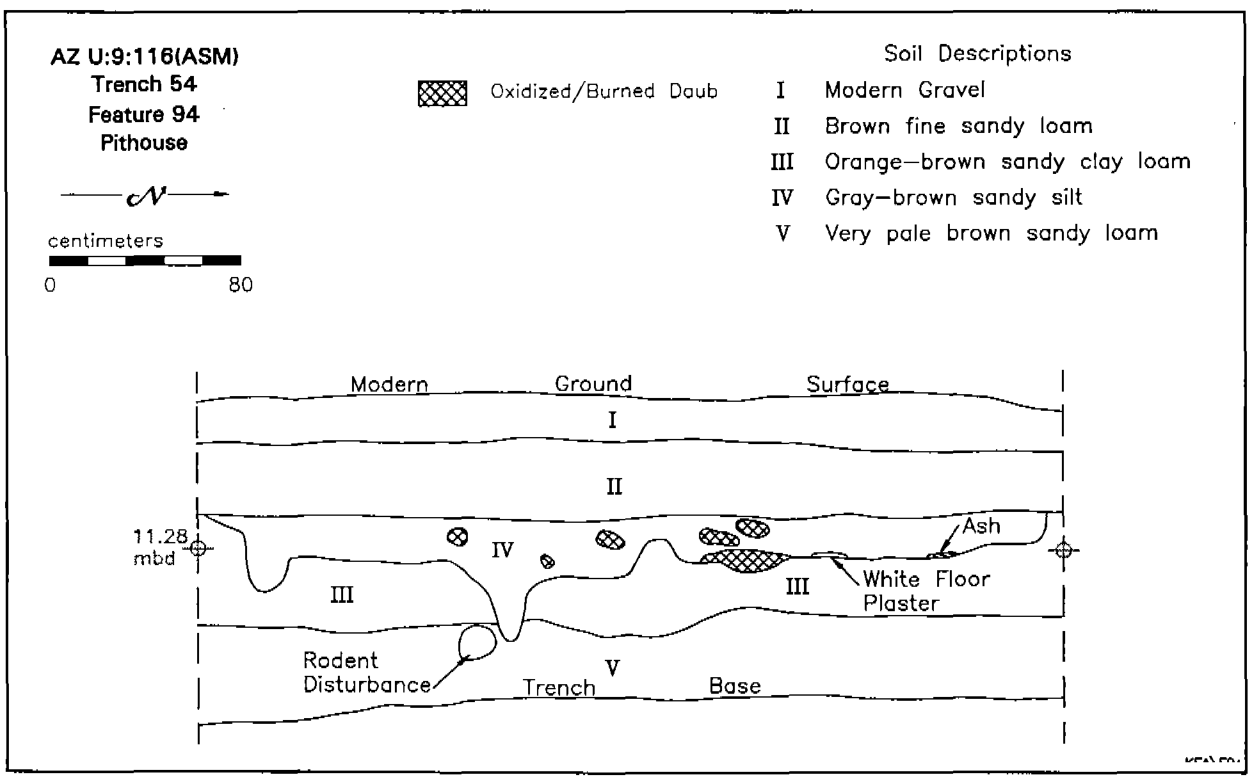

Figure 5.4. Profile of Feature 94, pithouse.

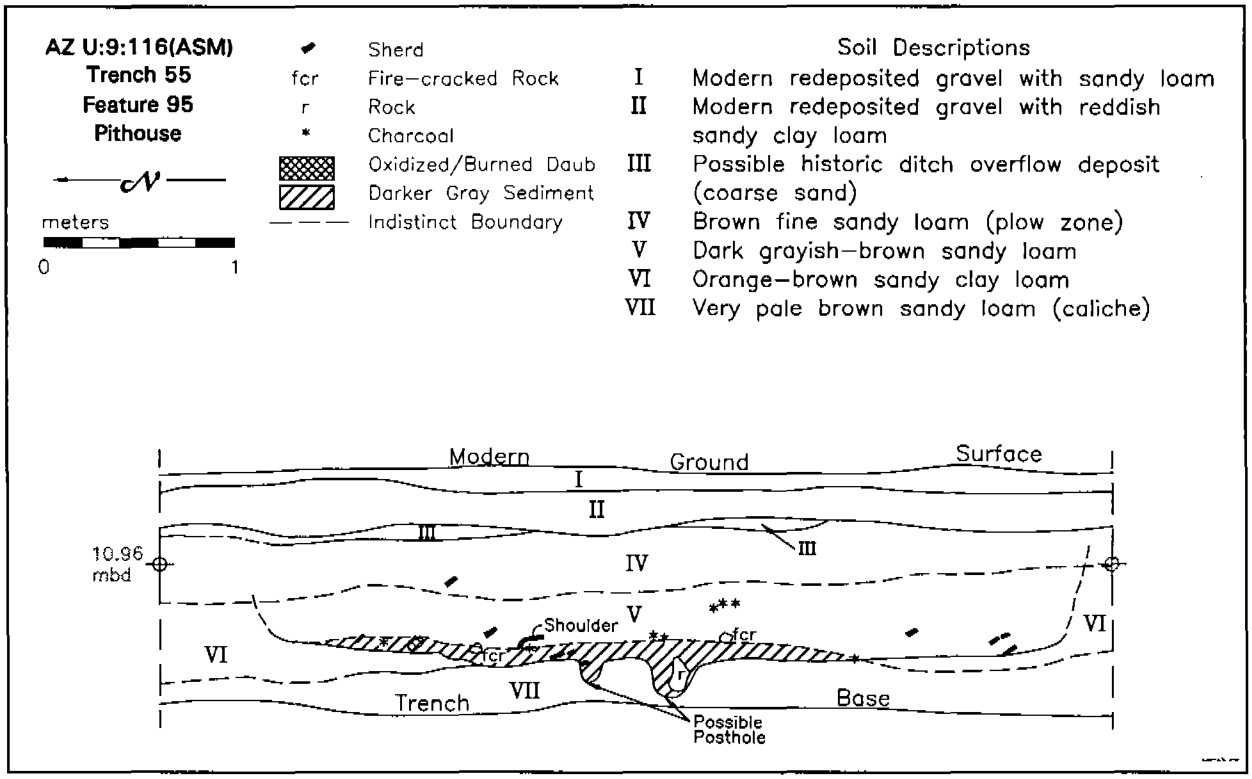

Figure 5.5. Profile of Feature 95, pithouse.

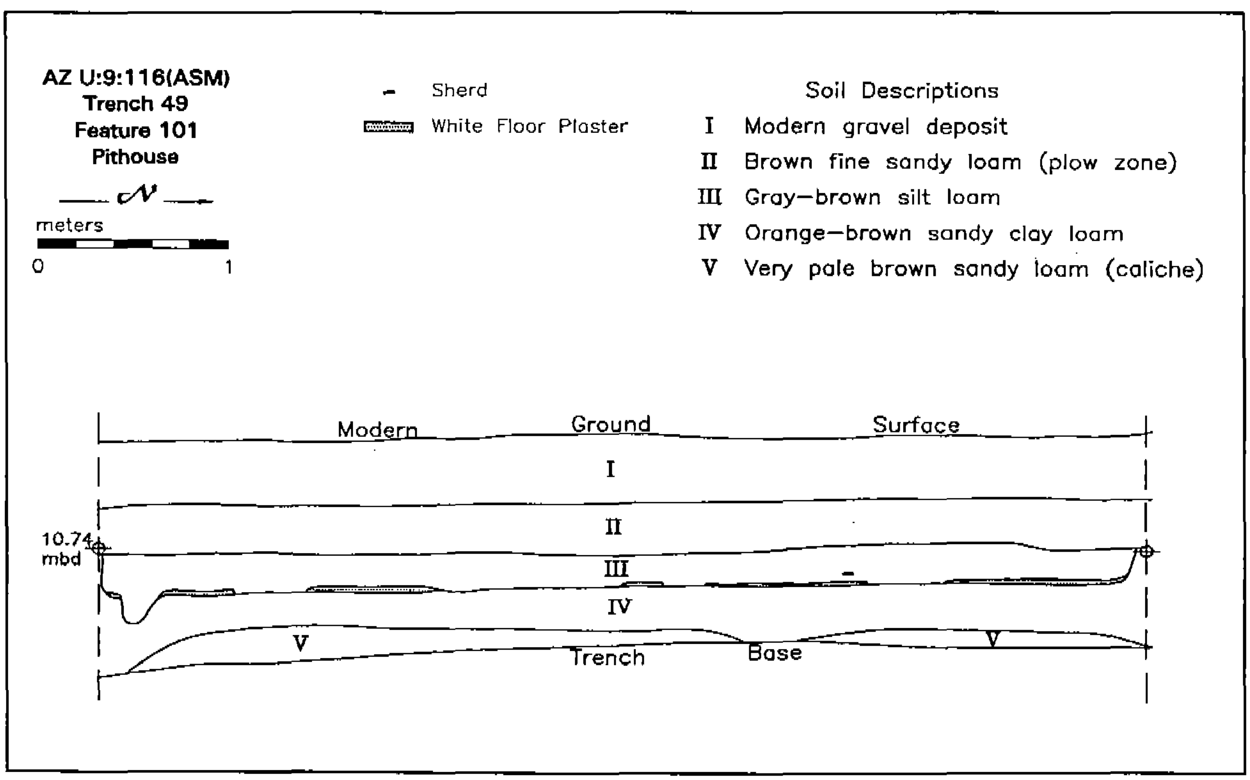

Figure 5.6. Profile of Feature 101, pithouse.

Feature 103

Feature 103 is another possible pithouse (Figure 5.7), although quite different from Feature 11 discussed above. Only 1.38 m of the feature is visible in the west trench wall, and none of it is visible in the east wall. The feature has sloping sides and only a small portion of a level surface, unlike most of the pithouses located by the project. Historic and modern plowing has truncated the upper portions of fill. Below this, the fill is gray-brown sandy loam with some bits of burned daub and a low density of charcoal flecking. The daub and charcoal may be structural debris. No artifacts or floor preparation are apparent in profile. Feature 103 is not located near any other pithouses (a similar situation to Feature 11) despite three trenches within 10 m of one another. The only other features near Feature 103 are two secondary cremations, Features 102 and 108. The lack of nearby pithouses and possible location of Feature 103 within a probable cemetery would seem to indicate it is unlikely to be a pithouse.

EXTRAMURAL FEATURES

Prehistoric extramural features comprise almost 63 percent of the identified features within the project area. These include a variety of small and large pits, borrow pits, bell-shaped pits, hornos and roasting pits, a hearth, an extramural surface, and a settling basin.

Pits

The largest class of recorded features in the Kyrene project area were pits of various shapes and sizes (Table 5.3). Most of these were classified under the general categories of large and small pits. These classes are differentiated by an arbitrary break at 1.5 m in profile length. Additionally, as part of the Kyrene project, pits that were dug into the caliche soil horizon were termed borrow pits. Ostensibly these pits were dug to obtain caliche, probably for pithouse construction. These pits may have later been used as trash receptacles or for other purposes. A few pits were classified as bell-shaped pits, a term reserved for pits with interiors wider than their openings. Finally, a number of pits were classified as hornos or roasting pits (Table 5.4). The horno category was reserved for features with discernible "rinds" created by wall preparation and repeated firing and that often contain high densities of charcoal and fire-cracked rock. Roasting pits lack the formal preparation or evidence of intensive use of hornos, but contain similar amounts of charcoal and occasionally fire-cracked rock. Both of these types of features were employed in the prepa-

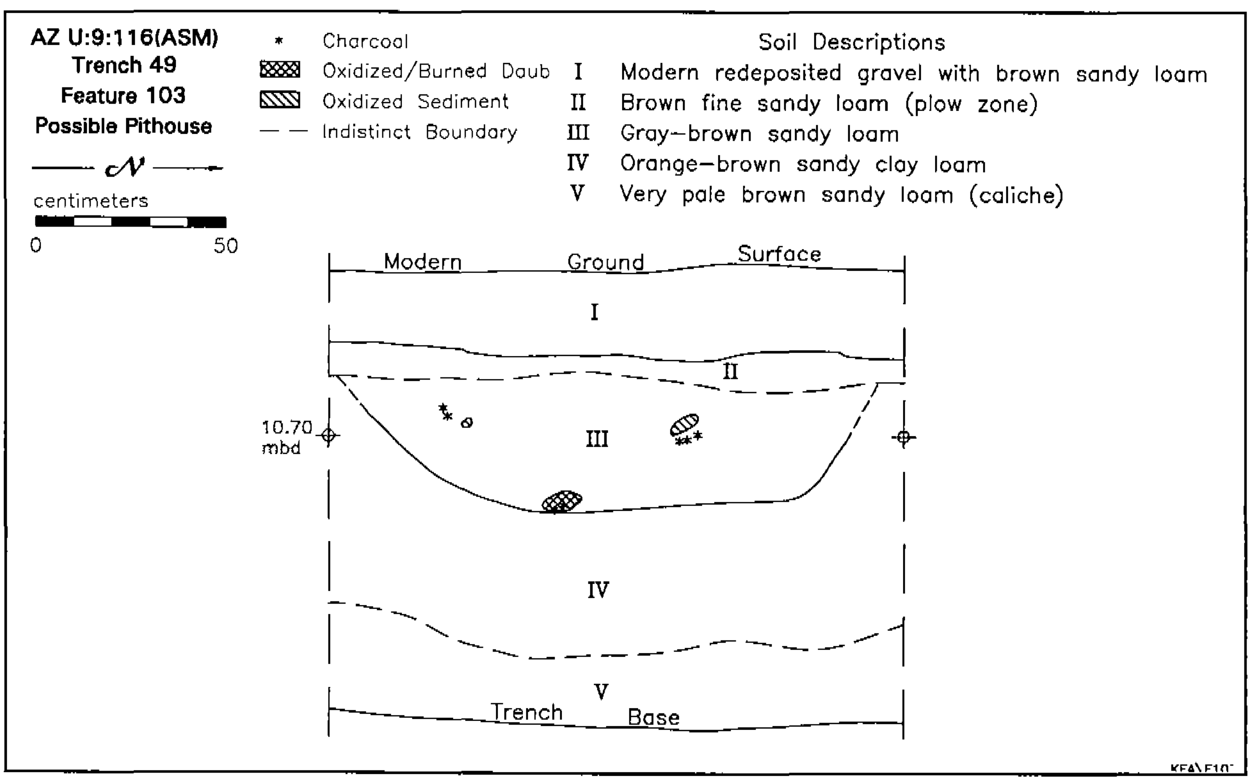

Figure 5.7. Profile of Feature 103, possible pithouse.

Table 5.3. Pit profile information.

Feature No	Feature Type	Trench	Profile Length (m)	Profile Length (Opposite Wall) (m)	Depth (cm below Ground Surface)	Confidence	Alternate ID	Burning	Fill (No of Artifacts)	Disturbance (%)
3	Large pit	5	1.30	1.45	25-55	High	-	Yes	0	1-25
4	Small pit	5	1.37	1.45	32-95	High	-	Yes	-	1-25
5	Small pit	5	.60	.60	23-69	High	-	No	0	1-25
7	Small pit	6	1.30	.10	17-46	Moderate	Trash conc	-	7	1-25
8	Small pit	3	.83	.76	25-85	High	-	No	0	1-25
9	Bell pit	6	.90	.00	15-84	High	-	No	0	1-25
12	Small pit	7	.91	.00	42-76	High	-	No	0	1-25
13	Small pit	8	.25	.00	14-44	Moderate	Poss pithouse	No	0	26-50
14	Small pit	9	.30	.00	60-70	Moderate	-	No	0	51-75
15	Small pit	16	.64	.00	44-77	High	-	No	0	1-25
17	Borrow pit	7	2.15	.00	40-115	High	-	No	0	1-25
18	Small pit	19	.33	.00	40-62	High	-	No	0	1-25
19	Small pit	19	.35	.00	29-54	High	-	No	0	1-25
21	Borrow pit	19	2.84	2.50	26-113	Moderate	-	No	3	26-50
22	Small pit	19	.24	.00	19-40	Moderate	Horno	No	0	51-75
24	Borrow pit	19	4.75	4.50	44-121	High	Poss pithouse	No	20	26-50
25	Small pit	11	.41	.00	38-70	Moderate	-	No	1	26-50
26	Small pit	11	.42	.00	51-57	Moderate	-	No	0	1-25
27	Small pit	11	.58	.00	33-71	Moderate	-	No	2	51-75
30	Borrow pit	19	1.90	2.60	45-107	High	Poss pithouse	No	1	26-50
32	Borrow pit	7	1.70	.00	35-115	High	-	No	0	1-25
34	Small pit	15	.32	.00	45-83	Moderate	-	No	2	1-25
35	Large pit	18	1.70	.00	47-88	High	-	No	0	1-25
36	Small pit	18	1.40	1.10	39-90	High	-	No	1	?
37	Small pit	23	.85	.00	31-56	Moderate	-	No	2	1-25
38	Small pit	23	.60	.80	17-66	Moderate	-	No	4	1-25
39	Large pit	23	2.08	.00	29-102	High	Pithouse	No	7	1-25
40	Large pit	24	3.90	3.95	38-107	High	-	No	6	1-25
42	Borrow pit	13	1.48	.00	80-134	High	-	No	-	1-25
45	Small pit	39	1.40	.54	63-115	High	-	No	1	1-25
48	Small pit	39	.58	.00	64-97	High	-	No	8	1-25
49	Small pit	39	.70	.00	63-102	Moderate	Floor feature	No	1	1-25
59	Large pit	40	5.05	4.70	66-156	High	-	No	16	1-25
60	Large pit	40	2.30	.00	48-110	High	-	Possible	14	1-25
61	Large pit	40	1.94	.57	59-128	High	-	No	2	1-25
65	Small pit	40	.53	.00	55-92	High	-	No	1	1-25
70	Large pit	51	1.05	1.55	67-99	High	-	No	6	1-25
73	Small pit	47	.35	.00	57-79	Moderate	-	No	1	1-25
74	Small pit	47	.61	.00	57-73	Moderate	-	No	0	1-25
75	Large pit	47	2.70	1.19	57-102	High	-	No	0	1-25
79	Small pit	47	.73	.00	64-98	High	-	No	1	1-25
82	Small pit	47	.80	.00	43-74	High	Floor feature	No	0	1-25
83	Small pit	47	1.20	.00	40-70	High	Floor feature	No	0	1-25
87	Bell pit	54	1.31	1.18	60-111	High	-	Yes	1	1-25
92	Small pit	54	.95	.00	38-84	High	-	No	0	1-25
98	Large pit	48	1.43	.00	58-76	Moderate	-	No	0	1-25
99	Large pit	59	2.45	1.60	53-66	Moderate	-	No	7	1-25
105	Borrow pit	61	1.82	1.37	48-98	Moderate	-	No	2	1-25
107	Borrow pit	61	3.41	3.27	45-104	High	-	No	3	1-25
109	Small pit	44	1.15	.00	42-130	High	-	No	0	1-25
110	Borrow pit	44	11.95	11.95	43-122	High	-	No	3	1-25
111	Borrow pit	43	.97	.97	52-114	Moderate	Small pit	No	0	-
112	Borrow pit	43	.74	.74	56-124	Moderate	-	No	0	1-25
113	Borrow pit	43	1.34	1.34	52-124	Moderate	-	No	0	1-25
114	Borrow pit	43	1.90	.64	47-120	Moderate	-	No	0	1-25
115	Small pit	43	.48	.00	44-67	High	-	No	0	1-25
116	Small pit	43	.51	.00	76-133	High	-	No	11	-
117	Small pit	43	.27	.00	75-118	Moderate	-	No	2	-
118	Borrow pit	43	1.13	.00	76-129	High	-	No	0	-
119	Borrow pit	43	2.05	.00	80-130	High	-	No	5	-
122	Large pit	41	1.92	.00	50-85	High	-	No	2	1-25
124	Small pit	54	.45	.49	37-54	Moderate	Posthole	Possible	2	1-25

Table 5.4. Horno and roasting pit profile information.

Feature No	Feature Type	Trench	Profile Length (m)	Profile Length (Opposite Wall) (m)	Depth (cm below Ground Surface)	Confidence	Alternate ID	Burning	Fill (No of Artifacts)	Disturbance (%)
20	Horno	19	2.10	1.70	25-120	High	-	Yes	6	1-25
28	Horno	12	1.46	.00	54-102	High	Hearth	Yes	0	1-25
58	Horno	38	1.06	1.20	68-118	High	Roasting pit	Yes	0	1-25
23	Roasting pit	19	.26	.00	80-93	High	Large pit	Yes	0	1-25
68	Roasting pit	53	.95	.00	38-51	Moderate	Other	Yes	0	1-25
84	Roasting pit	54	.88	.08	46-66	Moderate	-	Yes	0	1-25
96	Roasting pit	56	.97	.00	55-75	High	-	Yes	0	1-25

ration of various foodstuffs, including agave, cholla, and maize.

Small Pits

Thirty-three (27 percent) of the identified features in the project area were classified as small pits. These range in size from .24 to 1.40 m in profile length. Most of these are basin-shaped with sloping walls and rounded bottoms, although the steepness of the sides and depth of the features varies considerably (Figure 5.8). Small pits in the project area are rarely irregular in shape. In the cases that are, rodent or modern disturbance was often noted. The profile depth (from top to the bottom) of small pits ranges from a minimum of 6 cm to a maximum of 98 cm. Burning was noted for only one pit, while possible burning was recorded for another. The burned pit is Feature 4 (Figure 5.8), and contains dark gray sandy silt and a horizontal band of charcoal. The possibly burned pit, Feature 124, contains gray to gray-brown silty loam with moderate densities of charcoal and burned daub. Feature 124 either intrudes upon Feature 91, a burned pithouse, or is a subfeature of that same pithouse. Three other small pits, Features 49, 82, and 83, are also either intrusive pits or subfeatures of pithouse Features 51 (Feature 49), and 81 (Features 82 and 83). Seventeen of 33 small pits contain artifacts visible in profile. The average number of artifacts per pit (all small pits) is 1.42 (standard deviation = .56, maximum = 11).

Large Pits

Twelve features (10 percent) were classified as large pits. Large pits are 1.05 m (the opposite wall was over 1.5 m in length) to 5.05 m in profile length. The profile depth of these features ranges from 13 to 90 cm. As with small pits, most large pits are basin-shaped with sloping walls and rounded bottoms. Large pits generally have more gradually sloping sides than small pits. Burning or possible burning was recorded for two features. Feature 3, located adjacent to the burned Feature 4 discussed above (Figure 5.8), is filled with light to dark gray sandy silt and contains a few small chunks of charcoal. Feature 60 is a 62 cm deep, 2.30 m long round-bottomed symmetrical pit that intrudes upon Feature 59, a large trash-filled pit located to the south. The fill of Feature 60 is comprised of burned daub, charcoal, and dark gray-brown sandy silt, as well as having one of the highest number of artifacts noted in a feature profile (n = 14). Although some of the fill has the appearance of burned structural material, the recorder thought that the pit's location next to a large trash deposit, the high artifact count, and shape suggested that it was the locus of trash deposition rather than a possible pithouse. Visible artifacts were recorded in eight of 12 large pits, yielding an average of five for all large pits (standard deviation = 5.48, maximum = 20).

Borrow Pits

Fifteen features (12 percent) appear to be prehistoric borrow pits. These pits are .74 to 11.95 m in profile length and have a profile depth that ranges from 50 to 87 cm. As would be expected, all of these features reached well below modern ground surface, with the shallowest ending at 98 cm in depth, and a number extending below the bottom of the trench (bottom depths were recorded as the depth of the bottom of the trench). Borrow pits were generally very broad with gradually sloping sides and basin-shaped bottoms, although a few, including Features 112, 113, 118, and 119, were narrower and steeper (these pits were deeper than the backhoe trenches thus having unknown bottom depths). These features, as well as Features 111 and 114, were all found within Trench 43 near the southwestern end of the Pole Yard, suggesting

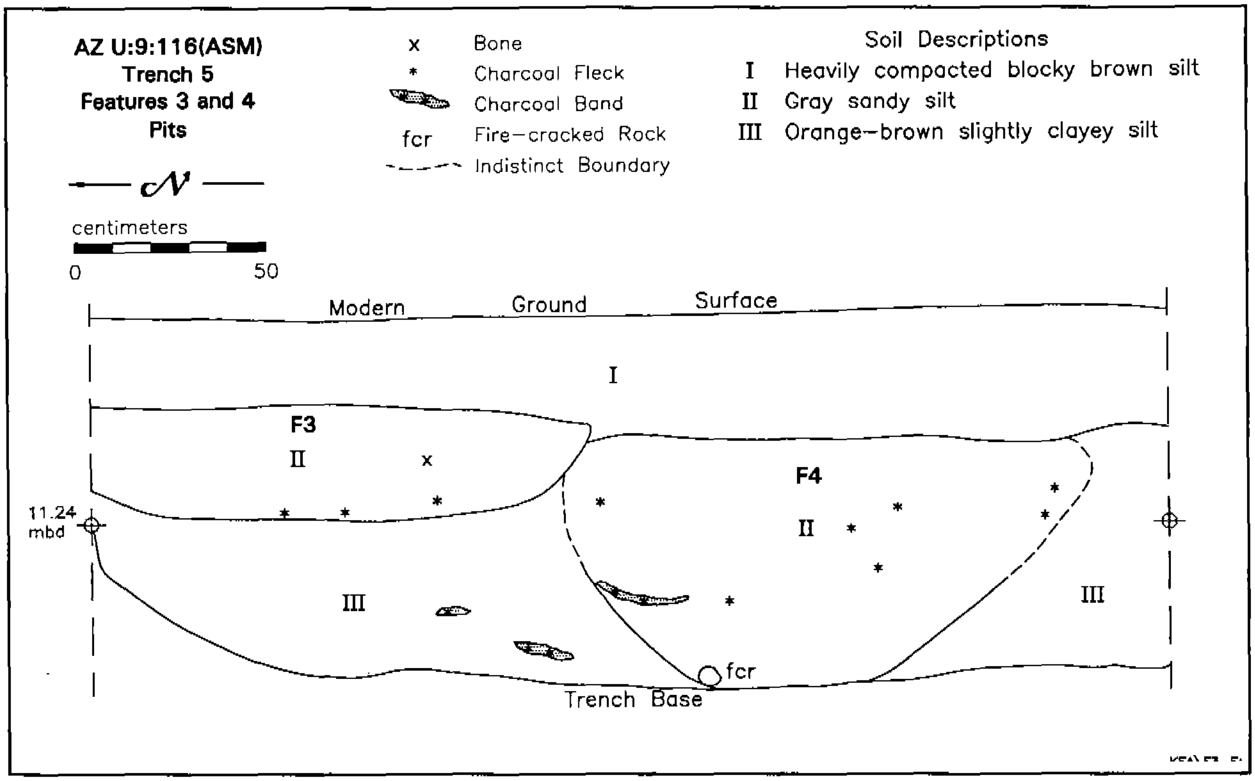

Figure 5.8. Profile of Features 3 and 4, pits.

activities aimed at mining caliche were somewhat spatially localized in the project area. No borrow pits exhibit evidence of burning. Artifacts were noted in seven of 15 features resulting in an average of 2.47 (standard deviation = 5.11, maximum = 20). This average is skewed by the high number of artifacts noted in Feature 24, which had an alternate classification as a possible pithouse.

Bell-shaped Pits

Field personnel recorded two bell-shaped pits. The first, Feature 9, is unburned, contains no artifacts, and is 69 cm deep. The opening of the pit is 76 cm wide, while the base of the pit is 94 cm wide, giving it an angular, almost trapezoidal shape. The bottom of the pit is highly irregular and appears rodent disturbed. The fill is light brown silt with a few small flecks of charcoal intermixed. The second bell-shaped pit, Feature 87, is quite different (Figure 5.9). The pit is much rounder, with an upper opening, truncated by plowing, that is 98 cm wide in profile, while the maximum profile length, approximately 30 cm lower, is 1.31 m. The pit tapers to a rounded basin-shaped bottom, giving it a profile depth of 51 cm. Feature 87 is clearly burned, the margins of the pit being a distinct red line of oxidized soil. The fill of the feature is predominantly clean, brown silt loam with a low density of charcoal flecking. At the base of the pit is a thin layer of white-gray ash with small chunks of charcoal. Additionally, a small, unburned, upside-down, wide-mouthed Sacaton Red-on-buff jar was located at the bottom of the pit. The clean fill, devoid of artifacts above the ash lens, suggests the pit was abandoned while open and filled naturally.

Hornos and Roasting Pits

Seven features were identified as hornos or roasting pits within the project area (Table 5.4). Although often used for similar purposes, these pits have distinct morphological characteristics. While both types of features are usually employed for roasting foodstuffs, hornos are generally larger and deeper, and possess a thick "rind" of charcoal-infused soil. Roasting pits are smaller and shallower and lack the intense burning along their margins suggesting they were either used less frequently or at lower temperatures. All of the hornos within the project area have thick rinds and are consistently deeper and larger than the features recorded as roasting pits. The hornos range in size from 1.06 to 2.10 m in profile length and from 48 to 95 cm in profile depth. These depths are probably minimum

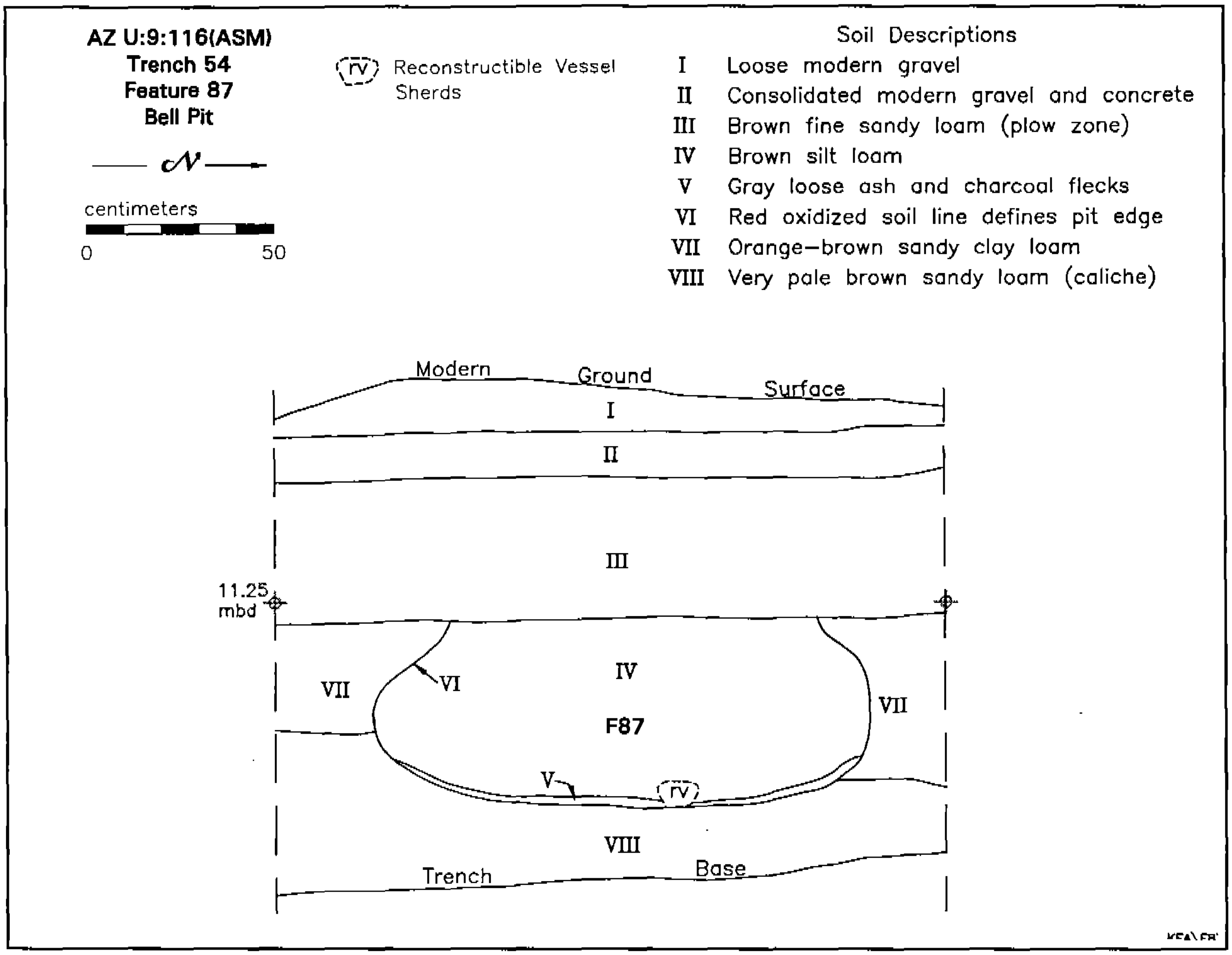

Figure 5.9. Profile of Feature 87, bell-shaped pit.

values, as neither Feature 20 or 28 were bisected by its trench, and Feature 58, which was bisected, extends below the base of the trench. All three of the hornos lack a large number of visible pieces of fire-cracked rock and burned vegetal matter, suggesting they were cleaned out after their final uses and subsequently filled either naturally or by cultural deposition. Feature 20 is probably the best example of the three hornos discovered during the project (Figure 5.10). A thick rind of oxidized soil and highly concentrated charcoal is visible in both sides of the trench. This pit is filled with gray-brown sandy silt with a light density of charcoal flecks. A few pieces of fire-cracked rock and a small number of sherds are also present. A few of these sherds are Gila Polychrome, indicating the feature was either last used or at least partially filled during the late Classic period.

Four roasting pits were discovered during testing, one (Feature 23) in the Tank Yard, and the others in the Pole Yard. All three of these latter roasting pits are near the large cluster of pithouses in the northwest quadrant of the Pole Yard. Roasting pits are much smaller and shallower than hornos, ranging in profile length from 26 to 97 cm and profile depth from 13 to 20 cm. No pieces of fire-cracked rock or artifacts were noted in any of the profiles, but all the roasting pits contain very high densities and large pieces of charcoal, as well as some ash and slightly oxidized soil. The four roasting pits in the project area are quite similar, suggesting they are likely to have been used for similar purposes and subject to comparable abandonment processes.

Hearth

A single, deeply buried extramural hearth, Feature 63, was identified in Trench 38. Feature 63 is a small, shallow hearth, with a profile length of 30 cm and a profile depth of 13 cm. Gray ashy soil containing small bits of charcoal filled the feature which was surrounded by slightly oxidized, reddish soil. The hearth is located 1.12 m below modern ground surface, just

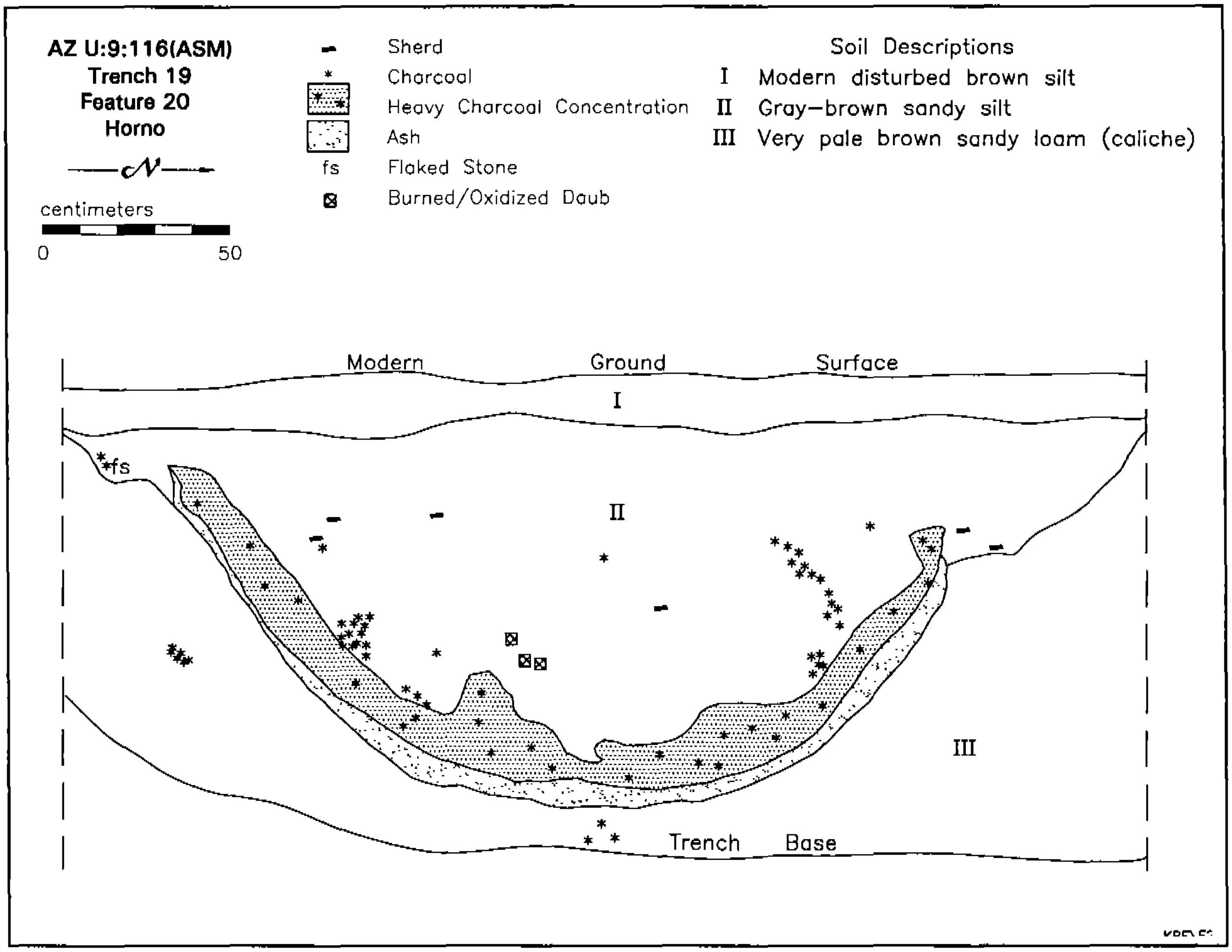

Figure 5.10. Profile of Feature 20, horno.

above the bottom of the backhoe trench. Field personnel noted that the hearth may be at the bottom of a large, poorly defined borrow pit that was not visible in profile. Isolated artifacts were seen for a few meters on either side of the hearth, but no definitive boundary to the hypothesized borrow pit could be discerned.

Extramural Surface

Feature 123 is a poorly defined extramural surface located near a large pit (Feature 122) in Trench 41. The surface was defined by a few flat-lying sherds and fire-cracked rocks and was traceable for 48 cm along the west face of the trench. No distinct stratigraphic break is visible in association with the artifacts. This feature is located at a depth of 14 cm below modern ground surface, just below the plowzone. The modern disturbance has rendered the prehistoric feature very difficult to follow.

Settling Basin

Feature 31 has been preliminarily identified as a settling basin. When first encountered in Trenches 7 and 20 in the eastern Tank Yard, the water-lain sediments composing the feature suggested it was a canal. To confirm this identification as well as orientation, a third trench (21) was cut at an angle perpendicular to the feature's suspected course. The cut revealed Feature 31 terminated abruptly at the southeast end of Trench 21. Although a 2.6-m-long segment of the feature, extending 90 cm to the base of Trench 21, was visible on the south wall, it was absent from the north wall. In addition, no trace of the feature's sediments was observed in Trench 8, which it should have intersected if Feature 31 were indeed a canal (see Figure 4.1).

The basin is oval in plan, oriented northeast to southwest, and is at least 25 m long. Width is variable, ranging from 2.6 m at Trench 21 to more than 10 m in the area of Trench 7; total depth is unknown but must exceed 90 cm. The feature originates immediately below the zone of modern disturbance and has been excavated through the argillic (Bt) and into the calcic horizon (Bk). A sequence of sediments, presumably reflecting filling and drying episodes, are evident in profile (Figure 5.11). At least four episodes can be distinguished. The lowermost stratum (XI) is a medium brown sandy silt with occasional gravel and some caliche nodules. This is overlain by Stratum X, a compact, medium brown silty clay. The textural difference of the two strata suggests the former represents suspended-load sediments deposited during filling of the basin, while the latter reflects finer-textured sediment deposited from standing water (Nials and Fish 1988:290). This sequence is repeated in later episodes represented by Stratum VI, a gray-brown sandy silt and clay deposit, and the inset Stratum VII, a very dark brown, compact clay. Stratum V, medium to light gray-brown, bedded sandy silt and clay, reflects another, younger episode of deposition. A layer of coarse sand and a lens of caliche-like material cap the feature in Trench 7, but both are unrelated to the settling basin and presumably derive from activity associated with the construction of the Tank Yard.

Not evident in Trench 7, but observed in Trenches 20 and 21, were areas containing a jumbled mass of material, literally hunks or balls of clay intermixed among sand, silt, and clay sediments. These occurred at the edge of the basin at the north end of Trench 20 and the southeast end of Trench 21. Originally thought to represent clean-out debris from the "canal," it is now speculated that the debris reflects material discarded during mining of clay in the basin, as suggested by Nials and Fish (1988).

A possible inlet to the basin was observed in the north wall of Trench 21. It consisted of a 94-cm-long parabolic lens of bedded red-brown and gray-brown clay extending 20 cm below the modern disturbed zone. Because this stratum was not observed in Trench 8, it could simply represent the far north end of Feature 31. Alternately, it is an inlet but it rises in elevation toward Trench 8, so all trace of the feature has been removed by construction activity in the Tank Yard.

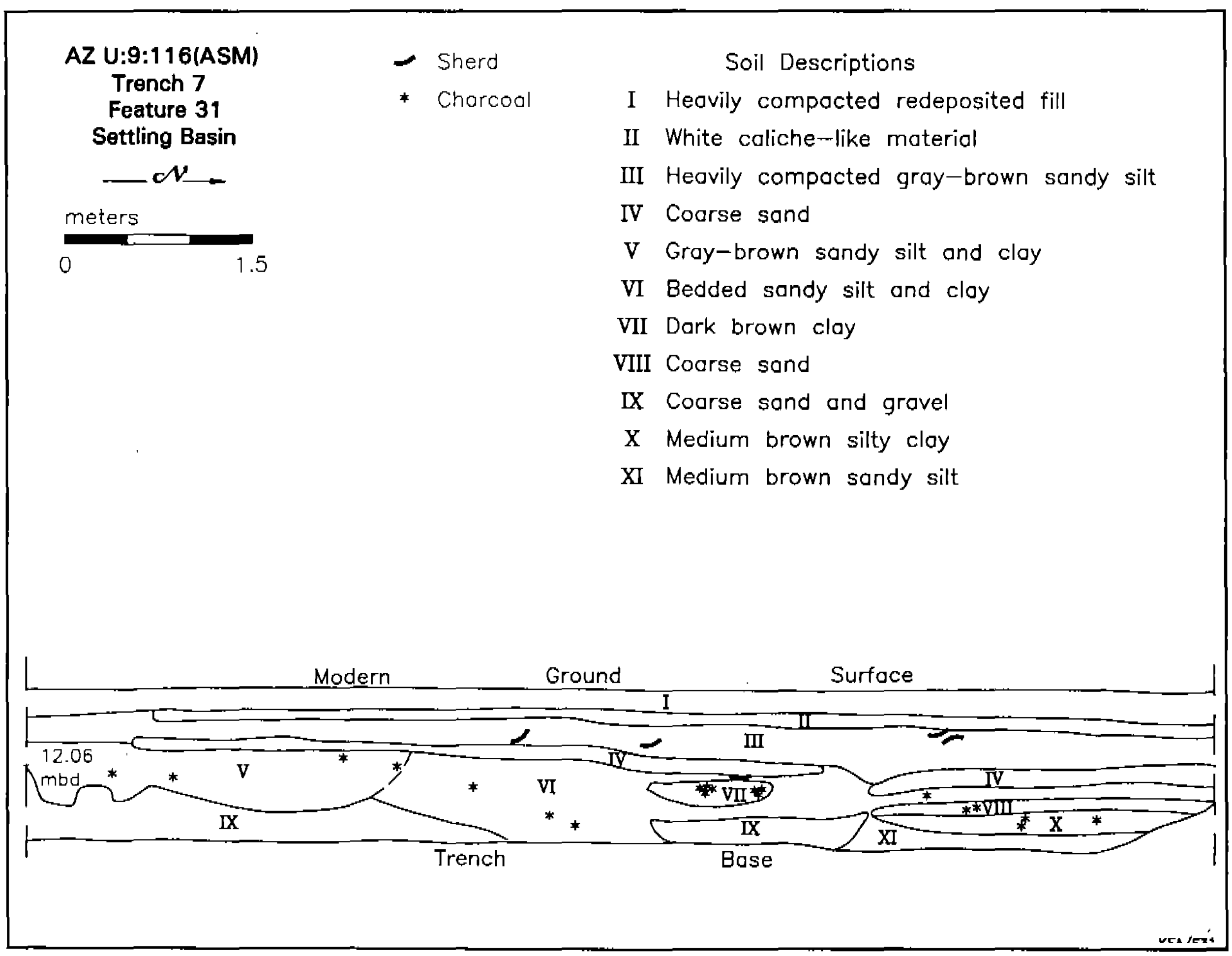

Figure 5.11. Profile of Feature 31, settling basin.

HUMAN REMAINS

Five secondary cremations were uncovered during backhoe trenching. These were located in three separate areas of the Pole Yard, two in a small cluster near the northwest corner, two more in the south-central portion, and a single cremation amongst the cluster of pithouses in the southeast quadrant. The two pairs of cremations in closely spaced trenches suggest the presence of at least two cemetery areas in the project range. Because cremations are small features, the probability of intersecting one with a backhoe trench is very low. If two are uncovered in close proximity, there are likely to be a number present in the immediate vicinity. All five cremations located during testing were completely excavated at the request of the Gila River Indian Community. Prior to excavation, the overlying gravel and plowzone above each feature was removed by the backhoe. These features were then excavated by hand, all fill except that found within burial vessels or which contained highly fragmented pieces of bone was passed through ⅛-in mesh screen, and all bone and artifacts were collected. The materials collected during the burial excavations have been repatriated to the Gila River Indian Community.

Feature 57

Feature 57 was an isolated secondary cremation located in Trench 38 within a cluster of pithouses. Excavation began as a 50-cm by 30-cm unit oriented lengthwise along the trench. An arbitrary unit was initiated because no pit outline was visible in the trench profile or after backhoe stripping. Two levels, totaling approximately 20 cm of fill, were excavated until the outline of a pit was visible. The pit was subrectangular to oval, with steep sides and a rounded bottom (Figure 5.12). Plowing had disturbed the upper portion of the pit, while the lower 15 cm of the pit was undisturbed and the cremation vessel and its contents were intact (other than what had been removed by the backhoe).

A few scattered plain ware sherds, possibly the remains of a second covering vessel removed by the backhoe, were the only artifacts recovered from the fill of the pit. The cremation vessel was a small, plain, sand-tempered, Gila-shouldered jar. Almost all of the cremated bone was contained within this vessel.

Feature 102

This secondary cremation, located in Trench 49 near the northwest corner of the Pole Yard, was in close association with Feature 108, another cremation a few meters to the northwest. A 1-m by 1-m unit was located along the backhoe trench over the cremated bone. Excavation began by shoveling off the top 13 cm of fill over the eastern half of the unit (Figure 5.13). This exposed the pit outline of Feature 102. Subsequent excavation was conducted within this pit, which proved to be circular, basin-shaped, and approximately 16 cm deep.

A single plain ware sherd was the only artifact recovered from the pit. Cremated bone was scattered throughout the feature, probably the result of significant rodent disturbance. The excavator noted that a river cobble located in disturbed fill above the pit might be a marker for the feature.

Feature 108

Feature 108 was uncovered in Trench 62, a few meters to the northwest of Feature 102. After the backhoe removed the overburden, a 1-m by 50-cm unit, oriented parallel to the trench, was located above the cremation. Seven centimeters of fill was removed before the pit outline became visible. Excavation then proceeded within the pit which was a 21-cm-deep, elongated oval with a flat bottom (Figure 5.14).

A few sherds recovered from above the pit and the upper portion of the pit fill were probably from the single, broken capping vessel. This vessel was an overturned, 25-cm-diameter, hemispherical, mica schist-tempered, plain ware bowl. Most of the cremated bone was contained within this vessel, but some of it trailed off into a "niche" at the base of the pit. Rodent runs were visible within the pit, indicating bioturbation as the probable cause for the dispersal of bone fragments and the creation of the "niche."

Feature 120

This secondary cremation was found in Trench 42, a few meters to the southwest of Feature 121, another secondary cremation. An approximately 85-cm by 55-cm unit was placed parallel to the trench above the cremation (Figure 5.15). Twelve centimeters of fill was then removed above the cremation vessel. No pit outline was discernible, although it was possible that the pit was of approximately the same diameter as the two vessels capping the concentration of human bone. The area where the vessels were located was 32 cm deep.

The remains of two overturned bowls used as capping vessels were removed from the feature. The upper vessel was a mica schist-tempered plain ware, while the lower vessel was a hemispherical, Sacaton Red bowl with a slightly flared-out rim. Most of the cremated bone was concentrated under this vessel.

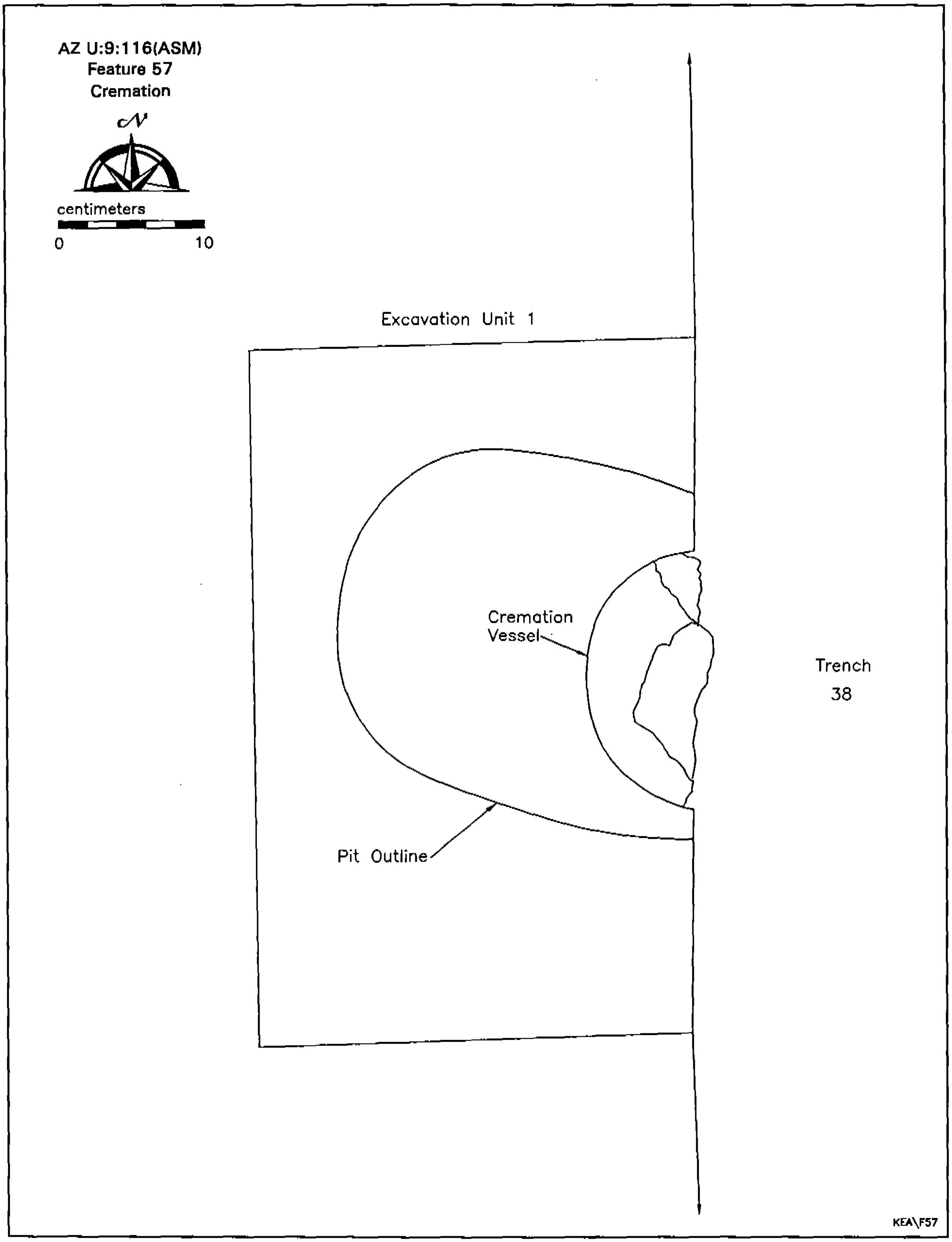

Figure 5.12. Plan view of Feature 57, secondary cremation.

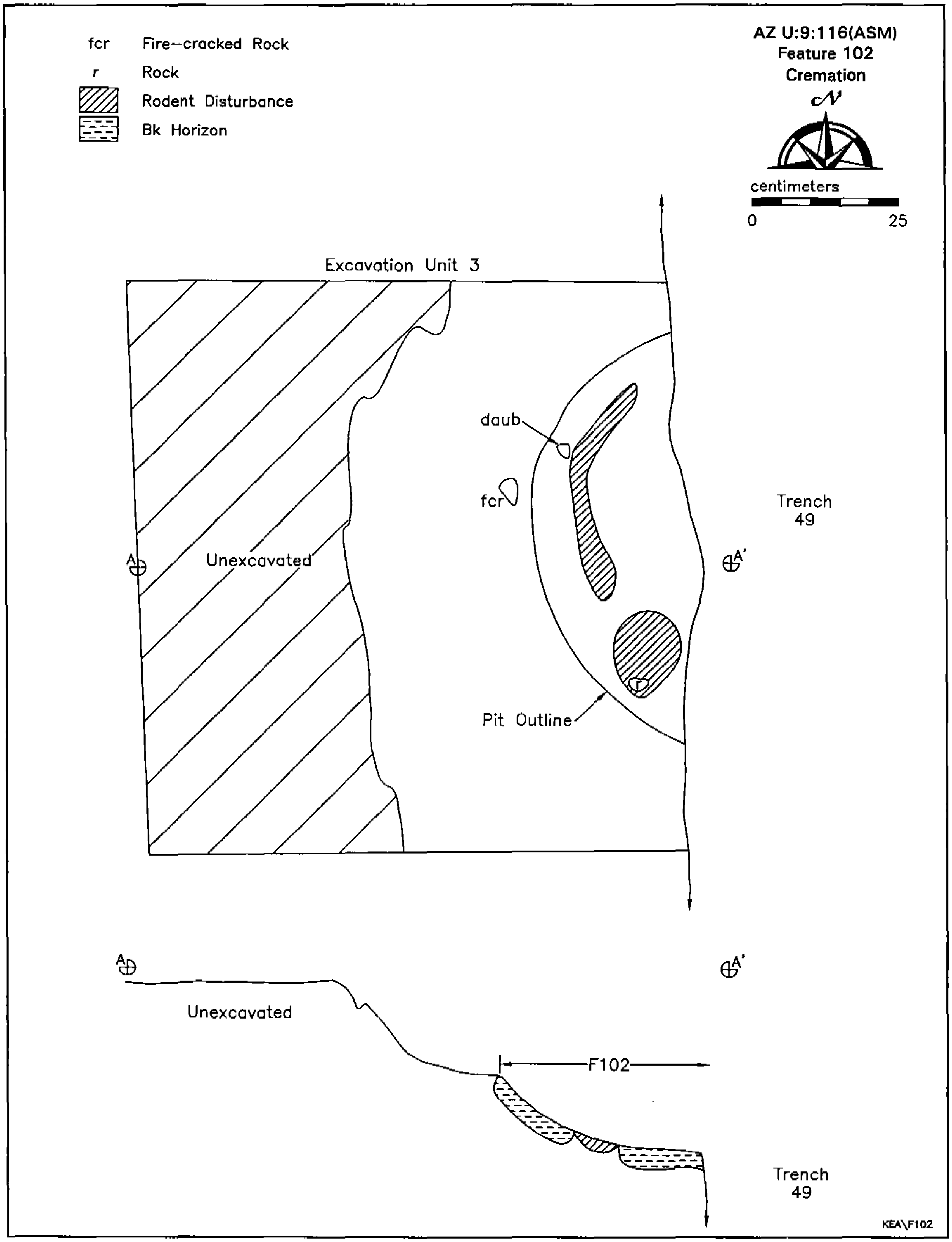

Figure 5.13. Plan view and cross section of Feature 102, secondary cremation.

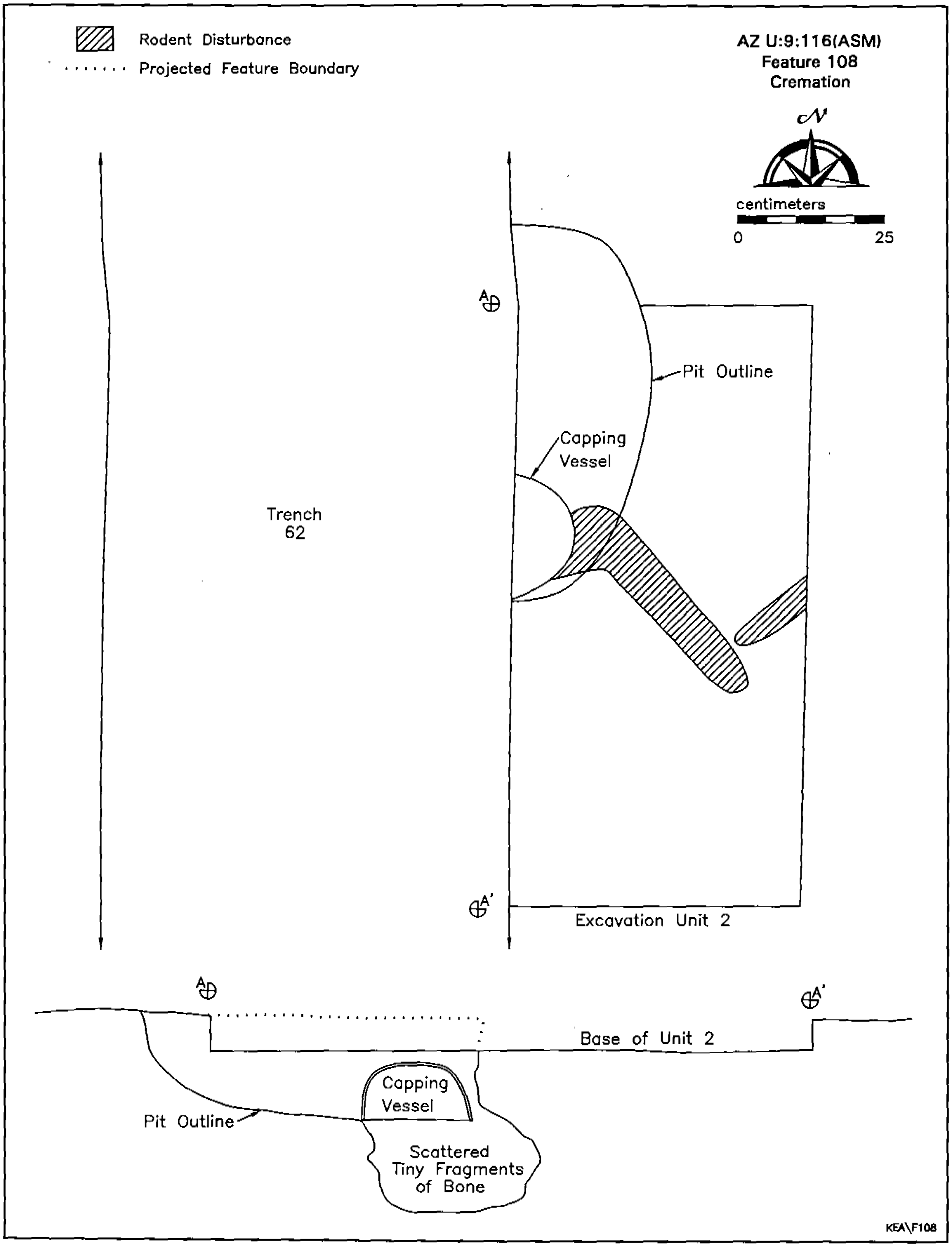

Figure 5.14. Plan view and cross section of Feature 108, secondary cremation.

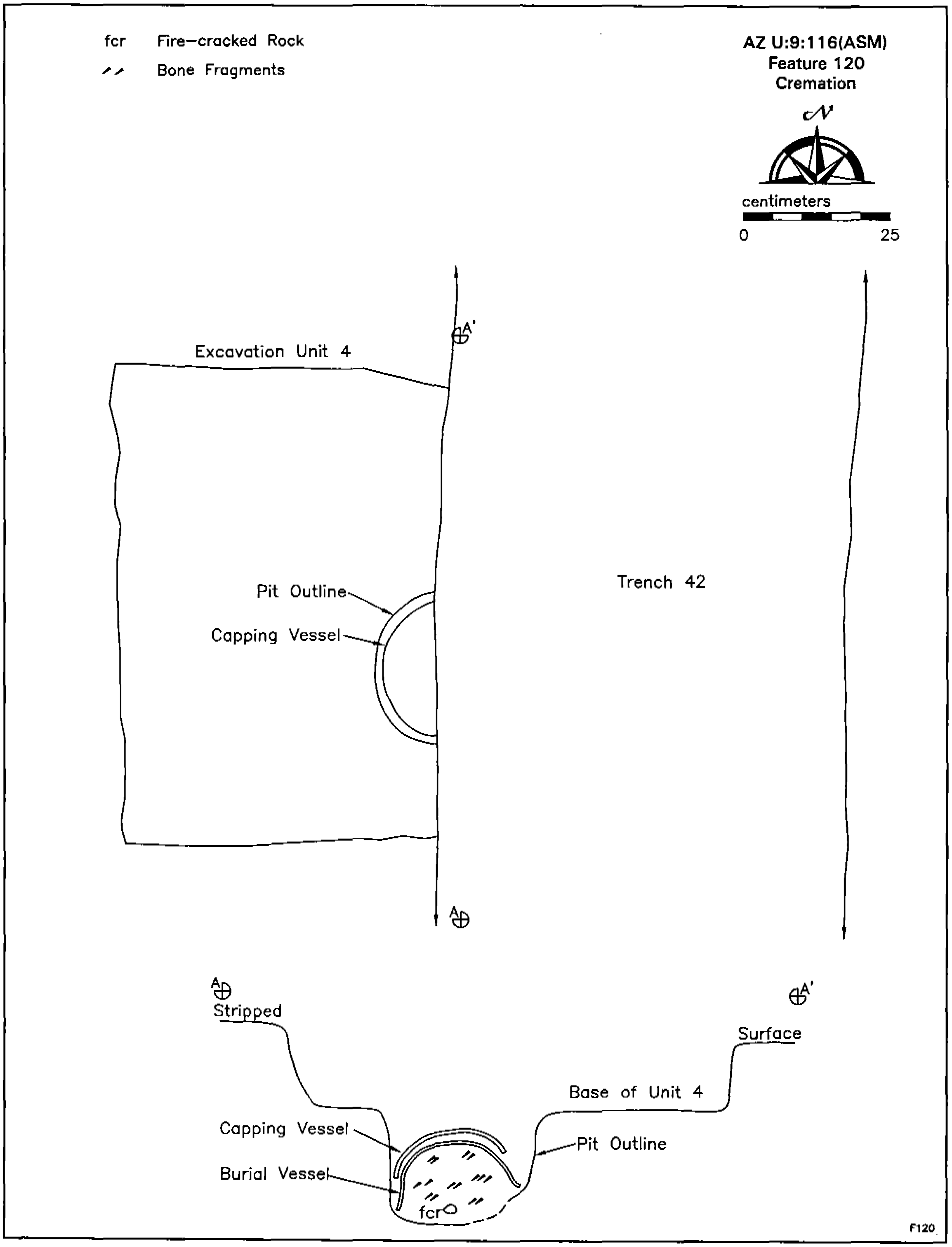

Figure 5.15. Plan view and cross section of Feature 120, secondary cremation.

Feature 121

Feature 121 was uncovered in Trench 57. Excavation of this feature began as a 1-m by 50-cm unit oriented lengthwise along the trench (Figure 5.16). A 10-cm-deep level was initially excavated before the pit outline was discernible. The pit itself was oblong, with steep sides and a slightly irregular bottom. All of the feature and overlying fill were heavily disturbed by rodents and plowing. This resulted in the fragmentation and scattering of most of the feature's contents.

A few plain ware sherds, a flake, a worked faunal bone fragment, and an obsidian point tip were recovered from the fill immediately above the cremation pit. Due to the disturbance, it was impossible to discern if these artifacts had come from the pit itself. Within the pit were the remains of two highly fragmented, mica schist-tempered plain ware vessels. No rim pieces or pieces large enough to determine vessel form were present. A portion of one of the vessels appeared to be in place near the south end of the pit. Most of the cremated bone was concentrated under this vessel fragment, but pieces were strewn throughout the feature.

MODERN FEATURES

Two modern features were located within the project area. One, an irrigation ditch, runs north-south along the entire western face of Trench 48. The other, a surface with associated firepit and utility posthole, is in the extreme northeastern corner of the property in Trench 45. Examination of aerial photographs and maps provided by SRP indicate that these features were created quite recently. The ditch, Feature 97, is approximately 35 cm in depth and located just below the modern gravel layer upon the surface. Feature fill is fine, light brown sand with chunks of dark brown clay up to 2-3 cm in diameter. Small riverine mollusk shells are strewn throughout the feature. A metal nail and a few pieces of wire were also found within the ditch. Additionally, large pieces of burned wood were found at the base of the ditch in a few places along the trench. This wood is probably the remains of vegetation burned to clear the ditch. A very thin layer (3-5 cm) of sediment identical to those from Feature 97 was found below the gravel layer in Trenches 55 and 56, indicating the ditch may have overflowed or its contents were spread across the area when the Pole Yard was later leveled and covered with gravel. The ditch is not visible in aerial photos of the agricultural fields in the project area in 1934 or 1949, suggesting it was constructed after those dates. The area of the Pole Yard continued to be cultivated until 1958, at which time the Pole Yard was constructed (see Chapter 2).

Feature 67 is located below the layer of surface gravel and a 15-cm-thick layer of gravel intermixed with concrete. The feature is marked by a thin layer of fine sand and laminar silts indicative of pooling water 41 cm below modern ground surface. This surface articulates on the south with a large utility posthole that has been backfilled with gravel similar to that covering the surface of the project area. A small, 20-cm-long, 10-cm-deep fire pit is dug into this surface, approximately 4 m north of the utility pole. The pit is filled with fine gray ash and bits of charcoal. Aerial photos indicate that the utility line posthole is probably associated with a transmission line constructed across the property to the generating station sometime between 1951 and 1954. The surface is also in the area of a tool shed on SRP maps that was built sometime between 1954 and 1958 and then replaced by a steel shed on a concrete slab (later demolished in 1974).

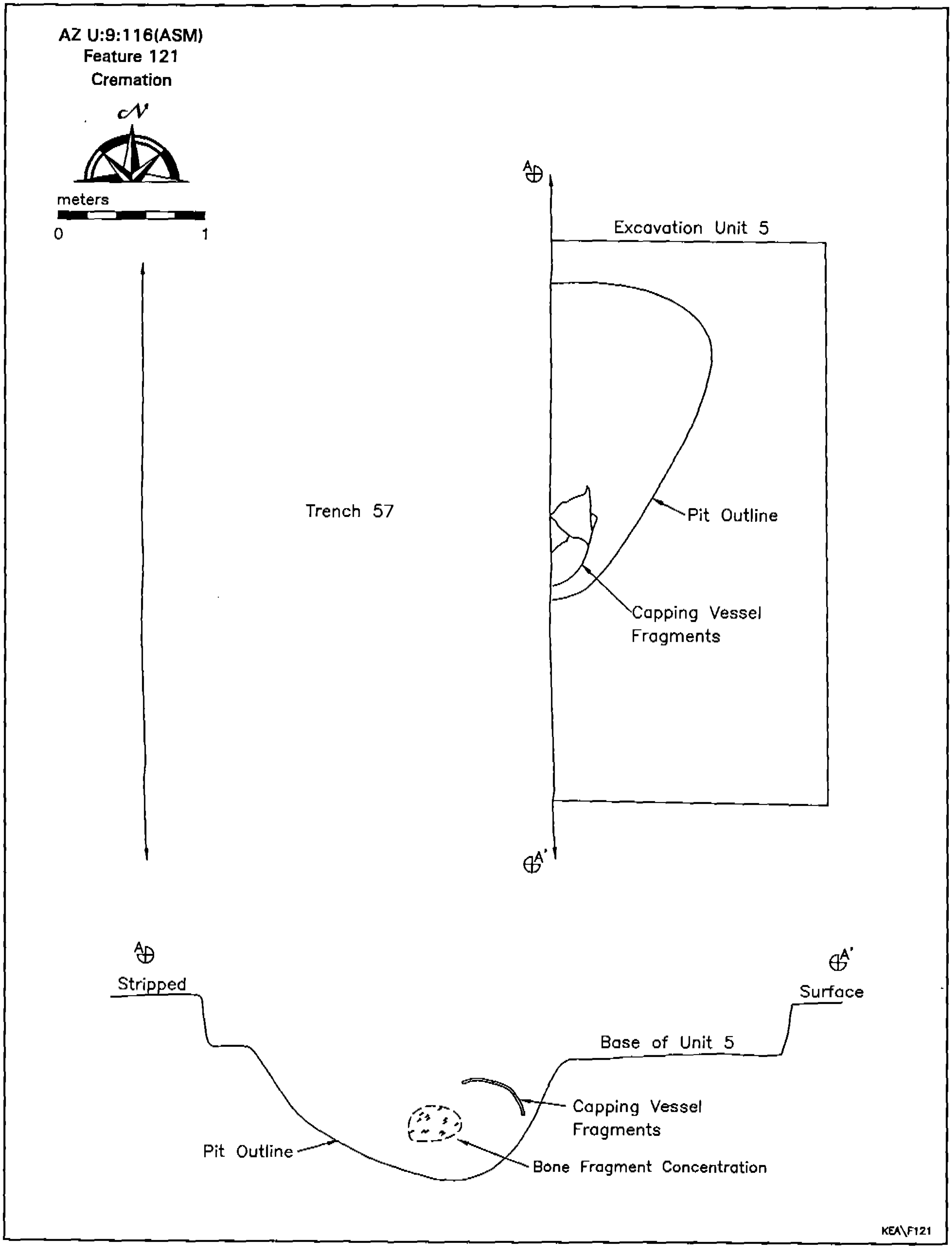

Figure 5.16. Plan view and cross section of Feature 121, secondary cremation.

ARTIFACTS AND PALEOBOTANICAL REMAINS

T. Kathleen Henderson

Seven hundred and fifty-eight artifacts were collected during testing for the Kyrene Expansion Project (KEP). Ceramics compose the majority of this assemblage (n = 721, 95 percent), as their collection was emphasized to obtain information about the ages of the features. The collection of other artifacts was conditioned by two factors: whether the artifact was a tool, and if it was likely to be lost once the trench in which it occurred was backfilled. These conditions, plus those artifacts recovered from the burial excavations, resulted in the collection of 22 flaked stone, 12 ground stone, 2 shell artifacts, and 1 worked faunal bone. A small number of flotation and pollen samples were collected also. The samples were taken from the interior of an horno (Feature 20), from the two vessels in the pithouse floor pits of Feature 46, and from strata in Feature 31, the settling basin. Clay samples were also obtained from Feature 31.

Detailed analyses were undertaken only for the ceramics per the goal of their recovery. An inventory level of analysis was accomplished on the remaining artifact types. Also, only the flotation samples from Features 20 and 46 were analyzed. The results of these endeavors are reported below.

CERAMICS

The ceramics were initially sorted according to ware: plain, red, buff, and polychrome. The criterion for distinguishing a red ware from a plain ware was the presence of a slip. All the plain ware ceramics met the definition of Gila Plain (Haury 1965, 1976), so distinctions among these were coded in terms of temper type. Similarly with one exception, no attempt was made to differentiate the red wares by traditional type. As numerous analysts have noted (Abbott 1983:82; Abbott and Gregory 1988:17; Cable and Gould 1988; Crown 1981), there is overlap in the distinguishing attributes of most Phoenix Basin red wares, making the typological significance of the wares inscrutable. Again, temper type was used as the distinguishing characteristic among red wares. The one red ware that was typed according to traditional classifications was Sacaton Red, a type characterized by the presence of a maroon or raspberry colored slip typically occurring on the interior surface of a mica schist-tempered bowl (Haury 1965, 1976). Buff ware and polychromes were identified to type where possible, following traditional definitions (Haury 1945, 1965, 1976).

Besides ware and type, attributes recorded for all sherds included size, temper type, whether the sherd was worked and in what manner, and vessel form, shape, body part, and wall thickness. For rim sherds, the attributes of rim shape, rim length, orifice diameter, and aperture diameter were also recorded. Temper was distinguished according to the types established by David Abbott (ed. 1994) for the Pueblo Grande-Hohokam Expressway project. Each sherd was examined using a binocular microscope at 10x to 30x power. Tiffany Clark undertook the analysis, under the supervision of Kathleen Henderson.

Although a broad suite of attributes was examined for the KEP sherds, only two will be discussed here: ceramic type and temper. The ceramic types are temporally sensitive, providing immediate clues as to the age of the cultural deposits in the project area. As Abbott's (1995; ed. 1994) studies have demonstrated, temper type can be used to identify production source areas, which has important implications for understanding patterns of exchange and interaction among the Hohokam. Information here bears on the significance assessment of the archaeological remains and on research issues appropriate to examination if the KEP proceeds to data recovery.

Table 6.1 presents a typological breakdown of the decorated (includes red ware) ceramics. Counts are presented by type and general location within the yards. Note that the table frequencies vary from the 721 total sherd count. This arises from the fact that sherds that were evidently part of the same vessel were counted as a single occurrence. For example, 99 sherds from the vessel in floor pit Feature 46.01 were counted as one Sacaton Red-on-buff.

The table reveals distinct differences among the ceramic types recovered by yard. Ninety-one percent of decorated ceramics from the Pole Yard are buff ware, and 82 percent of those that could be identified to type are Sacaton Red-on-buff. This percentage rises to 93 percent if the three sherds identified as either Sacaton or Casa Grande red-on-buff (Sacaton/CG r/b) are indeed Sacaton. Also, half of the red ware occurrences

Table 6.1. Decorated ceramic types by area.

Ceramic Type	NW Pole Yard	NE Pole Yard	SE Pole Yard	SW Pole Yard	N Tank Yard	E Tank Yard	W Tank Yard	S Tank Yard	Pole Yard Total	Tank Yard Total	Total
Sacaton R/b	-	9	13	1	2	1	-	-	23	3	26
Sacaton/CG r/b	-	1	2	-	4	-	1	-	3	5	8
Casa Grande R/b	1	-	-	1	2	-	-	-	2	2	4
Indet buff ware	7	24	38	5	16	5	3	2	74	26	100
Gila Polychrome	-	-	1	-	-	1	1	-	1	2	3
Sacaton Red	-	3	-	2	-	-	-	-	5	0	5
Indet red ware (MS)	-	-	1	-	-	-	1	-	1	1	2
Indet red ware (SM)	-	-	-	-	2	1	14	3	0	20	20
Indet red ware (EG)	1	-	1	-	-	-	1	-	2	1	3
Indet red ware (FP)	-	-	-	-	1	-	2	-	0	3	3
Indet red ware (U)	-	-	-	2	-	-	-	-	2	0	2
Total buff ware	8	34	53	7	24	6	4	2	102	36	138
Total red ware	1	3	2	4	3	1	18	3	10	25	35

Note: R/b = Red-on-buff; MS = mica schist temper; SM = South Mountain granodiorite temper; EG = Estrella gneiss temper; FP = fine paste temper; U = unknown.

are Sacaton Red, whose production span is fairly restricted to the Sedentary period (Haury 1976). Notwithstanding the single sherd of Gila Polychrome, recovered from the upper fill of cremation Feature 57, the decorated ceramics suggest features in the Pole Yard are almost exclusively Sacaton phase in age. In contrast, buff ware accounts for only 59 percent of the Tank Yard decorated ceramic assemblage and there is a sizeable increase in the quantity of red ware (41 percent). Coupled with this is an increase in the occurrence of Casa Grande relative to Sacaton Red-on-buff. Note also that half of the identified buff ware types are either Sacaton or Casa Grande red-on-buff, which may signal that even if these sherds are Sacaton Red-on-buff, they were produced late in the production span of the style. Two occurrences of Gila Polychrome were recorded also. These included four sherds of the same vessel recovered from the upper fill of horno Feature 20, and one sherd from the settling basin Feature 31. Accompanying the Gila Polychrome in the upper fill of Feature 20 were two fine-paste red ware sherds; this could be temporally significant as the fine-paste type tends to occur in greater abundance toward the end of the Hohokam sequence (Henderson 1995a). The conclusion to be drawn from the Tank Yard ceramics is that a late Sedentary to early Classic period component is represented in the yard, with an overlay of late Classic period material.

The plain ware ceramics provide insight about possible differences among the two yards' prehistoric inhabitants in regard to interaction patterns. The frequency of the plain wares by temper type and yard location are presented in Table 6.2, and a summary of this data according to possible production source is presented in Table 6.3. The production sources are based on the work of Abbott (1995; ed. 1994) and Miksa (1999), who has shown that, in the Phoenix Basin, mica schist tempers derive mainly from the middle Gila River Valley, South Mountain granodiorite and Estrella gneiss are found on the western and eastern slopes of South Mountain, respectively, and Squaw Peak schist and phyllite occur in the Phoenix Mountains north of the Salt River. Because the sources of these materials tend to be exclusive, it can be suggested that pottery bearing mica schist temper was made in the middle Gila River Valley, those with South Mountain granodiorite and Estrella gneiss were produced in the vicinity of South Mountain, and the schist and phyllite reflect pottery made at sites located in the Canal 2 System, Las Colinas in particular (Abbott 1998; ed. 1994).

The pattern revealed in Table 6.3 is as follows. Pottery in the Pole Yard reflects a more diverse set of sources, with ceramics originating both locally (South Mountain vicinity) as well as from more distant venues (middle Gila River Valley and the Canal 2 System). Note that pottery from the middle Gila River Valley dominates the Pole Yard assemblage, particularly when buff wares, all of which are tempered with mica schist, are included in the total. In contrast, the majority of pottery from the Tank Yard was produced locally (South Mountain) with only a moderate inclusion of pots from the middle Gila River Valley. Notably, the Tank Yard did not yield ceramics that might have been produced in the Canal 2 System north of the river.

This pattern is consistent with preliminary findings by Abbott (1998). In his work at Pueblo Grande and other sites in the lower Salt River Valley, he has found evidence to suggest a change in the configuration of pottery suppliers and producers from the Sedentary to

Table 6.2. Plain ware ceramic types by yard area.

Plain Ware Temper Type	NW Pole Yard	NE Pole Yard	SE Pole Yard	SW Pole Yard	N Tank Yard	E Tank Yard	W Tank Yard	S Tank Yard	Pole Yard Total	Tank Yard Total	Total
Mica schist	6	21	34	5	10	5	4	-	66	19	85
South Mountain granodiorite	3	7	12	-	12	3	22	7	22	44	66
Estrella gneiss	4	16	3	2	4	-	-	1	25	5	30
Squaw Peak schist	3	2	3	1	-	-	-	-	9	0	9
Phyllite	-	2	1	-	-	-	-	-	3	0	3
Fine paste	2	-	1	-	1	-	2	2	3	5	8
Unknown	-	1	4	1	-	1	2	1	6	4	10
Total plain ware	18	49	58	9	27	9	30	11	134	77	211

Table 6.3. Plain and red ware ceramics by possible production source.

	Pole Yard		Tank Yard	
Production Source	Frequency	Percent	Frequency	Percent
Plain ware only				
Middle Gila River Valley	67	53	19	28
South Mountain vicinity	47	37	49	72
Canal 2 System	13	10	0	0
Plain and red ware				
Middle Gila River Valley	72	55	20	22
South Mountain vicinity	47	36	70	78
Canal 2 System	11	9	0	0

the Classic period. In Sedentary period times, there appears to have been a more open network of exchange, with sites on both sides of the Salt River drawing pottery from multiple sources and particularly from the middle Gila River Valley. By the Classic period, there is a trend toward increased localization of pottery production: assemblages from sites in the Canal 2 System are dominated by ceramics bearing tempers from the Phoenix Mountains, while South Mountain-derived tempers dominate ceramics from sites on the south side of the Salt. Taking into account that the Pole Yard features are mainly of Sedentary period age, while those in the Tank Yard are Classic period, the differences evident in the assemblages from these two areas suggest a close match with those of Abbott's research.

FLAKED AND GROUND STONE

A simple inventory level of analysis was accomplished for the 34 lithic artifacts collected during the project. This analysis consisted of recording lithic class, tool type, and raw material, along with provenience information. A list of the 22 flaked and 12 ground stone artifacts is provided in Table 6.4. The artifact types are those commonly found at prehistoric Hohokam villages.

The flaked stone assemblage splits evenly between unmodified debitage and tools. The flake types composing the debitage, including complete and broken flakes, flake fragments, and shatter, reflect all the items that would be expected in the core flaking process. The informal tools are also debitage, but these artifacts exhibit retouched or utilized edges. The remaining flaked stone artifacts are formal tools, either retouched implements or core tools. In the former category are a biface, the tip of a projectile point with a serrated edge, and a flake scraper. The core tools include a hammerstone and two core choppers or scrapers.

The ground stone artifacts are represented by essentially three types: manos, pestles, and tabular knives. A large grinding slab completes the assemblage. The four pestles and two of the manos are modified river cobbles; the remaining manos are rectangular trough types formally fashioned from vesicular basalt. The tabular knives are thin blades of tabular rock, either schist or metavolcanic, with use wear occurring along one edge. The grinding slab or slab metate is interesting not only because it is com-

Table 6.4. Flaked and ground stone artifacts.

Artifact Class	Artifact Type	Pole Yard	Tank Yard	Total
Flaked stone	Complete flake	2	3	5
	Broken flake	-	2	2
	Flake fragment	-	4	4
	Shatter	-	1	1
	Informal tool[a]	2	2	4
	Biface	-	1	1
	Projectile point	1	-	1
	Scraper	-	1	1
	Core hammerstone	1	-	1
	Core tool	1	1	2
	Total flaked stone	7	15	22
Ground stone	Mano	2	2	4
	Slab metate	1	-	1
	Pestle	3	1	4
	Tabular knife	1	2	3
	Total ground stone	7	5	12

[a]Utilized or retouched flake.

plete, which is a rare event at Hohokam villages along the lower Salt, but also because its material appears to be Estrella gneiss. This material composes the eastern half of the South Mountains; a geologic map prepared by Reynolds (1985) indicates the nearest source of this gneiss is an outcrop located on the southeastern foot of the mountains about 6 km from the project area. Given that the modified slab weighs on the order of 10 kg, considerable effort was given to its transport. The occurrence of this large block of Estrella gneiss is additionally significant because of its use as a pottery tempering agent in locally produced ceramics. It suggests that if the prehistoric inhabitants were willing to transport such a large piece of the material to the KEP area, then acquisition of smaller amounts of the rock for pottery production would have posed few problems.

For the most part, the raw materials composing the lithic artifacts appear to be of local origin. The material types, which include rhyolite or andesite, basalt, diorite, quartzite, sandstone, chert, and other miscellaneous metamorphic, igneous, and sedimentary rocks, could all be obtained in the form of cobbles from the Salt River bed or nearby washes. The only clearly nonlocal material type observed was obsidian, represented by a small, complete flake and the projectile point tip. The vesicular basalt of the two trough manos may also have been transported over some distance, from either the Phoenix or McDowell mountains on the north side of the Salt or the Santan Mountains located on the north side of the middle Gila River to the southeast.

SHELL AND FAUNAL BONE

Two pieces of shell and a fragment of faunal bone were collected by the project. Both of the shell artifacts are indeterminate worked fragments, one each from the Pole and Tank yards. The single piece of faunal bone was recovered from the upper fill of cremation Feature 57. The bone's exterior is polished, and it appears to be a fragment from an awl.

PALEOBOTANICAL REMAINS

Three flotation samples were processed and then examined by our paleobotanist, Michael Diehl. The samples were obtained from the fill of horno Feature 20, and the contents of two Sacaton Red-on-buff ollas found in floor pits below the burned pithouse Feature 46 (Figure 5.1). The purpose was to identify any plants that might have been processed (horno) or stored (ollas) by the prehistoric residents of the KEP area. Feature 46.01 was of particular interest because the charcoal-laden fill in the vessel was stratified or bedded, suggesting its contents were intact.

Table 6.5 presents the results of this analysis. With the exception of a single cheno-am seed, all the charcoal fragments were wood. The fact that the two vessels contained only wood charcoal suggests they were empty and open when Pithouse 46 burned. The large quantity of reeds from Feature 46.02 raises the question of whether there could have been a mat covering the pit, or if this was simply material that fell from the roof. As regards Feature 46.01, the quantity of cottonwood suggests there was a post nearby or beam overhead. The paleobotanical remains from the horno are almost certainly fuel wood.

Table 6.5. Flotation sample results.

Feature	Field No	Volume (liters)	Weight (g)	Wood Charcoal: Cottonwood	Wood Charcoal: Mesquite	Wood Charcoal: Reeds	Wood Charcoal: Unknown	Seeds: Cheno-ams	Notes
20	32	4.5	41.4	0	20 (3.4 g)	0	0	1	Burned adobe
46.02	108	2.5	2.6	0	1	19 (.1 g)	0	0	
46.01	107	3.0	5.3	13 (.1 g)	2	3 (.1 g)	2	0	

Note: Reed (*Phragmites* sp.) stem fragments are suitable for AMS dating.

SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

T. Kathleen Henderson

Archaeological testing for the Kyrene Expansion Project (KEP) confirmed the presence of intact cultural features inside the project area. The task at hand now is to evaluate whether these archaeological remains can be considered significant according to the eligibility criteria for listing in the National Register of Historic Places. The significance of the KEP remains is assessed below, following a review of salient project findings.

One hundred and twenty-three archaeological features were documented inside the Pole and Tank yards at the Kyrene facility. One hundred and twenty-one of these are prehistoric and affiliated with the Hohokam culture. Identified types reflect the complement of features commonly found at Hohokam villages: pithouses, cremation burials, roasting pits and ovens, borrow pits, and other small and large pits of as-yet undetermined function. A less common feature was found as well: a settling basin, possibly used for mining clay to be used in the production of pottery (Nials and Fish 1988). Two archaeological features of recent age were documented also. One is an irrigation ditch deriving from agricultural use of the Pole Yard area just prior to 1958, and the other the remains of a tool shed constructed in the Pole Yard sometime between 1954 and 1958.

The prehistoric features are spatially patterned. The pithouses concentrate in three relatively discrete areas of the Pole Yard and at least two clusters of houses are evident in the Tank Yard. The clustering suggests the residential structures are arrayed in courtyard groups, a typical manifestation of the Hohokam village (Gregory 1991; Henderson 1987; Wallace 1995; Wilcox et al. 1981). Similarly, the cremation burials occur in spatial clusters indicative of cemetery areas. A number of borrow pits are localized in the western part of the project area, suggesting this locale was used more exclusively for activities involving caliche mining.

Temporal differences are evident between the yards. Tabulations of collected ceramics by type indicate the Pole Yard contains a single-component, Sedentary period occupation, whereas the Tank Yard features most likely date to the late Sedentary and early Classic period. The occurrence of a few late Classic period ceramic types intimate use of the Tank Yard during this period as well.

The evidence accumulated by previous archaeological projects in and near the Kyrene property indicate that the current project's prehistoric remains are a part of the site of Los Guanacos. Moreover, the Kyrene property may be the locale of the Colonial and Sedentary period component of the site described by Cushing (1890) and Haury (1945).

One aspect not yet addressed is how many archaeological features are present in the project area. Several methods are used here to extrapolate feature counts from the testing project sample. This is necessary because of the different manner in which testing phase trenches could be deployed in each yard, the fact that not all portions of the yards were available for testing, and due to the patterned configuration of features. Projected estimates of feature counts are provided in Table 7.1; the source of the various projections is enumerated below.

Identified pithouses (including possible pithouses) are distinctly arranged in clusters in the Pole Yard and here the landscape was relatively unencumbered so trenches could be positioned at systematic 10-m intervals to each side of where structures were found. Previous projects in the Phoenix and Tucson basins indicate that roughly 50 percent of all structures will be found in 10-m spaced trenches at single component Hohokam sites with little superpositioning (Elson 1986; Gregory 1988; Wallace 1995). Hence, the projected estimate for pithouse counts was obtained by doubling the count of known structures in each of the areas that pithouses were found (northwest, northeast, and southeast clusters). Of note, Feature 33, a pithouse that falls between the Pole Yard fence and the Tank Yard railroad spur, was included as part of the southeast cluster. This method was also used for the east end of the Tank Yard, where trenches were also spaced at 10-m intervals.

Extramural features are smaller than structures and less likely to be cut by backhoe trenches. Thus, it is anticipated that only a quarter of these features on average will be encountered in 10 m systematically spaced trenches. The projected counts of extramural features for the pithouse clusters mentioned above was produced by quadrupling the identified count. In the Pole Yard's southwest quarter, where no pithouses

Table 7.1. Known counts and projections of the total number of features in the project area.

Location	Known Pithouses	Known Extramural Features	Estimated Pithouses	Estimated Extramural Features	Estimated Human Burials
NW Pole Yard cluster	4	3	8	12	20
NE Pole Yard cluster	17	12	34	48	0
SE Pole Yard cluster	13	10	26	40	20
SW Pole Yard cluster	0	11	0	88	20
Outside clusters	2	3	4	9	-
Untested Pole Yard	-	-	6	18	20
Total Pole Yard	36	39	78	215	80
West Tank Yard cluster	3	15	6	30	-
East Tank Yard cluster	3	3	6	12	-
South Tank Yard cluster	2	4	6	16	-
Untested Tank Yard	-	-	36	108	60
Total Tank Yard	8	22	54	166	60
Total project area	44	61	132	381	140
Total KEP footprint	44	61	102	287	120

were found, trenches were spaced at 20-m intervals. By extrapolation, the identified feature counts in this quarter (southwest cluster) were increased by a factor of eight to arrive at a projected count.

There are several untested locations in the yards where additional pithouses arranged in courtyards are likely to be found. These include the stretch along the railroad spur between the northeast and southeast clusters in the Pole Yard, and the Tank Yard area south of its railroad spur between the tested locations at the west and east ends of the fuel tanks. The clusters of identified houses on the west and south sides of the tanks probably also signify courtyard locations. Henderson's (1987, 1999b) research indicates that, on average, Hohokam courtyards in the Phoenix Basin contain six pithouses and cover an area of 200 m^2, or an area roughly 16 m in diameter. A 16-m-diameter circle covers most of the untested area in the Pole Yard, and as many as six courtyards could occur in the untested area of the Tank Yard, especially taking into account the possibility that the isolated pithouses at the east end are part of larger residential units. The pithouse count for these expected courtyards is based on the average six houses per courtyard indicated by Henderson's data.

Data from the recent Grewe site excavations, where extensive stripping was accomplished, indicate that extramural features occurred at an average rate of three per pithouse (Woodson 1996:Table 12). The factor of three was used to estimate counts of extramural features in the anticipated courtyards and areas near isolated pithouses where systematic trenching was not accomplished.

The potential burial population is based on data from the Pueblo Grande (Mitchell, ed. 1994a) and La Ciudad (Henderson 1987) projects. The data indicate an average of 20 burials per Hohokam cemetery area. This figure was applied to known as well as projected cemetery locations. In this regard, it is assumed that one cemetery each will be found in the northeast and southeast clusters, and that as many as three cemeteries can be expected in the Tank Yard.

At present, the entire area of the Pole Yard is slated for development of the new Kyrene Generating Station. The proposed accompanying switchyard, however, will cover a smaller area extending 140 m west from the west side of the east tank and 120 m south from the railroad spur in the Tank Yard. Only four courtyards are anticipated to occur in the switchyard footprint, including the presently known west and south tank pithouse clusters and two as-yet unidentified house groups. Two cemeteries can be expected to accompany these residential units. Using only the proposed switchyard area as the basis for feature estimates, the counts for the Tank Yard are reduced to 24 pithouses, 72 extramural features, and 40 burials.

Using these general rules, a total of 132 pithouses, 381 extramural features, and 140 human burials is anticipated to occur in the entire project area (Table 7.1). Clearly, the prehistoric features found during testing, as well as these projections for total feature counts, indicate a substantial portion of the Hohokam village of Los Guanacos is present in the Pole and Tank yards.

SIGNIFICANCE ASSESSMENT

The Hohokam site of Los Guanacos has already been determined to be eligible for listing in the National Register of Historic Places, under Criterion D in 36 CFR 60.6, the Advisory Council Regulations (Fedick 1986a; Howell 1993). Thus, the relevant question for the KEP is whether they can be considered contributing elements to the National Register-eligible property. Simply, it must be demonstrated that further study of the KEP remains would contribute information important to our understanding of human prehistory. The quality of importance is judged by the likelihood that the deposits possess structural remains, configurations of artifacts, or other natural or cultural features that bear on important research questions in the social or natural sciences, or could be used to explain continuities or discontinuities in the archaeological record for a particular area (National Park Service 1990).

The KEP prehistoric remains readily meet the first condition. More than a third of the identified prehistoric features are structural remains (pithouses), and the preservation of these, at least in the Pole Yard, is excellent; structural elements such as plastered floors, hearths, floor pits, and wall trenches could be recognized in many of the feature profiles. Although elements such as these were difficult to discern in the heavily compressed soil of the Tank Yard, a few house pits and other subfeatures (e.g., postholes) were evident. In addition, a comparison of surface elevations inside and outside the Tank Yard indicates that the lowermost portions of the houses should be intact (see Chapter 4). Fifty percent of the houses contain what may be floor assemblages, and the fact that 68 percent of the houses are burned or possibly burned indicates they hold even greater potential for relatively intact assemblages. Most of the other types of features commonly associated with Hohokam villages are also present, with only public structures, such as a ballcourt, being absent. The settling basin found by the project is a relatively rare occurrence for Hohokam sites and its presence has important implications for understanding ceramic production and exchange in the region. Artifacts are also abundant in many of the extramural features.

There are two points to consider in weighing the project's research potential. First, the KEP remains represent temporal components of Los Guanacos that have not been examined in the modern era or have received only limited investigation by modern data recovery work. Although the Hemenway Expedition of 1887-1888 conducted excavations of the site's Colonial-Sedentary component, many of the notes and maps from this work are presently lost (Brunson 1989). The precise location of the work is not even known (Brunson and Fedick 1988). A few late Sedentary-early Classic period trash deposits were examined by Northland Research in its data recovery effort at Los Guanacos (Howell 1993), but most of the investigated material dated to the late Classic period. Second, there have been few extensive investigations of Hohokam archaeological sites, particularly of this period, in Canal System 1. Most of our knowledge of Sedentary and Classic period sites in the Salt River Valley comes from excavations in Canal System 2 on the north side of the Salt (e.g., Gregory et al. 1988; Henderson 1987; Howard, ed. 1988; Mitchell, ed. 1988, 1989a, 1989b, 1994b). The more limited research accomplished at sites in other Salt River canal systems (e.g., Greenwald and Ballagh, eds. 1996; Hackbarth 1997; Henderson 1995b) suggests that the developmental history of each may be unique. This finding has important implications for understanding social and political interaction among the various irrigation system-based communities across time.

Given these two considerations, it is evident that archaeological investigation of the KEP remains can provide not only significant new information about the Hohokam village of Los Guanacos, but also important baseline information about the occupational history of Canal System 1. Data could be garnered for investigating the research themes of *demography*: the dynamics of population size, distribution, and composition; *sociopolitical systems:* how populations are organized, internally structured, and socially managed; *exchange and interaction*: how individuals and social groups produce and transfer goods and services; *technology:* the techniques and processes by which societies control or modify their environment; and *subsistence:* how people obtain food, including the procurement and processing of resources and changing patterns of resource exploitation. Because of the temporal components represented by the KEP remains, the data gathered to address questions relevant to these individual themes would shed light on the larger research issue of what underlay the remarkable changes that occurred in Hohokam society in the transition from the pre-Classic to the Classic period.

Two non-prehistoric archaeological features, a ditch and the remains of a tool shed, also were encountered during testing. Documentary evidence indicates neither is older than 50 years, nor do they contain characteristics or have historical associations that would meet the eligibility criteria for listing in the National Register. For these reasons, both features are considered ineligible for the National Register.

PROJECT EFFECTS

Salt River Project (SRP) is proposing to construct a new natural gas-fired generating station in the testing phase project area. A map of the general arrangement of the station provided by SRP indicates the station will cover the entire area of the Pole Yard, as well as extend southward to the railroad spur in the Tank Yard. The station will contain a stack(s), turbine generator, water tank, drywell, administrative and warehouse buildings, and other related features. A 230 kV switchyard will be located adjacent to the station in the Tank Yard. The switchyard is planned to extend roughly 140 m west from the west edge of the east fuel tank, and 120 m across the Tank Yard from the proposed station's southern boundary. A proposed drywell may be built adjacent to the western boundary of the new switchyard, in the area bounded by the double dikes at the west end of the Tank Yard (see Figure 4.1).

As construction activity will include grading and leveling of the property, installation of utility lines, and laying of foundations, substantial subsurface disturbance can be anticipated in the development of these facilities. The project is still in a planning phase, however, so it is difficult to fully assess the effects of construction on the documented archaeological resources. Recommendations for treatment of the archaeological remains presented below, and the data recovery plan presented in the following chapter, are based on this preliminary information. As more specific plans are developed, or as plans change, the recommendations and the proposed archaeological sampling strategy may alter.

RECOMMENDATIONS

Desert Archaeology's fieldwork has demonstrated that a portion of a substantial Hohokam village is present in the project area. As many as 132 pithouses are estimated to occur, along with discrete cemetery areas, a multitude of pits, and a settling basin. The testing results further indicate that the level of preservation of prehistoric remains is moderate to excellent and that data about demography, sociopolitical organization, interaction and exchange, technology, and subsistence pattern is available. The variety of feature classes, their spatial segregation into recognizable units, the availability of temporally diagnostic artifacts, and the preservation of biological remains all indicate that the site contains information important to prehistory. Some form of treatment is recommended to mitigate the impact of proposed development in the project area.

There are three treatment options for the archaeological remains within the boundary of the KEP. The first option is site preservation through avoidance of any construction activities at the locations of the archaeological remains. Exercising this option may prove difficult in light of the widespread distribution of cultural features and equally widespread configuration of the proposed generating station's facilities. Also, moving the generating station elsewhere would increase visual/aesthetic and noise impacts of the project, something opposed by the neighborhood residents. The second option is mitigation of potential adverse effects of construction and development through a program of archaeological data recovery. A third possible option would be a program that combines elements of avoidance and data recovery for selected portions of the property. Recognize that, in considering the avoidance option, consideration must also be given to implementation of protective measures against construction-related impacts, natural processes of deterioration, and other unforeseen impacts, both presently and in the future. If focusing data recovery on areas of impact is the preferred option, a treatment plan defining long-term management issues and procedures would need to be developed as part of the compliance consultation process. This would involve consultation with federal agency archaeologists, SHPO and Native American representatives, as well as other interested parties. A program of data recovery would involve the excavation of a sample of pithouses and extramural features in those portions of the property where development is planned.

CHAPTER 8

DATA RECOVERY PLAN

T. Kathleen Henderson

This data recovery plan sets forth actions that will serve to mitigate adverse effects on archaeological features in areas that will be developed. The plan includes a research design and work plan that will provide for the recovery of significant data values from the site. The intent of the research strategy is to collect information and analyze materials from a sample of features that will be affected by the Kyrene Expansion Project (KEP), in order to augment the regional database and contribute to topics of current interest to archaeologists concerned with the aboriginal occupation of the lower Salt River Valley.

RESEARCH DESIGN

The theme or historic context that guides this research design is: *the history and development of irrigation-based communities in the lower Salt River Valley*. Although this theme is broadly applicable to both prehistoric and historic periods, the temporal setting for this data recovery project is the late pre-Classic and Classic periods of the Hohokam culture. Seven research topics will be used in the examination of this context: village organization, household organization and activity, chronology, ceramic technology and production, subsistence patterns, exchange and interaction, and the pre-Classic to Classic period transition. The following discussion of each topic includes research questions appropriate to their examination. Data required to address the questions are described at the end of this section.

Village Organization

Every pre-Classic Hohokam village that has been extensively excavated has shown a distinctive pattern (Gregory et al. 1988; Henderson 1987, 1999a; Sires 1984b; Wallace 1995; Wilcox et al. 1981). At the lowest level, the village is composed of pithouses, arranged in house groups or courtyards. Multiple courtyards are gathered in larger residential units, called village segments, whose members often share common cemeteries and other facilities. These units, in turn, are arranged around single or multiple plazas, depending on the size of the village. Ballcourts may occur singly at smaller villages; larger villages often have multiple ballcourts which, like the plazas, appear to differentiate larger village segments (Howard 1990). The early Classic period village is similarly arranged, although pithouses usually occur in more formalized rectangular patterns that at some point are enclosed by adobe compound walls, and ballcourts fall into disuse, possibly being replaced functionally by platform mounds.

This regularized site structure has important organizational and behavioral implications. House groups or courtyards are recognized as the domain of the Hohokam household (Henderson 1987; Huntington 1986; Wallace 1995). Knowledge of their size, composition, longevity, and material content can inform on the social and economic status of the courtyard group's members. Village segments likely reflect a larger social referent, such as lineages or some other form of corporate group, and contrasts among these units can inform on the political, social, and economic organization of the community. The fact that pithouses are spatially patterned in the KEP area indicates courtyards are undoubtedly present; what is unknown is how these groups are arranged, both internally (inter-courtyard arrangement) and externally (extra-courtyard membership in village segments). The testing results further indicate there are areas of the site that were nonresidential. It will be important to establish the nature of activities in these areas, in order to determine their contribution to life in the village.

Numerous research questions are relevant for defining the village's structure. How are pithouses distributed across the project area? Are house groups or courtyards represented? Are there suprahousehold social groups? What are the ages of different residential units at the site? What are the spatial limits of different residential areas? Is residential area size consistent across time and space? Do changes in the configuration of courtyards coincide with other signs of increased organizational complexity? Where are extramural activity areas located and what are their ages? Are plazas present? How are residential and activity areas distributed relative to one another, or other public facilities?

Household Organization and Activity

Households are the primary social and economic unit of Hohokam society (Henderson 1987; Huntington 1986; Wallace 1995; Wilcox et al. 1981). A growing body of data further suggests that Hohokam households may have had well-defined heritable tenure rights to their property, produced a significant part of their own subsistence, and were the fundamental corporate unit for mobilizing agricultural labor, managing productive resources, and organizing consumption (Craig 2000; Henderson 1999b, 2000b). For the purposes of understanding village organization and interaction, the household is the desired first-level analytical unit because, whether composed of a family, a kin group, or simply sharing members, it comprises some form of a single cooperative, to some degree self-sufficient entity.

Each household was unique. We know from excavations elsewhere that courtyards–the spatial referent of the Hohokam household–differ in the numbers of structures composing them, their longevity of occupation, the construction effort that went into houses, and their material content. This variability points to differences in the position, wealth, and status of household members, suggesting a pattern of flux in the fortunes of individual households and the potential for some households to achieve greater levels of success, both reproductively and socially. The differences among households further indicate that no single pithouse or courtyard group represents a microcosm of all that exist at the village. Some courtyards may have been occupied for longer periods of time and its residents had greater status and access to goods, while others may have been less residentially stable and its members accorded a lesser status. Given that the study of one courtyard may not inform directly on another, an examination of village organization and social structure requires knowledge of different households across space and time.

Wilk and Rathje (1982) observe that households have three essential elements: social, a demographic unit, including the number and relationships of its members; material, the dwelling(s), activity areas, and possessions; and behavioral, the activities it performs. Although not all aspects of these elements are directly observable in the archaeological record, some can be measured and assessed. Questions relevant to exploring variability in these elements among households at Los Guanacos are listed below.

How many pithouses compose each courtyard? What variability exists in the functions and structural composition of these houses? What are the types of artifacts associated with courtyards? Are locally produced and nonlocal goods distributed equally among these units? Are there differences in the subsistence products that are present in the courtyards? Are there differences in the wealth or status of courtyard groups? What activities were conducted by courtyards? Is performance of the activities equitably distributed among the yards?

Chronology

Dating archaeological remains has always been a principal concern of archaeological research because it is essential to monitoring the trajectory and rate of cultural change (Henderson 1996; Lengyel and Eighmy 2000; Plog 1974; Wallace 1995). The temporal bracketing of phases in the Hohokam chronology has been considerably refined over the years through archaeomagnetic and radiocarbon dating, but the phases still define only broad intervals of time. This is especially true for the Sacaton phase, a 200-year interval that comprises the entire Sedentary period (Table 2.1). The problem is compounded when decorated buff ware types, as traditionally defined, provide the chief vehicle for differentiating among the ages of Hohokam cultural deposits. Although it is true that the cultural sequence can be more finely subdivided at some sites by combining observations of stratigraphy, other ceramic attributes, and chronometric dates, this avenue is often not an option for single-component sites with little superpositioning of features. The KEP portion of Los Guanacos falls into this category.

Wallace (1985, 1986, 1995) has been able to provide increasingly finer levels of dating for the Sedentary period in the Tucson Basin using a refined, subtype classification of Rincon Red-on-brown. In the mid-1990s, he produced a fine-scale time seriation of Middle Gila Buff Ware, which has the potential to significantly refine the ceramic chronology for the Phoenix Basin (Wallace 1999). The refined ceramic sequence developed by Wallace is provisional, and requires testing as well as additional work to firmly anchor it in calendar time. In addition, the sequence presently ends with late Sacaton Red-on-buff; inclusion of contexts containing Casa Grande Red-on-buff would provide a means of extending the coverage of the seriation later in time.

The proposed data recovery effort provides an opportunity to both test and advance Wallace's buff ware ceramic seriation. The principal question to be asked is: does application of the provisionally defined ceramic subtypes order archaeological deposits correctly, as determined by other relative and absolute dating methods? If the answer is affirmative, then the ceramic subtypes could be used to date other archaeological features and deposits at a finer scale than is presently provided by the single types, Sacaton or Casa Grande red-on-buff.

Ceramic Technology and Production

One of the most important advances in Hohokam archaeology in recent years has been Abbott's (1995, 1997; ed. 1994, 1999) studies of ceramic technology and production in the Phoenix Basin. His work at Pueblo Grande and other sites in the lower Salt River Valley has shown that temper type is an excellent predictor of pottery source, and because the distribution of the tempering materials is geologically restricted, many ceramic varieties can be associated with areally specific production zones. As a consequence, the movement of pottery can be traced both between and within the different canal systems of the Phoenix Basin, which elucidates patterns of interaction and political organization. Abbott (1998) has also discovered that nearly all the pottery in the lower Salt River Valley during the Sedentary period was probably produced by specialists. Different pottery varieties and general production sources that have been identified include buff ware bowls and plain ware vessels produced in the middle Gila River Valley, thick-walled plain ware jars made somewhere in the vicinity of South Mountain, and plain ware bowls and jars produced on the north side of the Salt River at the site of Las Colinas in Canal System 2. This production and distribution pattern shifts toward one of increased localization of utilitarian pottery manufacture in the Classic period, although brisk exchange of some specialty wares, particularly red wares, continued among canal systems.

At present, there is little understanding of how the different pottery makers were organized. Unknown is the scale (household or village), intensity (part-time or full-time artisans), sociopolitical context (independent or elite-supported producers), or concentration (dispersed or nucleated producers) of pottery production (Abbott 1997). Exploration of these issues requires first-hand knowledge of the actual producers, that is, those households or villages where pottery was made. The only site in the Salt River presently known to be a production center is Las Colinas. The existence of a specific type of plain ware jar, tempered with material found only at South Mountain, indicates another production center must occur in its vicinity. There is tantalizing evidence to suggest that Los Guanacos may be this location. Primary among these is the possible settling basin identified by this testing project; to date, the only confirmed occurrence of this rare feature type is Las Colinas. In addition, Haury (1945) mentions that several wooden paddles, possibly used for pottery manufacture, were recovered at Los Guanacos by the Hemenway Expedition, and Henderson (1993) reports the recovery of significant quantities of polishing stones and caches of unfired, pigmented clay from the portion of Los Guanacos investigated by Northland Research. More tentative is Rice's (1980) suggestion that pottery may have been fired at nearby Las Estufas. The evidence suggests a high potential for Los Guanacos to be the locale of pottery producers. If found, the study of these pottery producers would significantly advance current understanding of the organization of ceramic production in the Salt River Valley.

Relevant questions include: Is there evidence to indicate pottery was being produced at the site? Are there caches of ceramic raw material (clay, temper)? Are pottery-making tools present? In what quantities? What is the spatial distribution of pottery-making tools and materials? Are there differences in the spatial distribution of pottery manufacturing materials relative to time? If pottery manufacturing is found, what types of vessels were being produced? Was the feature identified during testing as a settling basin used for the mining of clay? Does this clay match the type used in the production of local pottery?

Subsistence Patterns

The settlement of Los Guanacos was built upon a solid agrarian economic base, as indicated by the intricate series of canals that once coursed east and north of the site (Figure 3.1). Predictably, cultigens will comprise a substantial portion of the subsistence base, supplemented by wild plants and animals. This prediction is supported by Howell's (1993) research at Los Guanacos, where subsistence data were found to be similar to that recovered from other Classic period sites. The presence of corn, squash, bean, agave, amaranth, cacti and other less prominent plant species, as well as the dominant presence of rabbits among faunal remains, was consistent with findings elsewhere in the Salt River Valley.

Notwithstanding the similarities, Howell's (1993) work identifies two subsistence issues requiring additional research. First, his botanical and faunal data suggested a shift in subsistence focus at Los Guanacos across the Classic period. The use of several plants appeared to change, with increasing use of wild plant resources relative to agricultural products from middle to late Classic times. Howell suggested the shift might be related to postulated canal system failures occurring in the late-twelfth century A.D. (Nials et al. 1989). He observed biases in the data sources, however, that may have affected the trends. Because the KEP remains date primarily to the periods immediately preceding those investigated by Howell–periods marked by remarkably low variability in annual Salt River streamflow (Nials et al. 1989)–the recovery of subsistence data could provide important baseline information for further evaluating his findings.

Second, relatively high occurrences of agave were detected in the Los Guanacos data, perhaps indicating some form of intensified production of these plants (Howell 1993). Important to this finding is the location of Los Guanacos proximate to the flanks of South Mountain. Midvale (n.d.) and the site files of the Arizona State Museum indicate numerous terrace garden and rock pile sites occur on the flanks, and several of these contained numerous tabular knife fragments, suggesting the sites were locales of agave production. The proximity of Los Guanacos to these more upland sites presents the possibility that its inhabitants were their creators. Agave might have been used not only for local consumption, but also as a product traded outside the community.

Information from Los Guanacos can be expected to broaden the basic understanding of subsistence patterns as revealed by Howell (1993). Appropriate research questions include: What cultigens and wild food products are present at Los Guanacos? Do these products occur in roughly the same proportions across time? Are there tools related to the procurement and processing of food products? In what frequencies do these occur? Are there patterns relative to the spatial distribution of architectural units? Do faunal remains from the site follow exploitation patterns observed elsewhere in the Salt River Valley? Are there differences in animal exploitation patterns across time or space?

Exchange and Interaction

The topic of exchange and interaction is particularly relevant given the location of Los Guanacos at the end of Canal System 1. A strong web of relationships with communities upstream would have been crucial to ensure continued delivery of the irrigation water so essential to their livelihood. The exchange of goods is one mechanism to link populations within the larger irrigation community, as well as beyond it, to ensure its continuity.

Abbott's (1998; ed. 1994) studies of ceramic production and exchange have suggested that the configuration of pottery suppliers and producers changed from the Sedentary to the Classic period in the lower Salt River Valley. The Sedentary period exchange network appears more open, with sites on both sides of the Salt River drawing pottery from multiple sources and particularly from the middle Gila River Valley. By the Classic period, there is a strong trend toward increased localization of pottery production within the canal systems of the Salt. Abbott's pattern implies a significant change occurred in the regional organization of exchange near the beginning of the Classic period. The fact that this coincides with the apparent collapse of the ballcourt system makes it a compelling topic to pursue.

That pottery was being produced by specialists at select locations and broadly distributed across the Hohokam region, particularly during the Sedentary period, is fairly well established. Because some households or villages were specializing in pottery production, it is likely that other products would have been similarly selectively produced. To fully understand the regional exchange network and underlying web of interaction, it is time that these goods and their sources be identified. Likely candidates include ground stone artifacts, schist and slate palettes, projectile points, stone censers, and even plant products, such as the agave previously suggested as being intensively produced at Los Guanacos.

Questions relevant to exploring these aspects of exchange and interaction include: Is there evidence for the production of specific classes of goods at Los Guanacos? How similar are the ceramics or other artifact complexes to materials from other sites in the Salt River Valley? Are there regularities in the source areas of the ceramics? What items other than ceramics could have been traded? What artifacts are nonlocal and how common are they? Where are the nonlocal artifacts found most frequently at the site? Does the rate of product importation vary at the household or village segment level? How was the exchange of these products organized?

The Pre-Classic to Classic Period Transition

Perhaps the most important research consideration is the fact that the temporal components represented by the KEP archaeological remains transcend the time of the pre-Classic to Classic period transition. There is no other period in Hohokam history that is marked by such a drastic and rapid set of changes than is observed at this time. The marked shifts in architectural styles and configuration, burial practices, ceramic types and distribution, public facilities, and population distribution bespeak fundamental transformations in the social, political, and economic structure of Hohokam society. Why these organizational systems were transformed is a topic of continued interest not only to Hohokam archaeologists, but also to those anthropologists who seek to understand cultural evolution and change. Studies directed toward elucidation of all the previous research topics will inform on this important topic of Hohokam history. The primary questions to be asked of the Los Guanacos data: What changed, and, how did it change?

Data Requirements

To address the research topics, information is required on the spatial distribution of features, with feature age controlled at the finest scale possible. Tight stratigraphic control is another prerequisite for delineating changes in village and household structure over time. Information about pithouse size, composition and arrangement, and data relevant to discerning feature function must be acquired. Comparative architectural and artifactual information should be obtained from all portions of the site and all temporal components. Variation in artifact types among courtyards can be used to determine what activities were conducted in each and whether differences existed among the courtyards relative to the degree and types of activities performed.

Data to address the issue of chronology include ceramic assemblages of sufficient size to apply the fine-scale buff ware ceramic sequence. Some of these assemblages must be drawn from stratigraphically related features or deposits, or those that contain artifacts or material that could be dated using absolute methods in order to test the current provisional seriation model. Emphasis should be placed on acquiring suitable quantities of both Sacaton and Casa Grande red-on-buff.

The recovery of artifact types used in pottery manufacture is essential to addressing the issue of on-site ceramic production. Among the items to be sought are anvils, paddles, polishing stones; slabs, hammerstones, and manos used for grinding and crushing clay and temper; and caches of unfired clay, raw tempering material, and pigment. A detailed geomorphological study of the settling basin, coupled with the analysis of pollen from the sediments, is necessary to confirm the feature's use. A technological analysis of recovered vessels and large rim sherds is advocated, along with spatial analysis of the evidence pertaining to pottery production.

Obtaining samples of non-human biological remains from well-dated archaeological contexts is essential. Identification of resource processing features and analyses of specialized tools will inform on subsistence-related tasks. The varied data sources provide the basis for modeling changing patterns in resource availability and food consumption over time.

Artifact analyses directed toward identifying the source areas of ceramics and other artifact classes will play a key role in the assessment of regional interaction. Attention will also be directed to the distribution of nonlocal goods relative to local materials at Los Guanacos. It will be pertinent to examine the contexts in which these materials are found and the variation in these contexts relative to artifact class, form, and content. This information will elucidate how the materials were obtained and used.

Comparisons of the patterns found at Los Guanacos with sites elsewhere in the Phoenix Basin will provide the framework for assessing the degree of interaction, and delineating the network of social, political, and economic relationships that existed among the irrigation-based communities of the region.

WORK PLAN

The following work plan provides general methods for the data recovery effort. The section includes discussions of the proposed sampling strategy, field and analysis methods, laboratory procedures, data management, and report preparation. Because the design of the KEP has not been finalized, the procedures are broadly sketched to allow flexibility in the project approach.

Sampling Strategy

This sampling strategy assumes that construction activity will impact most portions of the project area. Design plans available at the time of this writing indicate subsurface disturbance will occur across the entire area of the Pole Yard and a 140-m by 120-m area in the Tank Yard. Unknown at this time are the locations of utilities to service the facilities, and other construction-related activities that might cause damage to the archaeological resources. The methods described below are generalized to allow reduction in scope once the final design of the KEP is known.

A review of data recovery programs conducted at Hohokam villages in the Phoenix Basin indicates that pithouses are commonly sampled in 70 to 90 percent range (Craig 1999; Gregory et al. 1988; Henderson 1987; Mitchell, ed. 1988, 1989b, 1994b). The high sampling fraction is a recognition that the material and structural content of structures provide the greatest quantity of data per recovery unit. In addition, pithouses are not replicates of each other; they vary in size, structural composition, length of use, material content, and function. Unfortunately, because Hohokam structures are inevitably buried, the only way to examine the variability among these units, and thereby determine what is or is not redundant, is through excavation of a large sample. In light of the significant quantity of information to be gained from the Kyrene pithouses and the extent of the construction impacts, 70 percent of the pithouses will be sampled using control units. Based on this sample, pithouses will be selected for full or partial excavation. A total level of effort equivalent to the full excavation of 50 percent of the pithouses within the project area is proposed.

Pithouses that show the most promise for yielding important data (for example, burned structures or those having high artifact densities or floor assemblages) will be emphasized for the excavated sample. Mechanical stripping will be employed prior to this activity to identify 90+ percent of all archaeological features. Based on the projected pithouse count for the entire project area, this would entail sampling of 92 pithouses. If data recovery is limited to the KEP footprint, the sample would be comprised of 71 pithouses sampled.

A lower sampling fraction will be employed in the case of pit features (30 percent) because more redundancy can be expected in the information contained in this feature class. Extramural pits generally had short use lives, with the site's inhabitants digging and using new pits for the same activities. Thus, what needs to be determined is the range of activities that extramural pits were used for, which can be provided by excavating a representative sample. Excavation priority will be given to those pits associated with residential areas. A subset of the trash-filled pits in the southwest quadrant of the Pole Yard and along the proposed gas line corridor in the northwest Tank Yard will be included in this sample. Based on the projected number of extramural features, roughly 114 would be examined in the entire project area or 86 in the KEP footprint.

In compliance with state and federal regulations, all human burials found during the project will be excavated. An effort should be made to identify cemeteries in areas to be impacted, in order to ensure that all human remains are uncovered.

Settling basins are a rare occurrence at Hohokam sites. Given that there are only two known examples (Nials and Fish 1988), further investigation of the possible Kyrene settling basin is appropriate. This activity would entail supplemental trenching of the feature, accompanied by detailed geomorphological and palynological analysis. Study of the feature would be directed toward testing hypotheses about its nature and use.

Field Methods

Prior to the commencement of fieldwork, the archaeological contractor will consult with Salt River Project (SRP) about the handling of existing obstacles in the project area. Present surface obstructions include the area of the railroad spur and layer of gravel in the Pole Yard, and the dike, railroad spur, and paved area enclosing fuel pumps in the Tank Yard. Decisions will need to be made as to whether these modern features will be removed and how that might be accomplished. We recommend that the archaeological contractor undertake removal of the gravel layer in the Pole Yard and the berm of the dike in the Tank Yard (only those areas where features might be expected) in order to avoid damage to archaeological features, and that SRP be responsible for removal of the railroad spurs in both yards and the asphalt pad in the Tank Yard. We further recommend that all underground utilities be left in place, and simply avoided as the excavations proceed in order to minimize damage to archaeological features. Locations for stockpiling gravel and fill will be identified through consultation with SRP.

Backhoe Trenching and Scraping

Supplemental backhoe trenching will be used to explore areas of the KEP that could not be examined during testing. The trenching will be limited mostly to those portions of the project area where additional features are expected to occur: the area between the northeast and southeast pithouse clusters in the Pole Yard, and the stretch of untested land between and north of the two fuel tanks in the Tank Yard. A few supplemental trenches may be excavated near existing isolated features to determine whether additional features are present.

Backhoe scraping or stripping will be used to remove overburden and expose feature outlines across large portions of the project landscape. The stripping will take place in those areas where pithouses and extramural features are concentrated. Generally, the stripping will proceed 5 m to 10 m beyond the limits of where features have been exposed.

Feature Excavation

Pithouses will be initially sampled using a 1-m by 2-m control unit excavated into fill after the outline of the pithouse has been exposed in plan view. Control units will be excavated in natural levels to the floor. If the floor level is known from trench profiles, the final 5 cm of fill above floor will be excavated separately from upper fill levels. All fill materials from control units will be screened through ¼-in mesh. In cases where the structure clearly burned or was rapidly filled after abandonment, a combination of ¼-in and smaller-sized mesh screening may be used to assist in recovering small artifacts and pieces of faunal bone. Whether additional units are excavated will be based on the results from the control unit. Pithouses with a high artifact density in the fill, presence of a floor assemblage, or evidence of burning will be targeted for additional excavation. The profile of the control unit will be used to guide the subsequent house excavation.

Natural levels will be excavated when evident, otherwise the levels used for the control unit will be retained. Again, the final 5 cm of fill above floor will be treated separately, as will all artifacts in direct contact with the floor. All fill deposits will be screened through ¼-in mesh, except in those instances noted previously. Pollen and flotation samples will be collected from floor features and a composite sample of each will be collected from across the floor. Charcoal will be collected for species identification and radiocarbon dating. Oxidized hearths or other features will be sampled for archaeomagnetic dating. Once the excavations are complete, but prior to the removal of floor artifacts, scaled maps will be drawn that will include the location of all floor artifacts and features, as well as information on pithouse architecture. Black-and-white photographs and color slides will be taken of all features, except human burials, both during and immediately following their excavation.

The excavation procedure for pit features will vary according to size and type. Generally, the fill of smaller pits will be entirely excavated as a single unit, moderately sized pits will be bisected and one of the halves excavated in natural levels, and the largest pits will be sampled using a 1-m by 2-m control unit. All fill will be screened through ¼-in or smaller mesh if deemed desirable. Flotation, charcoal, and pollen samples will be collected from suitable contexts. Plan views and profiles will be drawn at the completion of the excavations, and black-and-white photographs and color slides taken.

Treatment of Human Remains

A burial agreement was developed for the testing phase of this project (Ref Agreement, A.R.S. § 41-844, Case # 00-14). This agreement will be reviewed and revised as necessary for the data recovery phase. Excavating and analyzing human burials will be conducted in accordance with this agreement using standard, professional archaeological techniques. The Gila River Indian Community, which is acting on behalf of tribes claiming affinity with Hohokam remains in this area, will be notified prior to commencement of data recovery excavations and as work proceeds per the conditions of the agreement. Any human remains encountered will be treated with the utmost care and respect.

Mapping

Horizontal and vertical survey control and instrument mapping will be done using a total station and GPS system. A site datum horizontally tied to the modified Arizona State Plane System has been established for the project, and a master site map has been generated. Temporary datums and control points will be established as needed during the data recovery effort. Measurements from control points will be by conventional metric tape and transit. The maps drawn by tape and transit will be digitized and inset into the master site map by means of the control points. The master site map will be maintained throughout the project.

Data Analysis

Data obtained through the analysis of material culture and biological remains will be used to address the research topics described earlier. General procedures to be followed for analyzing the different artifact and biological types are discussed below. Research staff and highly qualified outside specialists will be utilized to maintain a high degree of integration among analyses and control of schedule.

Ceramics

All ceramic artifacts will be counted and identified to the most specific level possible for ware and type categories. Body sherds will be further identified according to basic vessel shape, and rim sherds analyzed for technological, morphological, and formal variables that can allow vessel size and minimum numbers of vessels to be estimated. Refitting of body and rim sherds will be undertaken. Reconstructible and whole vessels will be analyzed in more detail for attributes such as volume, vessel height, and maximum diameter. Ceramics other than pottery will be analyzed using standard techniques consistent with the artifact type (e.g., spindle whorl, figurine). Where possible, buff ware sherds will be classified according to Wallace's (1999) refined seriation for Middle Gila River Buff Ware. Collectively, the morphological, technological, and decorative attribute data recorded from ceramics of all ware groups will inform on chronological, organizational, and economic relationships among the residents of Los Guanacos and other settlements.

Ceramic temper studies will be conducted in the context of the existing Phoenix Basin petrofacies model. The ceramics will be examined under a low-power binocular microscope, comparing their temper against known reference samples and key grain identifications that have been verified petrographically. A sample of potsherds will be thin-sectioned and point-counted under a petrographic microscope to assess the accuracy of the binocular temper characterizations.

Flaked and Ground Stone

All flaked and ground stone artifacts will be inventoried and a sample selected for further detailed analysis. Flaked stone will be classified by technological and morphological variables, as well as raw material type and texture. Ground stone artifacts will be subdivided by type, and then attributes of morphology, use-wear, and raw material will be recorded. Particular attention will be given to analyses of whole or nearly whole artifacts. Projectile points, carved stone, worked palettes, tabular knives, and whole ground stone implements will be tabulated and described in detail. Because many of these items are perceived as status goods in Hohokam interaction spheres, these artifact types may provide a significant perspective on the site and region-wide relationships.

Sourcing studies may be carried out depending on the availability of suitable raw materials. X-ray fluorescence techniques will be used to source obsidian artifacts. Recently, these techniques have been applied to the sourcing of vesicular basalt artifacts in the lower Salt River Valley.

Shell Artifacts, Exotic Stone and Minerals

The analysis of shell and other exotic items will involve initial segregation by type. Some types, such as shell and ornaments, will require additional analyses. Shell will be categorized by species, artifact type, design style, size, shape, and condition. The same categories will be utilized for the ornaments, although raw material type will replace species identification. Minerals will be identified to type and source area if possible. If exotic materials are found in sufficient quantities they may also be sourced. Although exotic items are often rare in Hohokam site assemblages, their sourcing can provide significant information about trade networks, exchange patterns, and interaction spheres.

Faunal Remains

Faunal analysis will identify species diversity, animal preference, and butchering patterns. Patterns of subsistence intensification can be monitored using measures of species diversity and selective efficiency, and strategies of fauna procurement can be assessed by diversity and age assessments. Ultimately, the faunal analysis will enlighten our understanding of the role that animals played at the site.

Botanical Remains

Pollen and flotation analyses will document the economic uses of plants and animals. Samples will be examined for variation in the diversity and types of economic plants, and may extend to an evaluation of shifts in the relative abundance of species as well. Pollen and macrobotanical analysis can also be used to inform on the environmental conditions that existed at the time of the settlement's occupation, as well as on agricultural practices. Pollen and macrobotanical remains collected from the site can confirm the presence and types of agricultural products grown in the area, as well as inform on the availability and use of wild plant species.

Chronology

Both relative and absolute dating methods will be utilized. Radiocarbon and archaeomagnetic dating will be the primary means of procuring absolute dates. If suitably sized carbonized wood samples are found, they will be submitted to the Tree-ring Laboratory at the University of Arizona for possible dendrochronological dating. Special attention will be given to sample context and quality prior to the processing of any individual sample for dating; only those samples that can provide the highest return of information relative to the dating effort will be processed. Chronometric dates will be used in concert with relative dating of deposits and features, to provide estimates of age based on real calendar time. Relative dating methods will include documentation of stratigraphically related features, examination of the depositional characteristics of features, and relative dating through the use of ceramic typologies and ware frequencies.

Human Remains

Human remains will be examined for evidence related to population and health to the extent allowed in the burial agreement. An inventory of skeletal elements will be accomplished along with determination of the age and sex of individuals, the number of individuals represented in each grave lot, the identification of dental and skeletal pathologies, and assessments of stature. Analyses of the content and location of burial lots will also be performed. The distribution of grave goods by time, sex, age, and location will be examined. Patterns in the distribution of grave goods relative to one or more variables may inform on status or sex differences in the population.

All investigations associated with human remains will be conducted in a careful and respectful manner. The human remains will be treated with the respect due to the deceased, and will not be available for general public viewing at any time during excavation and analysis.

Laboratory Procedures and Data Management

Artifacts and all samples will be cleaned, sorted, and cataloged using standard laboratory procedures. The accuracy of provenience information will be reviewed on a regular basis.

Excavations in the project area will produce archaeological data in the form of artifacts, samples, and written records. All recovered artifacts and samples will be provenienced in the field by site, feature, stratum, level, and artifact class. Provenience information and pertinent field form data will be entered into a comprehensive database to facilitate the analysis process.

Standardized coding forms and variable lists will be used to enable comparative analysis. There can be flexibility in these variables, but a high degree of standardization facilitates comparisons between different sites and projects. A substantial effort will be made to ensure that data are verified and internally consistent, and regular backups of the database will be performed.

Report Preparation

An interpretive technical report will be prepared upon conclusion of all data recovery investigations, from fieldwork through data analyses. The report will conform to the Secretary of the Interior's standards for archaeological report preparation (National Park Service 1993) and guidelines established by the State Historic Preservation Office and Arizona State Museum. The text of the report will include a complete description of the project, an overview of the natural and cultural environment, discussions of field methods and analyses, detailed descriptions of all features, analytical results and interpretations, and comprehensive discussions that place the project area and its findings within the context of our understanding of the lower Salt River Valley. The report will contain professional quality maps, figures, and photographs of features, artifacts, and other significant cultural deposits. The report will be published and made available to the professional community.

Discovery Situations

If unanticipated cultural resources are encountered during the data recovery effort, work will cease in that area and SRP will be notified of the nature and location of the findings. The remains will not be disturbed further until a decision is reached as to the appropriate recovery action.

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