Results of a Class III Cultural Resources Survey along the Silverbell Road Corridor from Grant Road to Ina Road within the City of Tucson, Town of Marana, and Unincorporated Pima County, Arizona

Prepared for

City of Tucson

Prepared by

SWCA Environmental Consultants

Final Report - June 2010

RESULTS OF A CLASS III CULTURAL RESOURCES SURVEY ALONG THE SILVERBELL ROAD CORRIDOR FROM GRANT ROAD TO INA ROAD WITHIN THE CITY OF TUCSON, TOWN OF MARANA, AND UNINCORPORATED PIMA COUNTY, ARIZONA

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PROJECT ABSTRACT

Report Title. Results of a Class III Cultural Resources Survey along the Silverbell Road Corridor from Grant Road to Ina Road within the City of Tucson, Town of Marana, and Unincorporated Pima County, Arizona

Report Date. December 2009 (Revised June 2010)

Agency Names. City of Tucson (COT), Pima County (County), Town of Marana (TOM), U.S. Army Corps of Engineers (USACE), and Regional Transportation Authority (RTA)

Permit Number. Arizona Antiquities Act Blanket Permit No. 2009-010bl

Land Ownership Status. City of Tucson; Town of Marana; Pima County; Private Land

Project Description. The Silverbell Road Widening Project consists of the planned widening of Silverbell Road between Grant Road and Ina Road in the northwest Tucson metropolitan area, Pima County, Arizona. The Area of Potential Effect (APE) includes the Silverbell Road right-of-way (ROW) and adjacent lands. The ROW is administered by the COT, County, and the Town of Marana. The project will be constructed in two or more phases. The first phase extends between Grant Road and Camino del Cerro and is located entirely within the COT. The subsequent phases, between Camino del Cerro and Ina Road, are located in Pima County and the Town of Marana and will be constructed when funding is available.

The COT contracted SWCA Environmental Consultants (SWCA) to conduct a Class III archaeological survey of the APE to ascertain the location of significant cultural resources. Because the project is in its early design phase, the APE chosen for the survey is likely considerably larger than what the final construction APE will be. Generally, the APE for this survey consisted of a corridor along Silverbell Road that is 400 feet (128 m) wide, with 250 feet (73 m) on the east-northeast side of the road and 150 feet (54 m) on the west-northwest side. The corridor was expanded for deceleration/acceleration and turning lanes at intersecting roads such as Goret, Camino del Cerro, Sweetwater, and Sunset, which added 300 feet (91 m) to 1,000 feet (304 m) east-west × 300 feet (91 m) to 780 feet (237 m) north-south at these intersections. Additionally, the corridor was extended to 500 feet east and west of the road at major drainages, and 150 feet on either side of the drainage edges. Several of these drainages are likely to fall under the jurisdiction of the USACE. Depending on the final project design, the project will likely require USACE permitting under Section 404 of the Clean Water Act and environmental compliance under Section 106 of the National Historic Preservation Act, as amended.

SWCA's survey of the APE included an archival records search, field survey, evaluation of the eligibility of archaeological sites for nomination to the National Register of Historic Places, and recommendations for mitigating adverse effects if these historic properties fall within the final project APE. Additionally, SWCA recommends that the upper floodplain and piedmont areas west of the Santa Cruz River be determined eligible for listing in the National Register of Historic Places as the Silverbell Archaeological District in recognition of the extensive occupation of this area for more than 4000 years.

Project Number. Arizona State Museum (ASM) Accession No. 2009-0612; COT Project 09-26

Project Location. The APE is located in Sections 1, 2, 7, 12, and 18, Township 13 South, Range 12 East, Sections 17–20, 28–29, and 33–34, Township 13 South, Range 13 East, Pima County, Arizona, Gila and Salt River Baseline and Meridian, U.S. Geological Survey Jaynes and Cat Mountain, Arizona, 7.5-minute quadrangles.

Number of Acres Surveyed. 442.6 acres (90.1 acres COT; 35.5 acres County; 317.0 acres Private)

National Register of Historic Places (NRHP)-Eligible Properties. 1 district—Silverbell Archaeological District; 35 contributing properties—The Bridge at AZ AA:11:129(ASM); AZ AA:12:46(ASM); AZ AA:12:86(ASM); AZ AA:12:93(ASM); AZ AA:12:96(ASM); AZ AA:12:105(ASM); AZ AA:12:106(ASM); AZ AA:12:150(ASM); AZ AA:12:300(ASM); AZ AA:12:306(ASM); AZ AA:12:314(ASM); AZ AA:12:316(ASM); AZ AA:12:317(ASM); AZ AA:12:371(ASM); AZ AA:12:380(ASM); AZ AA:12:501(ASM); AZ AA:12:502(ASM); AZ AA:12:750(ASM); AZ AA:12:799(ASM); AZ AA:12:800(ASM); AZ AA:12:999(ASM); AZ AA:12:1005(ASM); AZ AA:12:1012(ASM); AZ AA:12:1013(ASM); AZ AA:12:1079(ASM); AZ AA:12:1080(ASM); AZ AA:12:1082(ASM); AZ AA:12:1083(ASM); AZ AA:12:1085(ASM); AZ AA:12:1087(ASM); AZ AA:12:1088(ASM); AZ AA:12:1089(ASM); AZ AA:12:1090(ASM); AZ AA:12:1091(ASM); AZ AA:12:1092(ASM).

NRHP-Ineligible Properties. 4 sites and 2 loci—AZ AA:12:980(ASM); AZ AA:12:1081(ASM); AZ AA:12:1084(ASM); and AZ AA:12:1086(ASM); 2 road segments at AZ AA:11:129(ASM); 54 Isolated Occurrences.

Recommendations. SWCA recorded 39 archaeological sites and 54 IOs within the surveyed portion of the current APE. The APE for the archaeological survey was 481 acres, of which 442.6 acres were surveyed for this report; 38.4 acres were not surveyed due to lack of access. Many of the unsurveyed acres are within the southern portion of the APE on private land that has been developed subsequent to earlier archaeological surveys; some of these are known to be within previously recorded site boundaries and are depicted as such on the individual site maps in this report so that they can be considered in the project design.

Of the 39 archaeological sites recorded within the APE during this survey:

SHPO has previously determined six sites are NRHP-eligible historic properties: AZ AA:12:46(ASM); AZ AA:12:93(ASM); AZ AA:12:96(ASM); AZ AA:12:105(ASM); AZ AA:12:300(ASM); AZ AA:12:314(ASM).

SWCA recommends 29 sites are NRHP-eligible historic properties: The bridge at AZ AA:11:129(ASM); AZ AA:12:86(ASM); AZ AA:12:106(ASM); AZ AA:12:150(ASM); AZ AA:12:306(ASM); AZ AA:12:316(ASM); AZ AA:12:317(ASM); AZ AA:12:371(ASM); AZ AA:12:380(ASM); AZ AA:12:501(ASM); AZ AA:12:502(ASM), AZ AA:12:750(ASM); AZ AA:12:799(ASM); AZ AA:12:800(ASM); AZ AA:12:999(ASM); AZ AA:12:1005(ASM); AZ AA:12:1012(ASM); AZ AA:12:1013(ASM); AZ AA:12:1079(ASM); AZ AA:12:1080(ASM); AZ AA:12:1082(ASM); AZ AA:12:1083(ASM); AZ AA:12:1085(ASM); AZ AA:12:1087(ASM); AZ AA:12:1088(ASM); AZ AA:12:1089(ASM); AZ AA:12:1090(ASM); AZ AA:12:1091(ASM); AZ AA:12:1092(ASM).

SWCA recommends four sites and 2 loci are NRHP-ineligible: AZ AA:12:980(ASM); AZ AA:12:1081(ASM); AZ AA:12:1084(ASM); AZ AA:12:1086(ASM); and two road segments at AZ AA:11:129(ASM).

The archaeological survey of Silverbell Road between Grant and Ina roads documented the nearly uninterrupted deposit of cultural resources between the west bank of the Santa Cruz River and the toe of the Tucson Mountains piedmont; this area is proposed as the Silverbell Archaeological District with 35 known historic properties and an unknown number of buried archaeological sites. Ground disturbing activities associated with road improvements have the potential to adversely affect contributing elements to the district's eligibility. Similarly, actions that indirectly lead to ground disturbing activities

(e.g., USACE issuance of a Section 404 Clean Water Act permit) would also result in adverse effects to historic properties.

SWCA recommends that:

- every attempt be made in project design and implementation to avoid adverse impacts to historic properties (realistically, the topography of the roadbed presents limiting factors that favor expansion to the east in many locations, which may affect the larger prehistoric archaeological sites);
- any portion of the final APE that includes areas not surveyed as part of this project should be surveyed for historic properties;
- identification testing should be conducted in non-site areas where portions of the final APE cross alluvial fans and floodplain deposits (i.e., mostly those areas in and east of the existing roadway);
- because of the multi-year phased nature of the project design and construction and the current uncertainties regarding the final APE and impacts to cultural resources, a Programmatic Agreement (PA) be developed to govern the resolution of adverse effects. Consultation in development of the PA should include, but not be limited to, the USACE, SHPO, Tohono O'odham Nation, Pima County, City of Tucson, Town of Marana, Arizona State Museum, and the Advisory Council on Historic Preservation);
- a Historic Properties Treatment Plan (HPTP) should be prepared to mitigate adverse effects to all affected historic properties and should include data recovery excavations, public interpretation, procedures for handling human remains, and monitoring during construction; and
- the seven roadside shrines (one pet burial and six human *descansos* or memorials) receive special treatment in recognition of the sensitive nature of this type of property. Although these IOs do not qualify as NRHP-eligible properties nor do the COT, County, or TOM have official policies concerning these shrines, the practice has been to make every effort to contact the deceased's relatives to arrange for relocation or removal of the memorial. SWCA recommends that this process be used if these features are within the final APE.

The research potential of the 54 IOs has been exhausted during the initial recordation and SWCA recommends no further work for 47 of the 54 IOs.

Chapter 1

INTRODUCTION

Suzanne Griset

SWCA Environmental Consultants (SWCA) was contracted by the City of Tucson (COT) to complete an archaeological records search, field survey, and report of results for the proposed Silverbell Road Expansion project in Pima County, Arizona (Figure 1.1) The proposed project will add a lane in either direction along an approximately 7-mile length of Silverbell Road between Grant and Ina roads. This will include the addition of pavement on each side of Silverbell Road in most areas, and potentially along only one side of the roadway in some areas, sufficient to accommodate extra travel lanes (currently planned for 3-4 lanes), acceleration and deceleration lanes, turning lanes in both directions of travel, bike lanes, and pedestrian and equestrian facilities. Striping and re-striping pavement, removing and reconstructing existing header curbs, and cutting and repaving existing driveways and intersecting streets may all be necessary in some sections of the Area of Potential Effect (APE). Concrete headers will be added in portions that pass through washes or roadside erosion areas. There are also likely to be numerous drainage improvements, enhanced wildlife crossings, and new native landscaping accomplished as part of this road construction project.

The APE is located in Sections 1, 2, 7, 12, and 18, Township 13 South, Range 12 East, Sections 17–20, 28–29, and 33–34, Township 13 South, Range 13 East, Pima County, Arizona, Gila and Salt River Baseline and Meridian, U.S. Geological Survey Jaynes and Cat Mountain, Arizona, 7.5-minute quadrangles (Figures 1.2a–1.2b). The APE consists of 481 acres on privately held lands and lands administered by the COT, Pima County (County), and the Town of Marana (TOM). A total of 38.4 acres of the APE was not surveyed because of access restrictions. Thus the surveyed area consists of a total of 442.6 acres. The archaeological investigation was contracted via the COT on-call archaeological services contract using funds from the Regional Transportation Authority (RTA). It includes the COT portion of the road from Grant Road to Camino del Cerro, and County and TOM portions between Camino del Cerro and Ina Road. Although construction funding is limited to the COT portion of the road expansion, the results of this archaeological investigation will be used to assist the road design concept study for the entire length between Grant and Ina roads. The design concept study was contracted by COT with Kittelson and Associates (Kittelson) using RTA funding; it includes all other environmental studies.

The APE for the archaeological investigation was determined during discussions with the COT Department of Transportation (TDOT) represented by Project Manager Andrew Denauer and Catesby Willis; with Dr. Jonathan Mabry of the COT Historic Preservation Office (CHPO); and with Roger Anyon of the Pima County Cultural Resources and Historic Preservation Office (PCHPO) in consultation with Kittelson's Project Manager, James Schoen. The APE was purposely drawn large for the archaeological investigations as this is known to be a highly sensitive area for cultural resources and the objective was to identify cultural resources so that they could be avoided as much as possible during the design of the roadway.

The APE includes a corridor along Silverbell Road that is 400 feet (128 m) wide, generally with 250 feet (73 m) on the east-northeast side of the road and 150 feet (54 m) on the west-northwest side. The corridor was expanded for deceleration/acceleration and turning lanes at intersecting roads such as Goret, Camino del Cerro, Sweetwater, and Sunset, which added 300 feet (91 m) to 1,000 feet (304 m) east-west × 300 feet (91 m) to 780 feet (237 m) north-south at these intersections. Additionally, the corridor was extended to 500 feet east and west of the road at major drainages, and 150 feet on either side of the drainage edges. Several of these drainages are likely to fall under the jurisdiction of the USACE.

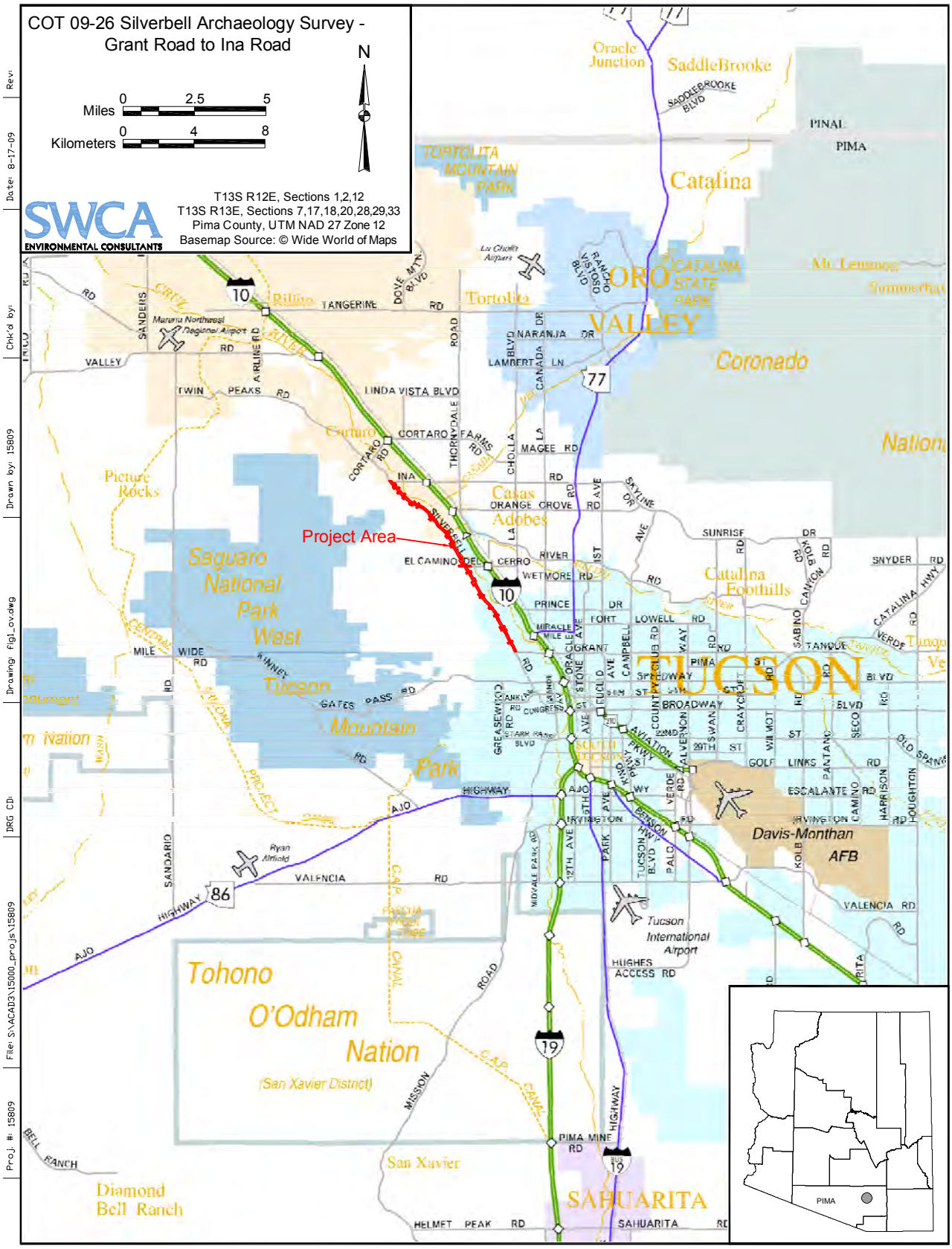

Figure 1.1. Project location.

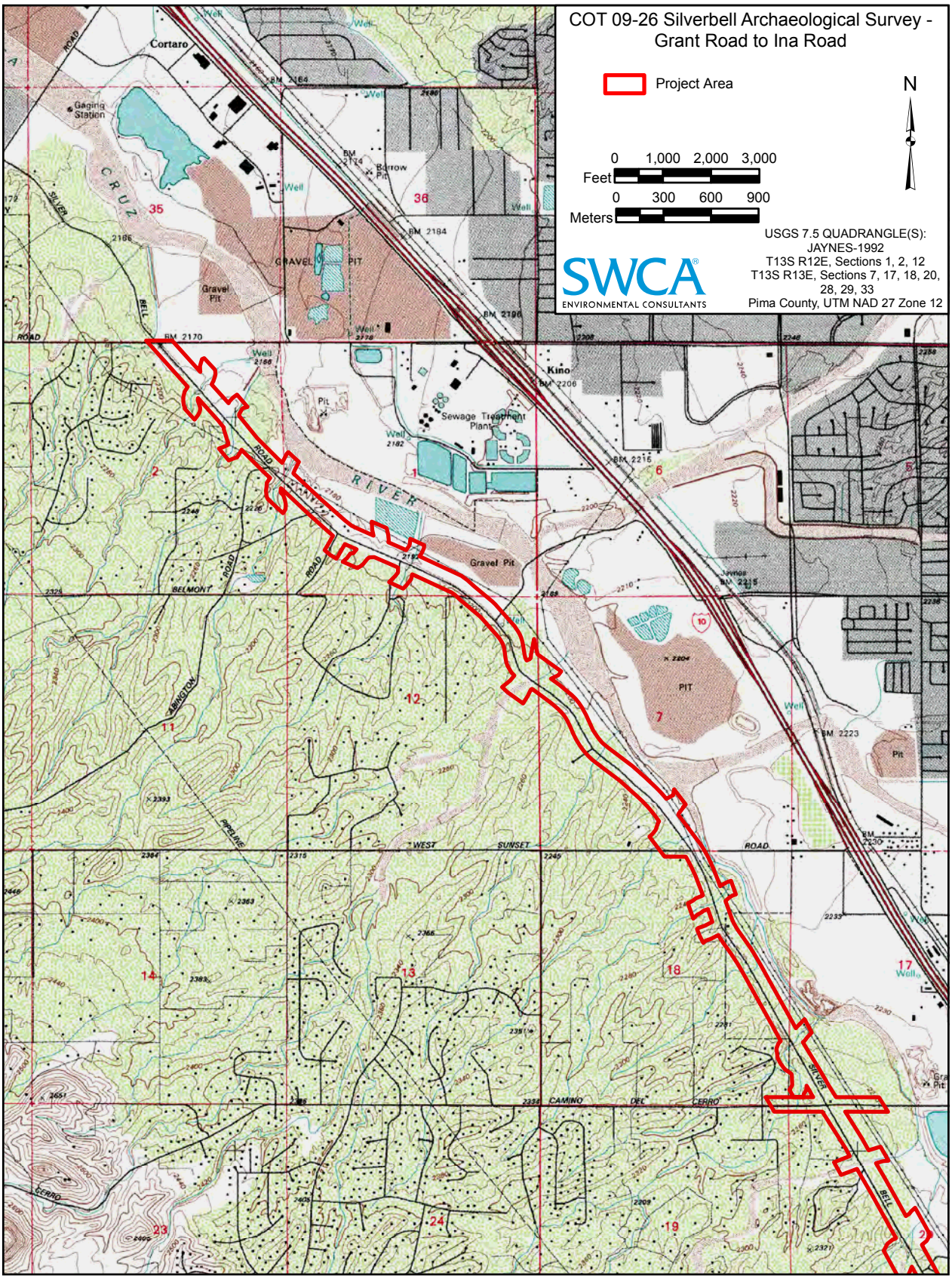

Figure 1.2a. Project APE – northern portion.

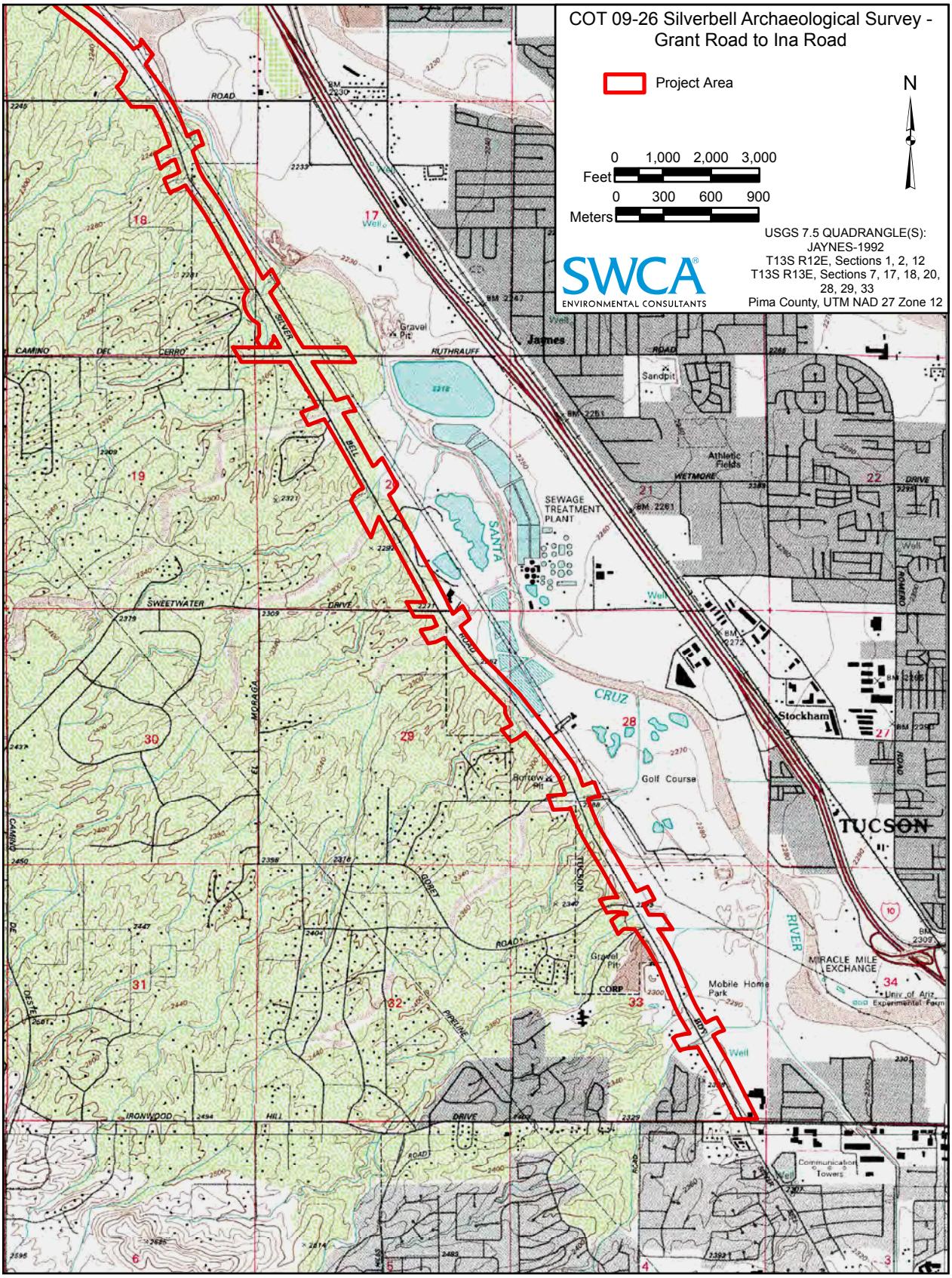

Figure 1.2b. Project APE – southern portion.

The final construction APE will be much smaller than the current APE. Once the planning stages of the proposed action are complete, the APE will be reduced to accommodate the actual locations of ground-disturbing activities and all consultation and compliance activities regarding the mitigation of adverse effects will be adjusted accordingly. If any portion of the final construction APE is within the 38.4 acres of land that were not surveyed at this time, it will be surveyed and included in compliance activities.

Depending on the final project design, the project may require USACE permitting under Section 404 of the Clean Water Act. In such a case, the project would fall under the requirements of Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470), as amended, and implementing regulations (36 CFR 800). This report serves as the initial step in the federal historical preservation compliance process.

Kittelson conducted two public meetings at the outset of the project to explain the process and the objectives of the initial design; one at the El Rio Community Center on August 12, 2009, and the other at the Wheeler Taft Abbett, Sr. Library in Marana on August 19, 2009. SWCA presented a poster at these meetings depicting the survey corridor and the general types of cultural resources previously recorded along Silverbell Road, and answered questions and gathered input from members of the public.

Chapter 2

SETTING AND BACKGROUND

S. Jerome Hesse, David M. R. Barr, and Suzanne Griset

ENVIRONMENTAL SETTING

Silverbell Road, from Grant Road to Ina Road, follows the western margin of the Santa Cruz River floodplain in the northwest Tucson metropolitan area. The southern part of the project corridor, between about Grant Road and Goret Road, passes through an area that has undergone land development in the form of small residential neighborhoods and variety of commercial businesses. Further north to Ina Road, land development has retained a somewhat more rural character. Land west of Silverbell Road consists of undeveloped privately held parcels and low-density residential development that has focused on retention of the natural environment. Most of the land east of Silverbell Road is owned by the City of Tucson, Pima County, and California Portland Cement Company. With the exception of limited residential development near the north end of the project corridor, development on the east side of Silverbell Road, between the Santa Cruz River channel and the road, currently is limited in extent and includes parks and small municipal facilities. Several decades prior, however, much of the floodplain east of Silverbell Road would have been agricultural fields. Silverbell Road, itself, has been an important transportation route up and down the west side of the river for more than 100 years.

Geomorphic Setting

The APE is located in the western portion of the central Tucson Basin in the Santa Cruz River Valley and is part of the Basin and Range Physiographic Province. The Tucson Mountains delimit the central Tucson Basin on the west; the Tortolita Mountains bound it to the north; the Santa Catalina Mountains and Rincon Mountains bound it to the north-northeast and east, respectively; and the Santa Rita Mountains bound it to the south. The APE follows the western margin of the Santa Cruz River floodplain over a distance of approximately 12 km. Two large tributaries of the Santa Cruz River, Rillito Creek and Cañada del Oro Wash, flow into the Santa Cruz from the east, directly opposite the northern end of the APE. The APE elevation is 2,170 to 2,300 feet above mean sea level.

As its name implies, the Basin and Range province is characterized by northwest-southeast-trending block-faulted mountain ranges bounded by deeply filled sedimentary basins, or grabens. Middle Tertiary tectonic extension was the dominant force in creating the Basin and Range Province in Arizona, southern California, and southern Nevada. The Tucson Basin was created when extensional forces in the Earth's upper crust resulted in the formation of and movement along large, low-angle detachment faults, with subsequent high-angle listric normal faulting of the upper fault block (Spencer and Reynolds 1989). The subsequent removal of the upper fault block resulted in the rise of the lower fault block along the origin of the detachment to form the Tortolita, Santa Catalina, and Rincon Mountains. This period of large-magnitude extension probably occurred between 25 and 13 Ma (millions of years ago) in southern Arizona (Coney 1980). A late Miocene extensional event, consisting primarily of high-angle normal faulting, resulted in deep alluvial basins separated by bedrock horsts (Sawyer and Pallister 1989). In southern Arizona, this extensional event referred to as the Basin-Range Disturbance by Menges and Pearthree (1989), probably occurred 15 to 10 Ma. Many of these later high-angle faults have been subsequently buried by basin fill. Since late Miocene times, the geological evolution of the Tucson Basin has been shaped by erosion and sedimentation, rather than through tectonic processes. As evidenced by evaporite deposits, the Tucson Basin was a basin-confined system until the middle Pleistocene, at which

time the Santa Cruz River became a through-flowing river draining to the north (Davidson 1973). The opening of the basin began a period of erosion that lasted until approximately 10,000 years ago. Renewed alluvial deposition and downcutting cycles during the Holocene created the geomorphic surfaces that are currently present along the Santa Cruz River.

The Tucson Mountains, which lie only 3.5 km west of the APE, consist primarily of late Cretaceous age andesitic to rhyolitic volcanic rocks, although younger Middle Tertiary volcanic eruptions of primarily basaltic andesite and andesite form low hills near the southern end of the Tucson Mountains, including Sentinel Peak, Tumamoc Hill, and Black Mountain. The Tortolita, Santa Catalina, and Rincon mountains, which lie 12.5–15 km from the APE, consist primarily of granitic rocks, frequently containing metamorphic fabrics that attest to ductile deformation at great depths prior to uplift. The Tucson and Tortolita mountains both rise to a maximum elevation of approximately 4,700 feet above sea level; the Santa Catalina and Rincon mountains are significantly larger, rising to nearly 9,200 feet and 8,700 feet, respectively.

Two general types of alluvial deposits are found in the Tucson Basin: 1) axial stream deposits associated with the Santa Cruz River and other large drainages; and 2) piedmont alluvium deposited mainly by large washes originating in the mountains. The axial stream deposits date to the last half-million years, and most of the piedmont deposits date to the last two million years. The Holocene-age (<10 ka) alluvium is known to contain buried archaeological deposits. These deposits typically comprise the floodplains and terraces adjacent to stream channels and alluvial fans at the distal margins of the piedmont. Archaeological sites may be found on or excavated into older, Pleistocene-age deposits, including abandoned river terraces and piedmont ridges.

The surficial geology of the Tucson Basin has been mapped by a number of individuals who have assigned different map unit designations to the various geological surfaces (Table 2.1). A surficial geological map of the APE vicinity is shown in Figure 2.1. As evident from the map, the APE generally follows the contact between the Tucson Mountains piedmont and the Santa Cruz River floodplain. Axial stream deposits in the APE include extensive Holocene floodplain and terrace deposits and a remnant late Pleistocene river terrace near the northern end of the APE. Piedmont alluvium includes a range of Pleistocene and potentially older deposits that form the ridges directly to the west of Silverbell Road, as well as a series of Holocene and late Holocene deposits alluvial fans that have encroached onto the floodplain at the mouths of the larger washes.

Tucson Mountains Piedmont

Piedmont deposits extend from the bedrock mountain front downward to the river terraces. Most of the piedmont surfaces in the Tucson Basin were formed during the Pleistocene Epoch (0.01–2.0 Ma). Holocene-age (<10ka) piedmont surfaces are limited to tributary alluvial fan deposits.

The Pleistocene and older surfaces are characterized by moderate to heavy argillic soil development, calcium carbonate accumulation, and well-developed, incised channel networks. Cobble lag deposits frequently exhibit rock varnish. The relative dating of these surfaces is based on the degree to which these traits are developed. Archaeological sites may be located on or excavated into these surfaces; however, the alluvium itself predates the accepted human occupation of the region. These upland piedmont surfaces would have provided stone for tool manufacture and would have supported a suite of wild plant resources, particularly cactus, to supplement domesticated crops. These surfaces also would have been used for non-irrigated agricultural pursuits evidenced today as rock piles, check dams, and terracing.

Table 2.1. Correlation of Surficial Geological Map Units Used by Katzer and Schuster (1984), Klawon et al. (1999), McKittrick (1988), and Pearthree and Biggs (1999)

Geological Deposit (Klawon et al. 1999; Pearthree and Biggs 1999)	Katzer and Schuster (1984)	McKittrick (1988)	Pearthree and Biggs (1999)	Klawon et al. (1999)
Axial Stream Deposits				
Modern River Channel Deposits (<100 years)	Q4	cha	Qycr	Qycr
Holocene Floodplain and Terrace Deposits (<10 ka)	Q3	t1, t2	Qyr	Qyr
Late Pleistocene River Terrace Deposits (10 to 130 ka)	Q1d	t3	Qlr	Qlr
Middle Pleistocene River Terrace Deposits (~130 to 500 ka)	–	t4	Qmr	Qmr
Middle to Early Pleistocene River Deposits (~500 ka to 2 Ma)	–	t5	–	Qor
Piedmont Alluvium				
Late Holocene Alluvium (<2 ka)	Q4, Q2b	ch	Qy2	Qy2
Holocene Alluvium (0 to 10 ka)	Q2a, Q2b	Y	Qy1	Qy1
Late Pleistocene Alluvium (10 to 130 ka)	Q1c	M2	Ql	Ql
Middle Pleistocene Alluvium (130 to 500 ka)	Q1b	M1	Qm	Qm
Middle to Early Pleistocene Alluvium (500 ka to 2 Ma)	Q1a	O	Qmo	Qmo
Early Pleistocene Alluvium (1 to 2 Ma)	Q1a	O, QTbf	Qo	–
Early Pleistocene to Pliocene Alluvium (1 to 5 Ma)	Q1a	QTbf	QT	QT
Bedrock				
Undifferentiated Bedrock	Br	br	R	R

Younger, Holocene-age (< 10 ka) piedmont surfaces are much more limited in spatial extent than the older alluvium. These deposits are found at the distal margins of the piedmont where alluvial fans have formed at the mouths of large drainages. In many areas, these fan deposits have encroached onto or have become intercalated with river floodplain deposits. The size of these fans is to a large degree a function of the size of their drainage basins. The Holocene alluvial fan surfaces, most of which are less than 2,000 years old, display little to no soil development or calcium carbonate accumulation, and channels are usually incised less than 1 m below the surrounding surface. Channels are not always well developed and may branch downstream to form a discontinuous network of smaller channels.

Field et al. (1993), in their geomorphic study of the Tortolita Mountains alluvial fans conducted as part of the Northern Tucson Basin Survey, documented thicknesses ranging from 0.50 m at the fan head to over 4 m at the toe of the fan, and noted that cultural deposits are commonly covered by at least 0.5 m of sediment and have been observed at depths of as much as 2 m. They rated the site-burial potential for floodplain and late Holocene alluvial fan surfaces as high (Field et al. 1993: Table 3.1). Archaeological features have also been noted within alluvial fan deposits on the eastern Tucson Mountains piedmont. Huckleberry (2008:40) noted that features were found buried between 60 cm and 110 cm below the surface within fan deposits at the mouth of Roger and Sweetwater washes. Archaeological features have also been found at several sites in Santa Cruz River floodplain alluvium overlain by fan deposits and document the encroachment of fans onto the river floodplain (see Huckleberry 2008:Figure 4.7).

The depositional environment at the distal margins of the active alluvial fans, with gentle slopes and shallow channels, is conducive to alluvial fan floodwater farming. This method of farming is dependent on rainfall and the diversion of water to crops via ditches and diversion structures. Agriculture based on a mixed strategy of riverine irrigation farming (see below) and alluvial fan floodwater farming would have provided flexibility and added stability to prehistoric groups and made the area in which the APE is located particularly favorable for habitation.

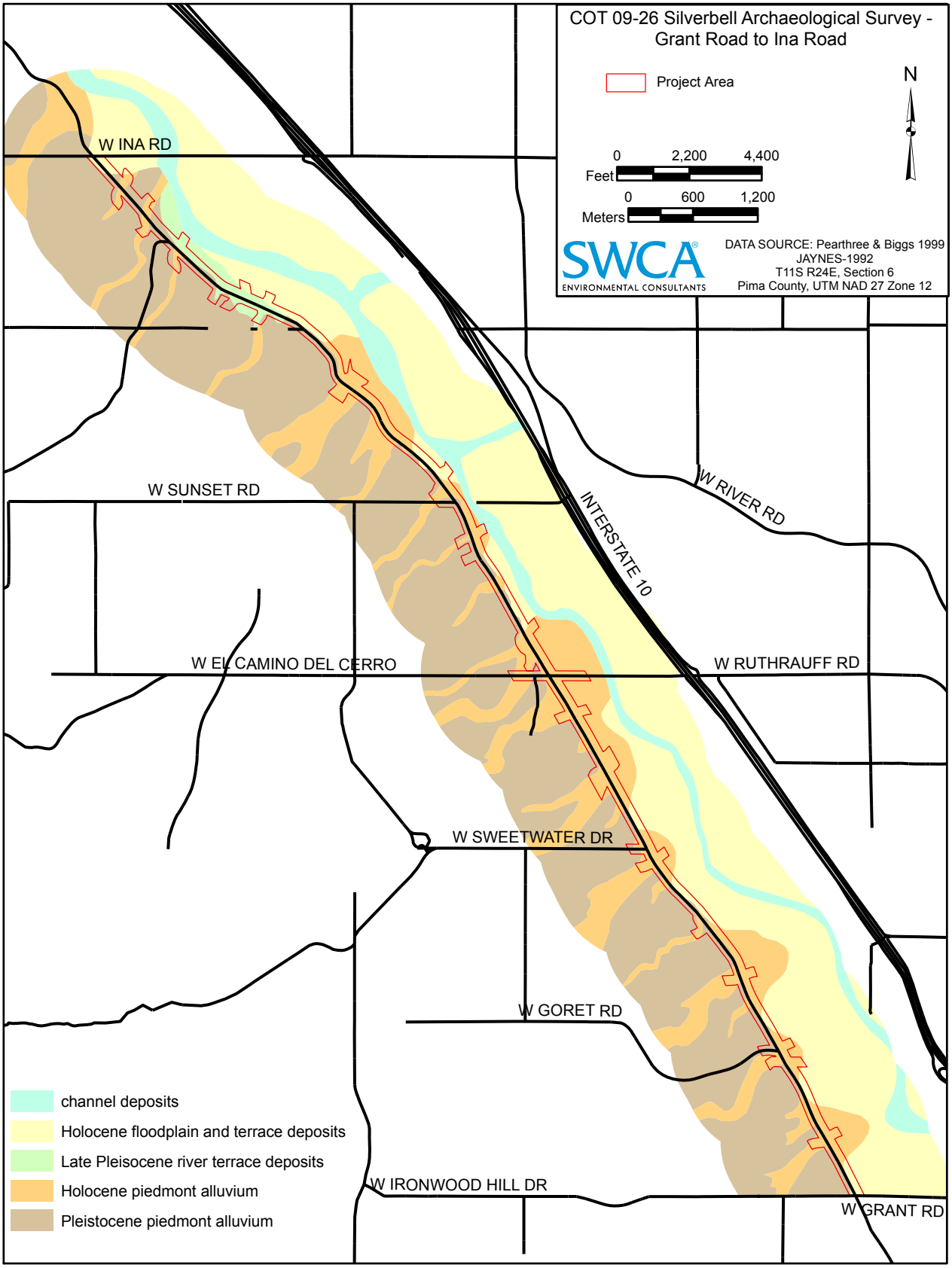

Figure 2.1. Surficial geological map of the APE (modified from Pearthree and Biggs 1999).

Santa Cruz River Floodplain

The Holocene floodplain and terrace deposits of the Santa Cruz River comprise much of the APE east of Silverbell Road. These deposits, particularly those forming the main terrace above the entrenched active channel, have a high potential for buried archaeological deposits and have yielded significant data regarding the transition to agriculture and sedentism in the Southwest. These deposits generally consist of a thick, roughly 3–5 m sequence of fine-textured (sand, silt, and clay) overbank floodplain alluvium that overlies coarser-textured (coarse sand and gravels) channel deposits (Haynes and Huckell 1986; Huckleberry 2008). Soil development is weak, particularly in near-surface horizons, with slight carbonate accumulation (Pearthree and Biggs 1999). At the mouths of several large washes throughout the APE, the floodplain deposits are overlain by and intercalated with alluvial fan deposits.

The encroachment of alluvial fans on the floodplain is believed to have been initiated by the entrenchment of the Santa Cruz River channel. Channel entrenchment results in the cessation of vertical floodplain growth because the stream load is transported downstream rather than deposited on the floodplain during periods of high flow. A significant amount of research has been conducted on the stratigraphic history of late Quaternary stream systems in southern Arizona (Freeman 1997; Haynes 1987; Haynes and Huckell 1986; Huckleberry 2008; Mabry 2006; Nials 2008; Waters 1986, 1988; Waters and Haynes 2001; Waters and Ravesloot 2000). A major focus of this research has been the timing of changes in the fluvial behavior of these systems, particularly the cycles of channel cutting and filling, and the relationship between fluvial behavior and environmental change.

In the past 4,000 years, there have been six episodes of channel entrenchment observed along the Santa Cruz River, as well as six more or less synchronous episodes along the San Pedro River (Waters and Haynes 2001). Arroyo-cutting events in the Santa Cruz River valley date to 4000, 2500, 2000, 1000, 500, and approximately 100 B.P., and in the San Pedro River valley, to 4000, 2600, 1900, 1000, 600, and approximately 100 B.P. (Waters and Haynes 2001). Arroyo-cutting events are believed to be triggered by periods of prolonged heavy rainfall, possibly following periods of drought during which there would have been a drop in the water table and associated reduction in vegetation (Schlesinger et al. 1990). Evidence suggests that the periods of heavy rainfall would have been the result of an increase in the frequency and intensity of wintertime El Niño events (Andrade and Sellers 1988; Ely 1997). Parker (1995) indicates that late summer monsoons, although potentially intense, do not produce the sustained discharge necessary to cause significant impacts on large desert streams (Freeman 2000:99).

Although this research points to large-scale synchronous, climatically influenced cut-and-fill cycles between drainage systems, individual drainage systems respond to these changes by internally adjusting through asynchronous cutting and filling along the various reaches of the system (see Force and Howell 1997; Freeman 1997, 2000). Because of the difficulties for irrigation-based agriculture as a result of channel entrenchment, sedentary peoples would have had to adjust the locations of their settlements accordingly, or find an alternative means of subsistence. The effect of channel entrenchment on settlement patterns has been observed previously in the Southwest (see Force and Howell 1997; Waters 1987, 1988).

In the Tucson Basin, the Santa Cruz River valley comprises three segments (reaches) based on geomorphic, primarily topographic, constraints on the river valley. Parker (1995) discusses the topographic constraints on stream flow throughout the three reaches of the Santa Cruz River in the Tucson Basin. These reaches, known as the San Xavier, Tucson, and Cortaro reaches, are briefly described below.

The San Xavier reach of the Santa Cruz River lies in the southern part of the Tucson Basin, extending from about the southern end of the San Xavier Indian Reservation north to the base of Sentinel Peak

(A-Mountain). Along this stretch, the river valley is wide, allowing floodwaters to extend some distance from the river channel. Over time, this has resulted in the aggradation of fine floodplain sediments. In the past 2,500 years, the floodplain along the San Xavier reach has experienced 7 meters of vertical aggradation, 4 meters of which were deposited between 2500 B.P. and 2000 B.P. (Waters 1988).

The Tucson reach of the Santa Cruz River extends from the base of Sentinel Peak north to Rillito Creek, and includes much of the current APE. The Tucson reach shows cycles of sedimentation and channel incision that are similar overall to the San Xavier reach, although vertical aggradation of the floodplain occurred at significantly slower rates because of lower sedimentary input. The river valley through this reach is narrow, with little storage space, causing the Tucson reach to act as a zone of sedimentary transport (Freeman 1998).

The Cortaro reach extends from the confluence of Rillito Creek north to where the river becomes unconfined, emptying into the Santa Cruz Flats. The northern part of the APE lies within this reach. Within the Cortaro reach, particularly further north, the river valley widens and is bound by piedmont deposits of the Tucson Mountains to the west and piedmont deposits from the Santa Catalina and Tortolita Mountains to the east. High sediment input from Rillito Creek and Cañada del Oro Wash, combined with the widening valley, make the Cortaro reach hydrologically dissimilar from the Tucson reach. According to Freeman (1998:24), increased discharge and a coarser sediment load in the Cortaro reach have resulted in "channel widening, shifting channel positions, and frequent, low-magnitude changes in channel elevation." Although this type of fluvial behavior commonly results in lateral erosion, over the long-term, there has been sufficient sediment input to result in net aggradation. Stratigraphic investigations at the Las Capas site (AZ AA:12:111[ASM]), located on the floodplain immediately downstream from the Canada del Oro confluence, have shown a period of aggradation of overbank floodplain deposits that lasted from approximately 4000 B.P. to the Late Prehistoric or Protohistoric period (Nials 2008).

Biotic Setting

The APE is in the Arizona Upland subdivision of the Sonoran Desertscrub biotic community, as described by Brown (1994). SWCA biologists observed a number of species in the surveyed area, including velvet mesquite (*Prosopis velutina*), foothill paloverde (*Parkinsonia microphylla*), blue paloverde (*P. florida*), whitethorn acacia (*Acacia constricta*), catclaw acacia (*A. greggii*), creosote bush (*Larrea tridentata*), triangle-leaf bursage (*Ambrosia deltoidea*), and burroweed (*Isocoma tenuisecta*). Other species observed include barrel cactus (*Ferocactus wislizeni*), prickly pear cactus (*Opuntia* sp.), chainfruit cholla (*Cylindropuntia fulgida*), staghorn cholla (*C. versicolor*), walkingstick cactus (*C. spinosior*), Mexican paloverde (*P. aculeata*), brittlebush (*Encelia farinosa*), cattle saltbush (*Atriplex polycarpa*), ocotillo (*Fouquieria splendens*), saguaro (*Carnegiea gigantea*), globe cactus (*Mammillaria* sp.), night-blooming cereus (*Peniocereus greggii*), desert broom (*Baccharis sarothroides*), Coues' cassia (*Senna covesii*), threeawn (*Aristida* sp.), spidergrass (*A. ternipes*), five-needle pricklyleaf (*Thymophylla pentachaeta*), fluffgrass (*Dasyochloa pulchella*), and desert globemallow (*Sphaeralcea ambigua*). Nonnative species include saltcedar, Lehman lovegrass (*Eragrostis lehmanniana*), stinkgrass (*E. cilianensis*), prickly Russian thistle (*Salsola tragus*), bermudagrass (*Cynodon dactylon*), buffelgrass (*Pennisetum ciliare*), and a variety of ornamental plant species associated with residential and commercial landscaping. Xeroriparian vegetation along the ephemeral washes includes desert broom, velvet mesquite, wolfberry (*Lycium* sp.), spiny hackberry (*Celtis ehrenbergiana*), graythorn (*Ziziphus obtusifolia*), whitethorn acacia, singlewhorl burrobrush (*Hymenoclea monogyra*), and cane bluestem (*Bothriochloa barbinodis*).

Prior to modern development and twentieth century groundwater pumping, the Santa Cruz River would have supported luxuriant riparian vegetation, probably including but not limited to Fremont cottonwood

(*Populus fremontii*), Goodding willow (*Salix gooddingii*), walnut (*Juglans major*), and Arizona sycamore (*Platanus wrightii*). Mesquite (*Prosopis* sp.) bosques and tall grass-covered areas may have been locally present on the floodplain.

This environmental setting was extremely attractive for human habitation in the prehistoric past. Vegetation was diverse, providing a great variety of economic plants, including desertscrub species and riparian plants. The riparian vegetation and water along the river would have attracted a wide range of game species, including mammals, reptiles, and birds. Larger game, such as deer and bighorn sheep, could be hunted in the nearby foothills and mountains.

Climate

The climate of southern Arizona is semiarid, with a bimodal precipitation pattern consisting of summer and winter rains (Sellers and Hill 1974). Summer temperatures are hot, and winter temperatures are relatively mild. July is the hottest month, with an average high temperature of 100.1ºF; January is the coldest month, with an average high temperature of 65.4ºF. Temperatures reach at least 90ºF an average of 150 days per year and drop to 32ºF or below an average of 28 days per year. There is a 90 percent probability of a "freeze-free" period lasting at least 253 days (Western Regional Climate Center 2003). The great number of frost-free days resulted in a long growing season for ancient farmers, but it was balanced by the region's aridity.

CULTURE HISTORY

Human occupation of the greater Tucson Basin spans some 12,000 years, from the Paleoindian period to the present. As the prominent drainage passing through the basin, the Santa Cruz River and its tributaries, with their seasonal flow and fertile sediments, have long been a major focus of human occupation. In this section, we offer an overview of the Native American culture history of the Tucson Basin, focusing on the middle Santa Cruz River valley. Because areas beyond the Tucson Basin at times witnessed parallel cultural developments, and inhabitants of these areas surely interacted with those of the Tucson Basin, we expand our discussion to include the San Pedro River valley, portions of the Papaguería, the Gila-Salt River Basin, and occasionally other regions.

For this overview, we use traditional cultural-historical labels and date ranges that have been defined for periods and phases. Our level of understanding varies with the intensity of archaeological research and the number of investigated sites.

Paleoindian Period (9500–8000 B.C.)

The earliest known human occupation of southern Arizona is the Paleoindian period (9500–8000 B.C.). Archaeological remains that characterize the period reflect small groups of hunter-gatherers who hunted now-extinct large game, including mammoths. Many excavated Paleoindian sites represent the killing and butchering of these animals; residential sites ("base camps") are rare. Artifact assemblages include distinctive "fluted" projectile points, which were hafted to handheld spears, along with other tools used for skinning animals and cutting meat and bone.

Although no substantial evidence of Paleoindian occupation has been discovered in the Tucson Basin, southeastern Arizona has been an important region for its study. Four Clovis culture sites associated with mammoth remains have been excavated in the upper San Pedro River valley (Faught and Freeman 1998:42). The Lehner Ranch and Murray Springs sites are mammoth-kill sites where the bones from

multiple butchered mammoths, as well as other now-extinct species, were found in association with Clovis points and other artifacts (Haury et al. 1959; Haynes 2007). The Naco and Escapule sites each consisted of a single unbutchered mammoth associated with Clovis points and are believed to represent sites where mammoths, wounded by Clovis hunters, died (Faught and Freeman 1998:42). Two additional sites with Pleistocene faunal remains and flaked stone tools—AZ EE:3:2(ASM)[1] and EE:3:3 —were located northeast of Benson, Arizona, in the walls of entrenched tributaries of the San Pedro River (Hemmings 1970). Cave sites, such as Ventana Cave (Haury 1975), have provided information about Paleoindian life that has been lost at open-air sites, but such settings are rare.

We assume that a similar Clovis occupation was present in the Tucson Basin. Clovis points have been found in the Tucson Basin at the Valencia site (BB:13:15) (Doelle 1985:181) and in Saguaro National Park East (Simpson and Wells 1984), as well as in the Tucson Mountains and Avra Valley to the west (Huckell 1984). Although the lack of Paleoindian sites in the middle Santa Cruz River valley may be because of its unattractiveness to Clovis hunters or because people visited the area only sporadically, their absence more likely is because the sites have been buried or destroyed by natural geomorphological processes (Haynes and Huckell 1986; Huckell 1984; Waters 1986).

Early and Middle Archaic (a.k.a. Early and Middle Preceramic Periods (8000–2000 B.C.)

The long temporal span of the Early and Middle Archaic periods encompassed a host of major economic and settlement changes among aboriginal groups in the Southwest. Climatic fluctuations led to hunting-and-gathering strategies that focused on small game and locally available plant resources. The extinction of large Pleistocene mammals during Paleoindian times was at least one cause of a shift from a largely hunting-based economy to an economy based on collecting a broad spectrum of wild plant and animal foods (although the degree to which Clovis peoples gathered plant foods is debatable, primarily because the majority of sites are kill sites rather than base camps). Dates for the beginning of the Early Archaic period are not well established, but the available evidence suggests that it began around 8000 B.C. This period is poorly documented in southern Arizona and virtually unknown in the Tucson Basin (Huckell 1984:137), probably as a consequence of its general under-representation and low visibility. Tapering-stemmed points, such as the Lake Mohave, Jay, and Silver Lake types, characterize assemblages from this period. Few radiocarbon or stratigraphically dated remains have been documented for the period. In the Sulphur Springs Valley of southeastern Arizona, Sayles (1983) identified Early Archaic sites along Whitewater Draw. Six sites exposed in the arroyo wall contained slab metates and hand stones along with unifacially retouched scrapers and other tools (Sayles 1983; Waters 1986).

The Middle Archaic period is better represented in southern Arizona. Primarily known in southeastern Arizona from the San Pedro and Sulphur Springs valleys (Sayles and Antevs 1941), the Middle Archaic period was marked by the presence of Chiricahua, San Jose/Pinto, and, in the latest stages, Cortaro style (Roth and Huckell 1992) projectile points. Socioeconomic adaptation at this time in southern Arizona appears to have been based on the exploitation of a wide range of plants and animals in complementary environmental zones. Assemblages from southern Arizona frequently include large numbers of projectile points and slab metates, as well as basin metates, mortars, and pestles.

Excavations at Los Pozos (AA:12:91) along the east bank of the Santa Cruz River opposite the APE, identified deeply buried evidence of episodic occupations during the late Middle Archaic period (Gregory ed. 1999). The site was characterized by thermal features, oxidized surfaces, a large number of Cortaro projectile points, and only minimal numbers of ground stone artifacts. Small charred seeds and mesquite

[1] All sites from this point on in the report are AZ ____(ASM) site numbers unless otherwise noted and will be given in the form X:X:X.

beans reflected on-site processing of wild floral resources. Large- and small-mammal remains represented important resources for food, tools, and probably pelts (Gregory ed. 1999:85–86). Maize (*Zea mays*) with a radiocarbon date of 4050 ± 50 B.P. (CAMS-34923; maize; $\delta^{13}C$ = est.−10.0‰), was also found in the Middle Archaic deposits; however, the dated sample did not originate from a feature, and the date was considered somewhat unreliable because of the potential for contamination and mixing of sediments and the $\delta^{13}C$ value was estimated rather than measured, preventing comparison with typical values for maize (Gregory ed. 1999:118).

A relatively substantial Middle Archaic period occupation was found at Las Capas (AA:12:111), which was located along the Santa Cruz River near its confluence with the Cañada del Oro Wash. Early maize remains were identified in deeply buried features associated with Cortaro style projectile points at Las Capas (Whittlesey et al. 2007). Maize from this deposit yielded a date of 3670 ± 40 B.P. (Beta-148409; maize; $\delta^{13}C = -10.6‰$). Ground stone tools included hand stones, manos, and two complete grinding slabs (found in a cache, Feature 1654). A second cache contained two flaked, tabular tools and a larger, unmodified piece of tabular stone. Twenty-five features were excavated. Pit shapes included bells, cylinders, cones, and basins. None but the basin and cylindrical pits have been previously documented at Middle Archaic period sites. The basin-shaped and cylindrical pits included examples with and without thermal attributes. No architectural features were discovered.

The association of maize with Middle Archaic projectile points has been documented elsewhere, including at the Clearwater site (BB:13:6) (Mabry 2007) and at McEuen Cave, located north of the Gila River valley in east-central Arizona (Huckell et al. 1999). To date, no evidence of floodwater farming or irrigation has been found during the Middle Archaic period. Maize may have been farmed using rainfall only, which seems unlikely, given the plant's high water requirements; more likely, it was grown on the floodplain and watered through overbank flooding. This farming strategy was used by the Akimel O'odham (Castetter and Bell 1942; Ezell 1964), the lower Colorado River tribes (Spier 1933), and other groups during the Historic period. Water-table farming may also have been practiced. This technique was employed historically by O'odham and Yuman peoples (Hackenberg 1983; Spier 1933). The presence of cienegas and wells at Las Capas in later deposits certainly suggests the presence of a high water table in the area, meaning that water-table farming would have been possible there.

Early Agricultural (a.k.a. Late Archaic or Late Preceramic Period (2000 B.C.–A.D. 200)

As more research is undertaken in southeastern Arizona, the initial introduction of maize is being pushed back in time. Huckell (1995) defined the earliest phase of the period, dating from about 2000 to 1300 B.C., but did not give it a label. Whittlesey et al. (2007) suggested it be called the Silverbell interval to avoid the awkward use of the phrase "earliest, unnamed interval of the Early Agricultural period." Evidence for early maize dating between 1700 and 1300 B.C. has been found at the Sweetwater locus of Los Pozos (Gregory ed. 1999; Stevens 1999) as well as at Las Capas (Mabry 2007; Whittlesey et al. 2007).

The following San Pedro phase (1300–800 B.C.) witnessed changes in artifact assemblages, cultural features, and archaeobotanical remains, signifying changes in settlement and subsistence patterns. At the Milagro site (BB:10:46), located on a low terrace north of Tanque Verde Creek in the eastern Tucson Basin, Las Capas, and elsewhere, the San Pedro phase was characterized by relatively small domestic structures with a few small, interior bell-shaped storage pits, numerous extramural storage and processing pits, abundant flaked stone artifacts (including San Pedro and Empire projectile points), simple shell jewelry, clay objects, utilitarian seed milling equipment, and maize cultivation (Huckell and Huckell 1984; Huckell et al. 1995).

Several sites with San Pedro phase components have been investigated along the Santa Cruz floodplain, including Las Capas; the Costello-King site (AA:12:503) (Ezzo and Deaver 1998); the Valley Farms site (AA:12:736) (Wellman 2000); the Home Depot site (AA:12:352) (Doak 1999); the Wetlands site (AA:12:90) (Freeman ed. 1998); Solar Well (AA:12:105) (Mabry 1990); Columbus Park (AA:12:96) (Wöcherl 2008); the Dairy site (AA:12:285) (Fish et al. 1992); and the Cortaro Road site (Slawson et al. 1986). Both Solar Well and Columbus Park are at least partially recorded within the current APE.

The 1998 and 1999 excavations by SWCA (Whittlesey et al. 2007) and Desert Archaeology, Inc. (DAI) (Mabry 2008), at Las Capas provided a wealth of new information on the San Pedro phase. As early as 1300 B.C., the residents were cultivating maize, building irrigation ditches, constructing pit structures, and using large, bell-shaped storage pits in both extramural and intramural contexts. Fired-ceramic artifacts included figurines, beads, pipes, cornucopia-shaped objects, and sherds from small, baseball-shaped bowls. Large, shallow pit structures were used for habitation; large, extramural bell-shaped pits provided storage for food and equipment, and hundreds of smaller pits of varied sizes and shapes were used for processing activities and other tasks. Projectile points included San Pedro and Empire styles that were exclusive in their distributions at the SWCA data recovery area (Whittlesey et al. 2007). Pit structures were arranged in loosely defined clusters; areas almost devoid of features, which could have served as communal space for ritual purposes, also were found. Irrigation ditches initially were used opportunistically to capture floodwater and later were used more systematically (Mabry 2008). Although these innovations reflect a more sedentary way of life than that practiced by earlier peoples (Doyel 1984; Eddy and Cooley 1983:46–47; Huckell 1990:351), these settlements were not occupied permanently, and some mobility continued to characterize a lifeway that remained focused on wild-plant foods.

The succeeding early and late Cienega phases (800 B.C.–A.D. 200) witnessed further changes. Most pit structures were small, informal constructions that lacked hearths and contained many large storage pits, which suggests they may have served as specialized storage facilities. At the same time, the number of extramural storage facilities was greatly reduced (Gregory 2001; Huckell 1990, 1995; Mabry 1998). Corner-notched Cienega points replaced the earlier San Pedro and Empire points, and ground stone and shell inventories became more elaborate. Large structures may have been used for communal ritual functions. What remains to be determined is whether the Early Agricultural period settlements along the Santa Cruz River were characteristic of the period elsewhere in southern Arizona and beyond. Current evidence indicates a possible dual settlement system focused on the floodplains and on the bajadas (Roth 1989). An important issue concerns whether sedentism began before or after cultivation was established (Fish et al. 1992; Huckell 1990:371). Fish et al. (1992:13–15) suggest that the riverine zone provided an "optimal environmental constellation" for sedentary, or near-sedentary, settlement by non-agricultural hunters and gatherers. This constellation included reliable sources of water, availability of a staple (mesquite pods), and access to environmental diversity. Increasing residential stability would have contributed to the adoption of farming (Roth 1989). In fact, it has been argued that "restricted residential mobility may be as much a prerequisite for a successful transition to agriculture as the result of such a transition" (Fish et al. 1992:14).

Early Ceramic Period (A.D. 200–650)

The Early Ceramic period marks the transition between the preceramic cultures and the subsequent Hohokam Pioneer period. It is divided in two phases: the Agua Caliente and Tortolita phases. This was a transitional time, marked by the introduction of new patterns and the persistence of some older patterns. By the end of the Early Ceramic period around A.D. 650, sufficient cultural differentiation was present to warrant treating the material culture of groups that inhabited southern Arizona as separate cultural entities. Some basic patterns persisted into the Hohokam sequence, however, and others continued in the Mogollon cultural tradition of southeastern Arizona (Ciolek-Torrello 1995).

Sometime around A.D. 200, perhaps as much as two centuries earlier, true ceramic containers appeared in the Tucson Basin. The Agua Caliente phase was characterized by plain brown ware ceramics and vessel shapes that include primarily seed jars and occasionally bowls (Deaver and Ciolek-Torrello 1995; Whittlesey 1998). These sand-tempered ceramics were made over broad areas of the Southwest, including the Peñasco phase of the San Simon Mogollon in southeastern Arizona, the Agua Caliente phase in the Tucson Basin, and the Red Mountain phase in the Gila-Salt Basin. Because of the technological similarity over such a broad region, ceramic-container technology may have been introduced from a single source, and the cultural differentiation characteristic of later periods had yet to take place (Whittlesey 1995). The appearance of ceramic containers used for seed storage coincided with greater residential stability, increased reliance on cultigens, and greater architectural formality. With the advent of ceramic vessels came a significant change in storage technology. The increased use of ceramic storage vessels was concomitant with a decrease in large storage pits (Ciolek-Torrello 1998).

In southeastern Arizona, the introduction of a red-slipped ware marked the beginning of the Tortolita phase around A.D. 400. New vessel shapes, such as the flared-rim jar and flared-rim bowl, the latter thought to be a hallmark of later Hohokam ceramic technology, were introduced. In addition to the locally made Tortolita Red pottery, Gila-Salt Basin Vahki Red and Vahki Plain ceramics and Mogollon San Francisco Red are commonly found at Tortolita phase sites in the Tucson Basin.

Architecture at Early Ceramic period sites shows a formalization of previous building techniques. Many pit structures were square to rectangular, with formal, plastered hearths centered on the entryway. Some structures had entryways flanked by adobe pillars that supported entry posts, creating a “bean” shape. This formalization in architecture suggests greater residential stability. True pit houses characterized the Agua Caliente phase. During the following Tortolita phase, houses in pits made their appearance, and they eventually became the most common architectural style (Wallace and Lindeman 2003:Table 4.1). Large communal houses continued to be used. Some material-culture patterns remained much like those of earlier times, however, including the persistence of large dart points and ground stone tools focused on basin metates and handstones (Ciolek-Torrello 1998).

One or both of the Early Ceramic period phases have been identified at several sites in the Tucson Basin. These include the Lonetree site (AA:12:120) (Bernard-Shaw 1990); Square Hearth (AA:12:745) and Stone Pipe (BB:13:425) (Mabry et al. 1997); the Dairy site (AA:12:285) (Fish et al. 1992); Rabid Ruin (AA:12:46) (Slawson 1990), which is located partially within the current APE; the Houghton Road site (BB:13:398) (Ciolek-Torrello 1998; Deaver and Ciolek-Torrello 1995); Valencia Vieja (BB:13:15) (Wallace 2003); the Julian Wash site (personal communication, Henry Wallace 2003); and the Triangle Road site (BB:9:87) (Wellman 1999).

Hohokam (A.D. 650–1450)

By around A.D. 650, the archaeological culture we recognize as the Hohokam of the Tucson and Gila-Salt Basins had appeared. The Hohokam sequence is composed of four periods: Pioneer (A.D. 650–750), Colonial (A.D. 750–950), Sedentary (A.D. 950–1150), and Classic (A.D. 1150–1450). In the Tucson Basin, the Pioneer period includes the Estrella-Sweetwater and Snaketown phases (duplicating the phases of the Gila-Salt Basin sequence). The Colonial period includes the Cañada del Oro phase, equivalent to the Gila Butte phase of the Phoenix area, and the Rillito phase, equal to the Santa Cruz phase. The Sedentary period includes the Rincon phase, which has been divided into early, middle, and late subphases and is equivalent to the Sacaton phase of the Phoenix area. The Classic period incorporates the Tanque Verde phase (Soho phase equivalent) and Tucson phase (Civano phase equivalent). Little evidence of the latest Hohokam phase of the Gila-Salt Basin, the Polvorón phase, has been found to date in the Tucson Basin.

Artifacts connoting Pioneer period occupation have been noted at the Dairy site (AA:12:285) (Deaver 1996; Fish et al. 1992), the Redtail site (AA:12:149) (Bernard-Shaw 1989), the Dakota Wash site (AA:16:49) near Sentinel Peak (A-Mountain) (Craig 1988), and the Hodges Ruin (Kelly et al. 1978). A small, Late Pioneer period farmstead was identified at Hawk's Nest in the Avra Valley (Czaplicki and Ravesloot 1989). Painted decoration appeared on ceramics, along with grooved and incised decoration. Painted designs become more complex from simple geometric designs early in the period to complex hachures later (Deaver and Ciolek-Torrello 1995; Heckman et al. 2000). The beginning of regional diversification in ceramic technology became apparent at this time, when local ceramic production may have begun in the Tucson Basin. Evidence for canal irrigation has been found at the Dairy site (Deaver 1996).

An ongoing, much-debated issue concerns the origin of Hohokam groups in the Phoenix and Tucson Basins. Whereas some archaeologists view the Hohokam culture as an outgrowth of local Early Ceramic period populations (Wallace and Lindeman 2003), others believe the Hohokam essentially were a frontier Mesoamerican group who moved into the Tucson and Gila-Salt basins (Whittlesey 2004). The number of parallels to Mesoamerican material culture, ritual, ideology, and cosmology make the Mesoamerican-migration hypothesis an attractive one.

Current evidence indicates rapid population increase during the Colonial period. By A.D. 800, the beginning of the Rillito phase, a number of settlements were established along the Santa Cruz River. Doelle and Wallace (1991) suggest this represents a fourfold increase in the number of sites known from the Cañada del Oro phase. Ball court villages dating to the Colonial period are known in the western Tucson Basin along the Santa Cruz River, as well as at the base of the Tortolita and Santa Catalina mountains and in the Avra Valley (Czaplicki and Ravesloot 1989; Doelle and Wallace 1991; Downum 1993). These ball court villages were the centers of larger communities that included farmsteads, field houses, and plant-procurement locales. Los Morteros (AA:12:57) is the nearest ball court village to the current APE. The Tucson Basin ceramic tradition burgeoned, with red-on-brown pottery that differed from the Gila-Salt Basin red-on-buff pottery in technology but paralleled it in design and vessel shapes. Villages were structured as clusters of courtyard groups, each with communal work areas, trash mounds, and associated cemeteries. Open plazas served communal functions.

By the middle of the Sedentary period, the Hohokam regional system had reached its maximum extent (Crown and Judge 1991; Wilcox 1991). The Sedentary period was a time of considerable change in the Tucson Basin. Although there was substantial growth in the number of small to moderate-sized settlements, with settlement expanding into all parts of the Tucson Basin (Elson 1986), ball courts ceased to be used. Settlements were expanded away from riverine environments to secondary drainages and bajadas. The repertoire of agricultural strategies was expanded on the bajadas to include large rock-pile fields, which are thought to have been used to a large degree for agave cultivation. Although courtyard groups continued to reflect the predominant organizational form, the number of houses in a group decreased (Whittlesey and Deaver 2004). In the Gila-Salt Basin, ceramics were distinguished by degeneration in the execution of line work and a bolder decorative style. Vessels were thicker and heavier than in earlier periods, and the distinctive Gila shoulder made its first appearance. In the Tucson Basin, ceramic manufacturing flourished, with the appearance of white-slipped and red-slipped pottery, black-painted pottery, and by the late Middle Rincon phase, Rincon Polychrome pottery (Deaver 1989a).

Beginning in the late Rincon phase, sweeping changes took place. Many existing settlements were abandoned, and new settlements were established in previously unoccupied areas. Large communities were located along the major drainages (Doelle and Wallace 1991). New architectural types, modes of interment, and changes in subsistence and economic pursuits were introduced. Various types of adobe-walled construction appeared, including adobe-walled pit houses and, later, aboveground structures of adobe and stone masonry. Dwellings and habitations often were enclosed entirely or in part by adobe and

stone compound walls (Kelly et al. 1978; Slaughter and Roberts 1996). Earthen platform mounds became the focal point of communal activities. Platform mounds were built at University Indian Ruin and Martinez Hill and in the Marana community.

Inhumation burial was added to the mortuary complex; at some sites, cremation persisted along with inhumation, although at other sites, inhumation replaced cremation. Maize, beans, squash, and cotton continued to dominate agricultural production, but a wider variety of cultivars and wild-plant resources were exploited than previously. Other changes in subsistence pursuits included significant increases in agave use (Wallace 1995:806–810) and reliance on artiodactyls. Whereas the expansion of farmsites in the Sedentary period has been attributed to salubrious climatic conditions (Van West and Altschul 1994), the expansion of alternative farming methods in the Classic period tends to suggest that other options were needed to mitigate the unpredictable availability of water for irrigation (e.g., Crown 1984; Fish et al. 1984:69; Miksicek 1987). Vulnerabilities in canal systems may have prompted some settlement relocations (Wallace 1995a:810–811). Certainly in the Phoenix Basin at villages such as Pueblo Grande, populations were under severe nutritional stress.

In the Tucson Basin, ceramics changed along with other lifeways. The designs of red-on-brown ceramics became simpler and more rectilinear, and design styles were shared with several other pottery types. Vessel forms also changed. Tanque Verde Red-on-brown pottery appeared in low frequencies in the Gila Basin and the western Papaguería. A study of the production and distribution of Classic period Tanque Verde Red-on-brown vessels from sites in the Marana and Robles communities of the northern Tucson Basin failed to identify the materials used to make these ceramics, and therefore production centers could not be identified (Harry 1997). Corrugated pottery and Mogollon-style brown ware and red ware evidently were locally made in the eastern Tucson Basin. In the Tucson phase, a wide variety of locally made and nonlocal polychrome wares appeared, including Roosevelt Red Ware and White Mountain Red Ware.

The Classic period was a time of demographic shifts, likely prompted by drought. Evidence of population relocation from northern and central Arizona has been documented in southeastern Arizona in the San Pedro River valley and possibly the eastern Tucson Basin (e.g., Clark 2001; Di Peso 1958; Slaughter and Roberts 1996; Woodson 1999). Some archaeologists view the changes in the Classic period material culture, site structure, and settlement patterns as resulting from sociopolitical and economic reorganization prompted by the influx of new people to the region.

Important Classic period settlements in the western Tucson Basin include the Dairy site (AA:12:285), Los Morteros (AA:12:57), and the Huntington Ruin (AA:12:73). Occupations at Los Morteros and the Huntington Ruin may have been related, with growth at the Huntington Ruin and adjacent hill top trincheras sites contemporaneous with the decline in population at Los Morteros. Many Tanque Verde phase sites, including the platform mounds at Marana and Los Robles and nearby trincheras sites, were abandoned (Doelle and Wallace 1991:Figures 7.25, 7.26; Downum 1993; Fish et al. 1992). By the Tucson phase, there is indication of increased social differentiation and aggregation of populations into fewer and larger villages. During the Tucson phase, population aggregation is apparent in the southern Tucson Basin near Martinez Hill, the northern Altar Valley around the Coyote Mountains, and at University Indian Ruin at the confluence of Pantano Wash and Tanque Verde Wash in the eastern Tucson Basin (Doelle and Wallace 1991:Figure 7.26). The area near and north of the Picacho Mountains, approximately 40 miles northwest of the Tucson Basin, also contained substantial communities with platform mound sites (Ciolek-Torrello and Wilcox 1988; Henderson and Martynec 1993). Smaller Tucson phase habitation sites such as a Rabid Ruin (AA:12:46) within the APE and the nearby Dairy site (AA:12:285) indicate that, despite the general trend for greater population aggregation during this phase, not all Tucson Basin residents concentrated in massive-walled villages (Wallace and Holmlund 1984).

Protohistoric Period (A.D. 1450–ca. 1700)

At some point before the arrival of the first Spanish conquistadors in southern Arizona, the Classic period population was reorganized yet again. Although the end of Hohokam culture at the close of the Classic period is accepted, the fate of the Hohokam is unknown. The ancestors of the present-day Native Americans populating southern Arizona have been suggested to be Hohokam (Haury 1976), O'otam (Di Peso 1956), Amargosans (Hayden 1970), and Sonoran Indians (Masse 1981:312). A Hohokam-Piman continuum has not been demonstrated conclusively, although there is some evidence that certain parts of southern Arizona were not completely abandoned at A.D. 1450 (Ciolek-Torrello 1988:314; Henderson 1993:86). The Great House at Casa Grande, however, was an abandoned ruin when Padre Kino visited in the late 1600s (Bolton 1919), and a new population was living along the San Pedro and Santa Cruz Rivers. These were the Sobaípuri, a subgroup of O'odham people who were long ago absorbed into other O'odham groups. We know little of the chronology of this reorganization, the ethnic affiliation of the Protohistoric and Early Historic period groups, or details of lifeways.

The San Xavier Bridge site (BB:13:14) may have had a Protohistoric period occupation. A number of flexed burials were found stratigraphically above the Late Classic period features. These burials had artifacts suggesting flintknapping tool kits and objects with clear ceremonial uses, including the skeleton of a golden eagle (*Aquila chrysaetos*), *Strombus* shell trumpets, abalone shell from the Pacific Coast, and many other ornamental and ritual objects. Two burials had clusters of Sobaípuri-style projectile points, and one cluster was evidently encased in a quiver decorated with mountain-lion claws (Ravesloot 1987). These inhumations and accompaniments differ in many ways from Classic period burials and indicate a strong possibility of a different ethnic or cultural connection.

Other Sobaípuri occupations have been identified in and near the Tucson Basin. These sites are characterized by oval or round rock foundations for brush-and-pole structures; Whetstone Plain pottery—a thin, wiped, sand-tempered ware—and a distinctive, concave-based, serrated projectile point (Masse 1980; Ravesloot and Whittlesey 1987). Other stone artifacts were relatively non-diagnostic, although the raw materials are typically thought to be of better quality than those used in Hohokam stone tools (Brew and Huckell 1987:171). Were the Sobaípuri the descendants of the Classic period peoples? It is impossible to say. Bioarchaeological and linguistic data suggest few if any connections between modern O'odham peoples and the Classic period populations (Shaul and Hill 1998:392; Turner and Irish 1987). By contrast, oral-history accounts relate a close connection between the O'odham peoples and the Classic period populations (Bahr et al. 1994). It is important for future research to study the fate of the Classic period peoples and the nature of their relationship to historically described O'odham peoples.

With the incursion of Spanish priests, soldiers, and settlers around the same time that Apachean bands began entering southern Arizona, many protohistoric settlements came into direct contact with these institutions and people and were greatly affected by them at the beginning of the 18th century.

Historic Period (A.D. 1699–1950)

The Historic period in the Tucson Basin can be divided into a Spanish/Mexican period (A.D. 1699–1854) and an American period (A.D. 1854–1950)—the terms Spanish, Mexican, and American referring to political hegemony rather than to ethnic identity (Ayres 1984). Spanish colonization of what is now known as southern Arizona began in the 1690s with the travels of the Jesuit missionary Eusebio Francisco Kino. Kino first traveled as far north as the Tucson Basin in 1692 and 1694 (Doelle 1984). The mission at San Xavier del Bac in the southern Tucson Basin was established under Kino's influence in 1700. In 1775, a presidio was established in Tucson to protect the missions at San Xavier and San Agustín from Apache attack (Harry and Ciolek-Torrello 1992). Small numbers of Spanish settlers populated the Santa

Cruz Valley after the establishment of the presidio and the Spanish establishment of Apache villages adjacent to Spanish towns for those willing to accept Spanish dole in exchange for abandoning raiding. In the Tucson area this was the Apache Mansos settlement to the south and east of the APE. Nonnative settlement slowed after Mexican independence from Spain in 1821 turned the territory over to Mexican jurisdiction; funds ceased for the Manso (Tame) Apache towns and Apache raiding resumed in force (Clemensen 1987; Harry and Ciolek-Torrello 1992). Mexican control lasted until the Gadsden Purchase of 1854. At this time, the United States acquired Arizona as a territory, although Arizona did not achieve Territorial status in its own right until 1863.

The local population slowly expanded but because of Apache raids remained centered on the town of Tucson until the 1870s. The continuing Apache raids of that era targeted the people in the Tucson Valley, and from 1860–1861 and 1866–1873, the U.S. Army (Army) was stationed at Camp Lowell in the old Spanish presidio in the heart of Tucson. Because of a lack of discipline among the soldiers, General George Crook ordered that a new site for the Army be chosen, and the confluence of Pantano Wash and Tanque Verde Creek was selected. A large military reservation was marked out, covering 80 square miles, in 1872, and Camp Lowell moved to Fort Lowell in 1873 (Turner 1982). After this, settlers from the eastern United States and Mexico began to ranch and farm along Tanque Verde Creek and the Rillito River.

Throughout the Historic period, conflict with the native peoples of the area was a major issue. The main source of Native American hostility in southern Arizona was from Apaches, who raided early settlements, stealing supplies and killing inhabitants. These raids lasted from the time of the earliest mission establishments through the 1870s. General Crook took control of Indian affairs in Arizona in 1872, unleashing a hostile plan of constant attack against the Apaches, with a goal of constant offensive action until the Apaches succumbed. Along with killing as many Apaches as possible, Crook's plan included the destruction of their weapons, clothing, and food. The campaign was a success, quickly and brutally ending more than a century of conflict (Sheridan 1995).

With the removal of the Apache, ranching and mining flourished, and settlers were able to occupy land away from urban centers. The Silver Bell mining district, northwest of Tucson, was the largest in the immediate Tucson area. The Sulphur Springs Valley, southeast of Tucson (home of the mining towns of Tombstone and Bisbee), and the Clifton area, east of Tucson, had larger mining industries. The mining boom led to the need to supply these outlying areas. Transportation across the area increased and changed from horse trails to wagon routes such as Silverbell Road, and then to railroads and automobile thoroughfares. Several stage stops began to spring up along these routes such as the Nine Mile Water Hole near the APE. Before the arrival of the railroad in the 1880s, Tucson remained isolated economically since all goods were brought to the area by oxen or mule. The railroads made it easier, faster, and cheaper to transport freight and people (Sheridan 1995). This brought many changes to Tucson, including a stronger economy, a larger population, a more diverse mix of people with the influx of Chinese railroad workers, and the beginnings of the tourist industry (Sheridan 1995).

The 1880s also saw an increasing migration of Yaqui Indians into the United States from Mexico. Many Yaqui came to Arizona in an effort to escape ethnic persecution by the Mexican government. The Yaqui settlement of Guadalupe formed in 1880, and the Old Pascua Village, just southeast of the APE, was established around 1903. Between 1910 and 1920, the Yaqui–Mexican wars raged, and open hostilities continued until 1939, when Mexican President Cardenas officially recognized the Yaqui as a tribe and granted the tribe title to their land. Meanwhile, Yaqui settlements grew larger and by the early 1950s, their villages had become surrounded by urban development in Tucson. In 1962, the U.S. government appropriated 202 acres of desert land to the Yaqui; in 1978, under the Carter administration, the Yaqui became a federally recognized tribe (Spicer 1988).

Henry Ford's invention of the Model T automobile further changed the landscape of southern Arizona, leading to a rise in automobile ownership and eventual road improvements. Only a handful of automobiles existed in southern Arizona before Ford's development of the Model T and the production line. In 1900, 8,000 automobiles were owned in this country, and the number had risen to just 10,000 by 1910. However, by 1920, the total number of automobiles owned in this country rose to 8 million, skyrocketing to 23 million by 1930. The rise in automobile ownership led to a need for better roads. The first automotive roads were not paved; such projects did not begin until the 1930s. These early roads continued to be the two-track dirt roads, graded dirt roads, and graveled roads of earlier wagon travel (Keane and Bruder 1999).

Chapter 3

PREVIOUS INVESTIGATIONS ALONG SILVERBELL ROAD

David B. Tucker, David M. R. Barr, and Suzanne Griset

Prior to beginning our field survey, SWCA checked the AZSITE database for previously recorded archaeological sites and surveys within 0.5-mile radius of the APE. AZSITE includes records from the Arizona State Museum (ASM), Arizona State University, and the Bureau of Land Management, and the Arizona State Historic Preservation Office (SHPO) as stipulated by the *SHPO Standards for Conducting and Reporting Cultural Resource Surveys on State Lands* IV.E.4.b for linear surveys. The National Park Service National Register Information System database was also consulted for National Register of Historic Places (NRHP)-listed properties within 0.5-mile radius of the APE. The ASM Library was visited to acquire information on past investigations involving testing and/or data recovery projects that have occurred within the APE, and copies of previous investigation reports by the Center for Desert Archaeology and by Desert Archaeology, Inc. (DAI) were purchased as references. SWCA staff also consulted with the COT Historic Preservation Officer, Dr. Jonathan Mabry, regarding his previous investigations along Silverbell Road and borrowed manuscripts he has collected regarding these sites.

The archaeological records search within a 0.5-mile radius of the APE indicated that there have been 62 archaeological surveys (Table 3.1) and 68 archaeological sites have been recorded (Table 3.2). Figures A.1a–A.1c in Appendix A show the locations of these surveys and sites. Twenty-seven of the archaeological sites are located within the project APE and are shaded in grey in Table 3.2.

Table 3.1. Previously Conducted Archaeological Surveys within a Half-Mile Radius of the APE

Agency Number	Name	Report Reference
11-42-19F.BLM	Unknown	No data
12-143.BLM	Unknown	No data
12-145.BLM	Unknown	No data
12-164.BLM	Unknown	No data
1979-34.ASM	Ironwood Hills Townhomes	Urban 1979
1980-12.ASM	Silverbell Estates	Urban 1980
1980-125.ASM	Saddlewood Ranch	Wells 1980
1980-143.ASM	Oshrin Intercept Survey	Huckell 1980
1981-174.ASM	The Northern Tucson Basin Survey: Phase I	Fish et al. 1992
1985-150.ASM	Archaeological Survey of the El Rio - Starr Pass Water Line, Tucson, Arizona	Dart 1985
1985-167.ASM	Western Area Power Administration's Saguaro to Tucson Reconductoring	Effland and Green 1985
1987-205.ASM	Orange Grove/ I-10/ SPRR Flood Control	Mayro 1987a
1987-214.ASM	Santa Cruz River Improvement	Mayro 1987b
1987-221.ASM	SCR Improvement D.3MLT	Mayro 1987c
1987-222.ASM	U.S. Telecom Buried Fiber Optic Cable	O'Brien et al. 1987
1989-167.ASM	Silverbell Park Survey II	Heuett 1989
1990-162.ASM	Archaeological Survey of Speedway/Pima Widening Project	DeMaagd 1990a
1990-167.ASM	Stone-Wetmore	DeMaagd 1990b

Table 3.1. Previously Conducted Archaeological Surveys within a Half-Mile Radius of the APE (Continued)

Agency Number	Name	Report Reference
1991-40.ASM	Orange Grove Extension Survey	Grenda 1991
1991-109.ASM	Cultural Resources Inventory for 11 CAP Pressure Regulating Valve Station Sites in Tucson and Pima County	Slawson 1991
1991-164.ASM	Survey of Silverbell lake Backup Supply Main	Mabry 1991a
1991-166.ASM	Silverbell Road - Grant to Speedway Widening, Plan R	Dart 1991
1991-185.ASM	Recharge Monitor Wells Survey	Mabry 1991b
1991-279.ASM	Silvercroft Wash – Speedway to Grant Survey	Eppley 1991
1994-200.ASM	Silverbell/Sunset Survey	Slawson 1994
1994-397.ASM	Camino del Cerro Survey	Freeman 1994
1995-68.ASM	Ina Road Landfill Expansion/Bank Protection Survey	Heckman 1995
1995-88.ASM	Horseshoe Trail Survey	Dart 1995
1995-330.ASM	Julian Park Survey	Swartz 1995
1995-394.ASM	Three Points Fiber Optic Line Project	Wallace 1995b
1996-13.ASM	Silverbell and Ina Testing and Monitoring	Lindeman et al. 1998
1996-284.ASM	Silverbell Urban Wildlife habitat Survey	Sliva 1996
1997-26.ASM	Water Main Installation Cottonwood/Silverbell Tract	Eppley 1997
1997-420.ASM	Tucson Mountain Assemblage	Jones 1998
1998-14.ASM	Neosho St. & Camino De Vista	Lenhart 1998
1998-77.ASM	Santa Cruz River Survey	Lascaux 1998
1999-54.ASM	Silverbell Driving Range Survey	Diehl 1999a
1999-57.ASM	Painted Sunset Property Survey	Folb and Ezzo 1999
1999-154.ASM	Silverbell Survey	Ruble 1999
1999-348.ASM	CAP Main Manhole Survey	Diehl 1999b
1999-350.ASM	Sunset Acres Survey	Diehl 1999c
1999-357.ASM	Gravel Pits Survey	Vint 1999
2000-283.ASM	Christopher Columbus Well Survey	Cook 2000
2000-320.ASM	Silverbell Road Survey Project	Tucker 2000
2001-245.ASM	Silverbell Landfill Monitor Well Survey	Hall 2001a
2001-325.ASM	Pima County Animal Control Facility Expansion Cultural Resources Assessment	Jones and Dart 2001
2001-553.ASM	Commerce Ave. Project	Stephen 2001b
2001-557.ASM	Silverbell/Grant NWC	Stephen 2001a
2002-9.ASM	Goret Road Survey	Olsson 2002
2002-324.ASM	Greasewood/Ironwood Traffic Signal	Diehl 2002
2002-333.ASM	Ironwood II	Stephen 2002
2003-37.ASM	Columbus Park Survey	Ruble 2002
2003-247.ASM	Ironwood Hills/Shannon Road Survey	Diehl 2003
2003-930.ASM	Santa Cruz River West Bank Protection Levee	Jones and Dart 2003
2003-1281.ASM	Grant/Ft. Lowell Survey	Sterner 2001
2003-1335.ASM	Silverbell Land Sale Survey	Ruble 2003a

Table 3.1. Previously Conducted Archaeological Surveys within a Half-Mile Radius of the APE (Continued)

Agency Number	Name	Report Reference
2003-1336.ASM	Silverbell Project Survey	Ruble 2003b
2004-136.ASM	Silverbell Survey	Petersen 2004
2004-324.ASM	Corrosion Prevention Project Assessment and Survey	Diehl 2004
2005-841.ASM	Gracious Estates Utility Corridor	Plescia and Cook 2006
2008-87.ASM	Gracious Estates	Cook 2005
2008-579.ASM	08-32 COT- El Camino del Cerro Rd Widening	Griset 2008

Table 3.2. Previously Recorded Archaeological Sites within a Half-Mile Radius of the APE

Site Number	Site Description	NRHP* Eligibility†
AA:2:118	State Route 84	Determined Eligible
AA:11:129	Silverbell Road, 1870s to present.	Recommended Not Eligible
AA:12:9	Rillito Bridge. Possible small village with trash mounds.	Not Evaluated
AA:12:10	Sunset Mesa Ruin/Basillio Cuevas Homestead. Sedentary Hohokam village with prehistoric irrigation canals and historic adobe homestead.	Not Evaluated
AA:12:11	Small Hohokam habitation.	Determined Eligible
AA:12:38	Hohokam artifact scatter with one thermal feature.	Not Evaluated
AA:12:41	Morris Site. Originally recorded as an extensive artifact scatter extending along 9.6 miles of Silverbell Road. The current site boundaries are in question.	Not Evaluated
AA:12:42	Classic period Hohokam campsite and historic foundation.	Not Evaluated
AA:12:44	Grant Road Industrial Park site. Hohokam artifact scatter with a hearth and several roasting pits.	Determined Ineligible
AA:12:46	Rabid Ruin. Hohokam village with Early Ceramic component.	Recommended Eligible
AA:12:55	'Nine Mile' Stage stop between Tucson and Sacaton	Not Evaluated
AA:12:78	Hohokam artifact scatter, possibly the same site as AZ AA:12:317(ASM).	Not Evaluated
AA:12:86	Roland Site. Lithic scatter (Lindeman et al. 1998 combines this site with AZ AA:12:371[ASM]).	Not Evaluated
AA:12:90 / AA:12:104	Wetlands Site. Early Agricultural mortuary and habitation, as well as Hohokam habitation	Not Evaluated
AA:12:91	Lost Pozos. Middle Archaic, Early Agricultural, and Classic period Hohokam habitation.	Determined Eligible
AA:12:92	El Taller. Early Agricultural habitation, as well as a minor Hohokam component and prehistoric canals.	Determined Eligible
AA:12:93	Hohokam habitation, extensive artifact scatter in Silverbell Golf Course	Determined Eligible
AA:12:95	Dispersed prehistoric artifact scatter, historic farmstead, and remains of the original wastewater treatment plant for Tucson (c. 1928).	Determined Eligible
AA:12:96	Late Archaic and Hohokam habitation in Columbus Park.	Determined Eligible
AA:12:97	Small Hohokam artifact scatter.	Recommended Ineligible
AA:12:98	Historic or Proto-historic Native American burial.	Not Evaluated
AA:12:99	Hohokam artifact scatter.	Not Evaluated
AA:12:102	Hohokam artifact scatter and historic trash.	Recommended Ineligible
AA:12:103	Large Hohokam artifact scatter, possible village.	Determined Eligible

Table 3.2. Previously Recorded Archaeological Sites within a Half-Mile Radius of the APE (Continued)

Site Number	Site Description	NRHP* Eligibility†
AA:12:105	Solar Well site is a Late Archaic and Hohokam habitation.	Determined Eligible
AA:12:106	Sweetwater Lime Kiln.	Not Evaluated
AA:12:107	Hohokam artifact scatter.	Not Evaluated
AA:12:111	Las Capas. Extensive Early Agricultural habitation and agricultural site.	Determined Eligible
AA:12:130	Cluster of pre-ceramic thermal features.	Not Evaluated
AA:12:131	Small artifact scatter	Not Evaluated
AA:12:150	Sunset Lime Kiln	Not Evaluated
AA:12:193	Ceramic and flaked stone scatter, Middle Archaic and Hohokam components.	Recommended Eligible
AA:12:300	Extensive flaked stone scatter and lithic procurement area.	Determined Eligible
AA:12:305	Dense Hohokam artifact scatter	Not Evaluated
AA:12:306	Light artifact scatter	Not Evaluated
AA:12:311	Yuma Wash. Large Hohokam habitation site with mortuary remains.	Determined Eligible
AA:12:312	Large Hohokam artifact scatter.	Not Evaluated
AA:12:313	Hohokam artifact scatter and historic foundation.	Determined Eligible
AA:12:314	Hohokam habitation – combined with AZ AA:12:315(ASM)	Determined Eligible
AA:12:316	Lithic scatter	Not Evaluated
AA:12:317	Lithic and ceramic scatter	Not Evaluated
AA:12:371	Julian Rodriguez Homestead, 1910, and Archaic habitation (Lindeman et al. 1998 combines this site with AZ AA:12:86[ASM])	Not Evaluated
AA:12:376	DeBascano Pumping Plant. Water well, pump, and canals, as well as a light scatter of prehistoric artifacts.	Not Evaluated
AA:12:379	Historic Nourse bungalow house, 1926	Recommended Eligible
AA:12:380	Remains of a house foundation, pre-1908	Not Evaluated
AA:12:487	Charcoal lens	Not Evaluated
AA:12:501	Artifact scatter with roasting pit	Not Evaluated
AA:12:502	Hohokam habitation.	Not Evaluated
AA:12:735	Hohokam artifact scatter	Not Evaluated
AA:12:750	Hohokam artifact scatter and historic culvert, wall.	Recommended Eligible
AA:12:751	Hohokam artifact scatter.	Recommended Eligible
AA:12:752	Small Hohokam artifact scatter.	Recommended Eligible
AA:12:781	Prehistoric human burial.	Recommended Eligible
AA:12:788	Rillito Fan Site. Large habitation site, including Early Agricultural and Hohokam components, as well as a bottle dump from the Sunset Dairy.	Determined Eligible
AA:12:790	Canal segment.	Recommended Eligible
AA:12:799	Hohokam artifact scatter and two trash mounds	Recommended Eligible
AA:12:800	Artifact scatter and roasting pits	Recommended Eligible
AA:12:850	Hohokam artifact scatter with three thermal features.	Recommended Ineligible
AA:12:851	Historic canal and concrete headgate.	Recommended Ineligible
AA:12:852	Hohokam artifact scatter.	Not Evaluated
AA:12:853	Thermal feature with two ceramics.	Determined Ineligible

Table 3.2. Previously Recorded Archaeological Sites within a Half-Mile Radius of the APE (Continued)

Site Number	Site Description	NRHP* Eligibility†
AA:12:854	Ash and charcoal stain, fire-cracked rock, and a ground stone fragment.	Not Evaluated
AA:12:862	Historic trash scatter.	Determined Ineligible
AA:12:880	Mosaic Site. Artifact scatter	Determined Ineligible
AA:12:980	Historic canal or effluent channel	Recommended Eligible
AA:12:999	Historic ranch house, 1920s	Insufficient data for eligibility determination (Wöcherl 2008)
AA:12:1000	Prehistoric canal within AZ AA:12:93(ASM).	Recommended Eligible
AA:12:1005	Prehistoric lithic scatter	Recommended Eligible
AA:12:1012	Prehistoric artifact scatter with a cobble cluster	Not Evaluated
AA:12:1013	Prehistoric artifact scatter with a cobble cluster	Recommended Eligible
AA:16:334	Hohokam artifact scatter with two rock piles.	Determined Ineligible

* NRHP = National Register of Historic Places.

† Data from AZSITE site records indicate status of NRHP evaluation: not evaluated, recommended status, or SHPO final determinations.

Shaded sites are within 250 feet of the Silverbell Road centerline.

SITES WITHIN 250 FEET OF THE SILVERBELL ROAD CENTERLINE

Of the 27 previously recorded sites within the APE, 16 are recorded as prehistoric sites, seven as historic, and four sites have both prehistoric and historic components (Table 3.3). The first prehistoric site recorded along Silverbell Road, AA:12:41, was registered by George Morris in 1949 as a single site extending from one mile northwest of Speedway Road to 9.6 mile northwest along Silverbell Road; subsequently, components of AA:12:41 have been assigned separate site numbers. Nevertheless, the determination by Morris that nearly the entire western floodplain of the Santa Cruz River should be encompassed as a single, nine-mile-long site, indicates the attractiveness of the Silverbell Road area for prehistoric inhabitants.

The foothills and upper terraces in the APE have seen extensive, long-term prehistoric occupation from as early as the Archaic period and throughout the Hohokam periods. Several important habitation sites are located along Silverbell Road, and have seen intensive archaeological investigation. These include AA:12:46 (Rabid Ruin), AA:12:93, and AA:12:96. Evidence for Archaic and Early Ceramic period occupations are present at Rabid Ruin, as well as discontinuous occupation during the early Hohokam periods, but most excavated pithouses, adobe compounds, cremations, inhumations, and other features indicate that the most intensive occupation occurred during the Hohokam Classic period. AA:12:93 is an extensive scatter of early Hohokam artifacts within the Silverbell Golf Course. AA:12:96 is located in Columbus Park. Surface artifacts included Sedentary period ceramics and flaked stone, but recent subsurface excavations explored an extensive Early Agricultural period, Early Cienega phase component. Table 3.3 synopsizes the previous investigations conducted at these sites; more detailed discussions are included in the individual site descriptions provided in Appendix A.

Table 3.3. Archaeological Sites Recorded within 250 feet of the Silverbell Road Centerline (listed in numeric order)

ASM Site Number	Site Name	Site Area (acres)	Levels of Investigation	Prehistoric Period	Prehistoric Function	Historical Period	Historical Function	References
AA:11:129	Silverbell Road	101.6	Survey			Late Historic (American Territorial and American Statehood phases)	transportation	Doak et al. 2001; Hartmann 1997
AA:12:42		1.2	Survey	Hohokam Classic (Tanque Verde phase)	limited activity	undifferentiated	habitation?	
AA:12:46	Rabid Ruin	53.2	Survey, testing, data recovery	Archaic or Early Ceramic; Hohokam Colonial through Hohokam Classic	Habitation			Betancourt 1978; Deaver and Ciolek-Torrello 1995; Gregonis 1999; Hammack 1977; Heidke 1990; Huckell 1976; Jones and Dart 2001; Mabry 1991b; Slawson 1990; Stephen 1988; Wallace and Holmlund 1984; Dutt 1999; Roudaut 2004; Hopkins and Craig 2009
AA:12:86		3	Survey, surface collection, testing	Archaic?	temporary habitation			Doak et al. 2001; Lindeman et al. 1998; Roland 1993
AA:12:93		11.6	Survey, testing, data recovery	Hohokam Pioneer (Snaketown phase); Hohokam Colonial (Rillito phase); Hohokam Sedentary; Hohokam Classic (Tanque Verde phase)	Habitation			Betancourt 1978; Doak et al. 2001; Slawson 1990; Dutt 1999; Whitney and Cook 2007; Hall 2001b
AA:12:96		66.2	Survey, testing, data recovery	Late Archaic-Early Agricultural (Cienega phase); Hohokam Sedentary	limited activity			Betancourt 1978; Doak et al. 2001; Wörcherl 2008
AA:12:105	Solar Well	4	Survey, testing	Late Archaic-Early Agricultural; Early Ceramic (Tortolita phase); Hohokam Sedentary; Hohokam Classic (Tanque Verde phase)	Habitation			Betancourt 1978; Deaver 1989; Mabry 1990
AA:12:106	Sweetwater Limekiln	0.001	Survey			indeterminate	Resource processing	Doak et al. 2001
AA:12:150	Sunset Limekiln	0.006	Survey			indeterminate	Resource processing	Bent 1964; Doak et al. 2001; Sayles 1968; Burgess 2009
AA:12:300		79.2	Survey, testing	Archaic; Hohokam	Resource Procurement			Jones 1998;Stephen 2003
AA:12:306		4.9	Survey	undifferentiated Hohokam	indeterminate			Doak et al. 2001; Fish et al. 1992

Table 3.3. Archaeological Sites Recorded within 250 feet of the Silverbell Road Centerline (listed in numeric order) (Continued)

ASM Site Number	Site Name	Site Area (acres)	Levels of Investigation	Prehistoric Period	Prehistoric Function	Historical Period	Historical Function	References
AA:12:314		13	Survey, testing, data recovery (ongoing)	Hohokam Classic	Habitation			Fish et al. 1992; Jones 1999a; Tucker 2000; MacWilliams 2005; Lindeman et al. 1998; Howell 2008; current Tierra work
AA:12:316		21.6	Survey	indeterminate	indeterminate			Doak et al. 2001; Fish et al. 1992
AA:12:317		6.5	Survey	undifferentiated Hohokam	limited activity			Fish et al. 1992
AA:12:371	Julian Rodriguez Homestead	3	Survey, testing	Archaic?	Habitation	Late Historic (American Territorial phase)	habitation; homesteading	Fish et al. 1992; Lindeman et al. 1998
AA:12:379		3.9	Survey, doc. research			Late Historic (American Statehood phase)	habitation; homesteading	Fish et al. 1992; Howell 2008; current Tierra work
AA:12:380		1.5	Survey			Late Historic (American Territorial and American Statehood phases)	habitation; homesteading	Doak et al. 2001; Fish et al. 1992
AA:12:501		1	Survey, testing	undifferentiated Hohokam	agriculture?			Doak et al. 2001; Lindeman et al. 1998
AA:12:502		4.8	Survey, testing	Hohokam Colonial; Hohokam Sedentary	Habitation			Doak et al. 2001; Lindeman et al. 1998
AA:12:750		10.4	Survey, testing	undifferentiated Hohokam	indeterminate	Late Historic	water control	Doak et al. 2001; Slawson 1994; Heuett 1996; Lindeman et al. 1998
AA:12:799		0.006	Survey, testing	undifferentiated Hohokam	Habitation			Lindeman et al. 1998
AA:12:800		0.9	Survey	undifferentiated Hohokam	Resource procurement/ processing	Late Historic (American Statehood phase)	trash dump; campsite	
AA:12:980			Survey, testing			Late Historic	Canal	Whitney and Cook 2007; Wörcherl 2008
AA:12:999			Survey			Late historic	Habitation	Wörcherl 2008
AA:12:1005			Survey, testing, data recovery	Hohokam				Cook 2005
AA:12:1012			Survey	Hohokam	Resource procurement/ processing			Plescia and Cook 2006
AA:12:1013			Survey, testing	Hohokam	Resource procurement/ processing			Plescia and Cook 2006

HISTORICAL MAP RESEARCH

In addition to the AZSITE database, the General Land Office (GLO) plat maps were consulted. For Township 12 South, Range 12 East, an early map filed in 1897 depicts "ROAD TO SILVER BELL MINES" trending through Section 35, east of the current alignment of Silverbell Road (Figures 3.1a and 3.1b). In addition, "ANTONIO CAÑAS HOUSE" is shown east of the current APE. No other buildings, roads, or structures are depicted within in a 0.5-mile radius.

The GLO plat map for Township 13 South, Range 12 East, filed in 1909, depicts "ROAD TUCSON TO SILVER BELL" trending through Sections 1, 2 and 12 following roughly the current alignment of Silverbell, except in Section 2. In Section 2, the depicted road turns sharply to the south before turning to the north (see Figures 3.1a and 3.1b). In addition, "J. RODRIGUEZ HOUSE" is shown along the northwest side of Silverbell Road in Section 12. Other roads depicted nearby include the "ROAD TO YUMA MINING CO." and the "ROAD TO NEW STATE COPPER MINE." Finally, an unnamed "RANCH HOUSE" and a "DESERTED HOUSE" are depicted within a 0.5-mile radius.

The GLO plat map for Township 13 South, Range 13 East, filed in 1871, shows the "ROAD TO FORT YUMA" trending northwest–southeast, east of the current APE. Only a small segment of this road appears to correspond with the alignment of Silverbell Road in Section 7 and 18 (see Figures 3.1a and 3.1b). Other features within the 0.5-mile radius include agricultural fields, ditches, and roads.

The GLO plat map for Township 14 South, Range 13 East, also filed in 1871, depicts an unnamed northwest–southeast road adjacent to and partially overlapping the current alignment of Silverbell Road in Sections 3 and 4 (see Figures 3.1a and 3.1b). No other buildings, roads, or structures are depicted within in a 0.5-mile radius.

The 1947 Cortaro U.S. Geological Survey 15-minute quadrangle depicts Silverbell Road following roughly the same alignment as the current Silverbell Road.

Examination of the GLO land patent records indicates that 66 patents have been recorded within a half-mile of the current APE (Figures 3.2a and 3.2b; Table 3.4). Of these 66 patents, 23 overlap with the current APE. These patents were filed between 1881 and 1939 under the authority of the: the May 20, 1862 Homestead Entry Original (12 Stat. 392); March 3, 1877, Desert Land Act (19 Stat. 377); the December 29, 1916 Homestead Entry-Stock Raising (39 Stat. 862); and the April 24, 1820 Sale-Cash Entry (3 Stat. 566). In addition, portions of Sections 2 and 36 of Township 13 South, Range 12 East, were acquired by the State of Arizona under the June 20, 1910 Arizona Enabling Act (36 Stat. 557).

Patents within the project APE total 23 and are shaded in grey in Table 3.4. Nine of these occurred in the last two decades of the 19th century; 14 in the twentieth century, primarily in the second and third decades. All but two of the 19th century patents were made to individuals with Spanish surnames, including one woman. The pattern reverses in the 20th century with only one Hispanic surname, a woman, receiving patents. One of the patents has been identified and recorded as a historical site in AZSITE (Julian Rodriguez Homestead, AA:12:371).

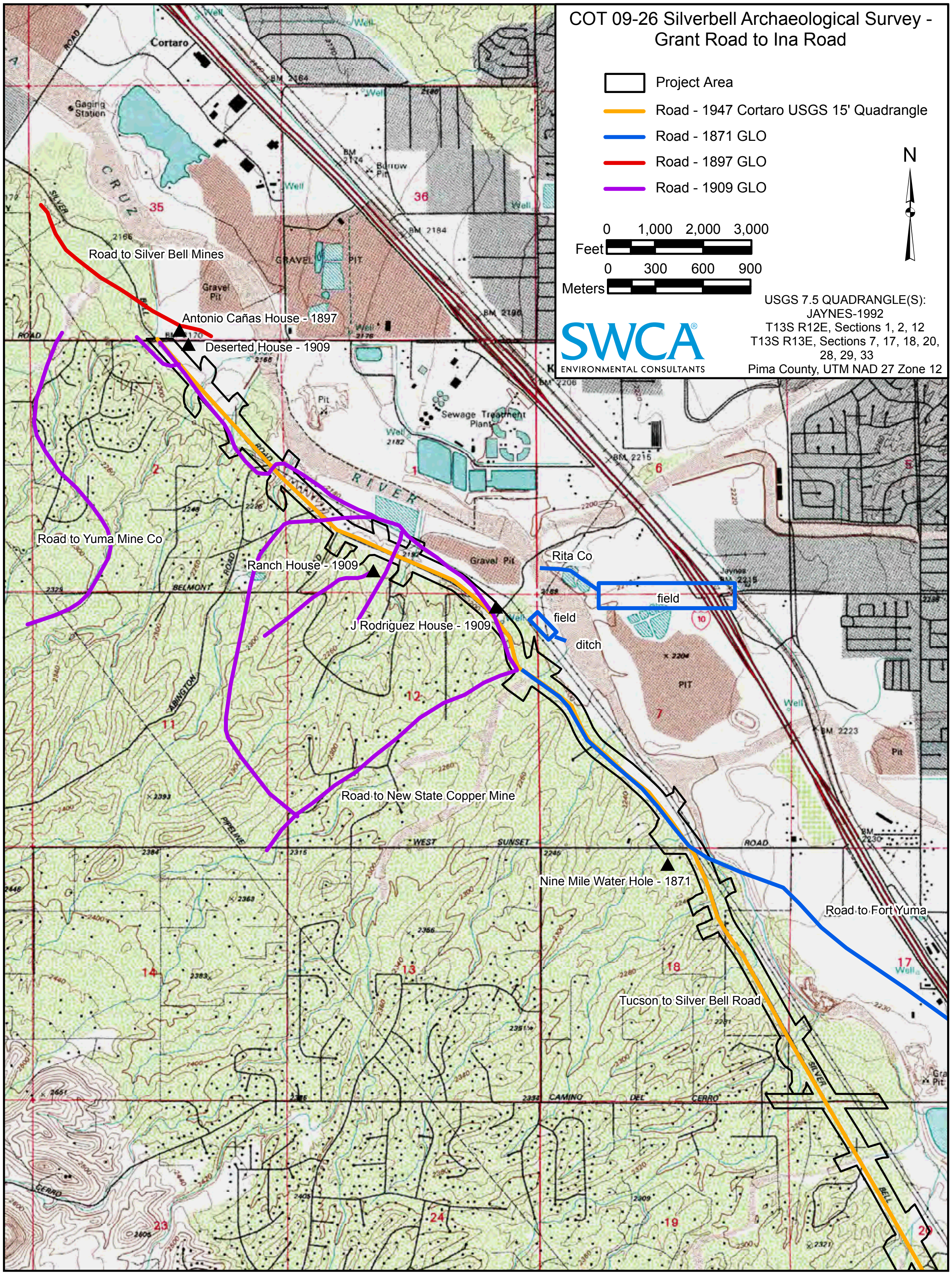

Figure 3.1a. Historical features in and near the APE as recorded on GLO maps; northern portion, Ina Road to Camino del Cerro.

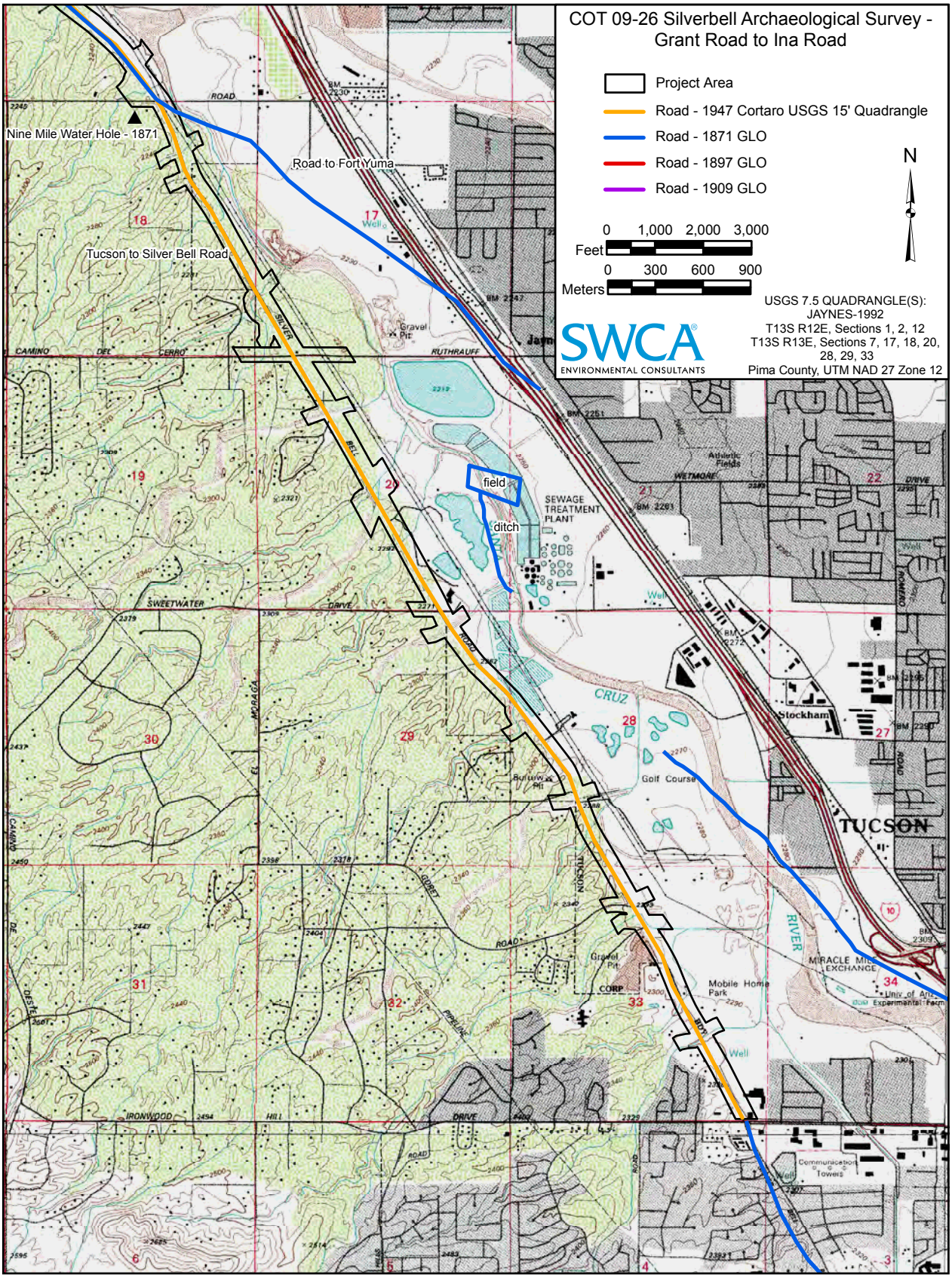

Figure 3.1b. Historical features in and near the APE as recorded on GLO maps; southern portion, Camino del Cerro to Grant Road.

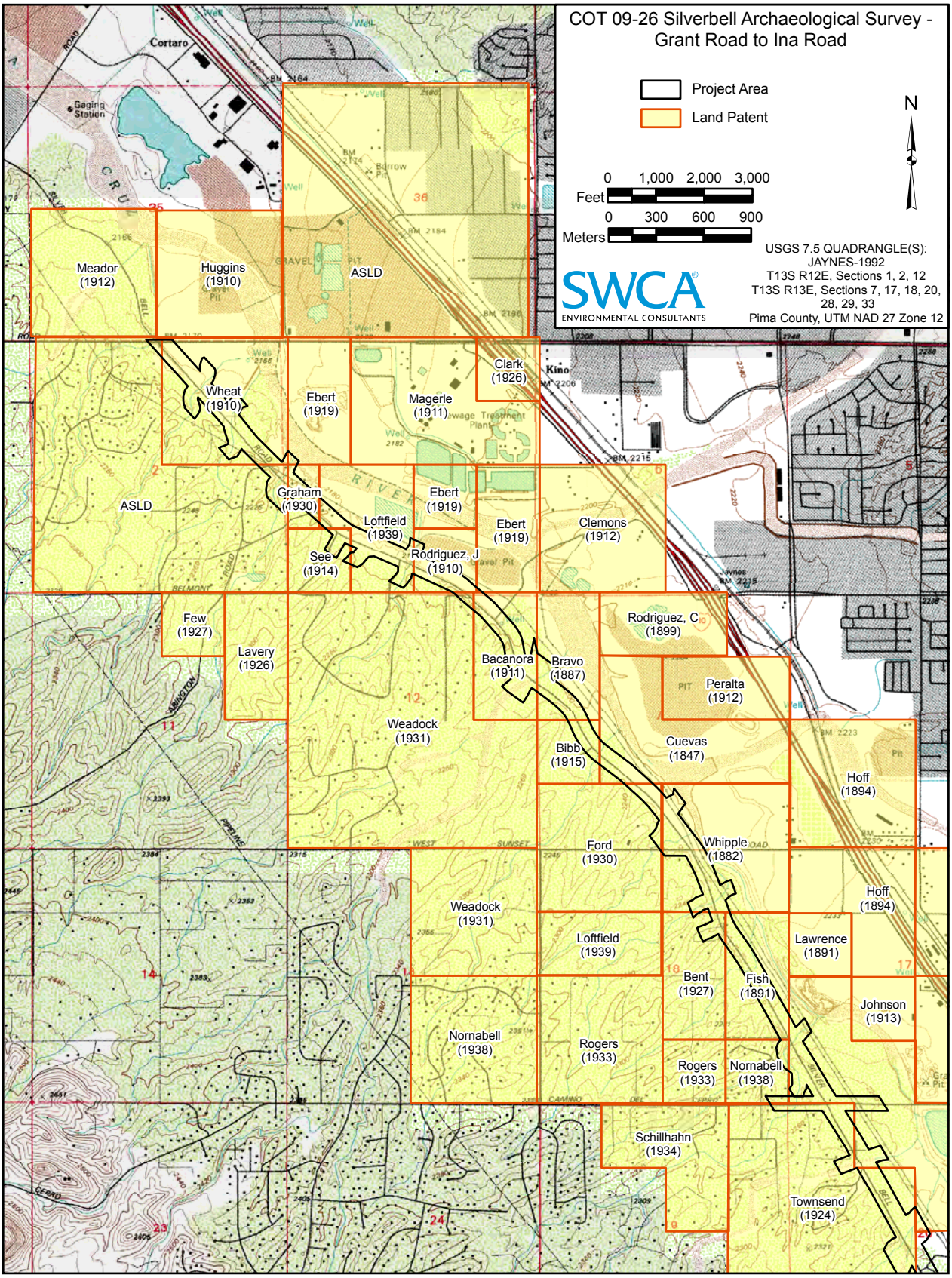

Figure 3.2a. Location of patented lands within and near the APE; northern portion, Ina Road to Camino del Cerro.

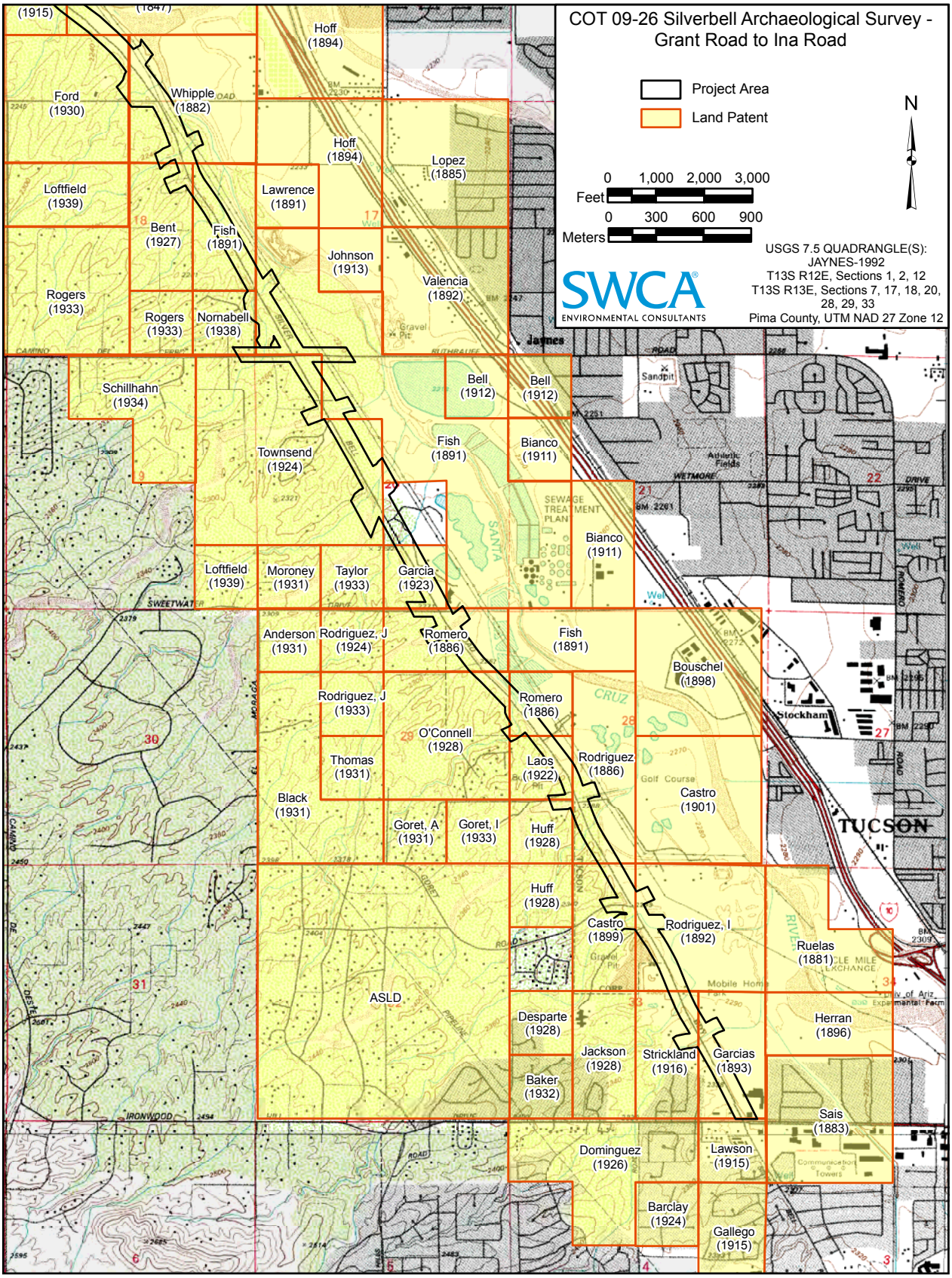

Figure 3.2b. Location of patented lands within and near the APE; southern portion, Camino del Cerro to Grant Road.

Table 3.4. Land patents filed within and adjacent to the Silverbell Project Corridor

Claimant*	Map Reference	Year	Entry Type**	Acres	Legal Description			Aliquot
					Township	Range	Section	
Huggins, Henry W.	59	1910	CE	160	12S	12E	35	SE
Meador, William Maxwell	60	1912	CE	160	12S	12E	35	SW
Clark, Isabel	1	1926	DL	37.61	13S	12E	1	Lot 1
Ebert, Jonathan S. and Louis B. Rodriguez	2	1919	DL	165.75	13S	12E	1	Lots 4–6, 9, and 10
Graham, Leon L.	3	1930	HE	20	13S	12E	1	W½SWSW
Loftfield, Gorm*	4	1939	HESR	616.98	13S	12E	1 and 13	E½SWSW; SENE; W½NE, NENW
	4				13E	13E	18 and 19	SWNW (Lot 2); SENW; SESE
	4				12S	13E	31	NE
Magerle, August	5	1911	HE	157.58	13S	12E	1	NWNE (lot 2); NENW (Lot 3); SWNE (Lot 7; SENE (Lot 8)
Rodriguez, Julian	6	1910	HE	137.11	13S	12E	1	SESW; NESW (Lot 11); W½SE (Lot 13); SESE (Lot 14)
See, Ida George Chan	62	1914	HE	43.4	13S	12E	1	Lot 12
Wheat, James C.	7	1910	CE	149.81	13S	12E	2	SWNE; NENE (Lot 1); NWNE (Lot 2); SENE (Lot 5)
Bacanora, Jesus	8	1911	HE	80	13S	12E	12	E½NE
Weadock, John F.	9	1931	HESR	600	13S	12E	12 and 13	W½; W½NE; SE; NENE
Clemons, Charles c.	61	1912	HE	153.09	13S	13E	6	E½SW; NWSW (Lot 6); SWSW (Lot 7)
Bibb, William S.	10	1915	HE	36.85	13S	13E	7	NWSW (Lot 3)
Bravo, Rafael	11	1887	HE	73.4	13S	13E	7	NWNW (Lot 1); SWNW (Lot 2)
Cuevas, Basillio	12	1897	HE	160	13S	13E	7	N½SE; SENW; NESW
Ford, William J.	13	1930	HE	153.94	13S	13E	7 and 18	SESW; NENW; SWSW (Lot 4); NWNW (Lot 1)
Peralta, Jose Maria	14	1912	CE	80	13S	13E	7	S½NE
Rodriguez, Crisencio	15	1899	HE	80	13S	13E	7	NWNE; NENW
Whipple, Samuel C.	16	1882	CE	160	13S	13E	7 and 18	S½SE; N½NE

Table 3.4. Land patents filed within and adjacent to the Silverbell Project Corridor (Continued)

Claimant*	Map Reference	Year	Entry Type**	Acres	Legal Description			Aliquot
					Township	Range	Section	
Fish, E. N.	17	1891	CE	640	13S	13E	17, 18, 20, 21, and 28	W½SW; SESW; SENE; NESE: W½NE; N½SE; SENE; NENW: SESE; W½SW; N½NW
Hoff, Gustav Anton	18	1894	HE	160	13S	13E	8 and 17	SWSW; N½NW; SENW
Lew, Washington L.	63	1927	HE	120	13S	13E	11	N½NW; NWNE
Lavery, Frieda A., and Peter G.	64	1929	CE	160	13S	13E	11 and 12	E½NE; W½NW
Johnson, Dixie	19	1913	HE	40	13S	13E	17	NESW
Lawrence, Georgia	20	1913	CE	40	13S	13E	17	SWNW
Lopez, Manuel	21	1885	HE	160	13S	13E	17	NE
Valencia, Jesus	22	1892	HE	160	13S	13E	17	SE
Bent, Thomas W.	23	1927	HE	80	13S	13E	18	NWSE; SWNE
Nornabell, Anna B. and Harold A.	24	1938	HESR	640	13S	13E	18	SESE
	24				13S	12E	13 and 14	W½NW; SENW; SW; E½
Rogers, James Albion	25	1933	HESR	629.02	13S	13E	18	E½SW; SWSE; NWSW (Lot 3); SWSW (Lot 4)
Schillhahn, Herman E.	65	1934	HESR	628.32	13S	13E	19	W½E½; E½W½; NWNW (Lot 1); SWNW (Lot 2); NWSW (Lot 3); SWSW (Lot 4)
Bianco, Joe	66	1911	HE	160	13S	13E	21	S½NW; E½SW
Bell, Sylvester D.	26	1912	CE	80	13S	13E	20 and 21	NENE; NWNW
Garcia, Carmen	27	1923	HE	40	13S	13E	20	SWSE
Moroney, Mary L.	28	1931	HE	40	13S	13E	20	SWSW
Taylor, May	29	1933	HE	40	13S	13E	20	SESW
Townsend, Hack	30	1924	HE	320	13S	13E	19 and 20	W½NW; SENW; N½SW; E½NE; NESE
Bouschel, John	31	1898	HE	160	13S	13E	28	NE
Castro, Raphaela	32	1901	HE	160	13S	13E	28	SE
Huff, Curtis	33	1928	HE	80	13S	13E	28 and 33	SWSW; NWNW
Laos, Roy E.	34	1922	CE	40	13S	13E	28	NWSW

Table 3.4. Land patents filed within and adjacent to the Silverbell Project Corridor (Continued)

Claimant*	Map Reference	Year	Entry Type**	Acres	Legal Description			Aliquot
					Township	Range	Section	
Rodrigues, Fecundo	35	1886	CE	120	13S	13E	28	E½SW; SENW
Romero, Juan	36	1886	CE	120	13S	13E	28 and 29	SWNW; E½NE
Anderson, Donald L.	37	1931	HE	40	13S	13E	29	NWNW
Goret, Alice T.	38	1931	HE	40	13S	13E	29	SWSE
Goret, Stella A.	39	1933	HE	40	13S	13E	29	SESE
O'Connell, Charles Joseph	40	1928	HE	160	13S	13E	29	SWNE; SENW; NESW; NWSE
Rodriguez, Julian	41	1924	HE	40	13S	13E	29	NENW
Rodriguez, Julian	42	1930	HE	40	13S	13E	29	NWNE
Black, Pinkney Jones	43	1931	HE	160	13S	13E	29	SWNW; W½SW; SESW
Thomas, Leo P.	44	1931	HE	40	13S	13E	29	NESE
Baker, Sam	45	1932	HE	40	13S	13E	33	SWSW
Castro, Mauricio	46	1899	HE	80	13S	13E	33	E½NW
Desporte, Sidney A.	47	1928	HE	40	13S	13E	33	NWSW
Garcia, Isabel	48	1893	CE	80	13S	13E	33	E½SE
Jackson, Edward S.	49	1928	HE	80	13S	13E	33	E½SW
Rodriquez, Inocento	50	1892	HE	160	13S	13E	33	NE
Strickland, Joseph Curby	51	1916	HE	80	13S	13E	33	W½SE
Herran, Saturnino	56	1896	HE	80	13S	13E	34	N½SW
Rueles, Francisco	57	1881	CE	120	13S	13E	34	W½NW; NENW
Sais, Juan Jose	58	1883	CE	160	13S	13E	34	S½SW
	58				14S	13E	3	N½NW
Barclay, Helen E.	52	1929	HE	40	14S	13E	4	SWNE
Dominguez, Ladislao	53	1926	HE	160.35	14S	13E	4	SENW; NWNE (Lot 2); NENW (Lot 3); NWNW (Lot 4)
Gallego, Jose	54	1915	HE	160	14S	13E	4	SENE; NESE; S½SE
Lawson, Cecilia	55	1915	CE	40.02	14S	13E	4	NENE (Lot 1)

* Shaded land patents overlap with the current APE.

** CE: Sale-Cash Entry; DL: Desert Land Act; HE: Homestead Entry; HESR: Homestead Entry-Stock Raising.

Chapter 4

METHODS, RESULTS, AND RECOMMENDATIONS

David M. R. Barr, Suzanne Griset, S. Jerome Hesse, and Eric S. Petersen II

PROJECT METHODS

The conceptual road design was awarded to Kittelson, Inc. under a separate contract that included all environmental compliance except that required for cultural resources. Kittelson conducted two public meetings at the outset of the project to explain the process and the objectives of the initial design. One public meeting was held at the El Rio Community Center on August 12, 2009, and the other at the Wheeler Taft Abbett, Sr. Library in Marana on August 19, 2009. SWCA presented a poster at these meetings depicting the survey corridor and the general types of cultural resources previously recorded along Silverbell Road, and answered questions and gathered input from members of the public.

SWCA surveyed the APE from north to south, beginning at Ina Road. Prior to surveying a particular area, SWCA archaeologists distributed a letter from the TDOT informing property owners of the purpose of the survey and a TDOT contact to call for further information or to deny access for the survey. SWCA was also instructed to not enter fenced residential property. Of the 481 acres in the APE, access was not available for 38.4 acres, making the total 442.6 acres surveyed.

SWCA archaeologists Eric Petersen, Maggie Evancho, and Heather West surveyed the APE from August 18, 2009 to September 15, 2009. At that point, TDOT called a halt to the survey to determine whether funding was sufficient to include the non-COT portions of the project, since initial road construction is limited to the COT portion. The decision was made to resume survey of the entire project. Eric Petersen and David Barr completed the survey from October 12, 2009 to October 14, 2009. A total of 59 person-field-days were spent surveying the 442.6 acres: 90.1 acres on COT lands; 35.5 acres on Pima County owned or managed lands; and 317.0 acres of privately-owned land. Figures 4.1a–4.1c depict the areas surveyed/unsurveyed within the APE and land ownership.

Copies of site records for previously recorded sites and maps of previous subsurface investigations were taken into the field by the surveyors. Every effort was made to compare present site conditions within the APE with any previous investigations to assist in determining the potential for subsurface deposits.

General conditions for the survey were excellent and ground visibility was generally 80 percent or higher. The survey was conducted using standard archaeological techniques following ASM guidelines for survey coverage and site recording methodologies. According to the standards for pedestrian survey established by ASM, a person conducting a pedestrian survey can achieve 100 percent coverage of a parcel by walking a series of systematic transects spaced no more than 20 m (66 feet) apart. SWCA archaeologists walked parallel transects spaced no more than 20 m apart. Evidence for cultural resources was sought in the form of artifacts (e.g., ceramics, lithics, historical metals, or glass) or features (concentrations of fire-affected rock, charcoal-stained soil, prehistoric or historic structures, or other cultural anomalies).

The ASM has established standards for evaluating materials identified during archaeological surveys. Briefly, properties of archaeological interest must contain the remains of past human activity that are at least 50 years old. Beyond this, two classes of findings are recognized, the site and the isolated occurrence (IO). To qualify as a site, a property must contain, within an area no more than 50 feet in diameter, 30 or more artifacts of a single type, unless all pieces originate from a single source (e.g., one broken bottle or ceramic vessel); or 20 or more artifacts when multiple types are present, or any number of artifacts, when

a single fixed feature is present; or multiple fixed features, with or without any associated artifacts. Artifact finds that do not meet these criteria but that are over 50 years old may be designated IOs.

Newly identified sites were recorded using the following methods: significant artifacts and features were marked with pin flags to assist in mapping their location with a handheld global positioning system (GPS) unit. General overviews of the site were recorded with digital photography as was each feature and temporally diagnostic artifact. Site boundaries and boundaries of artifact clusters were recorded with GPS. All artifacts were described in terms of their material class (e.g., ceramics, flaked stone, ground stone, historic metal, historic ceramic, etc,) and by artifact type, and when possible, sub-type (e.g., metal can/hole-in-top can, netherstone/metate, plainware or decorated, earthen whiteware/plate). When possible, the temporal range of historical artifacts was determined using the following sources: Goodman (1998); Hull-Walski and Ayres (1989); Simonis (1997); and Toulouse (1971).

The goal of the artifact recordation process was to inventory assemblages of fewer than 50–75 artifacts completely and to inventory a sample of assemblages of more than 50–75 artifacts. Sampling the assemblages at the larger sites provided a range of artifact classes present and was used to infer overall frequency of artifacts at the site within the current project corridor.

All data were also recorded manually on an ASM site form, including feature forms which require dimensions, written descriptions and plan maps of complex features. The last step was removal of the pin flags.

For previously recorded sites within the project corridor, the same general strategy was employed and also included the re-location of previously documented features and/or artifacts, and recording the locations of previously conducted project-specific testing or excavation activities when obvious. In many cases, additional features were identified and recorded for those portions of previously recorded sites that lie within the APE.

Isolated Occurrences of artifacts were point-located using a handheld GPS unit, and basic data including dimensions and numbers of artifacts of each type, were entered into the GPS unit. Artifacts were described using the same protocols used at sites and discussed above.

SURVEY RESULTS

The archaeological survey resulted in the documentation of 39 sites and 54 IOs within the project APE. Because archeological site location information is confidential, site maps and detailed descriptions of the location, features, types of artifacts, and time range(s) of occupation(s) are provided for each site in Appendix C; descriptions of IOs and their locational data are also provided in Appendix C.

Summary data are discussed here, as well as SWCA's assessments of each site's eligibility for nomination to the NRHP, the presence of or potential for subsurface deposits within the project APE, and treatment recommendations if those areas are not avoided in the proposed expansion of Silverbell Road.

Table 4.1 compiles summary data on the 39 archaeological sites recorded during the current survey: fourteen sites are newly recorded; 25 previously recorded sites have been updated; and 18 of the updated sites have newly expanded boundaries and/or additional features. Nineteen of the 39 sites are prehistoric, 17 sites date to the Historic period, and three sites are multi-component sites that contain both prehistoric and historical resources. All sites have been recorded with the ASM; they are listed in this chapter in abbreviated format AA:xx:xxx.

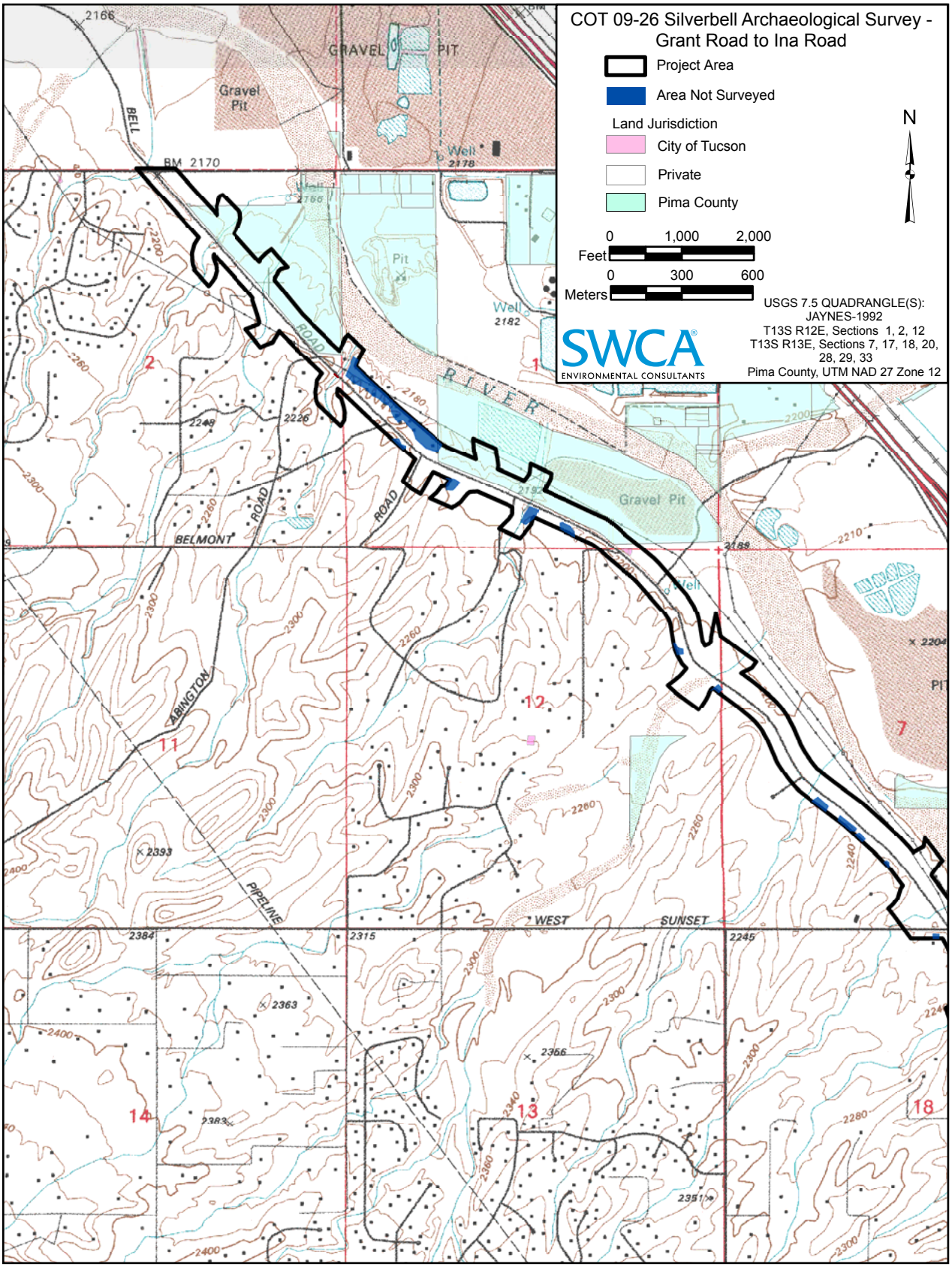

Figure 4.1a. Areas surveyed/unsurveyed and land ownership within the northern APE.

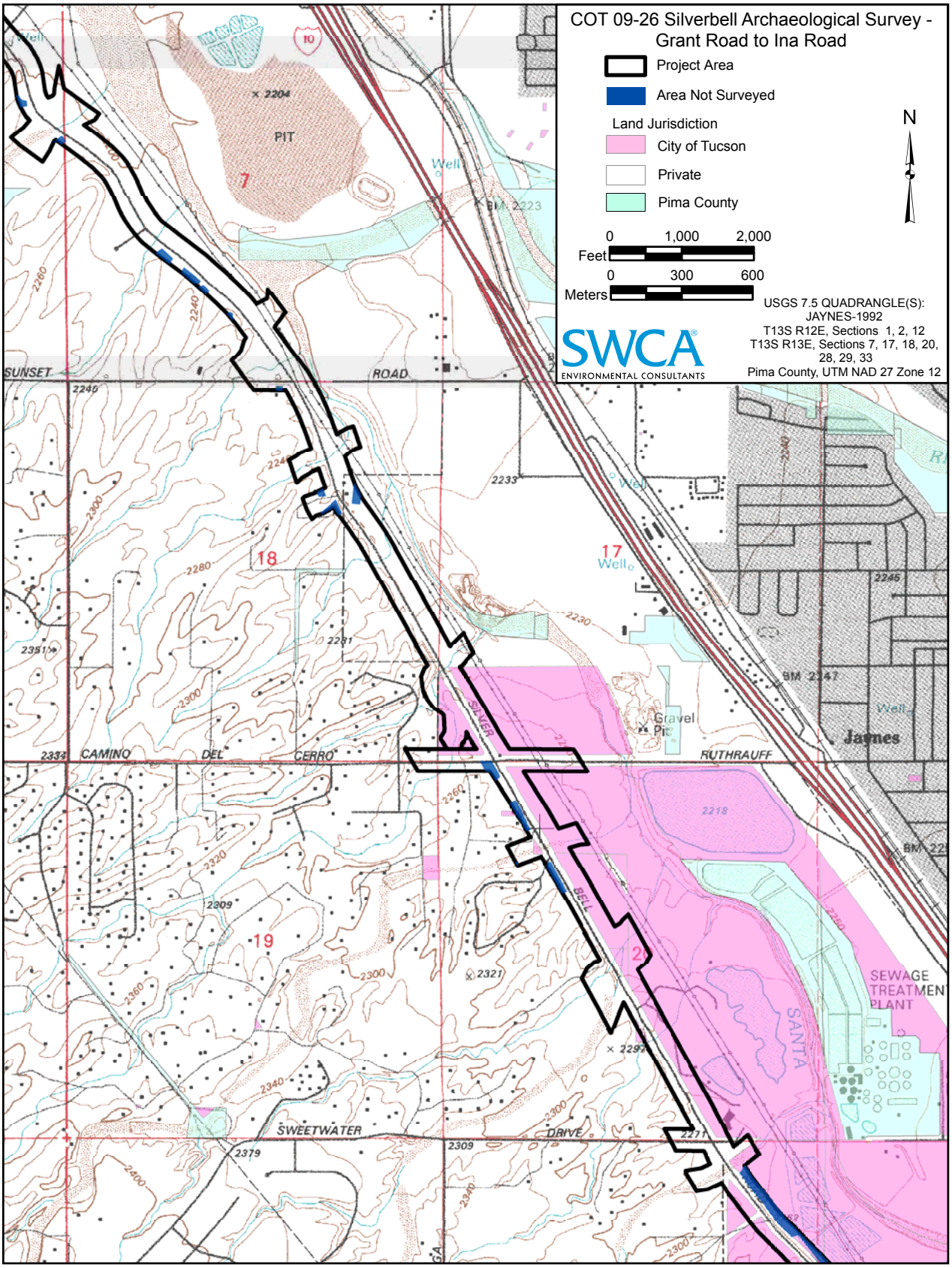

Figure 4.1b. Areas surveyed/unsurveyed and land ownership within the central APE.

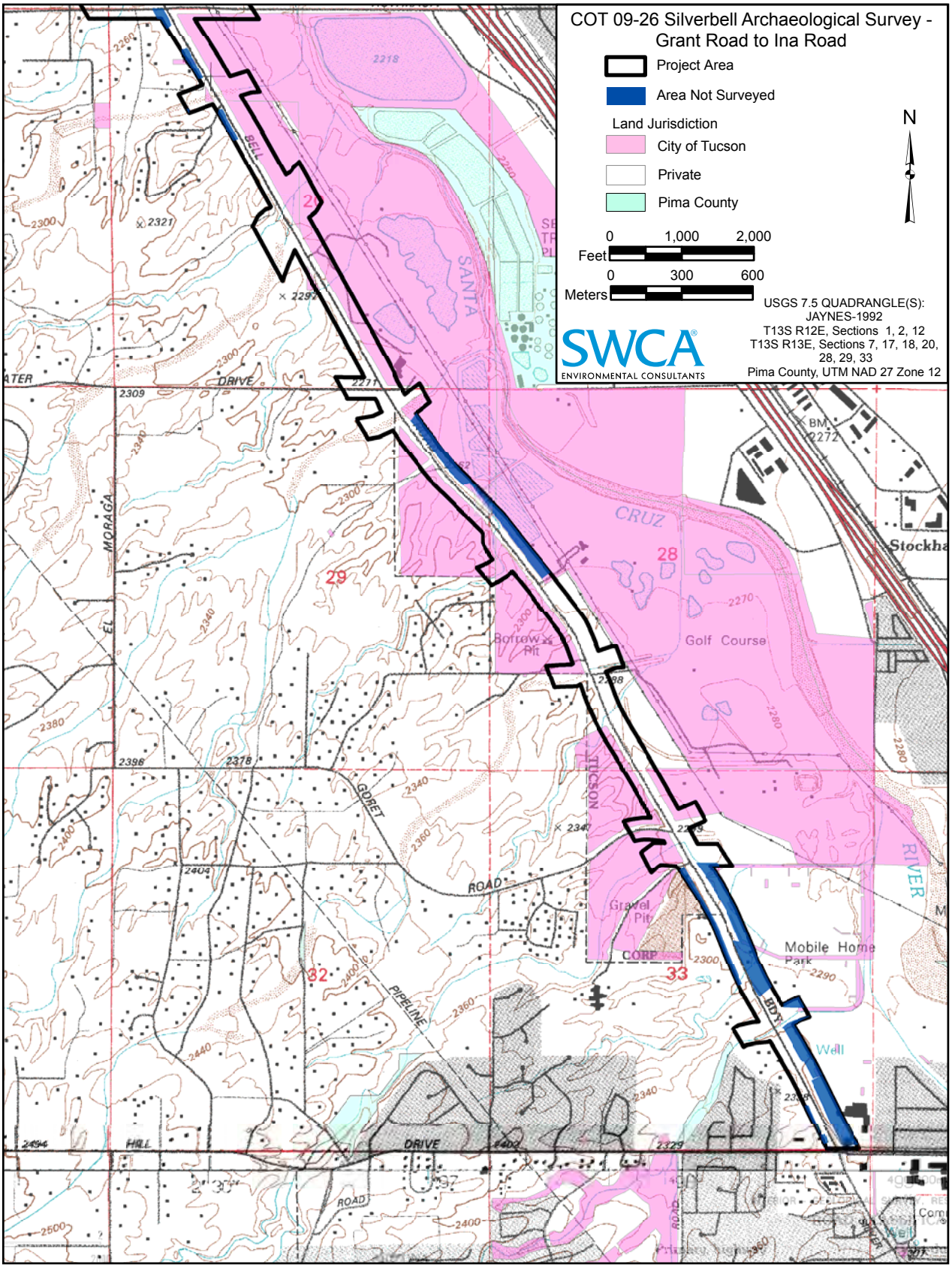

Figure 4.1c. Areas surveyed/unsurveyed and land ownership within the southern APE.

Table 4.1. SWCA Project Results and Recommendations Listed by Site Number

ASM Site # (AZ AA:)	Components[1]	Cultural Affiliation and Time Period	Site Function	Features/Artifact Types	Previous Work[2]	Landowner(s)	NRHP Status[3]	Criterion	SWCA Recommendations for Mitigation Actions
11:129 Silverbell Road	H	Euro-American: 1880s	Transportation	Road Segments, Bridge	S*	Private Pima County City of Tucson Town of Marana	NE previously (SWCA 2009): IN - road segments RE – bridge	A, C, D for bridge	Recommend archival research and photo documentation of bridge.
12:46 Rabid Ruin	P	Native American: • Middle Archaic • Early Ceramic • Hohokam (Colonial, Sedentary & Classic)	Habitation	Pithouses, primary cremations, inhumations, miscellaneous pits, and a trash pit – ceramics and lithics	S*, T*, DR*, M*	Private City of Tucson	DE (2009) previously	D	Recommend further Phase I data recovery and Phase II data recovery (if necessary) in portions of site not previously mitigated within APE.
12:86 Roland Site	P	Native American: • Middle Archaic • Early Agricultural • Hohokam	Habitation	Rock clusters, pits and a pithouse – ceramics, lithics, ground stone	S*, T*, M*	Pima County Private	NE previously RE (SWCA 2009)	D	Based on previously documented subsurface features, recommend Phase I data recovery and Phase II data recovery (if necessary).
12:93	P	Native American: • Hohokam (Colonial, Sedentary & Classic)	Habitation	Thermal pits, roasting pits, pithouse and trash mounds – ceramics, lithics, ground stone, and shell	S*, T*, M*	Private City of Tucson	DE (2004)	D	Recommend additional Phase I data recovery in portions not previously tested in APE and Phase II data recovery as necessary.
12:96	MC	Native American: • Early Agricultural • Early Ceramic • Hohokam (Colonial, Sedentary & Classic) Euro American: Late Historic	Habitation; Disposal	Pithouses, pits, trash mound, primary inhumations, rock clusters – ceramics, lithics, ground stone, glass, metal and historical ceramics	S*, T*, DR	City of Tucson Private	DE (2003)	D	Recommend additional Phase I data recovery in portions of prehistoric site that have not been previously tested and Phase II data recovery for portions of site that have not been previously mitigated within the APE.
12:105 Solar Well Site	P	Native American: • Early Agricultural • Early Ceramic • Hohokam (Sedentary & Classic)	Habitation	Pithouses, roasting pits, pits, midden, hearths, charcoal lenses, clusters of FCR, and an inhumation – ceramics, lithics, and ground stone	S*, T*, DR*	City of Tucson Private	DE (2003)	D	Recommend additional Phase I data recovery in portions of site that have not been previously tested and Phase II data recovery for portions of site that have not been previously mitigated within the APE.
12:106 Sweetwater/ Juan Romero Limekiln	H	Euro-American/ Mexican American	Limekiln	Limekiln, pit, and leveled area – glass, metal, historical ceramics including historic O'odham ceramics	S*	City of Tucson Private	NE previously RE (SWCA 2009)	D	Based on subsurface depth in Feature 1, recommend Phase I data recovery and Phase II data recovery (if necessary), and further archival research.
12:150 Sunset Limekiln	H	Euro-American /Mexican American	Limekiln	Limekiln, concrete footers – glass, metal, and historical ceramic	S*	Private	NE previously RE (SWCA 2009)	D	Based on subsurface depth in Feature 1, recommend Phase I data recovery and Phase II data recovery (if necessary), and further archival research.
12:300	P	Native American • Early Agricultural • Hohokam	Resource Procurement	Rock alignment – lithics and ceramics	S*, T*	Private	DE (2003)	D	Westland recorded no subsurface features and suggested that the site boundary was limited to the Pleistocene terraces and does not extend east to the APE despite the presence of prehistoric artifacts on the surface. SWCA recommends testing Feature 1 before the site boundary is reduced.
12:306	P	Native American • Hohokam	Habitation	Cobble clusters - ceramics, lithics and ground stone	S*	Private	NE previously RE (SWCA 2009)	D	Dark soil matrix surrounding Feature 3 suggests intact subsurface deposits and a high likelihood for additional subsurface features; recommend Phase I data recovery and Phase II data recovery (if necessary).
12:314 Ina-Silverbell Site	P	Native American • Hohokam (Sedentary & Classic)	Habitation	Cobble clusters, trash mounds, canal segments, pits, roasting pits, cremations, pithouses, and an inhumation – ceramics, lithics, ground stone, and worked shell	S*, T*, DR*, M*	Private Pima County Town of Marana	DE (2003)	D	Recommend additional Phase I data recovery and Phase II data recovery (if necessary) in portions of site not previously investigated within APE.
12:316	P	Native American • Prehistoric	Resource Procurement/ Processing	Cobble cluster – lithics, ceramics	S*	Pima County Town of Marana	NE previously RE (SWCA 2009)	D	Soil depth suggests likely subsurface features; recommend Phase I data recovery and Phase II data recovery (if necessary).

Table 4.1. SWCA Project Results and Recommendations Listed by Site Number (Continued)

ASM Site # (AZ AA:)	Components[1]	Cultural Affiliation and Time Period	Site Function	Features/Artifact Types	Previous Work[2]	Landowner(s)	NRHP Status[3]	Criterion	SWCA Recommendations for Mitigation Actions
12:317	P	Native American • Hohokam	Resource Procurement/ Processing	Lithics, ceramics	S*	Pima County Town of Marana	NE previously RE (SWCA 2009)	D	Soil depth suggests likely subsurface features; recommend Phase I data recovery and Phase II data recovery (if necessary).
12:371 Julian Rodriguez Homestead	H	Euro-American / Mexican American	Habitation	Adobe foundations, pits – glass, metal and historical ceramics	S*, M*	Pima County	NE previously RE (SWCA 2009)	D	Potential subsurface depth in all four features; recommend Phase I data recovery and Phase II data recovery (if necessary) and further archival research.
12:380 "Deserted House"	H	Euro-American	Habitation	Concrete, metal, glass, and bricks	S*	Private Town of Marana	NE previously RE (SWCA 2009)	D	Potential undisturbed subsurface features; recommend Phase I data recovery and Phase II data recovery (if necessary) and further archival research.
12:501	MC	Native American • Hohokam Euro-American	Habitation Historic Scatter	Cobble clusters, roasting pit – lithics, ceramics, ground stone, glass, metal, and historical ceramics	S*, T*	City of Tucson Private	NE previously RE (SWCA 2009)	D	Previously documented subsurface features suggest additional potential; recommend Phase I data recovery and Phase II data recovery (if necessary).
12:502	P	Native American • Hohokam (Sedentary)	Habitation	Pithouses – Ceramics, lithics, and at least three ground stone	S*, T*	Private Town of Marana	NE previously RE (SWCA 2009)	D	Previously documented subsurface features suggest additional potential; recommend Phase I data recovery and Phase II data recovery (if necessary).
12:750	P	Native American • Archaic • Hohokam (Sedentary & Classic)	Habitation	Cobble clusters, pithouses, extramural surface, roasting pit, and a pit – ceramics, lithics, and ground stone	S*, T*	Private Town of Marana	RE (1994)	D	Previously documented surface features suggest additional potential; recommend additional Phase I data recovery in portions not previously tested and Phase II data recovery for the entire portion in APE.
12:799	P	Native American • Hohokam (Sedentary & Classic)	Habitation	Ceramics, lithics, and ground stone	S*, T*, DR*	Private	RE (2007)	D	Recommend further Phase I data recovery and Phase II data recovery (if necessary) in portions of site not previously mitigated in APE.
12:800	MC	Native American • Hohokam (Sedentary) • Euro-American / Mexican American Late Historic	Habitation; Disposal	Cobble clusters, and pits – Lithics, ceramics, ground stone, metal, and glass	S*	Private	RE (1998)	D	Dark soil matrix surrounding Features 3 and 5 suggests intact subsurface remains and high likelihood for additional subsurface features; recommend Phase I data recovery and Phase II data recovery (if necessary).
12:980	H	Euro-American	Water/Soil Control	Canal	S*, T*	Private City of Tucson	IN previously		No further work is recommended for this site
12:999	H	Euro-American	Habitation	Foundations, concrete footers, cobble features, and a depression – glass, metal, historical ceramics, and animal bones	S*	City of Tucson Private	NE previously RE (SWCA 2009)	D	Potential subsurface depth in all four features; recommend Phase I data recovery and Phase II data recovery (if necessary) and archival research.
12:1005	P	Native American • Hohokam	Habitation	Cobble cluster – lithics and ceramics	S*, T*, DR*	Private	RE (2007)	D	Recommend further Phase I data recovery and Phase II data recovery (if necessary) in portions of site not previously mitigated in APE.
12:1012	P	Native American • Hohokam	Resource Procurement/ Processing	Cobble cluster – Lithics, ceramics	S*	Private	RE (SWCA 2009)	D	Recommend Phase I data recovery and Phase II data recovery (if necessary).
12:1013	P	Native American • Hohokam	Resource Procurement/ Processing	Cobble clusters, roasting pits, pits – lithics and ground stone	S*, T*, DR*	Private	RE (2006)	D	Recommend further Phase I data recovery and Phase II data recovery (if necessary) in portions of site not previously mitigated in APE.
12:1079	H	Euro-American	Disposal; Possible Habitation	Pit, cobble alignment, platform – glass, metal, historical ceramics, and shell	S*	Private City of Tucson	RE (SWCA 2009)	D	Potential subsurface depth in Features 2 and 3; recommend Phase I data recovery and Phase II data recovery (if necessary) and archival research.
12:1080	H	Euro-American	Manufacturing/ Production; Possible Habitation	Foundations, platform – glass, metal, and historical ceramics	S*	City of Tucson Private	RE (SWCA 2009)	D	Potential subsurface depth in Features 1 and 2; recommend Phase I data recovery and Phase II data recovery (if necessary) and archival research.
12:1081	H	Euro-American/ Mexican American	Disposal	Glass, metal, historical ceramics, and animal bone	S*	City of Tucson Private	IN (SWCA 2009)		No further work is recommended for this site.

Table 4.1. SWCA Project Results and Recommendations Listed by Site Number (Continued)

ASM Site # (AZ AA:)	Components[1]	Cultural Affiliation and Time Period	Site Function	Features/Artifact Types	Previous Work[2]	Landowner(s)	NRHP Status[3]	Criterion	SWCA Recommendations for Mitigation Actions
12:1082	H	Euro-American/ Mexican American	Disposal; Possible Habitation	Glass, metal, and historical ceramics	S*	Private	RE (SWCA 2009)	D	Recommend formal recording of the site outside of the APE could yield features that would have subsurface depth and further archival research could yield additional information regarding the history of the area. Recommend Phase I data recovery and Phase II data recovery (if necessary).
12:1083 Isabel Garcia Homestead	H	Euro-American/ Mexican American	Habitation	Adobe foundation, cobble alignments, cobble clusters – glass, metal, historical ceramics	S*	Private	RE (SWCA 2009)	D	Potential subsurface depth in all features except Feature 4; recommend. Phase I data recovery and Phase II data recovery (if necessary) and archival research.
12:1084	H	Euro-American	Disposal	Glass, metal, and historical ceramics	S*	Private	IN (SWCA 2009)		No further work is recommended for this site.
12:1085	P	Native American • Prehistoric	Resource Procurement	Lithics and ground stone	S*	Private	RE (SWCA 2009)	D	Recommend Phase I data recovery and Phase II data recovery (if necessary).
12:1086	H	Euro-American	Disposal	Glass, metal and historical ceramics	S*	Private	IN (SWCA 2009)		No further work is recommended for this site.
12:1087	H	Euro-American	Water/Soil Control	Check dams, retaining walls	S*	Private	RE (SWCA 2009)	A, D	Based on its association with the CCC, recommend archival research and photo documentation.
12:1088	P	Native American • Hohokam	Artifact Scatter	Ceramics and lithics	S*	Private Town of Marana	RE (SWCA 2009)	D	Recommend Phase I data recovery and Phase II data recovery (if necessary).
12:1089† Benjamen Limekiln	H	Euro-American/ Mexican American	Limekiln	Limekiln	S*	Private	RE (SWCA 2009)	D	Based on subsurface depth in limekiln, recommend Phase I data recovery and Phase II data recovery (if necessary) and further archival research.
12:1090	P	Native American • Hohokam	Resource Procurement	Ceramics and lithics	S*	City of Tucson	RE (SWCA 2009)	D	Recommend Phase I data recovery and Phase II data recovery (if necessary).
12:1091 Lead Crosses Limekiln	H	Euro-American/ Mexican American	Limekiln/ Invented History	Metal, glass	S*, DR*	Private	RE (SWCA 2009)	A, B, D	Based on association with Emil Haury and Byron Cummings and the Lead Crosses invented history, recommend Phase I data recovery and Phase II data recovery (if necessary) and archival research.
12:1092	P	Native American • Hohokam	Resource Procurement	Lithics, ceramics, and ground stone	S*	Private	RE (SWCA 2009)	D	Recommend Phase I data recovery and Phase II data recovery (if necessary).

* Work within current APE

† Site is adjacent to APE, but may be important to public interpretation along roadway

[1] P=prehistoric; H=historic; MC=multi-component

[2] S=survey; T=testing; DR=data recovery; M=monitoring;

[3] DE=determined eligible; RE=recommended eligible; ID=indeterminate; IN=ineligible; NE=not evaluated

With the exception of only a few sites, the sites recorded during the survey form an archaeological complex that occupies a unique setting along the west bank of the Santa Cruz River at the distal margins of the Tucson Mountains piedmont. Considering the high density of archaeological sites within the Silverbell Road corridor, the potential for additional buried archaeological deposits in non-site contexts, and the hydrogeomorphological setting that is unique to the west side of the river and that was advantageous for human settlement both in prehistoric and historic times, we propose that the sites form a contiguous archaeological district, the Silverbell Archaeological District, which is discussed further below.

Prehistoric Sites

Prehistoric occupation of the west side of the Santa Cruz River extends more than 4000 years: some sites represent a single cultural tradition, while others (e.g. AA:12:46, AA:12:86, AA:12:96: and AA:12 105) were reoccupied multiple times during various periods.

Archaic:	3 sites—AA:12:46; AA:12:86; AA:12:750
Early Agricultural:	4 sites—AA:12:93; AA:12:96; AA:12:105; AA:12:300
Early Ceramic:	3 sites—AA:12:46; AA:12:96; AA:12:105
Hohokam:	20 sites—AA:12:46; AA:12:86; AA:12:93; AA:12:96; AA:12:105; AA:12:300; AA:12:306; AA:12:314; AA:12:317; AA:12:501; AA:12:502; AA:12:750; AA:12:799; AA:12:800; AA:12:1005; AA:12:1012; AA:12:1013; AA:12:1088; AA:12:1090; AA:12:1092

Of the 20 identified Hohokam sites, nine have finer cultural/temporal discriminations revealed through previous archaeological excavations:

Colonial, Sedentary, Classic periods:	3 sites—AA:12:46; AA:12:93; AA:12:96
Sedentary, Classic periods:	4 sites—AA:12:105; AA:12:314; AA:12:750; AA:12:799
Sedentary period:	2 sites—AA:12:502; AA:12:800

The remaining 11 Hohokam sites were identified by the presence of prehistoric ceramic artifacts; unfortunately none of these ceramics is diagnostic of finer cultural/temporal discriminations.

Many of the Archaic and Early Agricultural occupation deposits are deeply buried and have only been revealed through previous archaeological investigations, often at depths of more than 6 feet below the modern ground surface. The prehistoric occupation during these periods is almost certainly more spatially extensive than currently recognized through survey and prior subsurface investigations.

The Hohokam tradition visibly accounts for the most extensive prehistoric occupation of the west side of the Santa Cruz River. Large settlements aggregated along and just above the western margin of the flood plain, particularly where alluvial fans encroached upon the floodplain. These fans have formed where large channelized washes emanating in the Tucson Mountains reached the floodplain, became unchannelized, and rapidly deposited their suspended alluvium on the floodplain. This hydrogeomorphological setting allowed for a mixed strategy of agriculture that proved favorable to prehistoric settlement, almost certainly starting in Early Agricultural times. Irrigation canals would have been excavated in the floodplain that would siphon water from the Santa Cruz River and convey it to fields downstream. Alluvial fan floodwater farming would have been possible through the excavation of ditches and the construction of water diversion features that would have directed rainfall runoff to nearby fields. This type of farming is sometimes referred to as *ak-chin* (arroyo mouth) farming, although the

O'odham term actually refers to settlements or locations at the mouths of washes rather than this method of farming (Foster et al. 2002:78). Non-irrigated dry farming using rock piles, check dams, and similar features would have been possible on the piedmont surface above the floodplain. An enormous Hohokam dry farming field system with thousands of rock features is well-preserved along the western slope of Tumamoc Hill less than 2 miles south of the project area. Although no extensive field systems were identified in the project area, small "backyard" features were observed.

In addition to the agricultural crops, a wide variety of native plant and animal resources would have been available along the riparian river corridor, within agricultural fields and their disturbed margins (i.e., crop weeds and opportunistic small mammals), and in the cactus-rich uplands.

Prehistoric settlement within the project area was not without its challenges. Heavy rains in the Tucson Mountains could produce flash flooding that could quickly destroy entire alluvial fan field systems, and over the long term, periodic downcutting of the Santa Cruz River would make canal systems ineffective and lead to further encroachment of alluvial fans on the floodplain. Such events would result in the shifting of settlements to areas where conditions were more favorable. The timing of these settlement shifts, and the adaptations made to subsistence strategies in response to changing environmental conditions, are important research topics for the project area sites.

Inhumations and/or cremations have been excavated from four of the prehistoric sites within the surveyed area (AA:12:46; AA:12:96; AA:12:105; and AA:12:314). Human remains are likely present at other Hohokam sites, especially those that have already been documented as having pithouse features (AA:12:86; AA:12:93; AA:12:502; AA:12:750); they may also be present in prehistoric sites that have not yet been tested for subsurface deposits.

Two of the prehistoric sites (AA:12:316 and AA:12:1085) contain surface scatters of lithic artifacts—and a single sherd in the case of AA:12:316— and have simply been assigned a cultural affiliation of "prehistoric"

Two sites listed in our search of the AZSITE database were not relocated: AA:12:42 is in the location of a recently constructed house and nothing remains of AA:12:379 within the APE after having undergone recent data recovery excavations (Howell 2008).

Historic Period Sites

The Historic period sites include: Silverbell Road, the historical route between Tucson and the Silverbell Mining District on the west side of the Avra Valley; three documented historic homesteads (AA:12:371, AA:12:999 and AA:12:1083), another probable homestead (AA:12:380) that was recorded as a "deserted house" on the 1908 GLO map; two artifact scatters associated with possible homesteads at multi-component sites (AA:12:501; AA:12:800); one artifact scatter associated with two structure foundations (AA:12:999); four limekilns (AA:12:106; AA:12:150; AA:12:1089; and AA:12:1091); two water control features, including one canal segment (AA:12:980); several Civilian Conservation Corps (CCC) features (AA:12:1087); one site that may have been a manufacturing location or a habitation (AA:12:1080); two twentieth-century disposal sites associated with possible habitations (AA:12:1079 and AA:12:1082); and five twentieth-century trash deposits not associated with other historical features (AA:12:96; AA:12:1081; AA:12:1084; and AA:12:1086).

Unlike the prehistoric occupation, the Historic period occupation was sparse until the mid-twentieth century. Up until the latter decades of the nineteenth century, the threat of Apache raiding forced most residents to remain within the confines of Tucson, venturing out for specific tasks or short-term residency.

Small individual family settlements were dispersed along Silverbell Road once it was developed to freight supplies to the mines in the Silverbell Mountains.

The limekilns are particularly iconic along Silverbell Road. Open pit burning of limestone to produce lime has an ancient past in the Americas and was practiced throughout southern Arizona as well (Jones 2005:187). Limekilns, however, were introduced by the Spanish and are integral to the production of lime plaster for adobe construction. Documentation of the locations of Tucson limekilns is sparse. Late 19th century newspaper articles occasionally report construction of new kilns, "burnings" of a kiln load, shipments of lime, or advertisements offering lime for sale (Jones 2005:Table 1). Local production of lime waned with the availability of inexpensive lime shipped by rail from Colton, California by the California Portland Cement Company beginning in 1891. The Silverbell Road limekilns are remnants of a small scale industry that was critical to the local economy before large scale production and transcontinental transportation made them obsolete.

Jones' map of Tucson Basin kilns (2005:Figure 2) shows two limekilns along Silverbell Road (AA:12:106, the Sweetwater Limekiln, and AA:12:150, the Sunset Limekiln); another two limekiln sites were identified during this project (AA:12:1089 and AA:12:1091). For many years, local lore attributed the Sunset Limekiln (AA:12:150) as the location of the "Lead Crosses" hoax of the 1920s–1930s. Burgess's recent research (2009) clarifies that the "Lead Crosses" excavations occurred at the location recorded during this survey as AA:12:1091. Nothing of the limekiln appears to remain after the extensive treasure hunt that occurred at this site. SWCA identified AA:12:106, known as the Sweetwater Limekiln, as the limekiln owned by Juan Romero and the site of his death when the wall collapsed as he was cleaning out a load—an event reported in an 1896 edition of the *Arizona Daily Citizen*. Both the Sunset and the Sweetwater limekilns are located at the toe of east-west trending ridges on the west side of Silverbell Road, and the small back wall fragments are visible from the road. AA:12:1089, newly recorded during the current survey, had been excavated into the side of an east-west trending ridge on the west side of Silverbell Road and adjacent to the APE. It is better preserved than any of the other three kilns, although it, too, has a collapsed front wall.

Modern-day Silverbell Road is part of the Juan Bautista de Anza National Historic Trail commemorating the 1775–1776 de Anza expedition to San Francisco. No evidence of this expedition has been found in the project area, and it is unclear if the expedition passed through the current project area or along more gentle terrain east of the Santa Cruz River. Silverbell Road, itself, follows the same alignment as the road to Fort Yuma shown on an 1871 GLO map. After 1873, the road's name changed to Silverbell as it became the route for transporting goods to and from the Silverbell Mountain mines. Many of the Historic period sites recorded in this survey document this era when the area contained small ranches and small scale industries that took advantage of the natural resources available along the ridges west of the Santa Cruz River. Closer to the river, irrigation districts in the late nineteenth century once again drew water from the river to irrigate agricultural fields along the floodplain, and quarries began harvesting sand and gravel for construction. The proposed expansion of Silverbell Road is in response to the dense residential population that has developed along the road within the past 50 years and that promises to intensify the carrying load of this transportation corridor.

Isolated Occurrences

Initially 79 IOs were recorded during the field survey; 25 isolates were later determined to be within site boundaries, leaving a total of 54 occurrences of isolated artifacts, features, or small isolated artifact concentrations. Detailed descriptions, GPS locational data, and the maps plotting the IO locations are provided in Appendix A (Figures A.1a–A.1c, Table A.1). Thirty-six isolates are prehistoric, 11 are historic, six are roadside shrines or *descansos*, and one is a pet burial.

The prehistoric IOs consist of flaked stone, ground stone, and ceramics. The historic period IOs consist of an abandoned Cadillac automobile bottle glass, tobacco tins, food cans, isolated concrete and masonry debris, Civilian Conservation Corps (CCC) water control features, and roadside shrines.

Approximately 91 percent of the prehistoric isolates are flaked stone or contain flaked stone artifacts associated with early stage core reduction (i.e., tested cobbles, cores, and cortical flakes). Nine of the prehistoric isolates have ceramic artifacts; the majority of these are plain ware sherds, with a few specimens of indeterminate red-on-brown sherds, indicating that all relate to either the Early Ceramic period or Hohokam occupation of the area.

Six roadside shrines and one pet burial were also recorded along Silverbell Road, all within the surveyed area. These "descansos" are part of the early Hispanic tradition of the Southwest, a tradition that has since been adopted beyond the Hispanic community. They commemorate the location where a family member or friend died, or possibly a pet was killed or buried, and the shrines are often maintained for many decades.

Silverbell Archaeological District

The Silverbell Road project corridor passes through the heart of the proposed Silverbell Archaeological District (Figures 4.2a–4.2b). The current survey and past research within the project corridor provides evidence that the environmental setting along the west side of the Santa Cruz River at the distal end of the Tucson Mountains piedmont resulted in a pattern and style of prehistoric archaeological settlement that was distinct from settlement east of the river or in other upstream and downstream reaches of the river. The proposed district also encompasses a series of historic-era sites that similarly function together in a district-like manner. These include multiple historic homesteads sites and limekiln sites, and of course Silverbell Road, which linked these sites together as well as areas beyond.

The alluvial fans that extend from washes at the toe of the piedmont and that cover large expanses of the floodplain form the core of the Silverbell Archaeological District. The proposed district boundary includes the largest prehistoric settlements on the alluvial fans and beyond to include archaeological sites that are partly on or adjacent to the fans (i.e., on the floodplain or distal end of the piedmont) and that were functionally tethered to the larger settlements on the fan surfaces. Additionally, it includes a 200-foot buffer around the sites in areas where intact archaeological deposits are suspected beneath the modern ground surface. The proposed district boundary on the west follows the toe of the piedmont and site boundaries; on the east it includes the alluvial fans and/or site boundaries.

Grant Road, at the south end of the project corridor, forms the southern boundary of the district. There is an absence of archaeological sites on the surface at the south end of the district that is quite likely a result of the residential and commercial development in this area and not because the area is void of archaeological sites. The geomorphology of the south end of the project area is similar to that further north where site density is high, and it is likely that buried archaeological deposits are present.

The north boundary of the district extends 700 feet north of Ina Road to include the entire extent of AA:12:380 and a 200 foot buffer. Areas excluded from the above described boundaries include areas that have no longer have potential for archaeological resources—areas such as gravel quarries, the modern river channel, water treatment ponds, and areas that have undergone archaeological testing and have been determined to be absent of archaeological deposits. Additionally, only the portion of AA:12:300 at the toe of the piedmont is considered part of the archaeological district. This part of the site functions separately from the remainder of the site that extends more than 1 mile up the piedmont slope and that served as a procurement area for rhyolite cobbles used for tool manufacture.

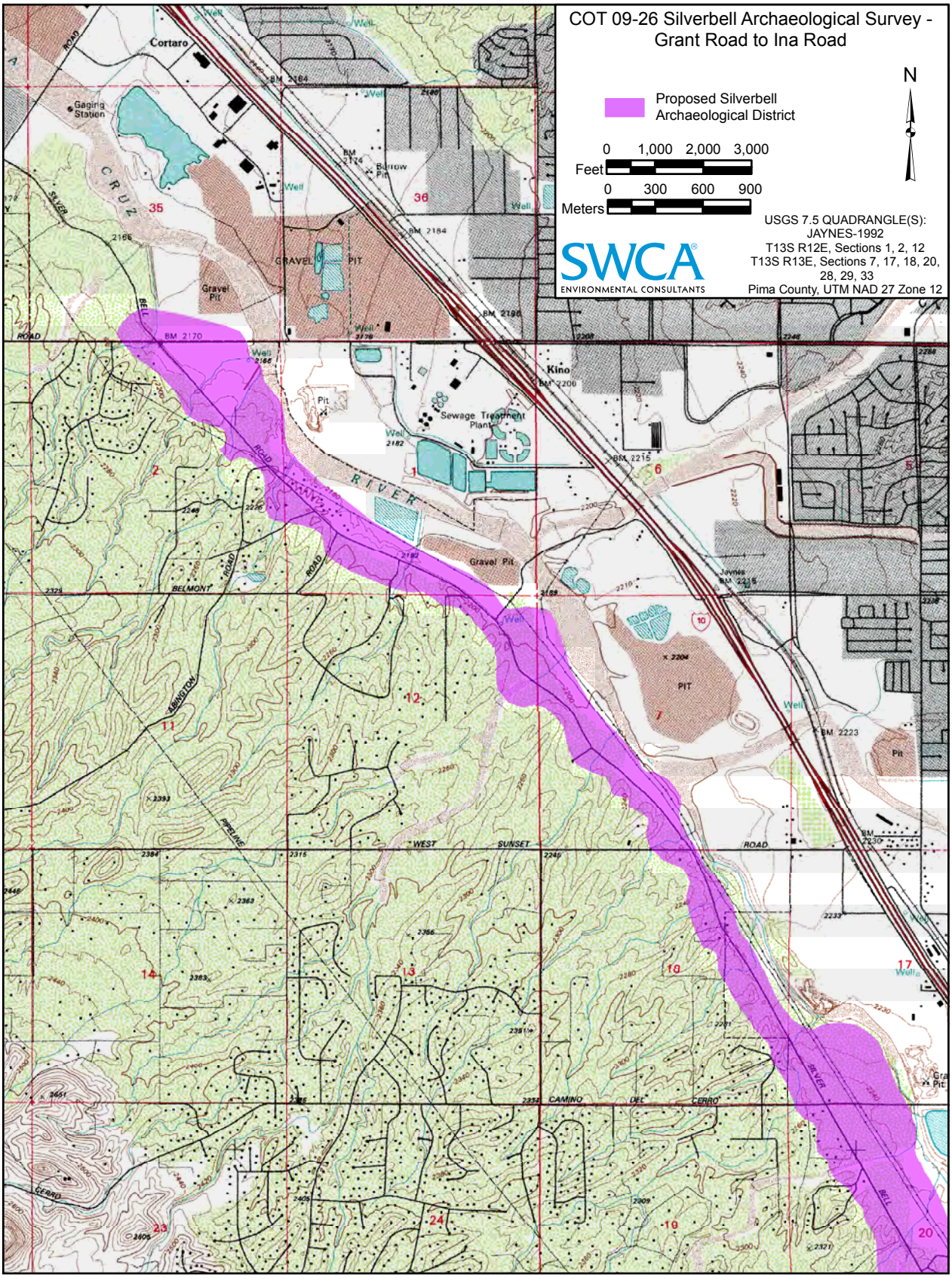

Figure 4.2a. Proposed Silverbell Archaeological District (northern portion).

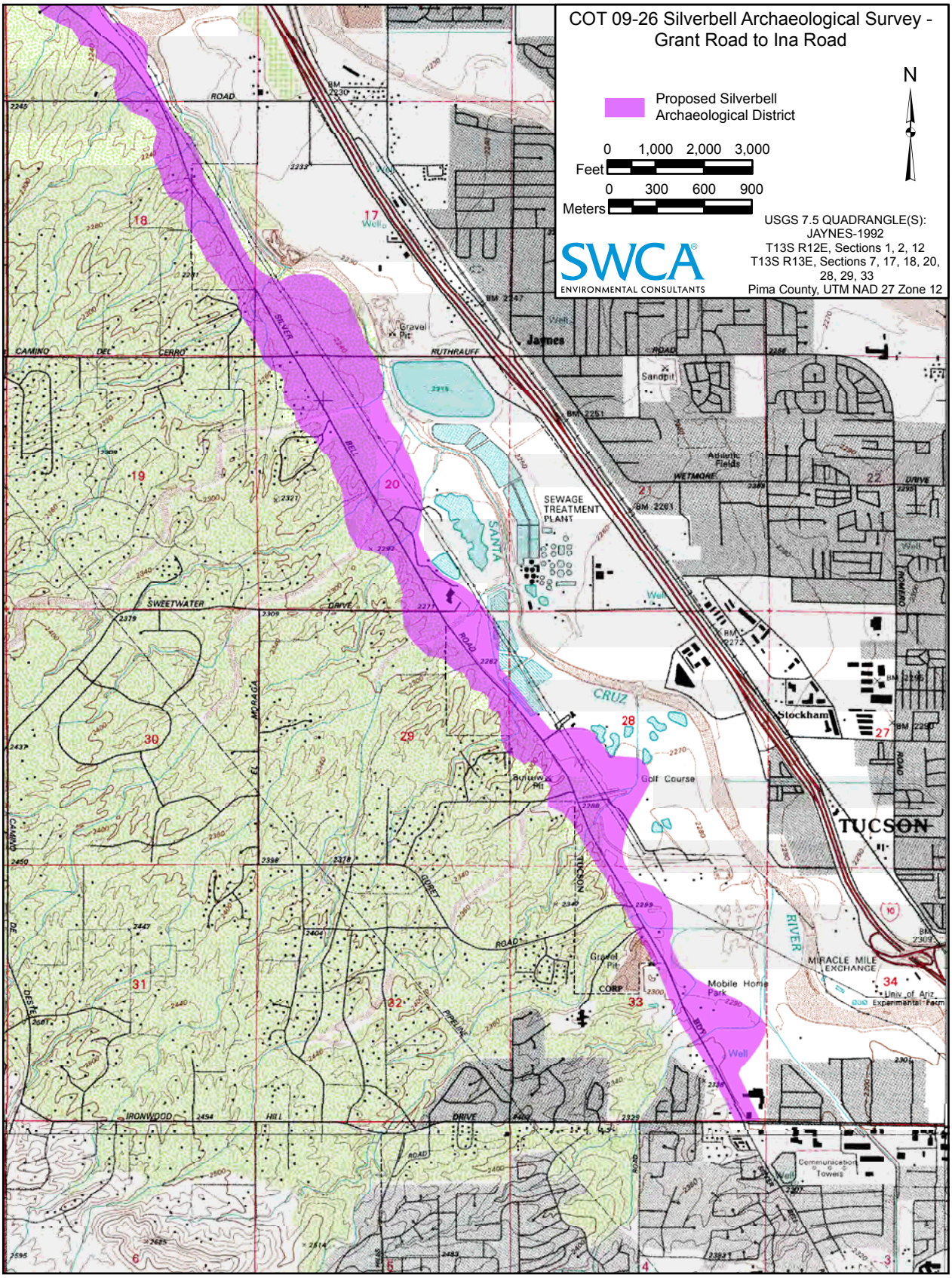

Figure 4.2b. Proposed Silverbell Archaeological District (southern portion).

NRHP ELIGIBILITY EVALUATIONS

With the federal nexus imposed by USACE jurisdictional delineations of waters of the U.S. (i.e., navigable waters and their tributaries) within the Silverbell Road expansion project, the project must comply with the provisions stipulated by the NHPA (36 CFR 800) and evaluate the eligibility of the cultural resources for inclusion as historic properties in the NRHP (36 Code of Federal Regulations 60.6). A historic property must be at least 50 years old, maintain significance in history, architecture, archaeology, engineering, or culture as a district, site, building, structure, or object, which possesses integrity of location, design, setting, materials, workmanship, feeling, and association, and meets one of the following four criteria:

a) are associated with events that have made a significant contribution to the broad patterns of our history, or

b) are associated with the lives of persons significant in our past; or

c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that posses high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d) have yielded, or may be likely to yield, information important in prehistory or history.

SWCA reviewed the extant NRHP eligibility determinations for previously recorded sites and made additional recommendations for the portions of the sites that were expanded and/or for additional features recorded during the current survey (see Table 4.1).

Previously Recorded Sites

Six of the 24 previously recorded sites had been determined eligible for NRHP listing during previous investigations (AA:12:46; AA:12:93; AA:12:96; AA:12:105; AA:12:300; AA:12:314); another five were recommended eligible (AA:12:750; AA:12:799; AA:12:800; AA:12:1005; AA:12:1013); one was recommended ineligible (AA:12:980); and twelve had not been previously evaluated. Eleven of the unevaluated sites are recommended eligible by SWCA (AA:12:86; AA:12:106; AA:12:150; AA:12:306; AA:12:316; AA:12:317; AA:12:371; AA:12:380; AA:12:501; AA:12:502; AA:12:999). SWCA also recommends that the bridge in the twelfth site, AZ AA:11:129—Silverbell Road, is eligible, but the two road segments recorded in the APE portion of the historic road do not contribute to the property's eligibility.

Fourteen of the previously recorded sites have been tested for subsurface features including portions within the current surveyed area. Seven of those sites underwent data recovery (AA:12:46; AA:12:96; AA:12:105; AA:12:314; AA:12:799; AA:12:1005; AA:12:1013); all save AA:12:96 included data recovery within portions of the current surveyed area.

All of the previously recorded NRHP-eligible sites are eligible for their information potential (Criterion D). Silverbell Road (AA:11:129) is also eligible under Criteria A and C.

Newly Recorded Sites

Of the 15 newly recorded sites, SWCA recommends that twelve are eligible for listing on the NRHP under Criterion D (AA:12:1012; AA:12:1079; AA:12:1080; AA:12:1081; AA:12:1082; AA:12:1083; AA:12:1085; AA:12:1087; AA:12:1088; AA:12:1089; AA:12:1090; AA:12:1091; AA:12:1092). AA:12:1087, a series of CCC check dams and retaining walls, is also eligible under Criterion A, its

association with a Depression-era public work relief program. AA:12:1091, the location of the "lead crosses" hoax, is eligible under Criteria A, B, and D based on its association with Emil Haury, Byron Cummings, and the Lead Crosses invented history. AA:12:1091 is somewhat anomalous in that this site, was extensively excavated in the search for additional Roman artifacts, which removed all visible traces of the original limekiln; however, the correct location had not been recorded until this survey and Burgess' recent (2009) research into the true location.

Three sites are recommended ineligible (AA:12:1081; AA:12:1084; AA:12:1086). These sites are early to mid-twentieth century refuse disposal sites that contain one or more small distinct trash deposits—mostly single-episode deposits of domestic refuse or construction debris. In all cases, the trash deposits do not appear associated with the early homesteading of the property or any nearby structures other than Silverbell Road, which apparently provided convenient access to dispose of trash on the outskirts of town. The historical artifacts that comprise these sites, however, do not provide information about the people who used Silverbell Road, unlike artifacts located along a historic wagon road, which could provide information about those who used the wagon road and thereby contribute to the road's eligibility.

Silverbell Archaeological District

The proposed Silverbell Archaeological District is recommended eligible for listing in the NRHP as a single contiguous archaeological district under Criterion D. The district includes 35 properties that are individual eligible for listing in the NRHP and an unknown number of undiscovered buried sites.

NRHP Eligibility Summary

In summary:

> Determined and Recommended Eligible NRHP Properties (1 district; 35 sites) Silverbell Archaeological District; AA:11:129 (including the bridge, excluding the road segments); AA:12:46; AA:12:86; AA:12:93; AA:12:96; AA:12:105; AA:12:106; AA:12:150; AA:12:300; AA:12:306; AA:12:314; AA:12:316; AA:12:317; AA:12:371; AA:12:380; AA:12:501; AA:12:502; AA:12:750; AA:12:799; AA:12:800; AA:12:999; AA:12:1005; AA:12:1012; AA:12:1013; AA:12:1079; AA:12:1080; AA:12:1082; AA:12:1083; AA:12:1085; AA:12:1087; AA:12:1088; AA:12:1089; AA:12:1090; AA:12:1091; AA:12:1092
>
> NRHP-Ineligible Properties (4 sites; 54 IOs) AA:12:980; AA:12:1081; AA:12:1084; AA:12:1086; IOs 1, 2, 6, 9–18, 20, 26, 28, 30, 31, 33–37, 40, 43–53, 57–63, 65–68, 70–72, 74, 76–79

MANAGEMENT RECOMMENDATIONS

The archaeological survey of Silverbell Road between Grant and Ina roads documented the nearly uninterrupted deposit of cultural resources between the west bank of the Santa Cruz River and the toe of the Tucson Mountains piedmont, and for the reasons described above, this area is proposed as the Silverbell Archaeological District. This NRHP-eligible district contains 35 known historic properties and an unknown number of buried archaeological sites. As a result, ground disturbing activities associated with road improvements have the potential to adversely affect contributing elements to the district's eligibility. Similarly, actions that indirectly lead to ground disturbing activities (e.g., USACE issuance of a Section 404 Clean Water Act permit) would also result in adverse effects to historic properties.

SWCA recommends that:

- every attempt be made in project design and implementation to avoid adverse impacts to historic properties (realistically, the topography of the roadbed presents limiting factors that favor expansion to the east in many locations, which may affect the larger prehistoric archaeological sites);
- any portion of the final APE that includes areas not surveyed as part of this project should be surveyed for historic properties;
- identification testing should be conducted in non-site areas where portions of the final APE cross alluvial fans and floodplain deposits (i.e., mostly those areas in and east of the existing roadway).
- because of the multi-year phased nature of the project design and construction and the current uncertainties regarding the final APE and impacts to cultural resources, a Programmatic Agreement (PA) be developed to govern the resolution of adverse effects. Consultation in development of the PA should include, but not be limited to, the USACE, SHPO, Tohono O'odham Nation, Pima County, City of Tucson, Town of Marana, Arizona State Museum, and the Advisory Council on Historic Preservation)
- a Historic Properties Treatment Plan (HPTP) should be prepared to mitigate adverse effects to all affected historic properties and should include data recovery excavations, public interpretation, procedures for handling human remains, and monitoring during construction;
- the seven roadside shrines (one pet burial and six human *descansos* or memorials) receive special treatment in recognition of the sensitive nature of this type of property. Although these IOs do not qualify as NRHP-eligible properties nor do the COT, County, or TOM have official policies concerning these shrines, the practice has been to make every effort to contact the deceased's relatives to arrange for relocation or removal of the memorial. SWCA recommends that this process be used if these features are within the final APE.

REFERENCES CITED

Andrade, E. R., and W. D. Sellers
1988 El Niño and Its Effect on Precipitation in Arizona and Western New Mexico. *Journal of Climatology* 8:403–410.

Ayres, James E.
1984 The Anglo Period in Archaeological and Historical Perspective. *The Kiva* 49(3–4):225–232.

Bahr, Donald, Juan Smith, William Smith Allison, and Julian Hayden
1994 *The Short, Swift Time of Gods on Earth: The Hohokam Chronicles*. University of California Press, Berkeley.

Bent, Thomas W.
1964 The Tucson Artifacts: A Narrative Report of the Discovery, the Unearthing, and the Failure of Subsequent Investigations to Solve this Mystery. Manuscript on file, Arizona Historical Society, Tucson.

Bernard-Shaw, Mary
1988 *Prehistoric Canals and Charos at the Los Morteros Site in the Northern Tucson Basin.* Technical Report No. 87-9. Center for Desert Archaeology, Tucson.

1989 *Archaeological Investigations at the Redtail Site, AZ AA:12:149(ASM), in the Northern Tucson Basin*. Technical Report No. 89-8. Center for Desert Archaeology, Tucson.

1990 *Archaeological Investigations at the Lonetree Site, AA:12:120(ASM), in the Northern Tucson Basin*. Technical Report No. 90-1. Center for Desert Archaeology, Tucson.

Bernard-Shaw, Mary (editor)
1989 *Archaeological Investigations at Los Morteros, AZ AA:12:57(ASM), Locus 1 in the Northern Tucson Basin*. Technical Report No. 87-8. Center for Desert Archaeology, Tucson.

Betancourt, Julio L.
1978 *Cultural Resources within the Proposed Santa Cruz River Park Archaeological District*. ASM Archaeology Series No. 125. Arizona State Museum, University of Arizona, Tucson.

Bolton, Herbert E.
1919 *Kino's Historical Memoir of Pimería Alta: A Contemporary Account of the Beginnings of California, Sonora, and Arizona, by Father Eusebio Francisco Kino, S.J., Pioneer Missionary Explorer, Cartographer, and Ranchman, 1683-1711.* University of California, Semicentennial Publications, 1868-1918.

Brew, Susan A., and Bruce B. Huckell
1987 A Protohistoric Piman Burial and a Consideration of Piman Burial Practices. *The Kiva* 52(3):163-191.

Brown, David E. (editor)
1994 *Biotic Communities, Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

Burgess, Don
2009 Romans in Tucson? The Story of an Archaeological Hoax. *Journal of the Southwest* 51(1:3-96).

Castetter, Edward F., and Willis H. Bell
1942 *Pima and Papago Indian Agriculture*. University of New Mexico Press, Albuquerque.

Ciolek-Torrello, Richard
1988 Conclusions. In *Hohokam Settlement along the Slopes of the Picacho Mountains,* Vol. 6: *Synthesis and Conclusions, Tucson Aqueduct Project*, edited by R. Ciolek-Torrello and D. R. Wilcox, pp. 300–314. Research Paper No. 35, Vol. 6. Museum of Northern Arizona, Flagstaff.

1995 The Houghton Road Site, the Agua Caliente Phase, and the Early Formative Period in the Tucson Basin. *Kiva* 60:531–574.

Ciolek-Torrello, Richard (editor)
1998 *Early Farmers of the Sonoran Desert: Archaeological Investigations at the Houghton Road Site, Tucson, Arizon*a. Technical Series No. 72. Statistical Research, Inc., Tucson.

Ciolek-Torrello, Richard, and David R. Wilcox
1988 Conclusions. In *Hohokam Settlements along the Slopes of the Picacho Mountain: Synthesis and Conclusions*, edited by R. Ciolek-Torrello and D. R. Wilcox, pp. 300–314. Research Paper No. 35. Museum of Northern Arizona, Flagstaff.

Clark, Jeffery J.
2001 *Tracking Prehistoric Migrations: Pueblo Settlers among Tonto Basin Hohokam*. Anthropological Papers No. 65. University of Arizona Press, Tucson.

Clemensen, Berle A.
1987 *Cattle, Copper, and Cactus: The History of Saguaro National Monument, Arizona.* U.S. Department of the Interior, National Park Service, Washington, D.C.

Coney, P. J.
1980 Cordilleran Metamorphic Core Complexes: An Overview. In *Cordilleran Metamorphic Core Complexes*, edited by M. D. Crittenden, Jr., P. J. Coney, and G. H. Davis, pp. 7–31. Memoir No. 151. Geological Society of America, Boulder.

Cook, Michael D.
2005 *Gracious Estates Class III Cultural Archaeological Survey West of Silverbell Road, Tucson, Pima County, Arizona*. Cultural Resources Report No. 2005-43. Westland Resources, Tucson

Cook, Patricia
2000 *Archaeological Survey of the Proposed Christopher Columbus Park Well.* Project Report No. 00-128. Desert Archaeology, Inc., Tucson.

2008 *Cultural Resources Monitoring at AZ AA:12:314(ASM), Marana, Pima County, Arizona*. Project Report No. 07-128. Desert Archaeology, Inc., Tucson.

Craig, Douglas
1988 *Archaeological Testing at the Dakota Wash Site (AZ AA:16:49[ASM]).* Technical Report No. 88-5. Institute for American Research, Tucson.

Crown, Patricia L.
1984 Prehistoric Agricultural Technology in the Salt-Gila Basin. In *Hohokam Archaeology along the Salt-Gila Aqueduct, Central Arizona Project*, Vol. 9: *Synthesis and Conclusions*, edited by L. S. Teague and P. L. Crown, pp. 87–114. Archaeological Series No. 150. Arizona State Museum, University of Arizona, Tucson.

Crown, Patricia L., and W. James Judge (editors)
1991 *Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest.* School of American Research Press, Santa Fe.

Czaplicki, Jon S., and John C. Ravesloot (editors)
1989 *Hohokam Archaeology along Phase B of the Tucson Aqueduct, Central Arizona Project*, Vol. 3: *Excavations at Water World (AZ AA:16:94): A Rillito Phase Ballcourt Village in the Avra Valley*. Archaeological Series No. 178. Arizona State Museum, University of Arizona, Tucson.

Dart, Allen
1985 *An Archaeological Survey of the El Rio-Star Pass Water Line, Tucson, Arizona.* IFAR Technical Report No. 85-7. Institute for American Research, Tucson.

1991 *Archaeological Survey for the City of Tucson's Proposed Silverbell Road - Grant Road to Speedway Boulevard* Widening*, Plan R*-87-10. Letter Report No. 91-149. Desert Archaeology, Inc., Tucson.

1995 *Archaeological Survey of a 7.09-Acre Property at the North End of Horseshoe Trail in the Tucson City Limits for Jon Tate and Catalina Communities*. Letter Report No. 95-06. Old Pueblo Archaeology Center, Tucson.

Davidson, E. S.
1973 *Geohydrology and Water Resources of the Tucson Basin, Arizona*. Water-Supply Paper 1939-E. United States Geological Survey, Washington, D.C.

Deaver, William L.
1989a Pottery and Other Ceramic Artifacts. In *The 1979–1983 Testing at Los Morteros (AZ AA:12:57 [ASM], a Large Hohokam Village Site in the Tucson Basin*, by R. C. Lange and W. L. Deaver, pp. 27–82. Archaeological Series No. 177. Archaeology Section, Research Division, Arizona State Museum, University of Arizona, Tucson.

1989b *Archaeological Test Excavations for the Tucson Solar Demonstration Project*. Report on file, Arizona State Museum, University of Arizona, Tucson.

1996 *Archaeological Excavations at the Dairy Site: A Preliminary Report*. Statistical Research Inc., Tucson.

Deaver, William L., and Richard Ciolek-Torrello
1995 Early Formative Period Chronology for the Tucson Basin. *Kiva* 60:481–530.

DeMaagd, Holly
1990a *Speedway/Pima Widening Project No. 90-107G.* Letter Report No. 90-129. Desert Archaeology, Tucson.

1990b *Stone-Wetmore Project No. 90-107NA*. Letter Report No. 90-132. Desert Archaeology, Inc., Tucson.

Di Peso, Charles C.
1956 *The Upper Pima of San Cayetano del Tumacacori: An Archaeo-historical Reconstruction of the O'otam of Pimeria Alta*. Publication No. 7. Amerind Foundation, Dragoon, Arizona.

1958 *The Reeve Ruin of Southeastern Arizona: A Study of Western Pueblo Migration into the Middle San Pedro Valley*. Publication No. 8. Amerind Foundation, Dragoon, Arizona.

Diehl, Allison Cohen
1999a *An Archaeological Survey between Silverbell Road and the Silverbell Driving Range, Tucson, Arizona.* Letter Report No. 99-116. Desert Archaeology, Inc., Tucson.

1999b *Cultural Resource Survey for the CAP Transmission Main Access/ Pumping Manhole Improvements, Tucson, Arizona*. Project Report No. 99-183. Desert Archaeology, Inc., Tucson.

1999c *Archaeological Survey for the Sunset Acres II Development, Marana, Arizona.* Project Report No. 99-172. Desert Archaeology, Inc., Tucson.

2002 *Cultural Resources Survey at the Intersection of Greasewood and Ironwood Hills Drive, Tucson, Pima County, Arizona*. Project Report No. 02-153. Desert Archaeology, Inc., Tucson.

2003 *Cultural Resources Survey of Various Road Segments in the Vicinity of the Intersection of Shannon Road and ironwood Hill Drive, Tucson, Pima County, Arizona*. Project Report No. 03-113. Desert Archaeology, Inc., Tucson.

2004 *Cultural Resources Survey for the Corrosion Prevention Protection, Tucson, Pima County, Arizona*. Project Report No. 04-118. Desert Archaeology, Inc., Tucson.

2008 *Additional Cultural Resources Monitoring at AZ AA:12:314(ASM), Marana, Pima County, Arizona*. Project Report No. 08-102. Desert Archaeology, Inc., Tucson.

Doak, David P.
1999 *Archaeological Data Recovery at the Home Depot Site, AZ AA:12:352(ASM), in Marana, Pima County, Arizona*. Cultural Resources Report No. 99-146. SWCA Environmental Consultants, Tucson.

Doak, David P., Jenna Neves, and Shannon Plummer
2001 *Addendum - The Silverbell Segment of the Ironwood Reroute: A Cultural Resources Survey of a Supplemental Reroute to the Arizona Segment of the El Paso to Los Angeles Fiber Optic Cable Project* (draft). SWCA Environmental Consultants, Tucson.

Doelle, William H.,
1984 The Tucson Basin during the Protohistoric Period. *The Kiva* 49(3–4):195–211.

1985 *Excavations at the Valencia Site, a Preclassic Hohokam Village in the Southern Tucson Basin*. Anthropological Papers No. 3. Institute for American Research, Tucson.

Doelle, William H., and Henry D. Wallace
1991 The Changing Role of the Tucson Basin in the Hohokam Regional System. In *Exploring the Hohokam*: *Prehistoric Desert Peoples of the American Southwest*, edited by G. J. Gumerman, pp. 279–345. Amerind Foundation New World Studies Series No. 1. University of New Mexico Press, Albuquerque.

Dolan, Sara M.
2007 *Revised Preliminary Phase I Data Recovery Report for Sites AZ AA:12:1005(ASM), AZ AA:12:799(ASM), and AZ AA:12:1013(ASM)*. Cultural Resources Report 2007-04. WestLand Resources, Inc., Tucson.

Downum, Christian E.
1993 *Between Desert and River: Hohokam Settlement and Land Use in the Los Robles Community*. Anthropological Papers No. 57. University of Arizona Press, Tucson.

Doyel, David E.
1984 From Foraging to Farming: An Overview of the Preclassic in the Tucson Basin. *The Kiva* 49:147–165.

Dutt, Andrew
1999 *Results of a Testing Program on the East Side of Silverbell Road Between the Silverbell Driving Range Restrooms and Avenida Albor, Tucson, Arizona*. Project Report No. 99-159, Desert Archaeology, Inc., Tucson.

Eddy, Frank W., and Maurice E. Cooley
1983 *Cultural and Environmental History of Cienega Valley, Southeastern Arizona*. Anthropological Papers No. 43. University of Arizona Press, Tucson.

Effland, Richard and Margerie Green
1985 *Cultural Resource Assessment: The Western Area Power Administration Saguaro to Tucson 115kV Transmission Line.* ACS Report No. 29. Archaeological Consulting Services, Ltd., Tempe.

Elson, Mark D.
1986 *Archaeological Investigations at the Tanque Verde Wash Site: A Middle Rincon Settlement in the Eastern Tucson Basin.* Anthropological Papers No. 7. Institute for American Research, Tucson.

Ely, L. L.
1997 Response of Extreme Floods in the Southwestern United States to Climatic Variations in the Late Holocene. *Geomorphology* 19:175–201.

Eppley, Lisa G.
1991 *Archaeological Survey of Silvercroft Wash - Speedway to Grant Replacement Plan No. E-84-16.* Letter Report No. 91-139. Desert Archaeology, Inc., Tucson.

1997 *An Archaeological Survey for a Water Main Installation Project in the Cottonwood/40th Street Silverbell Tract*. Letter Report No. 97-102. Desert Archaeology, Inc., Tucson.

Ezell, Paul H.
1964 *The Hispanic Acculturation of the Gila River Pima*. American Anthropological Association, Menasha, Wisconsin.

Ezzo, Joseph A., and William L. Deaver
1998 *Watering the Desert: Late Archaic Farming at the Costello-King Site*. Technical Series No. 68. Statistical Research, Inc., Tucson.

Faught, Michael K., and Andrea K. L. Freeman
1998 Paleoindian Complexes of the Terminal Wisconsin and Early Holocene. In *Paleoindian and Archaic Sites in Arizona*, edited by J. B. Mabry, pp. 33–52. Arizona State Parks, Phoenix.

Field, John J., Keith Katzer, Jim Lombard, and Jeanette Schuster
1993 A Geomorphic Survey of the Picacho and Northern Tucson Basins. In *The Northern Tucson Basin Survey: Research Directions and Background Studies*, edited by J. H. Madsen, P. R. Fish, and S. K. Fish, pp. 33–49. Archaeological Series No. 182. Arizona State Museum, University of Arizona, Tucson.

Fish, Suzanne K., Paul R. Fish, and Christian E. Downum
1984 *Hohokam Terraces and Agricultural Production in the Tucson Basin*. Anthropological Research Papers No. 33. Arizona State University, Tempe.

Fish, Suzanne K., Paul R. Fish, and John Madsen (editors)
1992 *The Marana Community in the Hohokam World.* Anthropological Papers No. 56. University of Arizona Press, Tucson.

Folb, Lisa and Joseph A. Ezzo
1999 *An Archaeological Survey of the Painted Sunset Property, Tucson, Pima County, Arizona*. Technical Report No. 99-6. Statistical Research, Inc., Tucson.

Force, Eric, and W. Howell
1997 *Holocene Depositional History and Anasazi Occupation in McElmo Canyon, Southwestern Colorado*. Archaeological Series No. 188. Arizona State Museum, University of Arizona, Tucson.

Foster, Michael S., M. Kyle Woodson, and Gary Huckleberry
2002 *Prehistoric Water Utilization and Technology in Arizona: Background for Historic Contexts. A* Component of the Arizona Historic Preservation Plan prepared by SWCA Environmental Consultants, Phoenix for the State Historic Preservation Office, Phoenix.

Freeman, Andrea K.L.
1994 *Archaeological Survey along I-10, South of Ina Road*. Letter Report No. 94-133. Desert Archaeology, Inc., Tucson.

1997 Middle to Late Holocene Stream Dynamics of the Santa Cruz River, Tucson, Arizona: Implications for Human Settlement, the Transition to Agriculture, and Archaeological Site Preservation. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

1998 Middle to Late Holocene Stream Dynamics of the Santa Cruz River. In Archaeological Investigations at the Wetlands Site, AZ AA:12:90(ASM), edited by A. K. L. Freeman, pp. 19–34. Technical Report No. 97-5. Center for Desert Archaeology, Tucson.

2000 Geomorphology and Canals. In Farming through the Ages: 3400 Years of Agriculture at the Valley Farms Site in the Northern Tucson Basin, edited by K. Wellman, pp. 95–117. Cultural Resources Report No. 98-226. SWCA Environmental Consultants, Tucson.

Freeman, Andrea K. L. (editor)
1998 *Archaeological Investigations at the Wetlands Site, AZ AA:12:90(ASM).* Technical Report No. 97-5. Center for Desert Archaeology, Tucson.

Goodman, John D.
1998 *Late Historic Artifacts Field Recording and Dating Guide.* Arizona Archaeological Council, Phoenix.

Gregonis, Linda
1999 Ceramic Artifact Analysis. In *The Tortolita Phase in the Tortolita Foothills: Investigations at the Triangle Road Site (AZ BB:9:87[ASM]) Oro Valley, Arizona* edited by Kevin Wellman, pp. 55-68. Archaeological Report No. 97-161, SWCA Inc., Environmental Consultants, Tucson.

Gregory, David A.
2001 *The Early Agricultural Period Component at Los Pozos: Feature Descriptions and Data Tables*. Technical Report No. 99-4. Desert Archaeology, Inc., Tucson.

Gregory, David A. (editor)
1999 *Excavations in the Santa Cruz River Floodplain: The Middle Archaic Component at Los Pozos*. Anthropological Papers No. 20. Center for Desert Archaeology, Tucson.

Grenda, Donn
1991 *Orange Grove Extension Survey: Report of Cultural Resources Survey, W.O. 4BBRGD, Proposed Extension of Orange Grove Road from I-10 West to Silverbell Road.* Statistical Research, Inc., Tucson.

Griset, Suzanne
2008 Archaeological Records Search and Survey for West El Camino del Cerro Road Widening, Tucson, Arizona. Letter report, SWCA Environmental Consultants, Tucson.

Hackenberg, Robert A.
1983 Pima and Papago Ecological Adaptations. In *Southwest*, edited by A. Ortiz, pp. 161–177. Handbook of North American Indians, Vol. 10, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Hall, Susan D.
2001a *An Archaeological Survey of the Silverbell Landfill Groundwater Monitor Well Sites, Tucson, Pima County, Arizona*. Project Report No. 01-124, Desert Archaeology, Inc., Tucson.

2001b *Archaeological Monitoring and Surface Collection at One Silverbell Landfill Groundwater Monitor Well, Tucson, Pima County, Arizona*. Project Report No. 01-127, Desert Archaeology, Inc., Tucson.

Hammack, Nancy S.
1977 An Analysis of the Ceramic Vessels from the Mortuary Pits, Ariz. AA:12:46, Rabid Ruin, Tucson, Arizona. Manuscript on file, Arizona State Museum Archives. University of Arizona, Tucson.

Harry, Karen G.
1997 Ceramic Production, Distribution, and Consumption in Two Classic Period Hohokam Communities. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Harry, Karen, and Richard Ciolek-Torrello
1992 *Farming the Floodplain: A Look at Prehistoric and Historic Land-Use along the Rillito, Test Excavations and National Register Evaluations of Eight Prehistoric and Historic Sites along the Rillito River, Pima County, Arizona.* Technical Series No. 35. Statistical Research, Inc., Tucson.

Hartmann, Gayle Harrison
1997 *Archaeological Investigations at the Silverbell Coachline Site, AZ AA:12:321(ASM), in Marana, Arizona*. Archaeology Report No. 13. Old Pueblo Archaeology Center, Tucson.

Haury, Emil W.
1975 *The Stratigraphy and Archaeology of Ventana Cave*. University of Arizona Press, Tucson.

1976 *The Hohokam, Desert Farms and Craftsman*: *Excavation of Snaketown*. University of Arizona Press, Tucson.

Haury, E. W., E. B. Sayles, and W. W. Wasley
1959 The Lehner Mammoth Site, Southeastern Arizona. *American Antiquity* 25:2–32.

Hayes, John
2002 *Results of Archaeological Test Excavations at AZ AA:12:880(ASM) Located Near the Northwest Corner of Silverbell Road and Grant Road in Tucson, Pima County, Arizona*. TAEC Technical Report No. 2001-54, Tierra Archaeological and Environmental Consultants, Tucson.

Hayden, Julian D.
1970 Of Hohokam Origins and Other Matters. *American Antiquity* 35:87–94.

Haynes, C. Vance
1987 Curry Draw, Cochise County, Arizona: A Late Quaternary Stratigraphic Record of Pleistocene Extinction and Paleo-Indian Activities. In *Cordilleran Section of the Geological Society of America: Geological Society of America Field Guide*, edited by M. L. Hill, Vol. 1, pp. 23-28. Geological Society of America, Boulder.

2007 *Murray Springs: A Clovis Site with Multiple Activity Areas in the San Pedro Valley, Arizona*. University of Arizona Press, Tucson.

Haynes, C. Vance, and Bruce B. Huckell
1986 Sedimentary Successions of the Prehistoric Santa Cruz River, Tucson, Arizona. Open-File Report No. 86-15. Arizona Geological Survey, Tucson.

Heckman, Robert A.
1995 *Ina Road Landfill Survey, PDOT W.O. 4000-6640800-WWMS-64080IPUR3*. Letter Report. Statistical Research, Inc., Tucson.

Heckman, Robert A., Barbara K. Montgomery, and Stephanie M. Whittlesey
2000 *Prehistoric Painted Pottery of Southeastern Arizona.* Technical Series No. 77. Statistical Research, Inc., Tucson.

Heidke, James
1990 Ceramic Artifacts. In *Archaeological Investigations at the Lonetree Site, AA:12:120(ASM), in the Northern Tucson Basin*, by Mary Bernard-Shaw, pp. 471-544. Anthropological Papers No. 19. Center for Desert Archaeology, Tucson.

Hemmings, E. Thomas
1970 Early Man in the San Pedro Valley, Arizona. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Henderson, T. Kathleen
1993 Site Chronology. In *Archaeological Investigations at the Hotts Hawk Site*, by M. Yeatts. *Classic Period Occupation on the Santa Cruz Flats: The Santa Cruz Flats Archaeological Project,* edited by T. K. Henderson and R. J. Martynec, pp. 53–91. Northland Research, Flagstaff.

Henderson, T. Kathleen, and Richard J. Martynec (editors)
1993 *Classic Period Occupation on the Santa Cruz Flats: the Santa Cruz Flats Archaeological Project*. Northland Research, Flagstaff.

Heuett, Mary Lou
1989 *Letter Report for a Class III Archaeological Survey of 5+ Acres for the Solar Demonstration Project (Alternate Site) at Silverbell Park*. Cultural and Environmental Services, Inc., Tucson.

1996 *Sunset Hills Estates: An Archaeological Testing at Four Archaic/Hohokam Sites*. Southwest Cultural Series No. 23, Cultural and Environmental Systems, Tucson.

Hopkins, Maren, and Douglas B. Craig
2009 *Archaeological Data Recovery at Rabid Ruin (AZ AA:12:46[ASM]): The Pima Animal Care Center Improvement Project, Tucson, Pima County, Arizona*. Report No. 09-09, Northland Research, Inc., Tempe.

Howell, Joseph
2008 *Phase I Archaeological Data Recovery Report and Historic Properties Treatment Plan for Phase 2 Data recovery at AZ AA:12:379(ASM) and at a Portion of AZ AA:12:314(ASM), in the Town of Marana, Pima County, Arizona*. Tierra Archaeological Report No. 2008-63, Tierra Right of Way Services, Ltd., Tucson.

Huckell, Bruce B.
1984 The Paleo-Indian and Archaic Occupation of the Tucson Basin: An Overview. *The Kiva* 49:133–145.

1990 Late Preceramic Farmer-Foragers in Southeastern Arizona: A Cultural and Ecological Consideration of the Spread of Agriculture into the Arid Southwestern United States. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

1995 *Of Marshes and Maize: Preceramic Agricultural Settlements in the Cienega Valley, Southeastern Arizona*. Anthropological Papers No. 59. University of Arizona Press, Tucson.

Huckell, Lisa W.
1976 Analysis of Plant Remains from the Rabid Ruin. AZ AA:12:46. Manuscript on file, Arizona State Museum Library, University of Arizona, Tucson.

1980 Archaeological Survey of the Proposed Oshrin Interceptor Route. Arizona State Museum Cultural Resource Management Division Letter Report, Arizona State Museum, Tucson.

Huckell, Bruce B., and Lisa W. Huckell
1984 Excavations at Milagro, a Late Archaic Site in the Eastern Tucson Basin. Ms. on file, Arizona State Museum, University of Arizona, Tucson.

Huckell, Bruce B., Lisa W. Huckell, and Suzanne K. Fish
1995 *Investigations at Milagro, a Late Preceramic Site in the Eastern Tucson Basin*. Technical Report No. 94-5. Center for Desert Archaeology, Tucson.

Huckell, Bruce B., Lisa W. Huckell, and M. Steven Shackley
1999 McEuen Cave. *Archaeology Southwest* 13(1):12

Huckleberry, Gary
2008 Late Holocene Depositional Processes and Geomorphic Changes at AZ AA:12:96(ASM), Christopher Columbus Park. In *Archaeological Investigations at Christopher Columbus Park, Tucson, Pima County, Arizona*, edited by H. Wöcherl, pp. 35–49. Technical Report 2007-08. Desert Archaeology, Tucson.

Hull-Walski, Deborah A. and James E. Ayres
1989 Appendix 1, Directory of Glass Marks. In *The Historical Archaeology of Dam Construction Camps in Central Arizona, Vol. 3, Laboratory Methods and Database Computerization*. Report Prepared for the U.S. Bureau of Reclamation, Phoenix, by Dames & Moore, Phoenix.

Jones, Jeffrey T.
1998 *An Archaeological Survey of 678 Acres in Sections 2, 10, and 11, Township 13S, Range 12E, G & SRB & M, Pima County, Arizona*. Letter Report No. 98006. Old Pueblo Archaeology Center, Tucson.

1999a *Archaeological Test Excavations at the Portion of AZ AA:12:314(ASM) West of Silverbell Road and North of Ina Road in Marana, Arizona*. Technical Report No. 9905. Old Pueblo Archaeology Center, Tucson.

1999b *Archaeological Testing at the Portion of AZ AA:12:300(ASM) Located on Parcel 1 of the Tucson Mountain Reserve Property Along West Belmont Road in Pima County, Arizona.* Technical Report No. 9804. Old Pueblo Archaeology Center, Tucson.

2005 Historical Lime Production in Southeastern Arizona. In *The Kiva.* Vol. 71, Number 2, Winter 2005. edited by Ronald H. Towner, pp. 187-202.

Jones, Jeffrey T. and Allen Dart
2001 *Cultural Resources Assessment of the Proposed Pima County Animal Control Facility Expansion Area in Tucson, Arizona (Pima County W.O. HYX-689).* Letter Report No. 2001.065. Old Pueblo Archaeology Center, Tucson.

2003 *Cultural Resource Survey of a 6,682.94-ft. long Corridor of Varying Widths Proposed for the Construction of a Bank Protection levee Along the West Bank of the Santa Cruz River Between Ina and Cortaro Roads in Marana, Arizona*. Letter Report No. 2003.013. Old Pueblo Archaeology Center, Tucson.

Katzer, Keith L., and J. H. Schuster
1984 The Quaternary Geology of the Northern Tucson Basin, Arizona and Its Archaeological Implications. Unpublished M.A. thesis, Department of Geosciences, University of Arizona, Tucson.

Keane, Melissa, and J. Simon Bruder
1999 *Good Roads Everywhere: Historic and Regulatory Contexts for the Evaluation of Arizona Roads*. Intermountain Cultural Resource Services Research Paper No. 42. Dames and Moore, Phoenix.

Kelly, Isabel T., James E. Officer, and Emil W. Haury
1978 *The Hodges Ruin: A Hohokam Community in the Tucson Basin*. Anthropological Papers No. 30. University of Arizona Press, Tucson.

Klawon, Jeanne E., William R. Dickinson, and Philip A. Pearthree
1999 *Surficial Geology and Geologic Hazards of the Northern Tucson Basin, Pima County, Arizona*. Open-File Report 99-21. Arizona Geological Survey, Tucson.

Lascaux, Annick
1998 *A Class III Archaeological Inventory of the Western and Eastern Santa Cruz River Banks, South of Ina Road, Northwestern Tucson Basin, Pima County, Arizona.* SWCA, Inc., Environmental Consultants, Tucson.

Lenhart, Austin
1998 *An Archaeological Assessment of a Development Property in Tucson, Pima County, Arizona, for Rogers Civil Engineering.* Letter Report. Tierra Archaeological and Environmental Consulting, Tucson.

Lehner, Lois
1988 *U.S. Marks on Pottery, Porcelain & Clay.* Collector Books. Paducah, Kentucky.

Levstik, Jennifer
2005 *Archaeological Testing at AZ AA:12:93(ASM), East of Silverbell Road, Tucson, Pima County, Arizona*. Tierra Archaeological Report No. 2004-95, Tierra Right of Way Services, Ltd., Tucson.

Lindauer, Owen
2001 *Assessing the Significance of Highways in Arizona*. Paper presented in Historic Contexts: Key to Assessing Highways, Session 398, January 10, 2001, Transportation Research Board, Washington, D.C.

Lindeman, Michael W., Catherine Gilman, and Andrea K.L. Freeman
1998 *Archaeological Investigations for the Roger to Ina Reclaimed Transmission Line Project, Pima County, Arizona.* Technical Report No. 97-17. Desert Archaeology, Inc., Tucson.

Lockhart, Bill
2004 The Dating Game: The AB-Connected Mark. *Bottles and Extras* 15(2):16-17. The Federation of Historical Bottle Collectors.

Mabry, Jonathan B.
1990 *A Late Archaic Occupation at AZ AA:12:105(ASM).* Technical Report No. 90-6. Desert Archaeology, Inc., Tucson.

1991a Archaeological Survey of Silverbell Lake Backup Supply Main*.* Letter Report No. 91-113. Desert Archaeology, Inc., Tucson.

1991b Archaeological Survey of Recharge Monitor Well Locations. Letter Report No. 91-137. Desert Archaeology, Inc., Tucson.

1998 Architectural Variability and Site Structures. In *Archaeological Investigations of Early Village Sites in the Middle Santa Cruz Valley: Analysis and Synthesis*, edited by J. B. Mabry, pp. 209–243. Anthropological Papers No. 19. Center for Desert Archaeology, Tucson.

2006 Geomorphology and Stratigraphy. In *Rio Nuevo Archaeology, 2000-2003: Investigations at the San Austia Mission and Mission Gardens, Tucson Presidio, Tucson Pressed Brick Company, and Clearwater Site,* edited by J. H. Thiel and J. B. Mabry pp. 20.1-20.24. Technical Report No. 2004-11. Desert Archaeology, Inc., Tucson.

2007 *Results of Cultural Resources Phase I Data Recovery along Clearwater Drive, within AZ BB:13:6(ASM), Tucson, Pima County, Arizona*. Project Report No. 07-105. Desert Archaeology, Inc., Tucson.

Mabry, Jonathan B. (editor)
2008 *Las Capas: Early Irrigation and Sedentism in a Southwestern Floodplain*. Anthropological Papers No. 28. Center for Desert Archaeology, Tucson.

Mabry, Jonathan B., Deborah L. Swartz, Helga Wöcherl, Jeffery J. Clark, Gavin H. Archer, and Michael W. Lindeman
1997 *Archaeological Investigations at Early Village Sites in the Middle Santa Cruz Valley: Descriptions of the Santa Cruz Bend, Square Hearth, Stone Pipe, and Canal Sites*. Anthropological Papers No. 18. Center for Desert Archaeology, Tucson.

MacWilliams, Arthur C.
2005 *Notice of Fieldwork Completion, Preliminary Report On Archaeological Data Recovery Excavations At Sites AZ AA:12:314(ASM) and AZ AA:12:315(ASM) Near the Silverbell and Ina Roads Intersection in Marana, Arizona, February-May 2005*. Technical Report Number 20042005.002, Old Pueblo Archaeology Center, Tucson.

Masse, Bruce W.
1981 *The Protohistoric Period in the Northern Southwest,* A.D. *1450–1700*. Anthropological Research Papers No. 24. Arizona State University, Tempe.

Mayro, Linda
1987a *Orange Grove/I-10/SPRR Flood Control Survey FC-87-41 W.O. 4FRCDW*. Letter Report dated January 16, 1987. Institute for American Research, Tucson.

1987b Santa Cruz River Improvement District Project, W.O. 4BSCSC. Letter Report. Institute for American Research, Tucson.

1987c *Santa Cruz Improvement District: Ina Road to Camino del Oro, Archaeological Testing at AZ AA:12:38 and AA:12:376.* Institute for American Research, Tucson.

McKittrick, Mary Anne
1988 Surficial Geologic Maps of the Tucson Metropolitan Area. Open-File Report No. 88-18. Arizona Geological Survey, Tucson.

Menges, Christopher M., and Philip A. Pearthree
1989 Late Cenozoic Tectonism in Arizona and Its Impact on Regional Landscape Evolution. In *Geologic Evolution of Arizona*, edited by J. P. Jenney and S. J. Reynolds, pp. 649–680. Digest No. 17. Arizona Geological Society, Tucson.

Miksicek, Charles H.
1987 Late Sedentary-Early Classic Period Hohokam Agriculture: Plant Remains from the Marana Community Complex. In *Studies in the Hohokam Community of Marana*, edited by G. E. Rice, pp. 197–216. Anthropological Field Studies No. 15. Arizona State University, Tempe.

Morris, George D.
1953 Report on Excavation of a Pithouse at the Four Mile Silverbell Road Site. Manuscript on file, Arizona State Museum, Tucson.

Nials, Fred L.
2008 Geomorphology and Stratigraphy. In *Las Capas: Early Irrigation and Sedentism in a Southwestern Floodplain,* edited by J. B. Mabry, pp. 35-53. Anthropological Papers No. 28. Center for Desert Archaeology, Tucson.

O'Brien, Patrick M., J. Simon Bruder, David A. Gregory, A. E. (Gene) Rogge, and Deborah A. Hull
1987 *Cultural Resource Technical Report for the US Telecom Fiber Optic Cable Project, from San Timoteo Canyon, California to Socorro, Texas: The Arizona Segment*. Dames & Moore, Phoenix.

Olsson, Karin
2002 *A Cultural Resources Assessment Survey of Approximately 180 Linear Feet Along Goret Road in Tucson, Pima County, Arizona*. TAEC Survey Report No. 2002-5A, Tierra Archaeological and Environmental Consultants, Tucson.

Parker, J. T. C.
1995 *Geomorphology and Hydrology of the Santa Cruz River*. Unpublished Ph.D. dissertation, Department of Geosciences, University of Arizona, Tucson.

Pearthree, Philip A., and Thomas H. Biggs
1999 Surficial Geology and Geologic Hazards of the Tucson Mountains, Pima County, Arizona: Avra, Brown Mountain, Cat Mountain, and Jaynes Quadrangles. Open-File Report No. 99-22. Arizona Geological Survey, Tucson.

Petersen, Eric S.
2004 *A Class III Cultural Resource Survey for the Qwest Silverbell Road Utility Trench Near Belmont Road, Pima County, Arizona*. SWCA Cultural Resources Report No. 04-83, SWCA Environmental Consultants, Tucson.

Plescia, Sara M. and Michael D. Cook.
2006 *Revised Class III Cultural Archaeological Survey of 11.8 Acres for the Greacious Estates Utility Right-of-way, North Silverbell Road, Tucson, Pima County, Arizona.* Cultural Resources Report No. 2005-70. Westland Resources, Tucson

Ravesloot, John C. (editor)
1987 *The Archaeology of the San Xavier Bridge Site (AZ BB:13:14) Tucson Basin, Southern Arizona*. Archaeological Series No. 171. Arizona State Museum, University of Arizona, Tucson.

Roland, Edward H.
1993 Investigations at a Multicomponent Archaic Site in the Tucson Basin. Ms. on file, Arizona State Museum, Tucson.

Roth, Barbara J.
1989 Late Archaic Settlement and Subsistence in the Tucson Basin. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Roth, Barbara, and Bruce B. Huckell
1992 Cortaro Points and the Archaic of Southern Arizona. *Kiva* 57:353–370.

Roudaut, Marie-Blanche
2004 *Results of Archaeological Identification Testing at the Rabid Ruin (AZ AA:12:46[ASM]), Silverbell Road and Sweetwater Drive, Tucson, Pima County, Arizona*. Tierra Archaeological Report No. 2004-58, Tierra Right of Way Services, Ltd., Tucson.

Ruble, Ellen
1999 *Archaeological Survey East of Silverbell Road between Foret Road and Neosha Street, Tucson, Arizona.* Project Report No. 99-144. Desert Archaeology, Inc., Tucson.

2002 *Cultural Resources Survey for the Columbus Park Expansion Project, Tucson, Pima County*, Arizona. Project Report No. 02-163. Desert Archaeology, Inc., Tucson.

2003a *Cultural Resources Survey of a Parcel East of Silverbell Road and North of Noesha Street, Tucson, Pima County, Arizona*. Project Report No. 03-184. Desert Archaeology, Inc., Tucson.

2003b *Cultural Resources Survey of Two Parcels East of Silverbell Road and North of Introspect Road, Tucson, Pima County, Arizona*. Project Report No. 03-185. Desert Archaeology, Inc., Tucson.

Sandelin, Linda C.
1998 *Clorox Bottles: A Key to Their Identification and Date of Manufacture.* California Department of Forestry and Fire Protection.

Sawyer, David A., and John S. Pallister
1989 Geologic Framework of the Southern Basin and Range. In *Field Excursions to Volcanic Terranes in the Western United States, Volume I: Southern Rocky Mountain Region*, edited by C. E. Chapin and J. Zidek, pp. 121–126. Memoir No. 46. New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.

Sayles, Edward B.
1968 *Fantasies of Gold: Legends of Treasures and How They Grew*. The University of Arizona Press, Tucson.

1983 *The Cochise Cultural Sequence in Southeastern Arizona.* Anthropological Papers No. 42. University of Arizona Press, Tucson.

Sayles, Edward B., and Ernst Antevs
1941 *The Cochise Culture.* Medallion Papers No. 29. Gila Pueblo, Globe, Arizona.

Schlesinger, W. G., J. F. Reynolds, G. L. Cunningham, L. F. Huenneke, W. M. Jarrell, R. A. Virginia, and W. G. Whitford
1990 Biological Feedbacks in Global Desertification. *Science* 247:1043–1048.

Sellers, William B., and Richard H. Hill
1974 *Arizona Climate, 1931–1972.* University of Arizona Press, Tucson.

Shaul, David L., and Jane H. Hill
1998 Tepimans, Yumans, and Other Hohokam. *American Antiquity* 63:375–396.

Sheridan, Thomas E.
1995 *Arizona: A History*. University of Arizona Press, Tucson.

Simonis, Donald E.
1997 Simonis Milk Can Guide. USDI Bureau of Land Management, Kingman Field Office, Arizona.

Simpson, Kay, and Susan J. Wells
1984 *Archaeological Survey in the Eastern Tucson Basin, Saguaro National Monument, Rincon Mountain Unit, Tanque Verde Ridge, Rincon Creek, Mica Mountain Areas*. Publications in Anthropology No. 22, Vol. 3. Western Archaeological and Conservation Center, National Park Service, Tucson.

Slaughter, Mark C., and Heidi Roberts (editors)
1996 *Excavations at the Gibbon Springs Site: A Classic Period Village in the Northeastern Tucson Basin*. Archaeological Report No. 94-87. SWCA Environmental Consultants, Tucson.

Slawson, Laurie V.
1990 *The Terminal Classic Period in the Tucson Basin: Rabid Ruin, A Late Tucson Phase Hohokam Settlement*. Southwest Cultural Series No. 10. Cultural and Environmental Systems, Inc., Tucson.

1991 *A Cultural Resource Inventory for Two CAP Pressure Regulating Valve Station Sites in Tucson and Pima County, Arizona*. Cultural and Environmental Services, Inc., Tucson.

1994 *A Cultural Resource Inventory for Sunset Hills Estates in Pima County Arizona*. Cultural and Environmental Services, Inc., Tucson.

Slawson, Laurie V., Keith Skip Miller, David C. Hanna, and Peter L. Steere
1986 *The Cortaro Site (AZ AA:12:232), a Late Archaic Period Occupation in the Tucson Basin*. Southwest Cultural Series 2. Cultural and Environmental Systems, Tucson.

Sliva, Jane
1996 *Silverbell Urban Wildlife Habitat Survey.* Letter Report No. 96-166. Desert Archaeology, Inc., Tucson.

Spencer, Jon E., and Stephen J. Reynolds
1989 Middle Tertiary Tectonics of Arizona and Adjacent Areas. In *Geologic Evolution of Arizona*, edited by J. P. Jenney and S. J. Reynolds, pp. 539–574. Digest No. 17. Arizona Geological Society, Tucson.

Spicer, Edward H.
1988 *People of Pascua*. University of Arizona Press, Tucson.

Spier, Leslie
1933 *The Yuman Tribes of the Gila River*. University of Chicago Press, Chicago.

Stein, Pat H.
1993 Historical Resources of the Northern Tucson Basin. In *The Northern Tucson Basin Survey: Research Directions and Background Studies*, edited by John H. Madsen, Paul R. Fish, and Suzanne K. Fish, pp. 85-122. Archaeological Series No. 182. Arizona State Museum, University of Arizona, Tucson.

Stephen, David V.M.
1988 *Exploratory Archaeological Test Excavations at Rabid Ruin, AZ AA:12:46(ASM).* Letter Report No. 8707. Center for Archaeological Field Training, Pima Community College, Tucson.

2001a Letter Report for Silverbell/Grant NWC Archaeological Survey. PAST Report No. 011283, Professional Archaeological Services and Technologies, Tucson.

2001b Report for Commerce Ave.: Archaeological Survey. Past Report No. 011333. Professional Archaeological Services and Technologies, Tucson.

2002 *Cultural Resources Survey of the Ironwood II Project Near Tucson, Pima County, Arizona*. PAST Report No. 021483, Professional Archaeological Services and Technologies, Tucson.

2003 *Cultural Resources Survey of the Silverbell/Abington Project near Tucson, Pima County, Arizona*. Cultural Resources Report No. 031536. Professional Archaeological Services of Tucson, Tucson.

Sterner, Matthew A.
2001 *Life Along the Santa Cruz River: Results of an Archaeological Survey Along 1.2 Miles of the Santa Cruz River from Grant Road to Fort Lowell Road, Pima County, Arizona*. SRI Technical Report 01-17, Statistical Research Inc., Tucson.

Stevens, Michelle N.
1999 Spectacular Results from Modest Remains. *Archaeology Southwest* 13(1):4–5.

Swartz, Deborah L.
1995 *An Archaeological Survey of a Parcel North of Grant Road, along the Santa Cruz River*. Letter Report No. 95-155. Desert Archaeology, Inc., Tucson.

Terzis, Lee
1996 *Archaeological Testing for the Proposed Coventry Homes Sewage Disposal Pipeline, Pima County, Arizona.* Archaeological Report No. 96-109. SWCA, Inc., Environmental Consultants, Tucson.

Thompson, Raymond H.
2009 Invented and Manufactured History. In *Journal of the Southwest.* Vol. 51, Number 1, Spring 2009. edited by Joseph Carleton Wilder, pp. 3-96. The Southwest Center, University of Arizona, Tucson.

Toulouse, Julian Harrison
1971 *Bottle Makers and Their Marks*. Thomas Nelson, Inc., New York.

Tucker, David B.
2000 *The Silverbell Road Survey: A Class III Archaeological Survey of Silverbell Road between Ina Road and Cortaro Farms Road, Marana, Pima County, Arizona.* Cultural Resource Report No. 00-186. SWCA, Inc., Environmental Consultants, Tucson.

Tucker, David B. (editor)
2000 *The El Paso to Los Angeles Fiber Optic Cable Project: A Cultural Resources Survey of the Arizona segment of a Linear Right-of-Way Across Cochise, Pima, Pinal, Maricopa, and La Paz Counties, Arizona.* SWCA Cultural Resource Report No. 00-178. SWCA, Inc. Environmental Consultants, Tucson.

Turner, Christy G., II, and Joel D. Irish
1987 Affinity and Dietary Assessment of Hohokam Burials from the Site of La Ciudad, Central Arizona. In *Specialized Studies in the Economy, Environment and Culture of La Ciudad*, Pts. I and II, edited by J. A. E. Kisselburg, G. E. Rice, and B. L. Shears, pp. 215–230. Anthropological Field Studies No. 20. Office of Cultural Resource Management, Department of Anthropology, Arizona State University, Tempe.

Turner, Teresa
1982 *The People of Fort Lowell.* Arizona Humanities Council, Tucson.

Urban, Sharon
1979 Ironwood Hills Townhomes Clearinghouse Project No. 79-85-0260. ASM Form Report. Form on file, Archaeological Site Files Office, Arizona State Museum, University of Arizona, Tucson.

1980 Silverbell Estates Clearinghouse Project No. 80-85-0040. ASM Form Report. Form on file, Archaeological Site Files Office, Arizona State Museum, University of Arizona, Tucson.

Vint, James
1999 *Cultural Resource Evaluation of the Tucson Ready Mix Orange Grove Road Materials Pit.* Project Report No. 99-189. Desert Archaeology, Inc., Tucson.

Van West, Carla R., and Jeffrey H. Altschul
1994 Agricultural Productivity and Carrying Capacity in the Tonto Basin. In *The Roosevelt Rural Sites Study*, Vol. 3: *Changing Land Use in the Tonto Basin*, edited by R. Ciolek-Torrello and J. R. Welch, pp. 361–435. Technical Series No. 28. Statistical Research, Inc., Tucson.

Wallace, Henry D.
1995a *Archaeological Investigations at Los Morteros, a Prehistoric Settlement in the Northern Tucson Basin*. Anthropological Papers No. 17. Center for Desert Archaeology, Tucson.

1995b *Initial Archaeological Assessment of a Portion of the Knapp Parcel SE of the Confluence of the Rillito and Santa Cruz Rivers, Tucson, Arizona*. Technical Report No. 95-111. Desert Archaeology, Inc., Tucson.

Wallace, Henry D. (editor)
2003 *Roots of Sedentism: Archaeological Excavations at Valencia Vieja, a Founding Village in the Tucson Basin of Southern Arizona.* Anthropological Papers No. 29. Center for Desert Archaeology, Tucson.

Wallace, Henry D., and James P. Holmlund
1984 The Classic Period in the Tucson Basin. *The Kiva* 49(3-4):181–189.

Wallace, Henry D., and Michael W. Lindeman
2003 Chronometrics. In *Roots of Sedentism: Archaeological Excavations at Valencia Vieja, a Founding Village in the Tucson Basin of Southern Arizona*, edited by H. D. Wallace, pp. 205–236. Anthropological Papers No. 29. Center for Desert Archaeology, Tucson.

Waters, Michael R.
1986 *The Geoarchaeology of Whitewater Draw*. Anthropological Papers No. 45. University of Arizona Press, Tucson.

1987 Holocene Alluvial Geology and Geoarchaeology of AZ BB:13:14 and the San Xavier Reach of the Santa Cruz. In *The Archaeology of the San Xavier Bridge Site (AZ BB:13:14), Tucson Basin, Southern Arizona,* edited by J. C. Ravesloot, pp. 39–60. Archaeological Series No. 171. Arizona State Museum, University of Arizona, Tucson.

1988 Holocene Alluvial Geology and Geoarchaeology of the San Xavier Reach of the Santa Cruz River, Arizona. *Geological Society of America Bulletin* 100:479–491.

Waters, Michael R., and C. Vance Haynes
2001 Late Quaternary Arroyo Formation and Climate Change in the American Southwest. *Geology* 29:399–402.

Waters, Michael R., and John C. Ravesloot
2000 Late Quaternary Geology of the Middle Gila River, Gila River Indian Reservation, Arizona. *Quaternary Research* 54:49–57.

Wellman, Kevin D. (editor)
1999 *The Tortolita Phase in the Tortolita Foothills: Investigations at the Triangle Road Site (AZ BB:9:87[ASM]), Oro Valley, Arizona*. Archaeological Report No. 97-161. SWCA Environmental Consultants, Tucson.

Wells, Susan J.
1980 *Saddlewood Ranch Project No. P-80-29.* ASM Letter Report. Arizona State Museum, Tucson Arizona.

Western Regional Climate Center
2003 University of Arizona, Tucson, Arizona: Period of Record Monthly Climate Summary. Retrieved April 3, 2003, from Western Regional Climate Center web site: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?aztucs.

Whitney, Gregory J. and Patricia Cook
2007 *The Silverbell Golf Course Data Recovery Project, Tucson, Pima County, Arizona*. Technical Report No. 2006-04, Desert Archaeology, Inc.

Whittlesey, Stephanie M.
1995 Mogollon, Hohokam, and O'otam: Rethinking the Early Formative Period in Southern Arizona. *Kiva* 60:465–480.

1998 Early Formative Stage Ceramics and Cultural Affiliation. In *Early Farmers of the Sonoran Desert: Archaeological Investigations at the Houghton Road Site, Tucson , Arizon*a, edited by R. Ciolek-Torrello, pp. 209–228. Technical Series No. 72. Statistical Research, Inc., Tucson.

2004 Ceramic Containers. In *Pots, Potters, and Models: Archaeological Investigations at the SRI Locus of the West Branch Site, Tucson, Arizona*, Vol. 2: *Synthesis and Interpretations*, edited by S. M. Whittlesey, pp. 283–322. Technical Series No. 80. Statistical Research, Inc., Tucson.

Whittlesey, Stephanie M., and William L. Deaver
2004 The Built Environment: Interpreting Architecture and Site Structure. In *Pots, Potters, and Models: Archaeological Investigations at the SRI Locus of the West Branch Site, Tucson, Arizona*, Vol. 2: *Synthesis and Interpretations*, edited by S. M. Whittlesey, pp. 191–230. Technical Series No. 80. Statistical Research, Inc., Tucson.

Whittlesey, Stephanie M., S. Jerome Hesse, and M. S. Foster (editors)
2007 *Recurrent Sedentism and the Making of Place: Archaeological Investigations at Las Capas, a Preceramic Period Farming Community in the Tucson Basin, Southern Arizona*. Cultural Resources Report No. 07-556. SWCA Environmental Consultants, Tucson.

Wilcox, David R.
1991 Hohokam Social Complexity. In *Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest,* edited by P. L. Crown and W. J. Judge, pp. 253–275. School of American Research Press, Santa Fe.

Woodson, M. Kyle
1999 Migrations in Late Anasazi Prehistory: The Evidence from the Goat Hill Site. *Kiva* 65:63–84.

Wöcherl, Helga (editor)
2008 *Archaeological Investigations at Christopher Columbus Park, Tucson, Pima County, Arizona*. Technical Report 2007-08. Desert Archaeology, Tucson.