Archaeological Investigations at AZ BB:13:756 (ASM) and AZ BB:13:757 (ASM), Historic Block 185, Tucson, Pima County, Arizona

Edited by

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Technical Report No. 2006-09
Desert Archaeology, Inc.

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Submitted to

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Technical Report No. 2006-09
Desert Archaeology, Inc.
3975 North Tucson Boulevard, Tucson, Arizona 85716 • July 2008

ABSTRACT

DATE: 7 July 2008

AGENCY: City of Tucson

REPORT TITLE: Archaeological Investigations at AZ BB:13:756 (ASM) and AZ BB:13:757 (ASM) Historic Block 185, Tucson, Pima County, Arizona

PROJECT NAME: Lot 7 (Art Museum Parking Lot) Data Recovery

PROJECT REFERENCE NUMBER: COT 228

FUNDING LEVEL: Municipal

PROJECT DESCRIPTION: The City of Tucson is selling the parking lot property to a private developer. The archaeological project sought to recover information prior to the planned development of the lot for housing.

PERMIT NUMBER: ASM permit 2005-105ps; ASM Accession number 2005-0564

LOCATION:

County: Pima

Description: Section 12 of Township 14 South, Range 13 East, USGS 7.5 topographic map TUCSON, NW; property is the southwest corner of Main Avenue and Paseo Redondo Drive, Historic Block 185.

NUMBER OF SITES: 2, AZ BB:13:756 (ASM), the Historic Block 185, and AZ BB:13:757 (ASM), irrigation canals on the east side of the Santa Cruz River

LIST OF REGISTER-ELIGIBLE PROPERTIES: 2, AZ BB:13:756 (ASM) is eligible under Criterion D because of the significant historic period archaeological resources present and AZ BB:13:757 (ASM) is eligible under Criterion C, due to the design characteristics of the prehistoric and historic canals, and under Criterion D, due to the significant archaeological information that has been recovered from the canals.

LIST OF INELIGIBLE SITES: None

MANAGEMENT SUMMARY AND RECOMMENDATIONS: Archaeological data recovery on Historic Block 185 documented features from two subsurface archaeological sites, AZ BB:13:756 (ASM) and AZ BB:13:757 (ASM). BB:13:756 included soil mining pits, where material to manufacture adobe bricks for the Tucson Presidio was collected, and the foundations of twentieth century dwellings. BB:13:757 consisted of portions of two canals, one dating to the Prehistoric era and one filled with Territorial-era trash.

These resources were determined to be significant during the testing phase of the project. The subsequent field work during the data recovery phase sought to document the features and recover a sample of the artifacts and food remains contained within them. The two sites were likely eligible for inclusion in the National Register of Historic Places under Criterion D, due to the significant information contained in the features uncovered, as well as the artifacts and food remains present in them.

Significant aspects of the site included the presence of a small prehistoric irrigation canal running north-south through the project area. This is one of many irrigation canals constructed by the Hohokam residents of the Tucson Basin, bringing water from the Santa Cruz River to their agricultural fields. A second canal, filled with trash dating to the American Territorial period, was probably constructed much earlier. It is known that a canal ran along the base of the terrace during the Presidio era, with women from inside the fort washing clothes there under guard by Presidio soldiers.

The Presidio soldiers had also mined portions of the project area for dirt to make adobe bricks for fort construction. These pits then filled with trash and excavation yielded a small but interesting set of artifacts dating to the Spanish and Mexican periods of Tucson's history. Of special mention is a religious medal and associated beads, a very rare find. Territorial-era trash was also recovered, including some items discarded by the Chinese residents who lived nearby.

The data recovery phase surpassed the goals outlined in the research design. Desert Archaeology, Inc., does not recommend any additional archaeological work for Historic Block 185. Following completion of fieldwork, a letter was submitted to the City of Tucson stating that construction work could commence on the parcel. Should any previously unidentified cultural materials be encountered during construction, work should be halted in that area and a qualified archaeologist contacted to evaluate the find.

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CHAPTER 1

HISTORY OF BLOCK 185

J. Homer Thiel
Desert Archaeology, Inc.

Archaeological fieldwork was conducted at a City of Tucson-owned parcel of land scheduled for development at the northwestern corner of Alameda and Main streets, located north and east of the Tucson Water building. Historic Block 185 is located immediately west of the Tucson Presidio and lies within the floodplain of the Santa Cruz River. The potential for archaeological resources on the property was determined to be high; therefore, the city requested an archaeological testing program be conducted. Subsequent fieldwork located a variety of features, including several canals and trash-filled adobe mining pits dating to the Presidial and American Territorial periods. These features were determined to be eligible for inclusion on the National Register of Historic Places under Criterion D, based on the significant information about Tucson's history that could be gleaned by excavation and analysis of a portion of the features. Thus, archaeological data recovery was conducted in November 2005, and the findings made during the project are summarized in this report.

The project area description and location, its archaeological and historical background, and previous archaeological work in the vicinity of Historic Block 185 are provided in Chapter 1. The archaeological fieldwork is described in Chapter 2. An analysis of the Native American ceramics is found in Chapter 3, while the flaked stone, ground stone, and historic artifacts are described in Chapter 4. The ethnobotanical research is summarized in Chapter 5, and animal bone recovered from Presidio features and the bone found in a Chinese trash midden are detailed in Chapter 6. Finally, the information collected for the overall project is summarized in Chapter 7.

The project was funded by the City of Tucson. Cultural resources compliance for City of Tucson projects is mandated from several sources. On 3 October 1983, Tucson's Mayor and Council passed Resolution No. 12443 that first defined procedures for protecting Tucson's rich, multicultural heritage. In 1999, these procedures were formalized in an Administrative Directive titled *Protection of Archaeological and Historical Resources in City Projects*, issued by the City Manager. Updated in 2005, the Administrative Directive includes policies and procedures that apply to City employees, rights-of-way, and projects. The directive also specifies coordination with other environmental laws and regulations where applicable. This Administrative Directive as well as the State of Arizona statute related to human burials (ARS 41-844), are the primary cultural resources compliance mandates addressed in the present project.

The project was conducted from 31 October 2005 to 11 November 2005, under Arizona State Museum (ASM) permit 2005-105ps. A total of 88 crew person-days was expended during fieldwork. All project materials are curated at the Arizona State Museum as Accession number 2005-0564. Dr. William Doelle was the Principal Investigator and Homer Thiel was the Project Director.

PROJECT AREA LOCATION AND DESCRIPTION

The project area is located in NW ¼ of the NW ¼ of Section 12 of Township 14 South, Range 13 East on the USGS topographic quad Tucson, Ariz. (Figure 1.1). More specifically, construction is proposed for the northern and eastern portions of Historic Block 185 bounded on the west by Granada Avenue, on the south by the Tucson Water building and Alameda Street, on the east by Main Avenue, and on the north by Paseo Redondo Drive. The area is roughly L-shaped, with the larger section fronting Paseo Redondo measuring approximately 94 m long (east-west) by 35 m wide (north-south), and the smaller area fronting Main Avenue measuring 33 m long (north-south) by 21 m wide (east-west).

The entire project area was an asphalt-paved parking lot referred to by the City of Tucson as Lot 7, and more commonly known as the Tucson Museum of Art parking lot. A 2-meter-wide area along the eastern boundary of the parking lot was an embankment for a rock wall. This rock wall extended 68 m along the eastern side of the parcel except for a staircase allowing access to Main Avenue. Some portions of the wall have been repaired in the last five years, while other parts appeared to be deteriorating. Although construction date of the wall has not been determined, it likely dates to the first decade of the twentieth century, when a home was constructed on the lot immediately west of the wall. A shorter rock wall, probably constructed at the same

TUCSON WATER WORKS
BUILDING PARKING LOT

Tucson, Pima County, Arizona

Project Area Map

USGS 7.5-minute Topographic Quad
Tucson, Arizona
UTM Projection Zone 12 NAD83

Desert Archaeology, Inc. 2007

N True

Meters
0 500
Feet
0 2000

Figure 1.1. USGS 7.5-minute topographic map, showing the project area location.

Table 1.1. Periodization and chronology of the Santa Cruz Valley-Tucson Basin prehistory.

Era/Period	Phase	Date Range
Historic		
American Statehood	–	A.D. 1912-present
American Territorial	–	A.D. 1856-1912
Mexican	–	A.D. 1821-1856
Spanish	–	A.D. 1694-1821
Protohistoric	–	A.D. 1450-1694
Prehistoric		
Hohokam Classic	Tucson	A.D. 1300-1450
	Tanque Verde	A.D. 1150-1300
Hohokam Sedentary	Late Rincon	A.D. 1100-1150
	Middle Rincon	A.D. 1000-1100
	Early Rincon	A.D. 950-1000
Hohokam Colonial	Rillito	A.D. 850-950
	Cañada del Oro	A.D. 750-850
Hohokam Pioneer	Snaketown	A.D. 700-750
	Tortolita	A.D. 500-700
Early Ceramic	Late Agua Caliente	A.D. 350-500
	Early Agua Caliente	A.D. 50-350
Early Agricultural	Late Cienega	400 B.C.-A.D. 50
	Early Cienega	800-400 B.C.
	San Pedro	1200-800 B.C.
	(Unnamed)	2100-1200 B.C.
Archaic	Chiricahua	3500-2100 B.C.
	(Occupation gap?)	6500-3500 B.C.
	Sulphur Springs-Ventana	7500-6500 B.C.
Paleoindian		11,500?-7500 B.C.

time, ran along Paseo Redondo and was in poor condition along its western side. That portion of Block 185 occupied by the Tucson Water building is not included in the project area.

The City of Tucson proposed selling the project area to a private developer who would construct an underground parking structure, retail stores, and residential housing. The construction activities for this project had the potential to destroy or damage any subsurface cultural resources present within the parcel.

The archaeological fieldwork on Lot 7 resulted in the discovery of 33 historic features associated with AZ BB:13:756 (ASM) and one prehistoric and one historic irrigation canal, AZ BB:13:757 (ASM). Many features were excavated, resulting in the recovery of artifacts dating from the Prehistoric to the Historic era. The features and artifacts were used to address several research issues, including recovering information about the irrigation systems present on the eastern side of the Santa Cruz River, the use of the area during the years the Tucson Presidio was present on the terrace overlooking the site, and a look at ethnicity and socioeconomic status of residents of the block and an adjacent property. Through the completion of this data recovery program, DesertArchaeology recommends construction work proceed as planned.

ARCHAEOLOGICAL BACKGROUND OF THE PROJECT AREA

Tucson's birthplace is a rich floodplain created by the Santa Cruz River as it winds around the base of a large volcanic hill. As the river approaches this area, the primarily underground flow is pushed closer to the surface by the volcanic formations. During the Paleoindian period (Table 1.1), the first human inhabitants of the area discovered a wide, shallow river running past the base of what we now call Sentinel Peak (A-Mountain). This desert oasis attracted wild game and supported lush vegetation. Paleoindians used stone, bone, and wooden tools to hunt animals and gather wild plants to support small groups of people as they moved about the region.

Paleoindian Period (11,500?-7500 B.C.)

Archaeological investigations suggest the Tucson Basin was initially occupied some 13,000 years ago,

a time much wetter and cooler than today. The Paleoindian period is characterized by small, mobile groups of hunter-gatherers who briefly occupied temporary campsites as they moved across the countryside in search of food and other resources (Cordell 1997:67). The hunting of large mammals, such as mammoth and bison, was a particular focus of the subsistence economy. A Clovis point characteristic of the Paleoindian period (circa 9500 B.C.) was collected from the Valencia site, AZ BB:13:74 (ASM), located along the Santa Cruz River in the southern Tucson Basin (Doelle 1985:182-183). Another Paleoindian point was found in Rattlesnake Pass, in the northern Tucson Basin (Huckell 1982). These rare finds suggest prehistoric use of the Tucson area probably began at this time. Paleoindian use of the Tucson Basin is supported by archaeological investigations in the nearby San Pedro Valley and elsewhere in southern Arizona, where Clovis points have been discovered in association with extinct mammoth and bison remains (Huckell 1993, 1995). However, because Paleoindian sites have yet to be found in the Tucson Basin, the extent and the intensity of this occupation are unknown.

Archaic Period (7500-2100 B.C.)

The transition from the Paleoindian to the Archaic period was accompanied by marked climatic changes. During this time, the environment came to look much as today. Archaic period groups pursued a mixed subsistence strategy, characterized by intensive wild plant gathering and the hunting of small animals. The only Early Archaic period (7500-6500 B.C.) site known from the Tucson Basin is found in Ruelas Canyon, south of the Tortolita Mountains (Swartz 1998:24). However, Middle Archaic period sites dating between 3500 and 2100 B.C. are known from the bajada zone surrounding Tucson, and, to a lesser extent, from floodplain and mountain areas. Investigations conducted at Middle Archaic period sites include excavations along the Santa Cruz River (Gregory 1999), in the northern Tucson Basin (Roth 1989), at the La Paloma development (Dart 1986), and along Ventana Canyon Wash and Sabino Creek (Dart 1984; Douglas and Craig 1986). Archaic period sites in the Santa Cruz floodplain were found to be deeply buried by alluvial sediments, suggesting more of these sites are present, but undiscovered, due to the lack of surface evidence.

Early Agricultural Period (2100 B.C.-A.D. 50)

The Early Agricultural period (previously identified as the Late Archaic period) was when domesticated plant species were first cultivated in the Greater Southwest. The precise timing of the introduction of cultigens from Mexico is not known, although direct radiocarbon dates on maize indicate it was being cultivated in the Tucson Basin and several other parts of the Southwest by 2100 B.C. (Mabry 2007). By at least 400 B.C., groups were living in substantial agricultural settlements in the floodplain of the Santa Cruz River. Recent archaeological investigations suggest canal irrigation also began sometime during this period.

Several Early Agricultural period sites are known from the Tucson Basin and its vicinity (Diehl 1997a; Ezzo and Deaver 1998; Freeman 1998; Gregory 2001; Huckell and Huckell 1984; Huckell et al. 1995; Mabry 2007; Mabry 1998; Roth 1989). While there is variability among these sites—probably due to the 2,150 years included in the period—all excavated sites to date contain small, round, or oval semisubterranean pithouses, many with large internal storage pits. At some sites, a larger round structure is also present, which is thought to have been for communal or ritual purposes.

Stylistically distinctive Cienega, Cortaro, and San Pedro type projectile points are common at Early Agricultural sites, as are a range of ground stone and flaked stone tools, ornaments, and shell jewelry (Diehl 1997a; Mabry 1998). The fact that shell and some of the material used for stone tools and ornaments were not locally available in the Tucson area suggests trade networks were operating. Agriculture, particularly the cultivation of corn, was important in the diet and increased in importance through time. However, gathered wild plants—such as tansy mustard and amaranth seeds, mesquite seeds and pods, and agave hearts—were also frequently used resources. As in the preceding Archaic period, the hunting of animals, such as deer, cottontail rabbits, and jackrabbits, continued to provide an important source of protein.

Early Ceramic Period (A.D. 50-500)

Although ceramic artifacts, including figurines and crude pottery, were first produced in the Tucson Basin during the Early Agricultural period (Heidke and Ferg 2001; Heidke et al. 1998), the widespread use of ceramic containers marks the transition to the Early Ceramic period (Huckell 1993). Undecorated plain ware pottery was widely used in the Tucson Basin by about A.D. 50, marking the start of the Early Agua Caliente phase (A.D. 50-350).

Architectural features became more formalized and substantial during the Early Ceramic period, representing a greater investment of effort in construction, and perhaps more permanent settlement.

A number of pithouse styles are present, including small, round, and basin-shaped houses, as well as slightly larger subrectangular structures. As during the Early Agricultural period, a class of significantly larger structures may have functioned in a communal or ritual manner.

Reliance on agricultural crops continued to increase, and a wide variety of cultigens—including maize, beans, squash, cotton, and agave—were an integral part of the subsistence economy. Populations grew as farmers expanded their crop production to floodplain land near permanently flowing streams, and it is assumed that canal irrigation systems also expanded. Evidence from archaeological excavations indicates trade in shell, turquoise, obsidian, and other materials intensified and new trade networks developed.

Hohokam Sequence (A.D. 500-1450)

The Hohokam tradition developed in the deserts of central and southern Arizona sometime around A.D. 500, and is characterized by the introduction of red ware and decorated ceramics: red-on-buff wares in the Phoenix Basin and red-on-brown wares in the Tucson Basin (Doyel 1991; Wallace et al. 1995). Red ware pottery was introduced to the ceramic assemblage during the Tortolita phase (A.D. 500-700). The addition of a number of new vessel forms suggests that, by this time, ceramics were utilized for a multitude of purposes.

Through time, Hohokam artisans embellished their pottery with highly distinctive geometric figures and life forms such as birds, humans, and reptiles. The Hohokam diverged from the preceding periods in a number of other important ways: (1) pithouses were clustered into formalized courtyard groups, which, in turn, were organized into larger village segments, each with their own roasting area and cemetery; (2) new burial practices appeared (cremation instead of inhumation) in conjunction with special artifacts associated with death rituals; (3) canal irrigation systems were expanded and, particularly in the Phoenix Basin, represented huge investments of organized labor and time; and (4) large communal or ritual features, such as ballcourts and platform mounds, were constructed at many village sites.

The Hohokam sequence is divided into the pre-Classic (A.D. 500-1150) and Classic (A.D. 1150-1450). At the start of the pre-Classic, small pithouse hamlets and villages were clustered around the Santa Cruz River. However, beginning about A.D. 750, large, nucleated villages were established along the river or major tributaries, with smaller settlements in outlying areas serving as seasonal camps for functionally specific tasks such as hunting, gathering, or limited agriculture (Doelle and Wallace 1991). At this time, large, basin-shaped features with earthen embankments, called ballcourts, were constructed at a number of the riverine villages. Although the exact function of these features is unknown, they probably served as arenas for playing a type of ball game, as well as places for holding religious ceremonies and for bringing different groups together for trade and other communal purposes (Wilcox 1991; Wilcox and Sternberg 1983).

Between A.D. 950 and 1150, Hohokam settlement in the Tucson area became even more dispersed, with people utilizing the extensive bajada zone as well as the valley floor (Doelle and Wallace 1986). An increase in population is apparent, and both functionally specific seasonal sites, as well as more permanent habitations, were now situated away from the river; however, the largest sites were still on the terraces just above the Santa Cruz. There is strong archaeological evidence for increasing specialization in ceramic manufacture at this time, with some village sites producing decorated red-on-brown ceramics for trade throughout the Tucson area (Harry 1995; Heidke 1988, 1996; Huntington 1986).

The Classic period is marked by dramatic changes in settlement patterns and possibly in social organization. Aboveground adobe compound architecture appeared for the first time, supplementing, but not replacing, the traditional semisubterranean pithouse architecture (Haury 1928; Wallace 1995). Although corn agriculture was still the primary subsistence focus, extremely large Classic period rock-pile field systems associated with the cultivation of agave have been found in both the northern and southern portions of the Tucson Basin (Doelle and Wallace 1991; Fish et al. 1992).

Platform mounds were also constructed at a number of Tucson Basin villages sometime around A.D. 1275-1300 (Gabel 1931). These features are found throughout southern and central Arizona, and consist of a central structure that was deliberately filled to support an elevated room upon a platform. The function of the elevated room is unclear; some were undoubtedly used for habitation, whereas others may have been primarily ceremonial. Building a platform mound took organized and directed labor, and the mounds are thought to be symbols of a socially differentiated society (Doelle et al. 1995; Elson 1998; Fish et al. 1992; Gregory 1987). By the time platform mounds were constructed, most smaller sites had been abandoned, and Tucson Basin settlement was largely concentrated at only a half-dozen large, aggregated communities. Recent research has suggested that aggregation and abandonment in the Tucson area may have been related to an increase in conflict, and possibly warfare (Wallace and Doelle 1998). By

A.D. 1450, the Hohokam tradition, as presently known, disappeared from the archaeological record.

Protohistoric Period (A.D. 1450-1694)

Little is known of the period from A.D. 1450, when the Hohokam disappeared from view, to A.D. 1694, when Father Kino first traveled to the Tucson Basin (Doelle and Wallace 1990). By that time, the Tohono O'odham were living in the arid desert regions west of the Santa Cruz River, and groups who lived in the San Pedro and Santa Cruz valleys were known as the Sobaipuri (Doelle and Wallace 1990; Masse 1981). Both groups spoke the Piman language and, according to historic accounts and archaeological investigations, they lived in oval jacal surface dwellings rather than pithouses. One of the larger Sobaipuri communities was located at Bac, where the Spanish Jesuits, and later the Franciscans, constructed the mission of San Xavier del Bac (Huckell 1993; Ravesloot 1987). However, due to the paucity of historic documents and archaeological research, little can be said regarding this inadequately understood period.

Spanish and Mexican Periods (A.D. 1694-1856)

Spanish exploration of southern Arizona began at the end of the seventeenth century A.D. Early Spanish explorers in the Southwest noted the presence of Native Americans living in what is now the Tucson area. These groups comprised the largest concentration of population in southern Arizona (Doelle and Wallace 1990). In 1757, Father Bernard Middendorf arrived in the Tucson area, establishing the first local Spanish presence. Fifteen years later, the construction of the San Agustín Mission near a Native American village at the base of Sentinel Peak was initiated, and by 1771, a church was completed (Dobyns 1976:33).

In 1775, the site for the Presidio of Tucson was selected on the eastern margin of the Santa Cruz River floodplain. In 1776, Spanish soldiers from the older presidio at Tubac moved north to Tucson, and construction of defensive and residential structures began. The Presidio of Tucson was one of several forts built to counter the threat of Apache raiding groups who had entered the region at about the same time as the Spanish (Thiel et al. 1995; Wilcox 1981). Spanish colonists soon arrived to farm the relatively lush banks of the Santa Cruz River, to mine the surrounding hills, and to graze cattle. Many indigenous settlers were attracted to the area by the availability of Spanish products and the relative safety provided by the presidio. The Spanish and Native American farmers grew corn, wheat, and vegetables, and cultivated fruit orchards, and the San Agustín Mission was known for its impressive gardens (Williams 1986).

In 1821, Mexico gained independence from Spain, and Mexican settlers continued farming, ranching, and mining activities in the Tucson Basin. By 1831, the San Agustín Mission had been abandoned (Elson and Doelle 1987; Hard and Doelle 1978), although settlers continued to seek the protection of the presidio walls.

American Period (1856-Present)

Through the 1848 settlement of the Mexican-American War and the 1853 Gadsden Purchase, Mexico ceded much of the Greater Southwest to the United States, setting the international boundary at its present location. The U.S. Army established its first outpost in Tucson in 1856, and in 1873, founded Fort Lowell at the confluence of Tanque Verde Creek and Pantano Wash to guard against continued Apache raiding.

Railroads arrived in Tucson and the surrounding areas in the 1880s, opening the floodgates of Anglo-American settlement. With the surrender of Geronimo in 1886, Apache raiding ended, and settlement in the region boomed. Local industries associated with mining and manufacturing continued to fuel growth, and the railroad supplied the Santa Cruz River Valley with commodities it could not produce locally. Meanwhile, homesteaders established numerous cattle ranches in outlying areas, bringing additional residents and income to the area (Mabry et al. 1994).

HISTORY OF BLOCK 185

The location of the Presidio San Agustín del Tucson, a Spanish military fortress, was selected on 20 August 1775, on the terrace immediately east of Historic Block 185. Construction began in 1776, and was probably completed in 1783. The western wall of the presidio ran from present-day Pennington Street north to Washington Street beneath what is now Main Avenue. Recent excavations between the Fish House and Stevens House along the east side of Main Avenue suggest the wall foundations are probably in the zone running from beneath the sidewalk along the eastern side of Main Avenue out into the middle of the street (Thiel and Mabry 2006). During the Presidio "era" (1771-1831), the area of Historic Block 185 was agricultural fields.

The first map of Tucson, drafted in 1862 by John Mills, shows a U-shaped building south of an agri-

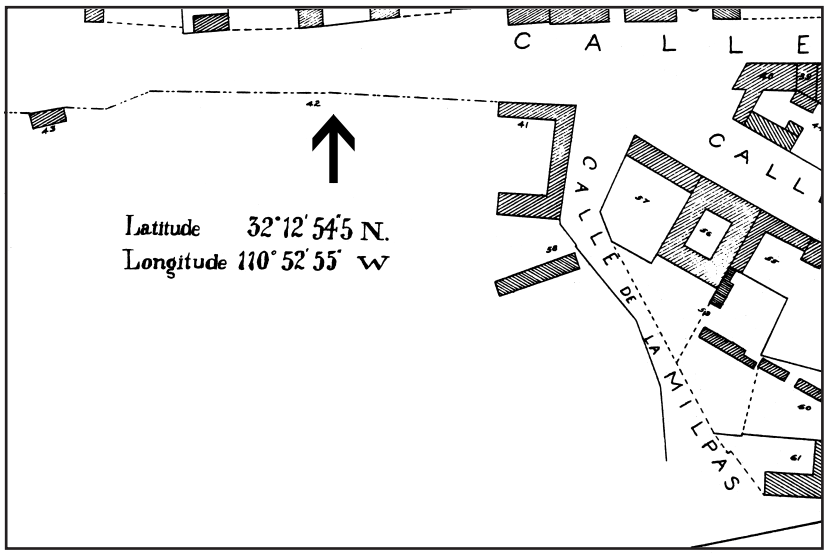

Figure 1.2. A portion of the 1862 Fergusson map, with the approximate project area denoted with an arrow.

cultural field apparently owned by George Tyroll. The project area is within this field (Figure 1.2).

The Village of Tucson was surveyed in 1872, and the project area was formally designated Block 185 (Figure 1.3). This block was irregular in shape, apparently due to existing field boundaries. It was later divided into numerous lots, with Lot 3 and Lot 5 forming the project area. As noted, the Lot 7 designation refers to City of Tucson Parking Lot 7 at the Tucson Museum of Art, not the land division. The project area was initially owned by Francisco Romero, a prominent local rancher, who purchased a deed verifying his ownership from the Village of Tucson on 9 September 1872 (Pima County Deed Record Entry [DRE] 32:72).

The 1883 and 1886 Sanborn Fire Insurance maps show that the U-shaped building (present in 1862) was occupied by Chinese immigrants (Figure 1.4). Other Chinese lived nearby in shanties. A canal ran along the backside (northern side) of the U-shaped building before turning and heading north along the base of the terrace, the eastern edge of Block 185. Unfortunately, the Sanborn maps for these years do not depict Block 185 in detail, so the course of the canal is uncertain.

Francisco and Victoriana Romero sold their field property, Lot 3, to Lillie Hughes on 20 November 1899 (Pima County [DRE] 30:286). The 1901 and 1904 Sanborn maps indicate the pump house for the Tucson Natatorium, the community's first enclosed swimming pool, was located on the southeastern corner of the block. The irrigation canal is no longer depicted and was probably filled in.

Mr. and Mrs. S. S. Hughes sold the Lot 3 property to Mrs. Cordelia F. Cater on 18 January 1905 (Pima County [DRE] 37:202). The property went through several owners in subsequent years (Pima County [DRE] 53:483, 75:588, and 41:470).

On 26 September 1907, Hiram W. Fenner purchased Lot 5 (Pima County [DRE] 17:261). Around

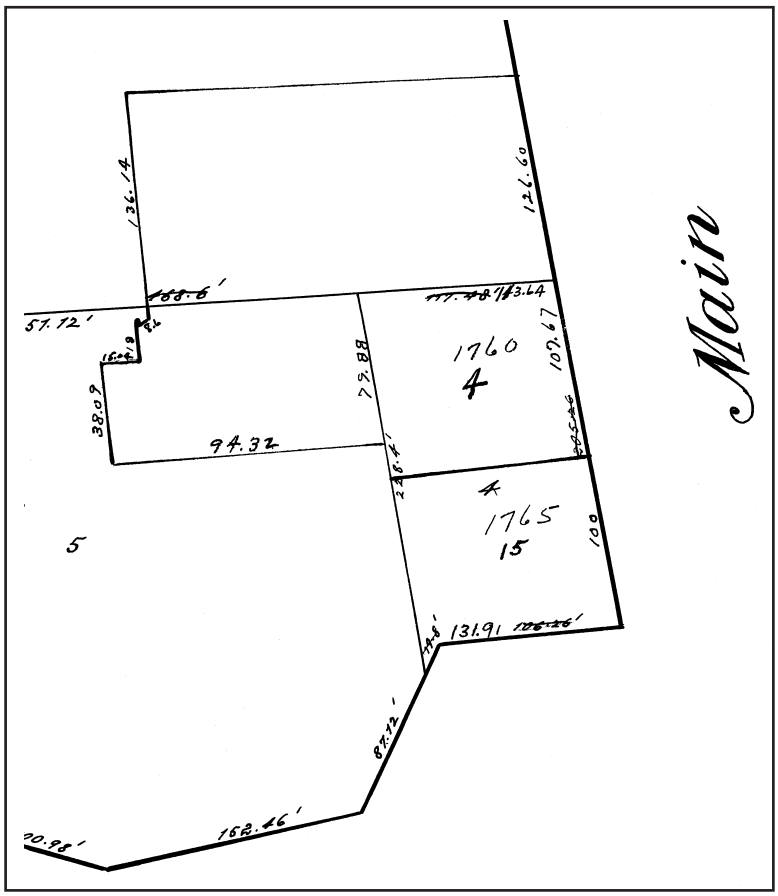

Figure 1.3. A portion of the Historic Block 185 map from the 1902-1904 Block Book (courtesy Arizona Historical Society, Tucson).

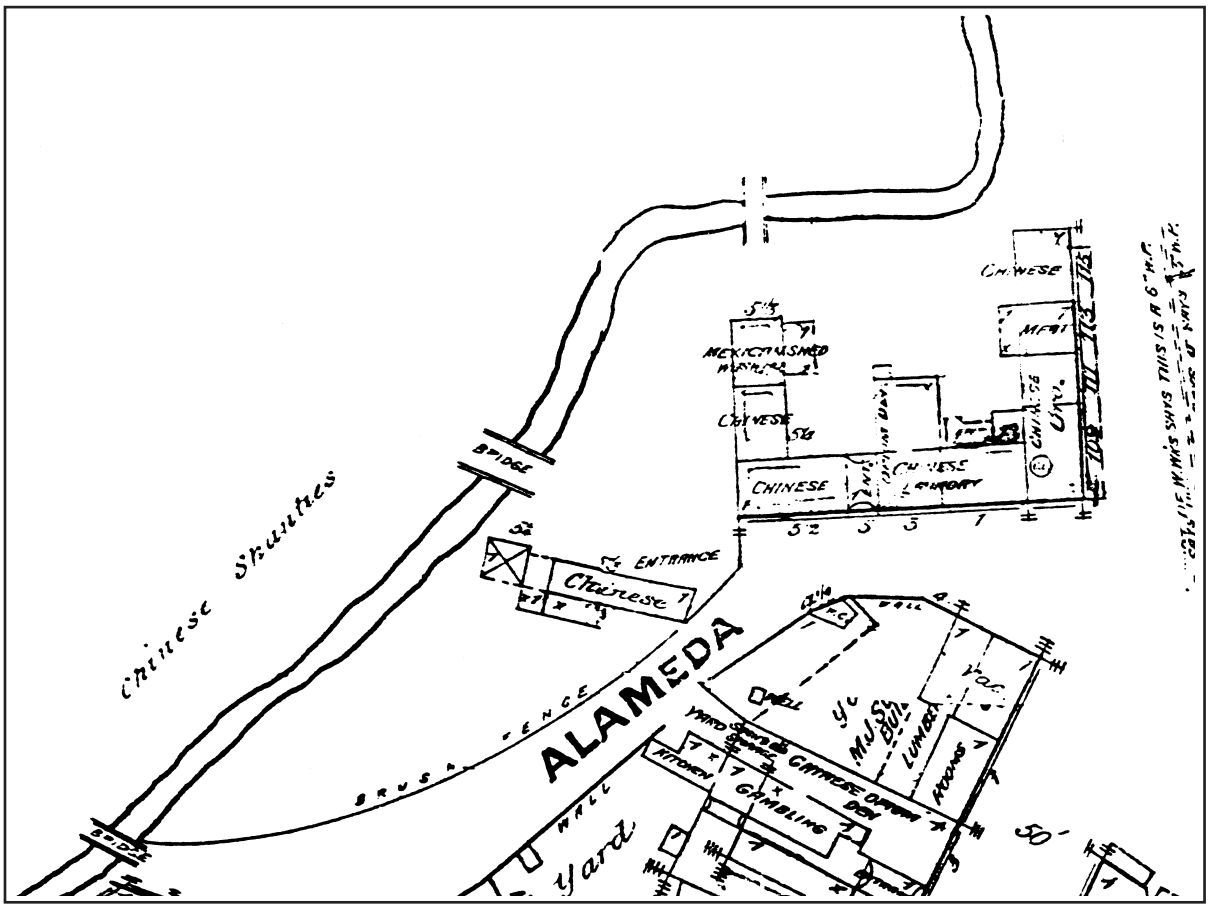

Figure 1.4. The 1883 Sanborn Fire Insurance map of the area adjacent to Block 185.

1908, Dr. Hiram and Laura Fenner built a house at 2 Paseo Redondo Drive. The 1909 Sanborn map reveals a one-and-a-half story house on the northern side of the lot (Figure 1.5). Two rooms were present along the southern side of the house; a concrete block "auto house" was south of the dwelling.

Around 1917, cattleman Deming Isaacson and his wife Cora built a house on Lot 3, at the northwestern corner of the block. This house was designated 4 Paseo Redondo Drive. At about the same time, the Tucson's Women's Club built a clubhouse on Alameda Street, the present location of the Tucson Water building. These structures are visible on the 1944 Sanborn Fire Insurance map (Figure 1.6) and in an aerial photograph of the area taken in the 1950s (Figure 1.7).

More detailed biographical information on the residents of the two homes is presented below.

2 Paseo Redondo

Doctor Hiram W. Fenner and his wife Laura Ida (Hemme) Fenner lived in their home at 2 Paseo Redondo from 1913 until 1921.

Hiram Fenner was born in 1859, Bucyrus, Crawford County, Ohio, son of Hiram Fenner and Elizabeth Meyers (Figure 1.8). On 23 June 1860, the census taker found Hiram living with his parents and siblings Mary, Samuel, and Milly in Bucyrus. His father worked as a tailor and owned $6,000 in real estate and $4,000 in personal property (1860 U.S. census, Crawford County, Ohio, Bucyrus, pp. 92-93). On 30 June 1870, 11-year-old Hiram lived with his parents and sister Millie in Bucyrus. His father was a retired clothing manufacturer who owned $21,000 in real estate, a fairly high sum at that time (1870 U.S. census, Crawford County, Ohio, Bucyrus, p. 354). Fenner attended school in Terre Haute, Indiana, and studied medicine at Medical College, later the University of Cincinnati (Hiram Fenner, biographical folder, ASM). He has not been located on the 1880 census.

Hiram's wife Laura Ida Hemme was born in January 1865, in California, daughter of August Hemme and Minerva E. (—?—). Laura (listed as Ida) was living with her parents and siblings Minnie, William, Clarence, Grace, August, and Minerva in the 12th ward of San Francisco on 28 June 1870. She had attended school the previous year (1870 U.S. census, San Francisco County, California, San Fran-

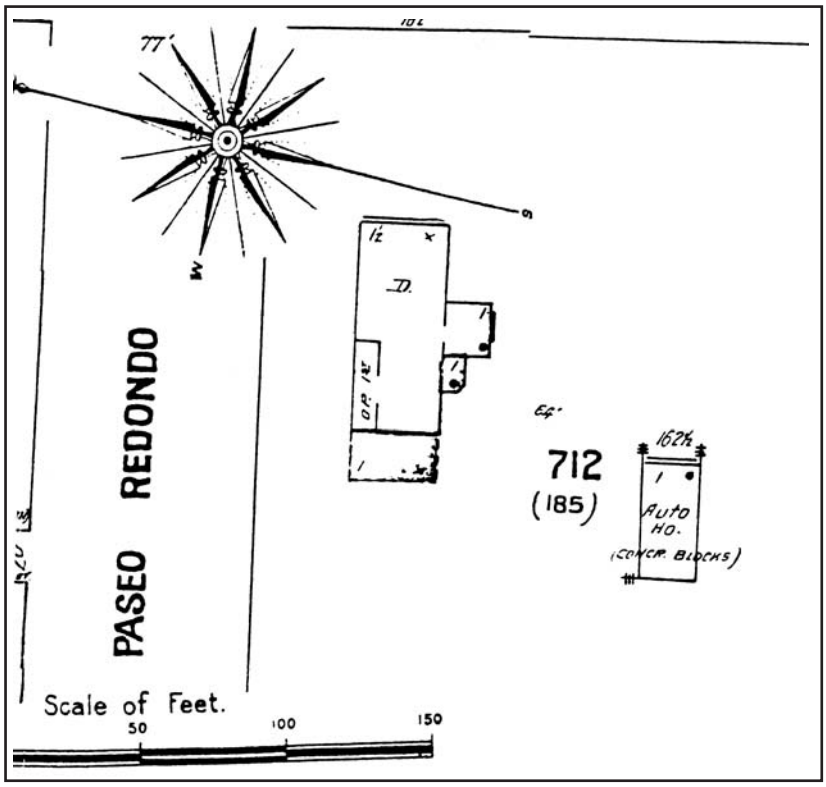

Figure 1.5. The 1909 Sanborn Fire Insurance map of Block 185.

cisco 12th ward, p. 31). On 7 June 1880, Laura was living with her parents and siblings Gracie, August, Minerva, and Gertrude in San Francisco. Her father was a native of Hanover (Germany) and was working as an assayer (1880 U.S. census, San Francisco County, California, San Francisco, ED 201, p. 19).

Hiram moved to Arizona in 1881, initially living in Bisbee while working as the physician for the Copper Queen Mining company. He moved to Tucson in 1883 (*Tucson Citizen* 1929). Fenner had an office at 14 Congress Street. He was a member of the Owls Club, a group of single wealthy men who lived in a house on Main Avenue (*Tucson Citizen* 1929) After his marriage, he lived at the north end of Church Avenue (unsourced newspaper clipping, Hiram Fenner, biographical folder, AHS/SAD). He later opened an office at the southeastern corner of Pennington Street and Stone Avenue.

Hiram and Laura were married circa 1890, probably in California. On 9 June 1900, the couple, Hiram's 15-year-old niece, and a Chinese cook Gon Wo lived at 7 West Pennington Street in Tucson. Hiram worked as a physician (1900 U.S. census, Pima County, Arizona, Tucson, ED 49, sheet 9B).

On 25 April 1910, the couple, their niece Elizabeth LeBarron, and their Chinese cook Gon Wo lived at the house on Paseo Redondo (1910 U.S. census, Pima County, Arizona, Tucson, ED 102, sheets 12B-13A).

Fenner was the chairman of the directorate of the Red Cross while living in Tucson. He opposed a benefit bullfight planned for Easter (unsourced newspaper clipping, H. W. Fenner, biographical folder, AHS/SAD).

On 8 January 1920, Hiram, Laura, and 54-year-old Gon Wo still resided at 2 Paseo Redondo (1920 U.S. census, Pima County, Arizona, Tucson, ED 92, sheet 9A).

The couple moved to Alameda County, California, in 1921. Fenner died while doing his morning exercises on 4 May 1929 (*Tucson Citizen* 1929). On 4 April 1930, Laura and Gon Wo were living on Camino Real Road in Carmel-by-the-Sea in Monterey County, California (1930 U.S. census, Monterey County, California, Carmel-by-the-Sea, ED 44, sheet 2B). Laura died on 19 May 1940, in Alameda County (California Death Records, <www.roots-web.com>).

Dr. Samuel Watson and his wife Jane (Shreeves) Watson moved into 2 Paseo Redondo in 1922. Samuel Humes Watson was born on 15 March 1877, in Vinton, Benton County, Iowa, son of Peter Wetty Watson and Blanche V. Hughes [or Hewes]. Samuel lived with his parents in Vinton on 1 June 1880. His father worked as a banker (1880 U.S. census, Benton County, Iowa, Vinton, ED 39, p. 14). He attended Cornell College in Mount Vernon, Iowa, from 1893 to 1894. He later transferred to Rush Medical College in Chicago, graduating from there in 1899 (*Arizona Daily Star* 1948). On 23 June 1900, Samuel lived in a hotel in Leroy township, Benton County, Iowa, a short distance from his future wife. He was working as a surgical physician (1900 U.S. census, Benton County, Iowa, Leroy township, ED 16, sheet 12B).

Jane (Shreeves) Watson was born in June 1888, in Iowa, daughter of John R. Shreeves and Adaline E. (—?—). On 26 June 1900, she lived with her parents and siblings Russel and Mary, and aunt Jessie Shreeves in Leroy township, Benton County, Iowa. Her father worked as a broker, and Jane had attended school for 9 months in the preceding year (1900 U.S. census, Benton County, Iowa, Leroy township, ED 16, sheet 14A).

Samuel and Jane were married on 10 October 1906, at Blairstown, Benton County, Iowa (*Arizona*

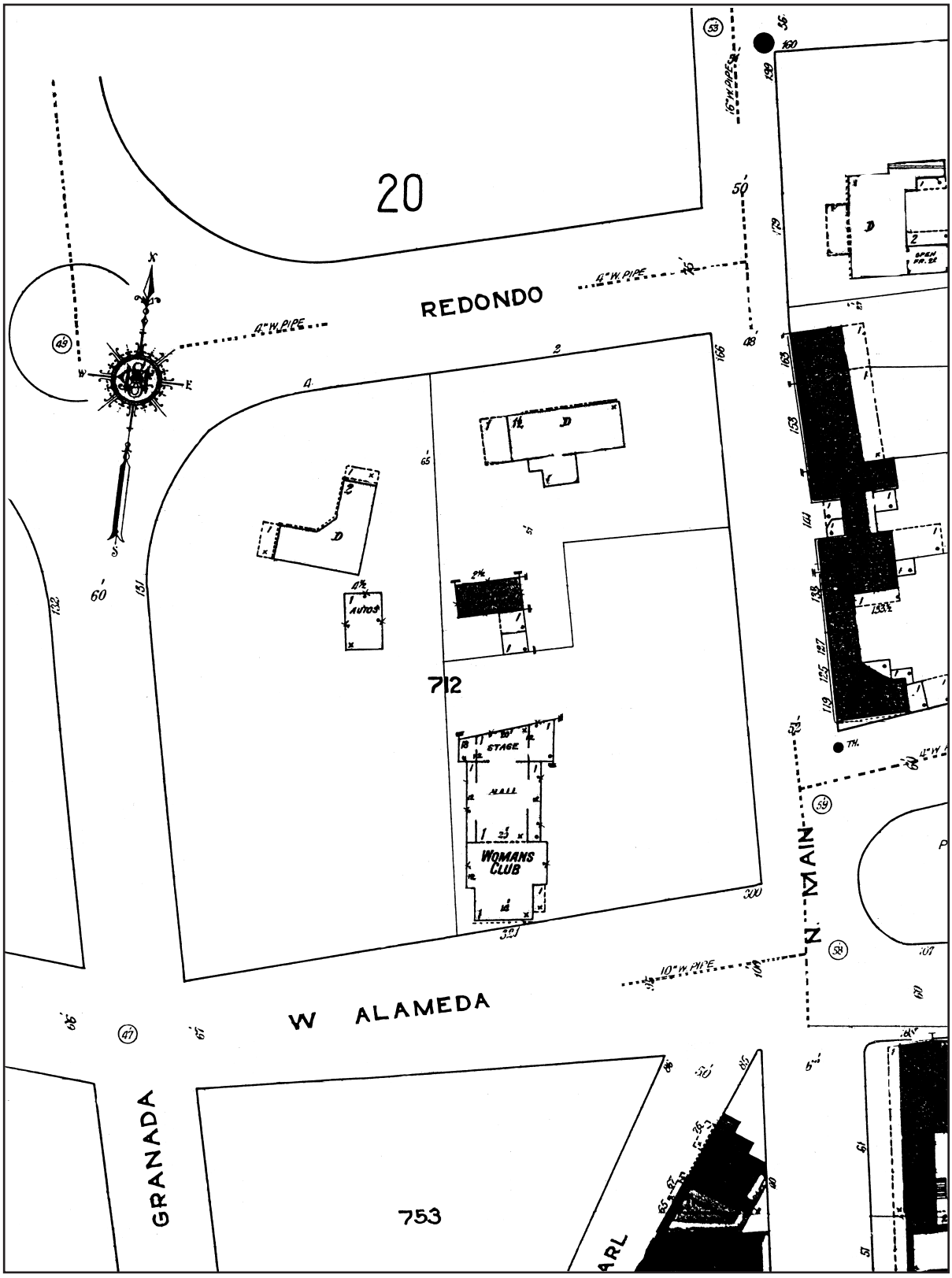

Figure 1.6. The 1944 Sanborn Fire Insurance map of Block 185.

Figure 1.7. A 1950s aerial photograph of the area, with Block 185 noted by an arrow (courtesy Arizona Historical Society, Tucson; PC 177, Magee Collection, Box 2, File 17, #106).

Daily Star 1948). On 15 April 1910, the couple lived on West Spruce Street in Blairstown. Samuel was a physician and surgeon (1910 U.S. census, Benton County, Iowa, Leroy township, ED 16, sheet 12B).

Samuel's health became impaired by tuberculosis, and he moved to Tucson in 1911, seeking to recover. He opened a private practice and became well known for his work on allergies in the Southwest and on intestinal tuberculosis. From 1912 through 1918, he was medical director of the Tucson Arizona Sanitorium. He formed a partnership with Dr. Meade Clyne in 1918, and they were joined by Dr. Charles Kibler in 1919. Watson also served as a member of the staff of St. Mary's Hospital and sanitorium, physician-in-chief at Barfield's sanitorium, St. Luke's In-the-Desert, and at Anson's Rest Home (*Arizona Daily Star* 1948).

On 16 January 1920, Samuel and Jane lived at 829 North 5th Avenue in Tucson, along with Jane's parents. Samuel was working as a physician (1920 U.S. census, Pima County, Arizona, Tucson, ED 96, sheet 1A). In 1922, Dr. Watson and his fellow doctors formed the Tucson Clinic, setting up business at 110 South Scott Street (*Arizona Daily Star* 1948).

The couple, Samuel's mother Blanche, and a housekeeper, Florence Standraff, lived at the house on 8 April 1930 (1930 U.S. census, Pima County, Arizona, Tucson, ED 43, sheet 7B).

Samuel Watson was active in many medical societies.

> . . .He has been a member of the American Medical Association since 1900, and a fellow of the American College of Physicians since 1915. He was a director of the National Tuberculosis Association, 1926-1929, vice president of the Association for Study of Allergy, 1926, and a member of the board of censors for the American Academy of Tuberculosis Physicians. He was a member and councilor for the American Trudeau Society.
>
> Dr. Watson was president of the Arizona State Medical Association, 1928-29, and of the Arizona Anti-Tuberculosis association, 1916. He joined the Pima County Medical Society, which was formed in 1904, shortly after coming to Tucson and was

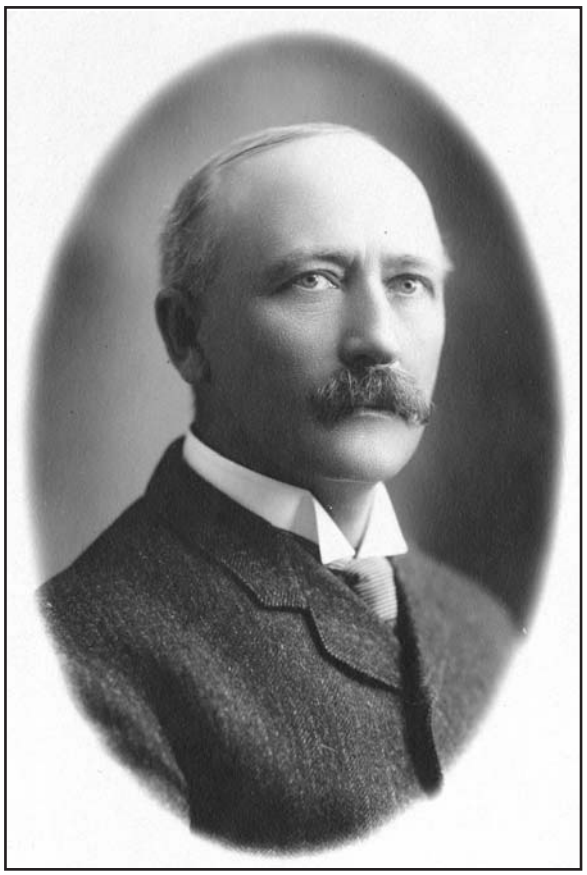

Figure 1.8. Dr. Hiram W. Fenner (courtesy Arizona Historical Society, Tucson; Portrait Dr. Hiram W. Fenner, #29,036).

its vice-president in 1916 and its president in 1918. he was active in the Southwest Medical Association.

Among his brochures were: "Big Little Things in Conquering Tuberculosis," "The Use and Abuse of Heliotherapy in Tuberculosis," and "Etiology of Hayfever in Arizona and the Southwest." Watson was also a founding member of the Tucson Country Club, was a Mason, and also a member of the Elks Lodge (*Arizona Daily Star* 1948).

Samuel died at home on 5 February 1948, from bronchopneumonia, 7 months after suffering a stroke on 8 June 1947. He had partially recovered from the stroke and was confined to his home afterward. His condition worsened in September 1947, ultimately leading to his death. He was cremated at South Lawn Cemetery, and his ashes were interred in the Watson family plot in Vinton, Iowa (Arizona State Department of Health, Standard Certificate of Death) (*Arizona Daily Star* 1948). His widow Jane lived at their home until 1951.

Between 1953 and 1955, Myrtle Ubsdell, widow of John Arnold Ubsdell, lived in the house. In 1957, Mrs. Helen Bohl occupied the home. The house was the residence of Edward C. Jacobs and his wife Carolina from 1960 until 1973. Edward Jacobs was the owner of Jacobs Enterprises and Jake's Quick Lunch in Tucson, according to Tucson city directories.

The Fenner home was vacant in 1974 and 1975; it was demolished, and the property became the City of Tucson carpool lot in 1978.

4 Paseo Redondo

The northwestern corner of Block 185 was empty until the construction of a brick home there around 1917. Deming Welch Isaacson and his wife Coralyn B. (—?—) moved into their new home at 4 Paseo Redondo in 1920. Deming was born on 27 December 1884, in England. He had registered for the World War I draft on 11 September 1918, at which time he lived with his wife Coralyn at Hot Springs Ranch in Cochise County, Arizona. He worked as a rancher and was tall, slender, had dark gray eyes, and brown hair (Deming Welch Isaacson WWI Draft Registration Card, online at <www.ancestry.com>). Cora was born on 14 September 1883, in Ohio.

On 8 January 1920, the couple lived at 4 Paseo Redondo with their son Blaine and two servants, Margaret Gaybrook and Amelia Manuel. Deming was working as a cattle rancher (1920 U.S. census, Pima County, Arizona, Tucson, ED 92, sheet 9A).

The Isaacson's sold their home to Mrs. Mary C. Wakefield in 1923, when they moved to California. On 3 April 1930, the couple, their son Blaine, and a servant named Juan Galaz lived at 301 East Hadley Street in Whittier, Los Angeles County. Deming was working as a meat packer (1930 U.S. census, Los Angeles County, California, Whittier, ED 1544, p. 2B). Deming died on 23 September 1966, in Santa Barbara County, California (California Death Index, <www.rootsweb.com>). Coralyn died on 3 March 1976, in Santa Barbara County (California Death Index, <www.rootsweb.com>).

Mary Wiley (Cameron) Wakefield was born in 1884, in Brickerville, Pennsylvania, daughter of Colin Cameron and Alice Faith Smith. She came to Arizona in 1890, after her father purchased a ranch near Patagonia. Mary attended Millersville College in Pennsylvania, and the Shipley School at Bryn Mawr, Pennsylvania, graduating from there in 1904. She continued her studies at the University of Bonn in Germany and the Sorbonne in Paris (*Tucson Citizen* 1971).

Mary was married to Walter James Wakefield on 10 October 1908, at the Presbyterian chapel in Tucson. "Owing to the recent bereavement of the family

of the bride the wedding was celebrated with the greatest simplicity and privacy" (*Arizona Daily Star* 1933; Negley and Lindley 1994:80). Walter was born on 22 March 1882, son of Lyman W. Wakefield and Anna R. Patrick. On 4 June 1900, Walter was living with his parents and siblings—William, Edith, Clarence, and Margaret—at 205 East 3rd Street in Tucson. His father was the County Sheriff (1900 U.S. census, Pima County, Arizona, Tucson, ED 47, sheet 4A).

In April 1910, the couple lived on the 200 block of Main Avenue in Tucson (1910 U.S. census, Pima County, Arizona, Tucson, ED 102, sheet 15A). Walter was president of Tucson Warehouse & Transfer, a company that specialized in storage and freight shipping. He was also a Tucson city councilman. In March 1918, he was named a director of the Arizona National Bank. At the time, he was overseeing construction of a new four-story warehouse on 5th Street (*Tucson Citizen* 1918).

The couple lived at 238 Granada Street in Tucson, where Walter died on 8 February 1919, during the influenza epidemic; he was buried at Evergreen Cemetery (Arizona State Board of Health, Original Certificate of Death). After Walter's death, Mary became president of Tucson Warehouse & Transfer, a position she held for more than 50 years. She was an astute businesswoman, later becoming president of Home Gas & Appliance Co. Mary also started the Southern Utilities Company of Patagonia and the Wakefield Investment Company (*Tucson Citizen* 1971).

On 8 January 1920, Mary lived at 238 Granada Street with her sister Alice Petrie Fensdale, a friend May Petrie Harvey, and a cook, Mary Scott (1920 U.S. census, Pima County, Arizona, Tucson, ED 92, sheet 9A). Mary's brother Colin Cameron and their mother Alice F. Cameron lived next door.

In 1925, Mrs. Wakefield spent $100,000 constructing an ice and cold storage building on North 7th Avenue between Sixth and Seventh streets (*Tucson Citizen* 1925).

On 8 April 1930, Mary lived with two roomers and a niece, Mary Ann Adams (1930 U.S. census, Pima County, Arizona, Tucson, ED 43, sheet 7B).

Mary Wakefield died on 28 June 1971, after a long illness (*Tucson Citizen* 1971). Her home was demolished after her death, and the property was converted into a City of Tucson parking lot.

PREVIOUS ARCHAEOLOGICAL RESEARCH

Several archaeological projects have been previously conducted in the general vicinity of Historic Block 185. Trenching along Alameda Street west of Granada Avenue on the block immediately west of Block 185 resulted in the discovery of a historic canal and scattered trash, with the observed artifacts dating to the late nineteenth century. The canal was described as 1.8 m wide by 33 cm deep. The top of the canal may have been removed by historic road-grading work. Only a small portion of the canal was located, and it was not possible to determine its course (Faught 1995:246).

Two city blocks to the southwest is the location of the U.S. Federal Courthouse. Archaeological testing in 1995 revealed the remains of several historic structures, including the El Paso & Southwestern Railroad freight depot and stables once owned by the City of Tucson. A historic canal was found south of these structures (Thiel 1996a). Work beneath the current alignment of Granada Avenue, immediately east of the courthouse location, uncovered numerous American Territorial period features (Heidke and Masse 1988).

Monitoring was conducted at Historic Block 188, three blocks to the southwest, in 1984. Historic foundations and a cistern were located, but no archaeological data recovery was conducted (Arizona State Museum site files).

Extensive fieldwork has been undertaken within the Tucson Presidio, located on the terrace immediately east of Historic Block 185. Various projects conducted since 1992 have located the eastern and western walls of the fort, the northeastern tower, portions of several interior structures, and large numbers of artifacts and food remains associated with the occupation of the presidio from about 1776 to the 1850s. Hidden beneath the presidio remnants are pit structures and other features dating to the Early Agricultural period (400 B.C-A.D. 50) and the Hohokam Pioneer, Colonial, and Sedentary periods (A.D. 550-1300). The size and layout of these villages is slowly being revealed as new projects locate additional features (Thiel 1996b, 2004; Thiel and Mabry 2006; Thiel et al. 1995).

Testing and data recovery at Historic Block 185 took place in 2005. The results of the fieldwork are described in Chapter 2.

CHAPTER 2

ARCHAEOLOGICAL INVESTIGATIONS

J. Homer Thiel
Desert Archaeology, Inc.

Archaeological testing and data recovery resulted in the documentation of 33 features located on Historic City of Tucson Block 185, AZ BB:13:756 (ASM), as well as portions of four irrigation features related to a canal system located on the eastern side of the Santa Cruz River, designated AZ BB:13:757 (ASM). After a short discussion of research issues, these features are described here.

RESEARCH ISSUES

The proposed testing was expected to provide information about prehistoric and historic use of the floodplain immediately adjacent to the first terrace east of the Santa Cruz River. Three research issues used to study the site are presented below. These issues provide guidelines from which to evaluate the eligibility of the cultural resources within the project area for nomination to the National Register of Historic Places.

Irrigation Agriculture

It was highly likely that both prehistoric and historic irrigation canals would be present on Block 185. Recent work along the Santa Cruz River during the Interstate 10 (I-10) improvements and the Rio Nuevo project have documented extensive canal systems dating back to 1200 B.C. The Early Agricultural period canals led to field systems where early farmers tended crops of corn, cotton, and tobacco. A set of Hohokam canals have been discovered in the La Entrada property, several blocks northwest of Block 185, running northward toward St. Mary's Road (Thiel 2005). Many more Hohokam canals have been found on the western side of the Santa Cruz River, where extensive archaeological exploration has recently been conducted (Freeman et al. 1999). As additional segments of Hohokam canals are revealed, a better understanding of the overall irrigation system is developed.

The 1883 Sanborn map indicates at least one historic canal is present within the project area. This canal probably dates to at least the 1770s, and it likely brought water to the Tucson Presidio; it remained in use until the late 1890s. A few historic canals have also been identified on the eastern side of the Santa Cruz River, one at the Federal Courthouse property and several at the León farmsite (Thiel 2005). Two of the three primary historic canals on the western side of the Santa Cruz have been identified in the last 10 years, as have other smaller historic *acequias* (Thiel 1995).

Basic information about these canals, such as their size, shape, depth, and orientation, allow for the reconstruction of canal systems. The Block 185 parcel is in an area where no previous work had been done and the presence or absence of canals was unknown.

The Tucson Presidio

Established in August 1775, the Tucson Presidio was the defining feature in Tucson from its completion in 1783 through the 1850s (Thiel 2004; Thiel et al. 1995). The current project area is located immediately west of the western presidio wall. Folklore has the adobe for the presidio walls mined from adjacent areas. Large borrow pits, dug to retrieve dirt to make adobe bricks, were considered likely to be present within the project area. Small pits recently found at the northeastern corner of the presidio during the Rio Nuevo project yielded large quantities of artifacts and food remains. Borrow pits sometimes contain important artifact assemblages, and the recovery of materials from a presidio-era pit would be especially significant, because relatively few features from this time period have been excavated. Sheet trash may also be scattered over the area. A similar situation was present outside the eastern gate of the presidio at the location of the current Tucson-Pima Public Library (Williams 1998).

Lifestyles of the Well-to-do and Property Use

Residents of the American Statehood period homes at 2 and 4 Paseo Redondo Drive were among the wealthiest individuals living in Tucson. Dr.

Hiram Fenner owned Tucson's first automobile. Samuel Watson was well known for his studies of hay fever and intestinal tuberculosis. Deming Isaacson was a wealthy cattleman. Mary Wakefield was a prominent businesswoman, taking over her husband's position after his untimely death.

Features associated with these households, ranging from house foundations to trash-filled pits, were thought to potentially still be present within the project area. Artifacts and food remains found in the features could allow for a comparison with excavated materials found in nearby areas, including a Chinese gardeners' farmstead, the León farmstead, the Osborn home, middle-to-upper class residents of Block 83, and apartments and homes in the Barrio Libre (A. Diehl et al. 2003; Mabry et al. 1994; Thiel 1997a, 2002a, 2003, 2005). Did the wealthier households spend more money on items such as ceramic tablewares, clothing, and food? Was consumption of more expensive items part of the everyday lives of these residents?

Sanborn Fire Insurance maps reveal the location of homes and automobile garages for the two houses built on the property circa 1908 and 1917. However, the maps do not include detailed information about how the occupants organized and used their properties. Archaeological work can provide a detailed understanding of past urban landscapes (Thiel 2003).

The project area may contain features used for trash disposal by the residents of the two historic households. It is unclear, however, if both households would have discarded refuse on their property, because to date, no comparable households of this socioeconomic class and time period have been examined in Tucson. The city did not begin organized trash collection until the mid-1910s, so the possibility that trash deposits are present is quite high.

Given the economic status of the residents, their property usage likely varied dramatically from contemporary housesholds, such as the Leóns living a few blocks away or residents of the Barrio Libre (A. Diehl et al. 2003; Thiel 2003, 2005).

FIELD METHODS

Fieldwork was accomplished in two stages, the first of which in October 2005, consisted of excavation of 15 east-west backhoe trenches in the paved parking lot, generally spaced 5 m apart. The side walls and bases of the trenches were scraped with hand tools to locate features, which were then documented by profile and plan view drawings and through data collected on standardized field forms.

Thirty-three features associated with BB:13:756, the designation given to Historic Block 185, were identified (Figure 2.1). Two irrigation canals were assigned a separate site number, BB:13:757, based on Arizona State Museum (ASM) guidelines for linear sites.

Features associated with BB:13:756 primarily related to the twentieth century occupation of the block by the Fenner/Watson and Isaacson/Wakefield households. The concrete foundations of the two homes, built circa 1909 and 1915, were found, as were a fenceline, planting pits, and a brick-lined walkway. On the east side of the block, the existing A-Mountain rock retaining walls appear to date to construction of the Fenner house in about 1909. There are currently two visible retaining walls. A third wall paralleling the two others was found beneath the parking lot surface. A fountain built into the easternmost retaining wall has a poorly preserved ceramic lion's head with a copper tube spout sending water into the pool below. A probable koi pond represents another feature likely associated with the Fenner/Watson home.

No further work was recommended on the subsurface features associated with the two twentieth century dwellings. The two aboveground retaining walls and the attached fountain may require additional documentation if this wall is to be removed as part of the proposed development. Historic era artifacts are present in the area immediately east of the eastern retaining wall, and if this wall is dismantled, additional archaeological work may be required in the area.

The southeastern portion of the parking lot revealed eighteenth and nineteenth century features. Several borrow pit features were documented. These pits were large and deep, and they contained artifacts and animal bones dating to presidio times, circa 1775-1856. The west wall of the presidio fortress lies beneath Main Avenue, a very short distance to the east. These pits probably represent some of the places where soldiers came to mine dirt to make adobe bricks during initial construction of the fort, approximately 1776 to 1783. Afterwards, soil eroded from nearby field areas into the large holes.

The extreme southeastern portion of the parking lot contained an area with trash dating to the 1880s. The 1883 Sanborn map indicates "Chinese shanties" were present in this area, and fragments of several Chinese-manufactured ceramic vessels were among the artifacts recovered.

The 1883 Sanborn map also indicates a canal was present along the eastern side of the property. This canal was located during the current project. It ran next to the terrace edge, apparently lying beneath the embankment in the area south of the modern stairs leading out of the parking lot. North of the stairs, the canal reappears, running slightly northwest. It cut through a presidio-era borrow pit, and

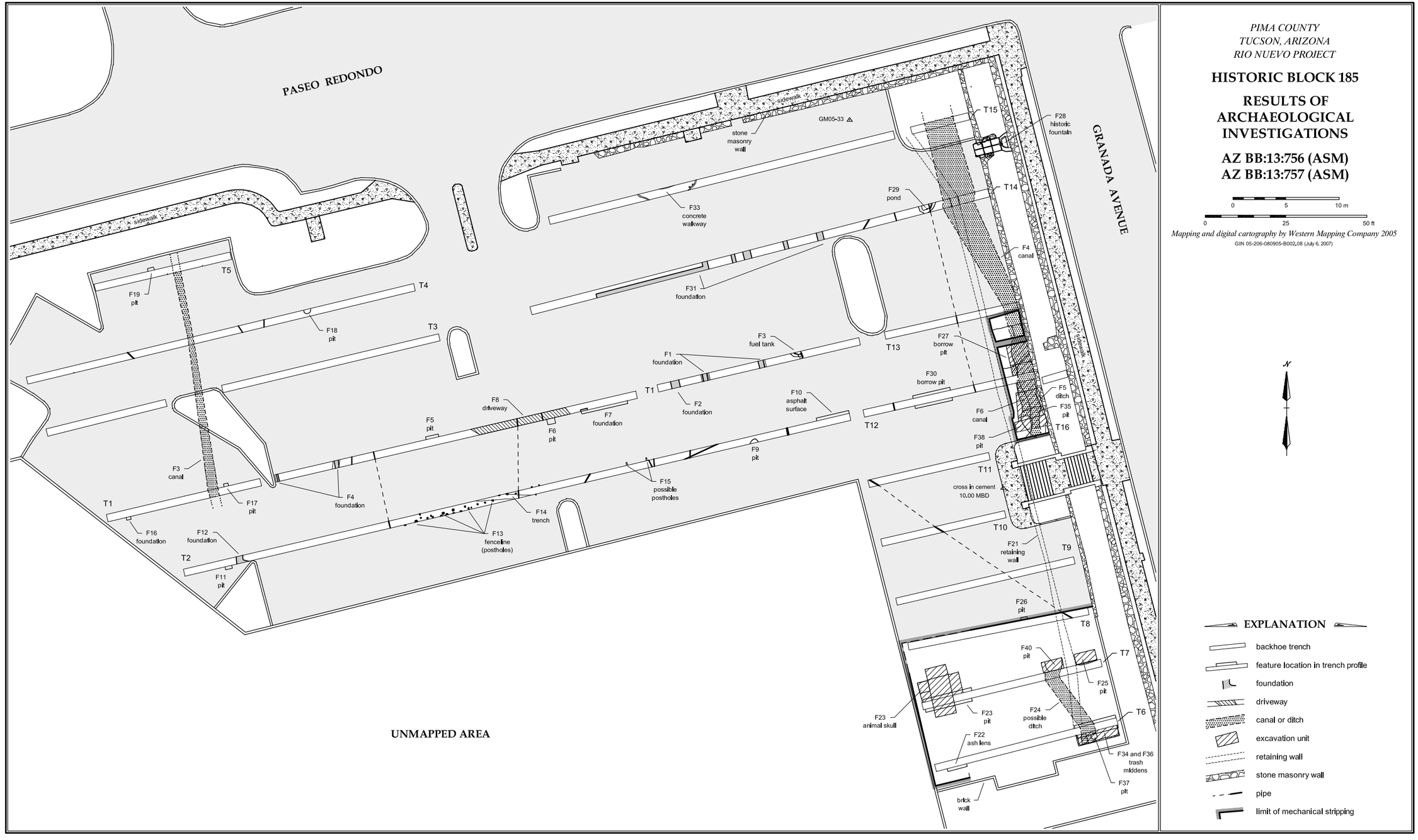

Figure 2.1. Archaeological features located in the Lot 7 project area, Block 185, AZ BB:13:756 (ASM).

was thought to date to after 1800. It remained in use until the 1890s. The canal contains evidence for cleanouts and reuse, and the upper portion contains large quantities of American Territorial period trash. A second, smaller canal, apparently prehistoric, was found in the western portion of the parking lot. This latter canal was adequately documented during testing, and no additional fieldwork was recommended.

A data recovery plan was submitted to the City of Tucson, recommending work be conducted in the eastern portion of the parking lot in two areas. The additional archaeological work sought to answer three specific research questions. What was life like for the Chinese men living in the shanties in the area? How did residents of the Tucson Presidio use this area? How was the irrigation canal along the eastern side of the property maintained and used?

Archaeologists returned to the site in October 2005 for three weeks of fieldwork. A backhoe was used to strip overburden from two areas. One area, in the southeastern portion of the parking lot, measured about 18 m by 13 m. This area contained several presidio-era borrow pits, a trash midden associated with Chinese farmers, a possible ditch, and other features. Portions of these features were excavated, with one additional feature located during excavations.

The second area was located immediately north of a stairway leading from the parking lot to Main Avenue. The backhoe stripped an area measuring 8.0 m by 2.8 m. Excavation of this area revealed a complex set of borrow pits and irrigation ditches.

A small trench was also cut between the two standing retaining walls to examine the fill in this area. The fill dates to the early 1900s, and was quite unstable due to rodent burrowing. No further work was conducted in the area between the two walls.

All features were excavated using hand tools, and all soil was screened through ¼-inch mesh. All artifacts were sorted by material type and returned to the laboratory for cleaning and subsequent analysis. Flotation samples were taken from each feature, often from each level excavated. Standardized field forms were completed, and plan view and profile drawings prepared. Black-and-white negative, color slide, and digital photographs were taken, when appropriate.

FEATURES FROM HISTORIC BLOCK 185, AZ BB:13:756 (ASM)

Testing and data recovery indicate people occupied this parcel of land during the Presidio, American Territorial, and American Statehood periods. An overall map, showing all features located during testing and data recovery, is provided in Figure 2.1. Features uncovered in the northern stripping unit are shown in Figure 2.2, while those features located in the southern stripping unit are depicted in Figure 2.3. Each of the features is described below (Table 2.1).

Feature 1, Foundation

Feature 1 was a pair of poured-in-place concrete foundations located in Trench 1 (see Figure 2.1). The foundations were each an upside-down T in profile; the upper portion was 45 cm wide, with the bottom 25 cm widening to 70 cm. The foundation stood 1.0 m high. The two foundations were 5.9 m apart, measuring from the exterior edges. The tops of these foundations were truncated during demolition of the structure. The foundations once formed part of the Fenner house.

Feature 2, Foundation

Feature 2 was a poured-in-place concrete foundation located in Trench 1 (see Figure 2.1). The foundation was 80 cm wide and 39 cm thick, and was located west of Feature 1. It was also a portion of the Fenner house.

Feature 3, Underground Tank

Feature 3 was a crushed iron tank, located east of the Fenner house (see Figure 2.1). The tank was about 1.15 m long and was found between 0.90 m to 1.60 m below the parking lot surface. An iron pipe ran into the tank, which probably once held fuel or fuel oil.

Feature 4, Foundation

Feature 4 was a pair of concrete and rock foundations located in Trench 1 (see Figure 2.1). The foundations were some 90 cm wide and were composed of poured-in-place concrete, encapsulating large rounded cobbles. The exterior sides of the foundations were about 6.9 m apart. These walls formed part of the Fenner house garage.

Feature 5, Small Pit

Feature 5 was a small pit located in the northern wall of Trench 1 (see Figure 2.1). The pit was 1.25 m

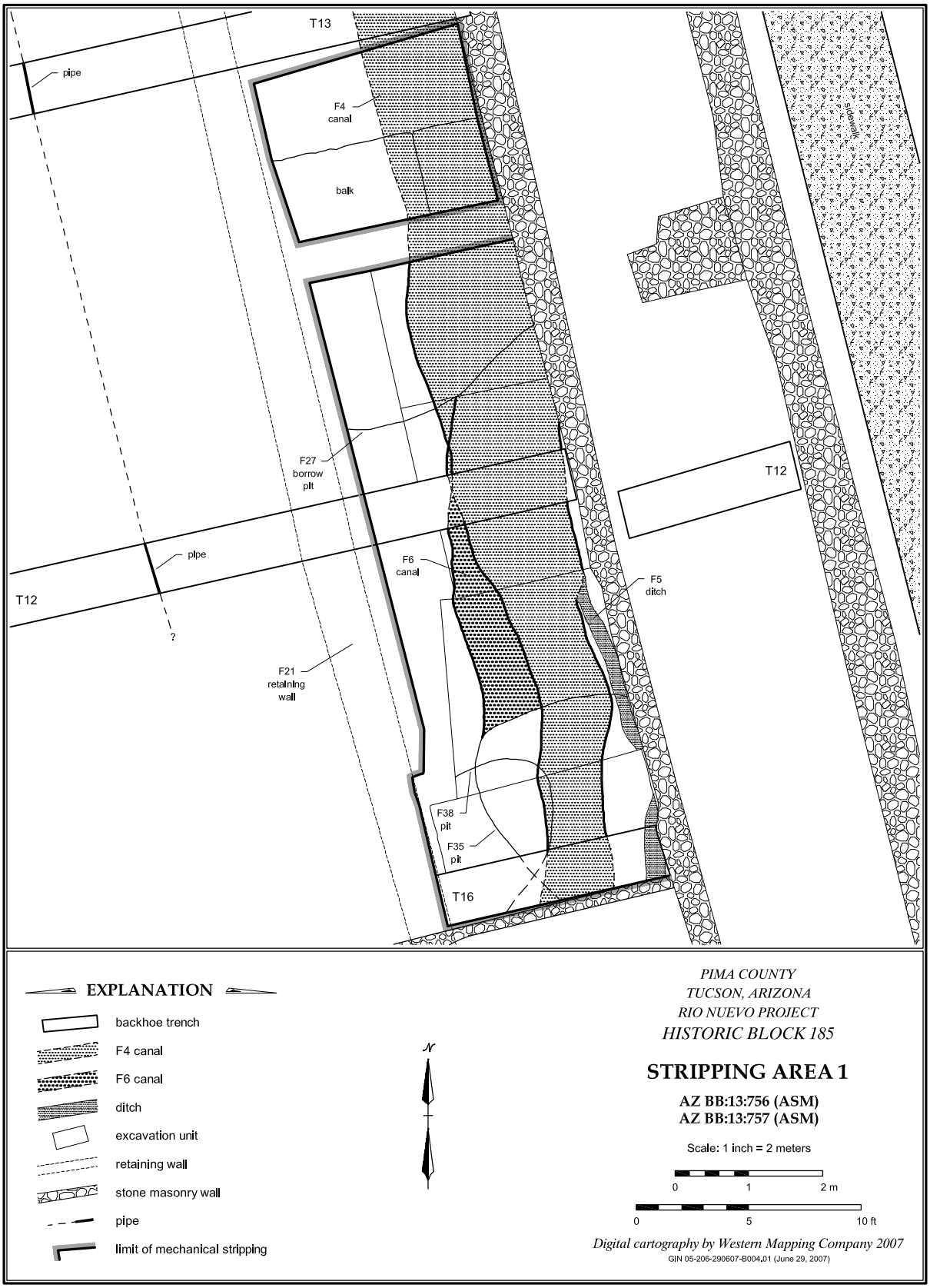

Figure 2.2. A close-up of the southern stripped area within Lot 7, Block 185, AZ BB:13:756 (ASM).

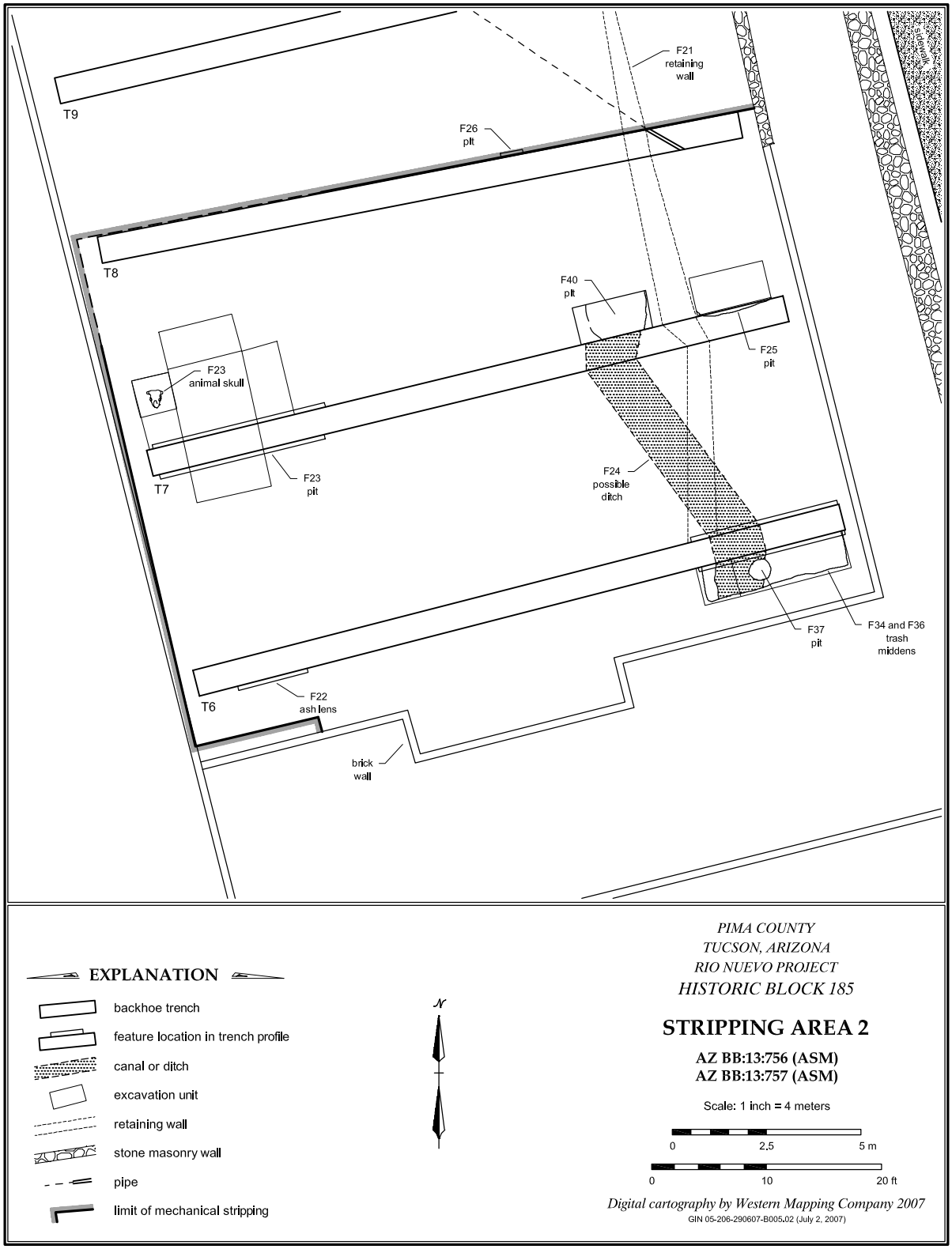

Figure 2.3. A close-up of the northern stripped area within Lot 7, Block 185, AZ BB:13:756 (ASM).

wide and 63 cm deep. The upper 40 cm was filled with a dark clay that appears to be redeposited cienega clay. The base of the pit was lined with a layer of broken brick fragments. The pit probably functioned as a planting feature, with the brick lens providing drainage for the tree or roots of bushes.

Table 2.1. Features located during testing and data recovery, Historic Block 185, AZ BB:13:756 (ASM).

Feature Number	Type	Comments
AZ BB:13:756 (ASM)		
1	Foundation	Fenner house
2	Foundation	Fenner house
3	Iron tank	–
4	Foundation	Fener garage
5	Small pit	Planting feature
6	Small pit	Date unknown
7	Foundations	Fenner house
8	Asphalt driveway	–
9	Small pit	Date unknown
10	Asphalt surface	–
11	Small pit	Planting feature
12	Foundation	Isaacson/Wakefield house
13	Fenceline	–
14	Trench	Planting feature
15	Possible postholes	–
16	Foundation	Isaacson/Wakefield house
17	Small pit	American Territorial period
18	Small pit	Date unknown
19	Small pit	Planting feature
20	Large pit	Unknown function
21	Retaining wall	Built circa 1909
22	Ash lens	–
23	Borrow pit	Presidio era
24	Ditch ?	Late Presidio era
25	Borrow pit	Presidio era
26	Roasting pit	Planting feature
27	Borrow pit	Early American Territorial period
28	Fountain	Built circa 1909
29	Fish pond	Built circa 1909
30	Borrow pit	Unknown function
31	Foundation	Fenner house
32	Retaining walls	Built circa 1909
33	Brick-lined walkway	–
34	Trash midden	Chinese
35	Borrow pit	American Territorial period
36	Trash midden	Early American Territorial period
37	Small pit	Presidio era
38	Borrow pit	American Territorial period
40	Ditch or canal	Presidio era
AZ BB:13:757 (ASM)		
3	Prehistoric (?) canal	Profiled
4	Historic canal	Excavated
5	Historic ditch	Excavated
6	Historic canal	Excavated

Feature 6, Small Pit

Feature 6 was a small pit found in the southern wall of Trench 1 (see Figure 2.1). The pit was 75 cm wide and 15 cm deep, originating at 1.25 m below modern ground surface. The feature was filled with very hard brown clayey silt. No artifacts were present, and it was impossible to determine if it dated to the Prehistoric or Historic era.

Feature 7, Foundations

Feature 7 was a pair of concrete foundations located in Trench 1, just west of Feature 1 (see Figure 2.1). The foundations were poured in place, with the forms pulled out and replaced by sand afterwards. They were roughly 30 cm wide, and the exterior sides were separated by 4.45 m. These walls were once part of the Fenner house.

Feature 8, Asphalt Driveway

Feature 8 was an asphalt driveway located on the western side of the Fenner house (see Figure 2.1). The driveway was 9.15 m wide, but only about 6 cm thick. Feature 8 was located in Trench 1.

Feature 9, Small Pit

Feature 9 was a small pit found in the southern wall of Trench 2 (see Figure 2.1). The pit was 80 cm wide and 46 cm deep, originating 96 cm below the asphalt surface of the parking lot. The pit was filled with dark brown clay, with a single charcoal chunk present. No artifacts were visible, and the date of the pit is unknown.

Feature 10, Asphalt Surface

Feature 10 was an asphalt surface, perhaps a driveway or parking spot, found in Trench 2 (see Figure 2.1). It was at least 3.2 m wide and 12 cm thick. The asphalt was found 75 cm below the modern parking lot, with a large amount of modern fill present in this area.

Feature 11, Small Pit

Feature 11 was a small pit found in the southern wall of Trench 2 (see Figure 2.1). The pit was 65 cm wide, and was filled with dark brown clay with a few charcoal flecks. No artifacts were present, and the date of the pit remains unknown. It originated abaout 25 cm below the historic ground surface. Given its location adjacent to the Isaacson/Wakefield house, the pit was probably a small planting pit.

Feature 12, Foundation

Feature 12 was the southwestern corner of the Isaacson/Wakefield house, located in the western end of Trench 2 (see Figure 2.1). A 60-cm-wide concrete foundation was present, with a 24-cm-wide fired brick wall on the foundation. Three courses of brick were present. A large pit filled with demolition debris from the house, including bricks, mortar, wall plaster, shingles, and iron pipes, was found east of the house.

Feature 13, Fenceline

Feature 13 was a fenceline associated with the Isaacson/Wakefield house, documented in the walls and floor of Trench 2 (see Figure 2.1). A series of 23 postholes was found, spanning a distance of 13.2 m. The postholes originated in the plowzone, and were filled with a soft brown clayey silt. In several cases, individual posts appear to have been replaced with posts set in place next to the original post. The fenceline dates to the American Territorial period, although the lack of artifacts prevented a more detailed estimate for its construction.

Feature 14, Trench

Feature 14 was a narrow trench found in the base of Trench 2 (see Figure 2.1). The 5.35-m-long trench cut through the line of postholes, Feature 13. The feature probably represents a planting feature, perhaps for a hedge.

Feature 15, Possible Postholes

Feature 15 was a pair of postholes found in the northern wall of Trench 2 (see Figure 2.1). The posts each measured about 10 cm in diameter and 10-12 cm deep, cutting into the underlying sterile light brown silt. The posts were 1.9 m apart.

Feature 16, Wall Foundation

Feature 16 was a foundation found in the western end of Trench 1 (see Figure 2.1). The concrete foundation was 45 cm wide and 45 cm deep. Two

carved stones are present on top of the concrete. This feature was part of the Isaacson/Wakefield house.

Feature 17, Small Pit

Feature 17 was a 42-cm-wide, 58-cm-deep small pit in the northern wall of Trench 1 (see Figure 2.1). It was filled with a light yellow-brown sandy silt with charcoal flecking. No artifacts were present, although it originated in the plowzone and probably dates to the American Territorial period.

Feature 18, Small Pit

Feature 18 was a small pit located in the northern wall of Trench 4 (see Figure 2.1). It was 66 cm wide and extended 35 cm from the wall of the trench. Feature 18 was filled with a brown clayey-silt that contained charcoal flecking. No artifacts were present, and the date of the feature could not be determined.

Feature 19, Small Pit

Feature 19 was a small pit found in the northern wall of Trench 5 (see Figure 2.1). The pit was 60 cm wide, extended 30 cm into the trench, and was at least 44 cm deep, extending into the base of the backhoe trench. It was filled with a dark brown cienega clay. Native American ceramics and pieces of a plain whiteware cup were present in the fill. The feature probably represents a small planting pit.

Feature 20, Large Pit

Feature 20 was a large pit found in the southern wall of Trench 6 (see Figure 2.1). The trench was 3.52 m long and 74 cm deep. It was filled with brownish-gray silty clay and a large number of broken, fired bricks lying over a layer of decomposed wood. The function of the pit is not known.

Feature 21, Retaining Wall

Feature 21 was a rock and mortar retaining wall running north-south along the eastern side of the historic block (see Figures 2.1-2.3). It was the westernmost of three retaining walls, with the middle and eastern walls still largely extant.

The foundation was about 30 cm wide, and appears to have been constructed by digging a trench, placing the rocks in the trench, and then pouring mortar around the rocks. The upper portions of the wall would have been better constructed.

The wall was probably built around 1909, by the Fenners, and was probably in place until the 1970s.

Feature 22, Ash Lens

Feature 22 was an ash lens found in the southern wall of Trench 6 (see Figure 2.1). The lens was roughly 1.9 m long and was 16 cm thick, originating 89 cm below the asphalt parking lot. The feature appears to represent an ash dump.

Feature 23, Borrow Pit

Feature 23 was a large presidio-era borrow pit located during test trenching in the southeastern portion of the project, immediately east of the tall Tucson Water building retaining wall (Figures 2.4 and 2.5; see also Figures 2.1 and 2.3). The feature was more than 5 m in diameter, extending west into the area disturbed by construction of the Tucson Water building. During data recovery, five units, Units 2, 8, 12, 17, and 18, totaling 12 m^2, were excavated.

Three natural strata were identified during excavation of the pit (see Figure 2.4). Stratum 50.02 was at the top of the feature and contained two lenses, the top being grayish-brown sandy silt with a lens of reddish-brown coarse sand below. This layer ranged from 4 cm to 24 cm in thickness. The middle stratum, Stratum 50, was grayish-brown clayey silt that was moderately compact; this layer was up to 60 cm deep. Stratum 50.01 lay beneath this layer and extended into the base of the excavation. This stratum was light brown clay that was quite compact; it yielded relatively few artifacts, their density decreasing as excavation proceeded. The layer was at least 56 cm thick. Excavation was terminated at the 5-ft level due to OSHA regulations; thus, the overall depth of this layer is unknown.

The size of the pit, its depth, and the presence of presidio-era artifacts suggests the feature was a borrow pit, where soil was mined to construct adobe bricks for the presidio walls or for interior structures.

Artifacts recovered from the borrow pit included Native American ceramics, flaked stone, Mexican and English ceramics, a partial rosary (a saint's medal and glass beads), pieces of flaked stone, and many pieces of animal bone, including a complete cow skull (see Figure 2.5). Mexican and English ceramics are summarized in Table 2.2.

The presence of Aranama polychrome and purple transferprint ceramics may suggest the borrow pit contains trash postdating 1820. The most

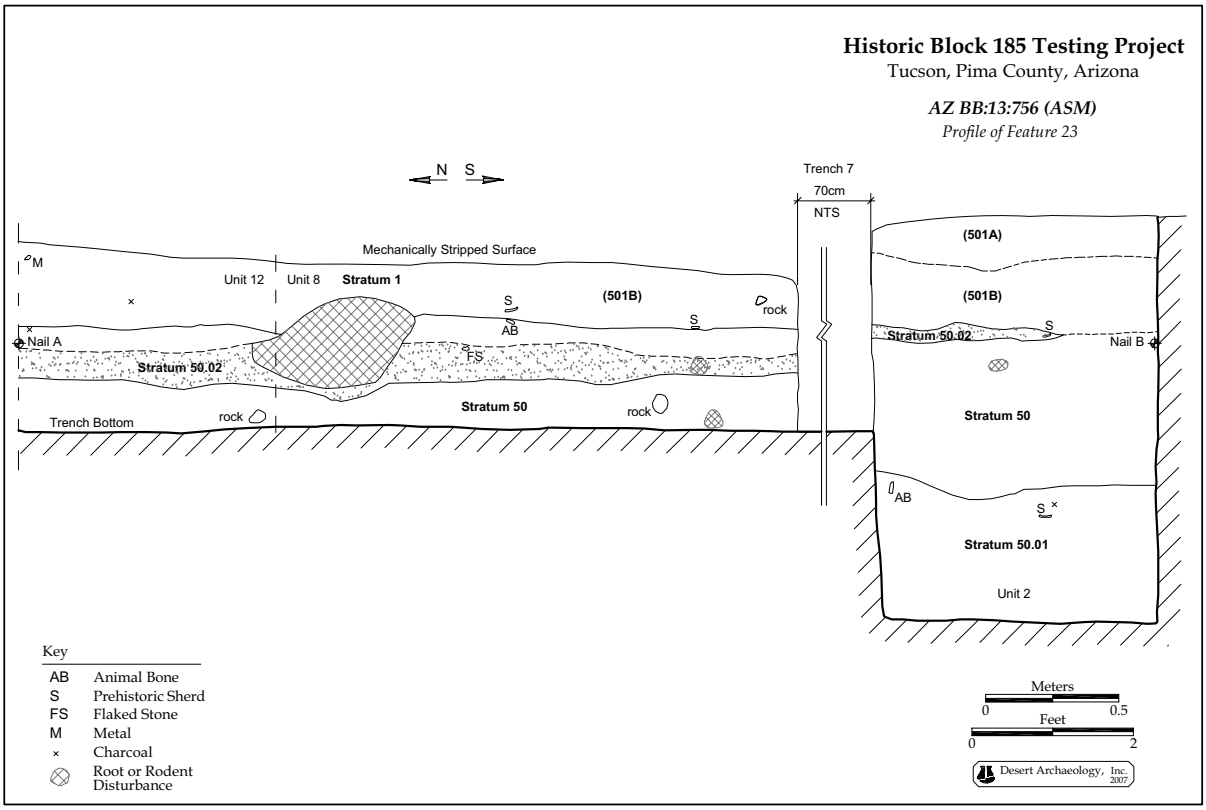

Figure 2.4. Profile of the eastern wall of excavation units within Feature 23, AZ BB:13:756 (ASM).

Figure 2.5. Cow skull found in Unit 18, Feature 23, AZ BB:13:756 (ASM).

likely date for the filling of the feature is between 1800 and 1840.

Feature 24, Ditch

Feature 24 was a small ditch or possibly an *acequia*, located at the southeastern corner of the project area (Figure 2.6; see also Figures 2.1 and 2.3). The feature was 1.65 m wide and at least 90 cm long, extending north-south. Feature 24 was excavated in a single unit (Unit 11) and was found to be about 7 cm deep. It was filled with a water-deposited light grayish-green silty clay (see Figure 2.6). A small number of artifacts were present, including flaked stone, Native American ceramics, a marble, historic ceramics, animal bone, metal, and shell. Some of these items may have been introduced through one of several rodent burrows noted in the fill.

The feature was found beneath Feature 36, an early American Territorial period trash midden, and, in turn, lay over Feature 37, a small pit.

Feature 24 and Feature 40 may represent the same linear ditch or shallow *acequia*; however, this remains uncertain. Like Feature 40, Feature 24 appears to date to late presidio times, circa 1840 to 1860.

Feature 25, Borrow Pit

Feature 25 was a presidio-era borrow pit located during test trenching in the southeastern portion of the project area (see Figures 2.1 and 2.3). The feature was visible for at least 1.7 m in the northern

Table 2.2. Mexican and English ceramics recovered from Feature 23, AZ BB:13:756 (ASM).

Ceramic Type	Stratum 50.02	Stratum 50
Aranama polychrome	5	2
Tumacacori polychrome	17	1
Puebla blue on white	2	–
San Elizario blue on white	2	1
Huetjotzingo blue	–	1
Unidentified blue on white	16	3
Plain body fragments	18	2
Olive ware	1	1
Purple transferprint	2	–

wall of Trench 7. The overall size of the pit is not known. A single 2-m-long (east-west) by 1-m-wide (north-south) excavation unit, Unit 14, was placed along the northern side of the trench, resulting in recovery of artifacts and faunal bone from the 46-cm-deep pit in this area.

The fill of the borrow pit was a very compact grayish-brown silty sand. Small chunks and flecks of charcoal were present throughout. The base of the pit cut into the underlying caliche. The feature extended north for an unknown distance, also widening to the east and west. The first level of pit fill may have a few American Territorial period artifacts mixed in, while the second level appears to date to presidio times.

Three majolica, two whiteware, and one olive-ware sherds were found in the second level of the pit. One of the majolica sherds was Aranama polychrome and another was Tumacocori polychrome. The presence of two whiteware sherds also suggests the feature dates after 1800, and perhaps as late as the 1820s-1840s. Dirt was likely mined from this area to make adobe bricks for presidio structures.

Feature 26, Roasting Pit

Feature 26 was a roasting pit exposed during testing in the northern wall of Trench 8 (see Figures 2.1 and 2.3). The top of the pit was 64 cm below the historic ground surface. The pit was 60 cm wide and 22 cm deep, filled with a layer of fire-cracked rocks above a 4-cm-thick lens of sandy ashy silt. A few flecks of metal were present, indicating this was a historic pit. A flotation sample was collected from the profile, as were a sample of the fire-cracked rocks. The pit was probably a planting feature associated with the Fenner house.

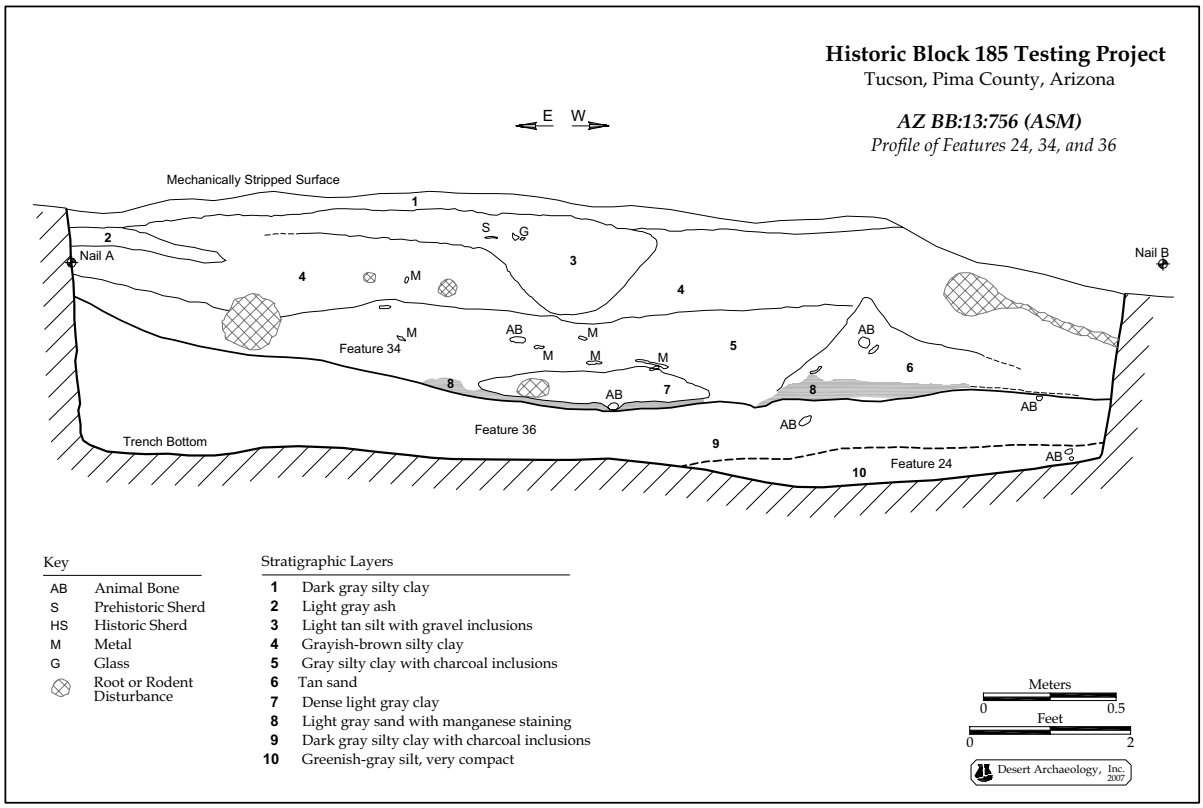

Figure 2.6. Profile of the south wall of the southern stripping unit, with Features 24, 34, and 36 of AZ BB:13:756 (ASM) visible.

Feature 27, Borrow Pit

Feature 27 was an American Territorial period borrow pit located in the eastern portion of the project area (see Figures 2.1-2.2). It was explored in two units (Units 16 and 103), totaling 6.4 m^2.

Two layers of fill were present in the borrow pit. At the top was Stratum 50, a light grayish-brown fine-grained silt. This layer was about 20 cm thick. It overlay Stratum 50.01, which was a light gray compact silt 16 cm thick. American Territorial period artifacts were present in both layers, and included animal bones, Native American ceramics, various European ceramics, metal, glass, and flaked stone.

Feature 4, an American Territorial period canal for BB:13:757, cut through the top of the borrow pit.

Feature 27 probably dates to the 1860s-1870s, and may represent an area where soil was used to make adobe bricks for buildings in the early American Territorial period.

Feature 28, Fountain

Feature 28 was a fountain attached to the easternmost rock retaining wall (see Figure 2.1). The fountain consisted of a mutilated ceramic lion's head attached to the wall, with a small copper pipe protruding from its mouth, lying inside an arched structure. A small, molded concrete pool is present below the head, catching the water. A spout cuts through the top of the pool, and drained water into a smaller half-circle pool. This pool, in turn, drained into a slot that ran down the center of three poured-in-place concrete steps. The slot was wavy-shaped, slowing the water to a meander. The second and third steps were lined with the same volcanic rocks used to build the retaining walls. The fountain was probably built by Hiram Fenner as a decorative element for his front yard. The fountain's water may have drained into a nearby koi pond, Feature 29.

Feature 29, Fish Pond

Feature 29 was a small fish pond located in Trench 14 (see Figure 2.1). The pond measured some 1.53 m in length and 24 cm in depth. It appeared to have been poured in place. The pond was probably associated with Feature 28, the nearby fountain.

Feature 30, Borrow Pit

Feature 30 was a borrow pit discovered in both walls of Trench 12 (see Figure 2.1). The pit was 3.6 m long and about 32 cm deep, filled with grayish-brown sandy silt. The pit extended north-south for an undetermined distance. No artifacts were visible in the profiles or backdirt, and this feature was not excavated further.

Feature 31, House Foundation

Feature 31 was a set of foundation walls for the northern portion of the Fenner house, uncovered in Trench 14 (see Figure 2.1). The house was 22.13 m long in this area, with a 10.90-m-long concrete slab present along the western side. East of the slab were four fragmentary foundations that jutted out from the southern wall of the trench. Each of these foundations was made from poured-in-place concrete. All had been truncated by the demolition of the house, with the bulk of the debris extending into the base of the trench.

Feature 32, Rock Retaining Wall

Feature 32 was the middle and easternmost rock retaining walls built circa 1909 by the Fenner family (see Figure 2.1). These two walls were still mostly extant during the current project. They were documented through mapping and excavation of a backhoe trench between the walls.

The foundations for the walls were constructed by digging a narrow trench into the underlying cienega clay. Rocks were then stacked inside the trench, and a mortar with high sand content was apparently poured over the rocks, bonding the rocks together. The wall was later completed by constructing upper walls on top of the foundation. The upper portion of the wall was also constructed of rocks and mortar. The rocks are volcanic and were probably collected from the Tucson Mountains. The area between all three walls was then filled with soil to create a set of terraces. Iron posts were installed along the easternmost wall, and an iron cable was strung between the posts to prevent people from falling over the wall. It is unclear if the iron posts were original to the wall, or if they were a later addition.

The westernmost wall was documented as Feature 21. A fountain attached to the eastern wall was designated Feature 28; both are described above.

The middle and eastern walls originally extended the entire length of the block, 69.44 m, although both walls had been replaced south of the modern staircase after portions of the wall collapsed. The eastern wall was 3.40 m tall, while the middle wall was about 2.00 m tall. The distance between the eastern and western walls was 6.35 m.

The wall also runs along the northern side of the block for 40 m, decreasing in height from east to west. A gate is present near the western end of the wall. An iron gate was apparently once present in

the gate opening, with a walkway probably leading from the gate to the front door of the Fenner house.

Feature 33, Brick-lined Walkway

Feature 33 was a brick-lined walkway located in Trench 15 (see Figure 2.1). The walkway once extended to the front door of the Fenner home, and would have been constructed sometime in the early 1900s. The path consisted of a double line of bricks imbedded into the ground lengthwise. It was 2.0-2.1 m wide. The eastern segment of the path ran toward a gate in the rock wall along Paseo Redondo Drive. The western segment of the path extended toward either another gate or the driveway of the house. The area between the lines of bricks was filled with broken pieces of concrete and gravel. A cement sidewalk was likely once present, but was removed during demolition of the house and adjacent features in the 1980s.

Feature 34, Trash Midden

Feature 34 was a trash midden located in the southeastern corner of the project area (see Figures 2.1, 2.3, and 2.6). Two units, Units 4 and 9, totaling 4 m^2, were excavated into this midden. The midden extended beyond the excavation area in all directions, and its overall dimensions were not determined. The trash area was about 47 cm deep and consisted of light grayish-brown silt that became more compact toward its base (see Figure 2.6).

Artifact density was high at the top of the midden deposit. Items recovered included animal bone, ceramic marbles, buttons, school slate fragments, shoe leather, jewelry, copper ore, and Native American ceramics, one of which was a fragment from an effigy vessel.

A number of Chinese artifacts were found, including glass medicine bottles, opium pipe fragments, opium tin fragments, and pieces of rice bowls, soup spoons, and wine cups. Several turtle shells and fish bones were also present. Together, the finds suggest the refuse was tossed out by the Chinese men reported to be living in shanties a short distance to the south.

The trash midden dates from circa 1880 to 1900. It lies over Feature 36, a trash midden dating to the early American Territorial period.

Feature 35, Borrow Pit

Feature 35 was a borrow pit found in the northern excavation unit (Figure 2.7; see also Figures 2.1 and 2.2). It was sampled in an area measuring 2.6 m

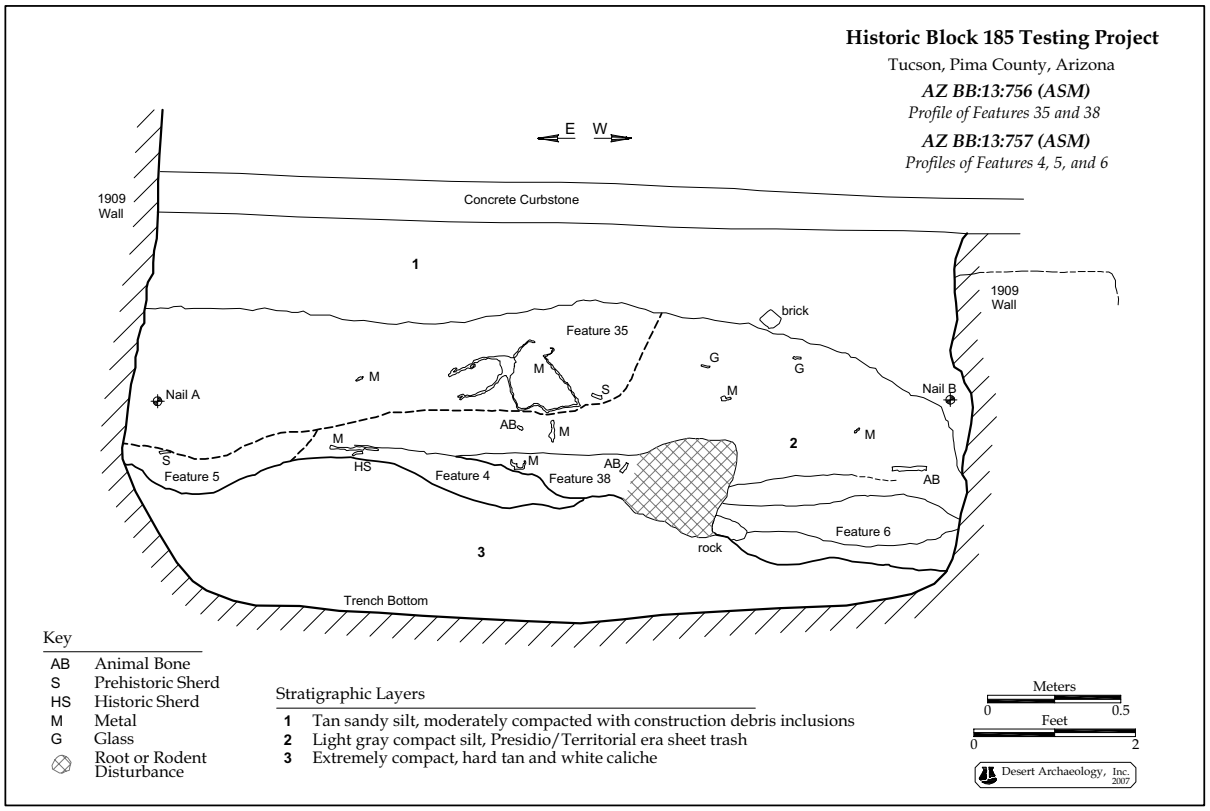

Figure 2.7. Profile of the south wall of the northern stripping unit, with Features 35 and 38 of AZ BB:13:756 (ASM) and Features 4 and 5 of AZ BB:13:757 (ASM) visible.

in length (north-south) by 2.3 m in width (east-west). The pit extended in all directions beyond the excavation area, and its overall dimensions are unknown.

The pit was filled with slightly hard pale brown sandy silt (see Figure 2.7). The average depth of the feature was 40 cm. It cut into an underlying irrigation canal, Feature 4, of BB:13:757.

Artifacts found in Feature 35 included Native American sherds, a ceramic marble, opium tins, buttons, a seed, and animal bones. The pit is thought to date to the 1880s to early 1900s.

Feature 36, Trash Midden

Feature 36 was a trash midden located in the southeastern corner of the project area (see Figures 2.1, 2.3, and 2.6). It was sampled in Units 7 and 10, with a total of 4 m^2 excavated.

The midden contained compact gray clay, with some areas of grayish-brown sandy silt. It was approximately 30 cm deep (see Figure 2.6).

Artifacts recovered from the midden included animal bone, Native American ceramics, a gun flint, a lead ball, flaked stone, a clay pipe bowl, and a button. The feature appears to date to the late Mexican to early American Territorial periods, circa 1850s-1860s.

This midden lay below Feature 34, a trash feature created by Chinese farmers. Feature 36 lay over the top of Feature 24, a ditch or possible canal, and Feature 37, a small pit.

Feature 37, Small Pit

Feature 37 was a small pit discovered in the southeastern portion of the project area (see Figures 2.1 and 2.3). The pit was about 55 cm in diameter, had nearly vertical walls, and had a flat base; it was 55 cm deep. The upper portion of the pit was filled with a compact light gray clay. A thin band of sand separated this layer from darker clay that lay at the base of the pit. Feature 36, an early American Territorial period trash midden, lay over the pit.

Few artifacts were found in the pit. They included some flaked stone, animal bone, and Native American ceramics. The function of the feature is not known. It dates to presidio times.

Feature 38, Borrow Pit

Feature 38 was a borrow pit found in the northern excavation area (see Figures 2.1, 2.2, and 2.7). It was studied in three excavation units, Units 6, 101, and 104; however, only the artifacts from Unit 6 were excavated as feature fill. The feature lay beneath borrow pit, Feature 35, and was above a canal, Feature 6 of BB:13:757. It extended beyond the excavation area, to the south, and the overall dimensions of the feature are not known.

The borrow pit was filled with brown silty sand that contained caliche nodules and charcoal flecks (see Figure 2.7).

The pit contained Native American ceramics, animal bone, pieces of bottle glass, and flaked stone. It dates to the American Territorial period, probably between 1860 and 1880.

Feature 40, Ditch or Canal

Feature 40 was a small ditch or possible canal found in both walls of Trench 7 along the eastern portion of the project area (see Figures 2.1 and 2.3). It was explored in a single excavation unit, Unit 20, measuring 2.1 m in length (east-west) by 1 m in width (north-south). The feature was filled with compact brown silty clay with a few lenses of sand. It was basin-shaped in profile. Screening of the fill yielded animal bone, majolica, flaked stone, and Native American ceramics. The feature dates to presidio times.

Although it seemed possible that Feature 40 and Feature 24, to the south, represented the same feature, perhaps a shallow ditch or *acequia*, the artifacts differed dramatically between the two. Feature 40 dates sometime between 1775 and 1840.

CANAL SITE, AZ BB:13:757 (ASM)

Canal sites, which are typically linear and may run for a long distance, are assigned distinct ASM site numbers. BB:13:757 has been assigned to the canals that run across Block 185. Additionally, two previously reported canals within the vicinity of Block 185 have been included with this site.

One of these canals was located in the early 1990s a short distance west of the project area, beneath the surface of modern-day Granada Avenue just north of Alameda Street. This historic canal was 1.8 m wide and 33 cm deep. At the top, it contained a 2.5-cm-deep gravel layer, then an 8-cm-deep sandy clay layer, below which was an 8-cm-deep lens of laminated silt resting on top of a 15-cm-deep layer of fine- to medium-textured sands. The sediments were determined to be alluvial in nature, and the canal was thought to extend southwest-to-northeast. Two non-diagnostic Native American sherds were recovered from the fill. It remains unknown if the canal dates to the Prehistoric or the Historic era (Faught 1995:246).

A second canal was discovered in 1995 during a testing project at the southwestern corner of Granada Avenue and Congress Street. This historic canal ranged in width from 1.7 m to 2.0 m, and was about 60 cm deep. It was filled with gray-brown silt that lay over a lens of very dark, grayish-brown clay. Lenses of water-deposited sediments were present. The canal was partially disturbed by modern construction activities. Artifacts found in the fill of the canal included a partial ceramic crucible, Tohono O'odham pottery, and part of a chicken skeleton (Thiel 1996a:17-18).

Feature 3, Canal

Feature 3 was a small canal located in Trenches 1, 4, and 5 on the western side of Block 185 (Figure 2.8; see also Figure 2.1). The canal ran almost due north-south. It was between 59 cm and 91 cm wide. The canal was 27-35 cm deep, with a basin-shaped profile. It was filled with brown clay that contrasted with the pale brown silt into which the canal had been cut. A few flecks of charcoal, bits of caliche, and some possible daub fragments were present in the fill. The top of the canal was between 24 cm and 66 cm below the historic (circa 1910) ground surface.

It is uncertain if the canal dates to the Prehistoric or Historic era. The lack of historic artifacts may suggest it was constructed during the Prehistoric era.

Feature 4, Historic Canal

Feature 4 was a canal documented in Trenches 12, 13, 14, 15, and 16 along the eastern side of Block 185 (see Figures 2.1, 2.2, and 2.7). It was traced for at least 34 m in those trenches and extended to the north, beyond the project area, and to the south, where it either continued along the extreme eastern edge of the property, which could not be examined, or it turned sharply to the west, between backhoe trenches.

The canal was at least 1.75 m wide and was quite shallow at only 15-25 cm deep. It had a flat base and gently sloping walls on the western side and slightly steeper walls along the eastern side. The canal had a parabolic-shaped cross section. Feature 5, a small ditch, runs into this canal on the east. It was filled with soft, loosely compact, tan sand with manganese staining.

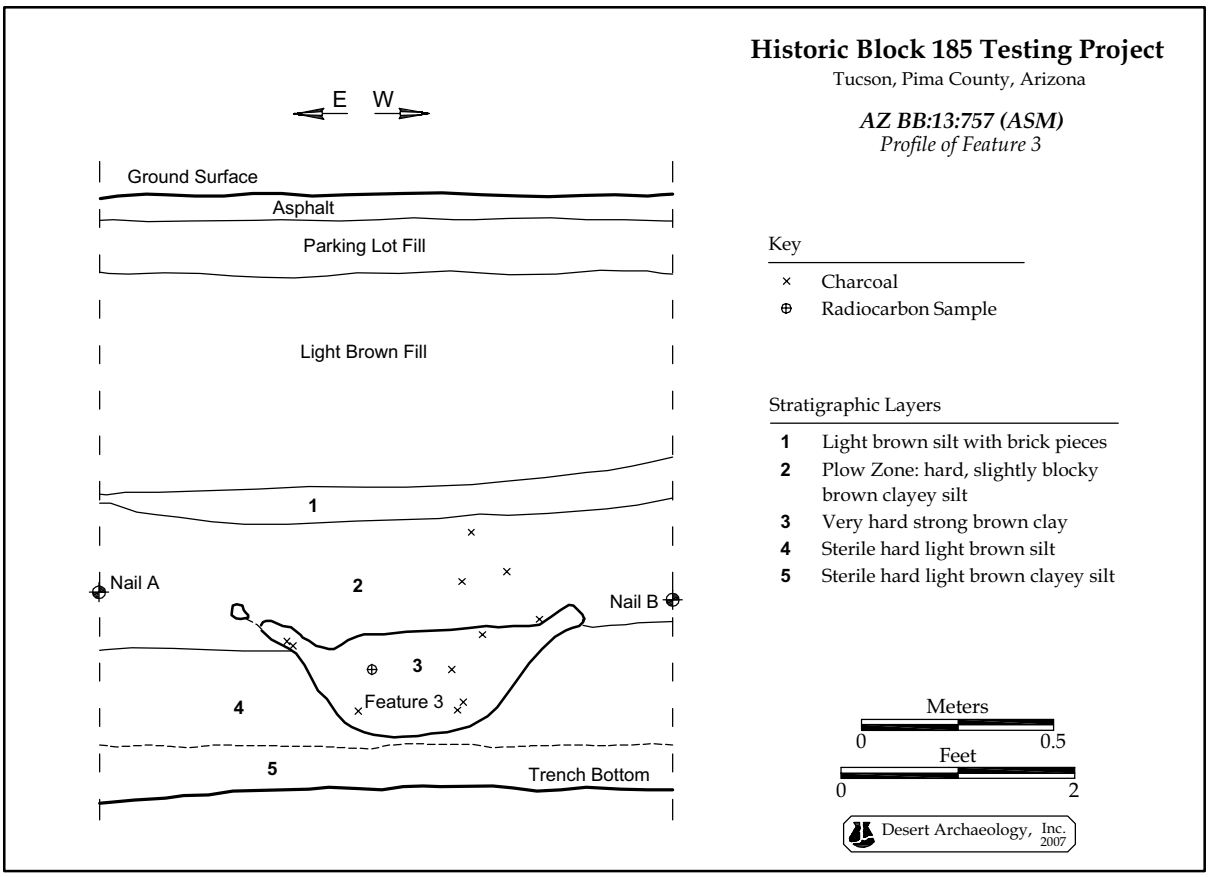

Figure 2.8. Southern profile of Feature 3, AZ BB:13:757 (ASM), in Trench 1.

The canal was cut into by Features 35 and perhaps Feature 38, both borrow pits. In turn, the canal cut into Feature 27, another borrow pit.

The artifacts recovered suggest this canal may have been filled in the 1870s to 1880s.

Feature 5, Small Ditch

Feature 5 was a small ditch-like feature located along the eastern side of canal Feature 4 (see Figures 2.1, 2.2, and 2.7). The ditch was exposed for 2.52 m in Unit 104, extending into the unexcavated area to the south. It appeared as a linear feature filled with light gray silty sand. After excavation, it was found to be 18 cm wide and approximately 17 cm deep. The ditch runs southeast-to-northwest before joining Feature 4. It appears to have been a small feeder ditch, perhaps channeling rainwater into the larger canal.

A variety of artifacts were found in the excavated portion of the ditch, including a mano and Native American ceramics. The ditch dates to the Historic era, and was probably filled in the 1870s to 1880s.

Feature 6, Historic Canal

Feature 6 was a historic canal located along the eastern side of the project area (see Figures 2.1 and 2.2). A 7-m-long segment of the canal was excavated; it extended north and south of the examined area. The canal was 1.4 m wide and 25 cm deep, and filled with tan laminated sandy silts with coarse sand and gravel scattered throughout. Manganese staining was present at the base of the canal.

The canal was present along the western side of the excavated area, and its western edge had been destroyed by Feature 21, a retaining wall. Feature 6 cut into the underlying caliche, and is the earliest feature in this part of the project area. It was, in turn, cut into by Feature 27, an American Territorial period borrow pit. A caliche berm, created for the western side of Feature 4, another American Territorial period canal, lay over the top of Feature 6. The canal is thought to date to the 1860s.

SUMMARY

A variety of features were located during testing and data recovery on Block 185. A prehistoric canal was located running south-to-north through the western third of the block. Previous archaeological work identified a series of Hohokam canals northwest of Block 185. While a scatter of ceramic and flaked stone artifacts are present in the soils of Block 185, none were associated with features, and instead, may have been brought into the area during periodic flooding, or from slopewash from the terrace to the east, where a long-lived Hohokam village existed. The primary use of the project area during the Prehistoric era appears to have been as an agricultural field.

Presidio features included several adobe mining pits, a possible ditch or canal, and a small pit. Material for adobe bricks was obtained from large pits located only a short distance from the walls of the fort. The adobe walls of the Tucson Presidio once stretched for some 700 ft along the edge of the terrace overlooking the project area. A large number of adobe bricks was required to construct the wall, estimated to be 10-12 ft tall. The average size of a Spanish adobe brick was 22 inches long by 11 inches wide and 4 inches thick. Bricks were separated from each other by at least 1 inch of mud mortar. The four walls were each approximately 700 ft long, totaling an estimated 2,800 linear ft (not including the towers at the northeastern and southwestern corners). The bricks were placed on the wall with their short (11-inch) side facing outward, and with the added mortar, approximately 2,800 bricks were needed for each course. An 11-ft-tall wall would have required about 26.5 courses of bricks (assuming 1 inch of mortar between the bricks). Therefore, a minimum of 73,920 bricks was needed to construct the walls, with the towers requiring a large, additional number of adobe bricks.

It is not surprising, then, that large adobe mining pits were located near the western wall of the fort. After excavation, the pits filled with soil that either washed down from the terrace to the east or from farming activities in the area. A relatively small number of artifacts, primarily animal bone and Native American ceramics, were deposited in the pits. A few unusual items, such as gunflints and a partial rosary or religious necklace, were also recovered from these features.

During the American Territorial period, the area continued to be used for agricultural purposes. However, the project area also began to be used for residential purposes, as the community of Tucson expanded beyond the presidio walls. Several shanties were constructed to the south by Chinese farmers, with these men dumping trash into the area. Other trash appears to have been tossed in or washed downslope from homes located on the terrace above. These residences were occupied by prominent Tucsonans Edward and Marie Fish, Hiram and Petra Santa Cruz, and Milton Duffield. Unfortunately, it is impossible to link the excavated trash directly to any of these families. Other trash appears in the irrigation canal along the edge of the floodplain. The origin of the artifacts is unknown, and the items cannot be linked to any group.

The American Statehood period saw the construction of the Fenner and Isaacson homes and their subsequent occupation into the 1970s. These homes had interior plumbing when they were constructed, and well and outhouse features were therefore not built in their backyards. Trash was also removed from the property, not surprising however, given the socioeconomic status of the families.

CHAPTER 3

NATIVE AMERICAN POTTERY FROM HISTORIC BLOCK 185

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Native American pottery made during the Prehistoric and Historic eras was recovered from archaeological sites AZ BB:13:756 (ASM) and AZ BB:13:757 (ASM) located in Historic Block 185 (Table 3.1). Pottery was recovered from undated nonfeature deposits, Tucson Presidio Features 23, 24, 25, 37, and 40, and American Territorial period Features 5, 19, 27, 34, 35, 36, and 38 at BB:13:756. American Territorial period Features 4, 5, and 6 at BB:13:757 also contained pottery. The nonfeature deposits at BB:13:756 yielded 206 sherds, representing portions of at least 37 vessels. The presidio features at BB:13:756 yielded 147 sherds (25 vessels). Sample sizes ranged from 1 to 104 sherds per feature, with a mean average value of 29 sherds per feature. The American Territorial period features at BB:13:756 yielded 436 sherds (93 vessels). Sample sizes ranged from 2 to 281 sherds per feature, with a mean average value of 62 sherds per feature. Finally, the American Territorial period features at BB:13:757 yielded 363 sherds, which represent portions of at least 40 vessels. Sample sizes ranged from 7 to 326 sherds per feature, with a mean average value of 121 sherds per feature.

The small amount of Prehistoric era pottery recovered from the sites is probably associated with the large, unnamed village designated AZ BB:13:9 (ASM), which is located directly east of Block 185. The prehistoric pottery was typed following descriptions presented in Greenleaf (1975), Kelly (1978), and Wallace (1986a, 1986b, 2001, 2004). The Historic era Native American pottery recovered from Block 185 belongs to the "Papago" (Tohono O'odham) ceramic series, discussed by Haury (1975), Fontana et al. (1962), Doelle (1983), Thiel and Faught (1995), Whittlesey (1997), and Heidke (2005a, 2005b, 2006), although the work of some Piman and Gileño potters may also be represented in the collection (Heidke 2006:7.42, 7.44).

In addition to the "Papago" ceramic series proposed by Fontana et al. (1962), a ceramic type proposed by Di Peso (1953) is of interest here: Sobaipuri Plain. Sobaipuri Plain (Di Peso 1953:148-154) shares many characteristics with Fontana and others' (1962:105) ceramic type Papago Plain, Variant 1; both types may exhibit casts of burned-out organic temper, medium-to-thick vessel walls, carbon cores, and rim coils. However, Di Peso (1953) never actually defined what he meant by the term "rim coil." Instead, he refers to a passage in Haury (1950). "One clear cut diagnostic feature, however, is seen in the rims of both bowls and jars. This is the addition of a coil at the rim, creating a band about the orifice" (Haury 1975:344). Di Peso (1953:Figure 14) illustrates a schematic cross section of a Sobaipuri Plain jar that clearly shows the coil separate from the body of the vessel. Fontana et al. (1962:103) use the term in much the same way, "'Rim-coiled' refers to one or two coils of clay added to the entire circumference of the rim. These added coils are not smoothed out." Recently, the author examined the Amerind Foundation's type collection of Sobaipuri Plain rim sherds recovered from the Presidio de Santa Cruz de Terrenate, AZ EE:4:11 (ASM)[1].

At 15-x magnification, most Sobaipuri Plain "coiled" vessels appear to have had the rim folded over rather than applied separately, based on observations of sand and organic temper casts that follow the curvature of the paste up and over the inner vessel wall. The folding process itself usually yielded a smooth, rounded lip. Additionally, examples displaying erosion at the very top of the lip exhibit a homogeneous paste—*not* a coil distinct from the body, which is what one would expect to see if the coil was attached separately. Occasionally, the coil looked as if it had been applied separately. In those cases, a V- to U-shaped groove is visible at the top of the lip where the two pieces came together, or, if the rim was eroded at the very top of the lip, a line separating the paste of the coil from the paste of the body is visible.

A similar technological procedure was also followed by potters in the Tucson area, based on the author's examination of Native American pottery sherds recovered from many historic sites, including Block 185. To track their occurrence, plain ware sherds exhibiting folded "rim coils" are reported as

[1]Although Di Peso thought the site to be the Sobaipuri village of Quiburi, most scholars now think it is the Presidio de Santa Cruz de Terrenate (Gerald 1968:20; Gilpin and Phillips 1999:34; Seymour 1989:215).

Table 3.1. Ceramic types recovered from excavations at Historic Block 185, reported by archaeological site and period.

Ceramic Type	Production Date Range (A.D.)	AZ BB:13:756 (ASM)						AZ BB:13:757 (ASM)		Row Total	
		Nonfeature Contexts		Historic Contexts: Spanish-Mexican		Historic Contexts: American Territorial		American Territorial			
		MNV[a]	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count
Prehistoric Native American Types											
Tucson Basin Red-on-brown Ware											
Indeterminate pre-Classic red-on-brown	50-1150	–	–	–	–	1	1	–	–	1	1
Indeterminate red-on-brown	50-1450	–	–	1	1	–	–	–	–	1	1
Rillito or Early, Middle, or Late Rincon red-on-brown	850-1150	–	–	–	–	–	–	2	3	2	3
Early, Middle, or Late Rincon, or Tanque Verde red-on-brown	950-1450	–	–	–	–	3	3	–	–	3	3
Middle Rincon Red-on-brown	1000-1100	1	1	–	–	–	–	1	1	2	2
Phoenix Basin Red-on-buff Ware											
Snaketown Red-on-buff	700-750	1	1	–	–	–	–	–	–	1	1
Indeterminate Tucson Basin Ware											
Indeterminate plain or red ware		N/A	–	N/A	2	N/A	2	N/A	1	N/A	5
Prehistoric/Historic Wares											
Tucson Basin Plain Ware											
Unmodified body sherd		N/A	60	N/A	82	N/A	80	N/A	74	N/A	296
Modified body sherd		–	–	–	–	–	–	1	1	1	1
Rim sherd		3	3	12	14	8	8	8	8	31	33
Neck sherd		N/A	4	N/A	5	N/A	5	N/A	6	N/A	20
Red Ware											
Unidentified red ware		4	11	3	9	6	15	3	6	16	41
Historic Native American Types											
Papago Series											
Sobaipuri Plain (folded rim coil)		4	4	4	5	5	5	–	–	13	14
Papago Plain		10	71	2	23	26	124	8	85	46	303
Papago Red		8	44	2	4	32	177	10	168	52	393
Possible Papago Red		–	1	1	2	1	2	1	1	3	6
Papago Buff		2	2	–	–	3	6	2	2	7	10
Papago Black-on-buff		–	–	–	–	1	1	3	6	4	7

Table 3.1. Continued.

Ceramic Type	Production Date Range (A.D.)	AZ BB:13:756 (ASM)						AZ BB:13:757 (ASM)		Row Total	
		Nonfeature Contexts		Historic Contexts							
				Spanish-Mexican		American Territorial		American Territorial			
		MNV[a]	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count
Papago Red-on-brown		–	–	–	–	3	3	1	1	4	4
Papago Black-on-red		1	1	–	–	2	2	–	–	3	3
Papago Red-on-buff		–	–	–	–	1	1	–	–	1	1
Acoma or Zuni series											
Indeterminate sherd-tempered, matte paint type	After 1680	1	1	–	–	–	–	–	–	1	1
Indeterminate sherd-tempered, no paint present		1	1	–	–	1	1	–	–	2	2
Indeterminate White Ware											
Indeterminate black-on-white type		1	1	–	–	–	–	–	–	1	1
Column Total		37	206	25	147	93	436	40	363	195	1,152

[a]MNV = Minimum number of vessel counts.

"Sobaipuri Plain" in this and earlier reports (Heidke 2002, 2003a, 2003b, 2005a, 2006; Thiel and Faught 1995). However, as discussed below, in the Tucson area, most of those vessels were tempered with sand or a mixture of sand and crushed potsherds (grog). Further, the category's name should not be taken to imply that Sobaipuri potters (Gilpin and Phillips 1999; Masse 1981) made all of the "Sobaipuri Plain" pots (see Thiel and Faught 1995:202), because we know that Tohono O'odham potters made vessels that also exhibit that morphological attribute (Fontana et al. 1962; Haury 1975).

ANALYSIS METHODS

All sherds were analyzed. The coding index used to record provenience, typological, technological, morphological, and use-alteration data from all the Native American pottery is available in Heidke (2006:Table 7.1). Additional qualitative and metric attribute data were recorded from a sub-sample of the pottery collection consisting of rim sherds, reconstructible vessels, and prehistoric and historic decorated wares; the coding index used for that supplemental analysis is also available in Heidke (2006:Table 7.3). Two attributes of the pottery recovered from Block 185, temper type and vessel function, deserve additional explanation because they are addressed repeatedly below for each point in time.

Temper Type

Native American pottery produced in the Greater Southwest often contains abundant non-plastic "temper" such as sand, disaggregated rock, and crushed sherd. For example, Tohono O'odham pottery is known to have been tempered with various types of material, including sand, crushed schist, ground potsherds ("grog"), and dried and sifted horse manure (Fontana et al. 1962:57-58, 135). Both sand and crushed rock tempers can be used as indicators of provenance once their geological sources have been identified (Arnold 1985; Heidke et al. 2002; Shepard 1936, 1942).

During the last two decades, an intensive program of wash sand sampling in the Tucson Basin has provided evidence that many spatially discrete sand temper compositions were available to Native American potters (Heidke and Wiley 1997; Heidke et al. 1998; Kamilli 1994; Lombard 1986, 1987a, 1987b, 1987c, 1987d, 1989, 1990; Miksa 2007). Temper type and provenance were characterized with respect to that petrofacies model, although no sherds were point-counted during the course of this project to verify the author's provenance assignments. However, nine sherds were thin-sectioned in preparation for petrographic analysis at a later date (Table 3.2). Temper attributes were recorded after examination of each sherd at 15-x magnification, using a Unitron ZSM binocular microscope fitted with a Stocker and Yale Lite Mite Series 9 circular illuminator.

Vessel Function

Two different approaches are utilized throughout this chapter to assess the likely uses that pottery played in the lives of the residents of the sites at different times. The first approach is strictly typological, and entailed the assignment of rim sherds and reconstructible vessels to vessel form categories originally created to classify the prehistoric pottery of the region (Kelly 1978). The second approach examined a subset of the rim sherds and, when present, reconstructible vessels—those with measurable orifice and/or aperture diameters—and placed them into functional categories determined by their overall morphology and size (Braun 1980). Braun's (1980) morphological classification is based on Shepard's (1995:230) geometric taxonomy of vessel shape, while the functional categories he developed are based on characteristics of historic and modern Piman, Yuman, and Puebloan pottery. The ethnographically based model that resulted from Braun's work provides an objective and replicable way to examine pottery function, regardless of when or where a pot was made. The interested reader is referred to the Heidke (2006:7.5-7.22) for a detailed presentation of the methods used here to implement the functional study.

Unfortunately, many historic sherds could not be assigned to a vessel form or Shepard-Braun functional category. Usually those rims were classified as an "indeterminate flare-rim" form. Indeterminate flare-rim vessels may represent as many as seven different Tohono O'odham vessel forms: the *hí-to-ta-kut*, *í-o-la-ki-ta-kut*, *bí-kut*, *há-a-i-cú-kai-tu-ta-kut*, *sú-u-te-ki-wá-i-kut, sí-to-ta-kut,* and the *wá-i-kut*. All seven of those vessel forms have everted, or flaring rims (Fontana et al. 1962:33-49). They often cannot be differentiated in archaeological collections because the rim of the vessel broke away from the body at its neck.

Conjoining and Matching Sherds

All rim sherds, reconstructible vessels, and decorated pottery recovered from each feature was laid out at one time in the order of the strata and levels excavated. In some cases, a number of sherds within

Table 3.2. Thin-section inventory and binocular microscopic temper characterization.

Thin Section Number	AZ ASM Site Number	Accession Number	Catalog Number	Feature Number	Field Number	Observation Number	Ceramic Type	Vessel Shape	Temper Type	Temper Source Generic	Temper Source Specific
CTA228-01	BB:13:756	2005-0564	1	0	670	1	Plain ware	Bowl	Sand and crushed sherd	Volcanic	Beehive Petrofacies
CTA228-02	BB:13:756	2005-0564	2	34	84	8	Papago Black-on-buff	Jar	Sand and crushed sherd	Volcanic	Beehive Petrofacies
CTA228-03	BB:13:756	2005-0564	3	34	335	12	Plain ware	Bowl	Sand and crushed sherd	Volcanic	Twin Hills Petrofacies
CTA228-04	BB:13:756	2005-0564	4	34	44	8	Papago plain	Indeterminate flare-rim	Sand and fiber	Granitic	Sierrita Petrofacies
CTA228-05	BB:13:756	2005-0564	5	36	352	1	Papago red	Bowl	Sand and fiber	Granitic	Sierrita Petrofacies
CTA228-06	BB:13:756	2005-0564	6	0	570	4	Indeterminate White Ware (no paint)	Jar	Sand and crushed sherd	Granitic and mixed lithic	Airport Petrofacies
CTA228-07	BB:13:756	2005-0564	7	0	674	3	Papago Plain	Bowl	Sand and fiber	Granitic and mixed lithic	Black Mountain Petrofacies
CTA228-08	BB:13:756	2005-0564	8	34	44	2	Papago Red	Jar	Sand and fiber	Granitic and mixed lithic	Black Mountain Petrofacies
CTA228-09	BB:13:756	2005-0564	9	34	68	2	Papago Red	Indeterminate flare-rim	Sand and fiber	Granitic and mixed lithic	Black Mountain Petrofacies

a bag or from different strata, levels, or units within a feature conjoined, that is, the pieces literally fit together, while in other cases, aspects of the decoration or morphology and temper of the sherd were similar enough to consider multiple sherds "matching" portions of a single vessel. When conjoins or matches were observed, the vessel was recorded in the provenience containing the largest portion of the pot. Because all diagnostic sherds recovered from a feature were laid out at one time, it was possible to quickly assess if pieces of individual pots were recovered from more than one vertical or horizontal excavation unit. In this way, a more accurate estimate of the minimum number of vessels (MNV) present in each deposit was obtained.

Two sets of conjoining sherds and one set of matching sherds were identified in the Historic Block 185 collection. An intra-feature conjoin was documented in BB:13:756 Feature 23, Stratum 50, Level 1, Units 8 and 18. A cross-feature conjoin was documented between BB:13:757 Feature 4, Stratum 59, Level 2, and Feature 6, Stratum 59, Level 1. An intra-feature match was also observed in BB:13:757 Feature 4 between Stratum 59, Level 1, and Stratum 59.01, Level 1.

HISTORIC ERA POTTERY

Project Director J. Homer Thiel provided the author with dating information for the contexts recovered from Historic Block 185. To review temporal trends in the ceramic data, most contexts were assigned to one of four temporal sets: 1800-1840, 1850-1880, 1870-1889, and 1880-1900. The 1800-1840 contexts include BB:13:756 borrow pit Features 23 (Stratum 50) and 25 (Stratum 50). The 1850-1880 contexts include BB:13:756 borrow pit Features 27 (Stratum 50) and 38 (Stratum 50) and trash midden Feature 36 (Stratum 4), and BB:13:757 canal Feature 6 (Stratum 59). The 1870-1889 contexts include BB:13:757 canal Feature 4 (Stratum 59) and ditch Feature 5 (Strata 50 and 59). Finally, the 1880-1900 context consists of BB:13:756 trash midden Feature 34 (Stratum 4). Ceramic-bearing deposits that were not assigned to one of the four groups listed above are BB:13:756 nonfeature contexts presidio Features 24, 37, and 40, and American Territorial period Features 19 and 35. Altogether, those five features contained only 54 sherds (10 vessels).

Data tables for each temporal set are formatted following a standardized approach developed by the author. It has been used previously to report attributes of historic Native American pottery recovered from Block 83, AZ BB:13:401 (ASM) (Heidke 2007), Block 136, AZ BB:13:513 (ASM) (Heidke 2002), Block 139, AZ BB:13:644 (ASM) (Heidke 2003a), Block 172, AZ BB:13:668 (ASM) (Heidke 2003b), Block 181, AZ BB:13:13 (ASM) (Heidke 2006), San Agustín Mission, AZ BB:13:6 (ASM) (Heidke 2006), the Tucson Presidio, AZ BB:13:13 (ASM) (Heidke 2006), and the León farmstead, AZ BB:13:505 (ASM) (Heidke 2005a). Following a standardized method of reporting facilitates the synthesis of data gathered from multiple contexts at one site or at many (Heidke 2006:Tables 7.50, 7.51).

Historic O'odham Pottery from Block 185, circa 1800-1840

A total of 121 pottery sherds, representing portions of at least 21 individual vessels, was recovered from the two features assigned to the 1800-1840 set (Table 3.3). Additional information regarding characteristics of the red-slipped pottery recovered from those features is provided in Table 3.4.

These presidio features exhibit some temporal mixing, with prehistoric painted pottery making up 0.8 percent of the sherds (4.8 percent of the vessels). Those values suggest some of the plain ware pottery may also be prehistoric, especially because it is nearly impossible to separate a prehistoric sand-tempered plain ware sherd from a historic sand-tempered plain ware.

Temper Type

The temper type data are summarized in Table 3.5. Two compositions dominate the collection: sand and crushed-sherd temper (44.6 percent) and sand (42.0 percent). Those temper types only occur in the plain and red ware and Sobaipuri Plain sherds. Also occurring in the plain ware are a few sherds tempered with mixtures of sand and crushed gneiss/schist. The gneiss/schist-tempered sherds may represent mixing of earlier prehistoric plain ware sherds into the deposits, as those temper types are known to have been in common use from approximately A.D. 850 to 1100 (Deaver 1984:397-398, Figure 4.69; Kelly 1978:72-76; Wallace et al. 1995:607, Figure 6). The remaining sherds are all tempered with sand and fiber (presumably manure; 8.9 percent). All examples of mixed sand and fiber temper occur in the "Papago" ceramic types, that is, Papago Plain, Papago Red, and possible Papago Red.

Pottery Function

Two different approaches were utilized to assess the likely uses that O'odham pottery may have played in the lives of Block 185 inhabitants from 1800 to 1840. As mentioned, the first approach was strictly typological and entailed the assignment of rim sherds

Table 3.3. Native American pottery types recovered from contexts at Block 185 that date from 1800-1840.

Ceramic Type	Production Date Range (A.D.)	Vessel Part[a]							
		Body Sherd		Rim Sherd		Neck		Row Total	
		MNV[b]	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count
Prehistoric Native American Types									
Tucson Basin Red-on-brown Ware									
Indeterminate red-on-brown	50-1450	–	–	–	–	1	1	1	1
Indeterminate Tucson Basin Ware									
Indeterminate plain or red ware		2	2	–	–	–	–	2	2
Prehistoric/Historic Wares									
Plain ware		N/A	78	11	13	N/A	4	11	95
Red ware		N/A	6	2	2	N/A	–	2	8
Historic Native American Types, Papago Series									
Sobaipuri Plain (folded rim coil)		–	–	4	5	–	–	4	5
Papago Plain		N/A	5	1	1	N/A	2	1	8
Papago Red		N/A	1	–	–	N/A	–	–	1
Possible Papago Red		N/A	1	–	–	N/A	–	–	1
Column Total		2	93	18	21	1	7	21	121

[a]Prehistoric/historic plain and red ware, including Papago types, body and neck sherds were not inspected for conjoins; therefore, minimum number of vessel (MNV) estimates are not available (N/A) for those ware and vessel part combinations.

[b]MNV = Minimum number of vessels.

Table 3.4. Location of slip on historic red ware and Papago Red pottery recovered from contexts at Block 185 that date from 1800-1840.

Slip Location	Red Ware			Papago Red	Row Total
	Vessel Part			Vessel Part	
		Rim Sherds			
	Body Sherds	Bowl	Indeterminate Bowl or Scoop	Body Sherds	
Interior only	4	–	–	–	4
Full slip	2	–	1	–	3
Interior and rim	–	1	–	–	1
Exterior only	–	–	–	1	1
Column Total	6	1	1	1	9

and reconstructible vessels to vessel form categories originally created to classify prehistoric pottery from the region. In contrast, the second approach examined a subset of the rim sherds and reconstructible vessels, placing them into functional categories determined by their overall morphology and size.

Typological Approach. The vessel form of O'odham pottery recovered from 1800-1840 contexts is reported in Table 3.6. Four bowl vessel forms make up nearly 90 percent of the determinate forms (55.5 percent of all rims); a tall straight-collared jar represents the only other determinate form identified. One of the bowl vessel forms has a semi-flaring rim, suggesting some of the five "indeterminate flare-rim" cases may also be bowls.

Shepard-Braun Approach. The count of sherds in each functional class is summarized in Table 3.7. Plain ware, red ware, and Sobaipuri Plain vessels are represented. The functional interpretation of each vessel form class follows the methodology described in Heidke (2006). The small collection shows a clear orientation toward food storage (plain ware, "H"), preparation (plain ware, "M"), cooking (plain ware, "C"), and large group (Sobaipuri Plain, "O") and small group (red ware, "M") serving. The 20 percent devoted to storage, 40 percent devoted to preparation and cooking, and 40 percent devoted to serving documented in this small collection falls within the range of values previously documented in 1771-1830s contexts (Heidke 2006). In those deposits,

Table 3.5. Three-way classification of historic ceramic types recovered from contexts at Block 185 that date from 1800-1840, by vessel part and temper type. (The "body" sherd category includes body and neck sherds.)

Temper Type	Plain Ware		Red Ware		Sobaipuri Plain	Papago Plain		Papago Red	Possible Papago Red	Row Total
	Body	Rim	Body	Rim	Rim	Body	Rim	Body	Body	
Sand and crushed sherd	38	7	3	1	1	–	–	–	–	50
Sand	40	1	3	1	2	–	–	–	–	47
Sand and fiber	–	–	–	–	–	7	1	1	1	10
7-25 percent gneiss/schist	2	–	–	–	–	–	–	–	–	2
1-7 percent gneiss/schist	1	2	–	–	–	–	–	–	–	3
Indeterminate	1	1	–	–	1	–	–	–	–	3
Column Total	82	11	6	2	4	7	1	1	1	115

Table 3.6. Frequency of rim sherds in each vessel form class recovered from contexts at Block 185 that date from 1800-1840, reported by ceramic type.

Vessel Form	Plain Ware	Red Ware	Sobaipuri Plain	Papago Plain	Row Total
Bowl Forms					
Semi-flare-rim, outcurved bowl	2	–	2	–	4
Outcurved bowl	1	1	–	–	2
Hemispherical bowl	1	–	–	–	1
Incurved bowl	1	–	–	–	1
Indeterminate bowl	2	–	–	–	2
Jar Forms					
Tall straight-collared jar	1	–	–	–	1
Indeterminate Forms					
Indeterminate flare-rim form	2	–	2	1	5
Indeterminate bowl or scoop	–	1	–	–	1
Indeterminate vessel form	1	0	–	–	1
Column Total	11	2	4	1	18

Table 3.7. Frequency of rim sherds in each Shepard-Braun functional class recovered from contexts at Block 185 that date from 1800-1840, reported by ceramic type.

Functional Category	Ware/Type			Row Total
	Plain Ware	Red Ware	Sobaipuri Plain	
Independent Restricted Vessels				
C: Cooking (small- to medium-sized groups), temporary storage, and/or water cooling (13.0-25.5 cm aperture diameter)	1	–	–	1
Simple and Dependent Restricted Vessels				
H: Specialized, temporary dry storage (13.0-25.5 cm orifice diameter)	1	–	–	1
Unrestricted Vessels (Deep)				
M: Food preparation and/or small group serving (13.0-25.5 cm orifice diameter)	1	1	–	2
O: Communal serving/eating (32.0-38.5 cm orifice diameter)	–	–	1	1
Column Total	3	1	1	5

7-21 percent were storage containers, 15-43 percent were preparation/cooking pots, and 36-70 percent were serving vessels.

Historic O'odham Pottery from Block 185, circa 1850-1880

A total of 152 pottery sherds, representing portions of at least 35 individual vessels, was recovered from the four features assigned to the 1800-1840 set (Table 3.8). Additional information regarding characteristics of the red-slipped pottery recovered from those features is provided in Table 3.9.

These late presidio to American Territorial period features exhibit some temporal mixing, with prehistoric painted pottery making up 2.0 percent of the sherds (8.6 percent of the vessels). Those values suggest some of the plain ware pottery may be prehistoric too.

Temper Type

Temper type data are summarized in Table 3.10. One composition dominates the collection: sand and fiber (presumably manure; 61.8 percent of examined sherds). Virtually all of the "Papago" ceramic types, that is, Papago Plain, Papago Red, and Papago Black-on-buff, are tempered with sand and fiber. Sand (21.5 percent) and sand-and-crushed-sherd temper (14.6 percent) comprise most of the remaining cases. Those temper types occur primarily in the plain and red ware sherds. The two sand-tempered Papago Red-on-brown sherds are a notable exception. Also occurring in the plain ware are a few sherds tempered with mixtures of sand and crushed gneiss/schist. As noted, gneiss/schist-tempered sherds may represent mixing of prehistoric plain ware into the deposits.

Pottery Function

Typological and functional approaches were utilized to assess the likely uses O'odham pottery may have played in the lives of Block 185 inhabitants during this time.

Typological Approach. The vessel form of late presidio to American Territorial period O'odham pottery recovered from 1850-1880 contexts is reported in Table 3.11. The six bowl vessel forms documented make up 77.0 percent of the determinate

Table 3.8. Native American pottery types recovered from contexts at Block 185 that date from 1850-1880.

Ceramic Type	Production Date Range (A.D.)	Vessel Part[a]							
		Body Sherd		Rim Sherd		Neck		Row Total	
		MNV[b]	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count
Prehistoric Native American Types									
Tucson Basin Red-on-brown Ware									
Indeterminate pre-Classic red-on-brown	50-1150	1	1	–	–	–	–	1	1
Early, Middle, or Late Rincon, or Tanque Verde red-on-brown	950-1450	–	–	2	2	–	–	2	2
Prehistoric/Historic Wares									
Plain ware		N/A	37	4	4	N/A	–	4	41
Red ware		N/A	5	5	5	N/A	–	5	10
Historic Native American Types									
Papago Series									
Sobaipuri Plain (folded rim coil)		–	–	2	2	–	–	2	2
Papago Plain		N/A	29	7	7	N/A	2	7	38
Papago Red		N/A	33	10	13	N/A	7	10	53
Papago Red-on-brown		2	2	–	–	–	–	2	2
Papago Black-on-buff		–	–	1	2	–	–	1	2
Acoma or Zuni series									
Indeterminate sherd-tempered, no paint or slip visible		1	1	–	–	–	–	1	1
Column Total		4	108	31	35	–	9	35	152

[a]Prehistoric/historic plain and red ware, including Papago types, body and neck sherds were not inspected for conjoins; therefore, minimum number of vessel (MNV) estimates are not available (N/A) for those ware and vessel part combinations.

[b]MNV = Minimum number of vessels.

Table 3.9. Location of slip on historic red ware and Papago Red pottery recovered from contexts at Block 185 that date from 1850-1880.

	Red Ware		Papago Red					
	Vessel Part		Vessel Part					
		Rim Sherds			Rim Sherds			
Slip Location	Body Sherds	Bowl	Body Sherds	Neck Sherds	Bowl	Jar	Indeterminate Flare-rim Form	Row Total
Exterior only	–	–	30	4	–	–	–	34
Full slip	5	3	3	–	6	–	–	17
Exterior, rim, and interior band below rim	–	–	–	3	1	1	1	6
Interior and rim	–	2	–	–	–	–	1	3
Column Total	5	5	33	7	7	1	2	60

Table 3.10. Three-way classification of historic ceramic types recovered from contexts at Block 185 that date from 1850-1880, by vessel part and temper type. (The "body" sherd category includes body and neck sherds.)

	Plain Ware		Red Ware		Sobaipuri Plain	Papago Plain		Papago Red		Papago Red-on-brown	Papago Black-on-buff	Row Total
Temper Type	Body	Rim	Body	Rim	Rim	Body	Rim	Body	Rim	Body	Rim	
Sand and fiber	–	–	–	–	1	31	6	40	10	–	1	89
Sand	18	1	5	4	–	–	1	–	–	2	–	31
Sand and crushed sherd	17	2	–	1	1	–	–	–	–	–	–	21
1-7 percent gneiss/schist	2	–	–	–	–	–	–	–	–	–	–	2
>25 percent gneiss/schist	–	1	–	–	–	–	–	–	–	–	–	1
Column Total	37	4	5	5	2	31	7	40	10	2	1	144

Table 3.11. Frequency of rim sherds in each vessel form class recovered from contexts at Block 185 that date from 1850-1880, reported by ceramic type.

Vessel Form	Plain Ware	Red Ware	Sobaipuri Plain	Papago Plain	Papago Red	Papago Black-on-buff	Row Total
Bowl Forms							
Semi-flare-rim, outcurved bowl	–	2	–	–	2	–	4
Outcurved bowl	–	1	–	–	1	–	2
Flare-rim bowl	–	–	–	–	1	–	1
Hemispherical bowl	–	–	–	1	–	–	1
Incurved bowl	1	–	–	–	–	–	1
Semi-flare-rim, incurved bowl	–	–	–	–	1	–	1
Indeterminate bowl	1	2	–	–	2	–	5
Jar Forms							
Tall flare-rim jar	–	–	–	1	1	1	3
Indeterminate Forms							
Indeterminate flare-rim form	2	–	2	4	2	–	10
Indeterminate vessel form	–	–	–	1	–	–	1
Column Total	4	5	2	7	10	1	29

forms (51.7 percent of all rims). The only other determinate form identified was the tall flare-rim jar. The occurrence of flared and semi-flaring bowl forms suggests some of the 10 "indeterminate flare-rim" cases may be bowls.

Shepard-Braun Approach. The count of sherds in each functional class is summarized in Table 3.12. Red ware, Papago Red, and Papago Black-on-buff vessels are represented. The small collection shows an orientation toward temporary storage (Papago Black-on-buff, "EE"), temporary storage or water cooling (Papago Red, "C"), and large group (Papago Red, "O") and small group (red ware and Papago Red, "M") serving. Comparative material is rare. A feature at the Carrillo household, located in the San Agustín Mission locus of BB:13:6, which accumulated from 1860 to 1880, yielded a Papago Red cauldron classified as a small group serving vessel (Heidke 2006:7.63).

Historic O'odham Pottery from Block 185, circa 1870-1889

A total of 335 pottery sherds, representing portions of at least 33 individual vessels, was recovered from the two features assigned to the 1870-1889 set (Table 3.13). Additional information regarding characteristics of the red-slipped pottery recovered from those features is provided in Table 3.14.

These American Territorial period features exhibit some temporal mixing, with prehistoric painted pottery making up 1.5 percent of the sherds (6.1 percent of the vessels). Those values suggest some of the plain ware pottery may also be prehistoric.

Temper Type

The temper type data are summarized in Table 3.15. One composition dominates the collection: sand and fiber (presumably manure; 71.2 percent of examined sherds). All the definite "Papago" ceramic types, that is, Papago Plain, Papago Red, Papago Red-on-brown, Papago Black-on-buff, and Papago Buff, are tempered with sand and fiber. Sand (18.1 percent) and sand-and-crushed-sherd temper (7.8 percent) make up most of the remaining cases. Those temper types occur primarily in the plain and red ware sherds. The sand-tempered "possible Papago Red" sherd is a notable exception. Also occurring in the plain ware are a few sherds tempered with mixtures of sand and crushed gneiss/schist. As noted, gneiss/schist-tempered sherds may represent mixing of prehistoric plain ware into the deposits.

Pottery Function

Typological and functional approaches were utilized to assess the likely uses O'odham pottery may have played in the lives of Block 185 inhabitants at this time.

Typological Approach. The vessel form of American Territorial period O'odham pottery recovered from 1870-1889 contexts is reported in Table 3.16. The two bowl vessel forms documented comprise 22.0 percent of the determinate forms; bowls represent 26.9 percent of all rims. The only other determinate form identified was the tall flare-rim jar, with 78.0 percent of determinate forms and 26.9 percent of all rims. The occurrence of semi-flaring bowl and flare-rimmed jar forms suggests the 10 "indeterminate flare-rim" cases may be a mixture of bowls and jars.

Table 3.12. Frequency of rim sherds in each Shepard-Braun functional class recovered from contexts at Block 185 that date from 1850-1880, reported by ceramic type.

	Ware/Type			
Functional Category	Red Ware	Papago Red	Papago Black-on-buff	Row Total
Independent Restricted Vessels				
C: Cooking (small- to medium-sized groups), temporary storage, and/or water cooling (13.0-25.5 cm aperture diameter)	–	2	–	2
EE: Cooking (large group) and/or temporary storage (>38.5 cm aperture diameter)	–	–	1	1
Unrestricted Vessels (Deep)				
M: Food preparation and/or small group serving (13.0-25.5 cm orifice diameter)	1	1	–	2
O: Communal serving/eating (32.0-38.5 cm orifice diameter)	–	1	–	1
Column Total	1	4	1	6

Table 3.13. Native American pottery types recovered from contexts at Block 185 that date from 1870-1889.

Ceramic Type	Production Date Range (A.D.)	Vessel Part[a]								Row Total	
		Body Sherd		Rim Sherd		Reconstructible Vessel		Neck			
		MNV[b]	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count
Prehistoric Native American Types											
Tucson Basin Red-on-brown Ware											
Rillito or Early, Middle, or Late Rincon red-on-brown	850-1150	2	3	–	–	–	–	–	–	2	3
Middle Rincon Red-on-brown	1000-1100	1	1	–	–	–	–	–	–	1	1
Indeterminate Tucson Basin Ware											
Indeterminate plain or red ware		–	–	–	–	–	–	1	1	1	1
Prehistoric/Historic Wares											
Plain ware		N/A	69	7	7	–	–	N/A	6	7	82
Red ware		N/A	3	2	2	–	–	N/A	–	2	5
Historic Native American Types, Papago Series											
Papago Plain		N/A	72	7	7	–	–	N/A	1	7	80
Papago Red		N/A	108	6	10	1	16	N/A	21	7	155
Possible Papago Red		N/A	–	1	1	–	–	N/A	–	1	1
Papago Buff		2	2	–	–	–	–	–	–	2	2
Papago Red-on-brown		1	1	–	–	–	–	–	–	1	1
Papago Black-on-buff		–	–	2	4	–	–	–	–	2	4
Column Total		6	259	25	31	1	16	1	29	33	335

[a]Prehistoric/historic plain and red ware, including Papago types, body and neck sherds were not inspected for conjoins; therefore, minimum number of vessel (MNV) estimates are not available (N/A) for those ware and vessel part combinations.

[b]MNV = Minimum number of vessels.

Table 3.14. Location of slip on historic red ware and Papago Red pottery recovered from contexts at Block 185 that date from 1870-1889.

	Red Ware		Papago Red				
	Vessel Part		Vessel Part				
		Rim Sherds			Rim Sherds and Reconstructible Vessels		
Slip Location	Body Sherds	Bowl	Body Sherds	Neck Sherds	Jar	Indeterminate Flare-rim Form	Row Total
Exterior only	1	–	107	15	–	–	123
Full slip	2	2	–	2	1	1	8
Exterior, rim, and interior band below rim	–	–	–	3	1	2	6
Indeterminate	–	–	1	1	2	–	4
Column Total	3	2	108	21	4	3	141

Shepard-Braun Approach. The count of sherds in each functional class is summarized in Table 3.17. Red ware, Papago Red, and Papago Black-on-buff vessels are represented. The small collection shows an orientation toward temporary storage or water cooling (Papago Red, "C" three cases), as well as temporary storage (Papago Black-on-buff, "EE"), and small group serving (red ware, "M"). A large comparative collection is available from BB:13:13, Block 181, Lot 1, Feature 376, which accumulated from the late 1870s to the early 1890s (n = 44; Heidke 2006:Table 7.49). That collection contains plain ware, Papago Plain, and Papago Red vessels; 20.5 percent of these were well-suited for storage (13.6 percent for temporary storage or water cooling), 38.6 percent for serving, and 40.9 percent for food preparation and cooking tasks.

Historic O'odham Pottery from Block 185, circa 1880-1900

A total of 280 pottery sherds, representing portions of at least 62 individual vessels, was recovered from the feature assigned to the 1880-1900 set (Table 3.18). Additional information regarding characteristics of the red-slipped pottery recovered from this feature is provided in Table 3.19.

This American Territorial period feature exhibits some temporal mixing, with prehistoric painted pottery making up 0.4 percent of the sherds (1.6 percent of the vessels). Those values suggest some of the plain ware pottery may be prehistoric too.

Temper Type

The temper type data are summarized in Table 3.20. One composition dominates the collection: sand and fiber (presumably manure; 77.4 percent of examined sherds). Most of the "Papago" series pottery, that is, Papago Plain, Papago Red, possible Papago Red, Papago Black-on-red, and Papago Red-on-buff, are tempered with sand and fiber. Sand (13.1 percent) and sand-and-crushed-sherd temper (8.4 percent) comprise most of the remaining cases. Those temper types occur primarily in the plain and red ware sherds; sand-tempered Papago Red-on-brown, Papago Black-on-buff, and Papago Buff sherds are notable exceptions. Also occurring in the plain ware are a few sherds tempered with mixtures of sand and crushed gneiss/schist. As noted, gneiss/schist-tempered sherds may represent mixing of prehistoric plain ware into the deposits.

Pottery Function

Typological and functional approaches were utilized to assess the likely uses O'odham pottery may have played in the lives of Block 185 inhabitants during this time.

Typological Approach. The vessel form of American Territorial period O'odham pottery recovered from 1880-1900 contexts is reported in Table 3.21. Numerous bowl and jar forms were identified. Six bowl vessel forms make up 55.6 percent of the determinate forms; bowls represent 25.0 percent of all rims. Two jar forms make up 44.4 percent of determinate forms and 15.4 percent of all rims. The occurrence of semi-flaring bowl and flare-rimmed jar forms suggests the 28 "indeterminate flare-rim" cases are likely a mixture of bowls and jars.

Shepard-Braun Approach. The count of sherds in each functional class is summarized in Table 3.22. Sobaipuri Plain, Papago Plain, and Papago Red vessels are represented. The collection contains vessels well-suited to a variety of tasks. Secure storage or water carrying (Papago Plain, "B"), temporary storage or water cooling (Papago Red, "C" three cases),

Table 3.15. Three-way classification of historic ceramic types recovered from contexts at Block 185 that date from 1870-1889, by vessel part and temper type. (The "rim" category includes rim sherds and reconstructible vessels; the "body" sherd category includes body and neck sherds.)

	Plain Ware		Red Ware		Papago Plain		Papago Red		Possible Papago Red	Papago Red-on-brown	Papago Black-on-buff	Papago Buff	
Temper Type	Body	Rim	Body	Rim	Body	Rim	Body	Rim	Rim	Body	Rim	Body	Row Total
Sand and fiber	–	–	–	–	73	7	129	7	–	1	1	2	220
Sand	48	3	2	1	–	–	–	–	1	–	1	–	56
Sand and crushed sherd	18	4	1	1	–	–	–	–	–	–	–	–	24
1-7 percent gneiss/schist	8	–	–	–	–	–	–	–	–	–	–	–	8
7-25 percent gneiss/schist	1	–	–	–	–	–	–	–	–	–	–	–	1
Column Total	75	7	3	2	73	7	129	7	1	1	2	2	309

Table 3.16. Frequency of rim sherds and reconstructible vessels in each vessel form class recovered from contexts at Block 185 that date from 1870-1889, reported by ceramic type.

Vessel Form	Plain Ware	Red Ware	Papago Plain	Papago Red	Possible Papago Red	Papago Black-on-buff	Row Total
Bowl Forms							
Semi-flare-rim, outcurved bowl	–	1	–	–	–	–	1
Semi-flare-rim, hemispherical bowl	–	1	–	–	–	–	1
Indeterminate bowl	5	–	–	–	–	–	5
Jar Forms							
Tall flare-rim jar	–	–	2	4	–	1	7
Indeterminate Forms							
Indeterminate flare-rim form	1	–	4	3	1	1	10
Indeterminate vessel form	1	–	1	–	–	–	2
Column Total	7	2	7	7	1	2	26

Table 3.17. Frequency of rim sherds and reconstructible vessels in each Shepard-Braun functional class recovered from contexts at Block 185 that date from 1870-1889, reported by ceramic type.

	Ware/Type			
Functional Category	Red Ware	Papago Red	Papago Black-on-buff	Row Total
Independent Restricted Vessels				
C: Cooking (small- to medium-sized groups), temporary storage, and/or water cooling (13.0-25.5 cm aperture diameter)	–	3	–	3
EE: Cooking (large group) and/or temporary storage (>38.5 cm aperture diameter)	–	–	1	1
Unrestricted Vessels (Deep)				
M: Food preparation and/or small group serving (13.0-25.5 cm orifice diameter)	1	–	–	1
Column Total	1	3	1	5

specialized temporary dry storage (Papago Red, "H"), food preparation (Papago Plain, "M"), cooking (Papago Plain, "C" four cases, and Sobaipuri Plain, "D"), and small group serving (Papago Red, "M"). A small comparative collection that accumulated during the 1880-1900 span is available from Block 83. The only ceramic type represented there is Papago Red. All five of the recovered Papago Red jars would have made good temporary storage containers, with three particularly well-suited to water cooling.

A Brief Review of O'odham Pottery Technology, as Reflected in the Block 185 Ceramics and Comparison with Other Collections Recovered from 1771-1900 Deposits

Table 3.23 provides information recorded from pottery recovered from the well-dated deposits at Block 185 and three archaeological sites with contemporaneous deposits that reflect decisions made by the potters—temper type, occurrence of folded rim coils, location of red slips, and decorated paint and slip color schemes—as well as those that reflect consumer preference—type frequency and vessel function implied by slip location. All of these attributes are characteristics of "Papago" pottery that contributed to Fontana and others' (1962:101-116) typology. The temper type, slip location, and ware frequency data are based on sherd counts, while the folded rim data are based on minimum number of vessel counts.

Block 185, circa 1800-1840

Native American pottery from Block 185 1800-1840 deposits was compared with data from San Agustín Mission (1771-1821) and the Tucson Presidio (1810s-1820s and 1820s-1830s) (Heidke 2006:Table 7.50). Review of the temper type, folded rim coil,

Table 3.18. Native American pottery types recovered from contexts at Block 185 that date from 1880-1900.

Ceramic Type	Production Date Range (A.D.)	Vessel Part[a]						Row Total	
		Body Sherd[b]		Rim Sherd		Neck			
		MNV[c]	Sherd Count	MNV	Sherd Count	MNV	Sherd Count	MNV	Sherd Count
Prehistoric Native American Types									
Tucson Basin Red-on-brown Ware									
Early, Middle, or Late Rincon, or Tanque Verde red-on-brown	950-1450	–	–	1	1	–	–	1	1
Indeterminate Tucson Basin Ware									
Indeterminate plain or red ware		2	2	–	–	–	–	2	2
Prehistoric/Historic Wares									
Plain ware		N/A	40	5	5	N/A	5	5	50
Red ware		N/A	3	2	2	N/A	–	2	5
Historic Native American Types, Papago Series									
Sobaipuri Plain (folded rim coil)		–	–	3	3	–	–	3	3
Papago Plain		N/A	52	17	19	N/A	7	17	78
Papago Red		N/A	76	24	25	N/A	31	24	132
Possible Papago Red		N/A	–	1	1	N/A	1	1	2
Papago Buff		2	2	–	–	–	–	2	2
Papago Black-on-red		–	–	–	–	2	2	2	2
Papago Red-on-brown		1	1	–	–	–	–	1	1
Papago Red-on-buff		1	1	–	–	–	–	1	1
Papago Black-on-buff		1	1	–	–	–	–	1	1
Column Total		7	178	53	56	2	46	62	280

[a]Prehistoric/historic plain and red ware, including Papago types, body and neck sherds were not inspected for conjoins; therefore, minimum number of vessel (MNV) estimates are not available (N/A) for those ware and vessel part combinations.
[b]Body sherd count includes handles.
[c]MNV = Minimum number of vessels.

Table 3.19. Location of slip on historic red ware and Papago Red pottery recovered from contexts at Block 185 that date from 1880-1900.

Slip Location	Red Ware		Papago Red						Row Total
	Vessel Part		Vessel Part						
		Rim Sherds			Rim Sherds				
	Body Sherds	Bowl	Body Sherds	Neck Sherds	Bowl	Jar	Indeterminate Flare-rim Form	Indeterminate	
Exterior only	–	–	72	28	–	–	–	–	100
Full slip	1	2	3	–	2	–	6	–	14
Exterior, rim, and interior band below rim	–	–	–	3	–	3	5	1	12
Interior only	2	–	1	–	–	–	–	–	3
Interior and rim	–	–	–	–	1	–	–	–	1
Exterior and rim	–	–	–	–	–	1	–	–	1
Indeterminate	–	–	–	–	–	–	5	–	5
Column Total	3	2	76	31	3	4	16	1	136

Table 3.20. Three-way classification of historic ceramic types recovered from contexts at Block 185 that date from 1880-1900, by vessel part and temper type. (The "body" sherd category includes body and neck sherds.)

Temper Type	Plain Ware		Red Ware		Sobaipuri Plain	Papago Plain		Papago Red		Possible Papago Red		Papago Red-on-brown	Papago Black-on-red	Papago Black-on-buff	Papago Red-on-buff	Papago Buff	Row Total
	Body	Rim	Body	Rim	Rim	Body	Rim	Body	Rim	Body	Rim	Body	Body	Body	Body	Body	
Sand and fiber	–	–	–	–	–	59	17	107	24	1	1	–	2	–	1	–	212
Sand	26	2	3	1	1	–	–	–	–	–	–	1	–	–	–	2	36
Sand and crushed sherd	16	3	–	1	2	–	–	–	–	–	–	–	–	1	–	–	23
>25 percent gneiss/schist	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
1-7 percent gneiss/schist	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Column Total	45	5	3	2	3	59	17	107	24	1	1	1	2	1	1	2	274

Table 3.21. Frequency of rim sherds and reconstructible vessels in each vessel form class recovered from contexts at Block 185 that date from 1880 to 1900, reported by ceramic type.

Vessel Form	Plain Ware	Red Ware	Sobaipuri Plain	Papago Plain	Papago Red	Possible Papago Red	Row Total
Bowl Forms							
Semi-flare-rim, incurved bowl	–	–	1	2	–	–	3
Outcurved bowl	1	–	–	–	1	–	2
Hemispherical bowl	–	1	–	1	–	–	2
Plate/platter	1	–	–	–	–	–	1
Incurved bowl	–	–	–	–	1	–	1
Semi-flare-rim, outcurved bowl	–	–	–	–	1	–	1
Indeterminate bowl	2	1	–	–	–	–	3
Jar Forms							
Tall flare-rim jar	–	–	–	2	4	–	6
Short flare-rim jar	–	–	–	2	–	–	2
Indeterminate Forms							
Indeterminate flare-rim form	–	–	2	9	16	1	28
Indeterminate bowl or scoop	1	–	–	–	–	–	1
Indeterminate vessel form	–	–	–	1	1	–	2
Column Total	5	2	3	17	24	1	52

Table 3.22. Frequency of rim sherds and reconstructible vessels in each Shepard-Braun functional class recovered from contexts at Block 185 that date from 1880-1900, reported by ceramic type.

	Ware/Type			
Functional Category	Sobaipuri Plain	Papago Plain	Papago Red	Row Total
Independent Restricted Vessels				
B: Permanent, secure storage and/or water carrying (including pitchers) (6.0-12.5 cm aperture diameter)	–	1	–	1
C: Cooking (small- to medium-sized groups), temporary storage, and/or water cooling (13.0-25.5 cm aperture diameter)	–	4	3	7
D: Cooking (large group) and/or temporary storage (26.0-31.5 cm aperture diameter)	1	–	–	1
Simple and Dependent Restricted Vessels				
H: Specialized, temporary dry storage (13.0-25.5 cm orifice diameter)	–	–	1	1
Unrestricted Vessels (Deep)				
M: Food preparation and/or small group serving (13.0-25.5 cm orifice diameter)	–	1	1	2
Column Total	1	6	5	12

type frequency, and slip location data shows that, in most cases, the Block 185 values fall within the attribute frequency ranges documented at the other sites, even though the Block 185 sample is much smaller.

Minor differences are seen in: (1) the percentage of red ware; (2) the percentage of decorated pottery; and (3) the percentage of interior and exterior slipping. The percentage of red ware recovered from Block 185 is lower than the lowest percentage documented at the other sites. The same can be said for the decorated pottery, although the difference there falls within rounding error (0.0 versus 0.4 percent). Difference in the percentage of interior and exterior slipping also approach rounding error (88.9 versus 87.8 percent interior slipped and 11.1 versus 11.8 percent exterior slipped). The Historic Block 185 O'odham pottery collection is remarkably similar to that recovered from 1771-1830s deposits from San Agustín Mission and the Tucson Presidio. This

Table 3.23. Summary of temporal changes in select technological attributes of historic Native American pottery recovered from excavations at Historic Block 185.

Common Name	Block 185	San Agustín Mission and Tucson Presidio[a]	Block 185	Carrillo Household[b]	Block 185	Block 181[b]	Block 185	Block 83[c]
AZ ASM Site Number		BB:13:6 and BB:13:13		BB:13:6		BB:13:13		BB:13:401
Feature Date Range	1800-1840	1771-1830s	1850-1880	1860-1880	1870-1889	late 1870s-early 1890s	1880-1900	1880-1900
Arrival of City Water	1908	N/A	1908	1940s	1908	1883	1908	1890s
Maximum Sample Sizes: Sherd Count (MNV)[d]	118 (18)	4,823 (623)	149(32)	332(36)	330(29)	1288(170)	277(59)	245(15)
		Median (Range)						
Temper Type[e]								
Percentage Sand-tempered	42.0	39.8 (31.7-48.6)	21.5	20.5	18.1	4.4	13.1	1.3
Percentage Sand and Crushed Sherd-tempered	44.6	43.4 (41.7-55.2)	14.6	3.6	7.8	5.0	8.4	–
Percentage Sand and Fiber-tempered	8.9	1.7 (1.4-20.4)	61.8	72.3	71.2	78.6	77.4	98.7
Folded-rims								
Percentage Folded rim coils[f]	22.2	20.0 (14.4-26.2)	6.9	–	–	1.8	5.8	–
Type Frequency								
Percentage Plain Ware Pottery[g, h]	84.7	66.1 (60.3-85.2)	29.0	7.8	24.8	19.3	19.1	1.2
Percentage Red Ware pottery[h]	6.8	13.2 (12.2-27.0)	6.8	–	1.5	0.5	1.8	–
Percentage Papago Plain pottery[h, i]	6.8	1.5 (1.0-17.0)	25.7	75.0	24.2	51.5	28.1	11.0
Percentage Papago Red pottery[h, j]	1.7	0.3 (0.2-5.0)	35.8	17.2	47.3	27.9	48.4	83.3
Percentage Decorated Pottery[h]	–	5.1 (0.4-5.4)	2.7	–	2.1	0.7	2.5	4.5
Slip Location								
Percentage interior-slipped[k]	88.9	82.1 (63.6-87.8)	33.3	67.5	5.8	22.5	13.7	4.4
Percentage exterior-slipped[l]	11.1	17.9 (11.8-36.4)	66.7	32.5	94.2	77.5	86.3	95.6
Decorated Types Present ("P")								
Papago Black-on-red	–	P (in 3 of 3)	–	–	–	P	P	P
Papago Red-on-brown	–	P (in 2 of 3)	P	–	P	–	P	–
Papago Red-on-buff	–	P (in 2 of 3)	–	–	–	–	P	–

Table 3.23. Continued.

Common Name	Block 185	San Agustín Mission and Tucson Presidio[a]	Block 185	Carrillo Household[b]	Block 185	Block 181[b]	Block 185	Block 83[c]
AZ ASM Site Number		BB:13:6 and BB:13:13		BB:13:6		BB:13:13		BB:13:401
Feature Date Range	1800-1840	1771-1830s	1850-1880	1860-1880	1870-1889	late 1870s-early 1890s	1880-1900	1880-1900
Arrival of City Water	1908	N/A	1908	1940s	1908	1883	1908	1890s
Maximum Sample Sizes: Sherd Count (MNV)[d]	118 (18)	4,823 (623)	149(32)	332(36)	330(29)	1288(170)	277(59)	245(15)
		Median (Range)						
Papago Buff	–	P (in 1 of 3)	–	–	P	P	P	–
Papago Black-on-brown	–	–	–	–	–	–	–	–
Papago Black-on-buff	–	–	P	–	P	–	P	–
Papago Red-on-white	–	–	–	–	–	–	–	–
Papago White-on-red	–	–	–	–	–	P	–	–

[a]Heidke 2006:Table 7.50.
[b]Heidke 2006:Table 7.51.
[c]Heidke 2007:Table 5.22.
[d]Prehistoric types and indeterminate wares not included in sherd and minimum number of vessel (MNV) counts.
[e]Indeterminate temper type observations were deleted before percentage values were calculated.
[f]Calculation based on the MNV count of all historic Native American rim sherds and reconstructible vessels; percentage figures include Sobaipuri Plain and any other cases of folded-over rim coils noted in other types.
[g]Calculation based on the sherd count of all historic Native American types; the "plain ware" category includes plain ware and Sobaipuri Plain observations.
[h]Calculation based on the sherd count of all historic Native American types.
[i]Calculation based on the sherd count of all historic Native American types; the "Papago Plain" category includes Papago Plain and possible Papago Plain observations.
[j]Calculation based on the sherd count of all historic Native American types; the "Papago Red" category includes Papago Red and possible Papago Red observations.
[k]Percentage based on all sherds slipped on their: (1) interior surface; (2) interior and rim; (3) interior, rim, and exterior band; and (4) fully-slipped on all interior and exterior surfaces; indeterminate observations were deleted before percentage values were calculated.
[l]Percentage based on all sherds slipped on their: (1) exterior surface; (2) exterior and rim; and (3) exterior, rim, and interior band; indeterminate observations were deleted before percentage values were calculated.

suggests that most of the interassemblage variation likely reflects decisions made by potters, rather than consumers.

Block 185, circa 1850-1880

Native American pottery from Block 185 1850-1880 deposits was compared with data from the Carrillo household (1860-1880) (Heidke 2006:Table 7.51). Review of the temper type, folded rim coil, type frequency, and slip location data shows considerable between-site variation. Although the percentage of sand-tempered pottery is similar at both sites, the percentage of sand-and-crushed-sherd temper is lower and the percentage of sand- and fiber-tempered pottery is higher in the Carrillo collection. That difference may be explained, at least in part, by the fact that the Carrillo deposits accumulated slightly later in time and, as the 1870-1900 data summarized in Table 3.23 shows, the frequency of sand-and-sherd tempering declined over time while the frequency of sand-and-fiber temper increased.

The sand- and sand-and-crushed-sherd tempers are associated with the plain and red ware types, just as the sand-and-fiber temper is associated with Papago Plain and Papago Red. Therefore, the greater abundance of plain and red ware in the Block 185 collection and Papago Plain and Red in the Carrillo household's collection is expected, given the temper type data. Unexpected are the extreme differences expressed in the slip location data. The Block 185 collection is consistent with the previously identified regional trend of decreasing frequency of interior-slipped pottery over time (Heidke 2006). However, the percentage of all red-slipped types is much lower in the Carrillo collection than in the Block 185 collection (17.2 percent versus 42.6, respectively). Functional differences in the two collections have been noted above. When all the evidence is examined, it suggests many more of the red-slipped pots recovered from Block 185 served as storage vessels, while those from the Carrillo household functioned as serving vessels.

Block 185, circa 1850-1880

Native American pottery from Block 185 1870-1889 deposits was compared with data from Block 181, Lot 1 (late 1870s to early 1890s) (Heidke 2006:Table 7.51). Review of the temper type, folded rim coil, type frequency, and slip location data shows similarities and differences. Sand-and-fiber temper and "Papago" ceramic types dominate both collections. Beyond that, differences in the temper type data are difficult to assess, because a large percentage of the Block 181 pottery may be prehistoric (Heidke 2006:Table 7.46). Notable differences in the frequency of Papago Plain and Papago Red occur between the two sites. The percentage of Papago Red is 1.7 times greater at Block 185, and a higher percentage of it is exterior slipped, while the percentage of Papago Plain is 2.1 times greater at Block 181. Functional differences between the two collections have been noted above. When the evidence is compiled, it suggests nearly half the pottery recovered from Block 185 may have served as temporary storage or water cooling vessels (i.e., exterior-slipped Papago Red), while the collection from Block 181 contained vessels well-suited to storage (including water cooling), food preparation, cooking, and serving tasks.

Block 185, circa 1880-1900

Native American pottery from the Block 185 1880-1900 deposit was compared with data from contemporaneous deposits at Block 83 (Heidke 2007:Table 5.22). Review of the temper type, folded rim coil, type frequency, and slip location data shows similarities and differences. Sand and fiber temper and "Papago" ceramic types dominate both collections, but especially, the Block 83 collection. Pottery recovered from 1880-1929 deposits at Blocks 136, 139, 172, and the León farmstead also displays a dominance of sand and fiber temper and "Papago" types (Heidke 2007:Table 5.22).

The Block 185 collection is most notable for having the greatest amount of sand and sand-and-sherd-tempered plain and red ware pottery recovered from any of these late collections. The percentage of Papago Plain, Papago Red, and decorated "Papago" types falls within the ranges documented in the collections cited above. Indeed, the Block 185 ceramics bear a greater similarity to the Block 136, 139, 172, and the León farmstead material than they do to the Block 83 collection, due to the extremely high percentage of Papago Red recovered from the Block 83 deposits. Similarly, the percentage of interior and exterior slipping present in the Block 185 collection falls within the range documented in the Block 136, 139, 172, and the León farmstead collections, and is more similar to them than the Block 83 material, due to the extremely high percentage of exterior slipping present in the Block 83 pottery.

Discussion

Review of the temper type, folded rim coil, type frequency, and slip location data summarized in Table 3.23 shows those attributes are temporally sensitive to potter behavior, regardless of consumer preference. A marked decline in the frequency of sand- and sand-and-crushed-sherd-tempered plain and red ware, folded rim coils, and interior slipping is clearly evident between deposits that filled by 1840

and those that accumulated after 1850. By 1850, most of the variation in the relative frequency of Papago Plain and Papago Red pottery seems to be related to consumer preference, which itself may reflect underlying differences in the wealth and/or ethnicity of the pottery users. The presence of prehistoric pottery in many of the deposits discussed here represents another source of variation. While decorated prehistoric types are easy to identify, there is currently no way to separate prehistoric sand-tempered plain ware sherds from historic sand-tempered plain ware sherds.

CHAPTER 4

FLAKED STONE, GROUND STONE, AND MANUFACTURED ARTIFACTS FROM HISTORIC BLOCK 185

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A variety of Historic era artifacts were recovered during the excavations on Historic Block 185. Jane Sliva examined presidio-era flaked stone artifacts recovered from three features. Jenny Adams examined the ground stone artifacts and minerals found during the project. Homer Thiel, Melissa Merkel, and Tylia Valilek analyzed the artifacts manufactured in North America, Europe, and China. Native American ceramics were also recovered, and are discussed in Chapter 3 (this volume). The goal of these analyses was to examine the types of artifacts used by residents of the Tucson Presidio and by the Chinese gardeners, because discrete deposits from both groups could be segregated. The recovery of artifacts from the presidio, early American Territorial, and later American Territorial time periods allowed for an examination of how material culture changed through time in Tucson. Unfortunately, the mixed nature of most of the excavated archaeological deposits prevented meaningful analyses at the household level, thus making it difficult to compare the recovered artifacts with those from most other nearby sites.

PRESIDIO-ERA FLAKED STONE

A small flaked stone assemblage (n = 152) was recovered from three Historic Block 185, AZ BB:13:756 (ASM), features dating to the Spanish (1694-1821) or Mexican (1821-1856) periods, combined here as the Presidio era. An additional 33 artifacts were recovered from features dating to the American Territorial period (1856-1912), although these were not formally analyzed.

The sampling and analysis were designed to investigate how flaked stone technology was utilized by residents of the Tucson Presidio. The analysis focused on Spanish and Mexican period features, but included selected artifacts from American Territorial features for comparison.

Assemblage Description

Presidio Era (1694-1856)

The three features dating to presidio times include two borrow pits, Features 23 and 25, and a small extramural pit, Feature 37. Most of the artifacts were recovered from Feature 23, and most of these are debitage and cores, with small numbers of cores and retouched pieces (Table 4.1).

Two gunspalls, made on honey-colored chalcedony flakes, were recovered from the lower portion of Feature 23 (Figure 4.1a-b). Gunflints found in North America made of this material are often identified as French (Hanson 1970:53; Kenmotsu 1990:96; Woodall et al. 1997:25-26), and the presence of these flake-based gunspalls, rather than gunflints made on blades, suggests a pre-1750 date (Kenmotsu 1990:99). Hanson (1970:53) also notes that gunflints found in central Georgia had been reshaped, possibly to reduce them from military musket size to fit civilian rifles, and that others had been converted to strike-a-lights (flints used to spark fires). Most of those had heavy wear traces suggesting long use-lives conditioned by frontier scarcity. This pattern is echoed in one of the gunspalls' apparent conversion to a strike-a-light, although the other gunspall showed only moderate wear not indicative of reuse beyond the gunspall's intended use-life.

A separate strike-a-light was recovered from Feature 23 as well (Figure 4.1c), although the translucent gray chert does not match the gunspall material. Feature 23 also contained the basal half of a Piman point (Figure 4.1d), and a narrow point tip that may be Protohistoric.

Except the gunspalls and possibly the strike-a-light, the materials are local to the immediate area along the Santa Cruz River near Sentinel Peak. The morphological attributes of the cores and debitage recovered are consistent with hard-hammer core reduction.

Table 4.1. Flaked stone artifacts from presidio-era features at AZ BB:13:756 (ASM), Historic Block 185.

Feature	Context	Artifact Class	Total
23	Large pit	Debitage	111
		Cores	5
		Possible perforator	1
		Fragmentary Piman points	2
		Gunspall	2
		Strike-a-light	1
25	Large pit	Debitage	27
37	Small pit	Debitage	2
		Gunspall	1
Total			152

Table 4.2. Flaked stone artifacts from American Territorial period features at AZ BB:13:756 (ASM), Historic Block 185.

Feature	Context	Artifact Type	Total
27	Pit	Gunspall	1
36	Trash concentration	Debitage	30
		Gunflint	1
		Strike-a-light	1
Total			33

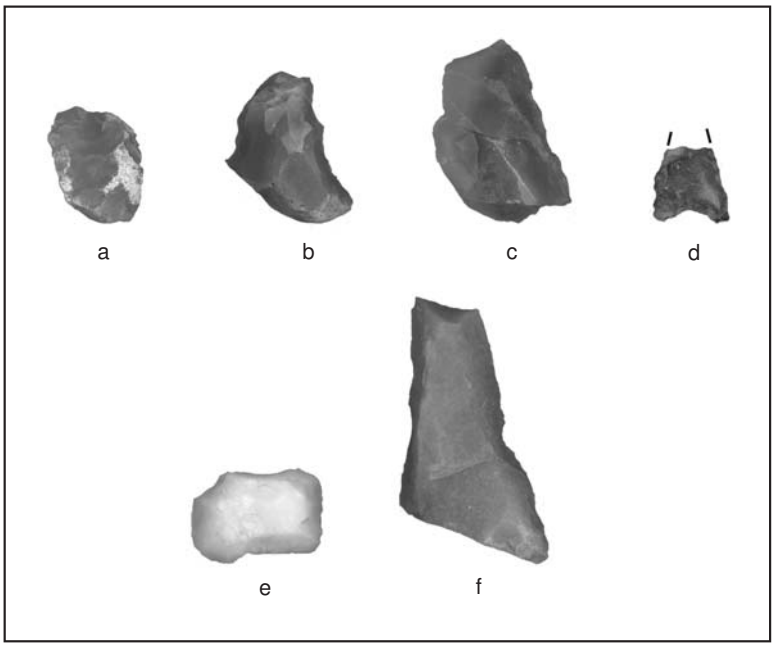

Figure 4.1. Flaked stone artifacts from Feature 23 and Feature 36, AZ BB:13:756 (ASM), Historic Block 185: (a) Feature 23, ASM 2005-564-15; (b) Feature 23, ASM 2005-564-16; (c) Feature 23, ASM 2005-564-17; (d) Feature 23, ASM 2005-564-18; (e) Feature 36, ASM 2005-564-17; (f) Feature 36, ASM 2005-564-20.

American Territorial Period (1856-1912)

Five features dating to the American Territorial period contained flaked stone (Table 4.2). Initially, only a gunflint (Figure 4.1e) and a strike-a-light (Figure 4.1f) from Feature 36 were analyzed; the debitage from Feature 36 was later added to the sample for comparison with the presidio-era debitage. The material and morphology of the gunspall fragment are consistent with the honey chalcedony gunspalls recovered from the presidio features. The gunflint from Feature 36 is made of white chert of unknown origin, while the strike-a-light is made of translucent light gray chert. The debitage is larger, on average, than the debitage from the presidio features, although the range of local materials is the same.

Nonfeature Contexts

Artifacts from nonfeature contexts were scanned but not formally analyzed. The range of raw materials present, with few exceptions, is the same as that observed in both the Spanish and American Territorial period contexts. One piece of obsidian and a few flakes of multicolored chalcedony were recovered, along with a possible strike-a-light fragment (or gunspall converted to a strike-a-light) of the same honey chalcedony as the gunspalls from Feature 23.

Flaked Stone Technology and Presidio Residents

The inferential problem posed by the presidio assemblage is the co-occurrence of flaked stone waste, which the presidio residents may or may not have produced or used, with gunspalls, gunflints, and strike-a-lights, which they certainly used. If the presence of the gunspalls in the borrow pits is explained by the Presidio residents using them, the flakes in those same pits must be explained as well. They cannot simply be written off as background noise incorporated into the pits as they were dug and filled in.

The technological attributes of the debitage are remarkably similar to those observed in Spanish-Mexican deposits at the Clearwater site, AZ BB:13:6 (ASM), located to the southwest on the western banks of the Santa Cruz River (Table 4.3). As various Pima and

Papago groups lived at the mission of San Agustín, they were likely a consistent presence within the presidio, which would have provided access to European metal tools. The need for stone implements would thus have been limited to immediate situational manufacture. This might be the best case for Haury's posited expedient technology (Haury 1976:293), where knapping was relied on in response to situational demands when metal tools were neither immediately accessible nor required. That is, it may have been easier to grab the nearest rock and quickly make a few flakes for the task at hand, and to then be discarded when the task was completed.

GROUND STONE ARTIFACTS

A small assemblage of ground stone and minerals was recovered from presidio-era features at BB:13:756 and canal deposits at AZ BB:13:757 (ASM) (Table 4.4). The challenge presented for the analysis of ground stone and minerals is to separate prehistoric items from those used during presidio times. Prehistoric Hohokam use of the presidio area is well documented (Thiel et al. 1995), and because many stone tool types continued to be used into the early Historic era, it is often difficult to determine specifically when they were used.

Borrow pits and trash deposits were the sources for the ground stone items and minerals recovered from AZ BB:13:756. Five ground stone artifacts were recovered from a Spanish-Mexican period borrow pit, Feature 23 (Table 4.5). All were broken, two beyond recognition. One was a broken disk ground on the edge of a naturally tabular piece of quartzite. Two broken quartzite handstones were also recovered. All five pieces probably eroded into the borrow pit from prehistoric trash and were not associated with early historic use of the borrow pit.

Contexts with ground stone and minerals that dated to the American Territorial period include a borrow pit at BB:13:756 and the canal designated BB:13:757 (see Table 4.5). Three ground stone artifacts were recovered from the borrow pit, Feature 27, including two whole and one broken piece. The broken piece is a vesicular basalt metate fragment that is too small to recognize the original metate type. One of the whole pieces is a quartzite lapstone that

Table 4.3. Comparative technological profiles (debitage and cores) for flaked stone assemblages in presidio-era Tucson.

			Debitage				Cores		
Site	Total Lithics	Complete Flakes	Total	Average Size (mm)	Average MI[a]	% PRF[b]	Total	Flakes: Core	Average Size (mm)
AZ BB:13:756 (ASM) (Lot 7)	152	60	140	28.48	0.159	37	5	28	65.09
AZ BB:13:6 (ASM)	381	187	350	27.62	0.154	32	10	35	56.69

[a]Mass index (mass/size; values closer to 1 indicate greater thickness relative to size).
[b]Potential retouch flakes (identified bifacial thinning flakes plus all debitage within 1 standard deviation of mean MI for identified bifacial thinning flakes).

Table 4.4. Ground stone artifact types, sorted by temporal contexts at AZ BB:13:756 (ASM) and AZ BB:13:757 (ASM), Historic Block 185.

	Spanish/Mexican		American Territorial		Chinese Trash		Undated		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Disks	1	20	–	–	–	–	–	–	1	2
Handstones	2	40	1	11	1	4	1	13	5	10
Lapstones	–	–	2	22	1	4	–	–	3	6
Manos	–	–	1	11	–	–	1	13	2	4
Metates	–	–	2	22	–	–	–	–	2	4
Ornaments	–	–	–	–	1	4	2	25	3	6
Pecking stones	–	–	–	–	–	–	1	13	1	2
Polishers	–	–	1	11	–	–	1	13	2	4
Unidentified	2	40	2	22	1	4	1	13	6	12
Raw material	–	–	–	–	1	4	1	13	2	4
Minerals	–	–	–	–	22	81	–	–	22	45
Grand Total	5	100	9	99	27	101	8	103	49	99

was redesigned to create an edge for use as a chopper. The second whole piece was a polisher that was secondarily used as a pecking stone. Similar stone tools were used by local Native Americans into early presidio times, although these tools were probably prehistoric.

Five of the six artifacts recovered from the canal were broken. The exception was a large, flat/concave metate with a shallow basin worn while grinding food with a small mano. The mano used with the metate was not recovered, but a broken mano that was once used with a larger trough metate was found in the canal sediments. The mano and a broken lapstone were also made from vesicular basalt. The vesicular basalt probably came from the vicinity of Sentinel Peak on the western side of the Santa Cruz River, an hour or two walk from the canal. A broken handstone and two unidentifiable fragments were made from quartzite and granite rocks that were probably accessible in the riverbed of the Santa Cruz, if not in some of the closer drainages. Flat/concave and trough manos and metates, lapstones, and handstones were used into early presidio times by local Native Americans, although it is most likely that the artifacts eroded into the canal from prehistoric trash deposits.

An American Territorial period trash deposit, Feature 34, was associated with the Chinese occupation of the Tucson Presidio. The stone and mineral items recovered from the trash include rocks with copper-based minerals, others with hematite, muscovite pieces, other raw material, and two broken tools (see Table 4.5). The broken tools are a handstone that had been recycled as a roasting stone, and a lapstone that had been used for smoothing small objects. These two pieces were probably prehistoric, and were part of the dirt into which the Chinese trash was deposited. Muscovite, hematite, and some copper-based mineral, such as turquoise, malachite, and chrysocolla, may have been prehistoric. The Hohokam ground muscovite into small disks and, less frequently, into other shapes that were perforated for suspension. They also collected hematite and soft copper-based minerals to be ground into pigments. Harder pieces of turquoise and chrysocolla were shaped into ornaments. However, the quantity of rocks with copper-based minerals in them far exceeds what is usually recovered from Hohokam deposits. It was common for prospectors to bring mineral samples to the presidio for assays, and these pieces may be discards from this process.

Eight pieces of stone were recovered from deposits that could not be assigned a date primarily because they were disturbed by cultural (plowzone) and natural forces (sheet trash) (see Tables 4.4-4.5). A broken mano and a broken handstone had been recycled as roasting stones. The third broken piece was too small to recognize its original artifact type. Whole manufacturing tools included a polisher and a pecking stone. Three pieces of muscovite had been cut or ground but remained unfinished.

MANUFACTURED ARTIFACTS

Artifacts manufactured in North America (primarily the United States, but a few from Mexico), Europe, and China were recovered during the excavations at Historic Block 185. Ceramic, glass, metal, stone, bone, shell, and hard rubber items were collected. Four features from BB:13:756 (Features 23, 25, 37, and 40) date to presidio times. Several features contain early American Territorial period refuse (Features 24, 27, 36, 38 from BB:13:756 and Feature 6 from BB:13:757). Two other American Territorial features from BB:13:756 (Features 34 and 35) contain trash discarded by Chinese gardeners living in the area. A summary of the artifacts, organized in functional categories for each feature, is presented in Table 4.6.

Presidio-era Artifacts

Four features—a pair of borrow pits, Features 23 and 25, a small pit, Feature 37, and a possible ditch, Feature 40—yielded artifacts that can be assigned to presidio times, from about 1775 to 1850. Based on the presence of Aranama Polychrome majolica, which is thought to have been produced between 1790 and 1830, as well as the presence of a couple of early English transfer-print ceramics, probably dating to the 1830s to 1840s, the two borrow pits are thought to likely date from about 1800 to the 1840s. None of the features appears to have been purposely filled, instead, the artifacts probably washed down from the elevated terrace located to the east. While small, the assemblage of artifacts adds to the current understanding of life in the Tucson Presidio.

A relatively limited variety of artifacts were found. Most common were fragments of majolica dishes, with 72 collected from the presidio features. An additional 172 pieces were found in nonfeature or American Territorial period features from BB:13:756, and 26 were collected from the historic canals, BB:13:757 (Table 4.7).

Focusing on the presidio-era features, two sherds of Puebla Blue-on-white were found. This is, consistently, the most common style of majolica found at Arizona sites, and the low number reported here suggests the features date to later in presidio times. This style is used on plates and bowls. Plates are

Table 4.5. Attributes of ground stone assemblage recovered from AZ BB:13:756 (ASM) and AZ BB:13:757 (ASM), Historic Block 185.

Site/Time Period	Feature	Context	FN	Artifact	Subtype	Condition	Burn	Design	Use	Sequence	Wear	Designed Activity	Actual Activity	Length (cm)	Width (cm)	Thickness (cm)	Weight (gm)	Second Type	Rock Type	Availability
AZ BB:13:756 (ASM)																				
None	0	Plowzone	13.01	Mano	Flat/Concave	Broken	Heat cracked	Strategic	Recycled	Sequential	Heavy	Food processing	Multiple	–	9.1	4.3	-	Fire-cracked rock	Granite	Local/Vicinity
	0	Plowzone	55.01	Pecking stone	Pebble	Whole	No	Expedient	Single	–	Moderate	Percussion	Stone manufacture	6.1	4.3	3	122.0	–	Quartzite	Local/Vicinity
	0	Sheet trash	485	Ornament	Blank	Whole	No	Expedient	–	–	–	Paraphernalia	Stone manufacture	2.1	2	0.1	-	–	Muscovite	Unknown
	0	Sheet trash	485	Ornament	Blank	Whole	No	Expedient	Unused	–	–	Paraphernalia	Stone manufacture	1.4	1.2	0.1	-	–	Muscovite	Unknown
	0	Sheet trash	485	Raw material	–	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	–	–	Muscovite	Unknown
	0	Sheet trash	503	Polisher	Pebble	Whole	No	Expedient	Single	–	Light	Polishing	Manufacture	2.4	2.1	2	14.1	–	Quartzite	Unknown
	0	Sheet trash	546	Handstone	–	Broken	Heat cracked	–	Recycled	–	–	General processing	Multiple	–	–	–	–	Fire-cracked rock	Diorite	Local/Vicinity
	0	Sheet trash	603	Unidentified	–	Broken	No	–	–	–	–	–	–	–	–	–	–	–	Basalt	Local/Vicinity
Spanish/Mexican	23	Large pit	99.01	Handstone	–	Broken	No	–	–	–	–	General processing	–	–	–	–	–	–	Quartzite	Local/Vicinity
	23	Large pit	325	Unidentified	–	Broken	Heat cracked	–	Recycled	Sequential	–	–	Multiple	–	–	–	–	Fire-cracked rock	Diorite	Local/Vicinity
	23	Large pit	402	Disk	Flat disk	Broken	No	–	–	–	–	–	–	–	–	–	–	–	Quartzite	Local/Vicinity
	23	Large pit	425	Handstone	–	Broken	No	Strategic	–	–	–	General processing	–	–	–	–	–	–	Quartzite	Local/Vicinity
	23	Large pit	616	Unidentified	–	Broken	No	–	–	–	–	–	–	–	–	–	–	–	Quartzite	Local/Vicinity
American Territorial	27	Large pit	535	Polisher	Pebble	Whole	No	Expedient	Multiple	Sequential	Moderate	Polishing	Multiple	6.2	4.3	3.6	136.9	Pecking stone	Quartzite	Local/Vicinity
	27	Large pit	535	Metate	–	Broken	No	–	–	–	Heavy	Food processing	–	–	–	–	–	–	Basalt/Andesite-vesicular	Vicinity/Distant
	27	Large pit	655	Lapstone	Flat	Whole	No	Expedient	Redesigned	Concomitant	Moderate	Smoothing	Multiple	6.3	7.3	2.2	138.9	Chopper	Quartzite	Unknown
Chinese trash	34	Sheet trash	39.01	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	66.0	–	Malachite in rock	Vicinity/Distant
	34	Sheet trash	39.02	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	90.0	–	Malachite in rock	Vicinity/Distant
	34	Sheet trash	42.01	Handstone	–	Broken	Heat cracked	–	Recycled	Sequential	–	General processing	Multiple	–	–	–	–	Fire-cracked rock	Diorite	Local/Vicinity
	34	Sheet trash	67.01	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	17.0	–	Malachite	Vicinity/Distant
	34	Sheet trash	67.02	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	35.0	–	Malachite in rock	Vicinity/Distant
	34	Sheet trash	85.01	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	107.0	–	Turquoise and chrysocolla	Vicinity/Distant
	34	Sheet trash	85.02	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	141.0	–	Hematite	Unknown
	34	Sheet trash	85.03	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	15.0	–	Turquoise and chrysocolla	Vicinity/Distant
	34	Sheet trash	85.04	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	7.0	–	Turquoise	Vicinity/Distant
	34	Sheet trash	85.05	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	2.0	–	Quartzite	Unknown
	34	Sheet trash	88.01	Ornament	Blank	Whole	No	Expedient	–	–	–	Paraphernalia	Procurement	3.3	2.5	0.1	–	–	Muscovite	Unknown
	34	Sheet trash	91.01	Lapstone	–	Broken	No	–	–	–	–	Smoothing	–	–	–	–	–	–	Quartzite	Local/Vicinity
	34	Sheet trash	91.02	Unidentified	–	Broken	No	–	–	–	–	–	–	–	–	–	–	–	–	–
	34	Sheet trash	336	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	240.0	–	Rhyolite	Local/Vicinity
	34	Sheet trash	336	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	280.0	–	Quartzite	Vicinity/Distant
	34	Sheet trash	336	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	61.0	–	Quartzite	Local/Vicinity
	34	Sheet trash	336	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	19.0	–	Quartzite	Local/Vicinity
	34	Sheet trash	336.1	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	13.0	–	Turquoise and chrysocolla	Unknown
	34	Sheet trash	343	Raw material	–	Broken	No	–	–	–	–	Resource procurement	Procurement	–	–	–	–	–	Muscovite	Unknown
	34	Sheet trash	413	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	13.0	–	Malachite in rock	Vicinity/Distant
	34	Sheet trash	447	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	229.0	–	Turquoise and chrysocolla	Unknown
	34	Sheet trash	447	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	49.0	–	Turquoise and chrysocolla	Unknown
	34	Sheet trash	447	Mineral	Natural	Whole	No	–	Unused	Sequential	–	Resource procurement	Procurement	–	–	–	14.0	–	Turquoise and chrysocolla	Unknown
	34	Sheet trash	447	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	6.0	–	Turquoise and chrysocolla	Unknown
	34	Sheet trash	447.1	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	3.0	–	Copper minerals	Unknown
	34	Sheet trash	447.1	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	0.4	–	Chrysocolla	Unknown
	34	Sheet trash	447.1	Mineral	Natural	Whole	No	–	Unused	–	–	Resource procurement	Procurement	–	–	–	3.0	–	Turquoise and chrysocolla	Unknown

Table 4.5. Continued.

Site/Time Period	Feature	Context	FN	Artifact	Subtype	Condition	Burn	Design	Use	Sequence	Wear	Designed Activity	Actual Activity	Length (cm)	Width (cm)	Thickness (cm)	Weight (gm)	Second Type	Rock Type	Availability
AZ BB:13:757 (ASM)																				
American Territorial	4	Canal sediments	104	Metate	Flat/Concave	Whole	No	Expedient	Single	–	Moderate	Food processing	Food processing	30.2	29.3	9.3	–	–	Basalt-vesicular	Local/Vicinity
	4	Canal sediments	124	Mano	Trough	Broken	No	–	–	–	Moderate	Food processing	–	–	–	–	–	–	Basalt-vesicular	Local/Vicinity
	4	Canal sediments	145	Unidentified	–	Broken	–	–	–	–	–	–	–	–	–	–	–	–	Granite	Local/Vicinity
	4	Canal sediments	169	Unidentified	–	Broken	No	–	–	–	–	–	–	–	–	–	–	–	Quartzite	Local/Vicinity
	4	Canal sediments	182	Handstone	–	Broken	No	–	–	–	Moderate	–	–	–	–	–	–	–	Quartzite	Local/Vicinity
	5	Canal sediments	192	Lapstone	Flat	Broken	No	Expedient	–	–	Moderate	Smoothing	–	–	13.7	3.7	–	–	Basalt-vesicular	Local/Vicinity

Table 4.6. Summary of artifacts, organized in functional categories for each feature, Historic Block 185.

	AZ BB:13:756 (ASM)										AZ BB:13:757 (ASM)			
	Feature 23	Feature 24	Feature 25	Feature 27	Feature 34	Feature 35	Feature 36	Feature 37	Feature 38	Feature 40	Feature 4	Feature 5	Feature 6	Row Total
Kitchen														
Food preparation	1	2	–	–	15	–	4	–	–	–	3	–	–	25
Food service	74	8	6	19	178	24	15	–	6	2	63	1	3	399
Food storage	–	12	–	–	301	89	4	–	–	10	143	–	–	559
Alcoholic beverage	1	–	–	1	2	26	51	–	–	–	4	–	–	85
Beverage	4	–	–	4	305	16	18	–	7	–	75	2		431
Unidentified kitchen	1	–	–	–	8	–	–	–	–	–	1	–	–	10
Native American ceramics	104	10	17	49	280	29	51	1	22	15	326	9	30	943
Architectural														
Nail	1	1	–	3	142	13	5	–	1	–	15	–	–	181
Window glass	–	–	–	–	2	–	–	–	–	–	8	–	–	10
Door parts	–	–	–	–	3	–	–	–	–	–	–	–	–	3
Electrical	–	–	–	–	1	–	–	–	–	–	–	–	–	1
Furniture														
Lighting	–	–	–	–	1	–	–	–	–	–	–	–	–	1
Decorative statue	–	–	–	–	–	–	–	–	–	–	3	–	–	3
Arms														
Ammunition	–	1	–	–	–	2	–	–	–	–	2	–	–	5
Gun part	2	–	–	–	–	–	1	–	–	–	–	–	–	3
Clothing														
Apparel	–	–	1	–	22	4	1	–	1	–	6	–	–	35
Accessories	–	–	–	–	2	–	–	–	–	–	1	–	–	3
Making/Repair	–	–	–	–	1	–	–	–	–	–	–	–	–	1
Personal														
Hygiene	–	–	–	–	3	1	–	–	–	–	3			7
Tobacco/Smoking	–	–	–	–	32	4	1	–	–	–	1			38
Medicine	–	–	–	–	92	–	–	–	–	–				92
Other personal	45	–	–	–	1	–	–	–	–	–				46
Activities														
Toys	–	–	–	–	6	1	–	–	–	–	–	–	–	7
Communication	–	–	–	–	15	10	–	–	–	–	–	–	–	25

Table 4.6. Continued.

	AZ BB:13:756 (ASM)										AZ BB:13:757 (ASM)			
	Feature 23	Feature 24	Feature 25	Feature 27	Feature 34	Feature 35	Feature 36	Feature 37	Feature 38	Feature 40	Feature 4	Feature 5	Feature 6	Row Total
Nuts/Bolts	–	1	–	–	5	–	1	–	–	–	9			16
Other activity	–	–	–	–	2	–	–	–	–	–	–	–	–	2
Transportation														
Horseshoe/Harness	–	–	–	–	4	–	–	–	–	–	–	–	–	4
Unidentified	15	5	–	2	358	51	6	1	16	–	27	–	–	481
Total	248	40	24	78	1,781	270	158	2	53	27	690	12	33	3,416

Table 4.7. Ceramics manufactured in Europe, Mexico, China, and the United States, by feature, Historic Block 185.

	AZ BB:13:756 (ASM)										AZ BB:13:757 (ASM)			
	Feature 0	Feature 23	Feature 24	Feature 25	Feature 27	Feature 34	Feature 35	Feature 36	Feature 38	Feature 40	Feature 4	Feature 5	Feature 6	Row Total
Native American ceramics														
All types	206	104	10	17	49	280	29	51	22	15	326	9	30	1,148
Majolica														
Puebla Blue-on-white	–	2	–	–	–	–	–	–	–	–	1	–	–	3
Huejotzingo blue	1	1	–	–	1	1	1	–	–	–	3	1	–	9
Unidentified blue	11	19	2	1	3	4	2	2	–	–	3	–	–	47
Aranama Polychrome	5	4	–	–	1	2	1	–	–	–	5	–	–	18
Tumacacori Polychrome	10	19	–	–	2	–	1	–	2	–	1	–	1	36
San Elizario Polychrome	2	4	–	–	–	1	–	–	–	–	6	–	–	13
Unidentified polychrome	7	2	–	2	5	2	1	1	1	–	7	–	–	28
Undecorated	10	21	–	–	3	5	3	2	–	2	–	–	–	46
Spanish/Mexican glazed wares														
Olive ware	1	1	1	–	–	–	–	–	–	–	–	–	–	3
Mexican glazed wares	9	1	1	1	1	23	–	4	1	–	5	–	–	46
Earthenwares														
Chinese unglazed	–	–	–	–	–	3	–	–	–	–	–	–	–	3
Stoneware														
European	8	–	–	–	–	8	7	–	1	–	–	–	–	24
Chinese	8	–	–	–	–	29	9	–	–	–	–	–	–	46
Rockingham	–	–	–	–	–	2	–	–	–	–	–	–	–	2
Whitewares														
Undecorated whiteware	46	–	2	2	1	98	5	–	–	–	24	–	–	178
Transfer-print	19	2	–	–	2	9	2	–	–	–	9	–	2	45
Flow blue	2	–	2	–	–	–	1	1	1	–	1	–	–	8
Decal print	3	–	–	–	–	–	–	–	–	–	–	–	–	3
Sponge-print	–	–	–	–	–	1	–	–	–	–	1	–	–	2
Annular decoration	4	–	–	–	–	3	1	1	1		1	–	–	11
Annular and sponge	1	–	–	–	–	2	–	–	–	–	–	–	–	3
Tinted/solid color	2	–	–	–	–	–	–	–	–	–	–	–	–	2
Hand-painted	1	–	2	–	–	6	1	–	–	–	–	–	–	10

Table 4.7. Continued.

	AZ BB:13:756 (ASM)										AZ BB:13:757 (ASM)			
	Feature 0	Feature 23	Feature 24	Feature 25	Feature 27	Feature 34	Feature 35	Feature 36	Feature 38	Feature 40	Feature 4	Feature 5	Feature 6	Row Total
Gilt decorated	–	–	–	–	–	1	–	–	–	–	–	–	–	1
Shell/feather-edged	–	–	–	–	–	2	–	–	–	–	–	–	–	2
Porcelain														
Plain	–	–	–	–	–	4	–	–	–	–	1	–	–	5
Hand-painted	1	–	–	–	–	1	–	–	–	–	1	–	–	3
Chinese plain	2	–	–	–	–	9	–	1	–	–	–	–	–	12
Chinese Bamboo pattern	5	–	–	–	–	2	–	–	–	–	–	–	–	7
Chinese celadon	6	–	–	–	–	4	–	–	–	–	–	–	–	10
Chinese 4 flowers	2	–	–	–	–	12	–	–	–	–	–	–	–	14
Unidentified	1	–	–	–	–	1	–	–	–	–	–	–	–	2
Total	373	180	20	23	68	515	64	63	29	17	395	10	33	1,790

white glazed, with a blue decoration consisting of two wide dark blue bands below the interior rim, and blue dots suspended below the lower band. Dark blue blossoms are interspaced among the dots (Barnes and May 1972:7). Bowls may have either light or dark blue decoration. This style has been dated from 1750 to 1850 (Goggin 1968:191).

A single rim sherd from a Huetjotzingo blue vessel was recovered from Feature 23. The Huetjotzingo style consists of a single blue, green, or orange band below the rim of a plate. The band may be present on both the exterior and the interior of the rim. The blue is more common than the green variety, and, to date, only one orange banded rim has been found in Arizona, at the Library site, AZ BB:13:9 (ASM), next to the Tucson Presidio (Williams 1997). The Yellow variety is reported from Tucson and Tubac (Barnes and May 1972:10). The date for this style is uncertain, with Goggin (1968:195) saying it ranges from 1700 to the nineteenth century, and other analysts dating it from 1750-1830 or 1780-1850 (Smith 1965:85; Snow 1965:26).

Four sherds of Aranama Polychrome were found in Feature 23. This style has an orange-yellow band below the interior rim and a second band near the interior base. The bands are accented with thin black lines. Between the two bands and in the center of the vessel are sets of floral elements composed of a yellow oval with black diagonal slashes and tight orange-brown spirals with a black accent line running along its midline. Green floral sprays extend from the spirals. Splotches of green paint separate the floral elements from each other. The center base has a yellow band outlined in black with a floral design similar to the design found on the marley, the main difference being green dots instead of green sprays. Both plates and bowls of this style have been identified in Arizona. The style is dated from 1790 to 1830 (Barnes and May 1972:12).

Nineteen sherds of Tumacacori Polychrome were recovered from Feature 23. This style is easily recognized by the light blue glaze on both the interior and exterior of the vessel. This type has been found on plates, bowls with foot rings, and handles with cups. Three subtypes have been recognized, although they can be difficult to separate. The style may be an attempt to imitate European, especially French, decorations. (Barnes 1984:192).

Four sherds of San Elizario Polychrome were found. This type is similar to Puebla Blue-on-white except the addition of two thin black lines on the outside edge of one of the blue interior bands. Goggin (1968) does not consider this a separate type, but other researchers think it is distinctive enough to be given a style name (Snow 1965:26). This style has only been identified on plates, and it has been dated from 1750 to 1850 (Barnes and May 1972:10).

Majolica ceramics are typically found smashed into very small pieces. Except Tumacacori Polychrome, these small pieces are usually difficult to identify. Fragments with unidentifiable blue designs (n = 20) and polychrome (n = 4) were common, as were undecorated fragments (n = 23), which likely came from vessels where the decoration was concentrated along the rim. Most of the recovered pieces appear to be from large, shallow bowls or plates, which is typical for presidio times in Tucson.

A few other ceramics were found in the presidio features. These include two pieces of terracotta bowls with green glazed interiors, a fragment from an olive ware vessel, and two pieces of purple transferprint, manufactured in England and bearing romantic scenes. This color was most commonly used between 1818 and 1854, with the period between 1828 and 1838 being most prevalent, and romantic scenes at peak production between 1831 and 1851 (Samford 1997).

Other artifacts included two of the gunflints discussed in the flaked stone portion of this chapter, an iron nail, a copper button, and an unidentified copper artifact.

Of special interest are a religious medallion and 44 small glass beads that were found together in the fill of Feature 23 (Figure 4.2). The medallion and beads were from a necklace, or perhaps a rosary. The medallion is quite corroded, but careful examination revealed that one side had the phrase "CORAZON DE JESUS Y DE MARIA" or "Heart of Jesus and Maria." The Congregation of "Corazon de Jesus y de Maria" was founded by Juan Eudes (1601-1680). Medallions worn by followers of the group, or of Saint Juan Eudes, typically had a heart surrounded by a crown of thorns on one side, representing Jesus, and a heart and sword on the reverse, representing Mary (see http://www.cruzadadelrosario.org.ar/mariana/9inmaculado.htm). This is the first such medallion found by archaeologists in Arizona.

Only a handful of medallions have been recovered by archaeologists from Spanish or Mexican sites in Arizona. Two medallions were recovered at Awatovi in northeastern Arizona. An oval medal has St. Christopher carrying the infant Jesus on one side and the stoning of St. Stephen on the other side. The second oval medal has St. Francis of Assisi on one side and St. Anthony of Padua on the other (Ewing 1949:100; Smith and Fontana 1970:13-16).

Two bronze medallions were found at the Terrenate Presidio. One was recovered from the floor of House 60. It had a bust of St. Ignatius Loyola on one side, who was gazing at the sun and holding a tablet or plaque engraved with the ten commandments. Over his head on the inside edge of the medallion was the inscription "S. IGNAT. D.LOY. SOC.

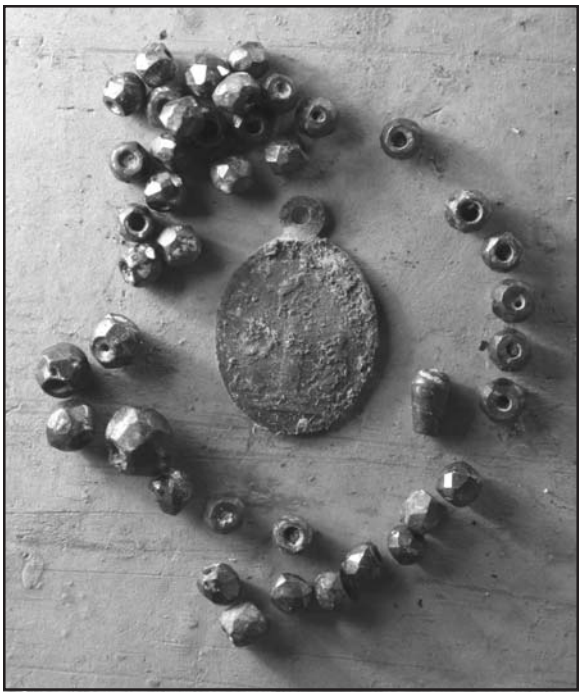

Figure 4.2. Religious medal and beads from Feature 23, Historic Block 185 (ASM 2005-564-12x, 13x; medal is 2.8 cm long).

IES. FVN. ROMA." The reverse side has a three-quarter length image of Saint Casimirus from Poland, holding a crucifix in his right hand and a lily in his left hand. This side is inscribed "S. CASMIRVS PAT. REG. POL.ET. M.D.L." (Di Peso 1953:208, 212). Di Peso (1953:212) does not describe the second medallion, which was found with Burial 6.

During the 1950 excavations at the San Agustín Mission in Tucson, a medallion was reported to have been found "in disturbed soil on east near spot where old burial had been removed" (ASM Archives, A-9218). This medallion has a figure of a woman on one side with Latin text "E VIRGO SINE PECCATO O" (ASM Archives, A-9218).

Beads have been found in Spanish period burials, as well as in domestic settings, at sites in Arizona. These have included small round seed beads, large faceted beads, and a polychrome example recently uncovered within the Tucson Presidio. Common colors are black, blue, red, and white. The beads from Block 185 are all dark blue to black glass, and most are faceted.

The presidio-era artifacts recovered from Block 185 are typical of those recovered during other nearby excavations. They suggest the Spanish and Mexican period residents of Tucson had access to a small amount of imported material culture. The items brought in were important to the community. Bright majolica dishes brought color to the dining table and were used during the course of occupation. The residents of the presidio likely felt that a "proper" table included at least some of these dishes.

Metal items are rarely found as they were likely recycled at the presidio blacksmith's shop, either made into new items or used to repair broken tools. Glass items are also rare and were probably difficult to import into Tucson, because they would have had to travel overland on mule trains to reach the community.

The religious medal and beads reinforces current knowledge about the importance of religion within the community. The Catholic Church was a unifying force in Tucson, with people gathering for mass, baptisms, burial services, and marriages. The surviving presidio enlistment records reveal that all the soldiers were Roman Catholic. Many residents of Tucson likely wore similar necklaces, serving both as a piece of jewelry and also as a testament to their faith.

American Territorial Period Artifacts

American Territorial period artifacts were recovered from several features at Historic Block 185, including borrow pits, trash middens, and irrigation canals. The nature of these features, most of which were filled in by soil washing down from the terrace to the east, resulted in numerous prehistoric and historic artifacts being mixed.

Several of the features—Features 27, 36, and 38 from BB:13:756 and Feature 4, 5, and 6 from BB:13:757—contain trash that predates the 1890s, with most of these features probably dating to the 1860s and 1870s. Few features from early American Territorial contexts have been excavated in Tucson.

The recovered artifacts included fragments of dishes, alcoholic beverage bottles, tin cans, three hair combs, 24 buttons, nails, window glass, and a glazed tobacco pipe bowl. A small figurine of a woman found in Feature 4 may represent the Virgin Mary, or it may have been a small doll (Figure 4.3).

Two features, Features 34 and 35, contain trash discarded by Chinese gardeners who, according to the 1883 Sanborn Fire Insurance map, lived in shanties just south of the project area. Chinese artifacts are fairly common at Tucson sites. However, city blocks occupied by Euro-Americans and Mexican-Americans typically have a low diversity and quantity of these artifacts, sometimes a single rice bowl or perhaps a soy sauce jar. Sites occupied by Chinese immigrants usually have larger diversity and greater quantities of Chinese artifacts (Thiel 1997b, 2006).

Chinese artifacts recovered during the Historic Block 185 excavations include fragments of a soup

Figure 4.3. Ceramic figurine of a woman from Feature 4, AZ BB:13:757 (ASM), Historic Block 185 (ASM 2005-564-11; item is 4 cm long).

Figure 4.4. Fired clay marble inscribed with "X" designs from Feature 34, AZ BB:13:757 (ASM), Historic Block 185 (ASM 2005-564-14; item is 2 cm in diameter).

spoon, rice bowls, Celadon wine cups, a large Four Seasons serving bowl, glazed food jars, soy sauce jugs, medicine bottles, opium tins, and pieces from several opium pipes.

The other artifacts recovered from these features are relatively mundane, and include liquor bottle fragments, tin cans, pieces of glass food jars, combs, clothing buttons, several cartridges, ink bottles, and school slate fragments. A fired clay marble inscribed with several "X" designs was found in Feature 34 (Figure 4.4). The marking may have been used to indicate to whom the toy belonged.

Changing Artifacts

The artifacts from Historic Block 185 can be divided into those from presidio-era features (Features 23, 25, and 40), those from the early American Territorial period (Features 27 and 36 and canal Features 4, 5, and 6), and those associated with the post-1880 Chinese shanties (Features 34 and 35). Counts and percentages for all artifacts, sorted by function, are presented in Table 4.8. Counts and percentages for ceramic artifacts, divided into broad types, are reported in Table 4.9.

The most visible trend in functional categories is the steep decline in kitchen-related artifacts after the arrival of the railroad, and the moderate increase in architectural, personal, and activity artifacts. The residents of the Chinese shanties discarded more nails, recreational items, and communication items than their predecessors. The arrival of the railroad in 1880 allowed many goods to be easily and cheaply imported into the community, and this is reflected by the increase in consumer goods. An anomaly is the high percentage of personal artifacts among the presidio-era features. This is a reflection of the recovery of the rosary or religious necklace in one of the adobe mining pits.

The frequency of Native American ceramics among kitchen artifacts declines, from a high of 58 percent in the presidio-era features, to 52 percent for the early American Territorial, down to only 24 percent among the kitchen artifacts discarded by the Chinese shanty dwellers. Manufactured cooking and storage vessels were probably increasingly used after the American entry into Tucson.

An examination of ceramic trends indicates that use of Native American ceramics increased in the early American Territorial period before declining dramatically in the post-railroad period. The cause

Table 4.8. Percentage of artifacts in each functional catergory, by time period.

	Presidio	Early Territorial	Chinese	Row Totals
Kitchen	81%	87%	62%	
Food preparation	1	7	15	23
Food service	82	107	202	391
Food storage	10	147	390	547
Alcoholic beverage	1	56	28	85
Beverage	4	106	321	431
Unidentified kitchen	1	1	8	10
Native American ceramics	136	463	309	908
Architectural	*	3%	8%	
Nail	1	24	155	180
Window glass	–	8	2	10
Door parts	–	–	3	3
Electrical	–	–	1	1
Furniture	–	*	*	
Lighting	–	–	1	1
Decorative statue	–	3	–	3
Arms	*	*	*	
Ammunition	–	2	2	4
Gun part	2	1	–	3
Clothing	*	*	1%	
Apparel	1	8	26	35
Accessories	–	1	2	3
Making/Repair	–	–	1	1
Personal	16%	*	6%	
Hygiene	–	3	4	7
Tobacco/Smoking	–	2	36	38
Medicine	–	–	92	92
Other personal	45	–	1	46
Activities	–	1%	2%	
Toys	–	–	7	7
Communication	–	–	25	25
Nuts/Bolts	–	10	5	15
Other activity	–	–	2	2
Transportation	–	–	*	
Horseshoe/Harness	–	–	4	4
Unidentified	15	51	409	475
Total	289	1,010	2,051	3,350

Note: * = Less than 1%.

of this change is not certain, but likely relates to changing cooking and water storage habits, along with the arrival of cheaper and more durable cooking implements or storage vessels, which replaced ceramic counterparts after the 1880 railroad arrival.

As expected, majolica ceramics became less common through time. The fragments found in American Territorial period features may represent "background noise," similar to the occasional prehistoric sherd found during the project. Whiteware and porcelain ceramics increased through time, as expected. Cheap, plain whitewares appear to have been a favorite of the Chinese gardeners, who also used a small but diverse set of Chinese ceramics.

SUMMARY

The artifacts recovered from Historic Block 185 provide additional clues about life in Tucson in the presidial times and in the American Territorial period. Like other archaeological projects within or near the fort, a relatively small diversity of artifacts was located in presidio-era features. The long distance to

Table 4.9. Counts and percentages of ceramic artifacts, by time period.

	Presidio	Early Territorial	Late Territorial	Row Totals
Native American ceramics	62%	82%	53%	
All types	136	465	309	910
Majolica	35%	8%	4%	
Puebla Blue-on-white	2	1	–	3
Huejotzingo blue	1	5	2	8
Unidentified blue	20	8	6	34
Aranama Polychrome	4	6	3	13
Tumacacori Polychrome	19	4	1	24
San Elizario Polychrome	4	6	1	11
Unidentified polychrome	4	13	3	20
Undecorated	23	5	8	36
Spanish/Mexican glazed wares	1%	2%	4%	
Olive ware	1	–	–	1
Mexican glazed wares	2	10	23	35
Earthenwares	–	–	*	
Chinese unglazed	–	–	3	3
Stoneware	–	–	9%	
European	–	–	15	15
Chinese	–	–	38	38
Rockingham	–	–	2	2
Whitewares	2%	8%	23%	
Undecorated whiteware	2	25	105	132
Transfer-print	2	13	11	26
Flow blue	–	2	1	3
Decal print	–	–	–	0
Sponge-print	–	1	1	2
Annular decoration	–	2	4	6
Annular and sponge	–	–	2	2
Tinted/solid color	–	–		
Hand-painted	–	–	7	7
Gilt decorated	–	–	1	1
Shell/feather-edged	–	–	2	2
Porcelain	–	1%	5%	
Plain	–	1	4	5
Hand-painted	–	1	1	2
Chinese plain	–	1	9	10
Chinese Bamboo pattern	–	–	2	2
Chinese celadon	–	–	4	4
Chinese 4 flowers	–	–	12	12
Unidentified	–	–	1	1
Total	220	569	580	1,369

Note: * = Less than 1%.

the nearest stores and the difficulty in importing goods resulted in a limited number of items being imported into Tucson. Once here, items were carefully recycled, if possible. Metal artifacts, in particular, are a rare find in archaeological deposits; when they wore out or were broken, metal items were likely taken to the presidio blacksmith shop and the metal used for other purposes. Spanish and Mexican period artifacts recovered from the ground surface or from archaeological sites in Arizona are listed in Table 4.10. Many of the artifacts were found at the Presidio of Terrenate, which was abandoned abruptly in 1781, with the soldiers leaving many items behind (Di Peso 1953).

Archaeologists also fail to find perishable materials, such as wood, cloth, basketry, and leather, used

Table 4.10. List of Spanish and Mexican period artifacts recovered from archaeological sites in Arizona.

Use	Artifacts
Kitchen	Olive jars, ceramic and brass cooking pots, knives, plates, bowls, cups, platters, spoons, chocolateros, glass wine bottles
Architectural	Nails, adobe bricks, wooden doors
Furniture	Screw, tacks, hinges, candlestick, candle snuffer
Arms	Musket parts, musket balls, gun flints, sword, daggers, lance heads
Clothing	Buttons, clothing, shoe buckles, cloth, leather, scissors, pins, needles, thimbles, lead cloth seals, sequins
Personal	Tweezers, coins, jewelry (tinklers, rings, earrings, brooches, gold braid), beads, parasol, spectacles, clay pipe, crucifixes, medallions, rosary beads, fica amulet, censor lid, baptismal font, church bells
Activities	Gaming pieces, strike-a-lights, augur, gouge bit, mattock, sickle, ox goad, chain links
Transportation	Horseshoes, horseshoe nails, jinglers, bridle decorations, cinch buckle, spurs, stirrups

to make clothing, containers, tools, bedding, and horsegear. Once discarded, items made from perishable materials decay. Archaeologists rely on documents and contemporary paintings or drawings for information on these types of artifacts. Unfortunately, relatively few of these depictions were made in the southern Arizona region during the Spanish and Mexican periods. One source of information, the frescoes at the Mission of San Xavier del Bac, has not been critically evaluated to see if the paintings can provide data on clothing and material culture in the region in the 1790s

American Territorial period artifacts from Block 185 included many items that could not be linked to a particular family or group. Some of these were probably washed into the area or tossed over the edge of the terrace. A small midden was associated with the Chinese men living in the shanties immediately to the south of the project area. These items include a greater diversity of consumer goods, reflecting the increased importation of everyday items as a result of the railroad arrival in 1880. Also present were a higher than normal amount of Chinese artifacts, items not typically located on Euro-American or Mexican house lots.

Understanding about daily life in the Tucson Presidio is becoming increasingly clear as excavations recover additional artifact samples. Food remains, which are discussed in Chapters 5 and 6 (this volume) provide additional information about the lives of Tucson residents of the eighteenth and nineteenth centuries.

CHAPTER 5

PLANT MACROREMAINS FROM HISTORIC BLOCK 185, AZ BB:13:756 (ASM), TUCSON, ARIZONA

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Excavations at AZ BB:13:756 (ASM) in Historic Block 185, Tucson, Arizona, yielded flotation samples from Feature 23, a Spanish or Mexican colonial period borrow pit, Feature 37, a Spanish or Mexican colonial period small extramural pit, Features 27 and 35, two American Territorial period borrow pits, Feature 36, an American Territorial period trash midden, and Feature 34, an overseas Chinese American Territorial period trash midden. Analyses of 23 flotation samples from these six features yielded a macrobotanical assemblage of wood charcoal and seeds consistent with discarded food waste and firepit or wood-burning stove gleanings. The assemblage was consistent with low to moderate socioeconomic status food waste; no rare or exotic Eurasian imported foods were observed. The assemblage was dominated by indigenous staples, including squash, maize, beans, cactus fruit, and pigweed seeds. All of the features yielded small amounts of two Eurasian grains, wheat and oats. In wood use, American Territorial period features included a slightly broader range of wood charcoals than the other assemblages, but the differences among features associated with different ethnic groups were minor.

LABORATORY PROCEDURES SAMPLE QUALITY ASSESSMENT

The dearth of contaminants in the samples suggests they were not subjected to intensive adverse preservation conditions. Further, low seed recovery rates and adequate charcoal recovery rates suggest the various borrow pits, trash middens, and the extramural pit were filled primarily with discarded fireplace or wood-burning stove gleanings, with some trace quantities of food detritus thrown into the pits. Because food waste is often smelly and attractive to pests, and because Historic period Tucsonans commonly used outhouses or latrines for discarding food waste and other garbage, low instances of food waste disposal in this assemblage is not surprising. The details that support these findings are discussed below.

Laboratory procedures for floating, processing, and handling flotation samples and resulting light fractions, as well as for identifying plant specimens, have been described elsewhere (see, for example, Diehl 1997b, 2001). Normal procedures applied except as follows. Although it is common to identify only charred plant remains from prehistoric archaeological sites (Diehl 2001; Miksicek 1987; Minnis 1981), in the current study, seeds that were not burned would have been identified and counted if any had been observed. However, no non-charred tissues were observed. The general characteristics of the flotation samples are provided in Table 5.1. Frequencies of identified seed taxa are enumerated in Table 5.2, and wood charcoal frequencies are presented in Table 5.3.

Evidence of disturbance in the assemblages was limited to the occurrence of terrestrial snails in 12 of the 23 light fractions, and insect exoskeleton fragments in three light fractions. The absence of evidence of rodent activity (no rodent feces) and infrequent instances of small amounts of insect parts indicates the deposits were not subjected to substantial disturbance by animal or insect burrowing. The routine occurrence of terrestrial snails was somewhat high, and their activities may have affected preservation of uncharred plant remains, but that possible effect is difficult to assess. In prehistoric sites with as many or more terrestrial snails, it is common to observe non-charred seeds. Their absence from the Block 185 assemblage seems likely to be more a consequence of how the trash deposits were created (discarded burned food waste and charcoal gleanings) than of microfaunal consumption or fungal deterioration.

In all other respects, the flotation samples were adequate for representing the contexts from which they were obtained. Prior studies have shown that 6-liter samples are usually adequate for sampling deposits in the Santa Cruz River floodplain and in the surrounding lower bajada, as well as for sampling Historic era trash deposits from Tucson. Block 185 samples varied from 5.0 liters to 8.0 liters, with a mean volume of 6.2 liters.

Table 5.1. General characteristics of Historic Tucson Block 185 flotation samples, AZ BB:13:756 (ASM).

Feature	Feature Type	Ethnic Affiliation	FN	Volume (liters)	Weight (gm)	Insect Exoskeleton	Snails
23	Borrow pit	Spanish or Mexican	77	6.0	76.0	1-50	51-100
23	Borrow pit	Spanish or Mexican	78	6.0	17.3	0	1-50
23	Borrow pit	Spanish or Mexican	96	6.0	62.1	0	0
23	Borrow pit	Spanish or Mexican	313	6.0	20.8	0	1-50
23	Borrow pit	Spanish or Mexican	329	6.0	32.0	0	51-100
23	Borrow pit	Spanish or Mexican	347	5.0	9.8	0	0
23	Borrow pit	Spanish or Mexican	408	5.0	53.6	0	51-100
23	Borrow pit	Spanish or Mexican	426	5.0	36.6	0	0
23	Borrow pit	Spanish or Mexican	477	6.0	40.8	0	1-50
25	Borrow pit	Spanish or Mexican	594	7.0	53.3	0	1-50
27	Borrow pit	Euro-American	531	7.0	43.0	0	0
27	Borrow pit	Euro-American	561	7.0	31.1	0	0
27	Borrow pit	Euro-American	585	6.0	26.9	0	0
27	Borrow pit	Euro-American	644	6.0	16.9	0	0
34	Trash midden	Chinese	49	5.0	27.5	0	0
34	Trash midden	Chinese	57	5.0	40.4	0	0
34	Trash midden	Chinese	300	7.0	21.5	1-50	1-50
34	Trash midden	Chinese	332	6.5	41.7	1-50	1-50
35	Borrow pit	Euro-American	305	6.0	33.5	0	0
36	Trash midden	Euro-American	364	7.0	39.8	0	0
36	Trash midden	Euro-American	388	7.0	38.7	0	1-50
36	Trash midden	Euro-American	394	7.0	56.8	0	1-50
37	Small pit	Spanish or Mexican	494	8.0	61.1	0	1-50

Seed recovery rates were quite low (0.33 seeds/liter), but charcoal recovery was sufficient to meet the standard 20-fragment count associated with macroplant analyses in samples from most features. Feature 23, however, lacked sufficient charcoal in seven of nine analyzed samples. Based on low seed recovery rates, low wood charcoal recovery rates, and low indices of disturbance, one must conclude that the trash deposits in this Spanish or Mexican period borrow pit, Feature 23, were very sparse with respect to plant remains.

DISCUSSION

Sixteen flotation samples yielded seeds, seed coat fragments, or maize cupules. Food plant remains from BB:13:756 include common, locally grown Iberian and indigenous crops, and common, locally available edible wild plants (see Table 5.2). Of the 19 identified taxa, most were commonly available food plants with well-established records as Native American or Iberian foods (grains, edible greens, or fruit). Three were grains (maize, oats, and wheat), and three other cultivars were "main dish"-type fruit (beans, bell or chili peppers, and squash). Several taxa with the potential for dual use as grains or edible greens were identified, including goosefoot, pigweed, and purslane. Moreover, three kinds of cactus fruit remnants were observed: barrel cactus, prickly pear cactus, and saguaro. One mustard family seed (Cruciferae, either pepperweed or tansy mustard) was observed, and one mesquite seed was also observed.

Several taxa have no obvious value as food; these included the false purslane, mint family, and pine family seeds, and the unidentified columnar-celled seed-coat fragment (CCSC). One taxon, sweet clover, an introduced Eurasian cover plant, has value only as animal fodder.

Socioeconomic Status

No exotic or nonlocally growable foods were observed. To the extent that exotic foods were absent from the macroplant assemblage, the identified taxa are consistent with food refuse from people of modest means. In contrast, studies of macroplant assemblages associated with wealthier and middle-class Tucsonans have shown that people of greater means made more frequent use of imported items.

Table 5.2. Frequencies of Historic Tucson Block 185 seeds and maize cupules from AZ BB:13:756 (ASM).

Feature	FN	Ethnicity	False purslane (*Trianthema* sp.)	Pigweed (*Amaranthus* sp.)	Saguaro (*Carnegiea gigantea*)	Barrel cactus (*Ferocactus* sp.)	Prickly Pear Cactus (*Opuntia* sp.)	Goosefoot (*Chenopodium* sp.)	Mustard Family (Cruciferae, *Descurainia* or *Lepidium* type)	Squash or Pumpkin (*Cucurbita* sp.)	Mint or Chia Family (Labiatae)	Wheat (*Triticum* sp.)	Maize (*Zea mays* cupules)	Oats (*Avena sativa*)	Common Bean (*Phaseolus* cf. *vulgaris*)	Mesquite (*Prosopis* sp.)	Sweetclover (cf. *Melilotus* sp.)	Pine-type Seed (Pinaceae)	Purslane (*Portulaca* sp.)	Green or Chili Pepper (*Capsicum* sp.)	Unidentified Columnar-celled Seed Coat Fragment (CCSC)
23	77	Spanish Colonial or Mexican	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0
23	78	Spanish Colonial or Mexican	0	2	1	0	0	2	0	0	0	0	0	0	0	1	0	0	3	0	0
23	313	Spanish Colonial or Mexican	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
23	329	Spanish Colonial or Mexican	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
23	408	Spanish Colonial or Mexican	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	0	0
23	426	Spanish Colonial or Mexican	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
23	477	Spanish Colonial or Mexican	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
27	531	Euro-American	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
27	585	Euro-American	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
27	644	Euro-American	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	0	0	1	0
34	49	Overseas Chinese	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	57	Overseas Chinese	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
34	300	Overseas Chinese	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
34	332	Overseas Chinese	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
35	305	Euro-American	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
36	388	Euro-American	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
36	394	Euro-American	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
37	494	Spanish Colonial or Mexican	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.3. Frequencies of Historic Tucson Block 185 wood charcoal taxa from AZ BB:13:756 (ASM).

Feature	FN	Juniper (*Juniperus* sp.)	Ocotillo (*Fouquieria* sp.)	Grass Family (Gramineae, stem)	Maize (*Zea mays*, stalk tissue)	Desert Legume Type (Leguminosae)	Ironwood (*Olneya* sp.)	Mesquite (*Prosopis* sp.)	Cottonwood or Willow (*Populus* sp. or *Salix* sp.)	Unidentified	Total
23	77	0	0	0	0	5	0	15	0	0	20
23	78	0	0	0	0	16	0	0	0	0	16
23	96	0	0	0	0	13	0	0	0	0	13
23	313	0	0	0	0	17	0	0	0	0	17
23	329	0	0	0	0	6	0	0	0	0	6
23	408	0	0	0	0	0	0	20	0	0	20
23	426	0	0	0	0	0	0	13	0	0	13
23	477	0	0	0	0	12	0	7	0	0	19
25	594	0	0	0	0	0	0	20	0	0	20
27	531	0	0	0	0	0	2	18	0	0	20
27	561	0	4	0	0	0	0	16	0	0	20
27	585	0	0	0	0	18	0	0	0	2	20
27	644	0	0	0	0	7	0	13	0	0	20
34	49	0	0	0	0	7	0	12	0	1	20
34	57	0	1	0	0	11	0	8	0	0	20
34	300	0	1	1	0	4	1	13	0	0	20
34	332	0	0	0	1	4	0	12	3	0	20
35	305	2	0	0	0	0	0	18	0	0	20
36	364	0	0	0	0	0	0	13	7	0	20
36	388	0	0	0	0	2	0	13	2	0	17
36	394	1	0	0	0	0	0	19	0	0	20
37	494	0	0	0	0	0	0	20	0	0	20

In the most compelling case, a nutmeg (*Mystica fragrans*) and coffee (*Coffea arabica*) were recovered in samples from the historic León family household, contexts affiliated with a nineteenth century Mexican-American landowner and his descendants (Diehl et al. 2005:185).

Wealthier families also tended to use more wheat than maize, and various fruits (raspberries, peach pits, watermelon seeds, and so forth) have been observed more frequently in samples from middle-class households than in lower socioeconomic status contexts in historic Tucson flotation samples from the Osborn and Hazzard households (M. Diehl et al. 2003:65-71). In contrast with those households, the food plant assemblage from Block 185 shows no strong bias for wheat. Instead, the dominant grain cultivar is maize; that observation is more consistent with prior studies of historic Tucson's day laborers (Diehl 2002).

Ethnic Variation in Food Waste

As is evident in Table 5.2, many of the identified taxa were unique in the assemblage. Four taxa, however, occurred in a sufficient number of samples that comparisons of their ubiquities among samples obtained from deposits associated with different ethnic groups may be warranted. These taxa include pigweed, goosefoot, wheat, and maize. The ubiquities of each of these taxa are presented in Table 5.4, illustrating differences in their relative occurrence among deposits affiliated with different ethnic groups. The statistical significance of the differences in the observed ubiquities among ethnic groups using a Fisher Exact Test is also presented in Table 5.4 (StatSoft 1994:1330).

It should be apparent by inspection that there are is only one statistically significant difference in the ubiquities among different ethnic groups. Pigweed

Table 5.4. Ethnic differences in the ubiquities of four food plant taxa from Historic Tucson Block 185, AZ BB:13:756 (ASM).

	Ethnic Group Affiliated with Depositional Context		
Taxon	Chinese (n = 4)	Euro-American (n = 6)	Spanish or Mexican (n = 8)
Goosefoot (*Chenopodium* sp.)	0.25	0.16	0.25
Maize (*Zea mays*)	0.25	0.33	0.50
Pigweed (*Amaranthus* sp.)	0.25	0.03	0.63
Wheat (*Triticum* sp.)	0.50	0.33	0.13
	Fisher Exact Test Probabilities		
Comparison	Spanish/Mexican vs. Euro-American	Spanish/Mexican vs. Chinese	Euro-American vs. Chinese
Goosefoot (*Chenopodium* sp.)	p = 1.00	p = 1.00	p = 1.00
Maize (*Zea mays*)	p = 0.30	p = 0.58	p = 1.00
Pigweed (*Amaranthus* sp.)	p = 0.59	p = 0.27	p = 1.00
Wheat (*Triticum* sp.)	p = 0.54	p = 0.24	p = 1.00

[a]Chinese: Feature 34.
[b]European-American: Features 26, 27, and 35.
[c]Spanish or Mexican: Features 23 and 37.

heavily favors the Spanish or Mexican contexts and is absent in the Euro-American contexts. An explanation for the high pigweed ubiquity observed in Spanish or Mexican samples may be found in the Spanish, Mexican, and Mexican-American preference for wild greens used as a potherb, *verdolegas*, and grown in backyard gardens (Bye 2000; Super 1988). Further, although the Chinese ubiquity ($U_{pigweed}$ = 0.25) for the plant was not significantly different from the Euro-American ubiquity ($U_{pigweed}$ = 0.00) using a Fisher Exact Test, it was nevertheless greater. A tendency for higher ubiquity scores in low- or lower-middle socioeconomic status Mexican or Chinese households was observed in other studies of Tucson Basin households (Diehl et al. 1998, 2005).

Fuel Wood Use

Nine wood charcoal or woody tissue taxa were identified, including cottonwood or willow, nonspecific desert legumes (tree legume fragments similar to mesquite, ironwood, and acacia, but too small to assign to a genus), a grass stem fragment, ironwood, juniper wood, ocotillo, a maize stalk fragment, mesquite, and unidentified knotwood tissue. However, the assemblage was so completely dominated by desert tree legumes (desert legumes and mesquites) as to approach homogeneity. Together, nonspecific legumes and mesquite account for 93 percent (372 of 401 counted fragments) of the wood charcoal assemblage. The remainder were cottonwood or willow (3 percent), ocotillo (1 percent), and trace quantities of the rest.

The dominance by desert tree legumes in the assemblage suggests the source of fuel, probably mesquite and possibly acacia wood, was local Sonoran Desertscrub. Mesquite and acacia are currently endemic to, and widespread and pervasive in, the undeveloped portions of the lower bajadas around Tucson and the Tucson Basin. They were certainly abundant and, most importantly, easily obtainable at no cost to the residents of Historic Tucson Block 185.

CHAPTER 6

A LITTLE ON THE WOOLY SIDE: ZOOARCHAEOLOGY AT THE TUCSON PRESIDIO, AZ BB:13:13 (ASM)

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INTRODUCTION

How people adapted to the environment for their subsistence needs is critical in understanding how they organized their lives. Spaniards, and later, Mexicans approached new environments and unfamiliar conditions with a suite of Euro-American domesticated plants and animals, as well as with a variety of cultural mores concerning subsistence. Native Americans responded to the influx of Euro-American plants and animals with their own adaptive strategies. These new taxa were often incorporated into the fabric of new Native American lifeways in the wake of massive depopulation and societal collapse. While the environment limited the success of Euro-American domesticates in different areas (Reitz 1992; Reitz and Wing 1999:279-287), cultural patterns also played a major role in subsistence and survival. A variety of studies have been conducted on Spanish colonial sites throughout New Spain, but a general lack of attention has been paid to zooarchaeological analyses. The current study of faunal remains from the Tucson Presidio, AZ BB:13:13 (ASM), allows for observation of the interplay among Hispanic settlers, Native Americans, and the environment at the site.

How residents of the Tucson Presidio adapted their subsistence strategies to the Tucson Basin is the major theme here. In this study, then, subsistence is defined as the use of animal and plant products to supply the nutrition necessary for survival. Using animals and other products involves a complex interaction with local environments and available resources through current wisdom and new innovation. Although the zooarchaeological assemblage used in this study is small in size and limited in context, it allows for the suggestion of a variety of patterns. To examine the topic of adaptations to the environment and to native people of the Tucson Basin, by residents of the Tucson Presidio, three major research questions are addressed.

(1) Did residents of the Tucson Presidio rely primarily on wild or domesticated animals? Was wild game readily available during this time?
(2) What types of domesticated livestock were raised at the presidio? Does the suite of domesticated animals at the presidio represent an adaptive response to raiding?
(3) How were cattle butchered and processed? Is there evidence for differential distribution of carcass portions?

These questions lead into broader issues in which ethnohistorical information informs on patterns in the zooarchaeological record. Did residents of the presidio choose to rely on wild or domesticated game for cultural or environmental reasons? Was there enough flexibility in subsistence practices at the presidio to adapt to the threat of Native American raiding? Can less well-represented skeletal portions indicate missing carcass portions that can be attributed to economic interactions with settled Native American groups?

Spanish Colonial Strategies

The Spanish strategy for colonization was a three-pronged approach utilizing missions, presidios, and pueblos. The first stage of colonization usually involved the entrance of Jesuit and Franciscan missionaries to new territories to convert native peoples to Christianity. These missionaries began to accustom native peoples to elements of the idealized Spanish lifestyle, including language and subsistence on domesticated plants and animals in the mission setting. Missionization activities were aided by the Spanish policy of *reduccíon* (reduction), which removed Native Americans from their dispersed settlements, bringing them together in a place where they could be better monitored. Additionally, attempts to integrate Native Americans into the

Spanish system could be conducted more efficiently in this environment (Trigg 2005:78-79).

The second major step in colonization was the establishment of military control over an area through the creation of presidios (Weber 1992:212-215). These institutions provided protection and support for missionaries, Christianized Native Americans, and Spanish settlers in the region so that formal settlements could be created. These settlements, or pueblos, were the third prong of the colonial strategy. While small villages of Spanish settlers were already established in several regions, access to the resources of both the church and the military were key to the expansion of Spanish towns. Spanish settlers were also expected to serve as an example for the Native Americans and display the "proper" way to live; that is, Christian subjects living in small pueblos established in imitation of their counterparts in Spain. Spicer (1962:282) sums up the Spanish program of conquest:

> Spanish regal authority and law must be the framework of Indian life. It was also agreed that the setting for these primary elements of civilization must be town life. In addition, the Indians must be made to dress in the Spanish manner at least to the extent of trousers and shirts for men and skirts and upper garments for women. They must also practice monogamy and employ formal marriage ceremonies, and they ought to live in adobe or stone houses.

There were, however, exceptions to these strategies for colonization. The founding of New Mexico, for instance, occurred in 1598, prior to any major missionization in the area (Trigg 2005). This example illustrates the flexibility of Spanish colonial policy.

It should be noted that while the Spaniards were from a variety of cultural groups, they were united under a single political leadership and policy. Spanish colonial culture in some areas, such as the Southeast, was the result of groups who came directly from Spain, and who adapted their culture on the fly. At the Tucson Presidio, however, most of the individuals were from families who had been resident in Mexico for several generations (Dobyns 1976:63-67). The Tucson Basin and the Sonoran Desert, however, were not familiar environments. Those individuals who became residents of the Tucson Presidio were forced to adapt to survive.

METHODS

All the faunal remains excavated from two soil mining pits, Features 23 and 25, filled between 1800 and 1849, were analyzed. Although it is not known precisely who deposited these materials, ethnohistorical sources from this period relate that the only settlements on the eastern side of the Santa Cruz River were the presidio of San Agustín del Tucson and the settlements of the Apache Mansos located downstream to the north (Dobyns 1976:141; McCarty 1976:86).

The date range for the zooarchaeological assemblage for the current study is 1800 to 1849. Because this period encompasses both the Spanish and Mexican occupations of the Tucson Presidio—with the change in 1821—residents of the presidio will be referred to here by their national affiliation when necessary. Because most of the patterns discussed here span both periods, the term Hispanic is used for both groups.

Zooarchaeological Methods

All faunal identifications for this analysis were conducted in the Stanley J. Olsen Laboratory of Zooarchaeology, Arizona State Museum (ASM), on the campus of the University of Arizona. The assemblage from the Tucson Presidio was analyzed using standard zooarchaeological techniques (Reitz and Wing 1999). As elements were identified, they were entered into a coding system developed by Mary Stiner and adapted by Rachel Diaz de Valdes and Barnet Pavao-Zuckerman for faunal analysis in the Southwest. Pavao-Zuckerman later altered this original coding system for use in Spanish colonial sites in the Pimería Alta. No major alterations were made to the coding system here, only several additions of taxa and codes for butchering marks.

A variety of primary data types were recorded, including: species, element, side, element portion, fusion, burning, butchering marks, and animal gnawing. Specimens were identified to the lowest taxonomic designation possible. Fractured bones that could be refit with other pieces were counted as a single specimen. No attempts to refit bones in separate proveniences were carried out. The basic summary statistic for this analysis is the number of identified specimens (NISP), or bone fragment count. Size categories of small (rodent-/rabbit-sized or sparrow-sized), medium (coyote-sized or chicken-sized), and large (artiodactyl-sized or eagle-sized) were utilized for mammalian and avian specimens that could not be identified beyond the level of Class, for example, Mammalia.

The summary category "Domesticated Food Mammals" includes cattle, sheep (*Ovis aries*), and goat (*Capra hircus*). Only chickens (*Gallus gallus*) are included in the "Domesticated Food Bird" category. The "Pets" category refers to animals that lived in close proximity to humans and that provided a service other than acting as beasts of burden. These

animals were typically not consumed. The "Pets" category is comprised of specimens identified as domesticated dog or cat (*Felis catus*). The "Draft Animals" category includes the specimen identified as a burro (*Equus asinus*). A "Wild Animals" category was used for frogs (*Rana* sp.), lizards (*Sauria* sp.), desert tortoise (*Gopherus agassizii*), birds (Aves), hares (*Lepus* sp.), squirrels (Sciuridae), and coyote (*Canis latrans*).

Relative ages of artiodactyls can be estimated based on two major variables, bone fusion and tooth eruption. The age at which an animal was killed can indicate a great deal about how an animal was used. In this study, relative age is helpful in answering the first research question regarding the use of wild versus domesticated taxa. An optimization strategy for meat usage is expected to have been followed at the Tucson Presidio, in which individual domesticated animals were killed immediately upon reaching their full adult size. A small proportion of older animals is also expected, as some individuals were likely kept into older adulthood for breeding, plowing fields, milking, or wool production.

Animals experience growth at the ends of elements, the epiphyses, until these epiphyses fuse with the shaft of the element, the diaphysis. Elements fuse in a known sequence and at species-specific ages; however, the precise age of fusion is somewhat influenced by environmental conditions. Therefore, the age at fusion is usually presented as an age range (Watson 1978). The range of ages between which elements fuse are well known for artiodactyls, and can provide valuable estimates of age at death (Schmidt 1972).

Fusion status was recorded as: fused, partially fused, unfused, or unknown. Unfused elements in the early fusing category are interpreted as evidence for juveniles; unfused elements in middle fusing and late fusing categories are usually interpreted as evidence for subadults, although characteristics of the specimen may occasionally suggest a specimen is juvenile. Fused specimens in the late fusing category are evidence for adults, while fused specimens in the early and middle fusing categories are indeterminate. If no evidence for fusion was noted, the specimen's fusion status was recorded as "unknown." Fusion is more informative for unfused elements that fuse early in the maturation sequence and for fused elements that complete fusion late in the maturation process than it is for other elements. An early fusing element that is fused could be from an animal that died immediately after fusion, or that died many years later. To reduce the amount of confusion in age grouping, elements are recorded under the oldest category possible.

Fragmentation of mandibles, maxillae, and teeth can render tooth eruption a more difficult technique for estimating age at death. Best estimates of age at death based on tooth eruptions are derived from in situ observations of teeth within mandibles and maxillae. Because intact mandibles and maxillae were rare, observations on tooth eruption were recorded in the comments area of coding sheets.

Several types of bone modifications were recorded, including burning/calcining, cutting/hacking/incising, and carnivore-/rodent-gnawing. In the current study, elements that are burned or calcined were assumed to represent either processes of cooking, disposal by fire, or accidental burning. Modifications by fire were recorded as: unburned, burned (blackened), or calcined (white in appearance). Burning or calcining may occur when meat is cooked on an open fire. Bones may also experience exposure to fire during the disposal process, such as burning a carcass or a trash pile. Because the middens do not appear to have been intentionally burned, any burning of bone is thought to have occurred prior to deposition in the midden.

Butchering marks can provide information about animal usage and the processes of butchering. Processes of butchering in the Spanish Colonial period tend to fall into two categories: cutting or hacking (Chapin-Pyritz and Mabry 1994:154-155; Diehl et al. 1997:133; Thiel 2004:98). The signatures of these butchering processes are represented by either a cutmark or a hackmark. A cutmark is a straight striation on the bone left by the knife that was used to remove meat before or after cooking, for removing the hide of an animal, or for disarticulating joints. Hackmarks are evidence that a larger implement, such as a hatchet, cleaver, or ax, was used to butcher an animal. These marks are deeper, have force behind them when delivered, and tend to remove an asymmetrical wedge of bone or separate the bone into two (or more) pieces. Hackmarks are generally left on bone before the meat is cooked, when the carcass is initially being dismembered. Other bone modifications, such as groove and snap, flaking, or polishing, were recorded when present. Zooarchaeological evidence indicates most of the butchering done in the Spanish Colonial period was with a hacking motion (Chapin-Pyritz and Mabry 1994:154-155; Diehl et al. 1997:133; Thiel 2004:98).

Animal gnawing on bones provides additional information about the state of preservation of the assemblage. Two types of animal tend to chew on bones: carnivores and rodents. Rodent gnawing appears as small, flat-bottomed, parallel striations on the surface of bone. Carnivore gnawing on bone often leaves puncture marks and larger v-shaped striations, or "drag marks." Animal gnawing can remove or destroy an unknown quantity of bone from an assemblage, and it is a significant, but not easily quantified, source of taphonomic bias in zooarchaeological assemblages.

Density-mediated attrition refers to the removal of less dense bone from an assemblage through taphonomic processes. Density-mediated attrition leads to the underrepresentation of certain elements and taxa. To rule out density-mediated attrition as a factor in the current assemblage, a count of the 10 highest and 10 lowest density scan sites was conducted. To remove the possibility that low-density element portions were overrepresented due to greater fragmentation, only complete density scan sites were counted. The count was created using the 10 highest and lowest density scan sites as defined by Kreutzer (1992) for bison (*Bos bison*). Because bison are quite similar to cattle, bison element densities were thought to be a valid proxy for cattle element densities. The element portion density count for this assemblage conducted on cattle suggests that, for cattle, density-mediated attritional processes were not a factor. More low-density elements were found to be present than high-density elements.

Three major quantitative statistical measures are used to describe the current assemblage: NISP, minimum number of individuals (MNI), and biomass. The purpose of these measures is to contrast the target population (Tucson Presidio livestock) with the sample population (faunal remains excavated in Features 23 and 25). The NISP (Payne 1975) is the basis for all the other statistics and calculations carried out on this assemblage; it reflects the total number of bone fragments present in an assemblage. However, NISP is subject several biases. The measure is strongly influenced by body size and the presence of landmark identifiable features. The bones of larger animals tend to be larger than the bones of smaller animals, and therefore, tend to break into more fragments. Similarly, fragmentation differentially affects the identifiability of specimens from animals with differing body sizes. Even when broken in half, a rabbit element can still be identified; however, a similarly sized fragment of cattle bone is unlikely to be identifiable beyond "large mammal." Animals with bones that contain a greater number of landmarks will thus be favored in calculations of both NISP and MNI. In an assemblage with larger animals, there will often be a greater percentage of unidentifiable elements than in an assemblage comprised primarily of small animals. An assemblage of large animals will reflect a greater percentage of elements identifiable only to "large mammal," "vertebrate," or "artiodactyl."

In this study, MNI (Stock 1929; White 1953) is used to provide a second measure of taxonomic representation of the sample. MNI serves as a valuable resource, not only for the research question regarding wild versus domesticated animal usage, but also for another question examining the use of domesticated livestock at the Tucson Presidio. MNI is estimated by examining the data tables according to element, portion, symmetry, and age. The most numerous elements present in each taxon were examined and divided into subcategories, by element portion. Only whole elements or element portions that overlap, such as the proximal three-quarters of a left tibia and the distal half of a left tibia, are counted as evidence of more than one individual. However, when fusion status differs between two of the same skeletal elements, the presence of more than one individual can be inferred. A fused right tibia and an unfused left tibia are counted as a minimum of two individuals.

Biomass is the third major statistic calculated for this assemblage (Casteel 1978). Biomass is a useful counterpoint to both NISP and MNI. While MNI and NISP are helpful for estimating the number of individuals in each taxon present at the site, biomass provides an estimate of meat that would have been associated with an assemblage of bones. This measure is necessary for a more complete understanding of the use of wild versus domesticated animals by presidio residents. Even if fewer cattle are present at a site than fish, it might take the meat of 50 fish to equal that of one cow. Biomass contributes to answering the research question regarding whether the presidio residents relied on wild or domesticated taxa.

Biomass estimates are derived by calculating the amount of meat associated with a given weight of bone using the principle of allometry, which states that skeletal dimensions change non-linearly with greater body size. Allometric scaling of bone weight compensates for weakness of the basic structure of bones and teeth. This relationship between body weight and skeletal weight is described in the formula: $Y = aX^b$ (Simpson et al. 1960:397). In this equation, X is specimen weight, Y is the biomass, b is the constant of allometry (the slope of the line), and a is the Y-intercept for a log-log plot using the method of least squares regression and the best fit line (Casteel 1978; Reitz and Cordier 1983; Reitz et al. 1987; Wing and Brown 1979). Values for a and b are derived from calculations based on data at the Florida Museum of Natural History (Reitz and Wing 1999:72). Allometric formulae for biomass estimates are not currently available for amphibians or lizards; therefore, biomass is not estimated for these animals.

The examination of cattle by carcass portion is useful for deriving secondary quantitative indices and for examining spatial patterns in carcass portion utilization. The "Head" category includes skull and mandible fragments, as well as fragments of horn and teeth. Ribs, the atlas, axis, and other vertebrae are placed in the "Vertebrae/Rib" category. Those categories are likely underrepresented due to recovery and identification problems. Ribs of cattle, horses, donkeys, and other large mammals can be

difficult to differentiate. Thus, most of these elements can only be classified as large mammal or mammal. The "Forequarter" category includes specimens from the scapula, humerus, radius, and ulna. Carpal and metacarpal specimens are presented in the "Forefoot" category; the "Hindfoot" category includes tarsal and metatarsal specimens. The "Hindquarter" category includes specimens identified as innominate, sacrum, femur, and tibia. Metapodiae and podiae that could not be assigned to one of the other categories, as well as sesamoids and phalanges, are assigned to the "Foot" category.

In addition to the three major statistics used to characterize this assemblage, four other measures were utilized specifically for cattle skeletal portions in the assemblage. These measures are: (1) a minimum number of elements (MNE); (2) a minimum number of animal units (MAU), a log difference function; and (3) food utility index (FUI). As noted, these measures were only calculated for cattle because other taxa are not considered applicable for the research question regarding possible rationing behavior, and because the sample size of caprines was too small. The MNE and MAU were calculated to check the NISP for problems of fragmentation in the cattle bone assemblage. The MNE is a measure of the minimum number of complete elements that can be accounted for by the bone fragments in an observed assemblage (Binford 1984; Bunn and Kroll 1986). The MAU is a measure of the minimum number of animal portions necessary to account for the observed specimens (Binford 1984). The MAU is calculated by dividing the MNE for specific elements by the number of times each element occurs in a complete skeleton. As MNE is derived in much the same way as MNI, and MAU is based on MNE, they are both subject to all of the biases of MNI (see above).

The log difference function was calculated to compare the observed sample of cattle bones with an expected skeletal assemblage (Reitz and Wing 1999:212). A complete skeletal portion has a certain number of elements. By comparing the number of elements in the skeletal portion of a single animal with the number of elements in an assemblage, the frequency of skeletal portions in the assemblage can be charted.

To examine several possible sources of error, three log difference functions were calculated: NISP, MNE, and MAU. NISP is the standard basis of log difference functions. By deriving a skeletal portion count from NISP, the highest possible number of skeletal portions is given, because all identifiable bone fragments are used to calculate the number of skeletal portions. Fragmentation is the most significant bias in this measure. Additionally, if different skeletal portions have elements that are more or less likely to fragment, this affects the representation of these portions. By using MNE to derive counts for skeletal portions, only whole elements are counted, which corrects for the problem of fragmentation. However, certain fragments of elements, generally shaft fragments, will not be counted in this measure, because it is impossible to determine how they might overlap with each other. This leads to a reduction in the total number of skeletal portions calculated. The MAU normalizes the MNE based on the number of each element present in a complete skeleton. MAU corrects for both fragmentation and symmetry. MNE and MAU are not more correct than NISP; rather, they are complementary techniques subject to different biases. None of these measures is meant to represent an exact number of skeletal portions. The data each measure provides are useful for comparing the proportion of each skeletal portion that is present.

In the current study, log differences are useful for identifying skeletal portions of cattle that are overrepresented or underrepresented; this is critical to the research question regarding differential distributions of cattle carcass portions. The representation of skeletal portions can demonstrate, through presence or absence, cuts of meat that were favored, carcass portions that were traded or sold to people away from the site, or carcass portions that were unusable. If meat was exchanged between residents of the presidio and other Tucson settlements, log difference should demonstrate a significantly different representation of skeletal portions in the assemblage.

One problem with the log difference measure is that differential transport/distribution cannot be separated from differential preservation. Because the log difference was used only for cattle, the bone density scan site measures (Figure 6.1) described above are thought to be a good evaluation of the possibility of density-mediated attrition. At the Tucson Presidio, log difference is taken as a measure of differential transport and distribution. This is also thought to be correct due to the relatively young age of the site and a lack of significant weathering on the assemblage.

The equation for log difference is: d = (LOGe X)-(LOGe Y). To solve this equation, percent NISP, percent MNE, and percent MAU of each skeletal portion of the observed assemblage (X) is calculated. Y is the expected frequency of each skeletal portion in a complete skeleton. Both X and Y are then multiplied by the constant of the natural log (LOGe) to normalize the data. The difference between the two is reflected in value d. A positive number reflects a greater abundance of a certain skeletal portion, while a negative value represents an underrepresentation of that skeletal portion.

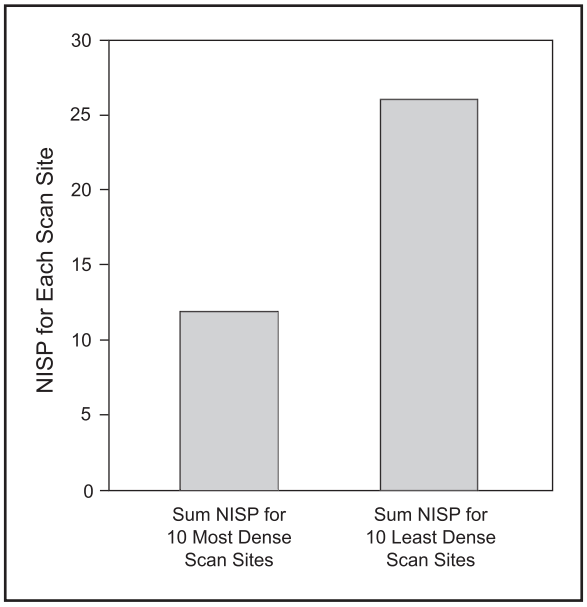

Figure 6.1. Number of identified specimens for bone density scan sites of cattle (*Bos taurus*).

The FUI is the other skeletal portion analysis used to characterize this assemblage (Metcalfe and Jones 1988). The FUI allows for a better understanding of decisions made by the individuals butchering an animal, based on meat and marrow content associated with specific skeletal portions. NISP was used here as the base for this measure due to the small size of the assemblage. Skeletal portions, based on NISP, are taken as a proxy for carcass portions. The ways in which carcass portions were used suggests how animal husbandry was practiced at a site. One of the research questions is concerned with adaptations in animal husbandry at the presidio due to Native American raiding. The FUI is a powerful tool in addressing this question.

The FUI is based on ethnoarchaeological data and utility indices created by Binford (1978) in his work with the Nunamiut of Alaska. The idea behind this index is that those butchering an animal will make decisions about which portions of a carcass will be used or discarded, based on the amount of meat and marrow they have attached. These decisions are affected by the distance from the area in which the meat/marrow will be processed or stored to the site of preparation and consumption. The size of the carcass and several other factors affect these decisions. Bone specimens in the assemblage are sorted by FUI ranges (low, medium, high utility). However, the NISP used in the FUI does not match the total NISP of cattle and caprines, because some elements, including sesamoids and miscellaneous vertebrae, do not have a FUI value. The list of elements for which FUI values were derived can be found in Metcalfe and Jones (1988) .

For the current assemblage, the FUI is useful in examining how Tucson Presidio residents divided cattle carcasses for transport, use, and trade/rationing.

RESULTS

The zooarchaeological assemblage from the Tucson Presidio includes a total of 2,769 specimens, 726 (26 percent of the total) of which were identifiable to the taxonomic level of Family or below (Table 6.1). Because very little information can be derived from specimens not identifiable below the Family level, the sample size should be considered 726. Unidentifiable specimens were only used in the analysis of butchering, burning, and gnawing evidence. Epiphyseal fusion rates are used to estimate age at death in the assemblage (Reitz and Wing 1999:76). Bone fusion can provide a better idea of how domesticated animals were used on the site, as well as patterns about their exploitation.

Epiphyseal fusion data (Figure 6.2; Table 6.2) suggest most cattle were kept to an age of more than 18-24 months, but did not live until their middle or late fusing elements had fused. At least one neonatal individual is present in the assemblage, as seen by an unfused proximal metapodial (and several other bones probably from the same individual). Another cattle individual in the assemblage was slaughtered before 18 months, as evidenced by an unfused distal humerus. Two individuals were slaughtered before their proximal calcaneus could fuse, typically at 36-42 months. However, one of these specimens could be from the same individual as the unfused distal humerus. At least three individuals, in addition to the neonatal cow, were slaughtered before 42-48 months.

The epiphyseal fusion of caprine elements (Figure 6.3; Table 6.3) indicates a pattern of butchery after 16 months of age. One individual has an unfused distal metapodial, indicating it was slaughtered before 23-36 months. Two individuals were killed before 23-60 months, as seen in the presence of an unfused proximal tibia. Compared with cattle, a higher percentage of caprines have their late fusing elements fused, which occurs at 23-84 months.

These data indicate a livestock optimization approach was utilized at the Tucson Presidio. Killing a domesticated animal as soon as it reaches full size optimizes the use of resources spent on providing care (protection, fodder, and so on) for the animal (Payne 1973). Once an animal reaches full body size, additional resources will not substantially increase the amount of meat on the animal. By killing it when it reaches its largest size, resources are not used on this animal, and those resources can be used for oth-

Table 6.1. Species list from AZ BB:13:756 (ASM).

Taxa	NISP[b]	MNI[a]		Weight (gm)	Biomass (kg)
		Number	Percent		
Rana sp. (true frog)	1	1	4	0.30	N/A
Sauria (lizards)	1	1	4	0.10	N/A
Gopherus agassizii (desert tortoise)	84	1	4	82.59	0.609
Aves (indeterminate bird)	14	–	–	2.90	0.054
Aves (medium bird)	22	–	–	4.00	0.072
Galliformes (fowl-like birds)	1	–	–	0.60	0.013
Gallus gallus (chicken)	65	5	19	46.45	0.671
Passeriformes (perching birds)	1	1	4	0.10	0.003
Mammalia (indetermnate mammal)	941	–	–	440.37	6.302
Mammalia (small mammal)	1	–	–	0.50	0.014
Mammalia (medium mammal)	18	–	–	10.50	0.218
Mammalia (large mammal)	909	–	–	2,585.46	30.995
Lepus sp. (hares and jackrabbits)	3	1	4	1.50	0.038
Sciuridae (squirrels)	1	1	4	0.20	0.006
Canidae (coyotes, dog, wolf, fox)	4	–	–	3.90	0.090
Canis sp. (coyote, dog, wolf)	4	–	–	3.20	0.075
Canis familiaris (dog)	73	1	4	181.83	2.843
Canis latrans (coyote)	1	1	4	3.70	0.085
Felis catus (domestic cat)	1	1	4	0.30	0.009
Artiodactyla (even-toed ungulate)	28	–	–	49.50	0.881
Bos taurus (cattle)	290	7	26	4,777.52	53.864
Caprinae (sheep/goat)	108	5	19	623.49	8.617
Ovis aries (domestic sheep)	10	(2)[c]	–	62.80	1.092
Capra hircus (goat)	5	(2)[c]	–	176.50	2.767
Equidae (horse/burro)	43	–	–	228.90	3.497
Equus asinus (burro)	2	1	4	121.90	1.983
Vertebrata (indeterminate vertebrate)	138	–	–	101.88	–
Total	2,769	27		9,510.99	114.798

[a]Minimum number of individuals.
[b]Number of identified specimens.
[c]Not counted in the MNI because five Caprinae were identified.

er, subadult animals. The fact that some late fusing cattle and caprine specimens were fused indicates some individuals were kept after reaching their full growth. Although caprines mature faster than cattle and their bones fuse earlier, the optimal strategy for meat resources is the same. Animals that were allowed to live past maturity might represent favored breeding stock, good milking animals, favored wool producers, or strong plow animals. These older animals were likely utilized as a food resource only after their usefulness in other capacities was done.

Butchering practices at the presidio were examined through an analysis of bone modification (Table 6.4). Butchering allows for a better understanding of whether wild taxa were butchered and eaten, or if they are present in the assemblage by accident. This is useful for talking about the environment and cultural patterns. In Tucson, butchering involved the use of hatchets, axes, or cleavers to dismember the carcass of the animal, and then knives to do the finer work of removing meat from the bones (Cameron et al. 2006:13.28; Chapin-Pyritz and Mabry 1994:155). Hackmarks (n = 226) are the most common tool modification in the assemblage. Of the 226 hackmarks, 108 were recorded on specimens that could only be identified as large or indeterminate mammal. The use of hacking on large domesticates as a butchering technique has a tendency to break bone into many unidentifiable small fragments. Bones that are cut, as well as those that exhibit both cutting and hacking, provide further evidence that most of the butchering was done with large tools, and then finished with smaller blades. Only one specimen in the assemblage was identified as having a girdled incision; however, the small size and incomplete nature of the specimen preclude any idea of its purpose.

Only 38 specimens in the assemblage are burned or calcined (see Table 6.4). This analysis of burning,

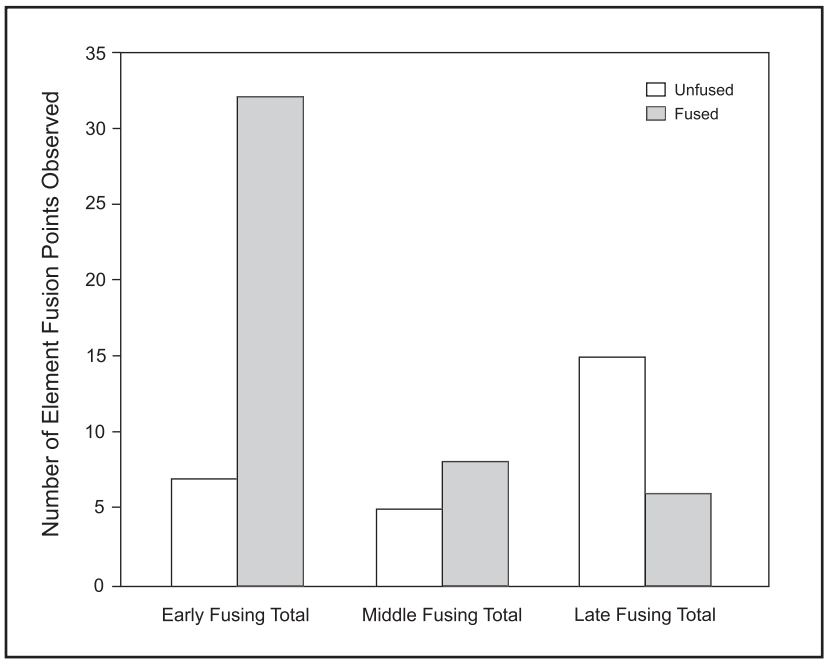

Figure 6.2. Epiphyseal fusion for cattle (*Bos taurus*); reported in number of identified specimens.

Table 6.2. Epiphyseal fusion for cattle (*Bos taurus*) at AZ BB:13:756 (ASM).

	Unfused	Fused	Total
Early Fusing			
Humerus, distal	2	11	13
Scapula, distal	–	2	2
Radius, proximal	–	3	3
Acetabulum	–	4	4
Metapodials, proximal	2	4	6
1st/2nd phalanx, proximal	3	8	11
Early fusing total	7	32	39
Middle Fusing			
Tibia, distal	1	2	3
Calcaneus, proximal	2	2	4
Metapodials, distal	2	4	6
Middle fusing total	5	8	13
Late Fusing			
Humerus, proximal	2	–	2
Radius, distal	1	–	1
Ulna, proximal	1	2	3
Femur, proximal	2	1	3
Femur, distal	3	2	5
Tibia, proximal	6	1	7
Late fusing total	15	6	21
Total	27	46	73

Note: All data are reported in number of identified specimens.

like butchering, can be useful in examining which taxa were cooked and eaten at the site. Unfortunately, due to the low number of burned/calcined elements (n = 38), very little information can be gleaned here. All burned and/or calcined elements were from large domesticated animals, large mammals, and indeterminate mammals. The lack of burning on smaller animal elements and most of the larger elements suggests these trash deposits were not burned following refuse disposal.

Only eight specimens in the assemblage have rodent or carnivore gnawing (see Table 6.4). If the bones were exposed on the ground surface for any length of time, carnivores, such as dogs, would probably have chewed them and removed them from their depositional location. Carnivore gnawing cannot be used effectively to measure whether an archaeological deposit is intact. In contrast, rodents tend to gnaw bone in its depositional location. Lack of rodent skeletal materials and gnawing of the bones suggests specimens were deposited and buried quickly before animals could have any great effect on the assemblage.

Wild taxa comprise more than one-quarter of the total MNI (Figure 6.4; Table 6.5). This proportion of wild taxa reflects some of the problems with MNI noted above; that is, MNI emphasizes animals with more identifiable elements and overemphasizes incompletely represented taxa. The NISP for wild taxa in the assemblage is overrepresented due to fragmentation. The tortoise remains in the assemblage appear to be from only one individual, but due to their heavy fragmentation, the count for wild animals is inflated. Examination of the biomass estimates better demonstrate the small contribution of wild taxa to the diet of presidio residents (see Figure 6.4 and Table 6.5). These statistics make it clear that there was a dependence on domesticated food mammals. An MNI of seven for cattle and five for caprines also contributes to the research question regarding Native American raiding.

A further clarification regarding the MNI counts of caprines is necessary. Both sheep (*Ovis aries*) and goat (*Capra hircus*) contribute an MNI of two, while sheep/goat (Caprinae) contributes an MNI of four. The count of five for sheep/goats (Caprinae) in the species list (see Table 6.1) comes from an overlap of

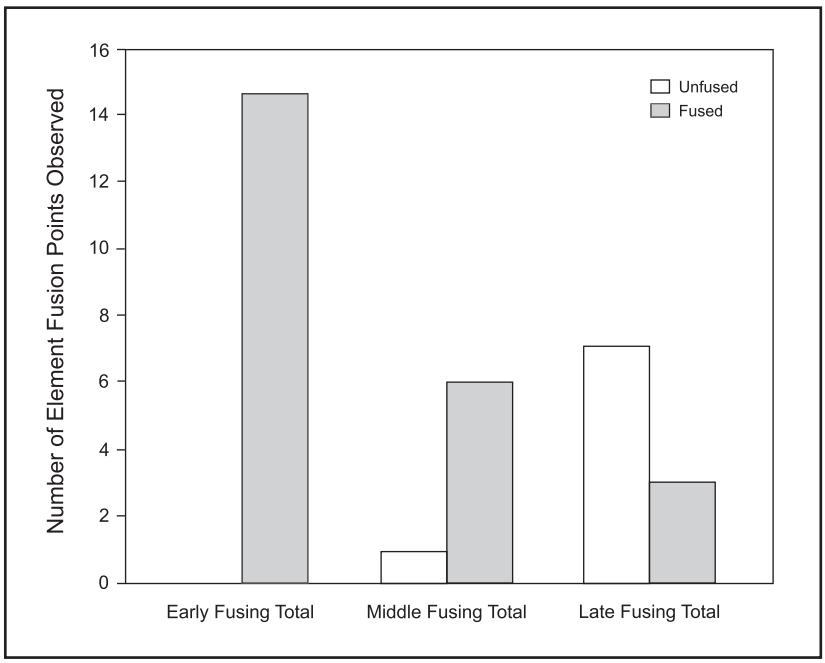

Figure 6.3. Epiphyseal fusion for caprines (sheep/goat [Caprinae], sheep [*Ovis aries*], and goat [*Capra hircus*]); reported in number of identified specimens.

Table 6.3. Epiphyseal fusion for caprines at AZ BB:13:756 (ASM).

	Unfused	Fused	Total
Early Fusing			
Humerus, distal	–	4	4
Radius, proximal	–	2	2
Acetabulum	–	3	3
Metapodials, proximal	–	4	4
1st/2nd phalanx, proximal	–	2	2
Early fusing total	–	15	15
Middle Fusing			
Tibia, distal	–	1	1
Calcaneus, proximal	–	3	3
Metapodials, distal	1	2	3
Middle fusing total	1	6	7
Late Fusing			
Radius, distal	2	–	2
Femur, distal	2	1	3
Tibia, proximal	3	2	5
Late fusing total	7	3	10
Total	8	24	32

Notes: Included in the caprines category are all elements identified as sheep/goat (Caprinae), sheep (*Ovis aries*), and goat (*Capra hircus*). All data are reported in number of identified specimens.

elements identified as sheep/goat (Caprinae) and as sheep (*Ovis aries*). Together, the specimens identified as sheep (*Ovis aries*), goat (*Capra hircus*), and sheep/goat (Caprinae) yield an MNI of five for caprines, higher than any of these categories alone.

Elements identified to skeletal portions of cattle are presented to answer the research question that centers on rationing (Table 6.6). In the case of NISP, element fragments were used as a proxy for skeletal portions. Both MNE and MAU use only complete elements to derive skeletal portion counts (see discussion of biases above). No clear picture of missing or underrepresented cattle skeletal portions is evident from the table comparing these three measures, although MAU hints at some disparities. By examining the observed assemblage versus the expected assemblage, a picture of skeletal completeness in the observed assemblage is created. Skeletal completeness is used to assess how carcasses were divided and how meat was distributed.

Log difference calculations allow for a more accurate comparison of skeletal portions, based on %NISP, %MNE, and %MAU. All three of these measures were used in this comparison. They all describe skeletal portions with different counts, derived from complete elements or fragments of elements (see "Methods" section for description of NISP, MNE, and MAU). These are not meant to be taken as actual skeletal portion counts; rather, they represent the proportion of each skeletal portion in the observed assemblage.

Log difference for each of these measures provides evidence of missing skeletal portions through lower representation of these portions. The results using NISP (Figure 6.5) demonstrate that the forequarter portion is strongly overrepresented, with a d value of 1.29. The hindquarter portion is also overrepresented, with a d value of 0.66. The overabundance of each of these portions reflects the large quantity of meat attached to each. The forefoot is also more abundant than expected (d = 0.21), which may indicate it was not separated from the forequarter during butchering. This reflects what Binford (1981) has referred to as "riders." These are elements attached to more valuable meat that are not separated and discarded until final preparation of the meat. The underrepresentation of foot portions (d = -0.76) suggests those elements were left at the butchering location. Log difference diagrams for %MNE

Table 6.4. Bone modifications at AZ BB:13:756 (ASM).

Taxon	Rodent Gnawed	Carnivore Gnawed	Burned	Calcined	Cut	Hacked	Girdled Incision	Cut and Hacked
Gopher tortoise	–	–	–	–	–	5	–	–
Chicken	–	–	–	–	5	–	–	1
Indeterminate mammal	–	1	3	5	7	14	–	–
Medium mammal	–	–	–	2	–	1	–	–
Large mammal	1	4	13	8	26	94	1	5
Dog	–	–	–	–	–	2	–	–
Coyote	–	–	–	–	1	–	–	–
Artiodactyl	–	–	1	–	3	2	–	–
Cattle	1	–	4	–	14	84	–	13
Sheep/Goat	–	–	1	1	2	19	–	2
Sheep	–	–	–	–	–	4	–	–
Goat	–	–	–	–	1	–	–	–
Burro	–	1	–	–	1	–	–	–
Indeterminate vertebrate	–	–	–	–	1	1	–	–
Total	2	6	22	16	61	226	1	21

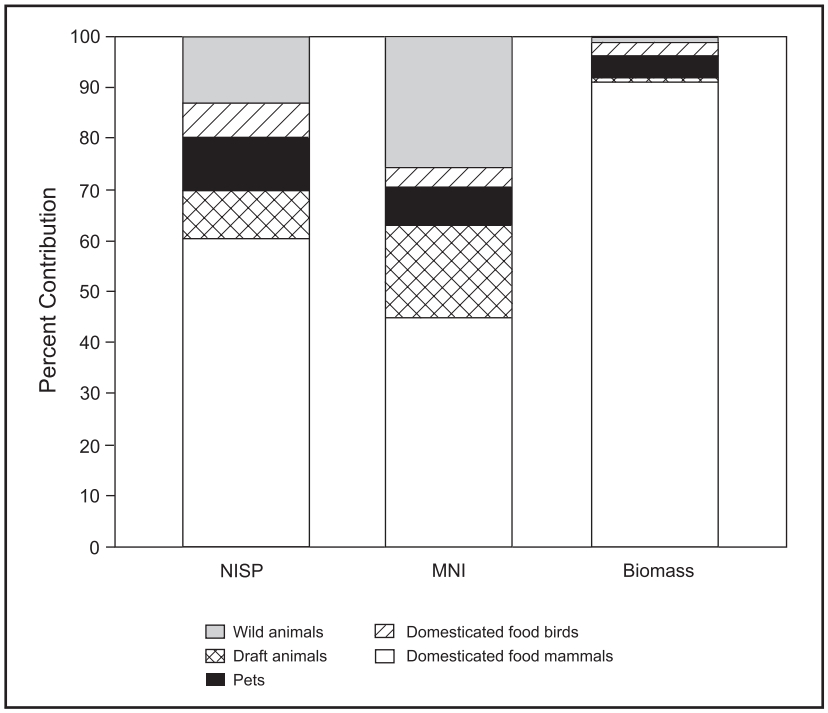

Figure 6.4. Summary chart.

and %MAU have been included (see Figure 6.5) to show that they evidence the same general trends in the data.

The FUI for cattle (Figure 6.6) demonstrates that the elements defined by Metcalfe and Jones (1988) as low ($n = 48$) and medium ($n = 47$) utility are strongly represented. The presence of only five high-value elements can be explained by the fact that fewer elements rank in the high FUI category. Although density-mediated attrition (Lyman 1984) has also been suggested for a lack of high value elements, it has been shown not to be a factor in the current assemblage. The high percentage of low-value element portions suggests low-value elements came back to the presidio as riders, attached to more valuable portions of meat.

Discussion

An examination of the range of animal taxa and their biomass in the species list (see Table 6.1) and the summary calculations (see Figure 6.4 and Table 6.5) indicates the Tucson Presidio was almost entirely dependent on domesticated animals for meat. A research question of this analysis then becomes, was wild game readily available during this period? To answer this, the presence of wild taxa in the Tucson Basin must be proven. The presidio and other sites in the Tucson Basin are used to provide evidence for the availability of wild game. Additionally, the local environment of the presidio, availability of ammunition, and fear of hostile Native Americans must be examined as reasons wild game was not exploited. To explain the use of do-

Table 6.5. AZ BB:13:756 (ASM) summary table.

	NISP[a]		MNI[b]		Biomass	
	Number	Percent	Number	Percent	Kilograms	Percent
Domesticated food mammals	413	60	12	60	62.481	91.9
Domesticated food birds	65	9	5	25	0.671	1.0
Pets	74	11	2	10	2.852	4.2
Draft animals	45	7	1	5	1.983	2.9
Wild animals	92	13	7	26	0.741	1.1
Total	789		27		68.728	

Note: Frogs and toads (Anurans) are included in the MNI calculation, but are not included in the biomass calculation, because allometric values are not currently available for Anurans.
[a]Number of identified specimens.
[b]Minimum number of individuals.

Table 6.6. Element distribution for cattle (*Bos taurus*) at AZ BB:13:756 (ASM).

Portion	NISP[a]
Head	77
Vertebra/Rib	74
Forequarter	32
Hindquarter	36
Forefoot	19
Hindfoot	15
Foot	35
Total	288

[a]Number of identified specimens.

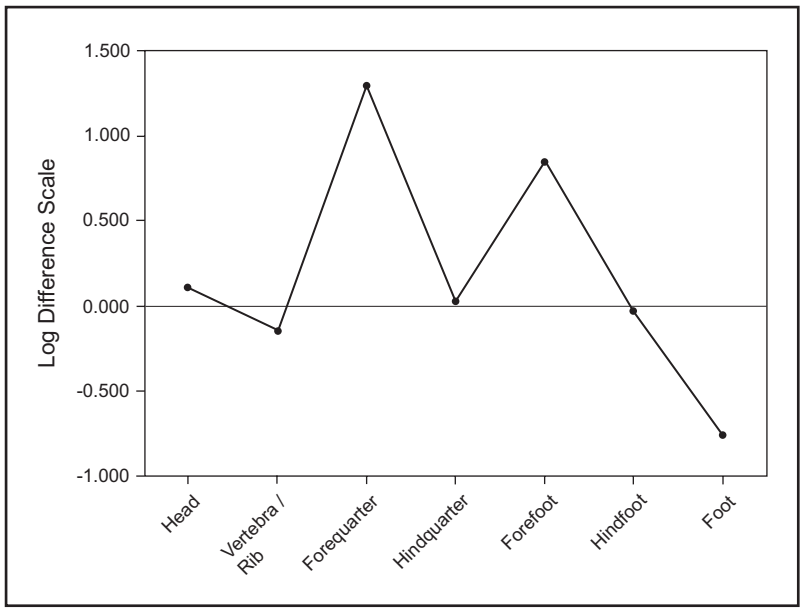

Figure 6.5. Log difference of observed versus expected for cattle (*Bos taurus*) (*n* = 288).

mesticated animals, an ethnohistoric examination of Hispanic food patterns must be made. If patterns of animal use at the Tucson Presidio are similar to these documented patterns, the environment will not be viewed as a limiting factor for domesticated animal use at the site.

To examine the question of wild versus domesticated animal, data for domesticated animal usage from a variety of historical sites in the greater Tucson area were compiled (Tables 6.7-6.8). In the NISP-based table (see Table 6.7), the measure of interest is the "Domesticate Contribution to Total." Where this number is low, a greater variety of wild game species was used. For most of these sites, domesticated animals comprise more than 75 percent of the total assemblage. Three of the assemblages in Tables 6.7-6.8 evidence strong breaks with this pattern.

The Tucson Presidio assemblage presented here contains a higher NISP for wild taxa than other Hispanic sites in the Tucson area, although solid evidence for consumption of these wild game species is limited to only one taxa. Only the tortoise, with hackmarks on a variety of shell and element portions, has evidence of bone modifications that indicates it was processed for food (see Table 6.4). Again, although the NISP for wild taxa in this assemblage is high, most of these bone fragments are from one, highly fragmented tortoise. Most of the wild taxa at the Tucson Presidio were likely commensal species—those that live in close proximity to humans but whose primary use is not food. Some of the wild taxa, such as the lagomorphs, however, may not have required butchery for consumption, or were used for food without leaving any marks on the bone.

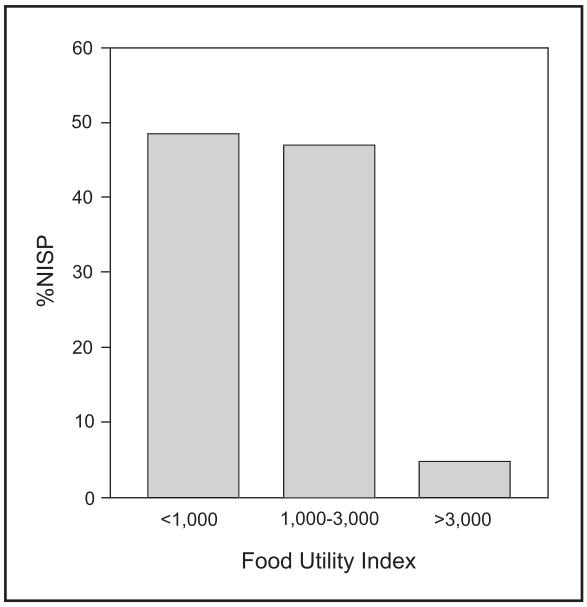

Figure 6.6. Cattle (*Bos taurus*) food utility index.

The San Agustín de Tucson Mission (Pavao-Zuckerman and LaMotta 2007) and the second Chinese Gardeners assemblage (Cameron et al. 2006) at AZ BB:13:6 (ASM) listed in Table 6.7 also display a much higher percentage of wild taxa. At both of these sites, however, there is evidence that a variety of wild game was consumed. These two sites provide an excellent comparison, because they lie in the same riparian ecological zone as the Tucson Presidio. The range of wild game utilized in these locations is important. The mission assemblage is comprised of over one-third wild game and only nine domesticated food animals from a total site MNI of 31. The wild taxa present in the mission assemblage are toads, tortoises, snakes, birds, lagomorphs, rodents, a fox, a peccary, and two species of deer. The dates for the assemblage, which range from 1795 to 1820, overlap those of the presidio assemblage, 1800-1849.

In the NISP of the Chinese Gardeners assemblage, more than one-third of the assemblage is not from domesticated food taxa. The wild species identified in this analysis include: frog/toad, turtle/tortoise, lagomorphs, rodents, and a wide variety of birds and fish. The dates for this assemblage, 1893-1900, are well after that of the presidio assemblage. This zooarchaeological evidence from the Tucson Presidio and other sites in the Tucson region suggest a wide variety of wild taxa were available for exploitation both before and after the time period in question.

Spanish settlers may have influenced the availability of wild animals by overgrazing domesticated animals. Further, the browse plants wild artiodactyls depend upon may have been removed when agricultural fields were created. Deer and antelope are browsers that subsist on a small range of available grasses and shrubs; in contrast, cattle and caprines are grazers that consume a greater range of the plant community (Pavao-Zuckerman and LaMotta 2007). Further, large herds of cattle trample the landscape, allowing a more limited range of plants to replace those that were consumed. This more limited range of plant life may account for a lack of wild artiodactyls in the immediate vicinity of Spanish Colonial settlements, but it did not limit their subsistence activities outside of this range. Individuals hunting wild artiodactyls would have needed to travel further from the presidio to find game. The density of some smaller wild taxa, such as fish and migratory birds (that do not depend on the small range of plant species as do artiodactyls), should remain unaffected by overgrazing. Additionally, some have suggested that the act of clearing fields results in an increase in lagomorphs and rodents (Sheridan 1995:13).

Fewer small wild animals are represented in the Tucson Presidio assemblage than in the mission and Chinese Gardeners assemblages. The resources of the Santa Cruz River and nearby fields are virtually unrepresented in this assemblage. Even if soldiers were constantly on patrol, without time to hunt for large ungulates, or if they were poor hunters, their families were still left at the post with the responsibility of tending the fields and herds of domesticated animals.

Native American children assigned the task of monitoring fields frequently utilized a strategy known as "garden hunting" (Linares 1976; Sheridan 1995:13). Garden hunting relies on protecting agricultural fields from pests such as lagomorphs, birds, and rodents. These animals were killed by the individuals watching the fields and incorporated into the daily diet. This not only eliminated competition for crops, but also provided a supply of meat. Very little meat of this type appears in these Tucson-area Hispanic assemblages. A lack of small wild game resources in the assemblage suggests individuals tending the fields either did not practice garden hunting, or they did not eat what they killed.

Lack of access to weaponry probably does not account for the lack of hunting indicated in the presidio assemblage. Guns depend on a sufficient supply of gunpowder and shot. A report from the presidio in 1779 indicates powder was available in surplus such that the commander of the fort was able to sell gunpowder to the local settlers at a very low cost (Dobyns 1976:61). In 1793, the presidio again reported a sufficient magazine of gunpowder (Dobyns 1976:106). Based on new guidelines passed by the Spanish Colonial administration in 1772, all soldiers were issued extra rations of powder with

Table 6.7. AZ BB:13:756 (ASM), compared with other Tucson area zooarchaeological sites.

Site Name	Site Dates	Site NISP Total[a]	Site NISP Food Domesticates[b]	Domesticate Contribution to Total (percent)	Cattle			Caprines			Pig			Chicken		
					NISP	% NISP Total	% NISP Domesticates	NISP	% NISP Total	% NISP Domesticates	NISP	% NISP Total	% NISP Domesticates	NISP	% NISP Total	% NISP Domesticates
Mission San Agustín de Tucson[c]	1795-1820	543	332	61	305	56	92	23	4	7	–	–	–	4	1	1
Tucson Presidio[d]	1775-1854	90	85	94	76	84	89	2	2	2	1	1	1	6	7	7
Tucson Presidio	1800-1849	726	463	64	290	40	63	108	15	23	–	–	–	65	9	14
Tucson Presidio[e]	1800-1854	394	309	78	247	63	80	20	5	6	10	3	3	32	8	10
Tubac Presidio[f]	1750-1800	368	311	85	57	15	18	143	39	46	6	2	2	105	29	34
Tubac Presidio[f]	1800-1850	418	381	91	120	29	31	178	43	47	1	<1	<1	82	20	22
Tubac Presidio[f]	post 1850	210	184	88	66	31	36	98	47	53	1	<1	1	19	9	10
León Farmstead[g]	1840s-1860s	265	254	96	233	88	92	13	5	5	4	2	2	4	2	2
León Farmstead[g]	1870s-1880s	54	49	91	44	81	90	3	6	6	–	–	–	2	4	4
León Farmstead[g]	1880s-1890s	591	530	90	474	80	89	30	5	6	7	1	1	19	3	4
León Farmstead[g]	1890s-1910s	633	583	92	520	82	89	36	6	6	7	1	1	20	3	3
Ft. Lowell[h]	1873-1891	206	156	76	82	40	53	24	12	15	37	18	24	13	6	8
Chinese Gardeners in Tucson[i]	1892-1905	260	202	78	161	62	80	4	2	2	36	14	18	1	<1	<1
Chinese Gardeners in Tucson[e]	1893-1900	4,536	2,855	63	534	12	19	52	1	2	1,723	38	60	546	12	19
Chinese Grocer in Tucson[j]	1890s-1900s	978	941	96	572	58	61	135	14	14	49	5	5	185	19	20

Note: Included in the caprines category are all elements identified as sheep/goat (Caprinae), sheep (Ovis aries), and goat (Capra hircus).
[a]The Site NISP Total refers to all specimens identified to Family or below.
[b]Site NISP Food Domesticates refers to cow, sheep, goat, pig, and chicken.
[c]Pavao-Zuckerman and LaMotta 2007.
[d]Diehl and Waters 2004.
[e]Cameron et al. 2006.
[f]Hewitt 1975.
[g]Diehl et al. 2005.
[h]Blythe 2005.
[i]Diehl et al. 1997.
[j]Thiel 2002a [Feature 21 only].

Table 6.8. AZ BB:13:756 (ASM), compared with other Tucson area zooarchaeological sites.

Site Name	Site Dates	Site MNI Total	Site MNI Food Domesticates[a]	Domesticate Contribution to Total (percent)	Cattle			Caprines			Pig			Chicken		
					MNI	% MNI Total	% MNI Domesticates	MNI	% MNI Total	% MNI Domesticates	MNI	% MNI Total	% MNI Domesticates	MNI	% MNI Total	% MNI Domesticates
Mission San Agustín de Tucson[b]	1795-1820	31	9	29	6	19	67	2	6	22	–	–	–	1	3	11
Tucson Presidio[c]	1775-1854	N/A	5	N/A	2	N/A	40	1	N/A	20	1	N/A	20	1	N/A	20
Tucson Presidio	1800-1849	27	17	63	7	26	41	5	19	29	–	–	–	5	19	29
Tucson Presidio[d]	1800-1854	23	13	57	5	22	38	2	9	15	2	9	15	4	17	31
Tubac Presidio[e]	1750-1800	32	26	81	3	9	12	8	25	31	3	9	12	12	38	46
Tubac Presidio[e]	1800-1850	29	24	83	6	21	25	8	28	33	1	3	4	9	31	38
Tubac Presidio[e]	post 1850	19	16	84	5	26	31	7	37	44	1	5	6	3	16	19
Ft. Lowell[f]	1873-1891	22	14	64	7	32	50	3	14	21	2	9	14	2	9	14

Note: Included in the caprines category are all elements identified as sheep/goat (Caprinae), sheep (Ovis aries), and goat (Capra hircus).
[a]Site MNI Food Domesticates refers to cow, sheep, goat, pig, and chicken.
[b]Pavao-Zuckerman and LaMotta 2007.
[c]Diehl and Waters 2004.
[d]Cameron et al. 2006.
[e]Hewitt 1975.
[f]Blythe 2005.

which to practice their marksmanship (Moorehead 1975:67-68).

As suggested, residents of the presidio may not have hunted due to fear of hostile Native American groups in the area. Secondary ethnohistorical resources provide a wide variety of accounts of Native American raiding (Dobyns 1976; McCarty 1976; Moorehead 1975; Officer 1987; Sheridan 1995; Weber 1992). The efforts of the residents in fighting and settling Native American groups was successful over time. Dobyns (1976:106) goes so far as to call the Tucson Presidio a "Peacetime Presidio," from 1793 until the end of its occupation. The majority of raiding that occurred from 1793 on was by small groups stealing livestock, grain, or other goods in quiet nighttime raids (see Dobyns 1976:107). Officer (1987:68) discusses the ability of colonists to move without fear of hostile Native Americans in the late presidio times. It seems unlikely then that fear was why Tucson presidio residents were not hunting.

Wild game resources clearly existed and could have been exploited without fear. The zooarchaeological record of the Tucson Presidio demonstrates that wild taxa were not used and that domesticated species were favored. It does not, however, offer an explanation for this pattern. The zooarchaeology of other Spanish Colonial sites offers some insight into these choices.

The lack of use of wild meat resources by presidio soldiers is not specific to the Tucson area. Presidio San Francisco also yielded zooarchaeological evidence for a primary reliance on domesticated animals (Voss 2005). This presidio is located in a very rich environment that gave settlers the opportunity to exploit both terrestrial and marine resources. Voss (2005) demonstrates, through zooarchaeological studies, as well as those of other material remains, that the settlers of San Francisco subsisted in a way that minimized differences among themselves while highlighting the difference between themselves and Native Americans. In her study, Voss (2005) indicates this subsistence strategy is both the by-product of Spanish food preferences and a form of social identification.

In Tucson, as at Presidio San Francisco, wild game species were ignored in favor of increased reliance on domesticated animals. Referring again to the composition of Hispanic assemblages in the Tucson area (see Table 6.7), most Tucson Basin sites have zooarchaeological assemblages of almost entirely domesticated taxa. The Hispanic focus on domesticated resources over wild species is clear. The two assemblages discussed earlier, that of the mission and the Chinese Gardeners, were not created by Hispanic individuals. The wild game species at Mission San Agustín de Tucson were deposited as the result of economic activities of settled Tohono O'odham groups. The wild game in the Chinese Gardeners assemblage clearly reflects Chinese subsistence practices, although not necessarily preferences. The fact that wild game was used at these two sites is a reflection of the non-Hispanic, animal-use patterns of individuals in those locations.

The wealth of wild game species in the Tucson Basin is clear through the three assemblages noted above. Thus, the environment cannot have been a limiting factor in attaining wild meat resources. Studies of the zooarchaeology of Spanish Colonial sites and later Hispanic sites in the Tucson Basin make it clear that Spanish subsistence practices were adapted to the local environments, as well as which domesticated taxa could thrive in those environments. In the Tucson area, the environment did not exclude the use of Euro-American domesticates, although it did limit the use of some, especially pigs. Use of Euro-American domesticates increased the opportunity for exploitation of natural graze that was unusable by humans. Domesticated animals allowed the residents to adapt Spanish subsistence patterns to their tastes, as well as providing the ability to support a larger population.

Domesticated Animals and Native American Raiding

To examine the range of domesticated livestock at the Tucson Presidio and the possibility that Native American raiding affected patterns of animal use there, a closer look at the proportions of domesticated livestock used at the site are necessary. The percentages of cattle, caprines, and chickens at Tucson area sites suggest those sites were susceptible to raiding. Examination of the vulnerability of domesticated animals during a raid and the effect that vulnerability has on husbandry strategies is also necessary. Based on separate lines of zooarchaeological and ethnohistorical evidence, it is suggested here that, if the Tucson Presidio demonstrates larger proportions of animals less amenable to raiding, these differences in animal husbandry likely represent an adaptation to raiding.

By examining Figure 6.7, it is clear that the total zooarchaeological assemblages of both the Tucson and Tubac presidios have fewer cattle, 61 percent and 31 percent, respectively, and more caprines, 23 percent and 47 percent, respectively, than the mission and the Léon Farmstead, AZ BB:13:505 (ASM), both with 92 percent cattle, and 7 percent and 5 percent caprines, respectively.

The 1804 report from the Tucson Presidio (Figure 6.8 and Table 6.9) indicates the presidio herds contained greater numbers of cattle (n = 3,500) than sheep (n = 2,600), but that sheep were also present

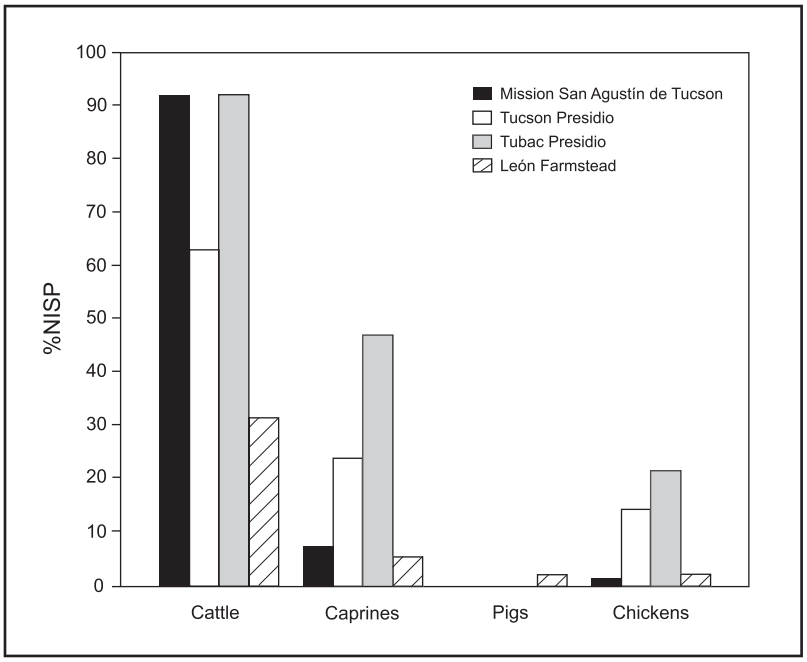

Figure 6.7. Domesticated taxa use at Hispanic sites in the Tucson area.

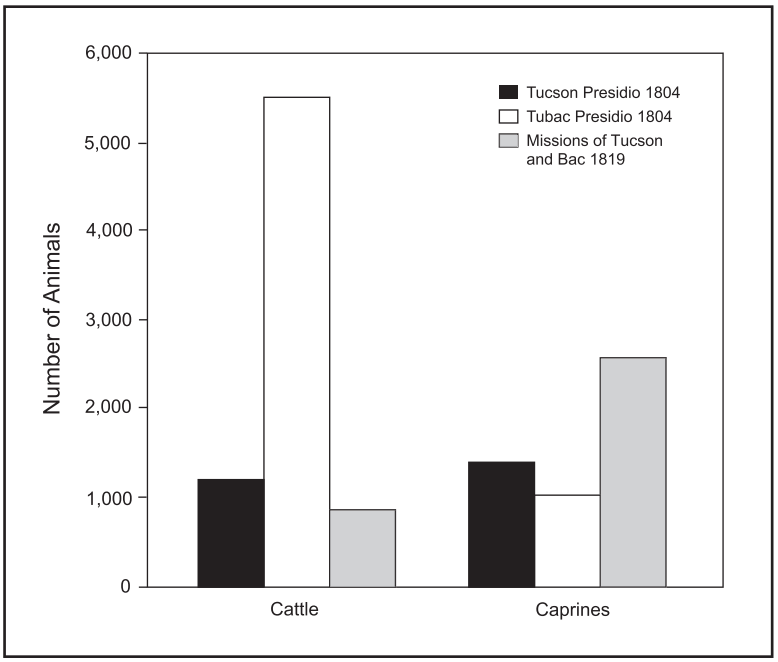

Figure 6.8. Livestock reported from Spanish Colonial sites.

in large numbers (McCarty 1976:90). When the percent MNI for cattle and caprines of the total number of domesticated food mammals is compared with the percentages in the 1804 report (Figure 6.9), the values match almost perfectly. The strength of this pattern of animal use at the presidio is not in doubt. However, why more caprines were used relative to other sites in the Tucson area warrants attention.

Decisions to diversify livestock kept at the presidio may have been due to several factors. Although cattle return the most meat for the pasturage they are provided, they require a larger area in which to graze. More pasture would require them to move farther out from the presidio. The further animals were moved from the protection of the presidio, the more vulnerable they would be to raiding. Because the presidio was the focus of more concentrated raiding and because it was located on the eastern side of the Santa Cruz River—with most of the raiding coming from the east—livestock was more prone to theft. The logical extension, then, is that if cattle were kept in smaller numbers, they could be kept closer to the presidio.

Because the Tucson Presidio was originally located in Tubac, the domesticated animal usage patterns of the Tubac Presidio are valuable for placing those of Tucson in context. Zooarchaeological evidence from the Tubac Presidio consistently demonstrates that the majority of livestock utilized were caprines (see Figure 6.7). Ethnohistorical information also makes clear a majority of caprines in Tubac animal husbandry practices (see Figure 6.8 and Table 6.9).

Secondary historical sources state that New Mexican settlers preferred caprines due to their relative slowness and resistance to stampeding (Weber 1992:310). Tubac occupies a precarious location on the landscape. Although the Tubac Presidio was on the western side of the Santa Cruz River, it was located very close to the mountains, which made for poor visibility and relatively easy raiding by Native Americans (Officer 1987:37-38). In response to exposure and persistent raiding, the residents of Tubac concentrated on caprines, learned in the New Mexican colonies. While a greater number of caprines require more pasturage and a greater grazing distance from the presidio, raiders probably would not have had time to round up sheep and goats during

Table 6.9. AZ BB:13:756 (ASM), comparison with other Tucson area sites, ethnohistoric livestock site comparison.

Site Name	Site Dates	Cattle	Sheep and Goats	Sheep	Goats
Tucson Presidio[a]	1804	3,500 (57%)	–	2,600 (43%)	–
Tubac Presidio[a]	1804	1,000 (16%)	–	5,000 (79%)	300 (5%)
Missions of Tucson and Bac (combined)[b]	1819	5,700 (89%)	700 (11%)	–	–

Note: Included in the equids category are individuals identified as horse/mule/burrro (*Equus* sp.), horse/burro (Equidae), horse (*Equus caballus*), burro (*Equus asinus*).
[a]McCarty 1976:85,90.
[b]Dobyns 1976:51.

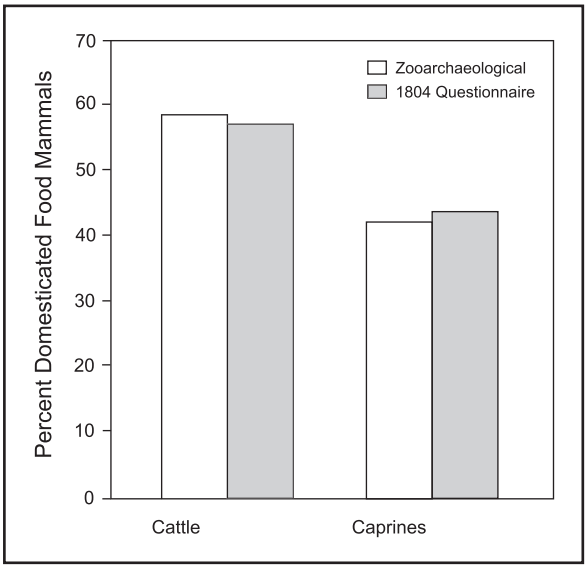

Figure 6.9. Tucson Presidio cattle and caprines versus 1804 questionnaire figures; reported in minimum number of individuals.

a raid. There were Native American communities in the Tubac area; however, there is no ethnohistorical documentation describing rationing from the Tubac Presidio herds. Because they did not have to ration Native American settlements, beef would not have been as important at Tubac as it was in Tucson.

The reliance upon caprines in Tucson is noteworthy. However, ethnohistorical sources indicate cattle were necessary in Tucson to ration the Apache Mansos and to feed residents of the presidio. The residents probably allowed more raid-resistant caprines to graze farther out and kept cattle in closer proximity under greater surveillance.

The pattern of greater numbers of chickens at the presidios of Tucson and Tubac during their military occupations also makes strategic sense. Chickens would be kept inside the presidio and were not amenable to raiding. They are an extremely productive yet low maintenance animal. They eat food scraps and trash, they "tractor" (turn over the soil through scratching and pecking) (Mollison and Slay 1996), and they supply eggs and meat, which made them an ideal resource for a wartime presidio.

All the patterns noted above fall into the category of protecting animals vulnerable to raiding, or relying on animals that were less amenable to raiding. These proportions of domesticated taxa strongly suggest adaptations in animal resource use in reaction to raiding by hostile Native Americans. The fact that both Tucson and Tubac display these patterns indicates this animal husbandry strategy was utilized at sites in the Tucson region that were more prone to raiding.

Cattle Carcass Portions and Differential Distribution

By examining the cattle skeletal portions in the Tucson Presidio assemblage, differential distribution of cattle carcass portions can be seen. Only cattle portions were examined because ethnohistorical evidence indicates rationing did not include caprines. Further, the caprine sample size is too small for proper analyses. The next question is whether this differential distribution demonstrates cattle skeletal portions systematically missing, as seen by their lower relative representation, throughout the assemblage. Cattle skeletal portions were compared using %NISP, %MNE, and %MAU in a log difference diagram that measures abundance of skeletal portions. An examination of the value of the missing meat will suggest the intended purpose for that meat. Later analyses of Anglo meat cuts may also provide indications of the meat value of these cuts. If the lower value meat cuts are missing, these absences may indicate a weekly ration was provided by the Tucson Presidio residents to the Apache Mansos.

Ethnohistorical sources indicate the Apache Mansos were rationed a certain amount of beef weekly from the Tucson Presidio, along with other supplies. Patterns of differential skeletal portion representation in the zooarchaeological assemblage provide evidence for these rationing activities. In the cattle FUI (see Figure 6.5), the hindquarter carcass

portion represents a large number of medium-value meat portions. Rations described for the Apache Mansos are given as ratios of "a beef." In 1793, adult Apache Mansos women were to receive one thirty-second of a beef, each other adult half of this amount, and children one-quarter (as well as other rations). Though ratios of cattle meat are provided for rationing, specific carcass and meat portions to be assigned to the Native Americans were never described. In 1804, the commander of the presidio noted that 300 head of cattle were killed each year, 130 of which were charged to the royal treasury to ration the Apache Mansos (McCarty 1976:90). The probability that an entire cow was given to the Apache Mansos at once is low, considering that rations were supplied every Monday throughout the entire year.

The NISP, MNE, and MAU numerical comparison of cattle skeletal portions (see Table 6.6) presents the appearance of equal numbers in forequarter versus hindquarter and forefoot versus hindfoot. This masks several factors, such as the different numbers of elements present in the skeletal portions of a living animal. To correct for this, the observed skeletal portions are compared with the expected skeletal portions, and both are multiplied by the natural log to normalize them. The difference between these two numbers is then used to create a log difference diagram.

As noted, the log difference diagram (see Figure 6.6) displays an overrepresentation of forequarter portions. Hindquarter portion representation is overabundant, but significantly less than that of the forequarter. Additionally, forefoot and hindfoot (in %MNE and %MAU) portions are overrepresented, which may indicate they returned to the presidio as riders on valuable meat cuts. The underrepresented foot portions may be accounted for by identifiability. Alternately, when cattle were butchered, foot portions (phalanges) may have been discarded in a separate location.

The surrender of hindquarter portions for provisioning still left residents of the presidio with a number of very valuable and meat-rich cuts of beef. Zooarchaeological research on meat cuts in the Anglo period (Schulz and Gust 1983:48) and relative meat values (Lyman 1987:62) indicate the cuts of meat retained by the residents were the highest quality cuts. Thiel (2004:98) has also noted a very high percentage of high-value meat cuts in other presidio trash deposits.

As it appears in the log difference diagram, hindquarter portions of cattle are systematically missing throughout the assemblage, as seen by their lower representation compared to forequarter portions. Based on the FUI and the analyses of Anglo meat cuts, this carcass portion represents some of the largest quantity but lower value meat cuts provided by cattle. This leads to the speculation that the residents conformed to the letter of the law in rationing the proper quantity of meat to the Apache Mansos, while retaining the best quality meat for themselves.

CONCLUSION

Residents of the Tucson Presidio were part of a larger system that attempted to force sedentary agriculture and pastoralism, as well as a wide variety of other Spanish values, on Native Americans. Rejection of this system led a number of Native American groups to fight against Catholic missionaries and Spanish settlers. This fighting, in turn, occasioned the creation of presidios to establish a military presence to ensure the continued success of the colonial enterprise. As Native American groups sued for peace, they settled in one place and chose elements of Hispanic culture to create new lifeways. These lifeways were a combination of old patterns and those of the new immigrants. This study has viewed zooarchaeological remains from the Tucson Presidio as part of this "bundle of relationships" (Wolf 1982:3).

Residents of the Tucson Presidio relied primarily on domesticated animals. During the Hispanic occupation of the Tucson Presidio, wild meat resources were accessible to both soldiers and their families. Zooarchaeological evidence from other areas indicates wild resources were not used due to Spanish cultural patterns. As Reitz (1992) points out, no Spanish colony could succeed if the Euro-American domesticated animals they brought with them did not thrive. The natural environment of the Tucson Basin allowed for the success of these imported animals. Domesticated animals allowed the settlers of the Tucson Presidio to produce more meat and to support a higher population. Many studies have indicated this was the preferred pattern throughout New Spain (Pavao-Zuckerman and LaMotta 2007; Reitz 1992; Voss 2005; Weber 1992).

Most of the livestock at the presidio appears to have been cattle. There were, however, significantly higher percentages of caprines (sheep or goats) and chickens kept at the Tucson Presidio than at many other Tucson area sites. Zooarchaeological and ethnohistorical evidence suggests Native American raiding influenced the percentages of domesticated animals utilized by the residents of the Tucson Presidio. Hispanic settlers were forced to adapt to this raiding by utilizing more caprines. These could safely be grazed further out while cattle were kept closer to the presidio to protect them from raiding. The residents also appear to have made more use of chickens, which could be kept in the confines of the presidio. Despite the fact that the residents could rely

on domesticated animals, their husbandry strategies were strongly influenced by local raiding behaviors.

Cattle appear to have been butchered and processed near the presidio with the use of hacking tools. Ethnohistorical evidence suggests hindquarter portions may have been used to ration the Apache Mansos. The zooarchaeological evidence for differential distribution of cattle carcasses comes from the consistent underrepresentation of hindquarter portions compared to forequarter portions. By examining models of meat value, it is clear that although a significant quantity of beef was used in rationing, the carcass portions with the highest meat value were reserved for the residents of the presidio. Although the law was followed, those in charge of rationing the Apache Mansos likely took advantage of a vague regulation to keep the best meat for themselves.

Hopefully, this study will contribute to an understanding of Hispanic and Native American interactions during the Spanish and Mexican periods. It is also anticipated that this model will contribute to an understanding of how much—or how little—the environment matters in the face of culturally conditioned subsistence practices. Much work remains to be done, specifically more research on the relations between presidios and the rationing of certain Native American communities.

Acknowledgments

I would like to thank Desert Archaeology, Inc., especially J. Homer Thiel and Jenny Waters for allowing me the opportunity to examine the faunal assemblage from the Tucson Presidio and for providing me with endless information. The completion of this project would not have been possible without the help of Barnet Pavao-Zuckerman and her help in matters zooarchaeological as well as literary. Additional thanks to Teresita Majewski and Mary Stiner for their help in this process. My gratitude is also extended to those who helped me with some of the tricky bones and editing, Kacy Hollenback, Elisabeth Cutright-Smith, Britt Starkovich, Rachel Diaz de Valdes, and Regina Chapin-Pyritz. The final thanks go to my loving family and friends, my support and shoulders to lean on, most especially Victoria Phaneuf.

CHAPTER 7

VERTEBRATE FAUNAL REMAINS FROM THE CHINESE MIDDEN

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The Chinese residents of Block 185 are represented by artifacts recovered from a trash midden, Feature 34. The fill from this feature was deposited sometime between 1880 and 1900. The Chinese men who lived on Block 185 were primarily laborers, and their meat diet reflected a relatively low economic status. The identified meat cuts were comprised primarily of, but not limited to, beef. Other domestic animals, including pig, chicken, sheep or goat, dog, and cat, were also included in their meals. The men ate a variety of wild animals as well, including turtle, tortoise, duck, and leporids.

Comparisons with other contemporaneous Chinese assemblages from Tucson reflect the dominance of beef in the diet. The apparent choice of beef as the primary meat, along with the presence of mostly saw-cut bone representing standard retail cuts, reveal the influence of Euro-American food preferences and butchering methods. However, the meat diet was diverse, and included unconventional species such as turtle, dog, and cat. The laborers living on Block 185, like other Chinese in Tucson at the time, ate animals that other ethnic groups did not in an effort to recreate the diet of their homeland.

METHODS

All faunal material recovered through ¼-inch mesh screen from Feature 34 was analyzed to some degree. The number of identified specimens (NISP) was tabulated for all identifiable taxa. Identifiable, in this case, includes all specimens identified at or below the order level. The Western Archeological and Conservation Center (WACC) and the Stanley J. Olsen comparative collections at the Arizona State Museum (ASM), as well as several references (Getty 1975; Gilbert 1990; Gilbert et al. 1985; Hoffmeister 1986; Olsen 1964, 1968, 1979; Peterson 1990; Stebbins 1985) were used in the identification of faunal specimens. Fragments from recently broken identifiable specimens were refitted when possible and counted as one. Bone surface modifications resulting from both cultural and natural agents were recorded. Recorded variables for identifiable bone included provenience, taxon, element, element part and side, degree of fusion, amount present, degree of burning, and other surface modifications, including butchering marks.

Unidentifiable bone comprised 56 percent of the bone fragments. Unidentifiable large mammal (pig-/sheep-/cattle-sized) bone scrap was counted and weighed, but was not otherwise analyzed. Most of the unidentifiable specimens are large mammal long bone shaft pieces. Based on the distribution of taxa in the identifiable assemblage, the bulk of these are probably cattle bone. Other specimens were recorded by class and size, including small-medium mammal (rabbit-/cat-sized), medium mammal (dog-/coyote-sized), unidentified mammal (unknown size), and unidentified animal (unknown class). Due to the small size of most bone fragments, refitting was not attempted for the unidentifiable bone; consequently, each fragment was counted as one.

ASSEMBLAGE DESCRIPTION

Domestic taxa comprise 87 percent (n = 411) of the identifiable assemblage, with the largest proportion (52 percent, or n = 245) from cattle (*Bos taurus*) (Table 7.1). Other domestic animals include pig (*Sus scrofa*) with 13 percent (n = 62), domestic dog (*Canis lupus familiaris*) and sheep/goat (*Ovis aries/Capra hircus*) with 6 percent (n = 27) each, chicken (*Gallus gallus*) with 4 percent (n = 18), and domestic cat (*Felis catus*) with 3 percent (n = 14). Together, medium artiodactyl (pig-/sheep-/goat-sized) and large artiodactyl (pig-/cattle-sized) make up 4 percent (n = 18) of the identifiable assemblage. Wild taxa comprise the remaining 13 percent (n = 63) of the identifiable assemblage.

Reptiles (n = 56) make up most of the wild taxa assemblage A total of 46 specimens are Sonoran mud turtle (*Kinosternon sonoriense*), although 33 of those are from one nearly complete carapace. Other reptile taxa include turtle/tortoise (Testudines), desert tortoise (*Gopherus agassizii*), and unspecified rattlesnake (*Crotalus* sp.). However, based on bone color and lack of surface modifications, the rattlesnake specimen is a recent intrusion into the historic deposits. Two bird specimens include an unidentified

Table 7.1. Taxa represented in Feature 34 at AZ BB:13: 756 (ASM).

Taxon	Quantity
Unidentified turtle/tortoise (Testudines)	2
Sonoran mud turtle (*Kinosternon sonoriense*)	46
Desert tortoise (*Gopherus agassizii*)	7
Uspecified rattlesnake (*Crotalus* sp.)	1
Unidentified duck (Anatidae)	1
Mallard? (cf. *Anas platyrhynchos*)	1
Chicken (*Gallus gallus*)	18
Cottontail (*Sylvilagus* sp.)	1
Jackrabbit (*Lepus* sp.)	2
Pocket gopher (*Thomomys* sp.)	2
Dog? (cf. *Canis lupus familiaris*)	7
Dog (*Canis lupus familiaris*)	20
Domestic cat (*Felis catus*)	14
Medium artiodactyl (pig-/sheep-/goat-sized)	8
Large artiodactyl (pig-/cattle-sized)	10
Pig (*Sus scrofa*)	62
Sheep/Goat (*Ovis aries/Capra hircus*)	27
Cattle (*Bos taurus*)	245
Identifiable total[a]	474
Small-medium mammal (rabbit-/cat-sized)	3
Medium mammal (dog-/coyote-sized)	4
Large mammal (pig-/sheep-/cattle-sized)	801
Unidentified mammal (unknown size)	4
Unidentified animal (unknown class)	2
Unidentifiable total[b]	814

[a]Number of identified specimens.
[b]Number of fragments.

large duck (Anatidae) and a possible mallard (cf. *Anas platyrhynchos*). Mammals (n = 5) consist of cottontail (*Sylvilagus* sp.), jackrabbit (*Lepus* sp.), and pocket gopher (*Thomomys* sp.). Like the rattlesnake vertebra, the pocket gopher specimens are recent intrusions to the historic deposits, based on bone color and lack of surface modifications.

Cattle, pig, and sheep/goat specimens exhibit butchering marks. There are no butchering marks on the dog and cat bones, although one chopmark was noted on a small- to medium-sized mammal cervical vertebra. However, other Chinese assemblages in Tucson (Cameron et al. 2006; Diehl et al. 1997; Gust 1993) did contain unequivocal butchering evidence for the consumption of dogs and cats; therefore, it is assumed that the individuals represented in the assemblage from Block 185 were eaten as well. Other data suggest these specimens did not come from pet burials. Some specimens were burned, and all are fragmented, indicating they were part of the food refuse. At least two adult dogs are represented. One was of small-medium (smaller than coyote) size, and the other was medium-large (larger than coyote) size. At least two cats are represented, including one kitten less than a year old and one juvenile, approximately 1 year old. Similarly, although turtles and small mammals, such as rabbits, did not exhibit butchering marks, they were probably also used for food.

Element representation of the large ungulates, including cattle, pig, and sheep/goat, was examined to determine if animals were butchered on the premises (Table 7.2). Likewise, the slaughtering ages were estimated for each ungulate taxon, as indications of animal husbandry. Finally, butchering marks and meat cuts were tabulated and compared with contemporaneous Chinese faunal assemblages from the Tucson area.

Element Representation and Slaughtering Ages of Large Domestic Ungulates

The presence of head and foot bones in historic archaeological assemblages is cited as evidence for animal husbandry or on-site butchering, because the "cranial and foot bones of cows and sheep are commonly discarded in the butchering process due to low food value" (Lyman 1977:69). Cattle skull and foot bones comprise 2 percent and 6 percent, respectively, of the total cattle specimens. Similarly, 8 percent of the sheep/goat subassemblage is cranial parts, and 4 percent is foot bones. In contrast, the pig subassemblage contains 14 percent skull parts and 15 percent foot bones. This suggests that beef and mutton were purchased rather than raised and butchered on-site, while the opposite appears true for pork. However, the heads and feet of pigs were often sold in butcher shops.

Aging of domestic animals within animal husbandry has a long history. Tooth eruption occurs at regular intervals in pig, sheep, and cattle, for example, thereby providing a guide to the ages of the individuals represented (see Getty 1975; Silver 1970). Epiphyseal fusion rates for postcranial elements are also well established, and provide age range estimates for domestic taxa (see Silver 1970).

The tooth eruption sequence for domestic ungulates begins with deciduous incisors and premolars at, or within weeks after, birth. Deciduous molars are absent. The permanent premolars and molars erupt in a regular sequence, allowing rough age estimates for maxillae and mandibles. Eruption ages also depend on management and nutrition. "The better the housing and feeding, and the more highly bred, the earlier the eruption of teeth" (Silver 1970:295). Additionally, domestic ungulates consist of many breeds whose rates of maturation vary considerably. The ages used in the current study are nineteenth century figures for cattle, median ages

Table 7.2. Cattle, pig, and sheep/goat elements (number of identified specimens) from Feature 34 at AZ BB:13:756 (ASM).

Element	Cattle	Cattle/Pig	Pig	Pig/Sheep/Goat	Sheep/Goat
Skull[a]	1	–	3	–	1
Mandible[a]	3	–	5	–	1
Cervical vertebra	10	–	2	1	6
Thoracic vertebra	28	–	1	–	–
Lumbar vertebra	22	–	–	–	1
Sacrum	3	–	2	–	–
Unspecified vertebra	6	–	–	2	–
Rib	35	7	2	2	4
Innominate	7	–	7	–	1
Scapula	15	–	5	–	–
Humerus	21	–	4	1	1
Radius	4	–	–	–	2
Ulna	7	–	1	–	–
Femur	13	–	3	–	2
Patella	1	–	–	–	–
Tibia	8	–	1	1	3
Fibula	–	–	1	–	–
Astragalus	2	–	1	–	–
Calcaneus	–	1	–	–	–
Carpal/tarsal	11	1	3	–	–
Metapodial	7	–	7	–	3
Sesamoid	3	–	–	–	–
Phalanx	12	–	8	–	1
Long bone	14	–	–	1	–
Total	233	9	56	8	26

[a]Does not include isolated teeth.

between modern figures and 1790 figures from semi-wild, hill sheep for sheep, and the median between late eighteenth century figures and modern figures for pigs (Silver 1970:296-299). In all cases, eruption ages are used only as an estimate for the age of the animal.

Sixteen cattle skull parts, representing at least two individuals, were identified in the Feature 34 assemblage; 12 are isolated teeth. There are two mandibular bodies without intact teeth and one basioccipital. Only one specimen (FN 331) was ageable, an adult mandible with the fourth premolar through the third molar intact. The third molar was erupted and slightly worn, indicating an age of at least 48 months (Table 7.3). Three sheep/goat skull parts were recovered, including one premaxilla, one isolated maxillary premolar, and one mandible. The mandible (FN 331) contains the first through third molars. The individual represented was at least 30 months old at death, the median age for the eruption of the third molar in sheep (see Table 7.3).

Pig cranial material is represented by 14 specimens, including three isolated teeth and three miscellaneous skull fragments, consisting of two occipitals and one squamous temporal. Five mandibles with teeth represent at least three separate individuals. One left mandibular body (FN 38) was from an individual aged 8-18 months at death, based on the deciduous fourth premolar and the erupted first molar. One right mandible (FN 86) had the fourth premolar erupting, indicating an age at death of approximately 18 months. One set of fused mandibular symphyses (FN 331) contains unerupted incisors with the permanent canine, indicating an age at death of 12-28 months. One left mandibular body (FN 331) has an unerupted third molar, indicating an age at death between 18 months and 26 months. This specimen fits with the left symphysis, and gives a slightly tighter age range for the element.

Epiphyseal fusion of specimens further established age ranges for the three main domestic taxa. Nearly half (n = 29) the cattle postcranial specimens with epiphyses are unfused, but very few are from the early fusing elements (Table 7.4). One distal humerus is unfused. This epiphysis fuses in cattle at 12-18 months of age. One proximal second phalanx is unfused. This epiphysis fuses around 18 months. The epiphyses of the remaining unfused elements

Table 7.3. Age ranges for cranial material with intact teeth from domestic ungulates in Feature 34 at AZ BB:13:756 (ASM).

Taxon	FN	Element	Teeth	Age[a]	Age Criteria
Cattle	331	Right mandible with teeth	Fourth premolar through third molar	At least 48 months	Third molar slightly worn
Sheep	331	Right mandibular body	First through third molar	At least 30 months	Molars fully erupted
Pig	38	Left mandibular body	Fourth premolar, first molar alveolus	8-18 months	Deciduous premolar, permanent first molar
	86	Right mandibular symphysis and body	First and fourth premolars, first and second molars	circa 18 months	Fourth premolar erupting
	331	Right and left mandibular symphyses	Left canine only	12-28 months	Permanent canine with unerupted incisors
	331	Left mandible with teeth (fits with mandibular symphysis above)	Fourth premolar to second molar	18-26 months	Permanent fourth premolar, third molar unerupted

[a]Median ages based on Silver (1970:296-299).

Table 7.4. Epiphyseal fusion rates for cattle specimens from Feature 34 at AZ BB:13:756 (ASM).

Element	Fused	Unfused	Fusing	Age at Fusion[a]
Proximal metapodial	4	–	–	Before birth
Distal first or second phalanx	6	–	–	Before birth
Scapula	1	–	–	7-10 months
Distal humerus	4	1	–	12-18 months
Proximal radius	1	–	–	12-18 months
Proximal first or second phalanx	8	1	–	1½ years
Distal metacarpal	1	1	–	2-2½ years
Distal tibia	1	2	–	2-2½ years
Proximal femur	1	–	–	2½-3 years
Distal metatarsal	–	1	–	2½-3 years
Proximal humerus	–	10	–	3½-4 years
Distal radius	2	–	–	3½-4 years
Proximal ulna	–	1	–	3½-4 years
Distal ulna	1	–	–	3½-4 years
Innominate	3	–	–	4½ years
Vertebral body with pad	2	12	–	5 years

[a]Silver 1970.

are from more mature animals, ranging in fusion age from 2 years to 5 years. Most (79 percent) of the unfused specimens are from elements that fuse at 3½ years or older.

Three-quarters (n = 6) of the sheep/goat specimens with epiphyses are fused (Table 7.5). Only two proximal femurs are unfused. This part of the femur fuses between 2½ years and 3 years in sheep. The fused innominate and proximal tibia are from animals at least 3½ years of age. This suggests most of specimens represent animals between 2½ and 3½ years of age, and corroborates the age of the cranial material. An examination of pig epiphyseal fusion rates shows that 65 percent of the specimens with epiphyses are unfused or fusing (see Table 7.5). The youngest specimens are from animals that were 1 year old, or younger, at death. More mature animals range in age from less than 2 years to less than 6 years at death. Most of the unfused specimens are from elements that fuse at 2 years or older. Only three of the 28 specimens (11 percent) with fused epiphyses are from elements that fuse at more than 2 years. This puts the typical age at death at about 2 years of age.

Postcranial material from the three primary domestic taxa fits fairly well with the cranial material in terms of relative age. The oldest sheep/goat postcranial elements are slightly older than the single cranial part aged to at least 30 months at death. One fused innominate and one fused proximal tibia represent an individual older than 3½ years old at death. The youngest specimens, two unfused, proximal

Table 7.5. Epiphyseal fusion rates for pig and sheep/goat specimens from Feature 34 at AZ BB:13:756 (ASM).

Element	Fused	Unfused	Fusing	Age at Fusion[a]
Pig				
Proximal metapodial	3	–	–	Before birth
Distal first or second phalanx	5	–	–	Before birth
Scapula	1	1	–	1 year
Distal humerus	-	1	1	1 year
Proximal second phalanx	2	–	–	1 year
Proximal first phalanx	3	–	1	2 years
Distal metapodial[b]	1	3	–	2-2¼ years
Proximal femur	–	2	–	3½ years
Proximal tibia	–	1	–	3½ years
Innominate	2	1	–	6-7 years
Sheep				
Proximal metacarpal	1	–	–	Before birth
Distal first or second phalanx	1	–	–	Before birth
Proximal radius	1	–	–	10 months
Distal metapodial[b]	1	–	–	18-28 months
Proximal femur	–	2	–	2½-3 years
Innominate	1?	–	–	3½ years
Proximal tibia	1	–	–	3½ years

[a]Silver 1970.
[b]Combination of metacarpal and metatarsal fusion rates.

femurs, represent an individual less than 2½-3 years old at death. The tooth eruption data for pigs fit fairly well with the postcranial fusion rates, except they may not include the oldest individual. The three individuals represented by the cranial material were between 8 months and 2 years at death. All the postcranial material fits into this age range, although the unfused proximal femurs, proximal tibia, and innominate could be from an older individual because they do not fuse until 3½ years in the case of the long bones and 6-7 years for the innominate. Cattle postcranial specimens range from younger than 12-18 months to older than 5 years at death. The mandible with teeth was aged to at least 4 years. There appears to be at least one younger individual in the assemblage.

This profile shows that a range of ages was present in the cattle and sheep/goat subassemblages. Most animals raised primarily for food are slaughtered before they are fully grown, although a few are kept alive for breeding. The use of cattle for draft or dairying would also result in more animals living to an older age (Landon 1996:96). The presence of younger animals among the cattle specimens concentrated in just a few body parts, such as the proximal humerus, may indicate purchased meat rather than breeding. The older animals may represent dairy or draft animals. The sheep/goat specimens represent at least one older individual. Based on the presence of cranial and foot bones, some of the cattle and sheep remains may be the result of home-based butchering. However, due to the small sample size, it is difficult to determine, based on the slaughtering ages alone, if the animals represent homegrown or purchased meat. The pig age profile, with individuals aged from 8 months to 2 years, shows a fairly narrow slaughtering age profile and probably represents purchased meat. Again, the presence of skull and foot bones could indicate some home butchering, although these cuts would be available for purchase in butcher shops.

Butchering Marks

Fifty percent (n = 176) of the large domestic ungulates exhibit butchering marks. This total includes 18 pig specimens, 145 cattle specimens, 5 artiodactyl (pig-/sheep-/goat-/cattle-sized) specimens, and 7 sheep/goat specimens. Butchered specimens comprise 29 percent of the pig bone, 59 percent of the cattle bone, 28 percent of the artiodactyl bone, and 26 percent of the sheep/goat bone. In addition to the large ungulates, one chicken and one small-medium mammal display butchering marks.

Butchering marks include chopmarks, sawmarks, cutmarks, and various combinations of these. Chopmarks made with an ax or a cleaver are primarily involved in initial butchering and secondary apportionment, and indicate butchering as traditionally

practiced by the Chinese (Gust 1982:109). Sawmarks reflect the Euro-American style of butchering in which the carcass is apportioned into specific cuts. Far fewer specimens exhibit cutmarks made by a thin blade, likely the result of skinning and defleshing.

Sawmarks outnumber chopmarks; 56 percent of the assemblage with butchering marks exhibit sawmarks, and 44 percent exhibit chopmarks (Table 7.6). Pig and sheep/goat specimens with butchering marks exhibit chopmarks and sawmarks in nearly equal proportions. A total of 64 cattle specimens with butchering marks exhibit chopmarks, compared to 86 with sawmarks. As noted, the only small animal with butchering marks exhibits only chopmarks.

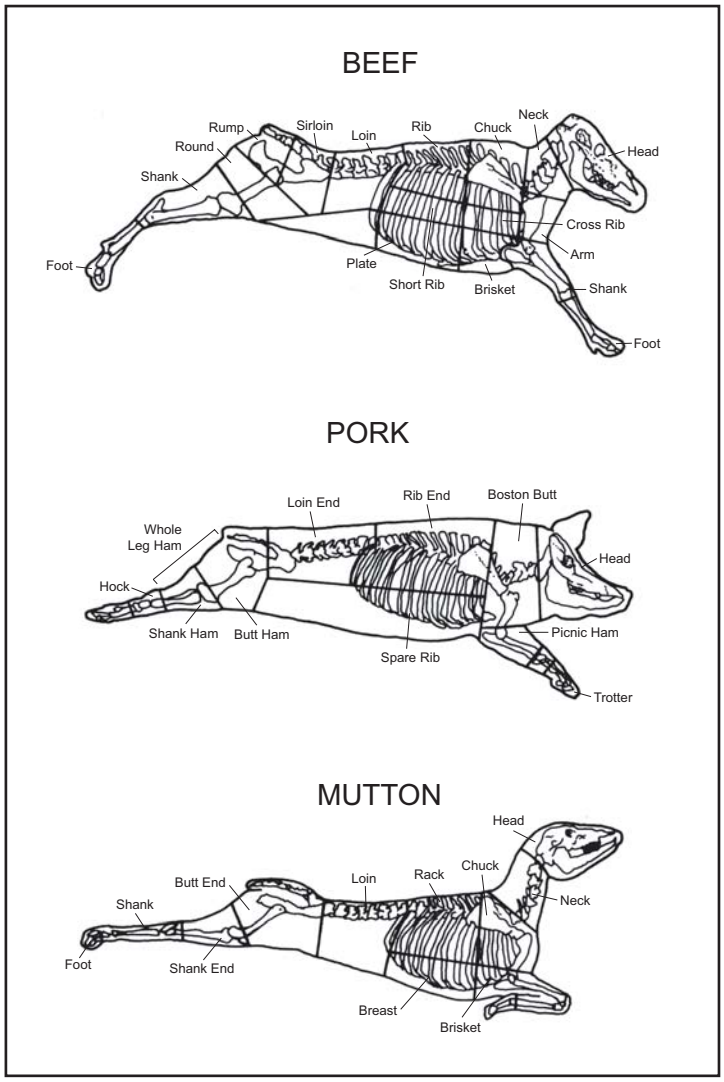

Figure 7.1. Locations of retail meat cuts for beef, pork, and mutton.

Meat Cuts, Meat Preferences, and Socioeconomic Status

The Chinese laborers living on Block 185 appear to have been eating primarily purchased meat. Therefore, an examination of which meat cuts were consumed will reveal their meat preferences and, possibly, their socioeconomic status. Meat cuts of beef, pork, and mutton differ in quality and price (Figure 7.1); thus, the faunal remains from Feature 34 are potentially good indicators of the socioeconomic status of the people represented by the food refuse. Schulz and Gust (1983:45) suggest "the frequency of consumption of differently priced cuts will vary with the socioeconomic status of consumers." Greater quantities of the more expensive meat cuts reflect a social unit with a higher income. Conversely, more of the least expensive meat cuts should be recovered in features associated with lower income individuals.

The ranks of beef cuts recovered from Feature 34 are based on retail beef prices from the second half of the nineteenth century (Schulz and Gust

Table 7.6. Quantities of pig, sheep/goat, and cattle (in number of identified specimens) with butchering marks from Feature 34 at AZ BB:13:756 (ASM). (Percentages are in parentheses.)

	Pig	Sheep/Goat	Cattle
Chopmarks	8 (44)	3 (43)	55 (38)
Sawmarks	8 (44)	2 (29)	75 (52)
Cutmarks	-	1 (14)	2 (1)
Chopmarks and sawmarks	1 (6)	1 (14)	7 (5)
Chopmarks and cutmarks	1 (6)	–	2 (1)
Sawmarks and cutmarks	–	–	4 (3)
Feature totals	18	7	145

Note: One small-medium mammal cervical vertebra and one chicken humerus also contained chopmarks.

Table 7.7. Cattle elements and corresponding meat cuts from Feature 34 at AZ BB:13:756 (ASM).

Element[a]	Cut	Rank[b]	NISP[c]
Lumbar vertebra	Loin	1	22
Thoracic vertebra (6-12)	Rib	2	6
Proximal rib (6-12)	Rib	2	4
Sacrum	Sirloin	2	3
Ilium/acetabulum	Sirloin	2	3
Femur shaft	Round	3	12
Patella	Round	3	1
Proximal femur	Rump	4	1
Ischium/acetabulum	Rump	4	4
Thoracic vertebra (1-5)	Chuck	4	1
Proximal rib (1-5)	Chuck	5	5
Scapula blade	Chuck	5	14
Rib shaft	Short or cross rib	6	3
Scapula head	Arm	6	1
Proximal humerus	Arm	6	13
Distal rib	Brisket or plate	7	1
Cervical vertebra	Neck	8	10
Basioccipital	Head	9	1
Maxilla	Head	9	1
Mandible	Head	9	2
Distal humerus	Foreshank	9	8
Radius	Foreshank	9	4
Ulna	Foreshank	9	7
Carpals	Foreshank	9	5
Tibia	Hindshank	9	8
Astragalus	Hindshank	9	2
Naviculo-cuboid	Hindshank	9	6
Metacarpal	Foot	10	2
Metatarsal	Foot	10	4
Metapodial	Foot	10	1
Sesamoid	Foot	10	3
Phalanx	Foot	10	12
Total			170

[a]Does not include isolated teeth.
[b]Based on Azizi et al. (1996).
[c]Number of identified specimens.

1983:48). The loin was the most expensive cut, followed by the rib and sirloin, round, rump, chuck, arm, cross rib, and short rib, brisket and short plate, neck, and, finally, the foreshank, hindshank, and foot. The identified cattle elements, beef cuts, and their ranks are listed in Table 7.7. The cuts represented were divided into high-, medium-, and low-quality groups. Thirty-three percent (n = 56) of the beef cuts identified in the Chinese deposit are from the high-quality meat cut group, followed by 22 percent (n = 38) of the medium group, and 45 percent (n = 76) for the low group. High-priced beef cuts identified include the loin, rib, sirloin, round, and rump. Medium-priced beef cuts recovered include the chuck, cross or short rib, arm, and brisket or plate. Low-priced beef cuts include the neck, head, foreshank, hindshank, and foot.

Table 7.8. Pig elements and corresponding meat cuts from Feature 34 at AZ BB:13:756 (ASM).

Element[a]	Cut	Rank[b]	NISP[c]
Innominate	Butt ham	1	7
Proximal femur	Butt ham	1	3
Thoracic vertebra	Rib end	2	1
Proximal rib	Rib end	2	2
Sacrum	Loin end	2	2
Cervical vertebra	Boston butt	3	2
Scapula	Boston butt	3	5
Distal humerus	Picnic ham	4	4
Radius	Picnic ham	4	1
Proximal tibia	Shank ham	4	1
Fibula shaft	Shank ham	4	1
Squamous temporal	Head	6	1
Occipital	Head	6	3
Mandible	Head	6	5
Lunar (carpal)	Hock	6	1
Astragalus	Hock	6	1
Naviculo-cuboid (tarsal)	Hock	6	1
Carpal or tarsal	Hock	6	1
Proximal metapodial (2nd or 5th)	Hock	6	1
Proximal metapodial (3rd or 4th)	Hock	6	1
Distal metapodial (2nd or 5th)	Trotter	6	1
Distal metapodial (3rd or 4th)	Trotter	6	4
Phalanx	Trotter	6	8
Total			57

[a]Does not include miscellaneous skull parts or isolated teeth.
[b]Based on Azizi et al. (1996).
[c]Number of identified specimens.

Fewer pork cuts were identified in the assemblage (Table 7.8). The ranks of pork cuts are based on Azizi et al. (1996). The butt ham is the most expensive cut, followed by the loin (rib end and loin end), the Boston butt, the picnic ham and the shank ham, the spare ribs, and the head, hock, and trotter. The high-quality butt ham, rib end, and loin end are all present in the identifiable assemblage, comprising nearly 26 percent (n = 15) of identifiable pork cuts. A similar proportion, 25 percent (n = 14), of the pork cuts are mid-priced cuts, including the Boston butt, picnic ham, and shank ham. The low-quality cuts, including the head, hock, and trotter, comprise nearly half, 49 percent (n = 28), of the pork cuts.

Far fewer (n = 23) mutton cuts are present in the assemblage (Table 7.9). The ranks of mutton cuts are also based on Azizi et al. (1996). The loin is the most expensive cut, followed by the rack, shank end, chuck and butt end, the breast, neck and brisket, and the foreshank, hindshank, and foot. One specimen each (9 percent of the identified meat cuts) is present from the high-quality loin and rack. With three specimens each, the medium-quality shank end and butt end comprise over one-quarter (26 percent) of the meat cuts. The remainder, 65 percent (n = 15), of the mutton cuts is made up of low-quality cuts, including the neck, head, shank, and foot.

Overall, the meat cut distribution meets expectations for an assemblage deposited by a group from the lower socioeconomic class. The largest proportions of all meat types are from the low-priced cuts. Low-quality cuts comprise 45 percent of beef cuts, 49 percent of pork cuts, and 65 percent of mutton cuts. Nonetheless, high-priced cuts outnumber medium-priced cuts for beef. High-priced beef cuts comprise 33 percent of the assemblage, compared to 22 percent for mid-priced beef cuts. High-priced and medium-priced pork cuts comprise nearly identical proportions, 26 percent and 25 percent, respectively. Mutton cuts are distributed somewhat differently. Over one-quarter (26 percent) are from mid-priced cuts, and only 9 percent are from high-priced cuts.

Table 7.9. Sheep/goat elements and corresponding meat cuts from Feature 34 at AZ BB:13:756 (ASM).

Element[a]	Cut	Rank[b]	NISP[c]
Lumbar vertebra	Loin	1	1
Proximal rib (6-12)	Rack	2	1
Proximal tibia	Shank end	3	3
Proximal femur	Butt end	4	2
Innominate	Butt end	4	1
Cervical vertebra	Neck	6	6
Maxilla	Head	7	1
Mandible	Head	7	1
Distal humerus	Shank	7	1
Radius	Shank	7	2
Metacarpal	Shank	7	1
Metatarsal	Shank	7	1
Metapodial	Shank	7	1
Phalanx	Foot	0	1
Total			23

[a]Does not include isolated teeth.
[b]Based on Azizi et al. (1996).
[c]Number of identified specimens.

COMPARISONS WITH CONTEMPORANEOUS CHINESE ASSEMBLAGES

The Chinese laborers' assemblage was compared with four other Chinese assemblages recovered from urban contexts in Tucson from the same period (Table 7.10). The assemblages date to between 1880 and 1910. The Tucson Chinatown was excavated as part of the Tucson Urban Renewal Project (Lister and Lister 1989). Feature 21 in Block 136 was a borrow pit filled with refuse from the local Chinese grocer in the Barrio Libre (Thiel 2002b). Two loci at AZ BB:13:6 (ASM) contained trash deposited by Chinese gardeners living on the outskirts of Tucson (Thiel 1997a; Thiel and Mabry 2006).

Ethnic affiliation appears to play a role in meat selection. Pork was the preferred meat in China, and the eating of pork has a long tradition among the Chinese (Gust 1993:185). Pig bones found in archaeological sites in China date to perhaps as early as 9300-7000 B.C. (Simoons 1991:295). Cattle bones were recovered from later (5000-1700 B.C.) sites, but the consumption of beef in China declined by the T'ang Dynasty (618-907 A.D.), due to the influence of Buddhism (Chang 1977:29). The taboo against beef consumption continued into the nineteenth century, when laws prohibited the slaughter of cattle and water buffalo for food (Simoons 1991:303). Consequently, beef consumption was not common among Chinese at that time, including those immigrating to the United States. The Chinese are also known for the diversity of their diet. They traditionally used a wide range of animals for food. Several species found in the Chinese features are not usually found in urban Mexican or Euro-American features, including fish, turtle, duck, dog, cat, and deer. The inclusion of these more unusual meats in their meals suggests the Chinese immigrants were trying to recreate the diet of their homeland.

Excavations in urban Chinatowns outside Arizona show that pork was also the primary meat consumed in Sacramento, Woodland, and Ventura, California, as well as Lovelock, Nevada (Gust 1993). However, as shown in Table 7.10, the assemblage from the Tucson Chinatown had cattle specimens comprising 56 percent of the identifiable assemblage, compared to 27 percent for pig specimens (Gust 1993). Cattle specimens from the borrow pit filled by the Chinese grocer in Block 136 comprise 59 percent of the assemblage, compared to only 5 percent for pig specimens (Diehl et al. 2002). Similarly, the assemblage from Feature 34 in Block 185 contained 52 percent cattle specimens, compared to 13 percent pig specimens. The multi-feature assemblage from the Spruce Street locus of BB:13:6 contained 50 percent cattle specimens and 11 percent pig specimens. The exception is the assemblage from Feature 4, a

Table 7.10. Comparisons among turn-of-the-nineteenth-century Chinese faunal assemblages recovered in Tucson.

Site	Dates	ID Sample Size	Number of Taxa	Cattle NISP[a]	Pig NISP[a]	Chopmarks	Sawmarks
Block 185, Feature 34	1880-1900	472	13	245	62	78	98
Tucson Chinatown	1880-1910	2,090	17	1,179	573	N/A[b]	N/A[b]
Block 136, Feature 21	1890-1910	1,965	14	572	49	N/A[c]	N/A[c]
AZ BB:13:6 (ASM), Spruce Street Locus, Features 124/2004, 2000, 2002	1892-1905	321	12	161	36	19	191
AZ BB:13:6 (ASM), San Augustín Mission Locus, Feature 4	1893-1900	4,296	19	534	1,723	1,581	425

[a]Number of identified specimens.
[b]Gust (1993:193) notes that there were mostly handsaw marks.
[c]Not recorded.

trash-filled well at the San Agustín Mission locus of BB:13:6. That assemblage contained 40 percent pig specimens, compared to only 12 percent cattle specimens. Multiple lines of evidence, including element representation, age profiles, beef-to-pork ratios, and butchering marks, indicate the Chinese gardeners represented by Feature 4 raised and butchered their own pigs (Cameron et al. 2006).

Butchering techniques are related to ethnicity as well. The presence of chopmarks in greater numbers than sawmarks in historic faunal assemblages from Tucson can be a good indicator of ethnicity (Thiel and Faught 1995:209). Greater proportions of chopmarks versus sawmarks are associated with early Chinese assemblages. Traditionally, Chinese butchers used axes and cleavers to divide the carcass into portions (Gust 1982:109). Handsaws were associated almost exclusively with Euro-American butchers (Chapin-Pyritz and Mabry 1994:155). Comparisons of chopmarks to sawmarks among the assemblages in Table 7.10 show that only Feature 4 from BB:13:6 contained more specimens that exhibited chopmarks than sawmarks. The majority of chopmarks in that assemblage probably indicates home butchering. Unfortunately, the butchering marks for two of the Chinese assemblages were not published, although Gust (1993:193) notes that most of the marks in the Tucson Chinatown assemblage were made by handsaws, which is very different than the assemblage from Feature 4. There were some differences in degree between the assemblages with more sawmarks than chopmarks, with nearly 1.5 times more sawmarks than chopmarks in the assemblage from the Chinese midden in Block 185, compared to 10 times more sawmarks than chopmarks in the assemblage from the Spruce Street locus of the Chinese gardeners.

Discussion

The arrival of the railroad to Tucson in 1880 "opened the floodgates of Anglo-American settlement" (Thiel 2002b:6), which created a market for individual meat cuts. This was "in contrast with the slaughter and consumption of the entire animal in one location" (Clonts 1983:351), ushering in the systematic techniques used by the modern meat packing industry. Rather than being chopped into pieces with cleavers and hatchets, carcasses were divided into specific wholesale and retail cuts using handsaws and, after the advent of electricity, bandsaws.

As shown in Table 7.10, archaeological evidence from most of the Chinese assemblages at the turn of the nineteenth century reflects meat purchases in a market economy rather than home butchering. After the introduction of American butchering methods, most Chinese living in Tucson appear to have either adopted the same butchering methods as, or patronized, Euro-American butchers. Gust (1993:193) notes that cleaver marks declined and sawmarks increased through time on animal bone from selected Chinese sites in the western United States. This was evident in the Chinese gardeners' assemblage from the San Agustín Mission locus of BB:13:6 where chop marks became less prevalent through time (Cameron et al. 2006). Therefore, Chinese assemblages dating to 1880 and later may be difficult to distinguish from Euro-American assemblages based on butchering marks alone.

SUMMARY AND CONCLUSIONS

A relatively small, but diverse, faunal assemblage was recovered from a midden associated

with Chinese laborers in historic Block 185 at the turn of the nineteenth century. Domestic animals include chicken, pig, cattle, sheep/goat, dog, and cat. Wild animals include Sonoran mud turtle, desert tortoise, rattlesnake, duck, cottontail, jackrabbit, and pocket gopher. Beef was the preferred meat, with cattle specimens comprising at least 52 percent of the identifiable assemblage. All the domestic taxa likely represent food items, based on the presence of butchering marks and patterns of burning and fragmentation. The wild small animal specimens did not exhibit butchering marks, and may or may not represent food items. The rattlesnake and pocket gopher remains are modern, intrusive specimens.

The presence of head and foot bones at archaeological sites is cited as evidence for animal husbandry and on-site butchering. These bones were usually discarded during the butchering process due to low food value (Lyman 1977:69). This does not necessarily apply to pigs' feet, however, which were, and still are, sold in butcher shops. The pig element representation, in which skull and foot specimens comprise 29 percent of the element representation, supports this. The small proportions (8 percent and 12 percent, respectively) of cattle and sheep/goat cranial and foot bones suggest a low occurrence of primary home butchering. A more plausible scenario suggests these specimens represent discards purchased from a butcher shop.

Slaughtering ages of the large domestic taxa also indicate the potential for animal husbandry in the Chinese assemblage from Block 185. Age ranges based on tooth eruption sequences and epiphyseal fusion rates place the slaughtering age range for cattle from younger than 12-18 months to over 5 years. Most cattle specimens appear to be from animals in the middle of that spectrum. Sheep/goat specimens ranged in slaughtering age from younger than 2½ years to older than 3½ years at death, with most specimens falling between those two ages. The pig specimens range in slaughtering age from 1 year to at least 6 years at death, but largely fall between 18-24 months. Most animals raised predominately for food are slaughtered before they are full-grown. Therefore, pigs appear to have a normal slaughtering distribution consisting of primarily young animals. The age profiles for cattle and sheep suggest some were used for draft, dairying, and wool production. However, it seems unlikely that Chinese laborers in downtown Tucson would have enough room for livestock. The cuts from older cattle and sheep/goats may represent cheap cuts of purchased beef and mutton.

The majority of butchering marks imply that most cuts were purchased, while others suggest some home butchering. Fifty-nine percent of cattle butchering marks were sawcuts. Most of the specimens were sawn into standard retail cuts, indicating most beef was purchased from outside sources. Likewise, 50 percent of pig specimens with butchering marks display sawmarks and were sawn into standard retail cuts. Forty-three percent of sheep specimens with butchering marks were sawn. The few sources documenting late nineteenth century butchering by Chinese in the United States indicate they eventually adopted American methods and tools (Gust 1993:207). Nonetheless, the chopmarks in the assemblage from Block 185 may represent secondary apportionment by the laborers from either standard retail cuts or larger, secondary cuts.

In a group living situation, it may have been more economical to buy the larger, secondary cuts from the butcher and chop them up at home. Interestingly, most of the sawmarks occur on bones from higher-ranked meat cuts, while the opposite is true for specimens with only chopmarks. The largest proportions of all meat types are from the lower-priced retail cuts, including cattle and sheep/goat heads and feet, which are not normally sold as retail cuts. This fits with the expectation that the Chinese laborers were members of the lower socioeconomic class. That did not preclude the men from occasionally buying a few high-priced cuts.

The faunal assemblage from the Chinese midden in Block 185 is small, but characteristic of other Chinese assemblages from urban contexts in Tucson that date to the turn of the nineteenth century. The primary meat consumed was beef, even though there was an existing cultural preference for pork. The Chinese in Tucson probably got most of their beef from butcher shops that used conventional, Euro-American butchering methods. Despite that, the laborers, like other Chinese immigrants in Tucson at the time, maintained the tradition of using a diverse array of meats in their diets.

CHAPTER 8

CONCLUSIONS

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The archaeological excavations at Historic Block 185 sought to increase current understanding about the use of the area during the Prehistoric and Historic eras. The features and artifacts discovered provide information about this, allowing for an interpretation of the human history of this location immediately adjacent to the first terrace above the Santa Cruz River floodplain.

Data recovery has been completed on the parking lot area, and it is recommended that construction proceed as planned.

PREHISTORIC PERIOD IRRIGATION AGRICULTURE

A probable prehistoric irrigation canal, Feature 3 of AZ BB:13:757 (ASM), was located in three trenches during testing. The small canal ran south to north and was found 24 cm below the 1910 ground surface. It was basin shaped, about 42 cm deep, and was filled with brown clay. No artifacts were visible in the profiles. The canal is thought to be prehistoric, because the historic canals all contained large amounts of trash, making it likely this would also be true if this canal had been used during the Historic era.

Previous archaeological work has located an extensive set of Hohokam irrigation canals about 150 m to the northwest, on the La Entrada/León Farmstead project (Thiel 2005). These canals were concentrated east of a slight ridge on the property, and had been re-dug several times following flooding events. Another canal was located to the west and farther north. These canals, as well as a small canal found on Block 185, drew water from the Santa Cruz River and transported it to agricultural fields. Extensive archaeological trenching on properties south of Congress Street have failed to locate any traces of prehistoric canals (Thiel 2008; Thiel and Mabry 2006). This suggests the point of origin for all of these canals was somewhere between Block 185 and Congress Street.

Other recent archaeological work has documented prehistoric canals on the western side of the Santa Cruz River. As fieldwork continues, a better understanding of the Tucson Basin canal system will almost certainly be developed.

The adjacent terrace was the site of a large pre-Classic Hohokam village, AZ BB:13:9 (ASM). Pit structures have been located in an area extending from the Tucson City Hall west lawn to Historic Block 181 to the northeast. Also present in this area are storage pits, caliche mining pits, roasting pits, cremations, a crematorium, and inhumation burials. This variety of features, somewhat remarkable given the long and intensive occupation of the area in the Historic era, suggests that a substantial and long-lived prehistoric settlement was present. The recent discovery of Early Agricultural period pit structures pushes the known prehistoric occupation of the downtown area to approximately 2,000 years (Thiel and Mabry 2006).

SPANISH AND MEXICAN PERIODS

The Tucson Presidio

Tucson was a walled fortress from 1776 through 1856. The western adobe wall of the fort was located along what is now Main Street, immediately east of the current project area. Two large soil mining pits were found during this project. An immense amount of soil was needed to manufacture the 22-inch-wide and, perhaps, the 10- to 12-foot-high adobe brick exterior walls of the presidio, as well as additional bricks for interior buildings and for the repair and maintenance of these structures. These are the first adobe mining pits located, and they reveal that the soldiers and civilians who lived at the fort did not travel far to mine dirt for adobe.

After the mining was completed, the pits were filled with soil and trash. A combination of deliberate disposal, such as the tossing of large animal bones, and alluvial activity, with trash and dirt washing down from the terrace, probably occurred. The samples of animal bones, plant remains, and artifacts advances our knowledge of life in the fort.

Animal bone was primarily from cattle that had been butchered by chopping with cleavers or axes. Hindquarters were underrepresented, and may have been distributed to the resident Apache Mansos. Sheep, goats, and chicken were also present, and may have been important due to the Apache raids prevalent in the area. Sheep and goats were more

difficult to herd, and thus, were less likely to be taken in raids. Chickens could be raised inside the fortress, eating table scraps and insects.

Plant remains included wheat and maize, along with pigweed, a plant used by Mexican-Americans as a potherb, or *verdolegas*.

Artifacts recovered included the typical Native American ceramics and Mexican majolicas. Like all other projects within or next to the presidio, a very small diversity of goods was recovered. Residents made do with only a handful of imported goods. Most items used in the house were probably locally manufactured, many from perishable materials (wood, cloth, leather) that have left no traces in the archaeological record.

The recovery of a religious medallion and glass beads, apparently part of a necklace, was fortuitous. The people of Tucson were Roman Catholics during the years the presidio was in existence. Until 1820, they had a resident priest. From 1820 to 1828, a priest came from San Xavier del Bac to conduct mass. Foreign-born priests were expelled from Mexico in 1828, and consequently there was no local priest in the community. A priest traveled north from Magdalena in the 1840s, but local residents were not satisfied. A petition was sent to Mexico by Tucson residents in 1850, asking for a permanent priest to be supplied to the community. It was not until the late 1850s that this was accomplished.

AMERICAN TERRITORIAL PERIOD

Irrigation Agriculture, Property Use, and the Lifestyles of the Well-To-Do

The earliest American Territorial period features located on Block 185 were a pair of small- to medium-sized irrigation canals (known locally as *acequias*) that ran along the base of the terrace, from south to north. Feature 6 was 1.4 m wide and 25 cm deep. This canal could date to the Presidio era or earlier, although any evidence for such use had been removed when the canal was re-dug. The earliest trash found in the feature dated to about the 1860s. It lay beneath Feature 4, another canal that was about 1.75 m wide and 15-25 cm deep, and that contained trash from the 1870s to 1880s, including several copper Chinese opium tins. Feature 4 appears to represent a re-working of the earlier Feature 6 canal.

Recent research in early Tucson newspapers located several mentions of the canal. By the 1870s, local politicians were increasingly concerned about the cleanliness of nearby *acequias*. Mayor Allen delivered an address to the City Council on 7 February 1877, in which he stated, "I would recommend that the *acequia* next to and running parallel with Main Street be declared a nuisance and that the superintendent thereof be required to abate the same (*Arizona Citizen* 1877a). A grand jury was called to investigate public nuisances in the community and they prepared a detailed report.

> We further report that the ditch or canal passing along the western side of the village of Tucson is getting daily and hourly a greater nuisance, and is now a regular slime ditch of disease; much of the time it is allowed to remain, almost dry or void of running water, and the result is pools of stagnant water and the accumulation of rotten and decayed vegetable matter and soap-suds, rendering the vicinity unhealthy, and, together with the general filth which is thrown off by the washing of clothes, &c., in the *acequia*, and lodges in the same, not only endangers the health of the whole village but is likely to be the cause of contagious diseases and pests. We therefore recommend that the washing of clothes should be confined to the lower part of the ditch, below the village, that the filth may not have to pass through the whole length of the town, and that proper measures be taken to secure a sufficient quantity of running water in said ditch, so as to carry off all debris and all rotten and decaying vegetable and other matter, and that the ditch be cleaned at least once a month during the warm season. We also submit that nearly all the bridges crossing the ditch are too low, and consequently all rubbish, filth, &c., will be stopped running down the stream or lodged in front or under the bridges, and we recommend that the street or road commissioner raise the same or require the proper parties to do so (*Arizona Citizen* 1877b).

Many Chinese men settled in Tucson after the arrival of the railroad in March 1880. Among the professions they practiced was washing laundry in the canals that snaked through the Santa Cruz River floodplain. While providing a necessary service, not everyone was happy with these entrepreneurs. In September 1880, a Chinese man named Sam was charged with allowing water from his laundry on Main Street to run into the *acequia*. Sam was fined $5. It was noted that many individuals were polluting the *acequias* (*Arizona Weekly Star* 1880).

The problems continued into the following year: "The *acequia* ditch… that drags its slow length through the park, ought to be disinfected, or deodorized, for it is becoming a veritable stench in the nostrils of the people" (*Arizona Weekly Star* 1881). The last use of the final canal on Block 185 appears to be in the mid- to late-1880s.

This canal has also been located in several locations to the south during other archaeological testing projects (Cook 2007; Thiel 1996a) (Figure 8.1). Its alignment closely matches a field boundary depicted on the 1862 map No. 1 of the Cultivated Fields

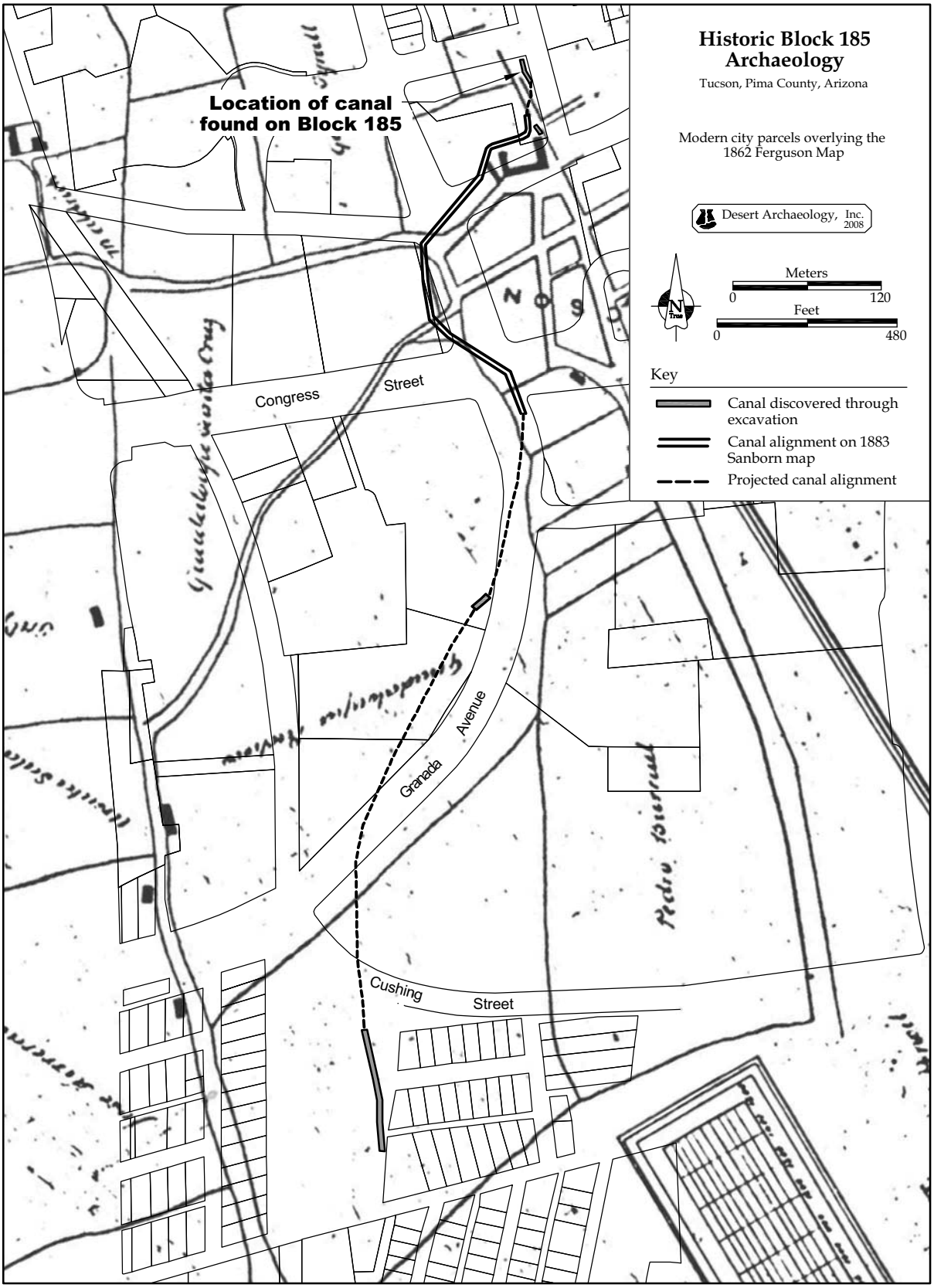

Figure 8.1. Location of the historic canal found during the Block 185 and other projects, overlaid on a portion of the 1862 field map and modern streets and parcels.

in and about Tucson. It may be possible to trace it further to the south and north in areas that have not been investigated archaeologically.

The presence of a canal on the property suggests the area was used for agricultural purposes into the early 1900s. No evidence for other use of the property is suggested, except a trash midden on the southeastern corner of the property.

Chinese men came to Tucson as early as 1874, and many settled in the area west of Main Street. The 1883 Sanborn map notes that Chinese shanties were present just south of the project area, and it was not surprising to find a small midden containing Chinese artifacts, including fragments of food and beverage containers, ceramic dishes, a ceramic soup spoon, a medicine bottle, opium tins, and opium pipes.

Like other overseas Chinese households excavated in Tucson, it was important for the Chinese men living in the nearby shanties to maintain many aspects of their traditional culture. This was reflected in the faunal bone recovered, which was primarily beef, but that also included turtle, tortoise, duck, dog, and cat. The Chinese were known for eating a wide variety of foods, much more so than their Euro-American and Mexican-American neighbors.

The early 1900s saw construction of two single-family homes. The area along Main Street was becoming a residential area for well-to-do families, which certainly included the Fenners and the Isaacsons. Little remains of these homes except their foundations. Dr. Hiram Fenner's landscaping work, which included three rock retaining walls from Sentinal Peak rock, a fountain with a lion's head spouting water, and a koi pond, point toward his affluence. The garden, with its trickling water and plantings, was likely a refuge for the Fenners and their friends in the rapidly changing community which was Tucson.

It was hoped that trash-filled features associated with the Fenner and Isaacson families would be located, providing glimpses of their possessions and diet; unfortunately, none such features were located. The two families do not appear to have discarded trash on their properties. Rather, the families likely paid to have their trash hauled away (Tucson did not begin formal trash collection until the mid-1910s at the earliest). This probably reflects their higher social economic status. Work in poorer neighborhoods has documented the discard of trash onto house lots as late at the 1940s (Thiel and Desruisseaux 1993).

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