National Register of Historic Places Eligibility Testing of 41BX474 for the Laurens Lane Hike and Bike Connection to the Salado Creek Greenway, San Antonio, Bexar County, Texas

by
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Texas Antiquities Permit No. 6756

Prepared for:
City of San Antonio
Parks and Recreation Department
P.O. Box 839966
San Antonio, Texas 78238

Prepared by:
Center for Archaeological Research
The University of Texas at San Antonio
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Archaeological Report, No. 438

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Abstract:

From January 23 through January 29, 2014, the Center for Archaeological Research (CAR) of The University of Texas at San Antonio (UTSA) conducted eligibility testing at 41BX474. The site, initially recorded in 1977 (McGraw and Valdez 1977), was revisited in 2013 (Munoz 2013) during a pedestrian archaeological survey of the proposed Laurens Lane connection trail to the existing Salado Creek Greenway located in San Antonio, Bexar County, Texas. The construction of the connection trail will impact 41BX474, identified in the 2013 survey as containing a high-density of buried cultural materials. The testing, conducted under the requirements of the Texas Antiquities Code, was performed under Texas Antiquities Permit No. 6756, with Dr. Steve Tomka serving as Principal Investigator for much of this project and Cynthia Moore Munoz serving as Project Archaeologist. Dr. Raymond Mauldin served as Principal Investigator for the completion of Permit No. 6756. The work was conducted in advance of the proposed improvements. The testing involved the hand-excavation of five test units.

Testing confirmed that the portion of 41BX474 with existing terrace deposits contains a high-density of cultural material. The vertical distribution of the material and the result of magnetic soil susceptibility analysis suggest the presence of at least one broad temporal component in the upper sediments and a possible older component in the lower sediments. The upper component produced five temporally diagnostic projectile points suggesting a date range from the Initial Late Archaic to the Initial Late Prehistoric. The diagnostics were stratigraphically out of place. One Terminal Late Prehistoric point was removed from the surface. No diagnostics were recovered from the lower component. No features were encountered, but burned rock was collected from throughout the test units suggesting the presence of buried thermal features. No organic material was recovered for radiocarbon dating. A detailed debitage and tool analysis suggests that the excavated lithic materials represent late stage reduction focusing on tool production.

Although the excavations yielded a relatively large number of lithic artifacts, the stratigraphically out of place diagnostics recovered from the site suggest that the majority of the materials recovered during the excavations are in a disturbed context. This disturbance, along with the presence of modern materials in the upper levels, suggests that the prehistoric cultural materials lack integrity. This reduces their research potential and, therefore, the CAR recommends that the site is not eligible for formal listing on the National Register of Historic Places. The CAR further recommends that the installation of the Laurens Lane hike and bike connection alignment proceed as proposed.

Following laboratory processing and analysis, and in consultation with both the City of San Antonio (COSA) and the Texas Historic Commission (THC), all burned rock, snail, and sediment samples collected from the project area were discarded. This discard was in conformance with THC guidelines. All remaining archaeological samples collected by the CAR, along with all associated artifacts, documents, notes, and photographs, were prepared for curation according to THC guidelines and are permanently curated at the Center for Archaeological Research at The University of Texas at San Antonio.

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Acknowledgements:

The successful completion of this project is owed in a large part to the hard-working field crew. They included the following individuals from the Center for Archaeological Research: Mark Luzmoor, Tyrone Tatum, Alex McBride, and Preston Beecher. Thank you all. Cyndi Dickey prepared and ran the soil susceptibility samples. She also assigned Munsell colors to the soil samples and washed the artifacts. Melissa Eiring prepared the artifacts and paperwork for curation. Dr. Raymond Mauldin, CAR Assistant Director, provided advice and comments throughout the project, and he served as Principal Investigator for the completion of the permit. Dr. Steve Tomka, CAR Director, served as Principal Investigator on most of the project and provided comments on the report. The author would also like to thank Rick Young and Kelly Harris for drafting the figures and producing the final manuscript. The author thanks Brandon Ross and Samuel Sanchez of the City of San Antonio Parks and Recreation Department for their assistance.

Chapter 1: Introduction

This report discusses the test excavations of site 41BX474 that occurred from January 23 through January 29, 2014. The site, initially recorded in 1977 (McGraw and Valdez 1977), was revisited in 2013 (Munoz 2013) during a pedestrian archaeological survey of 6.25 acres (2.5 ha) of parcels owned by the City of San Antonio (COSA). The distribution of surface and subsurface materials suggests that the site and two previously recorded sites located to its southeast, 41BX475 and 41BX476 (McGraw and Valdez 1977), should be combined into one larger site (renamed 41BX474). The Texas Historical Commission (THC) in accordance with the COSA listed 41BX474 as having unknown eligibility until testing to determine eligibility is completed.

The Center for Archaeological Research (CAR) of The University of Texas at San Antonio (UTSA) was contracted by the COSA, in accordance with THC recommendations, to conduct archaeological testing at 41BX474 on the portion of the site with existing terrace deposits. The site, located in north-central Bexar County, Texas (Figure 1-1), is bounded by Salado Creek to the north, a surface road to the south and east, and private property to the west. The excavations were conducted in advance of the construction of the proposed Laurens Lane connection trail to the existing Salado Creek Greenway. The proposed project is part of the City's long-range plan to maintain, improve, and expand existing multi-use greenway trails within San Antonio.

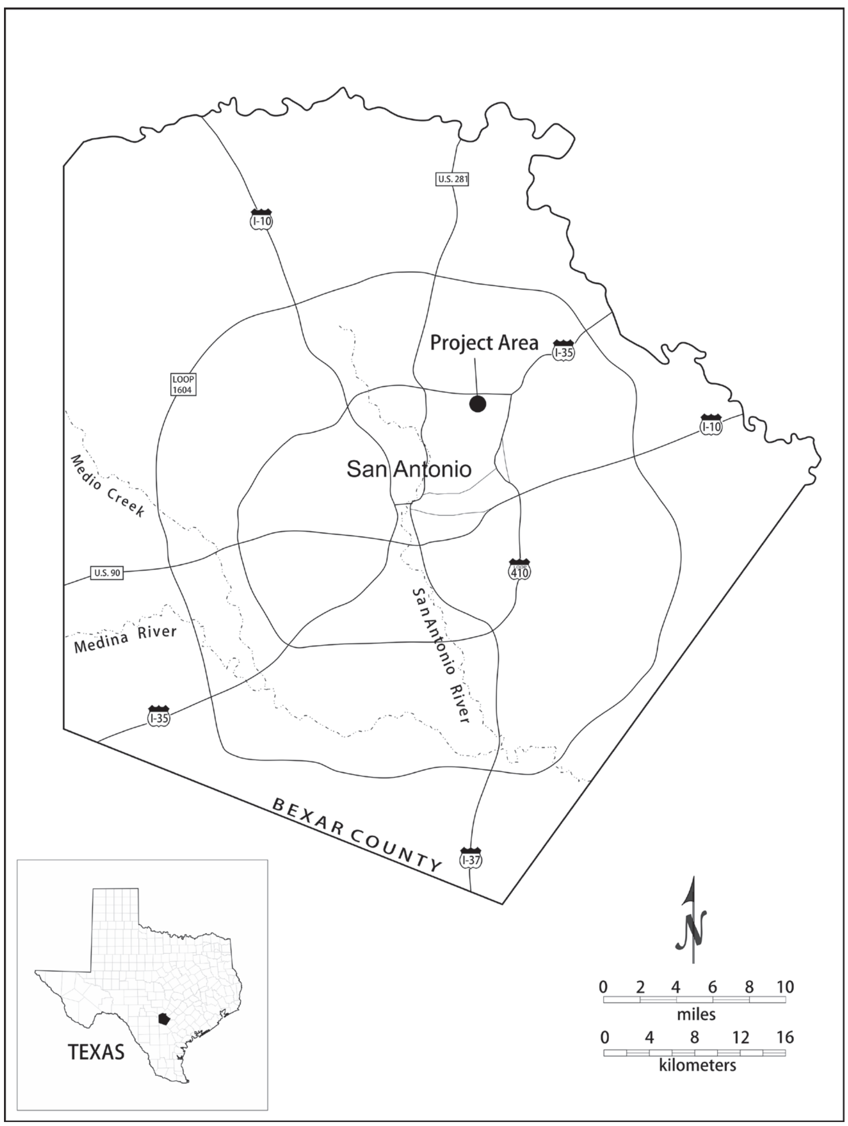

Figure 1-1. *Map of Bexar County showing location of project area.*

The land impacted by the project is owned by the COSA, a political subdivision of the State of Texas. As such, the project has to comply with State Historic Preservation laws and, specifically, the mandates of the Antiquities Code of Texas. The work was also coordinated through the City's Office of Historic Preservation in compliance with the City of San Antonio Unified Development Code Chapter 35. The archaeological testing of 41BX474 was performed under Texas Antiquities Permit No. 6756, with Dr. Steve Tomka, CAR Director, serving as Principal Investigator for most of the project and Cynthia Moore Munoz serving as Project Archaeologist.

The principal goals of the archaeological eligibility testing of 41BX474 were to expose and document the vertical distribution and density of buried materials, to determine the integrity of the archaeological deposits, and to assess the National Register of Historic Places (NRHP) eligibility status of the site in light of the integrity evaluation. The testing consisted of the hand-excavation of five 1-x-1 m test units (TU) positioned along the site's terrace. The results of the testing efforts suggest the presence of at least one broad temporal prehistoric component with a possible second component in the lower sediments. Six diagnostic artifacts were recovered. A stem fragment from either a Bulbar Stemmed or Perdiz arrow point was found near the surface, indicating a Terminal Prehistoric date. Five projectile points were recovered from the upper component, including one Edwards arrow point, one Edgewood, one Ensor, and two Bulverde dart points, suggesting a temporal range from the Initial Late Archaic to the Initial Late Prehistoric (Collins 2004; Thompson et al. 2012; Turner and Hester 1999). Across the site, the temporally diagnostic materials from the upper component appear to be stratigraphically out of place. Although no diagnostics were recovered, a peak in artifact density in the lower sediments of one test unit in association with a peak in magnetic soil susceptibility (MSS) values and increased patination of lithic material points to the possibility of an older component. No organic material or cultural features were identified on 41BX474. The recovery of isolated burned rock potentially suggests the presence of burned rock features.

Although the excavations yielded a relatively large number of lithic artifacts, no intact cultural features were noted. The temporally diagnostic artifacts recovered from the site are stratigraphically out of place suggesting that the majority of the materials recovered during the excavations are in a disturbed context. This disturbance, along with the presence of modern materials in the upper levels, suggests that the prehistoric cultural materials lack associational integrity. This reduces their research potential and, therefore, the CAR recommends that the site is not eligible for formal listing on the NRHP. The CAR further recommends that the installation of the Laurens Lane hike and bike connection alignment proceed as proposed.

This document summarizes the results of the testing and provides recommendations regarding the management of cultural resources located on the project area. The report is organized into six chapters. Chapter 2 discusses the environment of the project area and provides an overview of the cultural chronology of the area. Chapter 3 discusses the fieldwork and laboratory methodology used during the testing of 41BX474. The results of the excavation are presented in detail in Chapter 4. Chapter 5 presents descriptions of the artifacts and the results of their analyses. Chapter 6 summarizes the testing phase and provides recommendations for the site.

Chapter 2: Project Overview

This chapter contains a description of the environmental setting of the project area, including climate, vegetation, geology, and soils. A brief discussion of the cultural history of central Texas is included. Portions of the environmental and cultural history material were adopted from the archaeological survey report of the Laurens Lane connection trail (Munoz 2013). The chapter concludes with a description of the findings at 41BX474 during the initial survey conducted in August 2013.

Environmental Setting

The project area is located on the Longhorn, Texas, 7.5-minute series USGS quadrangle map within the Salado watershed in north-central San Antonio. It is bordered by Ira Lee Road on the south and Salado Creek to the north (Figure 2-1). Topographically, the proposed alignment affecting 41BX474 will be situated on the highest terrace overlooking the creek. Elevations on the site range from 207-213 m amsl. The area of potential effect (APE) consists of an alignment approximately 189 m long and encompasses approximately 1.7 acres (0.7 ha) of City-owned land.

The immediate project area is located in the Middle Salado watershed (Potter et al. 1995). The Middle Salado consists of approximately 25 linear km of drainage from the confluence of Panther Springs and Salado Creeks to roughly 20 km above the Salado/San Antonio River confluence. This portion of the Salado has a significant decrease in stream gradient when compared to the Upper Salado. This lessening gradient is accompanied by broadening floodplain and terrace landforms, deeper alluvial deposits, and significantly increased stream meandering (Potter et al. 1995).

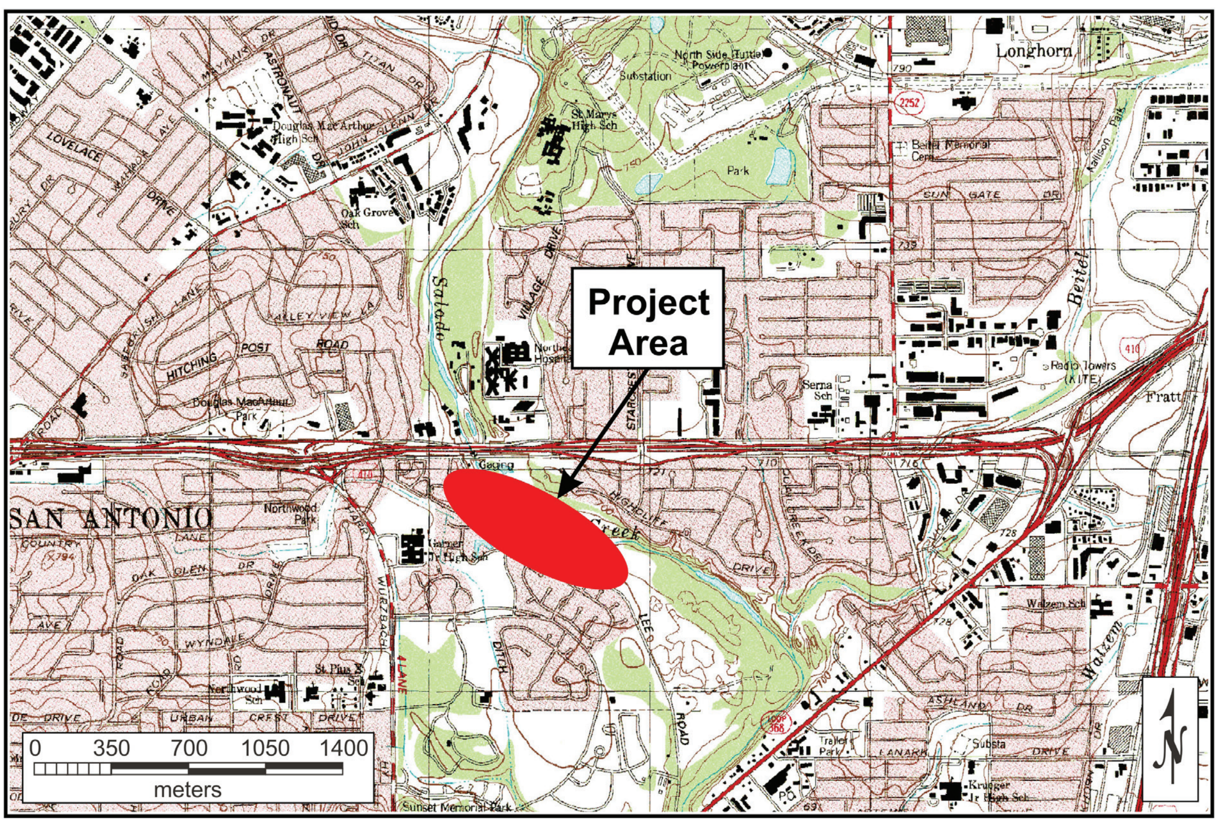

Figure 2-1. *The location of the project area on the Longhorn 7.5-minute USGS quadrangle map.*

Figure 2-2. *Typical vegetation on the project area.*

The project area is located at the boundary of the Tamaulipan and Balconian biotic provinces (Blair 1950). The Tamaulipan province, ranging from the east-west portion of the Balcones Escarpment in southern Texas to the east of the eastern Sierra Madre in northeastern Mexico, is made up of a mix of plants and animals typical of neotropical Mexico, the semiarid southern Plains, and the humid southeastern United States. Presently this subhumid to semi-arid land is dominated by thorny brush. The Balconian province covers most of the Edwards Plateau, an uplifted, limestone-dominated region, and is characterized by a semi-arid climatic regime and relatively denser vegetation. The province is dominated by oak, juniper and mesquite often underlain by a variety of grasses (Blair 1950; Hester et al. 1989). The project area lies in a setting where these two very different biotic provinces merge.

Flora and Fauna

The Middle Salado meanders through the Blackland Prairie region of Texas, a biotic zone running west to east across most of central Bexar County. The Blackland Prairie is characterized by low, rolling hills with gentle slopes (Diamond et al. 1987). Flora representative of the area (Figure 2-2) includes a variety of oaks (*Quercus* sp.), pecan (*Carya illinoinensis*), cedar elm (*Ulmus crassifolia*), mesquite (*Prosopis* sp.), buffalo grass (*Buchloe dactyloides*), Texas grama (*Bouteloua rigidiseta*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), sideoats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), tall dropseed (*Sporobolus asper*), and Texas wintergrass (*Stipa leucotricha*; Texas Parks and Wildlife Department [TPWD] 2013).

The modern vegetation in the project area is depicted in Figure 2-3 (TPWD 1984). The project area is located in an urban area. Currently, Live Oak-Ashe Juniper Woods, distributed chiefly on shallow limestone soils on the hills and escarpment of the Edwards Plateau, and Live Oak-Mesquite-Ashe Juniper Parks and Live Oak-Ashe Juniper Parks, found on level to gently rolling uplands and ridge tops of the Edwards Plateau, dominate the landscape to the north of San Antonio. Cropland with pockets of Mesquite-Live Oak-Bluewood Parks, primarily located in Uvalde, Medina, and Bee Counties on the South Texas Plains, and Post Oak Woods/Forest and Post Oak Woods Forest with Grassland Mosaic, distributed mostly on the sandy soils of the Post Oak Savannah, covers most of the areas to the south, east and west

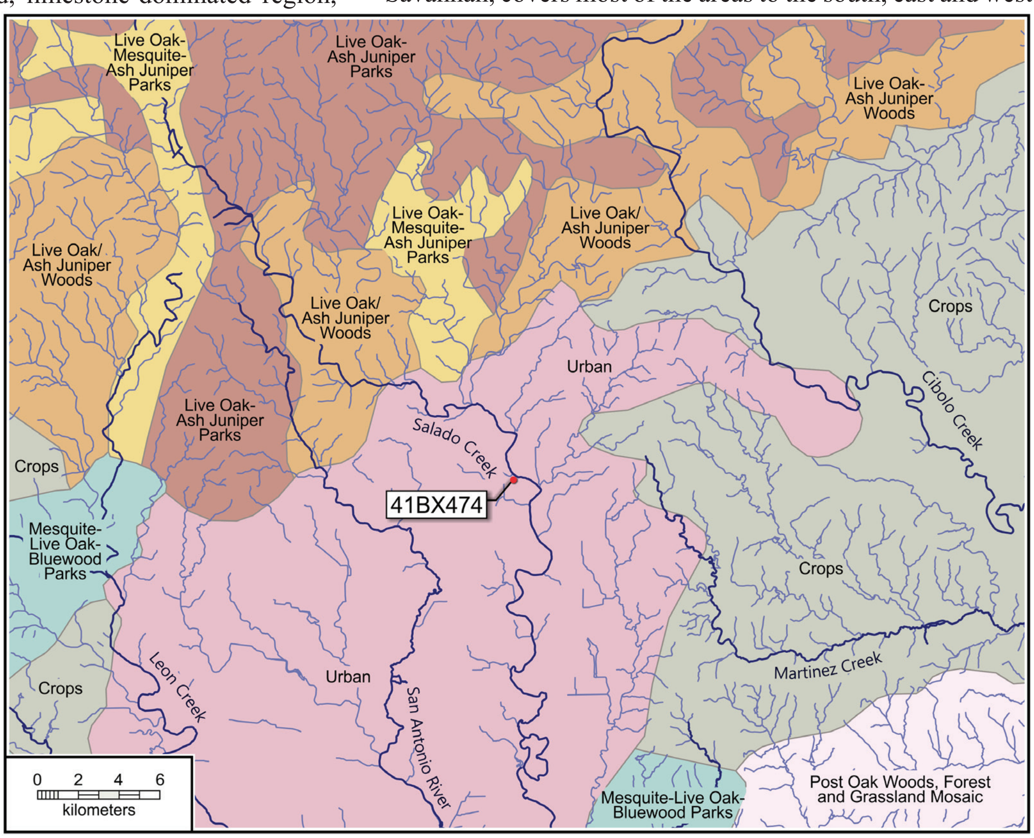

Figure 2-3. *Modern vegetation in the project area.*

(TPWD 2013). It is likely that prior to European settlement of the region in the mid-1800s, grassland was more common and the juniper, mesquite, woody brush, and shrubs that dominate the region today had a more restricted distribution.

Present day fauna occupying the area include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), fox squirrel (*Sciurus niger*), eastern cottontail rabbit (*Sylvilagus floridanus*), and turkey (*Meleagris gallopavo*), in addition to other mammals, snakes, and reptiles (Blair 1950). Prehistorically, important economic species in the area included bison (*Bison bison*), pronghorn antelope (*Antilocapra americana*), and black bear (*Ursus americanus*; Gerstle et al. 1978), along with deer and a variety of smaller animals.

Climate

Climate in this general area is classified as humid subtropical with hot, humid summers and mild, dry winters. The length of the growing season in Bexar County is roughly 265 days per year (Long 2014). Figure 2-4 presents the average minimum and maximum monthly temperatures in San Antonio, Texas, between 1971 and 2000 (National Oceanic and Atmospheric Administration [NOAA] 2004). Throughout these three decades the coolest months occurred in December and January and the warmest in July and August. Between 1971 and 2000 the average annual precipitation in San Antonio was 32.9 inches (835.7 mm). Rainfall peaks in May and June with a smaller peak in October, indicating a bimodal pattern (Figure 2-5). The driest periods fall in the winter to early spring with December, January, February, and March having an average of 1.82 inches (46.1 mm) of rain each (NOAA 2004).

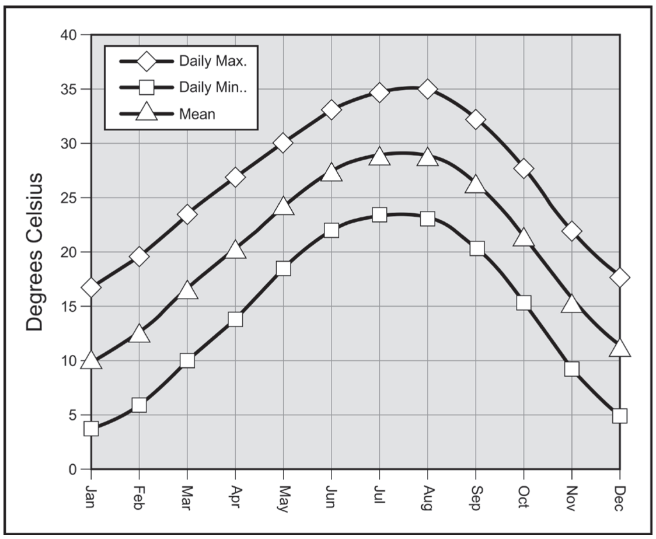

Figure 2-4. *Average maximum, minimum, and mean temperatures for San Antonio, Texas, (1971-2000).*

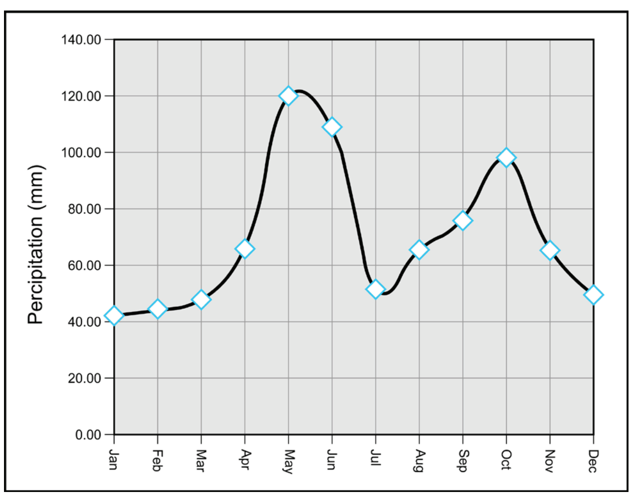

Figure 2-5. *Average precipitation for San Antonio, Texas, (1971-2000).*

Geology and Soils

Adapted from the San Antonio sheet of the Geological Atlas of Texas (Barnes 1983), Figure 2-6 shows the geology of the general project area. The project area is contained within Pliocene/Pleistocene age deposits of low terrace deposits (Qat) and fluviatile terrace deposits (Qt) that are associated with the Edwards Plateau. These deposits often contain chert gravel. Large deposits of Pecan Gap Chalk (Kpg) and smaller pockets of Austin Chalk (Kau) and Navarro Group and Marlbrook Marl (Kknm), all dating to the Upper Cretaceous, are located within a 5 km radius of the project area. Kpg, Kau, and Kknm formations are all devoid of chert, but Kknm is noted to contain sandstone. A deposit of Pliocene/Pleistocene age Uvalde Gravel (Q-Tu) is located on the far southern edge of the 5 km radius. Q-Tu is known to contain well-rounded cobbles of chert, as well as quartz and limestone (Barnes 1983). The projects area's setting on terrace deposits and its close proximity to a deposit of Q-Tu would have provided the inhabitants of 41BX474 easy access to material well suited to tool manufacture.

The soils in the immediate vicinity of the active channel, presented in Figure 2-7 are described as frequently flooded Trinity and Frio Soils (Tf). These soils occur as narrow, irregularly shaped areas on the flood plains of small streams and larger drainage ways. Tf soils range from 1-1.5 m deep and consist of a surface layer of clay loam and a subsurface layer of clay with pockets of thin loamy strata (Soil Survey Staff 2014). The soils abutting the active channel are identified as Lewisville silty clays (Lv), Patrick soils (Pa), and Tarrant association (Ta). The Lv series consists of moderately deep, dark colored, alluvial soils. Pa contain shallow, calcareous clay loam. The Ta series is characterized by gently undulating, stony, clay loam overlying shallow bedrock (Soil Survey Staff 2014).

Paleoenvironment

The introduction of fire suppression, domestic livestock, and fencing, all related to European settlement, has altered the landscape significantly from its condition during the prehistoric occupation of 41BX474. Much of our current

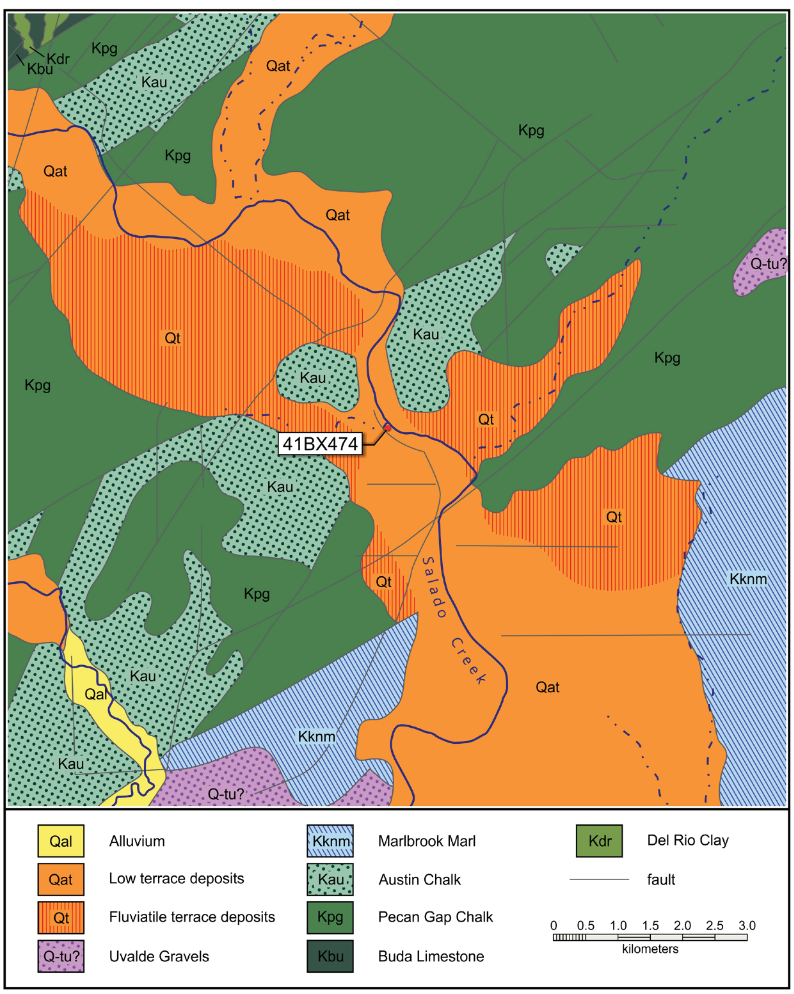

Figure 2-6. *Geological setting of 41BX474.*

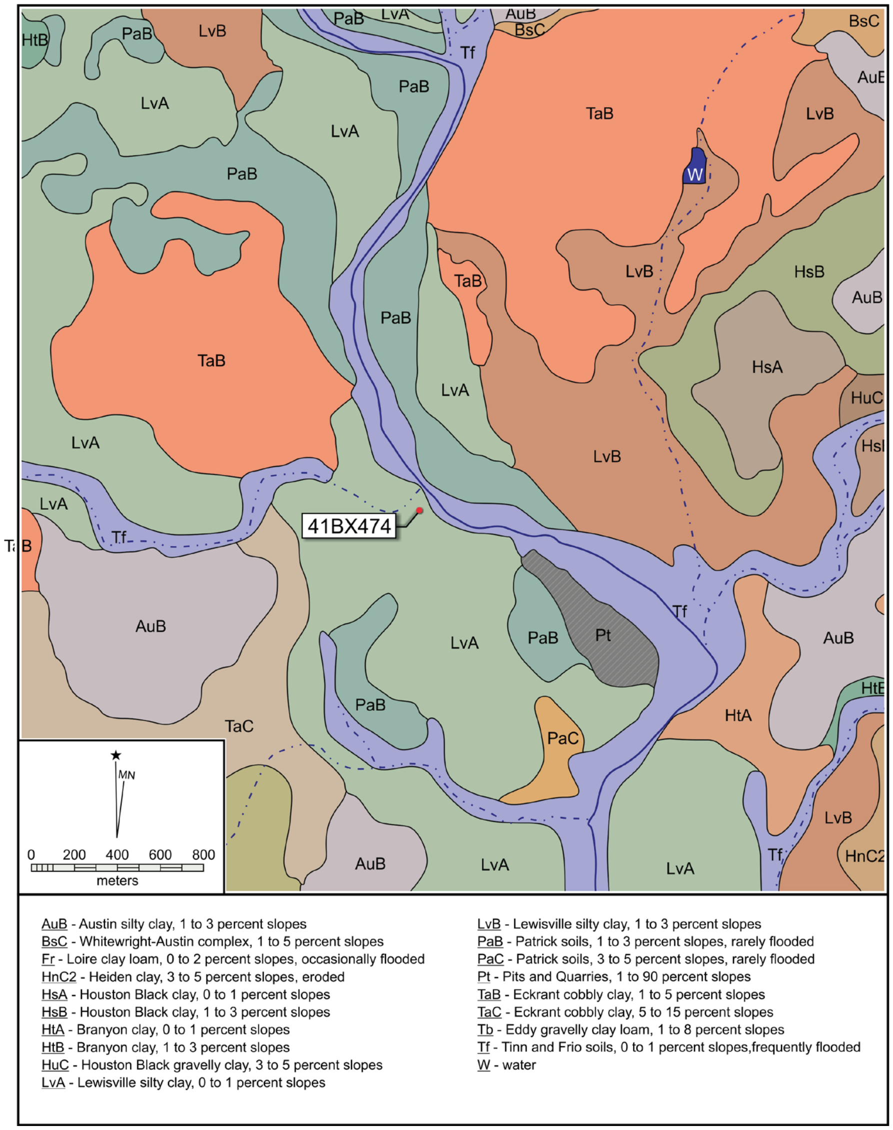

Figure 2-7. *Soils in the project area.*

knowledge about paleoenvironmental conditions in Central Texas in the Late Holocene is derived from climate studies using various proxy measures including the presence/absence of bison, pollen data, geomorphological shifts in alluvial deposition along major streams, cave humins, and fluctuations in shrew species in cave deposits (see Bousman 1998; Camper 1991; Collins 2004; Cooke 2005; Dillehay 1974; Johnson and Goode 1994; Mauldin et al. 2012a; Nickels and Mauldin 2001; Nordt et al. 2002; Toomey 1993; Toomey et al. 1993). Overall, these long-term data sets suggest a relatively mesic period with warmer temperatures as indicated by extensive grasslands/C_4 vegetation regimes during most of the Middle and Late Archaic. Grasslands seem to be at their peak in the early portion of the Late Archaic, and then began a slow, gradual decline until the close of that period. The data sets suggest that a different pattern, one of rapidly declining grasslands, is characteristic of at least the last 1,000 years. Information on paleoclimate at short temporal scales, the scale that would allow us to fully investigate the degree to which essentially modern fluctuations in grasslands may be characteristic of past vegetation regimes is currently sparse (for carbon, nitrogen, and oxygen isotopic research into past ecological conditions see Mauldin and Munoz 2013; Mauldin et al. 2013; Mauldin et al. 2012b; Munoz et al. 2011a; Munoz et al. 2011b; Paul and Mauldin 2013; Smith et al. 2014).

Paul and Mauldin (2013) studied the carbon and oxygen isotopic composition of archaeological snail shell carbonate from the Flatrock Road site (41KM69) in Central Texas. The data strongly suggest a progressively wetter climate in the Holocene with warm/arid conditions at 2000 BP followed by progressively cooler and wetter conditions to the present. These conditions imply a stable climate that would have supported C_3 vegetation.

Using stable carbon isotopic values from bone collagen and carbon values from bone apatite carbonate from prehistoric human skeletal samples in Central Texas, Mauldin and Munoz (2013) explored climate and resource use relationships over the Middle and Late Holocene. A series of macrophysical climate models (MCM) focusing on precipitation were developed to assess the impact of climate shifts on the isotopic results. For the Middle Holocene the resulting carbon isotope data trends patterned with C_3 production expected by the modeled precipitation values, i.e. increasing C_3 production and increasing C_3 dependence in the isotopic data to approximately 3900 BP followed by a decline in C_3 production and dependence in the isotopes to 3000 BP. After this point, however, divergences in the MCM data (flat to slightly increasing C_3 production) and isotope values (rapid C_3 increase followed by a decline) suggest changes in Late Holocene resource use. Mauldin and Munoz (2013) conclude that the divergence in the two data sets are possibly a reflection of regional population density changes, shifts in mobility patterns, or changes in social alliances.

Munoz et al. (2011b), as part of NRHP eligibility testing of the Granberg site (41BX17/271), compiled information from data sets gathered from gastropod and phytolith species as proxy indicators of paleoclimate. The Granberg site contained cultural components dating from the Middle to the Late Archaic period and lies on the Salado Creek approximately 280 m northeast of 41BX474. Results from the data suggest that in the Late Middle Archaic period, climatic conditions were relatively dry and that the forest or woodland canopy was moderately open. After this initial xeric period, conditions changed to become cooler, wetter, and more forested. Both the gastropod analysis and the phytolith analysis support this mesic interval with an increase in wooded habitat and a corresponding decrease in open habitat snail species, and the presence of Rondel and bulliform phytoliths, both indicative of wetland plants. At the transition from the Middle to Late Archaic, woodland and open habitat snail species are both abundant, suggesting a more xeric climate and wetland phytoliths gradually decrease indicating an overall trend from mesic to more xeric conditions. As the Late Archaic commences the environment becomes increasing wetter and cooler. The site level findings at 41BX17/271 correlate relatively well with the overall pattern apparent in the Middle and Late Archaic portions of the pollen and soil carbonate sequences in the long term data (Bousman 1998; Camper 1991; Cooke 2005; Nickels and Mauldin 2001; Nordt et al. 2002).

Cultural History

The cultural history of Central Texas is defined by four major cultural time periods: Paleoindian, Archaic, Late Prehistoric, and Historic. These periods are further divided into sub-periods that are based on particular subsistence strategies and material culture. Because the testing of 41BX474 uncovered cultural materials from the Late Archaic sub-period of the Archaic to the Terminal Late Prehistoric periods, neither earlier periods nor the Historic period are discussed in this report. The 2013 Laurens Lane survey report (Munoz 2013) presents descriptions of each of the four major time periods as well as a brief discussion of the Historic period.

Late Archaic

The Archaic period (8800-1200 BP) is identified as a period of intensification of hunting and gathering and a move toward greater exploitation of local resources. As a result, a broadening of the material culture is evident, including changes in projectile points and the "extensive use of heated rock" in cooking (Collins 1995:383). A broadening in food processing technologies is evident from a widespread increase in hearth, oven, and midden features (Black and McGraw 1985).

The final interval of the Archaic in Central Texas dates from 4000 to 1200 BP (Collins 2004). There is not a consensus among researchers as to population size in this sub-period. Prewitt (1985) posits an increase while Black (1989) believes populations remained the same or decreased. There is also disagreement as to the continuing use of burned rock middens. Prewitt (1981) suggests the near cessation of the midden construction, whereas excavations at a number of sites document large cooking features up to 15 m in diameter (Black and Creel 1997; Houk and Lohse 1993; Johnson 1995; Mauldin et al. 2003). Bison reemerge during this sub-period in Central Texas (Mauldin et al. 2012a; Mauldin et al. 2010) after evidence of a definitive decrease during the Middle Archaic (Dillehay 1974). Projectile points from the Late Archaic sub-period are generally smaller than those of the Middle Archaic and include Bulverde, Pedernales, Kinney, Lange, Marshall, Marcos, Montell, Castroville, Ensor, Frio, and Darl types (Collins 1995, 2004; Hester 2005; Turner and Hester 1999). During this period, large cemeteries were formed indicating an increasing population and the subsequent establishment of territories (Black and McGraw 1985). The earliest occurrences are at Loma Sandia (Taylor and Highley 1995), Ernest Witte (Hall 1981), Hitzfelder Cave (Givens 1968; Munoz et al. 2013), Olmos Dam (Lukowski 1988), and Granberg (Munoz et al. 2011b; Schuetz 1966). Late Archaic sites are usually located near modern stream channels and occur in all topographic settings (Black 1989; Hester 2004).

Late Prehistoric

The Late Prehistoric period (1200-350 BP) in Central Texas marks a distinctive shift from the use of the atlatl and dart to the use of the bow and arrow (Black 1989; Collins 2004; Hester 2004; Story 1985). The Late Prehistoric is subdivided into early and late sub-periods termed Austin and Toyah Phases, respectively (Prewitt 1981). Temporal diagnostics, including Scallorn and Edwards arrow points, define the Austin Phase (1200-650 BP; Prewitt 1981). The use of burned rock middens may have reached its peak during this phase (Black and Creel 1997). The subsequent Toyah Phase spans 650-350 BP and includes the first occurrence of pottery in South Texas (Black 1989). Characteristic artifacts of this phase include Perdiz arrow points (Black 1986). Material culture associated with the Late Prehistoric period indicates increasing complexity in subsistence patterns and large prehistoric populations (Black 1989; Collins 2004).

2013 Survey Results of 41BX474

Site 41BX474 is located on a terrace overlooking Salado Creek. It was originally recorded during a CAR survey for the Tobins Oakwell Farms project (McGraw and Valdez 1977). The site was revisited as part of a 2013 pedestrian survey for the proposed Laurens Lane connection trail (Munoz 2013). The large prehistoric site runs alongside Ira Lee Road. Prior to the road's construction the site likely extended to the west for an unknown distance. Initially recorded as three individual sites (41BX474, 41BX475, and 41BX476; McGraw and Valdez 1977), the site stretches approximately 301 m northwest/southeast by 45 m southwest/northeast and contains an area of approximately 2.7 acres (1.1 ha).

The CAR (Munoz 2013) performed a surface reconnaissance with shovel tests to more precisely define the boundaries of the three sites (Figure 2-8). At least 17 surface artifacts were recorded eroding downslope in eight locations along the proposed alignment in the vicinity of 41BX475, including four cores, three pieces of debitage, one edge modified flake, and a cluster of lithic artifacts consisting of a minimum of 10 pieces of debitage and cores. To determine if sites 41BX474, 41BX475, and 41BX476 were part of one larger site, the CAR staff walked the areas between the sites to record additional surface artifacts. The narrow terrace on the western half of the proposed alignment ends immediately west of the start of the alignment at Ira Lee Road at Laurens Lane. The property slopes steeply from the road to the Salado Creek channel. One additional piece of debitage was noted on the slope in the location of site 41BX474. No additional surface artifacts were recorded in the area near 41BX476.

Ten shovel tests (STs 5-14) were excavated on the terrace to attempt to establish whether 41BX475 and 41BX476 are part of the same site (see Figure 2-8). Nine of the ten shovel tests were positive for lithic artifacts producing 128 pieces of debitage, one core, one biface, one uniface, and one sherd of

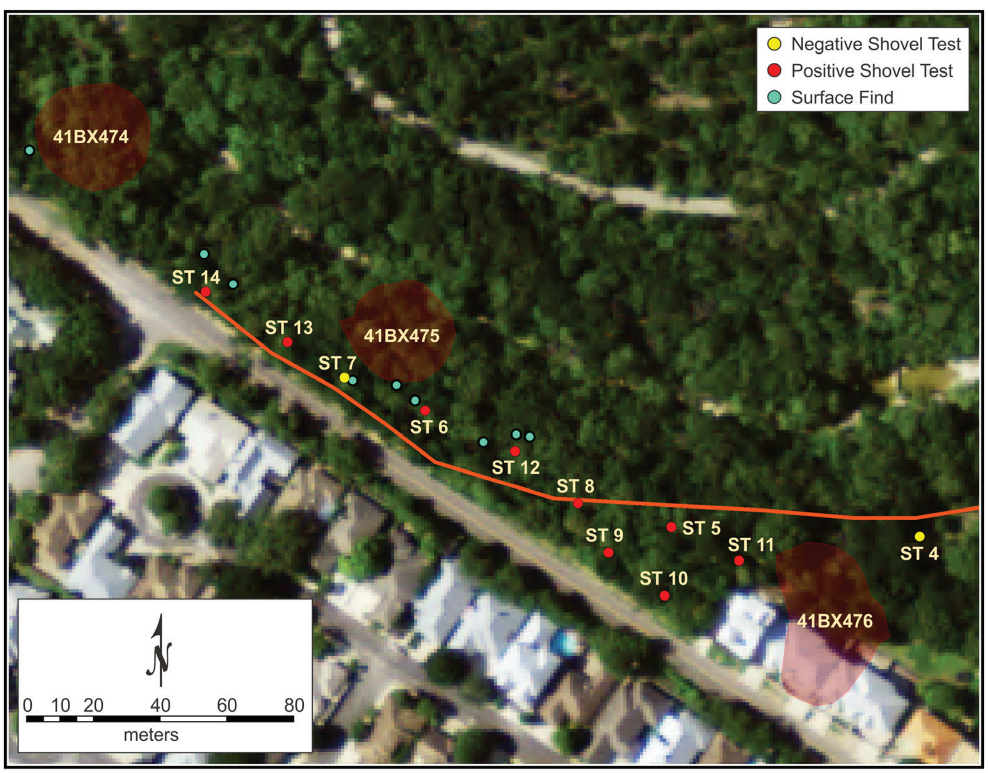

Figure 2-8. *Location of shovel tests and surface artifacts along the proposed alignment near 41BX475 and 41BX476 during Phase I investigations (after Munoz 2013).*

white earthenware. Shovel test artifacts were recovered from all levels (0-60 cm below the surface [cmbs]). Because the terrace steeply drops off to the creek channel between ST 14 and the location of 41BX474, additional shovel tests could not be excavated northwest of the alignment. However, surface artifacts near the alignment are roughly 30 m southeast of the outer edge of 41BX474, suggesting that the cultural material is continuously eroding out of the terrace edge. Based on the spatial proximity of surface artifacts and positive shovel tests, the CAR recommended that sites 41BX474, 41BX475, and 41BX476 should be combined into one large site (renamed 41BX474; Munoz 2013).

Because the proposed trail alignment crosses and will therefore impact the previously defined sites, and due to the density and depth of buried prehistoric material on 41BX474, the CAR suggested that the site possesses potential for research and, therefore the CAR recommended that the site is potentially eligible for listing on the NRHP. The THC and the Office of Historic Preservation of the City of San Antonio both concurred with the recommendation that if the western portion of the trail could not be relocated, the NRHP eligibility of the cultural deposits will need to be determined prior to any further action on the planned construction.

Chapter 3: Field and Laboratory Methods

The proposed Laurens Lane connection alignment to the Salado Greenway will impact 41BX474. The previous survey indicated that the site has probable intact deposits (see Munoz 2013). The CAR provided the following services for this project: 1) application for the Texas Antiquities Eligibility Testing Permit; 2) NRHP testing of the site using a minimum of five hand excavated 1-x-1 m units; 3) laboratory processing and analysis of all artifacts recovered during the testing; 4) preparation of a draft and final report summarizing the results of the investigations; 5) recommendations regarding the NRHP eligibility of the area tested; 6) preparation of all artifacts and project related documentation for permanent curation at the CAR; and 7) coordination with the appropriate oversight agencies (Archeology Division of the THC) to seek cultural resources clearance of the project. This chapter presents the field and laboratory methods used during the archaeological investigations of 41BX474.

Field Methods

Based on cultural deposits identified in the survey, the CAR hand-excavated five 1-x-1 m test units on the terrace containing site 41BX474 to expose and document the vertical distribution and density of buried materials. The site covers approximately 1.7 acres (0.7 ha) of the project area. Test units and unit datums were set up prior to the commencement of field work using a Sokkia Total Data Station and Carlson data collector, and a Trimble Geo X GPS unit. The test units were distributed to include the entire terrace within the APE and to examine the nature of the deposits near shovel tests with high artifact concentrations (Figure 3-1). The test units were to be excavated in arbitrary 10 cm levels to a minimum of six levels below the surface (60 cmbs) or to sterile soils if artifact concentrations continued below 60 cm (Figure 3-2). Due to

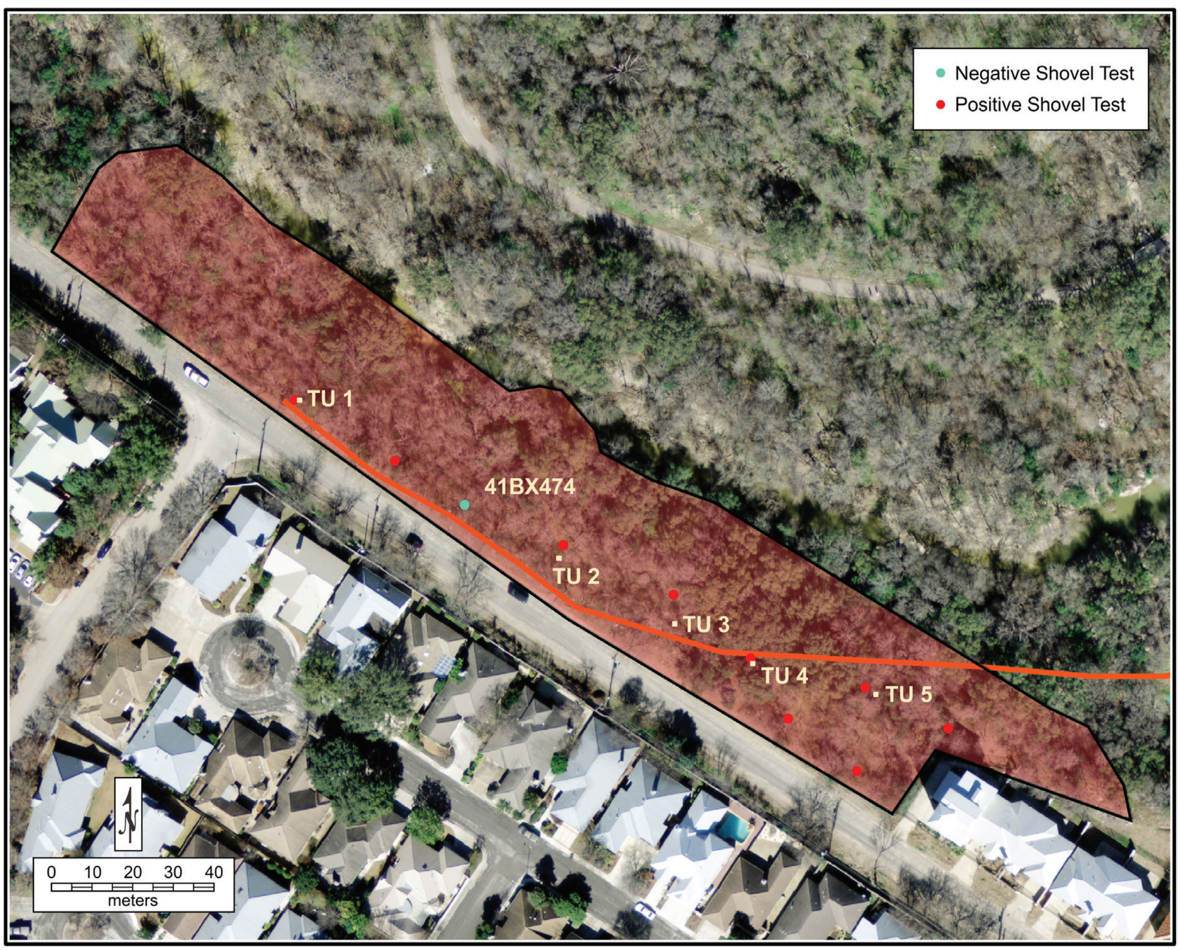

Figure 3-1. *Test units and shovel tests excavated on 41BX474.*

Figure 3-2. *Text excavation on 41BX474.*

excavator error, one unit, TU 3, was excavated in one 20 cm level and four 10 cm levels. The matrix removed from each level was screened through 1/4-inch hardware cloth. The depth of the test units did not exceed 150 cmbs. A test unit form was completed for each level. All recovered artifacts were bagged and referenced to the appropriate provenience. A small bag of matrix was collected from each level of every test unit, and sediments were described (texture, consistency, Munsell color, and inclusions). Additionally soil samples (6-x-10 cm bag) were collected every 5 cm from one wall of each test unit to determine soil magnetic susceptibility readings (n=62). One representative wall from each test unit was photographed and profiled. All material collected was returned to the CAR laboratory for processing and detailed analysis.

Archaeological Laboratory Methods

Cultural materials recovered from the testing procedures outlined above were inventoried and processed at the CAR laboratory at UTSA. All artifacts recovered were identified and analyzed. Proveniences for the materials were double checked through the use of a field sack number that was recorded on a field log form. Field sack numbers were assigned to all artifact bags in the field. At the CAR, all artifacts and samples were separated by type and recovery context to facilitate analysis. Processing of recovered artifacts began with washing and sorting into appropriate categories (e.g., debitage, bifaces, and cores). Individual categories were then analyzed by specific attributes designed for each group. All data was entered into Excel spreadsheets.

Cultural materials and records obtained and/or generated during the project were prepared in accordance with federal regulation 36 CFR part 79 and THC requirements for State Held-in-Trust collections. Artifacts processed in the CAR laboratory were washed, air-dried, and stored in archival-quality bags. Acid-free labels were placed in all artifact bags with a provenience and corresponding lot number. Tools were labeled with permanent ink and covered by a clear coat of acrylic. In addition, a small sample of unmodified debitage from each lot was labeled with the appropriate provenience data. Other artifacts were separated by class and stored in acid-free boxes.

Digital photographs were printed on acid-free paper and labeled with archivally appropriate materials and placed in archival-quality sleeves. All field forms were completed with pencil. Field notes, forms, photographs, and drawings were printed on acid-free paper and placed in archival folders. All archival folders were stored in acid-free boxes. A copy of this survey report and all computer media pertaining to the investigation were stored in an archival box and curated with the field notes and documents.

Following laboratory processing and analysis, and in consultation with both the COSA and the THC, all sediment samples, snail, and burned rock were discarded. This discard was in conformance with THC guidelines. Upon completion of the project, all remaining materials and records will be permanently curated at the CAR facility.

Chapter 4: Results of Testing at 41BX474

Phase II testing of 41BX474 occurred January 23 through January 29, 2014. Five 1-x-1 m test units revealed a high density of cultural material that was distributed both vertically and horizontally across the site. This chapter discusses the results of the test excavations.

Test units were spaced roughly evenly across the terrace based on the artifact distribution encountered in shovel testing during the 2013 survey of the project area (Munoz 2013). Recovered artifacts consist of 1,331 prehistoric artifacts and 982 gm of burned rock (n=195). Modern materials, including one fragment of ceramic, 33 shards of glass, 6 pieces of unidentified metal, and 9 specimens of modern trash, were also recovered (Table 4-1). Most of the historic material (98%) was uncovered in the upper 30 cm of excavated sediment. The excavation of TU 3 resulted in the most artifacts (906/m^3), followed by TU 2 (465/m^3), and TU 4 (319/m^3), suggesting that the highest density of material is located on the southern half of the site (Figure 4-1). No features, bone, or charcoal samples were identified during the test unit excavations. In total, 3.21 m^3 of sediment were excavated resulting in 415 prehistoric artifacts per cubic meter. Sediments across the site ranged from very dark grayish brown, loose to soft silty loams containing roughly 5% gravels in the upper levels transitioning to brown, compact silty clays with heavy gravel content in the lower levels. All five units terminated with 60% or more gravels with the initiation of heavy gravel concentration in TU 1 at 70-80 cm below datum (cmbd; 70%), in TU 2 at 50-60 cmbd (75%), in TUs 3 and 4 at 60-70 cmbd (70%), and in TU 5 at 100-110 cmbd (60%, Figure 4-2).

Sixty-two soil samples were collected for magnetic soil susceptibility (MSS) testing from TUs 1-5 from the surface to unit termination at 5 cm intervals. Collected in plastic bags, the samples were transported to the CAR laboratory where they were air dried and then crushed using a ceramic mortar and pestle. The sediment was then screened through a 2 mm plastic sieve, with material passing the sieve packed into plastic pots (10 cm^3). The mass of the sample was determined by subtracting the weight of the pots. Low frequency volume susceptibility (kappa, κ) was measured on a Bartington MS2 meter with an MS2b sensor, and the mass corrected magnetic susceptibility (chi, χ) values were calculated using the sample mass (see Dearing 1999). The values obtained from the test units are reported in Table 4-2 in SI units ($10^{-6}m^3kg^{-1}$).

In archaeological research, MSS has primarily been used to attempt to identify buried soils that are possibly associated with occupation (e.g., Takac and Gose 1998) and as a method for identifying sediment (Bellomo 1983; Dalan and Banerjee 1998) or rock associated with hearths (Mauldin and Figueroa 2006). Although the measure of susceptibility is initially dependent on the concentration and grain size of ferro- and ferrimagnetic minerals, other processes, such as increases in the mineralogy and organic constitutes of sediments of a given sample, can cause an increase in MSS values in a sediment sample (see Collins et al. 1994; McClean and Kean 1993; Singer and Fine 1989). Higher organic content tends to result in sediments with higher magnetic susceptibility values. This may be caused by maghemite produced during organic decay (Reynolds and King 1995). A concentration of organic material can be the result of soil formation and weathering, as well as changes in the mineralogy of a given zone. These processes can significantly increase susceptibility readings. Cultural processes, such as the concentration of organic refuse, ash, and charcoal, would also produce higher MSS readings (Mauldin 2003; Munoz 2011).

Test Unit 1

Test Unit 1 was located near ST 14, excavated in 2013 as part of the alignment survey (Figure 4-3). Thirty specimens of debitage were recovered in Levels 1–5 (0-50 cmbs) of the shovel test with 57% of the specimens coming from the upper 10 cm (Munoz 2013). The test unit datum was located off the western half of the south wall. The soils from this unit consisted of very dark grayish brown, silty clay loam from the surface to approximately 16 cmbs; dark brown, silty clay loam to approximately 48 cmbs; and yellowish brown, silty clay loam with 70% gravels to termination at 55 cmbs (Figure 4-4). Carbonate nodules were noted in the lower levels (35-55 cmbs).

Cultural materials retrieved from TU 1 include lithic debitage (n=138), tools (n=4), points (n=2), and burned rock (248 gm; see Table 4-1). Snail shell was present in Levels 2, 3, and 5 (5-25 and 35-45 cmbs). Historic materials, consisting of glass (n=6) and unidentified metal (n=1), were uncovered in the first three levels (0-25 cmbs). The vertical distribution of artifacts (debitage and tools) indicates a peak in Level 3 (15-25 cmbs; Figure 4-5). The highest density of artifacts were in Level 1 (0-5 cmbs, 60 per 10 cm level), followed by Levels 3 (51 per 10 cm level) and 2 (5-15 cmbs, 46 per 10 cm level; Table 4-3). A plot of MSS values relative to depth in relation to the test unit profile (see Figure 4-4 and Table 4-2) shows one peak that appears to reflect buried surfaces with prehistoric associations. The peak is present at 17.5 cmbs in

Table 4-1. Artifacts Recovered from the Eligibility Testing of 41BX474

TU	Level	Depth (cmbs)	Debitage	Modified Flake	Point	Biface	Core	Total Lithics	Burned Rock (n)	Burned Rock (gm)	Ceramic	Glass	Metal	Modern Trash
1	1	0-5	30					30	15	48.8		3		
	2	5-15	45	1				46	14	173.9		3		
	3	15-25	49		2			51	6	8.1			1	
	4	25-35	8			2		10	7	13.6				
	5	35-45	5			1		6	2	1.7				
	6	45-55	1					1	1	2.0				
	Total		138	1	2	3	0	144	45	248.1	0	6	0	0
2	1	0-7	28	1		3		32				10	3	
	2	7-17	76	1				77	11	35.4		5	1	1
	3	17-27	53					53	12	105.6		1		
	4	27-37	84	1	1	1		87	12	117.1				
	5	37-47	16					16						
	6	47-57						0						
	Total		257	3	1	4	0	265	35	258.1	0	16	4	1
3	1	0-4	15					15	3	7.6		2		6
	2	4-14	189		1	2	1	193	22	21.5		4	1	
	3	14-34	243	1		3		247	28	265.2		1		
	4	34-44	34					34	8	7.8				
	5	44-54						0						
	Total		481	1	1	5	1	489	61	302.1	0	7	1	6
4	1	0-5	9					9	1	1.6		3		
	2	5-15	55	1	1	3		60	13	43.5		1		
	3	15-25	44	2				46	4	4.6				1
	4	25-35	63	1		1		65	3	2.7				1
	5	35-45	15			1		16	6	24.9				
	6	45-55	10			1		11	1	3.1				
	7	55-65						0						
	Total		196	4	1	6	0	207	28	80.4	0	4	0	2
5	1	0-10	39		1	1		41	5	39.2			1	
	2	10-20	42	1				43	9	16.9	1			
	3	20-30	12					12						
	4	30-40	26					26	3	2.4				
	5	40-50	24					24	2	3.7				
	6	50-60	44					44	7	30.8				
	7	60-70	18					18						
	8	70-80	17					17						
	9	80-90	1					1						
	Total		223	1	1	1	0	226	26	93.0	1	0	1	0
Grand Total			1,295	10	6	19	1	1,331	195	981.7	1	33	6	9

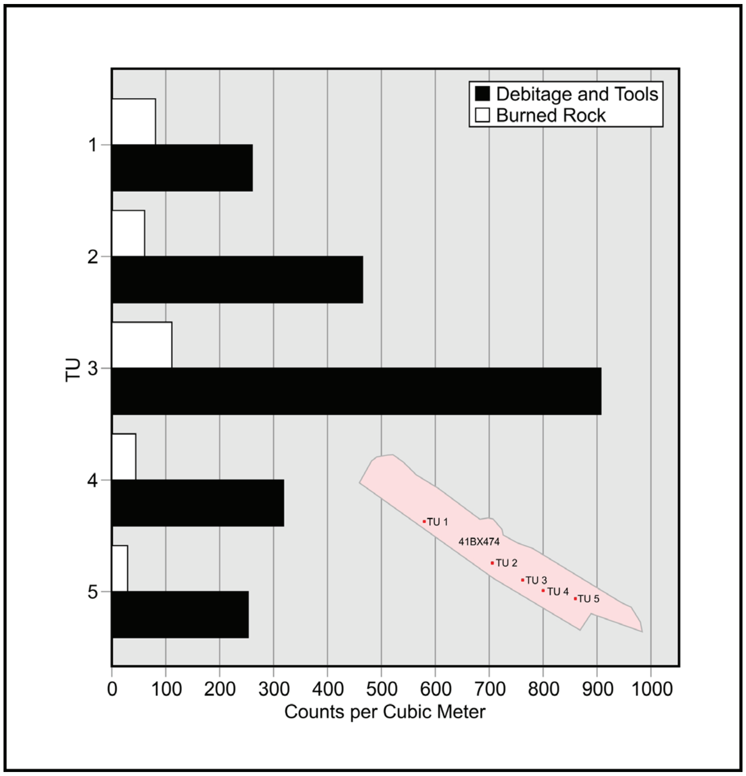

Figure 4-1. *Number of lithic artifacts and burned rock per cubic meter from TUs 1-5 on 41BX474.*

Figure 4-2. *Test Unit 5 profile (note gravel lens in lower levels).*

Table 4-2. MSS Values of Sediments from TUs 1-5 on 41BX474

TU	Mid-point Depth (cmbs)	Sample Weight	K Reading	MSS Value ($10^{-6}m^3kg^{-1}$)	TU	Mid-point Depth (cmbs)	Sample Weight	K Reading	MSS Value ($10^{-6}m^3kg^{-1}$)
1	7.5	9.4	89.2	0.948	4	2.5	9.4	87.9	0.935
1	12.5	9.8	96.4	0.984	4	7.5	9.9	104.7	1.058
1	17.5	10.0	103.6	1.036	4	12.5	9.9	107.4	1.084
1	22.5	9.8	95.4	0.973	4	17.5	9.9	99.8	1.008
1	27.5	9.9	92.0	0.929	4	22.5	9.4	96.7	1.029
1	32.5	10.0	92.3	0.923	4	27.5	9.6	96.8	1.008
1	37.5	9.7	86.3	0.889	4	32.5	9.9	94.8	0.957
1	42.5	10.0	82.6	0.826	4	37.5	9.7	87.4	0.901
1	47.5	9.9	75.3	0.761	4	42.5	10.0	85.3	0.853
1	52.5	9.8	72.4	0.738	4	47.5	9.8	77.5	0.790
2	4.5	10.1	86.2	0.853	4	52.5	10.0	76.4	0.764
2	9.5	9.4	91.7	0.975	4	57.5	10.2	71.5	0.700
2	14.5	9.8	109.1	1.113	4	62.5	10.1	67.8	0.671
2	19.5	9.6	103.4	1.077	5	7.5	9.4	78.8	0.838
2	24.5	9.7	104.6	1.078	5	12.5	9.7	89.9	0.927
2	29.5	10.0	102.9	1.029	5	17.5	9.9	95.6	0.965
2	34.5	9.7	96.6	0.995	5	22.5	9.5	92.6	0.974
2	39.5	10.1	87.1	0.862	5	27.5	9.9	95.3	0.962
2	44.5	10.0	84.0	0.840	5	32.5	9.5	93.3	0.982
2	49.5	9.7	78.5	0.809	5	37.5	9.8	89.6	0.914
2	54.5	9.5	53.1	0.558	5	42.5	10.1	80.7	0.799
3	1.5	9.7	98.8	1.018	5	47.5	9.9	84.6	0.855
3	6.5	9.4	109.4	1.163	5	52.5	9.4	76.3	0.812
3	11.5	9.5	112.2	1.181	5	57.5	9.7	73.7	0.760
3	16.5	9.6	109.8	1.143	5	62.5	9.6	71.8	0.747
3	21.5	9.8	104.7	1.068	5	67.5	10.0	70.0	0.700
3	26.5	9.8	105.5	1.077	5	72.5	9.8	85.8	0.875
3	31.5	9.2	78.9	0.857	5	77.5	10.0	62.1	0.621
3	36.5	9.8	84.6	0.863	5	82.5	9.8	58.3	0.594
3	41.5	10.0	65.3	0.653	5	87.5	10.2	55.7	0.546
3	46.5	9.9	64.8	0.654					
3	51.5	10.0	62.8	0.628					

association with the transition between Sediments 1 and 2 in the profile. The high density of artifacts in Level 3 (15-25 cmbs) corresponds to the MSS peak.

Two diagnostic artifacts were recovered from TU 1, an Edgewood and a Bulverde dart point. The Edgewood, assigned a Terminal Late Archaic date range from 1600-1250 BP, was removed from Level 3 (15-25 cmbs) near the transition between Sediments 1 and 2. The Bulverde point, dating to the Initial Late Archaic (4450-2500 BP), was recovered 24.5 cmbs in Sediment 2 (see Figure 4-4; Collins 2004; Thompson et al. 2012; Turner and Hester 1999). In addition to the diagnostics, two bifaces were recovered from Level 4 (25-35 cmbs) and one from Level 5 (35-45 cmbs). The tools will be discussed in more detail in Chapter 5.

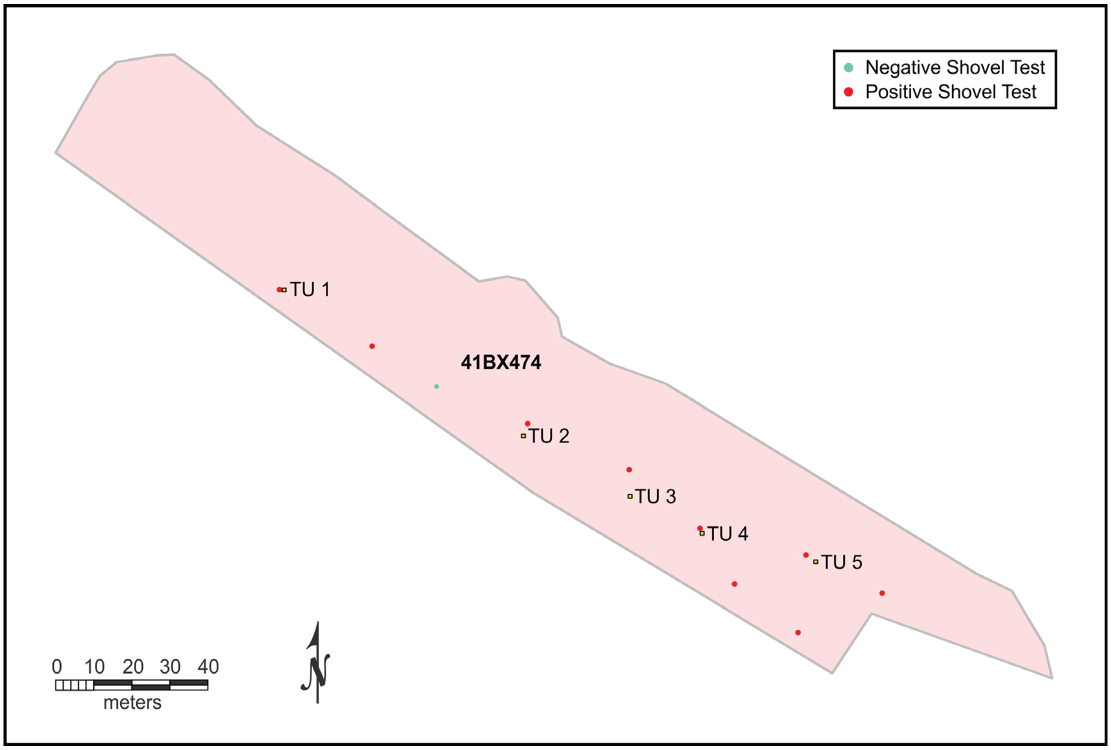

Figure 4-3. *Test unit locations in relation to shovel tests previously excavated during the 2013 Phase I survey of the project area.*

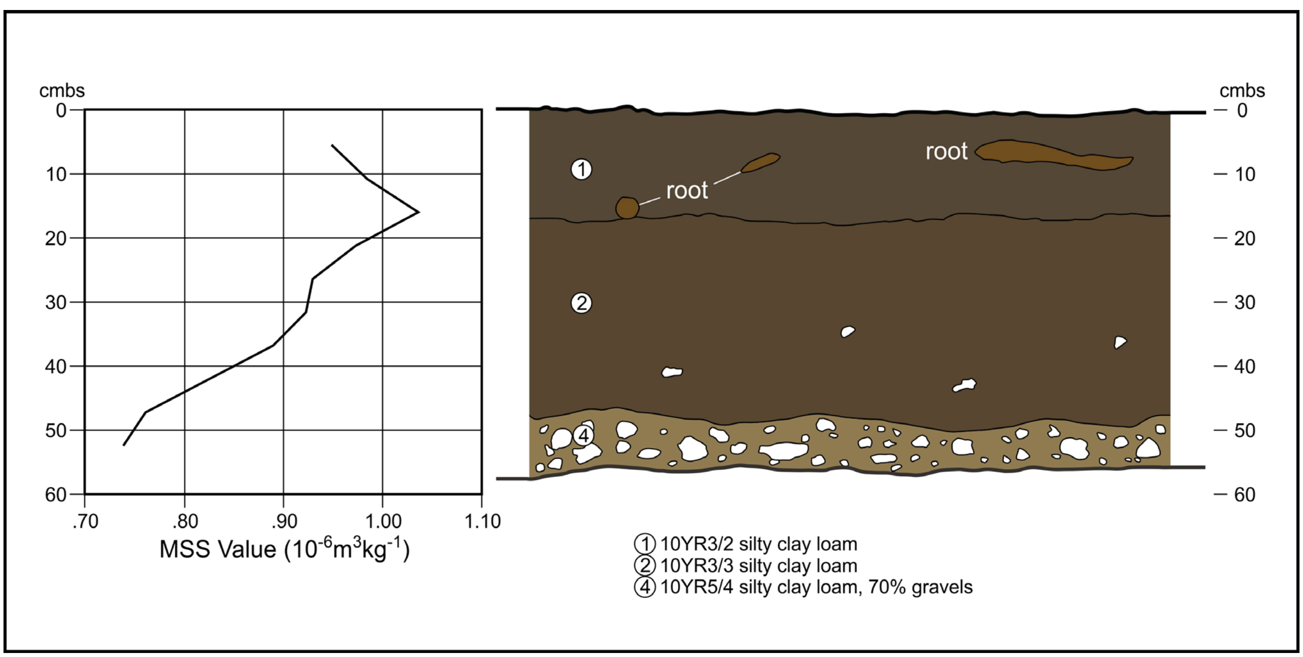

Figure 4-4. *Test Unit 1 south wall profile and results of magnetic susceptibility testing.*

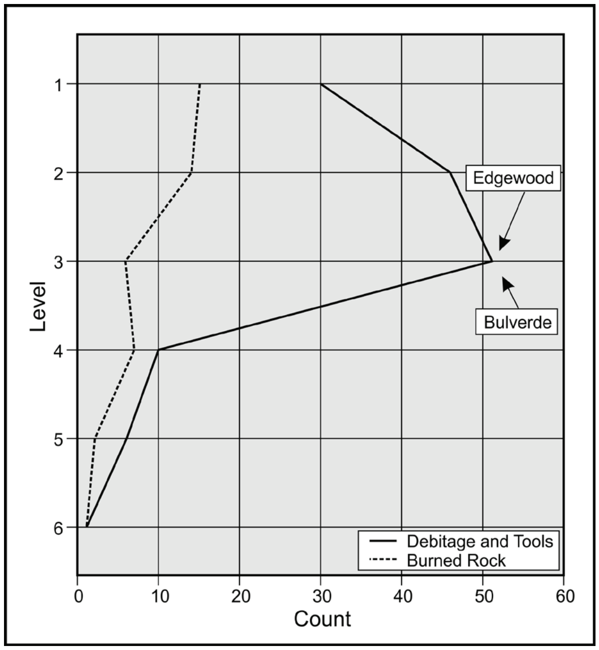

Figure 4-5. *Counts of burned rock, debitage, and tools from Test Unit 1.*

Table 4-3. Density of Lithic Artifacts in TU 1

Level	Top Depth (cmbd)	Bottom Depth (cmbd)	Lithic Artifacts (n)	Lithic Artifacts (density/10 cm level)	Burned Rock (n)	Burned Rock (density/10 cm level)	Burned Rock (gm)	Burned Rock (gm/10 cm level)
1	25	30	30	60	15	30	48.8	97.6
2	30	40	46	46	14	14	173.9	173.9
3	40	50	51	51	6	6	8.1	8.1
4	50	60	10	10	7	7	13.6	13.6
5	60	70	6	6	2	2	1.7	1.7
6	70	80	1	1	1	1	2.0	2.0
Total			144	262/m	45	82/m	248.1	451.1 gm/m^3

Test Unit 2

Test Unit 2 was placed near ST 6 in the center of the site (see Figure 4-3). Artifacts, consisting of debitage (n=22) and one uniface, were recovered from the first five levels (0-50 cmbs) of the shovel test (Munoz 2013). The test unit datum was located off the southern corner of the west wall. The soils in TU 2 consisted of three stratigraphic layers. Approximately 5 cm of very dark gray, silty humus transitioned to 25 to 34 cm of very dark grayish brown, silty clay. The final sediment consisted of dark grayish brown, silty clay loam with approximately 80% gravels to termination (57 cmbs; Figure 4-6).

Two hundred and sixty-five prehistoric artifacts, consisting of debitage (n=257), tools (n=7), one point, and burned rock (258 gm), were recovered from TU 2 (see Table 4-1). Snail shell was recorded in Levels 1, 2, 4, and 5 (0-17 cmbs and 27-47 cmbs). Historic materials, including glass (n=16), metal (n=4), and modern trash (n=1), were excavated from the upper three levels (0-27 cmbs). The highest density of artifacts (31%) was from Level 4 (27-37 cmbs), followed by Levels 2 (28%, 7-17 cmbs), and 3 (19%, 17-27 cmbs, Table 4-4). Figure 4-7 presents the vertical distribution of artifacts recovered from the unit. MSS values indicate one peak, at 14.5 cmbs, that suggests a buried surface (see Figure 4-6 and Table 4-2). The surface falls in Sediment 2 and corresponds to the artifact peak in Level 2 (7-17 cmbs; see Figure 4-7).

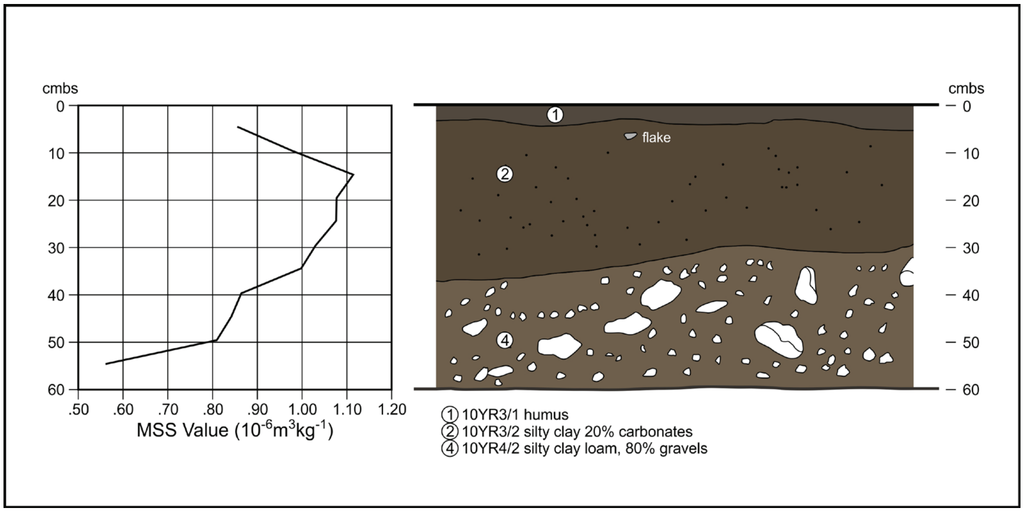

Figure 4-6. *Test Unit 2 east wall profile and results of magnetic susceptibility testing.*

Table 4-4. Density of Lithic Artifacts in TU 2

Level	Top Depth (cmbd)	Bottom Depth (cmbd)	Lithic Artifacts (n)	Lithic Artifacts (density/10 cm level)	Burned Rock (n)	Burned Rock (density/10 cm level)	Burned Rock (gm)	Burned Rock (gm/10 cm level)
1	23	30	32	46	0	0	0.0	0
2	30	40	77	77	11	11	35.4	35.4
3	40	50	53	53	12	12	105.6	105.6
4	50	60	87	87	12	12	117.1	117.1
5	60	70	16	16	0	0	0.0	0.0
6	70	80	0	0	0	0	0.0	0.0
Total			265	465/m	35	61/m	258.1	452.8 gm/m³

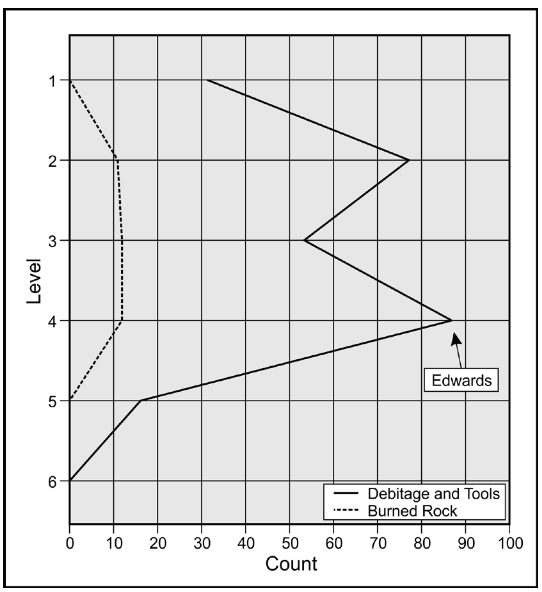

Figure 4-7. *Counts of burned rock, debitage, and tools from Test Unit 2.*

One diagnostic artifact, an Edwards arrow point, was excavated from TU 2. The point, associated with the Initial Late Prehistoric (Collins 2004; Thompson et al. 2012; Turner and Hester 1999), was removed from Level 4 (27-37 cmbs) near the bottom of Sediment 2 (see Figure 4-6). Three modified flakes, one each from Levels 1, 2, and 3, and four bifaces, from Levels 1 and 4, were also recovered.

Test Unit 3

Test Unit 3 was setup near ST 12 (see Figure 4-3). The shovel test, terminated at 40 cmbs upon hitting rock, produced 29 specimens of debitage, one core, and one ceramic fragment (Munoz 2013). The test unit datum was located off the western half of the south wall. The soils from this unit consisted of very dark grayish brown, silty clay loam from the surface to approximately 4 cmbs, very dark gray, silty clay with carbonates to approximately 30 cmbs, and dark grayish brown, silty loam with 70% gravels to termination (54 cmbs; Figure 4-8).

Cultural materials retrieved from TU 3 include lithic debitage (n=481), tools (n=6), points (n=1), and burned rock (302 gm; see Table 4-1). Snail shell was present in the upper 34 cm. Historic materials, consisting of glass (n=6) and unidentified metal (n=1), were uncovered in the first two levels (0-14

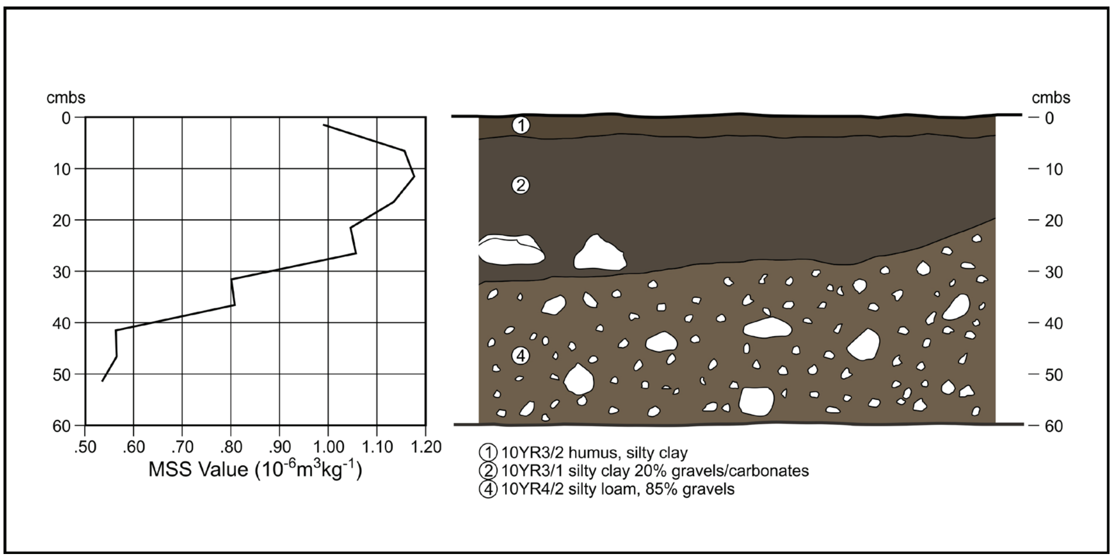

Figure 4-8. *Test Unit 3 east wall profile and results of magnetic susceptibility testing.*

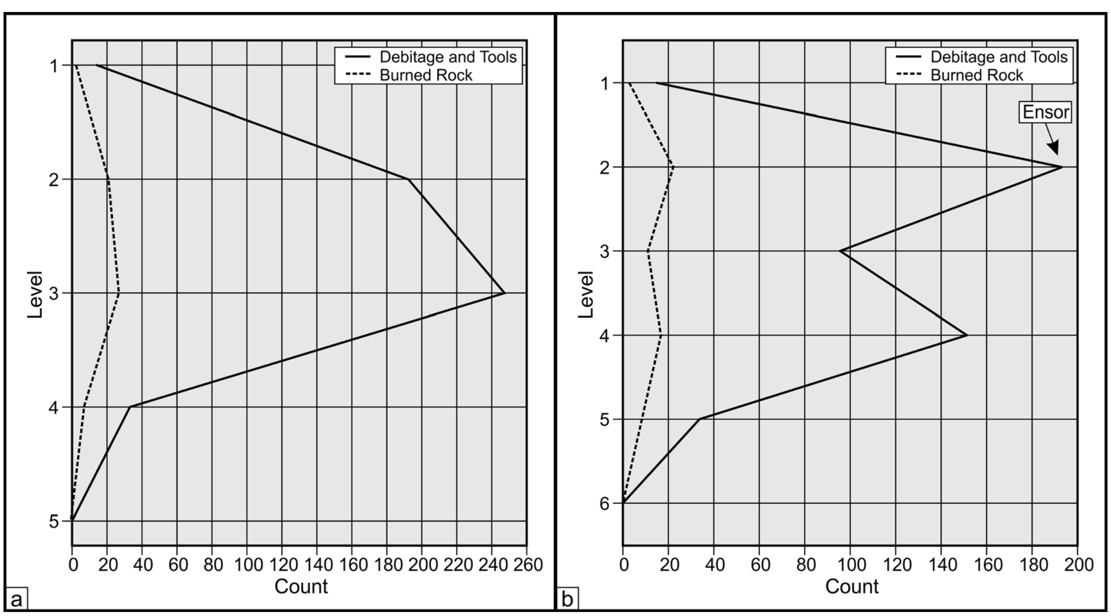

Figure 4-9. *Counts of burned rock, debitage, and tools from Test Unit 3 (a – with 20 cm level; b – with 20 cm split).*

Table 4-5. Density of Lithic Artifacts in TU 3

Level	Top Depth (cmbd)	Bottom Depth (cmbd)	Lithic Artifacts (n)	Lithic Artifacts (density/10 cm level)	Burned Rock (n)	Burned Rock (density/10 cm level)	Burned Rock (gm)	Burned Rock (gm/10 cm level)
1	26	30	15	38	3	8	7.6	97.6
2	30	40	193	193	22	22	21.5	173.9
3	**40**	**60**	**247**	**247**	**28**	**28**	**265.2**	**8.1**
4	60	70	34	34	8	8	7.8	13.6
5	70	80	0	0	0	0	0.0	1.7
Total			489	906/m	61	113/m	302.1	559.4 gm/m

Note that Level 3 is 20 cm.

cmbs) and one shard of glass was found from 14-34 cmbs. Due to an excavator error, Level 3 of TU 3 was excavated in one 20 cm level (14-34 cmbs). The vertical distribution of artifacts (debitage and tools) shows a peak in Level 3 (Figure 4-9a). Level 2 has the second highest density of artifacts (193 per 10 cm level; Table 4-5). To compare possible artifact peaks in TU 3 with MSS values and profile sediments, the lithic counts from 14-34 cmbs (Level 3) were split into two levels (14-24 and 24-34 cmbs) using percentages based on TUs 2 and 4's Levels 3 and 4 (Figure 4-9b). A plot of MSS values relative to depth in relation to the test unit profile (see Figure 4-8 and Table 4-2) shows one peak at 11.5 cmbs that appears to reflect buried surfaces within Sediment 2. The high density of artifacts in Level 2 (4-14 cmbs) corresponds to this peak. A second small peak at 26.5 cmbs, also in Sediment 2, may reflect the artifact spike from the Level 3 split (24-34 cmbs). It is conjecture, but the location of TU 3, in between TUs 2 and 4, a review of soil profiles, the MSS, and artifact densities, suggest that a second peak likely occurred.

One diagnostic artifact, an Ensor dart point was recovered from TU 3. The point, dated to the Terminal Late Archaic (1600-1250 BP; Collins 2004; Thompson et al. 2012; Turner and Hester 1999), was removed from Level 2 (4-14 cmbs) near the top of Sediment 2 (see Figure 4-8). In addition to the diagnostics, one modified flake and three bifaces were found 14-34 cmbs and two bifaces and one core were removed from Level 2 (4-14 cmbs).

Test Unit 4

Test Unit 4 was excavated near ST 8 (see Figure 4-3). Seventeen artifacts, consisting of 16 pieces of debitage and one biface were recovered from Levels 2-6 (10-60 cmbs) of the shovel test (Munoz 2013). The soils from this unit consisted of very dark grayish brown, silty clay loam from the surface to approximately 40 cmbs over dark grayish brown, silty loam with 70% gravels to termination (65 cmbs, Figure 4-10). The test unit datum was located off the southern corner of the west wall.

Debitage (n=196), tools (n=10), one point, and burned rock (80 gm) were recovered from TU 4 (see Table 4-1). Snail shell was present in all but Level 6 (45-55 cmbs). Four pieces of glass were found in the upper 15 cm, and two fragments of modern trash were recovered in Levels 3 and 4 (15-35 cmbs). The vertical distribution of artifacts (debitage and tools) indicates two peaks, in Level 2 (5-15 cmbs) and Level 4 (25-35 cmbs; Figure 4-11). The highest density of artifacts were in Level 4 (65 per 10 cm level), followed by Levels 2 (60 per 10 cm level), and 3 (46 per 10 cm level; Table 4-6). Of the two peaks that were evident from the plot of MSS values from TU 4 (see Figure 4-10), the upper peak in Sediment 2 (12.5 cmbs) corresponds to the artifact peak in Level 2 (5-15 cmbs). The lower MSS peak (22.5 cmbs) sits slightly above the lower artifact peak at Level 4 (25-35 cmbs; see Table 4-2).

One diagnostic artifact, a Bulverde dart point was recovered from Level 2 (5-15 cmbs) of TU 4. The point, associated with the Initial Late Archaic dates to 4450-2500 BP (Collins 2004; Thompson et al. 2012; Turner and Hester 1999). Four modified flakes (5-35 cmbs) and six bifaces (three from 5-15 cmbs and three from 25-55 cmbs) were also excavated from the unit.

Test Unit 5

Test Unit 5 was setup near ST 5 (see Figure 4-3). Eleven specimens of debitage were recovered from the shovel test's lower four levels (20-60 cmbs; Munoz 2013). The test unit datum was located off the southern corner of the east wall. The soil in TU 5 was composed of four stratigraphic layers. The top three levels consisted of silty loam transitioning from very dark

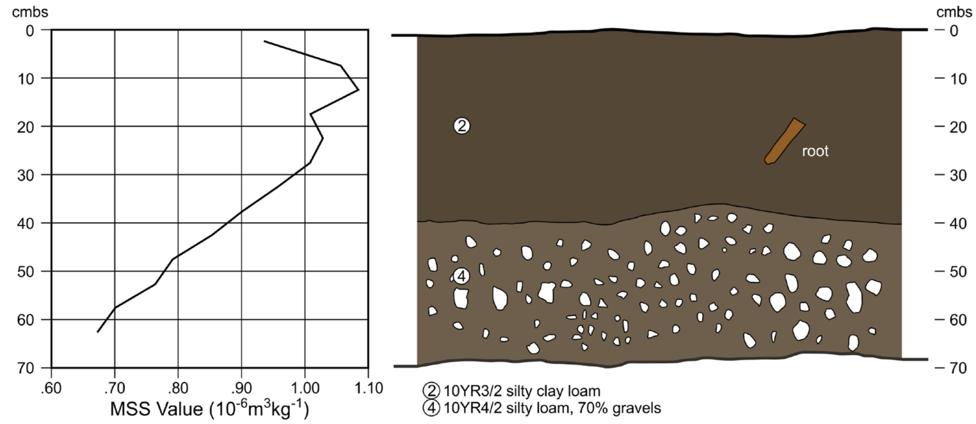

Figure 4-10. *Test Unit 4 west wall profile and results of magnetic susceptibility testing.*

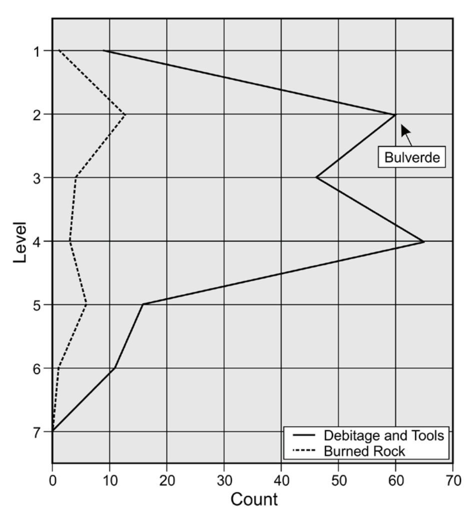

Figure 4-11. *Counts of burned rock, debitage and tools from Test Unit 4.*

Table 4-6. Density of Lithic Artifacts in TU 4

Level	Top Depth (cmbd)	Bottom Depth (cmbd)	Lithic Artifacts (n)	Lithic Artifacts (density/10 cm level)	Burned Rock (n)	Burned Rock (density/10 cm level)	Burned Rock (gm)	Burned Rock (gm/10 cm level)
1	25	30	9	18	1	2	1.6	3
2	30	40	60	60	13	13	43.5	43.5
3	40	50	46	46	4	4	4.6	4.6
4	50	60	65	65	3	3	2.7	2.7
5	60	70	16	16	6	6	24.9	24.9
6	70	80	11	11	1	1	3.1	3.1
7	80	90	0	0	0	0	0.0	0
Total			207	319/m	28	43/m	80.4	123.7 gm/m^3

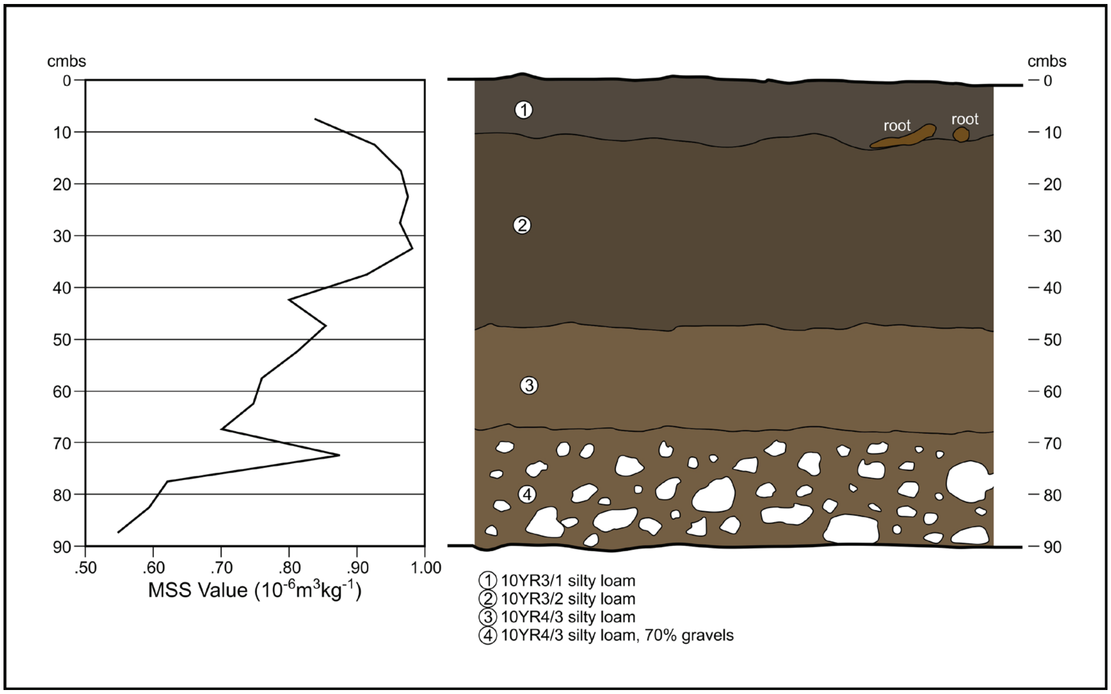

Figure 4-12. *Test Unit 5 south wall profile and results of magnetic susceptibility testing.*

gray to very dark grayish brown at approximately 10 cmbs, to brown soils at 48 cmbs. The lowest 23 cm contained brown, silty loam with 70% gravels (Figure 4-12). Carbonates were present as small flecks in Level 7 (60-70 cmbs) and as nodules in Levels 8 and 9 (70-90 cmbs).

Two hundred and twenty-six prehistoric artifacts consisting of debitage (n=223), tools (n=2), a point, and burned rock (93 gm) were recovered from the unit (see Table 4-1). Snail was present in the upper levels (0-30 cmbs) and in Levels 7 (60-70 cmbs) and 9 (80-90 cmbs). Two historic artifacts, a ceramic fragment and a piece of unidentified metal, were removed from the upper 20 cmbs.

The highest density of artifacts (20%) was from Level 6 (50-60 cmbs), followed by Levels 2 (19%, 10-20 cmbs), 1 (18%, 0-10 cmbs), and 4 (12%, 30-40 cmbs; Table 4-7). The vertical distribution of artifacts shows two obvious peaks at 0-20 cmbs (Levels 1 and 2) and 50-60 cmbs (Level 6), and a small jump in artifacts 30-40 cmbs (Level 4; Figure 4-13). A plot of MSS values relative to depth in relation to the test unit profile (see Figure 4-12 and Table 4-2) indicates three peaks that appear to reflect buried surfaces with prehistoric associations. The first peak is present at 17.5-32.5 cmbs in association with Sediment 2. The peak corresponds somewhat to the artifact peaks in Levels 2 (10-20 cmbs) and 4 (30-40 cmbs). The second peak at 47.5 cmbs falls at the transition between Sediments 2 and 3, and the third at 72.5 cmbs is at the top of Sediment 4. The artifact spike in Level 6 (50-60 cmbs) does not correspond to the MSS peaks, but falls in Sediment 3, between the lower two MSS peaks.

One diagnostic artifact, the stem from either a Perdiz or Bulbar Stemmed arrow point, was removed from Level 1 (0-10 cmbs) of TU 5. The point is associated with the Terminal Late Prehistoric (700-400 BP; Collins 2004; Thompson et al. 2012; Turner and Hester 1999). One modified flake and one biface were recovered from Levels 1 and 2 (0-20 cmbs).

Summary of Excavations

Phase II testing of 41BX474 used hand-excavated test units to investigate the area of the site on the terrace formation adjacent to Ira Lee Road. The principal goal of the eligibility testing was to better define the vertical and horizontal extent of the boundaries of the artifact distribution and to explore details of the stratigraphy and character of the deposits.

One thousand three hundred and thirty-one prehistoric and forty historic artifacts were recovered from test unit excavations (see Table 4-1). Five test units were hand-excavated resulting in the removal of approximately 3.21

Table 4-7. Density of Lithic Artifacts in TU 5

Level	Top Depth (cmbd)	Bottom Depth (cmbd)	Lithic Artifacts (n)	Lithic Artifacts (density/10 cm level)	Burned Rock (n)	Burned Rock (density/10 cm level)	Burned Rock (gm)	Burned Rock (gm/10 cm level)
1	20	30	41	41	5	5	39.2	39.2
2	30	40	43	43	9	9	16.9	16.9
3	40	50	12	12	0	0	0.0	0.0
4	50	60	26	26	3	3	2.4	2.4
5	60	70	24	24	2	2	3.7	3.7
6	70	80	44	44	7	7	30.8	30.8
7	80	90	18	18	0	0	0.0	0.0
8	90	100	17	17	0	0	0.0	0.0
9	100	110	1	1	0	0	0.0	0.0
Total			226	251/m	26	29/m	93.0	103.3 gm/m^3

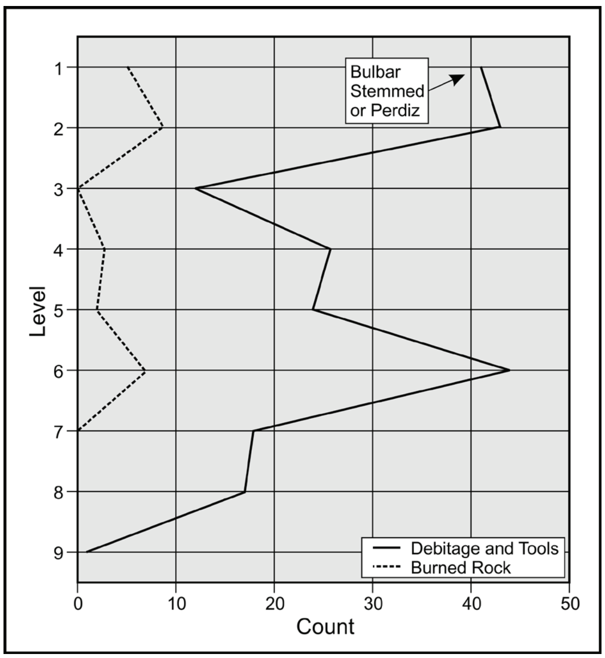

Figure 4-13. *Counts of burned rock, debitage, and tools from Test Unit 5.*

cubic meters of sediment. The vertical distribution of cultural material in TUs 1-5 suggests the presence of one, possibly two prehistoric components. The upper component, falling in Sediment 2, ranges from the transition of Sediment 1 into Sediment 2 to the bottom of Sediment 2 (approximately 5-40 cmbs). Two Initial Late Archaic Bulverde dart points, two Terminal Late Archaic period dart points, an Ensor and an Edgewood, and one Initial Late Prehistoric Edwards arrow point are associated with the Sediment 2 component. The diagnostics appear to be stratigraphically out of place suggesting that the materials recovered from the upper component are in a disturbed context. The presence of modern materials in the upper levels of the test units (see Table 4-1) also suggests disturbance of the cultural material. A peak in artifact distribution and MSS values in Sediment 3 (TU 5) suggests a second older component from approximately 50-60 cmbs on the southern portion of the site. No diagnostics or datable material was recovered from Sediment 3 but increased patination of the lithics suggests older material. Patination patterns are discussed in Chapter 5. No features were observed at this site, though isolated occurrences of burned rock were present throughout the test units.

Chapter 5: Artifact Descriptions and Analysis

This chapter presents descriptive data for the cultural material recovered during Phase II testing of 41BX474. Excavated artifacts include burned rock, lithic tools, lithic debitage, projectile points, one core, historic material, and snail shell. In addition to the descriptive data, the results of a lithic tool and debitage analysis are discussed.

Burned Rock

Burned rock indicates the presence of hearth or oven features. Surface fires (i.e., wildfires) may also result in burned rock. However, for rock to develop the angular breakage patterns and heat spalls suggesting cultural use, the fire must be prolonged and intense. Because surface fires tend to move over the landscape fairly rapidly, no one area is usually exposed to intense heat for extended time periods. Although no features were encountered during the testing of 41BX474, burned rock was recovered. Nine hundred and eighty-two grams of burned rock (n=195) were collected from the test units. Burned rock was encountered in the upper 60 cm of sediments with 69% recovered from Levels 2 and 3 (TU average of 6-26 cmbs). The density of burned rock in TUs 1-5 was 306 gm/m^3 with the highest density in TU 3 (559.4 gm/m^3). Because burned rock is associated with cultural features, its presence in the test units suggests the probability of buried thermal features in 41BX474.

Lithic Tools

Thirty-five lithic tools were identified in the 41BX474 collection (11/m^3; Table 5-1). The tool assemblage consists of 19 bifaces, 6 points, and 10 modified flakes. Of the 35 tools, 6 were discovered in TU 1, 8 in TU 2, 7 in TU 3, 11 in TU 4, and 3 in TU 5. Ninety-one percent were recovered from the

Table 5-1. Tools Recovered from Testing of 41BX474

TU	Level	Depth (cmbs)	Modified Flake	Point	Biface	Total
1	2	5-15	1			1
	3	15-25		2		2
	4	25-35			2	2
	5	35-45			1	1
	Total		1	2	3	6
2	1	0-7	1		3	4
	2	7-17	1			1
	4	27-37	1	1	1	3
	Total		3	1	4	8
3	2	4-14		1	2	3
	3	14-34	1		3	4
	Total		1	1	5	7
4	2	5-15	1	1	3	5
	3	15-25	2			2
	4	25-35	1		1	2
	5	35-45			1	1
	6	45-55			**1**	1
	Total		4	1	6	11
5	1	0-10		**1**	**1**	2
	2	10-20	1			1
	Total		1	1	1	3
Grand Total			10	6	19	35

Sediment 2 component (approximately 5-40 cmbs). Of the 35 tools, 17 display some degree of patination. Archaeologists working with lithic materials have repeatedly concluded that chert patination is related to material age. Patination appears to be progressive (Frederick et al. 1994). Of the 17, 47% were recovered from Level 4 (overall range from 25-37 cmbs). Patination will be explored in more detail in a subsequent section of this chapter.

Projectile points recovered during the testing project include five points from the Sediment 2 component. Two Bulverde dart points (Initial Late Archaic) were recovered, one each, from Level 2 (5-15 cmbs) of TU 4 and Level 3 (24.5 cmbs) of TU 1 (Figure 5-1a). An Edwards arrow point (Initial Late Prehistoric) was removed from Level 4 (27-37 cmbs) of TU 2 (Figure 5-1b). Two Terminal Late Archaic dart points, an Ensor and an Edgewood, were found in Level 2 (4-14 cmbs) of TU 3 and Level 3 (15-25) of TU 1, respectively (Figure 5-1c and d). The base of the Ensor is heavily ground indicating that it was hafted. A base from either a Bulbar Stemmed or Perdiz arrow point (Terminal Prehistoric) was uncovered above the Sediment 2 component in Level 1 (0-10 cmbs) of TU 5. (Figure 5-1e; Collins 2004; Thompson et al. 2012; Turner and Hester 1999).

Nineteen bifaces were recovered from 41BX474, three from TU 1, four from TU 2, five from TU 3, six from TU 4, and one from TU 5 (see Table 5-1). Selected bifaces are illustrated on Figures 5-2 and 5-3. Of the 19, 6 are complete. Three of the six, recovered from TU1, Level 4 and TU 4, Levels 5 and 6, retain 51-100% cortex and have width/thickness ratios of 3.7, 3.1, and 3.5, respectively. The presence of cortex and the small width/thickness ratio suggests an early reduction stage tool (Callahan 1979). One, removed from TU 3, Level 3, has less than 50% cortex with a width/thickness ratio of 4.1, indicating late stage reduction and two, excavated from TU 3, Level 2 and TU 5, Level 1, have no cortex with ratios of 5.5 (late stage) and 2.0 (early stage), respectively.

Five of the nineteen bifaces, recovered from TU 1, Levels 4 and 5, TU 2, Level 1, TU 3, Level 3, and TU 4, Level 2, show evidence of use breaks. Four of these five are small tip fragments, possibly distal ends of projectile points. The absence of cortex and the relative thinness of the five artifacts indicate late stage reduction. The remaining eight bifaces all exhibit breaks caused from manufacturing mishaps. Two, from TU 3, Level 3 and TU 4, Level 4, retain cortex and are relatively thick for their respective width suggesting early stage reduction. Six of the eight are cortex free. The relative thickness of two of the six, from TU 2, Level 1, and TU 4, Level 2, suggest early reduction stage tools. The remaining four are thin, late stage tools (TU 2, Levels 1 and 4, TU 3, Level 2, and TU 4, Level 2).

Ten expedient tools, i.e., modified flakes, were recovered from the testing of 41BX474. Modified flakes were recovered from each test unit (see Table 5-1) and were recovered from the Sediment 1/2 transition to the termination of Sediment 2.

Lithic Debitage

Lithic debitage recovered from 41BX474 consisted of 1,295 specimens. Debitage density across the site was calculated resulting in 403 flakes/m^3. Test Unit 3 contained the highest density of debitage with 891 specimens/m^3, followed by TU 2 with 451/m^3, TU 4 with 302/m^3, TU 1 with 251/m^3, and TU 5 with 248/m^3.

Lithic Debitage Analysis

An analysis was conducted on the lithic debitage recovered from 41BX474 in an attempt to determine the probable reduction/production strategy used at the site, i.e., late stage verses early stage and tool manufacture verses core reduction. The results of the analysis should also allow conclusions to be drawn regarding raw material availability in the area. Debitage recovered from the site was analyzed by technological attributes, including presence/absence of cortex, presence/absence of patination, and flake condition (breakage pattern). Additionally, the flakes were measured for maximum length and thickness. The following discussion on the debitage analysis is organized by attribute.

Cortex

A commonly used attribute in lithic reduction analysis is the percentage of cortex on a flake. Debitage can be sorted into primary, secondary, or tertiary cortex categories. Primary flakes have the dorsal face completely covered by cortex, secondary flakes have some cortex on their dorsal side, and tertiary flakes have no cortex. High frequencies of primary flakes are assumed to be indicative of early reduction, and high frequencies of tertiary flakes are assumed to reflect late reduction. Logically, the amount of cortex should be less on late reduction specimens and greater on early reduction pieces (Andrefsky 1998; Sutton and Arkush 2002). While tertiary flakes are likely to be generated throughout the reduction process, they should dominate assemblages late in the trajectory.

An additional factor related to the presence of cortex on a specimen is raw material availability, type, and size. Andrefsky notes that debitage produced from cobbles with complete cortical surfaces will have a greater amount of dorsal cortex (1998:109). If raw material availability is limited, noticeable variability in the reduction stage processes will be evident (Magne 1989). For example, if the lithic resource base consists only of pebble sized rocks, flakes should contain large amounts of dorsal cortex well into the reduction stages (Magne 1989:19).

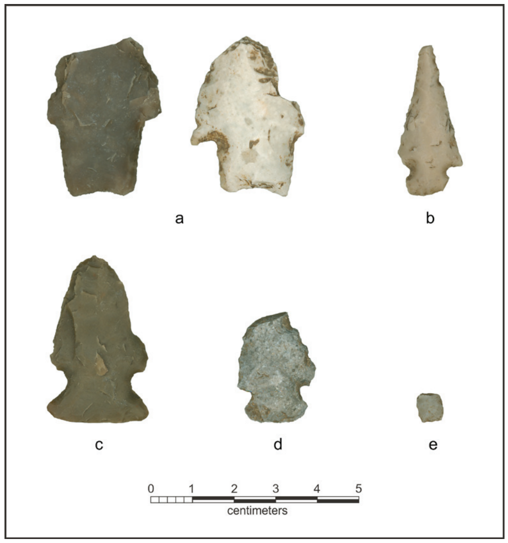

Figure 5-1. *Projectile points recovered from 41BX474: a) Bulverde (TU 4, Level 2, and TU 1, Level 3); b) Edwards (TU 2, Level 4); c) Ensor (TU 3, Level 2); d) Edgewood (TU 1, Level 3); e) Perdiz or Bulbar Stemmed (TU 5, Level 1).*

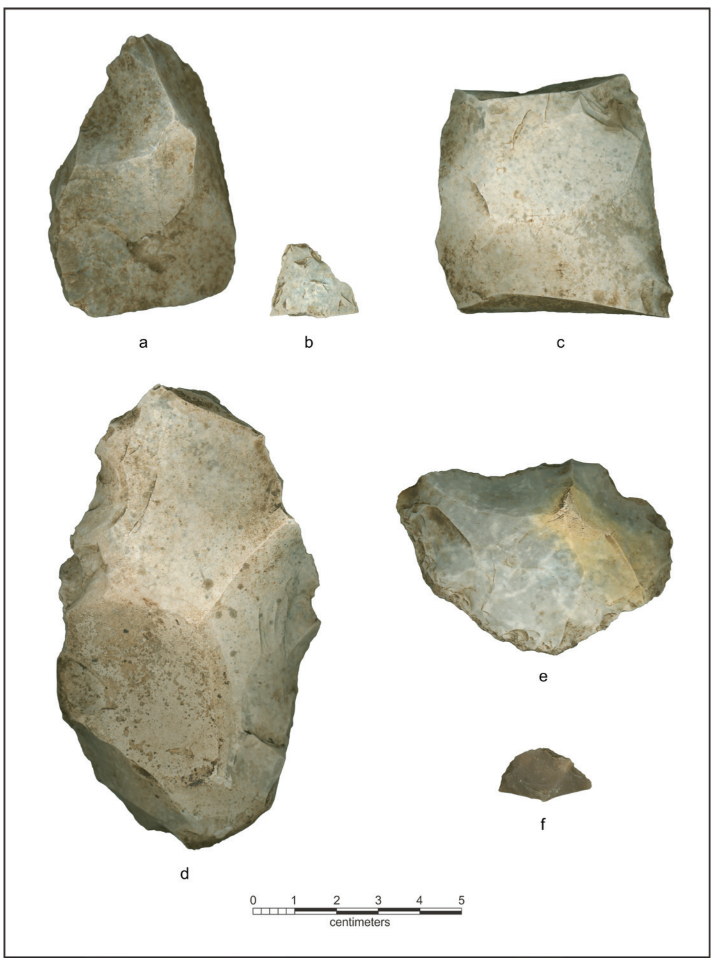

Figure 5-2. *Selected bifaces from TUs 1, 2, and 3: a) TU 1, Level 4; b) TU 1, Level 4; c) TU 2, Level 4; d) TU 3, Level 3; e) TU 3, Level 3; f) TU 3, Level 2.*

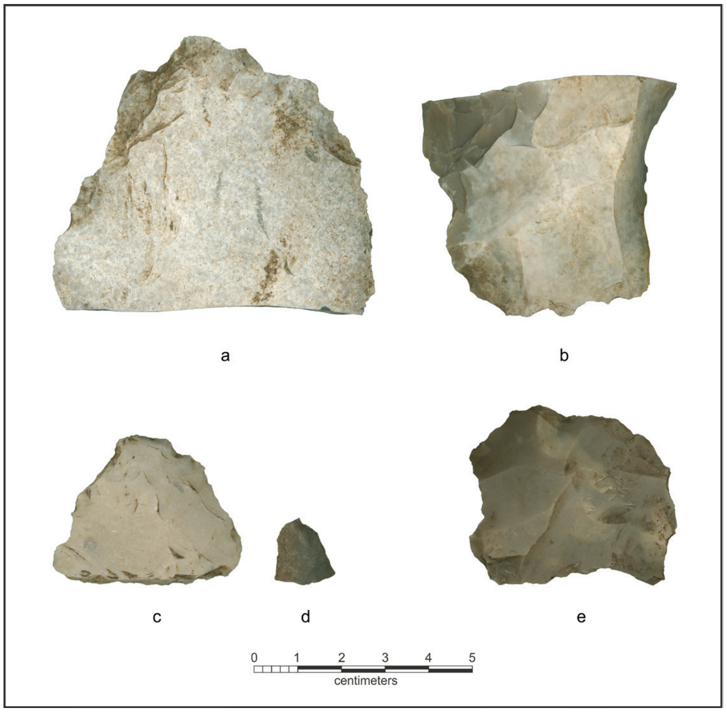

Figure 5-3. *Selected bifaces from TUs 4 and 5: a) TU 4, Level 5; b) TU 4, Level 6; c) TU 4, Level 2; d) TU 4, Level 2; e) TU 5 Level 1.*

Each specimen of debitage was examined to determine the percentage of dorsal cortex present. The debitage was coded as (0) 0% cortex, (1) 1-50% cortex, and (2) 51-100% cortex. Of the 1,295 specimens recovered, 84% (n=1,094) are tertiary (0% cortex), 10% (n=126) are secondary (1-50% cortex), and 6% (n=75) are primary (50-100% cortex). The high percentage of tertiary flakes may reflect a late reduction stage, possibly indicative of tool manufacture or refurbishing. The percentages are similar across the site with each test unit having tertiary flakes exceeding 80% (Table 5-2).

Research investigating the relationship between cortex percentage and raw material availability suggests that sites in areas with low raw material availability have a low percentage of tertiary flakes, while sites in areas with greater raw material availability have a higher percentage of tertiary flakes (Mauldin and Figueroa 2006). Mauldin and Figueroa (2006:Figure 9-1) defined three zones of material availability based on proximity to geological formations. Bexar County is within an area with high raw material availability. High material availability is defined as an area with high quality chert exposure or good quality stone easily attained, i.e., not requiring significant travel (Mauldin and Figueroa 2006). This zone was based roughly on Frederick and Ringstaff's (1994) Edwards Limestone distribution. The amount of tertiary flakes (84%) excavated from the test units correlates with expectations of greater amounts of tertiary flakes in areas with high raw material resources.

Ninety-nine percent of the flakes (n=1,281) are made from chert. The remaining 1% is made of quartzite. Of the 14 quartzite flakes, 12 (86%) were recovered from Sediment 2 (TUs 2, 3, and 4), 1 from Sediment 1 (TU 5), and 1 from Sediment 4 (TU 3). Seventy-one percent of the quartzite debitage were excavated from Sediment 2 in TU 3.

In addition to indicating reduction stage and raw material availability, cortex percentages can also be used to infer raw material size. As stated above, a resource base made up of small cobbles would produce flakes with large amounts of dorsal cortex simply as a function of raw material size. Because the majority of the specimens do not contain cortex, it is likely that the raw material was not limited to small cobbles.

Midpoint Thickness

Flake thickness is another debitage attribute commonly used to determine reduction stage. The thickness of a flake should correlate with the stage of reduction. Thicker specimens are likely to result from early stage reduction, and thinner flakes are likely to result from late stage reduction. Ideally, there should be a positive correlation between flake thickness and reduction stage. Based on this logic, a positive correlation should exist between cortex percentage and flake thickness. Early stage flakes should contain more cortex and should be thicker, whereas late stage flakes should have little to no

Table 5-2. Cortex Percentages by Test Unit

TU	Cortex %	Level 1		Level 2		Level 3		Level 4		Level 5		Level 6		Level 7		Level 8		Level 9		Total	
1	No cortex	25	83%	39	87%	40	82%	7	88%	4	80%	1	100%							116	84%
	1-50%	3	10%	4	9%	6	12%	0	0%	1	20%	0	0%							14	10%
	51-1005	2	7%	2	4%	3	6%	1	13%	0	0%	0	0%							8	6%
	Total	30	100%	45	100%	49	100%	8	100%	5	100%	1	100%							138	100%
2	No cortex	23	82%	62	82%	40	75%	77	92%	16	100%	0	0%							218	85%
	1-50%	4	14%	7	9%	11	21%	5	6%	0	0%	0	0%							27	10%
	51-1005	1	4%	7	9%	2	4%	2	2%	0	0%	0	0%							12	5%
	Total	28	100%	76	100%	53	100%	84	100%	16	100%	0	0%							257	100%
3	No cortex	11	73%	159	84%	207	85%	32	94%	0	0%									409	85%
	1-50%	2	13%	16	9%	24	10%	1	3%	0	0%									43	9%
	51-1005	2	13%	14	7%	12	5%	1	3%	0	0%									29	6%
	Total	15	100%	189	100%	**243**	**100%**	34	100%	0	100%									481	100%
4	No cortex	8	89%	52	94%	30	68%	51	81%	11	73%	10	100%	0	0%					162	83%
	1-50%	0	0%	2	4%	6	14%	6	10%	3	20%	0	0%	0	0%					17	9%
	51-1005	1	11%	1	2%	8	18%	6	10%	1	7%	0	0%	0	0%					17	9%
	Total	9	100%	55	100%	44	100%	63	100%	15	100%	10	100%	0	0%					196	100%
5	No cortex	28	72%	36	86%	11	92%	22	85%	19	79%	40	91%	17	94%	15	88%	1	100%	189	85%
	1-50%	9	23%	3	7%	1	8%	4	15%	4	17%	2	5%	1	6%	1	6%	0	0%	25	11%
	51-1005	2	5%	3	7%	0	0%	0	0%	1	4%	2	5%	0	0%	1	6%	0	0%	9	4%
	Total	39	100%	42	100%	12	100%	26	100%	24	100%	44	100%	18	100%	17	100%	1	100%	223	100%

20 cm level Not Excavated

cortex and should be thinner. Debitage should get smaller, thus thinner, as the tool being manufactured gets closer to completion (Andrefsky 1998).

Flake thickness for this analysis is defined as the distance from the dorsal side to the ventral side of the flake, perpendicular to the flake length line (Andrefsky 1998). Midpoint thickness was measured for each of the 1,295 specimens of lithic debitage using digital calipers (Tables 5-3 and 5-4). The mean thickness for the assemblage was 3.2 mm; 3.0 mm for TU 1, 2.9 for TU 2, 3.4 for TU 3, 3.2 for TU 4, and 3.1 mm for TU 5. The mean thickness of recovered tertiary flakes was 2.7 mm, secondary flakes were 5.7, and primary flakes were 6.5 mm. A site wide comparison of flake thickness to cortex percentage (Figure 5-4) suggests a significant relationship between specimens with no cortex and specimens with cortex, in terms of thickness. Both the Independent-Samples Median test and the Kruskal-Wallis 1-way ANOVA test result in Asymp. Sig. of <0.001. This relationship is also true in each individual test unit.

This data supports a conclusion of a positive correlation between cortex percentage and flake thickness. The above conclusion that the high frequency of tertiary flakes suggests tool manufacture and late stage reduction is further supported by the cortex/thickness correlation. The tertiary flakes are relatively thin and thinner flakes are likely to result from late stage reduction.

Maximum Length

The maximum length of lithic debitage is another attribute commonly used to determine reduction stage. While complicated by issues of raw material size, the length of a flake should correlate with the stage of reduction. Longer specimens are likely to result from early stage reduction, and shorter flakes are likely to result from late stage reduction. As with flake thickness, there should be a relationship between flake length and reduction stage. Using the same logic a relationship should exist between cortex percentage and flake length. Early stage flakes should contain more cortex

Table 5-3. Comparison of Midpoint Thickness in TUs 1-3 by Cortex Coverage Groups

TU	Level	Cortex%	*n	Median	Minimum	Maximum	Mean
1	1	No cortex	25	2.29	0.98	5.79	2.62
		1-50%	3	2.31	1.66	7.63	3.87
		51-100%	2	5.75	2.12	9.38	5.75
	2	No cortex	39	2.30	0.70	8.08	2.64
		1-50%	4	3.05	2.25	9.48	4.46
		51-100%	2	4.93	4.61	5.25	4.93
	3	No cortex	40	1.75	0.84	7.55	2.16
		1-50%	6	5.66	1.60	9.35	5.68
		51-100%	3	3.21	2.61	4.50	3.44
	4	No cortex	7	2.83	1.08	4.46	2.78
	5	No cortex	4	1.73	1.60	2.04	1.78
2	1	No cortex	23	2.53	0.98	8.12	3.32
		1-50%	4	5.75	3.57	10.00	6.27
	2	No cortex	62	2.21	0.85	10.48	2.70
		1-50%	7	4.76	2.92	8.96	5.06
		51-100%	7	2.90	2.26	9.37	4.81
	3	No cortex	40	1.87	0.75	7.45	2.07
		1-50%	11	3.48	1.26	11.24	3.94
		51-100%	2	12.87	9.39	16.35	12.87
	4	No cortex	77	1.86	0.62	7.75	2.14
		1-50%	5	5.41	2.63	17.18	8.01
		51-100%	2	5.62	4.62	6.62	5.62
	5	No cortex	16	1.85	0.87	3.89	1.92
3	1	No cortex	11	2.99	1.21	13.99	3.95
		1-50%	2	2.80	2.18	3.41	2.80
		51-100%	2	8.15	1.93	14.36	8.15
	2	No cortex	159	2.24	0.53	12.31	2.71
		1-50%	16	5.58	2.51	11.65	6.47
		51-100%	14	3.84	2.03	18.05	6.19
	3	No cortex	207	2.22	0.63	23.62	2.81
		1-50%	24	5.01	2.17	17.45	6.26
		51-100%	12	9.98	2.19	25.22	11.35
	4	No cortex	32	2.44	1.03	8.57	2.71

* if n = 0 or 1, the data was left off the table

and should be longer, whereas late stage flakes should have little to no cortex and should be shorter. Ideally, debitage should get shorter as the tool being manufactured gets closer to completion (Andrefsky 1998). In addition, flakes late in the reduction trajectory may have a tendency to break more often, thus resulting in shorter lengths.

Maximum length as defined by Andrefsky is measured as the maximum distance from the proximal to distal end along a line perpendicular to striking platform width (Andrefsky 1998). For the purposes of this analysis maximum length is defined as the maximum distance between any two points on the flake. The maximum length of each specimen was

Table 5-4. Comparison of Midpoint Thickness in TUs 4-5 by Cortex Coverage Group

TU	Level	Cortex%	*n	Median	Minimum	Maximum	Mean
4	1	No cortex	8	2.41	1.55	4.98	2.69
	2	No cortex	52	2.47	1.15	7.36	2.82
		1-50%	2	12.23	9.25	15.21	12.23
	3	No cortex	30	2.35	0.84	5.49	2.40
		1-50%	6	5.99	1.80	12.16	6.30
		51-100%	8	5.24	1.99	16.59	6.10
	4	No cortex	51	2.18	0.96	6.33	2.21
		1-50%	6	5.28	2.62	6.95	4.80
		51-100%	6	3.08	1.62	6.19	3.74
	5	No cortex	11	3.76	1.25	7.15	3.48
		1-50%	3	7.64	2.25	13.25	7.71
	6	No cortex	10	3.07	2.18	5.28	3.25
5	1	No cortex	28	3.08	1.60	23.44	4.45
		1-50%	9	4.84	2.50	11.41	5.84
		51-100%	2	2.87	2.51	3.22	2.87
	2	No cortex	36	2.09	0.84	5.77	2.53
		1-50%	3	3.41	1.49	4.23	3.04
		51-100%	3	2.10	1.45	3.03	2.19
	3	No cortex	11	2.23	1.34	3.63	2.31
	4	No cortex	22	2.44	0.87	5.02	2.50
		1-50%	4	2.59	1.98	3.98	2.79
	5	No cortex	19	2.08	0.68	5.47	2.40
		1-50%	4	4.57	2.59	4.71	4.11
	6	No cortex	40	2.04	0.76	6.48	2.37
		1-50%	2	4.93	3.78	6.07	4.93
		51-100%	2	9.71	6.49	12.92	9.71
	7	No cortex	17	2.19	1.16	9.64	2.65
	8	No cortex	15	2.75	1.23	10.00	3.83

* if n = 0 or 1, the data was left off the table

recorded regardless of specimen condition (i.e., complete verses incomplete flake). Maximum length was measured for each of the 1,295 specimens of debitage using digital calipers (Table 5-5). The median maximum length of the assemblage was 17.2 mm; 19.0 mm for TU 1, 15.8 mm for TU 2, 18.3 mm for TU 3, 16.4 mm for TU 4, and 16.1 mm for TU 5.

A comparison of maximum length to cortex percentage across the site (Figure 5-5) suggests a significant relationship between specimens with no cortex and specimens with cortex with an Asymp. Sig. of <0.001 for both the Independent-Samples Median test and the Kruskal-Wallis 1-way ANOVA test. Specimens without cortex are relatively short (mean = 18.7 mm), specimens with cortex in the range of 1-50% are longer (mean = 28.0 mm), and specimens with cortex in the range of 51-100% are the longest (mean = 29.4 mm).

This data supports a conclusion of a positive correlation between cortex percentage and flake length. The conclusion reached above that the high presence of tertiary flakes suggests tool manufacture or refurbishing and late stage reduction is further supported by the cortex/length correlation. The tertiary flakes are relatively short, and shorter flakes are likely to result from late stage reduction.

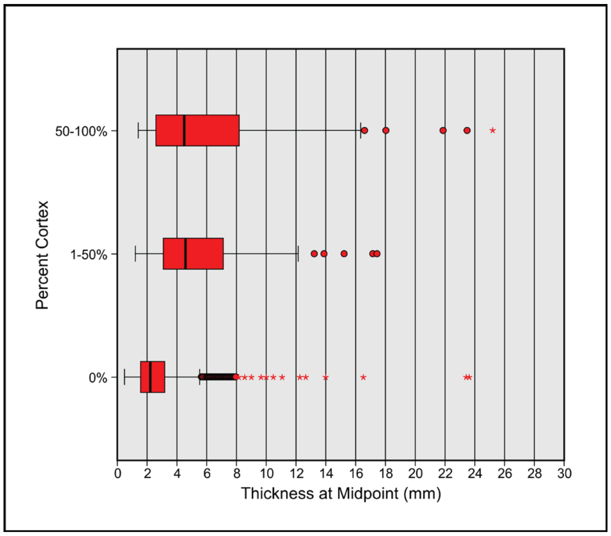

Figure 5-4. *Boxplot comparing midpoint measurement by cortex coverage group.*

Table 5-5. Comparison of Maximum Length by Cortex Coverage Groups

TU	Cortex%	Count	Mean (mm)	Median (mm)
1	No cortex	116	19.3	18.3
	1-50%	14	31.1	23.4
	51-100%	8	29.5	23.1
	Total	138	21.1	19.0
2	No cortex	218	16.9	14.9
	1-50%	27	26.2	24.3
	51-100%	12	25.3	22.9
	Total	257	18.3	15.8
3	No cortex	409	20.2	17.4
	1-50%	43	30.2	27.0
	51-100%	29	36.7	27.6
	Total	481	22.1	18.3
4	No cortex	162	17.3	15.9
	1-50%	17	30.2	28.9
	51-100%	17	23.6	19.1
	Total	196	18.9	16.4
5	No cortex	189	18.2	16.0
	1-50%	25	22.8	21.5
	51-100%	9	22.5	13.5
	Total	223	18.9	16.1

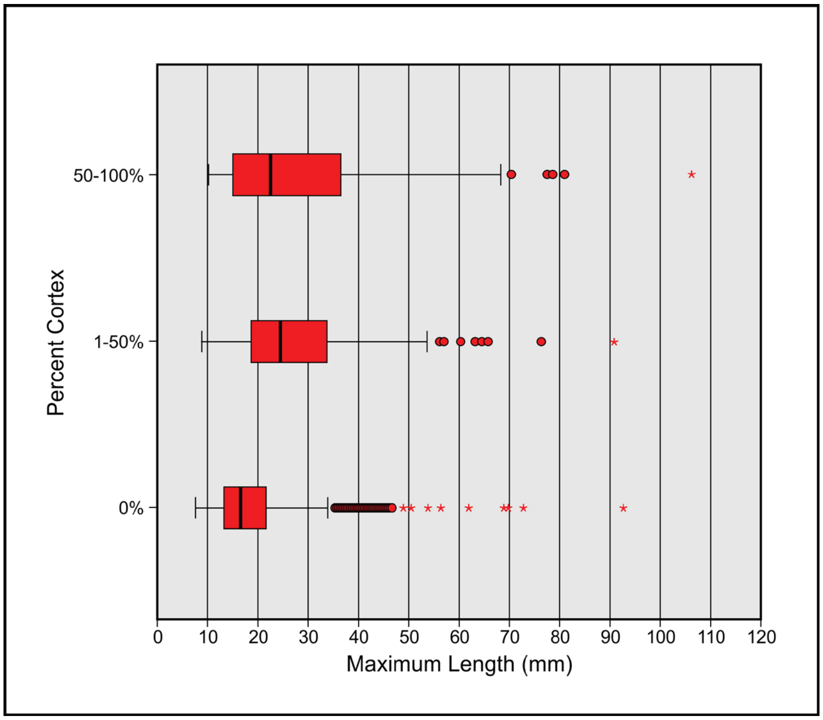

Figure 5-5. *Boxplot comparing maximum length by cortex coverage group.*

Patina

Analysis of the presence or absence of patina on lithic debitage as a method to determine dating is a subject of contention in the archaeological literature. Patina refers to a light colored weathering rind noticeable on the outside of an artifact (Purdy and Clark 1987). Patination is a result of environmental factors and various attributes of the parent material. Environmental variables include soil pH, permeability, chemistry, subsurface water exposure, exposure to ultraviolet and infrared radiation, and temperature (Benedict 1992). Characteristics of the parent material also affects patination, including porosity, structure, permeability, mineralogy, nonsilica impurities, and thermal alteration (Purdy and Clark 1987; VanNest 1985). Archaeologists working with lithic materials have repeatedly concluded that chert patination is related to material age. Patination appears to be progressive. Archaeologists opposed to this correlation argue that usable temporal information from patina observations are unobtainable due to the large number of factors involved in patination (Frederick et al. 1994). Frederick et al. (1994) explored the existence of a measurable temporal component to chert patination using archaeological artifacts from three temporal groups from Fort Hood, Texas. Fort Hood is located in the upland environments of the Edwards Plateau in Central Texas. The results of this study demonstrate that the formation of patina is progressive in both frequency and amount through time. However, the study also concludes that the lack of patina on an artifact is meaningless. Frederick et al. (1994) suggest that chert patination is not a reliable dating technique. Although time and patination are clearly related, the lack of a patina says nothing about age.

The presence or absence of patina was another attribute included in the analysis. Each debitage specimen was examined for evidence of patination. The amount of patination was not noted, only the presence or absence. Of the 1,295 pieces of debitage 40% were patinated to some degree. Patination occurs throughout the various levels excavated at 41BX474. Tables 5-6 and 5-7 present patination by levels from the test units. The data is organized into two tables because of the excavation error in TU 3, i.e., the removal of 20 cm of sediment from Level 3. The percentage of flakes displaying patination is positively correlated with depth suggesting that patination is indicative of age in the assemblage recovered from 41BX474.

Flake Breakage Pattern

Analysis of debitage can provide valuable insights into site specific reduction/production strategies and raw material availability. Various studies have addressed different aspects of lithic debitage analysis. Sullivan and Rozen (1985) developed a typology consisting of an attribute key used

Table 5-6. Comparison of Patination Percentages by Level for TUs 1, 2, 4, and 5

Level	Total Debitage	Patinated Debitage	Percent Patinated
1	106	12	11%
2	218	30	14%
3	158	51	32%
4	181	102	56%
5	60	44	73%
6	55	44	80%
7	18	18	100%
8	17	15	88%
9	1	1	100%
Total	814	317	39%

Table 5-7. Comparison of Patination Percentages by Level for TU 3

Level	Total Debitage	Patinated Debitage	Percent Patinated
1	15	3	20%
2	189	27	14%
3	243	141	58%
4	34	25	74%
5	0	0	n/a
Total	481	196	41%

to separate debitage into four categories: complete flakes, broken flakes, flake fragments, and debris. This attribute key was used to analyze two archaeological collections from east-central Arizona. The resulting percentages of debitage assigned to each of the four categories along with nonassemblage site data led Sullivan and Rozen to develop a method for inferring site type (core reduction verses tool production) based on flake condition. Prentiss and Romanski (1989) examined Sullivan and Rozen's (1985) approach using experimentally produced debitage assemblages. This study contradicted Sullivan and Rozen's conclusions concerning the relationship of flake condition percentages to site type. Sullivan and Rozen postulated that tool assemblages should contain high numbers of proximal fragments and low numbers of complete flakes compared to core reduction assemblages. Prentiss and Romanski conclude that more complete flakes indicate tool production. They also explored fracture properties of raw materials types and the effects of trampling on the archaeological record (Prentiss and Romanski 1989). Amick and Mauldin (1997) explored the effects of the differences in the mechanical properties of raw materials and the resulting patterns of flake breakage. They concluded that raw material differences significantly alter flake breakage patterns and must be addressed before using breakage patterns to infer site type.

The final attribute included in the debitage analysis was the flake breakage pattern. Tool production and core reduction will produce a variety of flakes, including complete flakes (CF), platform remnant bearing flakes (PRBF), medial/distal flakes (MDF), and non-orientable fragments (NF; Amick and Mauldin 1997; Prentiss and Romanski 1989; Sullivan and Rozen 1985). Because breakage patterns in an assemblage consisting of multiple raw material types (chert, quartzite, etc.) may be reflecting the different flaking qualities of the different raw materials, not different technological activities (Amick and Mauldin 1997), quartzite flakes were not included in the flake breakage analysis. Ninety-nine percent of the debitage (n=1,281) from 41BX474 was produced from chert. The remaining specimens (n=14) were produced from quartzite.

Each of the 1,281 chert lithic debitage specimens recovered during testing of 41BX474 were examined and placed into one of the four flake condition categories. For a flake to be categorized as complete, it must contain both the proximal and distal ends, the platform, and intact margins. If the flake was broken but contains a platform, it was categorized as a platform remnant bearing flake. A broken flake missing the platform was considered a medial/distal fragment and a specimen of debitage without discernible flake attributes was categorized as a non-orientable fragment. Of the 1,281 chert flakes, 20.7% were classified as complete (n=265), 21.2% as platform remnant bearing (n=271), 57.6% as medial/distal (n=738), and 0.5% as non-orientable (n=7).

The site-wide flake breakage pattern percentages were compared to data gathered by Amick and Mauldin (1997) on the breakage patterns of an assemblage generated experimentally on chert and to data from Prentiss and Romanski (1989; Table 5-8). The pattern evident at 41BX474 is not a good fit to any of the reduction data (Figure 5-6). Because neither patterns are a good fit, the 41BX474 breakage pattern data was further compared to four patterns noted by Sullivan and Rozen (1985). In addition to CF, PRBF, MDF, and NF flakes, Sullivan and Rozen included cores and retouched flakes. Table 5-9 compares 41BX474 breakage pattern percentages to the four groupings (unintensive core reduction, core reduction and tool manufacture, intensive core reduction, and tool manufacture). The pattern from 41BX474 is a fairly close fit to the Group II Tool Manufacture grouping (Figure 5-7). The breakage pattern percentages in TU 5, Level 6 (the lower artifact and MSS peak in Sediment 3) were also compared to the experimental data. Because this peak was stratigraphically deeper and suggests a second, older component, the artifact assemblage may exhibit a different reduction pattern. The breakage pattern in the lower component also was most like the Sullivan and Rozen (1985) tool manufacture grouping.

Table 5-8. Comparison of Flake Breakage Patterns at 41BX474 to Experimental Data

Assemblage	CF	PRBF	MDF	NF
41BX474	21%	21%	58%	1%
Amick and Mauldin (1987) Core Reduction	36%	21%	41%	2%
Amick and Mauldin (1987) Tool Reduction	42%	19%	38%	1%
Prentiss and Romanski (1989) Core Reduction	22%	23%	24%	32%
Prentiss and Romanski (1989) Tool Reduction	33%	26%	36%	5%

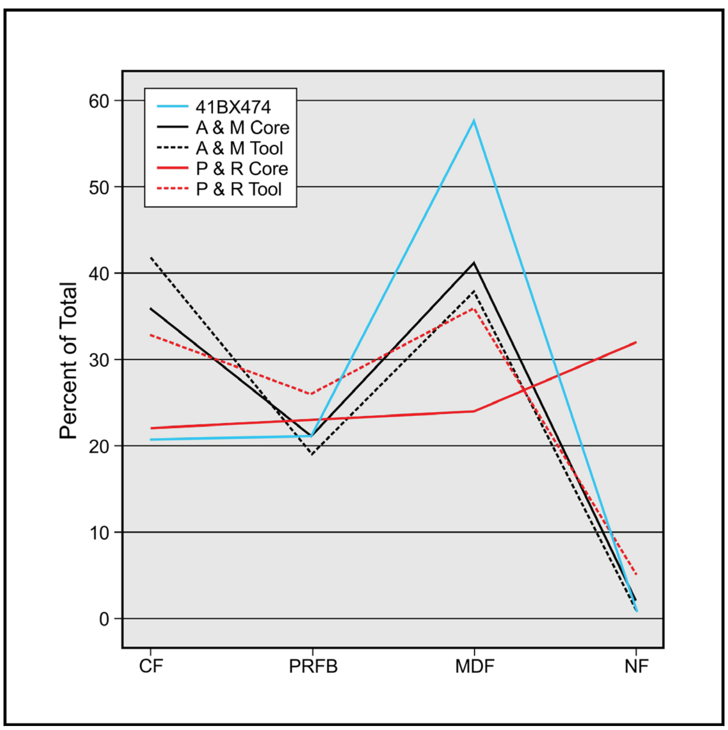

Figure 5-6. *Comparison of 41BX474 flake breakage pattern to experimental data from Amick and Mauldin 1997 (A & M) and Prentiss and Romanski 1989 (P & R).*

Table 5-9. Comparison of Flake Breakage Patterns at 41BX474 to Experimental Data

Assemblage	CF	PRBF	MDF	NF	Cores	Retouched
41BX474	21%	21%	57%	1%	0%	1%
Sullivan and Rozen (1985) Group IA Unintensive Core Reduction	53%	7%	16%	6%	15%	3%
Sullivan and Rozen (1985) Group IBI Core Reduction and Tool Manufacture	33%	13%	35%	8%	3%	8%
Sullivan and Rozen (1985) Group IB2 Intensive Core Reduction	30%	8%	35%	23%	2%	2%
Sullivan and Rozen (1985) Group II Tool Manufacture	21%	17%	51%	7%	1%	3%

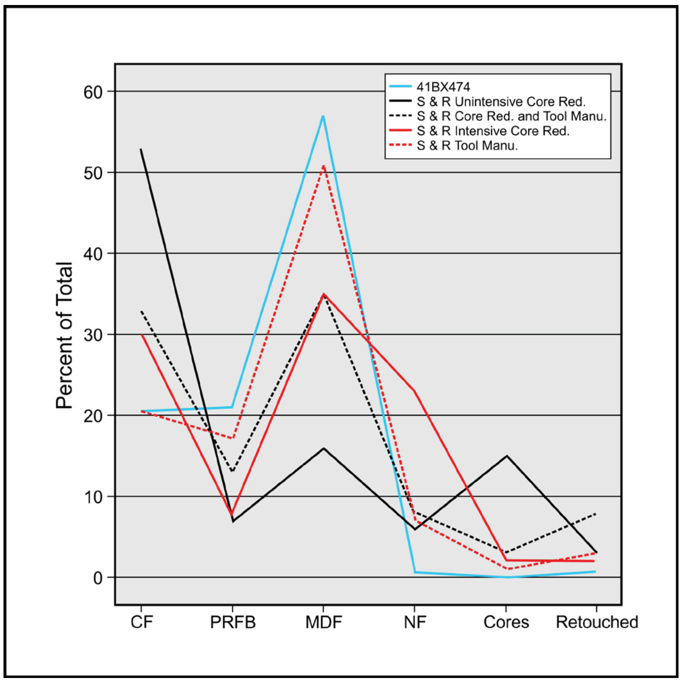

Figure 5-7. *Comparison of 41BX474 flake breakage pattern to experimental data from Sullivan and Rozen 1985 (S & R).*

Lithic Debitage Analysis Conclusions

The purpose of the analysis of the lithic debitage from 41BX474 was to try to determine the lithic technology practiced at the site and to determine accessibility and quality of raw material. To attempt to determine what type of technology was used at the site (core reduction verses tool production/early verses late stage reduction), cortex percentage, maximum length, midpoint thickness, and flake condition were analyzed. Based on the assumption that both early stage reduction and core reduction produce large flakes with some percentage of cortex on the dorsal surface and on the assumption that both late stage reduction and tool manufacture produce smaller, tertiary flakes, the debitage assemblage from 41BX474 appears to represent late stage tool manufacturing. The percentages of flake types in the assemblage correspond closest to patterns produced from experimental studies on tool manufacture (Sullivan and Rozen 1985). The high percentage of tertiary flakes recovered point to a site with access to plentiful raw materials.

For this analysis the assemblage was treated as one large component ranging in age from the Initial Late Archaic to the Initial Late Prehistoric Periods based on projectile points recovered from the test units. This is a broad temporal depth. Because of a jumbling of diagnostics, this component could not be partitioned into analytical units. The artifact distribution formed over thousands of years and likely consisted of multiple occupational events. Although the presence of a peak in artifact distribution and MSS values in TU 5, Level 6, suggests an earlier occupation towards the southern end of 41BX474, no diagnostic artifacts or change in artifact patterning substantiates a temporal difference. While diagnostic artifacts are mixed, percentages of debitage with patina increase with depth. This suggests that some of the assemblage may retain integrity.

Summary

This chapter presented descriptive data for the cultural material recovered during Phase II Testing of 41BX474. Test unit excavations resulted in the removal of 3.21 m^3 of sediment from the site. Nine hundred and eighty-two grams of burned rock were collected at the site with a density of 306 gm/m^3. Because burned rock is associated with thermal features, its presence suggests the probability of buried cultural features in the site.

One thousand two hundred and ninety-five pieces of debitage were retrieved from 41BX474 with a density of 403 $specimens/m^3$. The vertical distribution of lithic artifacts evident from test unit levels points to the presence of at least one prehistoric component with a broad temporal depth in the upper sediments and one occurring in the lower levels of TU 5. The diagnostic artifacts in the upper component are jumbled, preventing a more refined chronology than a range from the Initial Late Archaic to the Initial Late Prehistoric. The horizontal distribution suggests that the highest density of material is located on the southern half of the site. Thirty-five lithic tools, including bifaces, projectile points, and retouched flakes were identified in the collection.

In addition to the descriptive data, the chapter discussed the results of a lithic debitage and tool analysis. The purpose of the analysis was to attempt to determine the lithic technology practiced at the site and to determine accessibility to and the quality of raw material. Based on the assumption that both early stage reduction and core reduction produce large flakes with some percentage of cortex on the dorsal surface and on the assumption that both late stage reduction and tool manufacture produce smaller, tertiary flakes, the debitage assemblage from 41BX474 appears to represent late stage tool manufacturing. Also supporting the probability of tool manufacturing are the percentages of flake types in the assemblage. Flake breakage patterns correspond closest to patterns produced from experimental studies on tool production.

The high percentage of tertiary flakes recovered from 41BX474 point to a site with access to high sources of raw material. Bexar County falls in the area of Texas Mauldin and Figueroa (2006) designated as having high chert availability. The county is near the Edwards Plateau and near deposits associated with river systems and chert gravel deposits. Because the majority of the specimens do not contain cortex, it is expected that high quality raw material was accessible. In addition to chert flakes, 14 specimens of debitage were made from quartzite.

Chapter 6: Summary and Recommendations

The Center for Archaeological Research at The University of Texas at San Antonio was contracted by the COSA to conduct NRHP Eligibility testing at 41BX474. The project focused on the portion of the site with existing terrace deposits. This report discussed the test excavations conducted January 23 through January 29, 2014. The excavations were conducted in advance of the construction of the proposed Laurens Lane connection trail to the existing Salado Creek Greenway.

The goals of the eligibility testing of 41BX474 were to expose and document the vertical distribution, density, and integrity of buried materials and to assess the NRHP eligibility status of the site based on the findings. The testing consisted of the hand-excavation of five 1-x-1 m test units. Sixty-two soil samples were collected for magnetic soil susceptibility testing from Test Units 1-5 from the surface to termination at 5-cm intervals. The vertical distribution of cultural material and the MSS analysis suggest the presence of at least one prehistoric component in the upper sediments and a possibly older component in the lower sediment in TU 5 on the southern portion of the site. Six diagnostics were recovered from the site with dates ranging from the Initial Late Archaic to the Terminal Late Prehistoric.

Excavations at 41BX474 produced 1,295 pieces of debitage from a volume of 3.21 m^3 of matrix representing 403 pieces of debitage/ m^3. The analysis of a number of attributes on the debitage produced a late reduction pattern suggesting a tool reduction strategy. In addition, 35 lithic tools were identified. The tool assemblage includes bifaces, projectile points, and retouched flakes. Burned rock (982 gm), 306 gm/m^3, was retrieved from the site pointing to the possibility of thermal features in the unexcavated matrix.

Although the excavations yielded a relatively large number of lithic artifacts, no intact cultural features were noted. The temporally diagnostic artifacts recovered from the site are stratigraphically out of place suggesting that the majority of the materials recovered during the excavations are in a disturbed context. This disturbance, along with the presence of modern materials in the upper levels, suggests that the prehistoric cultural materials lack integrity. This reduces their research potential, and therefore, the CAR recommends that the site is not eligible for formal listing on the National Register of Historic Places. The CAR further recommends that the installation of the Laurens Lane hike and bike connection alignment proceed as proposed.

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