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Archaeological Data Recovery and Tracked Vehicle Impact Assessment at Sites 5LA03254, 5LA03421 AND 5LA05612, Pinon Canyon Maneuver Site, Colorado

By

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ABSTRACT

Between July 25 and November 11, 2000, archaeological investigations were conducted at three sites located on the United States Army Pinon Canyon Maneuver Site in southeastern Colorado. The goals of the research were to assess the impact of military traffic on the extant archaeological record of each site and to characterize the subsurface context of archaeological materials within the affected areas. The field research included the excavation of 130 test units, the interpretation of test unit stratigraphic profiles, and the collection of data on surface artifact distribution, temporal/cultural context, and site integrity. Impact from mechanized vehicle maneuvers was assessed through surface observation, subsurface soil context and soil compaction analysis.

ACKNOWLEDGEMENTS

The research summarized in this report was conducted under a subcontract between David Kuehn Consulting (DKC) and New Mexico State University (NMSU). The work was supervised by David D. Kuehn (DKC), with Lawrence L. Loendorf (NMSU) serving as Principal Investigator. Dr. Loendorf was very helpful in many aspects of the research effort and is thanked for his time, patience, and extensive knowledge.

The sites concerned are located on lands owned and administered by the United States Army, Fort Carson, Colorado. Steve Chomko, then Cultural Resources Manager at Fort Carson Directorate of Environmental Compliance and Management (DECAM), compiled the scope of work for the project and oversaw day to day management. Michael Flowers and Vincent Schiavitti, DECAM archaeologists, conducted site mapping and also assisted in the identification of areas to be investigated. Their help and support is greatly appreciated.

Archaeological field personnel included Pam Cowen, Sherri Thrash, Gene Smith, Ardie Vinton, Mark Valvo, and Marco Gonzalez. These hard-working professionals made the field effort successful and are very much thanked for their efforts. Subsequent to the field effort, Gene Smith conducted the artifact analysis, while Ken West drafted most of the report figures. We appreciate the hard work and extraordinary effort these individuals put into the project.

Special thanks are extended to Elaine Nimmo from New Mexico State University for her work on photography and converting field notes into spectacular graphics. A final word of appreciation goes to the past and present staff at DECAM, without whose continued help and support this project would not have been possible.

FOREWORD

The archaeological investigations reported in this manuscript are an important part of the Fort Carson Cultural Resources Management Program. The goal of the program is to maintain the largest possible area for military training while protecting significant cultural and environmental resources. The archaeological data recovery and tracked vehicle impact assessment of Sites 5LA3254, 5LA3421, and 5LA5612 are part of an integrated plan that takes a long-term systematic approach to meeting identification, evaluation, and resource protection requirements mandated by the National Historic Preservation Act. While meeting legislated requirements, this project also provides a valuable contribution to our knowledge of the prehistory and resources of Las Animas County, Colorado. Through an Interagency Service Agreement, the National Park Service, Midwest Archeological Center (MWAC), assists Fort Carson in accomplishing its cultural resources goals and meeting its legal obligations. New Mexico State University at Las Cruces, New Mexico, completed the reported project under a cooperative agreement with the MWAC through a subcontract with David Kuehn Consulting of El Paso, Texas.

Fort Carson began cultural resource studies on the Pinon Canyon Maneuver Site in 1983, immediately following the purchase of these lands. The Cultural Resource Program takes a multidisciplinary approach, combining archaeological theory and historical methods with geological, geomorphological, botanical, and statistical techniques and procedures in order to focus its efforts to locate, evaluate, and protect significant cultural resources. Professional studies and consultations with Native American tribes have resulted in the identification of National Register of Historic Places eligible sites and districts. The cultural resources of Fort Carson and the Pinon Canyon Maneuver Site represent all major prehistoric and historic cultural periods recognized in the Great Plains and Rocky Mountains. Sites of the Paleoindian, Archaic, and Ceramic stages are present as are sites from the Fur Trade era, 19th century Hispanic and Euroamerican settlements, early 20th century homesteading and ranching, and World War II and Cold War era military sites. The project reported here completes the third phase of the archaeological inventory program – data recovery investigations of archaeological sites to assess impacts from tracked vehicle damage to National Register of Historic Places (NRHP) eligible sites.

The Cultural Resources Management Program is in the Directorate of Environmental Compliance and Management (DECAM), which is tasked with maintaining Fort Carson's compliance with federal, state, and local environmental laws and mandates. The DECAM holistic management philosophy holds that all resources are interrelated. Decisions affecting one resource will impact other resources. The decisions we make today will affect the condition of Department of Army lands and resources for future training, research, and recreation. Mission requirements, training resources, wildlife, range, soil, hydrology, air, and recreation influence cultural resource management decisions. Integrating compliance and resource protection concerns into a comprehensive planning process reduces the time and effort expended on the compliance process, minimizes conflicts between resource protection and use, allows flexibility in project design, minimizes costs, and maximizes resource protection.

Federal laws protect the resources on Fort Carson and the Pinon Canyon Maneuver Site. Theft and vandalism are federal crimes. Protective measures ensure that Army activity does not inadvertently impact significant cultural and paleontological sites. Fort Carson does not give out site location information, nor are sites developed for public visitation. Similar resources are located in the Picketwire Canyonlands, where public visits can be arranged through the U.S. Forest Service, Comanche National Grasslands, in La Junta, Colorado.

Fort Carson endeavors to make results of the resource investigations available to the public and scientific communities. Technical reports on cultural resources are on file at the Fort Carson Curation Facility (Building 2420) and the Colorado State Historic Preservation Office. They are also available through the National Technical Information Service, Springfield, Virginia. Selected reports have been distributed to public libraries in Colorado. Three video programs produced by Fort Carson are periodically shown on Public Broadcasting Stations. Non-technical reports on the prehistory, history, and rock art of southeastern Colorado have been distributed to schools and libraries within the state.

Fort Carson continues to demonstrate that military training and resource protection are mutually compatible goals.

Thomas L. Warren
Director
Directorate of Environmental Compliance and Management
Fort Carson, Colorado
October 2008

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Chapter I: **INTRODUCTION AND METHODS**

Introduction

This report summarizes archaeological investigations conducted at three sites, 5LA03254, 5LA03421, and 5LA05612, located on the Pinon Canyon Maneuver Site (PCMS) in southeastern Colorado (Figure 1.1). The investigations were carried out between July 25 and November 11, 2000, by personnel from David Kuehn Consulting, El Paso, Texas, under a subcontract with New Mexico State University (NMSU). The fieldwork followed a scope of work (SOW) prepared by the Directorate of Environmental Compliance and Management (DECAM), US Army, Fort Carson, Colorado, in response to site disturbances initiated during the course of 1999-2000 military maneuvers. The goals of the research were to assess the impact of military traffic on the extant archaeological record of each site and to characterize the subsurface context of archaeological materials within the affected areas.

The field research included the excavation of 130 test units, the interpretation of test unit stratigraphic profiles, and the collection of data on surface artifact distribution, temporal/cultural context, and site integrity. Impact from mechanized vehicle maneuvers was assessed through surface observation, subsurface soil context and soil compaction analysis. Laboratory procedures included basic sedimentological analysis, radiometric dating, and scanning electron microprobe analysis of special samples. The report that follows is organized into five main sections: project background, natural site context, field and laboratory procedures, results of the excavations (archaeological materials, site stratigraphy and geomorphology, and natural and mechanical impacts) and conclusion of research.

Project Background and Scope of Work

All sites tested in 2000 were originally recorded by archaeologists from the University of Denver in 1984 (Mead and Carrillo 1984). Site 5LA03254 is a historic site which consists of a collapsed sandstone structure located in grassy uplands west of an unnamed tributary of Lockwood Arroyo. The site, interpreted as a late 19th century homestead, also includes an amorphous stone foundation or concentration of building stone. Site 5LA03421 is a multi-component site which encompasses both prehistoric and historic period architecture and cultural artifacts including rockshelters, bedrock metates, low rock walls, surface artifact scatters, and historic building foundations. The site is concentrated on a rocky hilltop east of Big Water Arroyo and extends onto a series of low terraces and slopes immediately adjacent to the stream. Diagnostic artifacts collected during the 1984 field season suggested occupational episodes during the middle to Late Archaic and historic periods (ca. 5500 - 2000 B.P. and late 19th century). Site 5LA05612 is a multiple component site with small rockshelters, bedrock metates, and a surface cultural material scatter. It is located along the rim of an unnamed tributary of Lockwood Arroyo and extends onto low, rocky uplands east of the arroyo. Artifacts recovered here suggest site use during the Late Archaic/late and historic periods.

The project scope of work (SOW) called for the excavation of 1 x 1 m test units along the rows of mechanized vehicle tracks created in the site areas during military maneuvers in 1999-2000. The specific locations of the test units were delineated by sets of stakes placed along the tracks by archaeologists from DECAM prior to the initiation of fieldwork. The maximum number and depth of the units were specified in the project SOW as follows:

Site 5LA03254 – maximum of 30 -1 x 1 m test units;
maximum depth of the excavations 40 cm

Site 5LA03421 – maximum of 300 -1 x 1 m test units;
maximum depth of the excavations 25 cm

Site 5LA05612 – maximum of 33 -1 x 1 m test units;
maximum depth of the excavations 25 cm

The investigations were part of a larger cooperative agreement between NMSU and the Midwest Archeological Center, National Park Service, for the purpose of implementing a broad spectrum of archaeological research at the PCMS. The work at 5LA03254, 5LA03421, and 5LA05612, authorized under a subcontract between NMSU and David Kuehn Consulting (DKC), was initiated on July 25, 2000, and completed on November 11, 2000.

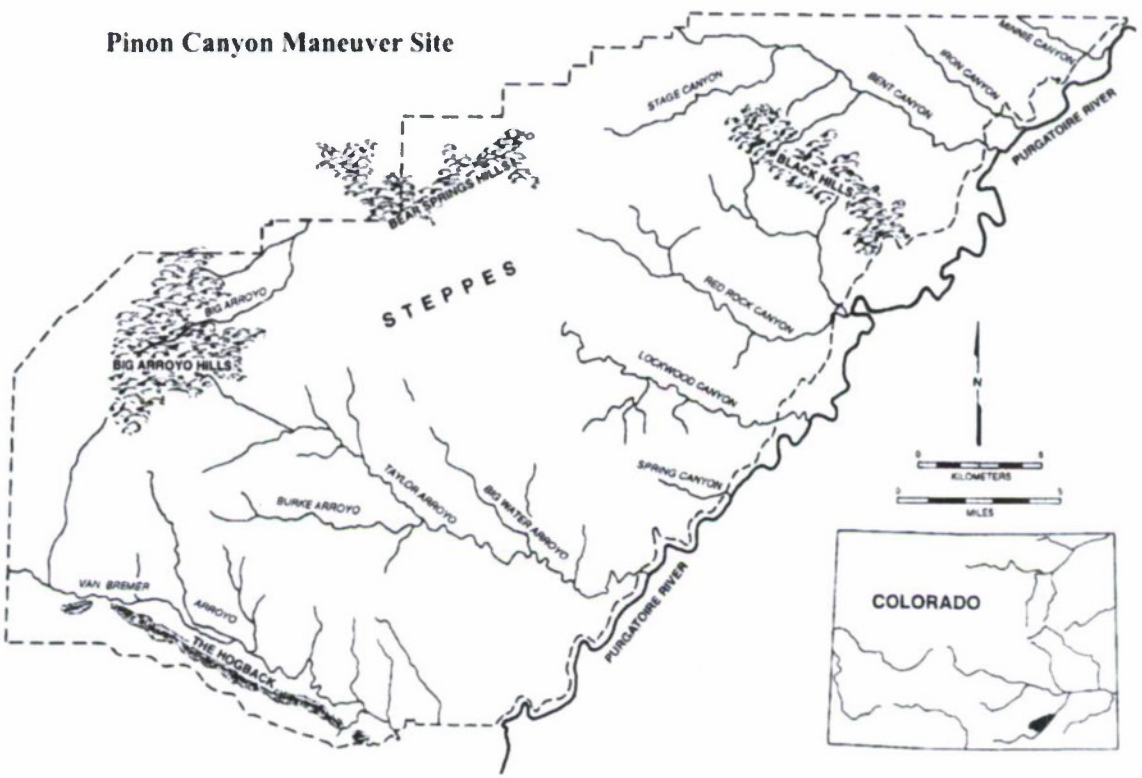


Figure 1.1: Map of Pinon Canyon Maneuver Site in southeastern Colorado

Natural Physiographic and Geologic Setting

The Pinon Canyon Maneuver Site is located northeast of Trinidad, Colorado, in the Raton section of the Great Plains physiographic province (Trimble 1980, 1990:24; Fenneman 1931). The Raton section represents a transition between the Front Range of the Rocky Mountains to the west and the High Plains to the east. The section is noted for the predominance of Tertiary-aged volcanic dikes, vents, and lava-flows. These features are concentrated in the vicinity of the Raton Mesa and the Mesa de Maya to the south of PCMS, and in the Spanish Peaks area to the southwest (Trimble 1990:10, 23-24). The Raton section is bordered on the north by the Arkansas River and the Colorado Piedmont section of the Great Plains, and on the south by the Canadian River and the Pecos Valley section (Trimble 1990:10).

The Raton Basin is the major physiographic and structural feature of the Raton section. This geologic feature is a small Cretaceous-late Mesozoic depression filled with sedimentary rocks and volcanic intrusives that extend from the titled "hogback" ridges at the front of the Rocky Mountains east to the High Plains (Trimble 1990:24-25). Mapped igneous rocks in these areas include Tertiary basalt flows and intermediate to felsic intrusives (Tweto 1979). In the Trinidad Mesa and Mesa de Maya areas, the igneous rocks are underlain by the gravelly Ogallala Formation of Tertiary age (Trimble 1990; Tweto 1979). In other portions of the section, the Ogallala is absent (erosionally truncated), and the volcanic rocks are underlain by the shale and limestone beds of the Cretaceous Niobrara Formation.

In non-volcanic portions of the Raton section, which includes sites 5LA03254, 5LA03421, and 5LA05612, the topography is dominated by hilly to low relief grasslands, piñon-juniper slopes, arroyos, smaller gullies, and "hogback" ridges constructed of shale, limestone, and sandstone. On the PCMS these rocks are Cretaceous in age and include (from Trimble 1990 and Tweto 1979): the Niobrara Formation (calcareous shale and limestone), Carlisle shale, Greenhorn limestone, Graneros shale, Dakota sandstone, and the Purgatoire Formation (sandstone and shale).

Sites 5LA03254 and 5LA05612 are located on upland landforms adjacent to unnamed tributaries of Lockwood Arroyo in the east-central portion of the PCMS (Figures 2.1 and 4.1). Site 5LA03421 is also in the east-central portion of the PCMS, and is located on alluvial terraces and hilly upland remnants east of Big Water Arroyo. Both Lockwood Arroyo and Big Water Arroyo are ephemeral/seasonal, moderately meandering streams that head in Niobrara Formation uplands to the northwest and empty into the Purgatoire River to the southeast (Figure 1.2). Bedrock in the immediate vicinity of sites 5LA03254, 5LA03421, and 5LA05612 has been mapped as Kdp -Dakota sandstone and Purgatoire Formation, and Kcg -Carlisle shale, Greenhorn limestone, and Graneros shale. These stratigraphic units are comprised of Cretaceous-aged sandstones, limestones, and shale (Tweto 1979). Both sites 5LA03421 and 5LA05612 are associated with a number of shallow rockshelters formed in outcrops of Dakota sandstone during Quaternary-aged episodes of local stream incision and lateral planation. Dakota sandstone is also exposed in the upland portions of both sites. Vertical exposures of Dakota sandstone are common along the lower reaches of both Lockwood and Big Water Arroyos.

Field and Laboratory Methods

Methods employed during the 2000 field investigations at 5LA03254, 5LA03421, and 5LA05612 followed the guidelines outlined in Dean (1992) for archaeological data recovery at PCMS. These included the screening of all matrix through ¼" dry screen, the excavation of 1 x 1 m squares in 10 cm vertical levels (or by natural stratigraphic levels when feasible), the collection of 33 x 33 cm samples from each unit level for waterscreening through 1/16" mesh, the use of standardized level and feature forms, photographic documentation, the drawing of stratigraphic profiles, and the establishment of a comprehensive field catalogue.

Fieldwork at site 5LA03254 was conducted between July 26 and August 3, 2000, and included the excavation of 1 x 1 m test units along mechanized vehicle tracks that passed directly over a collapsed sandstone structure (Figure 2.3). Test units were also excavated outside of the structure and at a nearby stone foundation (Figure 2.2). A total of 10 1 x 1 m squares were excavated at 5LA03254.

Investigations at site 5LA05612 were conducted between August 3 and August 21, 2000. The fieldwork consisted of the excavation of 36 test units - 16 along a series of mechanized vehicle tracks, and 20 in block excavation areas. In the first block, Locality A, 16 test units (12 -1 x 1 m and 4 -1.0 x .50 m) were excavated over a large concentration of burned rock (Feature 1). In the second block, Locality B, five test units (1 x 1 m and .50 x 1.0 m) were excavated at the location of a small thermal feature (Feature 3) with fire-cracked rock (FCR).

Fieldwork at site 5LA03421 was undertaken between August 22 and November 11, 2000. The research at this site consisted of the excavation of 89 test units. These were concentrated in six different landform/sedimentary environments:

Area 1. Rocky Hilltop – 31 test units located in mechanized vehicle tracks and nine block excavation areas.
Area 2. Bedrock Slope – 28 test units located in mechanized vehicle tracks and four block excavation areas.
Area 3. T2 Terrace – nine test units and one block excavation area.
Area 4. T1 Terrace – nine test units located in mechanized vehicle tracks and one block excavation area.
Area 5. Alluvial Fan – two test units located in mechanized vehicle tracks.
Area 6. Colluvial-Mantled Terrace – nine test units located in mechanized vehicle tracks and one block excavation area.

Cultural features encountered during the course of fieldwork were excavated to the point of maximum visibility and then photographed and drawn in planview. Features were also profiled in cross-section. All feature matrix was collected and subsequently processed by flotation.

Assessment of the impact from military activity included the placing of excavation units along obvious mechanized vehicle tracks within each of the site areas. After assessing surface damage, unit compaction was determined visually and with the use of a standard soil compaction meter from Forestry Supply. Normally, the compaction meter relies on a methodology for gauging soil resistance using the depth to which a cylindrical device penetrates the soil before stopping (Amacher and O'Neill 2005; Batey and McKenzie 2006;

Becker 1994). Because the pounds per square inch (psi) scale on the compaction meter malfunctioned, a slightly modified version of this technique was used in the field to measure compaction. Using the same individual to minimize inter-observer error, it is assumed that the same pressure was exerted during each measurement. Once the compaction meter stopped moving, the depth in centimeters was recorded from the side gauge of the meter. This data was then analyzed for obvious patterns. The expected results would be a lower reading in tracked vehicle areas as compared to non-tracked areas, since compaction would be expected in areas subject to military maneuvers. Areas of a single pass might not register significant subsurface compaction.

At the end of the 2000 field season, all of the individual test units and block excavation areas were backfilled with the aid of a skid loader. The 1 x 1 m units and smaller block excavations were filled with the original, screened matrix. At the two largest block areas (Locality A - 5LA05612, Block 7 - 5LA03421) the open units were filled with a combination of original matrix and clean, fine sand. All of the wooden stakes placed along mechanized vehicle tracks at the sites were left in place, as were iron rebar datum stakes.

Laboratory methods included the initial washing and sorting of materials into different artifact categories (e.g., flaking debris, chipped stone tools, cores, ground stone tools, historic materials, floral and faunal materials, fire-cracked rock, radiocarbon samples, etc.). After initial processing, all artifacts were sorted according to size grade. As outlined in Dean (1992) and Ahler (1975), this involved passing the materials through a stacked series of U.S. standard-sized screens. The screen openings and resultant size grades are as follows:

G1. Grade 1. 25.4 mm (1.00 inch) opening
G2. Grade 2. 12.7 mm (0.50 inch) opening
G3. Grade 3. 5.60 mm (0.22 inch) opening
G4. Grade 4. 2.54 mm (0.10 inch) opening
G5. Grade 5. 1.18 mm (0.05 inch) opening

After size grade, debitage (flaking debris and shatter) analysis involved the identification of raw material type, flake type (simple or complex, bifacial thinning, pressure or shatter), weight (in grams), degree of cortex remaining on the dorsal surface (primary-entircly covered with cortex, secondary-partially covered with cortex, tertiary-no cortex remaining), and striking platform morphology (none-no platform remaining, cortex-platform completely covered with cortex, secondary-flat platform, partially covered with cortex, tertiary-flat platform, no cortex remaining, faceted-platform has multiple flat surfaces, no cortex remaining).

Chipped stone tools were weighed (in grams), measured (length, width, thickness in cm), identified as to raw material type, and analyzed for technological and functional attributes. The latter included assignment of each tool into one of five technological classes and five functional classes, as defined in Ahler (1975), and Ahler et al. (1977). Technological class affiliation describes the technology employed and the manufacturing processes associated with each chipped stone tool. Technological classes identified in the PCMS chipped stone assemblage include large thin bifaces, small thin bifaces, patterned unifacial tools, unpatterned unifacial tools, and utilized flakes (Ahler 1989). Functional class affiliation describes tool use and involves a combination of morphological and technological variables. Functional classes identified in the PCMS assemblage include projectile points, generalized cutting tools,

generalized scraping tools, transverse scraping tools (side-scrapers), and expedient scraping tools.

Cores were weighed, identified as to raw material type, and classified according to the type and patterning associated with flake removal. Fire-cracked rock was weighed, size-graded, and identified as to raw material type. Prehistoric ceramics were described according to color, size grade, surface finish (plain, incised, corrugated), vessel position (rim, neck, body), and temper composition.

Samples of sediments collected from a number of cultural features and representative depositional environments were analyzed according to classification attributes described in Folk (1974), Boggs (1987), and the Soil Survey Staff (1951, 1990). Specific variables recorded include texture, color (via Munsell color charts), structure, consistence, unit or horizon boundary, reaction (to 10% HCL), and carbonate development (Gile et al. 1966). Potential radiocarbon samples (charcoal, charred seeds) were examined for dating potential (via 20x magnification) prior to submittal to Beta Analytic for analysis. One sediment sample, collected from Feature 1 at 5LA05612, was analyzed for elemental composition at the Texas A&M University Scanning Electron Microprobe Laboratory, College Station, Texas.

Results of Investigations

The field and laboratory investigations at 5LA03254, 5LA03421, and 5LA05612 produced widely diverse sets of archaeological, historical, geomorphological, and systemic contextual data. Recovery efforts at 5LA03254, for instance, revealed relatively low levels of modern military vehicle disturbance but an extreme paucity of surface and subsurface cultural material. Site 5LA03421, on the other hand, was more severely impacted by recent military activity, but contained a relatively large assortment of artifacts and cultural features. Finally, 5LA05612 was more or less intermediate, with moderate levels of disturbance and moderate numbers of artifacts and features. These individual site characteristics are summarized in the following chapters in order of their state site number.

Chapter II: **SITE 5LA03254**

Site 5LA03254 was the first of the three sites to be investigated during the 2000 field season. Field investigations were conducted between July 26 and August 3, 2000, and centered on the excavation of 10 1x1 m test units The site is the least culturally and archaeologically complex consisting of a single historic-period component and a very low number of recovered artifacts.

Topographic Setting and Surface Archaeology

The University of Denver crew described the site as situated "on a relatively flat area which is located [northwest] of the confluence of [two] unnamed intermittent drainages to Lockwood Arroyo. The surrounding area gently slopes from the [west] down [east]) toward the drainages" (Mead and Carrillo 1984). This description is illustrated in Figure 2.1 and represents an accurate overview of the site's topographic setting. The site area is relatively featureless and is covered with native grasses and forbs.

The two main features identified by the University of Denver at 5LA03254 were readily re-located in 2000, although new feature numbers were assigned for the purposes of consistency within this report. The surface archaeology consists of a historic period collapsed sandstone structure designated as Structure 1 in the 1984 field season, but Feature 1 during this recording. The second feature is an adjacent concentration of limestone slabs that appear to represent a former building foundation. The University of Denver designated this associated rock concentration Feature 1, considering it to be a type of outbuilding although no evidence was found to connect the two. For the purpose of this report the second feature was designated Feature 2.

Feature 1 contains one plainly visible main room, one less well-defined second room, and a collapsed stone chimney in the northeastern corner (Figures 2.2 and 2.3). The remaining foundation stones form a square outline that measures 5.10 x 4.20 m. Residual wall fall includes sandstone slabs piled to a height of .50 m. The concentration of limestone slabs (Feature 2) is somewhat amorphous and measures 10.50 x 3.80 m. It is located 6.0 m southeast of Feature 1. The site was interpreted as a late 19th century homestead (ca. A.D. 1870 -1890). The corner fireplace and a paucity of artifacts visible on the surface suggested an occupation by Hispanic American settlers (Mead and Carrillo 1984). A BLM record search of the legal description (USGS Quad Lockwood Arroyo, 1993, T 29S, R 58W, NW¼, NW¼, SW ¼, SE¼ of Sec 21) indicates Antonio Felix Duran obtained a land patent in 1918 for this land under the 1862 Homestead Entry Original 12 Stat 392.

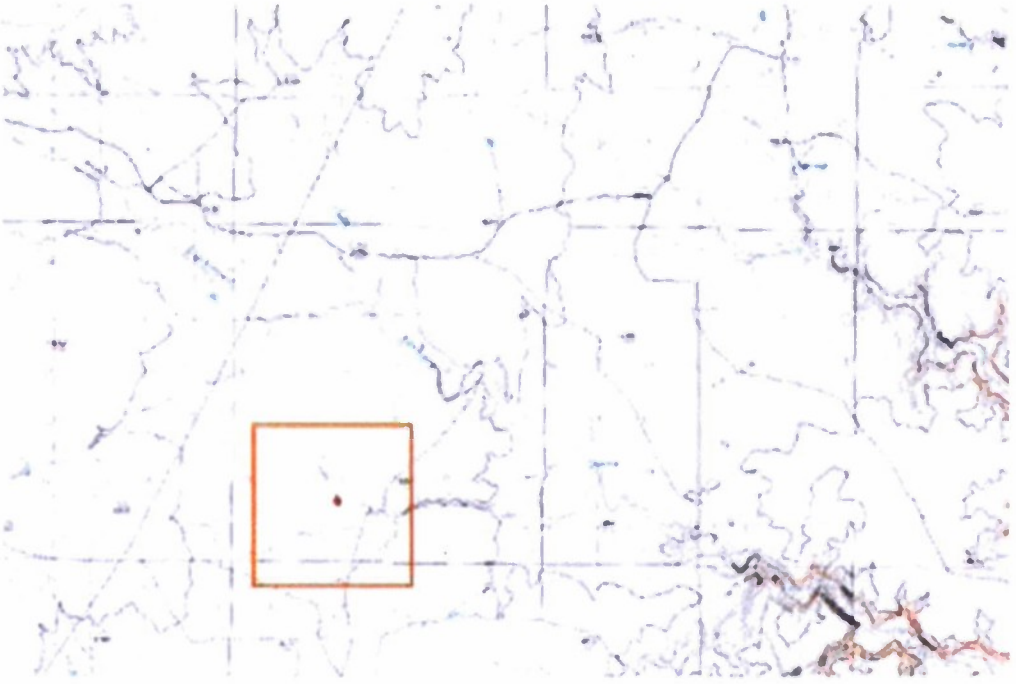


Figure 2.1: Location of Site 5LA03254, PCMS, Colorado,
USGS quad map, Lockwood Arroyo 1993

Stratigraphy and Sedimentary Depositional Environment

Site 5LA03254 is located in loess-mantled uplands. Surface and near-surface sediments at the site are therefore comprised of wind-blown silt associated with an aeolian depositional environment (Ruhe 1976). The loess forms a generally thin, but variable, mantle overlying Cretaceous-aged sandstone identified on local geological maps as Kdp – Cretaceous-aged Dakota sandstone/Purgatoire Formation (Tweto 1979). The sandstone was not encountered during the on-site investigations due to the shallow depth of the test unit excavations (10 to 20 cm below the surface). Bedrock, however, was observed eroding out of the sides of nearby Lockwood Arroyo.

The surface and near-surface soils at site 5LA03254 consist of a silty to very fine sandy loam Inceptisol arranged into an A/O-A-Bk, Btk1-Btk2-Btk/C horizon profile. The Btk and C horizon soils were only encountered in Test Unit 8, which was placed inside of the Feature 2 stone foundation and contained a shovel probe that was excavated in the center of the unit to a depth of 65 cm below the surface (Table 2.1).

Table 2.1: Summary of soil horizons encountered in Test Unit 8, 5LA03254

A/O Horizon – Depth 0 – 5 cm below ground surface, Munsell dark brown, 10YR3/3 (wet), silty loam, structureless, dry loose, no reaction, abrupt irregular boundary.

A Horizon – Depth 5 – 17 cm below ground surface, brown, 10YR4/3 (wet), silty loam, weak moderate subangular blocky, dry slightly hard, no reaction, clear smooth boundary.

Bk Horizon – Depth 17 – 29 cm below ground surface, dark yellowish brown, 10YR4/4 (wet), clayey silt loam, medium moderate subangular blocky, dry hard, weak reaction, clear smooth boundary.

Btk1 Horizon – Depth 29 – 46 cm below ground surface, dark yellowish brown, 10YR4/4 (wet), silty clay loam, medium distinct subangular blocky, dry very hard, moderate reaction, sparse powdery carbonates, clear smooth boundary.

Btk2 Horizon – Depth 46 – 56 cm below ground surface, yellowish brown, 10YR5/4 (wet), silty clay loam, medium moderate subangular blocky, dry very hard, strong reaction, sparse carbonate nodules, common carbonate threads, clear smooth boundary.

Btk/C Horizon – Depth 56 – 65 cm below ground surface, light yellowish brown, 10YR6/4 (wet), silty loam, weak medium subangular blocky, dry hard, strong reaction, sparse carbonate nodules and threads.

Summary of Test Unit Excavations

The 10 1 x 1 m test units excavated at 5LA03254 were placed within and immediately outside of Feature 1, the collapsed sandstone structure, and within the nearby stone foundation, Feature 2. They were placed along a t-shaped baseline that measured 13 m north-south by 8 m east-west. The intersection of the two lines was designated 100N, 100E (Figure 2.2). The units were excavated to an average depth of 20 cm below ground surface and the bulk of the matrix was screened through 1/8" dry screen. A 33 x 33 cm waterscreen sample was collected from each 10 cm vertical level and later processed in the field camp through 1/16" mesh. The specific results of the test unit excavations are summarized as follows:

Test Unit 1 – 101N, 93E. This unit was placed just outside (south) of the western room in Feature 1, the collapsed sandstone structure (Figure 2.2). It was excavated in two vertical 10 cm levels to a depth of 20 cm below ground surface. The soil in the unit consisted of Munsell yellowish-brown, 10YR5/4 (wet), with fine sandy loam (A horizon). A 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit. No cultural materials were recovered from Test Unit 1; however, four small sandstone rocks, apparently associated with the collapsed rock wall, were present on the surface of the unit.

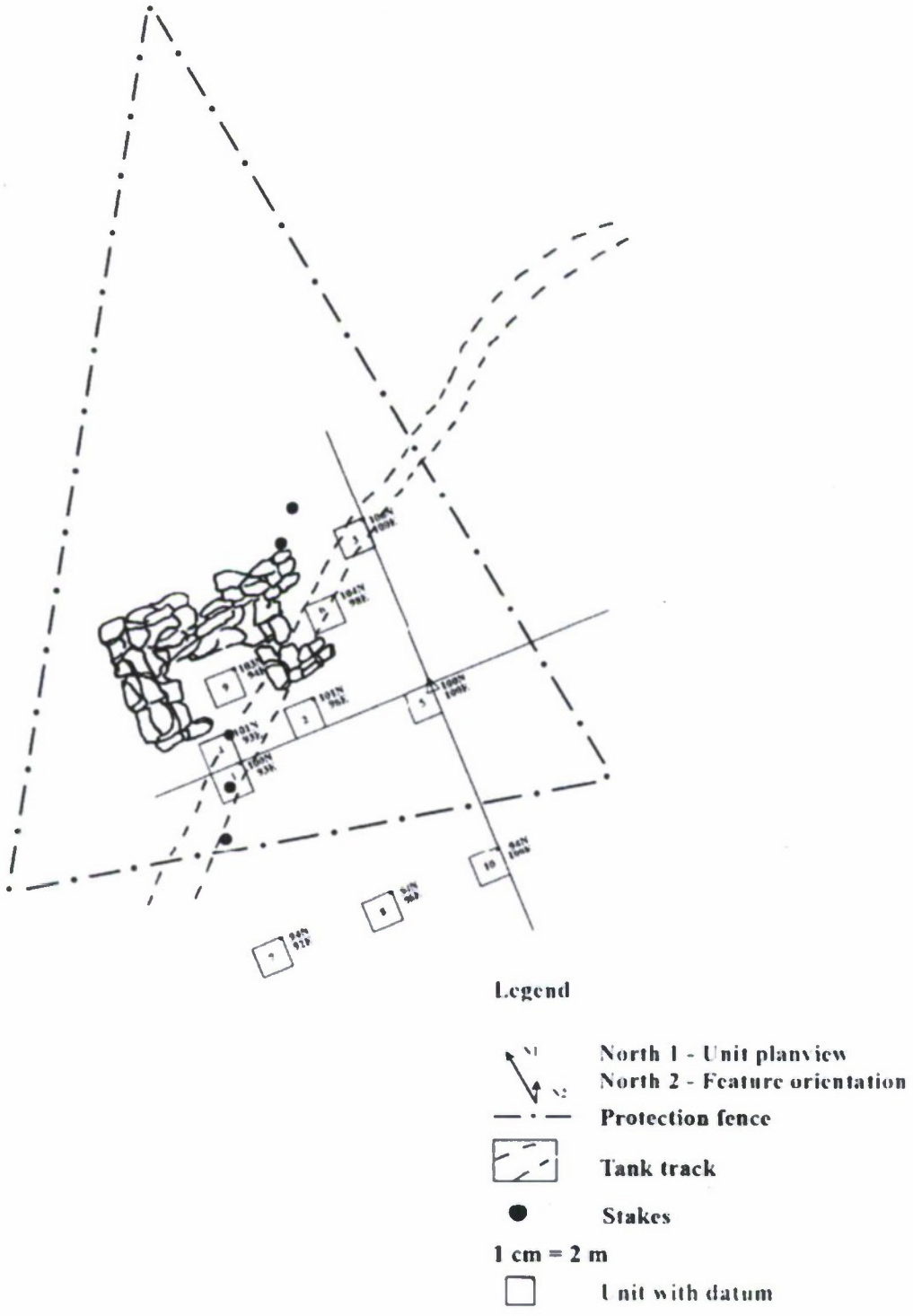


Figure 2.2: 5LA03254 Site planview and diagram of test unit positions

Test Unit 2 – 101N, 96E. This unit was located off of the southwestern corner of the eastern room in Feature 1, just outside of the collapsed rock wall (Figure 2.2). It was excavated in one vertical 10 cm level to a depth of 10 cm below ground surface. The soil in the unit consisted of Munsell dark yellowish brown, 10YR3/4 (wet), silty loam (A horizon). The 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit. No cultural material was recovered during the excavation and subsequent screening of Test Unit 2. One sandstone rock was present on the surface near the southwest corner.

Test Unit 3 – 106N, 100E. Test Unit 3 was located to the east-northeast of the eastern room in Feature 1, outside of the collapsed rock wall (Figure 2.2). The unit was excavated in two vertical levels to a depth of 20 cm below ground surface. The unit matrix was comprised of fine sandy loam ranging in color from dark yellowish brown 10YR3/4 (wet) to dark yellowish brown 10YR4/4 (wet). The waterscreen sample was collected from the northwest corner of the unit, and recovered cultural material consisted of a single strand of barbed wire from Level 1 (0 to 10 cm below ground surface).

Test Unit 4 -101N, 93E. This unit was contiguous to Test Unit 1 on the north and extended into the south opening (a possible door) of the western room in Feature 1 (Figure 2.2). It was excavated in two vertical levels to a depth of 20 cm below ground surface. The soil consisted of yellowish brown, 10YR5/4 (wet), fine sandy loam (A horizon). The waterscreen sample was collected from the southwest corner of the unit, and no cultural materials were recovered during the excavations or subsequent waterscreening. Sandstone rocks were present on the surface in the northwest and northeast portions of the unit.

Test Unit 5 – 100N, 100E. This unit was placed east of Test Unit 1 outside of and between Features 1 and 2 (Figure 2.2). The unit was two levels deep (0 to 20 cm below ground surface) and the matrix was comprised of dark yellowish brown, 10YR4/4 (wet), silty loam. The waterscreen sample was collected from the northwest corner, and no cultural material or sandstone rock was encountered.

Test Unit 6 – 104N, 98E. Test Unit 6 was located inside of the east room of Feature 1, near the eastern opening of the room (Figure 2.2). The unit was excavated in two levels to a depth of 20 cm below ground surface. The soil consisted of dark yellowish brown, 10YR3/4 (wet), fine silty loam. The waterscreen sample was taken from the southeast corner and no cultural material was recovered from the excavations. An area of compacted soil, however, was encountered in the western half of the unit at a depth of 4 cm below ground surface. The compaction corresponds to the location of a recent mechanized vehicle track that passes through the eastern portion of Feature 2. There were a number of small sandstone rocks in the northwest, west, and south-central portions of the unit and these may have been displaced by the action of the military vehicle passing over the feature.

Test Unit 7 – 94N, 92E. This unit was located inside of the west-central portion of Feature 2, the sandstone foundation (Figure 2.2). The unit was excavated to a depth of 20 cm below ground surface, and the matrix was comprised of dark brown, 10YR3/3 (wet), silty loam (A horizon). The waterscreen sample was collected from the northwest corner and no cultural materials were recovered during the excavation of the unit. One surficial sandstone rock slab was present in the south-central portion.

Test Unit 8 – 94N, 96E. Test Unit 8 was located in the inside central portion of Feature 2 (Figure 2.2). The unit was excavated in two vertical levels to a depth of 20 cm below ground surface; however, a shovel probe was also dug in the southeast corner of the unit to a depth of 65 cm below ground surface. The unit and shovel probe revealed a soil comprised of an A/0-A-Bk-Btk1-Btk2-Btk/C horizon profile. A description of these horizons is presented in Table 2.1. No cultural materials were recovered from Test Unit 8.

Test Unit 9 – 103N, 94E. This test unit was located inside of the central portion of the western room in Feature 1 (Figure 2.2). It was excavated in two vertical levels to a depth of 20 cm below ground surface. The waterscreen sample was collected from the northwest corner of the unit and the unit soils consisted of dark brown, 10YR3/3 (wet), silty loam (A horizon). No cultural material was recovered from Test Unit 9. One sandstone rock was located on the surface in the southwest portion of the unit.

Test Unit 10 – 94N, 100E. The last test unit excavated at 5LA03254, Test Unit 10, was located inside the eastern portion of Feature 2 (Figure 2.2). It was excavated to a depth of 10 cm below ground surface and the waterscreen sample was collected from the northwest corner. The unit matrix was dark yellowish brown, 10YR4/4 (wet), clayey silt loam. No cultural material was recovered from Test Unit 10, and two sandstone rocks were located on the surface along the southwest edge of the unit.

Natural and Cultural Impacts

The area appears relatively undisturbed by natural processes. The site exhibited a distinct lack of subsurface cultural materials and building stone, which suggests that little or no sediment deposition, has occurred in the site area since abandonment of the former structures. On the other hand, the site surface is flat, smooth, and well-sodded, which suggests that little or no erosion has occurred either, especially in relatively recent times (i.e., within the last 50 years). The site therefore appears to represent a relatively stable upland setting, conducive to local soil formation and the preservation of what archaeological materials may still remain at the site.

Site 5LA03254 did experience some negative impacts from recent military activity. One main set of mechanized vehicle tracks was clearly visible on the site surface and ran in a northeasterly direction across the site area (Figure 2.3). The track was about 1.40 m wide, with visible ruts and depressed areas across the prairie grasses. It crossed over the southeastern portion of the western room of Feature 1 and through the western half of the eastern room. Some of the sandstone building stones along the south-central and south-eastern portion of Feature 1 were cracked, scratched, and apparently moved from their original position. The vehicle appears to have completely missed Feature 2, which was confirmed by a comparison with the 1983 site report.

This site had the most visually demonstrative evidence of feature damage by mechanized military maneuvers. Of the 10 units discussed in depth above, compaction data were recorded for Test Units 1 through 5, and visual observations of track depressions were noted in Test Unit 6. The compacted surface in Test Unit 6 was encountered in the western half of the unit at a depth of 4 cm below ground surface. The soil here was aeolian silty loam. The compaction was evident in the soil consistence, which was dry, very hard, and in the soil structure, which was very weak, small angular blocky (hardness increased, soil structure class decreased).

Figure 2.3: 5LA03254 Site overview photo with Feature 1 center view

Soil compaction occurred at all levels within the test units as would be expected, but no clear pattern emerged. The lack of clear compaction patterns on this site suggests this was a single pass incident. Although disturbance to the surface is evident and this will affect environmental factors such as water runoff and plant growth, it might cause conflicting subsurface measurements (Shaw and Diersing 1989; Trumbull et al. 1994; Vaz et al. 2001). Other factors to take into account would be rainfall at the time of the impact and the consistency of the measurement applicator. As no artifacts were recovered in association with the compacted areas, its impact on the systemic context of the site cannot be assessed. A lack of buried cultural materials would tend to suggest that impacts to cultural resources on this site, if any, were minimal.

Management Recommendations

The investigations at 5LA03254 yielded an extreme paucity of historic cultural materials, both on the surface and in buried contexts. The only artifact recovered was a 7.5 cm-long strand of barbed wire. This was found in Level 1 (0 – 10 cm below ground surface) at Test Unit 3 (just northeast of Feature 1). Within the context of National Register eligibility, the single piece of wire recovered does little to broaden an understanding of the history and archaeology of site 5LA03254. While it is possible that additional buried cultural materials may still be present, but were not located during the investigations, it seems unlikely that these would be abundant or diverse enough to qualify as potentially significant under National Register criteria. For this reason, no additional archaeological work at 5LA03254 is recommended.

Chapter III: **SITE 5LA03421**

Site 5LA03421 was by far the largest and most archaeologically complex of the three sites excavated during the 2000 field season (Figure 3.1). The identifiable site area encompasses a number of different landform categories, each of which exhibit different archaeological contexts. For this reason, a summary of the excavations at 5LA03421 will be presented according to individual topographic and geomorphic areas. These areas are defined as: Area 1. Rocky Hilltop (aeolian); Area 2. Bedrock Slope (aeolian); Area 3. T2 Terrace (alluvial); Area 4. T1 Terrace (alluvial and bedrock); Area 5. Alluvial Fan (colluvial/alluvial); Area 6. Colluvial-Mantled Terrace (colluvial-alluvial).

The site was first recorded by the University of Denver in 1983; however, the area investigated during the 2000 field session greatly expanded the original site boundary to include an area just beyond the protection fence. The original recording described an unknown prehistoric and historic component to the site and focused on the former. In addition to a large amount of lithic debitage and tools, 15 features were documented by the University of Denver (Mead and Carrillo 1984). These included a historic stone corral (Feature 1), two stone cairns (Features 2 and 3), eight bedrock metates (Features 4 -11), and four burned rock concentrations (Features 12 through 15). Additionally, four structures were recorded, including a stone enclosure (A1), two remnant foundations (A2, 3), a spaced stone circle (A5) and four rock overhangs. Due to time constraints and the nature of this report, feature numbers were reassigned beginning with Feature 1. Subsequent work on the historic component of this site was conducted in 2002 (Charles et al. 2004).

Figure 3.1: Location of 5LA03421, PCMS, Colorado, USGS quad map, Rock Crossing

Topographic Setting and Surface Archaeology

Site 5LA03421 is a large and potentially complex site in terms of stratigraphy, soils, and late Quaternary depositional environments. Each of the different landform/sediment categories differ in size, geomorphic history, and depth of archaeological deposits. Some, like the bedrock slope and rocky hilltop, cover fairly large areas and have variable depth potential. Others, like the T1 strat terrace, are much smaller and have more limited potential for buried materials. The scope of the archaeological data recovery also varied, with much larger numbers of test units dug in those landforms with larger surface areas and fewer test units in those landforms with limited surface areas.

All of the test units at 5LA03421 followed staked mechanized vehicle tracks except one (Block 7 – buried wall). The placement of the units followed an arbitrary datum set at 1000N/1000E (Figure 3.2).The rocky hilltop area had 31 test units and nine block areas which included the cultural units associated with Features 1, 3, 4 and 6. The bedrock slope had a total of 28 test units with four block areas and included the largest cultural feature, Feature 2. Both the T2 terrace and T1 terrace included nine test units and one block area. The alluvial fan included two test units and no block areas. Finally, the colluvial-mantled terrace included nine test units and one block area.

Rocky Hilltop Area

The large, bedrock-dominated hilltop is located in the central-eastern portion of the site (Figure 3.2). Aeolian sediments are distributed from 0 to approximately 45 cm below the surface above sandstone bedrock. Preliminary data suggested that the hilltop area contained a minimum of two cultural components: one on and just below the surface, and one more deeply buried 15 to 45 cm, or just above the bedrock. Military disturbance in this area is dominated by a forked series of tracks leading to the northeast and another area of heavy disturbance. A total of 31 units were excavated along this disturbed area, 16 of which were related to cultural features (Figures 3.2 and 3.3). Though FCR and a small number of lithics were found in excavated units, no diagnostic artifacts were recovered from excavation units on the hilltop.

Stratigraphy and Sedimentary Depositional Environment

The rocky hilltop landform is characterized by sandstone bedrock that is buried less than 45 cm down, but is also occasionally present on the site surface. Where buried, the bedrock is mantled with a thin bed of silty loam and/or loamy fine sand (aeolian). As illustrated in a number of test unit and block unit profiles, cultural materials and features are concentrated in this silt and loamy sand mantle (Figures 3.21 and 3.26).

The upper stratigraphic component appears Late Prehistoric in age considering its association with a possible surface-visible stone circle and shallow "living surfaces". The latter constitutes flakes, a few chipped stone tools, almost ubiquitous amounts of both concentrated and scattered FCR, and Feature 4, an alignment of stones with an irregular cluster of FCR at either end. Materials were buried to a depth of 5 -10 cm below ground surface and were heavily disturbed by military traffic.

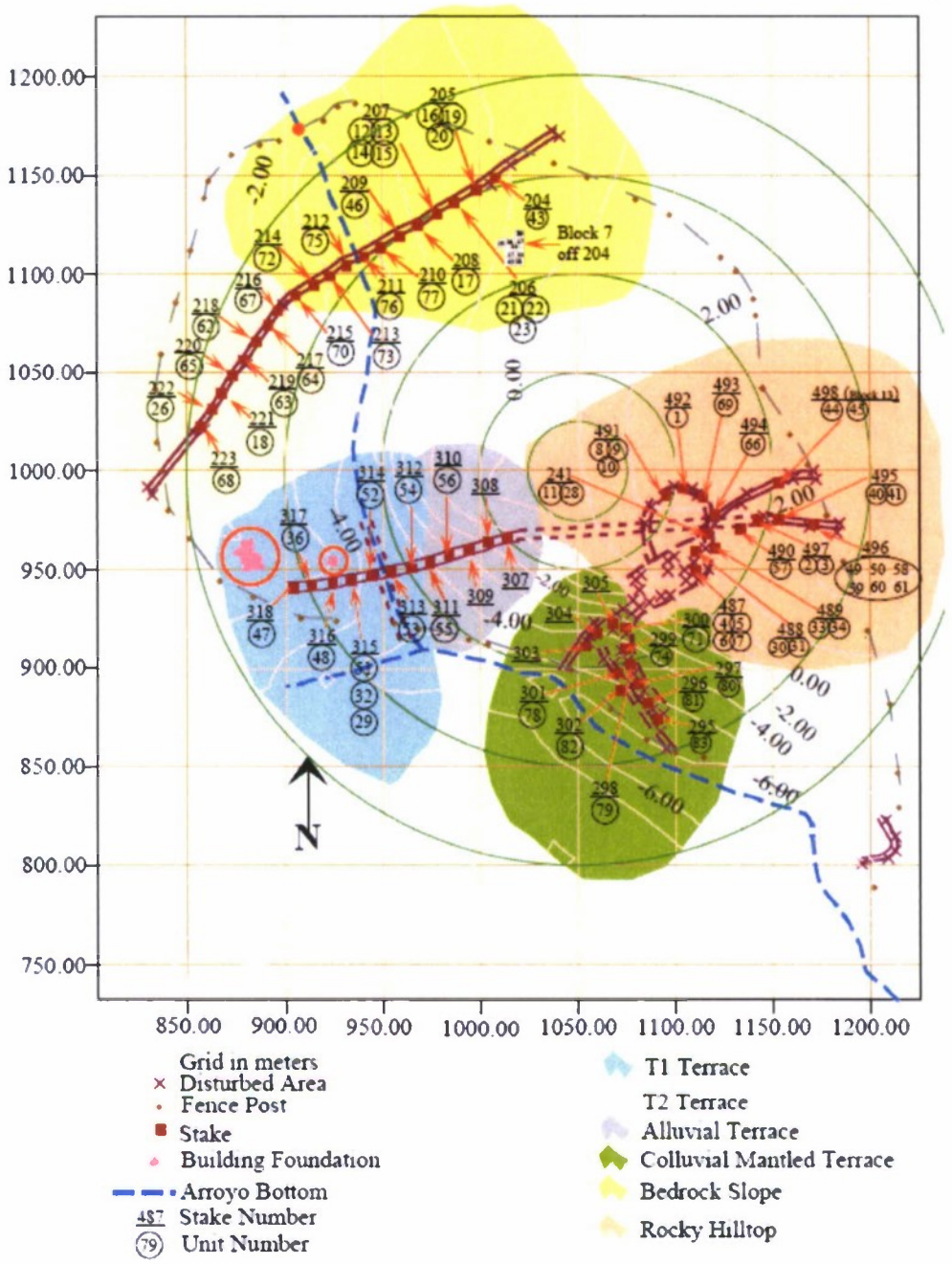


Figure 3.2: Topographic map of 5LA03421 showing recent mechanized vehicle tracks and placement of 1 x 1 m test units and block excavation areas

The more deeply buried materials in this area lie just above sandstone bedrock to depths of about 45 cm below ground surface, which suggests that they pre-date the shallower upper component. The morphology of the more deeply buried soils (i.e., Stage 1 carbonates) indicates greater age, likely associated with dryer periods in the Middle or Late Archaic periods. Cultural features associated with the possible lower component include Feature 1, a small circular ash stain; Feature 3, a large buried oval-shaped area of charcoal-stained earth, FCR, flakes and a small piece of bone; and Feature 6, two courses of FCR extending into the eastern wall of Test Unit 44a.

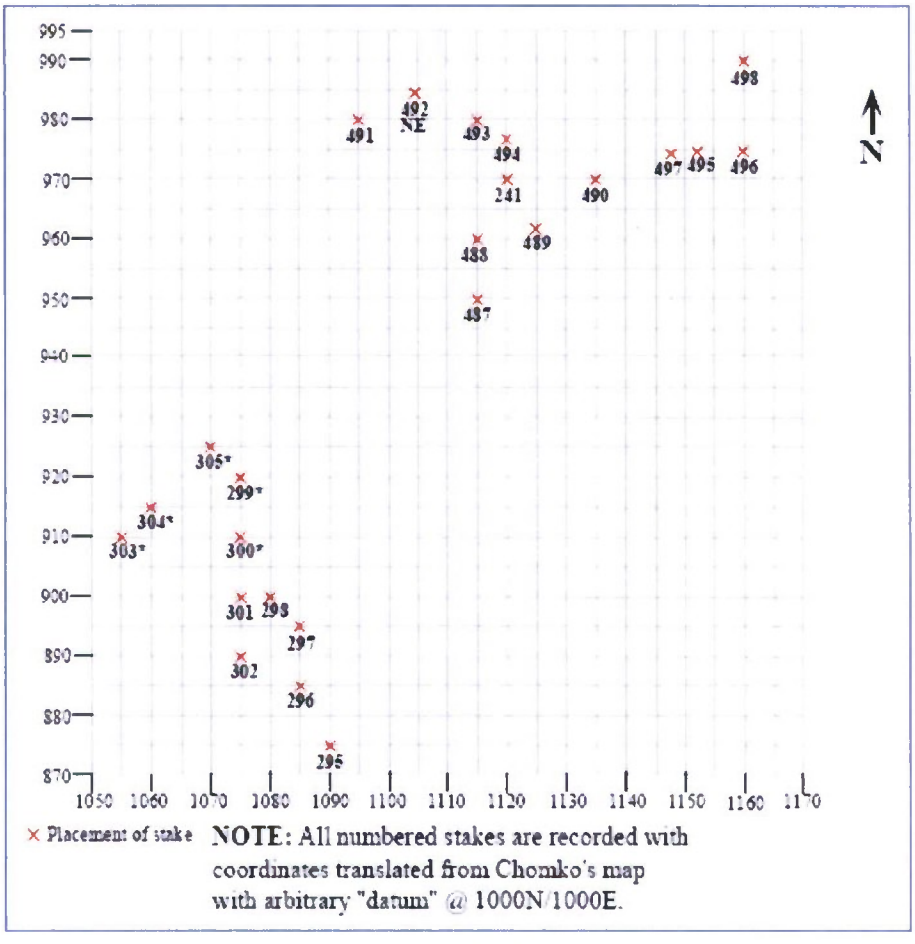


Figure 3.3: 5LA03421 Stake positions for the rocky hilltop area (upper right) and the colluvial mantle area (lower left)

Summary of Test Units

Test Unit 1 -ST 492. The vertical datum for this unit was placed in the northeast corner at 10 cm above modern ground surface. Sediments were shovel-skimmed in one natural level to a depth of 19 cm below datum and were ¼" dry screened. The soil is Munsell dark brown,

10YR3/3, loamy sand. A 33 x 33 cm soil sample was taken from the southeast corner. No cultural artifacts were found.

Test Unit 2 -ST 497 Block 1. Test Unit 2 was shovel-skimmed to bedrock as one level from a depth of 10 to 39 cm below datum. A single piece of black chert shatter was collected from the north half of the unit between 10 to 15 cm. The soil is a sandy loam with medium to large subangular pieces of sandstone bedrock. A 33 x 33 cm sediment sample for waterscreening was taken from the northwest corner. Other than the single piece of debitage, no artifacts were found.

Test Unit 3 -ST 497 Block 1. This unit was laid out adjacent to and south of Test Unit 2. It was excavated as one level from a depth of 10 to 36 cm below datum. A 33 x 33 cm sediment sample for waterscreening was collected from the northwest quarter of the unit. Soils are the same as those described in Test Unit 2 with the sandstone bedrock appearing at a depth of 32 to 36 cm below datum. No features or artifacts were found in association with this unit.

Test Unit 4 -ST 487 Block 2. The vertical datum for this unit was in the southwest corner of the unit at 10 cm above the ground surface. Two large rocks were removed from the surface of the unit. All sediments were shovel-skimmed to bedrock as one natural level to a depth of 25 cm below datum. The soil is described as brown 10YR4/3 fine sandy clay loam with some small gravels. A 33 x 33 cm waterscreen sample was collected from the northeast corner. No cultural materials were found within the unit.

Test Unit 5 -ST 487 Block 2. This unit is located adjacent to and south of Test Unit 4. The datum was located in the northwest corner at 10 cm above the modern ground surface. Level 1 was shovel-skimmed and troweled to a depth of 25 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner. Level 2 was skimmed to bedrock from 25 to 50 cm below datum. An ashy stain about 5 cm thick with charcoal flecks was encountered at 38 cm below datum. The charcoal was collected for potential radiocarbon dating. A 33 x 33 cm waterscreen sample was collected from the northeast corner. A black chert flake was collected from Level 2 along with three pieces of FCR and the ashy stain fill. Bedrock was encountered at 50 cm.

Test Unit 6 -ST 487 Block 2. This unit is located adjacent to and south of Test Unit 5 with the datum set at the northwest corner of Test Unit 5, 10 cm above the modern ground surface. The unit was shovel-skimmed to a depth of about 21 cm below datum when bedrock was encountered. Soils are silty loam with small to large unsorted gravels. No features were encountered in this unit although two pieces of FCR and a small non-cortical black chert flake were collected from 15 to 20 cm below datum in the east half of the unit. A 33 x 33 cm waterscreen sample was collected from the northeast quarter of the unit.

Test Unit 7 -ST 487 Block 2. This is the final unit in Block 2 and lies adjacent to and south of Test Unit 6. The datum was located in the northwest corner of Test Unit 5 at 10 cm above the modern ground surface. The unit was shovel-skimmed to bedrock at 25 cm below datum. Soils are silty loam with small to medium unsorted gravels. No cultural materials were associated with this unit.

Test Unit 8 -ST 491 Block 3. This unit was shovel-skimmed to bedrock at an approximate depth of 30 cm below datum. The vertical datum was 10 cm above ground surface in the northeast corner of the unit; bedrock was exposed in the southwest corner and center portions of the unit. Soil is described as dark yellowish brown, 10YR4/4, sandy loam. A 33 x 33 cm waterscreen sample was taken from the northwest quarter. No artifacts were found in this unit.

Test Unit 9 -ST 491 Block 3. This unit is west of and adjacent to Test Unit 8. Level 1 is a single natural level which extends from the modern ground surface to bedrock (18 to 38 cm below datum). Sediments were shovel-skimmed and ¼" dry screened. The soil is described as yellowish brown, 10YR5/4, sandy loam. A 33 x 33 cm waterscreen sample was taken from the northeast quarter of the unit. No cultural materials were found.

Test Unit 10 -ST 491 Block 3. This unit is located west of and adjacent to Test Unit 9, with datum at the northeast corner of Test Unit 8. It was excavated in one level from the natural ground surface to bedrock about 13 to 36 cm below datum. The sediments were shovel-skimmed and ¼" dry screened. A 33 x 33 cm soil sample was taken from the northeast corner. The soil is described as brown, 10YR4/3, sandy loam. The only cultural materials collected were a single black chert flake and a small black quartzite piece of shatter.

Test Unit 11 -ST 241 Block 8. This unit was excavated in one natural layer to bedrock. The vertical datum was located in the northeast quarter at 10 cm above modern ground surface. The sediments were shovel-skimmed and ¼" dry screened. A 33 x 33 cm waterscreen sample was taken from the northwest quarter. No cultural materials were found within this unit.

Test Unit 28 -ST 241 Block 8. This unit was located adjacent to and south of Test Unit 11. The datum was located in the northeast corner of Test Unit 11. The unit was excavated as one level to bedrock or about 25 cm below datum. Soil is described as silty loam with medium to large gravels. A 33 x 33 cm waterscreen sample was taken from the northeast quadrant of the unit. Though two fire-cracked rock fragments were located on the surface, no other cultural materials were found in this unit.

Test Unit 30 -ST 488 Block 9. This unit was excavated to bedrock at about 25 cm below datum. Vertical datum was in the corner of the northwest quadrant 10 cm above the modern ground surface. The soil is described as silty loam with small to medium-sized gravels. A 33 x 33 cm waterscreen sample was taken from the northeast quarter of the unit. No cultural artifacts were found.

Test Unit 31 -ST 488 Block 9. This unit was located south of and adjacent to Test Unit 30. The datum was located in the northwest corner of Test Unit 30. Sediments were excavated in one natural level to bedrock at a depth of 25 cm below datum. The soil was described as silty loam with small to medium-sized gravels. Bedrock was exposed in the center of the unit at a depth of 20 to 25 cm. The soils are compacted beginning at a depth of 10 cm to 25 cm, due to military maneuvers. A 33 x 33 waterscreen sample was taken from the northeast quadrant of the unit. No cultural materials were found.

Test Unit 40 -ST 495 Block 12. Vertical datum was at the southeast corner of this unit. The ground surface of Level 1 was 10 cm below datum. The unit was excavated in one natural level to 35 cm below datum. The sediments were shovel-skimmed to bedrock. Soils are described as

sandy loam with small and medium-sized poorly sorted gravels. Soft shale was noted at 34 cm below datum.

Krotovinas were noted at 15 cm below datum in the west and east walls (Figure 3.4). A 33 x 33 cm waterscreen sample was taken from the northeast corner. Cultural materials collected included a small non-cortical chalcedony flake, a non-cortical grey quartzite flake, a non-cortical Hornfels retouched utilized flake, a cortical brown chert flake and three fragments of fire-cracked rock.

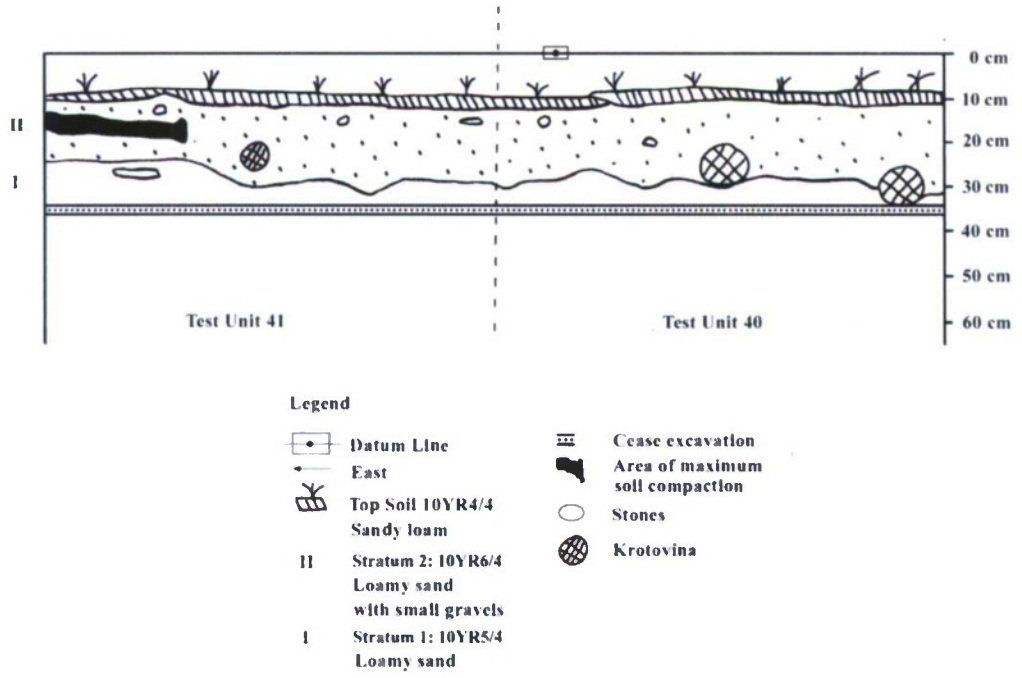


Figure 3.4: Stratigraphic profile of south wall,
Test Units 40 and 41, Rocky Hilltop, 5LA03421

Test Unit 41 -ST 495 Block 122. This unit lies adjacent to and south of Test Unit 40, with the datum located in the southeast corner of that unit. The sediments were shovel-skimmed in one natural unit to bedrock, 10 to 35 cm below datum. The soil is described as sandy loam with small to medium unsorted gravels (Figure 3.5). A large pocket of krotovina runs east to west through the unit at 10 to 20 cm below datum. A 33 x 33 waterscreen sample was taken from the northwest corner of the unit. Two cortical gray quartzite debitage, a non-cortical tan quartzite flake, and a non-cortical dark gray chert flake were collected from this unit.

Test Unit 57 -ST 490. The vertical datum was placed in the northeast corner of this test unit at 10 cm above modern ground surface. The unit was excavated by shovel and trowel to bedrock (10 to 35 cm below datum), although bedrock was encountered at 30 cm below datum in the western half of the unit. The soil is described as fine sandy loam with small to large pieces of

tabular weathered bedrock. A 33 x 33 cm waterscreen sample was taken from the northwest quarter. A single non-cortical black chert flake was collected from this test unit.

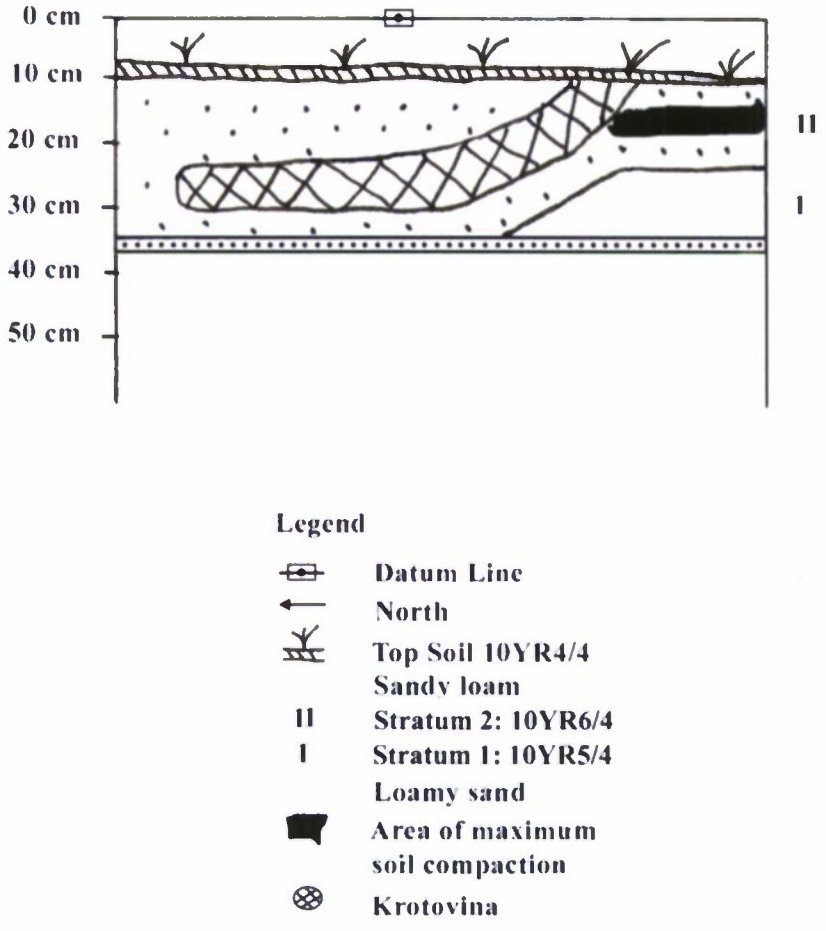


Figure 3.5: Stratigraphic profile of east wall, Test Unit 41, Rocky Hilltop, 5LA03421

Test Unit 66 -ST 494. A mechanized vehicle track ran diagonally across the eastern half of Test Unit 66. The datum was placed in the northeast corner of the test unit about 12 cm above the modern ground surface. The unit was excavated in 10 cm levels to a depth of 37 cm below datum. Each level was trowel-excavated in 2 cm increments to the 10 cm mark. Sediments from all levels were ¼" dry screened. A 33 x 33 cm waterscreen sample was taken from the northwest corner at each level of the unit. Levels 1 and 2 soils (12 to 32 cm below datum) are described as non-compacted fine silty sand with unsorted small gravels. Level 3 soils (32 to 37 cm below datum) are slightly compacted fine silty sand. Cultural materials were found in all levels of this unit and consisted of FCR, a single piece of chalcedony shatter, a non-cortical obsidian flake, a non–cortical black fine-grained quartzite flake and a fine-grained quartzite flake. Soil compaction tests were conducted at 2 cm depth in the center of the area of military activity throughout Levels 1 and 2. No compaction tests were conducted in Level 3 as bedrock was exposed at 31 to 37 cm below datum.

Test Unit 69 -ST 493. A mechanized vehicle track runs on a diagonal path through the middle of this unit. The datum was set in the northeast corner at 10 cm above modern ground surface. A total of four levels were excavated by trowel in 10 cm layers, to bedrock at about 58 below datum. A 33 x 33 cm waterscreen sample was taken at each level from the northwest corner. All sediments were ¼" dry screened.

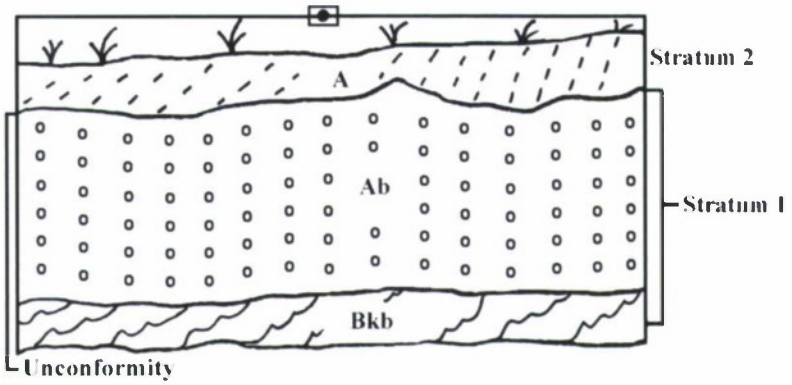
Level 1 soils, from 10 to 20 cm below datum, are described as non-compacted fine silty loam with few very small pebbles. Level 2 soils, from 20 to 30 cm below datum, were slightly compacted fine silty loam with some small pebbles and medium gravels. An increase in $CaCo^{1}$ was noted at 27 cm below datum. Soils from Level 3 (30 to 40 cm below datum) are slightly compacted fine silty loam with small unsorted gravels. Level 4 soils, 40 to 50 cm below datum, are fine silty loam with few small inclusions. Cultural artifacts include a brown fine-grained quartzite flake, two gray chert flakes, one black chert flake and two pieces of FCR (Level 1). FCR was collected from Levels 2 and 3. Charcoal was collected from Level 3. No cultural materials were collected from Level 4. Soil compaction testing was conducted at a depth of 2 cm below datum, within the mechanized vehicle track area and in the southwest quarter of the unit. Results indicted the highest level of impact at 300 psi.

Bedrock Slope

Stratigraphy and Sedimentary Depositional Environment

The rocky/bedrock slope is a long, thin area that forms much of the northern edge of the site. Stake positions for test units in this area are shown on Figure 3.9. Cultural materials and features in this area extend from the surface to a depth of about 45 cm below the surface, depending upon the distribution of sandstone bedrock which, like the rocky hilltop landform, appears to undulate significantly. Throughout the area, the bedrock is mantled by a bed of clay loam and silty clay loam. Evidence of at least two cultural components was obtained during the course of the excavations in the bedrock slope area. These include a possible Paleoindian component (evidenced by the isolated Folsom point) although it is also quite possible that the Folsom point is a re-worked artifact that was carried to the site by the Apishapa peoples. The remains of a buried Apishapa wall (Feature 2) at the site lend credence to this idea.

The stratigraphic composition of artifact-bearing sediments in this portion of the site is illustrated in the profiles obtained from Test Units 72, 73, and 77. The north wall profile from Test Unit 77 illustrates two stratigraphic units (Figure 3.6). The upper, Stratum 2, is a surface A horizon soil of very fine sandy clay loam with a clear irregular lower boundary. The Munsell color is dark brown, 10YR3/3 (wet). This is underlain by Stratum 1, a soil with an Ab/Bkb horizon profile. The Ab paleosol is silty clay loam, very dark grayish brown, 10YR3/2 (wet), with angular blocky structure and a gradual smooth lower boundary. The Bkb horizon is very fine sandy clay loam, yellowish brown, 10YR5/4 (wet), with subangular blocky structure and moderate reaction to HCI.



Legend

Datum Line
1 cm = 10 cm
Surface
A 10YR3/3 (wet)
Very fine sandy clay loam, strong structureless clear, irregular, wet, semi-sticky

Ab 10YR3/2 (wet)
Silty clay loam, distinctive large angular blocky, gradual smooth lower, wet semi-sticky

Bkb 10YR5/4 (wet)
Very fine clay loam, weak moderate, subangular blocky, moderate Rx

Figure 3.6: Stratigraphic profile of north wall, Test Unit 77, Bedrock Slope, 5LA03421

In Test Unit 73, soils consisted of an organic-rich A horizon underlain by a Bk/By horizon and sandstone bedrock, or R horizon (Figure 3.7). The A horizon was 5 to 12 cm thick and was comprised of very fine yellowish brown sandy clay loam, 10YR5/6 (wet), with no structure and a clear smooth upper boundary. The underlying Bk/By horizon was between 12 and 25 cm thick and comprised of pale yellow clay loam, 2.5Y7/4 (dry), with weak subangular blocky structure and powdery gypsum and carbonates. It was separated from the underlying bedrock by an abrupt, irregular boundary (Figure 3.7).

Finally, Test Unit 72 contained a 21 cm-thick A horizon, dark yellowish brown, 10YR3/4 (wet), of silty clay loam (Figure 3.8). The horizon was structureless and had a gradual smooth lower boundary. The A horizon was underlain by a Btk horizon that formed the bottom 5 cm of the unit profile. The Btk was comprised of silty clay, yellowish brown, 10YR5/6 (wet), with moderate/weak subangular blocky structure.

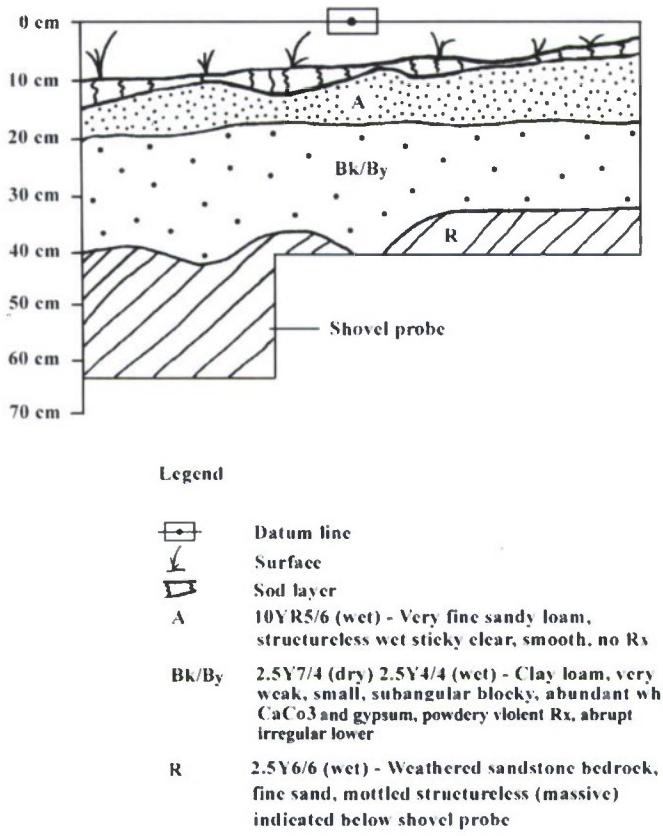


Figure 3.7: Stratigraphic profile showing T0/T1 riser, Test Unit 73, Bedrock Slope, 5LA03421

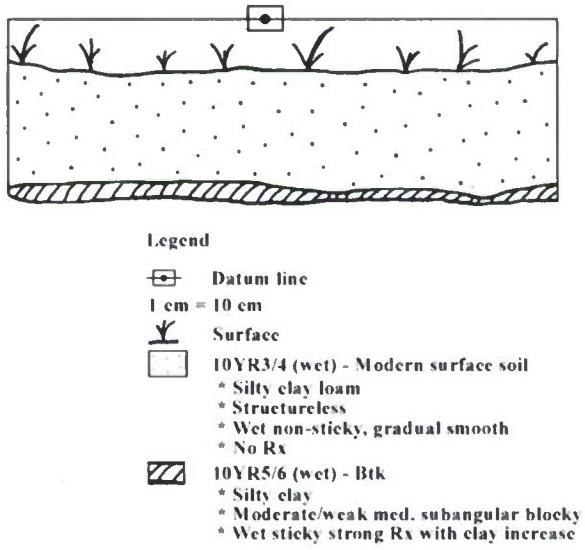


Figure 3.8: Stratigraphic profile of south wall, Test Unit 72, Bedrock Slope, 5LA03421

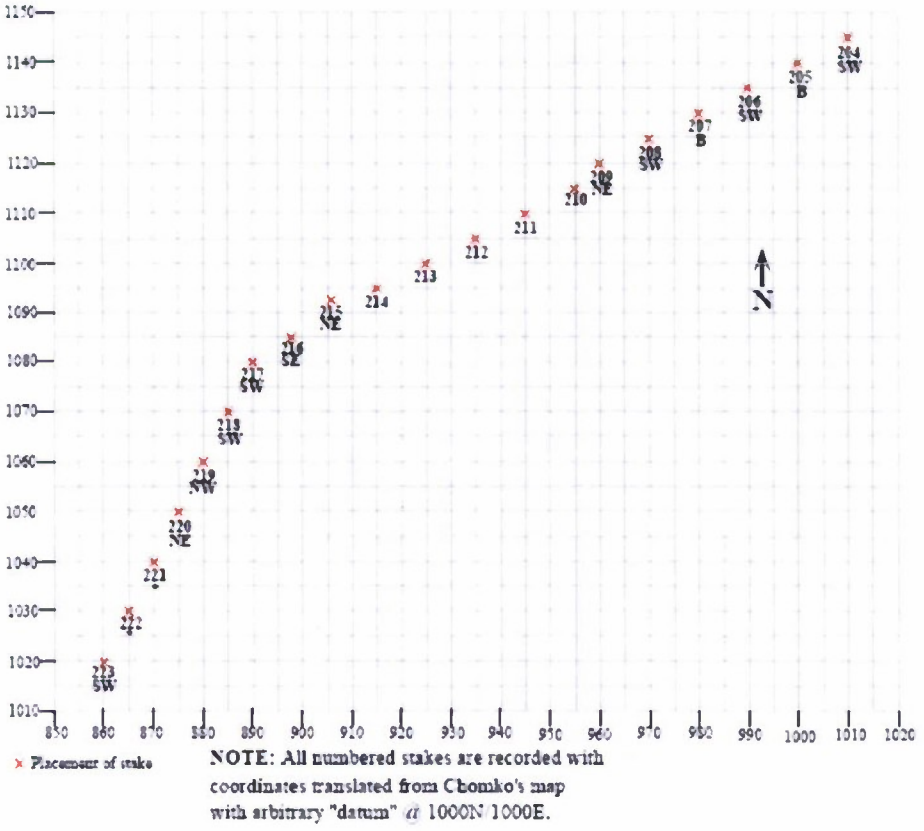


Figure 3.9: 5LA03421 Stake positions for test units on Bedrock Slope (215 to 204) and T2 Terrace (223 to 216)

Summary of Test Units

Test Unit 12 – ST 207 Block 4. The datum for this unit was in the southwest corner. This unit is the southeast quarter of Block 4 with Test Unit 14 adjacent to and north of, and Test Unit 13 adjacent to and to the west of. Excavation proceeded in one natural level from surface to bedrock 10 to 37 cm below datum. A 33 x 33 cm waterscreen was collected from the northwest corner of the unit. No artifacts were recovered.

Test Unit 13 – ST 207 Block 4. A vertical datum was placed in the southeast corner of this unit at 10 cm above modern ground surface. This unit is the southwest quarter of Block 4 and is adjacent to and south of Test Unit 15 and adjacent to and west of Test Unit 12. This unit was excavated in one natural level from surface to bedrock 10 to 37 cm below datum. A 33 x 33 cm waterscreen was collected from the northwest corner of the unit. No artifacts were collected, although a small charcoal fleck was found in the screen.

Test Unit 14 – ST 207 Block 4. Test Unit 14 is the northeast quarter of Block 4. It is adjacent to and east of Test Unit 15 and adjacent to and north of Test Unit 12. The unit was excavated in one natural level from surface to bedrock 10 to 25 cm below datum. A 33 x 33 cm waterscreen was collected from the northeast corner of the unit. Soils are described as dark yellowish brown clayey sand, 10YR3/4 (wet). No artifacts were recovered.

Test Unit 15 – ST 207 Block 4. Test Unit 15 is the northwest quarter of Block 4. It is adjacent to and north of Test Unit 13 and adjacent to and west of Test Unit 14. Excavation proceeded as one natural level from surface to bedrock 10 to 35 cm below datum. All sediments were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit. Soils are dark yellowish brown, 10YR3/4 (wet), clayey sand. No other artifacts were collected.

Test Unit 16 – ST 205 Block 5. The vertical datum for this unit was in the northwest corner of Test Unit 20. Test Unit 16 is located adjacent to and south of Test Unit 19. Excavation proceeded in one natural level from 10 to 21 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. No artifacts were collected.

Test Unit 19 – ST 205 Block 5. The vertical datum for this unit was in the northwest corner of Test Unit 20. Test Unit 19 is located adjacent to and north of Test Unit 16 and diagonally northwest of Test Unit 20. Excavation proceeded in one natural level from 10 to 35 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. No artifacts were collected.

Test Unit 20 – ST 205 Block 5. Vertical datum for this unit was in the northwest corner of Test Unit 20. Test Unit 19 is located adjacent to and north of Test Unit 16 and diagonally northwest of Test Unit 20. Excavation proceeded in one natural level from 10 to 32 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. No artifacts were collected.

Test Unit 17 – ST 208. The unit was shovel-skimmed from surface to bedrock in one natural level 10 to 25 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. Soils are silty loam with a large assortment of small to medium-sized gravels. No cultural artifacts were discovered.

Test Unit 21 -ST 206 Block 6. Vertical datum is in the southwest corner of the unit at 5 cm above modern ground surface. The sediments were ¼" dry screened. Level 1 was shovel-skimmed from 5 to 15 cm below datum; Level 2 ended at what appeared to be bedrock at 24 cm below datum. A 33 x 33 cm waterscreen was collected from the northwest corner of Level 1 but not from Level 2. Soils in both levels are sandy loam. A large stone in the center of the unit was removed, revealing a level of sediment at 37 cm below datum. The heavy concentration of large rock indicated bedrock and so further excavation was not pursued. A re-worked biface was found on the surface nearby; however, no cultural materials were located within the unit.

Test Unit 23 – ST 206 Block 6. This unit is adjacent to Test Unit 21 and was excavated in three levels. Sediments were shovel-skimmed in 10 cm levels and all sediments were ¼" dry screened. A 33 x 33 cm waterscreen was collected from Levels 1 and 2 in the northeast corner.

Soils are sandy loam at all levels though bedrock was encountered at 36 cm in the southwest corner. No cultural artifacts were found.

Test Unit 22 – ST 206. This unit is distinct from Block 6 and the datum was placed in the southwest corner of the unit. Sediments were shovel-skimmed in one natural level to bedrock at 35 cm below datum. A 33 x 33 cm waterscreen was collected from the northeast quadrant. The soils are fine silty loam with small to medium-sized gravels. An REM-UMC 410 shotgun shell was collected from the surface.

Test Unit 24 – ST 205 Block 7. The vertical datum for this unit was in the northeast corner at 5 cm above ground surface. Level 1 sediments were removed with shovel and trowel to a depth of 15 cm below datum. A 33 x 33 cm waterscreen was collected from the northwest corner of the unit. Soils are brown, 10YR4/3 (wet), loamy fine sand. A single flake was collected from the surface.

A stone slab feature was discovered in the southern half of the unit at 18 cm below datum. This feature was interpreted as a slab-lined thermal feature. A charcoal sample and a piece of FCR were collected from the center of the southern half of the unit at about 17 cm below datum and a 33 x 33 cm waterscreen sample was taken from the northwest corner. The soils were very loose sand with rounded gravels.

Test Unit 25 ST 205 Block 7. This test unit is adjacent to and west of Test Unit 25. Datum was moved to 38 cm north of the original location due to a soil cave-in and the new location was 5 cm above ground surface. The unit was excavated one level to 25 cm below datum. Soils in this unit are brown loamy fine sand, 10YR4/3 (wet). A waterscreen sample was collected from the northeast third of the unit; however, no cultural materials were found.

Test Unit 27 -ST 205 Block 7. This unit is adjacent to and south of Test Unit 24 at the location of a buried wall feature (Feature 2). The vertical datum was two cm above modern ground surface. Sediments were shovel-skimmed for 10 cm below datum before a trowel was used to define the perimeters of Feature 2. Soils are brown, 10YR4/3 (wet), loamy fine sand. The feature began to be clearly defined in this unit as soils were removed. Elements included slanted slabs which faced towards the east and others which faced the west though not as concentrated. A small piece of debitage was found in this unit along with charcoal flecks. A waterscreen sample was collected from the southwest corner in addition to some seeds.

Test Unit 33 -ST 205 Block 7. A new vertical datum was placed in the northeast corner of this unit, which was adjacent to and east of Test Unit 27, to test the extent of the eastern border of Feature 2. Sediments were shovel-skimmed to about 10 cm below datum before the feature was encountered. Trowels were used to define the feature. Soils are loamy fine sand and were ¼" dry screened. A waterscreen sample was collected from the southeast corner along with charcoal excavated at 25 cm below datum. Charcoal was concentrated 10 to 12 cm from the westernmost wall along the slabs at about 25 to 29 cm below datum. No other cultural materials were located.

Test Unit 37 – ST 205 Block 7. This unit is adjacent to and north of Test Unit 33 and adjacent to and east of Test Unit 24. Sediments were excavated to 12 cm below datum before Feature 2 was encountered. Soils are loamy fine sand, brown, 10YR4/3. The feature began to take on the

appearance of a structure instead of a thermal feature as originally hypothesized. The slab stones extended across the west wall and into Test Unit 39 along the same wall. A concentration of decomposing sandstone bedrock slabs and chunks are present along the north wall for about 50 cm. No waterscreen sample was collected but an obsidian flake was located in this unit.

Test Unit 38 – ST 205 Block 7. This unit is south of and adjacent to Test Unit 33 with the datum in the northeast corner of Test Unit 33. Sediments were removed with a shovel until Feature 2 was reached. Trowels and brushes were used to expose the sandstone slabs. Soils are loamy fine sand which graded in color from tan to dark brown and had small sandstone gravel inclusions. The feature west wall was further exposed and trended to the south. Charcoal and FCR were collected along with four seeds in a small area about 32 cm from the feature.

Test Unit 39 – ST 205 Block 7. This unit is adjacent to and north of Test Unit 37. Sediments were shovel-skimmed until Feature 2 was reached, when trowels were used. Soils do not differ from the neighboring units and were ¼" dry screened. The feature in this unit consists of sandstone rocks which angle to the northeast. There is an absence of rocks in the northwest quadrant, then more in the northeast. The pattern resembled an entrance but no architectural evidence was located to support this hypothesis. A single obsidian flake was collected.

Test Unit 42 -ST 205 Block 7. This unit is adjacent to and south of Test Unit 27. Sediments were shovel-skimmed to the surface of Feature 2, at which time excavation proceeded with trowels and brushes. All sediments were ¼" dry screened. Soils do not differ from the surrounding units. The feature was further exposed to reveal thermal-altered rock and very large slabs of sandstone with charcoal to black staining on the west side. The slabs slanted toward the east. The charcoal-stained rocks and FCR were concentrated in the southwest corner of the unit. Sandstone rocks appeared stacked along the east wall of the unit. Other than FCR, no artifacts were located within this unit.

Test Unit 84 – Block 7. This unit was laid in over the main portion of buried wall (Feature 2) exposed in Test Units 24, 27, 33, and 37. The unit was divided into two sections: north and south along a natural break in the feature. The datum was located at 31 m 20° off of ST 204 at 10 cm above modern ground surface. Once mapped and recorded, the rocks were removed to search for a possible trench underlying the feature. The rocks were very large white sandstone slabs (similar to those recorded in Test Unit 43). The soils beneath were soft sand similar to that of surrounding units and to that excavated from above the feature. The soils in the southern half beneath the rock consisted of the same dark brown sandy loam and were filled with roots. No artifacts were located. Once the rocks were removed, it was determined that the base consisted of only two very large bedrock slabs which continued into the unit walls. No evidence of a trench which might link the feature to an Apishapa-type structure or to suggest other cultural or occupational affiliation was found. Feature 2 fill was collected, but the only artifacts collected were three pressure flakes and a charred seed.

Test Unit 34 -ST 489 Block 11. The berm of a mechanized vehicle track cuts through the unit surface in a southerly direction with deep impressions on either side of the berm. The vertical datum for Test Unit 34 was placed in the southwest corner at about 10 cm above modern ground surface. Five distinct levels were excavated from this unit to a depth of 60 cm below datum. Level 1 was shovel-skimmed to 25 cm below datum. A 33 x 33 cm waterscreen sample

was collected from the northeast quarter of the unit. Soils are silty loam with small to medium-sized unsorted gravels. Cultural materials found in this level include FCR, a basalt flake, a complex non-cortical black chert flake, and a basalt patterned tool. A charcoal sample was collected from a pocket in a limestone rock. Level 2 was shovel and trowel-skimmed to a depth of 30 cm below datum. The soil is hard compact fine silty loam. The only cultural material collected were 14 pieces of FCR.

Level 3 in Test Unit 34 was shovel-skimmed to 40 cm below datum. Sediments were ¼" dry screened. Soil is described as hard compact fine silty loam (softer than Levels 1 and 2). A weathered thin layer of grey sandstone was encountered at 35 cm below datum. This level is below Feature 3 proper, but ash flecks were noted to a depth of 36 cm. A charcoal sample was collected from the southern half of the unit. Level 4 was shovel-skimmed to a depth of 50 cm below datum. Sediments were ¼" dry screened. The soils were compact fine silty loam with some small gravels and weathered bedrock (regoliths). Darker clay was encountered at 44 to 46 cm over a thin layer of tabular thin weathered bedrock. No cultural material was recovered from this level. The last level in the unit was shoveled and troweled to a depth of 60 cm below datum and all sediments were ¼" dry screened. The soils are fine silty loam with many small to large pieces of weathered bedrock. A "white" ashy lens was encountered between 55 and 56 cm. A small sample of what appeared to be ash was collected from the southeast corner at 55 to 60 cm below datum.

Test Unit 34a -ST 489 Block 11. This unit is adjacent to and west of Test Unit 34 with the datum located 10 cm above ground surface in the southeast corner. The unit was excavated with shovel and trowel to 18 cm below datum. No waterscreen sample was taken. Sediments were ¼" dry screened. Soils are described as dark brown, 10YR3/3, fine silty loam. Cultural artifacts collected in association with this unit include a piece of fine-grained quartzite shatter, two pieces of FCR, and an unidentified bone.

Test Unit 35 -ST 489 Block 11. This unit is adjacent to and south of Test Unit 34 with the datum in the northwest corner. The unit was excavated to 60 cm below datum. Level 1 was shovel-skimmed to 25 cm below datum. A 33 x 33 cm waterscreen sample was collected from the southwest corner of the unit. The soil is silty loam with small to medium-sized unsorted gravels. Cultural materials include an orthoquartzite flake, a black chert flake, seven pieces of FCR, and a sample of orthoquartzite. Level 2 was shovel-skimmed to 30 cm below datum just below Feature 3. Sediments were ¼" dry screened. The soil is hard and compact fine silty loam. Level 4 was shovel and trowel-skimmed to 40 cm below datum. Sediments were ¼" dry screened. The soil is hard compact fine silty loam, softer than that of Levels 1 and 2. A thin layer of grey weathered sandstone was encountered at 35 cm; a small sample was collected. Level 4 was shovel and trowel-skimmed to a depth of 50 cm below datum and sediments were ¼" dry screened. The soils are compact fine silty sand with some small gravels and weathered bedrock. A small sample of soil was collected from beneath the sandstone layer. The final level was shovel and trowel-skimmed to a depth of 60 cm below datum with sediment ¼" dry screened. The soils are described as fine silty loam with many small to large chunks of weathered bedrock. A light grey, ashy-appearing layer was encountered at 55 cmBD. A small sample of this ashy soil was collected.

Test Unit 44 – ST 498 Block 13. The vertical datum was located at the southeast corner of Test Unit 44 at 10 cm above modern ground surface. A total of four levels were excavated with

trowel and shovel to a depth of 50 cm below datum. Levels 1 and 2, 10 to 30 cm below datum, were excavated as one natural layer. A 33 x 33 cm waterscreen sample was collected from the northwest quarter. Soil is fine silty loam with small to medium-sized unsorted gravels. In the southern half of the unit, below the root layer, cultural materials collected include three argillite flakes, one siltstone flake, and one chert flake. In the northern corner of the unit, between 25 and 30 cm below datum, the cultural materials collected include a fine-grained quartzite flake, a quartzite flake, a single argillite flake, and a single chalcedony flake. Krotovinas were noted in the south (20-25 cm below datum) and north (17-30 cm below datum) walls. Level 3 was excavated with trowel and shovel to 40 cm below datum. Sediments were ¼" dry screened and a 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit. The soil is very hard compact with fine silty loam exhibiting minimal unsorted gravels. Level 4 was excavated with a shovel to 50 below datum. Sediments were ¼" dry screened and a 33 x 33 cm waterscreen sample was collected in the northwest corner. The soil is very hard compact fine silty loam with many small to medium-sized unsorted gravels. No artifacts were discovered below 30 cm.

Test Unit 44a – ST 498 Block 13. This unit was opened north of and adjacent to Test Unit 44 to gain compaction data from a visible mechanized vehicle track (Figure 3.10). The datum was in the southeast corner of Test Unit 44 at 10 cm above modern ground surface. Sediments were excavated in four levels with a shovel and trowel to a maximum depth of 50 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit at each level. The surface artifact collection included a utilized quartzite flake and two unspecified flakes. Other than a charcoal sample collected in Level 4, 40 to 50 cm below datum, no other cultural material was unearthed. The soils in Level 1 were medium brown silty loam, while Level 2 soils were medium to light brown silty to sandy loam. Level 3 soils exhibited more clay content but were still silty though the sand content decreased. Level 4 soils were lighter in color but much more compacted. While Levels 1 through 3 were soft, sediments in the lower level just above bedrock were extremely hard to dig through. Evidence of military traffic was clearly visible on the surface of the unit.

Test Unit 45 – ST 498 Block 13. This test unit is adjacent to and south of Test Unit 44 with the datum in the northeast corner of the unit at 10 cm above modern ground surface. The unit was dug in three distinct levels to a depth of 50 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit at each level. The first level was excavated to 30 cm below datum as one natural layer. The soils in Levels 1 and 2, 10 to 40 cm below datum, are fine silty loam with small to medium-sized gravels. Level 3 soils (40 to 50 cm below datum) were fine silty loam with small to medium-sized gravels and were very hard and compact. Surface artifacts collected include a quartzite flake, three argillite flakes, three chert flakes, a siltstone flake and a single chalcedony flake. Artifacts collected at 25 cm below datum include a chalcedony flake, a chert flake, and a single piece of argillite shatter. Krotovina was encountered from the center of the north wall to the center of the unit, then in a "v" shape to the southwest and southeast walls. No artifacts were found below the 30 cm level.

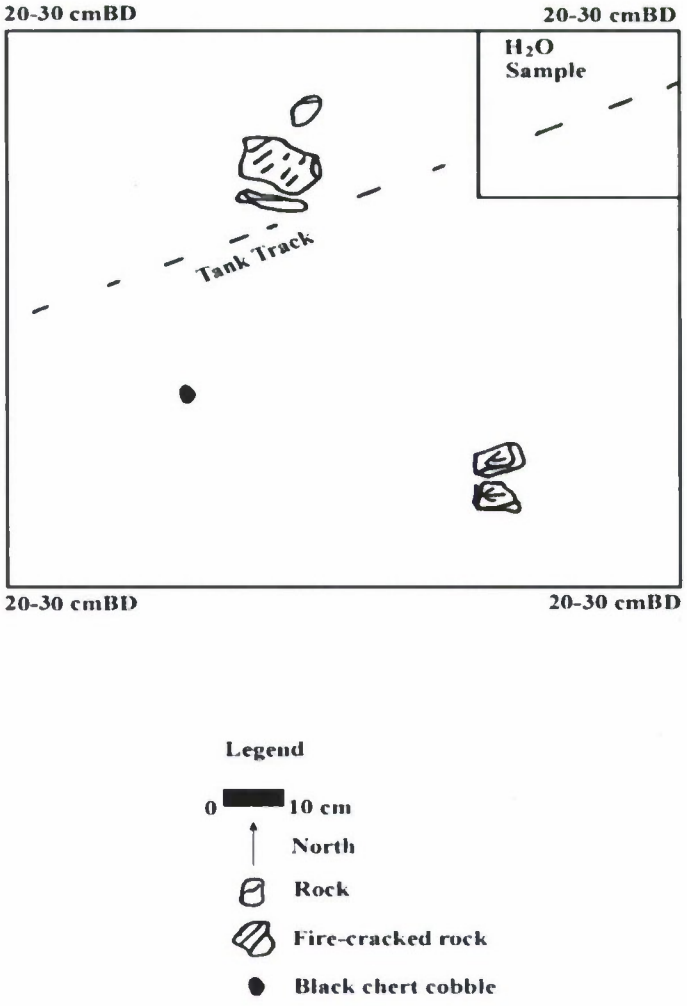


Figure 3.10: Planview drawing of surface impact, Test Unit 44a, Bedrock Slope, 5LA03421

Test Unit 49 -ST 496 Block 14. The vertical datum for this unit is in the southwest corner at about 10 cm above ground surface. Mechanized vehicle tracks are visible on the surface of the unit crossing a stone alignment. The soil was excavated using shovel and trowels in one natural level to 25 cm below datum. The soils are silty loam with few small gravels. Cultural materials found include a chalcedony flake (found at 20 cm below datum) and two chunks of FCR.

Test Unit 50 – ST 496 Block 14. Test Unit 50 is adjacent to and south of Test Unit 49 with the datum in the northwest corner at 10 cm above modern ground surface. The stone alignment continued through this unit. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. The soil is fine silty loam with small to medium unsorted gravels. Cultural materials collected include a small black chert flake and 11 pieces of FCR.

Test Unit 58 – ST 496 Block 14. This unit is adjacent to and west of Test Unit 50 with the datum in the northeast corner at 9 cm above ground surface. The unit was excavated with shovel and trowels (to expose the stones of Feature 4) in one natural level to 15 cm below datum. Soils are sandy loam with few small unsorted gravels. Cultural artifacts include three fire-cracked rocks, two possible pieces of groundstone, and a split chert pebble.

Test Unit 59 – ST 496 Block 14. Test Unit 59 is adjacent to and west of Test Unit 58 with the datum at the northeast corner of Test Unit 58. Sediments were excavated to 15 cm below datum with both shovel and trowel to further expose buried stones in this unit. The soil is fine silty loam. The only cultural materials recorded in this unit were fire-cracked rocks.

Test Unit 60 – ST 496 Block 14. This unit is adjacent to and north of Test Unit 61 and is diagonally northeast of Test Unit 49, with the datum in the southwest corner of Test Unit 49. Excavation of the unit proceeded to 15 cm below datum with shovels and trowels. The soil is fine silty loam. Three fire-cracked rocks were collected.

Test Unit 61 – ST 496 Block 14. This unit is adjacent to and east of Test Unit 49 and adjacent and south of Test Unit 60. The datum was located at 10 cm above ground surface in the southwest corner of Test Unit 49. The unit was excavated with shovel and trowel to 15 cm below datum to further expose stones inclusive in Feature 4. Cultural artifacts collected include an argillite core at a depth of 11 cm, two argillite flakes, unspecified chert debitage, two unidentified seeds, and a single piece of chalcedony debitage.

Test Unit 43 – ST 204. A vertical datum was placed in the southwest corner of the unit at 10 cm above ground surface. The unit was excavated with a shovel to 20 cm below datum. Sediments were ¼" dry screened and a 33 x 33 cm waterscreen sample was collected from the southwest corner. Soils in Level 1, 10 to 20 cm below datum, are very dark grayish brown, 10YR3/2, silty sand, with small to large gravels appearing 4 to 15 cm below datum. Soils in Level 2, 20 to 26 cm below datum, are clayey sand. The bottom of this level revealed a layer of unusually flat, white-topped sandstone. No cultural materials were discovered.

Test Unit 46 – ST 209. The unit was shovel-skimmed as one natural level from 10 to 36 cm below datum. Sediments were ¼" dry screened. Trowels were used after the 10 to 15 cm depth. Soils are dark brown, 10YR3/3, silty clay. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. Soil was very hard and compacted. No artifacts were discovered.

Test Unit 72 – ST 214. The datum was located in the southwest corner of the unit at 10 cm above ground surface. Heavy tracked vehicle compaction was noted throughout the entire unit. The unit was excavated in three levels to a depth of 35 cm below datum. Sediments were ¼" dry screened, and a waterscreen sample was collected from the southeast corner in each level. Soils in Level 1 (10 to 20 cm below datum) were light brown loamy sand that was hard and compact. White quartzite flakes were found in this level. Level 2 soils were brown silty loam with sandstone gravels. Level 3 soils are described as strong brown silty clay loam. The soils throughout all units were extremely compacted and difficult to dig. The compaction meter read 300 psi hardness throughout the unit. Other than the surface artifacts noted, no cultural materials were found.

Test Unit 70 – ST 215. The datum was located in the northeast corner of the unit at 10 cm above modern ground surface. The unit was excavated in four levels to a depth of 50 cm below datum. Sediments were ¼" dry screened and a waterscreen sample was collected from the northeast corner. Level 1 soils, 10 to 20 cm below datum, were sandy silty loam. Level 2 soils, 20 to 30 cm below datum, are clay loam with some silt. Level 3 soils, 30 to 40 cm below datum, were silty clay with a strong carbonate layer which was extremely difficult to excavate. Level 4 soils, 40 to 50 cm below datum, were fine sandy silty clay high in carbonates. The soils were too hard to dig dry so were soaked with water for six hours to soften. The unit was laid out between mechanized vehicle tracks so this may be evidence of soil compaction due to military activity. Cultural artifacts collected included two nondescript flakes found in Level 1 and a small flake debitage found in Level 2.

Test Unit 73 – ST 213. The datum was located in the southwest corner of the unit at 10 cm above ground surface. The unit was excavated in four levels to a depth of 50 cm below datum. Sediments were ¼" dry screened and a 33 x 33 cm waterscreen sample was collected from the southwest corner. Level 1 soils, 10 to 20 cm below datum, are light brown, fine silty loam. They are not compacted, although carbonate thread is exhibited throughout. Level 2 soils, 20 to 30 cm below datum, are silty loam, more compacted than upper level soils and exhibiting small angular stones which possibly represent a "wash" episode. Level 3 soils, 30 to 40 cm, are dark brown, silty clay loam with carbonate threads. The eastern half exhibits more clay at the lowest level and is densely packed. The western half has yellow silty clay toward the bottom of this level and into the next. There is a thin gray clay deposit between Levels 3 and 4. Level 4 soils, 40 to 50 cm below datum, are yellow silty clay with carbonate threads. This layer is distinct from the above level and is relatively moist. A 30 x 30 x 20 cm probe was laid in to evaluate the depth of this soil layer. The layer of moist yellow silty clay/gray clay and sand continued another 20 cm. Though this unit was between tracked vehicle compaction areas, compaction was clearly visible across the north wall. Cultural material collected included six pieces of FCR in Level 1, a small flake and a piece of FCR from Level 2.

Test Unit 75 – ST 212. This unit was placed between two tracked vehicle treads to document any differences. The datum is in the northeast corner at 10 cm above ground surface. This unit was excavated in three levels to 35 cm below datum. Sediments were ¼" dry screened and a 33 x 33 cm waterscreen was collected, at each level, from the northeast corner. Soils in Level 1 were strong brown sandy loam. Level 2 soils were dark brown silty loam, softer than upper level sediments and exhibiting carbonate threading. Level 3 soils were dark brown silty clay loam with consistent carbonate threading throughout the unit. No cultural artifacts were discovered in this unit and the soils appeared much less compacted.

Test Unit 76 – ST 211. This unit was laid out between mechanized vehicle tracks. The unit datum was in the northeast corner. Sediments were excavated in one natural level to bedrock at 20 cm below datum. Soils consisted of dark brown, rich organic clay loam. No cultural materials were found.

Test Unit 77 – ST 210. The unit datum was in the southeast corner at 10 cm above ground surface. Sediments were excavated in 10 cm levels to a depth of 55 cm below datum and were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the southeast corner. Level 1 soils, 10 to 20 cm below datum, are dark brown clayey loam with a few sandstone gravels. Levels 2 and 3 were excavated as a single layer. Soils, 20 to 35 cm below datum, are

composed of rich black silty clay with a sparse scatter of sandstone gravel. Level 4 soils, 35 and 45 cm below datum, are brown clayey loam with clods. A small core sample was taken from the center of this level. Level 5 soils, 45 to 55 cm below datum, are dense clay that lumps with a sparse concentration of small gravels. Cultural materials were confined to a single obsidian flake from Level 1 and yellow ochre fragments, some heat-altered, from Level 2.

T2 Terrace

Situated on a relatively flat tread of the T2 terrace above one branch of Big Water Arroyo, this area, in the northwest corner of the site, blends almost imperceptibly into an adjacent T1 cut terrace surface of the site. It is one of the most geomorphically and stratigraphically complex of all the landforms. All but three of the 1 x 1 m units excavated were situated on the T2 surface. Two units were also placed on the slightly lower T1 surface and one unit was placed on the still lower T0 surface, both of which border the T2 area at the extreme eastern end (Figures 3.9 and 3.13).

Stratigraphy and Sedimentary Depositional Environment

The T2 terrace itself rises approximately 3 m above the current channel of the Big Water Arroyo, and vegetative cover consists of short grass prairie. Detailed stratigraphic investigations indicate that the T2 surface has been relatively stable for a substantial period of time (i.e., since before the end of the Late Prehistoric period ca. 1000 years B.P.). The long period of stability has resulted in an extant archaeological record that is stratigraphically divisible into a minimum of two cultural components.

The T2 terrace fill contains an upper A horizon of silty clay loam and underlying Btk and 2Bkb horizons of clay loam and clayey fine sand respectively (refer to Figure 3.12). The T2 terrace fill varies, however, and in Test Unit 68 the profile consists of A-Bw-2Btkb horizons. The A horizon is silty clay loam, while the Bw horizon is weakly formed silty clay loam. The lower 2Btkb horizon consists of loamy clay (Figure 3.11).

The first component (or cultural horizon) consists of a ceramic-bearing component from the Late Prehistoric period (ca. 2000-250 B.P.) situated on the surface of the T2 terrace, to very slightly buried in the sod layer. The second component is lower in the stratigraphic profile, buried about 20-45+ cm below ground surface and associated with a sandy, carbonate-rich Bkb soil situated directly on sandstone bedrock. This component may be characterized by three artifact discoveries: 1) a previously reported Plano complex Paleoindian projectile point recovered from a heavily deflated portion of the site surface; 2) an Early Archaic side/corner-notched dart point recovered from a heavily deflated portion of the site surface during the current investigations, and 3) several flakes and expedient retouched flake tools recovered from the Bkb soil in several of the recent test units.

The later surficial component is widely represented in deflated or vegetation-free areas on the T2 surface, including one area of dense fire-cracked rock, four plainware ceramic body sherds, flaking debris of a variety of raw material types, including homogeneous brown and red cherts, broken bifacial tools, and a number of additional projectile points (Figures 3.30 and 3.31). Since the surface of T2 is deflated and yielded projectile points ranging in age from Paleoindian to Early Archaic to Late Prehistoric, there is little doubt that the T2 tread

represents a palimpsest of different components and or site use episodes. Therefore, although material associated with a Late Prehistoric, ceramic-bearing occupation(s) is indeed present, there is little doubt that it is mixed with at least two additional components as well.

In addition to being deflated and generally without identifiable archaeological/systemic context (Schiffer 1987) the surface component has been heavily impacted by mechanized vehicle traffic, which has served to fracture some materials, laterally displace others, and compact portions of the more shallowly buried artifacts. The lower component, on the other hand, appears totally unaffected by military disturbance, but has been impacted by animal burrowing and wind deflation.

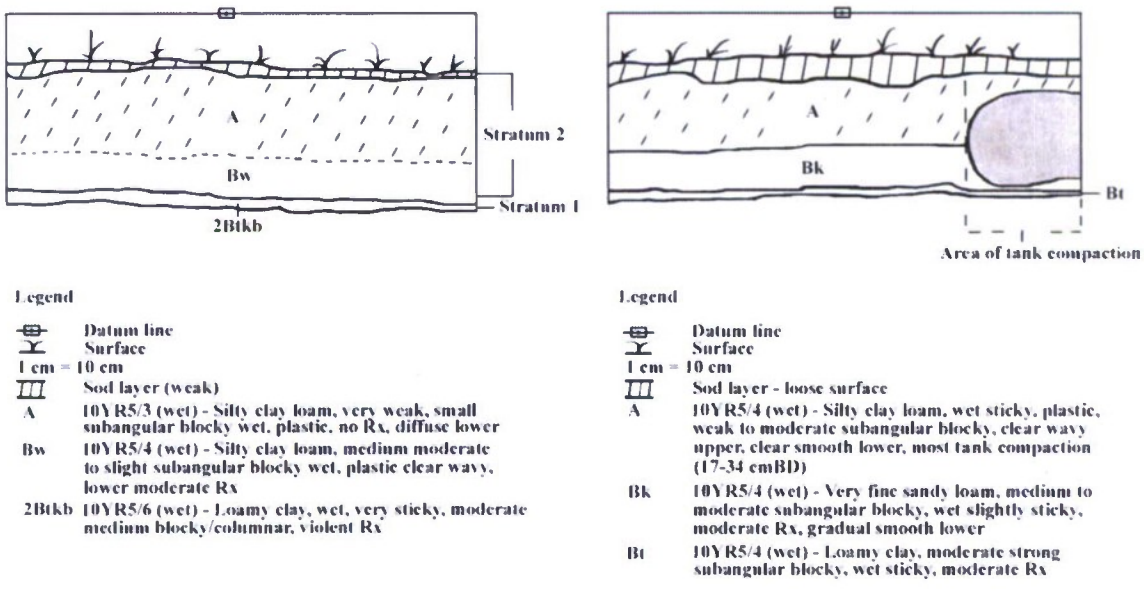
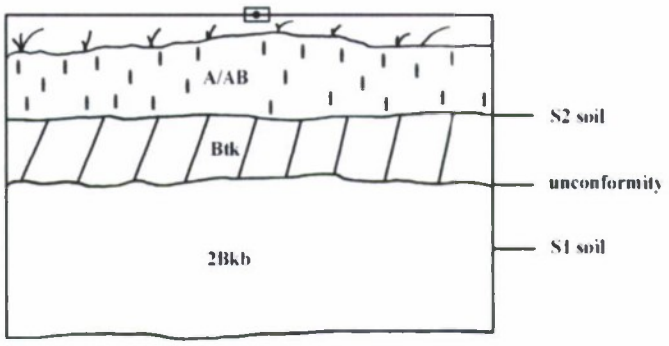


Figure 3.11: Stratigraphic profile of north wall, Test Unit 68 (left) and south wall, Test Unit 65 (right), T2 Terrace, 5LA03421



Legend

Datum line 1 cm = 10 cm Surface - no sod layer	A/AB	10YR5/4 (wet) - Moderately developed, top deflated, silty clay loam, weak small subangular blocky, wet non-sticky, gradual smooth lower, no Rx
	Btk	10YR5/4 (wet) - Clay loam (or loamy clay), moderate small subangular blocky, wet, very sticky, abrupt wavy lower, gradual smooth upper
	2Bkb	10YR6/6 (wet) - Clayey fine sand, abundant small calcium carbonate nodules, structureless wet slightly sticky, abrupt wavy upper

Figure 3.12: Stratigraphic profile of south wall, Test Unit 63, T2 Terrace, 5LA03421

Summary of Test Units

Test Unit 18 – ST 221. This unit was located away from the associated stake. The soil deposition was favorable to the potential location of buried cultural material. The datum was placed in the northwest corner of the unit at 10 cm above ground level. A blade flake was collected from the surface of the unit. All sediments were cleared using both shovel and trowel to a maximum depth of 35 cm below datum. Soils are brown, 10Y5/3, clayey silt at each level. Level 3 soils were extremely compact and hard. No other cultural materials were recovered.

Test Unit 26 – ST 222. The datum was located in the southwest corner of the unit at 10 cm above ground surface. Sediments were excavated to a depth of 35 cm below datum. A 33 x 33 cm waterscreen was collected from the southwest corner of the unit at each level. Level 1 soils are clayey sand with small gravels, while Level 2 soils are very hard clayey silt. Level 3 soils are clayey silt, gray brown in color, which are very hard, proving nearly impenetrable. No artifacts were found in this unit.

Test Unit 62 – ST 218. The datum for this unit is in the southwest corner at 10 cm above ground surface. Sediments were removed with shovel and trowel to a depth of 25 cm below datum in 10 cm levels to bedrock. A 33 x 33 cm waterscreen sample was taken from the southwest corner of the unit from each level. Soils in Level 1 are described as clay loam. Cultural materials collected include a single flake and a fire-cracked rock. Level 2 soils (20 to 30 cm below datum) are clay silt. Level 3 soils are sandy silty loam with clay pockets. No

cultural materials were found in either of the lower levels. Tracked vehicle compaction was evident in the southeast corner extending along the east wall and trending in a northern direction, although the strongest signature was along the south wall.

Test Unit 63 – ST 219. The datum for this unit was located in the northwest corner. The unit was excavated in six levels to a depth of 70 cm below datum. Sediments were shovel-scraped and ¼" dry screened. A 33 x 33 cm waterscreen sample was excavated at each level from the northwest corner. Level 1 soils (10 to 20 cm below datum) are loose silty loam. At a depth of 10 cm the soil changed dramatically and became more compact. A single argillite point tip and 13 nondescript flakes were collected from this level. Two soil samples were collected from the stratigraphic profile along the south wall. Level 2 soils (20 to 30 cm below datum) are hard silty clay, which was difficult to screen. Level 3 soils (30 to 40 cm below datum) are silty clay which is hard, friable and brittle. A single flake was collected. To check for tracked vehicle compression, a 40 cm by 40 cm test probe was placed in the northwest corner of the unit. This probe proceeded to bedrock at 70 cm below datum. The soil was compacted silt to the last 5 cm of the probe. A single quartzite bifacial thinning flake was found at 43 cm below datum.

Test Unit 63 was then excavated to Level 4 (40 to 50 cm below datum). A mechanized vehicle track cut through the southeast quadrant of the unit at 50 cm. Soils are medium to pale brown silty clay loam with tiny (1 to 2 cm) clay pockets. At 50 cm the soils became lighter. There was no visible compaction or difference in the military activity area. Level 5 soils were comprised of lighter brown compacted silt clay loam with more clay content. Level 6 soils (60 to 70 cm below datum) are silty loam containing more sand.

Test Unit 63a – ST 219. This unit was opened adjacent to and west of Test Unit 63 in order to test the area between the observable mechanized vehicle tracks. The datum was located in the northeast corner of the unit at 10 cm above ground surface. Sediments were shovel-skimmed and ¼" dry screened to a total depth of 45 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner. Cultural materials collected included a fine-grained quartzite flake, a basalt flake, and a tan fine-grained quartzite flake. There was no visible compaction in Level 1. Level 2 soils (20 to 30 cm below datum) are clay with a large area of very hard compact soil that differed from the rest of the soil layer in this unit. Level 3 soils (30 to 40 cm below datum) are clay. The area of compact soil continued in this level. A final level was completed to 45 cm below datum. No cultural material was found below 20 cm.

Test Unit 64 – ST 217. The datum for this unit is in the southwest corner at 10 cm above modern ground surface. The unit was placed between two mechanized vehicle tracks. Sediments were excavated to 35 cm below datum using a shovel. All sediments were ¼" dry screened. A 33 x 33 cm waterscreen was collected from the southwest corner of each level. Level 1 soils (10 to 20 cm below datum) are silty loamy sand with very little clay. No evidence of military vehicle compaction was found in this level. Level 2 soils (20 to 30 cm below datum) are sandy loam. Level 3 soils (30 to 35 cm below datum) are clayey sand of a strong brown color. The western quarter of the unit was more compact on a north-south axis, which coincides with the edge of the mechanized vehicle tracks. No other compaction or cultural artifacts were noted.

Test Unit 65 – ST 220. This unit datum was in the northeast corner at 10 cm above ground surface. Sediments were excavated with shovel and ¼" dry screened, to a depth of 35 cm

below datum. A 33 x 33 cm waterscreen sample was collected from the northwest corner of each level of the unit. Soils in Level 1 (10 to 20 cm below datum) were loose sod with heavy plant root matrix within the first 5 cm. Soils were very compact in the lower part of this level, fairly easy to dig but difficult to screen. Cultural artifacts included a piece of fire-cracked rock, a possible piece of sandstone fire-cracked rock, an unspecified piece of shatter and two flakes. Level 2 soils were hard silty clay with obvious compaction. The consistency of the soil was very hard, breaking in linear slabs. Level 3 soils (30 to 35 cm below datum) were extremely compacted hard silty clay, particularly in the southwest quadrant of the unit. Cultural artifacts were limited to the first level.

Test Unit 67 – ST 216. The datum was placed in the southeast corner of the unit at 10 cm above ground surface. Sediments were excavated to 35 cm below datum and were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the southeast corner of the unit at each level. Soils were described as densely-packed silty sand loam with some clay. A mechanized vehicle track was visible on the surface, cutting a northeast to southwest diagonal through the unit. Pinflags were placed on the borders of the track to determine the extent to which it penetrated into lower levels. Cultural materials collected included five chunks of fire-cracked rock and a rounded stone of unspecified material. Level 2 soils are very packed silty clay. Large root systems appear throughout the unit along with small gravels. Tracked vehicle compaction was difficult to access in this level. Other than sparse krotovina, there was no other sign of disturbance. Level 3 soils, from 30 to 35 cm below datum, are very fine sand silty loam. There was no evidence of soil compaction at this level.

Test Unit 68 – ST 223. The datum for this unit was placed in the southwest corner at 10 cm above modern ground surface. All sediments were ¼" dry screened. The sediments were removed with shovel and trowel to a maximum depth of 35 cm below datum. A 33 x 33 cm waterscreen was collected from the southeast corner. Soils are strong brown silty loam with a sparse amount of clay, but showing little difference between levels. No compaction from tracked vehicles was noted in this unit. A fragment of chert and a chert flake were collected from Level 2 at 20 cm below datum.

Test Unit 68a – ST 223. This unit is adjacent to and west of Test Unit 68. All sediments were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit. The soils are silty loam under approximately 4 cm of loose surface loess. Two possible artifacts were collected from the surface level. Compaction from military activity was noted throughout the unit and continued to a depth of 35 cm below datum. Other than the surface collections, no artifacts were located.

T1 Terrace

Located on the opposite end of the interfluves between two branches of Big Water Arroyo, T1 is a small, gently sloping erosional or strat terrace (Boggs, 1987). The T1 was scoured down to sandstone bedrock by previous degradational events associated with Big Water Arroyo. As such, the only Holocene-aged sediment on the T1 surface is a mantle (ca. 0-10 cm thick) of loose, highly deflated and bioturbated fine sand. All cultural materials in this area are either on or just underneath the surface of this sand unit.

Stratigraphy and Sedimentary Depositional Environment

The T1 terrace is an erosional terrace cut onto sandstone bedrock. Consequently, the sediments encountered in the T1 area are loose, heavily bioturbated fine sand. In some places, the T1 sands are gray in color, indicating they experienced substantial amounts of time underwater (i.e., in a subaqueous environment). In any event, they are highly weathered and very weakly cemented. During the excavations, it was sometimes difficult to identify the sandy matrix being excavated as weathered bedrock and not just unconsolidated sandy alluvium. The presence of partially cemented rock fragments and characteristics such as oxidation-reduction reactions (redox) and iron concretions were observed, however, and confirmed the bedrock nature of the sandy T1 matrix (Soil Survey Staff 1990).

The archaeology here consists of a large, potentially significant historic component, consisting of several stone-lined and depressed foundations, abundant cultural material (including several pieces of utilized and unifacially retouched glass), sandstone building materials, an extant well of sandstone slabs, open but fenced, and a surficial prehistoric component. The latter, which may be a mixture of various prehistoric site-use episodes, consists of chipped stone flakes, unifacial and bifacial chipped stone tools, and fire-cracked rock. While these materials were encountered below the surface in a number of test units, none appeared to be in systemic context.

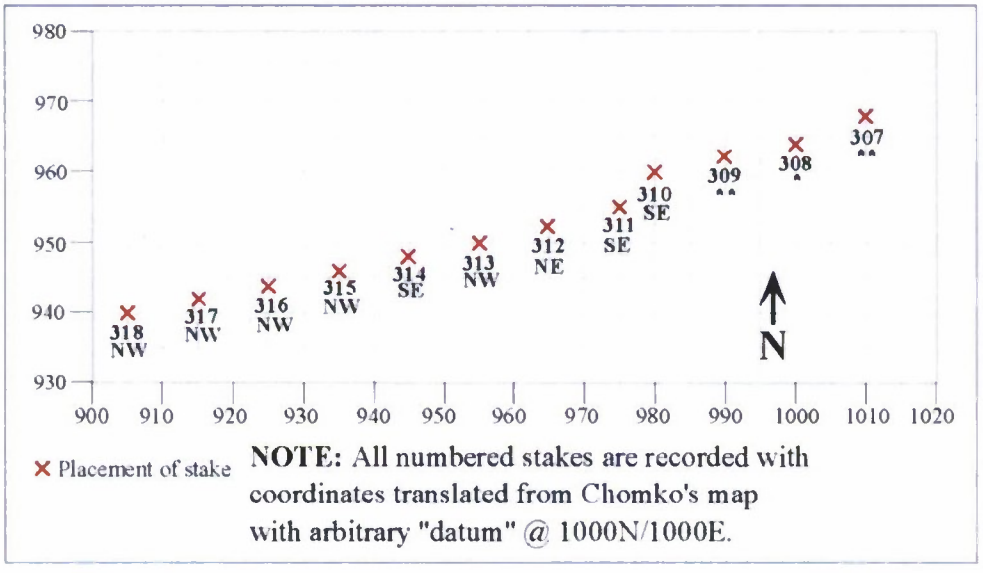


Figure 3.13: 5LA03421 Stake positions for test units on the T1 Terrace (318 to 312) and the alluvial mantle area (311 to 307)

Like the T2 tread in some ways, the artifacts contained on the surface and shallowly buried in the T1 have been repeatedly disturbed by rodent activity. In both areas, the archaeological setting can best be described within the context of a "biomantle" or relatively shallow package

of sediment on or near the site surface, in landform settings that have been relatively stable (in geomorphic terms of sediment aggradation or degradation) for long periods of time. In such areas, centuries of floral and faunal activities (and cultural in many cases) have been active long enough to completely churn or turn over the extant sediments and their archaeological constituents many times (Schiffer 1987, Waters 1992). In areas with active biomantles, archaeological contexts are invariably destroyed, although the material remains themselves may not be. Such is the case at the T1 portion of 5LA03421.

Summary of Test Units

Test Unit 29 – Block 10 ST 315. The vertical datum is in the southwest corner of the unit located 10 m and 20 degrees north of Stake 315, at 5 cm above modern ground surface. Sediments were excavated to a maximum depth of 30 cm below datum and were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the southwest corner. The soils are pale yellow to white sand, gradually becoming coarser towards the bottom of the level (Figure 3.14). A flake and a retouched utilized flake were collected from 10 to 20 cm below datum. Small red sandstone gravels were noted with the soil context. Level 2 soils consisted of sand and deteriorating sandstone, appearing yellow and granular. Two flakes were collected from this level but the unit revealed no other cultural materials

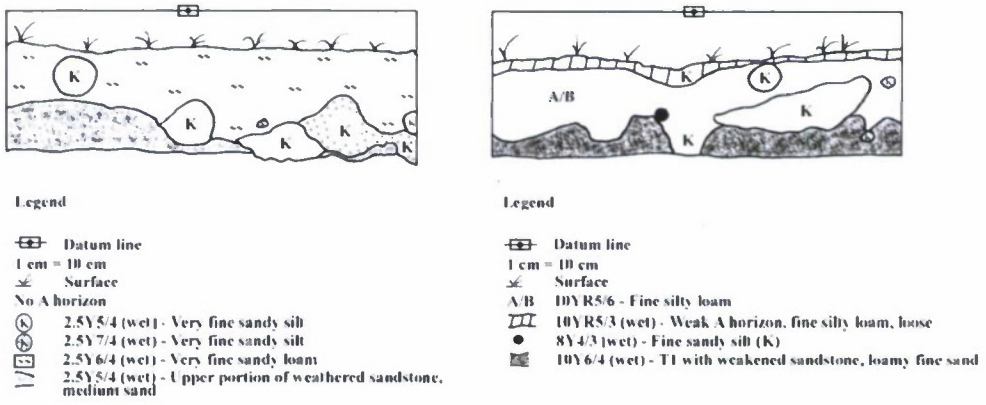


Figure 3.14: Stratigraphic profile of north wall, Test Unit 29 (left) and west wall, Test Unit 51 (right), T1 Terrace, 5LA03421

Test Unit 32 – Block 10 ST 315. This unit is located north of and adjacent to Test Unit 29 with the datum located in the northwest corner at 10 m 20 degrees north of Stake 315. Sediments were shoveled to a depth of 30 cm below datum. Soils are pale yellow medium-grained sand under fine white sand. Three flakes and a single piece of FCR were collected from this level. Level 2 soils are yellow to light brown fine to medium sand. A 33 x 33 cm waterscreen sample was taken from the northwest corner.

Test Unit 36 – ST 317. The datum was located in the northwest corner of the unit at 10 cm above ground surface. Sediments were shoveled to a depth of 33 cm below datum and were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the southwest corner.

Level 1 soils are pale yellow loamy sand; Level 2 soils are coarse sand. Cultural materials consisted of a single chalcedony flake (Figure 3.15).

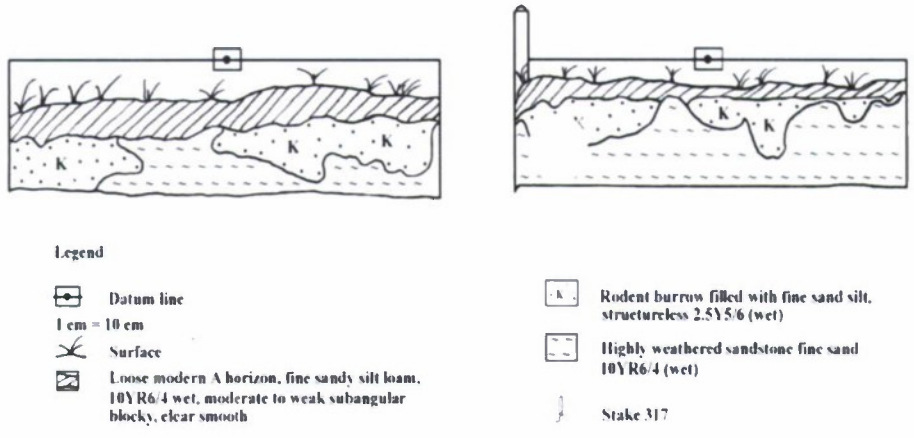


Figure 3.15: Stratigraphic profile of west wall, Test Unit 36 (left) and north wall, Test Unit 36 (right), T2 Terrace, 5LA03421

Test Unit 47 – ST 318. The unit was opened on a mechanized vehicle track with the datum located in the northwest corner at 10 cm above ground surface. Sediments were shoveled to a depth of 35 cm and were ¼" dry screened. Soils are clayey sand to yellow coarse-grained sand. Artifacts collected include two 4 cm sherds (rim and body), a 5 cm corroded folded metal fragment, a 10 cm-long metal scrap, a single piece of FCR, a white chert early-stage reduction flake, and an amethyst-colored glass fragment.

Test Unit 48 – ST 316. The unit was opened on a track from a military vehicle with the datum in the northwest corner at 10 cm above ground surface. Sediments were shoveled to a maximum depth of 35 cm below datum. Soils are yellowish brown, 10YR5/4 (wet), silty sand to fine silt. Cultural artifacts include two historic earthenware sherds from the surface, four flakes, a piece of cloth, and three chunks of FCR. Rodent disturbance was noticeable along the south wall extending north for 20 cm. No other artifacts or disturbances were noted.

Test Unit 51 – ST 315. The datum was located in the northwest corner of the unit at 10 cm above ground surface. Sediments were excavated with shovel to 35 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. Soils are very pale brown, 10YR7/3 (wet), silty sand. A single piece of solarized bottle glass and three flakes were collected.

Test Unit 52 -ST 314. The datum was located in the southeast corner of the unit. Sediments were excavated in one level to 35 cm below datum. A 33 x 33 cm waterscreen was collected from the southeast corner to a maximum depth of 18 cm. The soil is decomposing sandstone. Two flakes and a single piece of FCR were collected.

Test Unit 53 – ST 313. In this unit the datum was located in the northwest corner at 10 cm above ground surface. Sediments were shoveled to a depth of 35 cm below datum. Soils are loam with organic matrix 10 to 12 cm below datum. Under this unit is a decomposing sandstone layer with clay inclusions. Two pieces of fire-cracked rock and two flakes were collected.

Test Unit 54 – ST 312. The datum was placed in the northwest corner of the unit at 10 cm above ground surface. Sediments were excavated in one level to a maximum depth of 30 cm below datum. Soils are organic sand in a creek bottom setting. The only cultural material located was a tan fine-grained quartzite flake found in the waterscreen.

Alluvial Fan

This small landform is situated directly across the Big Water Arroyo branch from the T1 terrace in the approximate center of the site. Here a small alluvial fan extends from the prominent hilltop, debouching downhill to the west onto remnants of the T1 terrace. A single line of stakes were placed in this area, and two test units were excavated. These were taken to a depth of 25 cm below ground surface and did not produce any surficial or buried cultural materials. There could be some potential for more deeply buried materials, as the sediment in the units were relatively fine-grained (i.e., fine sandy loam) and could therefore retain systemic context. The units were not taken below 25 cm below ground surface because that was the maximum depth specified in the project scope of work.

Test Unit 55 – ST311. The unit datum was placed in the southwest corner of the unit. Sediments were excavated in one level to a maximum depth of 35 cm below datum. Soils are T1 gravels with clasts as large as 7 cm in diameter. No cultural materials were located in the unit or in the waterscreen.

Test Unit 56 – ST 310. The vertical datum was in the southeast corner of the unit at 10 cm above ground surface. Sediments were shoveled to a maximum depth of 38 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northeast corner. Soils are sandy silt with gravels. No artifacts were found.

Colluvial-Mantled Terrace

The final landform tested was the colluvial-mantled terrace. This is a thin, somewhat elongated, flat-lying surface along the east side of Big Water Arroyo near the southeastern end of the site. It is situated immediately below an eroding rim of sandstone bedrock, some of which has been eroded by previous stream action into shallow but largely alluvial-filled rockshelters.

Stratigraphy and Sedimentary Depositional Environment

The terrace surface below the rimrock is littered with sandstone boulders and cobbles, as is the subsurface, but often in the form of recognizable linear rock-strewn colluvial beds. The T1 in this area, unlike the T1 area previously described, is a depositional or fill terrace and Holocene-aged alluvium here is about 2 m thick. The colluvial material which originates on the

adjacent hillslope and rimrock area interfingers with relatively coarse-grained colluvial sands, the latter of which decrease in size and frequency below the surface.

The test units here follow at least two divergent sets of tracks left by mechanized vehicles, and were excavated below the 25 cm maximum to 80 cm below ground surface. Artifacts in the colluvial terrace area were found from the surface to 80 cm in depth. The artifacts consist of flaking debris, FCR and a small number of chipped stone tools. Distributed over the excavated alluvial/colluvial fill, the number of cultural components or their ages is not yet established. At least one component, however, was situated deep in the terrace fill, or about 50 to 80 cm below ground surface. This material is represented by Feature 5 (Block 74, Test Units 74 and 74a, Figures 3.24 and 3.25), consisting of a buried hearth feature comprised of sandstone slabs and local bedrock and forming an oval 140 x 70 cm in size. It was associated with FCR debitage and charcoal. There were no diagnostic materials to infer a date for this feature.

Summary of Test Units

Test Unit 71 – ST 300. The datum for this unit is in the northwest corner at 10 cm above ground surface. Sediments were excavated in one level. A mechanized vehicle track cuts through almost a third of the western side of the unit. Soil compaction tests were taken 2 cm to 300 psi in the track and southeast of the unit. Soils are sandy loam with small to large unsorted gravels and weathered bedrock. Artifacts consist of a red jasper flake, a limonite fragment, a tan fine-grained quartzite flake, and a single piece of brown fine-grained quartzite shatter.

Test Unit 74 – ST 299. This unit is located 1 m west of Stake 299, with the datum in the northeast corner at 10 cm above ground surface. The unit was placed here in order to cover a north-south track from military vehicles which was about 60 cm wide with a 10 cm berm on each side in the center of the unit. A 33 x 33 cm waterscreen was taken from the northwest corner of the unit and soil compaction data was collected every 2 cm at 300 psi. Level 1 soils are fine sandy loam with sparse gravels. A red fine-grained quartzite flake was collected at 18 to 20 cm below datum. Level 2 soils are fine sandy loam with sparse rounded gravels. Three FCR chunks and a tan fine-grained quartzite flake were collected from 22 to 24 cm below datum. A carbon sample was collected at 21 cm below datum (96 cm N, 47 cm W). Soils in Level 3 are fine sandy loam with sparse gravels. An unidentified animal tooth fragment was collected at 32 to 34 cm below datum in addition to cultural materials such as a chalcedony retouched flake (43 cm N, 56 cm W, 35 cm below datum), and a single chunk of FCR (83 cm N, 45 cm W, 35 cm below datum). A second piece of FCR was noted at 60 to 69 cm N, 95 cm W, 35 cm below datum, but was not collected. Evidence of a possible living surface dictated that the unit excavation continue below the scope specified. The remaining 5 cm of Level 3 had dark brown fine sandy loam soils but contained no artifacts. Level 4 soils are strong brown fine sandy loam with no artifacts. Levels 5 and 6 (50 to 70 cm below datum) soils are very strong brown fine sandy loam. Five flakes (argillite, quartzite, and chert), three FCR, and a piece of red ochre were collected from this level in addition to a sample of charcoal from 67.5 cm below datum. Level 7 further uncovered a feature that had been partially revealed in the northeast corner at 65 cm below datum. Soils 70 to 80 cm below datum are sandier but a strong brown loam. A layer of gravel was encountered about 4.5 cm into this level. Cultural materials include FCR, charcoal, a flake and some charcoal flecks throughout the unit. All but the latter were collected. Level 8 at 80 to 90 cm below datum uncovered more of the feature which began to resemble a lined hearth. Soils were clayey silt with small gravels; the clay was

contained under the sandstone slabs and around the bedrock. The feature fill was collected for flotation though no other artifacts were recovered.

Test Unit 74a – ST 299. This unit was opened to the east and adjacent to the previous unit to further expose the feature boundaries as well as to expose any military impact to subsurface deposits. A 33 x 33 cm waterscreen sample was taken from the northeast corner. Level 1 artifacts include a piece of FCR at 15 cm below datum (14 cm N, 48 cm W), three small FCR fragments, and a quartzite flake found in the screen. Artifacts found in Level 2 include 46 pieces of fire-cracked rock and a quartzite shatter. A small amount of unidentified seed was found at 42 cm N, 70 cm W, 27 cm below datum. Level 3 artifacts included FCR (937 cm N, 76 cm W), and krotovina was noted at 35 cm below datum in the northeast corner of the unit. Level 4 artifacts include a chalcedony flake in the western half of the unit at 45 to 50 cm below datum and snail shells at 40 to 45 cm below datum. Levels 5 and 6, from 50 to 68 cm below datum, were sterile. Collected material from Level 7, 68 to 80 cm below datum, include a clam shell (30 cm N, 30 cm W, 71 cm below datum), a clam shell fragment (34 cm N, 37 cm W, 71 cm below datum), a chert flake (45 cm N, 47 cm W, 71 cm below datum), charcoal flecks (12 cm N, 6 cm W, 75 cm below datum), and a composite C14 sample. The final level at 80 to 90 cm below datum was sterile. Soils were the same as in Test Unit 74.

Test Unit 78 – ST 301. The unit is located at the base of an alluvial terrace in a colluvial fan between a set of tracks left by military vehicles. The vertical datum is located in the northwest corner of the unit at 10 cm above ground surface. Sediments were excavated to depth of 35 cm below datum. A 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit. The soils in Level 1 are medium brown sandy silty loam with fine to medium fine sand and numerous angular stones between 3 to 8 cm. Level 2 soils are silty sandy loam with stone inclusions as seen in the upper level. Level 3 soils are silty sandy loam, with decreased gravel content although two rather large stones were found in this 5 cm level. No cultural materials were located and there was no evidence of soil compaction from military activity within the unit.

Test Unit 79 – ST 298. The unit was situated over two mechanized vehicle tracks, and the intermediate berm, which crossed in the southwestern corner and the northeastern quadrant. A 33 x 33 cm waterscreen sample was collected from the northeast corner of the unit. Sediments were excavated in 2 cm increments with shovel and trowel to the bottom of each 10 cm level. Soil compaction data was collected every 2 cm at 300 psi. Level 1 soils are very compact sandy loam with sparse small to medium-sized unsorted gravels. A charcoal sample was collected at 16 to 18 cm below datum. The soils in Level 2 are compact fine sandy loam with sparse, small unsorted gravels. Krotovina was evident at 26 cm below datum in the northern half of the unit. No artifacts were found. Level 3 soils are compact fine sandy loam with very small unsorted gravels and krotovina noted throughout the unit. A fine-grained quartzite flake was collected from 30 to 35 cm.

Test Unit 80 – ST 297. This unit is on an alluvial terrace in a high energy depositional environment, and was placed directly over a mechanized vehicle track which then crossed from northwest to southeast through the center of the unit. Sediments were excavated with a shovel and ¼" dry screened to a maximum depth of 35 cm below datum. A 33 x 33 cm waterscreen was collected from the southwest corner of the unit. Level 1 soils are medium brown silty sand with small gravel inclusions. Fire-cracked rock with some gravel was collected at this level.

Level 2 soils are fine sandy loam with ubiquitous small gravels. Level 3 soils are dark brown silty sandy loam. Compaction appeared very strong in Level 1 but was not evidenced in the units below 20 cm. A single piece of FCR was collected from Level 3.

Test Unit 81 – ST 296. This unit was laid out over an area of mechanized vehicle tracks with the vertical datum in the southwest corner at 10 cm above ground surface. Sediments were excavated to 35 cm below datum in 2 cm increments for soil compaction tests. A 33 x 33 cm waterscreen was collected from the southwest corner of the unit. Level 1 soils were very compact fine silty loam with dense small gravel inclusions. Level 2 soils are compact silty loam with small unsorted gravels. Level 3 soils are compact silty loam with a dense concentration of small gravels. The soil at this level changed to a clay loam with fewer gravels at 32 cm below datum, and formed small subangular peds. No artifacts were found in this unit.

Test Unit 82 – ST 302. This unit is directly over a mechanized vehicle track. Surface soil compaction was observed in the southern half and continued to become more compact as the excavation progressed. Vertical datum was located in the southeast corner at 10 cm above ground surface. Sediments were excavated to 35 cm below datum and were ¼" dry screened. A 33 x 33 cm waterscreen sample was collected from the southeast corner of the unit. Level 1 soils are sandy silty loam with dense gravels. A small piece of fire-cracked rock was noted but not collected. The northeast corner of the unit in Level 1 contained several large rocks with compaction being greatest in the southeast corner. Level 2 soils are a silty clay loam which was much more compact than Level 1. A dense collection of large stones from 5 to 12 cm in diameter was noted within the gravel matrix, which were mostly angular in form. Two fire-cracked rocks were collected along with a singular red chert shatter. Level 3 soils are silty clay loam with a marked decrease in large stones though density of the smaller gravels did not change. No carbonates were encountered in the unit. No other artifacts were collected.

Test Unit 83 – ST 295. A track from a military vehicle crossed the western edge of the unit. A vertical datum was placed in the northwest corner at 10 cm above ground surface. Sediments were excavated to a maximum depth of 35 cm below datum, at 2 cm intervals for soil compaction tests. A 33 x 33 cm waterscreen was collected from the northeast corner. Soils in Level 1 are compact fine silty loam with few small unsorted gravels. Level 2 soils are fine silty loam with sparse gravels and are extremely compacted. Charcoal flecks were noted at 28 to 30 cm below datum. A single chunk of FCR was collected from 27 cm below datum and a basalt flake was collected from 28 to 30 cm below datum. Level 3 soils are compact fine silty loam with sparse small gravels. Other than in Level 2, no other artifacts were recovered.

Summary of Cultural Features

Six cultural features were identified in the areas tested at 5LA03421. In keeping with the objective of documenting the impact of mechanized vehicle traffic within a prescribed section of the site, little time was spent in relocating or further documenting the bedrock metates or historical features described by the University of Denver. Since earlier features were not relocated, the features described below are considered as unique to the current investigation.

Feature 1– Block 2 Units 4-7. This feature is a small oval-shaped ash stain located in the central portion of the rocky hilltop area, an area very heavily impacted by military maneuvers (Figure 3.16). Multiple tracks form circles resembling donuts within the area, causing

substantial rutting. The stain was encountered in Test Unit 5 at a depth of 38 to 45 cm below datum. The complete dimensions are 20 cm (east-west) by 16 cm (north-south). Block 2 was expanded south, forming a 1 x 4 m grid in order to assess the full extent of the ash stain. No construction materials were associated with this stain.

The feature is mostly contained within Test Unit 5; however, some fire-cracked rock was encountered in Test Unit 6 at a depth of 15 to 20 cm. The exposed stain is composed of ashy sediments and charcoal flecks. The soils are silty loam with small to large gravels throughout. The maximum depth of Block 2 occurred in Test Unit 5 at 50 cm below datum. Sparse cultural materials were located in this block unit, consisting of two chert flakes and fire-cracked rock.

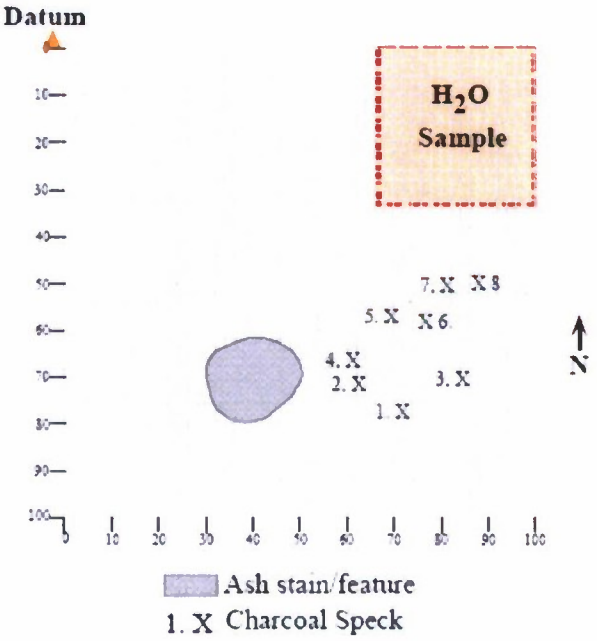


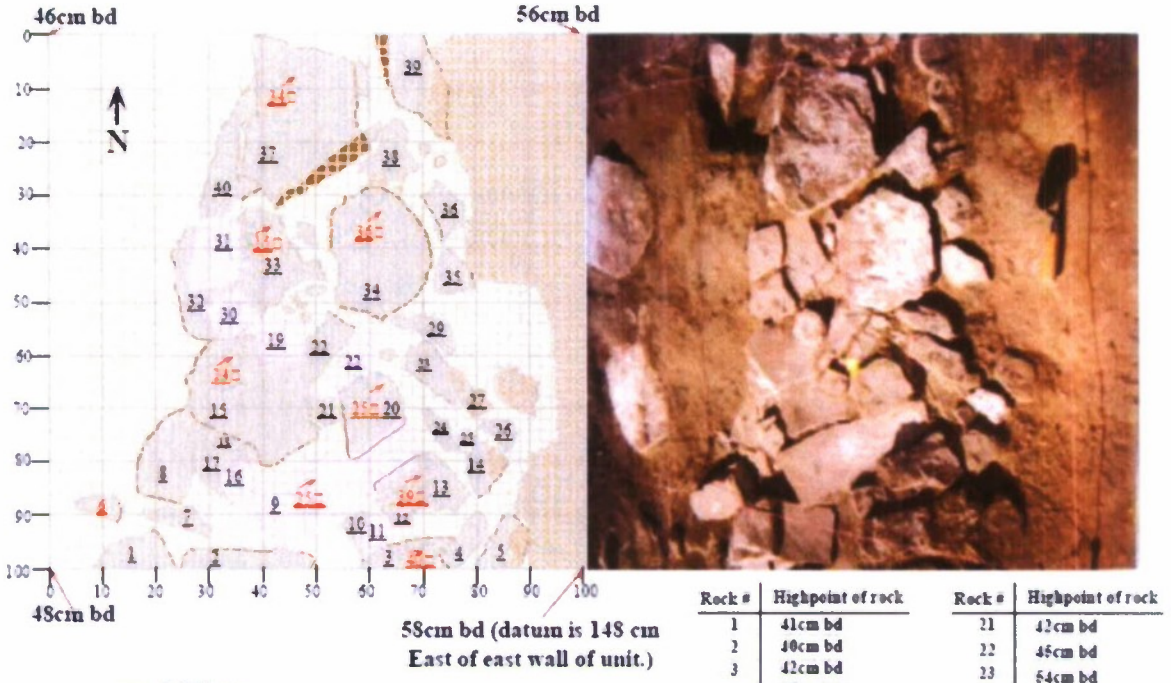
Figure 3.16: Planview drawing of Feature 1, Test Unit 5, 38 cm below datum, 5LA03421

Feature 2 Block 7. This feature is a buried stone wall consisting of small to medium-sized sandstone slabs placed directly on sandstone bedrock and forming at least three visible courses. These courses extend in a north-south orientation for a distance of more than 2 m before disappearing into an unexcavated area south of Test Unit 42. The slabs which form the wall were difficult to distinguish from the unconsolidated bedrock, but their cultural origin is based on a direct association with flaking debris, numerous charred seeds, charcoal flecks, a nearby fire-cracked rock concentration or hearth feature, as well as the presence of mud (clay and silt) "chinking" on the inside (roomward) surface of a number of slabs at the base of the wall. While chinking is present on the inside portions of the wall, the rest is comprised of largely unfinished or unshaped slabs stacked vertically with no plaster or mortar visible.

The feature is located in Block 7 on the bedrock slope, just outside of the mechanized vehicle tracks which cross this region. There were a total of nine units excavated to expose the entirety

of this feature, which was first encountered in Test Unit 24 at a depth of 18 cm below datum when slanted slabs facing east and west were unearthed (Figures 3.17, 3.18, and 3.19). Charcoal was found throughout the concourse along with obsidian flakes, debitage and fire-cracked rock. As excavation proceeded to uncover more of the feature, it began to resemble a formal structure rather than a thermal feature. A noticeable lack of stones in Test Unit 37 suggested a possible entrance; however, no evidence of architecture was found to support this hypothesis. Soils throughout this block were loamy fine sand with some small sandstone gravels. Charcoal was found in all units except Test Units 25, 39 and 84.

Test Unit 84 was excavated through the wall (i.e., perpendicular) down to the base of the slabs, which lay directly on bedrock without evidence of a trench or other support features (Figure 3.19). While three or more courses are extant, it does not appear that any portion of the excavated wall was significantly thicker, originally, than the current size of about 1.5 meters. There is no evidence for any other architectural features such as windows or doorways, so the exact function of the wall or the structure it is associated with remains unknown, although it resembles the low wall habitational features found elsewhere in the region.



Rock #	Highpoint of rock	Rock #	Highpoint of rock
1	41cm bd	21	42cm bd
2	40cm bd	22	45cm bd
3	42cm bd	23	54cm bd
4	47cm bd	24	59cm bd
5	52cm bd	25	58cm bd
6	43cm bd	26	59cm bd
7	44cm bd	27	59cm bd
8	42cm bd	28	60cm bd
9	41cm bd	29	53cm bd
10	45cm bd	30	43cm bd
11	43cm bd	31	43cm bd
12	48cm bd	32	44cm bd
13	46cm bd	33	45cm bd
14	53cm bd	34	48cm bd
15	39cm bd	35	58cm bd
16	40cm bd	36	56cm bd
17	41cm bd	37	40cm bd
18	45cm bd	38	53cm bd
19	42cm bd	39	56cm bd
20	48cm bd	40	40cm bd

Figure 3.17: Planview drawing and photo of Feature 2.
buried sandstone wall, Bedrock Slope, 5LA03421

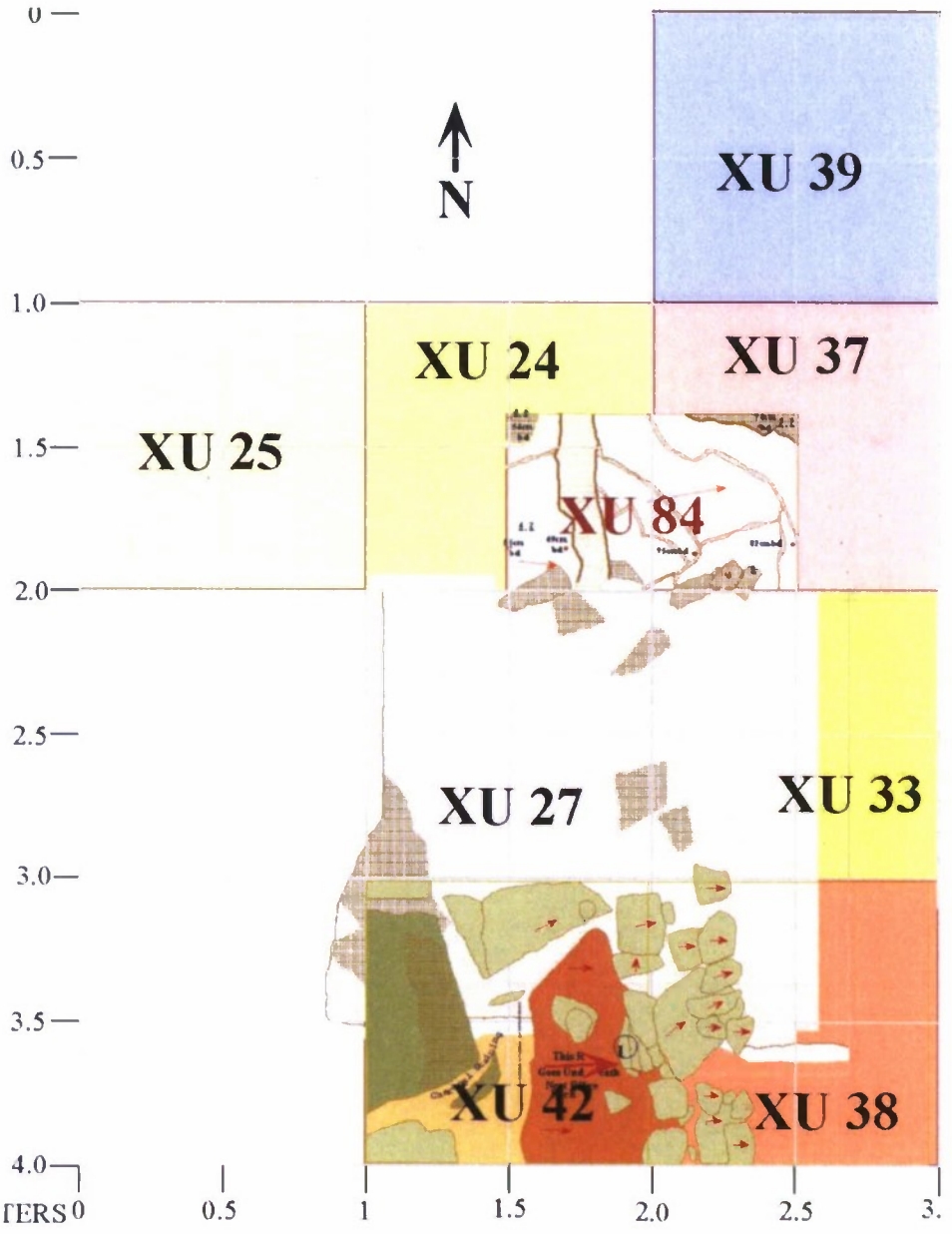
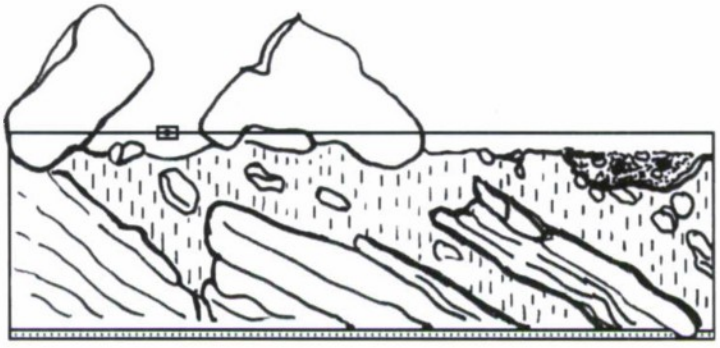


Figure 3.18: Block planview of Feature 2,
buried sandstone wall, all units, Bedrock Slope, 5LA03421



Legend

Line Datum

0 10 cm

Rock

Bedrock

Thermal feature

Grey soil with pebbles

Soil

Figure 3.19: Stratigraphic profile of Feature 2,
buried sandstone wall, Test Unit 84, Bedrock Slope, 5LA03421

Feature 3 – Block 11. Feature 3 is an oval concentration of fire-cracked rock located less than 20 m east of Feature 1 in an area heavily impacted by mechanized vehicles (Figure 3.20). The feature is in Block 11 which consists of three units: 34, 34a and 35. Test Unit 34 appears to show the most surface disturbance from this activity, as tracks and a distinguishable berm cross the unit on a north-south axis. While the area is heavily disturbed, none of the fire-cracked rock observed on the surface appeared to be broken from the activity. Feature 3 crosses into each of the units, with cultural debris encountered at a depth of at least 36 cm below datum. However, most of the cultural artifacts were evidenced in the surface levels of the units and include lithics, bone and fire-cracked rock (Figure 3.21).

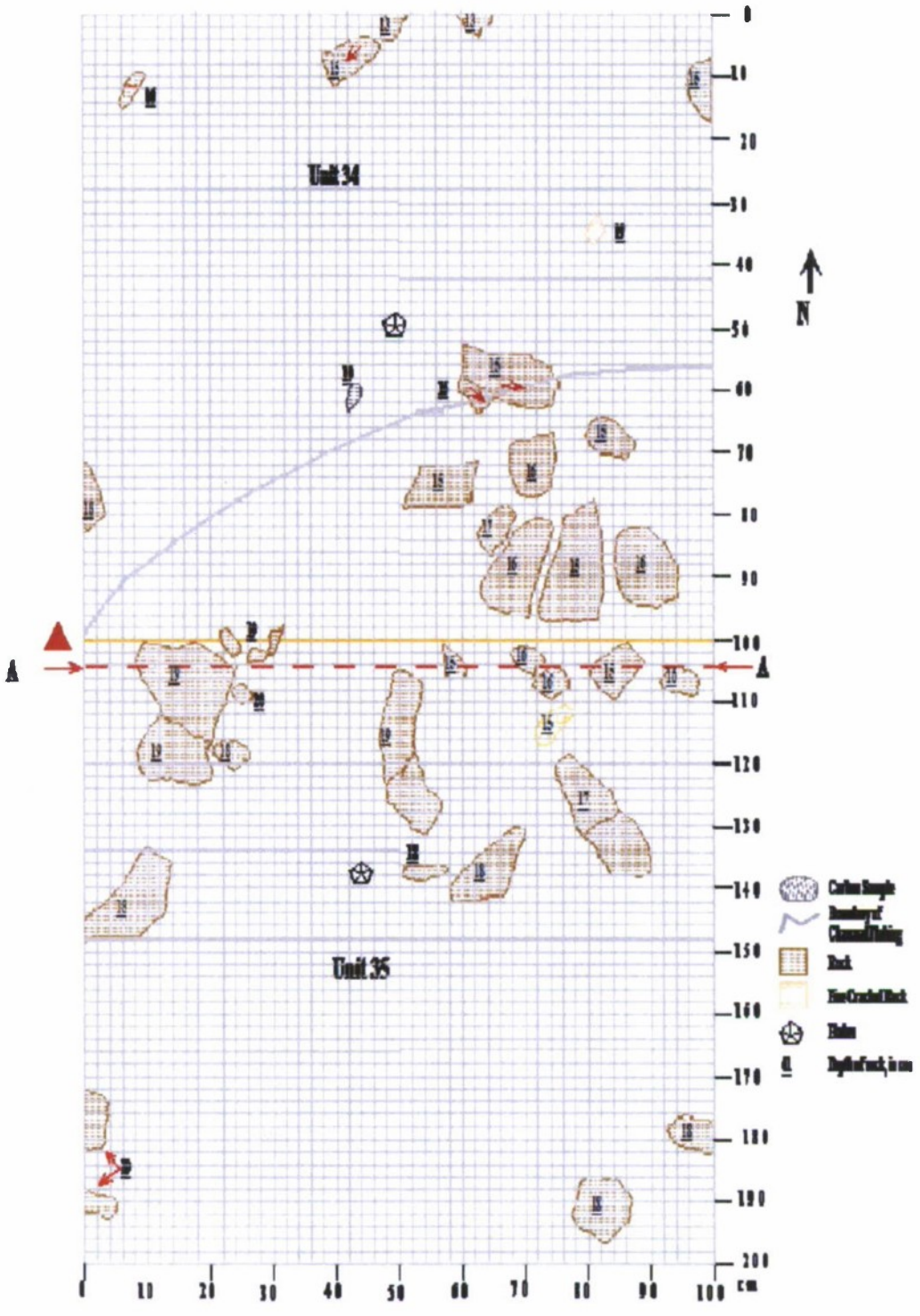


Figure 3.20: Planview drawing of Feature 3, fire-cracked rock concentration, Test Units 34 and 35, Rocky Hilltop, 5LA03421

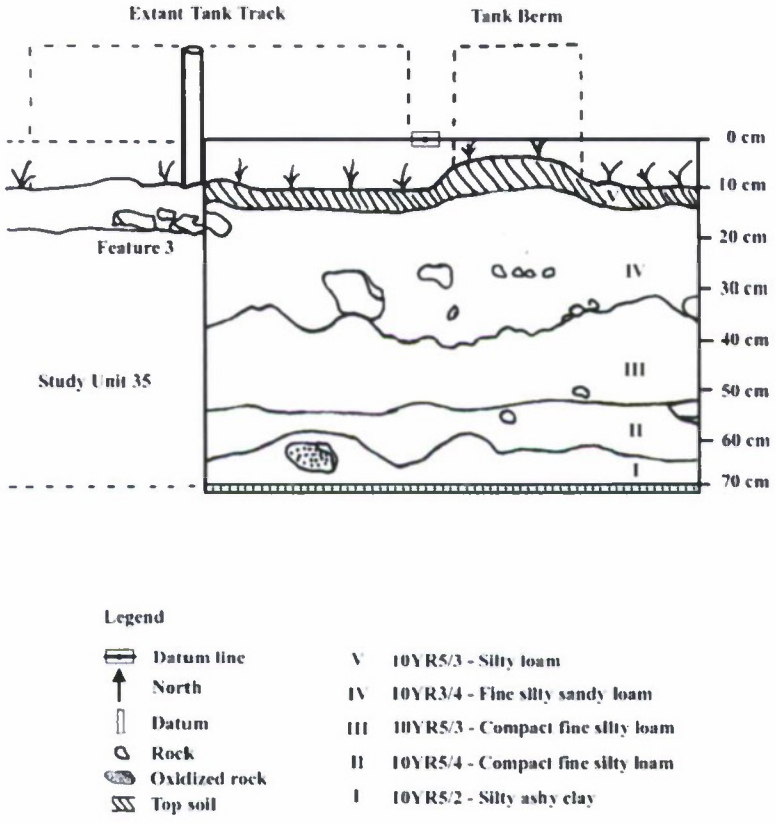


Figure 3.21: Stratigraphic profile of Feature 3, west wall, Test Unit 34, Rocky Hilltop, 5LA03421

Feature 4 – Block 14. Feature 4 is a linear arrangement of nine large stones, spaced about 10 cm apart, which is oriented on a northeast-southwest axis. Concentrations of fire-cracked rock are found at either end of the feature (Figure 3.22). Feature 4 was heavily impacted by mechanized vehicle traffic, as evidenced by tracks which cross the feature in a parallel direction and by smaller vehicles which created tracks in an east-west direction through the feature.

Disturbance from vehicular traffic is supported by surface observation and compact soils measured in the units. The feature was distributed across six units: 49, 50, 58, 59, 60, and 61 which are adjacent to one another and comprise Block 14. Soil compaction data was assessed for Test Units 49, 50, 60, and 61. Profiles of FCR Cluster 1 in Test Unit 59 and FCR Cluster 2 in Test Unit 61 indicate a shallow concentration of less than 10 cm below surface exposure (Figure 3.23). FCR Cluster 2 has a semi-circular area of soil which is distinct from that surrounding the cluster.

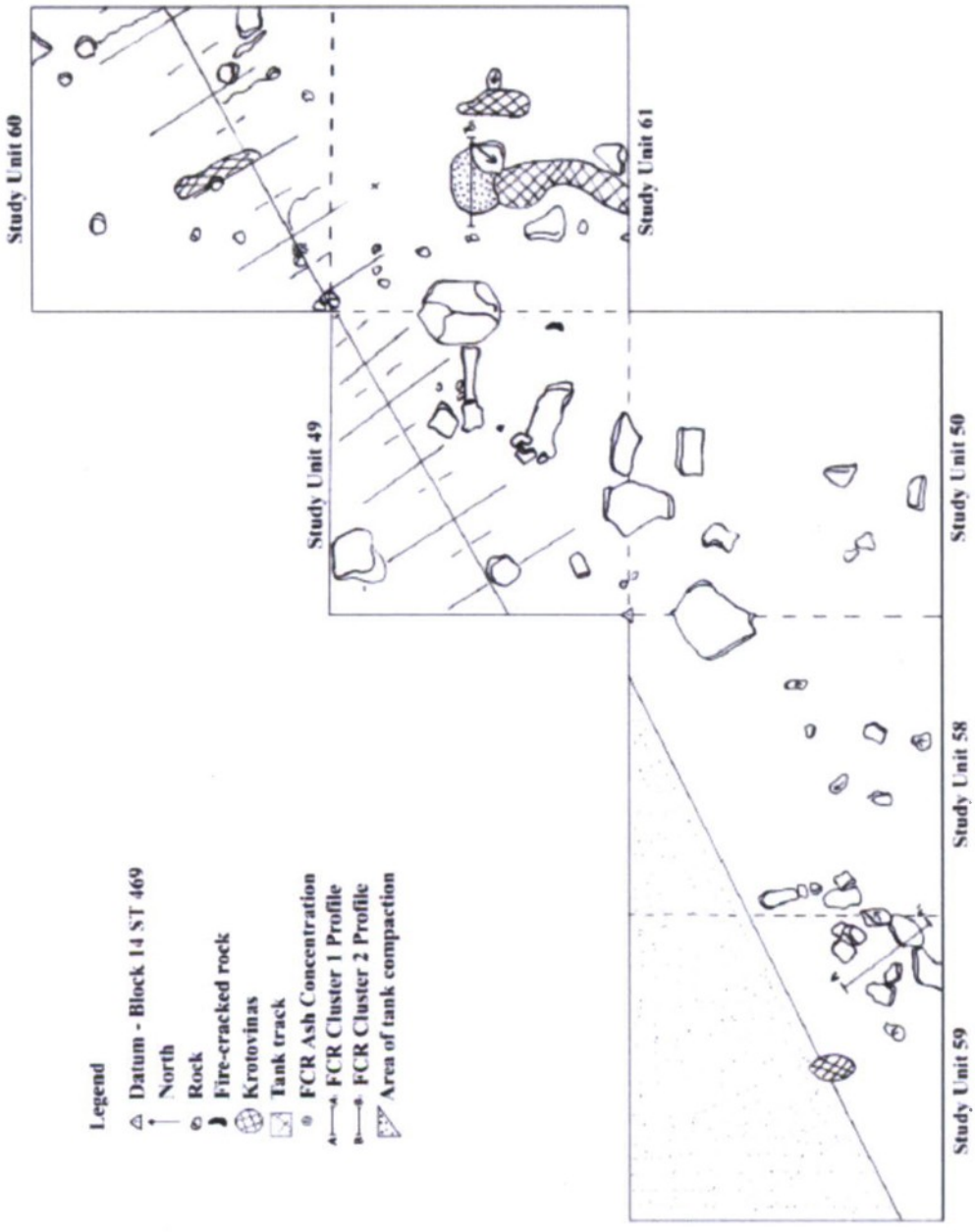


Figure 3.22: Planview drawing of Feature 4, Block 14,
Test Units 49, 50, 58, 59, 60 and 61, Rocky Hilltop, 5LA03421

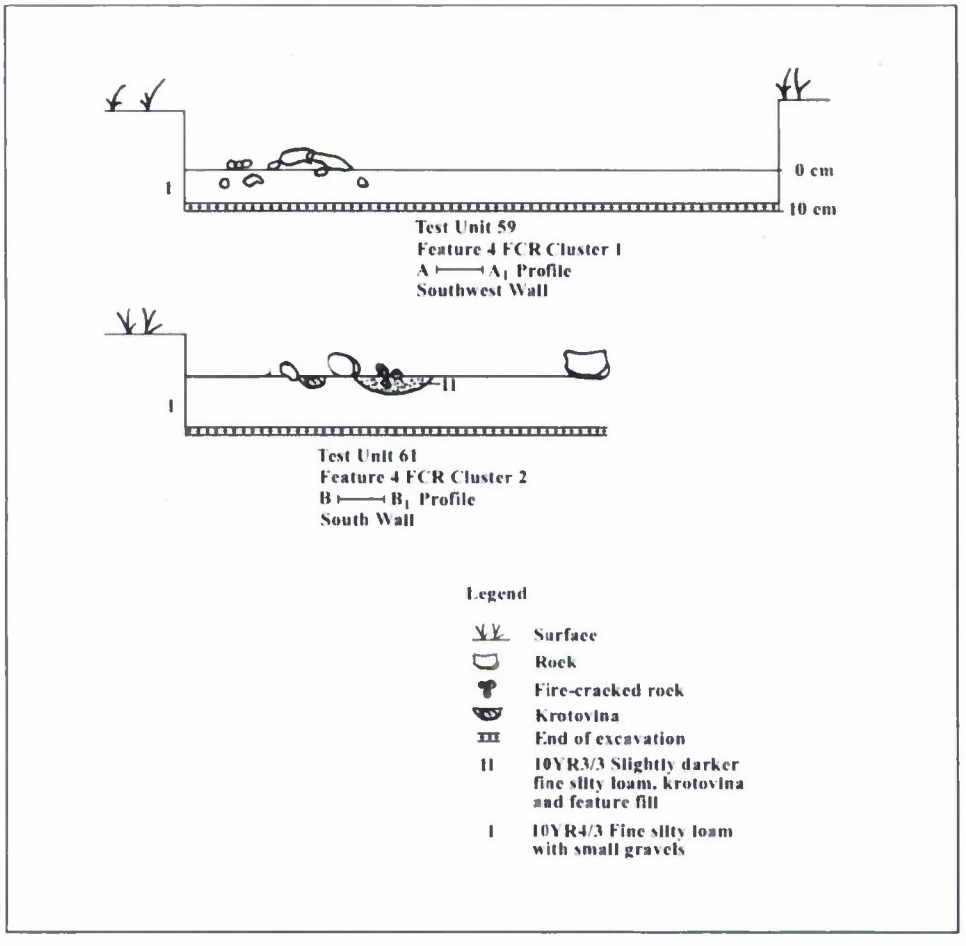


Figure 3.23: Stratigraphic profile of Feature 4, FCR Cluster 1, southwest wall, Test Unit 59, and FCR Cluster 2, south wall, Test Unit 61, Rocky Hilltop, 5LA03421

Feature 5. This feature is the sole feature located in the colluvial-mantled terrace, an area singularly impacted by mechanized vehicle traffic that is similar in scope to the damage on the rocky hilltop area (Figure 3.24). The feature concentration of fire-cracked rock measured 150 cm x 70 cm. It was found at 60 to 81 cm below datum in Test Unit 74. An additional unit, Test Unit 74a, was opened to the east in order to determine the extent of the FCR concentration (Figure 3.25). Feature 5 resembles an overlapping pile of rocks with sparsely scattered heat-treated rock interspersed with charcoal flecks.

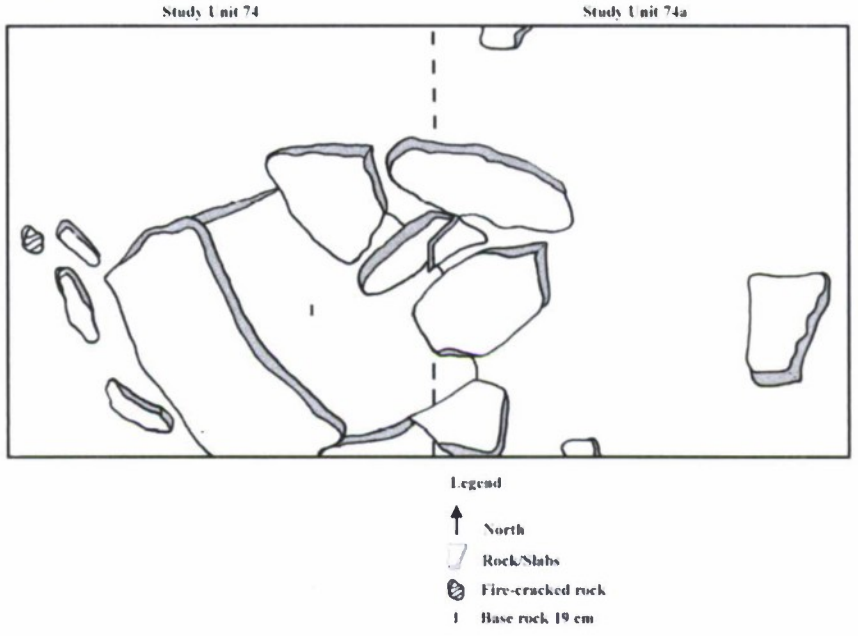


Figure 3.24: Planview drawing of Feature 5, Test Units 74 and 74a, colluvial-mantled T1 Terrace, 5LA03421

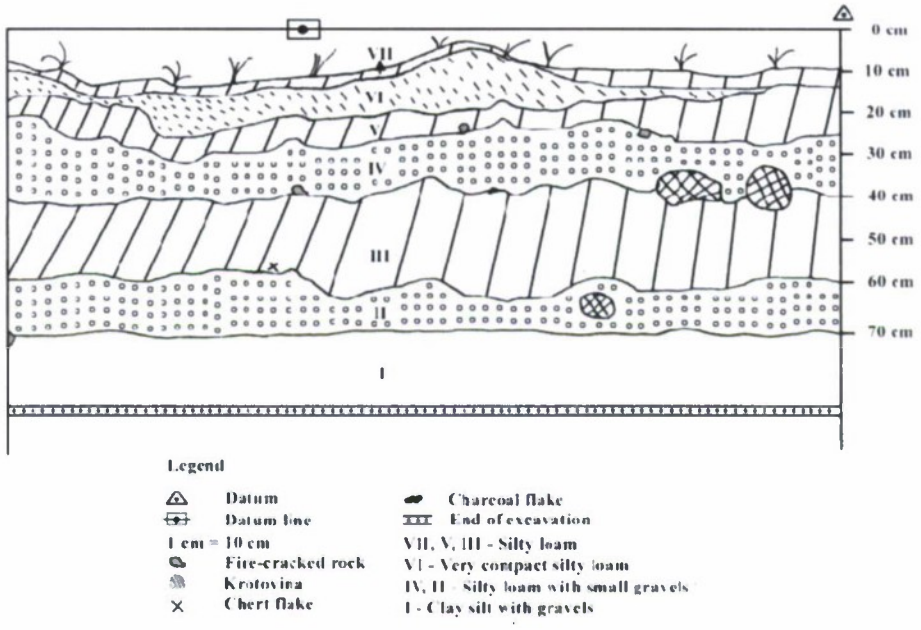
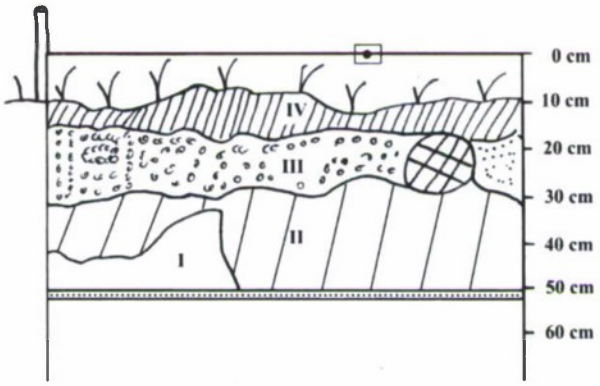


Figure 3.25: Stratigraphic profile of Feature 5, north wall, Test Units 74 and 74a, colluvial-mantled T1 Terrace, 5LA03421

Feature 6 – Block 13. Feature 6 is an irregular hearth measuring 29 cm x 12 cm which was exposed during the excavation of Block 13 (Figures 3.26 and 3.27). Block 13 was intended to include only two test units: 44 and 45; however, a third unit was opened adjacent to and north of Test Unit 44 to further investigate the impact of mechanized vehicle tracks observed on the surface. Two layers of oxidized sandstone (orange) were found along the north side of Test Unit 44. Five stones were exposed across these units. The course of these stones disappeared into the adjacent unexcavated sediments. Two of the excavated stones were stacked on the surface with a larger stone and were collected with the surrounding soil matrix as the feature fill. Cultural artifacts were found throughout all units, but other than FCR, none were found in explicit association with Feature 6.



Legend

Datum Line
Surface
North
Datum
Krotovina
End of excavation
IV 10YR4/3 Fine silty loam
III 10YR4/4 Fine silty loam, small unsorted gravel
II 10YR4/4 Fine silty loam
I 10YR6/4 Hard compact fine silty loam

Figure 3.26: Stratigraphic profile of Feature 6, buried hearth, east wall, Test Unit 45, Rocky Hilltop, 5LA03421

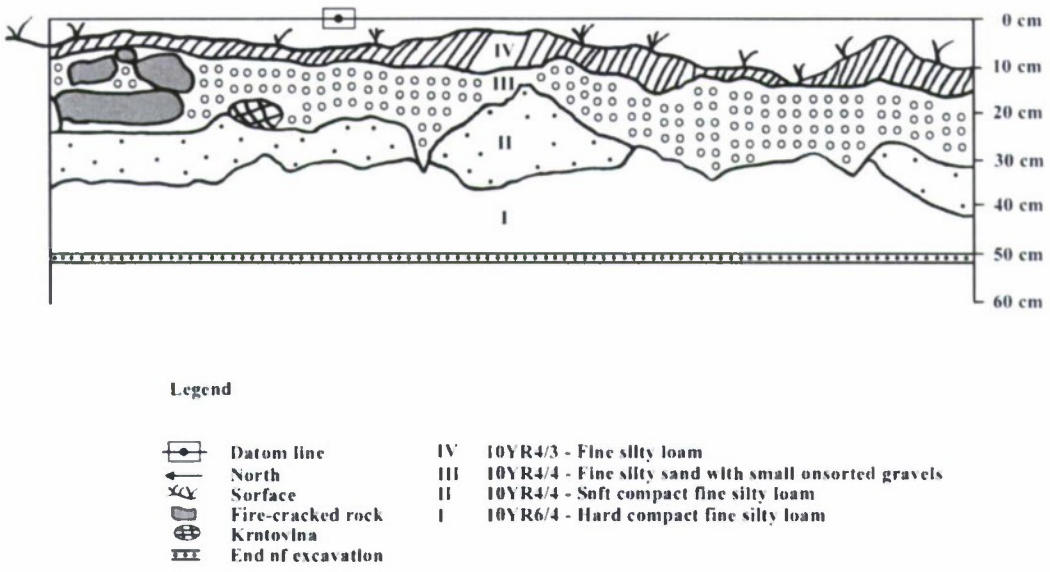


Figure 3.27: Stratigraphic profile of Feature 6, buried hearth, east wall, Test Units 44 and 45a, Rocky Hilltop, 5LA03421

Artifact Diversity and Density

Excavations at 5LA03421 recovered relatively few cultural artifacts, either of historic or undated prehistoric origins. Historic materials were extremely sparse but include solarized glass fragments, tin fragments, non-diagnostic earthenware and a shotgun shell (REM-UNC .410 NITRO). These items were recovered from the surface to 10 cm below surface from Test Units 47, 48, 51 and 52 on the T1 Terrace.

The prehistoric artifact assemblage is dominated by lithic debitage but also includes groundstone and pottery sherds. A total of 173 lithic debitage was recorded, most of which were uncovered during excavations. The sample was dominated by simple flaking debris. The most prevalent material type was chert followed by fine-grained quartzite and chalcedony. Obsidian, argillite, jasper and Hornfels/basalt were also found in the debris sample (Table 3.1). The majority of the flakes were non-cortical, of which there was a fair distribution between the complex and simple classifications of flaking debris. Cortical flakes made up an insignificant portion of the lithic remains (Table 3.2).

All features excavated had some lithic material in association. Approximately 43% of the lithic debitage was found within the features (Table 3.3). Of these, about 42% was found in Feature 6, the subsurface hearth feature. The majority of flaking debris in the hearth consisted of complex flakes or simple flakes. The artifacts were more or less evenly distributed between Test Units 44, 44a and 45. The dominant material type was chert. Feature 5 (26%) had the next densest concentration, though it, too, is relatively sparse and dominated by simple flakes.

Feature 4 contained about 14% of the flaking debris, which were evenly divided in types of flaking. Features 3 and 2 had about the same amount of lithic debitage (8%).

Table 3.1: 5LA03421 Summary of debitage class by material for all units

	Debitage Class			
Material Type	**Complex flake**	**Shatter**	**Simple flake**	**Grand Total**
argillite	4	1	5	10
chalcedony	8	3	11	22
chert	32	9	31	72
fine-grained quartzite	5	10	25	40
hornfels/basalt			2	2
jasper	1		1	2
Morrison chert			1	1
obsidian	3		2	5
quartzite	5	5	7	17
sandstone			1	1
siltstone	1			1
Total	**59**	**28**	**86**	**173**

Table 3.2: 5LA03421 Summary of all debitage for all units

Cortex	**Size**	**Complex flake**	**Shatter**	**Simple Flake**	**Grand Total**
Cortical	>1/2"	1		3	4
	<1/4"			1	1
	1/4" -1/2"		1	2	3
Non-cortical	>1/2"	11		9	20
	<1/4"			29	29
	1/4" -1/2"	47	1	38	86
Unspecified	>1/2"		3		3
	<1/4"		2	1	3
	1/4" -1/2"		18		18
	unknown		3	2	5
	(blank)			1	1
Total		**59**	**28**	**86**	**173**

Table 3.3: 5LA03421 Summary of debitage by material type for all features

Feature	Unit	Material	Complex flake	Shatter	Simple flake	Grand Total
1	5	chert	1			1
2	24	fine-grained quartzite			1	1
		silicified wood		1		1
	27	fine-grained quartzite			1	1
		silicified wood		1		1
	37	obsidian	1			1
	39	obsidian	1			1
	84	chert			1	1
3	34	basalt			1	1
		chalcedony			1	1
		chert	1		1	2
	34/35	silicified wood			1	1
	34a	fine-grained quartzite		1		1
4	49	chalcedony	1			1
		silicified wood		1		1
	50	argillite			1	1
		fine-grained quartzite		1		1
	58	chert	1			1
	61	argillite	1			1
		chalcedony		1	1	2
		chert	1			1
		fine-grained quartzite			1	1
5	74	argillite			1	1
		chert	2	1	3	6
		fine-grained quartzite		1	3	4
		silicified wood	1			1
	75	Morrison chert			1	1
	74a	argillite			1	1
		chalcedony	1	1		2
		chert	2			2
		fine-grained quartzite		1		1
6	44	argillite		1		1
		chert	3		2	5
		fine-grained quartzite		1	1	2
		silicified wood	1			1
	45	argillite			1	1
		chalcedony	3			3
		chert	4		1	5
		fine-grained quartzite			1	1
		silicified wood	1			1
	44a	chalcedony	1		1	2
		chert	3	1	1	5
		fine-grained quartzite			2	2
		jasper	1			1
		silicified wood			1	1
Total			31	13	30	74

Chipped stone tools made up a small fraction of the lithic assemblage. These included a chert end scraper, three large thin patterned bifaces of chert, fine-grained quartzite, and quartzite (Figure 3.29), a retouched Folsom point (Figure 3.28), four retouched/utilized flakes (fine-grained quartzite and Hornfels/basalt), and a single small thin patterned corner-notched biface (Figure 3.29). A single non-bipolar core was noted in Test Unit 44a and a core was also mapped in Test Unit 61. Fire-cracked rock was ubiquitous in all the features. Groundstone fragments made up a very small portion of the assemblage. Four pieces of pottery, one cordmarked, were found on the surface (Figures 3.30 and 3.31).

Figure 3.28: Photograph of reworked Folsom point, sides A and B, 5LA03421, Catalog No. 106.569 (Fort Carson, Curation Facility)

Figure 3.29: Photograph of lithic tools, 5LA03421, A) Cat. No. 106.726, B) 106.725, C) 106.708, D) 106.728 (Fort Carson, Curation Facility)

Figure 3.30: Photograph of pottery sherds, exterior view, 5LA03421, A) Catalog No. 106.724, B) 106.723, C) 106.722, D) 106.721 (Fort Carson, Curation Facility)

Figure 3.31: Photograph of pottery sherds, interior view, 5LA03421, A) Catalog No. 106.724, B) 106.723, C) 106.722, D) 106.721 (Fort Carson, Curation Facility)

Natural and Cultural Impacts

The diverse topography of 5LA03421 is subject to various types of natural erosional processes from wind surface abrasion to sheetwash runoff. Perhaps the most interesting aspect of this environmental dynamic will be the potential long-term effect of the military maneuvers on this site. The variety of traffic types made this site ideal for soil compaction analysis. According to the methodology developed for this study, excavation units were placed to cover much of the surface area affected by mechanized vehicle tracks during the earlier maneuvers. However, to better manage the cultural component of this site, several block units were placed outside the traffic area to investigate features located during the pedestrian survey (Feature 2, for example).

Site 5LA03421 was heavily impacted by military maneuvers. Mechanized vehicles made multiple passes though the area, leaving deep ruts. In the colluvial mantle and rocky hilltop areas of the site, churned scars from turning around were observed. No information is available about the amount of rainfall, time of maneuvers or specific types of military vehicles employed, but surface damage and subsurface compaction were readily observed. Data gathered from this site included visual observation within units laid out in tracks, as well as compaction measurements. In selected units, compaction measurements were taken at each 10 cm level.

Results of this data are more conclusive than that gathered for 5LA03254, again likely due to the timing and extent of maneuvers conducted on this landform. Of the 89 units excavated at 5LA03421, compaction data (observed and measured) was gathered for 31 units. The results are discussed by topographic area.

The rocky hilltop area was one of the most significantly impacted. Surface tracks were deep and highly turbated by tracked vehicles (Figure 3.32). Test Units 30 and 59 showed observable compaction at 10 cm depth below modern ground surface. Test Units 44, 44a and 45 showed an increase of compacted soils as the depth of the unit increased to a maximum depth of 50 cm below datum, though no track was observed on the surface of the unit. Test Units 49 and 60 showed no visible signs of compaction though tracks were visible on the surface. Compaction measurements for Test Units 66 and 69 showed little variation, though mechanized vehicle tracks were clearly observed on the surface and soil compaction was noted within the units, especially at deeper levels.

Figure 3.32: Photograph of surface tracks, 5LA03421

Compaction was recorded in five units placed on the bedrock slope landform. This area seems to have been affected by a single pass of tracked vehicles and showed obvious ruts, but considerably less disturbance than the rocky hilltop area. Test Units 50, 75, 76 and 73 were laid out between tracks and exhibited no evidence of disturbance, though the latter showed evidence of compaction in the corner of the unit which may have been clipped by a mechanized vehicle. Test Unit 72 showed extreme compaction both on the compaction meter and within the unit sediments.

The colluvial mantle area was also heavily impacted by military traffic. Compaction for Test Units 74 and 79 was measured at 24 to 30 cm depth below datum, although there is little difference between readings taken at the other levels within these units. Test Unit 78 was laid out between tracks and exhibited no evidence of soil compaction. Test Unit 80, in a track, did not exhibit soil compaction but the soils were described as high energy. Data for Test Unit 81 are incomplete, but given the shallow measurements taken in the mechanized vehicle tracks and from observation, it is inferred that this unit showed signs of soil compaction. Test Unit 81 was heavily impacted by surface tracking and showed visible signs of compaction within the unit. Test Unit 82, also within a track, showed only slight soil compaction. Test Unit 83 showed little difference in the compaction measurements, but the unit exhibits highly compact soils.

The T1 Terrace did not exhibit significant signs of compaction even though most units were excavated on the tracks. Only two test units (47 and 48) record disturbance from mechanized vehicles in the form of surface track damage (no subsurface change was noted). The T2 Terrace recorded slight compaction within the wall of Test Unit 62. Test Units 64, 65, 67 and 68 record no compaction, though soils in Test Unit 65 were recorded as more compacted within the southwest corner of the unit. Test Units 63a and 68a were opened to obtain compaction observation following a line of tracks. The former showed little compaction until

the soils became more clay-like and then the compaction was noted outside of the track itself. The latter showed considerable compaction in Level 3.

Clearly, military maneuvers at 5LA03421 had a demonstrable effect on surface soils. There appears, however, little conclusive evidence to suggest that the subsurface component of the site was damaged by surface traffic. It is clear that in areas with higher levels of military activity, compaction is more seriously noted with the units. A caveat is that the methodology used for this study was experimental and has not been reproduced. It may be that a wider control area around the traffic impact would provide alternative results. There is evidence (DOI Departmental Consulting Archaeologists 1991) that soil compaction may have a negative impact on buried features and artifacts. Nonetheless, at 5LA03421 the evidence of surface feature impact is minimal. However, it should be kept in mind that the features noted by the 1983 recording and the historical component of the site were not included in this study.

Management Recommendations

There appears little doubt that the buried rock wall in the bedrock slope is significant under National Register eligibility criteria and should be avoided or mitigated through intensive data recovery. Any attempt at such recovery should include the complete excavation of the feature in its entirety (the exact area of which is currently unknown) and should be of sufficient scale to adequately recover and analyze all cultural, architectural, floral, faunal and extraneous feature data uncovered. It should also attempt to more fully understand this remarkable feature within the cultural, temporal and behavioral context of the site as a whole.

The historic component extant in the T1 terrace area was only briefly described in this report; however, it was the site of detailed feature recording (surficial) during the course of fieldwork. This potentially significant component should be avoided by mechanized vehicle traffic until a more thorough program of mapping, testing and evaluation is conducted. This recommendation has been completed subsequent to giving it to the Army at the end of the field work (Charles et al. 2004). Once this is completed there is no reason why the site boundary fence in this portion of the site cannot be moved to the east, excluding both the T1 and T2 terrace areas from additional archaeological work. Both areas do not appear likely to contain National Register eligible deposits due to lengthy periods of surface stability, artifact mixing, active bioturbation, deflation and military disturbance. As with all the recommendations presented herein, this must first receive the concurrence of the archaeologists from Fort Carson Cultural Resources Management Program, the National Park Service and the Colorado SHPO.

Finally, the rocky hilltop and colluvial-mantled portions of the site do also appear to contain potentially significant cultural materials, albeit below the 25 cm depth designated as maximum in the project scope of work. For this reason, data recovery in both areas below about 25 cm was not sufficient to mitigate any adverse effects that may have already occurred from military traffic, but more significantly, by any future activities resulting from military maneuvers.

Chapter IV: **5LA05612**

Site 5LA05612 was the second site investigated during the 2000 field season and was intermediate between 5LA03254 and 5LA03421 in terms of size, artifact diversity and geoarchaeological complexity. The field investigations at 5LA05612 were conducted between August 3 and August 21, 2000. The research included the hand excavation of 36 test units, with a total excavated area of 33.5 square meters, which was the maximum number specified in the project scope of work.

The University of Denver (1984) recorded this site as a possible prehistoric base camp, a hypothesis supported by widespread lithic scatter, bedrock metates, natural rock overhangs and water catchments, and a densely distributed scatter of fire-cracked rock and ash stains. They identified a stone alignment which was postulated as belonging to a homestead to the northwest of this site. A total of four bedrock metates were noted, and a large rock overhang (Feature 7) as well as 12 hearth features were mapped. A site revisit by P. Sanders in 1987 noted that recent military activity had obliterated all of the hearths located by the 1984 recording and made relocation of the site datum impossible. This recording did not attempt to relocate the earlier features or to locate new ones, but instead concentrated on the newer mechanized vehicle tracks. The location of the four features identified during this study suggests it is unlikely they overlap with earlier recorded features or those discovered more recently by Charles et al. (2004). The feature numbers are considered as unique to this recording.

Topographic Setting and Surface Archaeology

Site 5LA05612 is located in rock-mantled uplands south of Lockwood Arroyo (Figure 4.1). The western portion of the site extends downslope to a small tributary of Lockwood, while the eastern portion is comprised of rolling grasslands with significant exposures of sandstone bedrock along the margin-stream periphery. The small stream valley contains a low, modern floodplain and adjacent incised exposures of sandstone bedrock. These contain three small cavities, or rockshelters, which are large enough to have served as temporary habitation loci, but they were not investigated because they lie outside of the investigated area (Figure 4.2).

The floodplain and rockshelters are bordered on the east by bedrock-covered slopes. Several of these outcrops contain bedrock metates, while charcoal-stained hearth areas were visible in areas between the exposed bedrock. These archaeological features were not investigated because they are located outside of the project area. The latter encompasses the east and southeastern portion of the site and is flat to gently undulating with generally thin soils.

A series of mechanized vehicle tracks traversed this area during military maneuvers conducted from 1995 to 2000. These tracks were clearly visible in the form of ruts and areas of depressed sod with noticeable soil compaction. The tracks run east to west along the long axis of the site and turn in a north-south direction near the eastern end of the site. In at least one portion of the site, designated Area A, the military vehicles performed one or more series of turns, which resulted in semi-circular to figure-8 configurations of tracks. The military maneuver area is covered in native grasses in addition to sparse to moderate sage brush and prickly pear cactus.

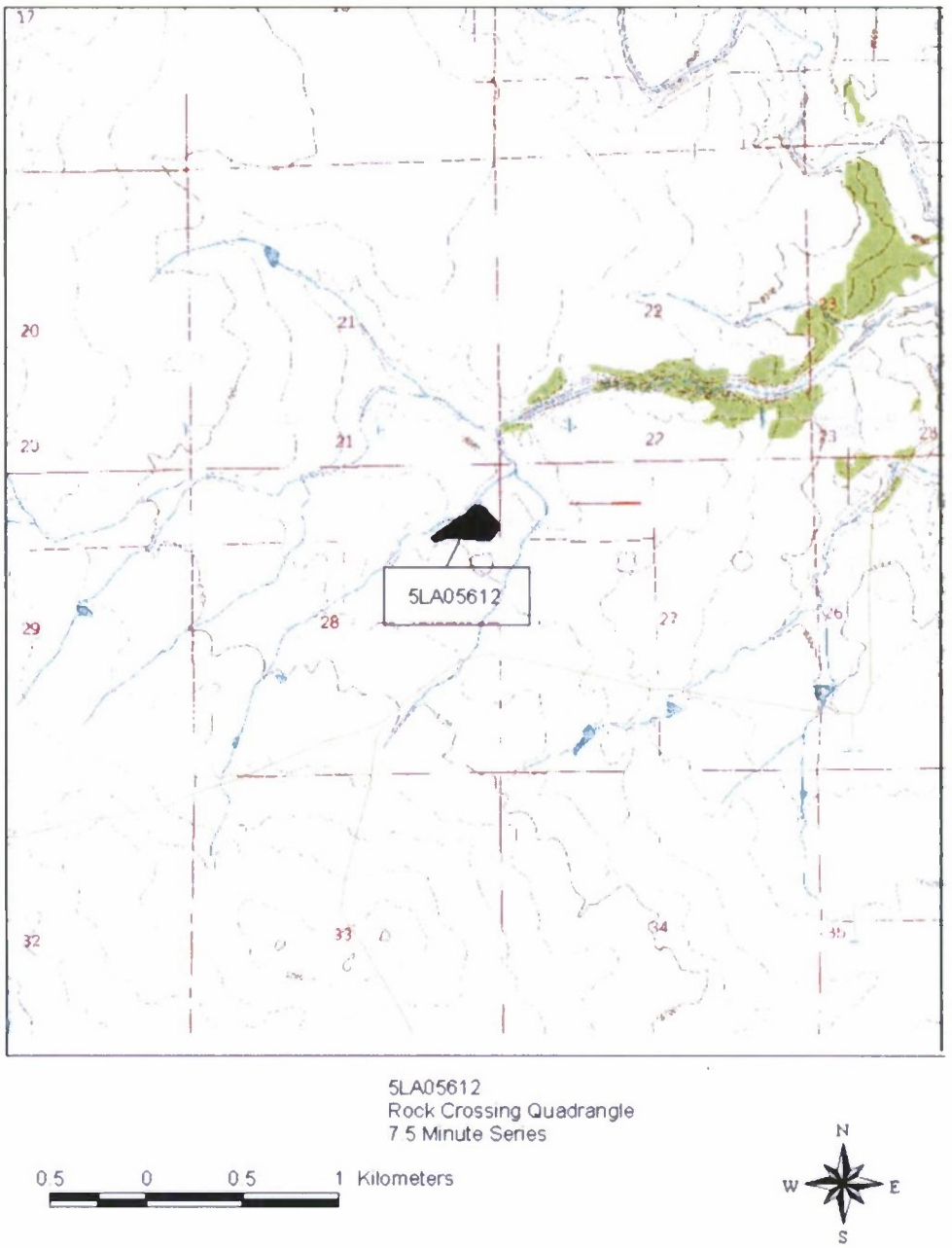


Figure 4.1: Site location of 5LA05612, Rock Crossing USGS quad

Stratigraphy and Sedimentary Depositional Environment

The site is characterized by exposed sandstone bedrock and adjacent areas of thin silty to fine sandy soils formed in situ with some apparent deposits of aeolian silt (loess). The intermittent stream portion of the site also contains low floodplain deposits comprised of alluvial sands and muds. The exposed sandstone in the site area is mapped as Kdp – Cretaceous Dakota Sandstone/Purgatoire Formation (Tweto 1979).

Surface soils in the site area consist of silty loam and fine sandy loam Entisols and Inceptisols, with A-C, A-Bw-C, A-Bw-Bk-C profiles. As stated, these are generally quite thin in the site area, overlying sandstone bedrock. At least one area of somewhat deeper and more-developed soil was encountered in the east/northeast portion of the site and will be discussed in more detail during the following summary of the 5LA05612 investigations.

Test Unit Excavations

The 36 test units were concentrated in two portions of the military activity areas and were designated Area A and Area B. Area A consisted of a concentration of 14 original test units (Test Units 1-13, and Test Unit 30) and a block unit excavation consisting of an additional 15 (Test Units 11a – 11o) units in the western portion of the tracked area (Figure 4.2). The units were located in a part of the site characterized by grass-covered uplands with very thin soils over sandstone bedrock.

Area B consisted of seven test units scattered over an area 35 m north-south by 10 m east-west. These units were located in the eastern portion of the area of mechanized vehicle tracks and were located in rolling grassy uplands. Six of the units were concentrated on a low hill near the east-northeast corner of the site which contained a pocket of relatively thick incipient soil. Of the units numbered on the map, Test Units 15, 16, 23 through 29, and 31 through 33 were not excavated. Instead, units numbering 11a through 11o were placed off of Test Unit 11 to expose the cultural feature located there. A brief descriptive summary of the individual test units in Areas A and B follows.

Summary of Test Units, Area A

Test Unit 1. This unit was excavated in two vertical levels (10 to 30 cm below datum). The 33 x 33 cm waterscreen sample was collected from the northwest corner of the unit and the soil encountered consisted of dark brown, 10YR3/3 (wet), fine sandy loam. Fire-cracked rock (sandstone) was recovered from Levels 1 and 2.

Test Unit 2. Test Unit 2 was also excavated in two levels to a depth of 30 cm below datum. A vertical datum was located in the northeast corner of the unit. The waterscreen sample was collected from the northwest corner and the soil consisted of brown, 10YR4/3 (wet), fine sandy loam A horizon. No cultural material was recovered from the test unit.

Test Unit 3. Test Unit 3 was excavated in three vertical levels to a depth of 35 cm below datum. A vertical datum was located in the northeast corner of the unit. The waterscreen sample came from the northwest corner and the unit soil consisted of dark brown, 10YR3/3 (wet), fine sandy loam with small lag gravels. One chert flake and one piece of chert angular debris were recovered from Level 2.

Test Unit 4. This unit was excavated to 30 cm below datum. The waterscreen sample was recovered from the northwest corner and the soil consisted of fine sandy loam, brown 10YR4/3 (dry) and yellowish brown 10YR5/4 (wet), with dense, small gravels. Unidentifiable bone fragments were recovered from Level 1, while one piece of sandstone FCR was recovered from the second level.

Test Unit 5. Test Unit 5 was excavated to a depth of 30 cm below datum. The datum was placed in the northwest corner of the unit at 10 cm above modern ground surface. The waterscreen sample was collected from the northwest corner. The unit soil was brown, 10YR4/3 (wet), fine sandy loam, with bedrock encountered at the bottom of Level 2. A projectile point (non-diagnostic tip fragment) and pieces of FCR were recovered from Level 1, while FCR and one flake were recovered from Level 2. The latter were found resting directly on sandstone bedrock.

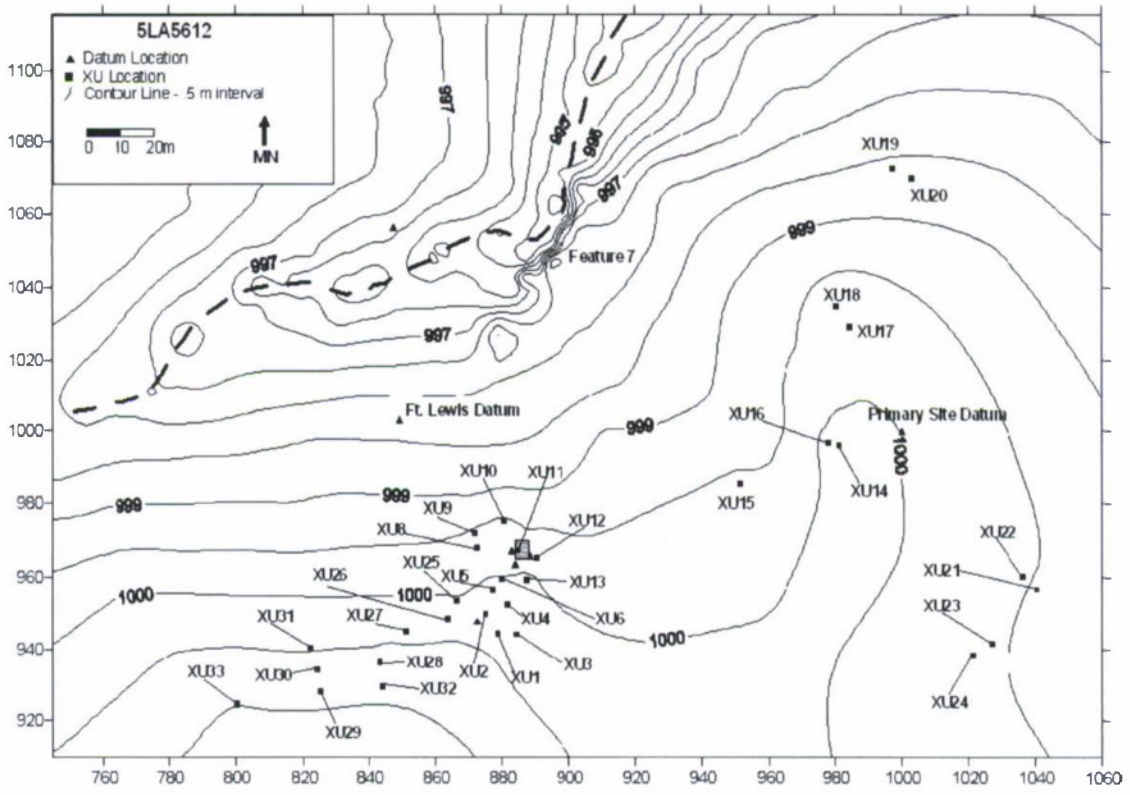


Figure 4.2: 5LA05612 Site overview map with location of test units

Test Unit 6. Test Unit 6 was excavated to a depth of 30 cm below datum, located in the northeast corner of the unit. The waterscreen sample was collected from the northwest corner and the soil consisted of dark yellowish brown, 10YR3/4 (wet), fine sandy loam. Sandstone bedrock was encountered in the northeast, northwest, and southwest portions of the test unit at a depth of 10 cm below ground surface. A single red chert flake was recovered from Level 1.

Test Unit 7. Test Unit 7 was excavated to a depth of 32 cm (Levels 1 and 2 – 0 to 20 cm below ground surface, Level 3 – 20 to 32 cm below ground surface). The waterscreen sample came from the southeast corner, and the soil consisted of dark brown, 10YR3/3 (dry), and dark yellowish brown, 10YR3/4 (wet), fine sandy loam in Levels 1 and 2, and dark yellowish

brown, 10YR3/4 (wet), loamy sand in Level 3. Sandstone bedrock was encountered at the bottom of Level 3. A cultural feature, Feature 2, was located in Level 3 at a depth of 26 to 32 cm below ground surface. The feature consisted of an amorphous concentration of ash and charcoal-stained matrix. The feature was associated with hard, compacted soil; however, this is attributed to military activity.

Test Unit 8. Test Unit 8 was excavated in two levels to a depth of 30 cm below datum. The waterscreen sample was collected from the northwest corner, and the unit soil consisted of dark brown, 10YR3/3 (wet), fine sandy loam in Level 1 and dark yellowish brown, 10YR4/4 (wet), sandy loam in Level 2. Bedrock was encountered in the southern half of the unit at a depth of 18 to 20 cm below datum. Several small pieces of possible fire-cracked rock (sandstone) were recovered from Level 1.

Test Unit 9. Test Unit 9 was excavated to a depth of 20 cm below datum, located in the northeast corner of the unit. The single waterscreen sample came from the southeast corner. The unit soil consisted of a fine silty loam A horizon, very dark grayish brown, 10YR3/2 (wet). No cultural material was recovered from this unit.

Test Unit 10. Test Unit 10 was excavated as one natural level to a maximum of 29 cm below datum in the northeast corner and 14 cm below datum in the southwest corner. The datum was located in the northeast corner. A waterscreen sample was collected from the northwest corner of the unit. Soils are very dark grayish brown, 10YR3/2 (wet), thin fine sandy loam. No cultural materials were found in this unit.

Test Unit 11. The last of the original test units in Area A, Test Unit 11 was taken to a depth of 30 cm below datum with the datum located in the southwest corner. The waterscreen sample was collected from the northwest corner of the unit and the soil was comprised of dark yellowish brown, 10YR4/4 (wet), fine sandy loam in Level 1, and dark yellowish brown, 10YR3/6 (wet), loamy fine sand in Level 2. The latter overlay sandstone bedrock. A prominent cultural feature, Feature 1, was encountered in the southern half of the unit at a depth of 20 to 30 cm below datum. Feature 1 is a large concentration of fire-cracked sandstone, with an associated pile of white powdered gypsum. This feature was subsequently investigated by the excavation of an additional 15 test units. These formed a rectangular block excavation area that measured 4 m x 3.5 m. The additional 15 units comprising the block were numbered 11a through 11o and are briefly described below.

Feature 1 – Test Units 11a -11o. These 15 test units were placed in a contiguous block unit that measured 4.0 m north-south by 3.5 m east-west. They were placed off Test Unit 11 in an attempt to completely expose Feature 1, a large pile of fire-cracked rock and concentrations of gypsum powder. The unit excavations did succeed in defining the feature boundaries and exposing the feature in planview. The units ranged between 9 and 29 cm in depth, as determined by either depth to the top of the FCR concentration or to sandstone bedrock. The matrix from the excavated units was screened through 1/8" mesh, and 33 x 33 cm waterscreen samples were collected from eight out of the 15 units. Waterscreen samples were not recovered from the remaining seven units because of dense concentrations of FCR. Eleven of the units were 1 x 1 m in size, while four (11l – 11o) were 1.0 m x 0.5 m.

Soil in the units consisted of a thin A horizon of fine sandy loam and loamy fine sand, dark brown, 10YR3/3 (dry), and brown, 10YR4/3 (wet). The A horizon was underlain by sandstone bedrock. All of the units contained varying amounts of fire-cracked sandstone rock, while Test Units 11f and 11h through 11k also contained concentrations of powdered gypsum. The morphology and composition of Feature 1 will be discussed in more detail in the subsequent section of this chapter.

Test Unit 12. This unit was excavated in three levels to a maximum depth of 40 cm below datum. Soils are brown, 10YR4/3 (wet), sandy loam. The 33 x 33 cm waterscreen was collected from the northwest corner of the unit. Fire-cracked rock and angular debris were found in Level 1. Additional cultural materials collected from Levels 2 and 3 respectively include fire-cracked rock and a possible chert flake. Bedrock was encountered in the southern half of Level 2.

Test Unit 13. This unit was excavated to a depth of 35 cm below datum, which was located in the northeast corner. Soils are sandy loam with small to medium-sized gravels with a Munsell color of dark yellowish brown, 10YR 3/4 (wet), with exfoliated sandstone encountered at 35 cm below datum. The waterscreen sample was taken from the northwest corner. Cultural material was absent from all levels save the first, where a sandstone cobble, nine pieces of fire-cracked rock and a single chert flake were found..

Test Unit 30. This unit was located in a mechanized vehicle track near the extreme western end of Area A (Figure 4.2). The unit was excavated in one vertical level to a depth of 20 cm below datum, where sandstone bedrock was encountered. The waterscreen sample was located in the southeast corner of the unit. Soils consisted of brown fine sandy loam A horizon, 10YR4/3 (wet). No cultural materials were recovered.

Summary of Test Units, Area B

Test Unit 14. Test Unit 14 was an isolated unit placed in a mechanized vehicle track in the southwestern portion of Area B (Figure 4.2). The unit was excavated to 30 cm below ground surface and the waterscreen sample was recovered from the northwest corner. The soil consisted of dark brown, 10YR3/3 (wet), fine sandy loam. Sandstone bedrock was encountered at depths ranging from 15 to 20 cm below ground surface. No cultural materials were recovered.

Test Unit 17. Test Unit 17, as well as Test Units 18 through 22, were concentrated on the apex of a low grassy hill in the northeast portion of the site. Test Unit 17 was excavated in four vertical levels to a depth of 45 cm below datum. The waterscreen sample was collected from the northwest corner of the unit. Soils consisted of an A horizon of fine sandy loam, brown 10YR4/3 (wet); an A/B horizon of loamy fine sand, brown 10YR4/3 (wet); a Bk horizon of loamy fine sand, brown 10YR4/3 (wet); and a 2Bkb horizon of fine sandy loam, brown 10YR5/3 (wet). These were exposed in a shovel probe that was excavated in one quarter of the unit to a depth of 1.15 m below ground surface. A thorough summary of the soils profile from Test Unit 17 is presented in Table 4.1. The feature, described below, was concentrated at 26 to 33 cm. Cultural material collected included two flakes (Level 1), three flakes (Level 2), a flake and chunk of fire-cracked rock (Level 3), and a dense concentration of fire-cracked rock with debitage (Level 4).

Test Unit 18. This unit was excavated to a depth of 40 cm below datum. The waterscreen sample was recovered from the northwest corner. The soils are fine sandy loam which ranged in color (from top to bottom) from dark brown, 10YR3/3 (dry), to brown,10YR4/3 (wet). One flake and two pieces of fire-cracked rock were recovered from Level 1, one projectile point was recovered from the southwest corner of Level 2, and seven flakes and 13 pieces of FCR were recovered from Level 3. The artifacts in Level 3 were associated with Feature 3, a concentration of fire-cracked rock, charcoal, charcoal-stained matrix, and debitage. Feature 3 was distributed throughout Level 3 in the next four test units as well (Test Units 19 – 22).
Test Unit 19. This unit was excavated to a depth of 40 cm below datum. The waterscreen sample was collected from the southwest corner and the unit matrix was comprised of fine sandy loam, dark yellowish brown, 10YR3/4 (wet). Again, Feature 3, the FCR concentration, was present throughout the unit in Level 3.

Table 4.1: Summary of soil horizons in Test Unit 17, Area B, 5LA05612

A Horizon – Depth 0 – 8 cm below ground surface, brown, 10YR4/3 (wet), fine sandy loam, structureless, dry, slightly hard, no reaction, clear smooth boundary.

A/B Horizon – Depth 8 – 40 cm below ground surface, brown, 10YR4/3 (wet), loamy fine sand, weak medium subangular blocky, dry slightly hard, no reaction, clear smooth boundary.

Bk Horizon – Depth 40 – 60 cm below ground surface, brown, 10YR4/3 (wet), loamy fine sand, moderate medium subangular blocky, dry hard, Stage 1 carbonates (filaments, threads), strong reaction, abrupt irregular boundary.

2Bkb horizon – Depth 60 – 115 cm below ground surface, brown, 10YR5/3 (wet), fine sandy loam, strong medium subangular blocky, dry very hard, Stage II carbonates (filaments, threads, small nodules), violent reaction, "Altithermal" soil horizon, abrupt irregular boundary.

Test Unit 20. Test Unit 20 was excavated to 40 cm below datum. There was no waterscreen sample collected. Levels 1 and 2 were comprised of fine sandy loam, dark brown, 10YR3/3 (wet), and Level 3 was comprised of loamy fine sand, brown, 10YR4/3 (wet). Two flakes and five pieces of fire-cracked rock were recovered from Level 1, and one flake and 11 pieces of FCR were recovered from Level 2. Feature 3 was present in Level 3. Four flakes and 18 pieces of FCR were collected from this level.

Test Unit 21. Test Unit 21 was excavated to a depth of 40 cm below datum. No waterscreen sample was collected and the soil was comprised of dark brown, 10YR3/3 (dry), and brown, 10YR4/3 (wet), loamy fine sand. Two flakes and four pieces of fire-cracked rock were recovered from Level 1, and one flake, one piece of fired clay, and seven pieces of fire-

cracked rock were recovered from Level 2. Level 3 yielded one flake and 12 pieces of fire-cracked rock. These were associated with Feature 3.

Test Unit 22. The final test unit at 5LA05612 was excavated to a depth of 42 cm below datum. There was no waterscreen sample collected from the unit. The soil was dark brown, 10YR3/3 (dry), and brown, 10YR4/3 (wet), fine sandy loam. The excavation of Test Unit 22 yielded two flakes from Level 1, six pieces of fire-cracked rock from Level 2, and one flake, one core, and 13 pieces of fire-cracked rock from Level 3 (Feature 3).

Summary of Cultural Features

The archaeological investigations at 5LA05612 resulted in the discovery and/or excavation of four cultural features. Two of these, Features 1 and 2, were located in Area A and the other two, Features 3 and 4, were located in Area B. Diagnostic projectile points and radiocarbon age suggest that at least two of these date from the historic period (Feature 1) and the Middle Plains Archaic (Feature 3).

Feature 1. Feature 1 was the largest, most complex, and potentially most significant feature encountered at 5LA05612. It was originally located in Test Unit 11 at a depth of 9 to 20 cm below ground surface. The feature consists of a large, primarily circular, concentration of fire-cracked sandstone and associated piles of a white powdery substance, first thought to be wood ash, but later analyzed and found to be gypsum. The burned and reddened sandstone rocks rested directly on weathered sandstone bedrock (Dakota sandstone). Soon after its initial discovery in Test Unit 11, it became clear that the FCR concentration was much larger than 1 x 1 m. Sandstone rocks were observed extending into all four walls of the test unit. As a result, additional test units were excavated around Test Unit 11 in an attempt to completely expose the feature. This was accomplished through the excavation of 15 test units. These formed a block excavation unit that measured 4 m north-south by 3.5 m east-west (Figure 4.3). Test Units 11 through 11k were 1 x 1 m in size, while Test Units 111 through 11o were 1 x .5 m in size (Figure 4.4).

The burned sandstone rocks that characterize Feature 1 were generally one to two courses thick. In the west-central portion of the feature, however, three to four of the slab-shaped rocks were stacked on top of each other. The rocks were loose, not sodded-in, and were associated with a matrix of generally loamy fine sand, which appears to have formed from the in situ weathering of the sandstone bedrock. Most of the rocks were the size of cobbles or small boulders, and most were flat-lying. A few of the larger rocks were slightly tilted to the north and west (see Figure 4.4).

As stated, large piles of a powdery white substance were present in the south and central portions of the feature (Figure 4.3). The largest concentration was present along the south and southeastern edge of the feature and measured 1.75 m north-south by 2.85 m east-west by .18 m thick (Figure 4.4). A sample of the material from this concentration was sent to the Scanning Electron Microprobe Laboratory at Texas A&M University. The resultant analysis identified the sample as gypsum (CaSO4-2(H2O) – hydrated calcium sulfate).

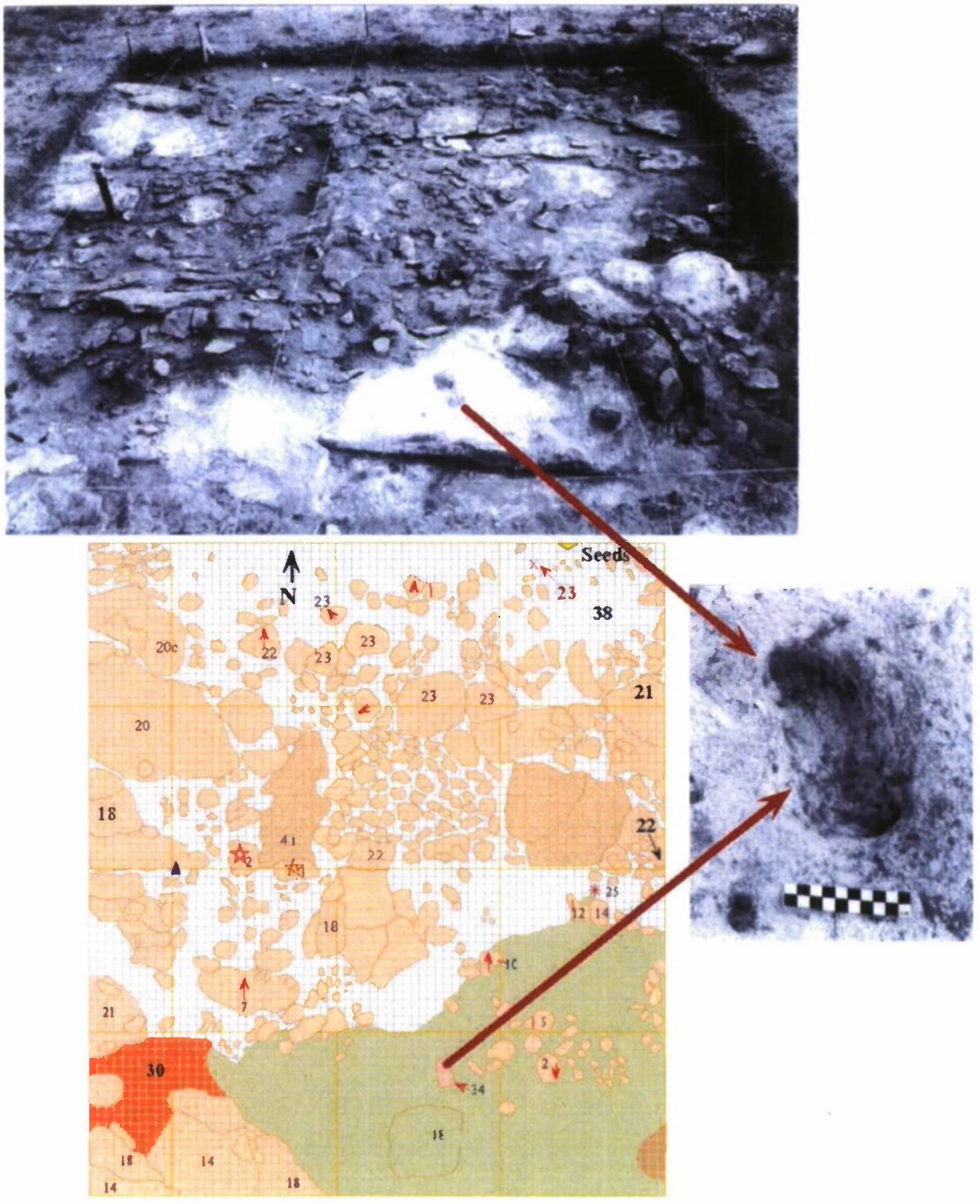


Figure 4.3: Planview drawing and photograph with inset of Feature 1, a buried historic gypsum processing feature and associated footprint, 5LA05612

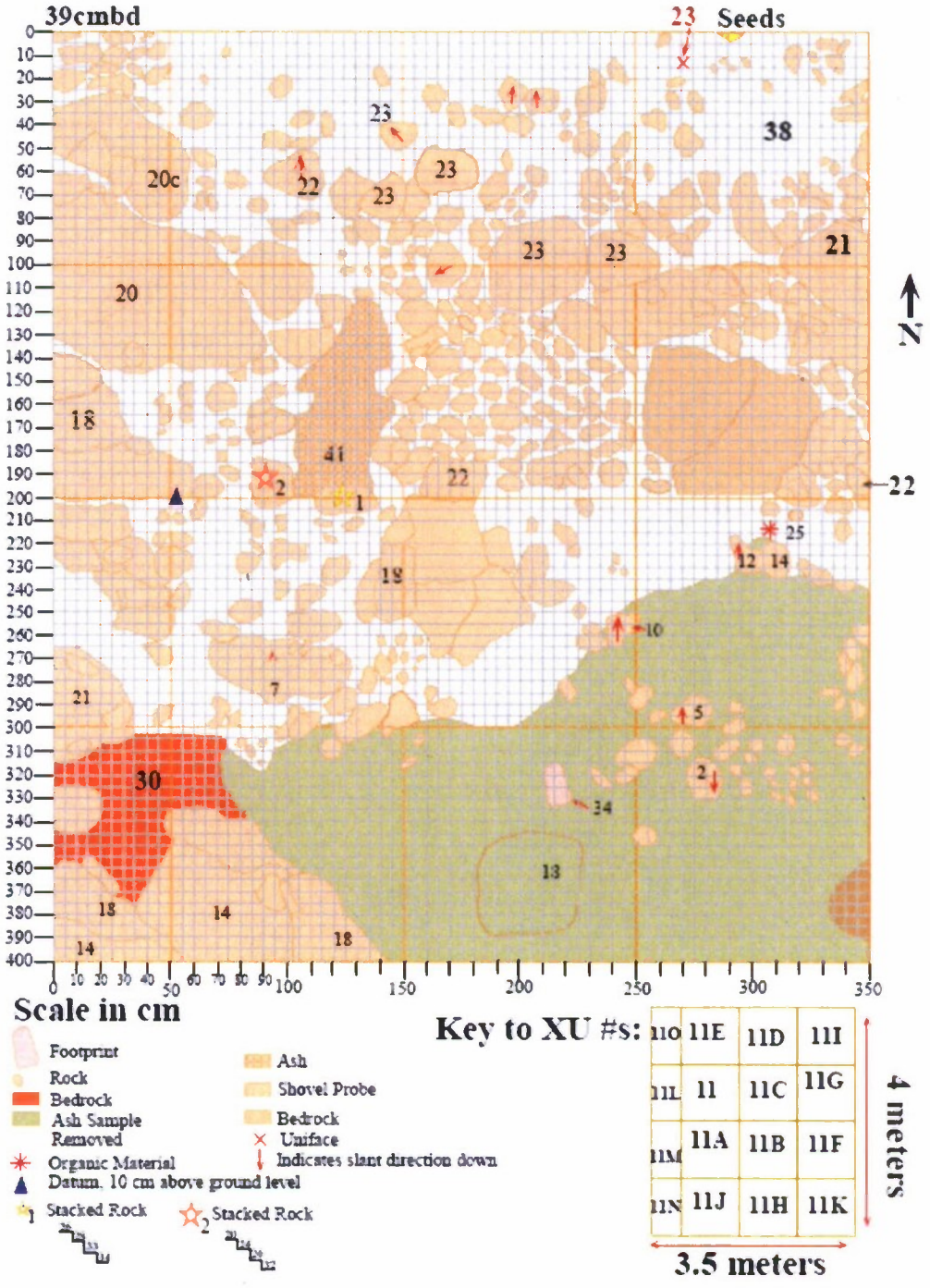


Figure 4.4: Planview drawing of Feature 1, Units 11, 11a -11o, 5LA05612

A sample of charred plant material was recovered from Feature 1 during subsequent flotation of the feature fill matrix. Directly associated with the burned sandstone rocks the sample was sent to Beta Analytic for analysis. The sample yielded a conventional radiocarbon age of 150 + 40 yr B.P. (Beta-155470). The age range at 2 Sigma is ca. A.D. 1660 to A.D. 1950. The age suggests that Feature 1 dates to the historic period in southeastern Colorado which is ca. A.D. 1800 to present (Appendix 1).

A probable human foot impression was located in the east-central portion of the large concentration of powdered gypsum. The impression consists of a depression that measured 18.5 by 8.5 cm by 5.5 cm deep. The cavity had an arch in the center, a concavity along the left side, and big toe and heel impressions at either end (Figure 4.3). The individual who made the impression was apparently wearing foot gear, as most of the front and rear ends of the impression were somewhat squared. The print was probably made by the right foot of a non-adult, who stepped on top of the gypsum pile while it was damp enough to hold a shape but not wet enough to collapse. The remarkable state of preservation suggests that the surface of the gypsum dried quickly soon after the impression was made. After abandonment, the feature became covered by a thin layer of aeolian silt and fine sand. At the time of discovery, the footprint was buried approximately 10 cm below ground surface.

Originally, prior to the procurement of the radiocarbon date and the analysis data on the gypsum pile, Feature 1 was thought to be a thermal feature associated with Late Prehistoric indigenous cultural groups. The feature is similar to the burned rock middens which frequent the Southern High Plains and Edwards Plateau province in Texas. Regionally, the feature is not unlike the roasting pits and other large thermal rock features reported from Diversification Period sites (i.e., Apishapa and Sopris, ca. A.D. 1050-1450) located in the Arkansas River area (Zier and Kalasz 1999). Locally, Feature 1 is also similar, albeit larger, to roasting pit/oven features excavated at the Forgotten Site on the PCMS and attributed to the Apishapa phase (Loendorf et al. 1996). After excavations at 5LA05261 were completed, Feature 1 was backfilled with clean white sand. Prior to the backfilling, a cast of the human footprint was made with dental cement and plaster.

Feature 2. Feature 2 is a hearth composed of a faintly ashy-colored lens with hard pedy matrix (Figure 4.5). The hearth is located 42 cm south of the datum for Area A. This irregularly-shaped feature measuring 36 cm x 15 cm was encountered at 36 to 42 cm below datum. There are no associated construction materials and it seems to be randomly placed. The feature was first encountered in Level 3 of Test Unit 7 at 36 cm below datum. Exfoliated sandstone was present throughout the content. The small ashy stain was completely taken out for waterscreening. Fire-cracked rocks were found in this level and the first, but were lacking from the second level. The only lithic material found was a single chert flake found in the first level.

Feature 3. Feature 3 is an oval-shaped hearth measuring 116 cm (southwest to northeast) by 76 cm (southeast to northwest) constructed from unmodified rock (Figure 4.6). The hearth was discovered in Test Unit 18, Level 3, along with four chert flakes, three quartzite chert flakes, and 13 pieces of fire-cracked rock. Charcoal was evident in the southwest corner of the unit. Test Unit 19 was opened to the south of this unit to discover the extent of the buried hearth and continued to a depth of 40 cm below datum. Charcoal, fire-cracked rock, and quartzite and chert flakes along with possible fired clay were collected from all levels of the unit.

Test Unit 20 was opened to further expose the feature. The unit extended to a maximum depth of 40 cm below datum. Cultural materials included fire-cracked rock and lithic debris, including a jasper flake found in situ. Test Unit 21 extended the feature to the southwest and was excavated to a final depth of 40 cm below datum. Flakes and FCR were located in all levels. The feature was further exposed in the final test unit (22) along with lithic debris and fire-cracked rock. A tan quartzite projectile point was found in the southwest quarter, second level, of Test Unit 18 which dates to the Middle Archaic period.

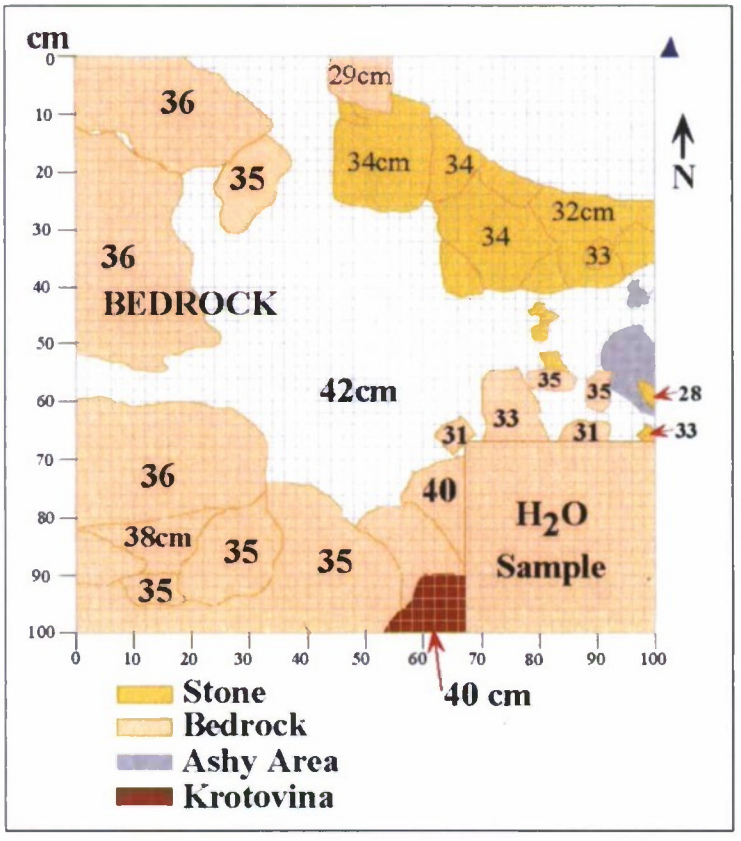


Figure 4.5: Planview drawing of Feature 2, buried hearth, Test Unit 7, Level 3, 5LA05612

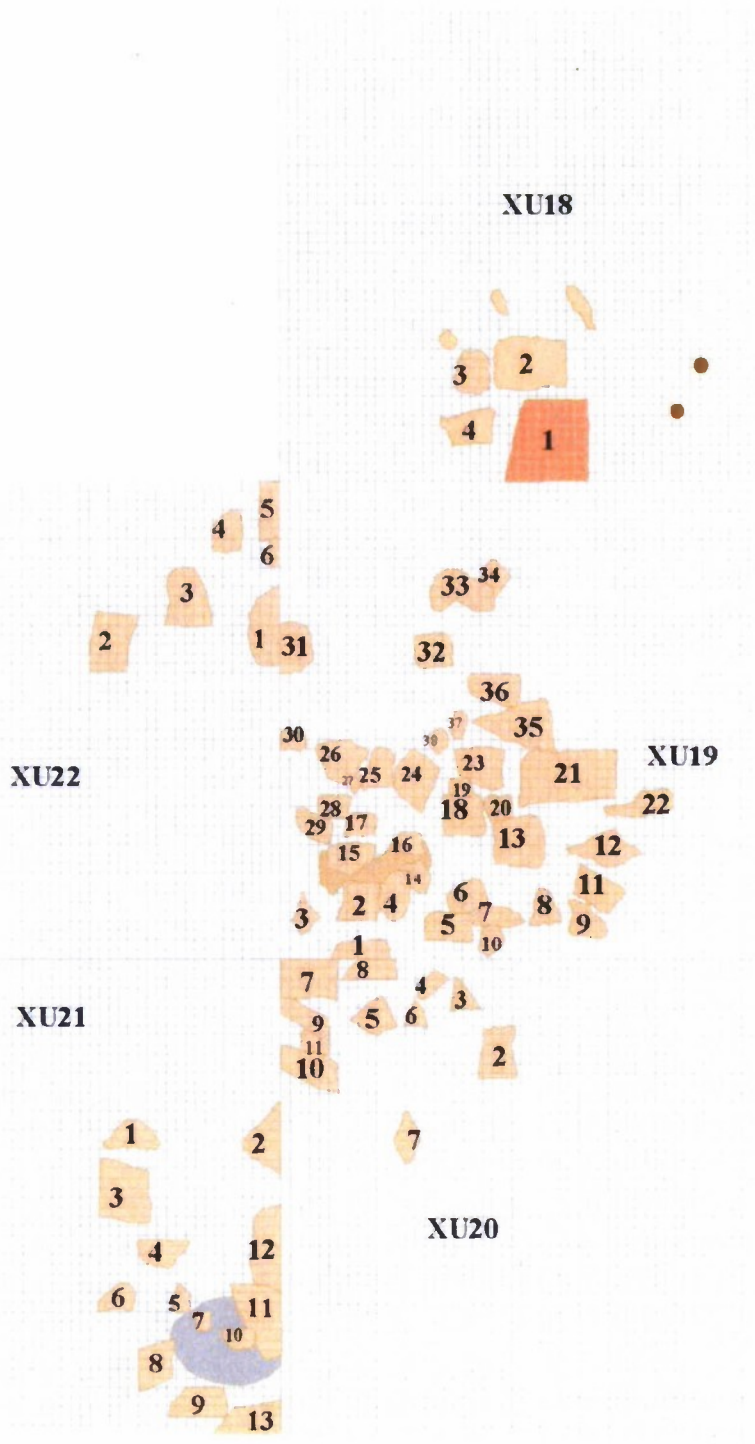


Figure 4.6: Planview drawing of Feature 3,
buried oval-shaped hearth, Test Units 18-22, 5LA05612

Feature 4. This feature is a buried concentration of fire-cracked rock discovered in the compacted soils of Test Unit 17 at a depth of 35 cm below datum (Figures 4.7 and 4.8). The feature measures 1 m x 38 cm with a depth of 7 cm (36 to 43 cm below datum), and appears to be basin-shaped. Flakes and fire-cracked rock were discovered in association with the main concentration. A shovel probe was placed in the southeast corner of the unit to determine the depth of the feature.

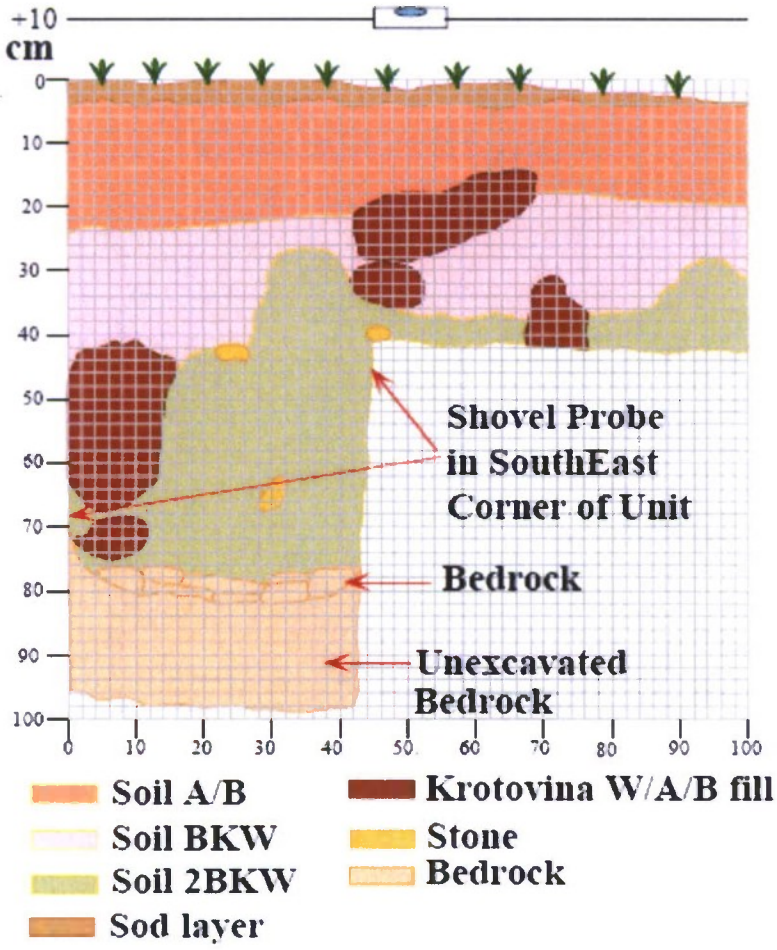


Figure 4-7: Stratigraphic profile of Feature 4,
buried FCR concentration, south wall, Test Unit 17, Level 4, 5LA05612

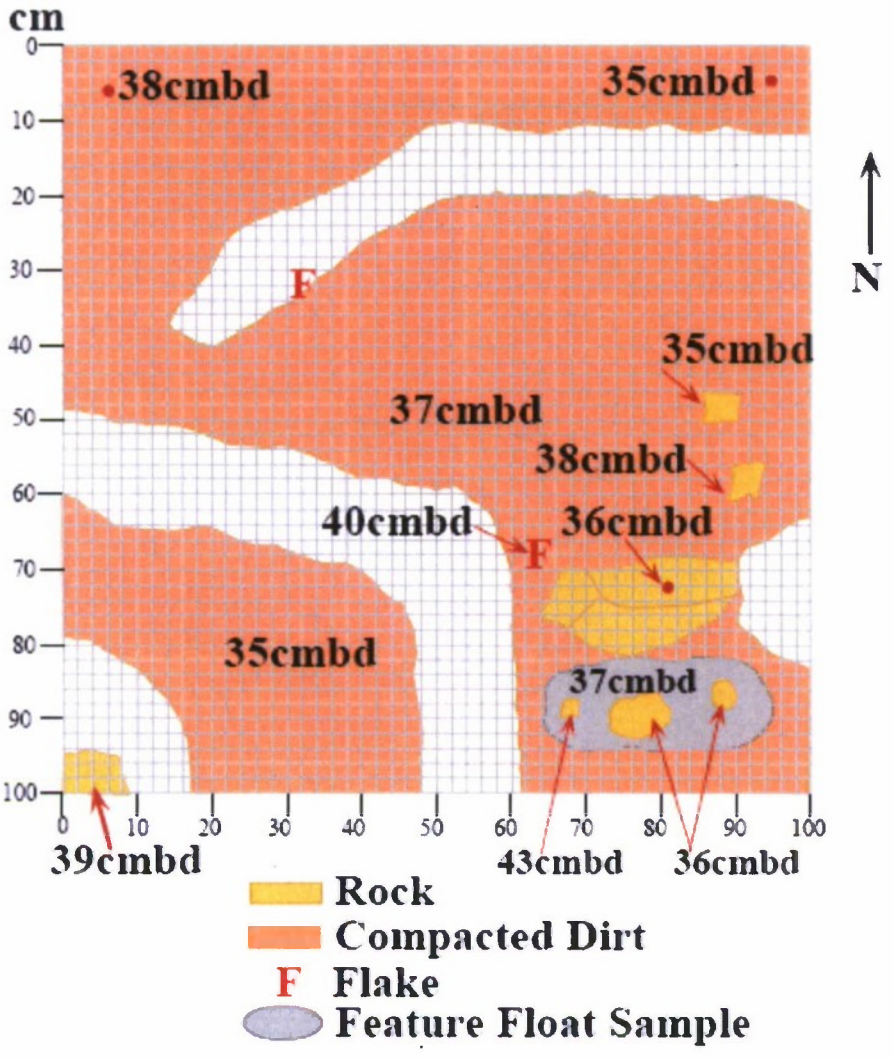


Figure 4.8: Planview drawing of Feature 4, buried FCR concentration, Test Unit 17, Level 4, 5LA05612

Artifact Diversity and Density

The lithic assemblage at 5LA05612 is relatively sparse. A total of 65 artifacts were recovered (Table 4.2). Flaking debris comprised the bulk of this collection with an almost equal distribution between simple and complex flakes. Of these, a small percentage represents cortical flakes (10%). Chert is the more dominant material type, followed by quartzite and chalcedony. Two small thin patterned bifaces (of chert and quartzite) were recovered, along with two utilized flakes, also of chert and quartzite.

Table 4.2: Summary of lithic artifacts from 5LA05612

Type	argillite	hornfels/basalt	chalcedony	chert	quartzite	fine-grained quartzite	jasper	obsidian	fired clay	Total
core		1								1
debitage				3	1			1		5
simple flake	1		4	16	7	1	2			31
complex flake		1	6	3	9	1	3			23
biface				1	1					2
utilized flake				1	1					2
unknown									1	1
Total	1	2	10	24	19	2	5	1	1	65

Fire-cracked rock was ubiquitous throughout units placed in the southwestern area of the site, specifically in Test Units 1 through 11o (Table 4.3). The largest amount centers on the historic gypsum processing feature (Feature 2), although the other hearth features also yield a large amount of FCR.

Natural and Cultural Impacts

Military maneuvers at 5LA05612 have occurred on at least two separate occasions, but may also have taken place at other times. The impact is certainly visible in the amount of surface damage to the entire site. The cultural features most heavily impacted appear to have been the 12 hearth features documented by the University of Denver, although, according to their map and descriptions, these features would have fallen outside the mechanized vehicle track under investigation. It may be that the historic rock alignment recorded earlier was also adversely affected by subsequent military vehicle activity since it has not been relocated during later site visits.

The tracks were measured visually within the units, and in appropriate circumstances compaction measurements were taken. Test Units 1, 6, 12, 17, and 18 showed clear differences in the compaction measurements, which would indicate compacted soils. Visual observations of these units suggest extremely compacted soils and heavily disturbed surface vegetation within the ruts left by military maneuvers. The two hearth/fire-cracked rock features (Features 3 and 4) were located directly beneath these areas of disturbance. Test Units 2, 3, 4, 5, 7, 11, 13, 14, and 30 were observed to have compacted soils and to exhibit heavy surface disturbance to vegetation; however, actual compaction data proved to be rather ambiguous as to soil resistance.

Table 4.3: Summary of FCR bulk weight in grams by unit and level for 5LA05612

	Level				
Unit	**1**	**2**	**3**	**4**	**Total**
1	11.1	507.5			518.6
4		58.4			58.4
5	4	38.5			42.5
7	25.5		687.5		713
8	82.9				82.9
11	238.9	1017.5			1256.4
12	16.7	90.3			107
13	106.3				106.3
17			23.3	20.3	43.6
18	3.4		47.6		51
19	14.1	181.7	30		225.8
20	57.1	35.7	71.9		164.7
21	9.7	9	65.2		83.9
22		8.6	21.6		30.2
11a		342.7			342.7
11b	364.1	282			646.1
11c		109.4	81.7		191.1
11d	352.9				352.9
11e	383.1				383.1
11f	126.9	109.5			236.4
11g	98.7				98.7
11h	295.8				295.8
11i		12.2			12.2
19/21			3419.05		3419.05
Total	**2191.2**	**2803**	**4447.85**	**20.3**	**9462.35**

Management Recommendations

This site has been subjected to heavy disturbance from both natural erosional processes and from military activity. Diagnostic lithics, the discovery of subsurface hearths, and a historic gypsum processing area along with good sediment depth indicate that, despite the level of disturbance, additional materials may be discovered that would yield information about the settlement patterns and homestead practices for early Hispanic settlers. The potential may exist for additional features that could add to our knowledge of prehistoric peoples and their lifeways. However, the level of disturbance and the dispersed recovery efforts may be providing a skewed picture of this site. It would be advisable to conduct a full reevaluation of this site before finalizing recommendations of eligibility.

Chapter V: **SUMMARY AND CONCLUSIONS**

Archaeological site data recovery plans are usually designed with a number of specific research questions that conform to a set group of overall goals for the region. On Pinon Canyon, the questions at prehistoric sites are usually linked to goals related to chronology, subsistence, exchange and mobility, and belief systems. The questions at historic sites are much the same except that more personal information on the identity of the site's occupants is usually a key part of the research. In the case of sites 5LA03254, 5LA03421, and 5LA05612, there was only one straightforward and uncomplicated question – what were the impacts of mechanized vehicle maneuvers on the cultural resources at the three sites?

The sites visited from July to November 2000 exhibited substantial surface disturbance from tracked vehicles sustained during military maneuvers. Excavation units were positioned along severely disturbed areas to assess changes to the archaeological context. Unfortunately there is a major flaw in this study because we did not learn the size and weight of the vehicles that impacted the sites. The Army uses a variety of vehicles with tracks and each of these would impact the surface differently. As we note below, there are also many other factors, such as the kinds of vegetation on the site, that play a role in studies of wheeled and tracked vehicle impacts. Recognizing these flaws the only reason to present additional information about the study is to point out the mistakes we made and to forewarn others that research into vehicle impact on cultural resources is a complex problem.

Assessment of Tracked Vehicle Impact on Cultural Resources

The purpose of this section is to expand on the framework used in this study to assess damage to cultural resources from tracked vehicles and to suggest a methodology for approaching future studies. Off road vehicles - in this case tracked mechanized vehicles - cause many concerns in the resource management of any property. Concerns include increased erosion due to surface soil degradation, loss of sustainable surface vegetation and changes in soil nutrients as well as changes to resources from soil compaction (Bruanack 1986a, b; Halvorson et al. 2001; Prose and Wilshire 2000; Shaw and Diersing 1989, 1990; Wilson 1986). The physiological imprints of tracked vehicles on the landscape, even from single pass incidents, remain for years, affecting plant growth and water runoff (Braunack 1986b; Fuchs 1997; Gato 2001; Kade and Warren 2002; Shaw and Diersing 1989, 1990; Wilson 1986). Soil compaction from tracked vehicles affects vegetation growth and communities, soil porosity, and soil chemical matrix (Braunack 1986a; Defossez and Richard 2002; Fuchs 1997; Gillespie 1987; Kade and Warren 2002; Richard et al 1999; Shaw and Diersing 1989, 1990; Wilson 1986).

However, few studies specifically address the impact of tracked vehicles on buried cultural deposits although changes to archaeological resources from soil compaction and resistivity are addressed by Carr (1982) and the National Park Service (1991). There are a number of ways in which archaeological resources may be affected by tracked vehicles, including direct changes to surface context (i.e., the destruction of structures, the relocation of surface artifacts and hearth features, etc.), indirect changes to surface context caused by increased erosion, and disturbance of subsurface context. Damage to extant surface artifacts are easily documented by pedestrian survey and site reevaluation. Site 5LA03254, the historic homestead, exhibited only surface damage with tracked vehicle imprints extending across the site, having clipped a corner of the extant structure and redistributing the wall fall. 5LA03421, on the other hand,

sustained severe damage to surface sediments. Mechanized vehicle disturbance was located throughout this site and appears to have been a series of passes and turnaround points on the landscape causing severe surface disturbance which seems to have displaced extant cultural components. Finally, 5LA05612 appears to have been impacted on more than one occasion and shows much more surface damage, seemingly obliterating hearth features noted by earlier recorders.

Archaeological sites are further affected by surface traffic through the compaction of soil under the tracks of these vehicles. Soil compaction is a change in chemical properties of the soil and its porosity (Braunack 1986b, Defossez and Richard 2002; Richard et al. 1999; Shaw and Diersing 1989, 1990; Trumbull et al. 1994). Greater soil compaction decreases soil porosity which affects surface runoff (Braunack 1986b; Kade and Warren 2002). The effects of soil compaction on archaeological sites may be long-term; for instance, an increase in erosion on site and chemical changes in buried features, charcoal, organic and fauna remains (Amacher and O'Neill 2004; Braunack 1986b; Wilson 1986). The presence of large rut and cleated tracks will have varying effects on plant communities and vegetation cover (Kade and Warren 2002; Prose and Wilshire 2000) and water runoff patterns across the site which may accelerate the exposure of features and other artifacts (Braunack 1986b; Shaw and Diersing 1989, 1990).

The extent to which tracked vehicle maneuvers specifically affect soil compaction and erosional processes is dependent on the types of soils, seasonality of the impact zone and the intensity of maneuvers (Braunack 1986a; Gatto 2001; Shaw and Diersin 1989, 1990). This is important for the interpretation of long-term effects to archaeological sites. Specific maneuver information for the sites in this study, including the types of mechanized vehicles and the rotation period, were unknown factors which need to be included into any study of compaction impact. Assuming the same pattern as reported by Shaw and Diersing (1989), maneuvers consist of M-60 tanks and armored personnel carriers (APC) on 15 to 30 day rotations during the summer months (information was for 1985). This may be some of the group that caused the 1987 reported damage to 5LA05612.

Military vehicle impact to the sites visited in 2000 was readily appreciated in the sheer number of ruts observed on the surface. In order to assess the impact, DECAM archaeologists Steve Chomko and Vince Schiavitti, laid out a series of stakes within and surrounding the surface tracks. One by one meter units were excavated at these stakes. Assessment of military impact included pedestrian survey of the tracks to previously recorded surface hearth or feature, observation of damage to structures, collection of soil samples, observation of soil compaction with units, and measurement of soil compaction in units containing or located between mechanized vehicle tracks. Soil compaction from military traffic at 5LA03254 appears to be negligible at the site itself, though the long-term effect of general compaction in the area surrounding this site is unknown. It is possible that further damage may occur as a result of changes to the general vegetation and soil matrix. Compaction data for 5LA03421 suggests that long-term damage to the vegetation and sediments may further affect any buried archaeological components at this site. Site 5LA05216 compaction observations varied significantly and may be due to multiple impact episodes; however, information as to the time and nature of maneuvers conducted here was not provided.

The 2000 study reinforced the visual assessment of damage and added valuable knowledge about potentially negative subsurface effects of tracked vehicle damage. Future studies of tracked vehicle disturbance to sites should consider revising the methodology to include long-term assessment (i.e., reevaluation of the sites periodically to measure surface compaction in the ruts and changes to plant distribution), changing compaction assessment to include a series of test probes at specified intervals (Fuchs, 1997), and comparison to previous studies on tracked vehicle disturbance within archaeological settings.

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APPENDIX I
RADIOCARBON ANALYSIS - CHARRED PLANT MATERIAL

Beta Analytic Inc.
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BETA ANALYTIC INC.

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REPORT OF RADIOCARBON DATING ANALYSES

Dr. David D. Kuehn

Report Date: 5/31/01

David Kuehn Consulting

Material Received: 5/10/01

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 155470	100 +/- 40 BP	-22.0 o/oo	150 +/- 40 BP

SAMPLE : 51A5612000012
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (plant material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1660 to 1950 (Cal BP 290 to 0)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Maasured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.