

# A REVOLUTION IN CADDO ARCHAEOLOGY: THE REMOTE SENSING AND ARCHAEOLOGICAL VIEW FROM THE HILL FARM SITE (41BW169) IN BOWIE COUNTY, TEXAS

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*The use of remote sensing technologies on prehistoric and early historic Caddo sites is allowing for new and unprecedented views of the spatial structure and internal organization of Caddo villages and mound centers. Recent remote sensing work at the Hill Farm site (41BW169) on the Red River in northeast Texas, along with available archaeological information from the shallowly buried site, has led to an unusually detailed view of the archaeological character of ca. A.D. 1600–1700 Nasoni Caddo village compounds that can be linked with the 1691 Teran map. Remote sensing has considerable potential to lead to long-term collaborative archaeogeophysical and archaeological projects to understand Caddo community-scale organization and landscapes.*

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## Introduction

There is a revolution underway in Caddo archaeology, and its name is remote sensing. The use of remote sensing technologies on Caddo archaeological sites—in conjunction with archaeological excavations—is producing, and will continue to produce, unprecedented characterizations of the internal spatial structure and organization of Caddo villages and mound centers. We illustrate the importance of remote sensing for the present and future of Caddo archaeology by focusing on the remote sensing and archaeological findings from one Caddo village on the Red River in Bowie County, Texas. The Hill Farm site is part of the larger Hatchel site village (see Perttula 2005) and was occupied by the Nasoni Caddo between ca. A.D. 1600 and 1700.

The Nasoni Caddo village was visited by Europeans in 1687, 1690, and 1691, most famously by the Spanish expedition led by Don Domingo Teran de los Rios. On this expedition (Hatcher 1932, 1999), a detailed map of this village was drawn that showed a temple mound and a number of village compounds (with house structures, granaries, and outdoor ramadas or arbors) (Wedel 1978:Figure 2; Perttula 2005:181). A convergence of large-scale remote sensing (Grealy and

Conyers 2006), the smaller-scale remote sensing discussed below, geoarchaeological findings (Guccione and Hays 2006), and the archaeological discoveries at the Hill Farm site and other places at the Hatchel site (Perttula 2005) have led us to the specific identification of the Hill Farm site with two of the village compounds depicted on the 1691 Teran map. This in turn opens the door to the possibility that continued archaeological and remote investigations can, in effect, locate and ground truth the 1691 Teran map and different parts of the Nasoni Caddo village.

## Remote Sensing in Caddo Archaeology

Archaeogeophysical prospecting using magnetometry, electromagnetic conductivity, electrical resistivity, ground-penetrating radar, and magnetic susceptibility have all been shown to be useful geophysical techniques for locating buried architectural remains on prehistoric Caddo mound sites, such as the George C. Davis site (Bruseth and Pierson 2004; Creel et al. 2005; Walker et al. 2003) and Horace Cabe Mounds (Walker and Perttula 2007) in northeastern Texas, and at various sites on the Grandview project in southwestern Arkansas (Schambach 2001, 2002; Schambach and Lockhart 2003; Lockhart 2006, 2007; Lockhart and Green 2006; Dalan 2006; Kvamme 2006). These techniques measure certain physical properties of the soil, such as magnetic conditions, electromagnetic conductivity, or electrical resistivity. Given the proper soil conditions, archaeological features such as fire hearths, post holes, and storage pits differ from the surrounding soil matrix, and can be recognized by distinctive spatial signatures in geophysical data sets from archaeological sites.

At the George C. Davis site, geophysical surveys, using a portable cesium magnetometer, on large blocks of land have proved successful in locating both large and small architectural features, particularly numerous Caddo structures (Bruseth and Pierson 2004:Figures 1–3; Creel et al. 2005). This work is contributing new information on the overall layout of structures around the mounds and across this large prehistoric site. In some settings, the geophysical survey has successfully located archaeological features in areas that previous subsurface excavations failed to locate (Walker et al. 2003). Shaded relief maps of the magnetic data have



Figure 1. Detail of a 1691 Nasoni Caddo farmstead compound. (From 1691 don Domingo Teran de los Rios map, Center for American History, University of Texas at Austin.)

also identified a number of unique architectural forms at the site, such as the so-called Button Houses (Creel et al. 2005), that can be compared to the architectural plans of the more than 50 previously excavated structures at the George C. Davis site (see Newell and Krieger 1949; Story 1997, 2000). These geophysical examples of Caddo structures are 10–15 m diameter

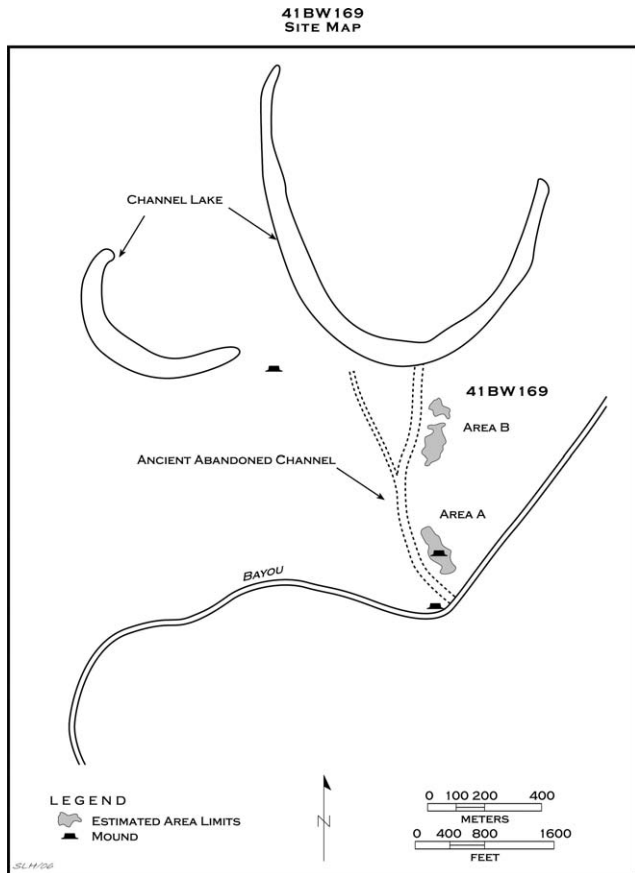


Figure 2. Areas A and B at the Hill Farm site (41BW169) in the larger Nasoni Caddo Hatchel site village.

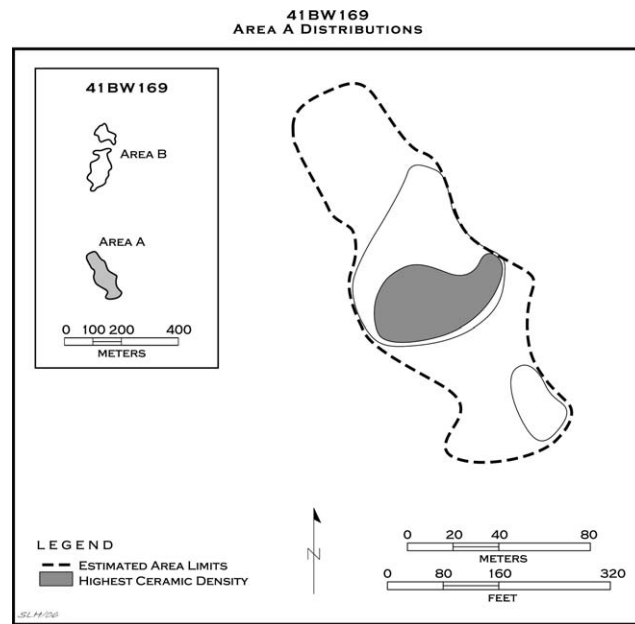


Figure 3. Ceramic sherd densities in Area A, Hill Farm site (41BW169).

circular structures with four internal magnetic returns that are spatially patterned on the interior of the structure to encircle a central hearth; these no doubt represent large post hole features (support posts) or interior pits. The magnetometer data from the Mound B area at George C. Davis are providing new information about the construction phases of the mound. These data have detected a trench of some kind or a small mound of earth that apparently served to anchor the mound to a specific place on the ground. The remote sensing work has also identified a second ramp on the southern flanks of the mound (Schultz et al. 2004).

On the Grandview project, the Arkansas Archeological Survey used a variety of geophysical surveying equipment to measure magnetic susceptibility, gradiometry, electrical resistance, and electromagnetic conductivity of key areas at Caddo mound and nonmound settlements, and achieved impressive results. The geophysical surveying has detected the locations of burned Caddo houses, fireplaces or hearths within the houses, burial pits, nonburial pits of various sizes and shapes, stockade lines around the Tom Jones mound (3HE40) (Lockhart 2007), and possible paths across the sites (Schambach 2001, 2002; Lockhart and Green 2006). Ground-truthing excavations of several of the subsurface anomalies identified in the Grandview geophysical survey have been successful in identifying archaeological features, including burned houses with “heaps of fired daub up to a meter deep in places, pieces of carbonized logs, and a floor laden with ash and domestic debris” (Schambach 2001:10). Other excavations exposed clay-lined hearths, and lines of post holes, while excavations placed over “reasonably clear

images [from the remote sensing] of house remains netted . . . the archaeological remains of four houses'' (Schambach 2001:10).

### The Archaeology of the Hill Farm Site within the Larger Hatchel Site Village

Before discussing the remote sensing findings and our interpretation of them, we review what is known about the archaeology of the Hill Farm site. The site is only one part of the much larger Hatchel site village occupied by the Nasoni Caddo from the eleventh to the eighteenth century (Perttula 2005). The village was apparently comprised of a number of farmstead compounds spread out over many acres, with domestic structures, granaries, arbors, and ramadas (Figure 1). The farmstead compounds may have been separated by compound fences (Perttula 2005:192 and Figure 7; see also Williams 1993:Figure 15d) or dividers of trees and bushes. The Hill Farm site has two areas, Areas A and B, with substantial archaeological deposits in both (Figure 2).

The first archaeological investigations at the Hill Farm part of the Hatchel village was completed by the Works Progress Administration (WPA) and the University of Texas at Austin in 1939 (TARL n.d.a). The work was on a small Caddo mound, 21 m in diameter and 0.9 m high, which is 915 m southeast of the main platform mound at the Hatchel site and 610 m southeast of WPA excavations in Village Plot 1 (Perttula 2005).

The mound (Mound 2) is in Area A at the Hill Farm site; its exact location is currently unknown. Three other small mounds (0.6–0.9 m in height) were nearby. Just east of Mound 2 was a borrow pit of unspecified size (TARL n.d.a).

The WPA excavations in Mound 2 were in two blocks at the northern and southern parts of the mound. The northern strip covered 150 ft<sup>2</sup> and the southern excavation was 900 ft<sup>2</sup> in size. These excavations disclosed that the mound was constructed in one episode of a brown clay fill that was 0.9 m thick. It was probably constructed to bury a structure or important public building, although the details of this building are not known. The mound fill was placed atop a 25 cm thick habitation and midden deposit of Late Caddo Texarkana phase age (ca. A.D. 1400–1700). No structural features or post holes were recorded in these submound deposits.

A single extended burial (Burial 1) was excavated in the southern Mound 2 strip. This adult burial originated at the top of the habitation/midden deposits—prior to mound construction—and the grave pit reached to 1.37 m below surface (bs). No funerary offerings were

Table 1. Tempering of Ceramic Sherds at the Hill Farm Site.

Area	Grog (%)	Grog-Bone (%)	Grog-Hematite (%)	Bone (%)	Shell (%)
A	96.0*	1.3	2.7	0.0	0.0
B	89.0	7.1	1.1	0.5	1.6

placed with this Caddo individual. There were seven sherds, including a vessel lug, in the burial pit fill.

Only 324 artifacts were recovered in the Mound 2 WPA excavations (none of the archaeological deposits were screened during the WPA work). This included 212 ceramic vessel sherds, one celt, 25 pieces of lithic debris, 71 animal bones, and 15 pieces of freshwater mussel shell.

In the 1950s, according to records on file at the Texas Archeological Research Laboratory, University of Texas, two avocational archaeologists (R. King Harris, from Dallas, Texas, and Pete Miroir, from Texarkana, Texas) conducted excavations in what appears to have been Area B at the Hill Farm site. They apparently encountered several Caddo burials and very large post holes from a large structure. No more details on this work are available, unfortunately.

More recently, Gilmore and McCormick (1980:Table 4) reported that an unknown number of Caddo burials had been looted at the Hill Farm site in the 1970s. Their location within the site is also unknown.

In 2005, renewed archaeological investigations at the Hill Farm site were completed as part of the Bowie County Levee Realignment project sponsored by the Tulsa District of the U.S. Army Corps of Engineers. During this work (Sundermeyer et al. 2006), 78 shovel tests were excavated in Area A (27 of which contained prehistoric archaeological materials), with another 127 shovel tests (51 contained prehistoric archaeological remains) in Area B. Additionally, a magnetometer survey was completed in both Area A (6,000 m<sup>2</sup>, ca. 1.5 acres) and Area B (3,600 m<sup>2</sup>, 0.9 acres) by Walker and Schultz (2006). It is the findings from both the shovel testing and the remote sensing that we discuss in the remainder of this article.

The Hill Farm site contains exceptionally well-preserved and buried Late Caddo Texarkana phase (ca. A.D. 1400–1700, Perttula 2005:Table 1) archaeological deposits. The archaeological materials are incorporated in Red River alluvial sediments of the abandoned and recently defined Cemetery Meander (Guccione and Hays 2006). These deposits apparently began to accumulate sometime after ca. A.D. 1240.

The site lies on sandy loam point bar alluvial deposits adjacent to an ancient abandoned channel of the Red River (see Figure 2). The archaeological deposits are marked by numerous structures of varying sizes, pit features, midden deposits, at least one constructed earthen mound (Mound 2 at Hatchel) and



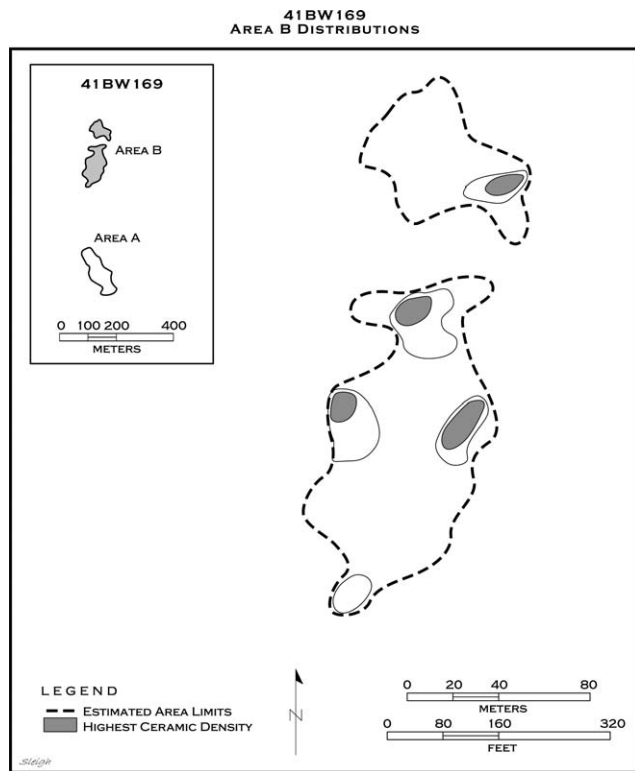


Figure 4. Ceramic sherd densities in Area B, Hill Farm site (41BW169).

as many as three other small mounds, a borrow pit, and one extended burial.

The recent shovel testing reported by Sundermeyer et al. (2006) identified two distinct areas (A and B) at the Hill Farm site. Area B, the northern area, covers approximately 13,000 m<sup>2</sup> (3.2 acres), while the southern part of the site (Area A) is about 11,000 m<sup>2</sup> (2.7 acres) in size. The two different site areas are about 160 m apart. Archaeological materials occur to depths of 80–100 cm bs. The vast majority of these remains are buried, coming primarily from 20–80 cm bs.

There are two concentrations of ceramic vessel sherds in Area A, with one large and heavy-density cluster covering ca. 2,400 m<sup>2</sup> in the center of this village locality (Figure 3). A much smaller and lighter scatter of sherds is ca. 15–30 m south of the principal sherd concentration.

In Area B, there are 4–5 distinct concentrations of ceramic vessel sherds (Figure 4). These concentrations are 15–40 m apart from each other within this village area, and most of them are situated in the southern part of Area B.

#### *Ceramics from Areas A and B and the Dating of the Hill Farm Site*

A relatively large assemblage of ceramic sherds (n = 360), considering the limited amount of archaeological work that has been done there, has been recovered

Table 2. Firing of Ceramic Sherds at the Hill Farm Site.

Area	R (%)	R-OA (%)	OXID (%)	INC-OXID (%)
A	41.5*	33.6	12.3	12.3
B	29.3	36.6	16.4	17.8

Note: R = reducing environment; R-OA = reducing environment but cooled in the open air; OXID = oxidizing environment; INC-OXID = incompletely oxidized during firing.

from both areas at the Hill Farm site by Sundermeyer et al. (2006), 82 sherds from Area A and 278 from Area B. The sherd density is 3.57 sherds per shovel test in Area A, about 30 sherds per m<sup>2</sup>. The highest density is in the central part of the alluvial landform. In this area, most of the sherds come from 20–60 cm bs, but they did extend to 60–80 cm in depth. In Area B, the sherd density is a very high 8.42 in those shovel tests that contained sherds (ca. 70 sherds per m<sup>2</sup>), and they are concentrated in at least four parts of the site (see Figure 4). The sherds appear to be particularly widespread in the southern part of the latter area. The sherds in this area are primarily from 40–60 cm and 60–80 cm bs, indicating that the assemblage comes mostly from a buried archeological deposit.

Approximately 89–96 percent of the sherds are from vessels tempered with grog, 1.3–7.1 percent are grog-bone-tempered, and 1.1–2.7 percent are grog-hematite-tempered (Table 1). In Area B, 0.5 percent are bone-tempered, and 1.6 percent are shell-tempered. Shell-tempered vessels are absent in Area A but present in some quantity at nearby 41BW716 (Sundermeyer et al. 2006). The presence of shell tempering in any amount suggests a very late use of Area B (i.e., after A.D. 1650, see Perttula 1992:125).

The sherds are from vessels that have been primarily fired and cooled in a low oxygen or reducing environment (29.3–41.5%); followed by those fired in an reducing environment, then cooled in the open air (33.6–36.6%) (Table 2). Oxidized sherds account for 12.3–16.4 percent of the sample, followed by those that come from incompletely oxidized vessels (12.3–17.8%). The similarities in the use of tempers and in the way in which the ceramic vessels were fired suggest that the pottery sherd assemblage from the two areas is part of the same seventeenth-century Caddo ceramic tradition.

Fine wares are equally common in both site areas, especially with respect to the engraved fine wares (39.1% in Area A and 38.8% in Area B) (Table 3). Trilled decorated sherds are more abundant in Area A (26.1%) than they are in Area B (17.5%), but this difference may be a product of low decorated sherd sample sizes as well as slightly different ages for the Caddo occupations at the Hill Farm site. Red-slipped sherds (6.3%) are only present in Area B (Table 3). Utility ware decorated sherds are equally well represented in Area A (34.8%) and Area B (37.1%) at the site.

Table 3. Decorative Methods Represented in the Hill Farm Site Sherds.

Method	Area A	Area B
Fine wares		
Trailed	6	14
Engraved	9	31
Red-slipped	–	5
Utility wares		
Incised	3	13
Brushed	2	7
Brushed-Incised	–	1
Punctated	1	5
Neck Banded	1	2
Appliqued	1	2
Plain/decorated sherd ratio	2.57	2.48

The more distinctive decorated sherds from Area A and B are listed in Table 4. Keno Trailed and Karnack Brushed-Incised sherds are the predominant typed sherds in Area A, and these are also common decorated wares in Area B, along with sherds from Hodges Engraved, Glassell Engraved, and Simms/Avery Engraved vessels. The presence of sherds from utility wares McKinney Plain, Nash Neck Banded, and Karnack Brushed-Incised and fine wares of Simms Engraved, Hodges Engraved, and Keno Trailed (see Suhm and Jelks [1962] for information on defined Caddo pottery types) in both Areas A and B indicates that the Caddo occupation in both parts of the Hill Farm site took place after ca. A.D. 1600, possibly as late as ca. A.D. 1650–1700 (see Perttula 2005:194; Schambach and Miller 1984) during the late Texarkana phase. This further indicates that the Caddo residential occupation at the Hill Farm site is contemporaneous with much of the occupied village areas at the nearby Hatchel site (Perttula 2005), the upper mound stages in the Hatchel temple mound (Hamilton 1972), as well as the late burial interments at the Hatchel and Moores sites (cf. Creel 1991; Perttula 1992). These other contexts have Simms Engraved, Hodges Engraved, Keno Trailed, Foster Trailed-Incised, Nash Neck Banded, and McKinney Plain vessels and vessel sherds. The decorated ceramics probably also suggest that the mound at the Hill Farm site (also known as Mound 2 at the nearby Hatchel site; see Perttula [2005], and in the northern part of Area A) was constructed and used during this time (when residential population was the highest here), contemporaneous with the construction and use of the large temple mound at the Hatchel site during its final mound stages (Floors A–D).

#### *Faunal Remains*

Faunal remains and mussel shell fragments are abundant in the habitation deposits in both Area A (178 bones and 14 mussel shell pieces) and Area B (362 animal bones and 67 pieces of freshwater mussel shell).

Table 4. Identified Caddo Pottery Types at the Hill Farm Site.

Pottery Type	Number of Sherds	
	Area A	Area B
Fine wares		
Keno Trailed	6	11
Simms Engraved	1	1
Glassell Engraved	1	11
Simms or Avery Engraved		5
Hodges Engraved		13
Utility wares		
McKinney Plain	1	2
Karnack Brushed-Incised	3	9
Nash Neck Banded	1	2
Foster Trailed-Incised	–	3

There are several large clusters of faunal remains within Areas A and B, probably marking trash/midden deposits and/or house areas. In Area A, the largest area of animal bones is north of the main ceramic sherd concentration; within it are two more discrete faunal remains clusters (Figure 5; see also Figure 3). There are four faunal remains clusters in Area B (Figure 6). Three of these four clusters clearly overlap with ceramic sherd concentrations (see Figure 4). The identifiable animal species present in the faunal remains include white-tailed deer, a large canid, turkey, squirrel, cottontail rabbit, box turtle, catfish, and gar. Both riverine and wooded habitats were apparently exploited by the Caddo living in this part of the Hatchel village.

#### **Remote Sensing Investigations at the Hill Farm Site**

In May 2005, a magnetometer survey was conducted by Walker and Schultz (2006) as part of the Bowie County Levee Realignment project. The purpose of the survey was to attempt to locate anomalies that may represent potential archaeological features at the Hill Farm site (41BW169) and Cabe Mounds (41BW14). The remote sensing survey was done using a Geometrics portable G858 cesium sensor magnetometer and a G-856 proton magnetometer base station.

#### *Archaeogeophysical Methods*

For the remote sensing effort, the Hill Farm site was divided into two areas of high artifact recovery, Area A and Area B (Figure 7). Magnetometer data in both areas were collected in adjacent 20 × 20 m blocks that were oriented north-south. The hand-held counterbalanced staff was used with two sensors spaced 50 cm apart. The center of the hand-held staff was carried along the survey line, allowing for each sensor to extend 25 cm on either side. Survey lines were spaced at 1 m intervals with data collected on a 0.1 second

Table 5. Remote Sensing Features at the Hill Farm Site.

Area	Feature/Anomaly	Diameter (m)	Interpretation
A	1	11-12	Circular Caddo structure
	1.1		Central hearth of Feature 1
	2	15	Circular Caddo structure
	2.1		Central hearth
	3	7	Possible granary structure
	4		Circular Caddo structure
	4.1	14.5-17.5	Central hearth
	5		Circular Caddo structure
	6	10	Circular Caddo structure
	6.1		Central hearth
	7	8	Circular Caddo structure
	7.1		Central hearth
	8	10	Possible Caddo structure
8.1	Possible hearth		
13	8	Possible Caddo structure	
B	9	10	Circular Caddo structure
	9.1		Hearth
	10	21 m long, 3.7 m wide	<b>Possible compound fence/divider or enclosure</b>
	11		Circular Caddo structure
	11.1	1-2	Central hearth
	12		<b>Possible compound fence/divider or enclosure</b>

interval, thus collecting approximately 10 readings per m. A G-856 proton magnetometer base station was used off site to collect data at 10 second intervals in order to record the observed diurnal variation. The diurnal variation, which is the natural and normal changes in the earth's magnetic field, was used to correct the survey data to lessen the effects of these ambient magnetic oscillations, thus allowing the cesium sensors to record the subtle magnetic variations associated with the prehistoric archaeological deposits at the Hill Farm site.

Collected remote sensing data were downloaded using MagMap 2000. With MagMap 2000, the base

station diurnal correction was applied to the files, and grid coordinates were assigned to each collection block. The magnetometer data were imported into Archaeo-Surveyor 2.0 and a composite map of the data was created, combining the individual grids into a master grid.

A destripping filter was run on the remote sensing data to equalize the underlying differences between

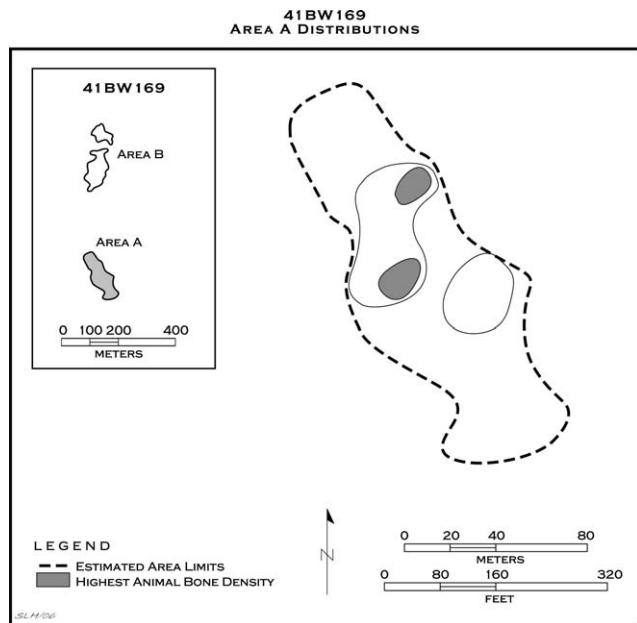


Figure 5. Animal bone densities in Area A, Hill Farm site (41BW169).

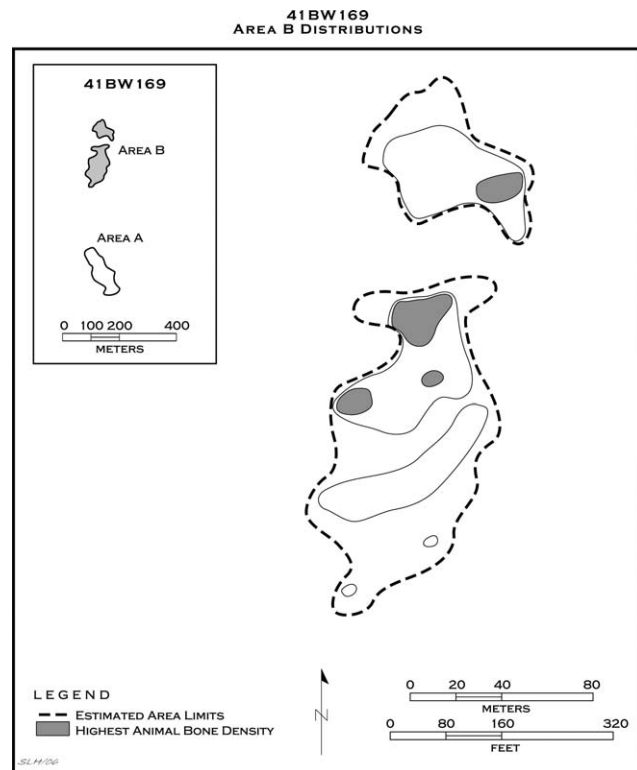


Figure 6. Animal bone densities in Area B at the Hill Farm site (41BW169).

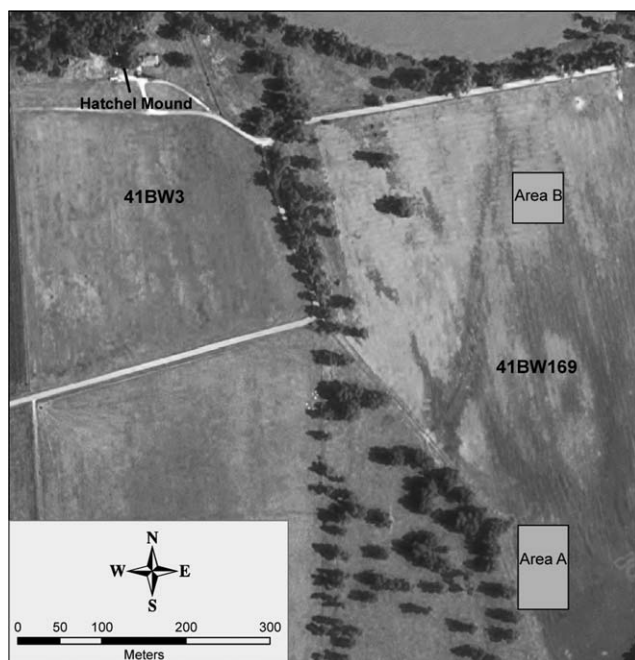


Figure 7. Magnetometer collection area locations at the Hill Farm site (41BW169).

grids caused by instrument drift, inconsistencies during setup, delays between surveying adjacent grids, or variations in the base histogram of the readings for each grid. The median of each traverse is effectively zeroed by subtracting its value from all readings along the traverse. Data were then clipped to  $\pm 10$  nT (nanoTeslas). Clipping replaces all values outside a specified minimum and maximum range. This process is used to remove extreme data point values and aids in normalizing the histogram of the data. Archaeological details are subtle, and having a normal distribution of remote sensing data allows the fine detail to show through with clarity. Finally, the data were interpolated along both the x and y axes.

#### *Remote Sensing Results from the Hill Farm Site (41BW169)*

A total of 24  $20 \times 20$  m remote sensing blocks were collected at the Hill Farm site: 15 blocks in Area A and nine blocks in Area B (see Figure 7). Several distinctive spatial patterns have been identified in the magnetometer data that we interpret as archaeological features, nine in Area A and four in Area B; these are further discussed below. In some cases, geophysical data compel archaeological interpretation because the spatial patterns that are visible have regular geometric shapes that likely represent culturally formed patterns—and we maintain that such a case exists at the Hill Farm site—and these are what we have labeled as features (cf. Kvamme 2003). We base these interpretations on the visible spatial patterning in the remote

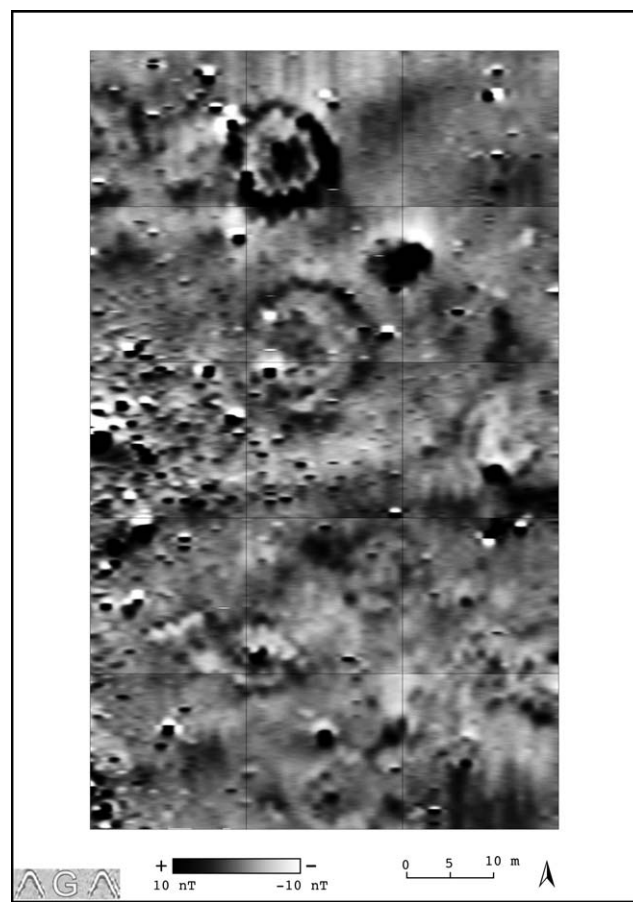


Figure 8. Hill Farm site (41BW169), plan of Area A collection blocks.

sensing data and the known spatial and formal characteristics of prehistoric and early historic Caddo architectural features. We must note none of the features presented here have been ground truthed through traditional archaeological means. Shovel test data discussed above does, however, provide information that all of these features occur within the broad and patterned distributions of archaeological materials in both Areas A and B. Thus the Hill Farm site provides an excellent example of a remote sensing data set that can be used as primary data to further our understanding of both inter- and intrasite settlement dynamics at this Nasoni Caddo village. This remote sensing data also adds to our overall understanding of the prehistoric Caddo landscape now just glimpsed haphazardly from previous archaeological investigations.

#### *Area A*

Nine features are noted in Area A, the southern section of the site (Figures 8 and 9). Of these, eight are interpreted as domestic Caddo structures (Features 1–2, 4–8, and 13). Features 1, 2, and 4 are all large structures (14.5–17.5 m in diameter for Feature 4) with



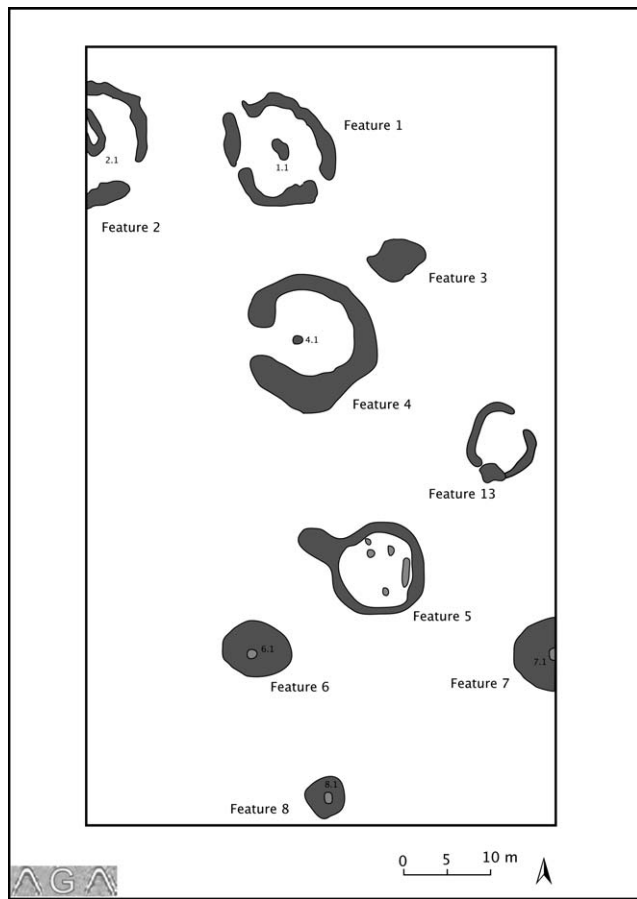


Figure 9. Hill Farm site (41BW169), interpretations of Area A features in the remote sensing data.

central hearths. In these three cases the magnetic patterning shows a series of positive magnetic returns comprising the outer ring of the structures. Feature 1 is also interpreted as a burned feature due to the large amount of high magnetic returns associated with this feature.

The central hearth varies in its magnetic patterning from structure to structure in Area A. Feature 1.1 has a positive mono-polar signature, Feature 2 has a central area that is a diffuse negative return surrounded by a semicircular positive return, and Feature 4 has a small diffuse positive magnetic return just off center.

Feature 3 is a large di-polar return interpreted as either a large borrow pit, where the underlying strata are of significantly higher magnetic susceptibility than the overlying strata, or a burned structure. The small size of the feature and proximity to other houses suggests that it may represent a special use structure, perhaps a granary.

Feature 5 displays another architectural pattern that is well known to archaeologists who work in the Caddo area. The structure is 12 m in diameter and has what appears to be a projection roughly radiating to the northwest (see Figures 8 and 9) that may be an

extended entranceway. Caddo structures often have extended entryways; in fact some of the best examples of this architectural pattern were excavated a little less than 1 km to the northwest at the Hatchel Mound. It is even possible that the entrance of this feature is orientated to face the platform mound at the Hatchel site or a plaza area in front of the mound. Circular structures with extended entrances are relatively common on prehistoric and early historic Caddo sites in northeastern Texas, including the Hatchel site and parts of northwestern Louisiana and southwestern Arkansas—often found in or under mounds—and they appear to represent special purpose structures probably used by the social and political elite among the Caddo. Feature 5 also has a considerable amount of remote sensing information from within the structure, namely, several small mono-polar positive magnetic returns just inside the walls of the structure possibly representing small storage pits.

Features 6–8 and 13 are more geophysically subtle features that are also interpreted as Caddo house structures (see Figures 8 and 9). These four features consist of a central mono-polar positive return with a circular to semicircular series of returns encircling the central feature. These Area A features are all less than 10 m in diameters, but well within the size range for typical Caddo houses here at the Hatchel site and various other Caddo sites (see Kelley 1997; Perttula 2005; Story 1997, 1998, 2000; Webb 1959; Williams 1993).

#### Area B

Four features were noted in Area B (Figures 10 and 11), two of which are interpreted as Caddo structures (Features 9 and 11). Feature 9 is a circular series of complex mono-polar to di-polar returns. The feature has a di-polar return in its center, suggesting the placement of the central fire hearth (Feature 9.1). Like Feature 5 discussed above, this structure feature appears to have an extended entryway. In this case, the Feature 9 extended entranceway points to the southeast, towards Area B. Feature 11 is also a Caddo structure with a mono-polar positive magnetic return in its center representing a central hearth. The mono-polar positive magnetic returns that make up the outside ring of the structure vary from solid high returns to lower and more diffuse returns. Both Features 9 and 11 appear to have been burned due to the high magnetic returns that comprise much of their remote sensing spatial patterning. Both Features 10 and 12 are low diffuse mono-polar linear magnetic returns (see Figures 10 and 11). These two features flank both the northeast and southwest sides of Feature 11. They may be compound dividers like those depicted on the Teran map (see Figure 1) of the Nasoni Caddo village.



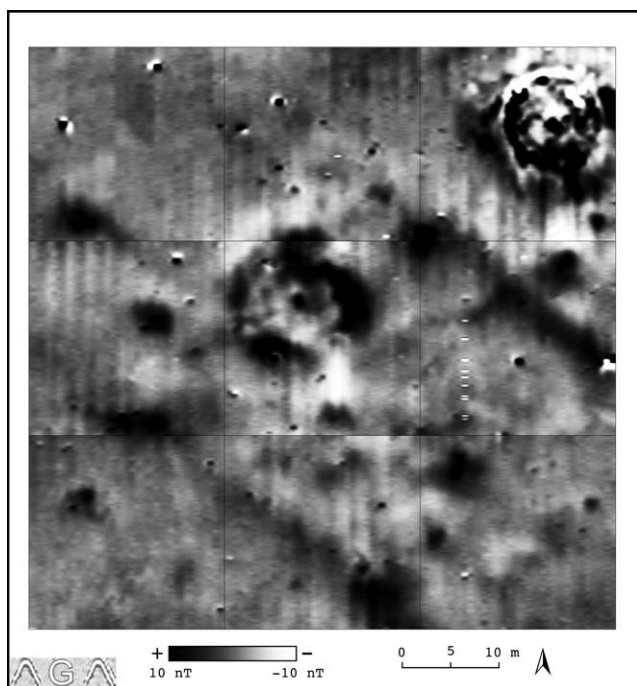


Figure 10. Plan of Area B collection blocks at the Hill Farm site (41BW169).

### Summary of the Archaeology and Architecture

The remote sensing investigations and the archaeological work (limited though it is to shovel testing) at the Hill Farm site indicate that there are extensive seventeenth century Caddo domestic deposits pre-

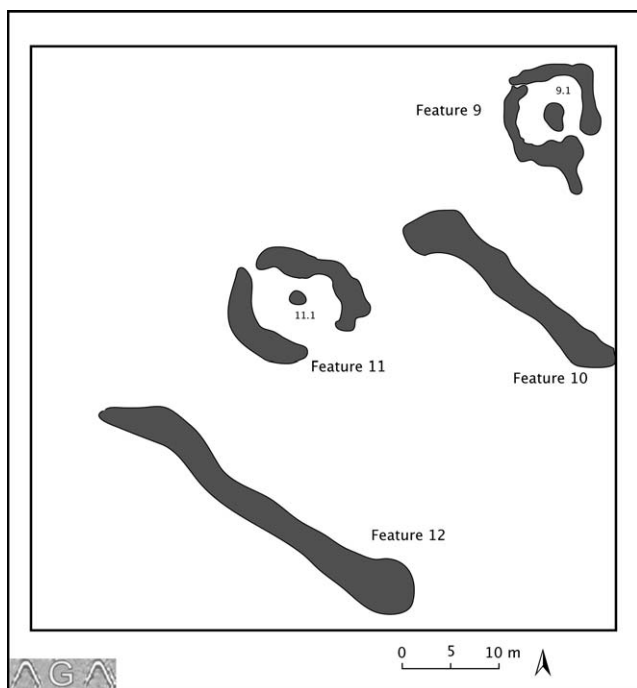


Figure 11. Hill Farm site (41BW169), interpretations of Area B features in the remote sensing data.

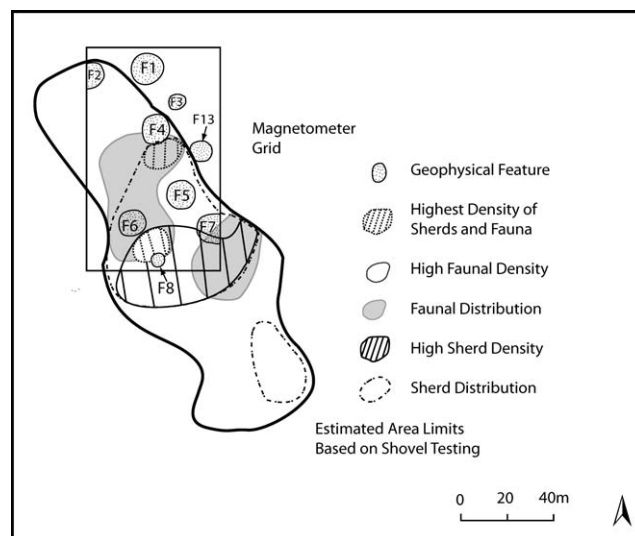


Figure 12. Remote sensing features and sherd/faunal concentrations in Area A, Hill Farm site (41BW169).

served in this part of the larger Hatchel village. There are at least 10 circular structures of different sizes apparent in the remote sensing findings (see Table 1). Approximately 40 percent of the Hill Farm site has been examined by remote sensing. If the density of structures across the unsurveyed portions of the site is comparable to those areas already documented by remote sensing, then there may be as many as 25 Caddo structures within the boundaries of Area A and Area B. These could be from as many as 9–10 separate household compounds that were contemporaneously and/or sequentially occupied by Nasoni Caddo families over several generations. There are also discrete concentrations of discarded ceramic vessel sherds and animal bones (as defined in the shovel testing) that can be associated with these remote sensing features.

In Area A, there is a heavy density of vessel sherds and animal faunal remains directly south of Feature 4, directly north of Feature 5, and west of Feature 13 (Figure 12). These artifact concentrations probably represent a midden/trash area used by the Caddo occupants of these different structures. There is a second high-density cluster of sherds and fauna between Feature 6 and Feature 8, suggesting they are related habitation features situated around another common midden/trash area and probably part of a separate household community (see Figure 12).

Feature 1 and Feature 3 are both located outside the area of the distribution of vessel sherds from shovel testing (see Figure 12). This distributional relationship suggests a very light occupation around these features—relative to the more intensively occupied and trash-accumulated areas in Area A—and possibly they are from the very latest Caddo household compound occupation. Feature 2, another Caddo structure that

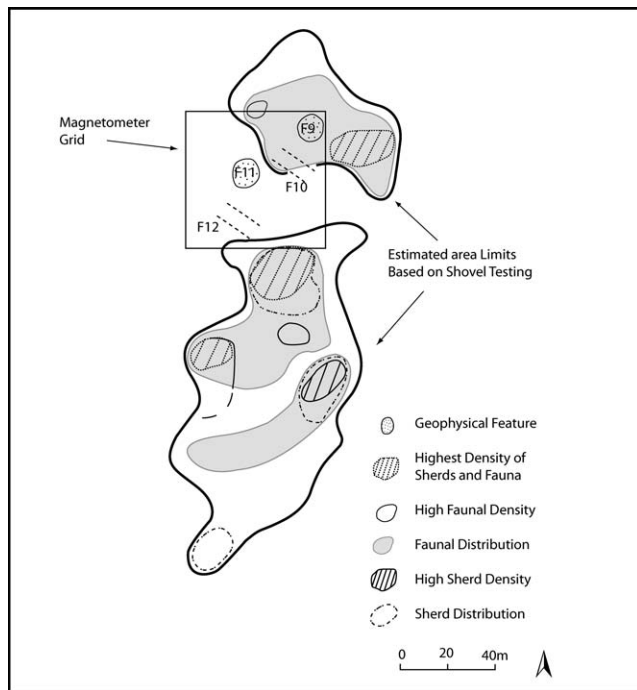


Figure 13. Remote sensing features and sherd/faunal concentrations in Area B, Hill Farm site (41BW169).

may be related to these other two, is also found in a part of Area A that had very little trash detected in the shovel testing. There is a large area of sherds and some faunal remains south and east of Feature 8 (see Figure 12). There must be other habitation features in this part of Area A.

There are extensive Caddo habitation deposits in Area B. Starting at the north end, Feature 9 is directly west of a heavy sherd/bone deposit, probably a midden area (Figure 13). Feature 9 and the probable midden area are likely part of a single household compound. Feature 11 is situated outside of any obvious sherd/fauna high-density areas, although there is a small area of high faunal density about 15 m north of Feature 11 that may be associated with this structure. The available evidence suggests that the area around Feature 11 was only lightly occupied.

The two linear features (Features 10 and 12) identified in Area B (see Figure 11) fall either at the southern end of the northern heavy sherd/faunal density area (see Figure 13) or at the northern end of the southern heavy sherd/faunal density area. Given such locations, these linear magnetic features may represent some form of constructed farm-household compound divider or enclosure that may be archaeologically identifiable. Problems with this scenario include the fact that these two areas have not been intensively shovel tested (Sundermeyer et al. 2006:Figure 12.8), and thus there may be undetected habitation deposits in the area between the two linear features. And second, Feature 11, a Caddo structure, is present

between the two linear features, exactly where we would not expect a domestic structure to be situated if these magnetic anomalies are contemporaneous compound dividers. Allaying that is the possibility that Feature 11 either predates or postdates the use of household compound dividers in Area B. More intensive archaeological investigations would be needed to establish the spatial and temporal relationships between Feature 11, other habitation features, and the linear magnetic features.

The southern part of Area B has three to four heavy sherd/faunal density areas (see Figure 13). We expect numerous but yet undocumented Caddo habitation features and extensive archaeological deposits in and around each distinct spatial artifact cluster.

Ten circular Caddo structures have been identified in the magnetometer data from the Hill Farm site. They are similar in form to those found in previous excavations at the Hatchel site (41BW3). The newly identified structures range from 8 to 17.5 m in diameter with the smallest potential structure (Feature 13) measuring 8 m in diameter. All have interior hearths (except for Feature 3, the possible granary). At least two structures may show evidence of burning (one with an extended entranceway), a widespread practice throughout the Caddo area when a structure was abandoned, and a second structure has a magnetic signature suggesting it has an extended entranceway.

The large platform mound at the Hatchel site was built in several stages (assigned floors A–K by the excavators, with A representing the latest addition) with structures identified on seven stages (A–H) and in archaeological deposits under the mound (K). Stages A–D appear to be contemporaneous with the Hill Farm site, based on the engraved ceramics from the mound deposits (see Hamilton 1972; Creel 1991).

These extensive WPA excavations, under the direction of William Beatty Jr., found at least 16 circular Caddo structures (Creel 1996) as well as several clusters of post holes that did not conform to any discernable pattern. There are over 20 possible Caddo structures and associated outbuildings (arbors, drying racks, granaries, etc) in various levels of the mound (Jackson 2004). Some of these possible structures were described in manners similar to Beatty's description of Feature 3, in which he stated that "the post holes are so numerous that any pattern desired might be formed" (TARL n.d.b:141).

A single large (ca. 15 m diameter) circular structure (Feature 25) was located on the pre mound surface (K). The outline of this structure consisted of 81 post holes with an interior "partition" made up of an arc of 26 posts (TARL n.d.c). The Feature 25 post holes ranged in diameter from ca. 15 to 46 cm with depths from their first exposure of about 33 to 82 cm (TARL n.d.c:398). Perttula (2005:183) has suggested that this pre mound

structure may date to Middle Caddo times (ca. A.D. 1200–1300) based on the association of a Crockett Curvilinear Incised vessel with this structure.

The subsequent structures found throughout the mound have diameters ranging from about 3.66 m (Feature 5) to over 10 m with an average diameter of 9–10 m (Jackson 2004:60). Several of the mound structures had interior hearths, storage or refuse pits, and evidence for extended entranceways pointing to the south, southwest, or southeast (in the general direction of the village areas). The extended entranceway structures are on mound Floor G, and date earlier than the Hill Farm site. Additionally, several structures (Features 4 and 16) had interior partitions while Feature 7 had an arc of posts forming an exterior wall or partition along the front of the structure, similar to Feature 45 from the George C. Davis site (Newell and Krieger 1949:47–49; Story 1998:33). Several of the mound structures have evidence of burning and subsequent rapid covering of the burned building. A deliberate vertical alignment of structures was clear throughout the mound with, for example, the hearths of Features 4 and 7 almost directly aligned and Feature 18 (which was apparently built atop a small rise in the center of the mound, on Floor H) situated almost in direct alignment below Feature 22 from the mound Floor G (TARL n.d.c:335).

The Caddo structures identified in the WPA village plot excavations at the Hatchel site were similar in size and shape to the mound structures and to those at the Hill Farm site. Perttula (2005) provides detailed descriptions of the village structures and identifies a previously unidentified circular structure overlapped by the smaller F-1 structure identified by the WPA (Perttula 2005:186 and Figure 9). In all, more than 350 post holes, six to 10 pit features, several burials, and multiple structures were identified in the Village Plot 1 and 2 areas excavated by the WPA (Perttula 2005:185–193). The structures ranged from F-2, only 3.05 m in diameter and possibly a granary, to the two overlapping structures identified as F-1 that measure 7.3 m and 9.5 m in diameter, and the large (11 m) charcoal-stained area representing a circular structure just to the north of F-1 and F-2 (Perttula 2005:186 and Figure 8).

### The Hill Farm Site and the 1691 Nasoni Caddo Village

There is an intriguing possibility that the Hill Farm site may have been occupied at the time of the 1691 exploration of the Nasoni Caddo settlement on the Red River explored and mapped by don Domingo Teran de los Rios. Not only that, but archaeological, geophysical, and geoarchaeological research along this stretch of the Red River suggests that we can link the Hill Farm site

with actual village compounds depicted on the 1691 map.

Teran's map (Figure 14a) shows a *templo*, or temple mound, at the western end of the village. The mound has been identified as the large platform mound at the Hatchel site (Wedel 1978:Figure 2; see also Figure 2), showing the Hatchel mound east of a Red River channel lake). The map shows many houses and associated outbuildings from several individual compounds in the village.

Based on the location of the household compounds at the Hill Farm site east of an ancient abandoned channel of the Red River that runs roughly north-south between McKinney Bayou to the south and the modern channel of the Red River to the north, and their location southeast of the temple mound at Hatchel (see Figure 1), we have identified two household compounds on the Teran map (Figure 14b) that represent the likely area of the Hill Farm site at the time of Spanish exploration. This abandoned channel has been identified in the large scale remote sensing work of Grealy and Conyers (2006). The ca. 1691 expression of these Caddo household compounds is just the tip to what we now know from remote sensing and archaeological evidence to be the remains of probably two to three or more generations of occupied household compound structures and ancillary features, only the latest of which is depicted on the Teran map of the Hatchel village community. The Caddo archaeological possibilities are virtually endless if indeed we can locate the archaeological expressions of the 1691 Nasoni village.

### Concluding Thoughts

The remote sensing data from the Hill Farm site has provided a heretofore unrealized view, through broad-scale archaeogeophysical investigations, of the structure and development of a prehistoric and early historic Caddo community and village, as well as the means to begin to unravel and better understand the history and life of these communities. To a Caddo archaeologist, the archaeogeophysical data that can now be obtained from Caddo communities and villages, when combined with well-conceived archaeological excavations of key deposits and features, opens new vistas and opportunities in the years ahead to frame the direction and scope of research on Caddo native history. Now is the time to develop long-term collaborative archaeogeophysical and archaeological projects to understand Caddo community-scale organization and landscapes.

The remote sensing focus and ability to identify important cultural features preserved in the archaeological deposits at the Hill Farm site has led to the



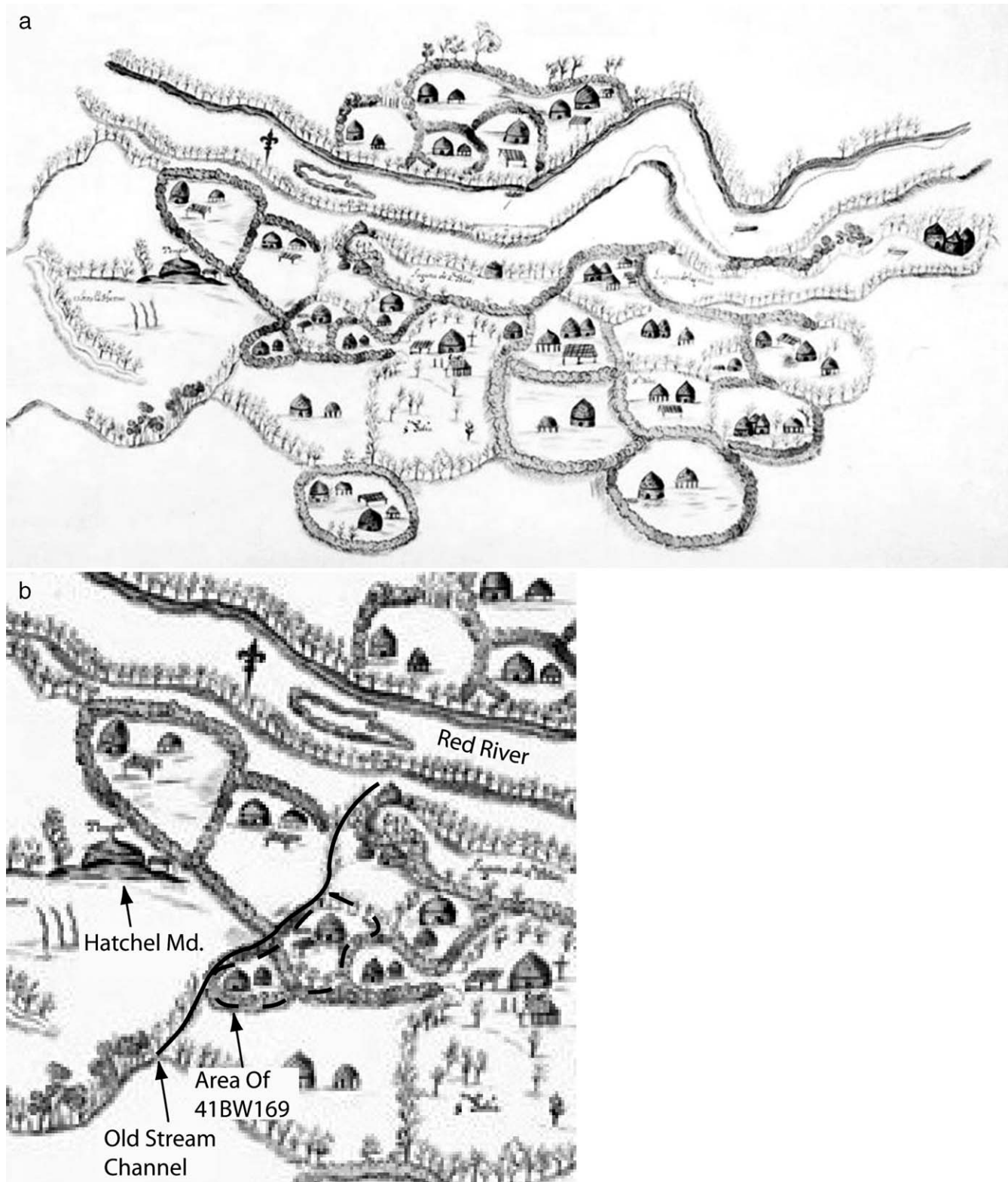


Figure 14. The 1691 Teran Map: (a) the Nasoni Caddo settlement explored and mapped by don Domingo Teran de los Rios in 1691 on the Red River; (b) detail of the 1691 Teran map showing the old abandoned channel of the Red River and the household compounds that may represent the likely area of the Hill Farm site.



identification (although provisional) of probable individual farm/household compounds and obvious demarcations in living spaces that also have archaeological expressions. There were widely spaced domestic households at the Nasoni Caddo village, with little evidence of crowding, even though the household compounds may have been occupied by several generations of Caddo families. Compound fences and dividers further kept separate household compounds within larger village areas. With the new and significant information obtained by remote sensing of the spatial arrangement and character of features (primarily structures and internal hearths), in conjunction with archaeological information obtained from intensive shovel testing, the seventeenth-century Nasoni Caddo habitation areas at the Hill Farm site now await renewed investigations by Caddo archaeologists and the Caddo Nation of Oklahoma.

### Notes

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*Notes on Collections.* Archaeological materials from the Hill Farm site (41BW169) are presently held in the office facilities of LopezGarcia Group in Dallas, Texas. At the completion of the Bowie County Levee Realignment project, the materials, along with project notes and records, will be curated at a facility approved by the U.S. Army Corps of Engineers, Tulsa District.

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