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by

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ABSTRACT

This document constitutes the final report of work done by Prewitt and Associates, Inc. (PAI), under a contract from the Texas Department of Transportation (TxDOT) to provide archeological services in five TxDOT districts—Atlanta, Dallas, Fort Worth, Paris, and Waco—in northeast, north-central, and central Texas. Under this contract, PAI completed Impact Evaluations and Surveys to assist TxDOT in meeting the requirements of their Memorandum of Understanding with the Texas Historical Commission and a Programmatic Agreement between the Advisory Council on Historic Preservation, the Federal Highway Administration, the Texas Historical Commission, and TxDOT. The contract began on 31 August 1998 and concluded on 31 August 2000. During these two years, 41 work orders were completed.

The 41 work orders consisted of 119 Impact Evaluations, 21 Surveys, 3 Surveys with Geoarcheological Evaluation, 1 work order for a quality control meeting with TxDOT, and 1 work order to produce this report. Combined, these work orders entailed efforts at 151 bridge or relief structure replacements, 14 projects involving primarily road widening or realignment (most with bridge replacements as well), and 1 project consisting of construction of an exit ramp. During completion of these work orders, 16 newly discovered or previously recorded archeological sites and 1 possible site were investigated.

Fourteen of the Impact Evaluations resulted in a recommendation that an archeological survey be completed prior to construction. In 69 additional Impact Evaluations for which specific constructions were not available, survey was recommended if areas outside the existing right of way, or below the zone of disturbance within the existing right of way, will be disturbed substantially. The remaining 36 Impact Evaluations resulted in a recommendation that no survey be required based on the extent of disturbance and the limited potential for sites with good integrity. Three of the Surveys investigated sites that were recommended for testing to assess eligibility for listing in the National Register of Historic Places and designation as State Archeological Landmarks. On two other surveys, it was recommended that charcoal recovered be radiocarbon dated to aid in making the decision about whether testing is needed. The other 19 Surveys either did not find any archeological sites or investigated sites that could be assessed as ineligible for National Register listing and State Archeological Landmark designation using the survey data.

ACKNOWLEDGMENTS

A number of people contributed to the successful completion of this project. Lain Ellis managed the contract for the Archeology Studies Program, Environmental Affairs Division, Texas Department of Transportation, with the oversight of Nancy Kenmotsu and the assistance of Steve Ahr, Pat McLoughlin, and Barbara Hickman. At Prewitt and Associates, Ross Fields served as Principal Investigator, while Doug Boyd was the Quality Control Officer. E. Frances Gadus, John Arnn, Jenny McWilliams, Paul Maslyk, Gemma Mehalchick, Karl Kibler, and Amy Holmes served as Project Archeologists, with Mr. Kibler and Ms. Holmes also filling the position of Project Geoarcheologist. These individuals performed most of the fieldwork and were responsible for writing most of the reports on individual work orders included as Appendix B; the site descriptions included in the body of the report are extracted from the work order reports. Mr. Kibler also prepared the Environmental Setting section of the report and one of the culture history summaries (Northeast Margin of Central Texas), while Ms. Gadus wrote or contributed to two of the other summaries (Northeast Texas and North-Central Texas). Lee Nordt was the Project Geoarcheologist on one work order involving trenching in the Brazos River valley at Waco; he authored part of the original letter report as well as the revised discussion of the results of his investigations that appears in the body. Mr. Fields wrote the remainder of the report. Support at Prewitt and Associates was provided by Karen Gardner (laboratory supervision, photograph cataloging, and curation), Brian Wootan and Sandra Hannum (production of graphics), Audra Pineda (report editing), and Melissa Keenan (report production).

INTRODUCTION

This document constitutes the final report of work done by Prewitt and Associates, Inc. (PAI), under a contract (P.O. No. 8-0271; Req. No. 60129-8-80990-B) from the Texas Department of Transportation (TxDOT) to provide archeological services in five TxDOT districts—Atlanta, Dallas, Fort Worth, Paris, and Waco—in northeast, north-central, and central Texas. The contract began on 31 August 1998 and concluded on 31 August 2000. During these two years, 41 work orders were completed, with the final one being issued on 25 April 2000 so that the draft version of this report could be submitted in June 2000, allowing time for review and revisions prior to the end of the contract.

Under this contract, PAI completed Impact Evaluations and Surveys to assist TxDOT in meeting the requirements of their Memorandum of Understanding with the Texas Historical Commission and a Programmatic Agreement between the Advisory Council on Historic Preservation, the Federal Highway Administration, the Texas Historical Commission, and TxDOT. Impact Evaluations are defined by TxDOT as "on-site inspection . . .documenting existing impacts or other conditions which may preclude the presence of intact archeological deposits within the project area for a proposed Transportation Activity." Thus, Impact Evaluations are an initial step to determine whether survey of a particular area is warranted, given the anticipated impacts of the project, the existing level of disturbance, and the likelihood of archeo-logical deposits in good context. Surveys are defined by TxDOT as "archeological field work . . .of a proposed Transportation Activity to locate archeological remains, if any, includeing on-foot examination of the surface, shovel testing, and subsurface trenching by mechanical means where appropriate." As described below, PAI completed 41 work orders involving 119 Impact Evaluations and 24 Surveys. Three of the surveys included geoarcheological evaluations, while 21 did not. Most of these projects focused on the replacement of specific bridges and relief structures on federal and state highways, farm-to-market roads, and county roads. Other kinds of Transportation Activities included road widening projects and the construction of new bypasses; many of these included bridge replacements within their overall larger scopes.

The body of this report consists of three major sections. Following this introduction is a brief characterization of the environmental setting of the five TxDOT districts. Four brief synopses of Native American culture histories are presented next. One deals with northeast Texas and encompasses the Atlanta District and the eastern part of the Paris District; one covers north-central Texas and is relevant to the western Paris District and the northern parts of the Dallas and Fort Worth Districts; one deals with the northeast margin of central Texas and applies to the western part of the Waco District and the southern edge of the Fort Worth District; and one is for the central Blackland Prairie and covers the southern part of the Dallas District and the eastern part of the Waco District. The third section summarizes the work done under this contract: the methods employed in the Impact Evaluations and Surveys are discussed and their effectiveness is evaluated; tables are presented listing the Impact Evaluations/Surveys and their topographic and geologic settings, soils, land use, vegetation, and presence/absence of archeological sites; the sites investigated are described; the existing impacts that affect the potential of project areas to contain sites with sufficient integrity to be eligible for National Register of Historic Places listing or State Archeological Landmark designation are listed and discussed; and overall recommendations concerning the Impact Evaluation/Survey process are provided. The body of the report is followed by a references cited section and two appendixes. Appendix A is a glossary of technical terms, while Appendix B (on CD-ROM) contains the letters and reports submitted to TxDOT concerning all Impact Evaluations and Surveys done under the contract.

ENVIRONMENTAL SETTING

The Atlanta, Dallas, Fort Worth, Paris, and Waco Districts cover a 42-county area in northeastern and north-central Texas. Almost all of the five-district area lies within the Gulf Coastal Plain physiographic province, its

inland (western) edge hinging on the Central Lowland and Great Plains provinces which make up a small portion of the study area (Fenneman 1931, 1938). The intersection of these three physiographic provinces has witnessed an interesting and dynamic geologic history (see Hayward 1988a, 1988b; Hayward et al. 1996; Spearing 1991). The western half of the area straddles a deep-seated fracture zone and site of past orogenic events that separates the stable continental interior to the west from the subsiding Gulf basin to the east and southeast. The rise of the Ouachita Mountains along this zone in the Paleozoic resulted in the deposition of clastic sediments on a broad shelf along the margin of the Permian Basin located southwest of the five-district area. These sediments formed the Pennsylvanian and Permian rock units of the western part of the Fort Worth District. These sandstone and mudstone units dip and become progressively younger toward the basin. Later, during the Cretaceous as the Gulf of Mexico formed, clastic sediments and carbonates were deposited over the worn-down Ouachita Mountains and along the broad marginal shelf of the Gulf basin. The Lower Cretaceous sandstones, mudstones, limestones, and marls found throughout parts of the Dallas, Fort Worth, Paris, and Waco Districts represent cycles of marine transgression and regression throughout the period. By Upper Cretaceous times, infilling of the Gulf basin and shoreline progradation predominated as evidenced by Upper Cretaceous sandstones and mudstones throughout much of the Paris District and the eastern parts of the Dallas, Fort Worth, and Waco Districts. Marine regression and shoreline progradation continued during the Tertiary period and is represented by Eocene sandstones and mudstones of the Atlanta District and the eastern parts of the Paris, Dallas, and Waco Districts.

The different rock units have a major influence on the topography, flora, and hydrology across the five-district area. Eight natural subregions lie within the study area, due in part to these lithological variations (Figure 1). These eight subregions are the Mixed Pine-Hardwood Forest of the Piney Woods region, the Oak Woodlands, Eastern and Western Cross Timbers of the Oak Woods and Prairies region, the Blackland Prairie and Grand Prairie of the Blackland Prairies region, the Mesquite Plains of the Rolling Plains region, and the Lampasas Cut Plain of the Edwards Plateau region (LBJ School of Public Affairs 1978). The Mixed Pine–Hardwood subregion is limited to the Atlanta District and covers the most of that district. The Oak Woodlands subregion encompasses the northern margin of the Atlanta District, the eastern and northern margins of the Paris District, the southeastern corner of the Dallas District, and the easternmost part of the Waco District. The Eastern Cross Timbers covers portions of the Dallas, Fort Worth, Paris, and Waco Districts, while the Western Cross Timbers make up part of the Fort Worth and Waco Districts. The Blackland Prairie subregion covers the central portion of the five-district area, covering parts of the Dallas, Fort Worth, Paris, and Waco Districts. The Grand Prairie subregion constitutes parts of the Dallas, Fort Worth, and Waco Districts. The Mesquite Plains subregion is limited to the western portion of the Fort Worth District, while the Lampasas Cut Plain is limited to the southwestern portion of the Waco District.

The modern plant communities vary from subregion to subregion. The Mixed Pine–Hardwood Forest consists of deciduous forests (forests having greater than 60 percent canopy) of loblolly pine, shortleaf pine, overcup oak, swamp chestnut oak, willow oak, water oak, sweetgum, and sweetbay (Diamond et al. 1987). Deciduous woodlands (woodlands having 26–60 percent canopy) of bluejack oak and pine and swamp communities of baldcypress, buttonbush, and water elm are also a part of the Mixed Pine–Hardwood Forest. The Blackland Prairie consists of tall grasslands, primarily little bluestem and Indiangrass, with riparian deciduous forests of sugarberry and elm (Diamond et al. 1987). The flora of the Eastern Cross Timbers consists of deciduous forests of post oak and black hickory and woodlands of post oak and blackjack oak. The Grand Prairie is a mixed-grass prairie dominated by little bluestem and containing isolated live oak mottes and juniper and mesquite savannas (Hayward et al. 1996). The Western Cross-Timbers consists primarily of deciduous woodlands of post oaks and blackjack

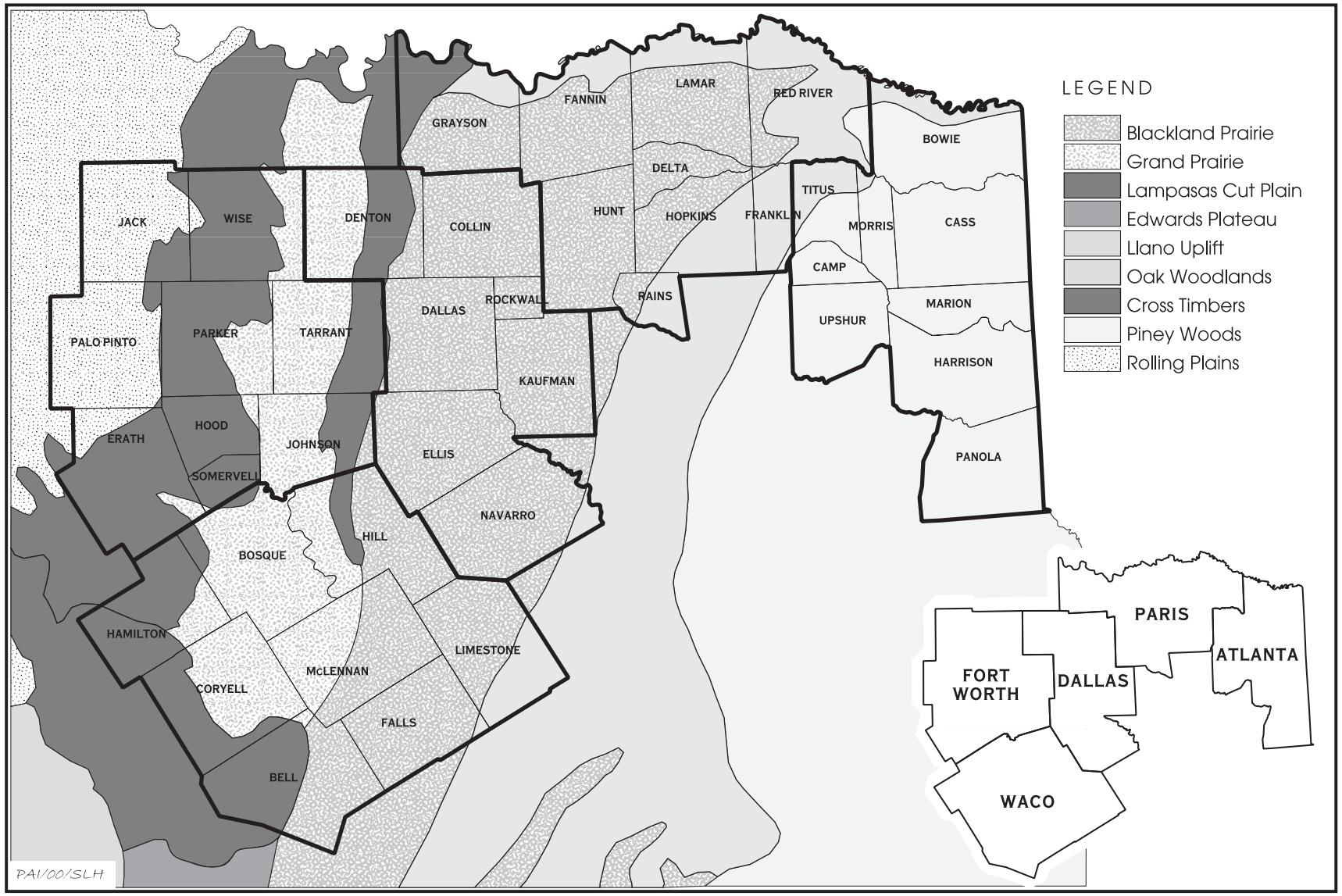

Figure 1. Locations of the Atlanta, Dallas, Fort Worth, Paris, and Waco Districts in relation to natural subregions.

oaks (Diamond et al. 1987). The Mesquite Plains along the western margin of the Fort Worth District consists of evergreen and deciduous shrub lands of oneseed juniper, redberry juniper, sand sage, and Mohr's shin oak, with an understory of little bluestem and sideoats grama grasses. Plant communities of the Lampasas Cut Plain include deciduous wood-lands of Texas oak and deciduous riparian forests of sugarberry and elm.

The major drainages within the five-district area are the Red River, the Sulphur River, Big Cypress Bayou, the Sabine River, the Trinity River, and the Brazos River (Figure 2). The Red River flows east along the northern edge of the Paris and Atlanta Districts. Upstream from the Lamar-Red River County line, the Red River floodplain is ca. 4 km in width, while downstream at Bowie County the floodplain averages 10 km in width. Holocene-age alluvium underlies the floodplain, which for the most part is flanked by extensive Pleistocene terraces both south and north of the river (McGowen et al. 1967; Shelby et al. 1979). Holocene alluvium also is mapped along several south-bank tributaries of the Red River, including Pine Creek, Little Pine Creek, Pecan Bayou, Bois d'Arc Creek, and Choctaw Creek.

The Sulphur River flows east through Red River, Franklin, Titus, Morris, Bowie, and Cass Counties in the Paris and Atlanta Districts. Its major tributaries or branches, the North Sulphur, Middle Sulphur, South Sulphur, and White Oak Bayou, head in Delta, Fannin, Hopkins, Hunt, and Lamar Counties to the west. The Sulphur River has a ca. 2-km-wide floodplain with Holocene fill that along some segments is flanked by remnants of Pleistocene terraces (Shelby et al. 1979). All of its branches or major tributaries contain Holocene floodplains that exceed 1 km in width and are bordered sporadically by Pleistocene terraces. Holocene alluvium also is mapped along the many smaller tributaries throughout the basin.

Big Cypress Bayou flows east and southeast through Franklin, Titus, Camp, Morris, Upshur, Marion, and Harrison Counties. It is joined by its largest tributary, Little Cypress Creek, in Harrison County east of Jefferson. Upstream from the confluence, floodplains with Holocene alluvium average ca. 2 km in width, while downstream the floodplain of Big Cypress Bayou is ca. 3 km wide (Pieper et al. 1975). Only small, widely scattered Pleistocene terrace deposits are mapped for this basin, except along Black Bayou, Frazier Creek, and Jims Bayou, which drain southeastern Cass County and northeastern Marion County and empty into Big Cypress Bayou east of the Texas-Louisiana line. Tributaries with relatively wide (up to ca. 1 km) floodplains (and thus extensive Holocene alluvium) consist of the following: Greasy Creek, Hart Creek, Tankersley Creek, and Boggy Creek, which drain into Big Cypress Bayou; Caney Creek, Lilly Creek, and Kelsey Creek, which flow into Little Cypress Creek; and Black Cypress Bayou, Frazier Creek, and Jims Bayou, which flow into Big Cypress Bayou downstream from Jefferson. Many smaller tributaries have less-extensive mapped Holocene alluvium.

The Sabine River flows east along the southern boundary of Rains County (Paris District) leaving the five-district area and then reentering it at Upshur and Harrison Counties (Atlanta District). Here, it continues east-southeast along the southern boundary of Harrison County before turning southeast-ward across the middle of Panola County. Prior to entering the Atlanta District, the Holocene floodplain of the Sabine River averages 2–3 km in width (Pieper et al. 1975). Downstream from this point, Holocene alluvial deposits ca. 6 km wide are mapped, as are extensive Pleistocene terrace deposits at the edges of the valley. Extensive Holocene alluvial surfaces also are mapped along Lake Fork Creek, a large tributary of the Sabine that flows in a southeasterly direction across the Paris District and enters the Sabine River outside the five-district area. Major north-bank tributaries, with floodplains 1 km or more wide, include Potters Creek, Eightmile Creek, Quapaw Creek, Socagee Creek, and Mill Creek, while major south-bank tributaries are Martin Creek, Irons Bayou, and Murvaul Bayou. A variety of minor tributaries have less-extensive mapped Holocene alluvium.

The Trinity River and its major branches flow through the Fort Worth and Dallas

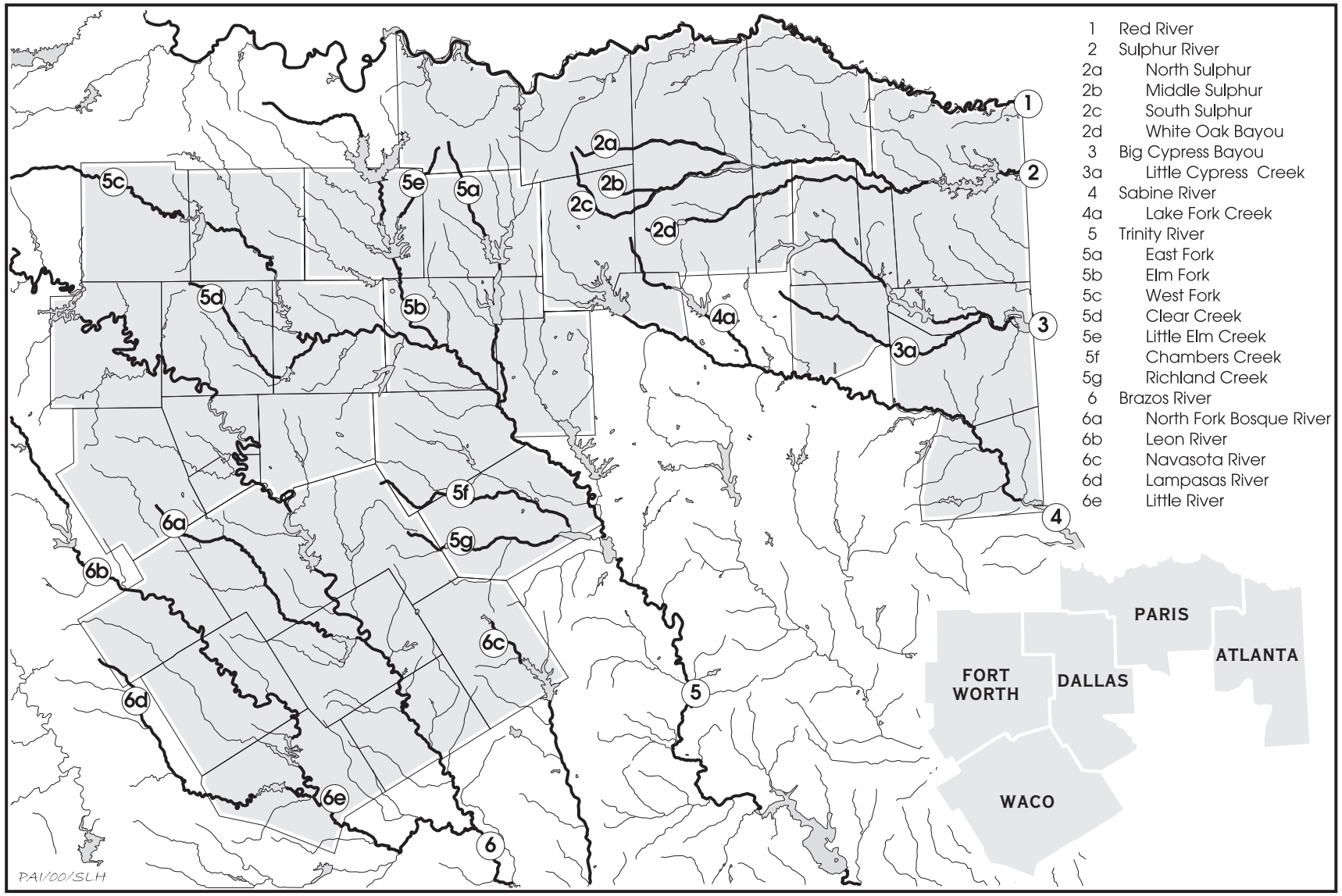

Figure 2. Major drainages in the Atlanta, Dallas, Fort Worth, Paris, and Waco Districts.

Districts. The various branches of the Trinity River (East Fork, Elm Fork, West Fork, Clear Creek, and Little Elm Creek) come together in and around the Dallas-Fort Worth metroplex. Below this point, the Trinity River flows southeast and the Holocene floodplain is broad and vast (up to 9 km wide) and bordered by extensive Pleistocene terraces (McGowen et al. 1972). Two large tributaries, Chambers and Richland Creeks, enter the Trinity along this stretch. Both creeks flow in an easterly direction and have Holocene floodplains ca. 3–5 km wide.

The branches of the Trinity River all contain Holocene alluvium below floodplains that are up to 1 km wide. One of the larger branches, the West Fork Trinity River, flows southeast across Jack and Wise Counties in the Fort Worth District, where its floodplain is narrow (<1 km) and no Pleistocene terraces are mapped (Hentz and Brown 1987; McGowen et al. 1967). However, as it enters Tarrant County it flows south and then abruptly turns eastward flowing through the City of Fort Worth; it is along this stretch that extensive Holocene and Pleistocene alluvial surfaces are mapped (McGowen et al. 1972). Several tributaries of the West Fork Trinity River flow southeast across Wise County (Big Sandy Creek and Denton Creek) and northeast across Johnson and Tarrant Counties (Clear Fork Trinity River and Village Creek). Holocene floodplains averaging 1 km in width are mapped along these tributaries, as well as remnants of Pleistocene terraces (McGowen et al. 1967, 1972).

The Brazos River flows southeast through the Fort Worth (Palo Pinto, Parker, Hood, Somervell, and Johnson Counties) and Waco (Bosque, Hill, McLennan, and Fall Counties) Districts. Upstream from Waco, the Holocene floodplain of the Brazos River is very narrow (if not absent), and at Lake Whitney and Lake Granbury it is below the surface of the flood pools (Brown et al. 1972; McGowen et al. 1972; Proctor et al. 1970). Pleistocene terraces are extensive along this stretch, however. At and downstream from Waco as the Brazos enters the Gulf Coastal Plain, the Holocene floodplain is ca. 6–7 km wide and bordered by segmented Pleistocene terraces. Several large tributaries flow through the study area: the North Fork Bosque River, the Leon River, the Navasota River, the Lampasas River, and the Little River. Several smaller Brazos River tributaries with mapped Holocene alluvium include Big Creek, the Little Brazos River, Pond Creek, Tehuacana Creek, and Aquilla Creek (Proctor et al. 1970).

The North Fork Bosque River flows southward across Erath County. Narrow (<1 km) Holocene floodplains are mapped along this stretch (Brown et al. 1972). The North Bosque River then flows east and southeast through Hamilton, Bosque, and McLennan Counties. Its Holocene floodplain is ca. 1 km wide and bordered by a few small Pleistocene terrace segments or the bedrock valley wall (Proctor et al. 1970). Tributaries of the North Bosque River with mapped Holocene alluvium include Meridian Creek, Neils Creek, Hog Creek, and the Middle Bosque River. The Leon River flows southeast across Hamilton, Coryell, and Bell Counties (Kier et al. 1976; Proctor et al. 1970). The Holocene floodplain is ca. 1 km wide and bounded by Pleistocene terrace segments or the bedrock valley wall. Tributaries of the Leon River with mapped alluvium include Cowhouse Creek and Coryell Creek (Proctor et al. 1970). The Navasota River flows southeast across Limestone County. On average, its Holocene floodplain is 1.5 km wide; it is flanked by few Pleistocene terraces (Proctor et al. 1970). Larger tributaries of the Navasota River with mapped Holocene alluvium include Christmas Creek and Steele Creek.

The Lampasas River flows southeast through Hamilton County, skirts outside the western margin of the Waco District, and reenters the district as it flows east and northeast across Bell County where it merges with the Leon River to form the Little River. The Lampasas River has a relatively narrow Holocene floodplain averaging less than 1 km in width (Kier et al. 1976; Proctor et al. 1981). Small Pleistocene terrace remnants flank the floodplain along some segments of the river. The Little River, forming at the confluence of the Leon and Lampasas Rivers, flows southeast across Bell County. The Holocene floodplain of the Little River is ca. 3 km wide and bordered by large Pleistocene terraces along most of its course (Proctor et al. 1981).

SYNOPSIS OF NATIVE AMERICAN CULTURE HISTORY

Northeast Texas

This synopsis covers the northeastern part of the state, encompassing the Atlanta District and the eastern part of the Paris District. Most of this area is in the Piney Woods, although the northern Oak Woodlands and the northeastern part of the Blackland Prairie are included as well. Major drainages are the Red and Sabine Rivers on the north and south, with the Sulphur River and Cypress Bayou basins in between. Compared to some other parts of the state, the archeology of this region is relatively well known, at least for the late part of prehistory. This can be traced directly to the long history of investigations focusing on Caddo sites, as thoroughly documented by Guy (1990) and Davis (1970), among others.

Occupation of northeast Texas area during the Paleoindian period (10,000–6000 B.C.) is demonstrated by the frequent, if not abundant, occurrence of projectile points such as Clovis, Dalton, San Patrice, and Scottsbluff and other distinctive tools such as Albany scrapers, Red River knives, and Dalton adzes (Story 1990: 177) at sites such as John Pearce in Louisiana just east of Harrison County (Webb et al. 1971), Jake Martin in Upshur County (Davis and Davis 1960), and Forrest Murphey in Marion County (Story 1990:180). Often, Paleoindian materials occur as single artifacts or are from mixed contexts. Still, from the few more-extensive deposits such as at those sites named above, some general observations about lifeways for this period can be made.

Story (1990:177; Story et al. 1990:425–426) observes that Paleoindian sites typically contain limited amounts of refuse and that the assemblages are marked by the following: high selectivity in tool types with carefully fashioned bifaces and unifaces being especially common; extensive curation, refurbishing, and recycling of tools; frequent use of high-quality, often nonlocal, lithic materials; a near-absence of tools and facilities indicative of plant processing; and broad distributions of particular artifact styles. Based on these characteristics, she speculates that Paleoindian adaptations in northeast Texas involved high residential mobility and large territories, short-lived occupations by small groups at individual sites, low population densities and hence little competition for resources, a generalized subsistence strategy focusing on hunting rather than plant collecting, and fluidity in group composition and movement as a means of avoiding or resolving economic or social problems.

The remains of occupations by Archaic groups (6000–200 B.C.), especially late Archaic peoples, are abundant in northeastern Texas, although a complete sequence of artifact styles and assemblages has yet to be developed. According to Story (1990:213; Story et al. 1990:426), Archaic-period sites are characterized by greater quantities of refuse, the appearance of tools and facilities suggestive of plant processing, tools that were less well made and more frequently of local materials than those of the Paleoindian period, functionally diverse tool assemblages containing relatively large proportions of expedient tools, limited tool curation and recycling compared to the Paleoindian period, reasonably distinctive regional artifact styles, and the appearance of cemeteries. From these observations, she goes on to suggest that Archaic-period adaptations involved the seasonal foraging and hunting of a wide variety of resources, with plant foods attaining greater importance; exploitation patterns that were more intensive and more focused geographically than were patterns of Paleoindian land use; better-defined and less-extensive group territories; decreased residential mobility and hence less direct access to nonlocal materials; and more involvement in trade relationships as a means of solving economic and social problems. While Archaic artifacts are common in the region, excavated sites that are predominantly Archaic in age or where Archaic components can be isolated from later components are rare. Some of the excavated Archaic sites in the region include Jake Martin in Upshur County (Davis and Davis 1960), Yarbrough in Van Zandt County (Johnson 1962), Finley Fan in Hopkins County (Gadus et al. 1992), Tankersley Creek and 41TT372 in Titus County (Barnhart et al. 1997; Young 1981), and 41BW422 in Bowie County (Tucker 1994).

The Woodland period (200 B.C.–A.D. 800) covers the ca. 1,000-year span preceding the appearance of the Caddoan culture and is pivotal to understanding this important cultural development in northeastern Texas and adjacent parts of Arkansas, Louisiana, and Oklahoma. The origins of the Caddoan culture have been debated for many years, but Story's (1990) synthesis of the archeology of the region suggests that speakers of Caddoan languages occupied the area before the development of a recognizable Caddoan archeological tradition, that the adoption of maize agriculture did not trigger the Caddoan florescence, and that early Caddoan culture was influenced by but did not develop out of Lower Mississippi Valley cultures. Thus, according to Story (1990:293), ". . . there can be little doubt that the emergence of a distinctive southern Caddoan archeological tradition was basically an in situ development within resident communities of Caddoan speakers." This is supported by Perttula's (1990) view of the coevolution of cultural systems and cultivated plants in the region. In brief, Perttula (1990:Part I, 70–97) suggests that there was substantial continuity in subsistence strategies from the late Archaic period through the early half of the Caddoan period, including increased use of domesticated cucurbits, bottle gourds, and native oily seeded and starchy seeded plants such as sumpweed, *Chenopodium*, maygrass, knotweed, and sunflower. While tropical cultigens were introduced during this time and were present across the Caddoan region by ca. A.D. 1000, the development of true agroecological systems, and hence the adoption of vastly different subsistence strategies, did not occur until later, probably after A.D. 1200 (Perttula 1990:Part I, 97). While the idea of local origins for the Caddoan culture is likely to hold up under further scrutiny, there are limited data from excavated, discrete Woodland sites in the northeast Texas region as a whole with which to evaluate this hypothesis.

Woodland sites in southwestern Arkansas are associated with the Fourche Maline culture (Schambach 1982a:132–197). Fourche Maline is represented archeologically by Gary dart points; flower pot-shaped ceramic vessels with bone, grit, or grog temper; and Lower Mississippi Valley ceramics which have been found in association with numerous village middens and mound sites along the Great Bend of the Red River. Fourche Maline sites such as Crenshaw, a multicomponent village and mound complex located in southwestern Arkansas, also produced intriguing evidence of early mortuary rituals. Four large Fourche Maline cemeteries are known from the site, while Mound F was found to contain a large circular mass grave at its base (Schambach 1982b:150–158). The occurrence of ceremonial interments and mound construction points to the beginnings of a hierarchical social system that is indicative of how the Fourche Maline culture foreshadows the Caddoan florescence.

In the lower Sulphur River valley, Woodland occupations are represented by materials from localities such as the Snipes site at Wright Patman Lake (Jelks 1961:41–54; Story 1990:304) and 41CS151 in Cass County (Cliff and Hunt 1995:144–146; Cliff et al. 1996:131–161). Both of these sites produced Gary dart points; however, the Snipes site also produced ceramics suggesting that it may represent a slightly later occupation. Ceramics from the Snipes site consist of Williams Plain and some Lower Mississippi Valley types such as Coles Creek Incised and possibly Marksville Incised. Burials from the site were generally extended with some grave offerings. These details caused Story to suggest that the Snipes site was more closely related to the Woodland manifestations in southwestern Arkansas than to those of the more westerly parts of northeast Texas (Story 1990:303–305). This is supported by the abundant and relatively well-sampled Woodland record at Cooper Lake in the upper Sulphur River basin of Delta and Hopkins Counties. There, sites with middens indicating intensive occupation and yielding numerous Gary and Kent dart points are common. These sites lack ceramics, however, and most of the limited number of burials dating to this period are cremations lacking grave offerings (Fields et al. 1997:86–88; Perttula 1999:385).

In the upper Sabine River and upper Cypress Bayou basins, the Woodland period generally is poorly understood because isolable components have proven elusive. While noting several problems with the data, Story (1990:

309–314) offers the following conclusions based largely on the published data from Lake Fork Reservoir in Rains and Wood Counties (Bruseth and Perttula 1981; Perttula and Skiles 1988) and Thurmond's (1981, 1985, 1990) synthesis of the archeology of the Cypress basin: (1) most of the Woodland occupations appear to date to the late part of the period; (2) settlement density was low compared to the Caddoan period; (3) a variety of sites were used, including short-term camps and more-intensively occupied small settlements represented by the earliest cultural middens in the area; (4) the limited macrobotanical evidence suggests that hardwood nuts, and probably less likely maize, contributed to the diet; and (5) there are no constructed mounds or elaborate burials reflecting the development of complex ritual or social systems. One important excavated site dating to this interval, the Resch site (Webb et al. 1969), is located on Potters Creek in the Sabine River basin in southern Harrison County, and Webb (1982) reports on a number of sites in northwestern Louisiana, including the excavated McKinney Mound site in Caddo Parish, that apparently date to this time period. The presence of small burial mounds at some of Webb's (1982) Bellevue focus sites implies greater cultural complexity for the Native American peoples who lived in the Red River valley of northwestern Louisiana than for the contemporary groups in Texas, although most of the Bellevue sites have seen only limited work and thus present interpretive difficulties.

There is ample evidence for intensive use of the Great Bend of the Red River valley, and the valleys of the Sulphur River, Cypress Bayou, and Sabine River to the south, during the Caddoan period (A.D. 800–1700). It has long been recognized that the Great Bend area, extending from above Texarkana to below Shreveport, was a focal point of Caddoan development, as this area contains a number of early Caddoan mound sites with elaborate burials pointing to hierarchical social systems (Schambach 1982b:7). The general picture is one of sedentary agricultural groups inhabiting small farmsteads dispersed around these vacant ceremonial mound centers (Schambach and Early 1982). The burials from the T. M. Sanders site in Lamar County (Krieger 1946), the structural mound and other evidence at the A. C. Mackin site in Lamar County (Mallouf 1976), and the mound and burial evidence at the Dan Holdeman site in Red River County (Perino 1995) indicate at least moderate social complexity for early Caddoan groups well west of the Great Bend.

Judging from the historic accounts and the archeological evidence, it is clear that the Great Bend region also was occupied intensively during the latter half of the Caddoan period. Settlement systems consisting of dispersed farmsteads and vacant ceremonial centers seem to have prevailed throughout the period in at least parts of the region (Kelley 1994; Schambach 1982b:7–10), and the occurrence of mound centers and elaborate shaft burials with rich grave offerings indicates the continuation of structured, hierarchical social systems. This manifestation of Caddoan culture in the Great Bend area has two labels, the Texarkana phase and the Belcher phase. The Texarkana phase was defined from information gathered from the Hatchel mound by WPA excavations and by the excavation of the Mitchell and Moores cemetery sites (Davis 1970:50–51; Krieger 1946). These sites are along the Red River in northern Bowie County. The Belcher phase covers the lower half of the Great Bend, having been defined based on work at the Belcher mound located north of Shreveport, Louisiana (Webb 1959). The two phases are marked by distinctive ceramic assemblages which suggest differing social and political affinities. Based on the occurrence of middle to late Caddoan mounds or elaborate burials at sites such as Sam Kaufman-Bob Williams-Roden, Wright Plantation, Dan Holdeman, and Rowland Clark in and just north of Red River County (Bruseth et al. 1991, 1992; Perino 1981, 1983, 1994, 1995; Skinner et al. 1969), it is clear that Caddoan complexes at least partly comparable to those of the Great Bend area extended well westward.

It is difficult to determine how the lower part of the Sulphur River basin was used during the early Caddoan period because so little work has been done there. While five possible mound sites were documented in surveys at Wright Patman Lake (Malone and

Briggs 1970:82, 84; Stephenson 1950a:6–8), little is known about them, including their ages, and the only two excavated Caddoan sites date to the latter part of the period (Jelks 1961). Nonetheless, the proximity of this part of the basin to the Great Bend of the Red River and the knowledge that mound sites (e.g., the Haley site) occur along the Red near the mouth of the Sulphur certainly lead to the expectation that the area was used with some intensity during this interval. Moving upstream, middens implying intensive use during the early to middle parts of the Caddoan period have been documented at 41CS150, 41CS151, and 41CS155/41CS156 in Cass County (Cliff and Hunt 1995:71–74, 144–146, 205–208), but the excavations into these components were not sufficiently extensive to define the nature of the occupations. Farther upstream at Cooper Lake in Delta and Hopkins Counties, early to middle Caddoan sites with middens and numerous features indicating intensive occupation are common, but only one excavated site—Hurricane Hill—yielded convincing evidence of use by fully sedentary groups (Fields et al. 1997:88–89; Perttula 1999).

As for earlier time periods, relatively little is known about late Caddoan use of the lower Sulphur River basin. As noted, two of the three excavated sites at Wright Patman Lake contained late Caddoan components, however, and both appear to represent small farmsteads or hamlets (Jelks 1961:36, 65). Based on proximity to the Great Bend of the Red River, it seems likely that this area was occupied by sedentary agriculturalists during this interval. This is supported by the data from 41MX5, a small, late Caddoan hamlet in Morris County which contained evidence of perhaps two domiciliary structures associated with burials and which yielded small quantities of maize and squash (Brewington et al. 1995). Recent work at the White Oak Creek Mitigation Area in Bowie, Cass, and Morris Counties (Cliff 1994:197; Cliff and Hunt 1995:145, 206) has identified a few sites with late Caddoan components (e.g., 41CS151 and 41CS155/41CS156), but these do not seem to represent intensive occupations, and most may reflect use for procurement/processing purposes rather than domiciliary activities. As represented at Cooper Lake, the upper part of the basin also seems not to have been occupied intensively during this part of the period, although one residential occupation, albeit a short-term one, was documented at the Peerless Bottoms site (Fields et al. 1997:90–91).

Both the upper-middle Sabine River and Cypress Bayou basins appear to have seen substantial occupations during the early Caddoan period. While farmsteads may have been the most common kind of site in the Sabine basin during this period, Perttula (1994) lists a number of known or potential mound sites along the Sabine River or its tributaries in Rains, Smith, Upshur, Harrison, Rusk, and Panola Counties. Many of these probably date to the early and middle parts of the period, indicating the development of hierarchical social and settlement systems. Further, recent excavations at the Oak Hill site in Rusk County have shown that the region contains some sites representing large planned communities (Perttula and Cruse 1997). A similar situation appears to have occurred in the upper Cypress basin, as Thurmond (1981:450–454) notes the presence of three early Caddoan mound sites (Hale, Keith, and Garrison) in Titus and Wood Counties and Nelson and Perttula (1993) identify an early Caddoan mound at the Z. V. Davis–McPeek site in northwestern Upshur County.

Late Caddoan residential sites are common in the upper-middle Sabine and upper Cypress basins, with mound sites apparently being numerous in both valleys (Perttula 1994:12; Perttula et al. 1998; Thurmond 1981: 451, 1985:195). Thurmond (1988:3) suggests that the upper Cypress basin was occupied by an essentially egalitarian society with few individuals of elevated rank. Nonetheless, a number of large cemeteries dating to this interval are known in the upper part of the Cypress Bayou basin (Perttula et al. 1998; Turner 1978, 1992), and it is clear that the Cypress and Sabine valleys supported sizable sedentary populations.

Caddoan lifeways were affected profoundly by European contact. Contact began for the Caddoan area with the coming of the De Soto entrada in 1542, though European diseases spreading through the Native American populations may have affected the Caddo

by the early 1500s (Perttula 1992:19). Gradually, the pressures of population decline from disease and raiding by other displaced native groups caused a breakdown in traditional boundaries. Between 1700 and 1800, Caddoan groups were on the move, seeking alliances with other surviving Caddo. Perttula (1992: 155) states that sites from this time period generally are small farmsteads and hamlets, sometimes associated with a household cemetery. These farmstead sites comprised dispersed communities (Perttula 1992:155–160). Such groups of sites from this period in the Great Bend include the Spirit Grove locality in the south, including Cedar Grove, Friday, Shaw-Russell, McClure, Battle, Rube, Russell, and Lester Bend (Schambach et al. 1982; Trubowitz 1984), with Crenshaw in the north (Gregory 1973). On the Red River in northern Bowie County, the Hatchel, Mitchell, and Moores sites, along with the Roseborough Lake site, have historic components (Gilmore 1986; Wedel 1978). These sites probably represent the upper Nasoni village visited by La Harpe and others in the late 1600s and early 1700s (Wedel 1978).

The Roseborough Lake site also is thought to have been the location of a trading post established by Alexis Grappé in ca. 1731–1733 (Gilmore 1986:13–14). Along with native-made ceramics and lithics, the site produced a variety of European goods including gun parts, axes, knives, ceramics, and glass beads. The post continued as a French garrison until Louisiana was ceded to Spain in 1763, and then it continued only as a trading house until 1778 (Miroir et al. 1975:162–163).

Historic sites on the lower Sulphur River in northeast Cass County include the Atlanta State Park site (Harris et al. 1980:231–239), the Clements site (Dickinson 1941:117–132; Lewis 1987), and the Hunt site (Jackson n.d.). Based on the ceramics and trade goods recovered, the sites are thought to have been occupied before the mid-eighteenth century (Perttula 1992:171–172), and they may have been associated with the Nasoni Caddo, who controlled a portage on the Caddo Trace connecting the northern Caddoan groups with the southern Caddoan groups of east Texas. In contrast, no historic Native American sites were recorded in the extensive work at Cooper Lake in the upper Sulphur basin, and it appears that this part of the valley was not settled during this time (Perttula 1999:31).

By 1790, the various Caddoan groups living in the Great Bend region had abandoned the area after severe raids by the Osage. They moved south to join with groups living near Caddo Lake in the Cypress Basin. One of the most important localities in this area is the recently excavated Timber Hill site in Marion County, which was occupied by the Kadohadacho and other Caddo groups in the first half of the nineteenth century prior to their removal from east Texas (Parsons 1999). Documented historic Caddo sites in the Sabine River basin include the so-called “Kinsloe focus” sites in Gregg, Harrison, Panola, and Rusk Counties (Jones 1968), as well as a few sites upstream at Lake Fork Reservoir (Perttula 1992:174). Other important historic Native American sites in this part of the Sabine valley include the Pearson and Gilbert sites in Rains County, which apparently represent Wichita groups who moved south into Texas in the seventeenth and eighteenth centuries (Duffield and Jelks 1961; Jelks 1967).

North-Central Texas

This synopsis deals with the northern parts of the Dallas and Fort Worth Districts and the western part of the Paris District, extending from Jack and Palo Pinto Counties on the west to Collin County on the east and from Dallas County on the south to Grayson County on the north. This is an environmentally diverse area. The northern Blackland Prairie occupies the eastern part, while alternating oak woodlands and grasslands associated with the Cross Timbers and Grand Prairie mark the central part. The far western edge intersects the eastern Rolling Plains. The main river that drains the area is the upper Trinity and its numerous tributaries; the Red River flows along the north side of the region, while the Brazos River drains the southwestern part.

Previous archeological investigations within north-central Texas vary in intensity and quality. Much work has been done in the Trinity River drainage within the northern part of the Dallas District and eastern Fort

Worth District, whereas significantly less work has taken place in the western and southwestern Fort Worth District. For instance, on the Trinity River's East Fork, several projects have made significant contributions, including Lavon Lake (Dawson and Sullivan 1973; Lynott 1975; Stephenson 1949) and Lake Ray Hubbard (Harris and Suhm 1963; Lorrain and Hoffrichter 1968; Ross 1966). Significant archeological projects on the upper Elm Fork of the Trinity in the Dallas-Fort Worth-Denton area include Ray Roberts Reservoir (Ferring 1987; Ferring and Yates 1997; Prikryl and Yates 1987; Skinner et al. 1982), Lewisville Lake (Brown and Lebo 1991; Ferring and Yates 1998; Stephenson 1950b), and Grapevine Lake (Ferring 1975; Morgan 1975). Along the West Fork of the Trinity River and its tributaries, intensive investigations have occurred only at Mountain Creek Lake (Peter and McGregor 1988). Beyond the headwaters of the Trinity and along the Red River in the northwest corner of the Paris District, investigations have occur-red at Lake Texoma (Prewitt and Lawson 1972) and Hubert Moss Lake (Lorrain 1969). Investigations in the Brazos River basin as it passes through the southwestern part of the Fort Worth District include Lake Granbury (Skinner 1971) and Possum Kingdom Lake (Brayshaw 1970; Hughes 1942; Krieger 1946).

Much of the information generated by the reservoir investigations has yet to be synthesized. The following discussion of the prehistory of north-central Texas draws on the few synthetic and/or summary sources available, especially those by Prikryl (1990, 1993). Story's (1990) summary of archeology on the east Texas Gulf coastal plain also draws on some of the work done in the upper Trinity basin, while Lynott's (1981) discussion of prehistoric adaptations in the Cross Timbers, Grand Prairie, and Rolling Plains provides connections to an overview by Hofman et al. (1989) of southern Great Plains archeology.

As with many other areas of Texas, Paleoindian materials in north-central Texas often are found in surface contexts or mixed with later materials. The generally low density of Paleoindian artifacts and sites and the tendency for projectile points to be made from nonlocal lithics have led investigators to characterize these populations as highly mobile with low regional densities (Lynott 1981:100–101). Megafauna fossil finds within the region have led some investigators to conclude that subsistence practices of Paleo-indian peoples were linked to mammoth and bison. However, no kill or butchering sites similar to those identified for the southern Plains have ever been discovered (Prikryl 1990, 1993).

Generally, the Paleoindian period in north-central Texas is considered to extend from ca. 10,000 to 6500 B.C. (Prikryl 1993:199). Point types often found that can be associated with the early to late parts of the period include Clovis, Folsom, Dalton, Plainview, San Patrice, and Scottsbluff. The most common types recognized are Dalton and Plainview (Prikryl 1990). The majority of the recorded Paleoindian sites cluster in the upper Trinity drainage where the most intensive archeological investigations have taken place, though often these sites consist of no more than one or two points. However, the Acton site, located in Hood County on a T_2 terrace of the Brazos River overlooking Lake Granbury, is significant for the number of Plainview and Dalton (Meserve) points it produced (n = 72). A variety of other lithic tools such as gouges, scrapers, and burins also were recovered. Unfortunately, the Paleoindian occupation could not be isolated from Archaic-period occupations of the site.

Interestingly, the only two investigated sites in north-central Texas with apparently discrete Paleoindian components are early, as both produced Clovis projectile points. These sites are the Lewisville and Aubrey sites located in the northern part of the Dallas District. The Lewisville site contained 27 hearth features with an associated Clovis point and other sparse lithics in a near-surface context (Crook and Harris 1957, 1958; Story 1990: 182–184), and the Aubrey site contained lithic debitage and Clovis points buried beneath 8 m of Holocene alluvium on the Elm Fork floodplain (Ferring 1989). Both sites also contained a variety of faunal remains both large and small, although only small game, the largest being white-tailed deer, can be associated comfortably with the Clovis occupation at the Lewisville site. The preponderance of small game at the Aubrey site could be interpreted

as representing a more generalized pattern of foraging than the reliance on mammoth and bison apparently demonstrated at Clovis sites on the southern Plains (Hofman 1989:31–32). Such a divergence in subsistence patterns may reflect an inherent adaptability of Clovis technology to changing environmental conditions encountered as early populations spread southeastward into Texas (Ferring and Yates 1997).

The Archaic period extends from ca. 6500 B.C. to A.D. 700, with ca. 2,500-year segments often considered as early, middle and late divisions of the period (Prikryl 1993:199). Diagnostic artifacts for the period are similar to those of adjacent regions, although developing a sound chronological sequence of diagnostic artifacts has proven difficult because many of the investigations have focused on surface manifestations. Prikryl (1990) suggests that early Archaic projectile points include early split-stemmed varieties and possibly Angostura, while middle Archaic points include basal-notched forms such as Bell, Andice, and Calf Creek along with Wells, Dawson, Carrollton, and Bulverde. Late Archaic point types reportedly include Castroville, Marshall, Edgewood, Ellis, Trinity, Palmillas, Yarbrough, Dallas, Godley, Elam, and Gary (Prikryl 1990). At one time, the Carrollton and Elam foci were defined to refer to the middle and late Archaic respectively (Crook and Harris 1952, 1954). However, reevaluation of the type-site artifacts showed that the materials were mixed such that perpetuation of these foci provides little interpretive value (Hofman 1989:57; Prikryl 1990:73–74). Some of this mixing and the generally low numbers of early and middle Archaic sites may be due to extensive erosion of mid-Holocene deposits. This type of erosion has been documented for the Brazos drainage immediately west of the Fort Worth District in Young, Stephens and Throckmorton Counties (Ensor et al. 1992:303).

Though few isolable components have been analyzed for the various divisions of the Archaic-period in north-central Texas, slowly increasing populations responding to warmer and drier environmental conditions have been postulated to explain the overall archeological record of the period (Lynott 1981:103–104; Story 1990:212). It is thought that these factors may have led Archaic populations of the Cross Timbers and prairie areas of north-central Texas to develop a diversified hunting and gathering pattern based on bottomland resources of the rivers and major creeks, while populations on the Rolling Plains maintained a focus on bison hunting (Hofman 1989:57–58). Projectile points of the period were fashioned from local lithic materials suggesting that populations were less mobile than their Paleoindian predecessors. Less mobility also may suggest refinement of the diversified subsistence pattern to include scheduling of resource use within more-restricted areas. Evidence from late Archaic sites at Mountain Creek Lake (Peter and McGregor 1988) and Ray Roberts Reservoir (Ferring and Yates 1997) indicates repeated site occupation by small groups, which could support the resource scheduling hypothesis. Still, even with refinement of resource utilization, evidence of dietary stress has been found on late Archaic human skeletal materials (Ferring and Yates 1997:305; Gill-King 1987:103–104).

Human burials are common in the archeological record of the late Archaic and Late Prehistoric periods of at least the eastern part of north-central Texas (Prikryl 1993). Some of these burials are associated with Wylie pit features, which are large man-made depressions measuring ca. 16 m in diameter and 2–4 m in depth. These features were first identified at a series of sites along the East Fork of the Trinity River and were considered an important trait of the Wylie focus (Harris and Suhm 1963; Stephenson 1952; Wilson 1946). Radiocarbon assays from pits at the Upper Rockwall and Sister Grove Creek sites in the area of Lavon Lake suggest that the pits and the Wylie focus were associated with the Late Prehistoric period (Lynott 1975:117; Ross 1966). Lynott (1977) widened the temporal span by incorporating a late Archaic phase into the focus definition. Subsequent work on Wylie pits at Richland-Chambers Reservoir to the south confirmed their late Archaic age (Bruseth and Martin 1987:165). However, the wide range of artifact types associated with them and the long span of time represented made it clear that the Wylie focus was not a useful construct. Bruseth and Martin (1987: 280–284), while discarding the focus as unusable, further supported Lynott's (1975)

original interpretation of the pits as being associated with large-scale food processing. Their interpretation likens the pits to the burned rock middens of central Texas, with both representing group aggregations.

Group aggregation and large-scale manipulation of subsistence resources, as represented by the Wylie pits and the human burials they contain, may be indicative of societal changes that continued through the Late Prehistoric period. Habitation structures indicating increased sedentism, at least in certain places and at certain times, have been found in some Late Prehistoric sites, along with cultigens such as corn and arrow points and ceramics indicating important technological changes. Also, there may be evidence (e.g., the distinction between burials placed inside and outside Wylie pits) of differential mortuary practices that could reflect a shift toward a hierarchical social structure, although this evidence is nowhere near as strong as that for the Caddoan area of northeast Texas. Prikryl (1990, 1993) defines two chronological periods for the Late Prehistoric in north-central Texas, which he links to particular projectile point and ceramic types.

Prikryl's (1990, 1993) Late Prehistoric I period (A.D. 700–1200) is marked by the arrow point types Scallorn, Catahoula, Steiner, Alba, and Bonham. Ceramic vessels are mostly grog tempered and undecorated, but there is some evidence of influences from other regions in that some locally manufactured wares display designs similar to those associated with east Texas Caddo ceramic types. Evidence for corn and structures has been found at sites at Mountain Creek Lake as well as to the north at Hubert Moss Lake near the Red River (Lorrain 1969; Martin 1994; Peter and McGregor 1988). Farther west, cultural changes also were taking place on the Rolling Plains, though this area held onto its Archaic lifestyle even after technological innovations such as the bow and arrow were accepted (Lynott 1981:106).

During the Late Prehistoric II period (A.D. 1200–1700), influences from the southern Plains became pronounced in the Cross Timbers and prairie areas. These influences coincided with an increase in bison herd size in north-central Texas (Lynott 1981:106; Prikryl 1990:80). Bison was important to subsistence, but shrinking procurement territory sizes due to population increases continued the trend toward horticulture and settled village life (Harris and Harris 1970; Morris and Morris 1970). In terms of technology, a Plains Indian tool assemblage was common (Prikryl 1990: 80). Items associated with this assemblage include calcareous-tempered ceramic vessels, some of which fit the description for the type Nocona Plain (shell tempered), and unstemmed triangular arrow points such as Maud, Fresno, Harrell, and Washita, as well as Perdiz points. Tools specific to bison processing include snub-nosed or thumbnail scrapers and edge-beveled Harahey knives. Bison scapula hoes, which also are common in Plains Indian sites, have been recovered from sites in the Lewisville Lake and Lavon Lake areas of Denton and Collin Counties (Barber 1969:118–119; Harris 1945).

The Plains Indian influences associated with settled village life were used to define the Henrietta complex of north-central Texas. This complex, based on Krieger's (1946) more-expansive Henrietta focus, extends from the Red River south along the headwaters of the Trinity and Brazos Rivers. The type site, M. D. Harrell, is located along the Brazos River in Young County just northwest of Palo Pinto County in the drainage basin for Possum Kingdom Reservoir (Krieger 1946). The Harrell site and other associated sites contain middens, house structures, rock hearths, storage pits, and burials, and they most often are located on sandy knolls or terraces over-looking river valleys (Brooks 1989:85–86; Forrester 1994:249–266). Excavated sites attributed to the Henrietta complex include the Coyote and Glass sites located on the Red River in Montague County (Lorrain 1967:24–44; Woodall 1967a), and it is clear that sites such as Dillard in Cooke County are related as well (Martin 1994).

The Henrietta complex as an investigative tool can be limiting since its loose definition tends to obscure local differences. More recent investigations in the upper Trinity River drainage have tended to highlight the local differences. For instance, at Ray Roberts Reservoir Ferring and Yates (1997:305) see local trends emerging independent of extraregional influences. They cite the lack of evidence for

extensive maize horticulture and the preponderance of short-term logistical camps as the basis of their hypothesis. Similarly, Peter and McGregor (1988:367) demonstrated that occupation of the Mountain Creek drainage was less intensive in the Late Prehistoric II period than before and that maize horticulture, if practiced at all, was limited. Yet sites in both of these parts of the Trinity drainage have produced items characteristic of Plains Indian sites, such as shell-tempered ceramics and diagnostic lithic tools.

By the eighteenth century, immigrant Plains Indian groups had moved into and beyond north-central Texas, and their documentation by traders and explorers marks the start of the historic period. Documentary sources suggest that the Tonkawa, Apache, Comanche, Wichita, Kitsai, Yojaune, Caddo, Delaware, and Kickapoo traversed the region at various times during the period (Campbell 1983; Newcomb 1961; Newcomb and Campbell 1982). However, archeological sites that can be associated definitely with historic groups are few. The Wichita are known to have moved into Texas from Oklahoma and Kansas in the early 1700s. Sites attributable to the historic Witchita have been identified at the edges of north-central Texas. Among these are the Stansbury site located in Hill County, now inundated by Lake Whitney (Stephenson 1970). Excavations at the site produced burials, house structures, storage pits, and a variety of aboriginal artifacts along with European ceramics, glass beads, metal arrow points, and flintlock musket parts. A cluster of Wichita sites also occurs to the north along the Red River in Montague County. These sites are known collectively as “Spanish Fort” and occur on both the Oklahoma and Texas sides of the river. Woodall (1967b) excavated one of these sites, named the Upper Tucker site; it produced artifacts and features similar to those discovered at the Stansbury site. Wichita sites both on the Brazos and Red Rivers were located atop high terraces that overlook the rivers.

Northeast Margin of Central Texas

The archeological record of the central Texas area is known from decades of investigations at various sites throughout areas of the Edwards Plateau, its highly dissected eastern and southern margins, and the margins of physiographic regions to the east and south (see Collins [1995] for review). Traditionally, the central Texas archeological area has included the middle Brazos River valley and Lampasas Cut Plain (e.g., Prewitt 1981; Suhm 1960), i.e., the western part of the Waco District and the southwestern part of the Fort Worth District, and a number of project areas that have contributed important information are located in this region, e.g., Stillhouse Hollow Lake, Belton Lake, Fort Hood, Waco Lake, the Hog Creek project, and Whitney Lake. These are on the periphery of the central Texas area, however, and their archeological records and projectile point style sequences contain elements that suggest influences and contacts to varying degrees over time with areas to the east and northeast (cf., Collins 1995; Johnson and Goode 1994).

Paleoindian (10,000-6500 B.C.) occupations of the central Texas area are represented by surfacial and deeply buried sites, rockshelter sites, and isolated artifacts. The period often is described as having been characterized by small but highly mobile bands of foragers who were specialized hunters of Pleistocene megafauna. However, a more accurate view of Paleoindian lifeways probably includes the utilization of a much wider array of resources. Recent investigations at the Wilson-Leonard site in Williamson County just south of the Waco District support this view and have challenged the fundamental defining criterion of the Paleoindian period, that of artifacts in association with late Pleistocene megafauna (Masson and Collins 1995).

Collins (1995) divides the Paleoindian period into early and late subperiods. Two projectile point styles, Clovis and Folsom, are included in the early subperiod. Clovis chipped stone artifact assemblages, including the diagnostic fluted lanceolate Clovis point, were produced by bifacial, flake, and prismatic-blade techniques on high-quality and oftentimes exotic lithic materials (Collins 1990). Along with chipped stone artifacts, Clovis assemblages include engraved stones, bone and ivory points, stone bolas, and ochre (Collins 1995:381; Collins et al. 1992). Clovis,

as well as a number of later Paleoindian dart points, have been recovered from the Gault site in Bell County (Collins and Brown 2000) and the Triple S Ranch site in Hamilton County (Hatfield 1997). Probable Clovis polyhedral blade cores have been found in Hamilton County (Goode and Mallouf 1991). Analyses of Clovis artifacts and site types suggest that Clovis peoples were well-adapted, generalized hunter-gatherers with the technology to hunt larger game but not rely on it solely. In contrast, Folsom tool kits, consisting of fluted Folsom points, thin unfluted (Midland) points, large thin bifaces, and end scrapers, are more indicative of specialized hunting, particularly of bison (Collins 1995: 382). Folsom points have been recovered from Horn Shelter No. 2 along the Brazos River (Redder 1985; Watt 1978).

Postdating Clovis and Folsom points in the archeological record are a series of dart point styles for which the temporal, technological, or cultural significance is unclear. Several of these styles were recovered from Horn Shelter No. 2 and include Plainview, Scottsbluff, Dalton, and San Patrice (Watt's [1978] Brazos Fishtail points) type. Often, the Plainview type name is given to any unfluted, lanceolate dart point, however, Collins (1995: 382) has noted that many of these points typed as Plainview do not parallel Plainview type-site points in thinness and flaking technology. Also problematic are the chronological position and cultural significance of Dalton and San Patrice dart points. Components and artifact and feature assemblages of the later Paleoindian subperiod appear to be Archaic-like in nature and, in many ways, may represent a transition between the early Paleoindian and succeeding Archaic periods (Collins 1995:382).

The Archaic period for central Texas dates from ca. 6500 B.C. to A.D. 700 (Collins 1995). The Archaic period generally is believed to represent a shift toward the hunting and gathering of a wider array of animal and plant resources and a decrease in group mobility (Willey and Phillips 1958:107–108). In the eastern and southwestern U.S. and on the Great Plains, the Archaic period is succeeded by the development of horticultural-based, semisedentary to sedentary societies. In these areas, the Archaic truly represents a developmental stage of adaptation as Willey and Phillips (1958) define it. For central Texas, this notion of the Archaic is somewhat problematic. An increasing amount of evidence suggests that Archaic-like adaptations were in place prior to the Archaic (see Collins 1995: 381–382; Collins et al. 1989; Masson and Collins 1995) and that these practices continued into the succeeding Late Prehistoric period (Collins 1995:385; Prewitt 1981:74). In a real sense, the Archaic period of central Texas is not a developmental stage but an arbitrary chronological construct and projectile point style sequence. This sequence is based on several decades of archeological investigations at stratified Archaic sites along the eastern and southern margins of the Edwards Plateau. Collins (1995) and Johnson and Goode (1994) have divided this sequence into three parts—early, middle, and late—based on perceived (though not fully agreed upon by all scholars) technological, environ-mental, and adaptive changes.

Early Archaic (6500–4000 B.C.) sites are small and their tool assemblages are diverse (Weir 1976:115–122), suggesting that populations were highly mobile and densities low (Prewitt 1985:217). It has been noted that early Archaic sites are concentrated along the eastern and southern margins of the Edwards Plateau (Johnson and Goode 1994; McKinney 1981). This distribution may be indicative of climatic conditions at the time, given that these areas have more reliable water sources and a more diverse resource base than other parts of the region. Early Archaic projectile point styles include Angostura, Gower, Wells, Martindale, and Uvalde. Manos, metates, hammerstones, Clear Fork and Guadalupe bifaces, and a variety of other bifacial and unifacial tools are common to early Archaic assemblages. The construction and use of rock hearths and ovens reflect a specialized subsistence strategy (exploitation of roots and bulbs?) during the early Archaic. These burned rock features most likely represent the technological predecessors of the larger burned rock middens extensively used later in the Archaic period (Collins 1995:383). Significant early Archaic sites include the Youngsport site in Bell County (Shafer 1963), which yielded

Gower and Wells dart points from deeply buried contexts.

During the middle Archaic period (4000–2000 B.C.), the number and distribution of sites, as well as site size, increased due to probable increases in population densities (Prewitt 1981:73; Weir 1976:124, 135). Macrobands may have formed at least seasonally, or an increased number of small groups may have utilized the same sites for longer periods of time (Weir 1976:130–131). A greater reliance on plant foods is suggested by the presence of burned rock middens toward the end of the middle Archaic, although tool kits still imply a strong reliance on hunting (Prewitt 1985:222–226). Middle Archaic projectile point styles include Bell, Andice, Taylor, Baird, Nolan, and Travis. Bell and Andice points reflect a shift in lithic technology from the preceding early Archaic Martindale and Uvalde point styles (Collins 1995:384). Johnson and Goode (1994:25) suggest that the Bell and Andice darts are parts of a specialized bison hunting tool kit. They also suggest that the beginning of the middle Archaic was marked by an influx of bison and bison-hunting groups from the Eastern Woodland margins during a slightly more mesic period. Bell points and bison remains were recovered from the Landslide site in Bell County (Sorrow et al. 1967). Bison disappeared as more-xeric conditions returned during the later part of the middle Archaic. Later middle Archaic projectile point styles represent another shift in lithic technology (Collins 1995:384; Johnson and Goode 1994: 27). Prewitt (personal communication 2000) postulates that the production and morphology of Travis and Nolan points are similar to projectile points from the Lower Pecos region. Such characteristics as beveled stems and overall morphology may have originated in the Lower Pecos, since these elements appeared earlier in the Lower Pecos than they did in central Texas. Shafer's (1963:67) surprise that Nolan points, which are more common in sites to the south and west, were not found in greater numbers at the Youngsport site might support the idea that bearers of these darts came out of the Lower Pecos and moved into adjacent portions of central Texas, but did not utilize all portions of central Texas equally. At the same time, a shift to more-xeric conditions bore witness to the construction and use of burned rock middens. Johnson and Goode (1994:26) believe that the dry conditions promoted the spread of xerophytic plants, such as yucca and sotol, and that it was these plants that were collected and cooked in large rock ovens by late middle Archaic peoples.

During the succeeding late Archaic period (2000 B.C. to A.D. 700), populations continued to increase (Prewitt 1985:217). Within stratified Archaic sites, such as Youngsport, the Baylor site in McLennan County (Story and Shafer 1965), and the Steele site in Hill County (Stephenson 1970), the late Archaic components contain the densest concentrations of cultural materials. The establishment of large cemeteries along drainages suggests strong territorial ties by certain groups (Story 1985a:40). A variety of projectile point styles appeared throughout the late Archaic period. Johnson and Goode (1994:29–35) divide the late Archaic into two parts based on increased population densities and perceived evidence of Eastern Woodland ceremonial rituals and religious ideological influences. Middle Archaic subsistence technology, including the use of burned rock middens, continued into the late Archaic period. Collins (1995:384) states that, at the beginning of the late Archaic period, the construction and use of burned rock middens reached its zenith and that their use declined during the latter half of the late Archaic. However, there is mounting chronological data that midden formation and use culminated much later and that this high level of use continued into the early Late Prehistoric period (Black et al. 1997:270–284; Kleinbach et al. 1995:795). A picture of prevalent burned rock midden use in the eastern part of the central Texas region after 2000 B.P. is gradually becoming clear. This scenario parallels the widely recognized occurrence of post-2000 B.P. middens in the western reaches of the Edwards Plateau (see Goode 1991). The use of burned rock middens appears to have been a major part of the subsistence strategy, as a decrease in the importance of hunting, inferred from the low ratio of projectile points to other tools in site assemblages, may have occurred (Prewitt 1981:74).

The Late Prehistoric period (A.D. 700–1700) is marked by the introduction of the bow

and arrow and then ceramics into central Texas. Population densities dropped considerably from their late Archaic peak (Prewitt 1985:217). Subsistence strategies did not differ greatly from the preceding period, although bison became an important economic resource during the latter part of the Late Prehistoric period (Prewitt 1981:74). The use of burned rock middens for plant food processing(?) continued throughout the Late Prehistoric period (Black et al. 1997; Kleinbach et al. 1995: 795). Horticulture came into play very late in the region but was of minor importance to overall subsistence strategies (Collins 1995:385).

In central Texas, the Late Prehistoric period generally is associated with the Austin and Toyah phases (Jelks 1962; Prewitt 1981: 82–84). Story (1990:364), in her overview of the middle Brazos River basin, argues for a period/horizon characterized by Alba points and early Caddoan-like pottery intermediate between the Austin and Toyah phases. Evidence of this proposed archeological manifestation was found at the Chupik site in McLennan County (Watt 1953). Much of what we know about the Austin and Toyah phases comes from rockshelter sites in and around Whitney Lake in Bosque and Hill Counties (see Jelks 1962; Stephenson 1970). Austin and Toyah phase horizon markers, Scallorn-Edwards and Perdiz arrow points, respectively, are distributed across most of the state. The introduction of Scallorn and Edwards arrow points into central Texas often is marked by evidence of violence and conflict, as many excavated burials contain these point tips in contexts indicating they were the cause of death (Prewitt 1981:83). Subsistence strategies and technologies (other than arrow points) did not change much from the preceding late Archaic. This continuity is recognized by Prewitt's (1981) use of the term "Neoarchaic." In fact, Johnson and Goode (1994:39–40) and Collins (1995:385) state that the break between the late Archaic and the Late Prehistoric could be represented easily and appropriately by the break between the Austin and Toyah phases.

Around A.D. 1000–1200, slightly more-xeric or drought-prone climatic conditions returned to the region, and bison returned in large numbers (Huebner 1991; Toomey et al. 1993). Utilizing this vast resource, Toyah phase peoples were equipped with Perdiz point-tipped arrows, end scrapers, four-beveled-edge knives, and plain bone-tempered ceramics. The technology and subsistence strategies of the Toyah phase represent a completely different tradition than the preceding Austin phase. Contact with Caddoan groups to the east and northeast is represented by Caddoan ceramics in site assemblages, particularly in the eastern peripheral areas of central Texas (e.g., Stephenson 1970). Collins (1995:388) states that burned rock middens fell out of use, as bison hunting and group mobility obtained a level of importance not witnessed since Folsom times. While the importance of bison hunting and high group mobility hardly can be disputed, the cessation of burned rock midden use during the Toyah phase is tenuous. A recent examination of Toyah-age radiocarbon assays and assemblages by Black et al. (1997) suggests that their association with burned rock middens represents more than a "thin veneer" capping Archaic-age features. Black et al. (1997) claim that burned rock midden use, while not as prevalent as in earlier periods, played a role in the adaptive strategies of Toyah peoples.

Historical accounts of Native Americans and their interactions with the Spanish, the Republic of Mexico, the Texas Republic, and the United States throughout the region are provided by Hester (1989), Jelks (1970), and Newcomb (1961). The late seventeenth and early eighteenth centuries was an era of more-permanent contact between Europeans and Native Americans, as the Spanish moved northward out of Mexico to establish settlements and missions on their northern frontier. There is little available information on aboriginal groups and their ways of life except for the fragmentary data gathered by the Spanish missionaries. The inevitable and disastrous impacts to native social structures and economic systems by disease and hostile encounters with Europeans and intruding groups, such as the Apache, were already under way at this time. Historically, three groups occupied the study area: Wichita-speaking groups consisting of the Tawakoni, Waco, and Kichai; Caddoan tribes comprised of the Anadarko, Hasinai, and Kadohadacho; and the Tonkawa.

The Apaches and Comanches also were present, but later in time.

Athanase de Mézières's expeditions along the Brazos River in the 1770s encountered two large Tawakoni villages along a stretch from present-day Waco to the vicinity of the Nolan River (Jelks 1970; Krieger 1996). Based on archeological evidence and historical documents, the Stansbury site near Whitney Lake was occupied by the Tawakoni in the 1770s–1780s (Jelks 1970), and Story (1985b) identifies a number of other sites in the Waco area, e.g., Stone, Gas Plant, and Walton, that appear to be associated with occupations by Wichita groups. By the mid-1830s, the Stansbury site was occupied by the Caddoan-speaking Hasinai, but the village moved in 1846 approximately 10 miles up the Brazos near the locale that would become Fort Graham in 1849. Fort Graham was established to provide protection for the growing number of Euro-American settlements in the area from Native American hostilities, but it was occupied only briefly by the United States military and abandoned in 1853 (Jelks 1970). Tonkawa groups seeking protection from Comanche raids settled near here. By the 1870s, the remaining groups of Tonkawa, Apache, and Comanches were removed from the area and placed on reservations in Indian territory.

Central Blackland Prairie

This synopsis focuses on the eastern part of the Waco District and the southern Dallas District, an area that is more coherent as a natural region than a cultural one. Most of this area is within the central part of the Blackland Prairie, extending from Bell County at the south end of the Waco District north to Ellis and Kaufman Counties in the Dallas District. Also included, however, are small areas of Oak Woodlands in the eastern parts of Limestone and Navarro Counties. The northern part of the region is drained by the Trinity River and two of its major tributaries, Chambers and Richland Creeks. The Brazos River and two of its major tributaries, the Navasota and Little Rivers, flow through the southern part.

The archeology of this area, or at least its core part, is not well understood because few large-scale projects involving excavations at numerous sites have been undertaken. Among those project areas that have contributed important information are the Superconducting Super Collider in Ellis County, Bardwell Lake in Ellis County, Cedar Creek Reservoir in Kaufman and Henderson Counties, Richland-Chambers Reservoir in Navarro and Freestone Counties, Navarro Mills Reservoir in Navarro and Hill Counties, Aquilla Lake in Hill County, and Lake Limestone in Limestone County (see Guy [1990], Prikryl [1993], and Yedlowski et al. [1998] for more-detailed information on these and other regionally relevant projects). However, three of these—Cedar Creek Reservoir, Richland-Chambers Reservoir, and Lake Limestone—are on the eastern margin of the area and tell us more about Native American adaptations to the Oak Woodlands than the Blackland Prairie. Aquilla Lake also is geographically marginal, lying at the boundary between the Blackland Prairie and the Eastern Cross Timbers. Another bias stems from the fact that all of these project areas, except Lake Limestone, are in the northern part of the region. There have been no major archeological projects on the Blackland Prairie in the Brazos basin portion of this region, although there is one notable project just to the south—Granger Lake in Williamson County—that provides important information about how this part of the area was used prehistorically.

The data from Granger Lake (Hays 1982; Prewitt 1974, 1982), as well as information supplied by avocational archeologists with collections from the Little River valley (Elton R. Prewitt, personal communication 2000), show that the prehistory of the Blackland Prairie south of the Brazos River has much more in common with the prehistory of the Edwards Plateau and central Texas to the west than with that of areas to the north. In fact, at least for certain time periods, the same may be said, albeit less strongly, for the western edge of the Blackland Prairie north of the Brazos, e.g., at Aquilla Lake (Brown 1987). Because the prehistory of central Texas as seen on the Edwards Plateau is summarized above, it is not reiterated here, regardless of its applicability to the southeastern section of the Waco

District. Instead, this discussion focuses on the rest of the central Blackland Prairie and immediately adjacent Oak Woodlands to the east.

Sites such as Horn Shelter No. 2 and Wilson-Leonard have provided substantial information on the Paleoindian period for the area to the west of this region (see Northeast Margin of Central Texas above), but there are no excavated and reported Paleoindian components on the central Blackland Prairie itself. Nonetheless, a variety of early points have been found, largely in surface contexts, and it is clear that this part of Texas was used throughout the period from ca. 10,000 to 6500 B.C. Presumably, this use was by hunter-gatherer groups with low population densities and high residential mobility. An analysis of materials collected by C. K. Chandler and other avocational archeologists from sites chiefly in Ellis County during the Superconducting Super Collider project identified a handful of Paleoindian projectile points typed as Clovis, Plainview, Dalton, Golondrina, and San Patrice, along with several untyped lanceolate specimens (Yedlowski et al. 1998:519–520). Other early materials from the area include one Folsom from the Wild Bull site in Henderson County (Story 1965:189–190); a few San Patrice points from Richland-Chambers Reservoir (McGregor and Bruseth 1987:176–179); several Brazos Fishtail and Plainview points from Aquilla Lake (Brown 1987:44-1 through 44-2); a cache of 23 prismatic blades from a site in Navarro County (Young and Collins 1989); probably the Brookeen Creek cache of 173 blades and flakes from Hill County (Mallouf 1981); and one Folsom point from Lake Limestone (Mallouf 1979:44). Just east of Lake Limestone in Leon County, the Lambs Creek knoll site yielded a Golondrina point, several untyped lanceolate points, and a radiocarbon assay of 8940 B.P., but these were mixed with later materials and hence of limited interpretability (Fields 1995: 304).

Mixing of components also has hampered interpretations about how the region was used by Native Americans during the lengthy Archaic period, ca. 6500 B.C. to A.D. 700. Because few pure Archaic components have been excavated, particularly ones dating to the first two-thirds of the period, it is difficult to say much about artifact chronologies, subsistence practices, or settlement strategies. A variety of projectile point styles traditionally associated with the early and middle parts of the Archaic period in central Texas—for example, Andice, Angostura, Bell, Gower, Hoxie, Martindale, Nolan, Travis, and Uvalde (Yedlowski et al. 1998:520)—were identified during analyses for the Superconducting Super Collider project (while a host of other types perhaps dating to this time and later were identified as well, their chronologies are less certain), but these points are few in number and do not appear to represent major occupation of this part of the Blackland Prairie. Demonstrably early points were even scarcer at the nearby Pecan Springs site at Bardwell Reservoir and the Strawn Creek site at Navarro Mills Reservoir, with a Hoxie point from Pecan Springs being the clearest example (Duffield 1963; Sorrow 1966). Similarly, early to middle Archaic points, including Angostura, Bell/Andice, Gower, Hoxie (?), and Martindale, were found only in small numbers at Aquilla Lake to the west (Brown 1987:44-12 through 44-21), suggesting limited use of the valleys of Aquilla and Hackberry Creeks during this time.

The relatively intensive work at Richland-Chambers Reservoir and Lake Limestone (and Jewett Mine just to the east) suggests a similar conclusion for the western edge of the Oak Woodlands, although for both areas it has been noted that data pertaining to the early to middle Archaic may be scarce in part because sites dating to this interval lie deeply buried or were removed by extensive erosion during the mid-Holocene (Fields 1995:302; McGregor and Bruseth 1987:229). Only a few radiocarbon assays predating 4000 B.P. were obtained from these project areas, and only one excavated site, Charles Cox at the Jewett Mine, contains a substantial component that might be early or middle Archaic in age (Fields 1995: 303, 304–305). This component appears to be represented by a variety of untyped dart points with expanding and parallel stems, but later materials are mixed in as well, and the deposits were not dated by radiocarbon. Points dated to this interval in central Texas, for example, Bell/Andice/Calf Creek and Hoxie,

occur at both Richland-Chambers Reservoir and the Jewett Mine, but only in very small numbers.

A much different picture is presented for the late part of the Archaic period, i.e., after about 4000 B.P. All parts of the central Blackland Prairie that have been studied archeologically contain sites dating to this period, and the late Archaic represents the earliest time for which much is known about Native American lifeways. Both the Pecan Springs and Strawn Creek sites on the Blackland Prairie proper yielded such late Archaic point types as Gary, Dawson, and Yarbrough, although they tend to be mixed with materials from later occupations (Duffield 1963:60–62; Sorrow 1966:56–61). The surface collections analyzed during the Superconducting Super Collider project also contained these types, as well as a number of late Archaic types common in central Texas—including Bulverde, Darl, Ensor, Marcos, Marshall, Montell, and Pedernales—and a variety of probably late Archaic forms more characteristic of the north-central and eastern parts of the state, such as Carrollton, Edgewood, Elam, Ellis, Kent, and Neches River oletha (Yedlowski et al. 1998: 520–521). Noting the relatively high frequency of late Archaic projectile points, Yedlowski et al. (1998:527–528, 533) suggest that the region saw an increase in utilization by hunter-gatherers as a result of moister climatic conditions than before, presumably associated with greater productivity in subsistence resources. They also note that, while the projectile point evidence indicates interaction with groups living in central Texas proper, larger proportions of points indicate affinities with eastern Texas than during the early and middle Archaic.

Brown (1987:44-22 through 44-26) presents similar conclusions concerning an increase in occupational intensity (increased population?) and increased interaction to the north and east during the late Archaic for the Aquilla Lake area based on an increase in the number of sites with late Archaic diagnostics and the dominance of the Gary dart point type. The same certainly may be said for those project areas at the eastern edge of the region, i.e., Cedar Creek Reservoir, Richland-Chambers Reservoir, and Lake Limestone. Two of the 3 excavated sites at Cedar Creek Reservoir have strong late Archaic components represented by numerous Gary points and a variety of other lithic tools (Story 1965), while at least 15 sites at Richland-Chambers Reservoir and 12 of the excavated sites at Lake Limestone and adjacent Jewett Mine have identifiable components of this age. In addition to constellations of projectile point styles (e.g., Dawson, Gary, Godley, Kent, Neches River oletha, and Yarbrough) that indicate ties more to the north and east than to the south and west, each of these areas has yielded information suggesting that ceramics may have been introduced into the material culture of local groups during the latest part of the late Archaic, as they were across most of Texas to the east (where this interval usually is called the Early Ceramic period, and sometimes the Woodland period).

At Cedar Creek Reservoir, there are hints in the distributional data from the Lacy and Gossett Bottoms sites that the initial use of ceramic containers preceded introduction of the bow and arrow, although it is difficult to be certain because the sites were not well stratified and the sherds could not be related to known early types such as Williams Plain (Story 1965:248, 251). At Richland-Chambers Reservoir, distinctive shell-tempered sherds were recovered from contexts dated between A.D. 200 and 700 at the Adams Ranch site (McGregor and Bruseth 1987:180–181), apparently representing the earliest ceramic industry in this part of the Trinity River basin. At Lake Limestone and the Jewett Mine, a few shell-tempered sherds, a few sherds with a fine kaolin paste but no obvious temper, and larger numbers of sandy paste ceramics and grog- or bone-tempered ceramics were found in contexts that appeared to predate arrow points (i.e., the latter part of the late Archaic). While some of these could be genuinely early, especially the sandy paste wares which are so reminiscent of the early ceramics that predominate in east Texas south of the Sabine River, it is possible that the other sherds were intrusive from later deposits (Fields 1995: 308). In either case, sherds were sufficiently infrequent to suggest that, while ceramic containers may have been a notable addition to the material culture, they were not abundant.

The most-complete picture of the archeology of the late Archaic for this region comes from the Oak Woodlands at the eastern margin of the Blackland Prairie. Along Richland and Chambers Creeks, late Archaic groups appear to have been hunter-gatherers whose subsistence pursuits focused on wild plant foods, such as hickory nuts and prairie turnip, and faunal taxa such as deer, turtles, small mammals, birds, and fish (McGregor and Bruseth 1987:236–240). While presumably not sedentary, these groups clearly used the area in an intensive fashion for residential purposes, and it appears that populations increased while territory sizes decreased. A conspicuous component of the record is the so-called "Wylie pit," examples of which were excavated at the Bird Point Island and Adams Ranch sites. These were large features that appear to have been used for communal processing of vegetal resources (and later as cemeteries), perhaps in the context of band aggregation in "tension zones" as territories decreased in size (McGregor and Bruseth 1987:237).

The Navasota River valley and the area eastward to and across the Trinity River divide also was occupied with increased intensity during the late Archaic period (Fields 1995:307–309), although there is no evidence for the kind of population aggregations indicated at Richland-Chambers Reservoir. Faunal and macrobotanical remains were not preserved in the late Archaic components at Lake Limestone and the Jewett Mine, except for the ubiquitous hickory nutshells, and thus data on subsistence are limited. Nonetheless, it is surmised that these hunter-gatherers subsisted on a variety of wild plant foods and game, especially deer. Of the 20 excavated components assigned to this period, 15 are interpreted as residential bases and 5 as procurement/processing locations. Five of the residential-base components are located along the Navasota River and appear to represent general-purpose campsites, while the others are in the uplands to the east and consist of 2 general-purpose residential bases and 8 residential bases at which activities focused heavily on plant processing and secondarily on hunting. This distinction suggests that late Archaic settlement systems were scheduled based on the occurrence of plant foods. The analysis units interpreted as procurement/processing locations appear to have had a primary focus on plant processing and a secondary focus on hunting-related activities. Four of these are along streams in the uplands, while the fifth is along a Navasota River tributary to the west. The data from these 20 components are consistent with the idea that late Archaic groups were chiefly foragers, as procurement/processing locations suggesting logistical use are not frequent. Settlement systems appear to have been highly scheduled, probably on a seasonal basis, with residential sites in riverine settings differing from those in the uplands. Comparisons with earlier components at Lake Limestone and the Jewett Mine are difficult, but the much greater frequency of late Archaic components and the overall greater intensity of use suggest increased population densities, decreased territories, or both. This also is suggested by the occurrence of the late Archaic cemetery at the Cottonwood Springs site along Lambs Creek on the east side of the Navasota River valley (Fields and Klement 1995).

Sites dating to the Late Prehistoric period, after ca. A.D. 700, also are common across the central Blackland Prairie. The collections studied during the Superconducting Super Collider project contain substantial numbers of both early (e.g., Alba, Bonham, Catahoula, Colbert, Scallorn, and Steiner) and late (e.g., Cliffton and Perdiz) arrow points, but Yedlowski et al. (1998:521, 527) note that early arrow points are more frequent, perhaps reflecting continued high population densities from the late Archaic period. Other than the Perdiz and Scallorn types, which have such widespread distributions, the arrow point styles point eastward and northward. The limited ceramic samples, containing sherds reminiscent of types such as Weches Fingernail Impressed, Killough Pinched, Maydelle Incised, and Poyner Engraved, also support interaction with Caddoan groups to the east (Yedlowski et al. 1998:521–522). The Strawn Creek site at Navarro Mills Reservoir presents a similar picture, with most of the typed arrow points dating to the first half of the Late Prehistoric period and the more-distinctive ceramics in the small collection

relating to the early Caddoan types Crockett Curvilinear Incised and Weches Fingernail Impressed (Duffield 1963). The Pecan Springs site at Bardwell Reservoir also yielded numerous early arrow points, as well as a respectable number of Perdiz points, along with a small collection of highly fragmented sherds (Sorrow 1966).

Occupations dating to the early and late parts of the Late Prehistoric period also are represented at Aquilla Lake at the western edge of the Blackland Prairie, with the strongest components at the McDonald and Brazil sites (Brown 1987:44-27). Almost all of the small ceramic sample was from one site, McDonald. Among the ceramics are specimens that could be related to the Caddoan types Canton Incised, Kiam Incised, and Maydelle Incised, pointing to interaction with groups living to the east and northeast. The faunal sample from the McDonald site indicates that these hunter-gatherers relied on deer, turtles, fish, and mussels; bison were utilized only during the latter part of the period (Brown 1987:38–144).

Hopping across the Blackland Prairie to the western edge of the Oak Woodlands, all three excavated sites at Cedar Creek Reservoir contained Late Prehistoric components, although materials of this age were common only at the Gossett Bottoms and Lacy sites (Story 1965:245–246). Early arrow point forms (e.g., Alba, Catahoula, Friley, Granbury, Scallorn, and Steiner) are better represented than late ones (e.g., Cliffton and Perdiz), but not by much. Not surprisingly, ceramics are more frequent in this area than to the west and clearly are related to the Caddoan tradition to the east and northeast; some of the more-distinctive decorated sherds were considered reminiscent of types such as Canton Incised, Killough Pinched, and Ripley or Wilder Engraved (Story 1965:226–234). The faunal remains from the Gossett Bottoms and Lacy sites, many of which probably relate to Late Prehistoric occupations, consist predominantly of deer, turtles, and small mammals, with bison occurring only in small numbers. Based on the feature evidence (or lack thereof), it appears that this part of the Trinity basin was occupied by mobile hunter-gatherers rather than sedentary groups during the Late Prehistoric period.

As for the preceding late Archaic period, some of the best data concerning how Native Americans used the region during the Late Prehistoric period is from Richland-Chambers Reservoir and Lake Limestone and adjacent Jewett Mine. Sites dating to this interval are common at Richland-Chambers Reservoir, especially for the early half of the period, and it appears that there was a significant decline in population densities after about A.D. 1300 (McGregor and Bruseth 1987:245). The data suggest that most of the excavated sites with Late Prehistoric components were used for residential purposes (McGregor and Bruseth 1987:241, 244, 246), although there are some sites, for example the stream-side concentrations of mussel shells and artifacts at 41FT193 and 41NV139, that probably were used in a more limited fashion. The house patterns at the Bird Point Island site point to intensive use by sedentary hunter-gatherers during the first half of the period, while other components that are contemporaneous, slightly earlier, or later (e.g., at Bird Point Island, Adams Ranch, Irvine, and Little Cedar Creek) have middens and numerous features suggesting intensive use but no houses. These components may represent occupations that were seasonal in length. Macrobotanical remains point to use primarily of wild plant foods, i.e., hardwood nuts, a variety of seeds, and tubers/rhizomes (McGregor and Bruseth 1987:243). The only tropical cultigen is maize, and it occurs in very small quantities only in contexts dating to the last half of the period. Hence, groups who lived in this area were predominantly hunters and gatherers. The arrow points that characterize the early and late parts of the period—Alba, Scallorn, and Steiner vs. Perdiz and Cliffton—are the same styles as found elsewhere across the area, and it appears that Gary dart points may have continued to be used through the early Late Prehistoric (McGregor and Bruseth 1987:183). Ceramics are moderately common and clearly relate to Caddoan wares, with most of the identified types (e.g., Maydelle Incised, Poyner Engraved, and Weches Fingernail Impressed) indicating contact with groups in the Neches River drainage, east of the Trinity.

Work at Lake Limestone along the

Navasota River and the Jewett Mine in the uplands to the east identified 11 components dating predominantly to the Late Prehistoric period, although not all are well dated (Fields 1995:313–317). Five are interpreted as residential bases, while the other six are procurement/processing locations. These sites suggest that the Late Prehistoric period saw a change in settlement strategies from the late Archaic, and that there were changes within the Late Prehistoric period as well. During the early part of the period, residential activities were increasingly restricted to lowland sites, while the uplands were used mostly for hunting-related procurement/processing tasks. This indicates that logistical strategies became more important, but there is no evidence that this was accompanied by increased sedentism within the upper Navasota River basin itself. During the late part of the period, the area apparently saw a return to forager-oriented hunter-gatherer strategies entailing more equable use of upland and lowland settings. Faunal remains indicate that deer, turtles, and rabbits were hunted commonly, with other small mammals, bison, fish, birds, lizards, and snakes being represented as well. Hickory nutshells are by far the most common plant remains; there is no evidence for horticulture in any of these components. Scallorn and Steiner are the most common early arrow point styles, and it appears that the use of dart points may have persisted through the early part of the period (Fields 1995:314). Perdiz is the dominant late arrow point style. Ceramics occur widely but infrequently, being common only at a few sites that date mostly to the late part of the period. Nonetheless, they all relate strongly to Caddoan wares from east of the Trinity River, with the more-distinctive sherds showing typological affinities to early types such as Holly Fine Engraved and Weches Fingernail Impressed and later types such as Maydelle Incised, Killough Pinched, Poyner Engraved, and Patton Engraved. Based mostly on the abundance of Caddoan ceramics in these components, but also lack of evidence for permanent occupations (i.e., structures), Fields et al. (1991) suggested that these sites were used by Caddo Indians as base camps in support of forays by hunting parties or other procurement/processing task groups, or perhaps by groups in transit between the eastern and central parts of the state. It is equally plausible, however, that they were created by local hunter-gatherer groups and that the ceramics are the result of trade or the borrowing of ideas about ceramic manufacture and decoration. Of course, this question applies to all of the area under consideration here, given the widespread but generally low-frequency occurrence of Caddoan-style ceramics on the Blackland Prairie proper and its eastern and western edges (e.g., Brown 1987:44-29 through 44-32).

Native American archeological sites dating to the protohistoric and early historic periods are not common in the central Blackland Prairie, and it appears that much of the area was depopulated for most of this time. Materials of this age are so scarce as to be almost invisible archeologically in the project areas discussed above, i.e., the Superconducting Super Collider, Bardwell Lake, Cedar Creek Reservoir, Richland-Chambers Reservoir, Navarro Mills Reservoir, Aquilla Lake, and Lake Limestone and Jewett Mine. About the only evidence for use of these areas are occasional occurrences of Caddoan Patton Engraved sherds, potentially late shell-tempered sherds that could relate to intrusive groups from Oklahoma and north Texas, and triangular arrow points. Conspicuously present, however, is a small number of sites that relate to use by Wichita groups who moved southward into the region in the seventeenth and eighteenth centuries. Among these are the Vinson site in Limestone County, the Gas Plant site and others in the Waco area, and, just outside the region to the east, the Pearson and Gilbert sites in Rains County (Duffield and Jelks 1961; Jelks 1967; Smith 1993; Story 1985b).

SUMMARY OF IMPACT EVALUATIONS AND SURVEYS

Forty-one work orders distributed across all five TxDOT Districts were completed (Figure 3). These consisted of 119 Impact Evaluations, 21 Surveys, 3 Surveys with Geoarcheological Evaluation, 1 work order for a quality control meeting with TxDOT, and 1 work order to produce this report. Combined, these work orders entailed efforts at 151 bridge or relief structure replacements, 14 projects

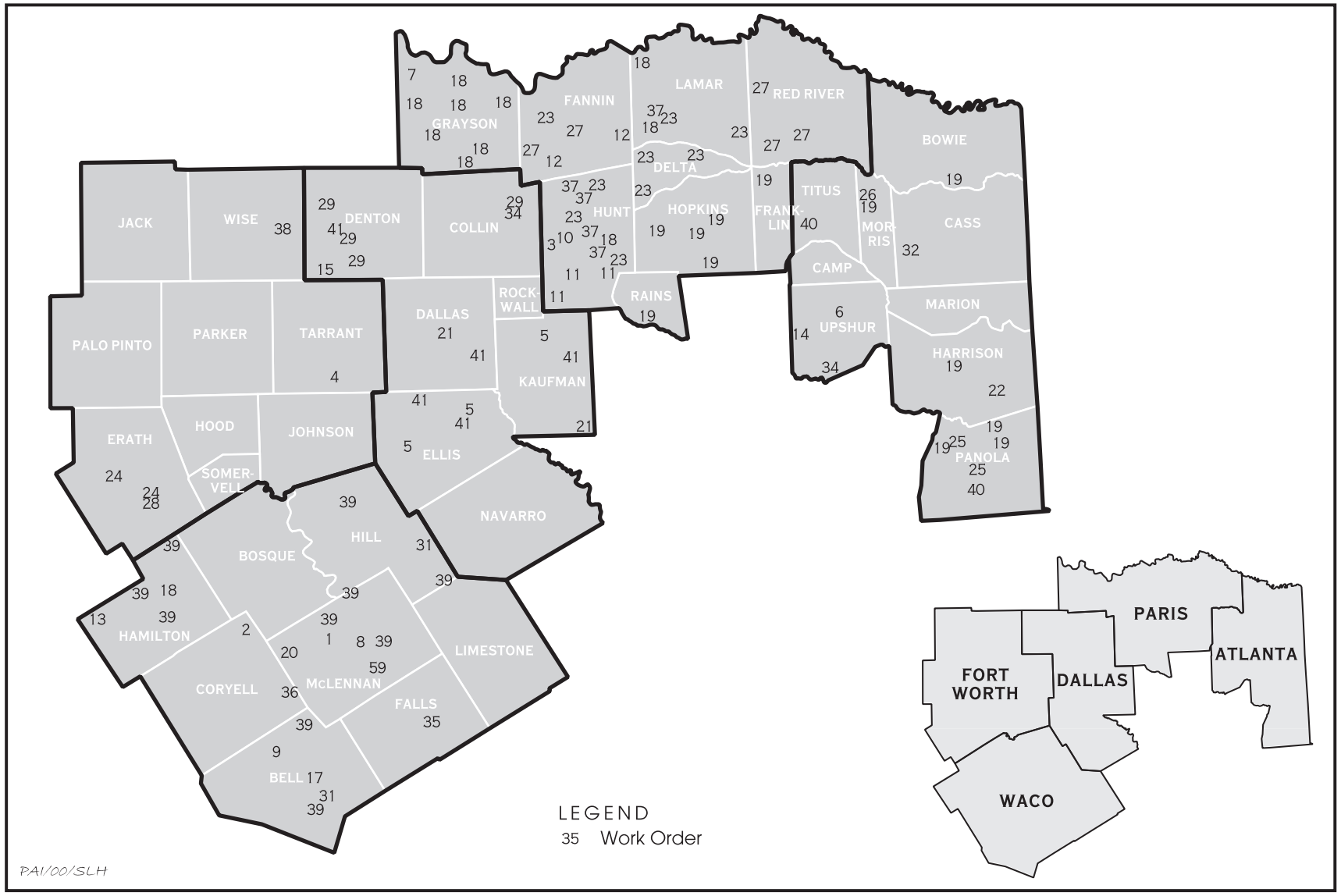

Figure 3. Map of the study area showing the locations of all Impact Evaluations and Surveys.

involving primarily road widening or realignment (most with bridge replacements as well), and 1 project consisting of construction of an exit ramp. During completion of these work orders, 16 newly discovered or previously recorded archeological sites and 1 possible site were investigated. This section begins with an outline of the methods used in accomplishing the work orders. Next, the work efforts are summarized in terms of distribution, setting, presence/absence of sites, and recommendations. This is followed by a discussion of the existing impacts observed as they relate to the potential for archeological remains in good context at these locations, descriptions of the sites investigated, and a summary of the results of the most-informative geoarcheological investigation. The section closes with a discussion of the utility of the fieldwork done under these work orders and recommendations for future projects of this kind.

Methods

Each work order done under this contract began with acquisition of the appropriate USGS map(s), a files search at the Texas Archeological Research Laboratory and the online Texas Archeological Sites Atlas concerning known sites in and near the project area, and review of project plans (if available) to identify impact areas. Plans showing areas to be impacted, or sufficient information to determine that no new right of way or construction easements will be required, were available for approximately 60 of the 143 areas investigated. The field methods employed varied depending on the type of project.

For Impact Evaluations of bridge replacements, fieldwork typically consisted of on-the-ground examination of the existing right of way on both sides of the road along the full length of the project area, usually extending at least 50 m and sometimes several hundred meters on each side of the bridge to be replaced. As right-of-entry usually had not been obtained for known/potential impact areas beyond the existing right of way, these areas were subjected to visual inspection across fence lines. The ground surface and any disturbed areas (e.g., road cuts, the backdirt of recently placed fiber optic/telephone lines, plowed fields, etc.) within and adjacent to the existing right of way were examined for evidence of archeological remains. However, the primary thrust was to record the kinds and extent of disturbance and determine the likelihood of archeological remains in undisturbed contexts. In most cases, this entailed examining visible stream cutbanks and overall valley geometry to form an opinion about the thickness and extent of Holocene alluvium that could host buried archeological deposits. Typically, shovel tests were not dug since cutbanks provided adequate information on sediment thickness.

For each bridge replacement or other Transportation Activity, a standardized Impact Evaluation form was completed recording anticipated impacts, location and extent of disturbances (e.g., ditches, fill sections, underground utilities, gullying/erosion, and other), location/extent of undisturbed right of way, geologic/geomorphic setting, nature/thickness/origin of sediments, archeological remains observed, recommendations, personnel, and time spent. In addition, each project area was documented with color photographs. Impact Evaluations were done by one or two individuals, with the typical bridge replacement requiring 1–2 hours. Each of the several Impact Evaluations that involved long stretches of highway was carried out as a series of on-the-ground inspections (i.e., at each stream crossing) following the methods outlined above, with the intervening upland areas subjected to windshield inspection.

For Surveys and Surveys with Geoarcheological Evaluations, fieldwork included excavating sufficient numbers of backhoe or Gradall trenches, often accompanied by shovel tests, to constitute a good-faith effort toward determining whether archeological sites are present. As listed in Table 1, 144 trenches were excavated in 20 of the 24 survey areas, ranging from only 2 trenches to as many as 26. One hundred twenty-nine shovel tests were excavated in 14 survey areas (range = 2–48 tests). In the 4 cases where only shovel tests were excavated, it was because the backhoe could not gain access or because of a lack of landowner permission. Only 4 of the surveys were restricted to existing rights of way; these project areas ranged from 5 to 94 acres

Table 1. Summary of work orders

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
1	McLennan	Impact Evaluation; bridge replacement on CR 345 (0.4 acres of new ROW)	Holocene alluvium (1+ m) along Tennant Branch; Trinity clay soils; adjacent uplands are Cretaceous Washita Group Formations	rural; adjacent lands in pasture	none	no survey needed
2	Coryell	Survey with Geoarcheological Assessment (2 trenches); bridge replacement on CR 213 (0.7 acres of new ROW)	Holocene alluvium (1.0–2.5 m) along Coryell Creek; Bosque clay loam and Lewisvile clay loam soils; adjacent uplands are Cretaceous marl and limestone	rural; adjacent lands mostly in pastures and fields	41CV1620	no further work
3	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (1.5+ m) along Payne Creek; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations	rural; adjacent lands mostly in pastures and fields	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (3+ m) along Brushy Creek; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (2+ m) along West Caddo Creek slough; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (4+ m) along West Caddo Creek; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (3+ m) along West Caddo Creek slough; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (?? m) along West Caddo Creek tributary; Leson clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations	rural; adjacent lands mostly in pastures and fields	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (1+ m) along Elm Creek; Tinn clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (2+ m) along East Caddo Creek slough; Tinn clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (3+ m) along East Caddo Creek; Tinn clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields with woods along the creek	none	survey only if impacts will occur outside existing ROW
	Hunt	Impact Evaluation; bridge replacement on SH 66 (specific plans not available)	Holocene alluvium (1+ m) along Block Branch; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pastures and fields	none	no survey needed
4	Tarrant	Survey (4 Gradall cuts); construction easement associated with bridge replacement on Enon Ave. at Everman Cemetery (0.2 acres of construction easement)	Cretaceous Grayson Marl and Main Street Limestone uplands; Crosstell fine sandy loam soils	semirural; adjacent to a modern cemetery with planted grasses, trees, and shrubs	none	no further work
5	Ellis	Impact Evaluation; bridge replacement on FM 66 (no new ROW)	Holocene alluvium (2–3 m) along South Prong Creek; Broken alluvial land and Austin silty clay soils; adjacent uplands are Cretaceous Austin Chalk	rural; adjacent lands mostly wooded	none	no survey needed

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Ellis	Impact Evaluation; bridge replacement on FM 813 (no new ROW)	Holocene alluvium (2+ m) along Red Oak Creek; Trinity clay soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands mostly in pasture	none	no survey needed
	Kaufman	Impact Evaluation; bridge replacement on Colquitt Rd. (no new ROW)	Holocene alluvium (1+ m) along Bachelor Creek; Kemp loam soils; adjacent uplands are Cretaceous Nacatoch Sand	semirural; adjacent lands are pasture and a golf course with planted grasses and trees	none	no survey needed
6	Upshur	Survey (9 trenches, 11 shovel tests); bridge and 2 relief structure replacements on SH 155 (no new ROW)	Holocene alluvium (1+ m) and terraces along Little Cypress Creek; Mantachie loam and Iuka fine sandy loam soils; adjacent uplands are Eocene Queen City Sand	rural; adjacent lands are mostly wooded with some pasture	41UR28	no further work
7	Grayson	Impact Evaluation; bridge replacement on U.S. Hwy 377 (no new ROW)	Holocene alluvium (2–3 m) along Sandy Creek; Bunyan soils; adjacent uplands are Cretaceous Woodbine Formation	rural; adjacent lands mostly in pasture with some woods	none	no survey needed
	Grayson	Impact Evaluation; bridge replacement on U.S. Hwy 377 (no new ROW)	Holocene alluvium (2–3 m) along Brushy Creek; Bunyan soils; adjacent uplands are Cretaceous Woodbine Formation	rural; adjacent lands mostly in pasture with some woods	none	no survey needed
	Grayson	Impact Evaluation; bridge replacement on U.S. Hwy 377 (no new ROW)	Holocene alluvium (2–3 m) along Red Branch; Bunyan soils; adjacent uplands are Cretaceous Woodbine Formation	rural; adjacent lands mostly in pasture with some woods	none	no survey needed
8	McLennan	Survey with Geoarcheological Assessment (26 trenches); bridge replacement and widening of 2.6 km of Loop 340 (no new ROW)	Holocene alluvium (9+ m) and terraces and Pleistocene terraces along the Brazos River; Bastrop fine sandy loam, Trinity clay, Asa silt loam, Asa silty clay loam, Miller clay, and Yahola silt loam soils; adjacent uplands are Cretaceous Ozan Formation	semirural; adjacent lands mostly in pasture, fields, and borrow pits	none	no further work
9	Bell	Survey (5 trenches); bridge replacement and road realignment on FM 439 (13 acres of new ROW)	Holocene alluvium (1.8+ m) along North Nolan Creek and adjacent Cretaceous Walnut Clay and Comanche Peak Limestone uplands; Krum silty clay, Lewisville silty clay, and Purves silty clay soils	rural; mostly in pasture	41BL1099 41BL1100 41BL1101	41BL1099 is outside of project area; assessment of 41BL1100 deferred pending dating of charcoal sample; no further work at 41BL1101

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
10	Hunt	Survey (4 trenches); bridge replacement on SH 66 (2.8 acres of new ROW)	Holocene alluvium (2+ m) along Elm Creek; Tinn clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations	rural; adjacent lands mostly in pasture	none	no further work
	Hunt	Survey (6 trenches); 2 bridge replacements on SH 66 (3.8 acres of new ROW)	Holocene alluvium (0.7–2+ m) along East Caddo Creek; Tinn clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations and Pleistocene terrace deposits	rural; adjacent lands mostly in pasture with woods along the creek	none	no further work
11	Hunt	Impact Evaluation; bridge replacement on CR 589 (<0.1 acre of new ROW)	Holocene alluvium (2.5+ m) along Pecan Branch; Kaufman clay soils; adjacent uplands are Cretaceous Kemp Clay	rural; adjacent lands mostly in pasture	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on CR 793 (no new ROW)	Holocene alluvium (3–4+ m) along Caddo Creek; Kaufman clay soils; adjacent uplands are Cretaceous Nacatoch Sand and Pleistocene terrace deposits	rural; adjacent lands mostly wooded	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on CR 813 (no new ROW)	Holocene alluvium (2+ m) along Dry Creek and adjacent Nacatoch Sand uplands; Nahatche loam soils	rural; adjacent lands partly wooded and partly in pasture	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on CR 520 (no new ROW)	Holocene alluvium (2+ m) along Cowleech Fork tributary; Nahatche loam soils; adjacent uplands are Cretaceous Navarro Group and Pleistocene terrace deposits	rural; adjacent lands mostly wooded	none	no survey needed
12	Fannin	Impact Evaluation; bridge replacement on FM 1550 (specific plans not available)	Holocene alluvium (3–5 m) along Davis Creek; Elbon silty clay loam soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands mostly in pasture with woods along the creek	none	no survey needed unless impacts extend beyond existing disturbed areas
	Fannin	Impact Evaluation; bridge replacement on FM 1550 (specific plans not available)	Holocene alluvium (3–5 m) along Bralley Pool Creek; Elbon silty clay loam soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands mostly in pasture with woods along the creek	none	no survey needed unless impacts extend beyond existing disturbed areas

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Fannin	Impact Evaluation; bridge replacement on FM 1550 (specific plans not available)	Holocene alluvium (2+ m) along Bledsoe Creek; Elbon silty clay loam soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands mostly in pasture with woods along the creek	none	no survey needed unless impacts extend beyond existing disturbed areas
	Fannin	Impact Evaluation; bridge replacement on FM 1553 (specific plans not available)	Holocene alluvium (2+ m) along Freeman Creek; Elbon-Trinity-Redlake soils; adjacent uplands are Cretaceous Gober Chalk	rural; adjacent lands partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
13	Hamilton	Impact Evaluation (1 shovel test); bridge replacement on CR 311 (1.3 acres of new ROW)	Holocene alluvium (<1 m) along Cowhouse Creek and adjacent Cretaceous Paluxy Sand and Glen Rose Limestone uplands; Purves-Denton-San Saba soils	rural; adjacent lands mostly in pasture and fields with woods along the creek	41HM44	no survey needed; 41HM44 is outside the project area
	Hamilton	Survey (2 trenches); bridge replacement and road realignment on CR 168 (2 acres of new ROW)	Holocene alluvium (2+ m) along the Leon River; Bosque clay loam soils; adjacent uplands are Cretaceous Glen Rose Formation and Pleistocene terrace deposits	rural; adjacent lands mostly in pasture with woods along the creek	41HM45	testing
14	Upshur	Survey (6 trenches, 9 shovel tests); bridge replacement on FM 1002 (1.5 acres new ROW, 0.8 acres for construction easement)	Holocene alluvium (1.5+ m) along Glade Creek and adjacent Eocene Queen City Sand uplands; Iuka fine sandy loam, Cuthbert fine sandy loam, and Bowie fine sandy loam soils	rural; adjacent lands are wooded	41UR36	testing
15	Denton	Impact Evaluation; bridge replacement on FM 156 (no new ROW)	Holocene alluvium (thickness unknown) along Harriet Creek; Frio silty clay soils; adjacent uplands are Cretaceous Duck Creek Formation and Fort Worth Limestone	rural; adjacent lands are in pasture or fields	none	no survey needed
	Denton	Impact Evaluation; bridge replacement on FM 156 (no new ROW)	Holocene alluvium (thickness unknown) and Pleistocene terrace deposits along Elizabeth Creek; Frio silty clay soils; adjacent uplands are Cretaceous Duck Creek Formation and Fort Worth Limestone	rural; adjacent lands are in pasture or fields	none	no survey needed
16	–	Quality Control Debriefing with TxDOT	–	–	–	–

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
17	Bell	Impact Evaluation; widening of 7.4 km of Loop 363 (13.5+ acres of new ROW)	Cretaceous uplands (Austin Chalk, Ozan, and South Bosque Formations) with limited Holocene alluvium (thickness unknown) along Pepper, Bird, Fryars, and Boggy Creek	mostly urban with shopping centers, parking lots, etc., adjacent to ROW; semirural at both ends of the project area, with pastures and fields adjacent to ROW	none	no survey needed
18	Grayson	Impact Evaluation; bridge replacement on SH 56 (specific plans not available)	Holocene alluvium (3+ m) along Post Oak Creek; Elbon silty clay and Trinity clay soils; adjacent uplands are Cretaceous Austin Group and Eagle Ford Formation	urban with parking lots and commercial buildings adjacent to ROW	none	no survey needed unless impacts extend beyond existing disturbed areas; historical research
	Grayson	Impact Evaluation; bridge and relief structure replacement on U.S. Hwy 82 (specific plans not available)	Holocene alluvium (2.0–2.5+ m) along Choctaw Creek; Elbon silty clay soils; adjacent uplands are Cretaceous Austin Group and Eagle Ford Formation	rural; adjacent areas are mostly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Grayson	Impact Evaluation; bridge replacement on U.S. Hwy 82 (specific plans not available)	Holocene alluvium (2–3+ m) along Mill Creek and Cretaceous Austin Chalk uplands; Elbon silty clay, Whitewright-Eddy-Howe, and Fairlie-Houston Black clay soils	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Grayson	Impact Evaluation; bridge replacement on FM 902 (specific plans not available)	Holocene alluvium (2–3+ m) along Range Creek; Elbon silty clay soils; adjacent uplands are Cretaceous Austin Group and Eagle Ford Formation	rural; adjacent lands are partly wooded and partly in fields	none	no survey needed unless impacts extend beyond existing disturbed areas
	Grayson	Impact Evaluation; bridge replacement on Whitaker Rd. (specific plans not available)	Holocene alluvium (2+ m) along West Prong of Whites Creek and Cretaceous Austin Group and Eagle Ford Formation uplands; Elbon silty clay, Austin silty clay, and Fairlie-Houston Black clay soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Grayson	Impact Evaluation; bridge replacement on CR 194 (specific plans not available)	Holocene alluvium (1.5–2.0+ m) along Mustang Creek; Bunyan-Whitesboro sandy loam to clay loam soils; adjacent uplands are Cretaceous Woodbine Formation and Pleistocene terrace deposits	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Grayson	Impact Evaluation; bridge replacement on N. Lincoln Park Rd. (specific plans not available)	Holocene alluvium (2–3+ m) along West Prong of Sister Grove Creek; Elbon silty clay soils; adjacent uplands are Cretaceous Austin Group and Eagle Ford Formation	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Grayson	Impact Evaluation; bridge replacement on Whitaker Rd. (specific plans not available)	Holocene alluvium (1.5–3.0+ m) along East Prong of Whites Creek and Cretaceous Austin Group and Eagle Ford Formation uplands; Trinity clay, Fairlie-Houston Black clay, and Lewisville clay soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Grayson	Impact Evaluation; bridge replacement on FM 131 (specific plans not available)	Holocene alluvium (2+ m) along Iron Ore Creek and Cretaceous Austin Group and Eagle Ford Formation uplands; Bunyan-Whitesboro sandy loam to clay loam, Normangee clay loam, and Fairlie-Houston Black clay soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hunt	Impact Evaluation; bridge replacement on FM 513 (specific plans not available)	Holocene alluvium (1.5–2.0+ m) along Caney Creek and Cretaceous Navarro Group uplands; Hopco silt loam, Crockett loam, Wilson silt loam, Ferris clay, Leson clay, and Heiden clay soils	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend onto undisturbed upland edges
	Hunt	Impact Evaluation; bridge replacement on FM 513 (specific plans not available)	Holocene alluvium (1.0–1.5+ m) along Ray Creek and Cretaceous Navarro Group uplands; Hopco silt loam, Crockett loam, Wilson silt loam, Ferris clay, Leson clay, and Heiden clay soils	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend onto undisturbed upland edges
	Hunt	Impact Evaluation; bridge replacement on FM 513 (specific plans not available)	Holocene alluvium (1.0–1.5+ m) along Drake Creek and Cretaceous Navarro Group uplands; Hopco silt loam, Crockett loam, Wilson silt loam, Ferris clay, Leson clay, and Heiden clay soils	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend onto undisturbed upland edges
	Hunt	Impact Evaluation; bridge replacement on FM 513 (specific plans not available)	Holocene alluvium (1.5+ m) along Head Creek and Cretaceous Navarro Group uplands; Hopco silt loam Crockett loam, Wilson silt loam, Ferris clay, Leson clay, and Heiden clay soils	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend onto undisturbed upland edges

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Lamar	Impact Evaluation; bridge replacement on FM 137 (specific plans not available)	Holocene alluvium (2 m) along Noble Creek and Cretaceous Ozan Formation uplands; Elbon silty clay, Lamar clay loam, and Ferris clay soils	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Lamar	Impact Evaluation; bridge replacement on FM 137 (specific plans not available)	Holocene alluvium (3 m) along Cane Creek and Cretaceous Ozan Formation uplands; Trinity clay, Heiden clay, and Houston Black clay soils	semirural; adjacent lands are in pasture or fields and residential areas	none	no survey needed unless impacts extend beyond existing disturbed areas
	Lamar	Impact Evaluation; bridge replacement on FM 137 (specific plans not available)	Holocene alluvium (3 m) along Maxwell Creek; Trinity clay and Houston Black clay soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Lamar	Impact Evaluation; bridge replacement on FM 79 (specific plans not available)	Holocene alluvium (2.5+ m) along Slough Creek and Pleistocene terrace uplands; Desha clay, Woodtell loam, and Whakana-Porum loamy soils	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Lamar	Impact Evaluation; bridge and relief structure replacement on FM 79 (specific plans not available)	Holocene alluvium (1.5–2.0+ m) along Sanders Creek and Cretaceous Eagle Ford Formation uplands; Roxton clay, Annona loam, and Whakana-Porum loamy soils	rural; adjacent lands are in pasture or fields and/or wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
19	Bowie	Survey (4 shovel tests); widening of 0.4 km of SH 8 (no new ROW)	Eocene Wilcox Group uplands; Bryarly clay loam and Woodtell very fine sandy loam soils	semirural; adjacent lands are partly a developed park and partly wooded	none	no further work
	Franklin	Impact Evaluation; bridge replacement on CR 130 (specific plans not available)	Holocene alluvium (1.0–1.5+ m) along Cobb Jones Creek and Paleocene Midway Group uplands; Nahatche clay loam and Woodtell-Raino loamy soils	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Harrison	Impact Evaluation; widening of 1.2 km of SH 154 (specific plans not available)	Eocene Recklaw Formation uplands; Bernaldo, Cuthbert, Kirvin, and Sacul fine sandy loam soils	semiurban; adjacent lands are wooded or residential areas	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hopkins	Impact Evaluation; bridge and 3 relief structure replacements on IH 30	Holocene alluvium (1–2 + m) along Rock Creek; Nahatche clay loam soils; adjacent uplands are Eocene Wilcox and	rural; adjacent lands are wooded to the north, IH 30 to the south	none	no survey needed

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Hopkins, *continued*	frontage road (specific plans not available)	Midway Groups			
	Hopkins	Impact Evaluation; bridge replacement on IH 30 frontage road (1.4 acres of new ROW, 2.3 acres for construction easements)	Holocene alluvium (2+ m) along East Caney Creek; Nahatche clay loam soils; adjacent uplands are Eocene Wilcox and Midway Groups	rural; adjacent lands are wooded to the north, IH 30 to the south	none	no survey needed
	Hopkins	Impact Evaluation; bridge replacement on CR 596 (specific plans not available)	Holocene alluvium (3+ m) along White Oak Creek and Eocene Wilcox and Midway Group uplands; Nahatche clay loam and Crockett loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hopkins	Impact Evaluation; 2 bridge replacements on CR 572 (specific plans not available)	Holocene alluvium (1.0–1.5+ m) along Kennedy Creek and Eocene Wilcox and Midway Group uplands; Nahatche clay loam and Freestone loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hopkins	Impact Evaluation; bridge replacement on CR 271 (specific plans not available)	Holocene alluvium (1+ m) along Running Creek and Eocene Wilcox and Midway Group uplands; Nahatche clay loam and Freestone and Woodtell loam soils	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hopkins	Impact Evaluation; bridge replacement on CR 387 (specific plans not available)	Holocene alluvium (1.5+ m) along Glade Creek and Eocene Wilcox and Midway Group uplands; Nahatche clay loam and Freestone and Woodtell loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Morris	Impact Evaluation; bridge and relief structure replacements and road realignment on FM 144 (4.4 acres of new ROW)	Holocene alluvium (1–2+ m) along Boggy Creek and upland Eocene Recklaw Formation; Nahatche clay loam, Liberty loamy fine sand, and Cuthbert fine sandy loam	rural; adjacent lands are partly in pasture and partly wooded	none	survey new ROW
	Panola	Impact Evaluation; 2 bridge replacements and widening of 3 km of U.S. Hwy 79 (no new ROW)	Holocene alluvium (1.5+ m) along the Sabine River and Pleistocene terrace deposits; Urbo-Mantachie clay to clay loam and Cart-Erno sandy clay loam soils; adjacent uplands are Eocene Wilcox Group	rural; adjacent lands are wooded	none	no survey needed

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Panola	Impact Evaluation; bridge replacement on FM 1186 (specific plans not available)	Holocene alluvium (0.5+ m) along Jackson Creek and Eocene Wilcox Group uplands; Nahatche clay loam and Sacul fine sandy loam soils	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Panola	Impact Evaluation; bridge replacement on FM 124 (2.8 acres of new ROW)	Holocene alluvium (2+ m) along Buckner Creek; Nahatche clay loam soils; adjacent uplands are Eocene Wilcox Group	rural; adjacent lands are partly in pasture and partly wooded	none	survey new ROW
	Panola	Impact Evaluation; bridge replacement on FM 124 (3.7 acres of new ROW and construction easements)	Holocene alluvium (1.5+ m) along Caney Creek; Nahatche clay loam soils; adjacent uplands are Eocene Wilcox Group	rural; adjacent lands are partly in pasture and partly wooded	none	survey new ROW
	Rains	Impact Evaluation (3 shovel tests); bridge and 2 relief structure replacements on SH 19 (specific plans not available)	Holocene alluvium (1.5+ m) along the Sabine River and Eocene Wilcox Group uplands; Gladewater clay and Woodtell loam soils	rural; adjacent lands are wooded	41RA86	no survey needed unless impacts extend beyond existing disturbed areas; no further work at 41RA86
20	McLennan	Impact Evaluation; bridge replacement on SH 317 (no new ROW)	Holocene alluvium (<0.5 m) along Wasp Creek; Trinity clay soils; adjacent uplands are Cretaceous Washita Group	rural; adjacent lands are mostly in pasture	none	no survey needed
21	Dallas	Impact Evaluation; exit ramp construction on Preston Road (no new ROW)	Holocene alluvium (3 m) along White Rock Creek; Eddy-Urban and Frio-Urban land complex soils; adjacent uplands are Cretaceous Austin Chalk	urban	none	no survey needed
	Kaufman	Impact Evaluation; 4 bridge replacements on U.S. Hwy 175 (no new ROW)	Man-made causeway on Holocene alluvium and Pleistocene terrace deposits at Cedar Creek Reservoir; Lufkin-Rader complex soils	mostly a man-made causeway	none in project area; 41KF83 and 41KF84 noted nearby	no survey needed
22	Harrison	Impact Evaluation; rehabilitation of 10.9 km of road and bridge and relief structure replacements on FM 31 (no new ROW)	Eocene Wilcox Group uplands and Holocene alluvium (1–2+ m) and Pleistocene terrace deposits along Quapaw Creek; Scottsville very fine sandy loam, Bernaldo and Latex fine sandy loam, and Sardis-Mathiston complex soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
23	Delta	Impact Evaluation; bridge replacement on CR 106 (specific plans not available)	Holocene alluvium (2+ m) along Johns Creek and Cretaceous Marlbrook Marl uplands; Trinity clay and Houston Black clay soils	rural; adjacent lands are mostly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	Delta	Impact Evaluation; bridge replacement on CR 128 (specific plans not available)	Holocene alluvium (2+ m) along West Fork of Jernigan Creek; Trinity clay and Wilson silt loam soils; adjacent uplands are Cretaceous Marlbrook Marl	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Delta	Impact Evaluation; bridge replacement on CR 218 (specific plans not available)	Holocene alluvium (2.0–2.5+ m) along Lake Creek; Kaufman clay and Wilson silt loam soils; adjacent uplands are Cretaceous Marlbrook Marl	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Delta	Impact Evaluation; bridge replacement on CR 180 (specific plans not available)	Holocene alluvium (2+ m) and Pleistocene terrace deposits along a tributary of the North Sulphur River; Wilson and Benklin silt loam soils; adjacent uplands are Cretaceous Wolf City, Ozan, and Pecan Gap Chalk Formations	rural; adjacent lands are partly wooded and partly in fields	none	no survey needed unless impacts extend beyond existing disturbed areas
	Fannin	Impact Evaluation; bridge replacement on U.S. Hwy 82 (specific plans not available)	Holocene alluvium (2.0–2.5+ m) along Big Caney Creek; Elbon-Trinity-Redlake complex soils; adjacent uplands are Cretaceous Eagle Ford Formation	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hunt	Impact Evaluation; bridge replacement on CR 1035 (specific plans not available)	Holocene alluvium (2.5+ m) along Hickory Creek and Pleistocene terrace deposits; Hopco silt loam and Axtell loam soils; adjacent uplands are Pecan Gap Chalk	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hunt	Impact Evaluation; bridge replacement on CR 1032 (specific plans not available)	Holocene alluvium (1.5+ m) along a tributary of Cowleech Fork and Pleistocene terrace deposits; Tinn clay and Crockett loam soils; adjacent uplands are Cretaceous Marlbrook Marl	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hunt	Impact Evaluation; culvert replacement on CR 3211 (specific plans not available)	Holocene alluvium (1.5+ m) along Lake Fork Creek and Paleocene Kincaid Formation uplands; Hopco silt loam and Crockett loam soils	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Hunt	Impact Evaluation; bridge replacement on FM 1563 (specific plans not available)	Holocene alluvium (2+ m) along the Middle Sulphur River and Cretaceous Wolf City and Pecan Gap Chalk Formation uplands; Hopco silt loam and Crockett loam soils	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	Lamar	Impact Evaluation; bridge replacement on 2nd St. (specific plans not available)	Holocene alluvium (2+ m) along Cane Creek and Cretaceous Ozan Formation uplands; Trinity clay, Heiden clay, and Norwood silt loam soils	urban; adjacent lands contain residential and commercial developments	none	no survey needed unless impacts extend beyond existing disturbed areas
	Lamar	Impact Evaluation; bridge replacement on Deport St. (specific plans not available)	Holocene alluvium (2+ m) along Mustang Creek and Cretaceous Pecan Gap Chalk uplands; Lassiter silt loam and Wilson silt loam soils	urban; adjacent lands contain residential and commercial developments	none	no survey needed unless impacts extend beyond existing disturbed areas
24	Erath	Impact Evaluation; bridge replacement on CR 417 (0.3 acres of new ROW)	Holocene alluvium (3.5+ m) along a tributary of the South Fork of the North Bosque River; Bunyan fine sandy loam soils; adjacent uplands are Cretaceous Paluxy and Glen Rose Formations	rural; adjacent lands are partly in pasture or fields and partly wooded	none	survey new ROW
	Erath	Impact Evaluation; bridge replacement on CR 230 (0.5 acres of new ROW and construction easements)	Holocene alluvium (3–4 m) along a tributary of Duffau Creek and Cretaceous Paluxy and Walnut Formation uplands; Frio clay loam, Purves-Dugout complex, and Duffau fine sandy loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	survey new ROW/construction easements west of creek
25	Panola	Survey (12 trenches, 2 shovel tests); bridge replacement and road realignment on FM 124 (2.8 acres of new ROW)	Holocene alluvium (2+ m) along Buckner Creek; Nahatche clay loam and Thenas fine sandy loam to clay loam soils; adjacent uplands are Eocene Wilcox Group	rural; adjacent lands are partly in pasture and partly wooded	none	no further work
	Panola	Survey (15 trenches, 2 shovel tests); bridge replacement on FM 124 (3.7 acres of new ROW and construction easements)	Holocene alluvium (2+ m) along Caney Creek and Eocene Wilcox Group uplands; Nahatche clay loam and Sacul fine sandy loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	no further work

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Panola	Survey (7 trenches, 6 shovel tests); bridge replacement and road realignment on FM 10 (6.2 acres of new ROW and construction easements)	Holocene alluvium (2+ m) along Six Mile Creek and Eocene Wilcox Group uplands; Nahatche clay loam, Wrightville-Cart complex, and Sacul fine sandy loam soils	rural; adjacent lands are partly in pasture, partly wooded, and partly in recently clear-cut area	none	no further work
26	Morris	Survey (5 trenches, 4 shovel tests); bridge and relief structure replacement and road realignment on FM 144 (4.4 acres of new ROW)	Holocene alluvium (1–2 m) along Boggy Creek and Eocene Reklaw Formation uplands; Nahatche clay loam, Liberty loamy fine sand, and Cuthbert fine sandy loam soils	rural; adjacent lands are mostly in pasture	none	no further work
27	Fannin	Impact Evaluation; bridge replacement on CR 271 (specific plans not available)	Holocene alluvium (2+ m) along Cooper Creek and Cretaceous Bonham Marl uplands; Elbon silty clay loam, Lassiter silt loam, and Wilson-Normangee-Crockett soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Fannin	Impact Evaluation; bridge replacement on CR 656 (specific plans not available)	Holocene alluvium (2+ m) along Rock Creek and Cretaceous Bonham Marl uplands; Elbon silty clay loam, Lassiter silt loam, and Wilson-Normangee-Crockett soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Red River	Impact Evaluation; bridge replacement on FM 909 (specific plans not available)	Holocene alluvium (5–6 m) along Cuthand Creek; Kaufman-Gladewater soils; adjacent uplands are Cretaceous Marlbrook Marl and Navarro Group	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Red River	Impact Evaluation; bridge replacement on FM 909 (specific plans not available)	Holocene alluvium (1.0–1.5 m) along Frances Creek and Cretaceous Marlbrook Marl and Navarro Group uplands; Nahatche silty clay loam, Woodtell fine sandy loam, and Kullit-Addielou complex soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Red River	Impact Evaluation; bridge replacement on FM 410 (specific plans not available)	Holocene alluvium (3 m) along Scatter Creek and Cretaceous Blossom Sand and Brownstone Marl uplands; Woodtell fine sandy loam soils	urban; adjacent lands are residential areas with maintained yards	none	no survey needed unless impacts extend beyond existing disturbed areas

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Red River	Impact Evaluation; bridge replacement on FM 410 (specific plans not available)	Holocene alluvium (2+ m) along Wildcat Creek and Cretaceous Blossom Sand and Brownstone Marl uplands; Nahatche silty clay loam and Woodtell fine sandy loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Red River	Impact Evaluation; bridge replacement on FM 910 (specific plans not available)	Holocene alluvium (4–5 m) along Cuthand Creek; Gladewater clay soils; adjacent uplands are Cretaceous Marlbrook Marl and Navarro Group	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
28	Erath	Survey (2 trenches); bridge replacement on CR 230 (0.5 acres of new ROW and construction easements)	Holocene alluvium (1.5–2.0 m) along a tributary of Duffau Creek and Cretaceous Paluxy and Walnut Formation uplands; Frio clay loam, Purves-Dugout complex, and Duffau fine sandy loam soils	rural; adjacent lands are partly in pasture and partly wooded	none	no further work
29	Collin	Impact Evaluation; 3 bridge replacements on FM 545 (3.1 acres of new ROW)	Holocene alluvium (2.5+ m) along Pilot Grove Creek and Cretaceous Ozan Formation uplands; Trinity clay, Houston Black clay, Lewisville silty clay, and Altoga silty clay soils	rural; adjacent lands are partly in pasture and partly wooded	none	survey new ROW
	Denton	Impact Evaluation; bridge replacement and road realignment on FM 1173 (2 acres of new ROW)	Holocene alluvium (<1 m) along North Hickory Creek and Cretaceous Fort Worth Limestone-Duck Creek Formation uplands; Frio silty clay loam, Branyon clay, Somervell gravelly loam, and Sanger clay soils	rural; adjacent lands are partly in pasture and partly wooded	none	no survey needed
	Denton	Impact Evaluation; 2 bridge replacements and widening of 17.5 km of FM 1171 (85 acres of new ROW and easements)	Cretaceous Woodbine Formation, Pawpaw Formation-Weno Limestone-Denton Clay, and Grayson Marl uplands; Pleistocene terrace deposits; and Holocene alluvium (2–4 m) along Graham Branch and Whites Branch; Birome-Gasil-Callisburg, association, Slidell-Sanger association, and Frio silty clay soils	rural to urban; adjacent lands are fields, pastures, wooded, residential areas, and commercial developments	none	survey in existing ROW at Graham Branch; survey new ROW at Whites Branch; survey new ROW at Sharps Branch and possible historic housesite nearby
	Denton	Impact Evaluation; bridge replacement on	Holocene alluvium (1 m) along Loving Branch and Cretaceous Woodbine	semirural; adjacent lands are partly in pasture and partly in	none	no survey needed

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Denton, *continued*	FM 1830 (no new ROW)	Formation uplands; Silstid loamy fine sand, Bunyan fine sandy loam, and Birome-Rayex-Aubrey soils	maintained lawns		
30	–	Produce synthetic report	–	–	–	–
31	Hill	Survey (4 trenches, 3 shovel tests); bridge replacement on FM 744 (0.4 acres of new ROW)	Holocene alluvium (1–2 m) along Four Mile Creek; Tinn clay soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands are partly in fields, partly in pastures, and partly wooded	none	no further work
	Bell	Impact Evaluation; widening of 8 km of SH 36, including construction of new 3.8-km bypass (with 3 bridges) (85 acres of new ROW)	Cretaceous Ozan Formation uplands with Holocene alluvium (<1–2 m) along Knob Creek, Margie Lou Branch, and 5 tributaries to these creeks	rural; adjacent lands are mostly in pastures and fields	none	survey new ROW at Knob Creek and new bypass at Margie Lou Branch and 2 tributaries
32	Cass	Survey (7 trenches and 4 shovel tests); bridge replacement and road realignment on FM 250 (3.9 acres of new ROW)	Holocene alluvium along Black Cypress Creek and Eocene Queen City Formation uplands; Darco-Fuquay association soils	rural; adjacent lands are mostly wooded	41CS143	no further work
	Cass	Survey (7 shovel tests); bridge replacement on FM 250 (1 acre of new ROW and construction easement)	Holocene alluvium along Arbery Branch and Eocene Queen City Formation uplands; Darco-Fuquay association soils	rural; adjacent lands are mostly wooded	none	no further work
	Cass	Survey (11 trenches, 4 shovel tests); bridge replacement and road realignment on FM 250 (4.5 acres of new ROW)	Holocene alluvium along Kelly Creek and Eocene Queen City Formation uplands; Darco-Fuquay association soils	rural; adjacent lands are mostly wooded	41CS144	no further work
33	Gregg and Upshur	Impact Evaluation; widening of 1.8 km of U.S. Hwy 80 (6 acres of new ROW)	Eocene Weches Formation uplands; Bowie fine sandy loam, Bowie urban land complex, and Cuthbert fine sandy loam soils	urban; adjacent lands are mostly residential areas and commercial developments	none	no survey except for possible historic housesite in new ROW
	Gregg and Upshur	Survey (3 trenches, 2 shovel tests); bridge	Holocene alluvium (2.1+ m) along Glade Creek and Eocene Weches Formation	semiurban; adjacent lands are mostly in pasture with oil/gas	none	no further work

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Gregg and Upshur, *continued*	replacement and road widening on U.S. Hwy 80 (3 acres of new ROW)	uplands; Iuka fine sandy loam, Bowie fine sandy loam, and Tenaha loamy fine sand soils	wells		
34	Collin	Survey (3 trenches); 3 bridge replacements on FM 545 (3.1 acres of new ROW)	Holocene alluvium (2.5+ m) along Pilot Grove Creek; Trinity clay soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands are partly in pasture and partly wooded	possible prehistoric site represented by bovid (?) bones and charcoal	date charcoal and analyze bones to determine if prehistoric; if so, additional survey/testing needed
35	Falls	Impact Evaluation; widening of 5.9 km of SH 6 (no new ROW)	Pleistocene terrace deposits flanking Big Creek on the east side of the Brazos River valley; Wilson silty clay loam and Crockett fine sandy loam soils	rural; adjacent lands are mostly in pasture	41FA65	no survey needed
	Falls	Survey with Geoarcheological Assessment (11 trenches); 2 bridge replacements and road widening on SH 6 (no new ROW)	Holocene alluvium (1.5+ m) along Big Creek; Ships clay soils; adjacent uplands are Pleistocene terrace deposits	rural; adjacent lands are mostly in pasture	none	no further work
36	Coryell	Impact Evaluation; widening of 3.6 km of FM 107 (no new ROW)	Cretaceous Weno Limestone, Main Street Limestone, and Grayson Marl uplands; Denton silty clay, Slidell silty clay, Bolar gravelly clay loam, and Purves gravelly silty clay soils	semirural; adjacent lands are partly in pasture, partly in fields, and partly in residential areas	none	no survey needed
37	Hunt	Impact Evaluation; bridge replacement on FM 499 (specific plans not available)	Holocene alluvium (4–6+ m) along Lynn Creek; Hopco silt loam soils; adjacent uplands are Paleocene Kincaid Formation	rural; adjacent lands are wooded	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hunt	Impact Evaluation; 2 bridge replacements on SH 224 (no new ROW)	Holocene alluvium (6–8+ m) along the Sabine River; Kaufman clay soils; adjacent uplands are Cretaceous Neylandville and Marlbrook Marl Formations	semiurban; adjacent lands are mostly wooded with commercial developments on adjacent uplands	none	survey existing ROW south of road except northeast of relief structure
	Hunt	Impact Evaluation; bridge replacement on SH 34 (no new ROW)	Holocene alluvium (2–3+ m) along South Sulphur River; Tinn clay and Hopco silt loam soils; adjacent uplands are	rural; adjacent lands are mostly wooded	none	survey existing ROW south of bridge if impacts extend below

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Hunt, *continued*		Cretaceous Wolfe City Formation, Pecan Gap Chalk, and Pleistocene terrace deposits			existing disturbed areas
	Hunt	Impact Evaluation; bridge replacement on CR 522 (no new ROW)	Holocene alluvium (4–6+ m) along Sabine River; Kaufman clay soils; adjacent uplands are Pleistocene terrace deposits and Paleocene Navarro Group	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on CR 523 (no new ROW)	Holocene alluvium (2.5+ m) along Lake Fork Creek; Hopco silt loam and Wilson silt loam soils; adjacent uplands are Paleocene Kincaid Formation	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed
	Hunt	Impact Evaluation; bridge replacement on FM 816 (no new ROW)	Holocene alluvium (3–4+ m) along Spring Creek; Tinn clay soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands are mostly in pasture	none	no survey needed
	Lamar	Impact Evaluation; bridge replacement on FM 2122 (no new ROW)	Holocene alluvium (1.5–3.0 m) along Maxwell Creek; Elbon silty clay loam soils; adjacent uplands are Cretaceous Gober Chalk and Ozan Formations	rural; adjacent lands are mostly in pasture	none	no survey needed
38	Wise	Impact Evaluation; widening of 17.2 km of U.S. Hwy 380 (155 acres of new ROW)	Cretaceous Goodland Limestone, Walnut Clay, and Antlers Sand uplands and Holocene alluvium (2–5 m) along Catlett and Denton Creeks; Brackett-Aledo complex, Batsil fine sandy loam, Ponder clay loam, Purves clay, Sanger clay, Somervell-Aledo complex, Frio silty clay loam, and Trinity clay soils	rural; adjacent lands are mostly in pasture	none	survey new ROW at Catlett Creek, Denton Creek, Sweetwater Creek tributary, and pimple mound field west of CR 2311
39	Bell	Impact Evaluation; bridge replacement on SH 36 (specific plans not available)	Cretaceous Edwards and Comanche Peak Limestone uplands adjacent to Belton Lake; Real, Purves, Tarrant, Crawford clay, and Speck soils	semirural; adjacent lands are wooded, semiopen private lands, and parks	41BL1103	no survey needed unless impacts extend beyond existing disturbed areas
	Bell	Impact Evaluation; bridge replacement on SH 95 (specific plans not available)	Holocene alluvium (2+ m) along the Little River; Bosque clay loam, Frio silty clay, and Trinity clay soils; adjacent uplands are Pleistocene terrace deposits	rural; adjacent lands are in pasture, pecan orchards, and drag strip	none	no survey needed unless impacts extend beyond existing disturbed areas

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Bell	Impact Evaluation; bridge replacement on CR 382 (specific plans not available)	Holocene alluvium (5+ m) along the Little River; Frio silty clay soils; adjacent uplands are Pleistocene terrace deposits	rural; adjacent lands are mostly in pasture with woods along the river	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hamilton	Impact Evaluation; bridge replacement on CR 284 (specific plans not available)	Holocene alluvium (1 m) along Alexander Creek; Bosque clay loam and Frio silty clay soils; adjacent uplands are Cretaceous Glen Rose Formation	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hamilton	Impact Evaluation; bridge replacement on CR 296 (specific plans not available)	Holocene alluvium (2–3 m) along Bear Creek; Bosque clay loam and Frio silty clay soils; adjacent uplands are Cretaceous Glen Rose Formation	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hamilton	Impact Evaluation; bridge replacement on CR 294 (1.7 acres of new ROW)	Holocene alluvium (2 m) along Alex Branch; Bosque clay loam and Frio silty clay soils; adjacent uplands are Cretaceous Glen Rose Formation	rural; adjacent lands are partly wooded and partly in pasture	none	survey new ROW west of the bridge
	Hamilton	Impact Evaluation; bridge replacement on CR 260 (specific plans not available)	Holocene alluvium (2–3 m) along North Bosque River tributary; Bosque clay loam and Frio silty clay soils; adjacent uplands are Cretaceous Glen Rose Formation	rural; adjacent lands are partly wooded and partly in fields	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hill	Impact Evaluation; bridge replacement on CR 469 (specific plans not available)	Holocene alluvium (3 m) along Cottonwood Creek; Tinn clay soils; adjacent uplands are Cretaceous Woodbine and Eagle Ford Formations	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	Hill	Impact Evaluation; bridge replacement on CR 114 (specific plans not available)	Holocene alluvium (4–5+ m) along Jackson Creek; Houston Black clay and Wilson clay loam soils; adjacent uplands are Cretaceous Wolfe City and Pecan Gap Chalk Formations	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	McLennan	Impact Evaluation; bridge replacement on CR 346 (specific plans not available)	Holocene alluvium (1 m) along Live Oak Creek; Trinity clay and Houston Black clay soils; adjacent uplands are Cretaceous Grayson Marl and Main Street Limestone Formations	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
	McLennan	Impact Evaluation; bridge replacement on	Holocene alluvium (1 m) along Patten Branch; Houston Black clay and	rural; adjacent lands are mostly in pasture	none	no survey needed

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	McLennan, *continued*	CR 440 (specific plans not available)	Houston Black gravelly clay soils; adjacent uplands are Cretaceous South Bosque and Lake Waco Formations			
	McLennan	Impact Evaluation; bridge replacement on CR 774 (specific plans not available)	Holocene alluvium (5+ m) along Castleman Creek; Asa silty clay loam, Asa very fine sandy loam, and Norwood silty loam soils; adjacent uplands are Cretaceous Ozan Formation and Pleistocene terrace deposits	rural; adjacent lands are cultivated fields	none	no survey needed unless impacts extend beyond existing disturbed areas
	McLennan	Impact Evaluation; bridge replacement on CR 581 (specific plans not available)	Holocene alluvium (3+ m) along Tehuacana Creek; Trinity clay loam soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed unless impacts extend beyond existing disturbed areas
40	Panola	Survey (48 shovel tests); 3 bridge and 1 culvert replacements and road realignment on FM 10 (12 acres of new ROW)	Holocene alluvium (1.5+ m) along Murvaul Creek and adjacent Eocene Wilcox Group uplands; Nahatche clay loam, Thenas fine sandy loam to clay loam, Sacul fine sandy loam, and Bowie fine sandy loam soils	rural; adjacent lands are mostly wooded with some pastures	41PN175 41PN176	testing at 41PN175; no further work at 41PN176
	Titus	Survey (23 shovel tests); bridge replacement on FM 127 (2.3 acres of new ROW, 0.4 acres of construction easements)	Holocene alluvium (2+ m) along Tankersley Creek and adjacent Eocene Wilcox Group uplands; Estes clay loam, Nahatche silty clay loam, and Woodtell fine sandy loam soils	rural; adjacent lands are partly wooded and partly in pasture	41TT823 41TT824	no further work
41	Dallas	Impact Evaluation; bridge replacement on Rylie Crest Dr. (specific plans not available)	Holocene alluvium (1.5+ m) along Hickory Creek; Gowen clay loam soils; adjacent uplands are Cretaceous Ozan Formation	semiurban; adjacent lands are partly residential	none	no survey needed unless impacts extend beyond existing disturbed areas
	Denton	Impact Evaluation; bridge replacement on Country Club Rd. (specific plans not available)	Thin Holocene alluvium along Graveyard Branch tributary and Cretaceous Grayson Marl and Main Street Limestone uplands; Lewisville, Navo, Birome-Rayex-Aubrey soils	semirural; adjacent lands are partly undeveloped and partly residential	none	no survey needed
	Ellis	Impact Evaluation; bridge replacement on Ebenezer Rd. (specific plans not available)	Holocene alluvium (5–6+ m) along Grove Creek; Trinity clay soils; adjacent uplands are Cretaceous Ozan Formation	rural; adjacent lands are partly wooded and partly in fields	none	survey

Table 1, *continued*

Work Order	County	Project Type	Topographic/Geologic Setting	Land Use/Vegetation	Sites	Recommendations
	Ellis	Impact Evaluation; bridge replacement on West Main St. (specific plans not available)	Holocene alluvium (2–3 m) along Red Oak Creek; Frio silty clay soils; adjacent uplands are Cretaceous Austin Chalk	semirural; adjacent lands are partly undeveloped and partly residential	none	no survey needed unless impacts extend beyond existing disturbed areas
	Kaufman	Impact Evaluation; bridge replacement on CR 313 (specific plans not available)	Holocene alluvium (1.0–1.5 m) along Muddy Cedar Creek tributary; Kemp loam soils; adjacent uplands are Paleocene Kincaid Formation	rural; adjacent lands are partly wooded and partly in pasture	none	no survey needed

in size (total acreage = 161), with substantial parts (usually one-third to two-thirds) being disturbed by existing roads and bridges. These 4 surveys involved the excavation of 46 trenches and 15 shovel tests. The other 20 surveys were in relatively undisturbed proposed new rights of way or construction easements, with these varying from 0.2 to 13 acres (median = 2.9 acres; total = 73 acres). Ninety-eight trenches and 114 shovel tests were excavated in surveying these areas. Trenches and shovel tests usually were placed judgmentally rather than at specific intervals based on the size and shape of each survey area, distributions of landforms, accessibility, and the locations of known sites.

The trenches were at least 5 m long and 0.75 m wide, and usually they were at least 1.5 m deep (i.e., the anticipated maximum depth of substantial disturbance). After excavation, their walls were cleaned and examined for cultural materials. Stratigraphic descriptions were prepared for selected trenches to characterize the sediments. Shovel tests averaged 30 cm in diameter and were dug to varying depths depending on depth to bedrock, clay content, and water content. The sediments removed from shovel tests were screened through ¼-inch-mesh hardware cloth. A standardized Survey Summary Form was completed noting whether the survey included a geoarcheological evaluation, describing the areas subjected to surface survey and visibility, indicating the number/depth/placement of shovel tests and trenches, listing the cultural materials observed/sites recorded, providing assessments/recommendations, and noting the personnel and time needed for the survey. Other documentation consisted of color photographs, Temporary Site Forms (for eventual submittal to the Texas Archeological Research Laboratory in TexSite format), stratigraphic profile descriptions, and project plans showing the locations of all trenches, shovel tests, and sites. Surveys usually were done by two-person crews; on Surveys with Geoarcheological Evaluations, one member of the crew was a Geoarcheologist. The amount of time required to complete the surveys varied depending on their size, the number of trenches and shovel tests excavated, and what was found. The range was 4–57 person-hours, with the median being 11.5 person-hours (excludes time spent by TxDOT personnel, including backhoe/Gradall operators).

Synopsis of Work Orders

As listed in Table 1, 8 of the 39 work orders involving fieldwork were in the Atlanta District (Cass, Gregg, Harrison, Morris, Panola, Titus, and Upshur Counties), 6 were in the Dallas District (Collin, Dallas, Denton, Ellis, and Kaufman Counties), 4 were in the Fort Worth District (Erath, Tarrant, and Wise Counties), 9 were in the Paris District (Delta, Fannin, Grayson, Hunt, Lamar, and Red River Counties), 11 were in the Waco District (Bell, Coryell, Falls, Hamilton, Hill, and McLennan Counties), and 1 was in both the Atlanta and Paris Districts (Bowie, Franklin, Harrison, Hopkins, Morris, Panola, and Rains Counties). The projects in the Atlanta District consisted of 9 Impact Evaluations and 13 Surveys for the replacement of 24 bridges/relief structures and 6 road-widening projects. In the Dallas District, the work orders were for 16 Impact Evaluations and 1 Survey on 21 bridge/relief structure replacements, 1 road-widening project, and 1 project involving construction of an exit ramp. The Fort Worth District work orders consisted of 3 Impact Evaluations and 2 Surveys entailing 3 bridge/relief structure replacements and 1 road-widening project. In the Paris District, 71 Impact Evaluations and 2 Surveys focused on the replacement of 80 bridges/relief structures. Finally, the projects in the Waco District involved 20 Impact Evaluations, 3 Surveys, and 3 Surveys with Geoarcheological Evaluations; these work orders were for 23 bridge replacements and 6 road-widening projects.

Not surprising given the focus on bridge replacements, many of the projects (n = 75) were restricted to Holocene alluvial settings (see Table 1). An additional 57 Impact Evaluations and Surveys encompassed upland margins as well as Holocene alluvium, with the uplands mapped as a variety of Cretaceous (Fredericksburg, Washita, Eagle Ford, Austin, Taylor, and Navarro Groups) and Paleocene-Eocene (Midway, Wilcox, and Claiborne Groups) formations, as well as Pleistocene

terrace deposits. The 11 projects that crossed mostly upland areas were on these same Cretaceous, Paleocene-Eocene, and Pleistocene deposits. A variety of soils are mapped for the project areas, ranging generally from loamy to clayey, sometimes stony, often shallow soils in the western part of the study area; to dark, calcareous, clayey soils of the Blackland Prairie; to loamy to sandy soils with clayey substrates in the Oak Woodlands and Piney Woods on the east. Common mapped Holocene alluvial soils in the areas examined during these work orders include Bunyan fine sandy loam, Elbon silty clay loam, Frio silty clay, Gladewater clay, Heiden clay, Hopco silt loam, Iuka fine sandy loam, Kaufman clay, Lassiter silt loam, Leson clay, Nahatche clay loam, Tinn clay, and Trinity clay (see Table 1). Upland and old terrace soils in these areas include Crockett fine sandy loam, Cuthbert fine sandy loam, Fairlie-Houston Black clay, Ferris clay, Freestone loam, Lewisville silty clay, Normangee clay loam, Purves silty clay, Sacul fine sandy loam, Wilson silt loam, and Woodtell sandy loam.

Most of the Impact Evaluations and Surveys (n = 122) were in rural areas where adjacent lands were undeveloped and in pastures or woods (see Table 1). Ten projects were in settings that can be classified as semirural (i.e., largely undeveloped but adjacent to modern cemeteries, golf courses, gravel quarries, residential yards, and parks). Eleven project areas were in urban or semiurban settings (i.e., the cities of Balch Springs, Dallas, Deport, Detroit, Gladewater, Greenville, Marshall, Roxton, Sherman, and Temple).

Fourteen of the Impact Evaluations resulted in a recommendation that an archeological survey be completed prior to construction (see Table 1). This was the case most often when construction plans called for new right of way or an easement across areas with substantial (i.e., at least 1 m thick), undisturbed Holocene deposits that could host buried, prehistoric archeological remains in good context. In 69 additional Impact Evaluations for which specific construction plans were not available (and thus specific areas to be affected not known), survey was recommended if areas outside the existing right of way, or below the zone of disturbance within the existing right of way (typically below 1.0–1.5 m), will be disturbed substantially. The remaining 36 Impact Evaluations resulted in a recommendation that no survey be required based on the extent of disturbance and the limited potential for sites with good integrity. In most cases, these Transportation Activities will require no new right of way or easements, with all construction-related disturbances restricted to the existing rights of way.

Three of the Surveys investigated sites that were recommended for testing to assess eligibility for listing in the National Register of Historic Places and designation as State Archeological Landmarks (see Table 1). On two other surveys, it was recommended that recovered charcoal be radiocarbon dated to aid in making the decision about whether testing is needed. The other 19 Surveys either did not find any archeological sites (n = 14) or investigated sites that could be assessed as ineligible for National Register listing and State Archeological Landmark designation using the survey data (n = 5).

Impacts and Site Potential

A primary thrust of the Surveys and especially the Impact Evaluations performed under this contract was documentation of existing impacts that would affect the potential of each project area to contain archeological sites with sufficient integrity to be eligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark. In general, four kinds of disturbances were observed consistently within existing rights of way: fill sections, ditches, gullies, and underground utilities (Figure 4).

Fill sections to elevate the approaches to bridges above the adjacent floodplains were present at almost all of the bridge replacement project areas (Table 2). These fill sections ranged from less than 0.5 m in thickness to as much as 7 m, but most extended 1–2 m above the natural surface. Horizontally, they extended as little as 10 m from each end of a bridge to as much as several hundred meters, depending on the size of the valley and the kind of road. The higher and longer fill sections tended to be associated with the larger roads and larger streams. Typically, fill

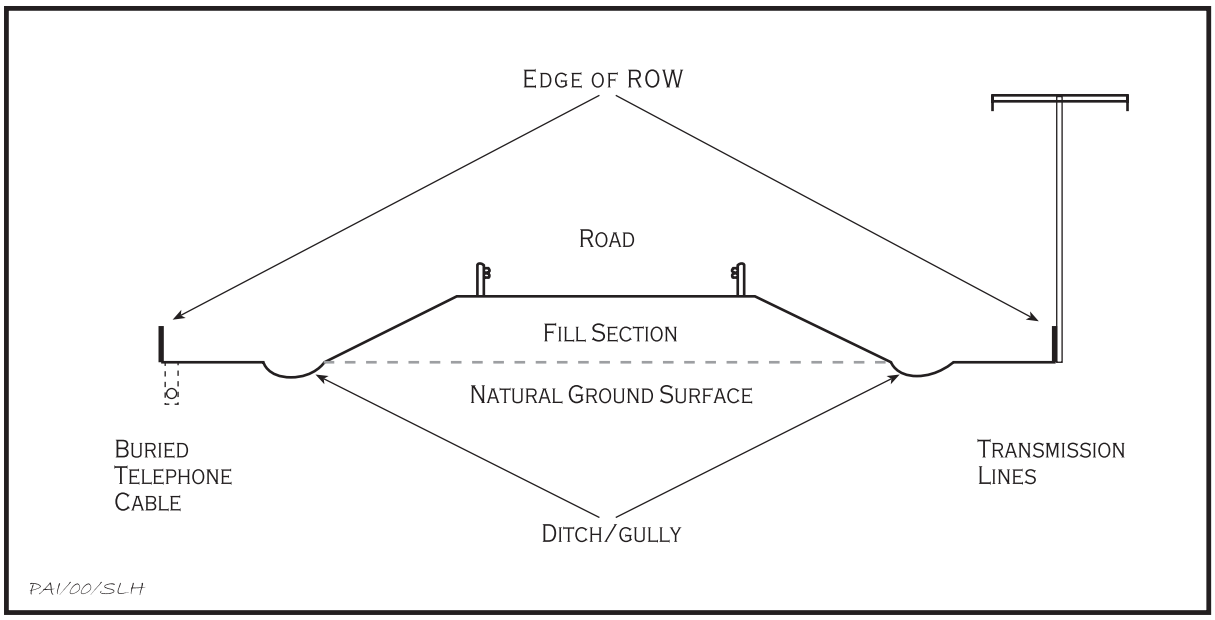

Figure 4. Schematic cross section of a bridge approach showing common disturbance factors.

sections extended at least several meters beyond the edges of the pavement, in some cases occupying as much as three-quarters of the existing right of way. It is difficult to quantify how much disturbance is associated with the placement of fill sections, but it is assumed that at least the upper 0.5 m of sediment beneath and adjacent to fill sections is disturbed by heavy machinery during construction and subsequently by compaction. Presumably, the larger the fill section, the deeper the disturbance.

In most cases, fill sections were bordered on both sides by shallow drainage ditches (see Table 2). These usually were less than 1 m deep, and often less than 0.5 m, and they were up to several meters wide. Most were covered by vegetation and thus did not offer any subsurface visibility, but a few that recently had been maintained exposed subsurface deposits. Better exposures typically were provided by gully erosion, which occurred often in the bottoms of ditches running along the edges of fill sections and breaching the creek banks. In many cases, such gullies were present at one or more corners of a bridge, often extending to depths of 1 m or more (see Table 2).

The fourth kind of disturbance observed consistently was underground utilities. These were present in most project areas, with the most common kind being buried telephone and/or fiber optic lines (see Table 2). These almost always were at one or both edges of the existing right of way and were marked by signs or areas of recent disturbance from placement of the lines. Based on the extent of the recent disturbance, it appears that trenching for these lines usually had disrupted an area 0.5 m or less in width. Presumably, they vary in depth, with most probably being no deeper than 1 m. More-extensive disturbance probably is associated with other kinds of underground utilities, including water lines, sewer lines, storm drains, and gas pipelines. These were not as ubiquitous as telephone and fiber optic lines, although some of these (especially water lines) may not be marked with signs as consistently as telephone and fiber optic lines.

A variety of other disturbance factors were noted less frequently (see Table 2). These included the following: constructed earthen berms to control runoff or creek flooding; severe erosion of creek banks; flood scouring; push piles from minor earthmoving; road cutting and erosion associated with the use of low-water crossings adjacent to impassable bridges; the placement of fill piles; the

Table 2. Summary of existing impacts by work order

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
1	McLennan	Impact Evaluation; CR 345 at Tennant Branch	1 fill section 1 m thick	1 ditch 2 m deep 1 ditch <1m deep		telephone line	
2	Coryell	Survey with Geoarcheological Assessment; CR 213 at Coryell Creek	2 fill sections 1 m thick	4 ditches <1 m deep	1 gully 1.5–2.0 m deep	telephone line	earthen berm; push piles; low-water crossing
3	Hunt	Impact Evaluation; SH 66 at Payne Creek	2 fill sections 1–2 m thick	2 ditches <0.5 m deep	2 gullies 1 m deep		adjacent railroad bed
	Hunt	Impact Evaluation; SH 66 at Brushy Creek	2 fill sections 1–2 m thick	1 ditch <1 m deep 1 ditch 1–2 m deep	1 gully 1.5–2.0 m deep 1 gully 3 m deep 1 gully 2 m deep	telephone line	adjacent railroad bed
	Hunt	Impact Evaluation; SH 66 at West Caddo Creek slough	2 fill sections 1–2 m thick	2 ditches <0.5 m deep	1 gully 1–2 m deep	2 fiber optic lines	adjacent railroad bed
	Hunt	Impact Evaluation; SH 66 at West Caddo Creek	2 fill sections 2 m thick	2 ditches <1 m deep		2 fiber optic lines	adjacent railroad bed
	Hunt	Impact Evaluation; SH 66 at West Caddo Creek slough	2 fill sections 1–2 m thick		1 gully <0.5 m deep	2 fiber optic lines	adjacent railroad bed
	Hunt	Impact Evaluation; SH 66 West Caddo Creek tributary	2 fill sections 1 m thick	4 ditches <0.5 m deep		2 fiber optic lines	adjacent railroad bed; fill pile
	Hunt	Impact Evaluation; SH 66 at Elm Creek	2 fill sections 1.5 m thick	4 ditches <0.5 m deep		2 fiber optic lines	adjacent railroad bed; spoil piles
	Hunt	Impact Evaluation; SH 66 at East Caddo Creek slough	2 fill sections 1.5–2.0 m thick	1 ditch <0.5 m deep	1 gully 1 m deep	fiber optic line	adjacent railroad bed; spoil piles
	Hunt	Impact Evaluation; SH 66 at East Caddo Creek	2 fill sections 1.5–2.0 m thick	1 ditch 0.5–1.0 m deep		fiber optic line	adjacent railroad bed
	Hunt	Impact Evaluation; SH 66 at Block Branch	2 fill sections 1.5–2.0 m thick	1 ditch <0.5 m deep		1 fiber optic line 1 telephone line	adjacent railroad bed and stock tank

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
4	Tarrant	Survey; Enon Ave. at Everman Cemetery		1 ditch <0.5 m deep		telephone line	adjacent cemetery landscaping
5	Ellis	Impact Evaluation; FM 66 at South Prong Creek	2 fill sections	4 ditches <1 m deep	4 gullies <0.5 m deep	2 telephone lines	
	Ellis	Impact Evaluation; FM 813 at Red Oak Creek	2 fill sections	4 ditches <1 m deep		telephone line	bank erosion
	Kaufman	Impact Evaluation; Colquitt Rd. at Bachelor Creek		4 ditches <1 m deep	3 gullies <0.5 m deep	water line sewer line telephone line	
6	Upshur	Survey; SH 155 at Little Cypress Creek	4 fill sections 2–3 m thick			gas pipeline	gravel access road
7	Grayson	Impact Evaluation; U.S. Hwy 377 at Sandy Creek	2 fill sections 3–4 m thick	1 ditch <0.5 m deep			bank erosion
	Grayson	Impact Evaluation; U.S. Hwy 377 at Brushy Creek	2 fill sections 2–3 m thick	1 ditch <0.5 m deep		water line	bank erosion
	Grayson	Impact Evaluation; U.S. Hwy 377 at Red Branch	2 fill sections 1–2 m thick	2 ditches <0.5 m deep		telephone line	bank erosion
8	McLennan	Survey with Geoarcheological Assessment; Loop 340 at the Brazos River	multiple fill sections 1.5–6.0 m thick	numerous ditches 0.5–4.0 m deep		water line fiber optic lines 2 gas pipelines	gravel access roads and driveways on fill with culverts; borrow pits
9	Bell	Survey; FM 439 at North Nolan Creek		1 ditch <0.5 m deep			push piles
10	Hunt	Survey; SH 66 at Elm Creek	2 fill sections 1.5 m thick	2 ditches 0.5 m deep		fiber optic line	old railroad bed
		Survey; SH 66 at East Caddo Creek	2 fill sections 1.5–2.0 m thick	1 ditch 0.5 m deep		fiber optic line	old railroad bed

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
11	Hunt	Impact Evaluation; CR 589 at Pecan Branch	2 fill sections <0.5 m thick	4 ditches 0.5 m deep		water line	
	Hunt	Impact Evaluation; CR 793 at Caddo Creek	2 fill sections <0.5 m thick	4 ditches 0.5 m deep	2 gullies <1 m deep		
	Hunt	Impact Evaluation; CR 813 at Dry Creek	2 fill sections <0.5 m thick	2 ditches 0.5 m deep	2 gullies <1.5 m deep	telephone line	
	Hunt	Impact Evaluation; CR 520 at Cowleech Fork tributary	2 fill sections <0.5 m thick	4 ditches <0.5 m deep	3 gullies <1 m deep	telephone line	
12	Fannin	Impact Evaluation; FM 1550 at Davis Creek	2 fill sections 1 m thick	4 ditches <0.5 m deep	2 gullies <1 m deep	2 telephone/fiber optic lines	
	Fannin	Impact Evaluation; FM 1550 at Bralley Pool Creek	2 fill sections 1.0–1.5 m thick	4 ditches <1 m deep	4 gullies 1–5 m deep	2 telephone/fiber optic lines	
	Fannin	Impact Evaluation; FM 1550 at Bledsoe Creek	2 fill sections 0.5–1.0 m thick	2 ditches 0.5 m deep	2 gullies 0.5 m deep		
	Fannin	Impact Evaluation; FM 1553 at Freeman Creek	2 fill sections 0.5–1.0 m thick	4 ditches 0.5 m deep	4 gullies 1 m deep		
13	Hamilton	Impact Evaluation; CR 311 at Cowhouse Creek	1 fill section 1–3 m thick	1 ditch 0.5 m deep	1 large gully		extensive bank erosion; push piles
	Hamilton	Survey; CR 168 at the Leon River	1 fill section 0.5 m thick			fiber optic line	extensive bank erosion; flood scouring
14	Upshur	Survey; FM 1002 at Glade Creek	2 fill sections 0.5–1.0 m thick	2 ditches <1 m deep	1 gully 1 m deep		old road bed with associated ditch
15	Denton	Impact Evaluation; FM 156 at Harriet Creek	2 fill sections 3–4 m thick	4 ditches 1–2 m deep		fiber optic line	adjacent railroad bed

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
	Denton	Impact Evaluation; FM 156 at Elizabeth Creek	2 fill sections 1–5 m thick	4 ditches 1–2 m deep	1 gully 2 m deep	fiber optic line	adjacent railroad bed; push pile
16	–	Quality Control Debriefing with TxDOT	–	–	–	–	–
17	Bell	Impact Evaluation; Loop 363 around Temple	multiple fill sections 1–4 m thick	multiple ditches 1–2 m deep		multiple telephone/ fiber optic lines water lines sewer lines storm drains electrical lines	adjacent parking lots, shopping centers, over-passes, road cuts, etc.
18	Grayson	Impact Evaluation; SH 56 at Post Oak Creek				storm drains	adjacent parking lots, sidewalks, commercial dev-elopments, etc.
	Grayson	Impact Evaluation; U.S. Hwy 82 at Choctaw Creek	2 fill sections 2.0–2.5 m thick		2 gullies 0.5 m deep		
	Grayson	Impact Evaluation; U.S. Hwy 82 at Mill Creek	2 fill sections 2–3 m thick	1 ditch 0.5 m deep	4 gullies 0.5 m deep	telephone line	road cut
	Grayson	Impact Evaluation; FM 902 at Range Creek	2 fill sections 2–3 m thick	4 ditches 0.5 m deep			push piles; bank erosion
	Grayson	Impact Evaluation; Whitaker Rd. at West Prong of Whites Creek	2 fill sections 0.5 m thick	4 ditches 0.5 m deep	5 gullies <1 m deep	telephone line	push piles
	Grayson	Impact Evaluation; CR 194 at Mustang Creek	2 fill sections 0.5 m thick	3 ditches 0.5 m deep	3 gullies 1–2 m deep		adjacent stock tanks
	Grayson	Impact Evaluation; N. Lincoln Park Rd. at West Prong of Sister Grove Creek	2 fill sections 0.5 m thick	4 ditches 0.5 m deep	1 gully <1 m deep	telephone line	adjacent push piles

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
	Grayson	Impact Evaluation; Whitaker Rd. at East Prong of Whites Creek	2 fill sections 0.5–1.5 m thick	3 ditches 0.5 m deep	3 gullies 1 m deep		bank erosion; road cuts
	Grayson	Impact Evaluation; FM 131 at Iron Ore Creek	2 fill sections 1.5–2.5 m thick	4 ditches <1 m deep	1 gully 1 m deep		
	Hunt	Impact Evaluation; FM 513 at Caney Creek	2 fill sections <1 m thick	4 ditches <1 m deep	1 gully 0.5 m deep		
	Hunt	Impact Evaluation; FM 513 at Ray Creek	2 fill sections <1 m thick	4 ditches <1 m deep	1 gully <0.5 m deep		
	Hunt	Impact Evaluation; FM 513 at Drake Creek	2 fill sections <1 m thick	4 ditches <1 m deep	1 gully 0.5 m deep		
	Hunt	Impact Evaluation; FM 513 at Head Creek	2 fill sections <1 m thick	4 ditches 0.5 m deep			road cut
	Lamar	Impact Evaluation; FM 137 at Noble Creek	2 fill sections 1 m thick	2 ditches 0.5 m deep	3 gullies <1 m deep		
	Lamar	Impact Evaluation; FM 137 at Cane Creek	2 fill sections 1.0–1.5 m thick	4 ditches 0.5 m deep	4 gullies <1 m deep		creek channel-ization; adjacent residential development
	Lamar	Impact Evaluation; FM 137 at Maxwell Creek	2 fill sections 1.0–1.5 m thick	1 ditch <1 m deep	2 gullies <1 m deep	telephone line	push piles
	Lamar	Impact Evaluation; FM 79 at Slough Creek	2 fill sections 1.0–1.5 m thick	4 ditches 0.5 m deep			
	Lamar	Impact Evaluation; FM 79 at Sanders Creek	2 fill sections 1.5–2.0 m thick	2 ditches <1 m deep	2 gullies <1 m deep	telephone line	berm

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
19	Bowie	Survey; SH 8 at Wright Patman Lake	fill sections/causeways 2–9 m thick	ditches 1 m deep		fiber optic line	park entrance road
	Franklin	Impact Evaluation; CR 130 at Cobb Jones Creek	2 fill sections 0.5 m thick	4 ditches 0.5 m deep	4 gullies 1.0–1.5 m deep	telephone line	
	Harrison	Impact Evaluation; SH 154 in Marshall	fill sections 0.5 m thick	ditches <1 m deep		telephone lines water lines sewer lines storm drains	road cuts; bull-dozing; adjacent development
	Hopkins	Impact Evaluation; IH 30 frontage road at Rock Creek	2 fill sections 1.5 m thick; adjacent IH 30 fill sections	2 ditches 0.5 m deep	2 gullies 0.5–2.0 m deep	telephone line	gravel access road
		Impact Evaluation; IH 30 frontage road at Caney Creek	2 fill sections 2 m thick; adjacent IH 30 fill sections			telephone line	berms; borrow pits
		Impact Evaluation; CR 596 at White Oak Creek	2 fill sections <1 m thick	4 ditches 0.5 m deep	4 gullies 1 m deep		push piles
		Impact Evaluation; CR 572 at Kennedy Creek	2 fill sections 0.5 m thick		3 gullies <1 m deep		
		Impact Evaluation; bridge replacement on CR 271 at Running Creek	2 fill sections <0.5 m thick		4 gullies 0.5–1.5 m deep		
		Impact Evaluation; bridge replacement on CR 387 at Glade Creek	1 fill section 0.5 m thick	2 ditches <0.5 m deep	4 gullies <1 m deep		
	Morris	Impact Evaluation; FM 144 at Boggy Creek	3 fill sections 1–2 m thick	6 ditches 0.5 m deep	6 gullies 1 m deep	telephone line	
	Panola	Impact Evaluation; U.S. Hwy 79 at the Sabine River	3 fill sections 2–4 m thick	6 ditches 1–2 m deep			earthmoving; fill piles; gravel access roads; road cuts

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
		Impact Evaluation; FM 1186 at Jackson Creek	2 fill sections 2 m thick	4 ditches 0.5 m deep	4 gullies 0.5 m deep		road cuts
		Impact Evaluation; FM 124 at Buckner Creek	2 fill sections <1 m thick	4 ditches 0.5 m deep	4 gullies 1 m deep	gas pipeline	
		Impact Evaluation; FM 124 at Caney Creek	2 fill sections 2 m thick	4 ditches 0.5 m deep	4 gullies 0.5 m deep	gas pipeline	
	Rains	Impact Evaluation; SH 19 at the Sabine River	2 fill sections 5 m thick	ditches 0.5 m deep	gullies 1 m deep	2 telephone lines	road cuts
20	McLennan	Impact Evaluation; SH 317 at Wasp Creek	2 fill sections 2.5–3.0 m thick	4 ditches <1 m deep			adjacent railroad bed
21	Dallas	Impact Evaluation; Preston Rd. in Dallas	fill sections 3–14 m thick			storm drains fiber optic lines gas lines	adjacent railroad bed, highway interchange, and frontage roads; fill pile
	Kaufman	Impact Evaluation; U.S. Hwy 175 at Cedar Creek Reservoir	large causeway over lake	ditches 1–2 m deep		telephone lines	road cuts
22	Harrison	Impact Evaluation; FM 31 at Quapaw Creek	fill sections 0.5–2.0 m thick	ditches <1 m deep	gullies <1 m deep	telephone line	gravel access roads
23	Delta	Impact Evaluation; CR 106 at Johns Creek	2 fill sections <1 m thick	4 ditches 1 m deep			bank erosion
		Impact Evaluation; CR 128 at West Fork of Jernigan Creek	2 fill sections <0.5 m thick	4 ditches 0.5 m deep	2 gullies 1.0–1.5 m deep		
		Impact Evaluation; CR 218 at Lake Creek			2 gullies 1 m deep	telephone line	road cuts; push piles

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
		Impact Evaluation; CR 180 at a tributary of the North Sulphur River	2 fill sections <0.5 m thick	4 ditches <0.5 m deep	4 gullies 1.0–1.5 m deep		bank erosion
	Fannin	Impact Evaluation; U.S. Hwy 82 at Big Caney Creek	2 fill sections 2.0–2.5 m thick	4 ditches 0.5 m deep	gullies <1 m deep	telephone line	push piles
	Hunt	Impact Evaluation; CR 1035 at Hickory Creek	2 fill sections <1 m thick	4 ditches 0.5 m deep	4 gullies 1 m deep	telephone line	adjacent stock tank
		Impact Evaluation; CR 1032 at a tributary of Cowleech Fork	2 fill sections 0.5 m thick	4 ditches 0.5 m deep	several gullies 0.5 m deep		
		Impact Evaluation; CR 3211 at Lake Fork Creek	2 fill sections 0.5 m thick	4 ditches 0.5 m deep	3 gullies 1 m deep	telephone line	
		Impact Evaluation; FM 1563 at the Middle Sulphur River	2 fill sections 1.0–1.5 m thick	4 ditches 0.5 m deep		telephone line	bank erosion
	Lamar	Impact Evaluation; 2nd St. in Roxton	2 fill sections 0.5–1.5 m thick	4 ditches 0.5 m deep	4 gullies <1 m deep	telephone line; gas lines; water lines	adjacent residential development
		Impact Evaluation; Deport St. in Deport	1 fill section 1 m thick	4 ditches 0.5 m deep	2 gullies <1 m deep	gas pipeline	creek channelization
24	Erath	Impact Evaluation; CR 417 at a tributary of the South Fork of the North Bosque River	1 fill section 0.5 m thick	2 ditches <0.5 m deep	2 gullies 2.0–3.5 deep	telephone line gas pipeline	push pile; bank erosion
		Impact Evaluation; CR 230 at a tributary of Duffau Creek	1 fill section 1.5 m thick		2 gullies 1–4 m deep		push pile
25	Panola	Survey; FM 124 at Buckner Creek	2 fill sections <1 m thick	4 ditches 0.5 m deep	4 gullies <1 m deep	gas pipeline	

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
		Survey; FM 124 at Caney Creek	2 fill sections <2 m thick	5 ditches 0.5 m deep		gas pipeline	old channel scars
		Survey; FM 10 at Six Mile Creek	2 fill sections <2 m thick	4 ditches 0.5 m deep		gas pipelines water line fiber optic line	road cut; adjacent clear-cut areas
26	Morris	Survey; FM 144 at Boggy Creek	3 fill sections 1–2 m thick	6 ditches 0.5 m deep	6 gullies 1 m deep	telephone line	
27	Fannin	Impact Evaluation; CR 271 at Cooper Creek		2 ditches <1 m deep		telephone line	push piles; bank erosion
		Impact Evaluation; CR 656 at Rock Creek		1 ditch <0.5 m deep	1 gully 1–2 m deep		bank erosion
	Red River	Impact Evaluation; FM 909 at Cuthand Creek	2 fill sections 4–5 m thick			water line	bank erosion
		Impact Evaluation; FM 909 at Frances Creek	1 fill section 2 m thick		2 gullies 1–2 m deep	water line	road cuts
		Impact Evaluation; FM 410 at Scatter Creek	2 fill sections 1.5–3.0 m thick	4 ditches <1 m deep	4 gullies 1–4 m deep	gas pipeline telephone line sewer line	bulldozing; adjacent residential development
		Impact Evaluation; FM 410 at Wildcat Creek	2 fill sections 2–4 m thick	4 ditches <0.5 m deep	4 gullies 2 m deep	telephone line	bank erosion
		Impact Evaluation; FM 910 at Cuthand Creek	2 fill sections 1.5–3.0 m thick	2 ditches <1 m deep	2 gullies <3 m deep	water lines	push pile; old channel scars
28	Erath	Survey; CR 230 at a tributary of Duffau Creek	1 fill section 1.5 m thick		2 gullies 1–4 m deep		push pile
29	Collin	Impact Evaluation; FM 545 at Pilot Grove Creek	4 fill sections 0.5–2.0 m thick	2 ditches 0.5 m deep	4 gullies <1 m deep	telephone line	gravel access roads; berm; road cut

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
	Denton	Impact Evaluation; FM 1173 at North Hickory Creek	2 fill sections <2 m thick	4 ditches <0.5 m deep	1 gully 0.5 m deep	2 telephone lines	old channel scars
		Impact Evaluation; FM 1171 north of Grapevine Lake	fill sections 1–8 m thick	multiple ditches <1 m deep	multiple gullies <1 m deep	telephone lines fiber optic lines storm drains gas pipelines water lines	road cuts; adjacent residential and commercial development
		Impact Evaluation; FM 1830 at Loving Branch	2 fill sections 1.5 m thick	1 ditch <1 m deep	1 gully <1 m deep	fiber optic line sewer line	road cuts; adjacent stock pond; adjacent residential development
30	–	Produce synthetic report	–	–	–	–	–
31	Hill	Survey; FM 744 at Four Mile Creek	2 fill sections 1.5–2.0 m thick	1 ditch <1 m deep	4 gullies <1 m deep	telephone line	
	Bell	Impact Evaluation; SH 36 south of Temple	fill sections 1–2 m thick	multiple ditches <0.5 m deep	multiple gullies <1 m deep	fiber optic lines	bulldozing; bank erosion; adjacent stock tanks; adjacent erosion control structures
32	Cass	Survey; FM 250 at Black Cypress Creek	2 fill sections 2 m thick	4 ditches <1 m deep	multiple gullies <1 m deep	gas pipeline	
		Survey; FM 250 at Arbery Branch	2 fill sections 0.5–1.5 m thick	4 ditches 0.5 m deep	2 gullies 1 m deep	gas pipeline	
		Survey; FM 250 at Kelly Creek	3 fill sections 1.0–2.0 m thick	2 ditches 0.5 m deep	multiple gullies <1 m deep	fiber optic line telephone line gas pipeline	
33	Gregg and Upshur	Impact Evaluation; U.S. Hwy 80 in Gladewater	1 fill section 6.5 m thick; 1 fill section 1 m thick	multiple ditches <1 m deep	multiple gullies <1 m deep	sewer lines gas pipelines fiber optic lines water lines	road cuts; adjacent residential and commercial development

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
		Survey; U.S. Hwy 80 at Glade Creek	2 fill sections 2–3 m thick	3 ditches 0.5 m deep	multiple gullies <1 m deep	sewer lines gas pipelines fiber optic line	road cuts; adjacent oil/gas development
34	Collin	Survey; FM 545 at Pilot Grove Creek	4 fill sections 0.5–2.0 m thick	2 ditches 0.5 m deep	4 gullies <1 m deep	telephone line	gravel access roads; berm; road cut
35	Falls	Impact Evaluation; SH 6 south of Marlin	multiple fill sections 1–5 m thick	multiple ditches <1.5 m deep	multiple gullies <1 m deep	telephone line fiber optic line	old railroad bed; old road bed; highway interchange; gravel access road
		Survey with Geoarcheological Assessment; SH 6 at Big Creek	3 fill sections 7 m thick	3 ditches 1 m deep	2 gullies 1.5 m deep	2 fiber optic lines	old railroad bed; old road bed
36	Coryell	Impact Evaluation; FM 107 north of Mother Neff State Park	4 fill sections 1–2 m thick	multiple ditches <0.5 m deep	multiple gullies 0.5 m deep	2 telephone lines gas pipeline	bulldozing; adjacent residential development
37	Hunt	Impact Evaluation; FM 499 at Lynn Creek	2 fill sections 1–5 m thick	3 ditches <0.5 m deep	2 gullies <1 m deep	2 telephone lines 1 water line	
		Impact Evaluation; SH 224 at the Sabine River	6 fill sections 6 m thick				
		Impact Evaluation; SH 34 at the South Sulphur River	2 fill sections 2–6 m thick			1 telephone line 1 fiber optic line	
		Impact Evaluation; CR 522 at the Sabine River	2 fill sections 0.5 m thick	4 ditches <1 m deep			
		Impact Evaluation; CR 523 at Lake Fork Creek	2 fill sections 0.5 m thick	4 ditches 0.5–1.5 m deep	2 gullies 2 m deep	1 telephone line 1 gas pipeline	
		Impact Evaluation; FM 816 at Spring Creek	4 fill sections 1 m thick	2 ditches	2 gullies 0.5–3.0 m deep	1 telephone line	bank erosion

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
	Lamar	Impact Evaluation; FM 2122 at Maxwell Creek	2 fill sections 2.5 m thick	4 ditches <1 m deep	3 gullies 2.5–3.0 m deep	1 telephone line	
38	Wise	Impact Evaluation; U.S. Hwy 380 east of Decatur	multiple fill sections 1–8 m thick		multiple gullies 0.5–2.0 m deep	gas pipeline fiber optic line telephone line	fill piles
39	Bell	Impact Evaluation; SH 36 at the Leon River	2 fill sections 7 m thick	4 ditches 1 m deep		1 telephone/fiber optic line	park access roads
		Impact Evaluation; SH 95 at the Little River	2 fill sections 4 m thick			1 telephone/fiber optic line	old highway bed; channel cutting; drag strip
		Impact Evaluation; CR 382 at the Little River	2 fill sections 2 m thick	2 ditches 1 m deep			bank erosion; gravel piles
	Hamilton	Impact Evaluation; CR 284 at Alexander Creek	2 fill sections 2.5 m thick		multiple gullies 0.5 m deep	1 telephone line	adjacent low-water crossing; bulldozing
		Impact Evaluation; CR 296 at Bear Creek		1 ditch 1 m deep		1 telephone line	adjacent low-water crossing; bank erosion; old railroad bed
		Impact Evaluation; CR 294 at Alex Branch	2 fill sections 2 m thick		1 gully <1 m deep	1 telephone line	road cut
		Impact Evaluation; CR 260 at the North Bosque River tributary	2 fill sections <1 m thick	2 ditches <0.5 m deep	multiple gullies <0.5 m deep	1 telephone line	push piles
	Hill	Impact Evaluation; CR 469 at Cottonwood Creek	2 fill sections 1.5 m thick		multiple gullies 1–2 m deep	1 telephone line	
		Impact Evaluation; CR 114 at Jackson Creek	2 fill sections 1.5 m thick	2 ditches 0.5 m deep	1 gully 1–3 m deep		

Table 2, *continued*

Work Order	County	Project	Fill Sections	Ditches	Gullies	Underground Utilities	Other
	McLennan	Impact Evaluation; CR 346 at Live Oak Creek	2 fill sections 2 m thick	4 ditches <1 m deep	2 gullies 1 m deep		
		Impact Evaluation; CR 440 at Patten Branch	2 fill sections 2 m thick	4 ditches 0.5 m deep	2 gullies 0.5 m deep		lake construction and contouring of adjacent land
		Impact Evaluation; CR 774 at Castleman Creek	2 fill sections 2 m thick	1 ditch 1 m deep	1 gully 4 m deep	1 fiber optic line 2 irrigation pipes	plowing of adjacent fields
		Impact Evaluation; CR 581 at Tehuacana Creek	2 fill sections 1 m thick	4 ditches 0.5 m deep	1 gully 1 m deep		
40	Panola	Survey; FM 10 at Murvaul Creek	5 fill sections 2.5 m thick	10 ditches 1.0–1.5 m deep		telephone lines	3 gas pipelines
	Titus	Survey; FM 127 at Tankersley Creek	2 fill sections 1 m thick	4 ditches 1.0–1.5 m deep	2 gullies 2 m deep	1 telephone line	water treatment plant effluent pipeline
41	Dallas	Impact Evaluation; Rylie Crest Dr. at Hickory Creek	2 fill sections 2.5 m thick	2 ditches 0.5 m deep		1 sewer line	
	Denton	Impact Evaluation; Country Club Rd. at Graveyard Branch tributary	2 fill sections 1–2 m thick	2 ditches 0.5–1.0 m deep	1 gully 1 m deep	2 telephone lines	adjacent roadside park
	Ellis	Impact Evaluation; Ebenezer Rd. at Grove Creek			1 gully 0.5 m deep		
		Impact Evaluation; West Main St. at Red Oak Creek	2 fill sections 1.5 m thick	2 ditches 0.5 m deep	2 gullies 0.5–1.5 m deep	2 telephone lines 1 gas pipeline	
	Kaufman	Impact Evaluation; CR 313 at Muddy Cedar Creek tributary		1 ditch 0.5 m deep	4 gullies 1 m deep	1 telephone line	road grading

construction of dirt, gravel, or paved driveways, often with associated culverts, to access fields, businesses, and residences beyond existing rights of way; plowing of fields adjacent to existing rights of way; construction and maintenance of railroad beds near existing rights of way; excavation of stock tanks on adjoining lands; landscaping adjacent to existing rights of way; and adjacent commercial development. Occurring more commonly but with low impacts were overhead transmission and telephone lines, which were observed along the edges of the rights of way at many locations.

By combining information on the observed/presumed depth of these disturbance factors, their horizontal extent, the size of the existing right of way, and planned new right of way or construction easements, it was possible to identify areas where disturbance has been so severe that archeological remains (if present) would be unlikely to survive with good integrity—i.e., areas where survey was not warranted. Areas lacking such disturbance typically were recommended for survey, especially if the potential for sites was considered high (i.e., on terraces or upland margins overlooking medium-sized and larger water courses) or if thick alluvial deposits that could host archeological remains in stratified contexts were present.

To illustrate how this worked in practice, four idealized scenarios based on actual Impact Evaluations are described. In Scenario 1, the Transportation Activity will involve replacement of a bridge across a small creek on a county road with a narrow (ca. 12 m) right of way. The new bridge will be slightly longer and wider than the old bridge, but it will be in the same location. The approaches will be reconstructed for ca. 30 m from both ends of the bridge. Because the bridge will be in the same position and the approaches will not be realigned, no new right of way is required. The bridge will be closed during construction and local traffic rerouted to a nearby county road, and thus no easement for a temporary detour outside the right of way is needed. In this case, the primary existing disturbance factors consist of the following: fill sections 0.5–1.0 m thick are present on both sides of the bridge, extending the full length of the project area and covering all but ca. 2 m on each edge of the right of way; ditches 1 m wide and less than 0.5 m deep are present between the fill sections and right of way edges; on one side of the creek, the ditches on both sides of the fill section have eroded to a depth of 1 m for a distance of ca. 10 m back from the creek, with these erosional gullies widening to ca. 2 m at the creek banks; and a buried telephone line is present along one edge of the right of way for the full length of the project area. The cutbanks of the creek expose ca. 2 m of fine-grained Holocene alluvium (bedrock is not visible above the water level, and thus the full thickness of the Holocene deposits cannot be determined). No archeological materials are visible in the cutbanks, but they are covered by vegetation, and visibility is poor. Impact Evaluation for this project area would result in a recommendation that no survey be required. While the Holocene alluvium is sufficiently thick to contain buried archeological remains in good context, the existing zone of disturbance probably approximates what will be disturbed by removal of the old bridge, construction of the slightly larger new bridge, and reconstruction of the fill sections. Hence, if a buried site is present, the new construction will not impact it to any greater extent than it has been disturbed already. In this example, almost all of the existing right of way likely has been disturbed to a depth of 0.5 to 1.0 m below the original surface by placement of the original fill sections, ditch excavation, gully erosion, and placement of the buried telephone line. In addition, it is expected that areas immediately around the bridge (i.e., within 2–5 m) were disturbed to a greater depth (at least 2 m) by construction of the original bridge.

The same parameters apply to Scenario 2, except that TxDOT will need to acquire a construction easement extending up to 12 m outside the existing right of way for a temporary detour to allow local traffic to continue to cross the creek during construction. Because the cutbanks show Holocene alluvium with sufficient thickness to contain buried archeological remains in good context and because the area of the construction easement shows only minor disturbance from cattle grazing,

Impact Evaluation would result in a recommendation that this area outside the existing right of way be surveyed with backhoe trenches. The trenches would be excavated to a depth of at least 1.5 m (the assumed maximum depth of substantial disturbance), with the sediments removed and the trench walls examined for archeological remains. A maximum of four trenches probably would be dug, since the temporary detour will extend only ca. 30 m on either side of the creek. In a slight variation of this scenario, survey probably would not be called for if the creek cutbanks showed thin (<1 m) alluvium sitting on bedrock and the gullies showed the alluvium thinning away from the creek, since the potential for buried archeological deposits would be lowered.

In Scenario 3, TxDOT plans to turn a two-lane highway across a major river valley into a four-lane divided highway, adding a new bridge across the river and several relief structures across sloughs. A similar project had been planned years ago, and new right of way had been acquired and surveyed archeologically (with shovel tests but no trenches) at that time. Large (up to 5 m high) fill sections adjoin the existing bridge and relief structures, occupying about 40 percent of the ca. 100-m-wide right of way. Ditches, gullies, access roads to fields and fishing areas, and buried utilities occupy another 10 percent. Because half of the large right of way remains undisturbed (except probably for minor surface disturbance associated with initial clearing after acquisition by TxDOT) and because the river valley contains many meters of Holocene fill, survey with trenching clearly is warranted. As above, the trenches would be excavated to at least 1.5 m, with those close to the new bridge and relief structures taken deeper (ca. 3 m) if the water table allows due to the likely deeper impacts that will result from putting in these large structures. The number of trenches would depend on a variety of factors, including the number and distribution of landforms evident on the surface, access off the existing high fill sections, and the extent of areas with ponded water. Of course, survey also would be recommended if TxDOT was acquiring new right of way (or construction easements) in this example. The same factors would affect how the trenching was done, with additional complications perhaps added by dense woods in the new right of way. Also, survey with shovel testing probably would be recommended if new right of way extended onto the upland margins adjacent to the valley.

Scenario 4 involves widening a bridge across a medium-sized stream and adding shoulders to the adjoining two-lane road for 0.8 km from valley wall to valley wall. Because only half of the bridge will be under construction at a time, a detour will not be needed. No new right of way will be required, as the existing one, at 29 m wide, is large enough to accommodate the new work. Fill sections 1–2 m high extend the full length of the project area and occupy 50–60 percent of the right of way. Shallow (0.5 m) ditches parallel the edges of the fill sections, and buried telephone/fiber optic lines are at both edges of the right way, leaving about 5 m of right of way with only limited surface disturbance on each side of the road. About 3 m of Holocene alluvium are visible in the creek cutbanks, with the creek having a bedrock bottom. While no archeological remains can be seen in the cutbanks, the potential for sites in good context appears high based on the thickness of the deposits. Despite this assessment of site potential, Impact Evaluation would result in a recommendation that no survey be required because the anticipated impacts are so minimal. Widening of the bridge will not affect any undisturbed areas, and widening of the roadway will result in the addition of new fill that will impinge on existing ditches and adjacent undisturbed right of way only to a limited extent.

Sites Investigated

Sixteen archeological sites and 1 possible site were investigated during 10 work orders. Descriptions of these sites, drawn from the original reports included on CD-ROM in Appendix B, are presented below. Table 3 summarizes the materials observed and recommendations made.

Work Order 2, 41CV1620

No cultural materials were observed in

Table 3. Summary of archeological sites investigated

Work Order	Site	Materials Observed	Recommendation
2	41CV1620	biface, debitage, historic structural remains	no further work
6	41UR28	debitage, sherds, burned rocks	no further work
9	41BL1099	nineteenth-century house with associated artifact scatter, twentieth-century dam	outside project area; not assessed
	41BL1100	burned rock feature, charcoal	obtain radiocarbon date before assessing further
	41BL1101	bifaces, debitage, cores	no further work
13	41HM44	bifaces, debitage, modified flakes, cores, burned rocks, mussel shells, snail shells	no further work in ROW; part of site outside ROW not assessed
	41HM45	possible hearth, core, burned rocks, mussel shells, snail shells, bones, charcoal	test excavations
14	41UR36	burned rock feature, scraper, debitage, pitted stone, burned rocks, burned nutshells, mussel shell	test excavations
19	41RA86	debitage, burned rock	no further work
32	41CS143	Gary dart point, debitage, burned rocks, burned nutshells	no further work
	41CS144	debitage, burned rocks, burned nutshells, whiteware, glass, metal	no further work
34	–	animal bones, charcoal	test excavations to determine if archeological materials are present
35	41FA65	none	no further work
40	41PN175	debitage, sherds, ochre, burned rock, burned nutshells, charcoal, possible feature	test excavations
	41PN176	debitage, sherds, burned nutshell, charcoal	no further work
	41TT823	debitage, sherd, burned rocks	no further work
	41TT824	Yarbrough dart point, debitage, charcoal	no further work

the two Gradall trenches and in the cutbank exposures at CR 213 on Coryell Creek in Coryell County, but an extremely sparse scatter of flakes and one biface were observed on the T_1 surface east of the creek. This scatter covers an area ca. 30 m east-west by 18 m north-south and was designated 41CV1620. It is bordered by CR 213 and an erosional gully to the south and west, respectively. Also included within 41CV1620 are displaced structural remains present along the northern edge of the right of way. No historic artifacts or foundation remnants were found on the terrace surface or in Gradall Trench 1, located a few meters south of the location of the displaced remains. The origin and age of the structural remains are unknown, but the construction materials of unmodified limestone, cement, and concrete blocks are indicative of a twentieth-century age. A few flakes and unmodified chert nodules also were noted on the T_0 surface between 41CV1620 and the

creek. Since the uppermost deposits of this terrace are interpreted as being less than 100 years old, however, the debitage is not in primary context. Debitage and natural chert nodules and cobbles were observed in gravel bars located along the edges of the creek channel. These materials have been redeposited, most likely from upstream. Because of the sparseness of the remains at 41CV1620 and the apparent lack of subsurface deposits, the site is considered ineligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark.

Work Order 6, 41UR28

Site 41UR28, recorded in 1980, was reported to occupy a low (2–3 m) rise 300 m northeast of the main channel of Little Cypress Creek in Upshur County. The rise was estimated to be 100 m in diameter and partially impacted by the southeastern right of way of State Highway 155. The site was defined based on quartzite and chert tertiary flakes, charcoal, burned hardwood nutshell fragments, mussel shell fragments, and bone fragments noted in rodent disturbances. The site type and cultural affiliation were not designated on the site form. However, Thurmond (1990:100) listed the site as limited in intensity of use for his inventory of recorded sites in the Cypress Creek basin. This classification was based on its extent and the density of surface artifacts.

Site 41UR28 was re-located during Work Order 6. It was found to be 100 m northeast of its plotted position and on both sides of the highway. The original plotting placed it on the southeast side of the highway between the northeastern relief structure (Relief Structure 2) and the main bridge. This area did not fit the topographic description of the site but, rather, was found to be low and wet. It was not logistically possible to get the Gradall into this area between the bridge and the relief structure. Consequently four shovel tests (Nos. 7–10) were excavated instead. These shovel tests encountered 30 cm of disturbed soils on top of gray sandy clay. No cultural materials were recovered from these tests. However, Gradall Trenches 4–7 placed on a series of three low rises on the southeast side of the highway just northeast of Relief Structure 2 did produce cultural materials. This series of rises, located approximately 100 m northeast of the original plotted position, better fits the original site description. Three of the trenches (Nos. 4, 5, and 6) encountered scattered burned rocks and lithic flakes within a deposit of yellowish brown sandy loam extending 15 to 70 cm below the surface. This deposit overlies a firm brown sandy clay with obvious polygonal cracks filled with a fine yellow sand. Artifacts appear to stop at the top of the sandy clay. The majority of the artifacts observed came from Trench 5, consisting mostly of burned rocks; only two quartzite flakes were recovered from the backdirt of the trench. Shovel Tests 1 and 2 also were placed in the area, but only Shovel Test 2, located between Trenches 4 and 5, produced an artifact—one burned rock from 40–50 cm below the surface.

On the northeast side of Relief Structure 2, located on the northwest side of the highway, an additional three sandy rises are present; these rises most likely are a continuation of the same landform encountered on the southeast side of the highway. Three trenches (Nos. 1–3) encountered cultural materials within the same yellowish brown sandy loam as observed on the southeast side of the highway. The deposit on the northwest side is slightly deeper at 12 to 92 cm below the surface, and it produced ceramic sherds in the upper 50 cm with burned rocks and lithic flakes scattered throughout. The majority of the materials observed came from Trenches 1 and 2. The deposit in Trench 3 was thinnest at 10–55 cm below the surface. Materials recovered from the walls and backdirt of the trenches include two chert flakes, one silicified wood flake, one quartzite flake, one incised grog-tempered body sherd, and one plain bone-tempered body sherd. Shovel Test 11 also was excavated on this side of the highway; it produced one quartzite flake and one shell-tempered plain body sherd at 50–60 cm below the surface.

In all, six lithic flakes and three sherds were recovered from the three trenches and two shovel tests placed on the site. The sherds recovered do not contain any diagnostic characteristics that would enable a firm type

assignment. However, the presence of ceramics confirms that at least a Late Prehistoric Caddoan component is present. Due to the lack of recovery of other diagnostic artifacts, it is unclear if other components are present. Given the lack of discernible stratigraphy within the artifact-bearing deposit, it is unlikely that components could be isolated. The meager artifact recovery does, however, appear to confirm the low use intensity postulated by Thurmond (1990:100) from surface artifacts. The presence of faunal and floral materials as noted on the original site form was not confirmed. Extensive trench exposures through the site show that midden deposits are not present. Some charcoal was noted in the trenches, but it appears to be modern and associated with recent vegetation burning. The burned rocks observed were scattered throughout the sandy loam deposits; no burned rock features were encountered.

Since the same landform and yellowish brown sandy deposit are present on both sides of State Highway 155, the boundaries of 41UR28 were expanded to encompass both sides of the right of way. The site likely extends beyond the right of way to the northeast and southwest as does the landform. However, within the right of way the site covers an area of approximately 7,800 m^2. It is likely that the site has been impacted by the original construction of Relief Structure 2 and by the deposition of fill to construct the elevated roadway approach to the relief structure.

Survey results indicate that 41UR28 has little potential to contain stratigraphically discrete cultural deposits relating to Native American use of the area. No intact cultural features were found, and no midden deposits appear to be present. The lack of such features and/or middens suggests that its potential to yield important information is limited. Hence, 41UR28 is considered ineligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark.

Work Order 9, 41BL1099–41BL1101

Three sites were recorded during Work Order 9 on FM 439 in Bell County: historic site 41BL1099 and prehistoric sites 41BL1100 and 41BL1101. Only 41BL1100 and 41BL1101 are within the proposed right of way. Site 41BL1099, approximately 100 m outside the project area, represents a reported stagecoach stop and associated outlying features, including a dam (ca. 1940). Site 41BL1099 was recorded in a limited fashion because of its obvious historic age and potential significance. It consists of a two-story, cut limestone house that appears to date to the mid-nineteenth century, although it also has modern additions; an associated artifact scatter that dates mostly to the very late nineteenth century and first half of the twentieth century; and a twentieth-century rock and concrete dam with associated ditch just east of North Nolan Creek.

Cultural materials were observed in only one of the five trenches (Backhoe Trench 1) excavated during this survey. Historic materials (pieces of finished mortar and one sherd of yellowware [ca. 1900–1930s]) were found in a buried A horizon between 67 and 120 cm; these probably are associated with 41BL1099 just to the south. At a depth of 153 cm, a concentration of burned rocks was exposed in the wall of the trench. A short extension was excavated parallel to and adjoining Backhoe Trench 1, extending 1.5 m southeast from the central portion of the original trench, to expose the burned rock concentration. This probable burned rock feature (possibly a hearth) consists of 11 burned limestone rocks and scattered charcoal covering an area of 60x50 cm. No artifacts were observed in association. TxDOT personnel collected a charcoal sample from the burned rock concentration for radiocarbon dating. Because of the likelihood that this represents a Native American occupation, albeit an apparently ephemeral one, this feature was recorded as 41BL1100.

Site 41BL1101 was located during pedestrian survey of the proposed right of way on the upland slope in the northeastern part of the survey area. The site, which is comparable to the Lithic Resource Procurement Areas that are so common in some upland areas just to the west at Fort Hood, consists of numerous primary and secondary flakes as well as numerous cores and bifaces scattered over an area 475 m long by 130 m wide. In addition, there are several mounds, 20–30 cm high and

1.5–2.0 m in diameter, composed of primary and secondary flakes and chunks of chert. These mounds contain very little matrix between the chert pieces and could represent accumulations of debris associated with quarrying and the initial stages of reduction. Alternatively, they could be nothing more than old push piles resulting from land clearing. No temporally diagnostic artifacts or burned rock features were observed at 41BL1101. No shovel testing was done because of the good surface visibility and the lack of Holocene sediment deposition.

Historic site 41BL1099 is outside the proposed right of way and therefore will not be impacted by the project. Site 41BL1100 is within the proposed right of way, and, although buried, it is likely that this burned rock concentration and any associated cultural deposits would be impacted by construction associated with the bridge and road relocation. This feature may represent an ephemeral occupation based on the fact that no Native American artifacts were observed in Backhoe Trench 1 or Backhoe Trench 2 just 15 m away. Because of this and the possibility that this component has been disturbed by historic activities (based on the presence of twentieth-century materials in the overlying buried A horizon), 41BL1100 may have a limited potential for the kind of information that would make it eligible for listing in the National Register of Historic Places or for designation as a State Archeological Landmark. On the other hand, its position in what appears to be stratified alluvium suggests that it could be in good geologic context. Because a radiocarbon sample that could help interpret this feature was taken, it was recommended that assessment of this site be deferred until a radiocarbon date could be obtained. Site 41BL1101 is an upland lithic procurement site. Because of the lack of Holocene deposition and accretional cultural features such as burned rock mounds, it does not have the kinds of contexts that would allow discrete occupational events, components, or periods of use to be isolated. For this reason, it lacks the capacity to yield important information about Native American use of the region, and it is recommended that it be considered ineligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark.

Work Order 13, 41HM44 and 41HM45

In conducting the Impact Evaluation on CR 311 at Cowhouse Creek in Hamilton County, one heavily patinated late-stage to finished biface and one burned rock were observed in an eroded area near the creek. From the top of the cutbank, the ground surface gently rises to the south and crests at the top of a small hill that lies just outside the project area and is bisected by CR 311. Site 41HM44 is located on this hill and appears to be the source of the biface and burned rock seen in the creek bank. Site 41HM44 was recorded, although most of it is beyond the project limits.

Site 41HM44 is a prehistoric open campsite of unknown age lying on the north/northwest slope of a hill composed of Paluxy Sand, overlain by 20–50 cm of clay loam that probably represents Walnut Clay sediments redeposited by slopewash. Numerous mussel shells, burned rocks, pieces of lithic debitage, edge-modified flakes, cores, bifaces, and *Rabdotus* snail shells were observed across the site and to a depth of 25 cm in the CR 311 road cut. These cultural materials occur in the clayey sediments above the Paluxy Sand. No diagnostic artifacts were observed and no cultural materials were collected. One shovel test was excavated east of the road between the site boundary and the southern end of the project area, and three medial flake fragments were recovered. Excavation was terminated when large rocks were encountered at 20 cm below the surface. Based on the surface extent of the cultural materials, the site is approximately 50x20 m, with the long axis oriented northeast-southwest. The extent of surface and buried cultural materials observed, combined with the landform where the site is located, suggest that intact cultural deposits are eroding out of the hillside and washing downslope toward Cowhouse Creek. While cultural materials found within the right of way may be attributable to 41HM44, they have washed into the right of way and, thus, are not in their original archeological context. These remains are

not eligible for National Register listing or State Archeological Landmark designation. Because most of the site is beyond the limits of the current project area, it was not assessed for National Register/State Archeological Landmark eligibility.

A second site in Hamilton County, 41HM45, was recorded during survey on CR 168 at the Leon River during Work Order 13. The site was identified in a backhoe trench on a terrace ca. 40 m south of the river. The trench was excavated to a maximum depth of 1.95 m. Dark brown clay loam occurred at 0–0.20 m, and from 0.20 to 0.50 m was unconsolidated mottled light brown sand. At 0.50–0.95 m was a dark brown clay loam paleosol, within which burned rocks, mussel shells, and *Rabdotus* snail shells occurred between 0.65 and 0.70 m. The deepest zone, 0.95–1.95 m, consisted of brown silty clay loam with calcium carbonate; burned rocks and mussel shells were noted at 1.00 m and again at the bottom of the trench at 1.95 m. There also was an ovate area (25x20 cm) in the bottom of the trench along the south wall consisting of patchy burned earth and charcoal, a sample of which was collected for possible dating. Root casts and charcoal flecks also were observed in the bottom of the trench. Cultural materials were encountered at 0.40 m in the east end of the trench and interpreted as being associated with the buried paleosol. The top of the paleosol was observed at 0.40 m in the east end of the trench, at 0.50 m in the center, and at 0.80 m at the west end suggesting a sloping surface. A swale that appears to be an abandoned channel of the river lies west of the trench. The sloping surface of the paleosol suggests that it may have been truncated by this old channel or that the soil developed after the channel had partially filled. Cultural materials were observed horizontally throughout the paleosol in the trench.

The materials observed consisted mostly of numerous mussel shells and burned rocks. The mussel shells varied from 5 to 10 cm in length, and the burned rocks varied from small angular and subangular fragments less than 5 cm in diameter to medium-sized angular and subangular rocks 10–15 cm in diameter. One core was observed, but no tools, projectile points, or lithic debris were found. In the east end of the trench, numerous pieces of unidentified bone were observed. They were in such poor condition that they crumbled when handled, and some pieces appeared to have been burned. Based on the evidence from the trench, 41HM45 appears to be a stratified campsite with considerable potential for containing intact features and preserved botanical and faunal remains. The ages of the cultural deposits are unknown, but it is possible that the buried paleosol at this locality equates to the Leon River and Tank Trail paleosols observed along the Leon River and Henson Creek (respectively) on Fort Hood (Mehalchick et al. 1999). These represent cumulic soils that frequently contain stratified cultural occupations dating to the latter half of the late Archaic period and the early part of the Late Prehistoric period. The size of the site is unknown, but it could extend along the river for some distance. Burned rocks and mussel shells noted eroding out of the south bank of the river approximately 0.75–1.00 m below the surface ca. 100 m downstream from the proposed bridge location may be associated with 41HM45. Based on the likelihood that it contains important archeological data, 41HM45 is considered potentially eligible for listing in the National Register of Historic Places and designation as a State Archeological Landmark, pending test excavations to more fully assess its significance.

Work Order 14, 41UR36

Site 41UR36 was recorded during the Big Sandy Reservoir survey project conducted by Prewitt and Associates in 1985 (Perttula et al. 1986). Investigations at that time included surface collection, along with excavation of three shovel tests and one 1x1-m test unit. These investigations identified Archaic and Late Caddoan occupations. The site was found to cover an area of 7,500 m^2 on both sides of FM 1002 at Glade Creek in Upshur County, with 450 m^2 of the site estimated as having been destroyed by road construction (Perttula et al. 1986:277). Seventy-eight sherds, 60 pieces of debitage, and a Bell dart point were recovered.

Most of the sherds came from a 1,100-m^2

concentration at 0 to 20 cm below the surface east of the road. This concentration was defined mainly by surface indications, since the area was a garden providing good surface exposure. However, the vertical extent was determined by the placement of a 1x1-m test unit within the concentration. The ceramic sample collected from the concentration includes brushed, punctated, and incised Late Caddoan utility wares. This sample was considered contemporaneous with the Whelan phase of the Cypress Creek basin and the occupation at McKenzie Mound within the Big Sandy Creek basin (Perttula et al. 1986:278). A thermoluminescence date of A.D. 1450 was obtained on a carinated bowl sherd from this concentration (Perttula et al. 1986:278).

A Bell dart point was recovered 30–40 cm below the surface in the 1x1-m test pit, while most of the lithic debitage was recovered at 30–80 cm (Perttula et al. 1986:277, 460). Based on this recovery, the investigators concluded that the site was potentially stratified with Caddoan materials confined to the upper 30 cm and Archaic materials below. Since the depth of excavation did not exceed 80 cm during these investigations, it was recognized that earlier materials also could be present. These characteristics led the investigators to conclude that the site has a high research potential; they recommended that it be considered potentially eligible for National Register listing (Perttula et al. 1986:211, 218). A second investigation at 41UR36 consisted of a re-location survey in October 1998 by TxDOT archeologists. Five shovel tests were excavated in the vicinity of 41UR36. All but one test were negative, with the positive test producing a single flake at 60 cm below the surface.

Site 41UR36 was reinvestigated during Work Order 14. As the main portion of the site had been recorded south of the creek and east of the road, six backhoe trenches were placed along the southeastern proposed right of way and construction easement. Shovel Tests 7–9 were placed along trench walls to achieve deep controlled excavations. Six additional tests (Shovel Tests 6 and 10–14) were placed on both the southeast and southwest sides of the road within the proposed right of way or construction easement. These tests were placed in areas were backhoe access was problematic.

Site 41UR36 is located 60–90 m south of the channel of Glade Creek. As noted by the original recorders, the site is bisected by FM 1002 with the major portion of the site east of the road. The relatively undisturbed portion of the site within the proposed right of way and construction easement covers ca. 1,400 m^2 east of the road, while ca. 350 m^2 of the site are within the proposed right of way west of the road. These areas take into account the disturbance caused by the steep road cut which extends from the road edge to the edge of the existing right of way on both sides of FM 1002. Shovel testing and trenching indicate that the site extends to a depth of 140 cm on the east side of the road and ca. 100 cm on the west.

The site appears to be restricted to brown to yellowish brown Bowie sandy loam soils, which form an upland bench overlooking Glade Creek. Artifacts were found in these deposits in Trenches 2, 3, and 5 and Shovel Tests 7–13. Trenches 1 and 4 on the east side of FM 1002 and Shovel Tests 6 and 14 on the west side were placed on the slope below the bench. These trenches and shovel tests encountered a different soil consisting of brown to yellowish red sandy loam with abundant ironstone gravels, some of which were more than 5 cm in diameter. No artifacts were found in these trenches or shovel tests. Trench 6, placed at the edge of a shallow swale that marks the southern edge of the bench, encountered yellowish red sandy clay at 40 cm below the surface. No artifacts were recovered from Trench 6 or Shovel Test 9 excavated into its north wall. Given the height of these deposits above the creek (ca. 6 m), it appears that colluvial processes were the main contributing factor to the deposition of the sediments.

Artifacts noted were lithic debitage, burned ironstone rocks, a nutting stone, a side/end scraper fashioned from a flake of chert, burned nutshells, and a mussel shell fragment. Based on the combined recovery from the six positive shovel tests, most of the materials appear to be at 40 to 110 cm below the surface. Given the depth of this concentration of materials and the lack of ceramics from any of the trenches or shovel tests, it is likely that the cultural deposits in this part of

41UR36 are associated with the Archaic component identified during the original site survey. These artifacts also are associated with a small cluster of burned rocks (ca. 25 cm long) noted at 83 cm below the surface on the north wall of Trench 3 and a side/end scraper recovered from the backdirt of Trench 5 at 50 to 100 cm below the surface. The distributional evidence, the nature of the sediments, and the topographic setting suggest that this part of 41UR36 contains a zone of occupation representing one or more Archaic components encased in colluvial sediments derived from the uplands to the south. Bioturbation surely has moved artifacts around to some extent, but the presence of a possible burned rock feature and the fact that most of the materials are restricted to a 70-cm-thick zone suggest that cultural deposits with reasonable integrity are present. Further, the lack of evidence for a Caddoan component in this part of the site suggests that the Archaic deposits may be relatively uncontaminated by later materials, a situation that is generally uncommon in northeastern Texas. Given the characteristics of the part of 41UR36 that is within the proposed right of way and construction easement, it appears that the site may be able to contribute to an understanding of prehistoric utilization of the Glade Creek drainage during the Archaic period. Thus, the site is considered to be potentially eligible for National Register listing and State Archeological Landmark designation, pending test excavations to more fully assess its significance.

Work Order 19, 41RA86

One archeological site, 41RA86, was discovered during the Impact Evaluation on State Highway 19 at the Sabine River in Rains County. The site was found on the uplands at the north end of the project area along the western edge of the present highway right of way. The site was discovered at the top of the road cut in a surface disturbance caused by the recent planting of grasses. Surface recovery from a 5x30-m area consisted of three quartzite flakes and a small fire-cracked rock. Three shovel tests were excavated in the vicinity of the surface scatter, with only Shovel Test 1 producing a single flake at 10–20 cm below the surface. Sediments on top of the road cut are shallow, 25 cm or less, above red clay. The site most likely extends west beyond the right of way. Given its shallow nature and the fact that it has been disturbed by an underground telephone cable and grass planting operations (as well as by the road cut itself), the part of the site within and immediately adjacent to the right of way does not appear eligible for National Register listing or State Archeological Landmark designation.

Work Order 32, 41CS143 and 41CS144

Previously recorded sites 41CS143 and 41CS144 were investigated in surveys along FM 250 at Black Cypress and Kelly Creeks in Cass County. Site 41CS143, located within the proposed right of way ca. 225 m north of Black Cypress Creek, was recorded as a prehistoric campsite by TxDOT personnel in 1989 and 1994. Artifacts recovered in 1989 (surface survey) and 1994 (shovel testing and excavation of one Gradall trench) include nondiagnostic flaked lithic artifacts, an Archaic dart point, and a mano. As a result of these investigations, the vertical extent of the site was estimated to be 130 cm and further testing was recommended.

Site 41CS143 is situated on the T_2 terrace ca. 225 m north of the Black Cypress Creek bridge. Seven backhoe trenches and four shovel tests were excavated on the T_1 and T_2 terraces in the vicinity to determine the horizontal and vertical extent of the site. Backhoe Trench 6 was on the T_1 tread 60 m north of the Black Cypress Creek slough and relief structure, and Backhoe Trench 1 spanned the T_1/T_2 riser 90 m north of the slough. Backhoe Trenches 1 and 6 sampled the upper 150 cm of the T_1 landform, which consists of a 10-cm-thick brown loamy fine sand A horizon and a mottled 30–40-cm-thick BC and Cc horizon formed in light yellowish-brown fine sand. Backhoe Trenches 2–5 and 7 were located on 41CS143. Backhoe Trenches 3 and 5 were profiled and characterize the T_2 landform as having a 7–42-cm-thick dark yellowish brown loamy fine sand AC horizon overlying a 43-cm-thick dark yellowish brown Bw horizon formed in pale brown to yellow sand.

Shovel Test 1 was excavated on the east wall of Backhoe Trench 2 to a depth of 180 cm. A burned nutshell fragment was recovered at 40–50 cm, and a lithic flake was encountered at 80–90 cm. Shovel Test 2 was dug on the east wall of Backhoe Trench 3 to a depth of 160 cm. Cultural materials recovered between 40 and 70 cm consist of a burned nutshell fragment, two lithic flakes, and a burned rock. Shovel Test 3 was excavated on the east wall of Backhoe Trench 4 to a depth of 150 cm. A Gary dart point was recovered at 70–80 cm. Shovel Test 4 was dug on the east wall of Backhoe Trench 5 to a depth of 150 cm. No cultural materials were recovered from this test. No features or midden staining were observed in any of the excavations. As evidenced by the recovery of only four lithic artifacts from three of four shovel tests, 41CS143 contains a very low density scatter of artifacts that probably could not be isolated into discrete cultural components. Coupled with the lack of midden staining and apparent lack of features, this indicates that the site has a low potential to yield important information. As a result, this site is considered ineligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark.

Site 41CS144 is located 100–160 m north of Kelly Creek within the proposed right of way on the uplands and has both historic and prehistoric components. It was recorded originally by TxDOT personnel in 1989 and defined by the occurrence of surface lithic and historic artifacts. TxDOT personnel excavated 25 shovel tests in 1994. Only 3 of these tests were positive. One test yielded one flake, one nail, and one sherd of clear glass at 20–30 cm; a second test contained two flakes at 40–50 cm; and the third test yielded one flake and one piece of glass at 20–30 cm. Historic materials (i.e., ceramics, a brick fragment, part of an iron skillet, and a clear glass bottle) were observed on the surface, with a concentration just outside the proposed right of way apparently representing an early-twentieth-century tenant house that had been torn down in the 1960s.

When revisited during Work Order 32, visibility on 41CS144 was good due to recent agricultural disturbance, and a piece of whiteware and one lithic flake were observed on the surface. Backhoe Trenches 1–7 were dug on the colluvial uplands in the immediate vicinity of 41CS144. Backhoe Trench 4 revealed a typical profile consisting of a 10-cm-thick pale brown loamy fine sand AC horizon over-lying a 60-cm-thick brown fine sandy loam Bw horizon, over a C horizon 56+ cm thick consisting of strong brown sand. Shovel Test 1 was dug on the south wall of Backhoe Trench 7 to a depth of 210 cm. One piece of glass and one piece of metal were recovered from the upper 20 cm, and possible burned rocks were recovered at 50–70 cm (n = 5), 90–100 cm (n = 4), and 170–180 cm (n = 1). One lithic flake was recovered at 180–190 cm. Shovel Test 2 was excavated on the south wall of Backhoe Trench 6. Two sherds of window glass and a metal eyelet were collected from the upper 20 cm. Single pieces of lithic debitage were found at 40–50 and 120–130 cm. Four burned nutshell fragments and two possible burned rocks were found at 50–70 cm, and a single possible burned rock was found at 170–180 cm. No features or midden staining were observed in the trenches or shovel tests. Shovel Tests 3 and 4 were placed ca. 200 m north of 41CS144 and were dug to a maximum depth of 100 cm. Neither test contained any cultural materials. These negative results, along with the recovery of materials from Shovel Tests 1 and 2 and the fact that artifacts were found in only 3 of the 25 tests dug by TxDOT personnel in 1994, indicate that 41CS144 extends only ca. 60 m north-south.

Artifacts were found in low density dispersed throughout the upper ca. 190 cm of sediment at 41CS144 with the historic (twentieth century) materials confined to the upper 20 cm. The low-density nature of the prehistoric deposit is evidenced by the fact that only 5 of the 27 shovel tests excavated in 1994 and 2000 contained cultural materials, with these 5 tests yielding just seven lithic artifacts. Given these low densities and the apparent lack of features or midden staining, isolating meaningful components would be problematical. Further, trucks and large machinery have heavily disturbed the surface. Therefore, this site is considered ineligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark.

Work Order 34

Survey on FM 545 at Pilot Grove Creek in Collin County identified a possible prehistoric site; lacking artifact recovery, however, a site trinomial was not assigned. Three Gradall trenches were excavated in the proposed new right of way south of the road between the main channel of the creek and a western tributary. Trench 1 was located ca. 10 m east of the western tributary and ca. 120 m west of the main creek channel; Trench 2 was ca. 55 m east of the western tributary and ca. 75 m west of the main channel; and Trench 3 was ca. 110 m east of the western tributary and ca. 20 m west of the main stem of Pilot Grove Creek. Trenches 1 and 3 were 5 m long, while Trench 2 was 10 m long. All three were 1.7 m wide and 1.6–1.8 m deep.

Trench 1 exhibited a 42-cm-thick dark gray clay loam AC horizon over a very dark gray clay B horizon at 42 to 98 cm and a dark gray to dark grayish brown clay loam BC horizon at 98 to 173+ cm. No artifacts or features were located, however, chunks and flecks of charcoal were noted at 127 cm. Trench 2 to the east exhibited a very similar profile, and at 135 to 160 cm scattered charcoal and a bone fragment, apparently representing part of the pelvis of a bovid or other large mammal, were encountered. The trench was lengthened to 10 m (leaving balks between trench segments) and carefully troweled to determine if artifacts were associated with the bones and charcoal. No artifacts or features were observed, but additional scattered charcoal and a second bone (scapula) were encountered. The bones were collected, as were charcoal samples for radiocarbon dating. Trench 3 farther to the east exposed sediments similar to those seen in Trenches 1 and 2, but it contained no artifacts, charcoal, or faunal materials.

While the youthful appearance of the profiles in Trenches 1–3, the fresh appearance of the bones (cow?) recovered, and the apparent lack of associated artifacts suggested that the upper 1.5–2.0 m of alluvium along Pilot Grove Creek could be of historic age, a radiocarbon assay on charcoal collected from Trench 2 yielded a calibrated one-sigma range of A.D. 1480–1650 (330 ± 30 B.P., Beta Analytic Sample No. 140857). Based on the possible prehistoric age of the charcoal and associated bones, it is recommended that the locality be subjected to test excavations to determine if archeological materials are present.

Work Order 35, 41FA65

Previously recorded site 41FA65 is located within the area subjected to Impact Evaluation during Work Order 35 on State Highway 6 in Falls County. This site is located on the Pleistocene terrace immediately south of the Big Creek valley. It was recorded in 1996 by Dr. Nancy Kenmotsu of TxDOT based on a report by an informant, who had observed a few lithic flakes within the highway right of way. Dr. Kenmotsu noted the presence of debitage and a chert scraper in thin, highly disturbed deposits on the terrace. She concluded that the part of the site in the right of way lacks the capacity to contribute important information due to disturbance, but that more-intact parts of 41FA65 could lie outside the right of way. The site was not located during Work Order 35 as a result of tall grass and the placement of gravels. Based on TxDOT's previous investigation, however, it is likely that the part within the right of way has been destroyed. Thus, it is considered ineligible for National Register listing or State Archeological Landmark designation.

Work Order 40, 41PN175–41PN176 and 41TT823–41TT824

Surveys on FM 10 in Panola County and FM 127 in Titus County identified four sites: 41PN175, 41PN176, 41TT823, and 41TT824. Site 41PN175 is located south of Murvaul Creek on a northward projecting interfluve edge at an elevation of 240 ft. The site is in a dense second-growth hardwood forest with a thick understory and leaf litter. This vegetation caused surface visibility to be poor and made trenching impractical. Thus, the horizontal dimensions of the site, determined to be 30x90 m within the proposed right of way, are based on shovel testing and landform characteristics. The site is bounded on the north by the edge of the landform as it slopes to meet the floodplain edge. To the west, the existing

right of way for FM 10 bounds the site. The site likely continues east beyond the proposed right of way edge, and possibly beyond FM 10 to the west, as the landform continues in those directions. In all, nine positive shovel tests (Shovel Tests 8, 9, and 38–44) define the site within the proposed right of way. Soils at the site are mapped as Sacul fine sandy loam. Shovel testing indicates that the fine sandy surface layer is 50 to 100 cm thick above bright yellowish brown sandy clay. The deepest soils were encountered at the north edge of the landform in Shovel Tests 9 and 41.

A possible feature was encountered in Shovel Test 8. A patch of reddish orange sandy clay was encountered at 55–65 cm below the surface in the southeast corner of the shovel test. This patch, which had the appearance and consistency of fire-hardened sediment, continued into the walls of the shovel test. A small lump of burned sandy clay and one flake from the level above the possible feature were the only artifacts recovered from the test. No charcoal, ash, or fire-cracked rocks were associated with the small part of this possible feature exposed. However, Shovel Test 8 is positioned between Shovel Tests 38, 40, and 41, which had the highest artifact frequencies at the site (5, 4, and 23 artifacts, respectively). This pattern of artifacts around a possible feature might indicate the presence of identifiable activity areas. Total artifact frequency for the site can be calculated as 1.6 artifacts per 20-cm level. The total artifact counts by level were as follows: 0–20 cm, 1 flake and 6 sherds; 20–40 cm, 9 flakes and 10 sherds; 40–60 cm, 1 flake and 6 sherds; 60–80 cm, 4 sherds; and 80–100 cm, 2 sherds.

Recovery from the shovel tests consisted of 11 lithic flakes, 2 fragments of petrified wood, 1 fragment of red ochre, 28 ceramic sherds, 1 piece of burned sandy clay, 1 fragment of burned sandstone, 4 burned nutshell fragments, and 1 piece of charcoal. The flakes are comprised mainly of quartzite and represent secondary and tertiary reduction. The petrified wood fragments are small (<3 cm) and may represent shatter from working this kind of stone, which does not readily fracture conchoidally.

The ceramic sherds also are small, ranging in size from less than 1 cm to 3 cm. Most of the sherds are bone tempered (n = 14), with bone/grog temper (n = 7) and grog temper (n = 7) evenly represented. Ten sherds are decorated with brushing (n = 5), incised lines (n = 2), appliqué (n = 2), or punctations (n = 1). Of the remaining sherds, 8 have no decoration and 10 are either eroded or too small to determine surface treatment. Only 1 rim sherd was recovered. It appears to be a fragment of a bottle neck with a rounded lip and an incised diagonal line below the lip. The ceramic sample is indicative of a Caddoan occupation, although the size of the sherds and the size of the sample do not enable confident association with particular ceramic types or time periods. Still, the presence of brushed and appliqué decorated sherds points to a middle or late Caddoan period occupation when these decorative techniques became common on utility wares (Thurmond 1990: 227–229). Ceramic types associated with these time periods, such as Crockett Curvilinear Incised, Pennington Punctated-Incised, Poynor Engraved, Ripley Engraved, and Harleton Appliquéd, have been recovered from 41PN13 and 41PN15 located near 41PN175.

The presence of ceramic utility ware, lithic debitage, and a possible burned clay feature suggests that 41PN175 represents a small Caddoan camp or farmstead. The harvesting of trees and road construction likely have disturbed the site to some extent, but the presence of the possible feature accompanied by a potentially unmixed Caddoan domestic artifact assemblage with possible intrasite artifact patterning suggests that the site may be able to provide important information on the nature of Caddoan settlement within the mid-Sabine River drainage. As such, 41PN175 may be eligible for listing in the National Register of Historic Places and designation as a State Archeological Landmark. It is recommended that archeological testing be undertaken before construction begins to clarify the site's potential to yield important information.

Site 41PN176 is located in pasture at the floodplain edge north of Murvaul Creek. The site is situated on a small rise at an elevation of 235 ft. Its dimensions were defined as 25x60 m within the proposed right of way by the extent of the rise and positive Shovel

Tests 27 and 48. Surrounding negative Shovel Tests 25, 26, 28, 45, and 47 indicate that the site does not extend beyond the proposed right of way, nor does it extend onto the upland edge to the north. Artifact recovery was low at 0.7 artifacts per 20-cm level. The artifacts were recovered from 0 to 100 cm below the surface. Shovel Test 27 yielded one ceramic sherd from the upper 20 cm and one at 80–100 cm. Shovel Test 48 yielded one sherd at 0–20 cm, one flake and two sherds at 40–60 cm, and one sherd at 60–80 cm.

Recovery from the shovel tests consisted of one quartzite flake, six ceramic sherds, one piece of burned clay, five pieces of charcoal, and one burned nutshell. All of the sherds are grog tempered. Decoration on four consists of brushing, zoned punctations, incised lines, and zoned incised lines. Though the ceramics indicate a Caddoan occupation, none is large enough to be confidently ascribed to known ceramic types, and as such the period of occupation remains unknown.

Site 41PN176 likely represents a site remnant associated with a Caddoan occupation of the area. Given the low artifact recovery, the type of occupation cannot be characterized. The site likely has been disturbed and probably reduced in size by continuing pasture maintenance activities and erosion. The current landowner recently has removed the trees and contoured the hillside to improve the pasture just north of the site, and extensive erosion is obvious in that area. Charcoal recovered from the upper two levels of Shovel Tests 27 and 48 may be suspect given that land clearing for pasture often involves the burning of stumps and other debris. Soils at the site are mapped as Thenas fine sandy loam and were observed in the shovel tests as a dark brown sandy loam to 40 cm below the surface and yellow brown sandy loam to at least 100 cm. The dark brown surface layer could reflect organic enrichment from the prehistoric occupation, but this seems unlikely given the very low artifact frequencies. Given its condition and the low artifact frequency, it is unlikely that 41PN176 has the capacity to yield important information about Native American use of the region. It appears not to be eligible for National Register listing or State Archeological Landmark designation, and no further work is recommended.

Site 41TT823 is located at an elevation of 328 ft on a small knoll at the western edge of the Tankersley Creek floodplain. The knoll is ca. 50 m in diameter; it is cut on the northwest by FM 127 and on the southeast by an earthen tank. Pasture covers most of the knoll, with thick trees and shrubs adjacent to the existing FM 127 right of way. Soils in the knoll area are mapped as Woodtell fine sandy loam. These soils were observed in the shovel tests to be a yellowish brown sandy loam that extends to at least 110 cm below the surface on top of the knoll.

Recovery from positive Shovel Tests 5, 20, 21, and 22 consists of 18 flakes, 19 fragments of petrified wood, 2 possible fragments of fire-cracked rock, and 1 ceramic sherd. The lithic debitage is predominantly quartzite with only 2 chert flakes recovered. The petrified wood fragments are small (<4 cm) and may represent shatter from working this kind of stone, which does not always fracture conchoidally. However, no obvious flake attributes were noted on these fragments, and thus they were not considered debitage. The ceramic sherd is a plain rim with flattened lip and no visible temper. The size of the rim, i.e., 1 cm, prevented determination of rim diameter and orientation.

The recovery of the rim sherd and most of the debitage from 0 to 60 cm below the surface suggests a possible Late Prehistoric Caddoan occupation. Clearly, the presence of sites such as 41TT3, 41TT6, and 41TT108 nearby in the Tankersley Creek floodplain and on upland edges indicate a Caddoan presence in the area. In addition, the three flakes at 80–110 cm in Shovel Test 21 may indicate an earlier occupation. However, the overall low artifact frequency, which is 1 artifact per 20-cm level, would make definition of these components difficult. Because of the low artifact frequency and impacts from erosion and road construction, 41TT823 is not likely to have the kinds of information that would make it eligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark. Therefore, it is recommended that no further archeological investigations be undertaken.

Site 41TT824 is located at an elevation of

340 ft on the sideslope of a southward-trending interfluve that forms the eastern edge of the Tankersley Creek floodplain. The interfluve supports pasture grasses with scattered trees and shrubs. Soils in the area are mapped as Woodtell fine sandy loam, and they were observed in the shovel tests to be yellowish brown sandy loam with a depth of at least 100 cm below the surface. Red sandy clay subsoil was encountered within 15 to 30 cm of the surface in shovel tests upslope and northeast of the site. The proximity of the subsoil to the surface in these tests and the deep soils on the sideslope suggest that erosion may be moving sediment and possibly artifacts downslope.

The site was defined by three positive tests (Shovel Tests 8, 9, and 10) and three negative shovel tests. The negative shovel tests were both upslope and downslope from the positive tests and encountered shallow surface soils, emphasizing the potential impacts of erosion on the site dimensions, which were determined to be 10 m northwest-southeast and 30 m northeast-southwest within the temporary construction easement. It is probable that the site extends to the northwest beyond the construction easement edge. On the southeast, the road cut for FM 127 defines the site limits.

Artifacts were recovered from 20 to 80 cm below the surface. Shovel Test 8 contained one Yarbrough dart point at 20–40 cm; Shovel Test 9 contained three flakes at 20–60 cm; and Shovel Test 10 contained 2 flakes at 60–80 cm. Total recovery consists of one Yarbrough dart point, five quartzite flakes, one fragment of petrified wood, one siliceous pebble, and two pieces of charcoal. The dart point, made from red chalcedony, indicates that the site has an Archaic component. However, the very low overall artifact frequency of 0.4 artifacts per 20-cm level makes further site definition problematic. Because of the low artifact frequency and impacts from erosion and road construction, 41TT823 is not likely to have the kinds of information that would make it eligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark. Therefore, it is recommended that no further archeological investigations be undertaken.

Patterns in Site Distributions

With a sample of just 15 prehistoric sites and 1 possible site, it is difficult to draw conclusions about patterns in site distributions and associations between site locations and elements of the environment. Nonetheless, it is useful to note that sites were found in a variety of topographic settings near water courses, including upland margins, probable strath terraces between the floodplain and valley walls, floodplain rises (levees or upland remnants?), and floodplains proper. Most of the sites are in the Waco (n = 6) and Atlanta (n = 8) Districts, which is not surprising given the fact that most of the surveys were in these areas. One shallow upland site (41RA86) is in the Paris District, while the single possible site is buried in Holocene alluvium along Pilot Grove Creek in the Dallas District.

The Waco District sites include both upland (41BL1101, 41FA65, and 41HM44) and Holocene alluvial (41BL1100, 41CV1620, and 41HM45) settings, with the upland sites being restricted to the surface (or nearly so) and two of the alluvial sites having cultural deposits to depths of 1.5 m or more. In contrast, the three Atlanta District sites that are arguably within Holocene alluvium (41PN176, 41TT823, and 41UR28) have deposits that are only about 1 m thick. Whether the low floodplain rises that these sites occupy are truly Holocene constructional features (e.g., levee remnants) or much older landforms (e.g., eroded terraces or upland outliers) remains to be determined, but in either case they lack thick Holocene deposits with the potential for deeply stratified sites. The five Atlanta District sites that are in upland or strath terrace settings (41CS143, 41CS144, 41PN175, 41TT824, and 41UR36) have cultural deposits that are at least as thick as the floodplain rise sites, with 41CS144 yielding artifacts to almost 2 m below the surface. These sites appear to have variable potential for deeply stratified archeological remains, although the nature of sedimentation on such landforms underlain by sandy Eocene deposits remains a matter of debate (e.g., are the sands Holocene colluvium, Holocene eolian deposits, in situ weathered Eocene deposits, or a “reconstituted” stratigraphy formed by pedogenesis,

graviturbation, gullying, and sheetwash [Fields 1990; Thoms 1993]?).

Geomorphological Investigations

Of the three work orders that included Survey with Geoarcheological Evaluations (Work Orders 2, 8, and 35), one produced substantive geomorphological information that warrants a summary here. Work Order 8 involved surveying 2.6 km on both sides of the Brazos River along Loop 340 on the southeast side of Waco in McLennan County. Twenty-six backhoe trenches were excavated and described, allowing for a reconstruction of the late Quaternary history of that part of the Brazos River valley based on stratigraphic relations, soil development, and correlation to other geological studies. The original report on these investigations (included on CD-ROM in Appendix B) was produced without the benefit of assays on radiocarbon samples, which had been collected but not yet analyzed. This summary incorporates the eight radiocarbon dates obtained on soil humates after that report was completed (Table 4).

Three alluvial landforms were identified in the project area: Pleistocene terrace, Holocene flood terrace, and modern floodplain (Figure 5). Four radiocarbon ages were determined from samples in Backhoe Trench 25 of the flood terrace, three from samples in Backhoe Trench 2 of the flood terrace, and one from a sample in Backhoe Trench 9 of the floodplain.

Two broad alluvial stratigraphic units were identified beneath the flood terrace: a lower unit and an upper unit (see Figure 5). Based on radiocarbon ages from Backhoe Trenches 2 and 25, deposition of the lower unit was under way by 7210 ± 40 B.P. and had terminated no later than 4890 ± 70 B.P. A radiocarbon age of 5260 ± 40 B.P. was obtained from within a truncated paleosol of the lower unit on the outer edge of the flood terrace in Backhoe Trench 2. It is possible that this soil is more developed (carbonate nodules) because it formed in a slowly aggrading flood basin setting. The equivalent paleosol from the lower unit exposed in Backhoe Trench 25 appears to have been proximal to the Brazos River channel during its formation based on the presence of channel sands. Thus, the area around Backhoe Trench 25 probably aggraded more rapidly, limiting long-term pedogenesis on a single stable surface.

Deposition of the upper unit beneath the flood terrace began between 4890 ± 70 and 2720 ± 60 B.P. and terminated no later than 1530 ± 70 B.P. In Backhoe Trench 25, the stacked paleosol sequence appears to again reflect rapid deposition as noted by beds at the base of each paleosol containing reddish brown clay clasts. Episodes of levee-type sedimentation in this position apparently prevented long-term pedogenesis on a single stable surface. In contrast, Backhoe Trench 2 revealed sediments from the upper unit without the

Table 4. Radiocarbon dates obtained from Brazos River alluvium in Work Order 8

Lab Number	Backhoe Trench	Landform	Depth (cm)	^{14}C Age (B.P.)	δ^{13}C
Beta-129689	2	flood terrace	52–62	1600 ± 60	–15.1
Beta-129688	2	flood terrace	76–86	2000 ± 60	–15.3
Beta-129687	2	flood terrace	178–188	5260 ± 40	–13.8
Beta-129686	9	floodplain	156–166	1030 ± 60	–19.2
Beta-129683	25	flood terrace	40–50	1530 ± 70	–16.1
Beta-129682	25	flood terrace	81–91	2720 ± 60	–17.0
Beta-129684	25	flood terrace	97–107	4890 ± 70	–16.5
Beta-129685	25	flood terrace	316–326	7210 ± 40	–15.2

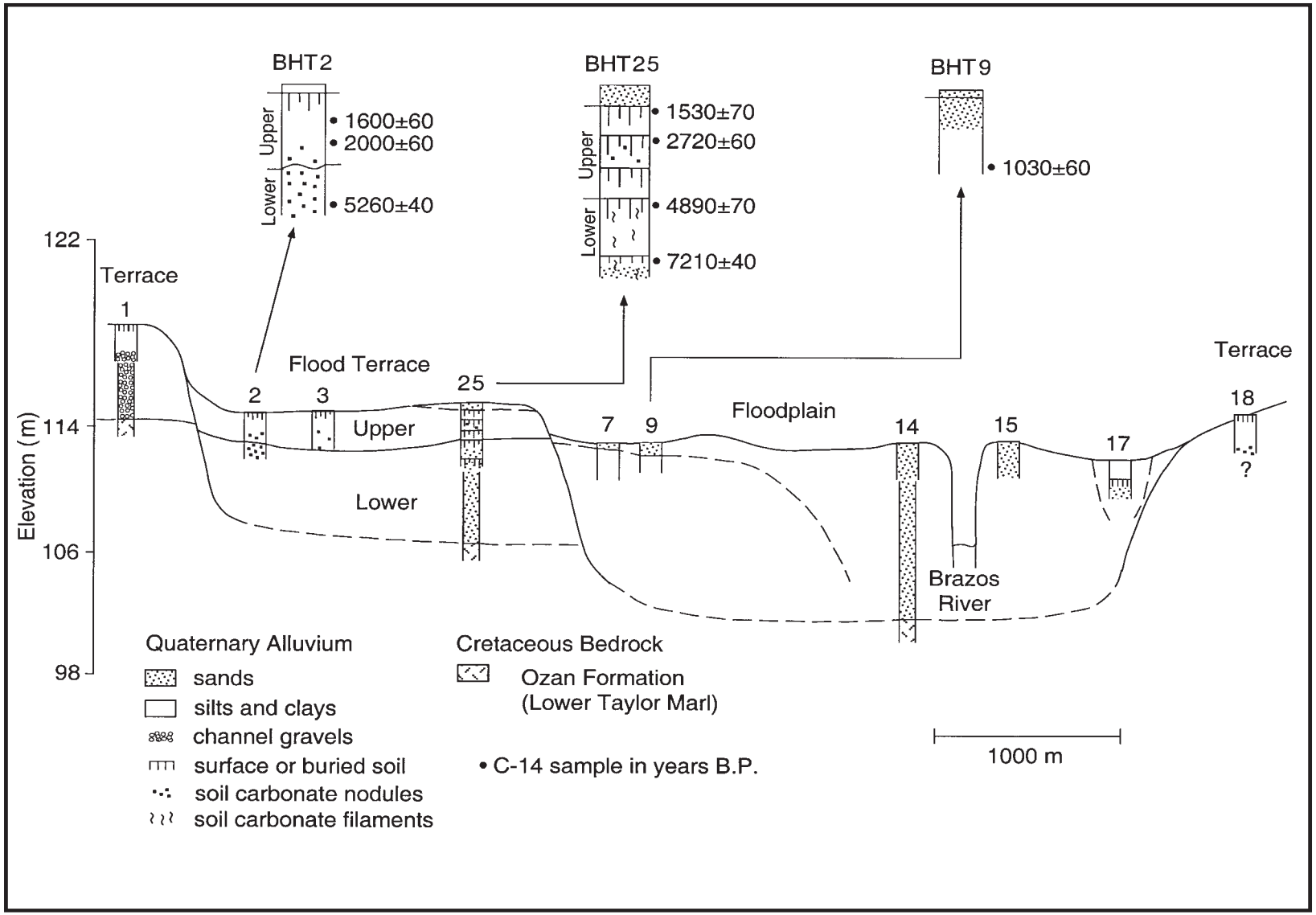

Figure 5. Alluvial stratigraphic cross section of the Brazos River valley along Loop 340 in McLennan County.

intervening flood deposits and stacked paleosols, thus producing one thick cumulic paleosol.

Radiocarbon ages from Backhoe Trenches 9 and 25 indicate that the Brazos River downcut shortly after 1530 ± 70 B.P. and that construction of the modern floodplain was under way no later than 1030 ± 60 B.P. Based on preserved sedimentary structures in the upper part of this unit, flood deposition has been ongoing until recently.

The results of the radiocarbon dating are consistent with the chronology from Brazos River sediments downstream near College Station, Texas, where Waters and Nordt (1995) dated a middle Holocene unit between 8500 and 4000 B.P. and a late Holocene unit between 4000 and 600 B.P. This correlates fairly well with the timing of deposition of the lower and upper units of the flood terrace in the Loop 340 project area.

The radiocarbon dating presented here generally supports the inferred chronology from the original investigation. Early Archaic sites could be preserved in primary contexts beginning at depths between 1.5 and 2.0 m beneath the flood terrace. Middle Archaic through Late Prehistoric features could be discovered in the upper unit beneath the flood terrace within the upper 1.5 to 2.0 m. Cultural deposits within this stretch of the Brazos River valley have the potential to be somewhat more stratified in contexts such as that sampled by Backhoe Trench 25 because of rapid deposition interrupted by episodes of pedogenesis. Deposition was less rapid on the outer edge of the flood terrace in the vicinity of Backhoe Trench 2, providing fewer opportunities for well-defined stratification of archeological deposits. The floodplain could contain buried features dating to the Late Prehistoric period and later.

Utility of Existing Methods

In general, the methods employed for Impact Evaluations and Surveys appear to be consistent with a "reasonable and good faith effort" to comply with federal and state laws governing identification of archeological sites that are eligible for listing in the National Register of Historic Places or designation as State Archeological Landmarks. The level of effort typically required to complete an Impact Evaluation (1–2 hours for a single bridge replacement) seems appropriate given the intent of this type of work and the generally small sizes of the project areas. To the extent that Impact Evaluations can quickly separate those project areas where survey is truly a good idea from those where sites are very unlikely or almost surely disturbed, they are an efficient and relatively inexpensive measure to guard against the loss of important archeological data. As discussed below, however, the results of this project suggest that more-restrictive requirements could be placed on identifying when Impact Evaluations need to be done.

The levels of effort spent on Surveys and the amounts of work done (i.e., numbers of trenches and shovel tests) also seem appropriate given the sizes of the project areas, although the amount of work can vary based on a variety of factors other than project size (e.g., backhoe accessibility, depth to ground water, extent of ponded water, landowner permission to trench, extent of disturbance, and number and location of buried utilities that must be avoided during trenching). The work done on these surveys easily meets or exceeds the Texas Historical Commission's archeological survey standards, except in some cases where only trenches were dug. This occurred in some floodplain settings where shovel testing was considered ineffective and inefficient because of the thickness of the alluvium or because of dense clay soils. In these cases, the lack of shovel testing is compensated for by the much greater subsurface visibility afforded by the backhoe trenches and the fact that the number of trenches well exceeds the minimum required.

Beyond the question of whether the level of trenching or shovel testing is adequate, two issues concerning the effectiveness of the survey methods merit discussion here. The first pertains to the use of shovel tests in lieu of trenches. In most cases, shovel tests were dug in situations where there is no argument about their appropriateness, i.e., on landforms with thin Holocene deposits, on sites where the cultural deposits occur at shallow depths, and adjacent to backhoe trenches that

extended to greater depths than can be reached normally with shovel tests. In a few surveys, however, shovel tests were excavated where trenches would have been preferable due to the thickness of the deposits. Trenching could not be performed because of dense woods and other access-limiting factors, or because of a lack of landowner permission, however. While shovel testing in these situations may not have the optimal approach in an ideal world, it does represent the required "good faith effort," considering the limitations.

The second issue pertains to the effectiveness of trenching in locating sites that lack conspicuous remains, such as rock features. While it is certain that trenches are more effective at identifying sites with numerous features or dense artifact concentrations than sites with low densities of cultural remains, it is noted that individual artifacts, burned rocks, and bones, as well as scatters of charcoal, were observed in some trenches during surveys performed under this contract. Several of these were tested subsequently by TxDOT personnel, with the results of testing confirming the survey-level observations that these are low-density cultural deposits (Lain Ellis, personal communication 2000). Further, TxDOT concluded that the cultural materials are so sparse at these locations that analysis would not yield meaningful interpretations, and the Texas Historical Commission concurred with this conclusion. Thus, there is good reason to believe that trenching, even without accompanying manual excavations, is an effective tool for determining the presence/absence of sites that might contain sufficiently important information to warrant designation as State Archeological Landmarks.

Recommendations

Seven main recommendations resulting from this project are highlighted here. Some relate to issues that may be specific to how this project unfolded, while others have broader relevance and may have a bearing on how similar projects are conceptualized and handled in the future. In some cases, solutions to problems can be identified, and specific recommendations can be made. In others, solutions may be more nebulous or perhaps nonexistent.

1. Many of the Impact Evaluations were done without specific construction plans in hand, or even information about whether new rights of way or construction easements will be needed. This made it impossible to identify specific areas that will be impacted, and hence to identify specific areas that should be surveyed. Most often, this resulted in a generalized recommendation that survey should be done only if impacts will occur outside the existing right of way or below a certain depth within the right of way. Whenever possible, Impact Evaluations should be done after construction plans have been developed so that areas needing survey (or not) can be identified specifically.

2. In a few cases, Surveys were done without Impact Evaluations having been done first. While this may be logical in situations where it is certain that survey is needed, it can lead to unforeseen difficulties. For example, without the on-the-ground knowledge gained from an Impact Evaluation, it may be impossible to determine if the area needing survey can be accessed with a backhoe. This could be solved by ensuring that TxDOT district personnel have examined the area and made this determination.

3. To a substantial extent, assessment of existing impacts and likely impacts from a planned Transportation Activity is a subjective exercise based on past experience with construction projects, casual observation of road/bridge projects observed during travel to and from Surveys and Impact Evaluations, and common sense. This applies particularly to estimating the amount of disturbance caused by the placement of fill sections of varying sizes (i.e., through heavy equipment churning the ground during construction, and subsequent compaction by the weight

of the fill). It usually was assumed that placement of a fill section had disturbed at least the upper 0.5 m, with large fill sections disturbing the ground to a depth of 1 m or more, but empirical evidence to back this up was not sought. If TxDOT has, or has access to, such data, a synopsis of the kinds and depths of disturbances associated with projects of various kinds would be helpful to those doing Surveys and Impact Evaluations.

4. During the course of this project, eight Staff Archeologists or Geoarcheologists were responsible for doing Surveys and Impact Evaluations, depending on TxDOT's scheduling of work orders. The maximum number working at any one time was four, and at times no one was working on the project. While this variability in work load may be unavoidable, a more-even distribution of work orders would have two benefits: it would make it easier to guarantee TxDOT that reports would be submitted on schedule and would make it easier to ensure consistency between work orders in terms of how the work was done and reported.

5. Most of the Surveys and Impact Evaluations focused on settings where prehistoric sites, particularly buried ones in good contexts for identifying discrete components, might be expected, i.e., Holocene alluvium. Some projects included adjacent upland margins, and a smaller number encompassed stretches of road traversing uplands between streams, but the slant of most of the work orders was toward examination of areas with some potential for prehistoric, rather than historic, sites. To a substantial extent, this is a function of the nature of the Transportation Activities, since bridge replacements, of necessity, are in alluvial settings where prehistoric sites are more likely than historic ones. Given this and the generally small size of most bridge replacement construction areas, the likelihood that important historic sites would be impacted seems minimal. However, this may not be the case for larger projects, such as where long stretches of highway are to be widened. One way to compensate partially for this, other than pedestrian survey of all project areas (which may not be feasible), is to include review of historic maps (e.g., late-nineteenth- and early-twentieth-century USGS maps, and county highway maps dating to the early decades of the twentieth century) for areas that are not likely to be examined closely during Impact Evaluations (i.e., uplands between streams). While the locations of buildings shown on these maps may themselves be too recent to be of interest archeologically, they may highlight areas where sites relating to earlier occupations (and thus potentially of greater archeological significance) may be expected.

6. Based on the observations made during the Impact Evaluations reported here, it appears that TxDOT could adopt more-restrictive criteria for determining when Impact Evaluations should be done. Specifically, survey seldom was recommended in project areas where impacts will be restricted to an existing narrow right of way, such as those typically associated with county roads. As discussed in Scenario 1 under Impacts and Site Potential, the zone of existing disturbance approximates what will be disturbed by the bridge replacement. Any sites present will be impacted only minimally, and any areas impacted will have been disturbed by earlier construction. It is recommended that Impact Evaluations be done for bridge replacements on county roads with narrow existing rights of way only when new right of way will be acquired or when a construction easement will be needed.

7. Most of the Impact Evaluations done during this project recommended survey

for those Transportation Activities involving acquisition of new right of way or construction easements, unless these areas had been disturbed substantially (e.g., by flood scouring) or contained only thin alluvium with a limited potential for buried archeological remains in good context. A legitimate question in such cases, however, asks how much new right of way/construction easement is enough to warrant survey. If the construction easement extends 1 m outside the existing right of way, should survey be performed? Probably not, given the very limited chance that such a narrow strip of land will contain important archeological information. How about if the new right of way reaches 20 m beyond the edge of the existing right of way? Assuming that Holocene alluvium with the potential for buried sites is present, survey surely would be warranted, given the large size of the area to be impacted. Where between 1 and 20 m should the line be drawn? From a practical standpoint (e.g., the width of an area required for a backhoe to work in), it is recommended that strips of new right of way/construction easement should be surveyed only if they exceed 5 m in width. This would have the greatest effect on Transportation Activities with narrow existing rights of way, since these are the situations where the existing rights of way are most likely to be disturbed from edge to edge. Where existing rights of way are wide, there is a greater likelihood that some undisturbed areas will be pre-sent; hence, survey may be needed regardless of how far the new right of way or construction easement extends outside the existing right of way. Based on this recommendation, it may be possible to determine whether Impact Evaluations and Surveys are warranted based solely on the size of the right of way and the extent of new right of way/construction easement.

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APPENDIX A: Glossary of Technical Terms

Adze: Tool whose cutting edge is at a right angle to the handle and that is used in working wood.

Arrow point: Point used to tip an arrow, which is propelled by a bow.

Biface: Piece of conchoidally fracturing stone that has had flakes removed from both faces to create a tool.

Burin: Chisel-like tool presumed to have been used in working bone, antler, and wood.

Dart point: Point used to tip a throwing spear or dart, which is propelled by an atlatl.

Debitage: Debris generated by the removal through percussion/pressure of flakes, chips, and chunks to make stone tools.

Fill section: Introduced fill used to elevate the approaches to a bridge above the surrounding terrain.

Flake: Generally thin piece of conchoidally fracturing stone with a positive bulb of percussion showing that it was removed from the parent piece by percussion/pressure.

Gouge: Generally thick, bifacially modified tool presumed to have been used like an adze.

Grog: Crushed fired clay added as temper to clay used in making ceramic vessels.

Impact Evaluation: Onsite inspection documenting existing impacts or other conditions that may preclude the presence of intact archeological deposits within the project area for a proposed Transportation Activity.

Mano: Handheld stone used, usually with a metate, to grind plant parts such as seeds.

Megafauna: Very large animal.

Metate: Anvil of stone used, usually with a mano, to grind plant parts such as seeds.

Midden: Accumulation of occupational debris, particularly organic remains.

Projectile point: Inclusive term for arrow and dart points.

Scraper: Tool with generally thick, unifacially modified edges used to work hides, bone, and wood.

Sherd: A piece of broken pottery.

Survey: Fieldwork to locate archeological remains within the project area for a proposed Transportation Activity, including on-foot examination of the surface, shovel testing, and trenching by mechanical means where appropriate.

Survey with Geoarcheological Evaluation: Fieldwork to locate archeological remains within the project area for a proposed Transportation Activity, including examination and recording of trench walls or other exposures by a geomorphologist, quaternary geologist, physical geographer, soil scientist, or archeologist with the formal training and experience to apply the principles of geology to the evaluation of the pedological, stratigraphic, geomorphic, anthrogenic, and other

conditions affecting the physical integrity of archeological deposits and the interpretation of archeological materials.

Temper: Nonplastic materials added to clay to decrease the risk of cracking when firing ceramic vessels.

Transportation Activity: any proposed project involving the development, design, construction, or maintenance of the state's intermodal transportation system.

APPENDIX B: Letters and Letter Reports for Impact Evaluations and Surveys

These reports are on the included CD-ROM, excluding reports for Work Orders 16 and 30. Work Order 16 was a Quality Control debriefing with TxDOT, whereas Work Order 30 was the order to produce this report. Authors for the reports include Ross C. Fields, E. Frances Gadus, Amy M. Holmes, Jennifer K. McWilliams, John W. Arnn III, Paul Maslyk, Karl W. Kibler, Gemma Mehalchick, and Lee Nordt.