Volume 2015 Article 238

2015

# Farm-to-Market (FM) 116 Improvements from US 84 to Cactus Lane, Coryell County, Waco

Eric R. Oksanen

James T. Abbott

# Farm-to-Market (FM) 116 Improvements from US 84 to Cactus Lane, Coryell County, Waco

# Report for Archeological Survey

## Farm-to-Market (FM) 116 Improvements from US 84 to Cactus Lane, Coryell County, Waco District.

CSJ: 0724-01-044

Eric R. Oksanen, Principal Investigator, Antiquities Permit No.7225
Eric R. Oksanen and James T. Abbott, Environmental Affairs Division

*The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.*

## Abstract

On March 17 and 25, 2015, archeologists from the Texas Department of Transportation Archeological Studies Branch conducted an archeological survey that included mechanical trenching along FM 116. The project Area of Potential Effects (APE) begins at United States Highway (US) 84 in Gatesville to the north and continues southward approximately 18.8 miles to Cactus Lane. All construction would occur in the existing right of way which is typically 100-feet-wide. The project would add sections of passing lanes and turn lanes at select locations and would replace the existing bridge at Cowhouse Creek with a new structure. The typical depth of impact is from 1 to 3 feet along the passing lane and approaches and up to 60 feet deep where shafts would be drilled for support columns.

The potential impacts from the proposed project were greatest and Cowhouse Creek and field investigations and records research determined that this crossing at Cowhouse Creek was the only location in the APE with potential to contain intact archeological deposits. Mechanical Trenching was conducted at Cowhouse Creek along the west side of FM 116 with James T. Abbott, TxDOT staff geoarcheologist and Eric Oksanen, TxDOT District Archeologist conducting excavations. Four trenches were excavated and no archeological deposits were observed.

## Project Identification

- **Date:** 04/10/2015
- **Date(s) of Survey:** 03/17/2015 and 03/25/2015
- **Archeological Survey Type:** Reconnaissance ☐ Intensive ☒
- **Report Version:** Draft ☐ Final ☒
- **Jurisdiction:** Federal ☒ State ☒
- **Texas Antiquities Permit Number:** 7225
- **District:** Waco
- **County or Counties:** Coryell
- **USGS Quadrangle(s):** Gatesville West [3197-234], Shell Mountains [3197-231], Pidcoke [3197-232]
- **Highway:** FM 116
- **CSJ:** 0724-01-044
- **Report Author(s):** Eric R. Oksanen, James T. Abbott
- **Principal Investigator:** Eric R. Oksanen

## Texas Historical Commission Approval

| |
|---|
| |

Signature Date

## Project Description

- **Project Type:** Passing lanes, turn lanes, bridge replacement
- **Total Project Impact Acreage:** 228 acres
- **New Right of Way (ROW) Acreage:** 0 acres
- **Easement Acreage:** 0.0 acres
- **Area of Pedestrian Survey:** 3 acres
- **Project Description and Impacts:** The proposed action would construct twelve passing lanes (6 south bound and 6 north bound) on FM 116 between Cactus Lane and US 84, a distance of approximately 18.8 miles (**Figure 1**). Each passing lane will be approximately 1.5 miles in length. The bridge at Cowhouse Creek would be replaced with a new, wider structure. Turn lanes would be included at the intersection with FM 580, FM 1783 and US 84. No detours, additional right of way or easement would be required to complete the project.
- **Area of Potential Effects (APE):** The APE is the length of the existing right of way (18.8 miles) and the 100-foot-wide right of way. This is an approximate area of 228 acres. The typical depth of impact would be less than one foot below original grade. Drainage structure extensions may require minor amounts of excavation, typically less than three feet below grade. Depths of impact at the bridge at Cowhouse creek would be 18 feet at the abutments in previous fill sections and as deep as 60 feet at selected locations for drilled support shafts **(Figure 2)**.
- **Parcel Number(s):** N/A
- **Project Area Ownership:** The proposed project is on Texas Department of Transportation-(State of Texas) owned property.

## Project Setting

- **Topography:** The APE is mapped within the Limestone Cut Plain within the Cross Timbers Ecoregion and , a transitional area between the prairies to the west and the low mountains and hills of eastern Oklahoma and Texas (Griffith et al . 2007). The typical physiography includes benched and stairstep topography, eroded sideslopes and broad, level valleys for the larger streams. Numerous streams and springs have created incised narrow canyons. Elevation above sea level is 1000 ft (305 m) at the south end of the APE, 800 ft at (244 m) the south bank of Cowhouse Creek, descending to 760 ft (232 m) at the channel, and rising to 780 (238 m) ft at the south bank, ascending to 1,100 ft (335 m) at Cottonwood Creek, and at 877 ft (267 m) at US 84 (USGS 7.5 minute topographic quadrangles Gatesville West, 1995; Shell Mountains 1995; Pidcoke 1995).
- **Geology:** The Geologic Atlas of Texas was used to map the extent of surface geology within and adjacent to the APE. Approximately 92 percent of the APE is Lower

Cretaceous formations Glen Rose, Paluxy Sand, Walnut Clay, Comanche Peak, and Edwards Limestone. The remaining is mapped Recent, Holocene-age alluvium (Qal) and Fluviatile Pleistocene terraces (Qt). The Holocene alluvium is mapped at the southern end of the APE at Cowhouse Creek and to a lesser extent, at Rock Creek. Extensive below-grade construction excavations will occur only at Cowhouse Creek. The Cretaceous-age deposits are exposed or covered in a thin veneer of soils, in some instances colluvial deposits. Within the APE, any cultural material would be at or near the surface and subjected to the impacts from initial road construction, maintenance activities and erosion. See Abbott (attached) for additional geological description.

- **Soils:** Soils were mapped using the on-line Web Soil Survey. In addition, the Hybrid Potential Archeological Liability Map (HPALM) for the Waco District was consulted. The Waco HPALM was devised to quickly assess archeological liability within a given APE. It is a geoarcheological based planning tool devised by James T. Abbott and Scott Pletka, from the TxDOT Archeological Studies Branch (Abbott and Pletka 2014), (**Figure 3**). The HPALM integrates geology, soils and landscape data and is useful in identifying areas with potential to contain buried archeological deposits. After examining the APE, the bridge replacement at Cowhouse Creek was identified as the area with greatest potential to contain intact buried archeological deposits. The remaining of the proposed project APE will be constructed in the right of way that has been extensively altered at the surface to a typical depth of two feet. See Abbott (attached) for soil descriptions.

**Land Use:** At the north end of the APE is the City of Gatesville, the Coryell County seat. Here, land use is a mixture of suburban residential, retail and light commercial. South of Gatesville the APE is maintained right of way for FM 116. The adjacent land use is mixed agriculture and rural residential, with livestock grazing as the predominant land use west of the APE. To the east, adjacent to the APE, is Fort Hood, approximately 108.000 acres military base of the United States Army. The base was created in 1942 from ranches and farms and is an active base (http://www.hood.army.mil/history.aspx). An examination of a 1917 map [(first edition 1894) 30 minute U.S.G.S. Reconnaissance Gatesville Texas Sheet] depicts a trail paralleling and in some sections, matching the current rout of FM 116 **(Figure 4a)**. The crossing of Cowhouse Creek is west of the current crossing. Land use is depicted as ranches and the city of Gatesville at the north end of the APE, and the Pidcock Ranch (now the town of Pidcoke) complex towards the south end of the APE. The 1936 [revised 1940] General Highway Map of Coryell County shows a highway in a similar alignment as the current roadway with the crossing at Cowhouse Creek in the same alignment **(Figure 4b)**. In the 1920s the bridge spanning Cowhouse Creek was east of its present route. This accounts for an anomalous wide right of way at the crossing. At Pidcoke, the road is lined with stores, residences, two schools and three churches. No structures are within the proposed APE.

**Vegetation:** The APE is mapped in the Silver Bluestem-Texas Wintergrass Grassland and Oak-Mesquite-Juniper Parks/Woods vegetation types which are found in the Cross

Timbers Ecoregion (McMahan, et al. 1984). Observed vegetation in the maintained right of way was a mixture of grasses and forbs, and included a mixture of native grasses such as little bluestem. Adjacent to the APE, vegetation included little bluestem, agave, live oak, post oak, cedar elm, Ashe juniper, tasajillo, prickly pear and mixed forbs.

- **Estimated Ground Surface Visibility:** 70-80 %

  **Previous Investigations and Known Archeological Sites:** An examination of the on-line Texas Archeological Sites Atlas identified 29 archeological sites and seven archeological projects within 1000 meters of the proposed APE (see **Figure 5. Sheets 1-4**; Tables 1 and 2). The APE is adjacent to the United States Army's (Army) Fort Hood, one of the Army's largest bases. The Army has conducted extensive archeological investigations within the base and five of the seven identified projects were conducted on behalf of the Army. All 29 of the mapped sites are on property controlled or owned by the Army. There is one historic marker, erected in 1986, and approximately 150 meters west of the APE, that commemorates the founding of the Pidcoke Baptist Church in the late nineteenth century. The marker will not be impacted.

  Four of the sites are mapped within the APE: 41CV320, 41CV358, 41CV1417, and 41CV18. All four of these sites are historic-era sites associated with farming and settlement. No further investigations were required for any of the sites. None of these sites are eligible for listing in the National Register of Historic Places or designation as State Antiquities Landmarks.

  Four sites are mapped adjacent to the APE: 41CV103, 41CV355, 41CV356, and 41CV1428. Although site 41CV103 is mapped adjacent to the APE, there are no elements such as burned rock middens within 100 meters of the APE. Sites 41CV355 and 41CV356 are historic-era dumps and are not eligible. Site 41CV1428 is the remnant of a possible early twentieth century homestead and is not eligible.

- **Comments on Project Setting:** The proposed project area is in an upland setting and has thin soils and exposed Cretaceous-age bedrock. It is unlikely any intact buried archeological deposits occur in the APE. Any archeological material would be at or near the surface. An examination of historic maps indicates no cemeteries in or adjacent to the APE. Continuous upgrades and improvements to FM 116 in its present alignment make it unlikely any intact historic or prehistoric cultural materials occur in the APE with the exception of the crossing at Cowhouse Creek.

## Survey Methods

- **Surveyors:** James T. Abbott and Eric R. Oksanen, Archeologists-TxDOT Environmental Affairs Division.
- **Methodological Description:** The entire APE was inspected by vehicle twice on two occasions, March 17, 2015 and March 25, 2015. Areas adjacent to recorded

- Table 1. Texas Archeological Sites Atlas depicted sites within 1,000 m of APE.

| Map Sheet | Site | Description | Distance (m)/ Direction | Year recorded or last investigation | Eligibility |
|---|---|---|---|---|---|
| 2 | 41CV103 | Prehistoric -Early through Late Archaic, burned rock middens, lithic debris | Adjacent | 1976 | Und |
| 1 | 41CV174 | Prehistoric -Archaic, Burned rock, lithics | 600 E | 1979 | Eligible |
| 1 | 41CV175 | Prehistoric-Archaic, burned rock, lithics | 800 E | 1979 | Ineligible |
| 2 | 41CV316 | Historic Farmstead-Prehistoric | 650 E | 1978 | Eligible |
| 2 | 41CV317 | Prehistoric-Burned rock midden | 900 E | 1978 | Eligible |
| 2 | 41CV318 | Historic Ranch-sheep dip tank | 500 E | 1978 | Ineligible |
| 1 | 41CV319 | Prehistoric-Archaic to Late Prehistoric, burned rock, lithic tools | 300 E | 1978 | Eligible |
| 1 | **41CV320** | Historic homestead/ranch, remnants of stone wall and pens | Adjacent/In | 1978 | Und |
| 1 | 41CV321 | Prehistoric lithics. Site could not be relocated during revisits. Recommended removal of site. | 1000 E | 1978 | Und |
| 2 | 41CV355 | Historic Ranch/Farmstead. Household debris from 1900-1940 | Adjacent | 1978 | Ineligible |
| 2 | 41CV356 | Historic-era 20th century dump | Adjacent | 1987 | Ineligible |
| 2 | 41CV357 | Historic-era 20th century dump | 100 E | 1978 | Ineligible |
| 2 | **41CV358** | Historic Ranch/Farmstead. Household debris from late 1800s to 1930s. | In ROW | 1978 | Ineligible |
| 2 | 41CV386 | Prehistoric rock midden-Middle to Late Archaic | 500 E | 1987 | Eligible |
| 1 | 41CV1241 | Historic homestead. Destroyed by post depositional impacts. | 100 E | 1987 | Ineligible |
| 1 | 41CV1243 | Historic Ranch/Farmstead cistern, historic debris, 1930s inscription. | Adjacent | 1986 | Ineligible |
| 1 | 41CV1245 | Prehistoric-Late prehistoric arrow point, burned rock | 200 E | 1987 | Ineligible |
| 1 | 41CV1273 | Historic era stock dip-tank | 100 E | 1986 | Ineligible |
| 1 | 41CV1292 | Historic Ranch/Farmstead | 400 E | 1986 | Ineligible |
| 2 | 41CV1411 | Historic dump 1920s to 1950s | 700 E | 1987 | Ineligible |
| 2 | 41CV1413 | Prehistoric-Archaic dart point, burned rock and lithic scatters. | 1000 E | 1987 | Ineligible |
| 2 | 41CV1415 | Prehistoric Archaic, burned rock and lithic scatters. | 300 E | 1987 | Eligible |
| 1 | **41CV1417** | Historic homestead foundations for outbuilding, possible cellar | In ROW | 1989 | Ineligible |
| 2 | **41CV1418** | Historic dump 1930s to 1980s | In ROW | 1989 | Ineligible |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 41CV1428 | Historic-era Early 20th century possible house site. | Adjacent | 1987 | Ineligible |
| 2 | 41CV1488 | Prehistoric lithic scatter | 750 E | 1999 | Ineligible |
| 2 | 41CV1491 | Prehistoric campsite, lithics, burned rock, shell. | 350 E | 1988 | Und |
| 2 | 41CV1549 | Prehistoric-burned rock and lithics, mussel shell | 400 E | 1993 | Eligible |
| 2 | 41CV1658 | Prehistoric lithic procurement site | 300 E | 2011 | Ineligible |
| 2 | Marker 4014 | Pidcoke Baptist Church | 150 W | 1986 | N/A |
| Bold sites are mapped extending into APE. | | | | | |

Table 2. Archeological projects depicted within 1,000 m of the APE.

| Survey | Permit/ Report | Agency | Archeological Company | Description | Distance (m)/ Direction | Date |
|---|---|---|---|---|---|---|
| 1 | Fort Hood | US Army Fort Hood | n/a | 250 acre survey | In ROW | n/a |
| 2 | Fort Hood | US Army Fort Hood | n/a | 235 acre survey | 200 m | n/a |
| 3 | n/a | n/a | n/a | n/a | 900 E | n/a |
| 4 | Fort Hood Series v. 50 | US Army Fort Hood | Prewitt and Associates | Testing 2002 | 200 E | 2002 |
| 5 | Fort Hood Series V.44 | US Army Fort Hood | Prewitt and Associates | Survey 1999 | 200 E | 1999 |
| 6 | Fort Hood Series V.61 | US Army Fort Hood | Prewitt and Associates | Area survey 793 acres | Adjacent | 2012 |
| 7 | TAP 1614 | Texas Parks and Wildlife | n/a | Linear survey | 500 E | 1996 |

archeological sites were examined for surface exposures of artifacts. The subsurface investigations were conducted at the Cowhouse Creek crossing, with trenches excavated along the west side of FM 116 and north and south of the Cowhouse Creek channel. Trenches were placed away from areas disturbed by prior construction and in sediments with potential to contain buried archeological material.

- Trenches were excavated with a Gradall equipped with a 5-ft wide smooth-blade bucket and were excavated perpendicular to the stream channel in areas that were deemed potentially intact Holocene-age terrace sections. In the south west quadrant (south of the channel and west of the roadway) three trenches, spaced approximately 40 m apart were excavated. A single trench was excavated in the northwest quadrant because of extensive disturbance from previous construction. Trenches were excavated in passes of approximately 10 cm to a depth of 150 cm below surface and were approximately 6 m in

length. Excavation was halted to examine exposures and to scrape sections of trench walls. The trench face was monitored by one archeologist while the other inspected the backdirt spoil for potential cultural material. In some of the trenches excavation continued below 150 cm, and the sides benched according to OSHA trench safety regulation. The trenches were stopped at 180-190 cm below surface (cmbs). See Abbott, attached, for additional descriptions and results of the trenching.

Table 3. Subsurface Probes (see Figure 6 and Abbott)

| Method | Quantity in Existing ROW | Quantity in Proposed New ROW | Quantity in Temporary Easements | Total Number per Acre* |
|---|---|---|---|---|
| Shovel Test Units | 0 | N/A | N/A | 0 |
| Auger Test Units | 0 | N/A | N/A | 0 |
| Mechanical Trenching | 4 | N/A | N/A | 4 |
| *Total acreage of possibly intact Holocene-age deposits at Cowhouse Creek | | | | |

- **Other Methods:** None
- **Collection and Curation:** NO ☒ YES ☐ If yes, specify facility.
- **Comments on Methods:** The Texas Historical Commission and Council of Texas Archeologists Archeological Survey Guideline Standards indicate that 16 shovel tests per mile be excavated. Given the shallow nature of the soil and surface exposure of bedrock through more than 90 percent of the APE, no shovel tests were excavated. Subsurface excavations were conducted on the terraces of Cowhouse Creek with potential to contain buried archeological deposits. The eastern side of the right of way contained buried utility lines and higher construction disturbances. After accounting for the records search and field observations during the survey, approximately one acre at Cowhouse Creek had potential to contain intact buried archeological deposits. Excavation was facilitated with Waco District Environmental Specialist David Jayroe and Gatesville Maintenance personnel Jimmy Barton and Marcus Yows.

## Survey Results

- **Project Area Description:** The APE is predominantly cleared and maintained highway right of way, typically 100 feet in width. The roadway occupies approximately 30 feet of the width, and considerably more in cut sand fill sections. Drainage ditches one to three feet deep were installed along segments of the APE (**Figure 7**). At Cowhouse Creek, disturbances from prior bridge construction were extensive close to the channel (**Figure**

8). The previous alignment from the 1930s was visible east of the APE with the north abutment still standing (**Figure 9**). In the northeast quadrant, a box culvert extends to the edge of the right of way, reducing the available area for trenching so that a single location was selected (**Figure 10**).

- **Archeological Materials Identified:** See Abbott. A possible burned rock fragment was observed in BHT at a depth of 180 cmbs; however, no direct cultural association could be determined and no other material that could be culturally produced was observed. The fragment is likely in a secondary context. In Trench 4 three disassociated burned limestone fragments were observed at depths of 110 cmbs and 145 cmbs. No other possible material was noted and they are likely in a secondary context. Because of the lack of context and ambiguous cultural affiliation of the material no site was recorded.
- **APE Integrity:** The APE has been disturbed by construction and maintenance activities and the effects of erosion. The APE is mapped as overwhelmingly uplands, with ancient surface geology and thin soils unlikely to contain intact, significant archeological deposits (see **Figure 11**). Investigations at Cowhouse Creek, where the existing bridge will be replaced with a wider structure, involved mechanical trenching in Holocene-age terraces. See Abbott for geoarcheological assessment of the trenching.

## Recommendations

- **Archeological Site Evaluations:** N/A
- **Comments on Evaluations:** None
- **Further Work:** No further work is recommended within the existing APE. No cultural material within the APE is recommended as eligible for listing in the National Register of Historic Places or designation as a State Antiquities Landmark.
- **Justification:** Trenching in identified undisturbed terrace deposits at Cowhouse Creek and FM 116 detected no archeological material that could be interpreted as an archeological site or property. As a result of prior construction and the typically shallow and ancient upland soils, there is little probability that archeological deposits occur in the APE with integrity sufficient to meet the criteria of eligibility (36 CFR § 60.4) for listing in the National Register of Historic Places as archeological historic properties (36 CFR § 800.16.(l)) or that would meet the criteria for designation as State Antiquities Landmarks (13 TAC 26.8). Furthermore it is also unlikely cemeteries occur in the APE and that the project will have no effect on a marked or unmarked cemetery (Health and Safety Code, Title 1, Chapter 711. 010, and Title 1, Chapter 711.035). In addition, site 41BL1379 does not constitute a 4(f) property under the Department of Transportation Act of 1966 as codified at 23 U.S.C. § 138 and 49 U.S.C. § 303, and administered under 23 CFR 774.

  Pursuant to Stipulation VI of the PA-TU, TxDOT finds that the APE does not contain archeological historic properties (36 CFR 800.16(l)), and the proposed undertaking

would not affect archeological historic properties. In addition, the project does not merit additional field investigations in compliance with the MOU (43 TAC 2.24(f)(1)(C). The project will have no effect on archeological historic properties. In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease and TxDOT archeological staff will be contacted to initiate post-review discovery procedures under the provisions of the PA and MOU.

- **References Cited:**


Abbott, James T., and Scott Pletka
2014 *The Waco District HPLAM Model.* Texas Department of Transportation, Environmental Affairs, Archeological Studies Branch. Austin.

Bureau of Economic Geology
1970 *Geologic Atlas of Texas: Waco Sheet.* The University of Texas at Austin.

Griffith, Glenn, Sandy Bryce, James Omernik and Ann Rogers
2007 *Ecoregions of Texas*. Texas Commission of Environmental Quality Surface Water Quality Surface Monitoring Program.

McMahan, Craig A., Roy G. Frye, and Kirby L. Brown
1984 *The Vegetation Types of Texas, Including Cropland*: *an Illustrated Synopsis to Accompany the Map*. Texas Parks and Wildlife, Austin.

Texas State Highway Department and United States Department of Agriculture
1936 [1940], *Coryell County, Texas, General Highway Map.*

United State Department of Agriculture/Natural Resources Conservation Service
2015 Web site Stable URL accessed 02/09/2015
http://websoilsurvey.sc.ego2v.usda.gov/App/ WebSoilSurvey.aspx

United States Department of the Interior, National Park Service Cultural Resources
2005 *National Register Bulletin: How to apply the National Register Criteria for Evaluation*. National Register of Historic Places, National Parrk Service, Washington, D.C.

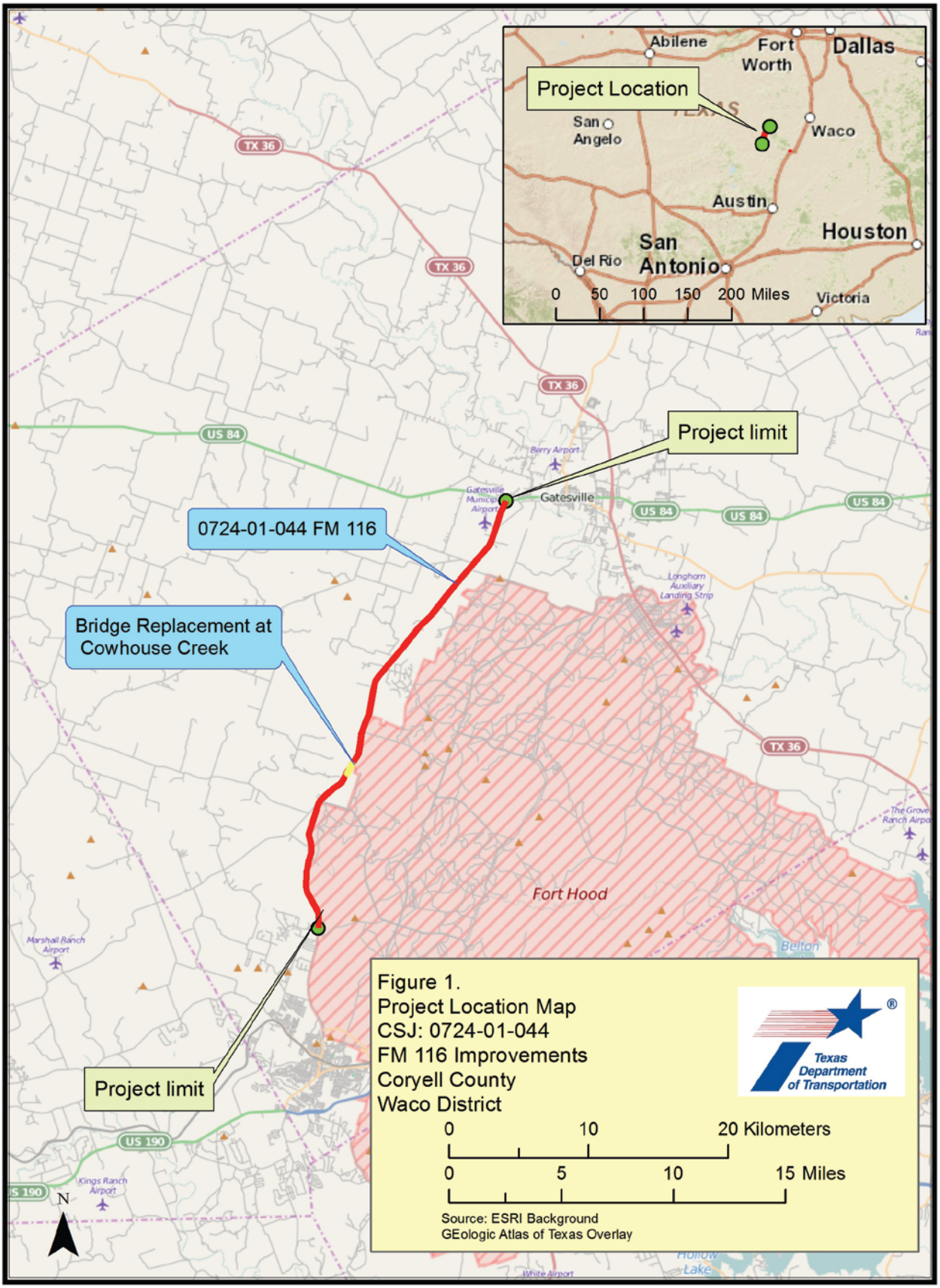
United States Geological Survey
1918 Gatesville 30 minute topographic map sheet [3197-5c]
1995 Gatesville West 7.5 minute topographic quadrangle [TTX 1476 o31097d7]
1995 Shell Mountains 7.5 minute topographic quadrangle [TTX 3444 o31097.c7]
1995 Pidcoke 7.5 minute topographic quadrangle [TTX 2923 o31097c8]

**Table of Figures:**



Attachment:

James T. Abbott, *Geoarcheological Observations, Survey of Proposed Bridge Replacement, FM 116 at Cowhouse Creek, Coryell County, Texas CSJ: 0724-01-044*
Environmental Affairs Division


Abilene
Fort Worth
Dallas
Project Location
San Angelo
Waco
Austin
Houston
San Antonio
Del Rio
0 50 100 150 200 Miles
Victoria
TX 36
US 84
Project limit
Gatesville
0724-01-044 FM 116
Bridge Replacement at Cowhouse Creek
Fort Hood
Belton
Project limit
US 190
N
Figure 1.
Project Location Map
CSJ: 0724-01-044
FM 116 Improvements
Coryell County
Waco District
0 10 20 Kilometers
0 5 10 15 Miles
Source: ESRI Background
GEologic Atlas of Texas Overlay
Texas Department of Transportation

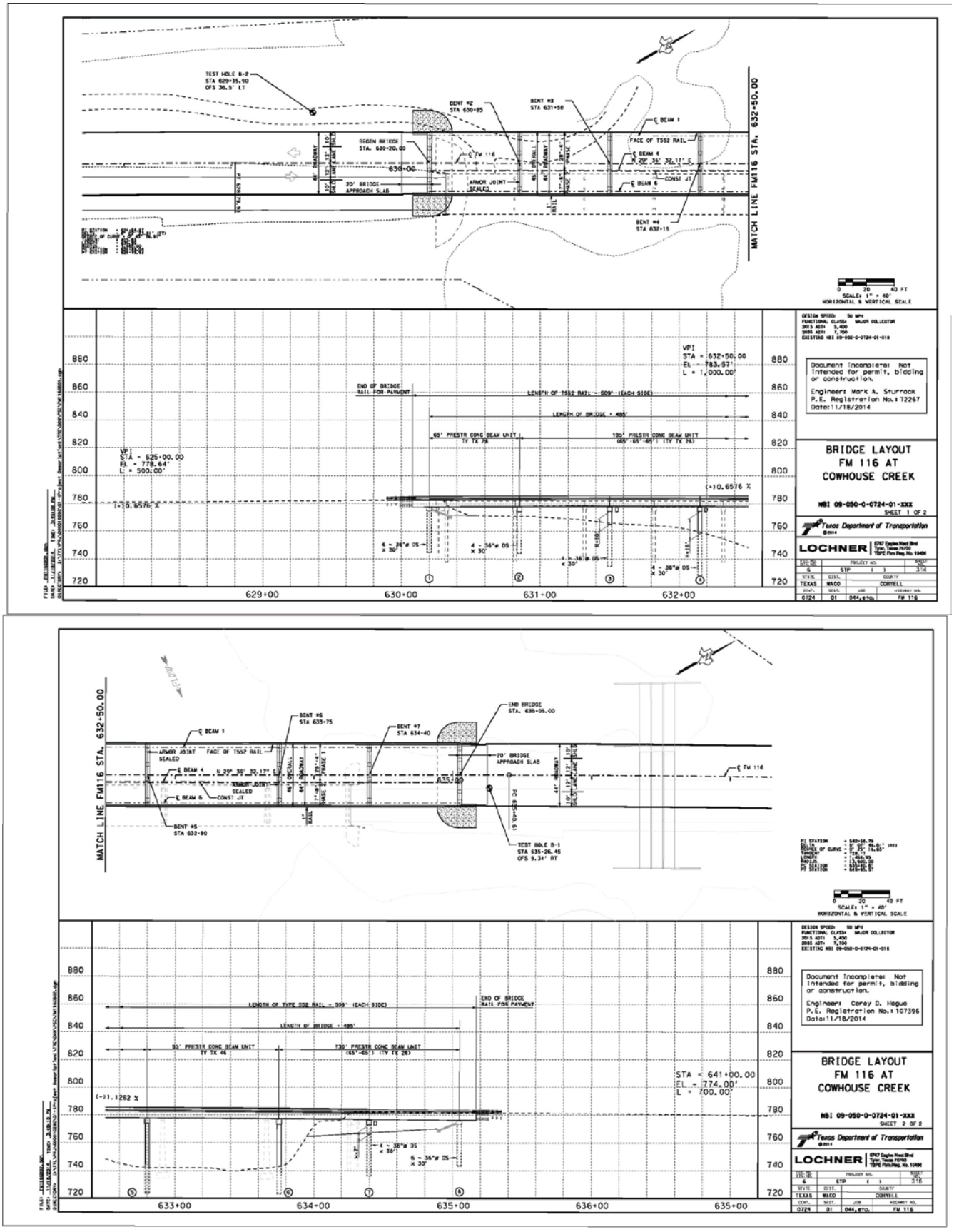



**Figure 2. Bridge layout at Cowhouse Creek.**

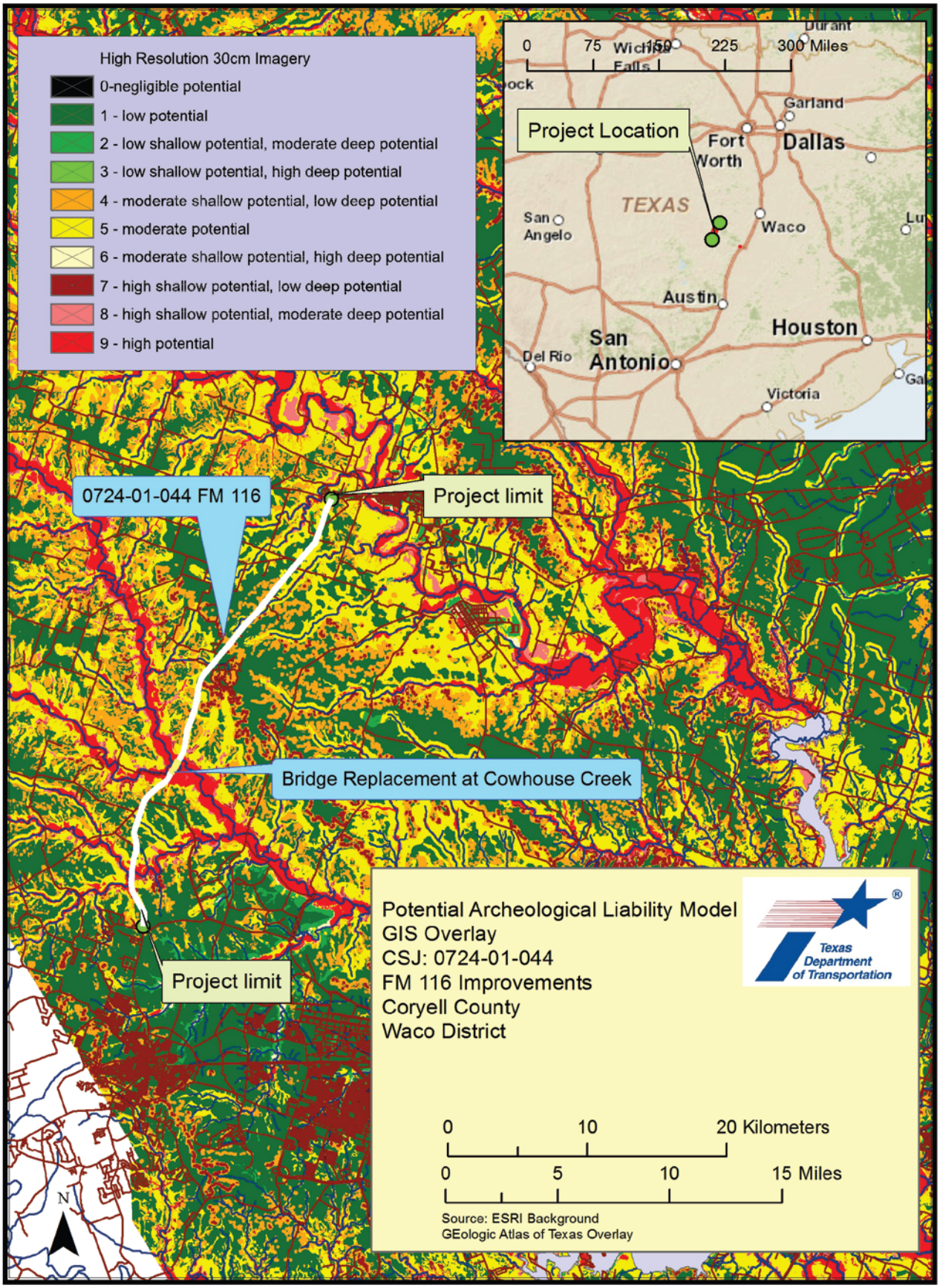



**Figure 3. Hybrid Potential Archeological Liability Model.**

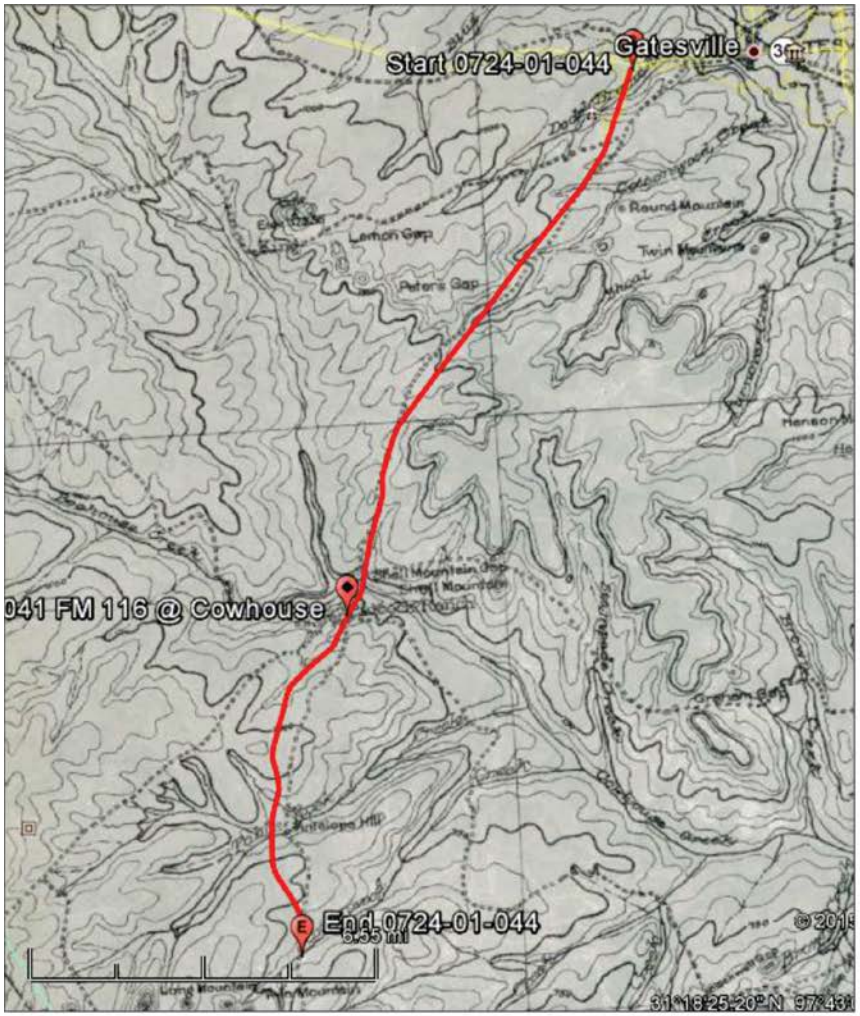



**Figure 4a. 1917 [1894 Survey] USGS Reconnaissance Gatesville, Texas Sheet**

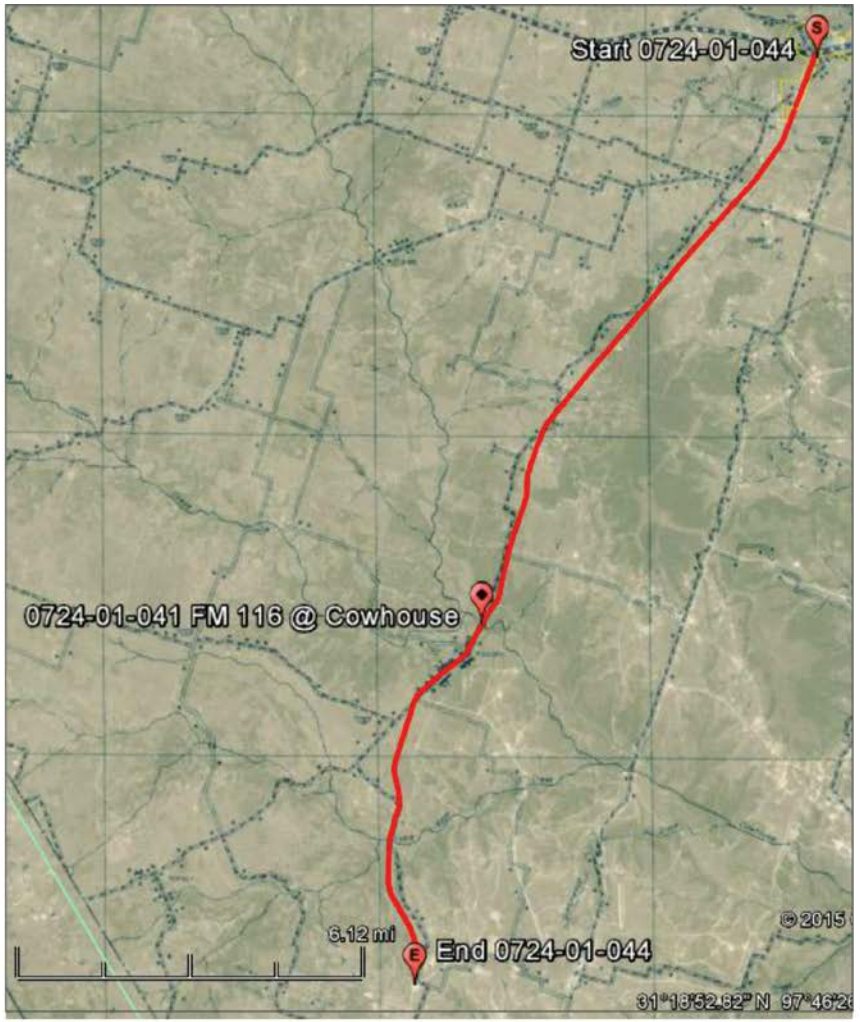



**Figure 4b. Texas State Highway Department 1936 [revised 1940] General Highway Map of Coryell County.**

REMOVED BECAUSE OF RESTRICTED INFORMATION

Texas Natural Resource Code Title 9, Section 191.004

Texas Antiquities Code Title 13, Part 2, Chapter 24.13

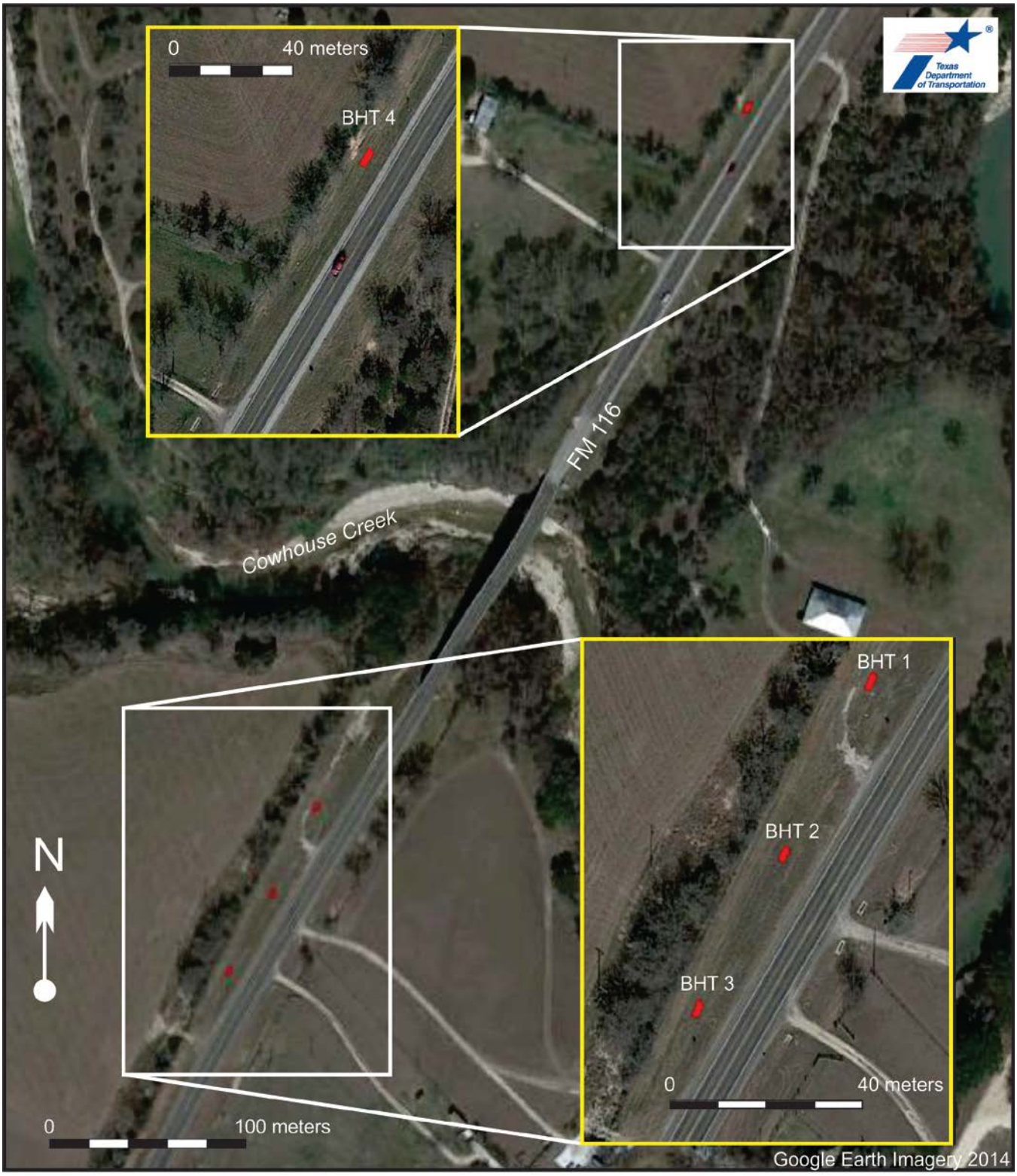



**Figure 6. Trench Locations at FM 116 at Cowhouse Creek**

**Figure 7. Looking south towards Cowhouse Creek. Note elevated section and drainage ditch.**

**Figure 8. South abutment of existing bridge at Cowhouse Creek. Note mechanically shaped terrace.**


**Figure 9. Existing bridge with previous alignment visible on north bank at Cowhouse Creek.**

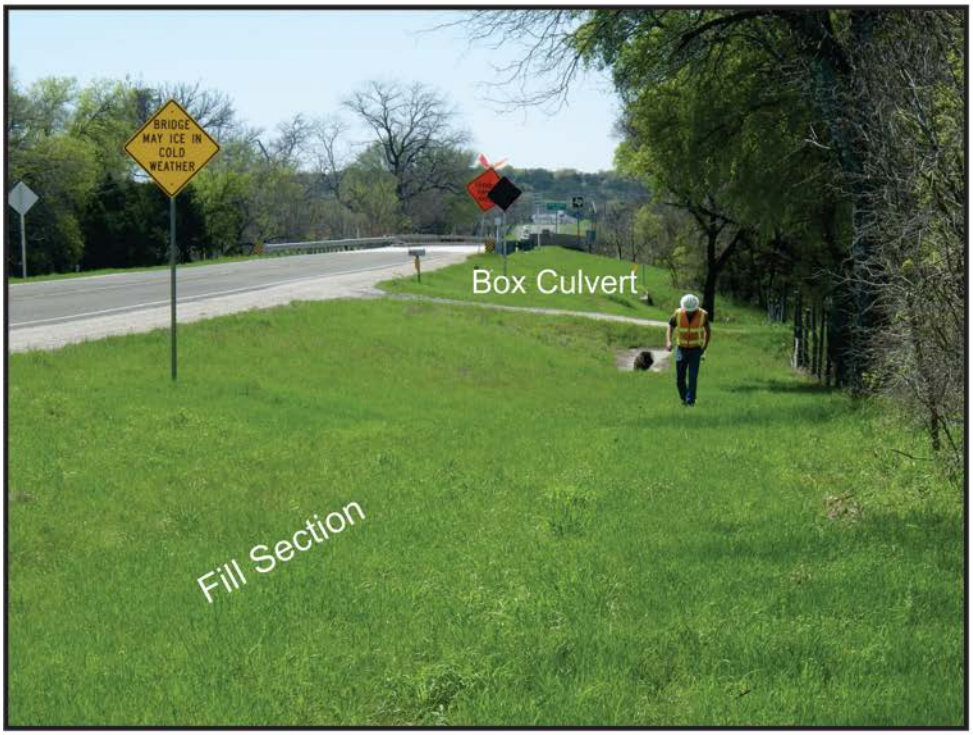



**Figure 10. Looking south at NW quadrant with fill section and box culvert at Cowhouse Creek.**

**Figure 11. Typical uplands cut section on FM 116 exposed Cretaceous-age geology. Looking south.**


# Geoarcheological Observations, Survey of Proposed Bridge Replacement, FM 116 at Cowhouse Creek, Coryell County, Texas

## CSJ: 0724-01-044

James T Abbott, Environmental Affairs Division

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

## Introduction

This report describes geoarcheological observations made during mechanical survey of a planned bridge replacement at SH116 and Cowhouse Creek, immediately upstream of the U.S. Army Fort Hood military reservation, and between the towns of Copperas Cove and Gatesville. In addition to these towns, the tiny community of Pidcoke lies less than a mile to the south, overlooking the Cowhouse Creek valley. Fieldwork was conducted on March 25, 2015. See Oksanen (attached) for additional details of the project history and for discussion of the archeological results.

**Figure 1** illustrates the location of the study area, which lies immediately downstream of the confluence of Cowhouse Creek and its relatively large tributary Beehouse Creek. The parent project area extends from Cactus Lane to US84 in Gatesville, a distance of approximately 18.8 miles (30.08 km), and would add passing lanes and 10 ft. shoulders to FM116. As part of overall improvements to FM116, the project would replace and widen the existing bridge at Cowhouse Creek. All construction would occur within the existing ROW, and no permanent or temporary easements are planned. The geoarcheological study reported here addresses only this bridge replacement.

The project area is situated in Central Texas, in the Great Plains physiographic province. Geology of the area consists of bedded, gently dipping Lower Cretaceous rocks, including limestones, marls, and clays, of the Washita (Duck Creek Limestone, Fort Worth Limestone) and Fredricksburg Groups ( Kiamichi Clay, Edwards Limestone, Comanche Peak Limestone, and Walnut Clay); pack sands of the thin Paluxy Sand Formation; and thin-bedded limestones, clays, marls, and minor sands of the Glen Rose Formation ( Sellards et al. 1932; Barnes, 1970; **Figure 2**). According to mapping by Texas Parks and Wildlife Department (**Figure 3A**), the area lies in the Grand Prairie subregion of the Blackland Prairie natural region, near its boundary with the Lampasas Cut Plain subregion of the Edwards Plateau natural region. However, most mapping places the study area (and indeed almost all of Coryell County) in the Lampasas Cut Plain (Hayward et al. 1990; Nordt 1992; Parish 1995; **Figure 3B**). Given the geology and physiography of Coryell County, the latter usage is preferred here. The Lampasas Cut Plain is a landscape developed on the northeastern margin of the Edwards Plateau, and underlain by the same series of relatively flat-lying, Lower Cretaceous marine clays and carbonate rocks. Unlike the majority of plateau, the Lampasas Cut Plain is characterized by two discrete upland surfaces resulting from several phases of downcutting and lateral planation. The high surface (termed the Manning surface by Nordt [1992] on Fort Hood), forms discrete upland mesas that rise above a broader eroded plain (termed the Comanche pediplain by Parish [1995] and the Killeen surface by Nordt[1992]) that was formed by lateral planation of rocks stratigraphically superior to the Walnut clay (**Figure 4**).

Cowhouse Creek consists of an incised, bedrock-confined valley with a fill of Holocene alluvium flanked by discontinuous remnants of Pleistocene terrace. The principal ($T_1$) terrace lies approximately 8 m (26.2 ft) above the channel. Because it passes through the actively managed archeological landscape of Fort Hood, there is a great deal of available stratigraphic and geoarcheological information on Cowhouse Creek (**Figure 5**).

Nordt (1992) identifies six distinct alluvial-stratigraphic units in the Cowhouse Creek valley: the Jackson, Georgetown, Fort Hood, Lower West Range, Upper West Range, and Ford alluvia. The oldest of these is the Jackson alluvium, which is believed to date to the final part of the Pleistocene (roughly 18-15 ka). It underlies a second ($T_2$) terrace. The tread of this terrace approximately 15-16 m above the channel, but the margins are typically beveled so that it grades into the lower surface.

Most deposits laid down since the Jackson fill was abandoned underlie this first ($T_1$) terrace, which is at an elevation of 8-10 m above the modern channel. These deposits include the Georgetown, Fort Hood, and Upper and Lower West Range units. Each represents a period of alluvial aggradation separated by an episode of stream entrenchment, and all but the Georgetown are exposed at the surface at various places on the terrace tread. The most recent unit is the Ford alluvium, which dates roughly to the last few centuries and underlies a narrow, discontinuous and irregular modern floodplain ($T_0$) up to 7.5 m above the channel. Floods in the Cowhouse valley are generally confined to the relatively narrow channel trench, and events overtopping the $T_1$ terrace are relatively rare and subside quickly (**Figure 6**).

Vegetation mapped in the vicinity of the study area is classified as Oak-Mesquite-Juniper Parks and Woods (**Figure 7**). This assemblage includes post oak, Ashe juniper, shin oak, Texas oak, blackjack oak, live oak, cedar elm, agarito, soapberry, sumac, hackberry, Texas pricklypear, Mexican persimmon, purple three-awn, hairy grama, Texas grama, sideoats grama, curly mesquite, and Texas wintergrass. Alluvial terrace surfaces adjacent to FM 116 are primarily cultivated or in pasture, although some native vegetation is present in northeast of the bridge.

Soils mapped in the vicinity are illustrated in **Figure 8**. These soils are developed in both alluvial sediments (e.g., Lewisville, Bosque, and Seawillow series) and upland limestones and marls (e.g., Doss and Real series). This discussion addresses only the soils in alluvial contexts.

Lewisville soils are Udic Calciustolls (Mollisols) and exhibit a typical A-Bk1-Bk2 profile characterized by silty clay textures and common small, hard calcium carbonate concretions (Stage II+ carbonate morphology). They are typical of the $T_2$ terraces (Nordt 1992), although in the study area they are also extensively mapped on the $T_1$ surface.

Bosque soils are Cumulic Haplustolls (Mollisols), and exhibit a typical Ap-A1-A2-Bw-Akb-Bwb profile developed in dark grayish brown to brown loam and clay loam. They typically exhibit stage I carbonate morphology (carbonate filaments )The Akb and Bwb horizons named in the official soil series description represent a buried soil that is not always present—in fact, the Bwb horizon is not listed in the principal portion of the description because it occurs below the 10- to 40-inch control section, and is identified only under the discussion of the range of characteristics. This buried soil represents a depositional hiatus, and does not commonly occur in the Cowhouse valley, except possibly in the narrow band where the Upper West Range drapes over the Lower West Range. They are typical of $T_1$ terraces.

Seawillow soils are Udic Haplustepts (Inceptisols) and exhibit a typical Ap-Bk1-Bk2-Bk3-BCk profile developed in clay loam that grades from dark brown to reddish yellow with depth. Like Lewisville soils, they exhibit Stage II+ carbonate morphology, and can include up to 25% hard nodules in the lower horizons. Although Nordt (1992) does not mention them, in the project area the series is mapped on a beveled riser between the $T_1$ and $T_2$ terraces (see Figure 8).

## Methods

Three mechanical trenches (BT1 - 3) were excavated in the south approach and one trench (BT4) was excavated in the north approach during the project to examine the stratigraphy and prospect for buried cultural material (**Figure 9; Table 1**). The trenches were placed on the $T_1$ terrace near the bridge and on the west side of the pavement, which is where widening the road would occur. No trenches were placed into the irregular, sloping $T_0$ floodplain because it was judged to be disturbed and have little potential (**Figure 10**). In addition, no trenches were placed close to the bridge on the north side of the river because the western ROW had been ditched and filled for drainage, and the fill section continued nearly to the ROW fenceline (**Figure 11**).

All trenching was actively monitored by two TxDOT archeologists. Excavation was periodically paused where appropriate so that the walls and floor of each trench could be trowelled and assessed. Although no profiles were prepared in an archeological sense, one sidewall of each trench was photographed and described using criteria outlined by Olson (1976) and Schoeneberger et al. (2012). When each trench reached a depth of approximately 150 cm, it was entered and a section of each wall was scraped, examined, and recorded. Excavation was typically terminated between 150 and 200 cmbs, based on a maximum assumed depth of impact of approximately 1.5 m

## Results

BT1-3 were excavated in the SW quadrant of the bridge approach at a spacing of approximately 50 m (see Figure 9), and revealed nearly identical profiles differentiated

primarily by the presence of small, hard carbonate nodules at depth in BT1 and differences in the veneer of construction spoil among the trenches. Apart from this variability in the spoil cap (see **Figure 12, Figure 13,** and **Figure 14**), BT1 exhibited an Ap-A-ABk-Bk profile typical of all three trenches. The Ap horizon was approximately 20 cm thick and consisted of mechanically placed and compacted gravelly clay loams and loams (in BT3, this horizon was underlain by a 20 cm-thick Ap2 horizon composed of crushed limestone and sand; see Figure 14). This unit rested on an abrupt, mechanically-truncated A horizon composed of very dark grayish brown (10YR 3/2), weak fine granular structured silt loam approximately 22 cm thick. This A horizon graded into a weak fine blocky structured silt loam ABk horizon that varied from very dark grayish brown (10YR 3/2) through dark brown (10YR 4/3) to brown (10YR 5/3) with depth, and was approximately 40 cm thick. This horizon contained occasional dispersed carbonate filaments, as did the underlying Bk1 and Bk2 horizons, which continued to the base of the trench at approximately 190 cmbs. Both of these latter horizons consisted of weakly structured brown (10YR 5/3) silt loams. The Bk2 horizon, which was only observed in BT1, also included a few small (2=5 mm), hard carbonate nodules. Other features of note include occasional dispersed *Rabdotus* sp. snail shells throughout the column and a single small, probable burned rock fragment at approximately 180 cmbs. Although some soil structure was apparent in the trenches, it was subtle and did not separate readily into peds, although the material was soft enough to shave smooth with little problem. No other cultural material was noted in association with the small clast, nor was any noted in either of the other trenches in the quadrant. Trenching was discontinued at approximately 180-190 cmbs for safety and because the trenches were deeper than the anticipated depth of impact of the project.

BT4 was excavated in the northwestern quadrant of the bridge, and exposed a far more clay-rich profile (**Figure 15**) consisting of 20 cm of fill over an A-Bk profile extending to at least 2 m bgs. The A horizon was approximately 55 cm thick and consisted of very firm blocky black (10YR 2/1) clay containing occasional fine gravels and hard secondary carbonate nodules, presumably reworked from upslope. The Btk horizon also consisted of very firm blocky clay, and graded from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3) with depth. As in the A horizon, small hard carbonate nodules were dispersed through the horizon, often in habits (e.g., subtle subhorizontal stringers) that suggest that suggest that they may represent reworked material. In addition, a few small (< 5m diam) fragments of probable burned limestone were encountered at several different elevations (110 cmbs, 145 cmbs), but no other materials were observed, and the rocks are likely in secondary context.

## Summary

A mechanically-assisted archeological survey was conducted in advance of a proposed bridge replacement on FM 116 at Cowhouse Creek, Coryell County, on March 25, 2015. Four backhoe trenches were excavated into the $T_1$ terrace; three in the SW quadrant and

one in the NW quadrant. Those trenches in the southwest quadrant exhibited an A-ABk-Bk profile developed in a relatively light silt loam, while the trench in the northwest quadrant exhibited a more clay-rich A-Bk profile containing probable reworked carbonate nodules and very sparse crumbs of burned rock that are likely in secondary context.

It is unclear how the deposits relate to Nordt's stratigraphic model of Cowhouse Creek on Fort Hood. The deposits on the south side of the stream are mapped as Lewisville soils, while those on the north side are mapped in the Bosque series. Nordt (1992) equates the Lewisville series with deposits of the Pleistocene $T_2$ terrace, but the deposits here are clearly Holocene in age, and given the absence of the pinkish caste typical of Fort Hood alluvium probably represent a relatively sandy facies of the Late Holocene West Range fill. The clayey deposits of BT 4 are mapped in the Bosque series, and are also believed to represent late Holocene alluvium, albeit a different facies than represented in BT 1 through 3. Although sparse fragments of probable burned rock were noted in BT1 and BT4, careful troweling failed to reveal any structure to these fragments, and no charcoal, lithic debitage, bone, mussel shell, or similar materials were present in association. Accordingly, no additional work is recommended in association with the planned bridge replacement.

### *References Cited*


Barnes, V. E., 1976. Geologic Atlas of Texas, Crystal City-Eagle Pass Sheet, Dolan Hoye Eargle Memorial Edition. University of Texas Bureau of Economic Geology.

Hayward, O. T., P. M. Allen, and D. L. Amsbury, 1990. *The Lampasas Cut Plain: Evidence for Cyclic Evolution of a Regional Landscape, Central Texas*. Field Trip #19 Guidebook, Geological Society of America.

McMahan, C. A., R. G. Frye, and K. L. Brown, 1984. The Vegetation Types of Texas, Including Cropland, Map and Accompanying Illustrated Synopsis. Texas Parks and Wildlife Department.

Nordt, L. C., 1992. *Archaeological Geology of the Fort Hood Military Reservation, Fort Hood, Texas.* Archaeological Resource Management Series, Research Report Number 25. United States Army, Fort Hood, Texas.

Olson, G. W. (compiler), 1976. Criteria for Making and Interpreting a Soil Profile Description: A Compilation of the Official USDA Procedure and Nomenclature for Describing Soils. Lawrence: University of Kansas Publications.

Parish, B. C., 1995. *Geomorphic Response to Regional Structure, Lampasas Cut Plain, Central Texas*. Bulletin 55, Baylor Geological Studies.

Schoeneberger, P.J., D.A. Wysocki, , E.C. Benham, , and Soil Survey Staff, 2012. *Field book for describing and sampling soils, Version 3.0*. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

USDA, no date. Web Soil Survey. (http://websoilsurvey.nrcs.usda.gov/app/). Accessed April 2015.

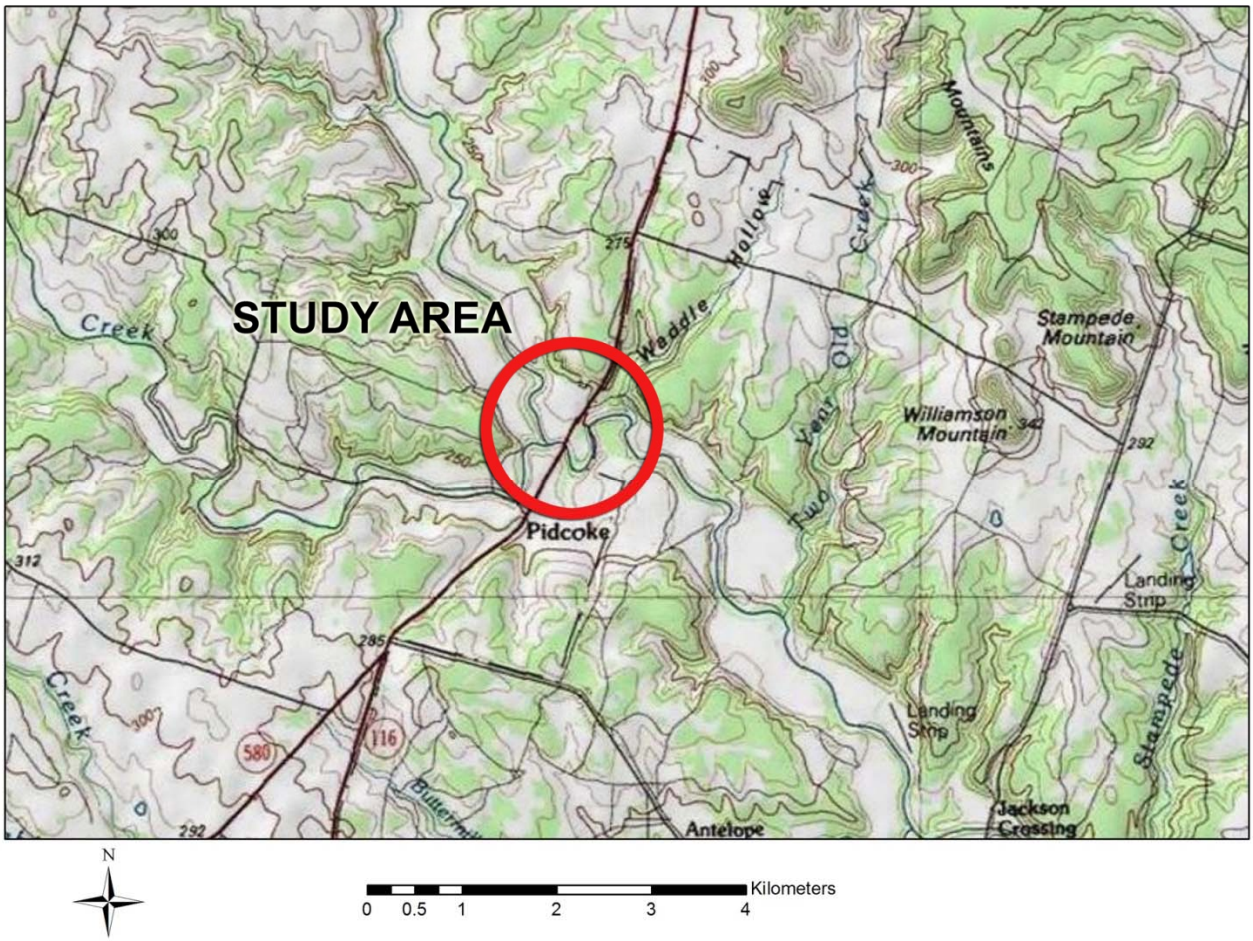



**Figure 1:** Detail of USGS 7.5' topographic map of the project area (Pidcoke, Tex).

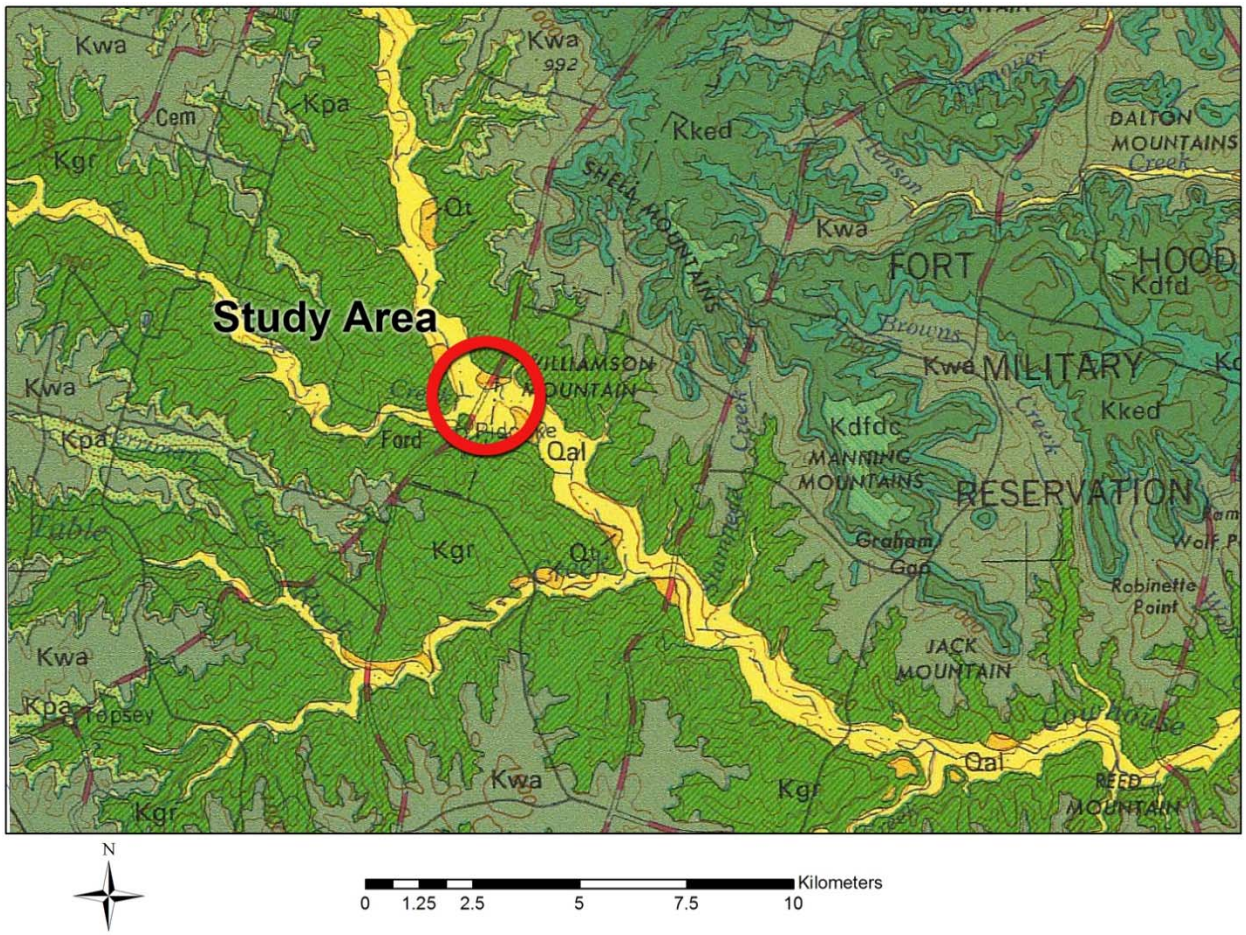



**Figure 2:** Location and geological setting of the study area. Key to mapping units: Qal = alluvium; Qt = Quaternary fluviatile terrace deposits; Kdfdc = Kiamichi Clay, Fort Worth Limestone, and Duck Creek Limestone undivided; Kked = Kiamichi Clay and Edwards Limestone undivided; Kc = Comanche Peak Limestone; Kwa = Walnut Clay; Kpa = Paluxy Sand; Kgr = Glen Rose Limestone.

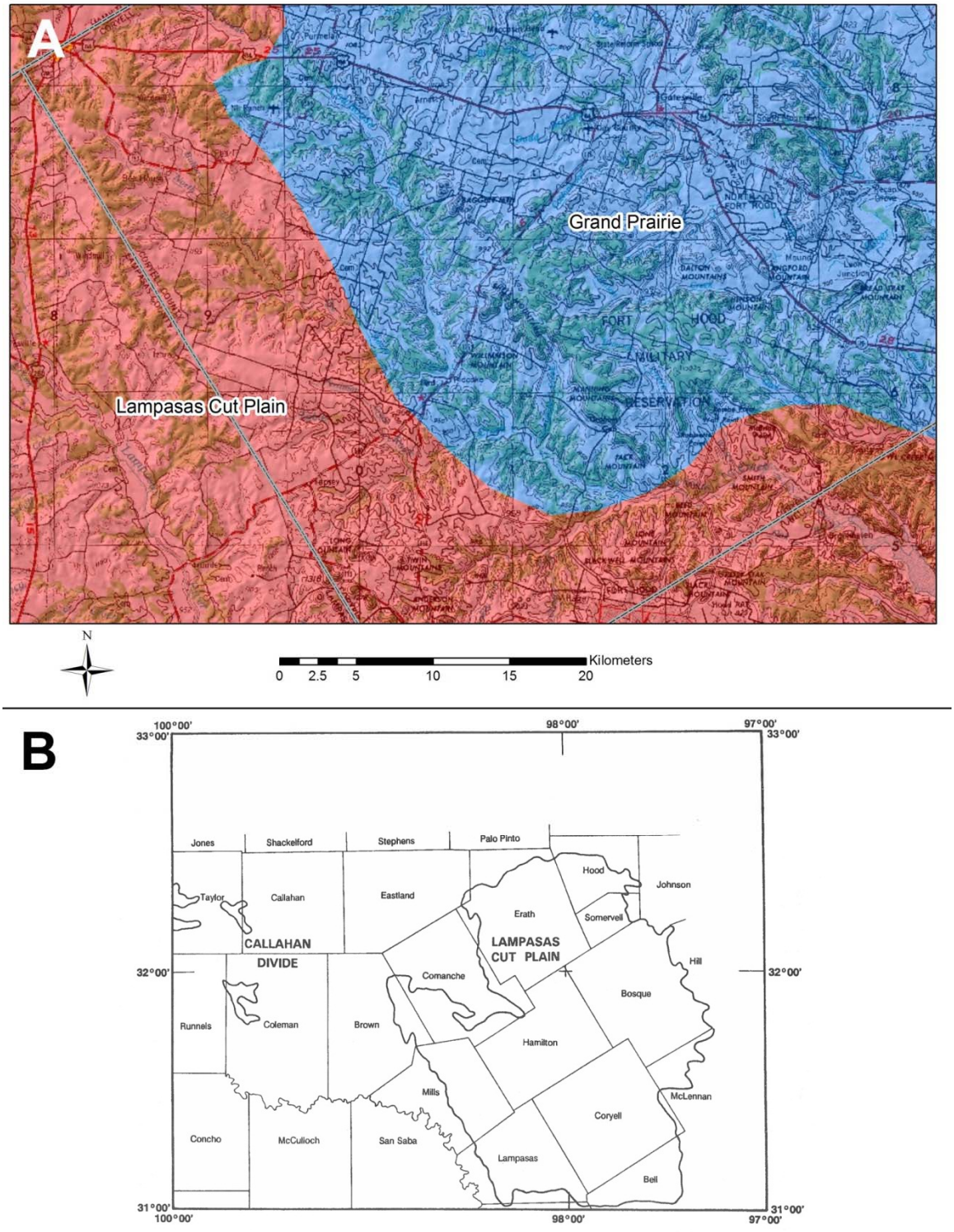



**Figure 3**: Location of the Lampasas Cut Plain according to **(A)** the natural subregions map of Texas Parks and Wildlife Department, and **(B)** Parish (1995) . Note that the study area, and indeed most of Coryell County, is considered in the Lampasas Cut Plain by Parish and in the Grand Prairie by TPWD.

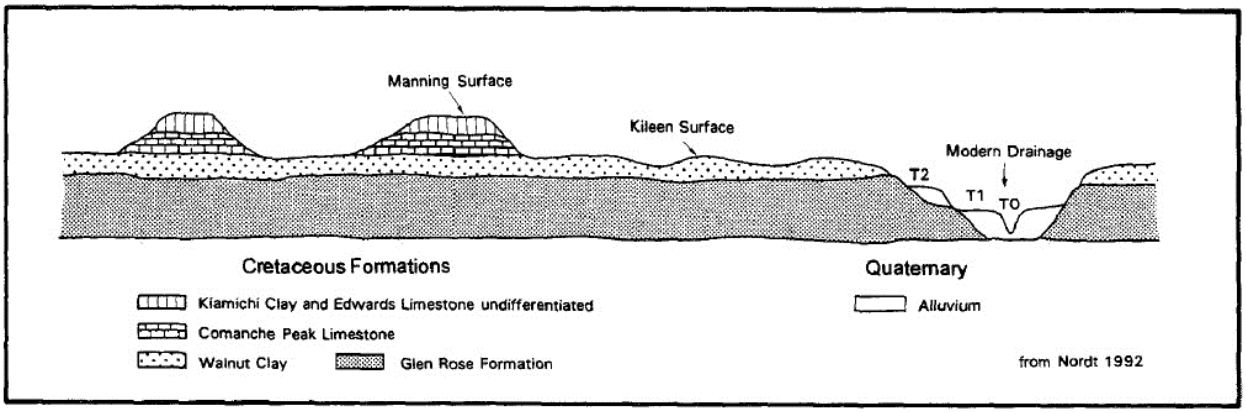


Figure 4: Generalized geologic cross-section of the Lampasas Cut Plain from Trierweiler (1994), adapted from Nordt (1992).

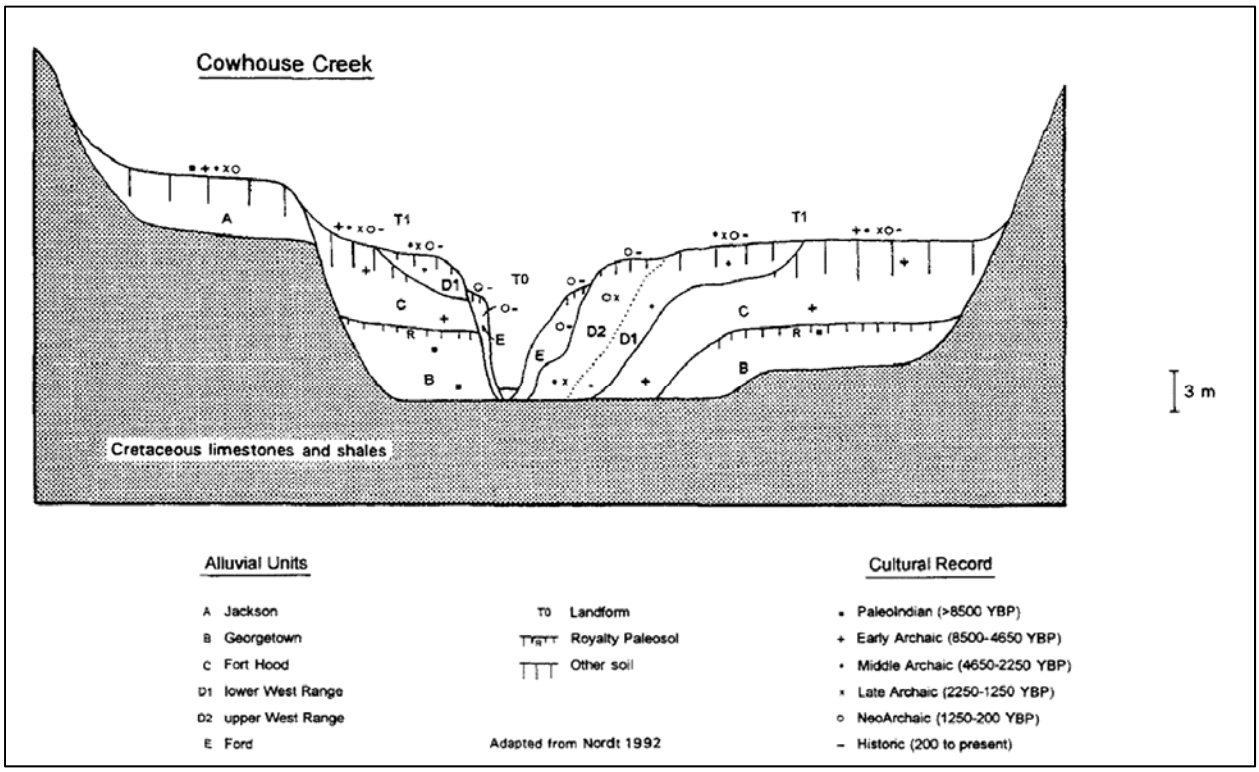



Figure 5: Generalized stratigraphic architecture of Cowhouse Creek on Fort Hood, from Trierweiler et al. (1994), adapted from Nordt (1992).

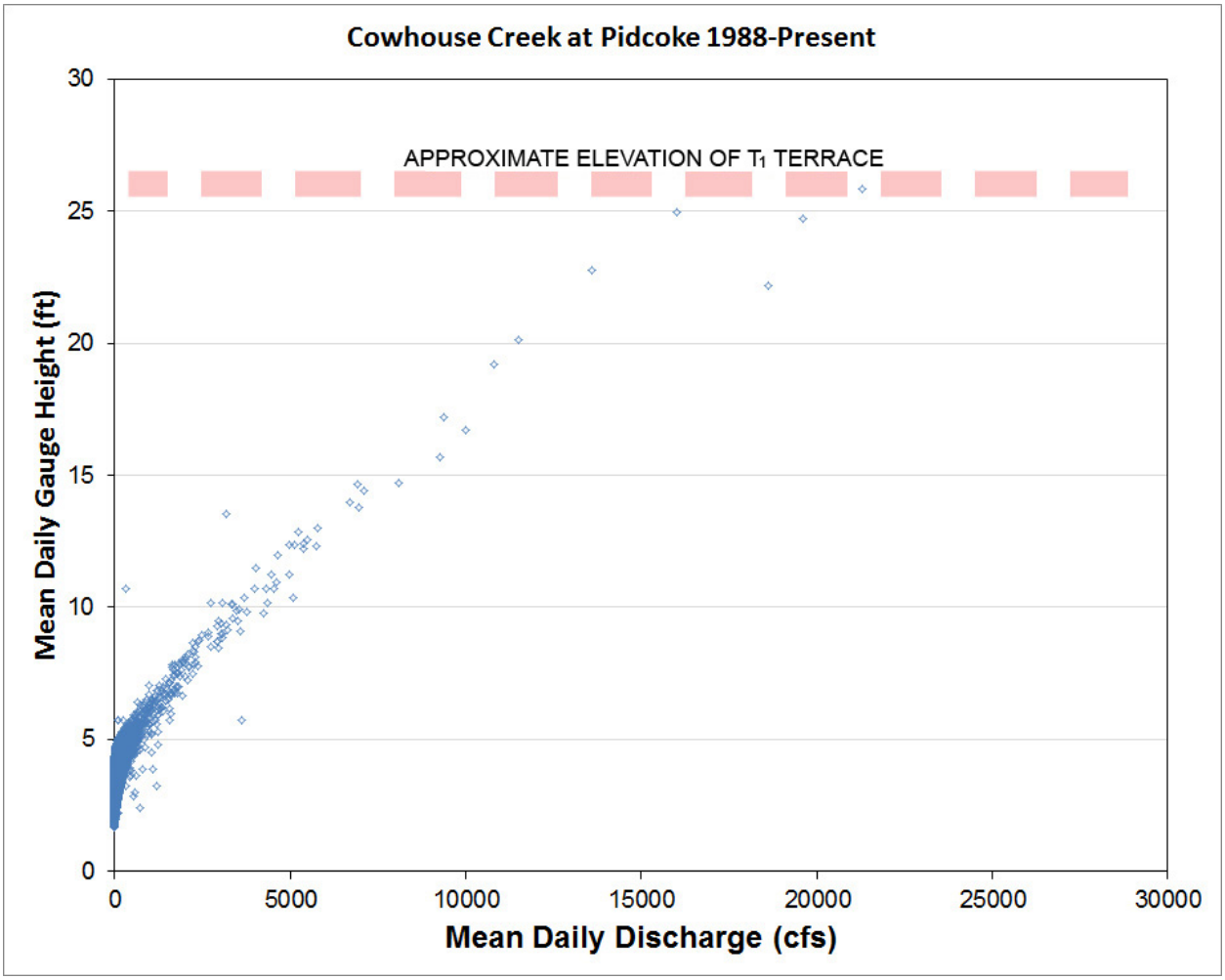


Figure 6: Relationship between mean daily discharge and mean daily stage height for Cowhouse Creek at FM116, 1988 to present.

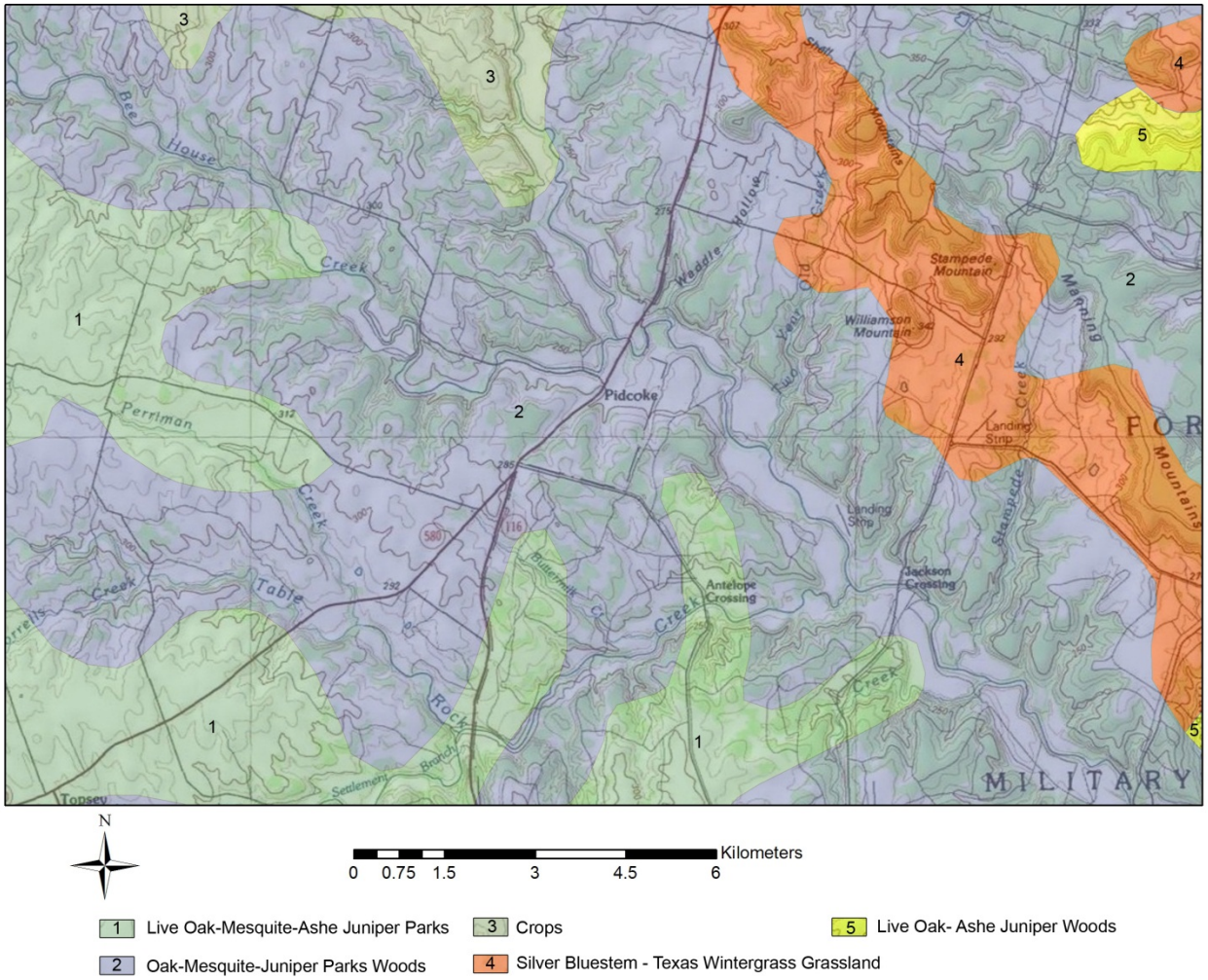



Figure 7: Vegetation zones surrounding the study area, after McMahan et al. (1984).


Figure 8: Soil map of study area. Key to mapping units : B0 = Bosque clay loam, 0-1% slopes; DrC = Doss-Real complex, 1-8% slopes; LeB = Lewisville clay loam, 1-3% slopes; ReF = Real-rock outcrop complex, 12-40% slopes; SeC = Seawillow clay loam, 3-5% slopes.

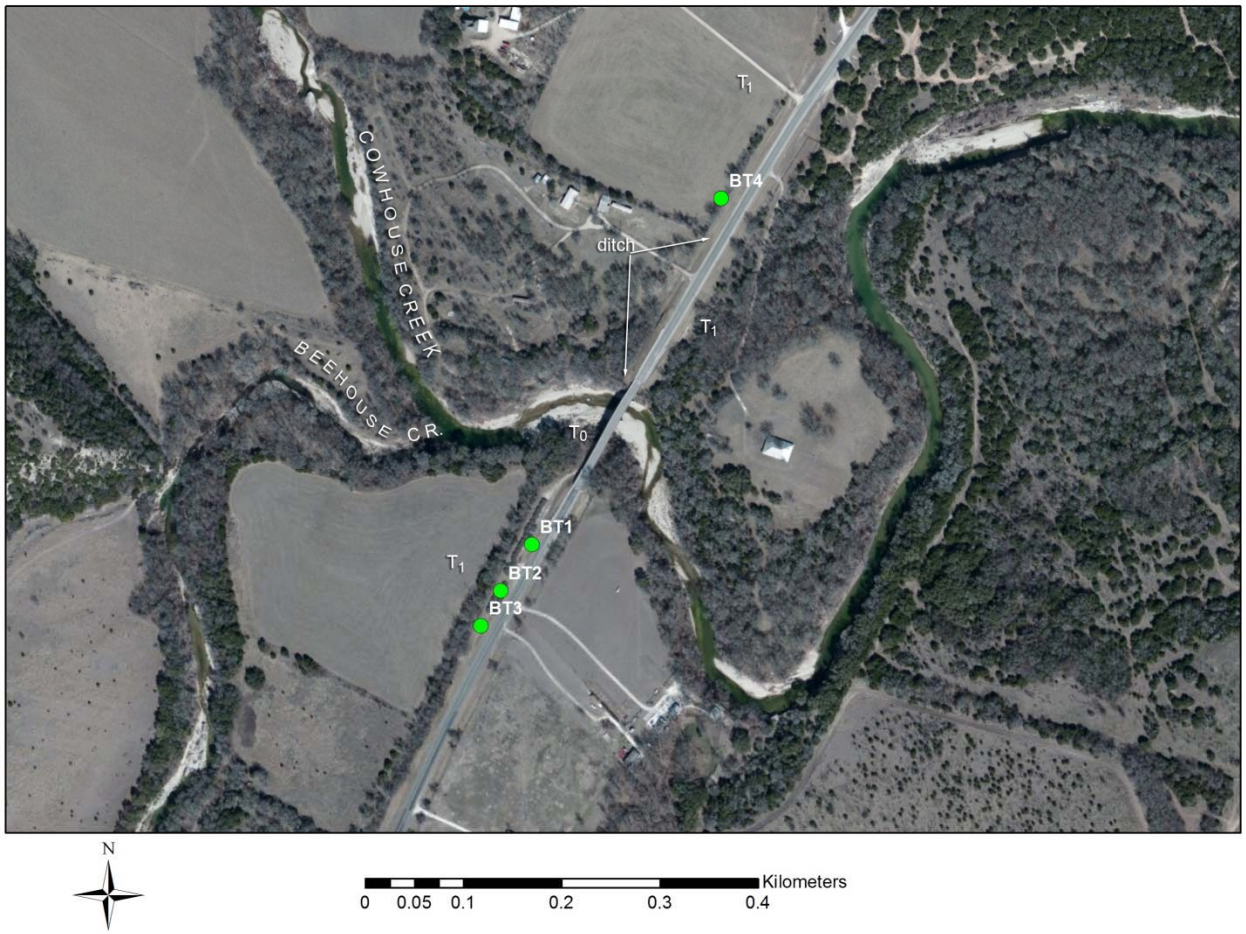



Figure 9: Aerial of study area, showing location of trenches.

Table 1: Trench locations. All UTMs are based on field readings with an Apple iPhone running mylce92' software's Coordinates app, version 1.4.0.

| Trench | UTM Zone | Easting | Northing |
|---|---|---|---|
| BT1 | 14 | 606129 | 3461709 |
| BT2 | 14 | 606097 | 3461662 |
| BT3 | 14 | 606077 | 3461626 |
| BT4 | 14 | 606322 | 3462062 |

Figure 10: View looking up from at the channel at the irregular $T_0$ surface.

Figure 11: View looking south toward the bridge from the approximate location of BT4, showing ditching and wide fill section of the ROW in proximity to the bridge.

Figure 12: Profile of BT1

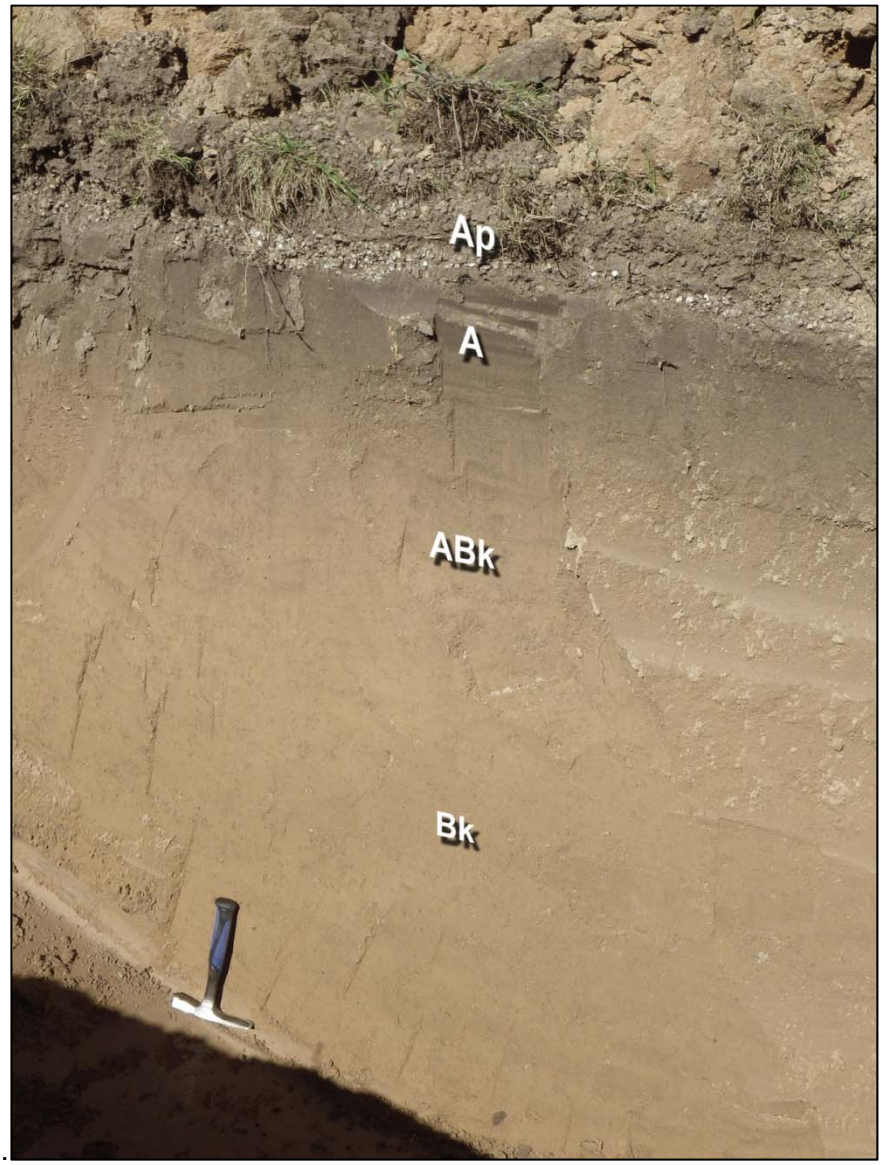



Figure 13: Profile of BT 2.

Figure 14: Profile of BT 3.

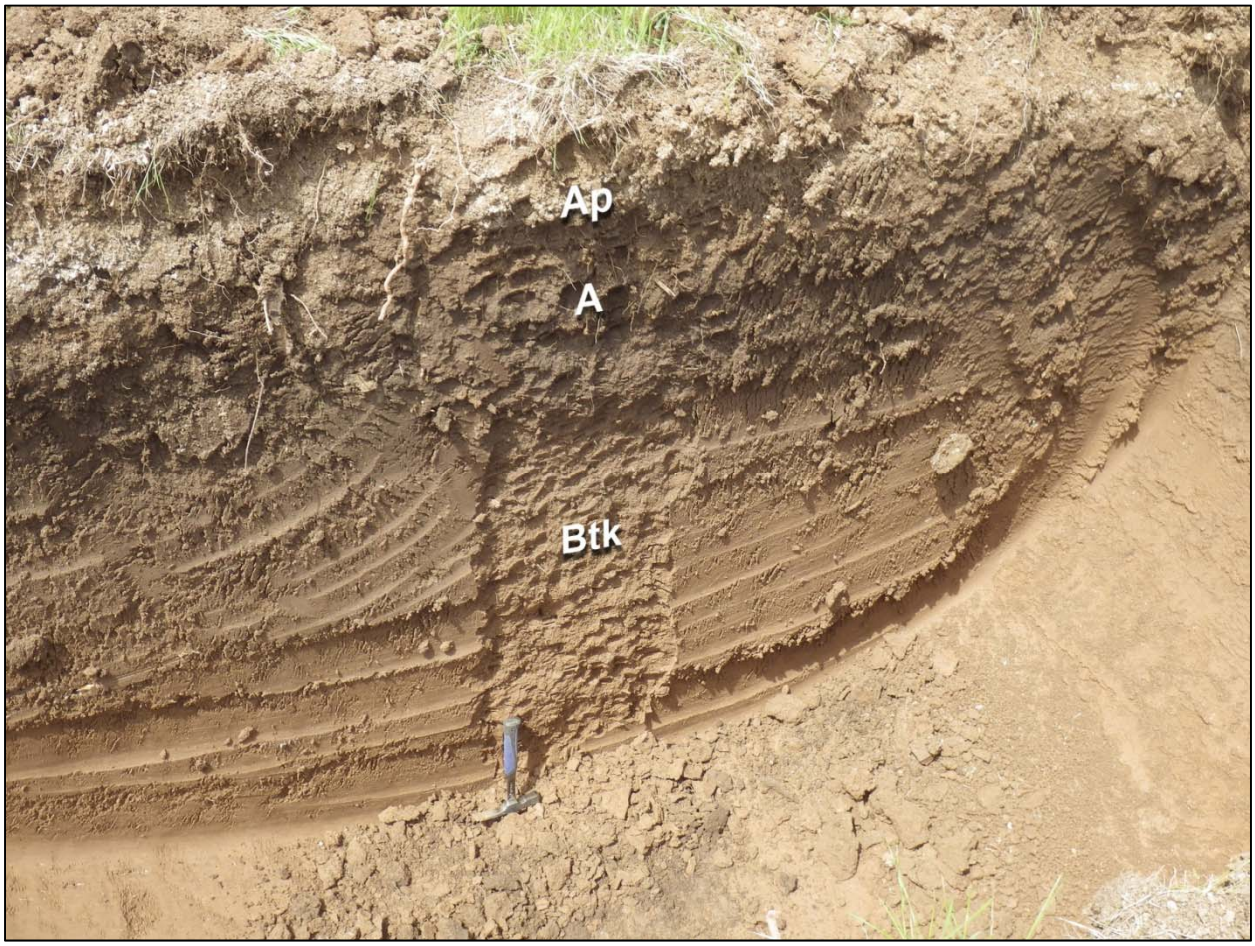


Figure 15: Profile of BT4.