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Intensive Archeological Survey of the Dairy Farm Road at Palo Pinto Creek, Palo Pinto County, Texas.

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Report for Archeological Survey

Intensive Archeological Survey of the Dairy Farm Road at Palo Pinto Creek, Palo Pinto County, Texas.

Fort Worth District

Jon Budd, Principal Investigator, Antiquities Permit No. 8132

CSJ: 0902-39-021

September 29, 2017

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 12-16-14, and executed by FHWA and TxDOT.

Abstract

On behalf of the Texas Department of Transportation, SWCA Environmental Consultants (SWCA) conducted an intensive cultural resources survey with mechanical trenching on September 19, 2017, of 1 acre of existing right-of-way (ROW) along Dairy Farm Road in Palo Pinto County, Texas. Because the project will receive funding from the Federal Highways Administration, it qualifies as an undertaking as defined in Title 36 Code of Federal Regulations (CFR) Part 800.16(y) and, therefore, survey was conducted in compliance with Section 106 of the National Historic Preservation Act (54 U.S. Code 306108). Furthermore, the project must also comply with the Antiquities Code of Texas (9 Natural Resources Code 191). Jon Budd served as Principal Investigator under Texas Antiquities Permit No. 8132.

The area of potential effects (APE) is defined as the existing 80-foot-wide Dairy Farm ROW beginning 250 feet east of the Palo Pinto Creek waterline and extending 500 feet west. According to project design, the depth of impacts will be up to 50 feet below the current ground surface for the bridge supports, 12 feet for the bridge headers, and 3 feet for the approaches.

A background literature review determined that the APE has not previously been surveyed for cultural resources and no archeological sites, historical markers, or cemeteries are within 0.6 mile (1 kilometer) of the APE.

The field investigation of the proposed project APE consisted of five backhoe trench (BHT) excavations and one column sample. The existing ROW has been modified by the construction of Dairy Farm Road and an earlier roadway that parallels Dairy Farm Road. Portions of the ROW consist of short grasses, naturally overgrown vegetation, and mixed hardwoods. SWCA identified three faunal element fragments (deer) in BHT01 and BHT05. The two deer fragments in BHT01 were encountered in association with a tin can (modern) in a disturbed context, while the single deer fragment in BHT05 was subsequently investigated with a column sample. No cultural materials or features were identified in the column sample. Overall, no prehistoric or historic cultural resources were identified in the proposed project APE. The investigations also encountered a buried soil in BHTS 02 through 05, which was negative for cultural materials. This buried soil is similar to that described by previous investigators along Palo Pinto Creek that has been *tentatively* interpreted to be contemporaneous with the West Fork Paleosol, which was deposited about 1,000 to 2,000 years ago.

SWCA made a reasonable and good faith effort as per 36 CFR Part 800.4(b)(1) to identify and locate prehistoric and historic archeological properties within the proposed project APE. The field investigation discovered no cultural resources; therefore, SWCA recommends that a finding of “no historic properties affected” be made for the current undertaking.

Project Identification

- **Date:** 9/29/2017
- **Date(s) of Survey:** 9/19/2017
- **Archeological Survey Type:** Reconnaissance ☐ Intensive ☒
- **Report Version:** Draft ☒ Final ☐
- **Jurisdiction:** Federal ☒ State ☒
- **Texas Antiquities Permit Number:** 8132
- **District:** Fort Worth
- **County or Counties:** Palo Pinto
- **USGS Quadrangle(s):** Stawn East
- **Highway:** Dairy Farm Road
- **CSJ:** 0902-39-021
- **Report Author(s):** Dan Rodriguez and Ken Lawrence
- **Principal Investigator:** Jon Budd

Texas Historical Commission Approval

Signature Date

Project Description

- **Project Type:** Bridge replacement
- **Total Project Impact Acreage:** 1 acre
- **Area of Pedestrian Survey:** 1 acre
- **Project Description and Impacts:** The proposed project would replace and widen the existing bridge and approaches on Dairy Farm Road at Palo Pinto Creek in Palo Pinto County, Texas (Figure 1). The existing bridge measuring 120 by 21 feet will be replaced by a 165- by 26-foot new structure (Figure 2). The 18- to 22-foot-wide approaches will be widened to 24 feet. All work is limited to the existing right of way (ROW). No new ROW would be required.
- **Area of Potential Effects (APE):** The APE is defined as the existing 80-foot-wide Dairy Farm ROW beginning 250 feet east of the Palo Pinto Creek waterline and extending 500 feet west (see Figure 2). According to project design, the depth of impacts will be up to 50 feet below the current ground surface for the bridge supports, 12 feet for the bridge headers, and 3 feet for the approaches. The APE comprises approximately 1 acre.
- **Parcel Number(s):** No parcel numbers.
- **Project Area Ownership:** The existing Dairy Farm Road ROW is owned and managed by the Texas Department of Transportation (TxDOT).

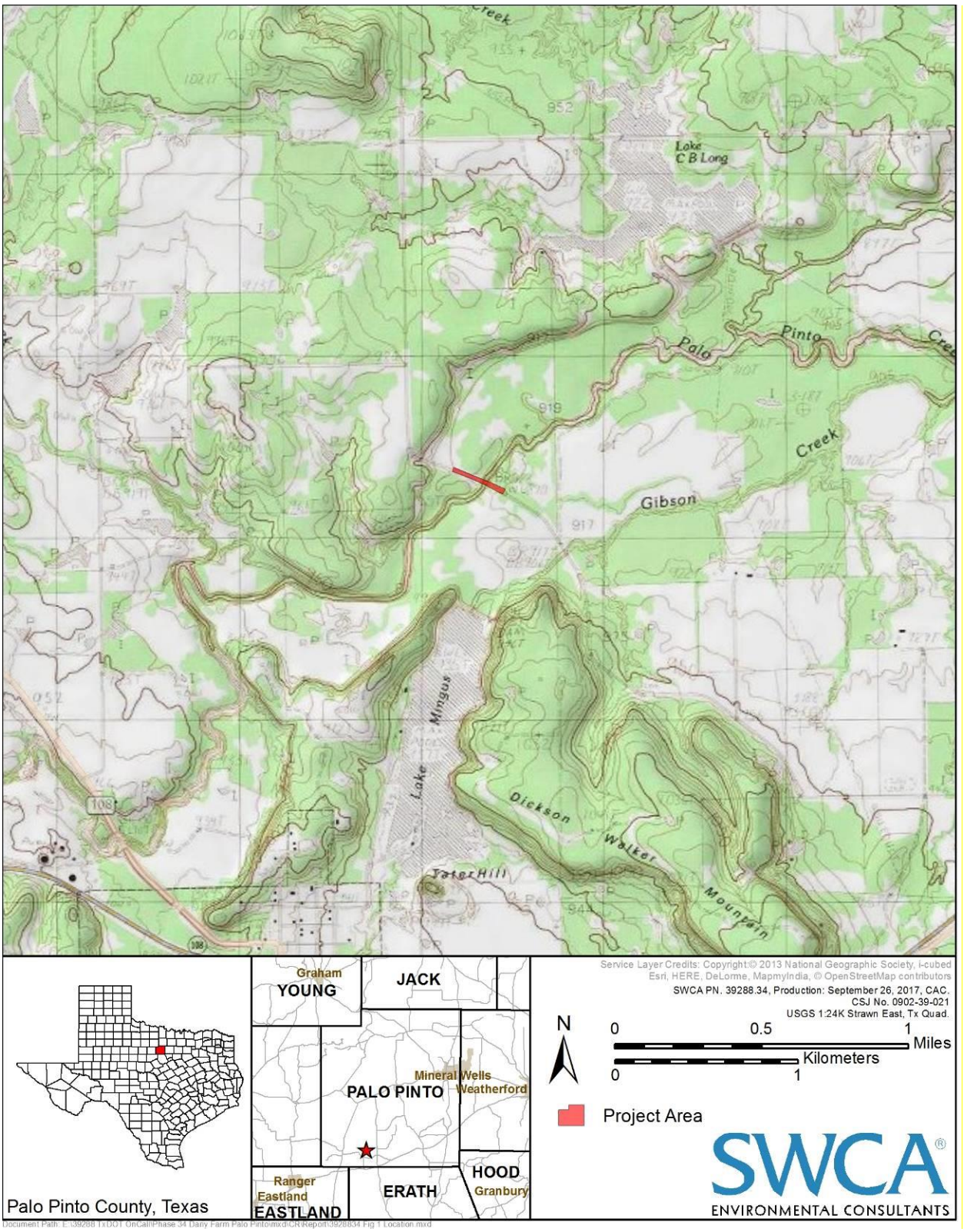

Figure 1. Project location.

Figure 2. Project Area.

Project Setting

- **Topography:** The APE runs roughly southeast to northwest across low rolling terrain of the Western Cross Timbers ecoregion (Wermund 2017). Elevation ranges from a maximum of 925 feet above mean sea level (amsl) on the north bank of the APE, to a low of 918 feet amsl at the bottom of the Palo Pinto Creek.
- **Geology:** According to the Geologic Atlas of Texas, Abilene sheet, all the APE is underlain by recent Holocene-aged sediments (Qal), laid down by the Palo Pinto River (Barnes 1972) (Figure 3).
- **Soils:** The APE is underlain by three soil series (Figure 4). Most of the APE is underlain by the Bosque series. Bosque loam consists of very deep loamy alluvium formed in calcareous alluvium of Pleistocene age derived from limestone and shale. The Bosque series is located on nearly level treads of floodplains with slopes ranging from 0 to 1 percent. The northwestern terminus of the APE is underlain by the Santo-Bunyan complex. These soils are sandy loams formed in calcareous or stratified alluvium of floodplains. Both the Santo and Bunyan series are found on nearly level to gently sloping floodplains with slopes between 0 and 2 percent (Natural Resources Conservation Service 2017).
- **Land Use:** The proposed project is in a rural area of southwest Palo Pinto County, just north of Lake Mingus. The APE is primarily surrounded by semi-wooded active and non-active agricultural and pastoral fields, and sparsely scattered residences.
- **Vegetation:** Vegetation within the project area is primarily short, mixed grasses within the existing ROW. The area surrounding the APE consists of grass pastures and dense trees and shrubs along the creek.
- **Estimated Ground Surface Visibility:** 0 percent within existing ROW.
- **Previous Investigations and Known Archeological Sites:** A background literature review determined that no portion of the APE has been previously surveyed for cultural resources. No archeological sites, historic markers, cemeteries, or State Antiquities Landmarks are located within 0.6 mile (1 kilometer [km]) of the APE (Texas Historical Commission [THC] 2017a). In addition, one historic-age building or structure was identified within 0.6 mile (1 km) of the APE during a review of the TxDOT Historic Overlay Maps (Foster et al. 2006); however, it does not fall within, or near, to the APE.
- **Comments on Project Setting**: A review of the Fort Worth District Hybrid Potential Archeological Liability Map revealed that the proposed project APE is within a floodplain setting with high potential for the preservation of archeological sites with reasonable integrity.

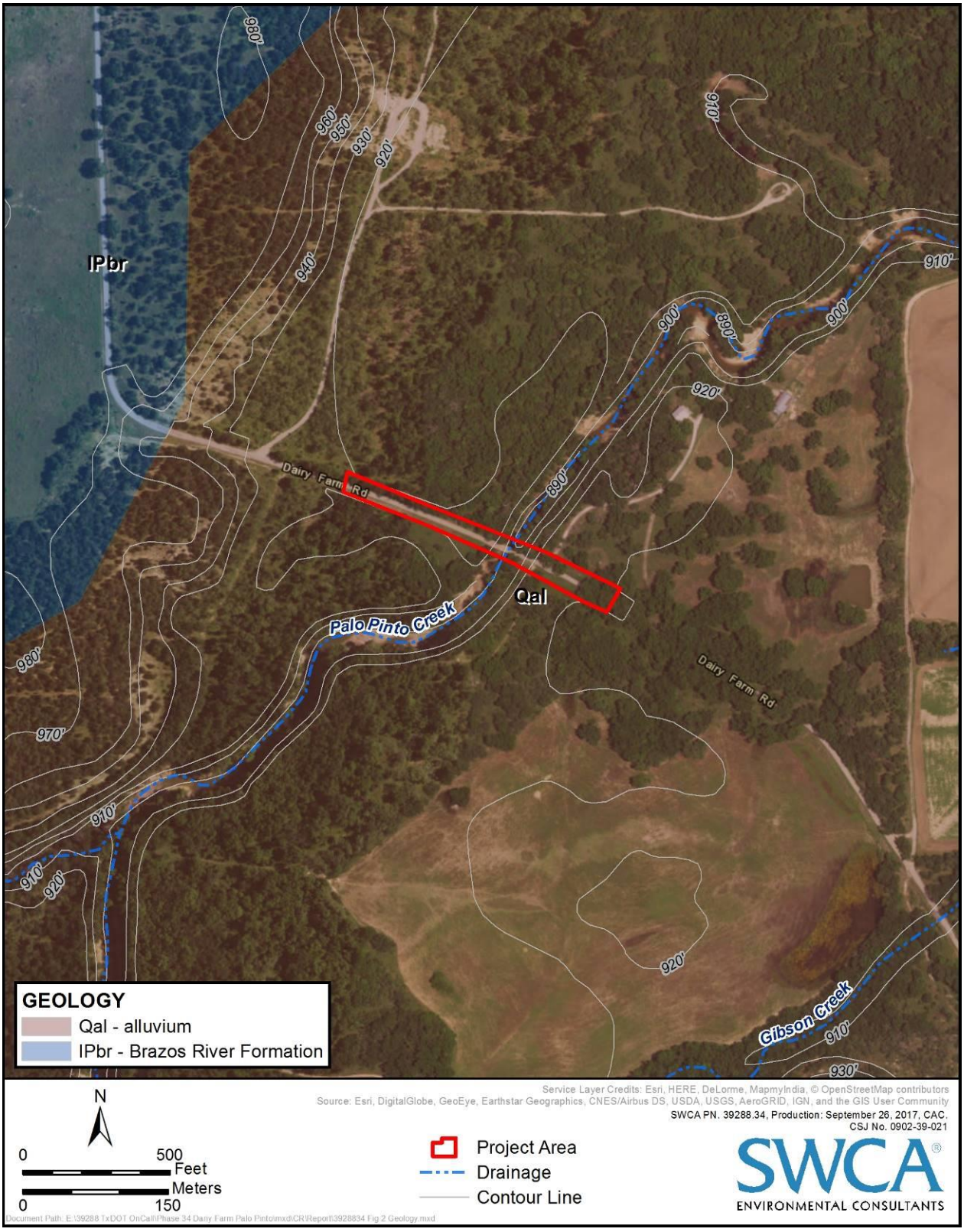

Figure 3. Project area geology.

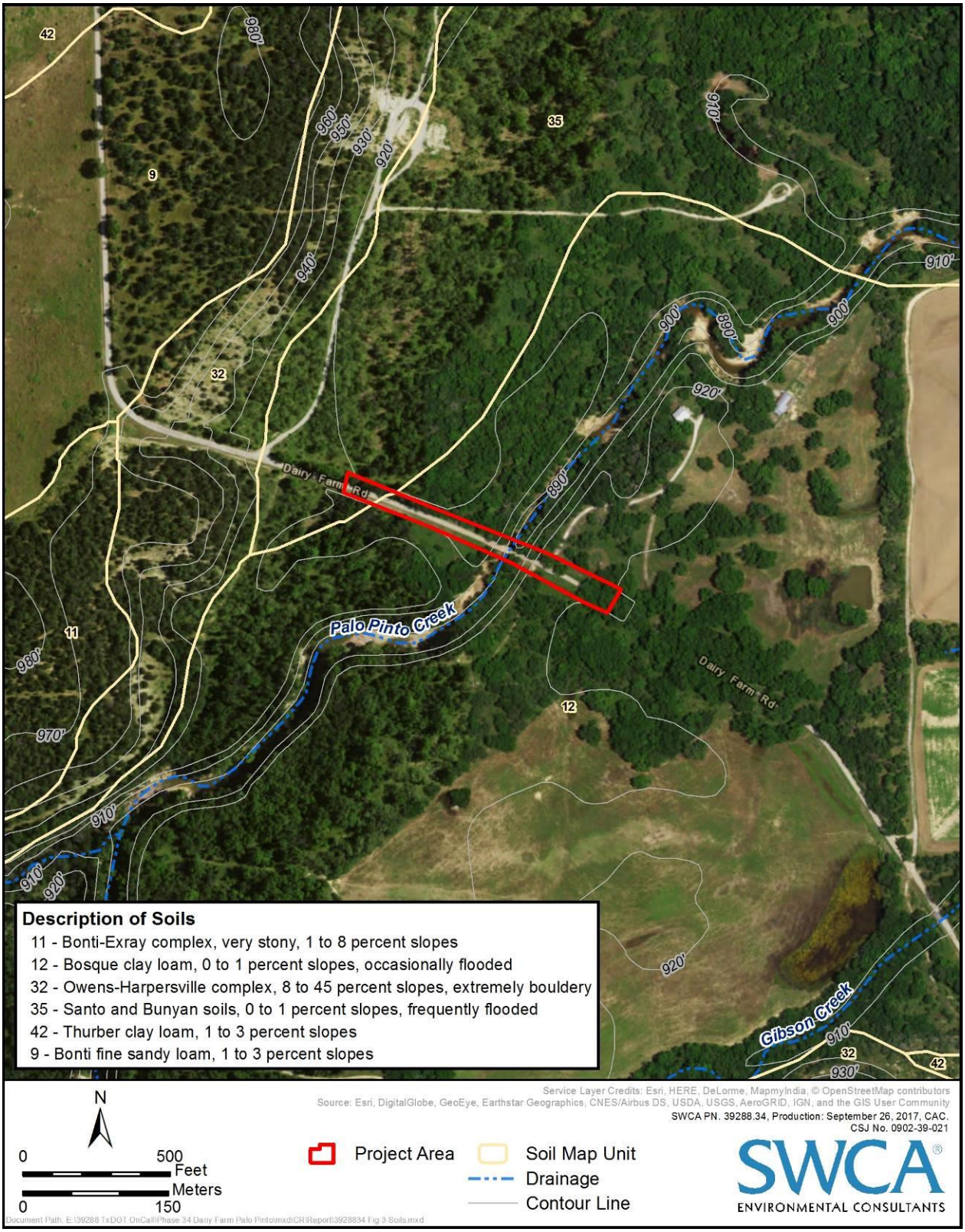

Figure 4. Project area soils.

Survey Methods

- **Surveyors:** Ken Lawrence, Ashley Eyeington, and Jared Wiersema
- **Methodological Description:** SWCA Environmental Consultants (SWCA) conducted mechanical trenching across accessible portions of the proposed APE. SWCA archeologists excavated five mechanical trenches within the APE (Table 1; Appendix A).

Table 1. Excavations in Project APE.

Method	Quantity in Existing ROW	Quantity in Proposed New ROW	Quantity in Temporary Easements	Total Number per Acre
Column Samples	0	0	0	0
Auger Test Units	0	0	0	0
Mechanical Trenching	5	0	0	5

Backhoe trenches (BHTs) were excavated entirely within the existing APE. The trench locations were chosen at the discretion of the project archeologist and focused on accessible areas with the least disturbance within the APE. Archeologists thoroughly documented and photographed the entire excavation process. Upon completion of each trench, the BHTs were backfilled, levelled, and returned as much as possible to their original state. SWCA excavated column samples when cultural or potentially cultural materials were identified within the trenches. A column sample consisted of a roughly 30-centimeter (cm) (12-inch) square shovel test excavated on the profile of the BHT, in a position nearest to the potential archeological materials. The column samples were excavated in arbitrary 20-cm (8-inch) levels until impenetrable soils or pre-Holocene strata were reached. All excavated soils were sifted through ¼-inch mesh. Archeologists recorded column samples on data forms, and included information on texture, consistency, color, and cultural materials collected.

- **Other Methods:** None
- **Collection and Curation:** NO ☒ YES ☐ If yes, specify facility.
- **Comments on Methods:** Due to the presence of numerous buried utilities and heavy subsurface disturbance within the existing ROW, much of the APE could not be trenched.

  THC archeological survey standards do not specify a density of BHTs per unit area (THC 2017b). However, SWCA excavated five BHTs within the proposed project area, which exceeds the shovel testing standards for a survey area of 1 acre or less.

Survey Results

- **Project Area Description:** SWCA archeologists conducted intensive pedestrian survey throughout the proposed project area with backhoe trenching (Figure 5). The investigations determined that the existing ROW has been modified by the construction of Dairy Farm Road and an earlier roadway that parallels Dairy Farm Road down to roughly 60 cm below surface (cmbs) (Figure 6). Below 60 cmbs within the existing ROW the project area is reasonably intact. Portions of the ROW consist of short grasses, naturally overgrown vegetation, and mixed hardwoods.
- **Backhoe Trenching:** SWCA excavated five BHTs and one (1) column sample within existing TxDOT ROW of the proposed Dairy Farm Road project APE (Appendix A). Two trenches (BHT01–BHT02) were placed on the eastern quadrants of the Palo Pinto Creek, with three trenches (BHT03–BHT05) placed on the western quadrants of the drainage within the proposed APE (see Figure 5).
- The BHTs were excavated to varying depths, ranging from a minimum of 1.36 m (4.5 feet) to a maximum of 3.1 m (10 feet) in an attempt to encounter strata that predated human occupation in the area. For the right bank (east side) of the Palo Pinto Creek, the trench dimensions were typically 90 cm (2.95 feet) wide, 7 m (23 feet) long, and excavated to a minimum of 1.4 m (4.6 feet) deep, while on the left bank (west side) of the drainage the trenches were 90 cm (2.95 feet) wide, 7 m (23 feet) long, and minimally excavated to 1.5 m (4.9 feet) deep.
- Palo Pinto Creek at this crossing has a paired, stair-stepped terrace system consisting of a series of alluvial terraces that bracket the drainage created by various episodes of overbank deposition (Waters 1992:149–151). At the crossing from youngest to oldest, Palo Pinto Creek contains T_0 (recent deposits), T_1, and T_2 landforms (Figures 7 and 8). The drainage has a narrow (2-m [6.6-foot] wide) T_0 landform with a surface (tread) that is gently undulating and roughly 1.5 m (4.9 feet) above the drainage surface. The T_0 tread dramatically rises to the adjacent T_1 landform, situated about 1.8 m (5.9 feet) above the T_0 surface and 3.3 m (10.8 feet) above the drainage surface (see Figures 7 and 8). The tread of the T_1 surface is sloping and has a variable width on the right (east side) and left (west side) banks. The T_1 landform is roughly 3.5-m (11.5-feet) wide on the right bank and about 1.2 m (3.9 feet) wide on the left bank. The T_1 landform dramatically rises to the T_2 landform, which has a surface situated about 2.5–3 m (8.2–9.8 feet) above the T_1 surface and approximately 9 m (29.5 feet) above the drainage surface. The surface of the T_2 landform is relatively level, wide (345–600 m [1,132-1,968 feet]), and gradually rises to the margins of the narrow Palo Pinto Creek valley. All five backhoe trenches (BHT01–BHT05) were placed on the T_2 landform.

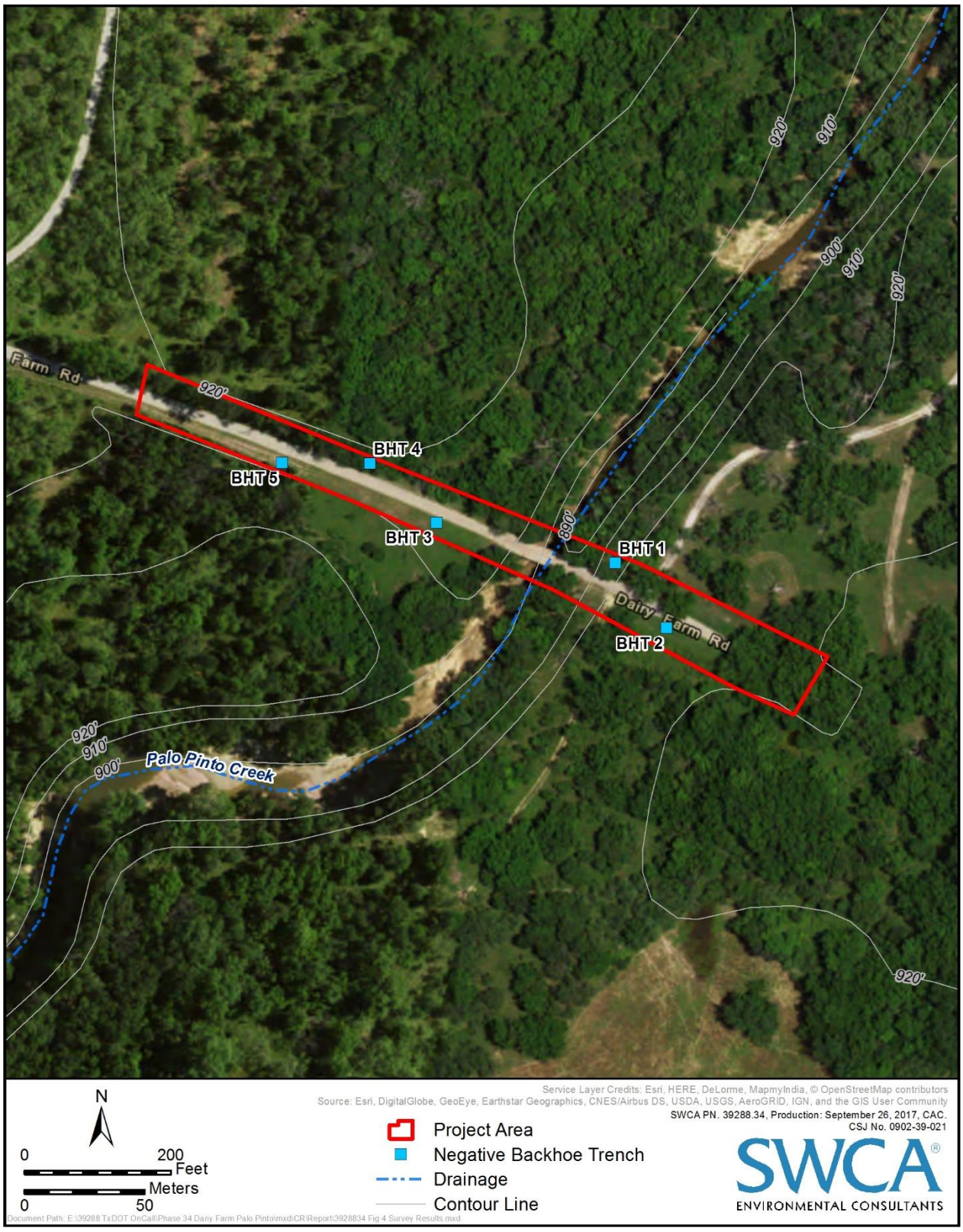

Figure 5. Survey results

Figure 6. Overview of left bank (west side) Palo Pinto Creek; arrow indicates steel pilings from an earlier bridge crossing.

Figure 7. Overview Palo Pinto Creek upstream from bridge; facing southwest.

Figure 8. Overview Palo Pinto Creek downstream from bridge; facing northeast.

- The project area crossing at Palo Pinto Creek is located along a relatively straight section of the drainage and has a low sinuosity ratio (SR) of 1.17 (Charlton 2008). This SR suggests a sinuous channel with minimal dynamic depositional history. Further, the channel in this area is likely more erosionally incisive, rather than laterally erosive. In this type of setting, instead of lateral (side to side) erosion, the drainage erodes downward until periods of overbank flooding occur (Charlton 2008; Knighton 1998).
- With some slight exceptions, the stratigraphy in all the trenches was very similar. All the trenches contained evidence of disturbance to roughly 50 cmbs (19.7 inches), but trenches BHT01 and BHT04 contained significant disturbance in the upper 96 cm (37.8 inches), likely from road construction for an earlier bridge crossing north of the current roadway (see Figure 6). The disturbance in these two trenches consisted of very mottled and mixed soils with angular gravels and recent debris (Figure 9). In BHT04, a thin (3–to 5-cm [1.2- to 2.0-inch]) band of crushed shale pebbles and gravels is present. This thin band (identified between 29–34 cmbs [11.4–13.4 inches]) is likely associated with the road base of an earlier road.

Figure 9. Faunal materials and tin can from disturbed deposits in BHT01.

- The relatively undisturbed backhoe trenches (i.e., BHTs 02, 03, and 05) contained four to eight strata of alluvial deposits depending on the depth of the trench (Appendix A). Typically, the surface horizon extended to 30 cmbs (11.8 inches) and consisted of a dark brown to brown (10YR 3/3–5/3) sandy loam with brown (10YR 4/3) mottles (2–40 percent) from bioturbation and a clear and smooth lower boundary. Below the surface stratum consisted of a brown to dark brown (10YR 3/3–3/4) sandy loam to sandy clay loam with brown (10YR 5/3) mottles (30 percent) from bioturbation, irregularly dispersed white filaments (30 percent) that appears to be michoryzal fungi. The base of the second stratum was typically observed around 50–60 cmbs (20–23.6 inches) and had an abrupt and slightly wavy lower boundary. Beginning around 60–70 cmbs, the natural stratigraphy is encountered, which consists of a dark yellowish brown to yellowish brown (10YR 5/4–5/6) sandy clay loam with irregularly dispersed white filaments (5–15 percent) that appears to be michoryzal fungi and an abrupt slightly wavy lower boundary. The horizon caps a buried soil at roughly 104 cmbs (41 inches) that consists of very dark grayish brown to very dark brown (10YR 3/2–2/2) sandy clay loam with irregularly dispersed white filaments (>5 percent) that appears to be michoryzal fungi. The buried soil was observed to average 31 cm (12.2 inches) in thickness with a maximum base depth of 156 cmbs (61.4 inches) with a clear and smooth lower boundary (Figure 10). Underlying the buried soil horizon to a depth of 309 cmbs (121.7 inches), the deposits consisted of several strata of sandy clay loam that became gradually lighter in color with depth. Notably, calcium carbonate (CaCO3) filaments (5–10 percent) appear around 188 cmbs (74 inches) that increase in prevalence and size with depth.

- Regarding the buried soil observed in all but one of the backhoe trenches (BHT01), this horizon is similar in appearance to a buried soil described by other researchers in the area (Tinsley and Frederick 2010). Previous investigations involving the excavation of 23 backhoe trenches along Palo Pinto Creek that occurred about 8 miles downstream from the Dairy Farm Road crossing (Tinsley and Frederick 2010). These investigations, for the Turkey Bend Reservoir project, recognized five allostratigraphic units interpreted to date from the Pleistocene to modern era (Tinsley and Frederick 2010:52). From oldest (Pleistocene alluvium) to youngest (Modern alluvium), these allostratigraphic units were designated Units A–E (Tinsley and Frederick 2010:52–60). Further, the investigations encountered several, stratified buried soils with an upper boundary depth ranging from 27 to 260 cmbs (10.6 to 102.4 inches) (Tinsley and Frederick 2010). To date, no chronometric results are available for these buried soils (Charles Frederick, personal communication, September 19, 2017).

Figure 10. Profile photo BHT05 with buried soil; facing southwest.

- The uppermost buried soil encountered by the previous investigators appears to correlate with the buried soil observed at the Dairy Farm Road crossing. This uppermost buried soil at the Turkey Bend Reservoir project was generally interpreted to be associated with the Late Holocene, Unit D allostratigraphic unit (Tinsley and Frederick 2010:56–57). The previous investigators infer that the uppermost buried soil is comparable to the West Fork Soil identified by Ferring (1987, 2001) in the Trinity River basin. This geomorphic feature is recognized across the Trinity River

basin and is generally interpreted to have been deposited between 1,000 and 2,300 years ago (Ferring 1987, 2001; Lintz et al. 2008). Where encountered, the Unit D allostratigraphic unit was capped unconformably by the Modern Unit E. The unconformable boundary noted at the Turkey Bend Reservoir investigations is similar to the stratigraphy observed at the Dairy Farm Road crossing.

- **Archeological Materials Identified:** No archeological materials were identified within the APE.
- **APE Integrity:** The upper 60 cm (23.6 inches) of the survey area within the current TxDOT easement has low stratigraphic integrity, due to previous road construction and maintenance. Below 60 cmbs (23.6 inches), the Dairy Farm Road ROW stratigraphy is reasonably intact.

Recommendations

- **Further Work:** No further cultural resources investigations are recommended within the existing 1-acre project area. Should construction impacts extend outside the existing TxDOT ROW at this crossing, then further investigations with deep mechanical excavations is recommended.
- **Justification:** Investigators did not encounter any historic or prehistoric cultural materials during intensive investigations of the APE. Cultural materials (e.g., tin can and plastic fragments) were observed in several of the backhoe trenches, but these were all recent in age and observed in disturbed contexts near the surface. SWCA identified three faunal element fragments (deer) in BHT01 and BHT05. The two deer fragments in BHT01 were encountered in association with a tin can (modern) in a disturbed context, while the single deer fragment in BHT05 was subsequently investigated with a column sample (see Figure 9 and 11). No cultural materials or features were identified in the column sample (Figure 12). Overall, no prehistoric or historic cultural resources were identified in the proposed project APE. The SWCA investigations also encountered a buried soil in BHTs 02–05 that is similar to that described by previous investigators along Palo Pinto Creek. The previous investigations have tentatively interpreted the buried soil to be contemporaneous with the West Fork paleosol. This Trinity River basin wide geomorphic feature was deposited about 1,000 to 2,300 years ago.
- SWCA made a reasonable and good faith effort as per 36 CFR Part 800.4(b)(1) to identify and locate prehistoric and historic archeological properties within the proposed project APE. The field investigation discovered neither significant historic properties nor cultural resources as defined in the respective legislation; therefore, SWCA recommends that a finding of “no historic properties affected” be made for the current undertaking.

Figure 11. Faunal material in BHT05 exhibiting interior (left) and exterior (right).

Figure 12. Profile photo BHT05 with buried soil; facing southwest.

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Appendix A – BHT Results

Trench	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Comments
BHT-01	0-23	10YR 5/4	Yellowish Brown	Sandy Loam	Friable to firm, compacted, angular blocky, medium, weak to moderate, 5% roots, 20% rootlets, 20% subrounded gravels, 30% subrounded pebbles, few subrounded cobbles, 5% pinhole burrows	Clear, Smooth	0-12 cm root zone
	23-46	10YR 5/4-5/6	Yellowish Brown	Sandy Loam	Friable, slightly compact, subangular, medium, weak to moderate, 3% roots, 15% rootlets, 10% pinhole burrows, 5% worm burrows	Clear, Slightly Irregular	
	46-69	10YR 4/3	Brown	Sandy Loam	Friable, subangular, medium, weak to moderate, 5% roots, 20% rootlets, 30%-40% white filaments, 5% pinhole burrows, 5% worm burrows, 2% burned charcoal (46-53 cmbs), 30% 10YR 5/3 mottles	Clear, Slightly Wavy	Disturbed, Discontinued lens (continued SE along trench but decreasing to 10% mottles for 50 cm before increasing again).
	69-92	10YR 5/6	Yellowish Brown	Sandy Loam	Loose to friable, granular to subangular, fine, weak, 15% rootlets, 5% pinhole burrows, >1% worm burrows, 2% white filaments	Abrupt, Slightly Wavy	Disturbed, 2 deer bones (distal humerus) and metal can between 69-110 cm - found in backfill, stratum narrows to the SE
	92-101	10YR 4/3	Brown	Sandy Loam	Friable, subangular, medium, weak to moderate, 5% roots, 20% rootlets, 30%-40% white filaments, 5% pinhole burrows, 5% worm burrows, 30% 10YR 5/3 mottles	Clear, Slightly Wavy	Disturbed? Discontinued lens (typically 10-15 cm wide narrowing to 5 cm and only 10% irregular).
	101-149	10YR 5/6	Yellowish Brown	Sandy Loam	Subangular, medium, weak, 3% rootlets, >1% roots, 5%-10% pinhole burrows, 3% worm burrows, 2% insect burrows with matrix	Unobserved	Intact horizon
BHT-02	0-33	10YR 5/3	Brown	Sandy Loam	Friable to firm, very compact, subangular, fine to medium, moderate, 15% rootlets, 5% pinhole burrows, 2% 10YR4/3 mottles from matrix 2, subrounded gravels and pebbles at top, 5% white filaments near base	Clear, Smooth	0-9 cm root zone
	33-52	10YR 4/3	Brown	Sandy Loam	Friable, slightly firm, crumb to subangular, fine, weak, 15% rootlets, >1% roots, 5% pinhole burrows, 2% worm casts, 30%-35% white filaments (m. fungi)- in pockets, irregular, 30% 10YR 5/3-5/4 mottles	Clear, Smooth	Intact horizon
	52-104	10YR 4/4-5/4	Dark Yellowish Brown to Yellowish Brown	Sandy Clay Loam	Friable, subangular, fine to medium, moderate, 5%-10% rootlets, >1% roots, 5% pinhole burrows, 2% worm casts, 10%-15% white filaments (m. fungi)	Abrupt, Smooth to Slightly Wavy	Intact horizon; 3-4 cm burrow with sand
	104-136+	10YR 3/2	Very Dark Grayish Brown	Sandy Clay Loam	Friable, subangular, medium, moderate, 5% rootlets, 20% pinhole burrows, 3%-5% worm burrows, 15% white filaments and increase in calcium carbonates	Clear, Smooth	Intact horizon; buried soil
	136+	10YR 4/4	Dark Yellowish Brown	Sandy Clay Loam	Friable, angular, medium, moderate, 15% calcium carbonates-thread like and increasing, 5% pinhole burrows, 2% worm burrows, 3% rootlets	Unobserved	Intact horizon

Appendix A – BHT Results

Trench	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Comments
BHT-03	0-38	10YR 3/3	Dark Brown	Sandy Clay Loam	Friable to firm, angular, medium, moderate, 5% rootlets, 5%-10% rounded subangular gravels and pebbles, 2% pinhole burrows, metal fragment 36-38 cmbs	Gradual, Irregular	Root zone 0-10 cmbs
	38-99	10YR 3/4	Dark Yellowish Brown	Sandy Clay Loam	Friable, subangular to angular, medium, moderate, 2% rootlets, 5% sub rounded and subangular pebbles, 3% charcoal pieces 1 cm, 1% manganese, 5% pinhole burrows, 3% worm burrows	Clear, Smooth	Intact horizon; 10YR 4/6 sand lenses 38-50 cm and 69-80 cm: irregular and sloping NW away from creek; bottom of stratum, white fungi sloping NW
	99-132	10YR 5/6	Yellowish Brown	Sandy Loam	Friable, granular to subangular, fine to medium, weak, 2% rootlets, <1% roots, 2% pinhole burrows, 5% white filaments-fungi	Gradual, Smooth	Intact horizon
	132-156+	10YR 3/2	Very Dark Grayish Brown	Sandy Clay Loam	Friable, angular, medium, moderate, <2% rootlets, <5% white filaments-fungi, concentrated at top	Unobserved	Intact horizon; buried soil
BHT-04	0-28	10YR 3/3	Dark Brown	Sandy Clay Loam	Friable to firm, angular, medium, moderate, 5% rootlets, 5%-10% rounded subangular gravels and pebbles, 2% pinhole burrows	Abrupt, Slightly Wavy	Root zone 0-7 cmbs, plastic bottle in upper 20 cm
	28-34	N/A	N/A	Shale	Crushed shale pebbles, gravels, small cobbles	Abrupt, Smooth	Disturbed; road bed
	34-96	10YR 5/4-6/4	Yellowish Brown	Sandy Loam	Friable, subangular to angular, medium, moderate, 3% roots, 20% rootlets, <10% white fungi, 3% mottles with insect burrows	Abrupt, Smooth	Disturbed; truncated upper portion of stratum
	96-118	10YR 4/3	Brown	Sandy Loam	Friable, granular to subangular, fine to medium, weak, 2% rootlets, <1% roots, 2% pinhole burrows, 5% white filaments-fungi	Clear to Abrupt, Slightly Wavy	Intact horizon
	118-147+	10YR 3/2	Very Dark Grayish Brown	Sandy Loam	Friable, angular, medium, moderate, <2% rootlets	Unobserved	Intact horizon; buried soil
BHT-05	0-33	10YR 5/6	Yellowish Brown	Sandy Clay Loam	Friable to firm, subangular, medium, weak to moderate, 5% roots, 15% rootlets, 2% pinhole burrows, 2% worm burrows, 40% 10YR 4/3 mottles	Clear, Smooth	Root zone 0-15 cmbs
	33-51	10YR 3/3	Dark Brown	Sandy Clay Loam	Friable to firm, angular, medium, moderate, 5% rootlets, 2% roots, 10% gravels (subangular to angular) increasing with depth, 5% pinhole burrows, 5% worm burrows	Abrupt, Slightly Wavy	
	51-57	10YR 4/3-4/4	Brown to Dark Yellowish Brown	Clay Loam	Friable to firm, 90% gravels, cobbles-subrounded to rounded; matrix supported	Abrupt, Slightly Wavy	Disturbed (road base?)
	57-88	10YR 4/4	Dark Yellowish Brown	Sandy Clay Loam	Friable, subangular to angular, medium, moderate, 5% rootlets, 10% pinhole burrows, 3% worm burrows, white filaments (fungi) at 66-80 cmbs, 10-15% 10YR 3/3 mottles	Clear, Slightly Wavy	Disturbed; truncated upper portion of stratum; bone fragment at 80 cm found on base of trench (deer?)

Appendix A – BHT Results

Trench	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Comments
	88-128	10YR 2/2	Very Dark Brown	Clay Loam	Friable to firm, angular, medium, moderate, 5-10% rootlets, 20% white filaments, <1% roots, 2% worm burrows, 5% pinhole burrows, red SS gravels - easily fragmented (5-10 cm) in 3 places	Clear, Smooth	Intact horizon
	128-188	10YR 3/4	Dark Yellowish Brown	Sandy Clay Loam	Friable, subangular to angular, medium, moderate, <5% rootlets, 10% white filaments, 2% pinhole burrows, <1% manganese	Unobserved	Intact horizon
	188-268	10YR 4/6	Dark Yellowish Brown	Sandy Clay Loam	Friable to firm, angular, medium to coarse, moderate, 15-20% pinhole burrows, >2% rootlets, 2% worm burrows, 10% white filaments - thread (calcium carbonate?), red SS nodules	Unobserved	Intact horizon
	268-309+	10YR 6/6	Brownish Yellow	Sandy Loam	Friable, angular, medium to coarse, moderate, >5% pinhole burrows, 5-10% white filaments-thread (calcium carbonate?)	Unobserved	Intact horizon

This report was written on behalf of the Texas Department of Transportation by

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