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Intensive Archeological Survey: State Highway 31, Navarro County, Texas

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Report for Archeological Survey

Intensive Archeological Survey:
State Highway 31, Navarro County, Texas

Dallas District

John Budd, Principal Investigator, Antiquities Permit No. 8081

CSJ: 0162-11-001

July 27, 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 systematic shovel testing and mechanical trenching from July 13-14 and 18-20, 2017 of 266 acres of new right-of-way (ROW) along State Highway (SH) 31 in Navarro 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 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. 8081.

The area of potential effects (APE) is defined as the typical 400 to 1200-foot-wide new ROW for a length of approximately 14 miles. The depth of impacts is estimated to be up to 50 feet below the current ground surface for bridge and overpass supports and up to 12 feet for the remainder of the project. The total project covers approximately 800 acres, but most of this has been previously surveyed. The survey area comprises 266 acres (the previously unsurveyed areas) within the total 800-acre project area.

A background literature review determined that portions of the APE have been previously surveyed for cultural resources, and nine archeological sites are within the APE (Table 1) (Texas Historical Commission [THC] 2017a). However, only two of the nine sites within the total APE (41NV48 and 41NV681) are located within the current survey areas reported herein. In addition, numerous previously conducted cultural resources surveys, four archeological sites, and a single cemetery are mapped within a 0.6-mile (1-kilometer [km]) radius of the APE (THC 2017).

The survey identified substantial disturbances within the APE, including ongoing construction, prior infrastructure development such as utilities and roads, and a variety of other land use practices. SWCA conducted a pedestrian inspection, augmented with the excavations of 71 shovel tests and 23 mechanical trenches, across the entire 266-acre survey area within the proposed ROW. The survey identified a total of six, factory-made bricks and brick fragments in the heavily disturbed existing Interstate Highway 45 ROW. No indications of 41NV48 or 41NV 681 were identified within the APE. SWCA recommends a finding of “no historic properties affected” and no further archeological investigations.

Project Identification

- **Date:** 7/26/2017
- **Date(s) of Survey:** 7/13/2017 through 7/14/2017 and 7/18/2017 through 7/20/2017
- **Archeological Survey Type:** Reconnaissance ☐ Intensive ☒
- **Report Version:** Draft ☒ Final ☐
- **Jurisdiction:** Federal ☒ State ☒
- **Texas Antiquities Permit Number:** 8081
- **District:** Dallas
- **County or Counties:** Navarro
- **USGS Quadrangle(s):** Corsicana (3296-122) and Corbet (3296-211)
- **Highway:** State Highway 31 Reliever Route
- **CSJ:** 0162-11-001
- **Report Author(s):** Christina Nielsen and Steve Carpenter
- **Principal Investigator:** John Budd

Texas Historical Commission Approval

Signature Date

Project Description

- **Project Type:** Roadway construction
- **Total Project Impact Acreage:** 800 acres
- **New Right of Way (ROW) Acreage:** 760 acres
- **Easement Acreage:** 31 acres
- **Area of Pedestrian Survey:** 266 acres
- **Project Description and Impacts:** The proposed project is a four-lane divided relief route on a new location. The proposed roadway would be a grade-separated facility with frontage roads. The project/study limits of the State Highway (SH) 31 Relief Route are entirely within Navarro County and extend from the existing SH 31 (3.2 miles west of Farm-to-Market Road [FM] 2555), to existing SH 31, 3.7 miles east of the IH 45/SH 31 intersection in Corsicana. The length of the alignment is 14 miles. The development will include the construction of overpasses, bridges, and the installation of non-bridge culverts. The proposed SH 31 Relief Route is on new location and would require acquisition of approximately 760 acres for new right of way (ROW) and 31 acres for drainage easements.

  Area of Potential Effects (APE): The overall APE is defined as the typical 400 to 1200-foot-width new ROW. The length of the APE is 14 miles within the limits defined above. The depth of impacts is estimated to be up to 50 feet below the current ground surface for bridge and overpass supports and up to 12 feet for the remainder of the project. The project incorporates approximately 800 acres; however, much of the APE has been surveyed. The current survey area covers 266 acres of 800-acre ROW that were not previously assessed. Specifically, the survey area includes 41.2 acres unavailable for survey (right of entry denial) and portions of the 150-foot expansion outside the original archeological surveys of the 250-foot APE with high potential for Holocene deposits. These latter locations are in the western and eastern limits of the proposed APE, respectively, as well as small areas along Liberty Road, US 287, and IH 45 (Figure 1).

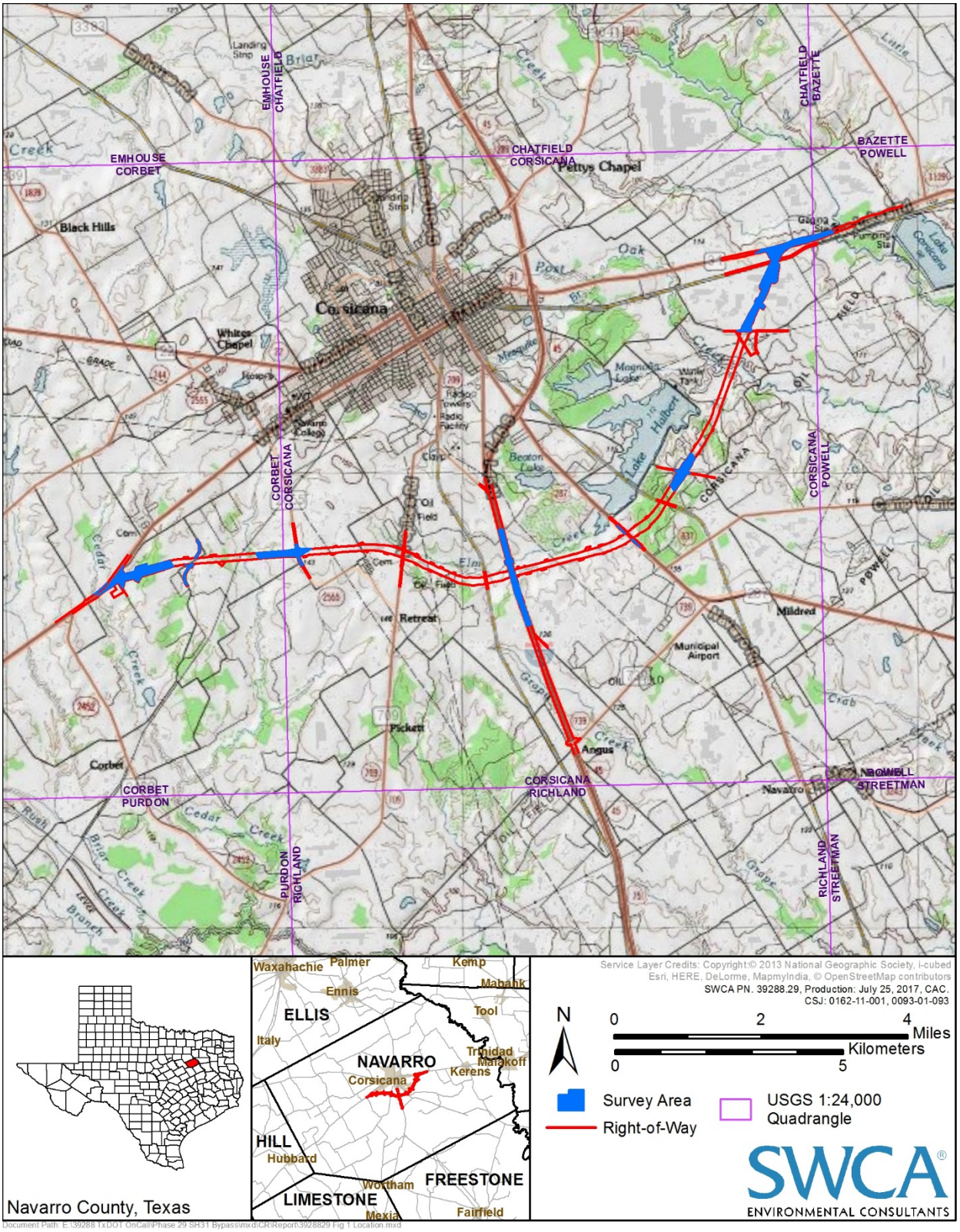

Figure 1. Project location.

- **Parcel Number(s):** Varied. TxDOT has acquired survey area.
- **Project Area Ownership:** Proposed new ROW consisting of private property.

Project Setting

- **Topography:** The APE runs roughly southwest to northeast across low rolling terrain of the Blackland Prairies southeast of Dallas (Wermund 2017). Elevation ranges from a maximum of 480 feet above mean sea level (amsl) in the western portion of the APE, to a low of 350 feet above means sea level (amsl) near the eastern terminus of the APE.
- **Geology:** According to the Geologic Atlas of Texas, Dallas sheet, the APE is underlain by two Upper Cretaceous age deposits, namely Nacatoch Sand (Kns) on the western extent of the project and Kemp Clay and Corsicana Marl (Kkc) throughout most of the central and eastern portions (Barnes 1972). South of lake Halbert the proposed project would cross through deposits of Paleocene-age Wilcox Group Undivided (EPAwi). On the eastern terminus of the project, at existing SH 31, are areas of Holocene-age alluvium (Qal) at Post Oak Creek and Pleistocene-age fluviatile terrace deposits (Qt) which contain potential for archeological sites.

  Soils: Numerous different soils are traversed by the APE (Figures 2a-c). The most common soil types (online Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/appN/ebSoilSurvey.aspx) found along the proposed project include Crockett, Ellis, Heiden, Houston Black, and Ferris series. Crockett soils are derived from Tertiary sources, while Ellis, Heiden, Houston Black, and Ferris series were formed from Cretaceous-age materials. The Burleson, Mabank, and Wilson series are derived from sediments of Pleistocene age and are located in terrace settings. As with the geological formations, the Tertiary and Cretaceous-age soils are too early to contain human occupations. Human habitation is associated with the late Pleistocene and particularly the Holocene periods. The Burleson series consists of soils that formed in calcareous clayey alluvium of Pleistocene age derived from mixed sources. These nearly level to gently sloping soils are on treads of Pleistocene stream terraces. Slope ranges from 0 to 5 percent. Three soil series in the APE are on drainages in frequently flooded locations. These are Gowen, Trinity, and Kaufman soils that formed in loamy Holocene alluvium. Gowen soils are on nearly level flood plains. Slopes are predominantly less than 1 percent, but range up to 2 percent. Trinity soils are on nearly level, wide flood plains of major rivers and streams. Slopes are typically less than 1 percent, but range from 0 to 3 percent. The Kaufman series consists of soils on flood plains draining Blackland Prairies. Slopes are typically less than 1 percent, but range from 0 to 2 percent.
- **Land Use:** The proposed project is located in a semirural area of central Navarro County, southeast of Dallas. The APE is primarily surrounded by rolling, open, active and non-active agricultural and pastoral fields, with sparsely scattered residences (Figure 3). The exception to this is the forested riparian margins along waterways traversed by the

project alignment, including Post Oak Creek at the northeastern end various smaller tributaries.

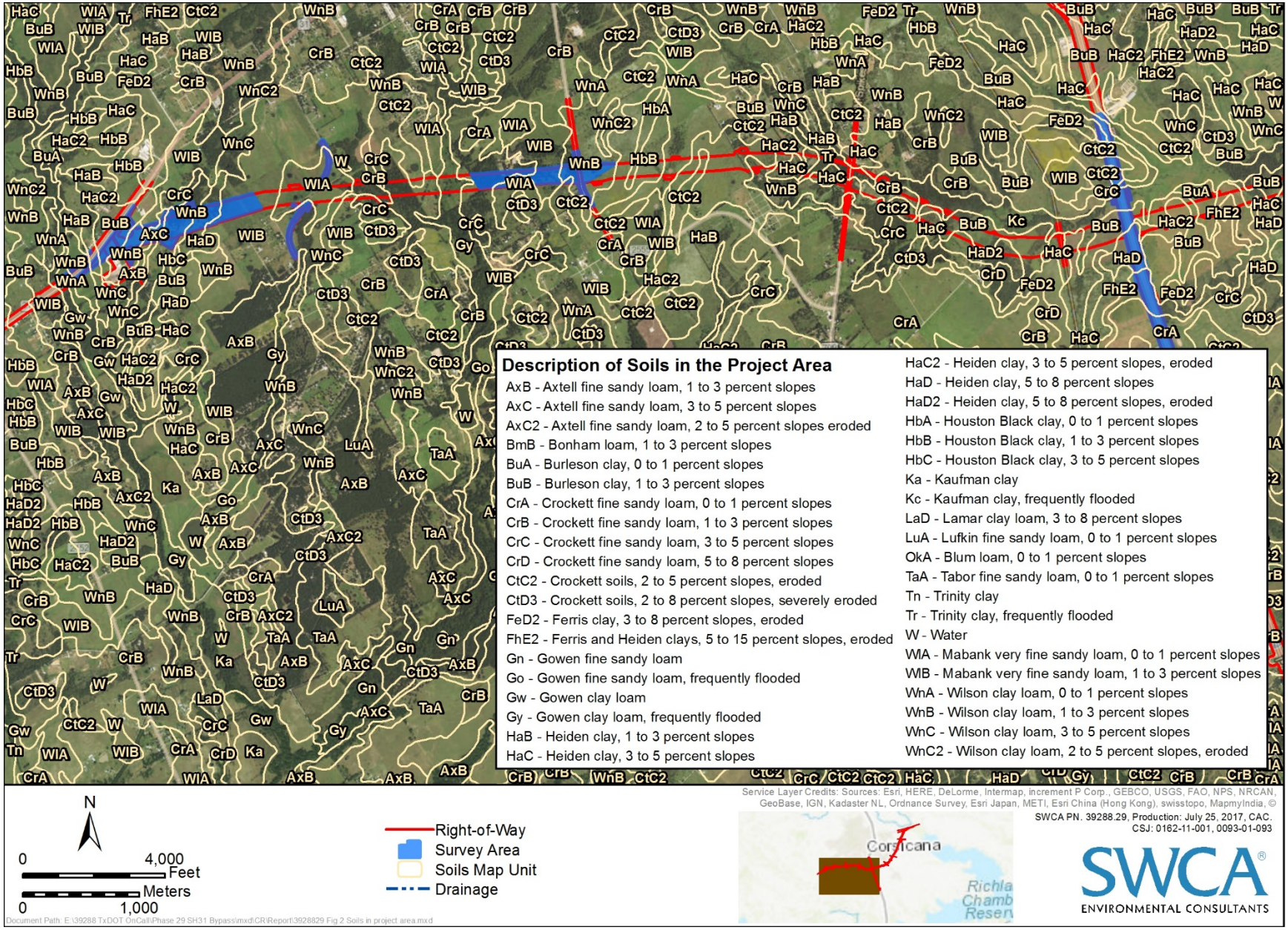

Figure 2a. Project area soils.

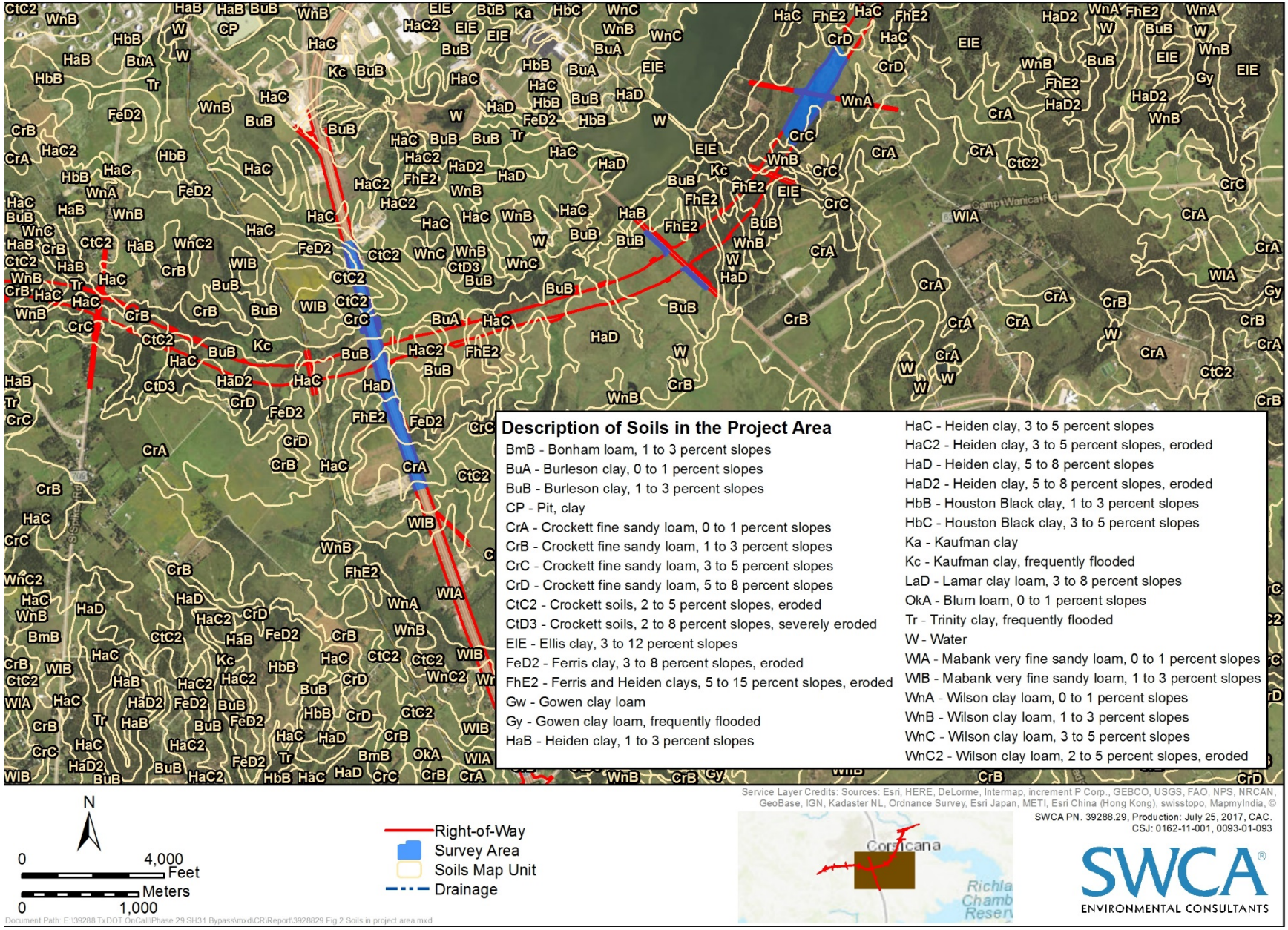

Figure 2b. Project area soils.

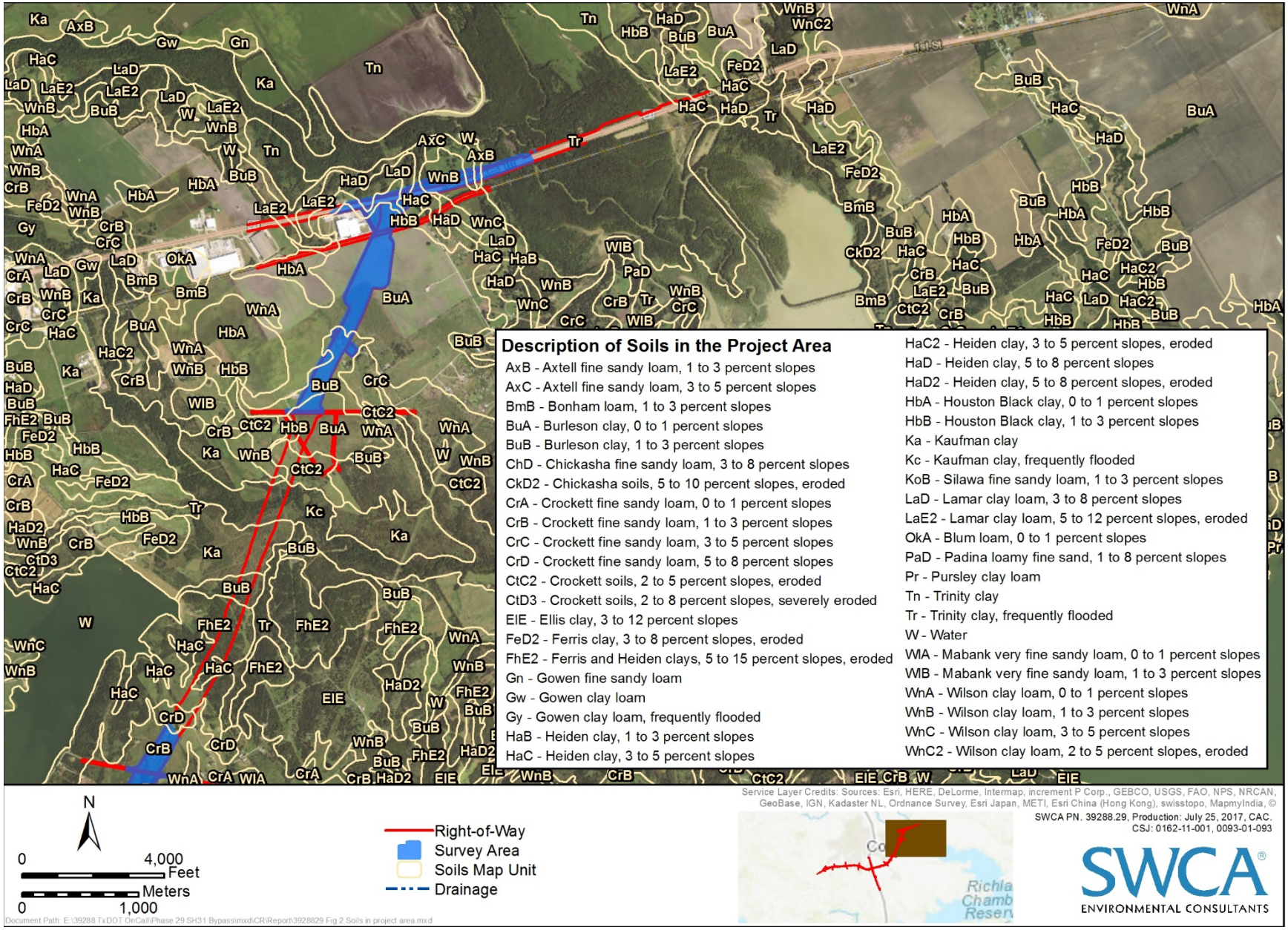

Figure 2c. Project area soils.

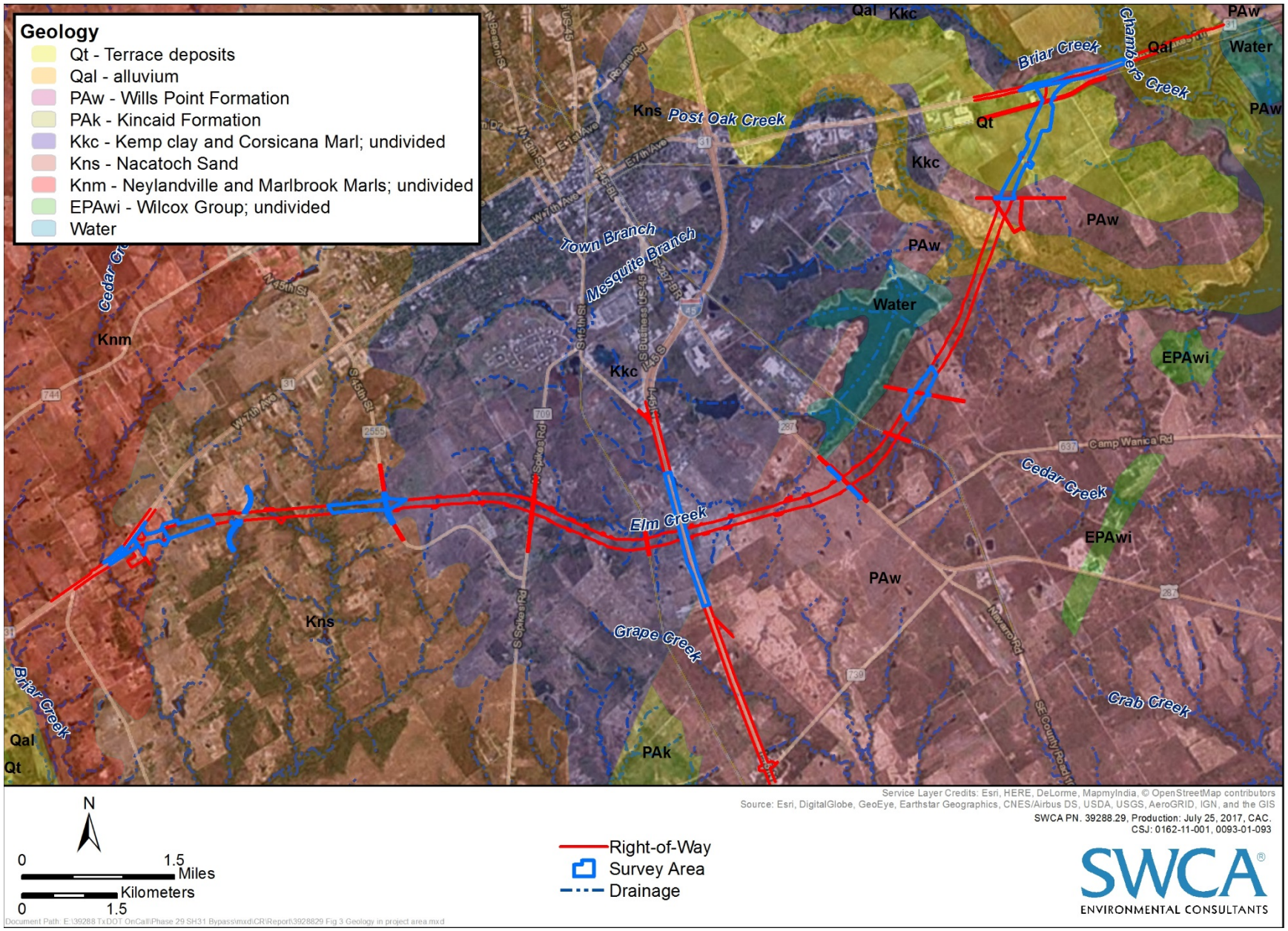

Figure 3. Project area geology.

- **Vegetation:** Vegetation surrounding the project area is primarily open pastures with short, mixed grasses and scattered mixed hardwoods. The riparian areas along the drainages of the APE contain mixed hardwoods (oaks and elms), shrubs, and short grasses.
- **Estimated Ground Surface Visibility:** 0–30 percent in unmodified areas; 100 percent in disturbed areas.

Previous Investigations and Known Archeological Sites: A background literature review determined that portions of the APE have been previously surveyed for cultural resources and that nine archeological sites are within the APE (Table 1) (THC 2017a). In addition, numerous previously conducted cultural resources surveys, four archeological sites, and a single cemetery are mapped within a 0.6-mile (1-km) radius of the APE (THC 2017). No historic-age structures were identified within the survey areas during a review of the Texas Department of Transportation (TxDOT) Historic Overlay Maps (Foster et al. 2006).

The previously recorded sites and archeological survey within the APE are related to earlier archeological investigations for the SH 31 Bypass. An intensive archeological survey of most of the western half of the proposed APE was conducted in 2004 for TxDOT (CSJ 0162-04-034) under Antiquities Code of Texas (ACT) permit number 3188. The archeological pedestrian survey included the excavation of 83 shovel tests (STs) and 13 backhoe trenches (BHTs) within a 250-foot wide proposed ROW (Ahr 2004). Three historic sites (41NV678, 41NV680, and 41NV681) and one prehistoric site (41NV679) were identified. The historic farm/ranch complexes were determined ineligible for inclusion in the National Register of Historic Places (NRHP) or listing as State Antiquities Landmarks (SAL). Site 41NV679, a subsurface lithic scatter/prehistoric campsite, had low artifact density, lacked diagnostics and stratigraphic integrity. Although located outside of the project boundary, site 41NV679 was fully assessed and determined ineligible for inclusion in the NRHP or listing as a SAL. No further archeological investigations were recommended for the surveyed portion of the proposed APE. However, a small percentage of the 290-acre project area lacked right-of-entry (ROE) permission and the outstanding 41.2 acres were recommended for further investigation upon ROE or ROW acquisition. The Texas State Historic Preservation Officer (SHPO) concurred with the findings on 23 July 2004.

An intensive archeological survey of most of the eastern half of the proposed APE was conducted in 2006 for TxDOT (CSJ 0162-04-043) under TAC permit number 3542. The archeological pedestrian survey included the excavation of 231 STs and six BHTs (Ahr 2006). Five historic farm and ranching sites (41NV683, 41NV684, 41NV685, 41NV686, and 41NV687) were discovered. Due to various disturbances, no integrity remained at any of the five sites; therefore, the sites were determined ineligible for inclusion in the NRHP or listing as SALs. Thirty acres in an upland setting were not surveyed, due to a lack of ROE; however, this acreage is considered to have a low probability for intact

archeological deposits. No further archeological investigations were recommended for this project. The TxSHPO concurred with the findings on 11 May 2006.

An intensive archeological survey of FM 2555 was conducted for TxDOT in 1983. FM 2555 crosses perpendicularly to the proposed APE. Very little data is currently available; however, the survey was negative for archeological resources, and no further archeological assessments were recommended within the 1983 survey corridor.

Comments on Project Setting: A review of the Dallas District Hybrid Potential Archeological Liability Map (HPALM) revealed that most of the proposed project APE is within upland settings with low potential for the preservation of archeological sites. However, areas along intermittent drainages and flood plains (e.g., Post Oak Creek and Cedar Creek), have high to moderate potential for the preservation of archeological sites with reasonable integrity.

Table 1. Archeological Sites within a 1-Kilometer Radius of the APE

Site Trinomial	Site Type	Location Relative to APE	NRHP and SAL Eligibility Status
41NV48	Prehistoric artifact scatter	Partially within survey area	Undetermined
41NV246	Prehistoric artifact scatter	200 m north	Undetermined
41NV391	Early 20th Century Bridge	700 m north	Undetermined
41NV678	Historic residential site	Within APE	Not Eligible
41NV679	Prehistoric lithic scatter	Within APE	Not Eligible
41NV680	Historic site	Within APE	Not Eligible
41NV681	Historic farmstead site	Within survey area	Not Eligible
41NV683	Historic site	Within APE	Not Eligible
41NV684	Historic site	Within APE	Not Eligible
41NV685	Historic site	Within APE	Not Eligible
41NV686	Historic site	Within APE	Not Eligible
41NV687	Historic foundations	300 m west	Not Eligible
41NV724	Historic artifact scatter	400 m southeast	Not Eligible

Survey Methods

- **Surveyors:** Mary Rodriguez, Ken Lawrence, Stefan Barker, Brandon Young, and Mercedes Cody
- **Methodological Description:** SWCA conducted a pedestrian inspection, augmented with the excavations of shovel tests and mechanical trenches, across the entire 266 survey area within proposed ROW. SWCA archeologists excavated a total of 71 shovel tests across the surveyed areas of the APE (Appendix B) (Table 2). Shovel tests were approximately 30 centimeters (cm) in diameter and excavated in arbitrary 20-cm levels to 100+ cm below ground surface (cmbs), unless soil conditions or bedrock precluded obtaining such depth. Archeologists screened the matrix from each shovel test through

¼-inch mesh and plotted the location of each excavation using a hand-held global positioning system (GPS) unit. Each shovel test was recorded on a standardized form to document the excavations (Appendix B).

- A total of 23 backhoe trenches (BHTs) were excavated within the APE (Appendix C). The trench locations were chosen at the discretion of the project archeologist and focused on accessible areas with the least disturbance within the APE, as well as areas with possible alluvial deposits and the potential for deeply buried cultural materials. 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. In the case of cultural or potentially cultural materials identified within the trenches.

Table 2. Excavations in Project APE.

Method	Quantity in Existing ROW	Quantity in Proposed New ROW	Quantity in Temporary Easements	Total Number per Acre
Shovel Test Units	0	71	0	0
Auger Test Units	0	0	0	0
Mechanical Trenching	0	23	0	0

- **Other Methods:** None
- **Collection and Curation:** NO ☒ YES ☐ If yes, specify facility.
- **Comments on Methods:** Investigations exceed the recommended THC/Council of Texas Archeologists survey standards for a project of this size (i.e., approximately 266 acres). Standards require one shovel test per 3 acres, or a minimum of 89 shovel tests for a project of this size. The 94 shovel tests and backhoe trenches, therefore, exceeds the survey standards. Additionally, various modern and ongoing disturbances provided additional exposures that augmented the shovel testing.

Survey Results

- **Project Area Description:** The project area crosses predominantly upland prairies occasionally intersected by waterways of varying size and magnitude. However, the surveyed portions of the APE contained no substantial drainages with aggradational terraces that would have a potential for deeply buried deposits. Although geological maps depict Holocene alluvium along Post Oak Creek, most of the narrow floodplain is characterized by high-energy backchannels with minimal potential for deeply buried deposits. Downcutting drainages, which may have been a fairly recent phenomenon

associated with modern agricultural practices, stripped much of the natural vegetation from the area, providing good profiles in isolated areas.

Other existing impacts within the project corridor include those associated with ongoing roadway construction, previous roadway construction such as along IH 45, as well as electrical transmission line, pipeline, and utility easements (Figures 4 through 6).

Surveyors excavated a total of 71 shovel tests and 23 backhoe trenches within the survey areas (Appendices B and C). The shovel test excavations throughout the APE encountered compact sandy clay loams and loamy fine sands, as well as hydric soils atop a shallow water table in lower elevation settings. No cultural materials were identified in the shovel tests.

- Backhoe Trenching

  SWCA excavated 23 BHTs within the project APE (Appendix C). These BHTs were located at the northeastern end of the project area on the large interfluvial landform between Post Oak Creek to the southwest and Briar Creek to the north. The area is mostly open pasture or plowed fields (Appendix A; Figure A-8). The natural stratigraphy identified in the trenches typically consisted of three strata in profile. The top natural stratum, 0–20 cmbs, consisted of a grayish brown (10YR 5/2) clay loam overlying a dark grayish brown (10YR 4/2) clay loam; this stratum extended from 20–120 cm below surface (cmbs). From 120 to 160 cmbs, a brown to yellowish brown (10YR 5/4) clay loam with 5 percent pebbles, gravels, and concretions. The bottom layer is likely a pre-Holocene unit, likely representing Pleistocene formation deposits mapped in the area. No archeological materials were found in any of the trenches.

- Archeological Materials Identified: Two previously recorded sites is located within the survey areas. During the current investigation, SWCA encountered a light scatter of bricks located south of a previously recorded historic site (41NV681). The previous boundaries of site 41NV48 extend into the survey area, but backhoe trenching and shovel testing showed the site does not extend into the APE.

- 41NV48

  Very scant information is available on 41NV48. The site form states: “see report by Burton and Connors 1979, T-25001. artifact scatter, prehistoric.” The site was described as Frank Bryan’s #110 and investigated by Bryan in the 1930s. Based on the information, the site is a prehistoric artifact scatter along Chambers Creek that was likely investigated and collected upon by an avocational archeologist. No mention of ceramics or diagnostic artifacts is provided on the site form, nor is there mention of temporal affiliation.

  SWCA excavated eight backhoe trenches and one shovel test in the vicinity of 41NV48 on the north side of the existing highway. The trenches ranched in depth from 117 to 171 cmbs, typically encountering clay loams, sandy loams, and sandy clay loams. No archeological materials were identified in the trenches or shovel tests. The area has

been disturbed to varying degrees by agriculture, existing utilities and roadway development.

Site 41NV48 might be the same site as 41NV246, which was recorded in 1980 and is plotted near a stock tank on the northern boundary of 41NV48 (Appendix A Figure A-8).

Figure 4. Existing disturbance near southwestern portion of the line. Looking northeast. Note person in center of cut in background for scale.

Figure 5. Existing disturbance on western survey area. Facing east.

Figure 6. Recent utility installation along IH 45.

According to the 41NV246 site form, side-notched arrow points, debitage, burned rock, and an end scraper were noted roughly 20 below surface in an artificial exposure of the stock tank. Based on the findings, the site does not extend into the APE and is probably located to the north near the plotting of 41NV246.

- 41NV681

Recorded during the initial phase of the SH 31 investigations in 2003, site 41NV681 is a previously recorded historic site consisting of septic tanks, foundations, and an artifact scatter bisected by IH 45 (Ahr 2004). At the time of the original survey, the area was sparsely vegetated with a few trees and excellent ground surface visibility (around 85 percent). The area is on a high hill that slopes down to the north towards the Elm Creek floodplain. Land use at the time was reportedly cattle pasture on both sides of IH 45. Three septic-like tanks were located on the western side of IH 45, along with a possible cistern. A PVC pipe was observed in a large crack adjacent to the cistern. The west side also contained a large number of scattered bricks, some of which appeared to be part of a driveway entrance. USGS maps indicated a structure was located in the area by the bricks, and three structures were present on the east side of IH 45. None of the structures remained standing at the time of the site recording. On the east side of IH 45, 45-x-45-cm concrete slabs were present, suggesting the former presence of structures that had a minimal foundation. Based on the previous investigations, the site was determined not eligible for the NRHP or as an SAL.

SWCA revisited the site on 14 July 2017 focusing on the additional survey areas south of the previously surveyed area and delineated site boundary. The area consists of existing IH 45 ROW that has been substantially modified by prior roadway construction and multiple utilities, including recent pipeline installation (Figures 7 through 9; Appendix A Figure A-3). No artifacts were observed immediately south of the site, but the surveyors observed approximately six bricks or brick fragments in a disturbed context about 300 m south of the site (See Figure 7). The bricks bore the marking “Whitesdale Cherry Reds Corsicana” (Figure 10) No other artifacts were observed in the abundant ground surface exposures. It is possible the bricks were secondarily displaced, moved downslope during clearing of the ROW. However, due to the 300 meter distance to the previously established 41NV681 site boundaries, the disturbed nature of the bricks, and the lack of any other artifacts, these bricks were recorded as an isolated find and not as part of any archeological site including 41NV681.

Summary. No evidence of Site 41NV681 was observed within any of the recently survey areas..

Figure 7. Small brick scatter (near pin flag) located south of 41NV681 in disturbed IH 45 ROW, looking north.

Figure 8. Disturbances along drainage south of 41NV681 from recently installed utilities, facing south.

Figure 9. Recent grading and utility installation near 41NV681, facing north.

Figure 10. "Cherry Reds" brick found south of 41NV681.

APE Integrity: The survey area within the new TxDOT easement has variable integrity. Portions of the western survey areas (all survey areas west of IH 45) have been disturbed by ongoing construction. Within each of the western areas, approximately 50 to 60 percent of the total APE has been modified, leaving a negligible potential for intact deposits. Areas along IH 45 have been substantially modified by prior interstate construction, utilities, fences, agriculture, and other activities. The areas east of IH 45 are moderately intact, consisting of agricultural fields or hunting tracts. Plowing has modified the upper portion of the pedogenic profile, as well as clearing. Recently, modern developments have increasingly encroached upon the area, and utilities associated with these are found in some areas.

Recommendations

- **Neither 41NV48 nor 41NV681 extend into the recently surveyed areas of the APE.**
- **Comments on Evaluations:** None.
- **Further Work:** No further cultural resources investigations are recommended within the 266-acre surveyed portion of the proposed 800-acre ROW. The current survey augments previously conducted surveys in 2004 and 2006; collectively these assessments have covered the APE.
- **Justification:** The available exposures, disturbances, backhoe trenches and shovel tests afforded sufficient archeological data to adequately assess the survey areas. The background review revealed no recorded sites or other known cultural resources concerns. The single recorded archeological site, 41NV281, has previously been determined not eligible for the NRHP or as an SAL. The site has a sparse artifact assemblage and has been heavily disturbed by prior I 45 construction. The surface geology is Pleistocene in age, and no aggradational settings with a potential for deep cultural deposits were identified. As per 36 CFR 800 and 13 Texas Administrative Code 26, SWCA has made a good faith effort to identify archeological resources within the APE.

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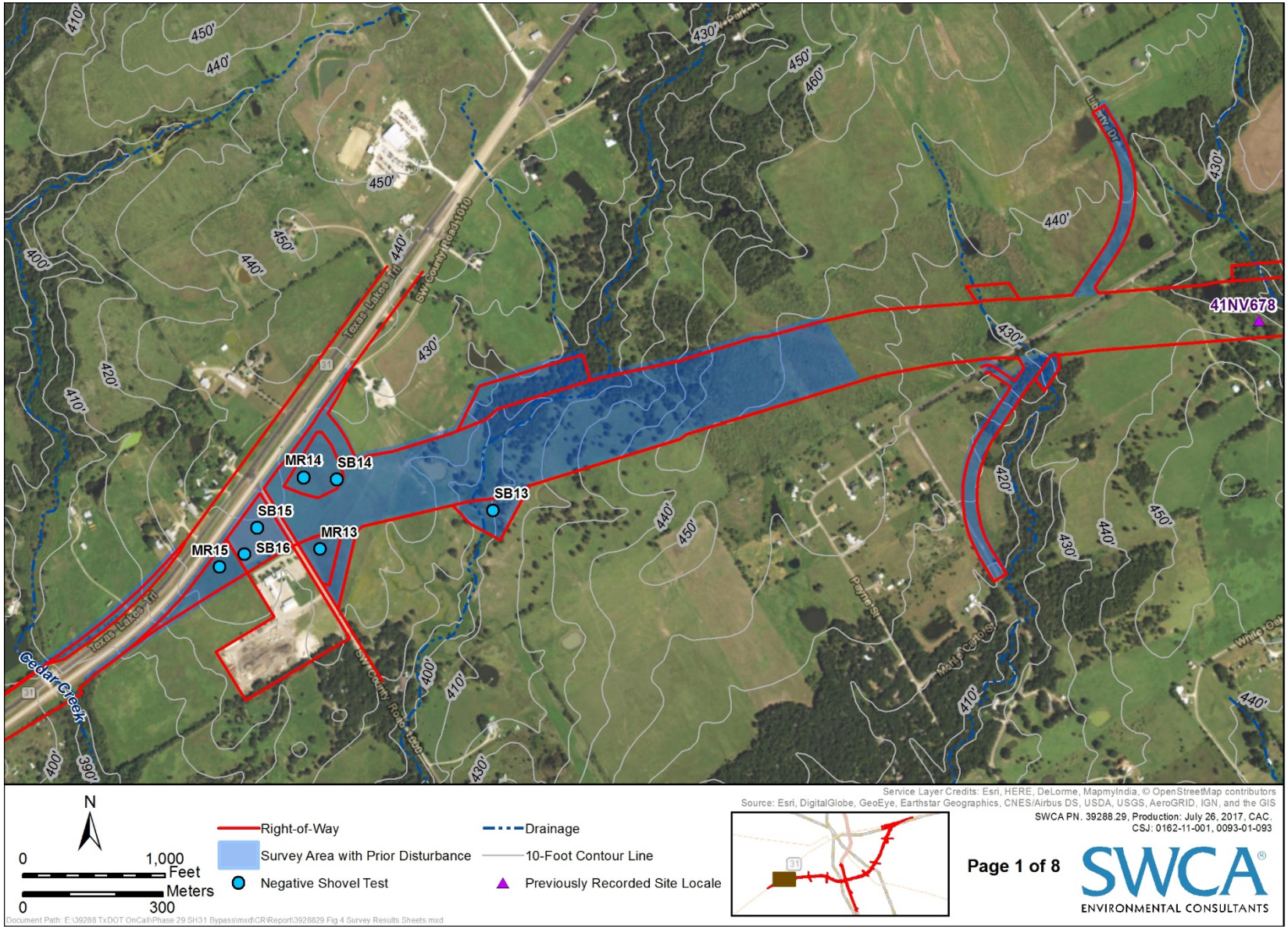


Figure A-1. Survey results.

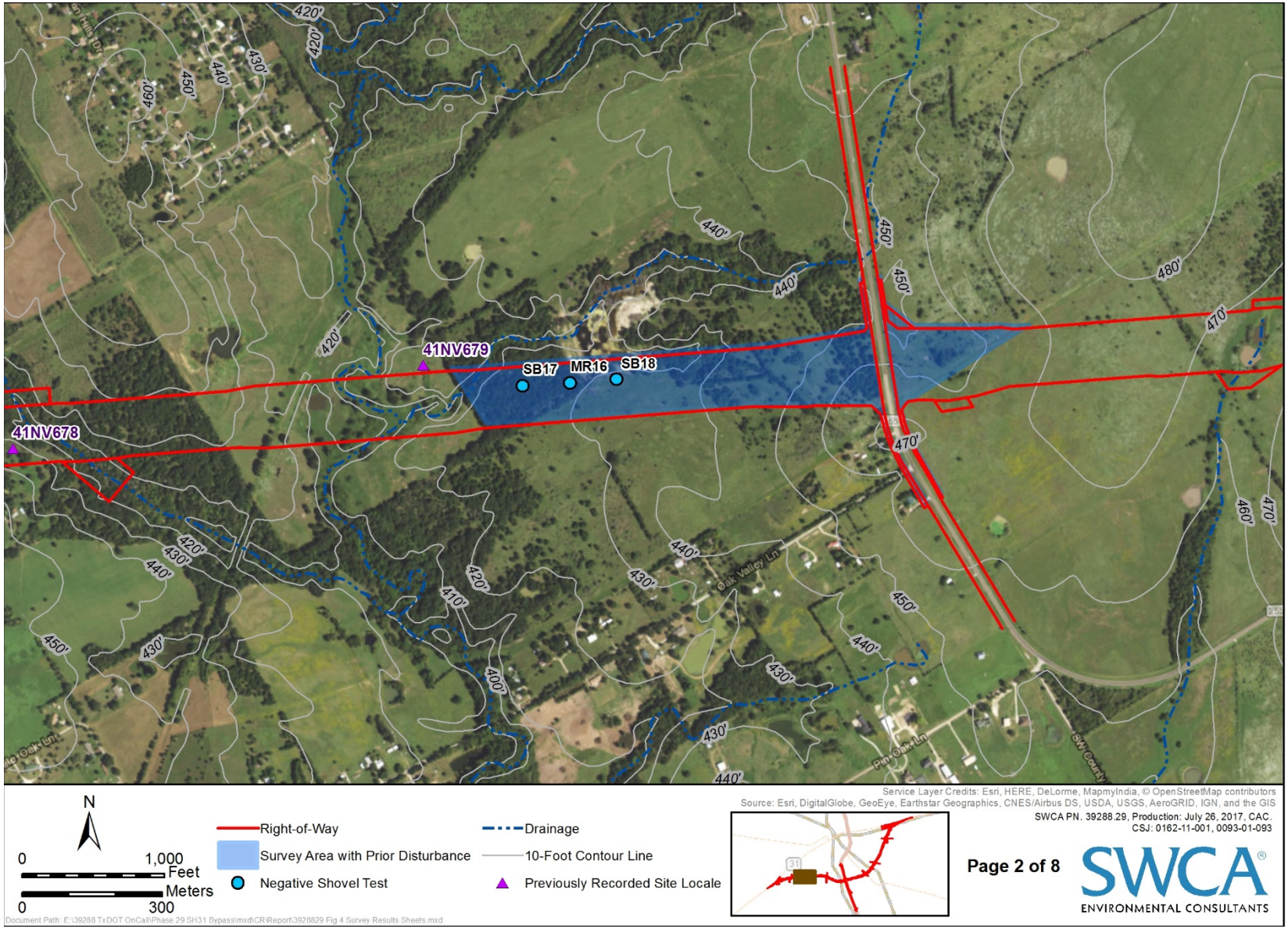


Figure A-2 Survey results.

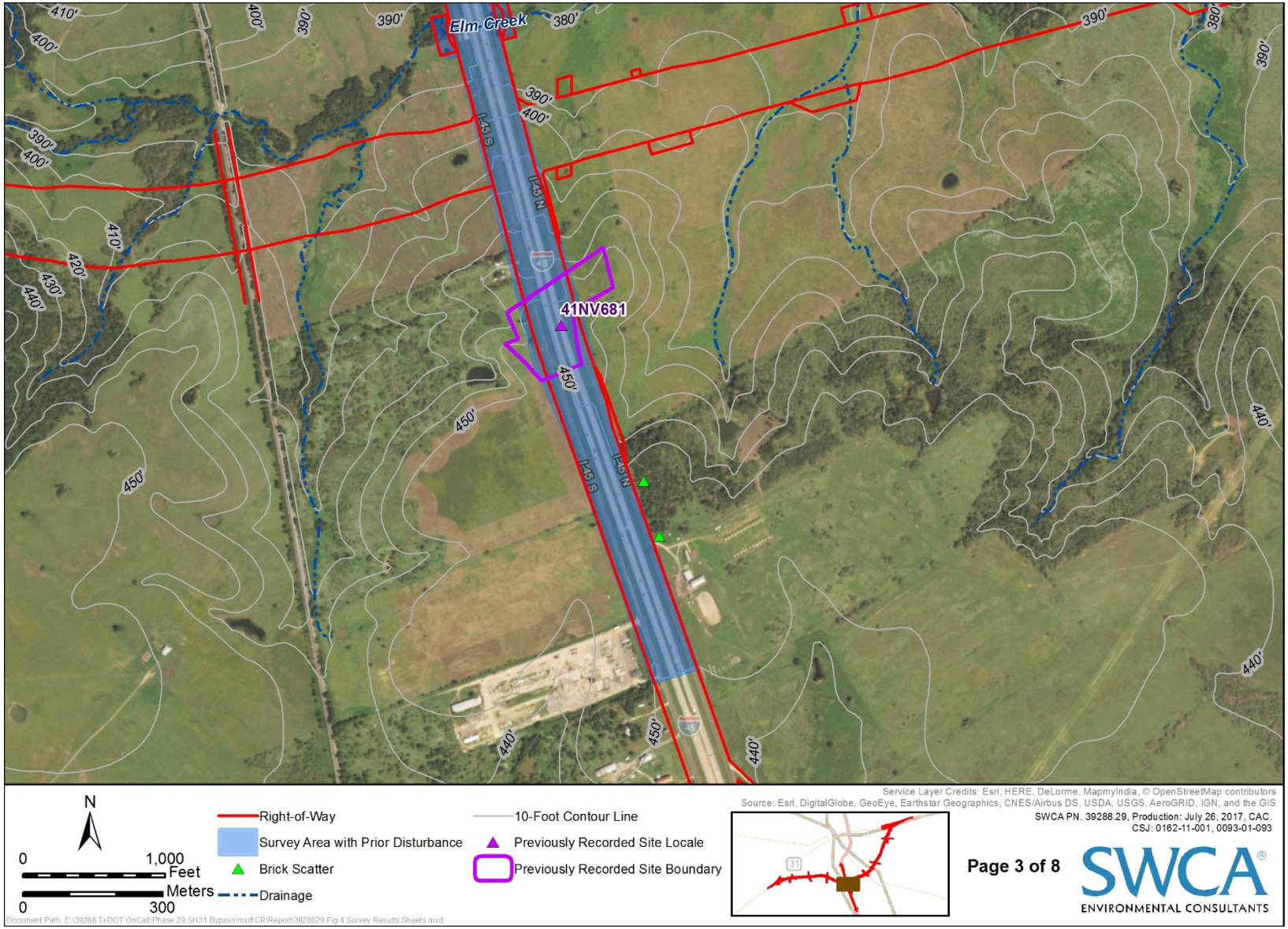
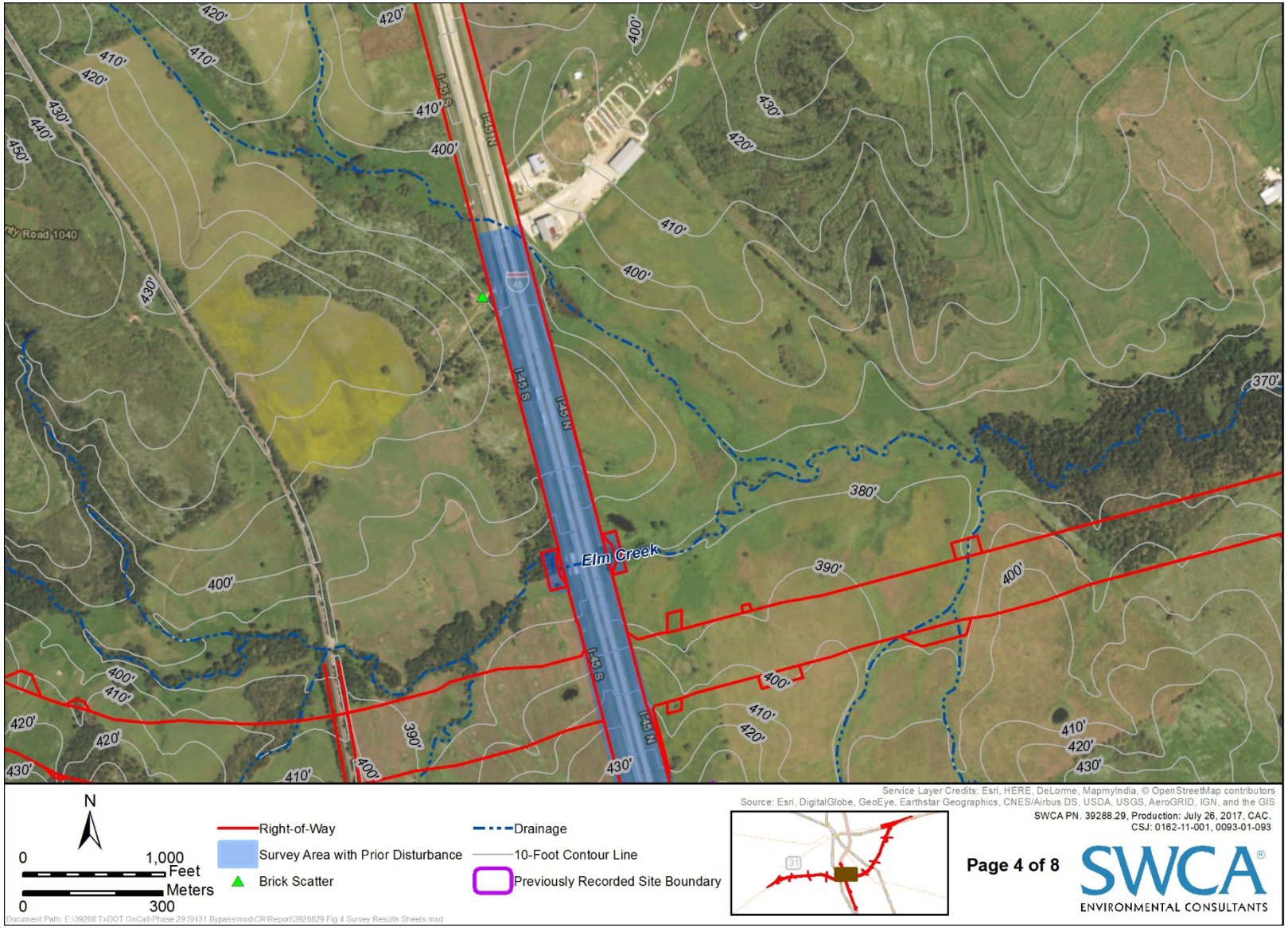


Figure A-3. Survey results.



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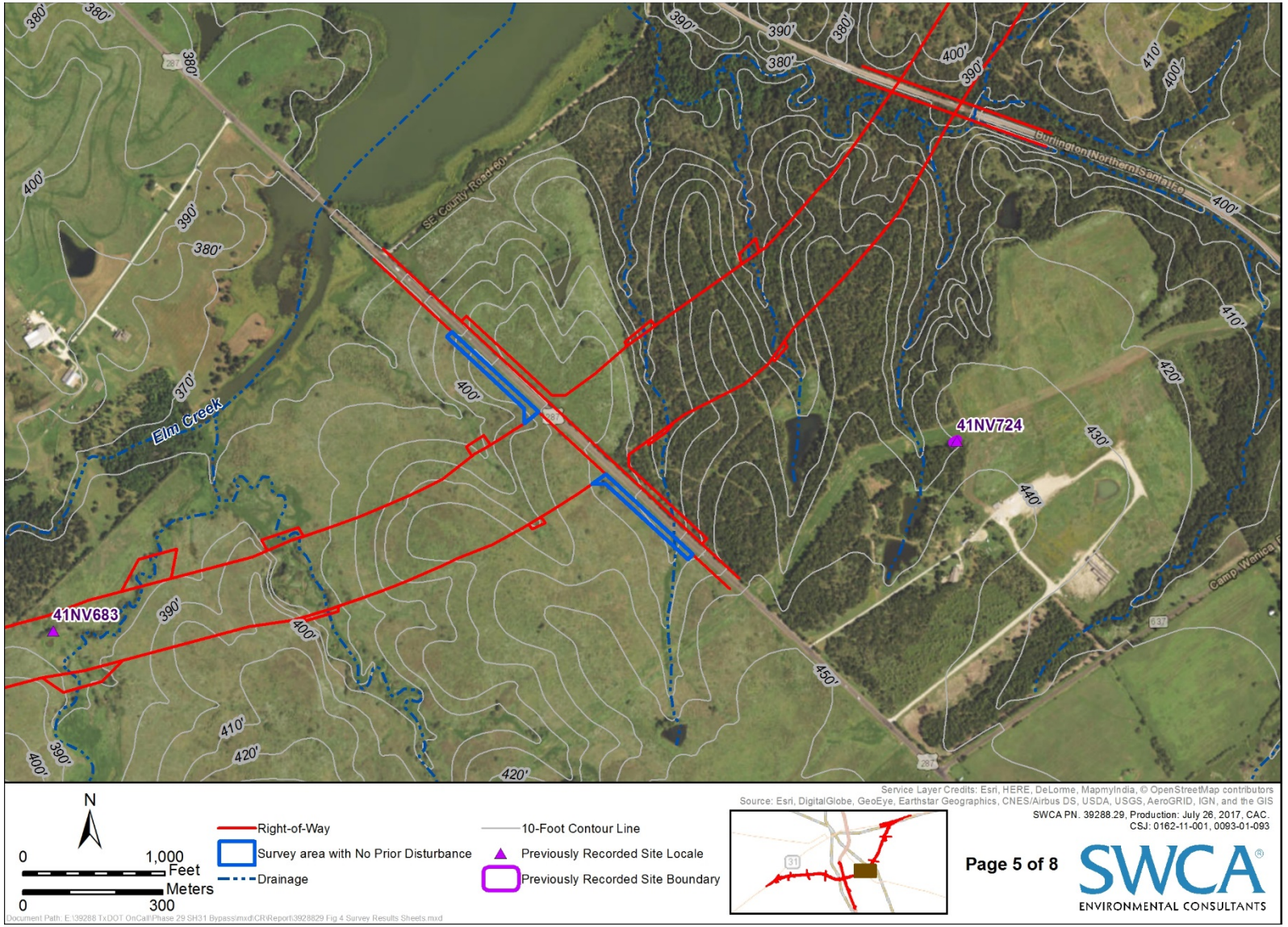

Figure A-5. Survey results.

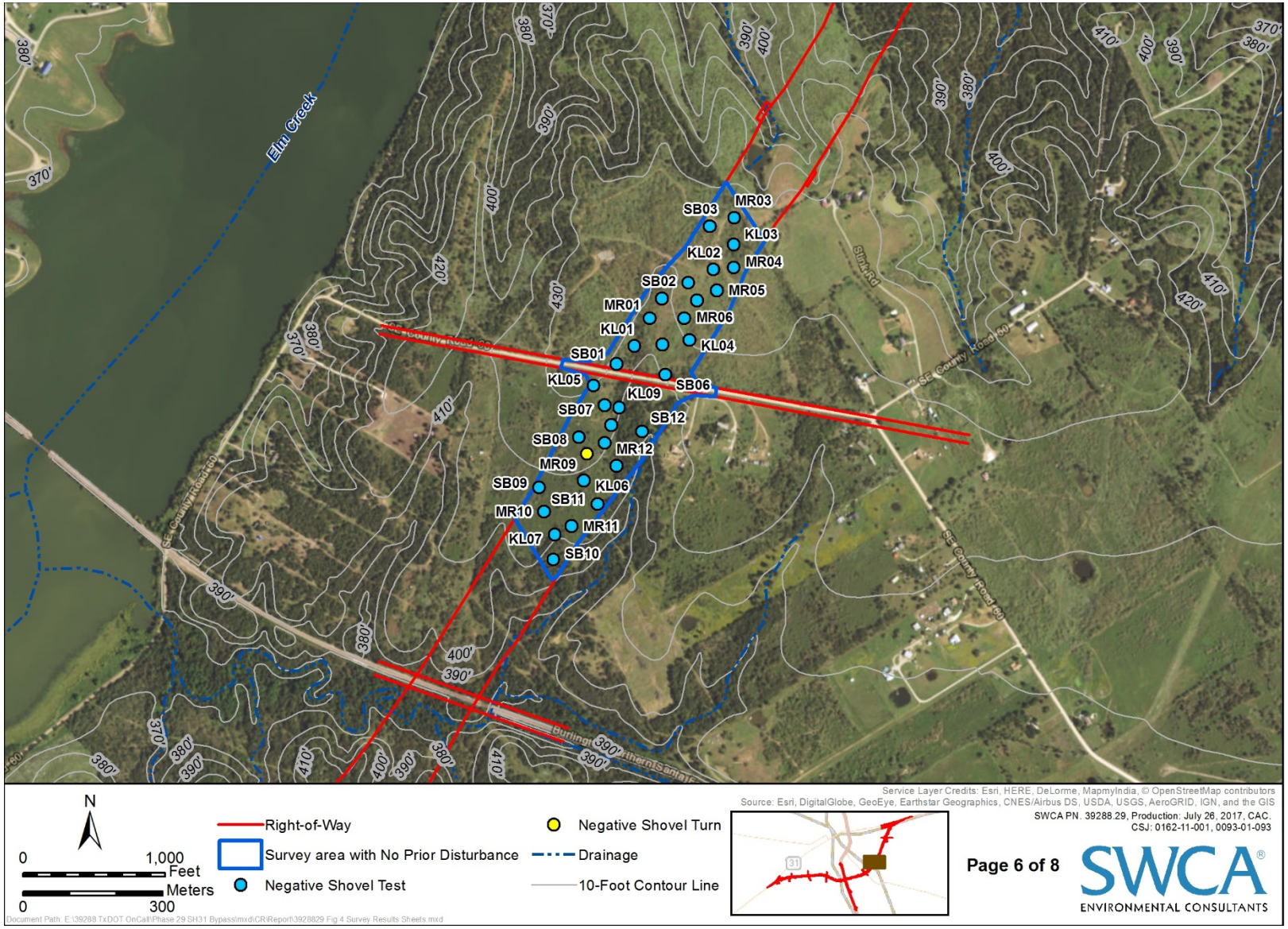

Figure A-6. Survey results.

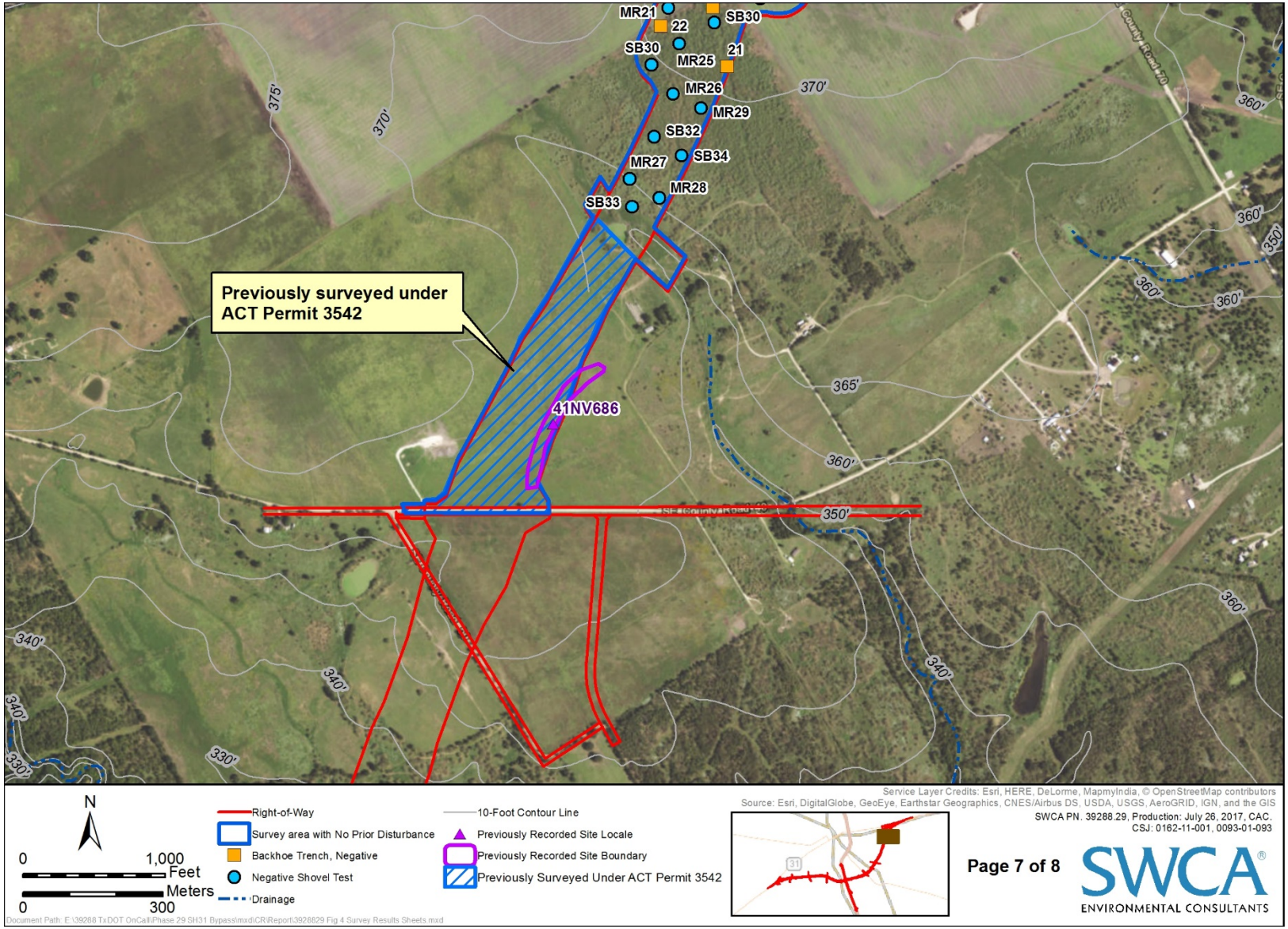

Figure A-7. Survey results.

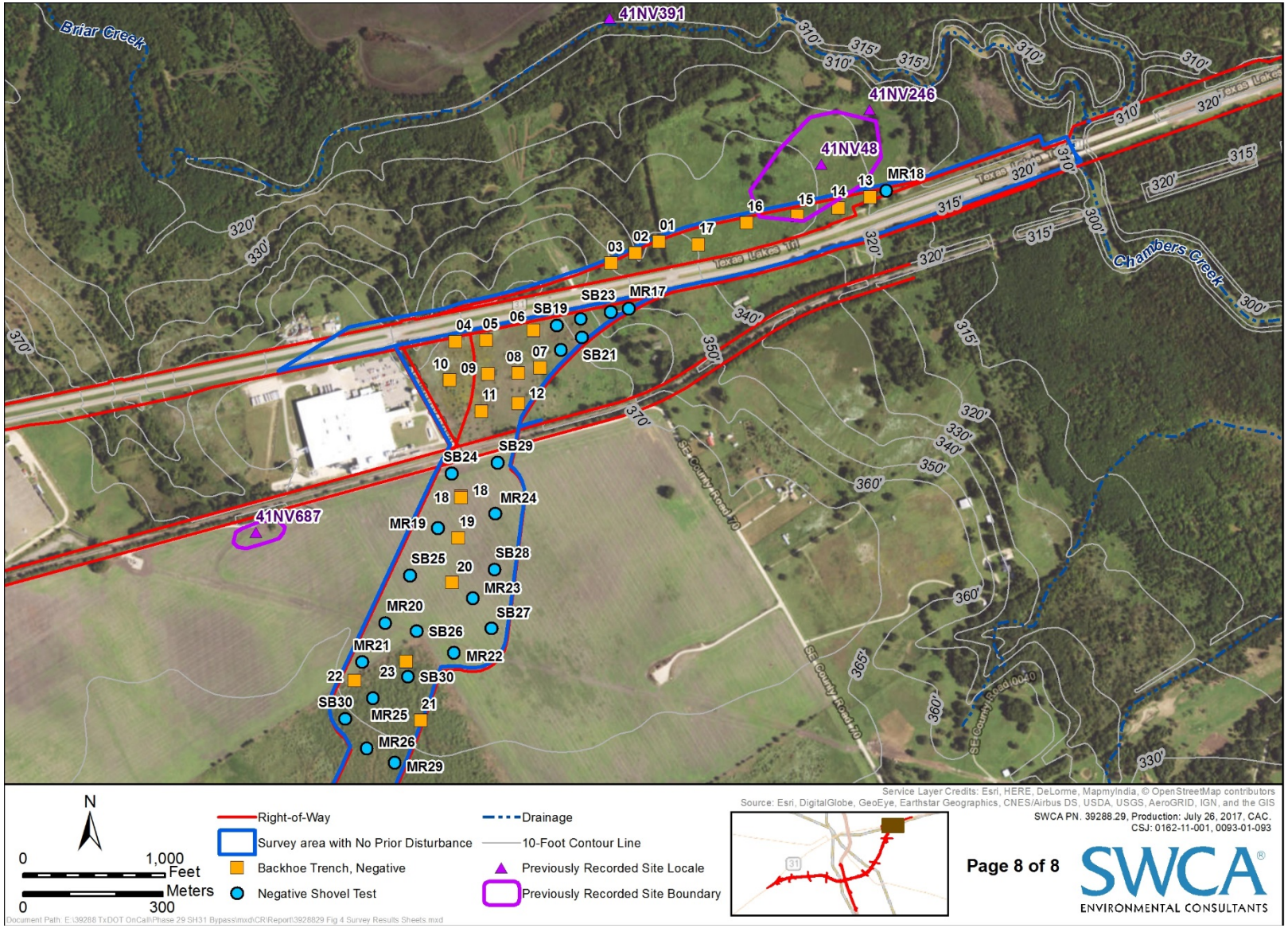

Figure A-8. Survey results.

Appendix B. Shovel Test Data

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
KL01	1	0-39	10YR 4/3	brown	Sandy Loam		None	N	No cultural material encountered.
	2	39-46	10YR 4/3	brown	Sandy Clay Loam			N	No cultural material encountered. Terminated at compact soil.
KL02	1	0-24	10YR 5/3	brown	Sandy Loam	5-10%	Gravels	N	No cultural material encountered.
	2	24-43	10YR 3/3	dark brown	Clay Loam	1-5%	Pebbles	N	No cultural material encountered. Terminated at compact soil.
KL03	1	0-16	10YR 5/3	brown	Sandy Loam	10-20%	Gravels, Pebbles	N	No cultural material encountered.
	2	16-27	10YR 5/3	brown	Sandy Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at gravels.
KL04	1	0-11	10YR 5/3	brown	Sandy Loam	10-20%	Gravels, Pebbles	N	No cultural material encountered.
	2	11-18	10YR 5/3	brown	Sandy Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at gravels.
KL05	1	0-37	10YR 5/3	brown	Sandy Loam	5-10%	Pebbles	N	No cultural material encountered.
	2	37-44	10YR 6/3	pale brown	Silt Loam			N	No cultural material encountered.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
	3	44-77	10YR 4/3	brown	Clay Loam			N	No cultural material encountered. Terminated at compact soil.
KL06	1	0-22	10YR 5/3	brown	Sandy Loam	1-5%	Gravels	N	No cultural material encountered.
	2	22-41	10YR 5/3	brown	Clay Loam	1-5%	Pebbles	N	No cultural material encountered. Terminated at compact soil.
KL07	1	0-26	10YR 5/3	brown	Sandy Clay Loam	1-5%	Gravels, Pebbles, Roots	N	No cultural material encountered.
	2	26-33	10YR 5/3	brown	Clay Loam			N	No cultural material encountered. Terminated at compact soil.
KL08	1	0-7	10YR 5/3	brown	Clay Loam	5-10%	Gravels, Pebbles, Roots	N	No cultural material encountered.
	2	7-21	7.5YR 5/4	brown	Clay Loam	1-5%	Pebbles	N	No cultural material encountered. Terminated at compact soil.
KL09	1	0-43	10YR 4/3	brown	Sandy Clay Loam	10-20%	Gravels, Pebbles, Roots	N	No cultural material encountered. Terminated at compact soil.
MR01	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR02	1	0-20	10YR 4/3	brown	Sandy Clay Loam	5-10%	Fe	N	No cultural material encountered. Terminated at basal clay.
MR03	1	0-20	10YR 4/3	brown	Sandy Clay Loam	5-10%	Fe	N	No cultural material encountered. Terminated at basal clay.
MR04	1	0-20	10YR 4/3	brown	Sandy Clay Loam	5-10%	Fe	N	No cultural material encountered. Terminated at basal clay.
MR05	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR06	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR07	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
MR08	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR09	1	0-30	10YR 4/3	brown	Sandy Clay Loam			N	No cultural material encountered.
	2	30-50	10YR 3/2	very dark grayish brown	Sandy Clay			N	No cultural material encountered. Terminated at basal clay.
MR10	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR11	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR12	1	0-40	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	40-50	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR13	1	0-40	10YR 2/1	black	Clay Loam			N	No cultural material encountered. Terminated at compact soil.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
MR14	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR15	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR16	1	0-30	10YR 5/2	grayish brown	Silty Clay Loam			N	No cultural material encountered. Terminated at compact soil.
MR17	1	0-20	10YR 5/2	grayish brown	Sandy Clay			N	No cultural material encountered.
	2	20-30	10YR 4/6	dark yellowish brown	Clay Loam			N	No cultural material encountered. Terminated at basal clay.
MR18	1	0-50	10YR 2/1	black	Clay Loam			N	No cultural material encountered.
	2	50+	2.5YR 8/4	pink	Silt			N	Terminated at compact soil.
MR19	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR20	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR21	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
MR22	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR23	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR24	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR25	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR26	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
MR27	1	0-40	10YR 2/1	black	Clay Loam			N	Terminated at compact soil.
SB01	1	0-30	7.5YR 4/1	dark gray	Silt	1-5%	Pebbles	N	
	2	30-60	7.5YR 3/1	very dark gray	Silt	1-5%	Pebbles	N	Terminated at compact soil.
SB02	1	0-30	7.5YR 4/3	brown	Silt			N	Terminated at compact soil.
SB03	1	0-20	7.5YR 4/3	brown	Silt			N	Terminated at compact soil.
SB04	1	0-30	7.5YR 4/3	brown	Silt			N	Terminated at compact soil.
SB05	1	0-30	7.5YR 4/3	brown	Silt			N	Terminated at compact soil.
SB06	1	0-30	7.5YR 4/3	brown	Silt			N	
	2	30-40	7.5YR 4/3	brown	Silt	1-5%	Pebbles	N	Terminated at compact soil.
SB07	1	0-30	7.5YR 4/3	brown	Silt			N	
	2	30-50	7.5YR 4/4	brown	Silt			N	Terminated at compact soil.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
SB08	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	
	2	30-60	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB09	1	0-30	7.5YR 4/2	brown	Silt			N	
	2	30-70	7.5YR 4/3	brown	Silt Loam			N	Terminated at compact soil.
SB10	1	0-30	7.5YR 4/2	brown	Silt Loam			N	
	2	30-60	7.5YR 4/3	brown	Silt Loam			N	Terminated at compact soil.
SB11	1	0-30	7.5YR 4/3	brown	Silt Loam			N	Terminated at compact soil.
SB12	1	0-30	7.5YR 4/2	brown	Silt Loam			N	
	2	30-60	7.5YR 3/2	dark brown	Silt Loam			N	Terminated at compact soil.
SB13	1	0-30	7.5YR 3/1	very dark gray	Silt			N	
	2	30-60	7.5YR 3/2	dark brown	Silty Clay Loam			N	Terminated at compact soil.
SB14	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB15	1	0-30	7.5YR 3/2	dark brown	Silt Loam			N	Terminated at compact soil.
SB16	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB17	1	0-30	7.5YR 6/2	pinkish gray	Silt			N	
	2	30-60	7.5YR 6/2	pinkish gray	Silt			N	Terminated at compact soil.
SB18	1	0-20	7.5YR 6/2	pinkish gray	Sandy Loam			N	Terminated at compact soil.

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
SB19	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	
	2	30-50	7.5YR 3/2	dark brown	Silt Loam	1-5%	Calcium Carbonate	N	Terminated at compact soil.
SB20	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	
	2	30-70	7.5YR 3/2	dark brown	Silty Clay Loam	1-5%	Calcium Carbonate	N	
	3	70-80	7.5YR 3/2	dark brown	Silty Clay Loam	5-10%	Calcium Carbonate	N	Terminated at compact soil.
SB21	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	
	2	30-60	7.5YR 3/2	dark brown	Silty Clay Loam			N	Terminated at compact soil.
SB22	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	
	2	30-60	7.5YR 3/2	dark brown	Silt Loam	1-5%	Calcium Carbonate	N	Terminated at compact soil.
SB23	1	0-30	7.5YR 3/1	very dark gray	Silt Loam			N	
	2	30-50	7.5YR 3/2	dark brown	Silty Clay Loam			N	Terminated at compact soil.
SB24	1	0-20	7.5YR 4/1	dark gray	Silt Loam			N	Terminated at compact soil.
SB25	1	0-30	7.5YR 4/1	dark gray	Silt Loam			N	
	2	30-50	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB26	1	0-30	7.5YR 4/1	dark gray	Silt			N	
	2	30-50	7.5YR 3/1	very dark gray	Silt			N	Terminated at compact soil.
SB27	1	0-30	7.5YR 4/1	dark gray	Silt Loam			N	

Shovel Test No.	Level	Depth	Munsell	Color	Texture	Inclusion (%)	Inclusion Type	Cultural Material (P/N)	Comments
	2	30-60	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB28	1	0-30	7.5YR 4/1	dark gray	Silt Loam			N	
	2	30-40	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB29	1	0-20	7.5YR 4/2	brown	Silt Loam			N	Terminated at compact soil.
SB30	1	0-30	7.5YR 4/1	dark gray	Silt Loam			N	
	2	30-40	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB31	1	0-30	7.5YR 4/1	dark gray	Silt Loam			N	
	2	30-50	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB32	1	0-30	7.5YR 4/1	dark gray	Silt Loam			N	
	2	30-40	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB33	1	0-30	7.5YR 4/2	brown	Silt Loam			N	
	2	30-40	7.5YR 3/1	very dark gray	Silt Loam			N	Terminated at compact soil.
SB34	1	0-30	7.5YR 4/2	brown	Silt Loam			N	Terminated at compact soil.

Appendix C. Backhoe Trench Data

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
BHT01	1	0-41	10YR4/3	Brown	Clay Loam	Friable, crumb-subangular, fine-medium, weak, roots 10%, rootlets 20%, worm burrows 15%, pinhole burrows 20%	Gradual, Smooth	No cultural materials
	2	41-103	10YR4/3	Brown	Clay Loam	Firm, Subangular, medium, moderate, rootlets 15%, Mg-1mm 15%, subtle slicken sides-1mm 10%, white pebble 5% 1-2 mm	Clear, Smooth	No cultural materials
	3	103-141+	10YR5/3	Brown	Clay	Extremely Firm, Angular, medium, moderate, rootlets 5%, subtle SS-1mm 10%, Mg-1mm 10%, white pebble nodules and white filaments-1mm 5-10%	Unknown	No cultural materials
BHT02	1	0-76	10YR5/3	Brown	Sandy Loam	Friable, Crumb-subangular, fine-medium, weak, roots 5%, rootlets 15%, worm burrows 10%, pinhole burrows 10-15%, pebbles-subangular 3%	Clear, Slight Undulating	Root zone at 9 cmbs, flood deposit 59-62 cmbs, lenses 0.1mm thick fine sand 10YR 5/3; broken, sloping toward creek

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	2	76-153	10YR4/3	Brown	Sandy Clay Loam	Friable, subangular, medium, rootlets 10-15%, pinhole burrows 20%, Mg-1mm 15%, subtle slicken sides-1mm 10%, white pebble 5% 1-2 mm	Clear, Smooth	Similar lenses as above 79-81 cmbs, flood lenses 110-121 cmbs
	3	153-162+	10YR6/3	Pale Brown	Clay Loam	Firm-Extremely Firm, angular, medium, moderate, rootlets 5%, subtle SS-1mm 10%, Mg-1mm 10%, white pebble nodules and white filaments-2-3cm 5%	Unknown	No cultural materials
BHT03	1	0-18	10YR5/2	Grayish brown	Clay Loam	Friable, subangular, Fine, weak, rootlets 20%, roots 3%, pinhole burrows 15%, worm burrows 5%, pebbles and gravels 10%	Clear, Smooth	No cultural materials
	2	18-58	10YR6/3	Pale Brown	Clay Loam	Friable, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1mm 2%, subtle SS-1mm 5%	Gradual, Smooth	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	3	58-117+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-3mm-1cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT04	1	0-45	10YR4/3	Brown	Clay Loam	Friable, Subangular, Fine, Weak, roots and rootlets 10-15%, $CaCO_3$ nodules 5%, Fe nodules 5%	Clear, Wavy	No cultural materials
	2	45-90	10YR5/4	Yellowish Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 5%, Mn 2%-2mm	Gradual, Smooth	No cultural materials
	3	90-135+	10YR5/4	Yellowish Brown	Clay Loam	Firm, Subangular, Medium, Moderate, Mn nodules-2mm 5%	Unknown	No cultural materials
BHT05	1	0-70	10YR2/1	Black	Clay Loam	Firm, Subangular, Fine, Moderate, roots and rootlets 10-15%, pinhole burrows 5%, Mn < 1mm 1-2%	Gradual, Wavy	No cultural materials
	2	70-160+	10YR4/1	Dark Gray	Clay Loam	Extremely Firm, Subangular, Medium, Strong, Mn nodules-1mm 5%, SS 20%	Unknown	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	1	0-44	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%	Clear, Smooth	No cultural materials
BHT06	2	44-86	10YR6/3	Pale Brown	Clay Loam	Friable, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1mm 2%, subtle SS-1mm 5%	Gradual, Smooth	No cultural materials
	3	86-118+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1-2cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT07	1	0-20	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%	Clear, Smooth	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	2	20-60	10YR6/3	Pale Brown	Clay Loam	Friable, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1mm 2%, subtle SS-1mm 5%	Gradual, Smooth	No cultural materials
	3	60-80+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1-2cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT08	1	0-32	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%	Clear, Smooth	No cultural materials
	2	32-133	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular-Massive, Medium, Moderate, rootlets 15%, pinhole burrows 15%, worm 5%, Mn-1mm 1%, subangular pebbles 1%		Sticky, structure is angular to massive, lower boundary in side is abrupt is steep. Sloping lower boundary on bottom is gradual to clear

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	3	133-139+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1-2cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT09	1	0-89	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%	Clear, Smooth	No cultural materials
	2	89-134	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular-Massive, Medium, Moderate, rootlets 15%, pinhole burrows 15%, worm 5%, Mn-1mm 1%, subangular pebbles 2%, white nodules .01 mm 5%	Clear, Smooth	Sticky, structure is angular to massive, lower boundary in side is abrupt is steep. Sloping lower boundary on bottom is gradual to clear
	3	134-146+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1-2cm 5%, SS 2-4mm 10%	Unknown	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	1	0-101	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%	Clear, Smooth	No cultural materials
BHT10	2	101-136	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular-Massive, Medium, Moderate, rootlets 15%, pinhole burrows 15%, worm 5%, Mn-1mm 1%, subangular pebbles 2%, white nodules .01 mm 5%	Clear, Smooth	Sticky, structure is angular to massive, lower boundary in side is abrupt is steep. Sloping lower boundary on bottom is gradual to clear
	3	136-147+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1-2cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT11	1	0-30	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%, heliodiscus- 1 found in 0-5 cm	Clear, Smooth	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	2	30-100	10YR6/3	Pale Brown	Clay Loam	Friable, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, CaCO3-2-3mm 5%, subtle SS-1mm 5%	Gradual, Smooth	No cultural materials
	3	100-160+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-1-2cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT12	1	0-64	10YR5/2	Grayish brown	Clay Loam	Loose-Friable, subangular, Fine-Medium, weak, rootlets 10%, roots 5%, pinhole burrows 15%, worm burrows 5%, subrounded gravels 1`%, root zone 0-13 cm, subtle SS 1-4mm 5%	Gradual, Smooth	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	2	64-116	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular-Massive, Medium, Moderate, rootlets 15%, pinhole burrows 15%, worm 5%, Subtle SS 1-4mm 10% Mn-1mm 1-2%, subangular pebbles 2%, white nodules 1 mm 5% increasing in size and prevalence with depth	Clear, Smooth	No cultural materials
	3	116-157+	10YR6/3	Pale Brown	Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 10-15%, pinhole burrows 5%, Mn nodules-1mm, pebbles-subangular 5%, white nodules-2-3cm 5%, SS 2-4mm 10%	Unknown	No cultural materials
BHT13	1	0-31	10YR4/2	Dark Grayish Brown	Sandy Loam	Friable, Crumb-subangular, Fine, Weak, roots 5%, rootlets 15%, worm burrows 5-10%, pinhole burrows 5%	Clear, Smooth	No cultural materials
	2	31-93	10YR4/2-5/2	Dark Grayish Brown to Grayish Brown	Sandy Clay Loam	Friable, Angular to subangular, Medium, Moderate, Roots 3%, Rootlets 10%, Pinholes 10%	Clear, Smooth	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	3	93-131+	10YR5/2-6/2	Grayish Brown to Light Brownish Gray	Clay Loam	Friable to Firm, Angular, Medium, Moderate, Rootlets 3%, Pinholes 3-5%, White Nodules 5mm-1cm 5%	Unknown	No cultural materials
BHT14	1	0-42	10YR4/3	Brown	Sandy Loam	Friable, Subangular to Blocky, Fine to Medium, Weak, Rootlets 10-15%, small burrows 3cm (mice) 3%, worms\pinhole 5%	Clear, Slightly Irregular	No cultural materials
	2	42-68	7.5YR5/6	Strong Brown	Sandy Clay Loam	Friable to Firm, Subangular, Fine to Medium, Weak, Rootlets 5%, pinhole 3%, root casts 3-4% with strat 1 matrix	Clear to gradual, Smooth	No cultural materials
	3	68-102	7.5YR5/4	Brown	Sandy Clay Loam	Friable to Firm, Subangular, Medium, Moderate, rootlets 5%, pinholes 5%, Fe 15-20% 1mm mottling	Clear, Smooth	No cultural materials
	4	102-171+	7.5YR6/6	Reddish Yellow	Sandy Loam	Loose to Friable, Subangular to crumb, Fine to medium, Weak, rootlets 5%, pinholes 5%, strat 1 matrix in root casts 2-3%, large cobbles (rounded sandstone?) 2% primarily near top of horizon, white filaments 1%	Unknown	Water table at 156cm

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	1	0-29	10YR5/3	Brown	Sand	Friable, Subangular, Medium, Moderate, roots 10%, rootlets 15-2-%, worms 5%, pinholes 5%	Clear, Smooth	Root Zone 0-5cm
BHT15	2	29-113	5YR5/8	Yellowish Red	Sandy Clay Loam	Angular, Medium, Moderate to Strong, rootlets 10%, root casts 5% with strat 1 matrix, Fe 1mm, 2%, pinholes 5%	Gradual, Smooth	Secondary color is 5YR6/4 20%, high clay content, redox
	3	133-156+	7.5YR6/3-6/4	Light Brown	Clay Loam	Friable to Firm, Angular, Medium to Coarse, Moderate, rootlets 5%, pinholes 15-20%, worm 3%	Unknown	Secondary color is 7.5YR7/6 at 10%
	1	0-46	10YR5/3	Brown	Sand	Friable, Subangular, Medium, Moderate, roots 10%, rootlets 15-2-%, worms 5%, pinholes 5%	Clear, Smooth	Root Zone 0-5 cmbs
BHT16	2	46-68	10YR6/3	Light Brown	Sandy Loam	Friable, Crumb to subangular, Fine, Weak, Rootlets 15%, pinholes 10%, worm 5%, Fe 1mm 2% mostly at base	Clear, Slightly Wavy	Transition zone?
	3	68-127	5YR5/8	Yellowish Red	Sandy Clay Loam	Angular, Medium, Moderate to Strong, rootlets 10%, root casts 5% with strat 1 matrix, Fe 1mm, 2%, pinholes 5%	Gradual, Smooth	Secondary color is 5YR6/4 20%, high clay content, redox

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	4	127-164+	7.5YR6/3-6/4	Light Brown	Clay Loam	Friable to Firm, Angular, Medium to Coarse, Moderate, rootlets 5%, pinholes 15-20%, worm 3%	Unknown	Secondary color is 7.5YR7/6 at 10%
BHT17	1	0-44	10YR5/3	Brown	Sand	Friable, Subangular, Medium, Moderate, roots 10%, rootlets 15-2-%, worms 5%, pinholes 5%	Clear, Smooth to Wavy	Root Zone 0-5 cmbs
	2	44-81	10YR5/4	Yellowish Brown	Sandy Clay Loam	Firm, Subangular, Medium, Moderate, rootlets 5%, pinhole 3-5%, root casts with strat 1 matrix 1-3% at 1-2mm, Fe 1mm 1-2%	Gradual, smooth	No cultural materials
	3	81-154+	10YR5/4-6/4	Yellowish Brown	Sandy Clay Loam	Angular to Blocky, Medium, Moderate, rootlets 3%, white nodules 5-8mm 5%, Fe 2mm 2%, pinholes 3%	Unknown	White nodules increase to 1-1.5 cm diameter at base of trench
BHT18	1	0-41	10YR5/3	Brown	Clay Loam	Friable, Platy, Medium, Strong, rootlets 10%	Clear, Slightly Wavy	Disturbed/ compressed
	2	41-107	10YR4/3-5/3	Brown	Clay Loam	Firm, Subangular to angular, Fine to medium, Moderate, snail shell fragments 1 %, subtle SS 10-15 mm 20%	Clear, Smooth	No cultural materials
	3	107-167+	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular, Medium, Moderate, White nodules 1-2cm 10%	Unknown	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
BHT19	1	0-29	10YR5/3	Brown	Clay Loam	Friable, Platy, Medium, Strong, rootlets 10%	Clear, Slightly Wavy	Disturbed/ compressed
	2	29-72	10YR4/3-5/3	Brown	Clay Loam	Firm, Subangular to angular, Fine to medium, Moderate, snail shell fragments 1 %, subtle SS 10-15 mm 20%	Clear, Smooth	No cultural materials
	3	72-147+	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular, Medium, Moderate, White nodules 1-2cm 10%	Unknown	No cultural materials
BHT20	1	0-29	10YR5/3	Brown	Clay Loam	Friable, Platy, Medium, Strong, rootlets 10%	Clear, Slightly Wavy	Disturbed/ compressed
	2	29-74	10YR4/3-5/3	Brown	Clay Loam	Firm, Subangular to angular, Fine to medium, Moderate, snail shell fragments 1 %, subtle SS 10-15 mm 20%	Clear, Smooth	No cultural materials
	3	74-151+	10YR4/2	Dark Grayish Brown	Clay Loam	Firm, Angular, Medium, Moderate, White nodules 1-2cm 10%	Unknown	No cultural materials
BHT21	1	0-86	10YR4/3	Brown	Clay Loam	Firm, Subangular to angular, Medium, Moderate, rootlets 10-15%, worm 5%, pinhole 5%	Gradual, Smooth	No cultural materials

BHT	Strat	Depth (cmbs)	Munsell	Soil Color	Soil Texture	Horizon Discussion	Lower boundary	Comments
	2	86-127+	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam	Extremely Firm, Angular, Medium, Moderate, rootlets 5%, worm 3-5%, pinhole 3-5%, white nodules 1-2cm 10%	Unknown	Very dense, sticky
BHT22	1	0-71	10YR4/3	Brown	Clay Loam	Firm, Subangular to angular, Medium, Moderate, rootlets 10-15%, worm 5%, pinhole 5%	Gradual, Smooth	No cultural materials
	2	71-127+	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam	Extremely Firm, Angular, Medium, Moderate, rootlets 5%, worm 3-5%, pinhole 3-5%, white nodules 1-2cm 10%	Unknown	Very dense, sticky
BHT23	1	0-72	10YR4/3	Brown	Clay Loam	Firm, Subangular to angular, Medium, Moderate, rootlets 10-15%, worm 5%, pinhole 5%	Gradual, Smooth	No cultural materials
	2	72-128+	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam	Extremely Firm, Angular, Medium, Moderate, rootlets 5%, worm 3-5%, pinhole 3-5%, white nodules 1-2cm 10%	Unknown	Very dense, sticky

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

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