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Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

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Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

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SWCA

Intensive Cultural Resources Survey of the
Proposed 407 McKinney No. 1 to Princeton
No. 1 72-Inch and 24-Inch Pipeline, Collin
County, Texas

Texas Antiquities Permit 7561
SWCA Cultural Resources Report No. 16-186
October 2017

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REDACTED

**INTENSIVE CULTURAL RESOURCES SURVEY OF THE
PROPOSED 407 MCKINNEY NO. 1 TO PRINCETON NO. 1 72-
INCH AND 24-INCH PIPELINE, COLLIN COUNTY, TEXAS**

Prepared for

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SWCA Project No. 34643

SWCA Cultural Resources Report No. 16-186

October 25, 2017

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ABSTRACT

On behalf of Lockwood, Andrews, and Newnam, Inc. (LAN), SWCA Environmental Consultants (SWCA) conducted an intensive archaeological survey of the proposed 407 McKinney No. 1 to Princeton No. 1 72-inch and 24-inch Pipeline in Collin County, Texas. The proposed 7.6-mile water pipeline will consist of 4,357-feet of new 72-inch-diameter pipeline and 35,843-feet of new 24-inch-diameter pipeline in order to connect an existing 60-inch-diameter pipeline in McKinney, Texas, to an existing connection to the pump station Princeton, Texas. The investigation included an archaeological background literature and records review and an intensive pedestrian survey augmented by shovel tests. As the undertaking will be funded by the City of McKinney and portions of the project are located on city owned property, cultural resources investigations were conducted to satisfy the requirements of the Antiquities Code of Texas under Texas Antiquities Permit 7561.

The background literature review revealed that portions of the project area have been previously surveyed for cultural resources. Within one mile of the project area a total of 11 previous surveys have been conducted, four of which intersect the current proposed project area. Additionally, a total of five previously recorded archaeological sites, 10 properties listed in the NRHP, four cemeteries, two abandoned railroad grades, two historic districts, five historic markers, and approximately 576 potential historic structures were identified within one mile of the proposed project area.

Investigations of the project area involved surface and subsurface investigations of a single transect along the proposed centerline with shovel tests excavated at 100-m intervals in accordance with the Texas Historical Commission's (THC) standards. Out of 141 proposed shovel test locations, 99 shovel tests were excavated, and 42 proposed shovel test locations were not excavated due to disturbances within the proposed project alignment. In addition to shovel testing, trenching of the Trinity River floodplain was also conducted to test for the presence of buried soil horizons which might contain archaeological sites. Seven negative trenches were excavated north of the Trinity River as part of the survey of the initial proposed right-of-way. An additional six backhoe trenches were excavated in March 2017 because of a reroute across the Trinity River floodplain in this area. The results of these geomorphological investigations are reported in Appendix A. The work conducted was completed across the full length (7.6 miles) of the proposed project area (Appendix B). Shovel test data are presented in Appendix C.

During SWCA's investigation two archaeological sites, 41COL269 and 41COL270, were identified. Both sites were identified as the remains of historic homesteads. These sites are characterized by surficial deposits that are heavily disturbed, contain sparse assemblages, represent ubiquitous site types, and/or are lacking in formal and temporally diagnostic artifacts. The investigated portions of these resources are recommended NOT ELIGIBLE for the National Register of Historic Places (NRHP). The NRHP eligibility of the portion of archaeological site 41COL269 that is located outside of the proposed right-of-way remains UNDETERMINED.

One previously recorded site (41COL168) was revisiting during SWCA's investigation. The site has been completely destroyed by the construction of Airport Road, and SWCA recommends the remaining portion within the project corridor as NOT ELIGIBLE for inclusion in the NRHP.

Based on the results of the investigation, and determined lack of eligibility for sites 41COL269, 41COL270, and 41COL168 within the current project area, it is SWCA's opinion that the proposed project would result in NO EFFECT ON HISTORIC PROPERTIES. SWCA recommends no further investigations of the investigated project area and that the project be allowed to proceed. No artifacts were collected, thus nothing will be curated except project paperwork and photographs, as per the requirements of the Texas Antiquities Permit 7561.

CONTENTS

Abstract.....	i
Management Summary	v
Introduction.....	1
Project Description	1
Environmental Setting.....	3
Environmental Setting.....	3
Geology.....	3
Soils	3
Cultural Context	4
Paleoindian Period	4
Archaic Period.....	5
Late Prehistoric Period.....	6
Late Prehistoric I.....	6
Late Prehistoric II	6
Historic Context	7
Methods.....	7
Background Review	7
Archaeological Survey	7
Results.....	8
Background Review Results	8
Archaeological Survey Results	9
Summary and Recommendations.....	24
References Cited.....	25

APPENDICES

- A. Geomorphology Report
- B. Cultural Resources Results Map
- C. Shovel Test Log

FIGURES

Figure 1. Project area in Collin County, Texas.....	2
Figure 2. Overview of disturbances at Shovel Test PN08. View to west.	10
Figure 3. Overview of Shovel Test PN10. View to east.	11
Figure 4. Overview of not excavated Shovel Test PN23 at possible historic railroad crossing. View to west.	11
Figure 5. Overview of agricultural field from Shovel Test AE23. View to west towards site 41COL270.	12
Figure 6. Map of site 41COL269.	14
Figure 7. Overview of site 41COL269 from north boundary. View to south.	15
Figure 8. Overview of Features 1 and 2 at site 41COL269. View to southwest.....	15
Figure 9. Electrical box at southeast corner of Feature 1 at site 41COL269. View to southwest.....	16
Figure 10. Map of site 41COL270.....	18
Figure 11. View of south wall of Feature 1 at site 41COL270. View to northwest.....	19
Figure 12. Overview of entrance of Feature 1 at site 41COL270. View to northeast.....	19
Figure 13. Sample of surface scatter inside Feature 1 at site 41COL270.	20
Figure 14. Sample of material within Feature 2 at site 41COL270.	20
Figure 15. Site overview from Shovel Test AE07. View to west.	23
Figure 16. Site overview at Shovel Test PN07 at the northern boundary of site 41COL168. View to south.	23

TABLES

Table 1. Soils within the project area.....	4
Table 2. Previous surveys intersecting the project area.	9
Table 3. Archaeological sites within one mile of the project area.	9
Table 4. Chain-of-Title Information for Parcel Containing Site 41COL270.....	21

MANAGEMENT SUMMARY

Project Title. Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

SWCA Project Number. 34643

Project Description. Lockwood, Andrews, and Newnam, Inc. (LAN) propose to construct a water pipeline along Airport Road and SH 380 in central Collin County, Texas. The proposed 7.6-mile water pipeline will consist of 4,357-feet of new 72-inch-diameter pipeline and 35,843-feet of new 24-inch-diameter pipeline in order to connect an existing 60-inch-diameter pipeline in McKinney, Texas, to an existing pump station Princeton, Texas. This report summarizes cultural resources investigations conducted along a 7.6-mile-long corridor within a 100-foot wide survey area consisting of the final project alignment. SWCA Environmental Consultants (SWCA) conducted a background literature and records review and an intensive pedestrian survey with shovel testing and mechanical trenching to systematically identify, record, delineate, and, if possible, determine the significance of any cultural resources located within this portion of the project area.

Location. The proposed project area begins at an existing waterline located across from the intersection of Elm Street and Airport Road in southeastern McKinney, Texas. The project area trends north along the east side of Airport Road before turning east and paralleling SH 380 for approximately six miles into Princeton, Texas.

Number of Acres Surveyed. Approximately 92 acres

Principal Investigator. J. Eric Gilliland, MA, RPA

Purpose of Work. On behalf of LAN, SWCA completed cultural resources investigations to satisfy the requirements of the Antiquities Code of Texas under Texas Antiquities Permit 7561.

Number of Sites. Two new historic sites (41COL269 and 41COL270) were identified during the investigation and one previously recorded site (41COL168) was revisited.

Eligibility. Due to site 41COL269's location completely outside of the current proposed project area it will not be effected by the proposed project. As such, the National Register of Historic Places (NRHP) eligibility of site 41COL269 is recommended as UNDETERMINED outside of the project area. Due to poor condition of site 41COL270 and the unremarkable character of the features and artifact assemblage, there is little potential to provide additional information that may contribute to the understanding of local and/or regional history. As such, site 41COL270 is recommended NOT ELIGIBLE for inclusion for the NRHP. Previously recorded site 41COL168 was revisited during SWCA's investigation. The site has been completely destroyed by the construction of Airport Road, and SWCA recommends the remaining portion within the project corridor as NOT ELIGIBLE for inclusion in the NRHP.

Curation. No artifacts were collected, thus nothing will be curated except project paperwork and photographs, as per the requirements of the Texas Antiquities Permit 7561.

Comments. Based on the results of the investigation, it is SWCA's opinion that the proposed project would result in NO EFFECT ON HISTORIC PROPERTIES. SWCA recommends no further investigations of the investigated project area and that the project be allowed to proceed. No artifacts were collected, thus nothing will be curated except project paperwork and photographs, as per the requirements of the Texas Antiquities Permit 7561.

INTRODUCTION

On behalf of Lockwood, Andrews, and Newnam, Inc. (LAN), SWCA Environmental Consultants (SWCA) conducted an intensive cultural resources survey of the proposed 407 McKinney No. 1 to Princeton No. 1 72-inch and 24-inch Pipeline in Collin County, Texas. The proposed 7.6-mile water pipeline will consist of 4,357-feet of new 72-inch-diameter pipeline and 35,843-feet of new 24-inch-diameter pipeline in order to connect an existing 60-inch-diameter pipeline in McKinney, Texas, to an existing pump station in Princeton, Texas. The investigation included an archaeological background literature and records review, an intensive pedestrian survey augmented by shovel tests along the proposed centerline, and mechanical trenching (deep testing) within the Trinity River floodplain. As the undertaking will be funded by the City of McKinney and portions of the project are located on city owned property, cultural resources investigations were conducted to satisfy the requirements of the Antiquities Code of Texas under Texas Antiquities Permit 7561.

The investigations began with a background literature and records review of previously conducted cultural resources surveys and recorded archaeological sites. The fieldwork consisted of an intensive pedestrian survey augmented by shovel testing and mechanical trenching in the Trinity River floodplain. The goal of the work was to locate all prehistoric and historic archaeological sites in the investigated project area, establish vertical and horizontal site boundaries, as appropriate, and evaluate the significance and eligibility of any site recorded for the National Register of Historic Places (NRHP). The goal of the deep testing was to evaluate the likelihood of the presence of buried soils that might contain archaeological sites within the buried portions of the Trinity River floodplain.

All investigations were conducted in accordance with the standards and guidelines of the NHPA and the Texas Historical Commission (THC) minimum archaeological survey standards. Antonio Padilla served as the initial Principal Investigator. In March 2017, J. Eric Gilliland took over as Principal Investigator. Fieldwork was completed in March and April of 2016 by Ashley Eyeington, Ken Lawrence, Patricia Neuhoff, and Robert Brush. Fieldwork for reroutes was conducted by J. Eric Gilliland in August 2016, and geomorphological testing for the Trinity River floodplain reroute was conducted by Ken Lawrence and Nick Wood in March 2016.

PROJECT DESCRIPTION

Within Collin County, LAN proposes to build a 7.6-mile water pipeline that will consist of 4,357-feet of new 72-inch-diameter pipeline and 35,843-feet of new 24-inch-diameter pipeline in order to connect an existing 60-inch-diameter pipeline in McKinney, Texas, to an existing pump station in Princeton, Texas. The proposed project area begins at the intersection of Elm Street and Airport Road in southeastern McKinney, Texas. The project area runs north along the east side of Airport Road before turning east and paralleling SH 380 for approximately six miles into Princeton, Texas (Figure 1). Construction will be confined within a typically 100-foot-wide construction corridor with impacts consisting of clearing of vegetation, excavation of a trench, installation of the pipe, and horizontal directional drilling (HDD) and bores at major water and road crossings. The project alignment is depicted on the Culleoka and McKinney East, Texas, U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles.

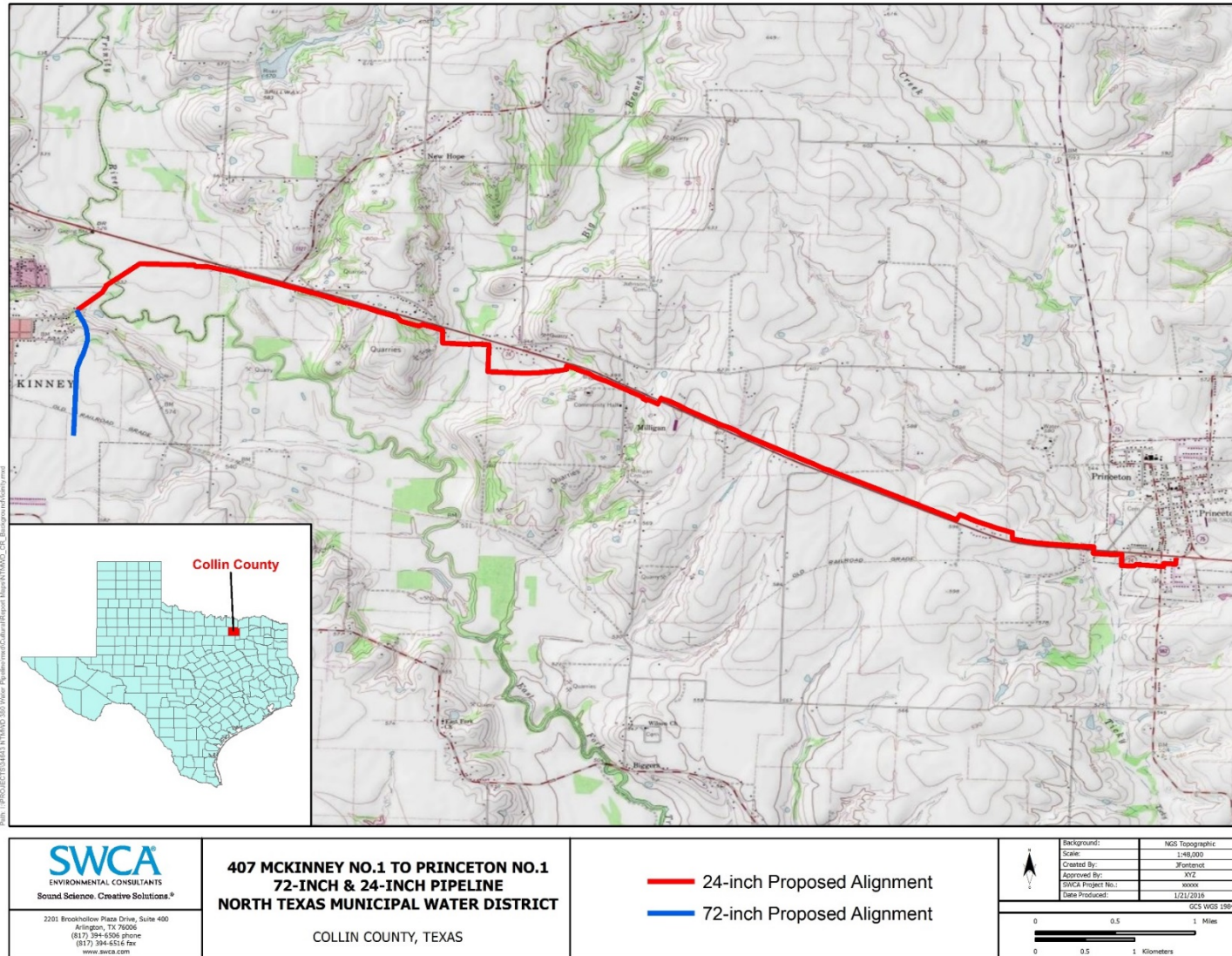


Figure 1. Project area in Collin County, Texas.

ENVIRONMENTAL SETTING

Environmental Setting

The project area is situated within the Northern Blackland Prairie ecoregion (U.S. Environmental Protection Agency [EPA] Level IV Ecoregion) within the Texas Blackland Prairie ecoregion (Level III). The Texas Blackland Prairie is characterized as smooth to slightly undulating plains distinguished from neighboring regions by its fine clay soils and natural prairie vegetation. The high occurrence of vertisols, unlike typical prairie environments found to the north, is a result of the underlying Cretaceous age chalk, marl, and shale (Griffin and Omernik 2015). The Northern Blackland Prairie sub region of the Texas Blackland Prairie covers a belt of Upper Cretaceous chalk, marl, and shales from Sherman, Texas, to San Antonio, Texas. Historically, the region was shaped by prairie fires and bison grazing resulting in the large expanses of tall prairie grass (Griffin and Omernik 2015). The calcareous rich soils produce rich cropland dominated by sorghum, wheat, cotton, and corn. As a result of the rich soil and agricultural practices, most of the native Blackland Prairie communities are gone (Griffin and Omernik 2015).

Geology

Due to the projects location within the Northern Blackland Prairie ecoregion, the geology of the area is dominated by underlying chalk, marl, and shale. Two prominent formations produce the rich clay prairie environment encountered within the project area, the Cretaceous age Austin Chalk and Ozan Formations. The Austin Chalk formation consists of light-gray, massive, chalk with scarce marine megafossils. The middle portion of the Austin Chalk formation is characterized by thin-bedded marl with interbeds of chalk. The Austin Chalk formation as a whole is approximately 600 feet thick (Barnes 1991). The Ozan Formation is characterized by weak, calcareous, poorly bedded, clay. Silt, siltstone beds, and marine megafossils are found in variable amounts throughout the formation. The Ozan Formation is approximately 425 feet thick (Barnes 1991).

Soils

Soil survey data obtained from the Natural Resources Conservation Service (NRCS 2015) for Collin County were used to compile a list of soils intersected by the project route. Soils identified along the project route are presented in Table 1. The project area is dominated by the Houston Black, Austin, and Tinn soil series which make up 80 percent of soil encountered (NRCS 2016). All three of these soil series create rich cropland characteristic of the Blackland Prairie ecoregion.

Houston Black clay is characterized as deep, well drained, clay residuum originating from Cretaceous Age calcareous mudstone (NRCS 2015). It is typically found on level plains and the side slope of upland ridges and plains. Soils range in color from very dark gray to brownish gray (10YR3/1 to 10YR5/2) and reach depths up to and below 203 cm below surface (cmbs). Austin silty clay is moderately deep, well drained, and formed from weathered chalk of the Austin Formation (NRCS 2016). These soils are found on level to sloping erosional uplands and dissected plains and range from dark gray brown to brown (10YR4/2 to 10YR5/3) in color. The Austin series soils range in depth from 50 to 100 cmbs. Tinn soils are very deep, well drained, calcareous alluvium (NRCS 2016). They range in color from black to very dark gray (10YR2/1 to 10YR3/1)

and reach a depth of up to or below 200 cmbs. Tinn series soils are typically found within the floodplains along streams and drainages within the Blackland Prairie.

Table 1. Soils within the project area.

Soil Series and Description	Sum of Acres
Altoga silty clay, 8% slope in cropland	1.29
Austin silty clay, cropland	19.40
Burleson clay, native pasture	2.07
Eddy gravelly clay loam, native pasture	1.83
Frio silty clay, wooded	5.64
Heiden clay, 1% slope cropland	5.04
Houston Black clay, on a 0.5% slope	40.2
Lewisville silty clay, pasture	1.62
Tinn clay, >1% slope, floodplain	14.75
Trinity clay, occasionally flooded pastureland	0.09

CULTURAL CONTEXT

Within Texas, archeological regions largely reflect topographical settings. This division is seen in Turner and Hester’s (1999) model of the archeological regions of Texas, in which Texas is divided into nine archeological regions, all based on geographical change. Although the divisions of Turner and Hester’s (1999) are generally accepted, Pertulla (2004) further divides these regions, based on physiographic zones and biotic communities, into 16 distinct archeological regions. The project area is located in the north-central Texas archaeological region, and within the Trinity River Basin (Pertulla 2004; Turner and Hester 1999). The chronological framework of the North-central Texas region remains unrefined and lacking in data. For the purpose of this report, chronological information presented is in accordance with the data available (Ferring and Yates 1997, 1998).

The cultural history of the north Texas region is generally divided into four periods that include the Paleoindian (11,500 – 8,500 B.P.), the Archaic (8,500 – 1,200 B.P.), the Late Prehistoric (1,200 – 250 B.P.), and the Historic (250 B.P. – present). The historic period usually begins with the arrival of the Spanish at the beginning of the seventeenth century. However, the northern area of Texas was explored rarely by the Spanish and was generally solely inhabited by native groups until the 1830s. Thus, the period from 250 B.P to 150 B.P. is considered the Protohistoric period for the north-central Texas area (Hunt et al. 1989:7).

Paleoindian Period

The Paleoindian Period was commonly characterized throughout Texas by nomadic big-game hunters who heavily relied on megafauna of the Pleistocene (e.g., mammoth, mastodon, bison, camel, and horse) for subsistence (*sensu* Willey 1966). However, a more accurate description of this stage is presented by Bousman et al. (1990:22) “this period may have seen use by small, mobile bands of nonspecialized hunters and gathers occasionally utilizing megafauna perhaps only as the opportunity arose.” Thus, according to Bousman et al. (1990), Paleoindians used a wider variety of resources than previously thought. Evidence of this broader resource subsistence is based on

the works of Johnson (1977), Collins (1998:1505–1506), and Collins and Brown (2000). Johnson (1977) reviewed reports on numerous Paleoindian sites that indicated a range of small and medium fauna were harvested in addition to big game. Investigations at the Wilson-Leonard site (41WM235), the Gault site (41BL323), and Lubbock Lake (41LU1) provide evidence of small and medium faunal remains (i.e., turtle, rabbit, squirrel, snakes, gopher, and deer) associated with megafaunal remains (i.e., bison and mammoth) (Collins 1998: 1505–1506). Clovis and Folsom points are the primary diagnostic artifacts associated with this period (Turner and Hester 1999; Collins 1995).

The Paleoindian period of occupation in North-Central Texas is known through the presence of diagnostic lithic projectile points in surface collections or from limited excavations. Due to the paucity of large intact Paleoindian sites and the fact that most artifacts are manufactured from non-local materials, researchers characterize these Paleoindian groups as highly mobile. Very few sites in this area exhibit definitive contextual integrity; however, some Plainview material associated with a radiocarbon date of 9,260 B.P. was found at the Horn Shelter (Hunt et al. 1989; Peter et al. 1990). In addition, the Lewisville and Aubrey sites in north-central Texas showed discrete Paleoindian components with the recovery of Clovis points (Owens 2007). The Lewisville site contained 27 hearth features in association with a Clovis point and other sparse lithics in a near-surface context (Crook and Harris 1957, 1958). The Aubrey Site contained a Clovis component in association with cultural features and concentrations of lithics and animal bones near the Elm Fork floodplain in Denton County (Ferring 2001).

Archaic Period

The Archaic period is further subdivided into Early (8,500–6,000 B.P.), Middle (6,000–3,500 B.P.), and Late (3,500–1,200 B.P.) (Perttula 2004:9). The Archaic stage signifies a shift away from big-game hunting subsistence strategies to a less mobile, more generalized subsistence strategy. This change in subsistence strategies encompasses a greater exploitation of local environments with the utilization of plants and animals located in the immediate vicinity. Generally, trends during the Archaic period suggest increasingly complex settlement systems which correspond with decreased mobility, increased population size and density, and the development of distinct territories (Prikrýl 1990; Story 1985). Along with the change in subsistence practices a change is also seen in lithic technology. Evidence of this is apparent in the archaeological record where lanceolate-shaped points gave way to dart points that were stemmed and barbed and in the production of groundstone artifacts (Black 1989; Collins 2004).

The primary cultural marker of this time period in central Texas is the burned rock midden (Collins 2004:119). These piles of burned limestone, sandstone, and other lithic debris represent the remains of multiple ovens that were used, reused and discarded over time. Although these burned rock middens are a common marker for the Archaic period in central Texas, they are much less common in north Texas. This would make any archaeological sites in north Texas containing such middens much more likely to be eligible for inclusion in the NRHP.

Although Archaic peoples were still nomadic in nature, subsistence activities became more seasonal, involving the utilization of food resources specific to certain localities and seasons. During the Archaic period, the climate changed from wet and mild conditions seen in the

Paleoindian period, to warmer and drier conditions. Researchers believe that the changes in climate influenced prehistoric subsistence strategies (Story 1985:38–39; Weir 1976).

Late Prehistoric Period

The Late Prehistoric period is marked by the replacement of the atlatl with the bow and arrow as indicated by the production of small arrow points (Hester 1981:122). With this technological advancement an apparent increase in warfare is reported (Black 1989; Story 1985). However, the presence of dart points in contexts from Cooper Lake sites dating to the Late Prehistoric indicate that the atlatl was still in use even after the introduction of the bow and arrow (Fields 2004:361). During this stage other new technological adaptations came about. Ceramics and agriculture became important in the lifeways of the Late Prehistoric peoples. The first evidence of horticulture appeared and resulted in significant changes to ecological and economic adaptations.

In north-central Texas, the Late Prehistoric dates from A.D. 700 to 1700, and is further subdivided into the Late Prehistoric I (A.D. 700–1200) and Late Prehistoric II (A.D. 1200–1700).

Late Prehistoric I

The Late Prehistoric period is characterized by Scallorn, Catahoula, Steiner, Alba, and Bonham arrow points, as well as sand- and grog-tempered ceramics appearing around A.D. 1000 (Prikryl 1990). There is some evidence of influences from other regions in that some locally manufactured wares display designs similar to those associated with east Texas Caddo ceramic types. Evidence for corn agriculture and the building of structures has been found at sites at Mountain Creek Lake in Dallas County and at Hubert Moss Lake near the Red River (Lorrain 1969; Martin 1994; Peter and McGregor 1988). Farther west, cultural changes also were taking place, though the inhabitants of this area continued to practice an Archaic lifestyle even after technological innovations such as the bow and arrow were accepted (Lynott 1981:106).

Late Prehistoric II

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

Historic Context

The Historic period in Texas can be divided into two sub-periods: the Protohistoric and Historic. The Protohistoric Period of north-central Texas is not well documented archaeologically, but a few pieces of information from Spanish explorers have made their way into the record. At the time, Native American groups inhabiting the area consisted predominately Caddo Indians (Minor 2016) or possibly Wichita groups that had moved into the area in the seventeenth and eighteenth centuries (Fields 2004:349). Due to remoteness and aggressive attacks by local Native American tribes, little European-American settlement of the area occurred until shortly before the Civil War. As settlers began moving into Collin County outbreaks of violence occurred, ultimately pushing out the Caddo by the mid-1850s (Minor 2016). The lack of Native American conflict, fertile soil, and promise of free land via land grants by the Peters colony slowly drew settlers to the area.

Collin County was settled to two phases; early farmers from 1840 to 1860, and after 1870 with the arrival of railroads (Minor 2016). Due to the lack of transportation to connect to the larger markets, early farms remained small, relying on wheat and corn rather than cotton. With the introduction of the Houston and Texas Central Railway in 1872, which connected McKinney to Houston, Texas, and also to markets to the east, settlers were able to take advantage of the fertile Blackland Prairie soils and a fifty year period of growth for the region began (Minor 2016). While agriculture remains an important part of the economy, the growth of the Dallas-Fort Worth metropolitan area has resulted in a diverse and fruitful economy for the area.

METHODS

Background Review

SWCA conducted a background review to determine if the project area has been previously surveyed for cultural resources or if any archaeological sites have been recorded within a 1-mile radius of the project area. To conduct this review, an SWCA archaeologist reviewed the Culleoka and McKinney East, Texas USGS 7.5-minute topographic quadrangle maps on the THC's Texas Archeological Sites Atlas (TASA 2015). These sources provided information on the nature and location of previously conducted archaeological surveys, previously recorded cultural resources, locations of NRHP-listed properties, sites designated as State Antiquities Landmarks, Official Texas Historical Markers (OTHMs), Recorded Texas Historic Landmarks, cemeteries, and local neighborhood surveys. As a part of the review, an SWCA archaeologist reviewed the Texas Department of Transportation (TxDOT) Historic Overlay, a mapping/geographic information system (GIS) database with historic maps and resource information covering most portions of the state (Foster et al. 2006).

Archaeological Survey

Investigations of the project area involved surface and subsurface investigations of a single transect along the proposed project centerline with shovel tests excavated at 100-m intervals in accordance with the Texas Historical Commission's (THC) standards. Out of 141 possible shovel test locations, 99 shovel tests were excavated, and 42 possible shovel tests were not excavated due to disturbance within the proposed project corridor. All excavated shovel tests were negative. In addition to shovel testing, mechanical trenching (deep testing) of the Trinity River floodplain was

also conducted. Seven negative trenches were excavated north of the Trinity River as part of the survey of the original proposed right-of-way. In March 2017, a reroute crossing the Trinity River floodplain was also subject to deep testing, and six trenches were excavated and examined as a part of this effort. This deep testing is reported in Appendix A.

Shovel tests measured roughly 30 x 30 cm in size and were excavated in 20-cm arbitrary levels to a depth of 1 m or to culturally sterile deposits, whichever came first. All excavated soil was screened through ¼-inch (6-mm) mesh hardware cloth to retrieve any cultural materials that might be present. The location of each shovel test was recorded using a Trimble GEO XT handheld global positioning system (GPS) receiver. Data for each shovel test were recorded on appropriate field forms. Soils were described utilizing standard terminology and colors were identified with a Munsell Soil Color Chart. Areas with previously recorded or newly discovered cultural resources required additional shovel testing, per THC standards, to explore the nature and extent of the cultural deposits. Photographs were also taken at each location and were recorded on appropriate field forms.

RESULTS

Background Review Results

The background literature review revealed that portions of the project area have been previously surveyed for cultural resources. Within one mile of the project area a total of 11 previous surveys have been conducted, four of which intersect the current proposed project area. Table 2 summarizes the four previous surveys that intersect the project area. Additionally, five previously recorded archaeological sites, 10 properties listed in the NRHP, four cemeteries, two abandoned railroad grades, two historic districts, five historic markers, and approximately 576 potential historic structures were identified within one mile of the proposed project area.

Of the five archaeological sites identified within one mile of the project area, only one (41COL168) intersects the proposed project area. Site 41COL168 was initially identified by Geo-Marine, Inc. in 2005 during the survey of Airport Road for the City of McKinney. It was recorded as a middle to late nineteenth century farmstead partially disturbed due to bulldozing and clearing activities. The site was determined as INELIGIBLE for inclusion in the NRHP (TASA 2015). Since site 41COL168's identification, Airport Road, a heavy traffic four lane road with medium, has been built through the site. Table 3 summarizes all five archaeological sites identified within one mile of the proposed project area.

Due to the projects location between the populated cities of McKinney and Princeton, Texas, various historic resources were identified within one mile of the project area. Many of these resources being focused within the cities of McKinney and Princeton, are well outside of the proposed project area. The 10 identified properties listed on the NRHP are all located within the city of McKinney along State Highway 5. Two of the four cemeteries are located within McKinney and/or Princeton, Texas, while the other two are found in communities along State Highway 380. The two abandoned railroad grades intersect the proposed project area, one in the west at Airport Road, and one in the east on the south side of State Highway 380. Also within the cities of McKinney and Princeton, two historic districts and five historic markers of various events and buildings were identified. Finally, a majority of the potential historic structures were identified

during neighborhood surveys of McKinney and Princeton. A total of seven structures, one neighborhood survey point, and six potential structures identified during SWCA’s historic map review, were identified within 300 feet of the proposed project area and therefor further investigated during survey.

Table 2. Previous surveys intersecting the project area.

Date	Survey Type	Investigating Agency	Sponsor	Project Name	Sites Identified
1/11/2005	Linear	GMI, Inc	City of McKinney	Chiang, Patel, and Yerby, Inc. McKinney	41COL168
2/22/2006	Linear	GMI, Inc	FAA	City of McKinney	None
6/19/2009	Linear	GMI, Inc	North Texas Municiple District	Civil Associates, Inc.	None
03/1987	Linear	—	—	—	—

Table 3. Archaeological sites within one mile of the project area.

County	Site Trinomial/ Resource Name	Distance From Centerline	Resource Description	Time Period	Further Work	NRHP Eligibility
Collin	41COL66	Within 1 mile	Open Campsite, Wylie Focus	Late Prehistoric	Not recommended	Not Eligible
Collin	41COL102	Within 1 mile	2 Residential Structures	Early 20th Century	None	Undetermined
Collin	41COL168	Intersects	Farmstead	Mid to Late 19th Century	No further work	Not Eligible
Collin	41COL175	Within 1 mile	Open Campsite	Unknown Prehistoric	Further work	Undetermined
Collin	41COL260	Within 1 mile	Scatter	Multicomponent	No further work	Not Eligible

Archaeological Survey Results

Field survey of the entire 7.6 mile proposed waterline was completed by SWCA archaeologist in March and April of 2016. Investigations of the project area involved surface and subsurface investigations of a single transect along the proposed centerline with shovel tests excavated at 100-m intervals in accordance with the Texas Historical Commission’s (THC) standards. Seven negative backhoe trenches were also excavated north of the Trinity River as part of a deep testing program to identify potential buried soils (Appendix A). The work conducted was completed across the full length (7.6 miles) of the proposed project area (Appendix B). A total of 141 possible shovel test locations were recorded. Of these, 99 negative shovel tests were excavated and 42 proposed shovel test locations were not excavated due to disturbance, development, or other factors (Appendix C).

During SWCA's investigation, large portions of the project area were found to be heavily disturbed. Due to the projects alignment along major roads between McKinney and Princeton, Texas (Figure 1) many portions of the proposed project area were pedestrian surveyed and excavation of shovel tests was not possible. Common disturbances included intersecting roads, paralleling roads and associated road berms or drainages, power and telephone lines, and existing water, gas, and fiber optic lines (Figures 2 through 5). Additionally, much of the proposed project alignment intersects existing businesses (Figure 3 and 4). In areas where the proposed project alignment was not disturbed, common prairie vegetation and grasses flourished with occasional riparian environments along ephemeral and intermittent waterways. Agricultural fields covered much of the undisturbed project area (Figure 5).



Figure 2. Overview of disturbances at Shovel Test PN08. View to west.



Figure 3. Overview of Shovel Test PN10. View to east.



Figure 4. Overview of not excavated Shovel Test PN23 at possible historic railroad crossing. View to west.



Figure 5. Overview of agricultural field from Shovel Test AE23. View to west towards site 41COL270.

Pedestrian survey was augmented with shovel tests where possible. A total of 141 possible shovel test locations were recorded; 99 negative shovel tests were excavated, and 42 possible shovel test locations were not excavated due to the above mentioned disturbances (Appendix C). Excavated shovel tests encountered typical Blackland Prairie soils consisting of very dark brown to black (10YR3/1 to 10YR2/1) clay and clay loams. Shovel tests were typically terminated due to compact clay approximately 40–50 cmbs. No cultural material or features were identified below surface in any of the excavated shovel tests.

During pedestrian survey of the proposed project area two new archaeological sites were identified (41COL269 and 41COL270). Both sites were recorded as historic period homesteads or farmsteads with standing structures and features associated with both. Shovel testing at both sites recovered no buried cultural material. In addition to the two newly recorded sites, one previously identified site, 41COL168, was revisited. Site 41COL168 was initially identified during the 2005 survey for the then proposed Airport Road. Since being recorded site 41COL168 has been completely destroyed due to the construction of the high traffic, four lane road. All three sites are discussed in detail below.

Site 41COL269

Site 41COL269 is a possible historic homestead located in the southwest corner of an abandoned lot in central Princeton, Texas. The site measures approximately 28 x 28 m and is situated on a level floodplain (Figure 6). The site is bounded by businesses to the north, a residence to the south, County Road 982 to the east, and a planted agricultural field to the west. Vegetation throughout the site area consists of short grasses with mature hardwoods across the lot (Figure 7).

Pedestrian survey of the site identified two features approximately 30 meters south of the current proposed project area (Figure 8). Feature 1 consists of a corrugated steel garage located at the very southwest corner of the lot. The garage features sliding corrugated doors on the north face, two

garage doors separated by a wooded entrance door on the east face, and a glass window on the west face. All doors were locked, and nothing could be seen of the inside from the windows. Portions of garage had been updated, but wood was heavily weathered and all non-corrugated metal was rusted (wire nails, metal banding on doors). An older electrical box was identified on the southeast corner of the garage (Figure 9). Feature 2 was a concrete storm cellar with locked metal doors located 5 m northeast of the garage. Portions of the eroding concrete exposed large cobbles and gravels. A large imported gravel/concrete drive and parking area wraps around the north, west, and south boundary of the lot providing access to County Road 982 (Figure 8). No surface scatter was identified in the site area.

Six shovel tests were recorded within the proposed project area near the site. Four of these shovel tests were not excavated due to the large gravel drive along the northern boundary of the lot (AE21 to AE23, PN18, and PN20 to PN21). The two excavated shovel tests were located along the edge of the planted agricultural field west of an unnamed tributary of the East Fork of the Trinity River. A typical shovel test consisted of black clay loam (10YR2/1) and terminated around 30 cmbs due to firm clay (Appendix C). No cultural features or material was identified within either of the excavated shovel tests.

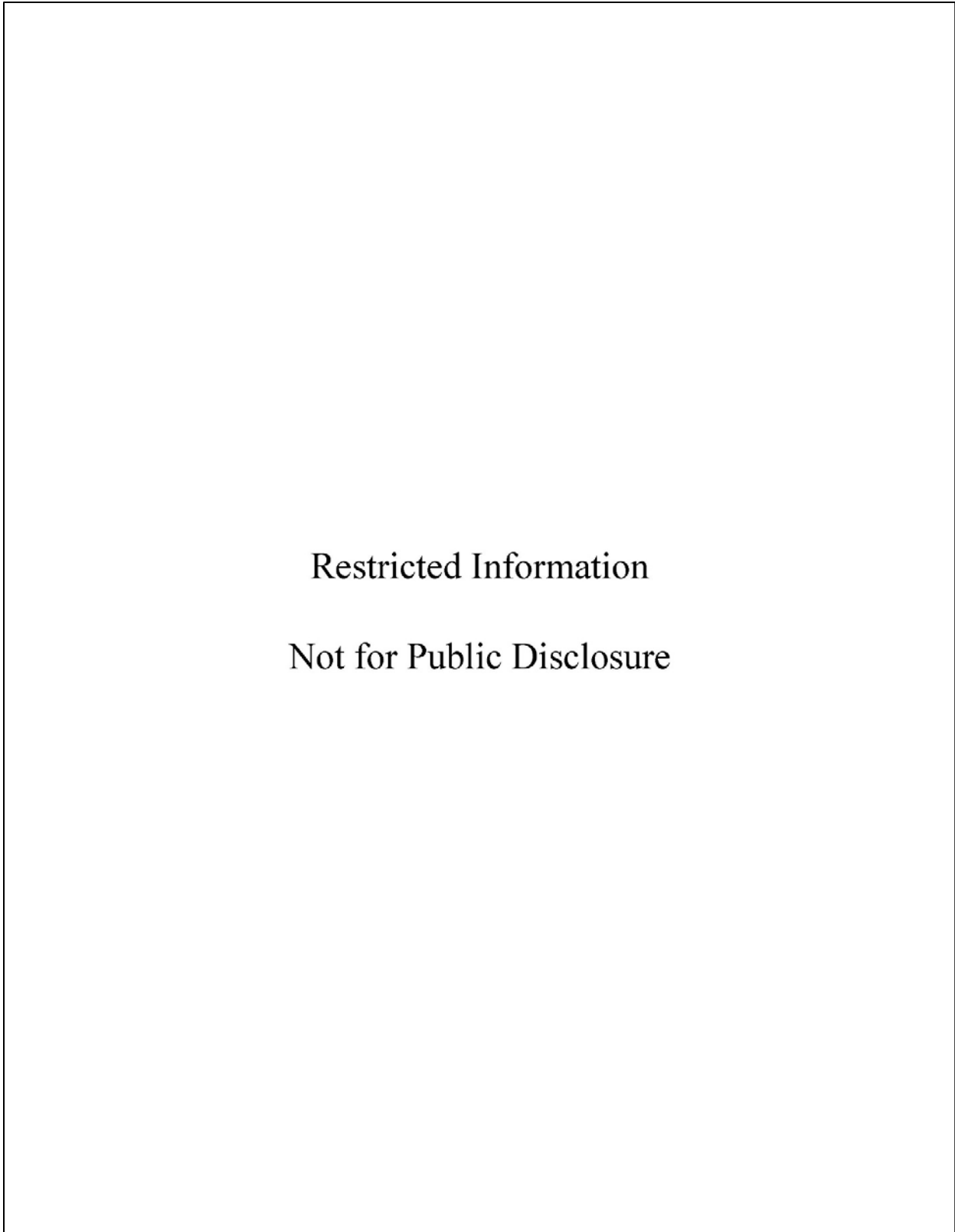


Figure 6. Map of site 41COL269.



Figure 7. Overview of site 41COL269 from north boundary. View to south.



Figure 8. Overview of Features 1 and 2 at site 41COL269. View to southwest.



Figure 9. Electrical box at southeast corner of Feature 1 at site 41COL269. View to southwest.

Site 41COL269 is a historic homestead that likely dates to the early to late twentieth century. Given the lack of associated archaeological deposits within the proposed right-of-way and the distance of the standing structures from the proposed right-of-way, it is SWCA's opinion that the proposed project will have NO EFFECT on site 41COL269, and recommends that no additional investigations are necessary. As no subsurface investigations were undertaken within the boundaries of the site, SWCA recommends that the NRHP eligibility of site 41COL269 be considered as UNDETERMINED.

Site 41COL270

Site 41COL270 is a possible historic homestead located in a dense corpse of mixed woods on the north side of State Highway 380. The site measures approximately 40 x 50 m and is situated on the edge of an active agricultural field (Figure 10). The site is bounded to the south by State Highway 380 and its associated drainage, a telephone line, and a gas pipeline. The remainder of the site is bound by the active agricultural field which had no vegetation during SWCA's investigation. Vegetation throughout the site area consists of very dense cedar and mixed hardwoods with tall grasses and vines (Figure 11).

Pedestrian survey of site 41COL270 identified two features (Figure 10). Feature 1 consists of a dilapidated saltbox barn identified in the southwest corner of the site. The barn was approximately 8 x 6 m (EW x NS) and located 4 m north of the project centerline (Figure 12). Most of the barn has collapsed with only the western wall remaining completely intact. The walls are a mix of wood and corrugated steel. A sparse scatter of church key and sanitary cans along with blue glass, patina

clear glass, and green soda bottle fragments were identified inside the barn (Figure 13). The area immediately around the barn is heavily covered with modern trash likely from SH 380 and its associated ditch on the south side of the site.

Approximately 24 m east of the barn is Feature 2. Feature 2 consisted of a large (2 m diameter) pile of miscellaneous metal, sanitary and beer cans, patina clear glass, clear glass liquor bottles, decorated green and blue glassware, brown and green glass bottles, and fragmented domestic ceramic cups and plates (Figure 14). Modern debris was also found within Feature 2 in the form of miscellaneous plastic, light bulbs, and plastic bottles. A sparse scatter of orange or reddish bricks were identified within Feature 2 and between the two features. No identifiable maker's marks or embossing was identified on any of the bricks.

Six negative shovel tests were excavated to test the site for buried cultural material or features (AE24, AE25, PN27 to PN31). Two shovel tests were outside of the site boundary and within the agricultural field. A typical shovel test consisted of black clay loam (10YR2/1) with termination occurring from 30 to 40 cmbs due to firm clay (Appendix C). No cultural features or material was recovered from any of the excavated shovel tests.

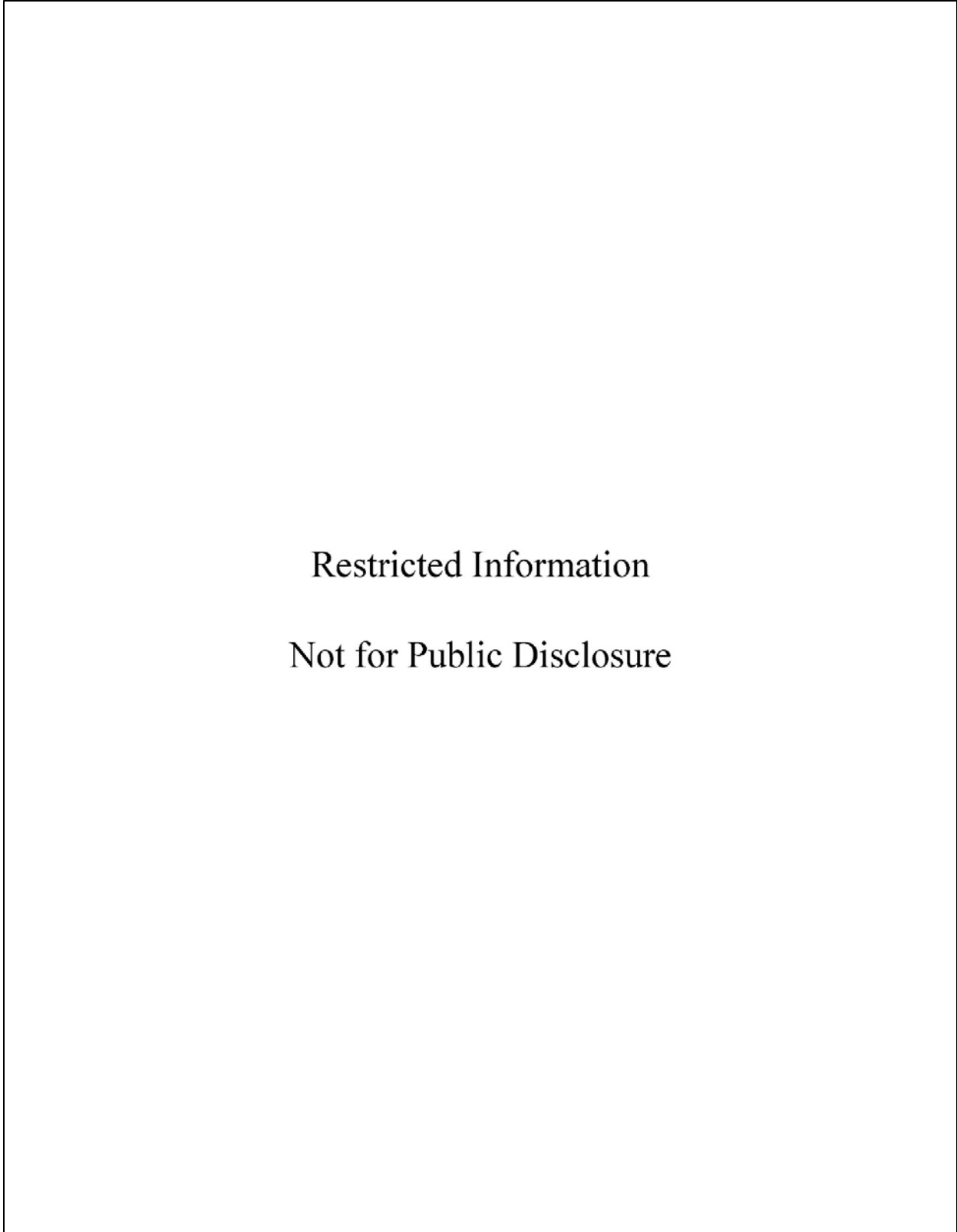


Figure 10. Map of site 41COL270.



Figure 11. View of south wall of Feature 1 at site 41COL270. View to northwest.



Figure 12. Overview of entrance of Feature 1 at site 41COL270. View to northeast.



Figure 13. Sample of surface scatter inside Feature 1 at site 41COL270.



Figure 14. Sample of material within Feature 2 at site 41COL270.

Chain-of-title research was completed for the tract containing site 41COL270 to determine if any person(s) associated with the historic occupation was of local, regional, or national significance. This chain-of-title research was conducted by GeoSearch on April 13, 2016, at the request of SWCA. Chain-of-title information is presented in Table 4 below.

Table 4. Chain-of-Title Information for Parcel Containing Site 41COL270.

GRANTOR	GRANTEE	DOCUMENT TYPE	DATE
Sportsman Nineteen Partners, L.P.	Trination Global Investments P67 Partnership	Warranty Deed File No. 140701000679010	6/30/2014
Princeton 67 Holdings, L.L.C.	Sportsman Nineteen Partners, L.P.	Warranty Deed File No. 100205000121400	2/4/2010
Sportsman Nineteen Partners, L.P.	Princeton 67 Holdings, L.L.C.	Warranty Deed File No. 070605000763820	6/5/2007
Robert G. McCain III	Sportsman Nineteen Partners, L.P.	Warranty Deed File No. 47003388	6/28/2000
Mary Virginia Burton McCain and R. G. McCain Jr.	Robert G. McCain III	Warranty Deed File No. 725340	1/25/1969
N. A. Burton, deceased	Mary Virginia Burton McCain and R. G. McCain Jr.	Probate File No. P-B1792	7/3/1955
Ella N. Wooten	N.A. Burton	Warranty Deed File No. 253156	9/26/1924

Little record of an Ella N. Wooten was found, although there was an important Wooten family in Austin, Texas.

Mr. N. A. Burton was Postmaster of McKinney, Texas, starting in 1913. He was also a prominent local businessman, and his house, which is a Recorded Texas Historical Landmark, still stands at 515 West Hunt Street in McKinney, Texas. As Mr. Burton's house is located in McKinney it is considered unlikely he occupied the location of site 41COL270. For a property to exhibit NRHP eligibility under Criterion B it should "illustrate...a person's important achievements" (National Park Service 1997:14) and simple ownership of a property by a significant person does not meet this criterion. In any case, the architectural remains and the archaeological deposits at site 41COL270 lack the integrity necessary for NRHP eligibility.

Site 41COL270 is a historic homestead that likely dates to the early to late twentieth century. Given the lack of integrity of the deposits, the lack of intact cultural material, and the current investigation within the proposed right-of-way (ROW), it is SWCA's opinion that the site does not contain information which would contribute to our understanding of history or prehistory. As such, SWCA recommends site 41COL270 as NOT ELIGIBLE for inclusion to the NRHP and recommends no further work be conducted at this time.

Site Revisit 41COL168

Site 41COL168 is a previously recorded historic homestead located on Airport Road in eastern McKinney, Texas. The site was initially recorded by Geo-Marine, Inc. (GMI) in 2005 during survey of the then proposed Airport Road for the City of McKinney (TASA 2015). GMI reported the site to consist of eight features and a low density surface scatter of various glass types, ceramics, and bricks. The features included concrete tanks, pads, walls, a manhole, pipe, brick lined well, a washer, and concentration of bricks (TASA 2015). During GMI's 2005 investigation

the site had already been heavily impacted by bulldozing and land clearing. They recommended site 41COL168 as NOT ELIGIBLE, and Airport Road has since been built through the majority of the site.

SWCA's 2016 investigation of site 41COL168 was focused on the eastern portion of the site now located on the side of Airport Road. The site is located upslope and north of an intermittent drainage and the portion remaining consists of short grass vegetation with sparse mature hardwoods (Figure 15). The projects proposed centerline parallels with edge of Airport Road and consists of the disturbed roadside berm (Figure 16). Pedestrian survey of site 41COL168 identified no remaining features or scatters of cultural material.

Six negative shovel tests were excavated to test the site for buried cultural material or features (AE6 to AE8, and PN5 to PN7). All shovel tests were negative for cultural material and heavily disturbed. A typical shovel test consisted of black clay loam (10YR2/1) and with termination occurring from 30 to 40 cmbs due to firm clay (Appendix C). No cultural features or material was identified within the excavated shovel tests.

Site 41COL168 is an historic homestead that likely dates to the early to late twentieth century. Given the lack of integrity of the deposits, the lack of intact cultural material, and the current investigation within the proposed right-of-way (ROW), it is SWCA's opinion that the site will not aid in better understanding of the local or regional history of the area. SWCA recommends the remainder of the site as NOT ELIGIBLE for inclusion in the NRHP and no further work is necessary.



Figure 15. Site overview from Shovel Test AE07. View to west.



Figure 16. Site overview at Shovel Test PN07 at the northern boundary of site 41COL168. View to south.

SUMMARY AND RECOMMENDATIONS

On behalf of Lockwood, Andrews, and Newnam, Inc. (LAN), SWCA Environmental Consultants (SWCA) conducted an intensive cultural resources survey of the proposed 407 McKinney No. 1 to Princeton No. 1 72-inch and 24-inch Pipeline in Collin County, Texas. The investigation included an archaeological background literature and records review, an intensive pedestrian survey augmented by shovel tests, and deep testing of the Trinity River floodplain. As the undertaking will be funded by the City of McKinney and portions of the project are located on city owned property, cultural resources investigations were conducted to satisfy the requirements of the Antiquities Code of Texas under Texas Antiquities Permit 7561.

The background literature review revealed that portions of the project area have been previously surveyed for cultural resources. Within one mile of the project area a total of 11 previous surveys have been conducted, four of which intersect the current proposed project area. Additionally, a total of five previously recorded archaeological sites, 10 properties listed in the NRHP, four cemeteries, two abandoned railroad grades, two historic districts, five historic markers, and approximately 576 potential historic structures were identified within one mile of the proposed project area.

Investigations of the project area involved surface and subsurface investigations of a single transect along the proposed centerline with shovel tests excavated at 100-m intervals in accordance with the Texas Historical Commission's (THC) standards. Out of 141 proposed shovel test locations, 99 negative shovel tests were excavated, and 42 proposed shovel test locations were not excavated due to disturbances within the proposed project alignment. In addition to shovel testing, trenching of the Trinity River floodplain was also conducted. A total of seven negative trenches were excavated north of the Trinity River (Appendix A). The work conducted was completed across the full length (7.6 miles) of the proposed project area (Appendix C).

During SWCA's investigation two archaeological sites, 41COL269 and 41COL270, were identified. Both sites are interpreted as the remains of historic homesteads. These finds are characterized by surficial deposits that are heavily disturbed, contain sparse assemblages, and represent ubiquitous site types. The investigated portions of these resources are recommended NOT ELIGIBLE for the National Register of Historic Places (NRHP). Additionally, one previously recorded site, 41COL168, was revisiting during SWCA's investigation. The site has been completely destroyed by the construction of Airport Road, and SWCA recommends the remaining portion of the site within the project corridor as NOT ELIGIBLE for inclusion in the NRHP.

Based on the results of the investigation, it is SWCA's opinion that the proposed project would result in NO EFFECT ON HISTORIC PROPERTIES. SWCA recommends no further investigations of the investigated project area and that the project be allowed to proceed. No artifacts were collected, thus nothing will be curated except project paperwork and photographs, as per the requirements of the Texas Antiquities Permit 7561.

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**APPENDIX A: SH 380 PIPELINE GEOMORPHOLOGY BY KEN
LAWRENCE**

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PROJECT DESCRIPTION-BACKGROUND

The proposed project alignment is in north-central Texas located in central Collin County, just east of McKinney, Texas. The proposed alignment straddles the East Fork of the Trinity River that begins on an upland, valley margin on the right bank (west side) of the East Fork of the Trinity River and proceeds northeast across the drainage onto the left bank (east side). On the left bank of the East Fork of the Trinity River, the alignment parallels the north side of Greenville Road for 0.4 miles where it crosses the road to parallel on the south side of the road. The alignment then parallels the East University Drive (FM 1827) for approximately 0.5 miles before entering the uplands surrounding the East Fork of the Trinity River floodplain (see Figure 1, main report). The alignment continues for another 0.4 miles crossing the uplands where it terminates. This report section regards the portion of the alignment that crosses the alluvial flood plain of the East Fork of the Trinity River.

The Trinity River is solely contained within Texas and is generally recognized to have an upper and lower extent (Gard 2010). The project location is within the Upper Trinity River basin that is situated in the North Central Plains region and encompasses the headwaters region of the basin bounded by the Brazos River basin to the south and the Red River basin to the north. The Upper Trinity River is recognized to cross forested rolling topography with narrow stream channels with three main headwater branches, the Elm Fork, the West Fork, and the Clear Fork Rivers (Ferring 1991; Gard 2010; Williams 2004). Some of the prominent contributory drainages in the Trinity River basin include Elm Fork, East Fork, West Fork, and Clear Fork Rivers. Less prominent tributaries include Ten Mile, Five Mile, White Rock, Keechi, Clear, Hickory, and Cedar creeks as well as Cedar Bayou. The project area is located on the East Fork, which is the easternmost tributary in this basin and is about 78 miles (125 km) long and extends through Grayson, Dallas, and Kaufman Counties.

Previous Investigations

The Trinity River and its deposits have been of interest to geologists and archaeologists for over a hundred years (Ferring 2000). Arguably, the first geoarchaeological investigation to have been conducted in Texas occurred in 1920 in the Trinity River basin. Specifically, Robert Hill and Ellis Shuler examined a human skeleton discovered at the Lagow Sand Pit along the Trinity River in Dallas County to determine its association with Pleistocene fauna (e.g., mammoth, camel, and horse) also discovered there (Ferring 2000:47). Hill and Shuler interpreted the human remains to be contemporaneous with the Pleistocene fauna, although subsequent analyses in the late 1960s determined that the remains were actually much younger.

Despite the fact that these early researchers (e.g., Robert Hill, Cyrus Ray, or Ellis Shuler) did not benefit from radiocarbon dating, their research attempted to determine the age of the Trinity River terraces and its deposits had some success. The first researchers to characterize the terraces of the Trinity River in combination with reconstructing the paleoenvironment were Stovall and McAnulty (1950) in Henderson County. Concerted geoarchaeological investigations appear to have begun in the late 1960s in the lower extent of the Trinity River basin and in the 1980s for the upper extent. In the Lower Trinity River basin, Aten (1983) conducted a series of archaeological investigations along the coast with a research focus on geomorphic processes.

For the Upper Trinity River basin, the research that occurred for Lake Ray Roberts involved an extensive geoarchaeological component (Prikryl and Yates 1987). Since then several significant geoarchaeological investigations have been carried out in the Trinity River Basin. Interestingly, the research in the Trinity River basin has largely been conducted either in the upper extent or in the extreme lower extent along the Gulf Coast. Despite the limited amount of geoarchaeological investigations within the basin, the research that has been conducted is thorough and far-reaching.

The most extensive geoarchaeological investigations within the Trinity River basin and in proximity to the project area are associated with the Ray Roberts-Lewisville Reservoir project in Cooke, Denton, and Grayson Counties (Prikrýl and Yates 1987; Ferring and Yates 1997). The creation of these reservoirs from the impoundment of segments of the Elm Fork River generated archaeological investigations extending over two decades by a variety of interdisciplinary researchers (e.g., SMU, Environmental Consultants Inc., USACE-FW, and University of North Texas). Among the many notable accomplishments from this research was the discovery and investigation of the Aubrey Clovis site (41DN479). The Aubrey Clovis site situated on the Elm Fork River was identified to have an intact stratigraphy extending back into the Pleistocene (Ferring 1990, 1991, 1992, 1994, 1995a, 1995b, 2000, 2001; Humphrey and Ferring 1994). Most significant, the site has a Paleoindian occupation with a well-dated stratigraphy that suggests it is the oldest Clovis site currently known (Ferring 2001). In addition, the extensive investigations at Aubrey Clovis have provided a robust radiocarbon dataset and information from past environments.

Finally, a geoarchaeological examination was conducted at the Dickie Carr site (41PR26) also in the upper extent of the Trinity River basin (Byers 2007). The Dickie Carr site is located in eastern Parker County situated on a terrace of Mill Creek, a tributary of West Fork River. Byers (2007:57–72) identified three stratigraphic units (Units I–III) that contained a complex stratigraphy extending to the Late Pleistocene with the remains of a *Mammuthus columbi* (Unit Ib), a Late Paleoindian component (Unit IIa), and a Late Archaic component (Unit IIb). The researcher compared the site deposits and setting with other archaeological sites in the region. Unfortunately, no chronometric analyses were conducted for this research.

Geomorphic/Alluvial History

The following review of the depositional history of the Trinity River basin is composed of an intensive review of the interpretations associated with the Ray Roberts-Lewisville Reservoir project and particularly the Aubrey Clovis site (41DN479). Although this depositional history is in the upper limits of the basin, upstream from the project area, the data is interpreted to be comparable to the East Fork of the Trinity River. In summarizing the alluvial history of the Upper Extent of the Trinity River basin, Ferring (1994) recognizes four morphostratigraphic units (i.e., landforms) composed of deposits from six alloformations. The morphostratigraphic units identified from oldest to youngest include the Stewart Creek Terrace, Hickory Street Terrace, Denton Creek Terrace, and the Floodplain that are interpreted to encompass the Middle Pleistocene up to the present.

The Stewart Creek Terrace composed of Irving alloformation deposits and the Hickory Street Terrace, which is composed of the Coppel alloformation deposits are indicated to date to the Pleistocene sometime around 30,000 years ago (Ferring 1994; Ferring and Yates 1997). The more recent Denton Creek Terrace is composed of deposits from the Carrollton alloformation that contain Pleistocene faunal remains (e.g. *Bison antiquus*) and is interpreted to date to roughly 30,000–20,000 years ago (Ferring 1994:47–48). Most relevant to the archaeology of the region is the landform identified as the Floodplain. The Floodplain contains deposits from three alloformations that from oldest to youngest include the Aubrey, Sanger, and Pilot Point alloformations.

Ferring (1994) indicates that the Aubrey alloformation dates to the Late Pleistocene-Holocene transition. The *terminus ante quem* for this alloformation is from the Aubrey Clovis site (41DN479), which initially calibrated to 17,030 cal yr BP (SMU-2236) and terminates sometime after 14,410 cal yr BP (Ferring 1994; Ferring and Yates 1997). The initial calibration of the overlying Sanger alloformation begins in the Late Pleistocene sometime prior to 13,460 cal yr BP (AA-5274) and extends to sometime after 7,550 cal yr BP (SMU-2339) (Ferring 2001: Table 3.2). Ferring (1994:58–59) notes that the Sanger alloformation is capped by a moderately developed buried soil that in several locations has been eroded by the Pilot Point alloformation. The Pilot Point deposits began prior to 4,470 cal yr BP (SMU-2401) and terminated sometime after 1,676 cal yr BP (Beta-14963). A well-developed cumulic soil identified as the West Fork soil frequently caps the Pilot Point alloformation interpreted to encompass the last 4,000 years.

Beginning in the Late Pleistocene, the alluvial history of the Upper Trinity River basin as defined by Ferring (1994:147–149) has a period of stasis with no discernable geomorphic activity occurring between 14,000–11,000 years ago (17,000–13,000 calibrated). Specifically, Ferring (1994:147) notes that no alluvial or colluvial deposition or evidence of a disconformity is associated with this period. Subsequent to 11,000 years (13,000 calibrated) ago, a period of rapid alluviation occurs in the basin initiating a phase of valley filling. Interestingly, this period of rapid alluviation occurred shortly after the Clovis occupation at the Aubrey Clovis site and continued until 7,500 years ago (7,550 calibrated) (Ferring 1994:148). This event is inferred to be associated with a shift to a moister (i.e., mesic) climate. By the middle of the Holocene, a shift to a drier (xeric) climate occurred as evidenced by soil development in the Sanger alloformation and eolian deposits in some of the uplands of the upper basin of the Trinity River (Ferring 1994:148). These xeric conditions seemingly continued until roughly 4,500 years ago when a period of rapid alluviation occurred and the deposition of the Pilot Point alloformation began (Ferring 1994:148–149). The rapid alluviation is particularly apparent between 3,000–2,000 years ago (Ferring 1994:149).

In contrast to other researchers, Ferring (1994) notes that alluviation in the Upper Trinity River basin does not correlate with arid conditions. Instead, Ferring (1994:150–153) noted in this basin that the fluvial response to moist conditions was rapid alluviation and/or erosion while drier conditions led to stability and soil development and that the primary internal influence on a landscape's evolution is the underlying bedrock, which affects the vegetation. Specifically, the calcareous loams and clay loams derived from weathered limestone support a prairie environment that is more resistant to erosion. Conversely, the non-calcareous soils derived from sandstone and shale supports a mixed forest environment that has a lower threshold for erosion. Two primary external influences identified are the climate and changes in sea level. Although no examples are provided, eustatic influence is proposed as a possible influence to the upper extent of the basin.

Regarding overall archaeological potential within the upper basin, Ferring and Yates (1997) indicate that archaeological sites occur in two principal contexts (i.e., terraces and upon or below floodplains). For the terraces, Ferring and Yates (1997) propose that the Trinity River terraces between Dallas and Valley View are Late Pleistocene in age. As such, any archaeological sites less than 11,000 years old (~13,000 calibrated) could occur on the terrace surfaces, which are supported by numerous surveys in the area particularly in Denton, Dallas, and Tarrant Counties (Ferring and Yates 1997:279).

For the floodplains in the Upper Trinity River basin, the age of the sites on the floodplains can be predicted by their stratigraphic location (Ferring and Yates 1997: Table 18.2). Unfortunately, Ferring and Yates (1997) note that cutbank exposures along Elm Fork River are “poor” and alluvial units thicken as they progress downstream. Consequently, older sites will become increasingly difficult to discern downstream. This will be particularly evident for Paleoindian–Middle Archaic sites, which will likely require mechanical excavation for their discovery. In contrast, the Pilot Point alloformation is exposed within the cutbanks of the entire upper extent of the basin and is characterized as thick, dark and clayey with a buried soil (West Fork soil) located beneath recently deposited sand (Ferring and Yates 1997:280).

Results

The surface geology for the project area indicates that the project alignment begins and ends in Upper Cretaceous-aged Austin Chalk deposits and crosses Holocene aged alluvium centered upon the East Fork of the Trinity River floodplain (McGowen et al. 1991). The Austin Chalk deposits at the western and eastern alignment termini are characterized as consisting of chalk with interbeds of calcareous clay (McGowen et al. 1991). The alluvium deposits are described as containing sand, silt, clay, and gravel (McGowen et al. 1991).

In order of predominance, the soils in the project alignment are mapped as Tinn clay (frequently flooded) and Houston Black clay, Austin silty clay, and Eddy gravelly clay loam (Natural Resources Conservation Service [NRCS] 2016). The Tinn clay encompasses the entire East Fork of the Trinity River flood plain

and is characterized as very deep, moderately well drained soils formed in calcareous clayey alluvium (NRCS 2017). The Houston Black clays (1–3 percent slopes) occupy the valley margins of the project alignment and consist of very deep, moderately well drained soils formed in clayey residuum derived from calcareous mudstone (NRCS 2017). The Austin silty clay (2–5 percent slopes) are situated on upland slopes overlooking the flood plain are described as eroded, moderately deep soils formed in residuum weathered from chalk (NRCS 2017). Finally, the Eddy gravelly clay loam (2–5 percent slopes) are positioned on the uplands and are characterized as eroded soils that are shallow to very shallow soils formed in residuum from chalky limestone (NRCS 2017).

At the project area, the East Fork of the Trinity River is a competent drainage with an approximately 30 foot (9 m) wide base and a slow northwest-southeast flowing channel minimally 4.5 feet (1.25 m) in depth. The East Fork at the Trinity River at this crossing has a high sinuosity ratio (SR) of 2 indicating that it is meandering waterway, which is apparent from the McKinney East topographic quadrangle map (Charlton 2008:138–139). This high SR value indicates that lateral erosion and extensive sediment deposition are occurring within the channel particularly at exterior and interior meander bends. Notably, the left bank (east side) is positioned on an interior bend of the drainage while the right bank is on an exterior bend. The channel base is positioned at 518 feet above mean sea level (amsl) while the surrounding flood plain in the project area is generally at 530 feet amsl.

The East Fork of the Trinity River valley is incised with a paired, stair-stepped terrace system consisting of alluvial terraces that bracket the drainage created by various episodes of overbank deposition (Waters 1992:149–151). Both banks of the East Fork of the Trinity River exhibit one terrace landform that is perched roughly 12 feet (3.6 m) above the drainage (Figures A–1, A–2, and A–3). The terrace landform on the right bank (west side) ranges from 300 to 1,600 feet (91–488 m) in width where it drapes the upland valley slope. The flood plain on the left bank (east side) is much wider in the project area ranging from 1,900 to 4,700 feet (580–1433 m) in width. Portions of the East Fork of the Trinity River drainage, as it passes through the project alignment, have natural levee features. These features are situated along the edge of the flood plain in concave portions of the channel and indicate overbank flooding where heavier sediments drop out during flooding (Leopold et al. 1992; Reineck and Singh 1975:244). These lunate shaped natural levees are roughly 2 to 3 feet (0.6–0.9 m) high, 8 to 10 feet (2.4–3 m) wide, and gradually slope away from the channel (Figure A–4). The project alignment also crosses several tributary channels that drain the flood plain. One tributary channel is located on the right bank (west side) and two tributaries are located on the left bank (east side) near East University Drive (FM 1827). All of the tributaries on the flood plain are narrow and less than 2 feet (0.6 m) in depth. Further, the two tributaries near East University Drive appear to have been extensively modified (e.g., straightened) and possibly channelized to assist flood plain drainage (Figure A–5). Overall, the project alignment is bracketed by the valley margin uplands of the East Fork of the Trinity River and primarily crosses a low lying, frequently inundated, dynamic fluvial environment.



Figure A-1. Downstream view of East Fork of the Trinity River near project alignment; facing south.



Figure A-2. Upstream view of East Fork of the Trinity River near project alignment; facing west.



Figure A-3. Overview East Fork of the Trinity River near project alignment; looking downstream; facing south.



Figure A-4. Overview of East Fork of the Trinity River left bank floodplain near project alignment; facing south. Arrow indicates apex of natural levee.



Figure A-5. Overview of tributary drainage and numerous disturbances (water line, fiber optic line, berm); facing west.

Thirteen backhoe trenches were excavated along the proposed project alignment (Figures A-6 and A-7). However, seven trenches (BHT01A-07A) were placed along the initial alignment in 2016 while six trenches (BHTs Trin01-06) were more recently placed along the current alignment (reroute) in 2017. All thirteen trenches were placed on the left bank of the East Fork of the Trinity River. The far eastern portions of the project alignment on the left bank of the drainage were evaluated solely by shovel tests due to extensive disturbances including buried fiber optic lines and extensive modifications (see Figure A-5). Several areas along the reroute alignment also had extensive earth movement disturbance from the construction of a pond and a road (see Figure A-6).

With the exception of Trin01 and Trin02, closest to the drainage, the trenches contained similar soil profiles (Table A-1). All of the trenches were minimally excavated to a depth of 124 cmbs, but generally exceeded 250 cmbs. Trenches (Trin05 and Trin06) at the eastern end of the reroute encountered the water table at roughly 120 cmbs that prevented deeper investigations (Figure A-8).

Trenches Trin01 and Trin02 consisted of strata of clay loam that with depth transitioned into clays with varying amounts of slickensides (Figure A-9). Slickensides form during the expansion stresses (swell) of the clay in wet periods and subsequent contraction (shrink) during dry periods (Schaetzl and Anderson 2005:283-285). As a consequence, these shrink-swell cycles can translocate vertically any cultural materials that may be present. Notably, the third horizon (Strat III), beginning around 40-50 cmbs, appears to be partially truncated possibly from erosional processes or earth movement activities. The overlying Strats I and II abruptly cap this horizon evidenced by having lower boundaries of clear to abrupt distinctness and slightly wavy topography suggesting disturbance. Water was observed to seep into the trenches at roughly 260 cmbs (Table A-1).

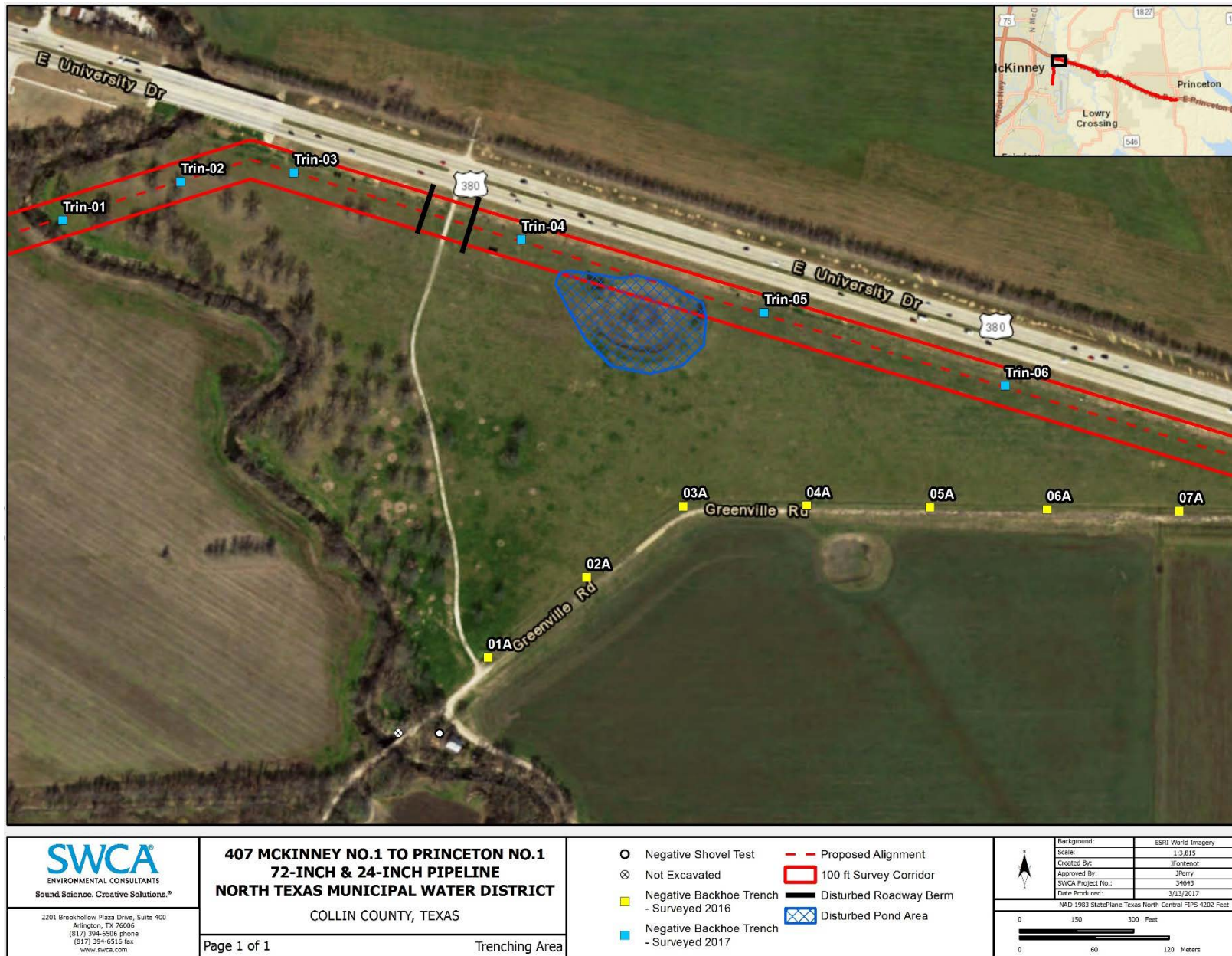


Figure A-6. Project alignment with backhoe trenches indicated.

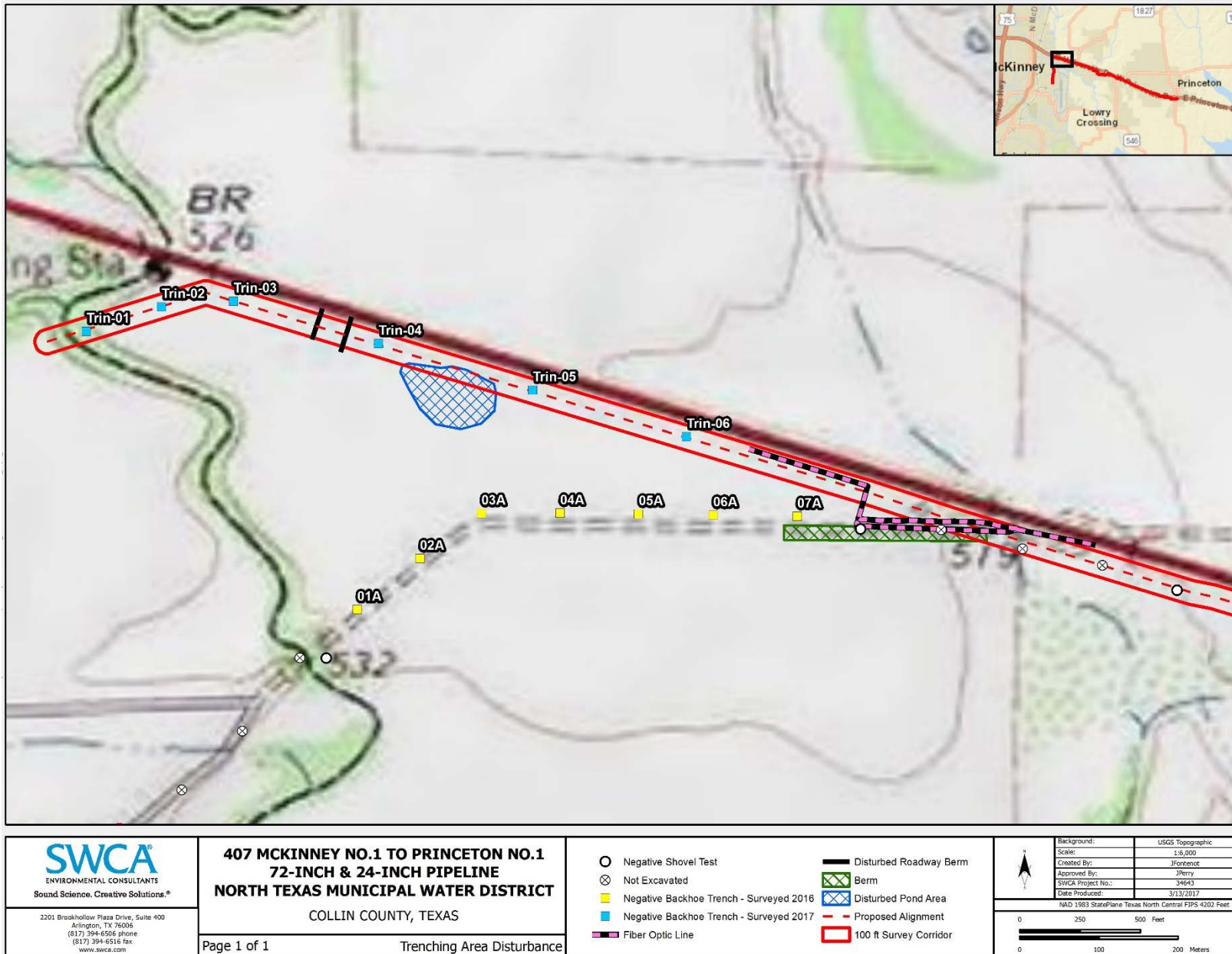


Figure A-7. Project alignment with backhoe trenches indicated.

Table A-1. Backhoe Trench Reroute Results

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
TRIN-01	0-13	10YR 3/2	Very Dark Grayish Brown	Clay loam	Friable consistency; crumb parting to subangular blocky structure, fine size, weak grade; 5% earthworm casts, 20-30% roots and rootlets, and insect burrows <5%.	Clear and Smooth	None	Root Zone-disturbed
	13-51	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Loamy Clay	Friable to firm consistency; subangular blocky structure, medium structure, weak to moderate grade; 15% rootlets, 5% earthworm casts, 5% insect burrows, and 3% snail shell fragments	Clear to Abrupt and Smooth to Wavy	None	None
	51-148	10YR 4/2	Dark Grayish Brown	Loamy Clay	Firm consistency; angular blocky structure, medium size, moderate grade; 5% rootlets, 3% earthworm casts, dark staining at surface of horizon (vegetation clearing), slickensides 5mm-2cm 20%	Clear and Smooth	None	Truncated horizon; several discontinuous lenses observed of 1-3mm thick, gray clay (flood events?)
	148-304+	10YR 4/3	Brown	Clay Loam	Friable consistency; crumb parting to subangular blocky structure, medium size, moderate grade; rootlets 2%, worm burrows 3%, and slickensides 1-2 cm 4%	Unobserved	None	Mottles 10YR 5/6, 2mm 3%; observed from above after 182 cmbs
TRIN-02	0-14	10YR 3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Clay loam	Friable consistency; crumb parting to subangular blocky structure, fine size, weak grade; 15% earthworm casts	Clear and Smooth	None	Root Zone-disturbed
	14-36	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Loamy Clay	Friable to firm consistency; subangular blocky structure, medium structure, weak to moderate grade; 5% rootlets and 15% earthworm casts	Clear to Abrupt and Smooth to Wavy	None	None
	36-94	10YR 4/2	Dark Grayish Brown	Loamy Clay	Firm consistency; angular blocky structure, medium size, moderate grade; snail shell (heliodiscus) 1-2% and snail fragments 3%	Clear and Smooth	None	None
	94-303+	10YR 4/3	Brown	Clay Loam	Friable consistency; crumb parting to subangular blocky structure, medium size, moderate grade; snail shell (heliodiscus) 1-2% and snail fragments 3%	Unobserved	None	Water table at 263 cmbs; observed from above after 152 cmbs

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
TRIN-03	0-11	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb structure, fine size, weak grade; 30% rootlets, 5% earthworm casts	Clear and Smooth	None	Root Zone-disturbed
	11-58	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb parting to subangular blocky structure, fine size, weak grade, with 15% rootlets, 5% earthworm casts, 5% insect burrows	Gradual and Smooth	None	None
	58-111	10YR 4/2-4/3	Dark Grayish Brown to Brown	Clay loam	Friable consistency; subangular blocky structure, medium size, moderate grade; 10% rootlets, 5% earthworm casts, 5% snail shell fragments, and 1% heliodiscus snail shell	Clear and Smooth	None	None
	111-154	10YR 3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Loamy Clay	Friable to firm consistency; subangular blocking parting to angular blocky structure, medium size, moderate grade; 3% rootlets, 5% snail shell, 1% heliodiscus snail shell, and 20% slickensides 5mm	Clear and Smooth	None	Buried soil?
	154-258+	10YR 4/2-4/3	Dark Grayish Brown to Brown	Clay loam	Firm consistency; angular blocky structure, medium size, moderate grade; 2% rootlets, 5% snail shell fragments, 2% heliodiscus snail shell, and 40% slickensides 1 cm in size	Unobserved	None	Watertable at 243 cmbs; observed from above after 188 cmbs
TRIN-04	0-13	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb structure, fine size, weak grade; 30% rootlets and 5% earthworm casts	Clear and Smooth	None	Root Zone-disturbed
	13-34	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb parting to subangular blocky structure, fine size, weak grade; 15% rootlets, 5% earthworm casts, and 5% insect burrows	Gradual and Smooth	None	None
	34-99	10YR 4/2-4/3	Dark Grayish Brown to Brown	Clay loam	Friable consistency; subangular blocky structure, medium size, moderate grade; 10% rootlets, 5% earthworm casts, 5% snail shell fragments, and 1% heliodiscus snail shell	Gradual to Diffuse and Smooth	None	None

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
	99-161	10YR 3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Loamy Clay	Friable to firm consistency; subangular blocky parting to angular blocky structure, medium size, moderate grade; 3% rootlets, 10% snail shell, 1-2% heliodiscus snail shell, and 30% slickensides 2-3mm	Clear and Smooth	None	Very subtle transition of lower boundary
	161-246+	10YR 4/2-4/3	Dark Grayish Brown to Brown	Clay loam	Firm consistency; angular blocky structure, medium size, moderate grade; 2% rootlets, 15-20% snail shell fragments, 4% heliodiscus snail shell, and 20% slickensides 5 mm-1 cm in size	Unobserved	None	Watertable at 243 cmbs; observed from above after 192 cmbs
TRIN-05	0-14	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb structure, fine size, weak grade; 30% rootlets and 5% earthworm casts	Clear and Smooth	None	Root Zone-disturbed
	14-45	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb parting to subangular blocky structure, fine size, weak grade; 15% rootlets, 5% earthworm casts, and 5% insect burrows	Gradual and Smooth	None	Crawfish chimneys (2%)
	45-96	10YR 4/2-4/3	Dark Grayish Brown to Brown	Clay loam	Friable consistency; subangular blocky structure, medium size, moderate grade; 10% rootlets, 5% earthworm casts, 5% snail shell fragments, and 1% heliodiscus snail shell	Clear and Smooth	None	Crawfish chimneys (2%)
	96-124+	10YR 3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Loamy Clay	Friable to firm consistency; subangular blocky parting to angular blocky structure, medium size, moderate grade; 3% rootlets, 5% snail shell, 1% heliodiscus snail shell, and 20% slickensides 5mm	Clear and Smooth	None	Water seeping in at 118 cmbs
TRIN-06	0-17	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb structure, fine size, weak grade; 30% rootlets and 5% earthworm casts	Clear and Smooth	None	Root Zone
	17-54	10YR 3/2-3/3	Very Dark Grayish Brown to Dark Brown	Clay loam	Friable consistency; crumb parting to subangular blocky structure, fine size, weak grade; 15% rootlets, 5% earthworm casts, and 5% insect burrows	Gradual and Smooth	None	None

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
	54-109	10YR 4/2-4/3	Dark Grayish Brown to Brown	Clay loam	Friable consistency; subangular blocky structure, medium size, moderate grade; 10% rootlets, 5% earthworm casts, 5% snail shell fragments, and 1% heliodiscus snail shell	Clear and Smooth	None	None
	109-131+	10YR 3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Loamy Clay	Friable to firm consistency; subangular blocky parting to angular blocky structure, medium size, moderate grade; 3% rootlets, 3% snail shell, 1% heliodiscus snail shell, and 20% slickensides 5mm	Clear and Smooth	None	Water seeping in at 124 cmbs
BHT01A (2016)	0-34	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam	Friable, subangular to angular structure, medium size, moderate structure; roots and rootlets, 15% subrounded pebbles and rare subrounded gravels	Abrupt-Slightly Wavy	Historic/Recent-age artifacts: 10 ceramics, 1 whiteware, bottle glass (20 clear, 5 green), 20-30 metal fragments, sanitary can fragments	Disturbed horizon, cultural material in upper 25 cm
	34-54	10YR5/2-5/3	Grayish Brown to Brown	Sandy Clay Loam	Friable to firm, subangular blocky structure, medium size, moderate grade; rootlets, worm casts, insect pinholes, 2-3% rounded gravels, 5-10% subrounded pebbles	Clear-Slightly Wavy	None	Disturbed, possibly truncated; No cultural material encountered
	54-91	10YR3/2-4/2	Very Dark Grayish Brown to Dark Grayish Brown	Clay Loam	Friable, subangular blocky structure, medium to coarse size, moderate grade; rootlets, insect pin holes, 20% subrounded pebbles	Abrupt-Smooth	Historic/Recent-age artifacts: 1 whiteware at 65 cmbs	Disturbed; 10YR6/3 Pale Brown lens, friable sandy loam from 82-86 cmbs, ranges from 2-10 cm thick, discontinuous, smooth, 20% subrounded pebbles
	91-111	10YR5/3-5/4	Brown to Yellowish Brown	Sandy Loam	Friable, angular blocky structure, medium size, moderate grade; snail shell (<i>Heliodiscus singleyanus?</i>), rootlets, insect pin holes	Clear-Smooth	None	Natural stratigraphy begins; top of horizon appears to be truncated; No cultural material encountered
	111-180	10YR3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Sandy Clay Loam	Friable, subangular structure, medium size, moderate grade; snail shell (<i>Heliodiscus singleyanus?</i>), rootlets	Gradual-Smooth	None	Base of strat observed from above; No cultural material encountered; Buried soil?

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
	180–210+	10YR4/3	Brown	Clay Loam-Clay	Friable, subangular blocky structure, medium size, moderate grade; 2% subrounded pebbles	Unobserved	None	Strat observed from above; No cultural material encountered
BHT02A (2016)	0–10	10YR3/1-2/1	Very Dark Gray to Black	Clay Loam	Friable, subangular blocky structure, fine to medium size, weak grade; Rootlets, worm casts, insect pin holes	Clear–Smooth	None	Disturbed horizon; no cultural material encountered
	17–93	10YR3/2	Very Dark Grayish Brown	Clay Loam	Friable, subangular blocky structure, fine to medium size, moderate grade; Rootlets, snail shell fragments, worm casts, insect pin holes, 2% subrounded pebbles, 40% subtle slickensides from 30-80 cmbs	Abrupt–Smooth	clear glass fragment at 20 cmbs, metal fragments at 45 cmbs	Disturbed, possibly truncated
	93–180	10YR3/1-2/1	Very Dark Gray to Black	Clay	Friable to firm, angular blocky structure, medium to coarse size, moderate grade; Rootlets, snail shell (indeterminate), 40% prominent slickensides	Unobserved	One amber glass fragment 118 cmbs	Base of strat observed from above; No cultural material encountered
	180–240+	10YR4/1	Dark Gray	Clay	Friable to firm, angular blocky structure, medium to coarse size, moderate grade; 5% calcium 1-3 mm carbonate nodules	Unobserved	None	Strat observed from above; No cultural material encountered
BHT03A (2016)	0–17	10YR3/1	Very Dark Gray	Clay Loam	Friable, subangular blocky structure, medium size, weak grade; rootlets, worm casts, insect pins, 20% subrounded pebbles	Clear–Smooth	None	No cultural material encountered
	10–88	10YR3/2-4/2	Very Dark Grayish Brown to Dark Grayish Brown	Clay Loam	Friable, subangular blocky structure, medium to coarse size, moderate grade; Rootlets, snail shell (<i>Rabdotus mooreanus?</i>), <1% rounded pebbles, 30% slickensides from 40-93 cmbs	Clear–Smooth	One clear glass fragment 33 cmbs, metal fragment 35 cmbs; trailer hitch 50 cmbs; one amber glass 75 cmbs	Disturbed horizon
	88–180	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay	Friable to firm, angular blocky structure, coarse size, strong grade; Rootlets, snail shell (<i>Heliodiscus singleyanus?</i>), 50% prominent slickensides, 5% calcium carbonate	Gradual–Smooth	None	Base of strat observed from above; No cultural material encountered
	180–210+	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam-Clay	Friable, subangular blocky structure, medium to coarse size	Unobserved	None	Strat observed from above; No cultural material encountered

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
BHT04A (2016)	0–13	10YR3/2	Very Dark Grayish Brown	Clay Loam	Friable, subangular blocky structure, fine size, weak structure; roots and rootlets, worm casts, insect pin holes, 2% subrounded pebbles	Gradual–Clear	None	Root zone; No cultural materials
	13–31	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam	Friable, subangular blocky structure, fine to medium size, moderate grade; rootlets, 2% angular gravels, 3% subangular pebbles, worm casts, 40% prominent slickensides	Clear–Wavy	None	Disturbed; No cultural material encountered
	31–47	10YR5/2-6/2	Very Dark Grayish Brown to Dark Grayish Brown	Clay Loam	Friable, subangular blocky structure, fine size, weak grade; rootlets, 40% road gravels (small angular limestone cobbles)	Clear–Wavy	Ferris brick fragment, rare amorphous metal	Disturbed road base
	47–106	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Sandy Loam	Friable, subangular blocky structure, medium size, moderate grade; snail shell (<i>Heliodiscus singleyanus?</i>), rootlets, 40% prominent slickensides, 1% vertical cracking	Gradual–Smooth	None	Disturbed, burned tree stump at top of strat; No cultural material encountered
	106–180	10YR3/1-3/2	Very Dark Gray to Very Dark Grayish Brown	Sandy Clay Loam	Friable, angular blocky structure, fine size, strong grade; snail fragments, rootlets, crawfish	Clear to Gradual–Smooth	None	Possible buried soil, seeping water on floor; No cultural material encountered
	180–220+	10YR5/4-6/4	Yellowish Brown to Light Yellowish Brown	Clay	Friable to firm, angular blocky structure, medium to coarse size, moderate to strong grade; 4% pebbles and small gravels, 2% calcium carbonates,	Unobserved	None	Strat observed from above; No cultural material encountered
BHT05A (2016)	0–11	10YR3/1	Very Dark Gray	Clay Loam	Friable, subangular blocky structure, fine size, weak grade; Rootlets, worm casts	Clear–Smooth	None	Disturbed horizon; no cultural material encountered
	11–36	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam	Friable, platy structure, fine size, moderate grade; Rootlets, insect pinholes, 1-2% angular limestone pebbles, 50% prominent slickensides	Clear–Smooth to Slightly Wavy	clear glass fragment at 20 cmbs, metal fragments at 45 cmbs	Disturbed; No cultural material encountered
	36–91	10YR4/1	Dark Gray	Clay Loam	Friable, subangular blocky structure, medium to fine size, weak grade; Rootlets, snail shell fragments, worm casts, 20% subtle slickensides	Gradual–Smooth	Metal wire at 70 cmbs	Disturbed; 10YR7/3 Very Pale Brown discontinuous lens at 74 cmbs, about 5 cm thick and 1 m long

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
	91–145+	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam-Clay	Friable to firm, angular blocky structure, medium to coarse size, moderate grade; rare rootlets, snail shell fragments, crawfish, 40% prominent slickensides, 20 cm diameter pocket of reddish yellow clay at 103 cmbs	Unobserved	None	Water seeping in at base; No cultural material encountered
BHT06A (2016)	0–14	10YR3/1	Very Dark Gray	Clay Loam	Friable, subangular blocky structure, fine to medium size, weak grade; Rootlets, 5% angular gravels and pebbles	Clear–Smooth	None	Disturbed; No cultural material encountered
	14–31	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam	Friable, subangular blocky structure, medium size, moderate grade; Rootlets, <5% angular gravels and pebbles, 10% subtle slickensides	Clear–Smooth	None	Disturbed; No cultural material encountered
	31–61	10YR4/1	Dark Gray	Clay Loam	Friable, subangular blocky structure, medium size, moderate grade; Rootlets, snail shell fragments, 40% prominent slickensides, 5% pebbles	Clear–Smooth	Clear glass fragment at 47 cmbs	Disturbed
	61–81	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam	Friable, subangular blocky structure, medium size, moderate to weak grade; Rootlets, snail shell fragments, 10% subtle slickensides, 2% pebbles	Clear–Smooth	None	Disturbed, possibly truncated; No cultural material encountered
	81–130+	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam-Clay	Angular blocky structure; Rootlets, snail shell, 2% pebbles	Unobserved	None	No cultural material encountered
BHT07A (2016)	0–11	10YR3/1	Very Dark Gray	Clay Loam	Friable, subangular blocky structure, fine size, weak grade; Rootlets, worm casts	Clear–Smooth	None	Disturbed horizon; no cultural material encountered
	11–31	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam	Friable, platy structure, fine size, moderate grade; Rootlets, insect pinholes, 1-2% angular limestone pebbles, 50% prominent slickensides, 1% subrounded gravels	Clear–Smooth to Slightly Wavy	None	Possibly disturbed; No cultural material encountered
	31–54	10YR4/1	Dark Gray	Clay Loam	Friable, subangular blocky structure, medium to fine size, weak grade; Rootlets, snail shell fragments, worm casts, 20% subtle slickensides, 1% road gravel at 42 cmbs	Gradual–Smooth	One plastic fragment at 34-35 cmbs	Possibly disturbed, recent plastic debris observed

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Trench	Depth (cmbs)	Munsell*	Soil Color	Soil Texture	Horizon Discussion	Lower Boundary	Cultural Materials	Comments
	54-102	10YR3/1-4/1	Very Dark Gray to Dark Gray	Clay Loam	Friable to firm, angular blocky structure, medium to coarse size, moderate grade; rare rootlets, snail shell fragments, crawfish, 40% prominent slickensides, 20 cm diameter pocket of reddish yellow clay at 103 cmbs	Abrupt to Clear-Smooth to Slightly Irregular	None	Water seeping in at base; No cultural material encountered
	102-135+	10YR4/1-4/2	Dark Gray to Dark Grayish Brown	Clay Loam-Clay	Friable, subangular blocky structure, medium to coarse size	Unobserved	None	Moisture seeping in from top of strat; No cultural material encountered

*soils recorded dry unless otherwise noted



Figure A-8. Overview of water table encountered in Trin05; facing west.



Figure A-9. Overview of Trin01 profile; facing east. Base of trench 304 cmbs.



Figure A-10. Overview of Trin04 profile; facing south. Base of trench 246 cmbs.

The remaining trenches (Trin03–06) contained the same stratigraphy and were similar to trenches Trin01 and Trin02. These trenches consisted of horizons of clay loam that gradually transitioned into a clay loam-clay horizon (Figure A-10). These trenches also contain the aforementioned slickensides that increase in size, distinctness, and prevalence with depth. Additionally, these trenches (Trin03–06) differ from Trin01 and Trin02 due to the presence of a possibly buried soil horizon. Specifically, Strat IV in these trenches were darker in color (very dark gray 10YR3/1) that appears to be a buried soil (Figure A-11). The surface of this horizon across the trenches varied from roughly 96 cmbs to 111 cmbs and extended to 154 cmbs to 161 cmbs. Underlying this buried soil horizon is a dark gray brown to brown (10YR4/2–4/3) clay loam (Table A-1).

Overall, despite excavating several of these trenches (i.e., Trin01 and Trin02) to over 300 cmbs, no evidence of calcium carbonate (CaCO_3) were observed in any of the six backhoe trenches. Disturbance was observed in all of these trenches to varying degrees down to about 50 cmbs, but were typically limited to the upper 15 cmbs. The disturbances for all of the trenches near the surface is possibly related to recent plowing or vegetation removal. The soil strata in Trin01–06 most closely correlated with that attributed to the Tinn clay soil pedon characterized as an Ap, A, Bss1, Bss2, and Bss3 (NRCS 2017). The Tinn clay soil pedon notes a basal Bkssy stratum, which indicates the presence of CaCO_3 and gypsum. Neither of these were observed in Trin01–06 (Table A-1). No cultural materials were observed within any of these backhoe trenches (BHTs Trin01–06).

Comparing the 2017 backhoe trenches (BHTs Trin01–06) for the reroute to the seven backhoe trench (BHTs01A–07A) excavations of the initial 2016 alignment there are some notable similarities and differences (Figure A-12). Briefly, the 2016 trenches exhibited significant disturbances down to about 90 cmbs primarily from road construction and maintenance (Table A-1). Further, cultural materials were



Figure A-11. Profile Trin04 facing south; dashed line illustrates surface of buried soil.



Figure A-12. Profile BHT01A from 2016 facing east; dashed line illustrates surface of buried soil.

encountered in most of these trenches (BHTs01A–05A). The cultural materials in those trenches consisted of highly fragmented and small pieces of debris (i.e., glass, metal, and ceramic) in the upper three strata. The temporally diagnostic manufacturing techniques of these artifacts suggest an age of middle to late

twentieth century construction (Intermountain Antiquities Computer System [IMACS] 2001). Another difference was the presence of CaCO₃ nodules in several of the backhoe trenches beginning around 180 cmbs.

One similarity between the 2016 and 2017 investigations was the presence of the buried soil horizon. The buried soil was observed in BHT01A and investigated with magnetic susceptibility (MS) analysis (see Figure A-12). Briefly, MS analyses of soils have been utilized in archaeological investigations for several decades, and have largely been directed toward surveys (e.g., Dalan 1996, 2008; Rosendahl et al. 2014; Van Leusen et al. 2014; Wiewel and Kvamme 2014). More recently, these investigations have focused on archaeological site formation and associated depositional processes (Dalan 2006, 2008). In particular, these analyses have assisted in identifying buried or thermally altered soils associated with cultural activities, as well as identifying the horizontal extent of cultural features (e.g., Dalan and Banerjee 1998; Dalan and Bevan 2002; Ellwood et al. 1995).

Extensive reviews of the processes of environmental magnetism and particularly the application of magnetic susceptibility have been produced (e.g., Gale and Hoare 1991:201–229). Briefly, however, magnetic minerals are prevalent in the natural environment and are sensitive to environmental changes (Gale and Hoare 1991:202). The measurement of magnetic susceptibility χ (Chi) is a quantification of the ‘magnetisability’ of the material (Dalan 2008; Dalan and Banerjee 1998; Gale and Hoare 1991:202–204). The mineralogy, the size and shape of the grains, internal stress, and other factors can initially influence the susceptibility value (Gale and Hoare 1991:204). However, of relevance to this discussion, factors including organic content, pedogenesis, thermal alteration, and cultural activities (e.g., ash-charcoal and refuse) can subsequently alter (usually increase) the susceptibility values. The implications of using magnetic susceptibility for archaeological research is that when examining either vertical or horizontal areas, the susceptibility values can assist in identifying cultural activities areas that may otherwise be blurred at a macro level. Horizontally, the application of MS analysis has been used to define the limits of cultural features and living spaces in excavation blocks. Vertically, the MS results have been applied to recognizing and delineating cultural horizons.

For the investigations in BHT01A, the MS analysis examined the profile *in situ* with a Bartington MS2F probe and a Bartington MS2B dual frequency sensor. This analysis followed the instructions as indicated by Bartington Instruments (2014). The *in situ* analysis recorded data in 5 cm intervals down profile. The magnetic susceptibility readings were recorded adjacent to the matrix sample column for each trench. Briefly, the MS2F coil was placed against the profile and measured down profile at both the low sensitivity (1.0) setting. Due to Occupational Safety and Health Administration (OSHA) safety requirements, these recordings were only able to examine the *in situ* profile down to roughly 140 cmbs (4.5 feet).

The results of the MS analysis of BHT01A did support the interpretation of a series of disturbance events capping natural stratigraphy at roughly 91 cmbs (Figure A-13). The upper Stratum I MS values were 2672, which is exponentially higher than the underlying horizons that are generally below 50. This suggests that in addition to the disturbance some extensive burning activity occurred in the area. Similarly, down profile in Stratum III, there was a notable spike that coincided with a discontinuous lens of pale brown (10YR6/3) sandy loam that may have represented a burn, disturbance event. Finally, in Stratum V the MS values noticeably increased with depth and was interpreted as a buried soil. This buried soil in BHT01A from 2016 and BHTsTrin03–06 (2017) may correspond to that recognized as the West Fork soil described as thick, dark and clayey (Ferring and Yates 1997:280). As discussed above, the West Fork soil dates to roughly the last 2,000 years (Ferring 1994, 2001). Notably, no cultural materials were observed in the natural stratigraphy of BHT01A or BHTsTrin03–06.

In conclusion, the backhoe trenches of the current alignment (Trin01–06) all exhibited some evidence of disturbance extending down to roughly 50 cmbs while the 2016 alignment (BHTs01A–07A) exhibited

disturbance down to 90 cmbs. No cultural deposits were observed in the current alignment (Trin01–06), but several trenches along the initial alignment contained heavily fragmented, disturbed debris from the middle-late twentieth century. Also a buried soil does seem to be present in the East Fork of the Trinity River floodplain that may correspond to the West Fork soil identified by previous researchers (discussed above). The West Fork soil has been interpreted to date to the last 2,000 years in age. However, no evidence of prehistoric cultural materials was observed.

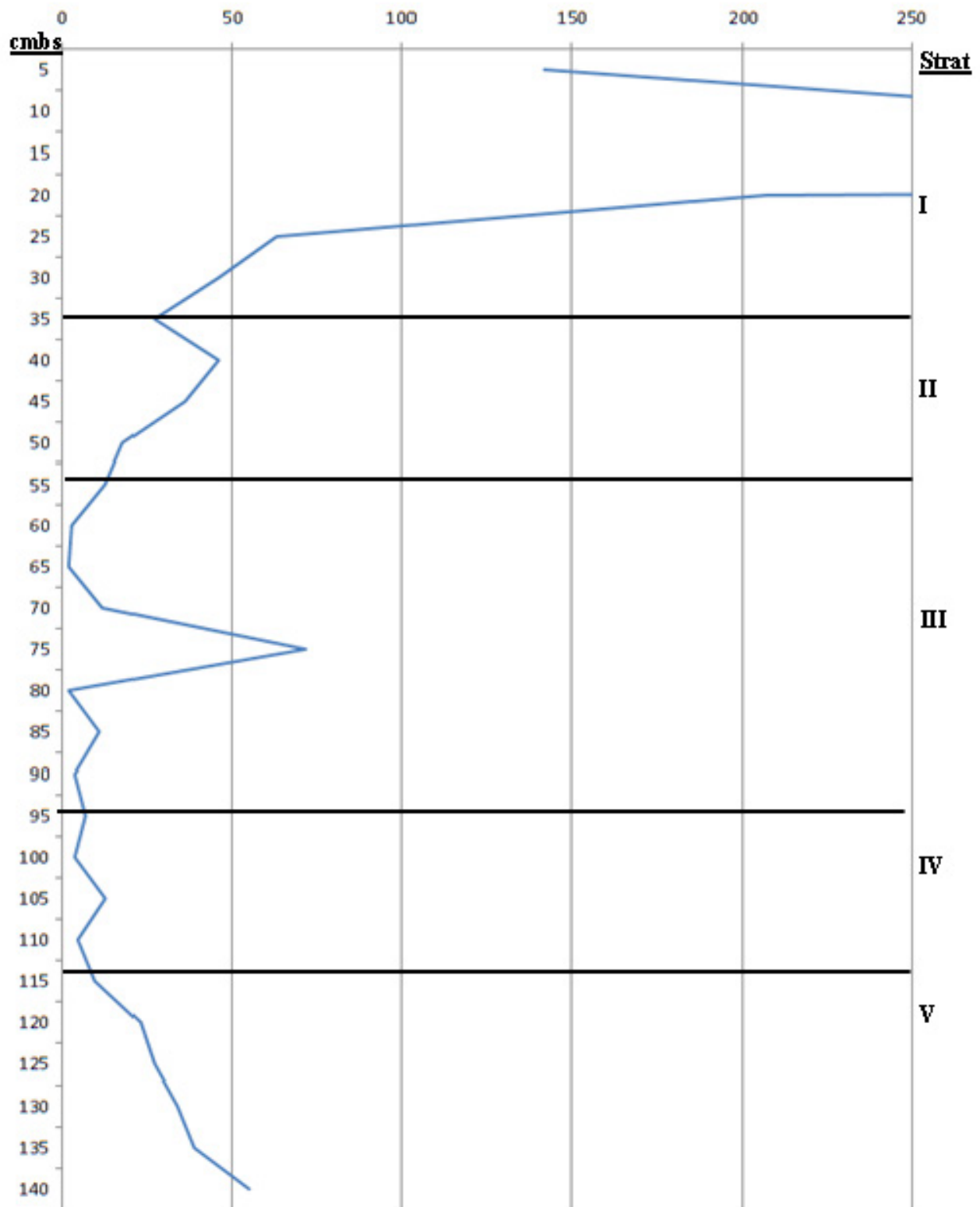


Figure A-13. Magnetic susceptibility data from profile of 2016's BHT 01A; note large spike near surface is recent road fill matrix with value of 2678 at S. I. 1.0.

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APPENDIX B: ALIGNMENT MAPS – REDACTED DUE TO RESTRICTED INFORMATION NOT FOR PUBLIC USE

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APPENDIX C: SHOVEL TEST DATA

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Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	AE01	1	0-40	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	AE02	1	0-40	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	AE03	—	—	—	—	—	—	—	Not excavated
—	AE04	1	0-40	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
41COL168	AE05	1	0-40	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
41COL168	AE06	1	0-40	7.5YR 4/2	Clay Loam	>20%	Calcium Carbonate, Gravels, Mottles	N	No cultural material encountered. Terminated at compact soil.
41COL168	AE07	1	0-40	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	AE08	1	0-40	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	AE09	1	35	7.5YR 5/3	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	AE10	—	—	—	—	—	—	—	Not excavated

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	AE11	1	30	7.5YR 4/4	Clay Loam	>20%	Calcium Carbonate, Gravels	N	No cultural material encountered. Terminated at disturbed driveway area and roadside.
—	AE12	—	—	—	—	—	—	—	Not excavated
—	AE13	—	—	—	—	—	—	—	Not excavated
—	AE14	—	—	—	—	—	—	—	Not excavated
—	AE15	1	40	7.5YR 5/3	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	AE16	—	—	—	—	—	—	—	Not excavated
—	AE17	1	50	7.5YR 5/3	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	AE18	—	—	—	—	—	—	—	Not excavated
—	AE19	1	45	10YR 2/2	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
41CO269	AE20	—	—	—	—	—	—	—	Not excavated
41CO269	AE21	—	—	—	—	—	—	—	Not excavated
41CO269	AE22	—	—	—	—	—	—	—	Not excavated
—	AE23	1	45	10YR 2/1	Clay	1-5%	Gravels, Manganese	N	No cultural material encountered. Terminated at compact soil.
41COL270	AE24	1	40	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
41COL270	AE25	1	40	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	AE26	1	40	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	AE27	1	40	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	AE28	1	40	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN01	1	30	10YR 2/1	Clay Loam	>20%	Gravels, Mottles	N	No cultural material encountered. Terminated at disturbed side of road and agricultural field.
—	PN02	1	50	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	PN03	1	50	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	PN04	1	35	10YR 2/1	Clay Loam	1-5%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
41COL168	PN05	1	10	10YR 4/3	Sandy Clay Loam	>20%	Gravels, Pebbles	N	No cultural material encountered. Terminated at disturbed , rock layer from road construction..
41COL168	PN06	1	30	10YR 2/1	Clay Loam	>20%	Gravels, Large Rock Frags	N	No cultural material encountered. Terminated at disturbed, road construction gravel and rock debris.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
41COL168	PN07	1	30	10YR 2/1	Clay Loam	>20%	Gravels, Large Rock Frags	N	No cultural material encountered. Terminated at disturbed, road construction gravel and rock debris.
—	PN08	1	30	10YR 4/3	Sandy Clay Loam	>20%	Calcium Carbonate, Gravels, Large Rock Frags	N	No cultural material encountered. Terminated at disturbed, roadside..
—	PN09	1	40	7.5YR 3/4	Clay Loam	—	—	N	No cultural material encountered. Terminated at water table.
—	PN10	1	20	10YR 2/1	Clay Loam	5-10%	Gravels, Large Rock Frags	N	No cultural material encountered.
—	PN10	2	20-40cmbs	7.5YR 7/4	Sandy Clay	1-5%	Large Rock Frags	N	No cultural material encountered. Terminated at disturbed.
—	PN11	1	0-30	10YR 2/2	Clay Loam	>20%	Calcium Carbonate, Gravels	N	No cultural material encountered. Terminated at disturbed.
—	PN12	1	0-20	10YR 2/2	Clay Loam	10-20%	Calcium Carbonate, Gravels	N	No cultural material encountered. Terminated at disturbed.
—	PN13	1	0-10	10YR 2/2	Clay Loam	>20%	Gravels	N	No cultural material encountered. Terminated at disturbed.
—	PN14	1	0-45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN15	—	—	—	—	—	—	—	Not excavated
—	PN16	—	—	—	—	—	—	—	Not excavated
—	PN17	—	—	—	—	—	—	—	Not excavated
41COL269	PN18	—	—	—	—	—	—	—	Not excavated
—	PN19	1	0-30	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	PN19	2	30-40	2.5Y 7/4	Clay	—	—	N	No cultural material encountered. Terminated at compact soil.
41COL269	PN20	1	35	10YR 2/1	Clay Loam	1-5%	Large Rock Frags	N	No cultural material encountered. Terminated at compact soil.
41COL269	PN21	1	0-30	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered.
41COL269	PN21	2	30-40	2.5Y 7/4	Clay	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN22	—	—	—	—	—	—	—	Not excavated
—	PN23	—	—	—	—	—	—	—	Not excavated
—	PN24	—	—	—	—	—	—	—	Not excavated
—	PN25	—	—	—	—	—	—	—	Not excavated
—	PN26	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
41COL270	PN27	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
41COL270	PN28	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
41COL270	PN29	1	0-15	10YR 3/2	Loam	5-10%	Pebbles	N	No cultural material encountered.
41COL270	PN29	2	15-30	7.5YR 7/4	Loamy Sand	10-20%	Calcium Carbonate, Gravels	N	No cultural material encountered. Terminated at disturbed.
41COL270	PN30	1	35	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
41COL270	PN31	1	20	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at water table.
41COL270	PN32	1	20	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at water table.
—	PN33	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN34	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN50	—	—	—	—	—	—	—	Not excavated
—	PN51	—	—	—	—	—	—	—	Not excavated
—	PN52	1	50	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN53	—	—	—	—	—	—	—	Not excavated
—	PN54	—	—	—	—	—	—	—	Not excavated
—	PN55	—	—	—	—	—	—	—	Not excavated
—	PN56	1	40	10YR 2/2	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN57	—	—	—	—	—	—	—	Not excavated
—	PN58	—	—	—	—	—	—	—	Not excavated
—	PN59	—	—	—	—	—	—	—	Not excavated
—	PN60	1	50	10YR 2/2	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	PN61	1	50	10YR 2/2	Clay Loam	5-10%	Roots	N	No cultural material encountered. Terminated at compact soil.
—	PN62	—	—	—	—	—	—	—	Not excavated
—	PN63	—	—	—	—	—	—	—	Not excavated
—	PN64	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at large root and compact sticky soil.
—	PN65	1	30	7.5YR 5/4	Sandy Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at disturbed buried cable line area.
—	PN66	1	0-7	7.5YR 2.5/3	Clay Loam	5-10%	Gravels	N	No cultural material encountered.
—	PN66	2	7-50	10YR 2/2	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN67	—	—	—	—	—	—	—	Not excavated
—	PN68	1	45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	PN69	—	—	—	—	—	—	—	Not excavated
—	PN70	1	45	10YR 2/1	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	PN71	1	0-30	7.5YR 5/4	Clay Loam	5-10%	Gravels	N	No cultural material encountered.
—	PN71	2	30-45	10YR 2/1	Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	PN72	1	45	10YR 2/1	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	PN73	1	45	10YR 2/1	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	PN74	1	45	10YR 2/1	Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	PN75	1	25	10YR 2/1	Loam	>20%	Gravels, Large Rock Frags	N	No cultural material encountered. Terminated at impenetrable gravel layer.
—	PN76	—	—	—	—	—	—	—	Not excavated
—	RB01	1	0-30 cmbs	10YR 2/1	Silty Clay Loam	10-20%	Gravels, Pebbles, Imported sand for road.	N	No cultural material encountered. Terminated at compact soil.
—	RB02	—	—	—	—	—	—	—	Not excavated
—	RB03	—	—	—	—	—	—	—	Not excavated
—	RB04	1	0-45	10YR 2/1	Silty Clay Loam	1-5%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	RB05	1	0-45	10YR 2/1	Silty Clay Loam	1-5%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	RB06	1	0-45	10YR 2/2	Silty Clay Loam	1-5%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	RB07	—	—	—	—	—	—	—	Not excavated

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	RB08	1	0-30	10YR 2/1	Sandy Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB09	1	0-30	10YR 2/1	Sandy Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	RB10	1	0-30	10YR 2/1	Sandy Clay Loam	5-10%	Gravels	N	No cultural material encountered. Terminated at compact soil.
—	RB11	1	0-15	7.5YR 8/3	Loamy Sand	—	—	N	No cultural material encountered.
—	RB11	2	15-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB12	1	0-30	10YR 2/1	Silty Clay Loam	1-5%	Gravels, Roots	N	No cultural material encountered. Terminated at compact soil.
—	RB13	1	0-15	7.5YR 8/3	Loamy Sand	—	—	N	No cultural material encountered.
—	RB13	2	15-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB14	1	0-30	10YR 2/1	Sandy Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB15	—	—	—	—	—	—	—	Not excavated
—	RB16	—	—	—	—	—	—	—	Not excavated
—	RB17	—	—	—	—	—	—	—	Not excavated
—	RB18	—	—	—	—	—	—	—	Not excavated

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	RB19	1	0-40	10YR 2/1	Silty Clay Loam	5-10%	Calcium Carbonate	N	No cultural material encountered. Terminated at compact soil.
—	RB20	1	0-40	10YR 3/2	Silty Clay Loam	1-5%	Roots	N	No cultural material encountered. Terminated at compact soil.
—	RB21	1	0-40	10YR 3/2	Silty Clay Loam	1-5%	Roots	N	No cultural material encountered. Terminated at compact soil.
—	RB22	—	—	—	—	—	—	—	Not excavated
—	RB23	—	—	—	—	—	—	—	Not excavated
—	RB24	—	—	—	—	—	—	—	Not excavated
—	RB25	1	0-45	10YR 2/1	Silty Clay Loam	—	None	N	No cultural material encountered. Terminated at compact soil.
—	RB26	—	—	—	—	—	—	—	Not excavated
—	RB27	1	0-30	7.5YR 2.5/2	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at in a disturbed area behind business.
—	RB28	1	0-50	10YR 2/1	Silty Clay Loam	—	None	N	No cultural material encountered. Terminated at compact soil.
—	RB29	1	0-10	7.5YR 2.5/3	Silty Clay Loam	5-10%	Cobbles, Gravels, Mottles, Pebbles	N	No cultural material encountered.
—	RB29	2	10-50	7.5YR 2.5/2	Sandy Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	RB30	2	10-50	7.5YR 2.5/2	Sandy Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB30	1	0-10	7.5YR 2.5/3	Silty Clay Loam	5-10%	Cobbles, Gravels, Mottles, Pebbles	N	No cultural material encountered.
—	RB31	1	0-10	7.5YR 2.5/3	Silty Clay Loam	5-10%	Cobbles, Gravels, Mottles, Pebbles	N	No cultural material encountered.
—	RB31	2	10-50	7.5YR 2.5/2	Sandy Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB32	1	0-45	10YR 2/1	Silty Clay Loam	10-20%	Cobbles, Gravels, Pebbles	N	No cultural material encountered. Terminated at compact soil.
—	RB33	1	0-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB34	1	0-50	10YR 2/1	Clay Loam	5-10%	Gravels, Pebbles	N	No cultural material encountered. Terminated at compact soil.
—	RB35	1	0-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB36	1	0-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.

Intensive Cultural Resources Survey of the Proposed 407 McKinney No. 1 to Princeton No. 1 72-Inch and 24-Inch Pipeline, Collin County, Texas

Site Number	Shovel Test Number	Level	Depth	Munsell	Soil Type	Inclusion %	Inclusion Type	Cultural Material	Comments/Termination
—	RB37	1	0-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB38	1	0-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB39	1	0-50	10YR 2/1	Silty Clay Loam	—	—	N	No cultural material encountered. Terminated at compact soil.
—	RB41	1	0-30 cmbs	10YR 2/1	Silty Clay Loam	10-20%	Gravels, Pebbles, Imported sand for road.	N	No cultural material encountered. Terminated at compact soil.
—	RB42	1	0-30 cmbs	10YR 2/1	Silty Clay Loam	10-20%	Gravels, Pebbles, Imported sand for road.	N	No cultural material encountered. Terminated at compact soil.