Volume 2020 Article 127

2020

ArchaeologicalSurvey for the Proposed San Antonio Water System W-1 Leon CreekSewer Main Improvement Project,Bexar County, Texas

Steve Ahr

Chris Matthews

ArchaeologicalSurvey for the Proposed San Antonio Water System W-1 Leon CreekSewer Main Improvement Project,Bexar County, Texas

Archaeological Survey for the Proposed San Antonio Water System W-1 Leon Creek Sewer Main Improvement Project, Bexar County, Texas

February 2020

Project Number
60492977

AECOM

Prepared for Pape-Dawson Engineers
By AECOM

Archaeological Survey for the Proposed San Antonio Water System W-1 Leon Creek Sewer Main Improvement Project, Bexar County, Texas

By

Steve Ahr
Chris Matthews

Principal Investigator

Steve Ahr, Ph.D.

For

Pape-Dawson Engineers

Texas Antiquities No. 7632

February 2020

ABSTRACT

AECOM Technical Services, Inc. (AECOM) conducted an intensive archaeological survey for the proposed San Antonio Water System (SAWS) W-1 Leon Creek Sewer Main Improvement Project (project). Initially, the project spanned approximately 3.9-miles from State Highway 151 to United States Highway 90, in west San Antonio, Bexar County, Texas. In 2017, the project alignment was split into 2 segments: Segment 1 (northern half) and Segment 2 (southern half). Segment 2 of the alignment was re-evaluated in 2018, which resulted in approximately 1.1-miles of alignment which was not previously surveyed. Project construction will include the installation of an 84-inch diameter wastewater sewer main, to be installed parallel to the existing undersized 42-inch wastewater sewer main. The existing sewer main may be abandoned in-place. Construction will be located within or adjacent to an existing 50-foot wide SAWS easement. A proposed construction easement (approximately 100-feet in width) and a temporary construction easement (approximately 25-feet in width) are also included within the project area.

Because Section 404 permitting or a Nationwide Permit 12 is required, the project constitutes a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. In addition, portions of the project are on land owned by the City of San Antonio (CoSA); therefore the project falls within the purview of the Antiquities Code of Texas, which requires review by the Texas Historical Commission. Furthermore, since the project is located within the city limits, the survey was also conducted in compliance with historic preservation provisions of the CoSA's Unified Development Code.

AECOM archaeologists conducted the initial archaeological survey of the project between May 25, 2016, and June 8, 2016, under Texas Antiquities Permit No. 7632. The investigation included a pedestrian survey and the excavation of 57 shovel tests, all of which failed to identify any cultural resources sites. Numerous disturbances, particularly from gravel quarrying and previous sewer line installations, were observed, which precluded the presence of any intact sites. Segment 2, which was developed much later over the course of the project, was surveyed on September 26, 2018. Pedestrian survey and the excavation of 10 shovel tests failed to yield cultural materials. Since no artifacts were identified or collected during the survey, only records will be curated at the Center for Archaeological Research, the University of Texas at San Antonio.

During the survey, shovel tests, cut bank profiles, and fluvial-morphological observations revealed the Leon Creek floodplain consists of a recently-constructed (historic/ modern) alluvial deposit. The presence of imbricated gravel layers within the loamy floodplain soils, along with reworked sediments, gravel bars, and numerous bedrock scours indicates this portion of the stream is subject to periodic, high-energy flooding, with little potential to contain deeply buried and intact sites. As such, no deep mechanic trenching was warranted.

Based on the survey results, it is recommended that construction of the project would have **No Effect** on any archaeological historic properties, State Antiquities Landmarks, or historic structures. Therefore, no further archaeological investigations are recommended. However, should the project alignment change, additional archaeological investigations may be necessary.

TABLE OF CONTENTS

FIGURES

TABLES

1.0 INTRODUCTION

AECOM Technical Services, Inc. (AECOM) conducted an intensive archaeological survey for the proposed San Antonio Water System (SAWS) W-1 Leon Creek Sewer Main Improvement Project (project). Initially, the project spanned approximately 3.9-miles from State Highway 151 to United States Highway 90, in west San Antonio, Bexar County, Texas. In 2017, the project alignment was split into 2 segments: Segment 1 (northern half) and Segment 2 (southern half). Segment 2 of the alignment was re-evaluated in 2018, which resulted in approximately 1.1-miles of alignment which was not previously surveyed (**Figure 1**).

Proposed construction of the project will include the installation of an 84-inch diameter wastewater sewer main, to be installed parallel to the existing undersized 42-inch wastewater sewer main. The existing sewer main may be abandoned in-place. Proposed construction will be located within or adjacent to an existing 50-foot wide SAWS easement. A proposed construction easement (approximately 100-feet in width) and a temporary construction easement (approximately 25-feet in width) are also included within the project area.

AECOM conducted the archaeological investigation to assist SAWS in meeting applicable cultural resources compliance requirements under Section 106 of the National Historic Preservation Act of 1966, as amended, the Antiquities Code of Texas, and the City of San Antonio (CoSA) Unified Development Code. Because Section 404 permitting or a Nationwide Permit 12 (Utility Line Activities) may be required, the project constitutes a federal undertaking and will require compliance with Section 106. In addition, portions of the proposed project are on land owned by CoSA, which fall within the purview of the Antiquities Code of Texas and require review by the Texas Historical Commission (THC). Furthermore, since the proposed project is located within the city limits, the survey is also being conducted in compliance with historic preservation provisions of the CoSA's Unified Development Code.

The Area of Potential Effect (APE) for the archaeological resources survey included all areas of potential disturbance related to the project, as referenced above, as well as the vertical construction impacts, which may extend as much as 25 feet (7.6 meters [m]) deep in some locations. AECOM archaeologists conducted the archaeological survey of the initial project alignment between May 25, 2016, and June 8, 2016, while Segment 2 was surveyed on September 26, 2018. All investigations were carried out under Texas Antiquities Permit No. 7632.

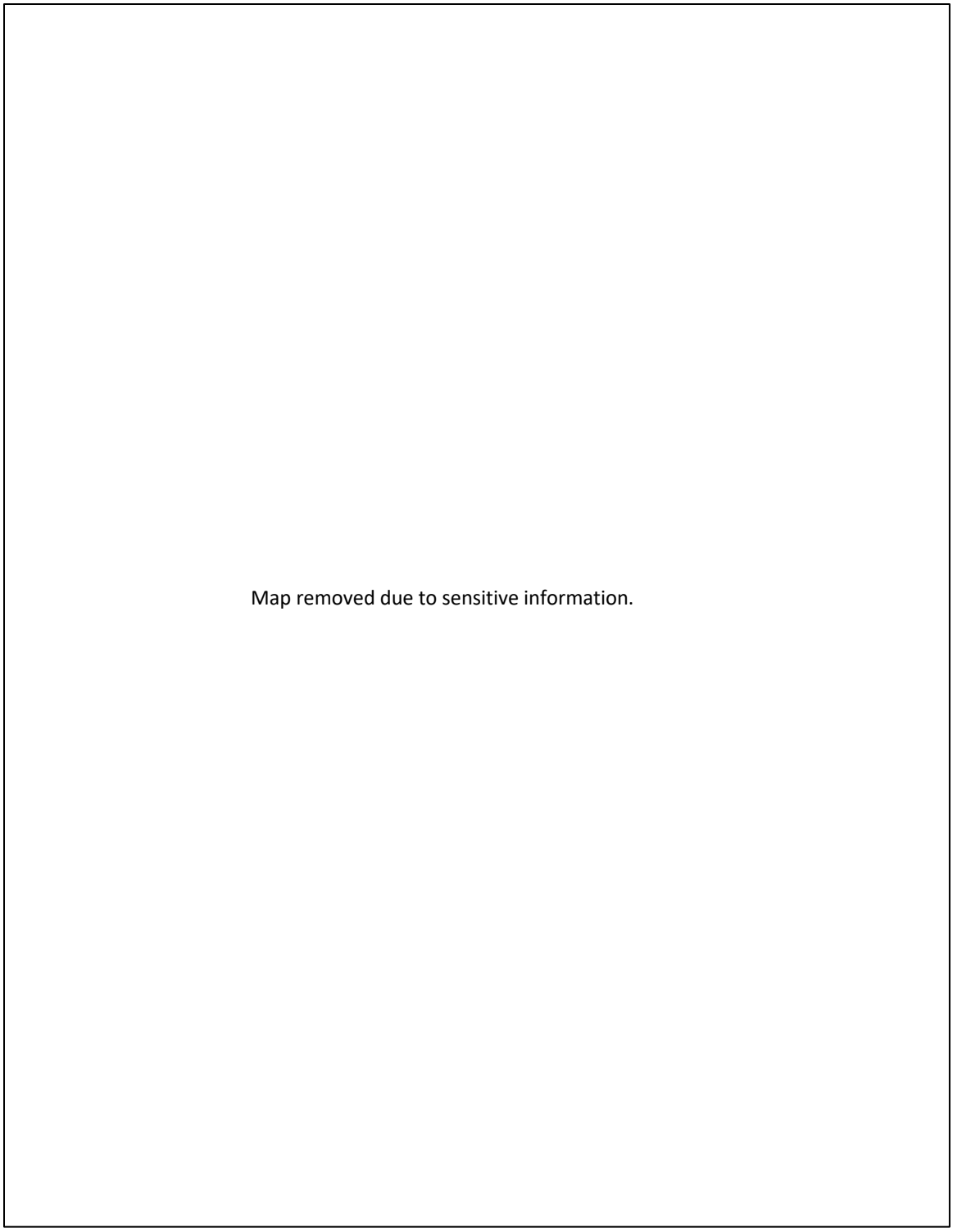

Figure 1. Map showing Initial Project Alignment, Segment 2, previously recorded cultural resources, and previous surveys.

2.0 ENVIRONMENTAL SETTING

Physiography and Climate

Bexar County is located at the southeastern edge of the Balcones Escarpment. From northwest to the southeast, the region transitions from thin, stony soils within the rugged and dissected Edwards Plateau, to the rolling hills, broad rivers, and fertile clays of the Blackland Prairie. The northern quarter of the county has Edwards Plateau vegetation of tall and medium-height grasses, live oak, juniper, and mesquite. Moving to the south, a narrow strip of Blackland Prairie is present and consists of tall native grasses. Native vegetation in the southern part of the county consists of South Texas Plains vegetation, including short grasses, live oak, mesquite, thorny bushes, and cacti. Mineral resources include sulfur springs, limestone, petroleum, and natural gas (Long 2012).

The project is within the south-central climate region (Bomar 1983), which is characterized as humid subtropical, with hot summers, and peak precipitation in May and September. Mean annual precipitation is 28 inches, while mean annual temperature is 68.9° F.

Geology

Geologic formations in northwestern Bexar County consist of shale, siltstone, and limestone rocks of the Upper Cretaceous Eagle Ford Group (Kef), chalk and marl from the Pecan Gap Chalk (Kpg), and marl, clay, sandstone, and siltstone from the undivided Upper Cretaceous Navarro Group and Marlbrook Marl (Kknm) (Barnes 1974). Moving south, these older Cretaceous deposits transition to younger Eocene-age formations that are part of a larger, basinward series of down-dipping Paleogene through Quaternary formations that were deposited in a fluvial-deltaic environment. These weakly-consolidated sedimentary rock formations are made up of cross-bedded quartz sand intercalated with thin beds of clay, sandy clay, and ironstone concretions (Barnes 1974).

Inset into the older geologic formations are extensive Quaternary fluviatile terrace deposits, which closely follow modern stream networks such as the San Antonio River and its tributaries. These terraces rest above flood levels along deeply entrenched streams. Occasionally, preserved fluvial morphological features such as point bars, oxbows and abandoned channel segments are observed within these terrace deposits, which underlie most of the downtown San Antonio area. An extensive lag deposit of Plio- to Pleistocene-age Uvalde Gravels (Qtu) lies to the east of IH-37, and includes chert, quartz, limestone, and igneous rock gravels (Barnes 1974). This formation was an important source of raw material for prehistoric inhabitants.

From its headwaters in northern Bexar County, Leon Creek flows south for approximately 20 miles, before entering the Medina River near US 281. The Leon Creek watershed occupies a significant portion of western San Antonio and Bexar County, and drains an approximately 237-square mile area (Ockerman and McNamara 2003).

Most of the narrowly-entrenched Leon Creek channel is flanked on either side by late Quaternary fluviatile terrace deposits (Qt), which occur above normal flood levels (Barnes 1974). Based on available topographic data, these terrace surfaces are about 9 m above the low water channel. Examination of average and peak streamflow data for Leon Creek, from 1985 to 2002,

indicate that large floods do occasionally top these adjacent high terraces (United States Geological Survey 2016), and such high-energy hydrological events can result in dramatic floodplain alterations, including avulsions, channel cut-offs, and neck cut-offs. On the older, high terraces, archaeological materials are commonly found at the surface, but could be buried within thin overbank veneers of sediment.

The low-lying areas adjacent to Leon Creek, which are frequently inundated by floods, contain variably thick deposits of Holocene-age alluvium (Qal). Based on available topographic data, this flooding surface rises up to 3 m above the low water channel.

Soils

Patrick soils, 3 to 5 percent slopes, rarely flooded (PaC) are common to the paleoterrace surfaces adjacent to Leon Creek (National Resources Conservation Service [NRCS] 2016). Patrick soils consist of moderately deep, well drained and moderately permeable soils that formed in clayey and gravelly sediments. A typical pedon is represented by a thin calcareous clay A and Bw horizons (<55 centimeters [cm]), separated by a lithologic discontinuity from the underlying gravelly 2Ck horizons, which are weakly cemented with calcium carbonate.

The floodplain deposits in the study area are mapped as Loire clay loam, 0 to 2 percent slopes, occasionally flooded (Fr) soils. These soils are well-drained, very deep, and moderately permeable (NRCS 2016). A typical pedon is represented by a calcareous silty clay loam A horizon over a series of minimally-altered C horizons. The presence of fluventic bedding planes and stratification below depths of 20 cm, as presented in the NRCS soil type description, could indicate that portions of the floodplain may be too young to contain prehistoric materials.

Nearly seven percent of the APE is mapped as “Pits and Quarries”. These areas are presumed to exhibit low integrity potential due to past disturbances. Nonetheless, observation of open quarries was conducted opportunistically in order to view the late Quaternary geomorphology of the study area as it relates to the archaeological record.

3.0 CULTURAL BACKGROUND AND PREVIOUS INVESTIGATIONS

Cultural Background

Paleoindian Period (11,500 – 8800 years Before Present [B.P.])

The traditional view of the Paleoindian Period is one that is characterized by small groups of highly mobile hunter-gatherers who hunted mega-fauna such as mammoth, bison, and horse. A more recent interpretation of this period, however, suggests that diverse resources were exploited, including smaller animals, such as turtle, alligator, raccoon, and waterfowl, and a diverse range of plants (Collins 2002; Collins 2004). The defining characteristics of Paleoindian lithic assemblages include lanceolate points with straight or concave bases, scrapers, and notched tools. The earliest part of the Paleoindian Period is represented by Clovis and Folsom cultures, which are identifiable by diagnostic projectile points bearing the same names.

Evidence of big game hunting (e.g., mammoth and bison) is represented by a number of sites containing Clovis and Folsom spear points (Black 1989; Hester 1995). Few deeply buried and preserved sites from this period have been intensively investigated in south Texas. One notable example includes the Richard Beene Site, located in south San Antonio (Thoms and Mandel 1992; Thoms and Mandel 2007).

Archaic Period (8800 – 1200 B.P.)

During the Archaic Period, plant food gathering became an increasingly important part of the overall subsistence in response to increasingly arid climate conditions. This shift is represented archaeologically by a wide array of stone tools geared toward plant processing (e.g., grinding implements), and varied projectile point styles. Three subperiods are recognized in south Texas, including the Early Archaic, Middle Archaic, and Late Archaic Periods (Black 1989).

The Early Archaic Period (8800 – 6000 B.P.) is characterized by greater emphasis on exploitation of riverine settings. This period is recognized archaeologically by the presence of corner- and basal- notched projectile points (Hester 1995). Early Archaic sites are relatively rare in south Texas, which may be attributed to warmer and drier climates that had been seen previously (Black 1989; Collins 1995). Commonly exploited biomass during this period include freshwater mussel, deer, rabbit, and antelope (Thoms and Mandel 1992, 2007).

The Middle Archaic Period (6000 – 40000 B.P.) saw a population increase (Hall et al. 1986), with a subsistence focused on locally available plants and roots, such as mesquite beans and acacias (Hester 1995). Tortugas, Abasolo, and Carrizo points are diagnostic artifacts for this period (Hester 1995; Turner and Hester 1993). Evidence of prehistoric cemeteries was found at the Bering Sink Hole in Central Texas (Bement 1994) and the Loma Sandia Site in Live Oak County (Taylor and Highley 1995).

The Late Archaic Period (4000 – 1200 B.P.) witnessed continued reliance on hunting along with an increase in gathering. Evidence suggests that cemeteries continued to be used during this time. Bison hunting also took place (Hester 1995), and a wider variety of smaller mammals such as rabbits and rodents may have been exploited with greater intensity, as well as the use of

mesquite and acacia. Numerous sites from this period contain large fire-cracked rock features, and include seed processing implements such as manos and metates.

Late Prehistoric Period (1200 – 350 B.P.)

The Late Prehistoric Period is divided into Austin and Toyah phases. During the Austin Phase, the bow and arrow was introduced (Black 1989; Hester 1995; Prewitt 1981). Scallorn arrow points are diagnostic of this period, as well as other side-notched varieties. Use of Clear Fork gouges and bifaces is also common, as well as grinding stones and scrapers, which represents a diverse range of subsistence activities. Deer, freshwater mussels, and snails have been suggested as important food resources during the Austin Phase (Prewitt 1981).

The subsequent Toyah Phase is represented by distinct Perdiz arrow points and other contracting stem varieties. Also commonly found in Toyah sites are bone-tempered pottery, beveled-edge bifacial knives, perforators, and end-scrapers. This artifact assemblage is attributed to widespread deer and bison exploitation (Black 1989; Creel 1991; Dillehay 1974; Hester 1995; Huebner 1991; Johnson 1994; Prewitt 1981). Although Toyah lifeways likely persisted into the earliest historic times, sites from this period are difficult to distinguish from pre-contact sites. Furthermore, ceramics such as Leon Plain were used extensively throughout the Toyah Phase and are similar to historic period Goliad wares (Black 1986, 1989; Hester 1995).

Historic Development

Bexar County is located in an area that has long been occupied by humans, from the early Paleoindian Clovis and Folsom cultures, through Late Prehistoric and Historic-era Native American, early Spanish settlers, Mexicans, and Anglo-Americans. The first known Europeans to explore the area were part of the 1691 Domingo Teran de los Rios and Fray Damian Massanet expedition. They reached the San Antonio River, near the future site of the San Juan Capistrano Mission. In April 1709, two Franciscans, Fathers Antonio de San Buenaventura y Olivares and Isidro Felix de Espinosa, and a military officer, Pedro de Aguirre, reached the area. A subsequent expedition in 1714, led by Louis Juchereau de St. Denis, also passed through the region on the way to San Juan Bautista. In 1716, Espinosa, as part of the expedition of Domingo Ramon, again visited the area on his way to East Texas, and recommended San Pedro Springs as a mission site. Near that spot, Martin de Alarcon led the expedition that founded San Antonio de Valero Mission and San Antonio de Bexar (or Bejar) Presidio, named in honor of the family of the dukes of Bexar (Long 2012). The town grew as the Spanish began construction on five Missions along the San Antonio River in 1718 (Fehrenbach 1978).

In 1772 the government offices of Spanish Texas moved from Los Adaes to Bexar, and some of the East Texas settlers also moved with them. Still, Bexar remained a small frontier outpost. During the late colonial period, Bexar continued to serve as the capital of the province of Texas as well as the main shipping point for supplies headed for Nacogdoches and La Bahia (Long 2012). By 1778, the population was 2,060. In 1795, the missions were secularized and the San Antonio de Valero Mission (the Alamo) served as a military barracks (Fehrenbach 1978).

In 1811, Juan Bautista de Las Casas mounted an insurrection in Bexar that spread throughout the province of Texas. Shortly after this began, some military officers and clergy, who were supported by the aristocratic decedents of the original Canary Island settlers, staged a

counterrevolution and executed Las Casas. After his death, the insurrectionists seized San Antonio in 1813, proclaiming Texas an independent state. However, by August of that year, royalist forces succeeded in routing the rebellion and restored order.

By 1820, Bexar had approximately 2,000 inhabitants, many of whom lived on ranches in the outlying countryside (Long 2012). In 1836, Bexar County was established, with San Antonio serving as the county seat. During the Texas Revolution, San Antonio became the site of the battle of the Alamo, which was critical to Texas' eventual independence.

Despite the steady population growth during the late 1840s, Bexar County was still a sparsely populated region. In 1850, the county had a total population of 5,633 inhabitants, most of who lived in San Antonio. The economy was still based on subsistence agriculture and livestock. Corn constituted the most important crop, followed by oats, beans, and other vegetables. Less than 5 percent of the total land in farms had been tilled, and as late as 1858, three-fourths of the county's terrain was still native prairie (Long 2012). By 1860, San Antonio's population was 8,235 making it the largest city in Texas. During the Civil War, San Antonio served as a Confederate depot and several units of soldiers were formed there (Fehrenbach 1978).

Although Bexar County escaped the destruction and devastation which other parts of the South experienced during the Civil War, the war years contributed to the costs of goods falling. In addition, the county and surrounding region experienced an increase in cattle rustling and other crimes, due to the absence of men who were away serving in the war. The war and its aftermath, contributed to a serious decline in land prices and many of the county's businesses suffered. In addition, many farms did not produce any crops or cattle as the amount of improved farmland declined by more than 60 percent between 1860 and 1870, from 13,697 acres to 5,546 acres. This decline was attributed to the City of San Antonio and Bexar County being unable to provide many services due to little tax money coming in (Long 2012).

Economic recovery did not begin until the late 1860s and early 1870s, with the start of the great cattle drives. The completion of the rail link from the coast in 1877 made shipping local products easier and helped to rapidly grow the population. The Galveston, Harrisburg, and San Antonio Railway came to San Antonio in 1877, ushering in a new era of economic growth. By 1880, the population reached 20,550. The new immigration was overwhelmingly native-born Anglos, mostly from Southern states. The population which had only grown by 2,000 between 1860 and 1870 nearly doubled from 16,043 in 1870 to 30,470 in 1880 (Long 2012). In 1881, a second railroad, the International–Great Northern, reached the city from the northeast, and five railroads had been built into the city by 1900 (Fehrenbach 1978).

From 1900 to 1920, San Antonio was the largest city in the state. Civic government, utilities, street paving and maintenance, water supply, telephones, hospitals, and a power plant were all established or planned. The confluence of Hispanic, German, and Southern Anglo-American cultures in San Antonio made it one of the most diverse cities in America as each group of immigrants influenced the city's culture and architecture (Fehrenbach 1978).

By 1920, the number of farms grew to 3,205 and the amount of land in farming increased to more than 800,000 acres. Principal crops included corn, milo, cane, oats, vegetables, and fruits. Prior to World War II, Bexar County remained a significant source for beef cattle, poultry, and dairy. By the late 1940s, more than half of the county's agricultural receipts came from livestock

and livestock products. Since World War II, oil has been a significant part of the county's economy. Another important boost to the economy was tourism with Bexar County and San Antonio attracting numbers of tourists to the Alamo, the missions, and the area's mild climate (Long 2012). Numerous military bases in San Antonio have provided economic stability to the city and region including Fort Sam Houston, Kelly, Randolph, Lackland, and Brooks. The city's economy has been further enhanced by numerous institutions of higher education, tourism, and medical research (Fehrenbach 1978).

By the 1980s, chief industries included oil and gas extraction, beer brewing, construction, canning and bottling, printing, bookbinding, lumber milling, iron and steel milling, clothing manufacturing, household furniture, cardboard boxes, pharmaceuticals, construction machinery, aircraft and aircraft parts, and electronic components. Nonfarm earning totaled over $9 billion. In 1982, 66 percent of the land in the county was dedicated to farms and ranches with 27 percent under cultivation and 14 percent irrigated. Bexar County ranked fifty-third among Texas counties in agricultural receipts, with 61 percent coming from livestock and livestock products. Major crops at the time consisted of oats, sorghum, hay, corn, wheat, pecans, and vegetables (Long 2012). During the second half of the twentieth century the population of Bexar County grew significantly. In 1940, the county had a population of 333,176, in 1960 it doubled to 687,151, by 1980 it increased to 988,800 and in 1990 it topped over one million (Long 2012).

Previous Investigations

The Texas Archeological Sites Atlas (TASA) and Texas Historic Sites Atlas (THSA) was reviewed to locate previous archaeological investigations and previously recorded cultural resources within 1 kilometer (km) of the APE, including those listed in or eligible for listing in the National Register of Historic Places (NRHP), State Antiquities Landmarks (SALs), Official Texas Historical Markers (OTHMs), Recorded Texas Historic Landmarks (RTHLs), and cemeteries. Sanborn maps and other historic city maps were also reviewed. Within the 1-km file search area, 13 previous archaeological surveys, one reconnaissance survey, and three testing projects have been conducted (**Table 1**).

Table 1. Previous archaeological investigations within 1,000 m of the APE.

Type	Date	Antiquities Permit No.	Agency/Firm	Description
Survey	No data	No data	No data	No data
Survey	1985	N/A	State Department of Highways and Public Transportation (SDHPT)	Archaeological survey for SH 151
Survey	1988	689	Center for Archaeological Research at the University of Texas at San Antonio (CAR-UTSA)	Archaeological survey of 37 acres in Rodriguez County Park. No sites identified (Highley and Hafernik 1988).
Survey	1989	N/A	State Department of Highways and Public Transportation (SDHPT)	Archaeological survey for South Callaghan Road
Survey	1995	N/A	United States Air Force (USAF)/CAR-UTSA	No data on Atlas

Type	Date	Antiquities Permit No.	Agency/Firm	Description
Testing	1996	N/A	NPS/USAF	No data on Atlas
Survey	2002	2954	CoSA/PBS&J	Cultural resources investigation for the Culebra/Loop 410 (Leon Creek) Regional Storm Water Facility, Bexar County. One multicomponent prehistoric/historic site and two prehistoric archaeological sites were identified (41BX1534-1536) (Smith et al. 2003).
Survey	2004	3592	SAWS/SWCA	Cultural resources survey of the 2-mile long San Antonio Western Watershed Relief Line W-04. No archaeological sites were identified in the right-of-way (Carpenter 2005).
Reconnaissance	2005	3003	Department of Transportation (TxDOT)/CAR-UTSA/Texas	Archaeological survey for the Loop 410 Improvements Project. No new archaeology sites were documented during Phase I and II of archaeological investigations. Four sites were revisited (41BX555, 41BX556, 41BX683 and 41BX704). All were impacted by development and no cultural material was recovered. Phase III of the project consisted of 16 backhoe trenches placed in areas where deeply buried cultural deposits were probable. Only one trench (BHT 13) encountered artifacts. Testing was recommended for site 41BX1749 (Figueroa et al. 2008).
Testing	2006	N/A	USAF/Geo-Marine, Inc. (GMI)	No data on Atlas
Testing	2008	4840	Bexar County/Abasolo Archaeological Consulting	Survey and backhoe trenching for underground utilities installation corridor at Miracle League, Inc. No sites located (Shafer 2008).
Survey	2009	5165	SAWS/EComm	Archaeological survey for 4.8-mile long 30-inch water line from Medio Creek facility to a storage facility. No new sites recorded (Butler and Feit 2009).
Survey	2011	5941	USAF/GMI	Intensive archaeological survey and shovel testing of three alternative routes for the proposed relocation of Growdon Gate at Lackland Air Force Base. One site, 41BX1886, a mid-twentieth century homestead site was found. This site is located approximately 1,200 m east of the current APE. The site was recommended as Not Eligible, and no further archaeological investigations were recommended (Fullerton 2011).
Survey	2011	5945	CoSA (hike and bike trail)/SWCA	Intensive cultural resources survey of the proposed Leon Creek Hike and Bike trail, from SH 151 to Camargo Park. No new sites were identified (Stotts and Galindo 2013).
Survey	2011	5980	CPS Energy/ Atkins	Intensive cultural resources survey for the CPS Energy TCC-SWRI 138-kilovolt transmission line project. No new sites were identified (Nash 2011).
Survey	2012	6168	CoSA/Hicks & Company	Archaeological survey for 837-m long hike and bike trail within the Leon Creek Greenway

Type	Date	Antiquities Permit No.	Agency/Firm	Description
				Development project area. No archaeological sites were recorded (Champion 2012).
Survey	2016	7760	CoSA/Prewitt and Associates	Archaeological survey for Slick Ranch Creek drainage improvements. No sites recorded (Kibler 2016).

Source: TASA (2018)

Within the 1-km file search area, six previously recorded archaeological sites have been recorded, though none are in the current APE. In numerical order, these previously recorded sites include:

- **41BX555** – This site was recorded in 1985 by the SDHPT. The site consists of a prehistoric lithic scatter of flakes and burned rock fragments, located on a disturbed terrace surface adjacent to Slick Branch Creek and Loop 410. No additional site information was available. This site is located approximately 800 m west of the current APE.

- **41BX683** – This site was recorded in 1985 by the SDHPT. The site is described as an open campsite, located on a bluff on the south bank of Leon Creek, between Military Drive, Pinn Road, and West Commerce Street. The site is described as deflated, with no top soil remaining and no intact cultural materials. Identified materials include burned rocks, a core, and flakes. This site is located adjacent to the current APE, but is within the current SH 151 right-of-way, and was not relocated during the survey.

- **41BX1108** – This site was recorded as a prehistoric open campsite and was recorded in 1995 by CAR-UTSA. The site is situated on a high terrace surface, approximately 250 m north of Leon Creek, on the Lackland Air Force Base Golf Course. Site investigations revealed the presence of numerous flakes, thin biface fragments, fire-cracked rocks, mollusk shell, small pieces of a burned long bone, burned caliche, and an extensive burned rock feature. The site was determined eligible for listing in the NRHP by THC in 2006. This site is located approximately 800 m south of the current APE.

- **41BX1534** – This site consists of a possible Late Prehistoric open campsite and mid-twentieth century historic abandoned industrial site. The site was identified during a survey for the Culebra/Loop 410 (Leon Creek) Regional Stormwater Detention Facility (Smith et al. 2003). Prehistoric artifacts identified at the site include lithic debitage, cores, two bifaces, burned rock, a dart point, and possible intact prehistoric burned rock features. Historic-age features include two large concrete pads and four smaller concrete pads found at the surface. No further investigations were recommended for the historic component, though additional investigations were recommended for the subsurface prehistoric component. The site was determined eligible for listing in the NRHP by THC in 2003. This site is located approximately 300 m north of the current APE.
- **41BX1535** – This site consists of a prehistoric lithic scatter approximately 1,200 east of Leon Creek, and was identified during a survey for the Culebra/Loop 410 (Leon Creek) Regional Stormwater Detention Facility (Smith et al. 2003). Artifacts include three pieces of lithic debitage from the surface and two debitage flakes from shovel tests. No further investigations were recommended. Also observed were small cobbles of chert and

limestone. No further investigations were recommended at this site. The site was determined ineligible for listing in the NRHP by THC in 2003. This site is located approximately 400 m northeast of the current APE.

- **41BX1536** – This site consists of a low-density prehistoric lithic scatter and was identified approximately 600 feet east of Leon Creek, during a survey for the Culebra/Loop 410 (Leon Creek) Regional Stormwater Detention Facility (Smith et al. 2003). Artifacts at this site include lithic chert debitage and one biface fragment. In addition, a small scatter of modern brick was found near western end of site, which may indicate construction of clearing at some time, though no structure was reported. No evidence of features was found. No further investigations were recommended at this site. The site was determined ineligible for listing in the NRHP by THC in 2003. This site is located approximately 200 m north of the current APE.

One historical marker is located within the 1-km file search area. The **Lapham Moses Historical Marker** is located approximately 100 m west of the APE, at Leon Creek and Old Castroville Road. It consists of a 1936 gray granite centennial marker. The marker text reads: *"Near hear on October 20, 1838 Moses Lapham, a veteran of San Jacinto, and three of his companions were killed by Indians, as were seven members of a rescue party on the following day."*

4.0 FIELD METHODS

The objective of the archaeological investigation was to identify and inventory any archaeological sites within the APE, define archaeological site boundaries, and make eligibility recommendations for inclusion in the NRHP and/or for formal designate as a SAL.

Fieldwork included a 100 percent pedestrian survey, supplemented by shovel testing. Shovel testing followed the Council of Texas Archeologist's survey standards. The survey of the initial project alignment was conducted from May 25 to June 8, 2016, and Segment 2 was surveyed on September 26, 2018. All work was supervised by cultural resources professionals that meet the United States Secretary of the Interior's Professional Qualification Standards for Archaeology and Historic Preservation. During the course of the survey, AECOM archaeologists also evaluated whether any areas warranted mechanical trenching. No artifacts requiring curation were collected during the survey.

All exposed ground surfaces were examined for evidence of archaeological resources. Shovel tests were 30 cm in diameter and excavated to the bottom of Holocene deposits, where possible. Shovel tests were dug in 20-cm levels and excavated soil was screened through ¼ inch hardware mesh, except where the soils were dominated by clay. Clay-dominated soils were troweled. The location, depth, soil strata, and presence/absence of cultural materials were recorded for each shovel test, and all shovels tests were backfilled upon completion. Shovel tests were visually described, mapped using a handheld GPS unit. Shovel testing was precluded in some areas based on extant soil conditions, natural features, or prior disturbances.

In accordance with the approved research design, any diagnostic artifacts would be collected and brought to AECOM's office for cleaning, analysis, and curation. A representative sample of any non-diagnostic artifacts would be photographed and documented in the field but not collected.

In the event any archaeological sites were identified in the APE, the site boundaries would be defined in the project area on the basis of artifact distributions, either on the surface or identified from shovel tests. The location and extent of each would also be mapped with GPS, and an inventory and provenance of artifacts and/or features would be documented. A temporary field designation would be assigned to each site, and sites would be recorded on TexSite forms in the field, and the forms submitted to the Texas Archeological Research Laboratory to obtain trinomials. If historic archaeological sites were found anywhere within the project area, archival research would be conducted.

Any newly discovered sites would be assessed to determine whether they are eligible for listing in the NRHP and/or merit designation as a SAL. NRHP eligibility is dependent upon satisfying the criteria spelled out in Title 36, Chapter I, Part 60 of the Code of Federal Regulations (36 CFR 60.4), which states:

"…the quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
b) that are associated with the lives of persons significant in our past; or
c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d) that have yielded or may be likely to yield, information important in prehistory or history."

In order to be considered eligible for the NRHP, a resource must satisfy at least one of the four criteria listed above (a through d) and it must retain one or more aspects of integrity, including location, design, setting, materials, workmanship, feeling or association. The integrity a resource must retain for NRHP eligibility is different for different kinds of resources. For example, for archaeological sites, integrity generally means that components of a site must be in their original depositional context, such that the stratigraphic relationships of site components are maintained.

The Antiquities Code of Texas allows for certain cultural resources to be designated and protected as a SAL. For a historic building to be eligible for designation as a SAL, it must be listed in the NRHP prior to being designated. The same prerequisite does not apply to archaeological sites. At the state level, under Title 13, Part 2, Chapter 26, Subchapter C, Rule 26.10 of the Texas Administrative Code, an archaeological site under the ownership or control of the State of Texas may merit official designation as a SAL if one of the following criteria applies:

1. The site has the potential to contribute to a better understanding of the prehistory and/or history of Texas by the addition of new and important information;
2. The site's archaeological deposits and the artifacts within the site are preserved and intact, thereby supporting the research potential or preservation interests of the site;
3. The site possesses unique or rare attributes concerning Texas prehistory and/or history;
4. The study of the site offers the opportunity to test theories and methods of preservation, thereby contributing to new scientific knowledge; and
5. There is a high likelihood that vandalism and relic collecting has occurred or could occur, and official landmark designation is needed to ensure maximum legal protection, or alternatively, further investigations are needed to mitigate the effects of vandalism and relic collecting when the site cannot be protected.

5.0 RESULTS

Pedestrian survey was carried out for the 3.9-mile long initial project alignment and the recently realigned 1.1-mile Segment 2 alignment. Survey included two parallel transects spaced 15 m apart. In most places, the APE closely follows the current Leon Creek channel alignment and is dominated by typical south Texas riparian vegetation (**Figure 2**). In order to facilitate the discussion of observations and results in the current report, the initial project alignment was subdivided into four survey areas. From south to north, these were designated as Survey Areas A, B, C, and D. A total of 57 shovel tests were excavated within the initial project alignment. Segment 2 was surveyed on September 26, 2018 and included the excavation of ten additional shovel tests (**Figure 3**). All shovel tests were negative for cultural materials, and no archaeological sites were identified during the survey.

Figure 2. Generalized overview of Leon Creek study area.

Figure 3. Map illustrating survey areas along W-1 Leon Creek Sewer Main Improvement Project.

Survey Area A

Survey Area A begins just south of US Highway 90 and extends northwest to Old Highway 90. From Old Highway 90, the alignment runs along Leon Creek, following the southern boundary of Rodriguez County Park, and then turns north. This area ends at the Olmos Equipment, Inc. property (see **Figure 3**).

Survey Area A follows a low, broad floodplain surface that is densely vegetated (**Figures 4-5**). The soils adjacent to the creek are mapped as Loire clay loam, 0 to 2 percent slopes, occasionally flooded (NRCS 2016). These well drained soils formed in loamy alluvium and exhibit a weakly-developed A horizon over a series of unaltered C horizons containing primary bedding structures. The area exhibits uneven terrain, and contains extensive debris scatters from flooding that occurred during the week prior to the survey. In some areas of the alignment, exposed gravel bar deposits are evident, which indicates very high flow regimes consistent with incipient floodplain construction (**Figure 6**). This was further evidenced by opportunistic cutbank examinations, which revealed deposits of imbricated gravels intercalated with loamy clays exhibiting minimal pedogenic development (**Figure 7**).

Figure 4. Densely vegetated floodplain area along Leon Creek within Survey Area A.

Figure 5. Floodplain within Survey Area A, located west of Rodriguez County Park.

Figure 6. View of channel gravels within Leon Creek floodplain within Survey Area A.

Figure 7. Profile view of Leon Creek floodplain. Note the relatively young constructional surface, as evidenced by the minimally weathered loamy soils, along with discrete layers of imbricated gravels indicative of a high-energy flow regime.

A total of 38 shovel tests were excavated within Survey Area A (**Figure 8; Appendix A**). Shovel tests were spaced at approximately 100-m intervals and measured 30 cm in diameter. All were negative for cultural materials. In general, shovel tests encountered relatively shallow (<20 cm) loamy and clayey soils over point-bar gravels, at which point they were terminated. The shallow gravels encountered in these tests are consistent with the relatively recent floodplain construction and the high energy flow regimes that were documented during the most recent flooding event. At the northern end of this segment, the survey was halted due to the presence of biohazardous raw sewage overflows.

Profile examination revealed this section of Leon Creek is characterized by periodic high flow regimes, such that any former cultural occupation surfaces would have been subjected to intensive erosion/scouring. Based on the shallow floodplain deposits over bedrock, which were found to consist of thin loamy and clayey soils intercalated with gravel beds, it is unlikely any archaeological deposits with sufficient integrity potential would be present. Given the poor integrity potential in this setting, no backhoe trenches were warranted.

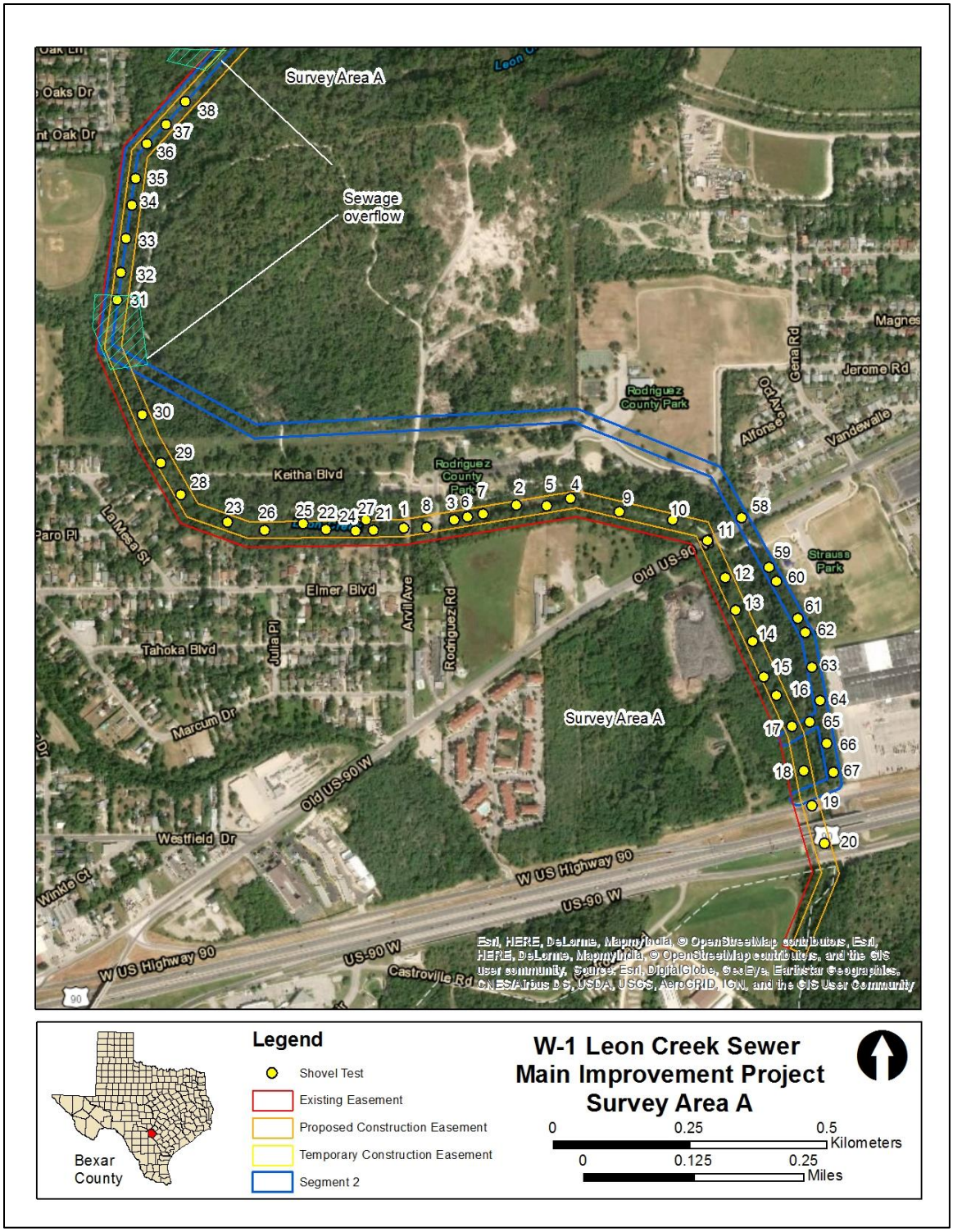

Figure 8. Map of Survey Area A showing the locations of shovel tests. Segment 2, located north of Survey Area A, was subsequently added to the project and surveyed in 2018.

Survey Area B

Survey Area B begins at the south end of the Olmos Equipment, Inc. property, located to the north of the adjoining Survey Area A, and extends north and northwest to Pinn Road (**Figure 9**). The eastern portion of Survey Area B runs north-south through a gravel quarry site (**Figure 10**). Soils mapped within the existing and proposed alignments are classified as "Pits and Quarries." This reclaimed area was subjected to pedestrian walkover and was found to exhibit extremely rugged and uneven terrain indicative of former quarry activities (**Figure 11**). At the southern end of Survey Area B, a former, water-filled quarry pit was encountered, and the southern pedestrian progress was halted (**Figure 12**).

The western half of Survey Area B runs parallel to the south side of Leon Creek, along a paved gravel pit access road, which was built upon the floodplain between the creek and the adjacent, disturbed terrace/upland margin to the south (**Figure 13**). The existing sewer line runs between the paved roadway and Leon Creek. A residential area is located on the top of the adjacent terrace, which also exhibits numerous rip-rap and push piles along the lower terrace scarp (**Figure 14**). One shovel test (ST 39) was excavated in the unpaved portion of the proposed alignment, which confirmed the previous disturbances to this area and revealed mixed, gravelly soils and asphalt. Additional creek views revealed shallowly buried bedrock beneath the floodplain, which is comprised of mixed floodplain soils and gravelly layers (**Figure 15**).

Based on the extant conditions within this segment, no additional shovel tests were excavated, and no backhoe trenching were warranted.

Figure 9. Map of Survey Area B showing the locations of shovel tests.

Figure 10. View of active quarry pit located within Survey Area B.

Figure 11. Reclaimed land in Survey Area B, with disturbed, uneven terrain.

Figure 12. Water-filled quarry pit at south end of Survey Area B.

Figure 13. View of paved gravel pit access road within Survey Area B.

Figure 14. View of disturbed lower terrace scarp near edge of floodplain in Survey Area B.

Figure 15. View of Leon Creek bedrock channel within Survey Area B.

Survey Area C

Survey Area C begins at Pinn Road and extends northwest to Commerce Street (**Figure 16**). Approximately 30 percent of this segment lies within the existing and disturbed rights-of-way for Pinn Road, Commerce Street, and SH 151, while the remainder parallels the wooded south side of Leon Creek (**Figure 17**). In this area, Leon Creek is deeply incised into bedrock, likely due to historic channel downcutting, followed by historic/modern floodplain construction. There is an approximately 12-m elevational difference between the lower floodplain level and the adjacent Quaternary terrace to the south. The floodplain soils are shallow (<1 m) over bedrock. Given the prior week's flooding, which overtopped the Pinn Road bridge crossing (**Figure 18**), it was observed that much of the floodplain in this area is scoured down to bedrock. Pedestrian survey and the excavation of two shovel tests (STs 40 and 41) in this segment confirmed most of Survey Area C is disturbed, and contains a thin zone of mixed, gravelly and loamy soils over shallow bedrock.

Within Survey Area C, archaeological site 41BX683 was previously documented by the SDHPT (TxDOT) on the south bank of Leon Creek, during the survey of SH 151 in 1985 (see **Figure 1**). The site is described as a prehistoric open campsite containing burned rocks, a core, and flakes, within a deflated and eroded context. The Atlas map places the site beneath the western bridge approach fill embankment, just outside the current APE. No evidence of the site was found during the current survey. Given the dynamic nature of the floodplain, erosion and scouring, and prior disturbances, there is no potential for the presence of buried and intact archaeological deposits within this Survey Area. No additional shovel tests were excavated, and no backhoe trenching was warranted.

Figure 16. Map of Survey Area C showing the locations of shovel tests.

Figure 17. High terrace above incised Leon Creek channel in Survey Area C.

Figure 18. Leon Creek at Pinn Road during flood stage on June 2, 2016.

Survey Area D

Survey Area D extends from Commerce Street to the northern project terminus. The northern 40 percent of Survey Area D is mapped as "Pits and Quarries" on soil maps (NRCS 2016). Based on a review of the TASA, a larger area that encompasses Survey Area D was previously surveyed by PBS&J (Antiquities Permit 2954) as part of the Proposed Culebra-Loop 410 Leon Creek Regional Storm Water Facility (Smith et al. 2003). Several sites were recorded to the north of the current APE, though none were found within the current proposed alignment (see **Figure 1**). In addition, SWCA conducted a survey along this stretch of Leon Creek for the SAWS Western Watershed Relief Line W-04 (Antiquities Permit 3592). SWCA's fieldwork revealed this area along Leon Creek is within a reclaimed gravel quarry area, is reworked, and exhibits low archaeological potential due to high-energy flood impacts. No cultural materials were identified (Carpenter 2005).

During the current, survey, disturbances from former quarry activities were confirmed, as well as recent channel modifications due to earth-moving activities (**Figure 19**). Three shovel tests (STs 42-44) were excavated in this area and revealed shallow, gravelly, and disturbed soils (**Figure 20)**.

South of the quarry pits, 13 additional shovel tests (STs 45-57) were excavated; each was negative for cultural materials. In this area, as in the rest of the project, floodplain soils are shallow, with loamy deposits intercalated with gravel layers. Bedrock outcrops and numerous gravel bars distributed throughout a relatively wide channel area were observed, which suggests this area is subjected to extensive erosion and reworking during floods (**Figure 21**). Additionally, Survey Area D is marshy, with low lying areas of standing water from recent rains (**Figures 22 and 23**). The presence of several wetland areas in Survey Area D attests to how past channel modifications have altered the stream flow.

Based on field observations and shovel tests, the floodplain appears to be subject to episodic erosion and reworking during large magnitude flood events. This has resulted in extensive erosion, scouring, and sediment reworking, which is consistent with previous survey observations (Carpenter 2005). Furthermore, recent mechanical disturbances were apparent within the APE. Given the nature of prior disturbances, the floodplain dynamics, and the relatively young (historic/modern) constructional floodplain surface, there is no potential for the presence of buried and intact archaeological deposits within this survey area. No additional shovel tests were excavated and no backhoe trenching was warranted.

Figure 19. Recently disturbed Leon Creek floodplain in Survey Area D.

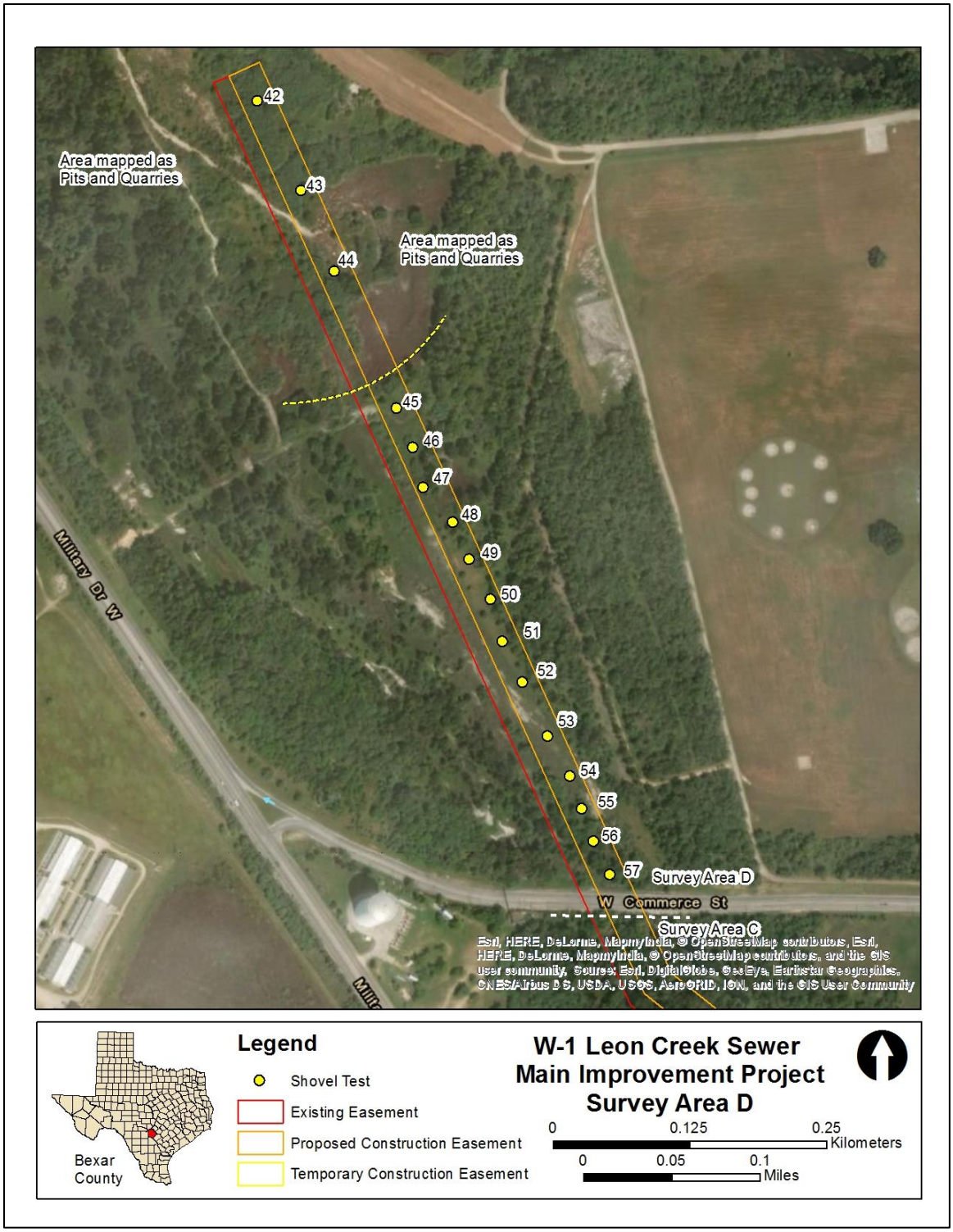

Figure 20. Map of Survey Area D showing locations of shovel tests.

Figure 21. Eroded and reworked floodplain sediments in Survey Area D.

Figure 22. Standing water in low floodplain areas of Survey Area D, following heavy rains.

Figure 23. Wetland marsh areas within Survey Area D.

Segment 2

Segment 2 closely parallels to the north and east of Survey Area A (**Figure 24**). Segment 2 was added to the project in 2017, following the survey of initial project alignment. The east-west portion of this segment closely follows a cleared transmission line corridor, which exhibits mechanical disturbances. In addition, review of historical aerial photographs showed that a majority of this segment traverses an old, in-filled gravel quarry that was active during the 1960s and 1970s.

Pedestrian walkover of the quarry portion of Segment 2 was conducted on September 26, 2018, during which disturbances from former quarry activities were confirmed, as well as recent earth-moving activities (**Figures 25 and 26**). To the east of the former quarry, along Leon Creek, a total of 10 shovel tests (STs 58-67) were excavated, which revealed shallow, gravelly, and disturbed soils (**Figures 27 and 28**). All shovel tests were negative.

Soils tended to be shallow, with loamy deposits intercalated with gravel layers. Bedrock outcrops and gravel bars distributed throughout a wide channel area were observed throughout this segment, along with extensive sediment erosion and reworking during floods.

The floodplain appears to be subject to episodic erosion and reworking during large magnitude flood events. This has resulted in extensive erosion, scouring, and sediment reworking, which is consistent with previous survey observations (Carpenter 2005). Furthermore, recent mechanical disturbances were apparent within the APE. Given the nature of prior disturbances and thin, gravelly soils, there is no potential for the presence of buried and intact archaeological deposits within Segment 2. No additional shovel tests were excavated and no backhoe trenching was warranted.

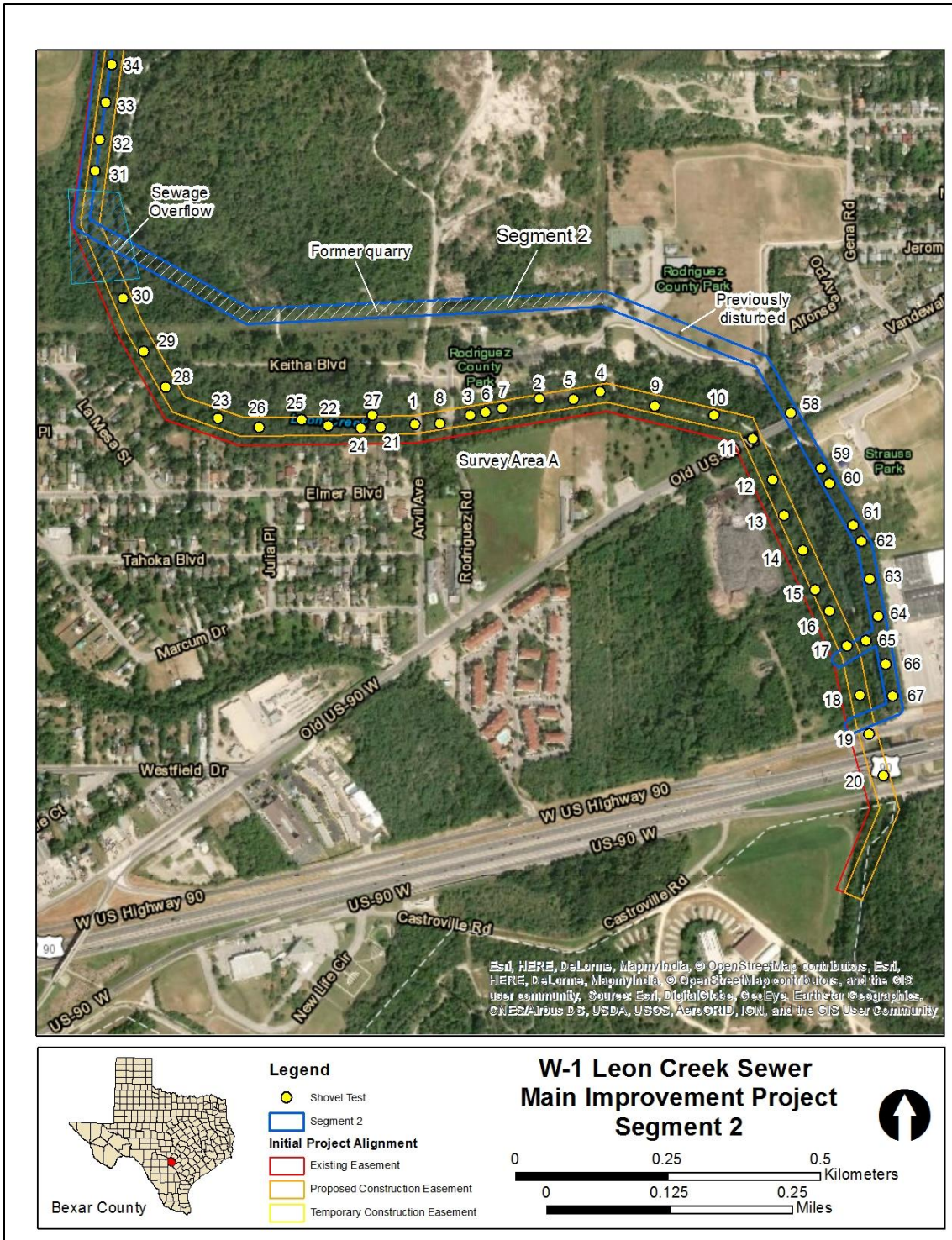

Figure 24. Map of Segment 2 showing locations of shovel tests and prior disturbances.

Figure 25. Hummocky surface observed in former gravel quarry at Segment 2.

Figure 26. View of transmission line corridor adjacent to Segment 2 and former gravel quarry seen to the north (left).

Figure 27. Gravel lag surface along east side of Leon Creek within Segment 2.

Figure 28. Gravel lag and disturbed, eroded deposits on east side of Leon Creek within Segment 2.

Impact Assessment

The field investigations included an assessment of the soils and geomorphic setting of the project relative to archaeological integrity potential and extant project impacts. Within the floodplain portion of the APE, the soil-geomorphic conditions are such that prehistoric archaeological sites are not likely to be deeply buried or intact. Examination of shovel tests, cut bank profiles, and fluvial morphological processes and forms indicates the Leon Creek floodplain within the APE is a thin (<1 m) deposit that was constructed relatively recently, either in recent history or modern times. The presence of large, imbricated gravel layers within the loamy floodplain soils, the presence of reworked sediments and gravel bars, and surface scours from recent floods suggest the study area does not exhibit the necessary geomorphological conditions to contain intact archaeological sites. The few minor areas of the project located on the higher Quaternary terrace deposits were also observed to be too disturbed to contain intact sites. This includes the Olmos quarry area within Survey Area B, a narrow strip adjacent to Old Highway 90 in Survey Area A, and Segment 2. Given the foregoing observations, no areas within the project warrant deep mechanical trenching.

6.0 SUMMARY AND RECOMMENDATIONS

From May to June, 2016, AECOM conducted an intensive archaeological survey for the initial alignment of the SAWS W-1 Leon Creek Sewer Main Improvement Project, spanning approximately 3.9-miles from SH 151 to US Highway 90, located in west San Antonio, Bexar County, Texas. Segment 2, which was later added to the project area, was surveyed by AECOM on September 26, 2018.

The survey was performed under Texas Antiquities Permit No. 7632 and included parallel pedestrian transects and the excavation of 67 shovel tests. All shovel tests were negative for cultural materials. No cultural materials were identified.

Based on the observed geomorphological conditions, prior disturbances, and the high-energy flood regime, the project does not exhibit the necessary preservation conditions to contain deeply buried and intact archaeological sites. As such, no deep mechanic trenching was warranted.

Based on the results of the survey, it is recommended that construction of the proposed project would have **No Effect** on any archaeological historic properties, SALs, or historic structures. Therefore, no further archaeological investigations are recommended. However, should additional alignment changes be necessary, then additional archaeological investigations may be warranted.

7.0 REFERENCES CITED

Barnes, V.E.

1974 *Geologic Atlas of Texas*, *San Antonio Sheet*. Bureau of Economic Geology. The University of Texas at Austin.

Bement, L.C.

1994 *Hunter-Gatherer Mortuary Practices During the Central Texas Archaic*. University of Texas Press, Austin.

Black, S.L.

1986 *The Clemente and Herminia Hinojosa Site, 41JW8: A Toyah Horizon Campsite in Southern Texas*. Special Report No. 18. Center for Archaeological Research, The University of Texas at San Antonio.

1989 South Texas Plains. In *From the Gulf of the Rio Grande: Human Adaptation in Central, South, and Lower Pecos Texas*, by Thomas R. Hester, Stephen L. Black, D. Gentry Steele, Ben W. Olive, Anne A. Fox, Karl J. Reinhard, and Leland C. Bement, pp. 39–62. Research Series No. 33. Arkansas Archeological Survey, Fayetteville.

Bomar, G.W.

1983 *Texas Weather*. University of Texas Press, Austin.

Butler, J., and R. Feit

2009 *An Archeological Survey of a Proposed Recycle Water Pipeline to the SAWS Medio Creek Facility, Bexar County, Texas*. Prepared for AECOM and the San Antonio Water System. Prepared by Ecological Communications Corporation.

Carpenter, S.

2005 *Cultural Resources Survey of the San Antonio Western Watershed Relief Line W-04, Bexar County, Texas*. SWCA Environmental Consultants Cultural Resources Report No. 04-409. Austin.

Champion, S.W.

2012 *Short Report on the Archeological Investigations of the City of San Antonio's Leon Creek Greenway Development Project, Wade Segment, in Bexar County, Texas*. Hicks & Company Archeology Series #238.

Collins, M.B.

1995 Forty Years of Archeology in Central Texas. *Bulletin of the Texas Archeological Society* 66:361-400.

2002 The Gault Site, Texas, and Clovis Research. *Athena Review* 3(2).

2004 Archeology in Central Texas. In *The Prehistory of Texas*, edited by Timothy K. Perttula, pp. 101–126. Texas A&M University Press, College Station.

Creel, D.
1991 Bison Hides in Late Prehistoric Exchange in the Southern Plains. *American Antiquity* 56(1): 40-49.

Dillehay, T.D.
1974 Late Quaternary Bison Population Changes in the Southern Plains. *Plains Anthropologist* 19(1): 180-196.

Fehrenbach, T.R.
1978 *The San Antonio Story*. Continental Heritage Press, Tulsa, Oklahoma.

Figueroa, A.L., B.A. Meissner, and K.J. Cordova
2008 *Archaeological Survey of the Loop 410 Improvements Project, City of San Antonio, Bexar County, Texas*. Center for Archaeological Research, The University of Texas at San Antonio. Archaeological Report No. 378.

Fullerton, B.
2011 *Cultural Resources Survey for the Relocation of Growdon Gate at Lackland Air Force Base, Bexar County, Texas*. Geo-Marine, Inc. Miscellaneous Reports of Investigations No. 542. Plano, Texas.

Galindo, M.J.
2012 *Intensive Archaeological Survey of the Proposed FM 3487 at Leon Creek Gas Adjustment Project, San Antonio, Bexar County, Texas*. SWCA Environmental Consultants Cultural Resources Report No. 11-398. Austin.

Hall, G. D., T. R. Hester and S. L. Black
1986 *The Prehistoric Sites at Choke Canyon Reservoir, Southern Texas: Results of Phase II Archaeological Investigations*. Choke Canyon Series No. 10. Center for Archaeological Research, The University of Texas at San Antonio.

Hester, T. R.
1995 The Prehistory of South Texas. *Bulletin of the Texas Archaeological Society* 66(1): 427-459.

Highley, C.L., and D.B. Hafernik
1988 *Archaeological Survey of Rodriquez County Park, South San Antonio, Bexar County, Texas*. Center for Archaeological Research-University of Texas at San Antonio.

Huebner, J.A.
1991 Late Prehistoric Bison Populations in Central and Southern Texas. *Plains Anthropologist* 36:343-358.

Johnson, L.
1994 *The Life and Times of Toyah-Culture Folk: The Buckhollow Encampment, Site 41KM16, Kimble County, Texas*. Office of State Archeologist Report 38. Texas Department of Transportation and Texas Historical Commission, Austin.

Kibler, K.W.
2016 *Archeological Survey for the Slick Ranch Creek Drainage Improvements at Tom Slick Park, City of San Antonio, Bexar County, Texas*. Prewitt and Associates, Inc. Letter Report No. 911.

Long, C.
2012 "BEXAR COUNTY," *Handbook of Texas Online* (http://www.tshaonline.org/handbook/online/articles/hfb06), accessed September 4, 2012.

Nash, M.A.
2011 *A Cultural Resources Survey of the Proposed TCC-SWRI 138-kV Transmission Line Project, Bexar County, Texas*. Atkins, Austin, Texas.

Natural Resources Conservation Service (NRCS)
2016 *Web Soil Survey*. Electronic database, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, accessed April 2016.

Ockerman, D.J., and K.C. McNamara
2003 *Simulations of Streamflow and Estimation of Streamflow Constituent Loads in the San Antonio River Watershed, Bexar County, Texas, 1997-2001*. United States Geological Survey (USGS) Water-Resources Investigations Report 03-4030, in cooperation with the San Antonio Water System.

Prewitt, E. R.
1981 Culture Chronology in Central Texas. *Bulletin of the Texas Archaeological Society* 56(1): 65-89.

Shafer, H.J.
2008 *Archaeological Testing at the Miracle League, Inc. Utility Construction Site, San Antonio, Bexar County, Texas*. Abasolo Archaeological Consultants Report No. 65. San Antonio, Texas.

Smith, M., M. Cliff, R. Rogers, and K. Jecker
2003 *A Cultural Resources Investigation of the Proposed Culebra/Loop 410 (Leon Creek) Regional Storm Water Facility, Bexar County, Texas*. PBS&J. Austin.

Soil Survey Staff
2010 *Keys to Soil* Taxonomy, 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. Washington D.C.

Stotts, M.C., and M.J. Galindo
2013 *Intensive Archaeological Resources Survey of the Highway 151 to Camargo Park Segment of the Proposed Leon Creek Hike and Bike Trail Project, Bexar County, Texas*. SWCA Environmental Consultants Cultural Resources Report No. 2011-261. Austin, Texas.

Taylor, A.J., and C.L. Highley
1995 *Archeological Investigations at the Loma Sandia Site (41LK28): A Prehistoric Cemetery and Campsite in Live Oak County, Texas*. Studies in Archeology 20. Texas Archeological Research Laboratory, The University of Texas at Austin.

Texas Archeological Sites Atlas (TASA)
2018 Electronic document, http://nueces.thc.state.tx.us/, accessed October 17, 2018.

Texas Historic Sites Atlas (THSA)
2016 Electronic document, http://atlas.thc.state.tx.us/, accessed July and April 2016.

Thoms, A.V., and R.D. Mandel
1992 The Richard Beene Site: A deeply stratified Paleoindian to Late Prehistoric Occupation in South Central Texas. *Current Research in the Pleistocene* 9:42-44.

Thoms, A.V., and R.D. Mandel (editors)
2007 *Archaeological and Paleoecological Investigations at the Richard Beene Site, South-Central Texas.* Report of Investigations 8, Center for Ecological Archaeology, Texas A&M University, College Station.

Turner, E.S. and T.R. Hester
1993 *A Field Guide to Stone Artifacts of Texas Indians*. 2nd ed. Gulf Publishing, Houston.

United States Geologic Survey
2016 National Water Information System http://nwis.waterdata.usgs.gov/tx/nwis/inventory/?site_no=08181480&agency_cd=USGS, accessed April 13, 2016

APPENDIX A – SHOVEL TEST DATA

Shovel Test	Depth	Description	Cultural Materials
Survey Area A			
1	0-10	10YR 3/4 sandy clay loam; disturbed mixed soil; shovel test terminated	Negative
2	0-31	10YR 3/4 sandy clay loam	Negative
	31-41	10YR 5/2 clay loam	Negative
3	0-10	Gravel deposits at surface; shovel test terminated	Negative
4	0-10	Disturbed/mixed soil; shovel test terminated	Negative
5	0-20	10YR 3/4 sandy clay loam; disturbed mixed soil; shovel test terminated	Negative
6	0-10	Gravel deposits at surface; shovel test terminated	Negative
7	0-10	Gravel deposits at surface; shovel test terminated	Negative
8	0-10	Gravel deposits at surface; shovel test terminated	Negative
9	0-10	Gravel deposits at surface; shovel test terminated	Negative
10	0-42	10YR 3/4 sandy clay loam	Negative
	42-52	10YR 5/2 clay loam	Negative
11	0-10	Gravels at surface and disturbances from Old Highway 90 construction; shovel test terminated	Negative
12	0-10	10YR 3/2 clay over 7.5YR 5/4 clay; older terrace surface; shovel test terminated	Negative
13	0-10	10YR 3/2 clay over 7.5YR 5/4 clay; older terrace surface; shovel test terminated	Negative
14	0-10	10YR 3/2 clay over 7.5YR 5/4 clay; older terrace surface; shovel test terminated	Negative
15	0-34	10YR 3/4 silty clay loam	Negative
	34-44	10YR 5/2 silty clay loam	Negative
16	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated	Negative
17	0-10	Gravel deposits at surface; shovel test terminated	Negative
18	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated	Negative
19	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated	Negative
20	0-10	10YR 5/2 silty clay loam; mixed/disturbed, with gravels throughout; shovel test terminated	Negative
21	0-10	10YR 5/2 silty clay loam; mixed/disturbed from berm; shovel test terminated	Negative
22	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated	Negative
23	0-10	Disturbed due to concrete slab	Negative
24	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to water saturation	Negative
25	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to water saturation	Negative
26	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to water saturation	Negative
27	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to water saturation	Negative
28	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to presence of water saturation	Negative
29	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to presence of water saturation	Negative
30	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to presence of gravels	Negative
31	0-10	10YR 5/2 silty clay loam; mixed/disturbed; shovel test terminated due to presence of gravels	Negative
32	0-10	Gravel bar at surface; saturated ground conditions	Negative
33	0-10	10YR 5/1 sandy clay loam; mixed/disturbed	Negative
34	0-20	10YR 3/2 clay loam over gravel; saturated	Negative
35	0-10	10YR 3/2 clay loam over gravel; saturated	Negative

Shovel Test	Depth	Description	Cultural Materials
36	0-10	10YR 3/2 clay loam over gravel; saturated	Negative
37	0-10	10YR 5/1 sandy clay loam	Negative
38	0-10	10YR 3/2 clay; disturbed from two-track road; saturated	Negative
Survey Area B			
39	0-5	Mixed/disturbed soil with asphalt from paved roadway	Negative
Survey Area C			
40	0-20	Mixed/disturbed 10YR 3/2 clay loam over gravels	Negative
41	0-10	Mixed/disturbed 10YR 3/2 clay loam over gravels	Negative
Survey Area D			
42	0-5	Gravel bar at surface; reworked channel flood deposit within reclaimed land from former quarry	Negative
43	0-5	Gravel bar at surface; reworked channel flood deposit within reclaimed land from former quarry	Negative
44	0-5	Gravel bar at surface; reworked channel flood deposit within reclaimed land from former quarry	Negative
45	0-5	10YR 5/1 reworked sandy clay loam; shovel test terminated due to presence of raw sewage	Negative
46	0-5	10YR 5/1 reworked sandy clay loam; shovel test terminated due to presence of raw sewage	Negative
47	0-5	10YR 5/1 reworked sandy clay loam; shovel test terminated due to presence of raw sewage	Negative
48		10YR 5/1 reworked sandy clay loam; shovel test terminated due to presence of raw sewage	Negative
49	0-5	10YR 5/1 reworked sandy clay loam; shovel test terminated due to presences of raw sewage	Negative
50	0-10	10YR 3/4 sandy clay loam; disturbed berm	Negative
51	0-10	10YR 3/4 sandy clay loam; disturbed berm	Negative
52	0-10	10YR 3/4 sandy clay loam; disturbed berm	Negative
53	0-28	10YR 3/3 sandy loam	Negative
	28-38	10YR 4/6 clay	Negative
54	0-10	Gravel deposits at surface; shovel test terminated	Negative
55	0-10	Gravel deposits at surface; shovel test terminated	Negative
56	0-10	10YR 3/4 sandy clay loam; disturbed	Negative
57	0-10	10YR 3/4 sandy clay loam; disturbed	Negative
Segment 2			
58	0-10	10YR 4/2 clay loam; gravels and pebbles	Negative
59	0-5	Gravel deposits at surface; shovel test terminated	Negative
60	0-15	10YR 4/2 clay loam; compacted; gravels throughout	Negative
61	0-15	10YR 4/2 clay loam; compacted; gravels throughout	Negative
62	0-10	10YR 4/2 clay loam; compacted; gravels throughout	Negative
63	0-10	10YR 4/2 clay loam; compacted; gravels throughout	Negative
64	0-5	Gravel deposits at surface; shovel test terminated	Negative
65	0-5	Gravel deposits at surface; shovel test terminated	Negative
66	0-10	10YR 4/2 clay loam; compacted; gravels throughout	Negative
67	0-10	10YR 4/2 clay loam; compacted; gravels throughout	Negative