Volume 2017 Article 141

2017

Archaeological Investigations and Monitoring of the Installation of a Water Line along Cunningham Avenue Near the Joint Base San Antonio-Fort Sam Houston, San Antonio, Bexar County, Texas

Kristi Miller Nichols

Mark P. Luzmoor

Archaeological Investigations and Monitoring of the Installation of a Water Line along Cunningham Avenue Near the Joint Base San Antonio-Fort Sam Houston, San Antonio, Bexar County, Texas

Archaeological Investigations and Monitoring of the Installation of a Water Line along Cunningham Avenue Near the Joint Base San Antonio-Fort Sam Houston, San Antonio, Bexar County, Texas

By:
Kristi Miller Nichols
and Mark P. Luzmoor

Prepared for:
K Friese & Associates
16170 Jones Maltsberger Road, Suite 109
San Antonio, TX 78247

Final
Redacted

Prepared by:

12821 W. Golden Ln.
San Antonio TX, 78249

RABA-KISTNER ENVIRONMENTAL, INC.
San Antonio, Texas

Kristi Miller Nichols
PRINCIPAL INVESTIGATOR

Texas Antiquities Permit Number: 7833

ASF16-053-00

November 8, 2017

Management Summary:

In the fall of 2016, **Raba Kistner Environmental Inc.** (**RKEI**) contracted with K Friese & Associates (CLIENT) to monitor the installation of a San Antonio Water System (SAWS) waterline along Cunningham Avenue (Ave.), between Broadway Street (St.) and N. Pine St., along the northern fence line of Joint Base San Antonio-Fort Sam Houston (JBSA-FSH) and the old Playland Park property. SAWS plans to install waterlines along four distinct locations surrounding JBSA-FSH. Of the four proposed waterlines, only one waterline has the potential of impacting a recorded archaeological site. The proposed waterline warranting archaeological investigation is located along Cunningham Ave. and is projected to intersect the known route of the *Acequia de Valero* (*Acequia de Valero)* also known as archaeological site 41BX8.

As the utility installation is located on land owned by the City of San Antonio, a political subdivision of the State, and funding will be partially derived from public sources; the project is subject to review under the Antiquities Code of Texas (Texas Natural Resource Code, Title 9, Chapter 191) which protects historic resources found on state lands or lands owned by a political subdivision of the state. Additionally, the project is subjected to review by the City of San Antonio under the City of San Antonio's Preservation Ordinance (Article VI, Historic Preservation and Urban Design, City of San Antonio, Unified Development Code). All work was performed in accordance with the Council of Texas Archeologists (CTA) and Texas Historical Commission (THC) Survey Standards, under Texas Antiquities Committee Permit No. 7833. Kristi Miller Nichols served as Principal Investigator and Mark Luzmoor served as Project Archaeologist. Assistant City Archaeologist, Matt Elverson was present during the exposure and documentation of the *acequia*.

The *Acequia de Valero* was the first irrigation canal excavated by the Spanish colonists in the upper San Antonio River drainage. The construction of the canal began in January of 1719 for the purpose of transporting water to the agricultural fields of Mission San Antonio de Valero.

Previous research conducted by **RKEI** within the former Playland Park property, south of the current project area, revealed a portion of the *Acequia de Valero.* Due to the potential of the *acequia* extending into the project area, the City of San Antonio's Office of Historic Preservation (COSA-OHP) requested that **RKEI** monitored the mechanical excavation of a 1,000-foot portion of the waterline along Cunningham Ave., specifically focusing on an approximately 66-feet (20 meter [m]) area where the project route of the *Acequia de Valero* intersects Cunningham Ave.

Prior to the installation of the SAWS waterline, the COSA-OHP requested that a Ground Penetrating Radar (GPR) survey be conducted to determine if the *acequia* alignment is still present within the project area*.* Additionally, the COSA-OHP requested that an exploratory trench be excavated in the area where the *acequia* crosses the APE, in an attempt to identify and document the *acequia.* On November 28, 2016, Kristi Miller Nichols and Cynthia Dickey conducted the GPR survey; however, no distinguishable anomalies were detected within in the GPR data. Therefore, on March 7, 2017, monitoring of the exploratory trenching began of an approximately 20 m long trench. The purpose of excavation of the trench was to determine if remnants of the *acequia* existed within the project area, prior to installation of the waterline.

Due to the many layers of fill within the *acequia* at this location, it was difficult to identify the channel during excavation of the trench. After sections of the trench were excavated, an archaeologist entered the trench and cleared the trench walls to carefully inspect each profile for any signs of the *acequia.*

Approximately 140 m to the east of the intersection of Broadway/Cunningham Ave., there appeared to be an outline of a ditch. Based on the location of the alignment of the *acequia* on historic maps and further investigations of the profiles, it was determined to be the *Acequia de Valero.* The north wall profile of the trench revealed the *acequia* to be approximately 4.15 m wide at the top of the channel and 70 centimeters (cm) wide at its base. The base of the *acequia* was 1.24 m below the top of the asphalt and neither the base nor its walls were lined. The south wall profile of the trench revealed that the *acequia* had been partially impacted on this southern edge as it was only 2.9 m wide. The southern wall profile revealed that the eastern end of the *acequia* was offset from the northern wall, approximately 60 cm to the east, indicating that the trench crosscut the *acequia* at an angle. Some similarities were noticed between this portion of the acequia and that uncovered within Playland Park, although, the Playland Park portion appears to have been truncated. Similarities between the two sections included the soil types encountered (i.e. the dark soil with cultural material). Once the documentation of the trench walls was complete the trench was filled in. After consultation with the THC and COSA-OHP, SAWS was permitted to install the waterline in the already excavated trench. No further investigations are recommended for this project as long as excavations did not further impact the *acequia*.

All field records and photographs produced during investigations were curated at the Center for Archaeological Research at the University of Texas at San Antonio.

Table of Contents:

List of Figures:

Chapter 1: Introduction and Area of Potential Effect

Introduction

K Friese & Associates (CLIENT) contracted with **Raba Kistner Environmental, Inc.** (**RKEI**) on behalf of the San Antonio Water System (SAWS) to perform archaeological investigations and monitoring associated with the installation of a waterline along Cunningham Avenue (Ave.) between Broadway Street (St.) and Pine St., along the northern fence line of Joint Base San Antonio-Fort Sam Houston (JBSA-FSH) and the former Playland Park property (**Figure 1-1**). SAWS plans to install waterlines along four distinct locations surrounding JBSA-FSH. Three of the four proposed locations do not appear to impact areas where documented historic or prehistoric sites are present. In contrast, the fourth location along Cunningham Ave., crosses the known route of the *Acequia Madre de Valero* (*Acequia de Valero*), archaeological site 41BX8. As the *acequia* is part of a larger *acequia* system throughout San Antonio and is a contributing element of the San Antonio Missions United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site, the *Acequia de Valero* is a protected entity.

Previous research conducted by **RKEI** within the former Playland Park property, just south of the current project area, revealed a portion of the *Acequia de Valero.* Due to the proximity of the *Acequia de Valero* and the project area, the City of San Antonio-Office of Historic Preservation (COSA-OHP) requested that **RKEI** conduct archaeological investigation for the proposed undertaking. Prior to construction activities, the COSA-OHP asked that a Ground Penetrating Radar (GPR) survey be conducted in an attempt to identify the *acequia* alignment. In addition to the GPR survey, the COSA-OHP requested an exploratory backhoe trench be excavated to further identify and document the *acequia*. Finally, the COSA-OHP requested monitoring of a portion of the mechanical excavation for the waterline along Cunningham Ave. between Broadway St. and Haywood Ave. Focus of the monitoring was centered on the point at which the *Acequia de Valero* issues from under Cunningham Ave.

Archaeological investigations were conducted in two phases, and in accordance with the Texas Historical Commission (THC) and the Council of Texas Archeologists standards. The GPR survey was conducted on November 28, 2016 by Kristi Miller Nichols and Cynthia Dickey and the exploratory trenching and monitoring was conducted on March 7, 2017 by Mark P. Luzmoor. Both phases of the fieldwork were conducted under Texas Antiquities Committee Permit No. 7833, issued to Principal Investigator: Kristi Miller Nichols.

Figure 1-1. Project area location.

Area of Potential Effect.

The Area of Potential Effect (APE) measures 1,000 feet and is located just northeast of downtown San Antonio, Bexar County, Texas, along Cunningham Ave., between JBSA-FSH and former Playland Park, now property of Alamo Community College, and extends from Broadway St. to approximately 25-feet east of Haywood Ave. The APE is depicted on the *San Antonio East, Texas* (2998-133) 7.5 minute U.S. Geological Survey (USGS) topographic quadrangle (**Figure 1-2**). **Figure 1-3** shows the APE on a current aerial photo.

The *Acequia de Valero*, a main irrigation ditch constructed during Spanish Colonial times to service Mission San Antonio de Valero and its croplands. The *Acequia de Valero* is still visible from Cunningham Ave. The area to the north of Cunningham Ave. has been developed, whereas the area to the south appears to be currently open land. Limited construction has occurred to the south of Cunningham on Fort Sam Houston property. The area to the east of Fort Sam Houston was once Playland Park, an amusement park in operation until 1980. The park and its facilities were demolished after its closure.

The southern edge of Cunningham Ave. exhibits a strip of grasses, with trees lining the edge of Alamo Community College District property. The northern edge of Cunningham Ave. is composed of a concrete curb, with a section of grass next to a sidewalk. A portion of the *acequia* is visible inside of the former Playland Park property just south of Cunningham Ave., approximately 450 feet east of the intersection of Broadway St. and Cunningham Avenue. Its construction and dimensions have never been properly examined south of the dam and this project will provide a great opportunity to carry out such documentation. The *Acequia de Valero* portion located within the Alamo Community College District property has been altered by erosion. The portion that is located under Cunningham Ave. is likely more intact and may have evidence of the original channel.

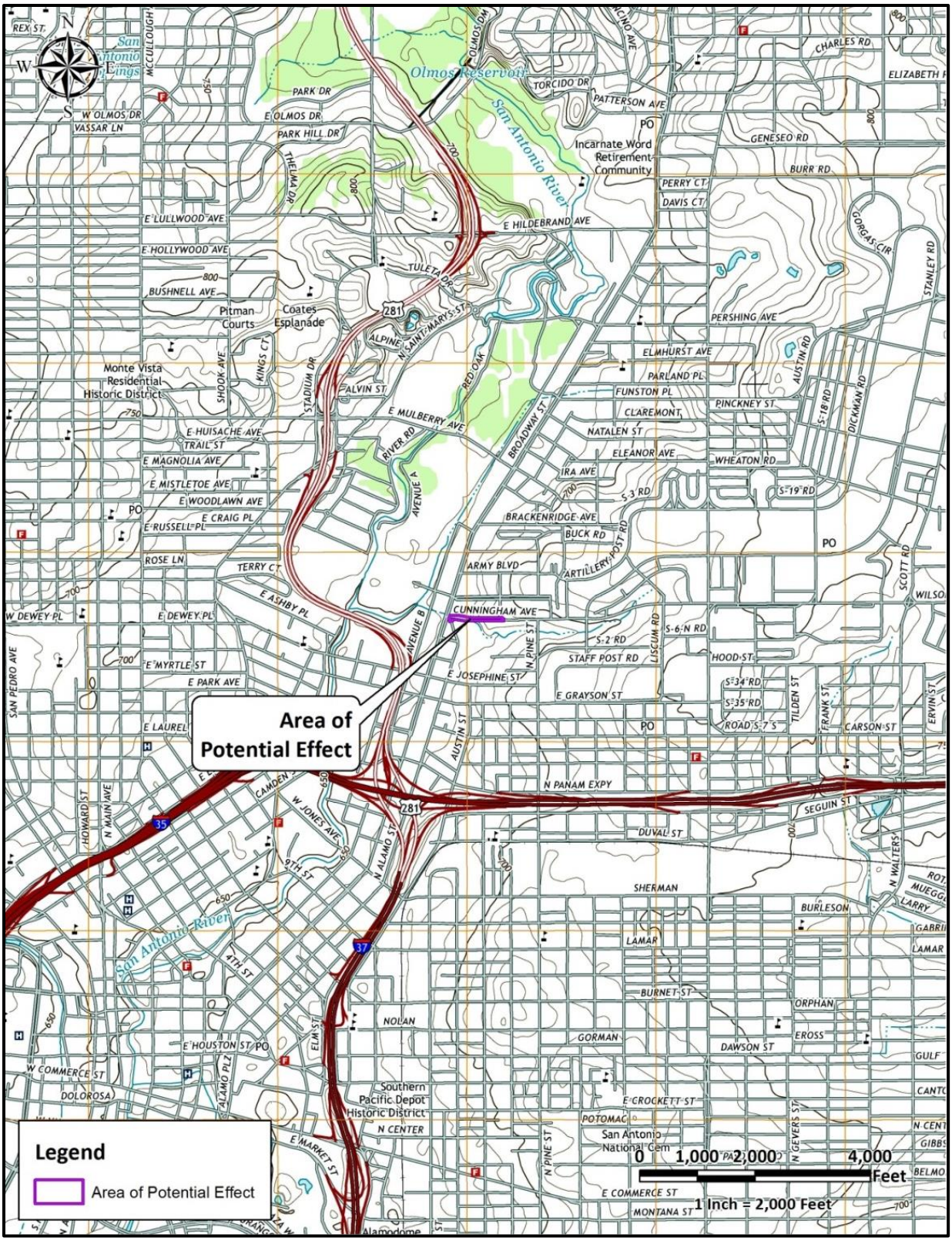

Figure 1-2. The APE on the *San Antonio East, Texas* (2998-133) 7.5-minute USGS topographic quadrangle map.

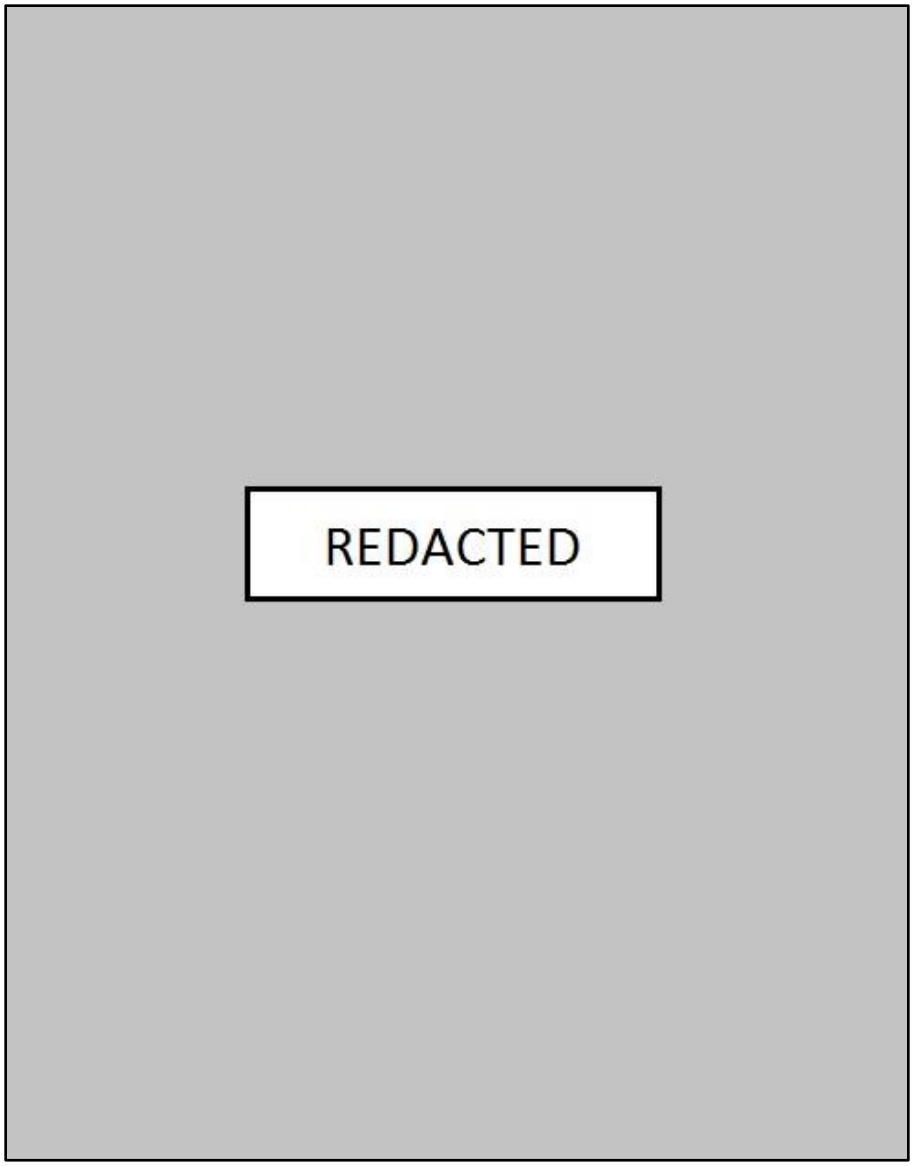

Figure 1-3. The APE along Cunningham Ave as it is crossed by the *Acequia Madre del Valero*.

Chapter 2: Environmental Setting

Project Area Setting

The project area is located in the south-central Texas geographic region within the Blackland Prairie eco-region. The Blackland Prairie is an area of low topographic relief and poor drainage, prone to frequent flooding (Collins 1995). The Blackland Prairie physiographic region is characterized by gently undulating topography and is generally defined as grasslands punctuated by riparian bands along creeks, rivers, and other drainages. Creation of the Blackland Prairie occurred during the late Tertiary, with the erosions of soils on the Edwards Plateau. These soils were deposited by eolian and colluvial processes across an existing, eroded parent material of the Gulf Coastal Plain, creating a mix of deep Tertiary and Quaternary calcareous clay soils (Black 1989a).

Soils

Two soil types are encountered within the APE: Lewisville Silty Clay (LvB) and Houston Black Gravelly Clay (HuC) (Natural Resource Conservation Service 2016) (**Figure 2-1**). Lewisville Silty Clays are the predominant soil type within the APE. Houston Black Gravelly Clays are associated with the western extent of the APE. Lewisville Silty Clays form as deep, well-drained deposits on uplands. These moderately permeable soils are often found as gently sloping deposits (0–3 percent slope). Lewisville is formed from ancient loamy and clayey calcareous deposits, and calcium carbonate nodules are found throughout the deposit. The silty clay deposit is dark grayish brown (10YR 4/2) from the surface to a depth of 41 centimeter (cm). At this depth, the deposit becomes a grayish brown (10YR 5/2) and contains calcium carbonate nodules between 2 and 5 millimeters (mm) in diameter. The base of the deposit, found 86 to 157 cm below the surface (cmbs), is pale brown (10YR 6/3) in color and becomes calcareous.

Houston Black Gravelly Clay is formed by the erosion of Cretaceous-age calcareous mudstone. Houston clays are often found along interfluves or on side slopes within plains or dissected plains. This soil forms as deep, moderately well-drained deposits. In the project area, this deposit is found on slopes ranging between 3 and 5 percent. The deposit is clay throughout, ranging in color from very dark gray (10YR 3/1) at the surface to gray (10YR 6/1) with light olive brown mottles (2.5Y 5/6) with depth. The deposit contains weekly cemented iron-manganese and calcium carbonate nodules. Gravels composed of chert and quartzite may be found in dense concentrations in the upper 25 cm of the deposit. Houston clays can be identified by deep cracks that appear along the surface of the deposit when the usually most soil dries.

Figure 2-1. Soils located in the vicinity of the APE.

Flora and Fauna

The project area is located near the juncture of the Balconian and Taumaulipan biotic provinces (Blair 1950). Because the project is situated at the ecotone of two biotic provinces it Floral and faunal resources consist of a mix of the two provinces. Trees, plants and grasses in this region include cedar (*Juniperus ashei*), live oak (*Quercus fusiformis*), Texas mountain laurel (*Sophora secundiflora*), mesquite (*Prosopis glandulosa*), prickly pear (*Optunia* sp.), agarita (*Berberis trifoliolata*), cat claw (*Smilax bona-nox*), mustang grape (*Vitis mustangensis*), sotol (*Dasylirion texanum*), and Spanish dagger (*Yucca* sp.).

The fauna that inhabit the south-central Texas region includes at least 95 bird and 29 mammal species. The area also contains a wide array of reptiles, fish and amphibians. Mammal species that were noted within the APE include white-tailed deer (*Odocoileus virginianus*), nine-banded armadillo (*Dasypus novemcinctus*), Virginia opossum (*Didelphis virgininana*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), cottontail rabbit (*Sylvilagus audubonii*), feral hog, domestic and feral cat, and squirrel.

South Texas Climate

The climate in South-central Texas is humid subtropical with hot and humid summers. From May through September, hot weather dominates with the cool season beginning around the first of November and extending through March. Winters are typically short and mild with little precipitation. San Antonio averages only 33 inches of rain per year (Southern Regional Climate Center 2015; based on monthly averages from 1980 to 2010). Monthly temperature averages range between 52°F in January to 85°F in August.

Chapter 3: Culture Chronology and Previous Archaeology

Culture Chronology

The cultural history of Bexar County and the vicinity spans approximately 11,500 years. Archaeologists have divided the occupation of the region into four principal periods and several sub-periods: Paleoindian, Archaic, Late Prehistoric, and Historic. The periods are characterized by changes in climatic conditions, distinct vegetation types, structure and concomitant adaptive changes by human populations in hunting and gathering technologies and strategies, general material culture, and at the tail end of the cultural sequence, the arrival of non-indigenous populations. The standard summaries of the culture chronologies of Central Texas accepted by many of the regional archaeologists were produced by Collins (1995) and Prewitt (1981). Below is a brief summary of the cultural sequence that has been reconstructed by archaeologists for the south-central part of the state.

Paleoindian Period

The oldest cultural materials found in the region date to the Paleoindian period. The period spans roughly from 11,500-8800 B.P. (Collins 1995, 2004). The Aubrey site in Denton County has one of the earliest occupations, with radiocarbon assays dating to between 11,542 ± 11 B.P. and 11,590 ± 93 B.P. (Bousman et al. 2004:48). Paleoclimatic proxy measures suggest that a cooler climate with increased precipitation was predominant during the Late Pleistocene (Mauldin and Nickels 2001; Toomey et al. 1993), the later portion of the period.

Initial reconstructions of Paleoindian adaptations typically viewed these hunter-gatherers as traversing extreme distances in pursuit of now extinct mega-fauna such as mammoth and mastodon. While these Paleoindians populations did exploit the Late Pleistocene mega-fauna when it was accessible, faunal assemblages from a larger number of sites indicate that the Paleoindian diet was more varied and consisted of a wide range of resources, including small game and plants. The Lewisville (Winkler 1982) and the Aubrey sites (Ferring 2001) produced faunal assemblages that represented a wide range of taxa, including large, medium, and small species. Information on the consumption of plant resources during the Paleoindian period is lacking. Bousman et al. (2004) reported that the late Paleoindian component at the Wilson-Leonard site reflected the exploitation of riparian, forest, and grassland species. Analysis of Paleoindian skeletal remains indicates that the diets of the Paleoindian and later Archaic hunter-gatherers may have been similar (Bousman et al. 2004; Powell and Steele 1994).

The early portion of the Paleoindian period was characterized by the appearance of Clovis and Folsom fluted projectile points that were used for hunting mega-fauna. Typical projectile points produced at sites with occupations dating to the later portion of the Paleoindian period included the Plainview, Dalton, Angostura, Golandrina, Meserve, and Scottsbluff types. Meltzer and Bever (1995) have identified 406 Clovis sites in Texas. One of the earliest, 41RB1, yielded radiocarbon assays that put the maximum age for the Paleoindian component at 11,415 ± 125 B.P. (Bousman et al. 2004:47).

Sites in Bexar County that contain Paleoindian components include St. Mary's Hall (Hester 1978, 1990), Pavo Real (Collins et al. 2003), the Richard Beene site (Thoms et al. 1996; Thoms and Mandel 2006), and 41BX1396 (Tomka 2012). St. Mary's Hall, 41BX229, was first encountered in 1972 during the construction of a house just outside the school property. The Pavo Real site, 41BX52, is located along Leon Creek in northwest Bexar County. The site was first documented in 1970 and has been investigated

several times over the past 40 years (Collins et al. 2003). The Richard Beene site, 41BX831, is located along the Medina River in southern Bexar County (Thoms et al. 1996). Site 41BX1396 is located in Brackenridge Park in San Antonio, and was encountered during installations for lighting in 2010. Dating of organic samples indicated that occupation at the site occurred as early as 10,490–10,230 B.P.

Archaic Period

The Archaic period dates between ca. 8800 to 1200 B.P. It is divided into three sub-periods: Early, Middle, and Late. During the Archaic, mobility strategies may have shifted to more frequent short distance movements that allowed the exploitation of seasonal resource patches. The intermittent presence of bison in parts of Texas combined with changes in climatic conditions and the primary productivity of the plant resources may have contributed to shifts in subsistence strategies and associated technological repertoire. When bison was not present in the region, hunting strategies focused on medium to small game along with continued foraging for plant resources. When bison was available, hunter-gatherers targeted the larger-bodied prey on a regular basis.

Early Archaic

The Early Archaic spans from 8800 to 6000 B.P. (Collins 1995). Projectile point styles characteristic of the Early Archaic include Angostura, Early Split Stem, Martindale, and Uvalde (Collins 1995). The Early Archaic climate was drier than the Paleoindian period and witnessed a return to grasslands (Bousman 1998). Mega-fauna of the Paleoindian period could not survive the new climate and ecosystems, therefore eventually died out. Early Archaic exploitation of medium to small fauna intensified.

The Wilson-Leonard excavation produced a wealth of cultural materials representative of a lengthy period in regional prehistory. The projectile point assemblages from the site indicate that the lanceolate Paleoindian point forms continue from the Paleoindian into the Early Archaic (Angostura). However, relatively quickly during the Early Archaic, they are replaced by corner- and basally-notched and shouldered forms (Early Triangular, Andice, Bell) that quickly become the dominant points tipping the atlatl-thrown darts. In addition, the uses of small to medium hearths similar to the previous period were noted too. The appearance of earth ovens suggests another shift in subsistence strategies. The earth ovens encountered at the Wilson-Leonard site were used to cook wild hyacinth along with aquatic and terrestrial resources (Collins et al. 1998). Analyses of Early Archaic human remains encountered in Kerr County (Bement 1991) reveal diets low in carbohydrates in comparison to the Early Archaic populations found in the Lower Pecos region. Within Bexar County, the excavations at 41BX1396 revealed an Early Archaic component, radiocarbon dated to cal B.P. 8390 to 8180 (Tomka 2012).

Middle Archaic

The Middle Archaic sub-period spans from 6000 to 4000 B.P. (Collins 1995). Archaeological data indicates that there appeared to be a population increase during this time. Climate was gradually drying leading to the onset of a long drought period. Changes to the demographics and cultural characteristics were likely in response to the warmer and more arid conditions (Robinson 1982). Projectile point styles characteristic of this sub-period include Bell, Andice, Calf Creek, Taylor, Nolan, and Travis.

Subsistence during the Middle Archaic saw an increased reliance on nuts and other products of riverine environments (Black 1989b). The increase of burned rock middens during the Middle Archaic represented the increased focus on the use of plant resources (Black 1989b; Johnson and Goode 1994).

Little is known about burial practices during the Middle Archaic. An excavation in an Uvalde County sinkhole (41UV4) contained 25–50 individuals (Johnson and Goode 1994:28).

Late Archaic

The Late Archaic spans from 4000 to 1200 B.P. (Collins 2004). It is represented by the Bulverde, Pedernales, Kinney, Lange, Marshall, Williams, Marcos, Montell, Castroville, Ensor, Frio, Fairland, and Darl projectile points. The early part of the Late Archaic exhibited fluctuations in the temperature and rainfall. There appears to have been an increase in population at this time (Nickels et al. 1998).

Some researchers believe that the use of burned rock middens decreased during the Late Archaic. Some research has challenged this notion (Black and Creel 1997; Mauldin et al. 2003). Johnson and Goode (1994) discuss the role of burned rock middens in relation to acorn processing.

Human remains from burials related to the Late Archaic in Central and South Texas suggest the region saw an increase in population. This increase may have prompted the establishment of territorial boundaries which resulted in boundary disputes (Story 1985). Human remains dating to this sub-period have been encountered near the Edwards Plateau.

Late Prehistoric Period

The Late Prehistoric period begins ca. 1200 B.P. (Collins 1995, 2004), and appears to continue until the beginning of the Protohistoric period (ca. A.D. 1700). The term Late Prehistoric is used in Central and South Texas to designate the time following the end of the Archaic Period. A series of traits characterizes the shift from the Archaic to the Late Prehistoric period. The main technological changes were the shift to the bow and arrow and the introduction of pottery. The Late Prehistoric period is divided into two phases: the Austin phase and the Toyah phase.

At the beginning of this period, environmental conditions were deemed to be warm and dry. Moister conditions appear after 1000 B.P. (Mauldin and Nickels 2001). Subsistence practices appeared similar to the Late Archaic. Projectile points associated with the Austin phase include the Scallorn and Edwards types. The Toyah phase is characterized by the prominence of the Perdiz point (Collins 1995).

Most researchers concur that the early portion of the Late Prehistoric period saw a decrease in population density (Black 1989b:32). Radiocarbon dates from some sites have indicated that the middens were utilized during the Late Prehistoric. Some archaeologists feel the peak of midden use was after A.D. 1 and into the Late Prehistoric (Black and Creel 1997:273). Radiocarbon dates from Camp Bowie middens provide evidence that supports Black and Creel's arguments that burned rock middens were a primarily Late Prehistoric occurrence (Mauldin et al. 2003).

Beginning rather abruptly at about 650 B.P., a shift in technology occurred. This shift is characterized by the introduction of blade technology, the first ceramics in Central Texas (bone-tempered plainwares), the appearance of Perdiz arrow points, and alternately beveled bifaces (Black 1989b:32; Huebner 1991:346). Prewitt (1981) suggests this technology originated in North-Central Texas. Patterson (1988), however, notes that the Perdiz point was first seen in Southeast Texas by about 1350 B.P., and was introduced to West Texas some 600 to 700 years later.

Early ceramics in Central Texas (ca. A.D. 1250 to 1300) are associated with the Toyah phase of the Late

Prehistoric and are referred to as Leon Plain ware. The Leon Plain ceramic types are undecorated, bone-tempered bowls, jars, and ollas with oxidized, burnished, and floated exterior surfaces (Ricklis 2004). There is notable variation within the type (Black 1986; Johnson 1994; Kalter et al. 2005). This variation can be attributed to differences in manufacturing techniques and cultural affiliation. Analysis of residues on ceramic sherds suggests that vessels were used to process bison bone grease/fat, mesquite bean/bison bone grease, and deer/bison bone grease (Quigg et al. 1993).

The return of bison to South and Central Texas during the Late Prehistoric resulted from a drier climate in the plains located to the north of Texas and increased grasses in the Cross-Timbers and Post Oak Savannah in North-Central Texas (Huebner 1991). The increased grasses in the two biotas formed the "bison corridor" along the eastern edge of the Edwards Plateau and into the South Texas Plain (Huebner 1991:354–355). Rock shelter sites, such as Scorpion Cave in Medina County (Highley et al. 1978) and Classen Rock Shelter in northern Bexar County (Fox and Fox 1967), have indicated a shift in settlement strategies (Skinner 1981). Burials encountered that dated to this period often reveal evidence of conflict (Black 1989b:32).

Historic Period

The beginnings of San Antonio came about with the establishment of Mission San Antonio de Valero in 1718. Fray Antonio de San Buenaventura y Olivares had briefly visited the site several years prior, and petitioned to set up a mission at the headwaters of the San Antonio River to act as a waypoint in the journey to East Texas. The Marques de Valero, Viceroy of New Spain, granted Olivares' request and granted him permission (de la Teja 1995). Mission Valero occupied at least two locations before it settled into its current spot. The final location was in use by 1724.

Five days after Mission Valero was founded, Presidio de Bexar was established. The presidio was to house the Spanish soldiers who had come along with the expedition to found the Mission. Typically, the families that followed the soldiers lived just outside the presidio.

Two years later, in 1720, Mission San José y San Miguel de Aguayo was established on the opposite bank of the San Antonio River, and to the south of Mission Valero and Presidio San Antonio de Bexar. This mission was established to help serve native groups that did not want to reside at Mission Valero because they were not on friendly terms with groups already living there. The original location of Mission San José was along the east bank of the San Antonio River, approximately three leagues from Mission Valero. The mission was then moved to the opposite bank sometime between 1724 and 1729, and relocated to its present site during the 1740s due to an epidemic (Scurlock et al. 1976:222).

In 1722, just two years after Mission San José was founded, Mission San Francisco Xavier de Nàjera was established. The mission was to serve a group of 50 Ervipiami families that came from the Brazos River area (Schuetz 1968:11). Mission San Francisco Xavier de Nàjera was located on or near the present site of Mission Concepción. The mission was unsuccessful due to a lack of funding. An attempt was made to make the mission a sub-mission of Valero, but this failed as well (Habig 1968:78-81). Its doors closed in 1726 (Schuetz 1968:11). Ivey (1984:13) argued that the closure of the mission was due to the natives' lack of interest in entering mission life.

Within the next few years, four other missions were established within the San Antonio area. The remaining three missions were established in San Antonio within weeks of each other in 1731. These three missions, Mission Nuestra Señora de la Purisima Concepción, Mission San Juan de Capistrano, and

Mission San Francisco de la Espada, were originally missions established in east Texas. When each failed along the eastern border, they were moved to San Antonio.

In addition to the five missions, the civilian community outside of the mission and presidio, Villa San Fernando de Bexar was established by the Canary Islanders. Prior to the establishment of Villa San Fernando, Villa de Bexar had been settled by 30 presidial soldiers, seven of whom were married and brought their families. Archival research indicates that upon arrival, the Canary Islanders immediately took over the land surrounding the garrison. This land was used as pasture and was originally property of Mission Valero. There had been a lack of cleared agricultural land at the time, leading Captain Juan Antonio Pérez de Almazán to allow the Canary Islanders use of the property (de la Teja 1995). The initial plan was for additional Canary Island settlers to be sent to San Antonio after the first group was established. Due to high costs to the Spanish Crown, no more groups were brought to Texas. The Canary Islanders launched a formal complaint against Mission Valero. In 1731, the Canary Islanders established their own villa, named San Fernando de Bexar, with their own church. The arrival of the *Isleños* resulted in the first clearly defined civilian settlement in San Antonio.

During the early years of the Villa de Bexar, no formal titles were issued as the property was distributed. If a presidial soldier and his family occupied the property, they likely did not own it (de la Teja 1995). Prior to 1731, soldiers and settlers were issued licenses to build houses on and farm the land surrounding the garrison. The area was considered the royal property of the presidio (Ivey 2008).

During the early years of the Villa de Bexar and San Fernando de Bexar, the property that was granted to the *Isleños* after 1745 and the settlers changed hands several times. The *Isleños* requested more property in the Labores, and attempted to hinder the original settlers from obtaining any more land. Though their efforts were not entirely successful, they did slow the amount of property given to the settlers (de la Teja 1995). As grants were passed out, it appears that the *Isleños* would sell their original grants to incoming settlers, or current non-*Isleño* inhabitants, then request an additional grant from the government. By the 1800s, seven families had control of approximately half of the *suertes* that had been distributed during the mid- to-late 1700s (de la Teja 1995).

Acequia de Valero

The *Acequia de Valero* (also referred to as *Acequia del Alamo* or Alamo ditch) was the first irrigation canal excavated by the Spanish colonists in the upper San Antonio River drainage. The construction of the feature started in January of 1719 in order to bring water to the fields of Mission San Antonio de Valero. The irrigation ditch began at a diversion dam at the San Antonio River, located just north of the former Pioneer Hall, located at the Witte Museum. Water was diverted to the east crossing the bank just south of the large Cypress trees still standing on the property. Tomka indicates that a plot of the route of the *Acequia de Valero* on a Digital Elevation Model (DEM) of the upper San Antonio River valley shows that the acequia's route along the eastern margin of the river valley closely follows the 680 foot contour line (Tomka, Personal Communication 2017). The *acequia* extended to the Mission San Antonio de Valero complex, and continued south to a re-entry point on the river.

Historic deed records and maps of the project area show how the property has changed hands and land uses after the Spanish Colonial Period. The project area appears on the 1886 Bird's Eye View of San Antonio by Augustus Koch (**Figure 3-1**). The map depicts a branch in the acequia west of the project area and north of Josephine Street. The eastern branch crosses River Ave. into the project area and then curves to the south to exit the property at Grayson Street. The *acequia* passes by several buildings

within the project area, including a two-story structure with wrap-around porches.

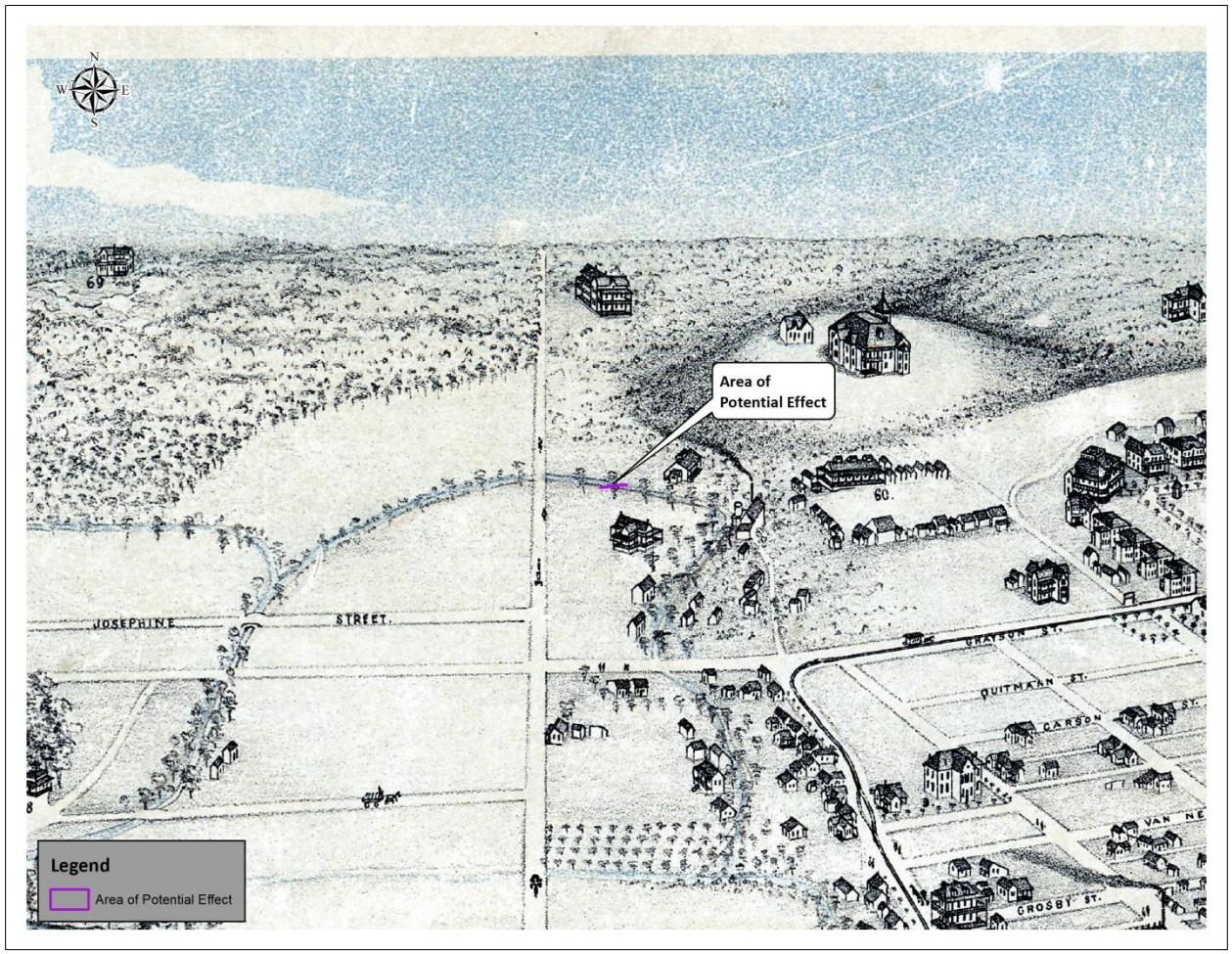

Figure 3-1. The 1886 Bird's Eye View of San Antonio by Augustus Koch.

Previous Archaeological Investigations

The APE is located along Cunningham Ave., west of Broadway, in San Antonio, Texas. No previously conducted cultural resources surveys nor archaeological sites have been recorded within the APE. The APE is less than ½ km from Brackenridge Park, a National Register District. Many archaeological surveys have been conducted within Brackenridge Park, and the park is rich with both prehistoric and historic archaeological sites (**Figure 3-2**). Within a 1-km buffer of the APE, five archaeological sites have been recorded: 41BX13, 41BX264, 41BX293, 41BX1396, 41BX1899. Site 41BX13 is an Archaic campsite with a Neohistoric period component. The site is listed as a State Antiquities Landmark (SAL) and is considered eligible for listing on the National Register of Historic Places (NRHP). Site 41BX293 is a small prehistoric site that was unearthed during digging for flower beds. One Pedernales and one Frio point were encountered (THC 2016). Site 41BX264, also known as the Polo Field Site, exhibited lithic concentrations associated with the Archaic Period. The site is eligible for listing on the NRHP. Several archaeological investigations within the site have encountered numerous lithic tools, flakes, cores, and points associated with the Middle Archaic (THC 2016). Site 41BX1396 is a significant prehistoric site that exhibited Paleoindian occupation. The site is listed as a SAL and as eligible for listing on the NRHP. The site occupies most of the Brackenridge Golf Course, with a portion located along Mulberry Ave. In addition to the Paleoindian component, the site contained evidence of Early Archaic occupation (THC 2016). In 2010, a backhoe trenches excavated during the Brackenridge Trail 11 project encountered debitage, a core and a retouched flake and exhibited stratigraphy similar to that seen in the Archaic occupation zone of 41BX1396. The trench locations were recorded as Site 41BX1899 (THC 2016).

To the south of the APE, immediately adjacent to the project area, two archaeological projects have been conducted. One project was conducted in 1978 by the Army Corps of Engineers, Fort Worth Division. It appears that the project focused on surveying Fort Sam Houston (THC 2016). No other information was located concerning the 1978 investigations.

Another project was conducted in 2008 by the Center for Archaeological Research at the University of Texas at San Antonio (CAR-UTSA) that encompassed the property previously known as Playland Park (Meissner 2009). During the course of the 2008 survey, the course of the *Acequia de Valero* was observed. Due to erosion, the channel of the *acequia* is deeper and wider than original construction. No intact prehistoric deposits were encountered during the course of the survey. Remnants of Playland Park structures were observed, but were in poor condition. The project area was not determined to be a historic archaeological site. No further archaeological investigations were recommended, although, CAR and the THC determined that the route of the *Acequia de Valero* be preserved (Meissner 2009).

Two National Register Districts are located within 1-km of the APE. Fort Sam Houston, located to the south and east of the APE, was listed in 1975. The property is considered to have national significance as it is one of the oldest military installments still in operation. Fort Sam was established in 1876 as “Post San Antonio” (Ramsdell 1959).

Located to the west of the APE is Brackenridge Park. Brackenridge Park was nominated to the National Register in 2011. The park has many components that are historically significant, as well as many known significant prehistoric sites. A Paleoindian site was encountered within the park that dates to approximately 10,400 B.P. The Park exhibits Spanish Colonial features, as well as nineteenth to mid-twentieth century structures that play an important role in the history of San Antonio (THC 2016).

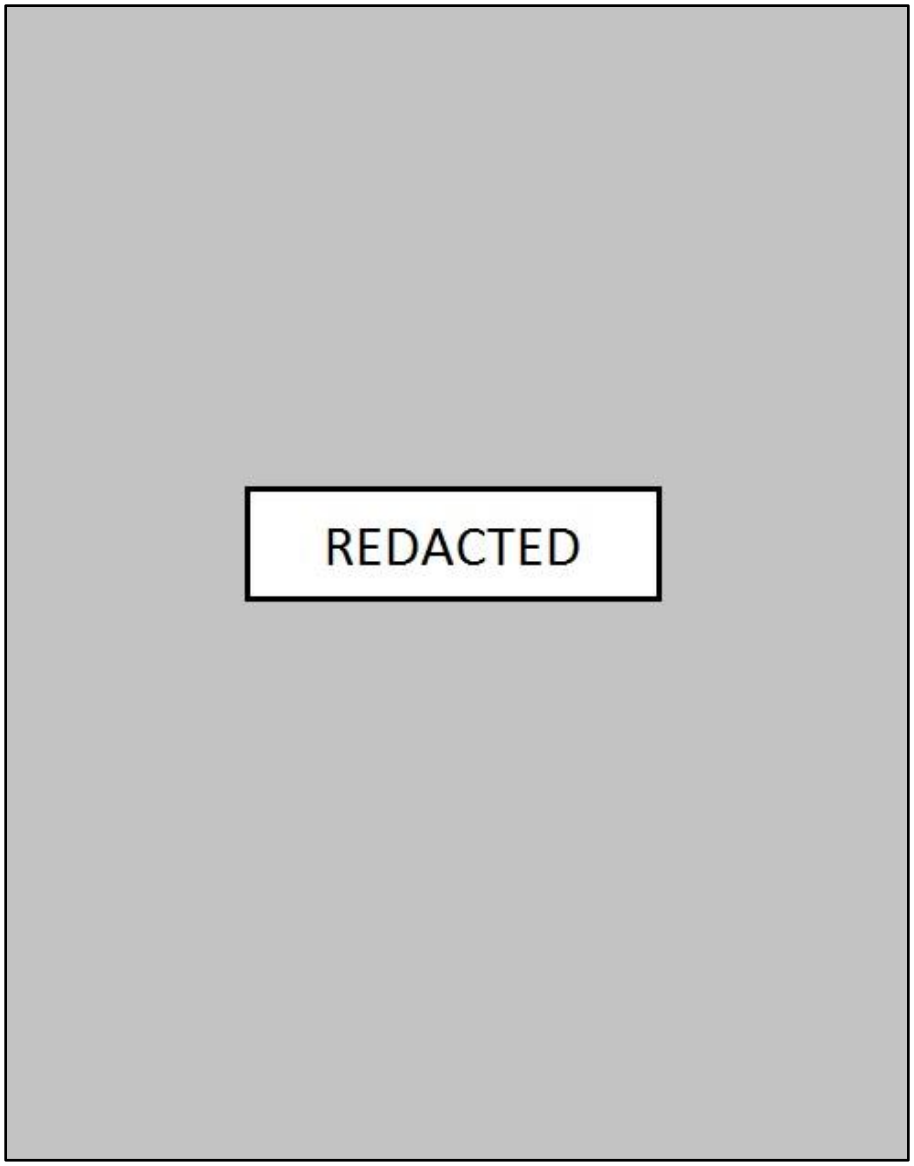

Figure 3-2. The location of the previously recorded archaeological sites and surveys.

Chapter 4: Methods of Investigation

Field Methods

Ground Penetrating Radar

Prior to the installation of the SAWS water line, **RKEI** used GPR to determine if anomalies were present along the projected alignment that may indicate the presence of the *Acequia de Valero*. Ground Penetrating Radar (GPR) is a non-destructive method of geophysical inspection that uses radar pulses to image the subsurface. It utilizes electromagnetic radiation produced by a surface antenna. The antenna emits pulses of radar energy, creating waves of varying wavelengths that pass through the ground. The waves spread as they pass through the ground, creating a cone shape in relation to the properties of the subsurface materials (Conyers 2016). As the waves pass through the ground, they are reflected back to the transmitter as they come in contact with the buried features or changes in soil stratigraphy. The travel time of the waves is measured by the receiver. Only reflected radar waves are recorded by the receiver, as some waves extend deeper below the surface before eventually dissipating. The velocity of the waves slows as they move through the ground. Waves that return at an angle not aligned with the receiver or slower than the receiver can read are not recorded, making those subsurface features invisible, and therefore not included in data interpretation (Conyers 2016).

The type of GPR antenna employed determines the depth of penetration of the radar waves. Lower frequency antenna results in deeper penetration, whereas higher frequency reaches shallower depths. In contrast, lower frequency antenna produce coarser resolution, while a higher frequency antenna will produce a finer image (Geophysical Survey Systems, Inc. [GSSI] 2016)

Dielectric properties of the materials encountered by the waves result in different reflections of the wavelengths. The reflections returned to the antenna are displayed on a video monitor as a continuous cross-section in real time. The Relative Dielectric Permittivity (RDP) of water is 81, whereas concrete is 6.25. A low-to-high change in RDP produces a reflection in-phase with the transmitted waveform. A high-to-low change in the RDP produces a reflection phased-flipped with the transmitted waveform. The directionality displayed in the data contrast determines the phase of the reflection (GSSI 2016).

Performance limitation is most significant in high-conductivity materials such as clay soils and soils that are salt contaminated. Performance is also hampered by signal scattering in heterogeneous conditions (e.g. rocky soils). The signals are read in units of time, but can be converted to depth measurement in the control unit. The general consensus is that the depth displayed for signal reflections has a 15 to 20 percent margin of error (GSSI 2016). For the purposes of this project scanning was performed using a GSSI SIR-4000 GPR controller with an internal hard drive and a color display, and a 400 mega-Hertz (MHz) antenna. A 400 MHz antenna is the typical antenna used for archaeological investigations as it reaches depth of up to 3.5 meters (m) below the surface. Minimal processing of the data was done in the field by adjusting the gain and color of the frequency reading.

RADAN 7 was used to extrapolate the data and run the models to produce 3-D images, as well as attempt to define anomalies noted on the individual line scans. Each grid was processed using the processing steps that included moving the data to an effective time zero, removing background, applying minimal filters, and plotting the signal floor. The signal floor is the estimate of the effective depth of each scan based on the analysis of the signal noise to signal loss. In some cases, though, a

reflector can still be located beneath the signal floor if they are strong enough. The extrapolated data was examined to view the signal strata and identify anomalies.

Backhoe Trench Monitoring

RKEI performed the archaeological monitoring of the SAWS waterline installation in efforts to re-discover and document a portion of the *Acequia de Valero*. A **RKEI** archaeologist was present to monitor the removal of soils of the length of the proposed waterline. Soils were inspected for prehistoric deposits and historic material related to the *Acequia de Valero*, which was in use during the Spanish Colonial Period through the early twentieth century. While the mechanical trenching took place, the Project Archaeologist monitored the trench for any signs the *acequia* outline. Due to the sensitive nature of the *acequia*, it was not to be impacted. However, due to its ephemeral nature, it was very difficult in determining the location while excavating. After sections of the trench were complete, the archaeologist entered the trench and cleared the trench walls to carefully inspect each profile for any signs of the *acequia.*

As part of the monitoring, **RKEI** inspected the trench walls for evidence of the *Acequia de Valero*, as well as associated artifacts. The documentation consisted of the clearing of a representative segment of each trench wall for careful scrutiny. The trench walls were photographed with measurement scales. Profiles of the trench walls in which the *Acequia de Valero* is identified will be drawn to scale.

Laboratory Methods

Artifacts identified in backhoe trench walls were drawn *in situ* and photo-documented, but not all were collected. Artifacts that were observed within the back dirt were noted and documented on the backhoe trench forms. A small sample of artifacts encountered during excavations were collected during the project, taken to the **RKEI** Archaeological Laboratory for brief analysis, then returned to the excavations for reburial.

All project-related documentation produced during the survey was prepared in accordance with federal regulation 36 CFR Part 79, and THC requirements for State Held-in-Trust collections. Field notes, field forms, photographs, and field drawings were placed into labeled archival folders and converted into electronic files. Digital photographs were printed on acid-free paper, labeled with archival appropriate materials, and were placed in archival-quality plastic sleeves when needed. All field forms were completed with pencil. Ink-jet produced maps and illustrations were placed in archival quality plastic page protectors to prevent against accidental smearing due to moisture. A copy of the report and all digital materials was saved onto a CD and stored with field notes and documents. All project-related documentation is permanently housed at Center for Archaeological Research at the University of Texas at San Antonio.

Chapter 5: Results

Previous research by **RKEI** within the former Playland Park property, just south of the current project area, revealed a portion of the *Acequia de Valero.* Due to the proximity of the *acequia* to the APE, the COSA-OHP, requested that a portion of the mechanical excavation for the SAWS waterline along Cunningham Ave. between Broadway St. and N. Pines St. be monitored. Prior to monitoring the proposed undertaking, the COSA-OHP requested that RKEI conduct a GPR survey concentrated at the location the APE is intersected by the projected *acequia* route and to excavate an exploratory trench to identify the absence/presence of the *acequia* within the APE. The GPR component of the investigations occurred in November 2016 while the exploratory trenching and monitoring occurred on March 7, 2017.

GPR Survey Results

One GPR grid was established to investigate the possible *acequia* route within Cunningham Ave. The grid was approximately 58 m maximum length and 4 m maximum width (**Figure 5-1**). Due to the presence of a retaining wall along the southern edge of the grid, the southwest section was not surveyed and appears as a gray block on the GPR readings. The east-west transect located adjacent to the property edge exhibited a layer of grass and decaying leaves. The remainder of the grid was located on the asphalted street.

Transects were spaced 1 m apart, and data was collected in the same direction from each axis. The GPR console was observed throughout the survey to note anomalies so as to mark these while in the field. It was quickly detected that the GPR signal appeared to not be penetrating the substrate well. The console showed few anomalies, none which could be attributed to the channel of the *acequia*.

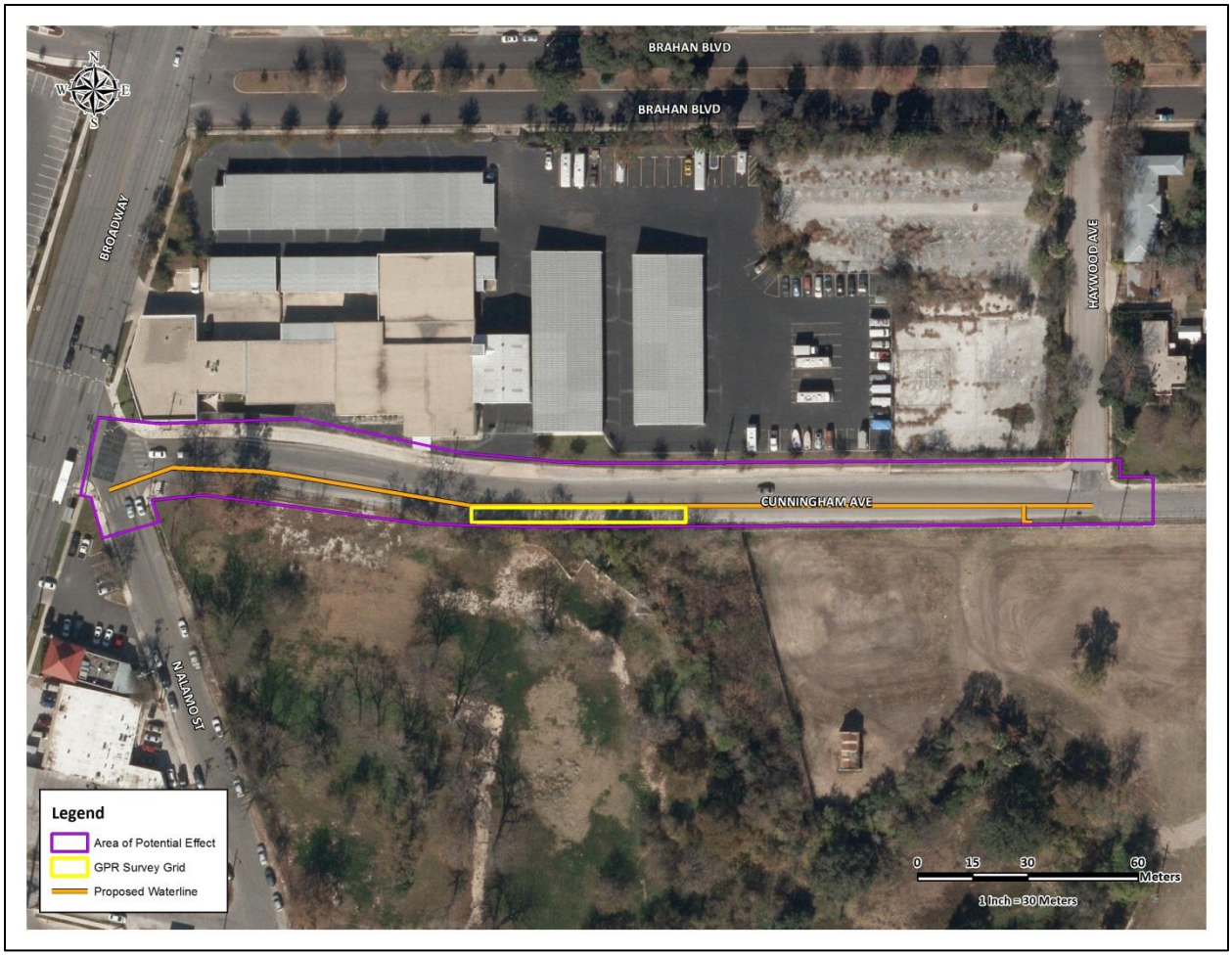

Figure 5-1. Location of the GPR grid on Cunningham Ave.

The data collected in the field was returned to the RKEI Archaeological Laboratory for processing. The individual transect lines were examined for anomalies that could be associated with the *acequia* route. In addition, the individual data lines were assembled into a batch to be processed as a 3-D grid.

The individual lines displayed a few anomalies, but these were likely due to the presence of utilities. The process data revealed that the signal was penetrating between 50 and 150 cm below surface. It is possible that the asphalt, road base, and underlying soils did not have good conductivity. The 3-D model also lacked distinctive anomalies that could be associated with the *acequia* channel (**Figure 5-2**).

Figure 5-2. The 3-D model of the GPR survey displaying the signal readings at 85 cm below surface.

The poor conductivity of the substrate resulted in no clues as to the trajectory of the *Acequia de Valero* across Cunningham Ave. Due to the lack of anomalies that could be associated with the *acequia*, the RKEI archaeologists could not narrow the possible location of the channel. It was recommended that an exploratory trench be excavated crossing the projected paths of the *acequia*. By excavating a long trench, there would be a greater possibility of encountering the *acequia* channel.

Exploratory Trench Excavation and Monitoring

On March 7, 2017, **RKEI** monitored the excavation of the exploratory trench (**Figure 5-3**). The backhoe operator carefully excavated the trench horizontally, in 1-foot vertical sections, to allow for inspection of the trench profiles. After sections of the trench were complete, an archaeologist entered the trench, cleaning off the trench walls and carefully inspected each profile for signs of the *acequia.* City Archaeologist, Matthew Elverson, was present throughout the process.

Approximately 140 m to the east of the Broadway St./Cunningham Ave. intersection, there appeared to be an outline of a ditch. The layers of fill and the inability to see a distinct channel outline in the profiles necessitated the excavation of the trench to a depth at which there was no mistaking evidence of the *acequia*. Based on the location of the alignment of the *acequia* on historic maps and after further

investigating the profiles, it was determined to be the *Acequia de Valero* (**Figure 5-4 and 5-5**).

The *acequia* channel observed in the north wall profile was located approximately 40 cm below the surface and measures greater than 4.2 m in width. The bottom of the *acequia* channel appeared to extend below the base of the exploratory trench. The eastern edge of the *acequia* channel displayed a steeper slope, in comparison to the western edge of the channel. Both edges of the channel cut into mottled clay (10YR 7/1 and 10YR 6/3) which appears to be the natural substrate in which the channel was constructed.

The outline of the *acequia* was offset approximately 60 cm to the east in the south wall of the exploratory trench. The south wall profile paired with the difference in slope observed in the edges of the *acequia* channel in the north wall profile indicates that the exploratory trench intersects the *acequia* alignment at an angle. In addition, after comparison of the location of the *acequia* channel to the historic topographic maps, it appears that the *acequia* was constructed to follow the natural topography of the surrounding area (**Figure 5-6**).

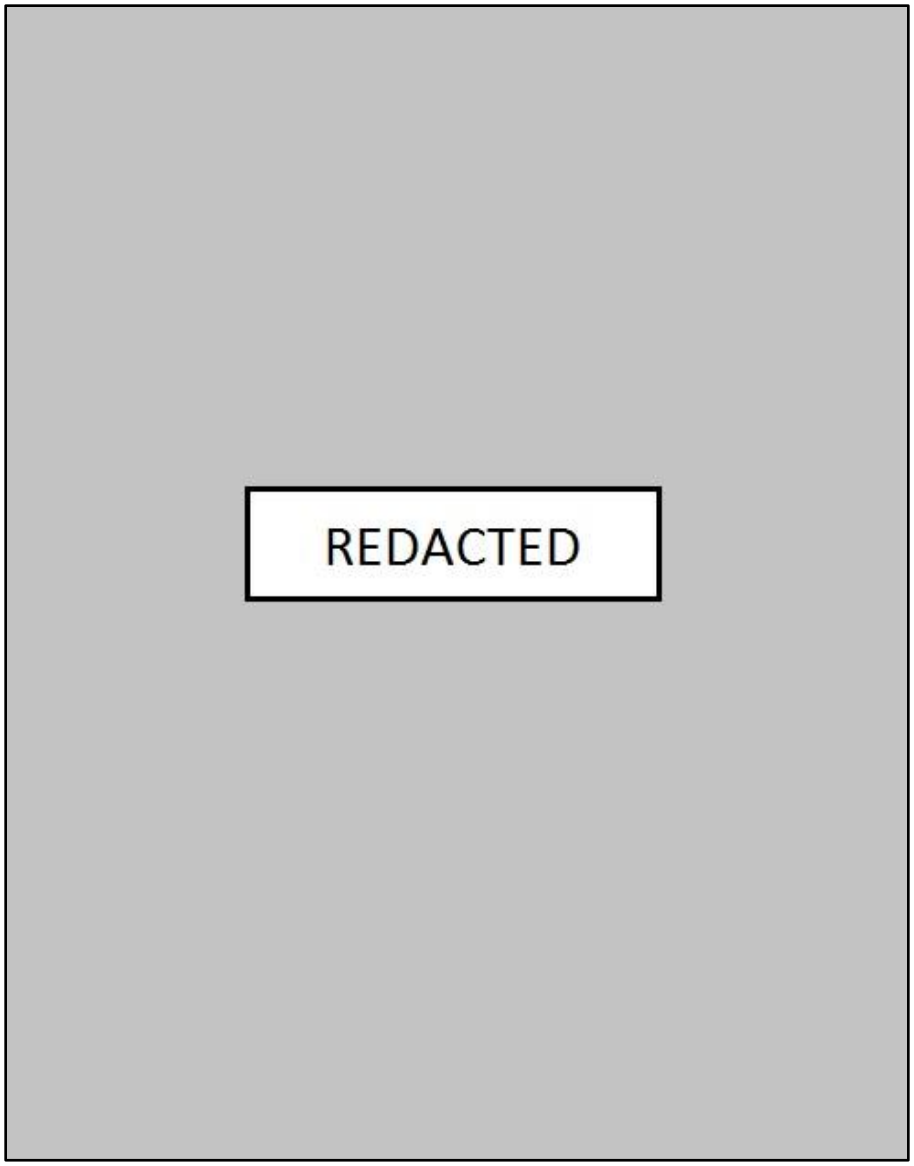

Figure 5-3. Location of exploratory trench within the APE.

Figure 5-4. North wall profile of the SAWS trench with the *Acequia de Valero*.

Figure 5-5. South wall profile of the SAWS trench with the *Acequia de Valero*.

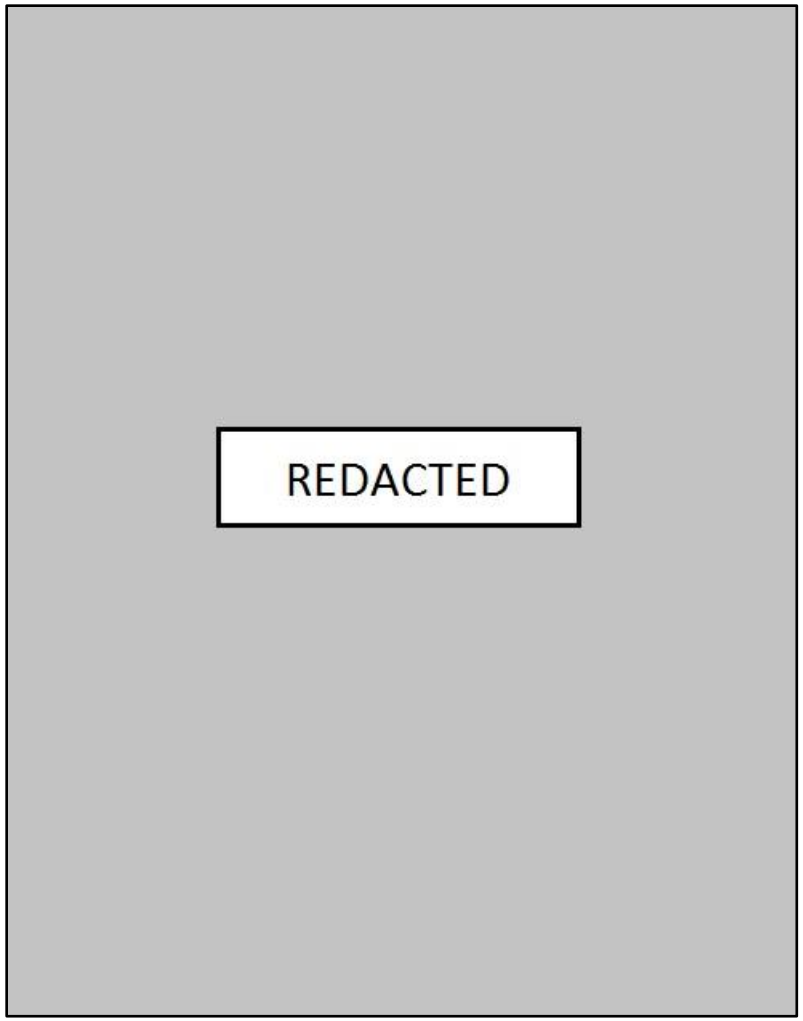

Figure 5-6. Location of the APE and alignment of the *Acequia de Valero* within the 1953 (red) and 2013 (black) topographic map. Note the *acequia* alignment roughly following the topography of the surrounding area.

After carefully investigating the profile of the north and south walls, it appears that the *acequia* was constructed within a naturally occurring substrate of mottled clay (**Figure 5-7, Figure 5-8, and Figure 5-9**). Above the natural substrate, the matrix consisted of Houston Black clay (10YR 2/1) that contained some cultural material. A second channel may have been cut into the black clay, as the outline of a canal is noted in the soil about the Houston Black (**Figure 5-9**). The bottom is located approximately 1.4 m below the surface. The edges of the second channel measures approximately 3 m in width. This cut into the black clay was filled with several layers of clay, sandy clay, and silty clay containing gravels. The fill within the second channel showed signs of undercutting and overlapping, consistent with episodes of filling to create a level surface. Road base and asphalt completed the transition to the level driving surface.

Development of city water systems in the early 1900s, and increased issues with maintaining the irrigation system, resulted in much of the *Acequia Madre* being filled. By 1901, the *Acequia Madre* was ordered to be closed. This closure led to serious problems with storm water. Streets near the *acequia* would become flooded during heavy storms. In 1903, the *acequia* was ordered to be re-opened and plans were made to improve drainage in areas that would reduce the flooding of the nearby streets. However, by 1905, the *acequia* was once again ordered to be closed (Ulrich 2011).

Figure 5-7. Western edge of the *Acequia Madre.* Note the light colored clay at bottom left of the trench.

Figure 5-8. Eastern edge of the *Acequia Madre.* Note the light colored clay at bottom right of the trench, and various fill layers.

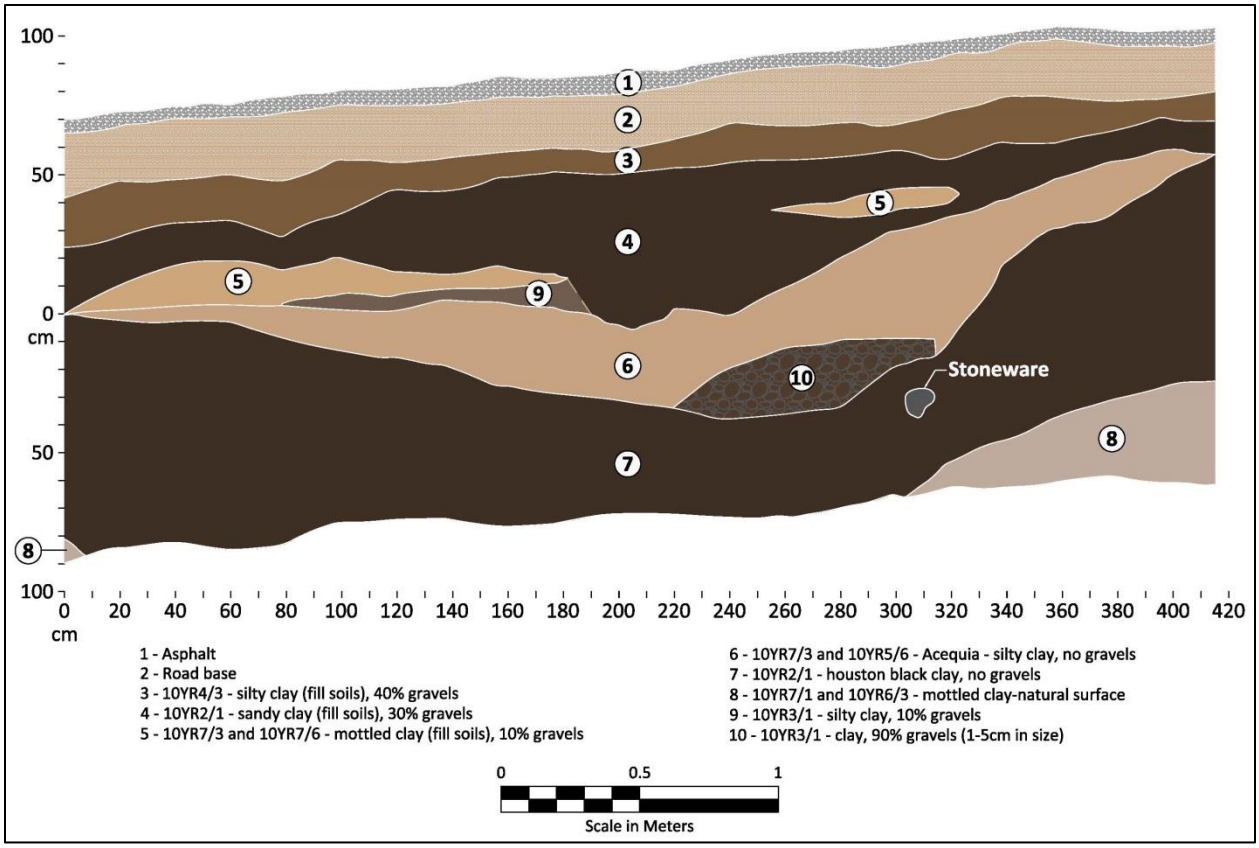

Figure 5-9. Profile of the north wall of the trench depicting the two episodes of the *acequia* channel.

It is perhaps due to these multiple filling in and re-excavating events that we have the complex stratigraphy of both the north and south profiles. Just above the naturally occurring substrate of mottled clay, a large band of black clay is noted in both profiles. This layer was likely deposited during the first closure episode of the *acequia*. This hypothesis is strengthened by the fact that the only artifacts noted came from this layer (**Figure 5-10**). These included a piece of Stoneware, one piece of Spongeware, a yellow brick with no maker's mark and a heavily degraded nail. Yellow brick became a common building material after the arrival of the railroad system in the late 1870s. The ceramic varieties were also varieties that would have become more readily accessible after the railroads arrived in San Antonio (Ulrich et al. 2010). American versions of Spongeware were manufactured into the 1930s. The subsequent layers on top of the black clay indicate a long history of fill events that would eventually become Cunningham Ave. The *acequia* was initially closed in 1901, as ordered by the City. It was re-opened in 1903 to alleviate flooding issues in the vicinity. Final closure occurred in 1905, with the channel of the *acequia* filled with street sweepings (Ulrich 2011; Cox 2005). Due to the location of the cultural material in the feature profile, it is likely that the artifacts were deposited during the first closure in 1901.

Should Strata 8 represent the natural substrate into which the *acequia* channel was excavated, this would mean that the base of the *original acequia* channel exceeded 2 meters below the present-day surface. A similar scenario was noted further north in the *Acequia de Valero*, in front of the Witte Museum (Ulrich 2011). Since the purpose of the project was just to expose the top of the *acequia* channel, no efforts were made to locate the base of the feature.

Figure 5-10. Artifacts observed within the North wall profile of the *Acequia de Valero.*

Upon the completion of the documentation of the *acequia's* profile, the trench was backfilled. After consultation with the THC and the COSA-OHP, the CLIENT received permission to re-excavate the trench for the installation of their water line, being careful to cause no further impact the *acequia*.

Chapter 6: Discussion and Recommendations

In 2016, K FRIESE & Associates (CLIENT) contracted with **RKEI** to conduct archaeological investigations of four proposed waterline installation locations in San Antonio, Bexar County, Texas. Based on a review of the installation locations, three of the four alignments are in areas where they would not impact any previously recorded prehistoric and historic cultural resources. One location, located along Cunningham Ave., between Broadway St. and Pine St., was identified to intersect the projected route of the *Acequia de Valero*. The *Acequia de Valero* was the first irrigation canal excavated by the Spanish colonists within the upper San Antonio River drainage. The purpose of the irrigation ditch was to transport water to the agricultural fields of *Mission San Antonio Valero*.

Due to the potential of the *acequia* extending into the project area, the City of San Antonio's Office of Historic Preservation (COSA-OHP) requested that **RKEI** monitored the mechanical excavation of a portion of the waterline along Cunningham Ave., that extends from Broadway St. to approximately 25-feet east of Haywood Ave., specifically focusing on an approximately 66-feet (20 m) area where the project route of the *Acequia Madre* intersects Cunningham Ave.

Prior to trenching, a GPR survey was conducted within the APE where the *Acequia Madre* is projected to intersect. In November 2016, the GPR survey was conducted; however no distinguishable anomalies were detected within in the GPR data. Due to the lack of evidence identifying the *acequia* within the APE, **RKEI** returned in March 2017 to excavate and monitor an exploratory trench in an attempt to identify the *acequia* alignment. During the excavation of the trench, spoils were examined for artifacts and the trench walls were examined for signs of an outline of the *acequia*. Approximately 140 m to the east of the Broadway St./Cunningham Ave. intersection, there appeared to be an outline of a ditch. The *acequia* outline was observed on both the northern and southern profiles; however it was offset approximately 60 cm east on the southern profile, indicating that the *acequia* likely follows the natural topography.

Examination of the north wall profile revealed that two channels of the *acequia* exist. The original channel of the *acequia* was cut into the mottled yellow clay substrate. It appears that the channel was wide, although, due to encountering the feature at an angle, the view is distorted and the actual dimensions of the acequia are difficult to determine. At the location of the exploratory trench, the feature was greater than 4.2 meters in width. In addition, the base of the original feature was not exposed during the exploratory trenching. The base of the trench was at 1.8 m below the surface. The profile indicates that the original *acequia* channel extends deeper. A large band of black clay is noted in both profiles and was likely deposited after the *acequia* was filled in 1901. Within this layer, cultural materials included a sherd of stoneware, a sherd of Spongeware, a yellow brick with no maker's mark, and a heavily rusted nail. The ceramic and brick are representative of items that became more accessible after the arrival of the railroad in 1877. A second channel appears to have been cut into the black clay, and likely represents the re-opening of the *acequia* in 1903. The channel was finally closed in 1905, as ordered by the City.

The early historic Sanborn Fire Insurance Maps do not depict the area until 1904, when the APE and *acequia* appear on the Key Sheet. No east/west running roads were present on the map where Cunningham runs today. By 1905, the *acequia* was ordered to be closed again. It appeared that clays with gravels were used to fill the channel to comply with the closure. Additional base was utilized to level the surface in preparation for the construction of Army Boulevard (later renamed Cunningham

Ave.) by 1911. The 1911-1924 series of Sanborn maps shows the area on the Key Sheet of Volume 2, with Army Boulevard in the location of present day Cunningham Ave. The *acequia* is not depicted on the map. By the 1912-1951 Sanborn map series, the street has been renamed Cunningham Ave., and no evidence of the *acequia* is noted north of the road. It appears that the *Acequia de Valero* was paved over by 1911, with the section of the *acequia* south of the road used as a drainage.

Excavations conducted in front of the Witte Museum to relocate another portion of the *Acequia Madre de Alamo* encountered the similar scenario of two channels representing the original location and the re-opening of the *acequia* after the closure (Ulrich 2011). During the current project, it appears that the second channel was shallower in comparison to the original *acequia* depth. The presence of the two channels added to the difficulty to identifying the *acequia* channel during the exploratory trenching.

Once the *Acequia de Valero* was recorded by the **RKEI** archaeologist, the exploratory trench was backfilled. During the field discussions with the excavation crew and the Assistant City Archaeologist, it was determined that the waterline could be installed at the depth of the exploratory trench termination with no need to widen or deepen the exploratory trench. The THC was consulted and agreed that the waterline could be installed in the area already excavated. The construction crews were given the notice to proceed the following day, and the installation of the water line occurred with no further impacts to the *acequia*.

Since the installation of the waterline was allowed to proceed, **RKEI** does not recommend any further archaeological investigations within the project APE. Evidence of the *Acequia de Valero* was encountered during the trenching, indicating that the *acequia* still exists under the current roadway. In addition, the top of the *acequia* appears approximately 40 cm below the current surface and extends to a depth greater than 1.8 meters. Should future improvements be planned in the area, further consultation with the THC, per the Texas Antiquities Code, is necessary to determine appropriate efforts needed to avoid impacting the Spanish Colonial feature.

References

Bement, L.C

1991 The Thunder Valley Burial Cache: Group Investment in a Central Texas Sinkhole Cemetery. *Plains Anthropologist* 36(135):97–109.

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.

1989a South Texas Plains. In *From the Gulf Coast to the Rio Grande: Human Adaptations in Central, South, and Lower Pecos Texas*, by T.R. Hester, S.L. Black, D.G. Steele, B.W. Olive, A.A. Fox, K.J. Reinhard, and L.C. Bement, pp. 39–62. Research Series No. 33. Arkansas Archaeological Survey, Fayetteville

1989b Central Texas Plateau Prairie. In *From the Gulf Coast to the Rio Grande: Human Adaptations in Central, South, and Lower Pecos Texas*, by T.R. Hester, S.L. Black, D.G. Steele, B.W. Olive, A.A. Fox, K.J. Reinhard, and L.C. Bement, pp. 17–38. Research Series No. 33. Arkansas Archaeological Survey, Fayetteville.

Black, S.L. and D.G. Creel

1997 *The Central Texas Burned Rock Midden Reconsidered*. In Hot Rock Cooking on the Greater Edwards Plateau: Four Burned Rock Midden Sites in West Central Texas, by Steve Black, Linda W. Ellis, Darrell G. Creel and Glenn T. Goode, pp.269-305. Studies in Archeology 2. Texas Archeological Research Laboratory, The University of Texas at Austin.

Blair, W.F.

1950 The Biotic Provinces of Texas. *Texas Journal of Science* 2(1)93–117.

Bousman, C.B

1998 Paleoenvironmental Change in Central Texas: The Palynological Evidence. *Plains Anthropologist* 43 (164):201-219.

Bousman, C.B, B.W. Baker and A.C. Kerr

2004 Paleoindian Archeology in Texas. In *The Prehistory of Texas*, edited by Timothy Perttula, pp. 15-97. Texas A&M University Press, College Station.

Collins, M.B.

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

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

Collins, M.B., J. Guy, and S.W. Dial

1998 The Archaic Period, 8800 to1300 BP. In Wilson-Leonard: An 11,000-year Archaeological Record of Hunter-Gatherers on Central Texas. Volume I: Introduction, Background, and Syntheses. Edited by Michael B. Collins. Studies in Archaeology 31. Texas Archaeological Research Laboratory, The University of Texas at Austin.

Collins, M.B., D.B. Hudler, and S.L. Black
2003 *Pavo Real (41BX52): A Paleoindian and Archaic Camp and Workshop on the Balcones Escarpment, South-Central, Texas*. Studies in Archeology 41, Texas Archeological Research Laboratory, The University of Texas at Austin. Archeological Studies Program, Report 50, Environmental Affairs Division, Texas Department of Transportation, Austin.

Conyers, L.B.
2016 *Ground-Penetrating Radar for Geoarchaeology*. John Wiley & Sons, Ltd., Hoboken, NJ.

Cox, I.W.
2005 *The Spanish Acequias of San Antonio*. Maverick Publishing Company, San Antonio.

de la Teja, J.F.
1995 San Antonio de Bexar: A Community on the New Spain's Northern Frontier. The University of New Mexico Press, Albuquerque.

Ferring, C.R.
2001 The Archaeology and Paleoecology of the Aubrey Clovis Site (41dn479) Denton County, Texas. Center for Environmental Archaeology. Department of Geography, University of North Texas.

Fox, A.A. and D.E. Fox
1967 The Classen Rock Shelter, 41BX23. Manuscript on File at the Center for Archaeological Research, The University of Texas at San Antonio.

Geophysical Survey Systems, Inc. (GSSI)
2016 Advanced GPR Data Processing with RADAN 7. Geophysical Survey Systems, Inc., Nashua, NH.

Habig, Marion A.
1968 The Alamo Chain of Missions: A History of San Antonio's Five Old Missions. Franciscan Herald Press, Chicago.

Hester, T.R.
1978 Early Human Occupation in South Central and Southwestern Texas; Preliminary Papers on the Baker Cave and St. Mary's Hall Sites. Manuscript on File. Center for Archaeological Research, The University of Texas at San Antonio.
1990 Plainview Artifacts at the St. Mary's Hall Site, South Central Texas. *Current Research in the Pleistocene* 7:14–17.

Highley, C.L., C. Graves, C. Land, and G. Judson
1978 Archeological Investigations at Scorpion Cave (41ME7) Medina County, Texas. *Bulletin of the Texas Archeological Society* 49:139–194.

Huebner, J.A.
1991 Late Prehistoric Bison Populations in Central and Southern Texas. *Plains Anthropologist* 36(137):343–358.

Ivey, J. E.
1984 The San Antonio Missions. Unpublished Manuscript. On file at the Center for Archaeological Research-University of Texas at San Antonio.
2008 A Reconsideration of the Survey of the Villa de San Fernando de Béxar in 1731. Southwestern Historical Quarterly 111(3): viii-281.

Johnson, L.
1994 The Life and Times of Toyah-Culture Folk: The Buckhollow Encampment Site 41KM16, Kimble County, Texas. Report No. 38. Office of the State Archeologist, Austin.

Johnson, L. and G.T. Goode
1994 A New Try at Dating and Characterizing Holocene Climates, as well as Archaeological Periods, on Eastern Edwards Plateau. *Bulletin of the Texas Archaeological Society* 65:1–51.

Kalter, A.J., R.M. Rogers, and M.N. Smith
2005 *Analysis and Reporting for 41FY135, the Sandbur Site, Fayette County, Texas*. PBS&J, Document No. 020388. Archeological Studies Program Report No. 73. Texas Department of Transportation. Austin.

Mauldin, R.P., and D.L. Nickels
2001 An Archaeological Survey of Twin Buttes Reservoir, Tom Green County, Texas. Archaeological Survey Report, No. 300. Center for Archaeological Research, The University of Texas at San Antonio.

Mauldin, R.P., D.L. Nickels, and C.J. Broehm
2003 Archaeological Testing at Determine the National Register Eligibility Status of 18 Prehistoric Sites on Camp Bowie, Brown County, Texas (Volume 1 and Volume 2). Archaeological Survey Report, No. 334. Center for Archaeological Research, The University of Texas at San Antonio.

Meissner, B.A.
2009 *Archaeological Survey and Historic Background Research Conducted for the Alamo Community College District at the Former Site of Playland Park, San Antonio, Bexar County, Texas*. *Archaeological Survey Report No. 400*. Center for Archaeological Research, The University of Texas at San Antonio.

Meltzer, D.J. and M.R. Bever
1995 Paleoindians of Texas: An Update on the Texas Clovis Fluted Point Survey. *Bulletin of the Texas Archeological Society* 66:47–81.

Natural Resource Conservation Service (NRCS)
2016 Soil Survey Staff, Natural Resource Conservation Service. United States Department of Agriculture. Web Soil Survey of Bexar County. Available at https://websoilsurvey.nrcs.usda.gov/. Accessed November 2016.

Nickels, D.L., C.B. Bousman, J.D. Leach, and D.A. Cargill
1998 *Test Excavations at the Culebra Creek Site, 41BX126, Bexar County, Texas*. Archaeological Survey Report, No. 265. Center for Archaeological Research, The University of Texas at San Antonio.

Patterson, L.W.
1988 Chronology of Arrow Point Types in South Texas. *La Tierra* 15(4):29–33.

Powell, J.F. and D.G. Steele
1994 Diet and Health of Paleoindians: An Examination of Early Holocene Human Dental Remains. In *Paleonutrition: The Diet and Health of Prehistoric Americans*. Edited by K.D. Sobolik. Pp. 176–192. Occasional Paper No. 22. Carbondale: Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Prewitt, E.R.
1981 Cultural Chronology in Central Texas. *Bulletin of the Texas Archaeological Society*. 52:65–89.

Quigg, J.M., C. Lintz, F.M. Oglesby, A.C. Earls, C.D. Frederick, W.N. Trierweiler, D. Owsley, and K.W. Kibler
1993 Historic and Prehistoric Data Recovery at Palo Duro Reservoir, Hansford County, Texas. Technical Report 485. Mariah Associates, Inc., Austin.

Ramsdell, C.
1959 *San Antonio: A Historical and Pictorial Guide*. University of Texas Press. Austin.

Ricklis, R.A.
1995 Prehistoric Occupation of the Central and Lower Texas Coast: A Regional Overview. *Bulletin of the Texas Archeological Society* 66:265–300.

Robinson, R. L.
1982 Biosilica Analysis of Three Prehistoric Sites in the Choke Canyon Reservoir, Live Oak County Texas: Preliminary Summary of Climatic Implications. In *Archaeological Investigations at Choke Canyon Reservoir, South Texas: The Phase I Findings,* by G. D. Hall, S. L. Black, and C. Graves, pp. 597-610. Choke Canyon Series 5. San Antonio: Center for Archaeological Research, University of Texas at San Antonio.

Schuetz, M.K.
1968 *The History and Archaeology of Mission San Juan Capistrano, San Antonio, Texas.* Volume 1. Archeology Program Report Number 10. State Building Commission, Austin.

Scurlock, D., A. Benavides, Jr., D. Isham, and J. Clark, Jr.
1976 *An Archeological and Historical Survey of the Proposed Mission Parkway, San Antonio, Texas.* Archeology Survey Report No. 17, Texas Historical Commission, Austin.

Skinner, S.A.
1981 Aboriginal Demographic Changes in Central Texas. *Plains Anthropologist* 26(92):111–118.

Southern Regional Climate Center
2017 Monthly Climate Summary. Available at www.srcc.lsu.edu/. Accessed March 20, 2017.

Story, D.A.
1985 Adaptive Strategies of Archaic Cultures of the West Gulf Coastal Plain. In *Prehistoric Food Productions in North America*, edited by R.I. Ford, pp. 19–56. Anthropological Papers No. 75. Museum of Anthropology, University of Michigan, Ann Arbor.

Texas Historical Commission (THC)
2016 Texas Archeological Sites Atlas. http://nueces.thc.state.tx.us/ Accessed November 2016.

Thoms, A.V., D.D. Keuhn, B.W. Olive, J.E. Dockall, P.A. Clabaugh an R.D. Mandel
1996 Early and Middle Holocene Occupations at the Richard Beene Site: the 1995 Southern Texas Archaeological Society Association Field School Project. *La Tierra* (23) 4:1–36.

Thoms, A.V. and R.D. Mandel
2006 *Archaeological and Paleoecological Investigations at the Richard Beene Site 41BX831: South Central Texas.* Reports of Investigations, No. 8. Center for Ecological Archaeology, Texas A&M University, College Station.

Tomka, S.A.
2012 Archaeology Along The Upper San Antonio River. Paper presented at the Southern Texas Archaeological Association Spring Quarterly Meeting.

Toomey, R.S., M.D. Blum, and S. Valastro, Jr.
1993 Late Quaternary Climates and Environments of the Edwards Plateau, Texas. *Global and Planetary Change* 7:299–320.

Ulrich, K.M.
2011 *Intensive Survey and Testing Associated with the Rediscovery of the Acequia Madre and Alamo Dam, San Antonio, Bexar County, Texas. Archaeological Report, No. 417*. Center for Archaeological Research, University of Texas at San Antonio.

Ulrich, K.M., J.L. Thompson, K. Hindes, B.K. Moses, J.J. Dowling, L.K. Wack and B.A. Meissner
2010 *Testing and Data Recovery at the Perez Ranch (41BX274).* Archaeological Report, No. 404. Center for Archaeological Research, The University of Texas at San Antonio

Winkler, B.A.
1982 Wild Plant Foods of the Desert Gatherers of West Texas, New Mexico, and Northern Mexico: Some Nutritional Values. Unpublished Master's Thesis, Department of Anthropology, The University of Texas at Austin.