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Archaeological Survey of Proposed Houston Arboretum & Nature Center Improvements, Harris County, Texas

Todd McLeod

C. Wesley Mattox

Hannah Curry-Shearouse

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Archaeological Survey of Proposed Houston Arboretum & Nature Center Improvements, Harris County, Texas

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**Archaeological Survey of
Proposed Houston
Arboretum & Nature Center
Improvements, Harris
County, Texas**

Prepared for

Design Workshop, Inc.

Prepared by

SWCA Environmental Consultants

Texas Antiquities Permit No. 7592

SWCA Project No. 37041.00

SWCA Cultural Resources Report No. 16-130

June 6, 2017

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August 10, 2016 June 6, 2017

ARCHAEOLOGICAL SURVEY OF PROPOSED HOUSTON ARBORETUM & NATURE CENTER IMPROVEMENTS, HARRIS COUNTY, TEXAS

Prepared for

Design Workshop, Inc.
800 Brazos Street, Suite 490
Austin, Texas 78701

Prepared by

Todd McLeod, C. Wesley Mattox, and Hannah Curry-Shearouse

C. Wesley Mattox
Principal Investigator

SWCA Environmental Consultants
10245 W. Little York Road, Suite 600
Houston, Texas 77040
www.swca.com

Texas Antiquities Permit No. 7592

SWCA Project No. 37041.00

SWCA Cultural Resources Report No. 16-130

August 10, 2016 June 6, 2017

ABSTRACT

On behalf of Design Workshop, Inc. and the Houston Arboretum & Nature Center (HANC), SWCA Environmental Consultants (SWCA) conducted an intensive archaeological survey of the proposed HANC improvements in Harris County, Texas. The portion of the HANC to be affected by the proposed improvements consists of an approximately 55-acre area (project area) located in the northern third of the overall 155-acre HANC. Archaeological investigations were conducted in compliance with the Antiquities Code of Texas under Antiquities Permit No. 7592 and with guidelines set forth by the Texas Historical Commission (THC).

The background literature review revealed that no cultural resources surveys had been conducted within the boundaries of the project area, although 12 cultural resources surveys had been conducted within 1 mile of the project area. In addition, five archaeological sites (41HR614, 41HR617, 41HR791, 41HR885, and 41HR1158), five historic structures, and two cemeteries were found to be located within a 1-mile radius of the boundary of the HANC. Site 41HR614, representing the intact remains of a WWI training facility, Camp Logan, has been recorded as a State Antiquities Landmark, and site 41HR617, a prehistoric lithic scatter has been recorded as potentially eligible for State Antiquities Landmark designation. One historic structure, the Meachum and Mellinger House, has been listed on the National Register of Historic Places (NRHP).

During the field investigation, a team of two archaeologists examined only those portions of the HANC where construction activities were anticipated. In accordance with THC standards, SWCA excavated 59 shovel tests within the project area. One new historic archaeological site (41HR1181), representing an early twentieth-century historic dump, was identified and delineated. A second locus of scattered brick was also identified; however, the locus contained no other artifacts and appeared to be displaced. This locus was recorded as Isolated Find 1. In addition, an SWCA architectural historian completed an architectural evaluation of the Houston Arboretum Visitor Center, a potentially historic structure designed by noted Houston architect Hugo Victor Neuhaus, Jr., that has been significantly modified in the past. SWCA conducted a non-collection survey; therefore, no cultural materials will be curated. The original survey documentation will be curated with the Texas State University Center for Archaeological Studies.

In accordance with the Antiquities Code of Texas, SWCA has made a reasonable and good faith effort to identify significant cultural resources within the project area. No properties listed or otherwise eligible for listing in the NRHP, or eligible for official designation as a State Antiquities Landmark, were identified within the project area. Consequently, SWCA recommends no further archaeological investigation, and that the project be allowed to proceed.

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MANAGEMENT SUMMARY

Project Title. Archaeological Survey of Proposed Houston Arboretum & Nature Center Improvements, Harris County, Texas

SWCA Project Number. 37041

Project Description. The Houston Arboretum & Nature Center (HANC) in concert with City of Houston, is proposing number of improvements to a 55-acre portion of the grounds of the HANC. Improvements include the construction of new educational facilities, parking lots, access roads, and trails throughout the northern portion of the property. The present investigation included a background review, an intensive pedestrian survey augmented with shovel testing, and an architectural assessment in order to systematically identify, record, delineate, and if possible, determine the significance of any cultural resources identified within the project area.

Number of Acres Surveyed. 55 acres

Principal Investigator. C. Wesley Mattox

Dates of Work: March 22-23, 2016

Purpose of Work: All work was conducted under Texas Antiquities Permit No. 7592, in compliance with the Antiquities Code of Texas.

Number of Sites. As a result of field investigations, one new historic archaeological site (41HR1181) and one historic isolated find were identified within the project area. The potentially historic Houston Arboretum Visitor Center was also documented.

Eligibility. None of the recorded archaeological sites or historic structures were assessed to be eligible for listing in the National Register of Historic Places or for official designation as a State Antiquities Landmark.

Curation. SWCA conducted a non-collection survey; therefore, no cultural materials will be curated. Original survey documentation will be curated with the Texas State University Center for Archaeological Studies.

Comments. In accordance with the Antiquities Code of Texas, SWCA has made a reasonable and good faith effort to identify significant cultural resources within the project area. No properties listed or otherwise eligible for listing in the NRHP, or eligible for official designation as a State Antiquities Landmark, were identified within the project area. Consequently, SWCA recommends no further archaeological investigation, and that the project be allowed to proceed.

INTRODUCTION

On behalf of Design Workshop, Inc. and the Houston Arboretum & Nature Center (HANC), SWCA Environmental Consultants (SWCA) conducted an archaeological survey of a 55-acre portion (project area) of the 155-acre HANC located within the City of Houston's Memorial Park in Harris County, Texas (Figure 1). The project area covers a number of proposed improvements to the HANC, including the construction of access roads, parking lots, improved trails, ponds, and at least three new nature center facilities located in the northern third of the HANC. As the property is owned by the City of Houston, a political subdivision of the state, investigations were conducted in compliance with the Antiquities Code of Texas.

SWCA archaeologists conducted an intensive archaeological survey of the planned area of effect of the project area, and an SWCA architectural historian completed an architectural evaluation of structures on the property. All investigations were in accordance with the standards and guidelines of the National Historic Preservation Act (NHPA) and the Texas Historical Commission's (THC) minimum archaeological survey standards for such projects.

C. Wesley Mattox and Colleen Kennedy conducted the survey on March 22 and 23, 2016. Hannah Curry-Shearouse conducted the architectural evaluation of the standing structures on the property on April 11, 2016. Mr. Mattox served as the Principal Investigator for the project and Mike Crow served as Project Manager.

PROJECT AREA DESCRIPTION

The HANC is bounded on the north by Woodway Drive, on the west by Interstate 610 West Loop, on the east by a Southern Pacific Railway line, and on the south by Buffalo Bayou, covering approximately 155 acres. The HANC is depicted on the Houston Heights 7.5-minute U.S. Geological Survey (USGS) topographic map.

Currently, the HANC features a mix of stands of pine and oak punctuated with wide areas of dead trees and thick briars and holly, a result of the nearly 50 percent tree mortality after Hurricane Ike and the drought of 2011 (HANC 2016). Current facilities include a paved driveway and parking lot; a network of paved, graveled, and mulched trails and raised boardwalks; the Houston Arboretum Visitor Center; and a small, modern maintenance shed facility just east of the Visitor Center. The currently proposed project will impact only the northern third of the HANC along with a small strip running along the western side of the HANC property adjacent to Interstate 610 West Loop (see Figure 1). The project will reconfigure access to the park, providing a looping parking lot surrounding a pond north of the Visitor Center and a second entrance and parking for busses west of the Visitor Center. At least three new nature center facilities will be constructed, including one just north of the Visitor Center, one approximately 250 m northwest of the Visitor Center, and one approximately 500 m to the southwest.

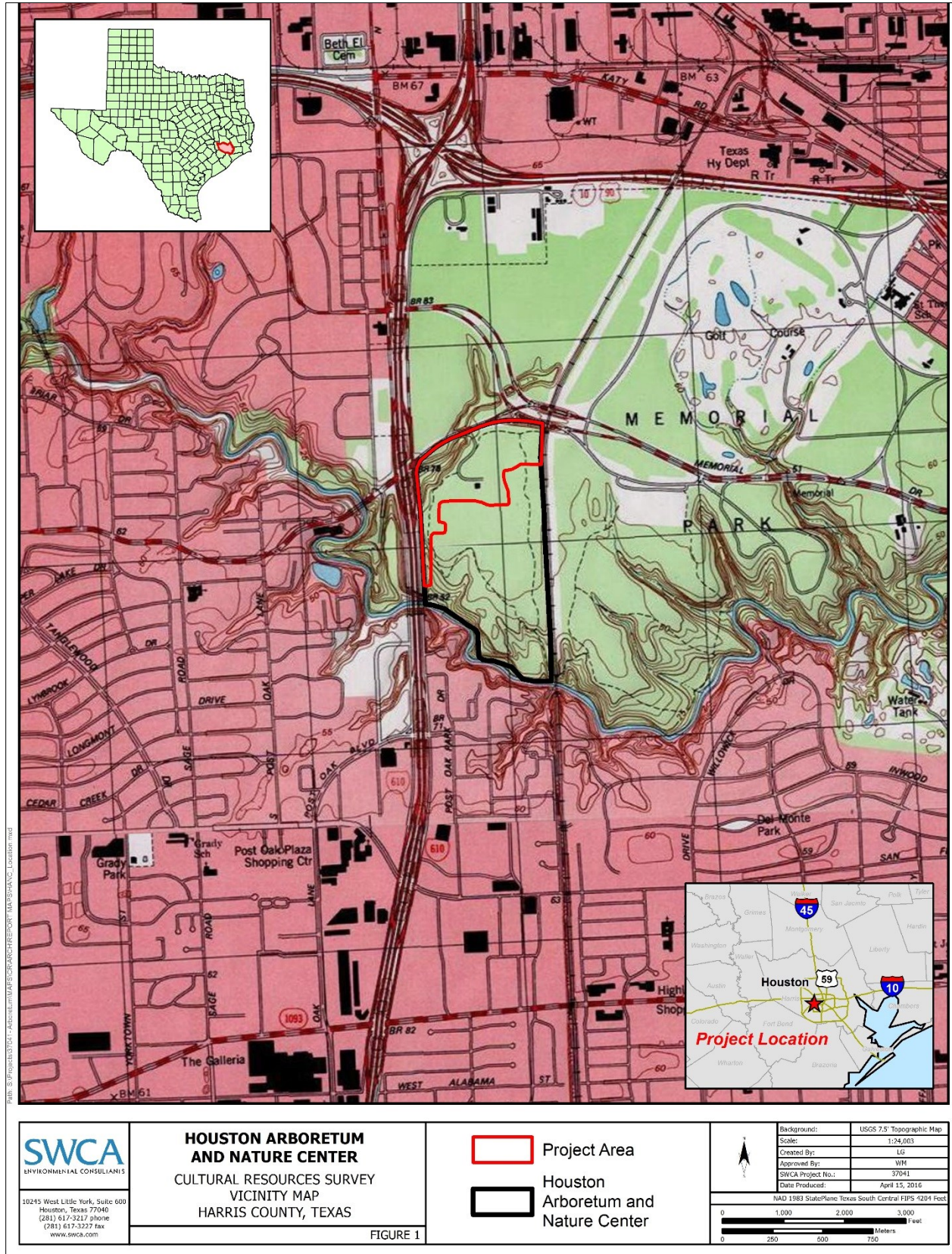


Figure 1. Houston Arboretum & Nature Center project area, Harris County, Texas.

ENVIRONMENTAL SETTING

Physiography

The project area is located in the Northern Humid Gulf Coastal Prairies of the Coastal Plain physiographic province (Griffith et al. 2007). Generally, the area is nearly flat, slightly sloping towards the south and east. Local topography is limited to small, natural pimple mounds or to deeply incised channels of the sinuous streams and bayous cut across the coastal plain. Most of the land covered by the HANC is nearly flat and lies approximately 60 feet above sea level. However, within several deeply incised tributaries of Buffalo Bayou, elevation drops rapidly as much as 15 to 20 feet.

The eastern portion of the Coastal Plain was initially covered in expansive prairies with isolated stands of oak and pine. During the historic occupation of the region, rice, cotton, and rangeland for cattle and horses have been the predominant land uses. The urban development of Houston has also significantly changed the landscape of the Coastal Plain in the last 150 years.

Geology

Geologically, the project area is located on the Beaumont formation (Qbc) (Barnes 1982). This portion of the Beaumont is formed primarily from low permeability clays and muds. The formation consists of backswamp, coastal marsh, and alluvial deposits of clay and silt dating to the latter part of the Pleistocene epoch.

Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2016), soils in the project area consist of Pleistocene age terrace deposits and areas of backswamp clays. Individual soil series within the proposed project area are presented in Table 1.

Houston-PALM

According to Abbott's (2001) Houston-PALM, a guide to archaeological potential related to geomorphology in the Harris County area, the project area is situated within Map Units 2 and 4. Briefly, Map Unit 2 consists of Pleistocene landforms that are covered by a thin layer of Holocene-age soils. Map Unit 4 consists of stable Pleistocene landforms. The PALM recommends surface survey with shovel testing within Map Unit 2, and recommends no survey of Map Unit 4. Deep testing for deeply buried archaeological deposits is not recommended for either map unit (Abbott 2001).

Table 1. Soils within the project area.

Soil Series	Texture	Location	Description	Geoarchaeological potential (per Abbot 2001:Table 2)
Verland	Silty clay loam	Uplands	Very deep, somewhat poorly drained, very slowly permeable, level to nearly level soils. Formed in clayey and loamy sediments of the Beaumont Formation of Pleistocene age.	Low
Bissonnet	Loam	Uplands	Very deep, poorly drained, nearly level soils formed in loamy fluviomarine deposits of the Beaumont Formation of Pleistocene age.	Low

Soil Series	Texture	Location	Description	Geoarchaeological potential (per Abbot 2001:Table 2)
Atasco	Fine sandy loam	Floodplain and terrace	Very deep, moderately well drained soils. These nearly level to gently sloping soils formed in loamy fluvial deposits of Pleistocene age.	Low

Flora and Fauna

Modern vegetation communities within the Northern Humid Gulf Coastal differ significantly from past biotic communities (Griffith et al. 2007). Vegetation on the Northern Humid Gulf Coastal Prairies once consisted of grasslands dominated by little bluestem (*Schizachyrium scoparium*), yellow indiagrass (*Sorghastrum nutans*), brownseed paspalum (*Paspalum plicatulum*), and switchgrass (*Panicum virgatum*), along with isolated stands of southern live oak (*Quercus virginiana*) (Griffith et al. 2007). Today, invasive species such as Chinese tallow (*Triadica sebifera*), as well as introduced range, crop, and ornamental plants, cover most of the western Gulf Coastal Plain. However, the project area, itself, does not follow this trend, as one of the stated goals of HANC is to promote native plant and animal life as well as prevent the spread of invasive species (HANC 2016).

The project area lies on the edge of the Texan and Austroriparian biotic provinces to the west and east, respectively, as defined by Blair (1950). Some native mammals common to the area include: opossum (*Didelphis virginiana*), eastern mole (*Scalopus aquaticus*), eastern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Scurrius carolinesis*), pocket gopher (*Geomys breviceps*), fulvous harvest mouse (*Reithrodontomys fulvescens*), white-footed mouse (*Peromyscus leucopus*), hispid cotton rat (*Sigmodon hispidus*), eastern cottontail rabbit (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), mink (*Mustela vison*), muskrat (*Ondata zibethica*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and white-tailed deer (*Odocoileus virginianus*). Historically, red wolf, bison, and black bear ranged into or near the project area (Kricher and Morrison 1998; Sutton and Sutton 1985).

The reptilian assemblage includes the racer (*Coluber constrictor*), rat snake (*Elaphe obsoleta*), timber rattlesnake (*Crotalus horridus*), common kingsnake (*Lampropeltis getulus*), woodhouse toad (*Bufo woodhousii*), bullfrog (*Rana catesbiana*), northern leopard frog (*Rana pipiens*), eastern box turtle (*Terrapene carolina*), and the gulf coast toad (*Bufo vallicepus*) (Blair 1950; Conant and Collins 1998; Sutton and Sutton 1985).

Breeding birds common to the wooded areas include black vulture (*Coragyps atratus*) and turkey vulture (*Cathartes aura*), wild turkey (*Meleagris gallopavo*), northern bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*), red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), scissor-tailed flycatcher (*Tyrannus forficatus*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), eastern bluebird (*Sialia sialis*), northern mockingbird (*Mimus polyglottos*), northern cardinal (*Cardinalis cardinalis*), painted bunting (*Passerina ciris*), and lark sparrow (*Chondestes grammacus*). Migratory species within wooded areas include yellow-bellied sapsucker (*Sphyrapicus varius*), northern flicker (*Colaptes auratus*), eastern phoebe (*Sayornis phoebe*), ruby-crowned kinglet (*Regulus calendula*), hermit thrush (*Catharus guttatus*), American robin (*Turdus migratorius*), and many sparrows (Bull and Farrand 1977; Kricher and Morrison 1998; Sutton and Sutton 1985).

CULTURAL SETTING

The project area is located within the Southeast Texas archaeological region (Perttula 2004a). Southeast Texas is identified to include the upper Texas coast, from the Sabine River southwestward to the Brazos River delta, and including the adjacent inland coastal plain (Ricklis 2004).

Prehistoric Cultural Setting

The prehistoric cultural setting is divided into three primary periods: Paleoindian, Archaic, and Ceramic. The Protohistoric period bridges the gap to the historic period, with the arrival of Europeans to Southeast Texas. The following general summary draws heavily from regional sources found in *The Prehistory of Texas* (Perttula 2004b) and a comprehensive regional summary provided by Story (1990) in *The Archaeology and Bioarchaeology of the Gulf Coastal Plain*.

Paleoindian Period

In Southeast Texas, the Paleoindian period (ca. 11,500-8000 years before present [B.P.]) is divided into Early (ca. 11,500-10,000 B.P.) and Late (10,000-8500 B.P.) subperiods (Perttula 2004a:9). Fluted points are the most commonly known markers of the Paleoindian period. Early types include Clovis and Folsom points. Late Paleoindian occupation is generally represented by Dalton, San Patrice, and Scottsbluff, in addition to Plainview and Angostura points (Bousman et al. 2004; Ricklis 2004; Turner et al. 2011).

Few Paleoindian sites have been identified, and of those, none have been systematically excavated in Southeast Texas. Paleoindian projectile points have been primarily identified by surface collections in the region, and only about two dozen Paleoindian sites have been recorded in Harris County (Bousman et al. 2004:64). Paleoindian points have been found in excavated contexts, although these have generally been mixed with materials from later periods. Most have been identified along major stream drainages (Ricklis 2004). It is thought that one factor in the lack of intact Paleoindian sites is due to the submersion of coastal occupations by an increase in sea level and the lack of preservation across older upland areas (Aiuvalasit 2007; Aten 1983). Sea levels did not stabilize until the end of the Middle Archaic period, approximately 5000 B.P. (Aten 1983:157).

One of the largest local collections of Paleoindian artifacts comes from the McFaddin Beach site, located southeast of the project area in Jefferson County, Texas. Numerous Paleoindian points have been recovered, along with a significant amount of materials from later time periods. Research at the site, however, indicates that artifacts have been re-deposited inland from an unknown location offshore (Brown 2009). As no excavation has been conducted at the site proper, little is known about the lifeways of individuals who utilized these projectile points. A second significant site is located in northwest Harris County, where for the first time, Clovis projectile points have been identified in close association with other Paleoindian tool types (Crook 2016).

Because no discrete Paleoindian components have been directly excavated in Southeast Texas, there is no direct evidence for Paleoindian subsistence practices. In other parts of Texas and the Southeastern United States, early discoveries of Paleoindian artifacts in conjunction with now-extinct Pleistocene megafauna, such as mastodon and *Bison antiquus*, strongly biased early descriptions of Paleoindian subsistence towards exploitation of big game animals (Bousman et al. 2004:15; Williams and Stoltman 1965). Continued evidence from excavated Paleoindian components outside Southeast Texas suggests that Paleoindian subsistence was more widely varied, though exploitation of big game was certainly a part (Bousman et al. 2004:75; Dunbar and Webb 1996).

One significant line of evidence for understanding Paleoindian lifeways comes from their diagnostic projectile points; across North America, archaeologists have documented consistent Paleoindian use of nonlocal raw materials for stone tool manufacture (Bousman et al. 2004). Most of the recovered points in southeast Texas are of a high grade lithic material that is scarce or absent in the region, suggesting a widespread movement of peoples and materials over long distances in a highly mobile lifestyle that likely depended on a diverse range of food resources (Ricklis 2004). Due to this high-mobility lifestyle, population densities were likely low and social structure is hypothesized as relatively simple (Ricklis 2004).

Archaic Period

The Archaic period generally dates to the end of the Wisconsin glaciation and the concomitant extinction of Pleistocene megafauna. The period is often distinguished by the development of a broad subsistence base and evidence of a more intensive exploitation of regionally specific plant and animal resources. This change in subsistence is marked by an adaptation in tool production to conform to new hunting techniques, food preparation, and related activities.

The Archaic period in Texas is generally defined by pre- or non-horticultural adaptations and pre-ceramic and pre-bow-and-arrow hunting technologies (Story 1990). In Southeast Texas, the Archaic sequence is separate for inland groups (ca. 8000–1500 B.P.) and coastal groups (ca. 5000–2200 B.P.), due to the fact that the coastline was not stabilized until the middle of the Archaic period (Ricklis 2004). Numerous Archaic sites have been found along inland stream courses in Southeast Texas. The Archaic components at these sites are represented by various types of flaked stone dart points and other lithic tools. For coastal groups, the Archaic also includes stratified shell midden sites (Ricklis 2004).

For inland groups, a typological cluster of expanded-stem types dominates the Early Archaic (before ca. 6000 B.P.). Included in this group are early side-notched and early stemmed forms and corner-notched points of the Keithville, Neches River, and Trinity types. These are followed by massively barbed points of the Bell/Calf Creek series, as well as non-stemmed Tortugas points and stemmed Wells points (Ricklis 2004).

A variety of Middle Archaic tool types is reported from Southeast Texas, including Yarbrough, Bulverde, Travis, and Pedernales in the western sector. The predominant Late Archaic types are Kent and Gary, with Ensor and Godley points common in the western reaches of Southeast Texas (Ricklis 2004). A shift to the use of poorer quality and more local lithic resources in Late Archaic times suggests reduced group mobility and more tightly defined group territories (Story 1990). Several Middle to Late Archaic cemeteries have been reported from the coastal prairies of the western part of southeast Texas. By the Late Archaic, cemeteries were an integral part of cultural behavior along the inland margins of the coastal prairies zone, further tying groups to specific locations of shared mortuary practice (Ricklis 2004).

Ceramic Period

The Ceramic period in Southeast Texas begins ca. 2200 B.P., with the introduction of ceramics on the Texas Coast (Ricklis 2004; Aten 1983). Ceramics would not be found in inland southeast Texas for several centuries (Ricklis 2004). A later, important technological innovation was the introduction of the bow and arrow (marked by the appearance of small, light straight and expanded-stem stone point types), around 1300 B.P. (Ricklis 2004; Story 1990). The Ceramic period of southeast Texas is further divided into Early and Late subperiods.

The Early Ceramic subperiod shows a continuation of Archaic period subsistence and settlement patterns (Ricklis 2004). Gary contracting stem points began to replace earlier Kent points. Tchefuncte and Mandeville ceramics began to be present in small amounts as one moves east towards the Louisiana border, but sandy Goose Creek ceramics spread throughout an area bounded by the Brazos River to the west and

extend to the upper reaches of the Neches and Angelina Basins (Ricklis 2004; Story 1990:257). This area has been called the Mossy Grove culture area, and appears to have been a distinct regional development that persisted through time until the Protohistoric period (Ricklis 2004:190).

On the central Texas coast, the Late Ceramic/Late Prehistoric subperiod saw an apparent division of Toyah phase groups in inland areas and the Rockport phase groups on the central Texas coast (Ricklis 2004). Small, light arrow point types, such as Scallorn, Alba, and Catahoula appear during this time (Ricklis 2004). Goose Creek ceramics continue along with the introduction of grog-tempered and some bone-tempered ceramics, and decoration becomes more elaborate, although grog-tempered ceramics are more common and decorations are less elaborate inland (Ricklis 2004; Story 1990). Additional characteristics of the Late subperiod include the appearance of bison bone along with a lithic technocomplex of Perdiz arrow points, unifacial end scrapers, blade-core lithic technology, thin bifacial knives (often alternately beveled), and expanded base drills/perforators made from flakes and prismatic blades (Ricklis 2004). The use of cemeteries continued through the Ceramic period, with the Harris County Boys School Site, including 29 burials on the western edge of Galveston Bay, and the Mitchell Ridge Site on Galveston Island, presenting notable examples (Story 1990:242; Ricklis 1994).

Protohistoric Period

Native groups in the Galveston Bay area, due to their proximity to the Gulf of Mexico, had some of the earliest contact with European explorers and colonists in the history of Texas. However, this contact was not sustained or formalized, and Native American lifeways predominated in the area until the late eighteenth to early nineteenth centuries. The Protohistoric period (A.D. 1528 to 1810) began with several sixteenth-century expeditions to the area, most notably Alvar Nuñez Cabeza de Vaca's travels stemming from the failed Panfilo de Narvaez expedition in 1527. Although it is not completely certain where Cabeza de Vaca landed, evidence points to Galveston Island (Ricklis 1996:107).

The identity of the inhabitants of the area around Houston at that time is unclear; called the Bidai and the Patiri, their language is unknown, although it may have been a western Atakapan language (Newcomb 2004). The normal range given to the northernmost Karankawa tribe, the Cocos, generally does not extend past the Brazos River valley (Ricklis 1996:6). The eastern side of Galveston Bay was inhabited by a number of Atakapan-speaking groups, including the Atakapans (proper) and the Akokisa (Newcomb 2004). Galveston Bay may have been a dividing line between the Karankawan and Atakapan groups, with settlements around the bay shifting and levels of interaction changing over time.

Archaeological sites from this period are characterized by a near-disappearance of native-made pottery, except for Goose Creek Plain (Story 1990:260). Sites 41CH110 and 41CH32 in Chambers County, in the Trinity River area, both appear to date to this period (Aten 1983:283). At Mitchell Ridge, groups continued to bury their dead on Galveston Island throughout the Protohistoric period, suggesting little change in lifeways throughout the period. Conclusively-dated European artifacts do not appear at Mitchell Ridge until the middle of the eighteenth century (Ricklis 1994:470). Subsistence did not change much during this period. Hunting, gathering, and fishing still provided the main source of sustenance; however, the Atakapans and Akokisa appear to have slowly begun to incorporate horticulture into their subsistence patterns (Newcomb 2004:661).

Historic Cultural Setting

Earliest Contact/Colonial Era (1500-1836)

European documentation, control, and exploitation of Texas grew slowly after initial contact in 1528. As noted, Cabeza de Vaca was shipwrecked near Galveston Bay in 1528, and began a years-long odyssey

living among and documenting the Native American groups of Texas (Hester 1999). Soon afterwards, remnants of the Hernando de Soto expedition, led by Luis de Moscoso Alvarado, crossed through central Texas in 1542, but found the country “uninviting” (Hudson 1997). As such, there was little interest or pressure for colonization and Europeans largely avoided the area.

For approximately 150 years, contact between Native American groups and Europeans was sporadic, until the French began to make incursions into the western Gulf of Mexico. French explorer Robert Sieur de La Salle wrecked in Matagorda Bay in 1685, during an attempt to colonize the area (Weddle 2010). This earliest French presence in Texas proved short-lived, as La Salle’s settlement in Matagorda Bay was attacked and destroyed, likely by the Karankawa, in 1688. The French incursion into the region provoked Spanish retaliation, resulting in the spread of the Spanish mission system into South Texas (Weddle 2010).

Spanish attempts to establish missions and forts to convert and pacify the native populations along the coastal plain continued through the 1700s. These included Mission Espíritu Santo de Zuniga, established in 1722 near Matagorda Bay and then moved to Victoria County in 1726 (Walter 1999); Presidio La Bahia and Mission Rosario, established in 1749 and 1754, respectively, in Goliad County (Ricklis 1999); and Mission Nuestra Señora de Refugio, which was built on the mouth of the Mission River and lasted until 1828 (Newcomb 1961:63). Missions located on the San Gabriel River, near present-day Rockdale, Texas, attracted some of the displaced Atakapan inhabitants of the Galveston Bay area.

In response to increasing French fur-trading expeditions west from the Louisiana Territory, the Spanish established a small mission and *presidio* at San Agustín de Ahumada, near the village of El Orcoquisac on the Trinity River between 1756 and 1771 (Newcomb 2004). Though the missions continued operating throughout the Spanish Colonial period, they were often impermanent, due to consistent antagonism between the missions and local populations, as well as often receiving poor support from the far-removed colonial government (Ricklis 1999; Newcomb 2004; Carlson and Corbin 1999). Though the Spanish claimed the area, the Texas coastal plain would remain mostly native until the Mexican revolution and the enticement of *empresarios* and colonists to the area.

After the end of the Mexican Independence from Spain, Mexico attempted to create a more populated buffer state in Texas, in an effort to protect against encroachments by the nascent United States of America. To this end, Mexican officials invited colonization of Texas, doling out land to farmers and ranchers and deferring payment for several years (Henderson 1928). These policies also continued the Spanish system of *empresarios*, by which land agents could obtain large grants of lands, which could then be separately divided, instead of individual families petitioning the Mexican authorities. The area around Houston was not initially included in any *empresario* grant, but petitions from new colonists soon had the area, which was valued for the ease of transportation on the San Jacinto and Trinity River watersheds, added to Stephen F. Austin’s grant (Henson 2010). A majority of the *empresarios* and colonists were Anglo-American and white settlers (Henderson 1928). This includes the first inhabitants of the HANC tract, the Reinermanns who had emigrated from Germany in 1834 (Aulbach 2012:79). Slavery was allowed within Mexico, until banned by President Guerrero in 1829; however, Texas was specifically exempted (De León 2010). Despite this favorable treatment, suspicions of the increasingly Anglo-American character of Texas and the increasing power and autonomy of Anglo-Americans in Texas led to pushes by the Mexican central authorities under General Santa Ana to revoke the colonization laws and promote a general trend of de-federalization of political control (De León 2010). Viewing these capricious changes to law as tyranny, a number of Texans, including a several former *empresarios*, convened and declared independence for the Republic of Texas on March 2, 1836 (De León 2010).

Republic of Texas/Pre-Civil War (1836-1860)

During the Texas Revolution, in 1836, Harrisburg, located further down Buffalo Bayou from Houston served as capital for a few weeks in early April, though the government was evacuated by steamboat to Galveston Island when threatened by Santa Anna. After the defeat of Santa Anna at San Jacinto, the new Texan Congress settled on the nascent town of Houston as the first national capital, and formed the county of Harrisburg (later to be renamed Harris) in late 1836 (Henson 2010; McComb 1969). Although the capital was short-lived, relocating to Austin in 1839, trade in the new city grew. By 1850, Houston was the home to the first railroad in Texas, the Buffalo Bayou, Brazos and Colorado (later to be known as the Galveston, Harrisburg, and San Antonio) ran a line west through Houston (Werner 2010). A second line opened to the northwest in 1856, and by 1861, there was around 470 miles of track already laid in Texas (Werner 2010).

For a new, small, and relatively poor nation, protection and recognition by foreign nations was vitally important. Annexation by the United States had always been one distinct possibility for Texas, and one that was promoted by Sam Houston during his first term as president (Nance 2010). By the 1844 United States presidential election, the question of Texas annexation was also on the front of the United States' national mind. The election of expansionist President James K. Polk was taken as a good sign of the desire of the United States to include another slave state in the nation and Texas President Anson Jones pushed for Texans to vote on the issue (Nance 2010). On October 13, 1845, annexation and the new Texas State Constitution were accepted by overwhelming popular vote, and Texas became a part of the United States on December 29, 1845 (Nance 2010).

The subsequent years leading up to the Civil War were generally a time of expansion and consolidation of the primarily plantation-based farming economy, especially within the coastal plain region. Cotton production increased over 600 percent between 1849 and 1859 (Britton et al. 2010). Slavery also expanded at an astounding rate. Between 1850 and 1860, the overall number of slaves increased by 130,000, expanding from 27 percent of the population to 30 percent of the population in the years just before the Civil War (Campbell 2013). At the same time, other industries grew slowly, possibly due to the overwhelming reliance on "King Cotton." Only 5 percent of Texans were involved in commercial activity and only 1 percent involved in manufacturing (Campbell 2013). Near Buffalo Bayou, industries included numerous sawmills, including one owned by the Reinermann family in the 1860s, along with brick kilns just upstream from the HANC (Molineu et al. 2010: 23; Aulbach 2012: 81).

The Post-Civil War/Reconstruction Period (1865-1880)

Although Governor Sam Houston opposed any step that might lead Texas to break from the Union that he had fought so hard to join, Texans voted to secede from the United States in February of 1861 (Wooster 2010). Up to 90,000 Texans served in the Confederate forces, mostly fighting outside the state boundaries. Only the seacoast saw significant fighting during the war and most action focused on Galveston (Wooster 2010). Although Houston was not directly affected by fighting during the Civil War, prices rose and hardship increased (McComb 1969:75). In June of 1865, two U.S. regiments reoccupied Houston, installing a military government in the city (McComb 1969:77).

Reconstruction brought massive changes to the economic and cultural systems of Texas. Many of the former agricultural elites lost much of their wealth as a result of the abolition of slavery (Moneyhon 2010). At the same time, former slaves, now emancipated, were provided with little support from their former masters. There was some political advancement, however, including the election of black aldermen in Houston for the first time (McComb 1969:81). Change was relatively slow, otherwise. The railroads slowly expanded throughout the postwar period, and cotton remained the most significant cash crop (Moneyhon 2010). The Reinermanns continued to sell off portions of their land throughout the later part of the

nineteenth century, mostly to lumber interests, much like many of their neighbors (Molineu et al. 2010: 89; Aulbach 2012: 80).

Late Nineteenth/Early Twentieth Century (1880-1940s)

Little would change in Houston until the turn of the twentieth century. The first major development was the dredging of a deep-water channel in Buffalo Bayou, allowing ocean-going vessels to travel deep into Galveston Bay. By 1897, Congress had approved funding for dredging the Houston Ship Channel to a depth of 25 feet, thus rivaling Galveston Harbor's depth (Sibley 2010). By 1919, blue-water ships could sail directly to Houston, bypassing Galveston and signaling the ascendancy of Houston over its older sister (Sibley 2010). The second revolutionary change occurred after the gusher at the Spindletop well, near Beaumont (McComb 1969:113). Houston's oil industry developed rapidly; in 1904, the Moonshine well came in, ushering in the exploitation of the Humble oil field north of Houston (McComb 1969:115). Refineries and other industry sprang up along the ship channel, spurring a population boom throughout the twentieth century (Henson 2010). By 1930, Harris County passed Dallas and Bexar counties for the highest population in Texas, and Houston has since remained the most populous city in Texas (Henson 2010).

Early suburban expansion in the first part of the twentieth century west of downtown Houston included the Houston Height's subdivision north of White Oak Bayou, the Montrose and Hyde Park suburbs west of downtown, and the River Oaks subdivision south of Buffalo Bayou (McComb 2010). The area around the HANC was spared, however. During WWI, the land was leased by the United States government to construct a military training facility, named Camp Logan (Aulbach et al. 2014). The camp would eventually house tens of thousands of men destined for the trenches of France. After the camp was decommissioned in 1919, the buildings were sold, but the land remained undeveloped (Aulbach et al. 2014). Instead, the land was sold in 1924 to the City of Houston with the express intent of creating a park to memorialize the men who served at Camp Logan (Aulbach et al. 2014).

In that role, Memorial Park has remained an extensive swath of greenspace within the urban environment of Houston for nearly 100 years. The HANC itself was parceled out of Memorial Park in 1951, when founder, Dr. Robert Vines, convinced the Houston City Council to set aside a 200-acre swath as the "Houston Botanical Gardens and Arboretum" (Langworthy 1978). Vines also helped establish the non-profit governing body which operates the facility. The most significant development of the property since that time occurred in the late 1960s, when Mrs. S.M. McAshan, Jr. helped fund the construction of a nature center, which was dedicated to her mother-in-law, Aline McAshan, in 1968 (Langworthy 1978).

BACKGROUND REVIEW

The background review consisted of a cultural resources and environmental literature review of the entire 155-acre HANC. An SWCA archaeologist reviewed the corresponding USGS 7.5-minute topographic quadrangle map on the Texas Archeological Sites Atlas (TASA), a restricted online database, for any previously recorded surveys and historic or prehistoric sites located in or near the project area. Site files, relevant maps, National Register of Historic Places (NRHP) properties, State Antiquities Landmark (SAL) listings, Registered Texas Historic Landmarks, cemeteries, and local neighborhood surveys were also examined. Listings on TASA are limited to projects under purview of the Antiquities Code of Texas or the NHPA of 1966. Therefore, all work conducted in the area may not be available. The Texas Historic Sites Overlay, aerial photographs, Bureau of Economic Geology Maps, and the NRCS Web Soil Survey were also examined for historical and environmental information related to the project area.

Previous Investigations

A review of TASA shows that no previous cultural resources investigations have been conducted within the HANC; however, at least 12 previous cultural resources investigations have been conducted within 1 mile of the HANC (Figure 2, Table 2). Of these, four were conducted in order to evaluate cultural resources within Memorial Park (Moore et al. 1989; Moore and Sanchez 2002; Molineu et al. 2010; Mangum 2012). The archaeological assessment survey conducted by Roger Moore and Joseph Sanchez is depicted in TASA as covering the HANC, but the investigation did not, in fact, survey any portion of the HANC (Moore and Sanchez 2002:1). Along with conducting a general reconnaissance of portions of Memorial Park, that survey also provided a model for assessing the potential for the appearance of cultural resources within different parts of the park. This model has been incorporated into the survey methodology below. Another four projects were associated with construction of infrastructure improvements under the purview of the Texas Water Development Board. Two surveys were associated with projects relating to the Buffalo Bayou drainage improvements, and two were associated with transportation projects, including one that surveyed improvements to Interstate 610 West Loop, directly adjacent to the HANC.

Table 2. Previously conducted cultural investigations within 1 mile of the project area.

Year	Distance (mile)	Sponsoring Agency	Survey Type	Report Author/ Principal Investigator	Investigating Agency	Additional Information
1989	0.01	City of Houston (COH)	Area	Moore, R. et al.	MAC	Project: 9 Land Units in Memorial Park; Results: 41HR614
1993	0.01	Federal Highway Administration	Linear	Bohuslav, K	TxDOT	Project: IH 610 West Loop Improvements
1994	0.49	Houston Metropolitan Transit Authority	Area	Moore, R. and S. Moss	Moore Archeological Consulting (MAC)	Project: Reserve C, West Oaks Subdivision; TAC No. 1395; Results: no cultural resources identified
1996	0.16	Texas Water Development Board (TWDB)	Linear	Davis, G. et al.	N/A	Project: Texas Water Development Board 1996 Annual Report, Multiple Locations; TAC No: 1641; Results: No cultural resources identified
1996	0.73	TWDB	Linear	Unknown	MAC	Project: Texas Water Development Board 1996 Annual Report, Multiple Locations; TAC No: 1641; Results: 41HR791
1996	0.81	TWDB	Linear	Unknown	Unknown	-
1996	1.00	TWDB	Linear	Unknown	Unknown	TAC No. 1641
2001	0.01	COH	Recon- aissance	Moore, R. and J. Sanchez	MAC	Project: Archaeological Assessment of Portions of Memorial Park TAC No. 2695; Results: Site 41HR885 and 3 non-site loci
2008	0.07	COH	Area	Molineu, D. et al.	J.K. Wagner & Co., Inc.	Project: Memorial Park Archery Range; TAC No. 5072; Several historic features identified
2011	0.88	Harris County Flood Control District	Area	Nash, S. et al.	HRA Gray and Pape	Project: 1.3 mile Segment of Buffalo Bayou; TAC No. 6003; Results: no cultural resources identified

Year	Distance (mile)	Sponsoring Agency	Survey Type	Report Author/ Principal Investigator	Investigating Agency	Additional Information
2012	0.05	COH	Area	Mangum, D.	MAC	Project Planner: Memorial Park Conservancy; Project: Running Center; TAC No.: 6253; Results: no cultural resources identified
2014	1.00	Harris County Flood Control District	Area	Tuttle, M.	HRA Gray and Pape	Project: Submerged Resource in Buffalo Bayou; TAC no. 6744; Results: non-historic resource identified
On-going	0.71	Rice University	Excavate	Dickens et al./ Fleischer, J.	Rice University	Excavations within Site 41HR614 (Camp Logan)

Previously Recorded Cultural Resources

A review of TASA indicates that there are a number of previously recorded cultural resources near the project area. A total of five previously recorded archaeological sites (including one SAL), one historic cemetery, one modern cemetery, and five historic structures (including one listed on the NRHP) are within 1 mile of the HANC (Table 3, see Figure 2).

Most of the nearby archaeological sites are related to historic-period occupations in and around Memorial Park. The most important to the current project is 41HR614, representing the intact archaeological remains of Camp Logan. Camp Logan was commissioned as a training camp at the outbreak of the American involvement in World War I in 1917. The area now occupied by Memorial Park formed only a portion of the camp, which included several thousand acres of rifle and artillery ranges spread west of Houston (Molineu et al. 2010). Most of the camp has now been swallowed by development in the Spring Branch and River Oaks neighborhoods of Houston, but a large portion, owned by Will and Mike Hogg (sons of former governor James Hogg), was sold to the City of Houston to remain as a park in perpetuity (Aulbach 2012:82). This served to protect a number of Camp Logan structures, mostly the concrete foundations of bathhouses and latrines still located within Memorial Park. Other portions of the camp, including an extensive network of training trenches, have been destroyed by development around the park (Aulbach et al. 2014: 63). The main areas of archaeological interest still remaining within the park were defined in 1989 and have been recorded as a SAL (Moore et al. 1989; TASA 2016). These areas abut the HANC on the eastern side, extending up to the Southern Pacific railroad tracks (see Figure 2).

Other sites include 41HR885, an early-to mid-twentieth-century trash dump located just north of Woodway Drive and identified by Moore Archeological Consulting (MAC) during their archaeological assessment survey of Memorial Park in 2001 (Moore and Sanchez 2002). The site sits on the edge of the tributary of Buffalo Bayou that crosses into the northwest corner of HANC. Materials recovered from the site included glass bottle fragments, colorless window pane fragments, electrical insulators, slag, bone, and several pieces of wire located in a dark, ashy matrix.

The closest identified prehistoric archaeological site is 41HR617, situated on the west side of the Interstate 610 West Loop on the bank of Buffalo Bayou. This site consisted of several pieces of prehistoric debitage and Late Archaic projectile points identified by an amateur archaeologist in 1939 and reported in 1988. A revisit of the site area by professional archaeologists in 2010 could not identify the previously recorded site at the currently marked location, but suggested the site was elsewhere within Memorial Park (Molineu et al. 2010:13). Testing in the site vicinity also noted a number of historic period features, including a brick kiln and trash midden, both of which appeared to be associated with mid-to late-nineteenth-century occupation of the area along the banks of Buffalo Bayou (Molineu et al. 2010:19).

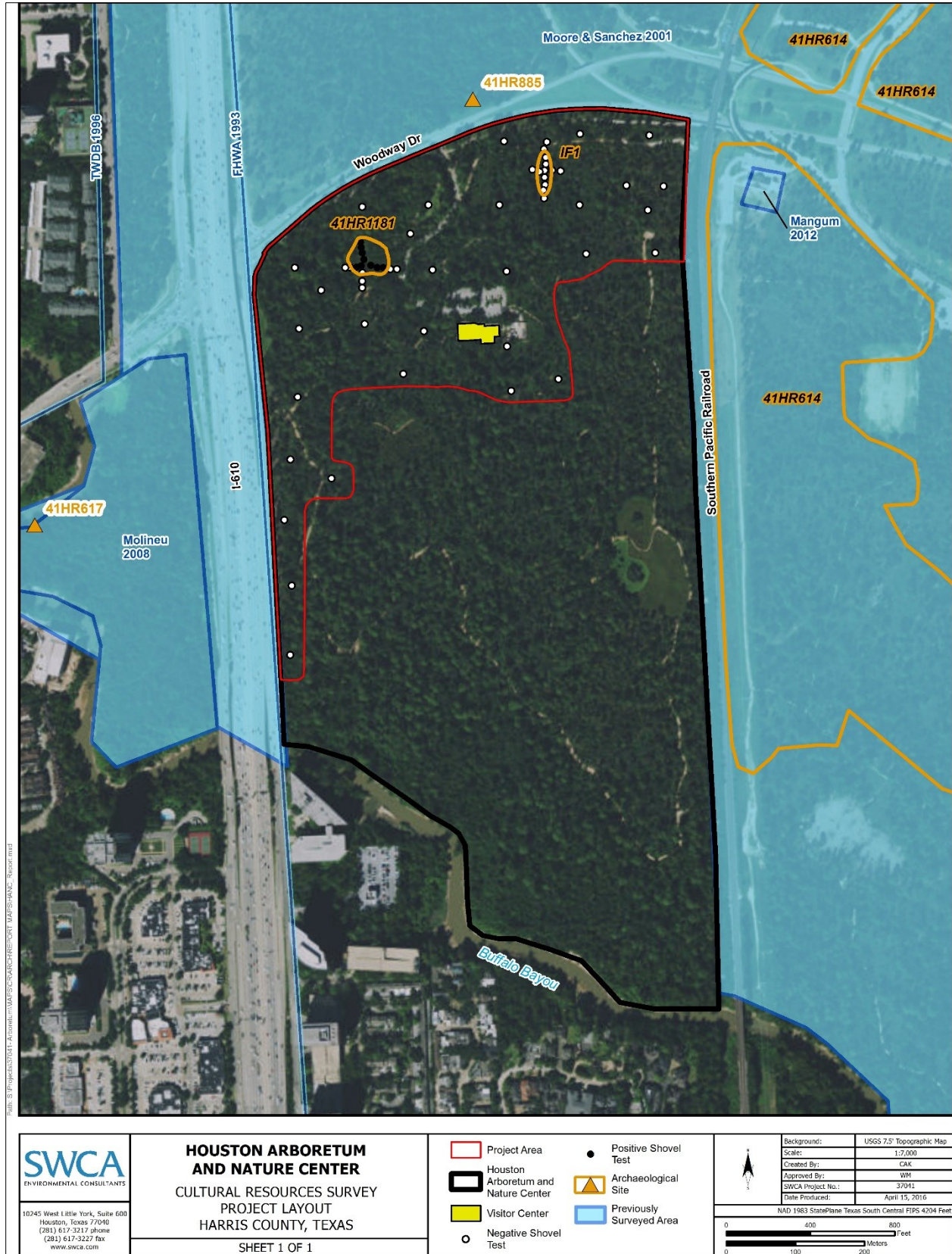


Figure 2. Cultural resources investigations within the Houston Arboretum & Nature Center.

Site 41HR791 is described as a very low-density lithic scatter overlooking the south side of Buffalo Bayou. Cultural materials recovered from the site included two pieces of lithic debitage. The investigating agency recommended that the site was not eligible for inclusion on the NRHP; however, since their investigation was limited to a City of Houston easement, the research potential for the entire site was unknown (TASA 2016).

Site 41HR1158 is described as a prehistoric open campsite situated on the south bank of Buffalo Bayou within the boundaries of a modern golf course. Cultural materials recovered from the site included large quantities of oyster shell, numerous lithic cores, a few lithic flakes, and a single utilized lithic flake. However, as a result of modification activities associated with the golf course over the past several decades, the site has been heavily disturbed and according to the recorders is almost entirely out of context. Therefore, the investigating agency recommended that future research potential for the site was very low and not eligible for listing in the NRHP (TASA 2016).

Table 3. Cultural resources located within 1 mile of the proposed project area.

Site No./ Name	Distance (mile)	Type	Time Period	Site Type	Recommendation
41HR885	0.03	Historic	1920-1960	Historic Dump	Further work*
Wiess Stables	0.46	Historic	1930-1931	Historic Stables	None recorded*
41HR614	0.01	Historic	1917-1919	Camp Logan: WWI Training Facilities	SAL
Bayou Club	0.23	Historic	1938-1940	Louisiana Creole Style Country Club Facility	None recorded*
41HR1158	0.93	Prehistoric	Undefined Prehistoric	Shell Midden	Not eligible*
41HR791	0.79	Prehistoric	Undefined Prehistoric	Lithic Scatter	SAL eligible*; Monitoring*
Parten House	0.81	Historic	1939-1940	Art Moderne Residential	None recorded
Meachum & Mellinger House	1.00	Historic	1931	Colonial Revival Residential	NRHP Listed
41HR617	0.22	Prehistoric	Late Archaic	Lithic Scatter	SAL eligible*
Barthème House	0.50	Historic	1941	Art Moderne Residential	None recorded
Morse-Bragg Cemetery	0.51	Historic	1957-1932	Historic Cemetery with 40+ interments	None recorded
St. Martin's Episcopal	0.70	Historic	1975-present	Cemetery with ~200 interments	None recorded

*As evaluated by the individual reporting the site details, as opposed to a formal eligibility evaluation from the THC. Pertains to evaluated portion of site within a previous project area. Any portion of the site outside of that project area remains unevaluated.

Other historic period occupations in the area are represented in a number of extant historic structures and cemeteries in the vicinity. Most of the historic structures date to the 1930s and 1940s and are generally associated with the elite residences of River Oaks or estates and country clubs along Buffalo Bayou. One home, the Marguerite Meachum and John S. Mellinger House, was designed by noted architect John Staub in 1930. The house is a white brick Colonial Revival home that has been listed on the NRHP (Fox 2007; TASA 2016).

A review of historic maps and aerial photographs of the project area dating back to at least 1915 suggest that the HANC area was only marginally utilized during the twentieth century, and likely has never been intensively occupied. A 1915 topographic map shows only the Southern Pacific railroad line (then identified as the Galveston, Harrisburg, and San Antonio's Eureka Cutoff), along with possible pimple mounds on the upland areas away from Buffalo Bayou. The nearest structure at that time was situated approximately 0.15 miles west of the project area, on the far side of the Interstate 610 West Loop (USGS 1915). A hand-drawn map of the facilities at Camp Logan does not show any structures within the HANC, either (Aulbach et al. 2012:76). However, a 1922 topographic map does appear to show a structure located within the HANC, approximately 120 m south-southwest of the present day location of the Visitors Center, and outside the project area (USGS 1922). This structure is not present in 1944 aerial photographs of the area or 1946 topographic maps, though the structure on the far side of Interstate 610 West Loop remains (Google Earth 2016; USGS 1946). It would not be until 1968 and the construction of the Visitor Center that the built environment of the HANC would change.

FIELD INVESTIGATIONS

Field Methods

Archaeological investigations of the project area were designed to be of sufficient intensity to determine the nature, extent, and if possible, significance of any cultural resources located within the project area. An intensive pedestrian survey with systematic shovel testing was conducted within the project area. In addition, an SWCA architectural historian conducted an architectural evaluation of the HANC.

During the survey, a team of archaeologists walked the proposed project area inspecting the ground surface for artifacts and anomalies that may indicate subsurface cultural deposits. Subsurface explorations consisted of shovel tests placed systematically throughout the project area at a distribution of 1 shovel test per 2 acres, and at any landforms suspected of having archaeological potential, including areas of dramatic elevation change or suspected pimple mounds, in keeping with the archaeological probability model for Memorial Park provided by Moore and Sanchez (2002). The intensity of the subsurface investigations complied with THC survey standards and was commensurate with the proposed depth of ground disturbance.

Individual 30-cm-diameter shovel tests were excavated until culturally sterile clay, water table, or 100 cmbs was reached. The excavated matrix was screened through ¼-inch hardware mesh to retrieve any cultural materials that were present. The data from each shovel test was recorded on standardized shovel test forms and the location of each test was plotted with a handheld global positioning system (GPS) unit. As geoarchaeological assessments of the project area indicated that the project area had no potential for deeply buried cultural deposits; deep testing below 100 cmbs was not conducted.

During background review of the HANC, SWCA architectural historians noted that the Visitor Center, previously known as the Aline McAshan Botanical Hall for Children, was constructed in 1967/1968, meaning that it could be a potential historical resource prior to the completion of the proposed improvements. For this reason, an architectural historian visited the Visitor Center and conducted an architectural evaluation of the interior and exterior of the structure, as well as conducted additional background research on the architect, Hugo Victor Neuhaus, Jr.

Results of Field Investigations

The intensive survey was conducted throughout the entirety of the project area. In compliance with THC standards, a total of 26 shovel tests were excavated on a grid throughout the project area, and an additional 5 judgmental shovel tests were placed on areas with a higher potential for cultural resources, such as

possible pimple mounds and on the terrace edge overlooking the unnamed tributary of Buffalo Bayou (Figure 2). One transect shovel test was positive for cultural materials and one surface find was identified, resulting in the excavation of 28 additional delineation shovel tests. The results for all shovel tests are recorded in Appendix A.

During the current investigation, SWCA identified one new historic archaeological site (41HR1181) and one brick scatter without associated debris that has been identified as Isolated Find 1. Discussion of the investigations at these locations, along with a description of the Houston Arboretum Visitor Center, follow below.

Site 41HR1181 (Temporary Site 1)

Site 41HR1181 is a historic artifact scatter situated approximately 0.15 mile east of the intersection of Woodway Drive and the Interstate 610 West Loop in central Harris County, Texas. SWCA identified the site on March 22, 2016, and it was subsequently investigated and delineated on March 23, 2016.

Site 41HR1181 is situated on the upper terrace and slopes adjacent to an unnamed tributary of Buffalo Bayou, which lies approximately 50 m to the northwest. Vegetation throughout the site area consists of mixed hardwoods (Figure 3). The site area is crossed by at least two graveled hiking paths. A substantial section of the northern path includes a wooded walkway set into concrete foundations. To the east, the site approaches the asphalt driveway associated with the Visitor Center and parking lots. A now-abandoned wooden viewing deck is also situated just to the northeast of the site.



Figure 3. General overview of site 41HR1181, view facing east.

Site 41HR1181 was initially identified during surface survey of the project area, and the site boundaries were initially defined by the surface scatter of historic artifacts. Archaeological investigation of site

41HR1181 included systematic surface survey and subsurface shovel testing. Ground surface visibility was approximately 10 percent throughout the site. Shovel tests were placed within a single cruciform running at cardinal directions with shovel tests at 10-m intervals.

A total of 16 shovel tests were excavated to delineate the site; nine of which contained cultural material. A typical shovel test was excavated to a depth of approximately 40 to 60 cmbs and exhibited three strata in profile. Stratum I consisted of a layer of black (10YR 2/1) sandy loam to a depth of approximately 20 cmbs. Stratum II consisted of a dark grayish brown (10YR 4/2) sandy loam to a depth of approximately 30 cmbs. Stratum III consisted of brownish yellow (10YR 6/8) sandy clay subsoil. Shovel tests on the upper surface of the terrace more often encountered this shallow subsoil, while tests on the slope often were excavated to deeper depths of up to 100 cmbs.

A total of 430 artifacts were observed at site 41HR1181. Artifacts observed include 116 pieces of glass, 99 brick fragments, 13 ceramic sherds, 26 pieces of slag, 110 pieces of unidentified metal, 3 pieces of oyster shell, 1 bone fragment, 3 ceramic insulators, and 59 wire nails (Figure 4). Diagnostic artifacts include a mold-blown colorless glass Tabasco sauce bottle, dating to between 1909 and 1930 (Orser and Babson 1990), a solarized amethyst glass jar base dating to the first quarter of the twentieth century (Lockhart 2006), a milk glass canning lid dating to between 1871 and 1950 (Glassbottlemarks 2013), a milk glass MacLaren's Imperial Cheese container likely dating between 1892 and the early twentieth century (Badgley 1998), an unidentified colorless glass jar with an embossed date of July 21, 1908, and an aqua glass bottle fragment from the Potthoff Union Bottle works of Houston dating to the first quarter of the twentieth century (Allen 1915; Polk 1920) along with machine-made bottles and soda bottles with crown cap finishes, both dating to after 1905 (Lindsey 2010).

Artifacts were recovered at depths of up to 100 cmbs, although most shovel tests did not extend to that depth. Subsurface deposits account for the majority of recorded artifacts (n=228, 53 percent), with the majority of those artifacts occurring at depths less than 20 cmbs (n=164). Only 25 artifacts were recovered at depths below 40 cmbs. A near majority of the artifacts on the site were recorded at the surface (n=202, 47 percent), although controlled documentation of the surface scatter was only conducted within a 5-m radius of each shovel test. Total surface expression is likely much higher than the recorded 202 artifacts.

Artifacts were not distributed equally throughout the site area. Surface artifacts clustered along the slope of the ravine, while the upper portion of the terrace often had a relatively sparse distribution of artifacts. No historic features were identified. Two rows of concrete footings with imbedded wooden posts were initially identified as possible structure foundations; however, these were shown to align well with an older, abandoned path that crossed the eastern portion of the site, suggesting that these concrete foundations were likely supports for an earlier boardwalk slightly north of the existing boardwalk.

The presence of copious amounts of potentially historic, stamped HOUSTON bricks also suggested the possibility of former structures that may have been demolished. However, several other locations on the HANC property included small scatters of un-mortared brick, both historic and modern, that appear to have been placed within small drainages for erosion control purposes. Other areas of ad-hoc erosion control architecture were identified along the unnamed tributary of Buffalo Bayou, including an area of concrete rubble rip-rap placed within the site boundary, which may explain the presence of the large quantities of brick on site 41HR1181.

Site 41HR1181 is generally oval in shape and measures approximately 35 m north-south by 55 m east-west. The site has been disturbed by erosion along the hill slope, construction of several walking paths along the edge of the terrace, as well as a construction of a wooden deck on the east side of the site.

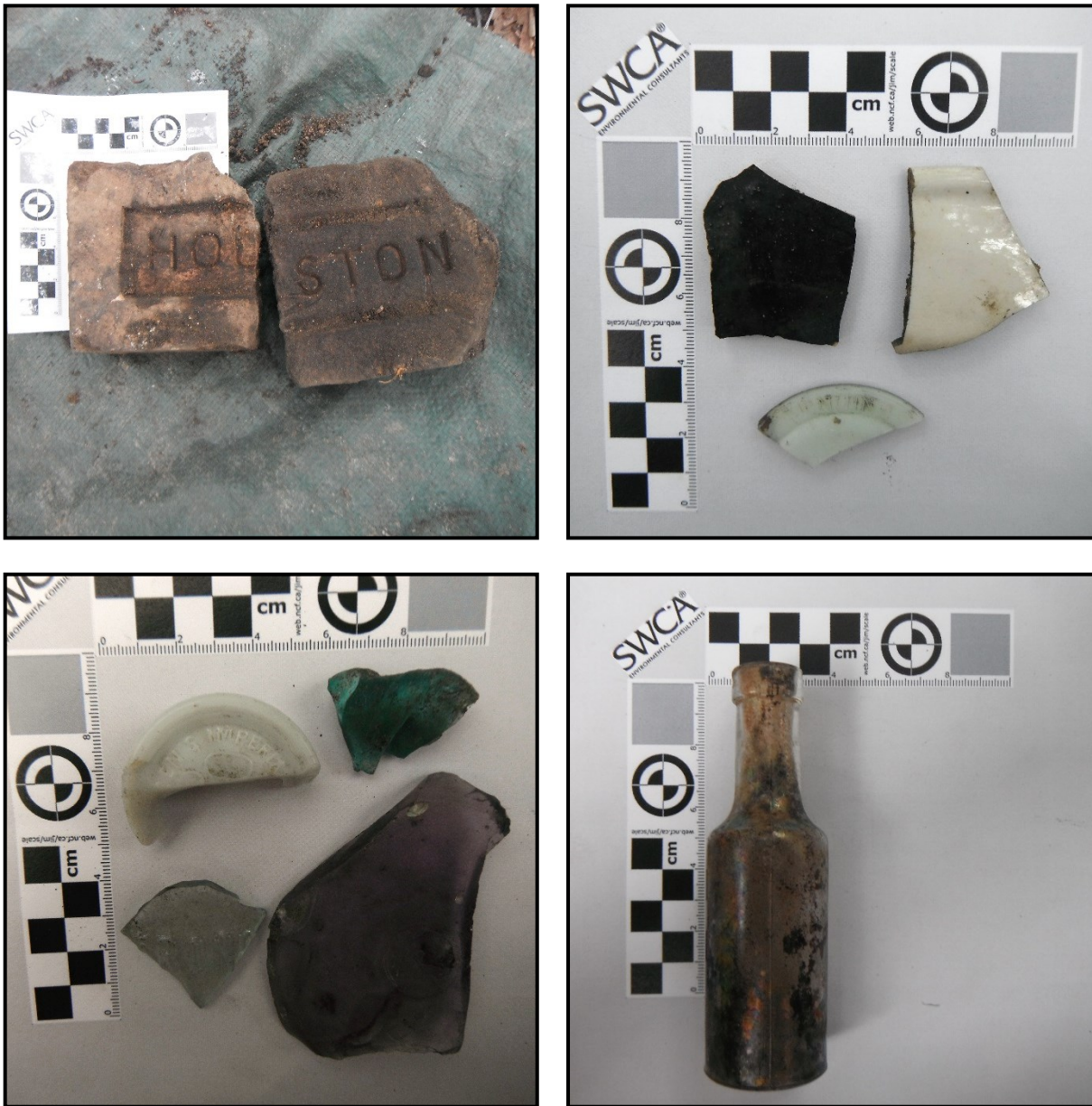


Figure 4. Representative artifacts from site 41HR1181.

In sum, site 41HR1181 is a historic artifact scatter likely dating to the early twentieth century. The site appears to represent the remains of a small historic dump. Similar sites have been identified nearby on the slopes of the unnamed tributary of Buffalo Bayou (see 41HR885). Like site 41HR885, this site appears to lack any evidence of intact features or constructed elements associated with permanent occupation (. Artifacts appear to come from both domestic and industrial contexts, and likely represent the remains of several different dumping events. The location of the site along the edge of a steep slope, along with recent construction of recreation paths have impacted the integrity of the site. This disturbance, along with the lack of features or intact architecture, suggest that the site is unlikely to yield archaeological data furthering the understanding of local or regional history. During the time period the site was utilized, the site was leased to a number of timber companies and was briefly included within the area leased to the U.S. Army for Camp Logan (Aulbach 2012:81). However, neither occupation led to significant use of the HANC area;

Camp Logan's main activity area was located on the east side of the Southern Pacific railway line (Aulbach et al. 2014:76). As such, the archaeological remains at 41HR1181 lack an integrity of association with Camp Logan or any other known historic individuals. Therefore, site 41HR1181 is recommended NOT ELIGIBLE for the NRHP (36 Code of Federal Regulations [CFR] 60.4 [a-d]) or to be officially designated as a SAL (13 Texas Administrative Code 26.10) and no further work at this location is recommended.

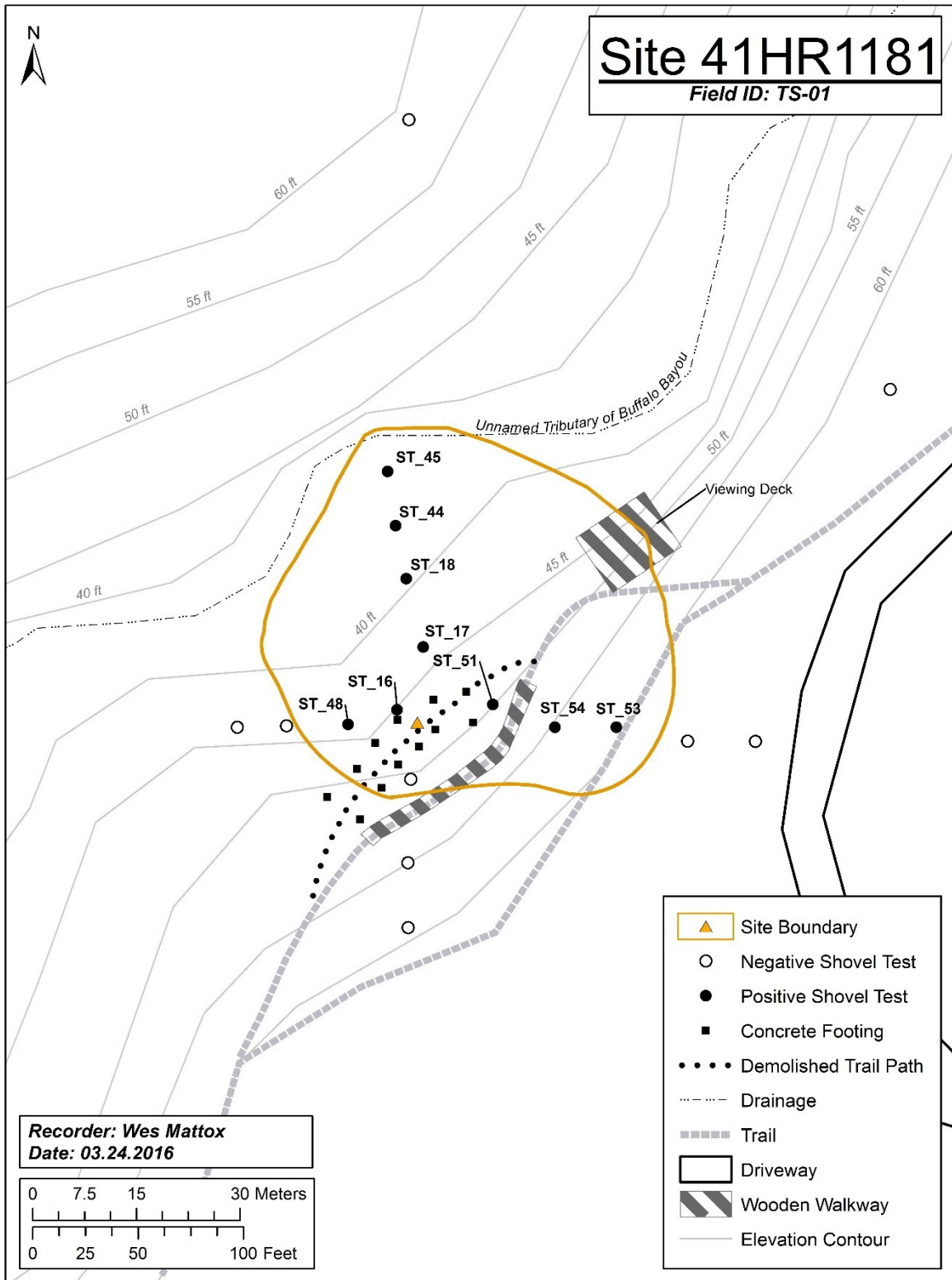


Figure 5. Sketch map of site 41HR1141.

Isolated Find 1 (Temporary Site 2)

Isolated Find 1 is a historic brick scatter located approximately 0.3 miles east of the intersection of Woodway Drive and the Interstate 610 West Loop in central Harris County, Texas. SWCA identified the site on March 22, 2016, and it was subsequently investigated and delineated on March 23, 2016. The locus is situated on an upland plain and is surrounded by oaks, pine, and small pocket wetlands (Figure 6).



Figure 6. General environmental photograph of Isolated Find 1, view facing south.

Archaeological investigation of Isolated Find 1 included systematic surface survey and subsurface shovel testing. Ground surface visibility was approximately 10 percent throughout the locus. Shovel tests were placed within a single cruciform running at cardinal directions with shovel tests at 10-m intervals.

The cultural materials at Isolated Find 1 were initially identified through pedestrian surface survey. A total of 13 shovel tests were excavated to delineate the locus; all were negative for cultural materials. A typical shovel test was excavated to a depth of 40 cmbs and exhibited two strata in profile. Stratum I consisted of dark grayish brown (10YR 4/2) sandy clay loam at depths of approximately 0 to 20 cmbs. Stratum II consisted of gray (10YR 6/1) sandy basal clay with copious yellow (10YR 7/8) mottles. Tests terminated at this clay, or at the water table.

The only cultural materials observed at Isolated Find 1 consisted of a scatter of mortared brick. Portions of the scatter consisted of large clumps of brick and concrete mortar, while other areas consisted of low piles of isolated brick. No brick fragments or other artifacts were recovered below the surface.

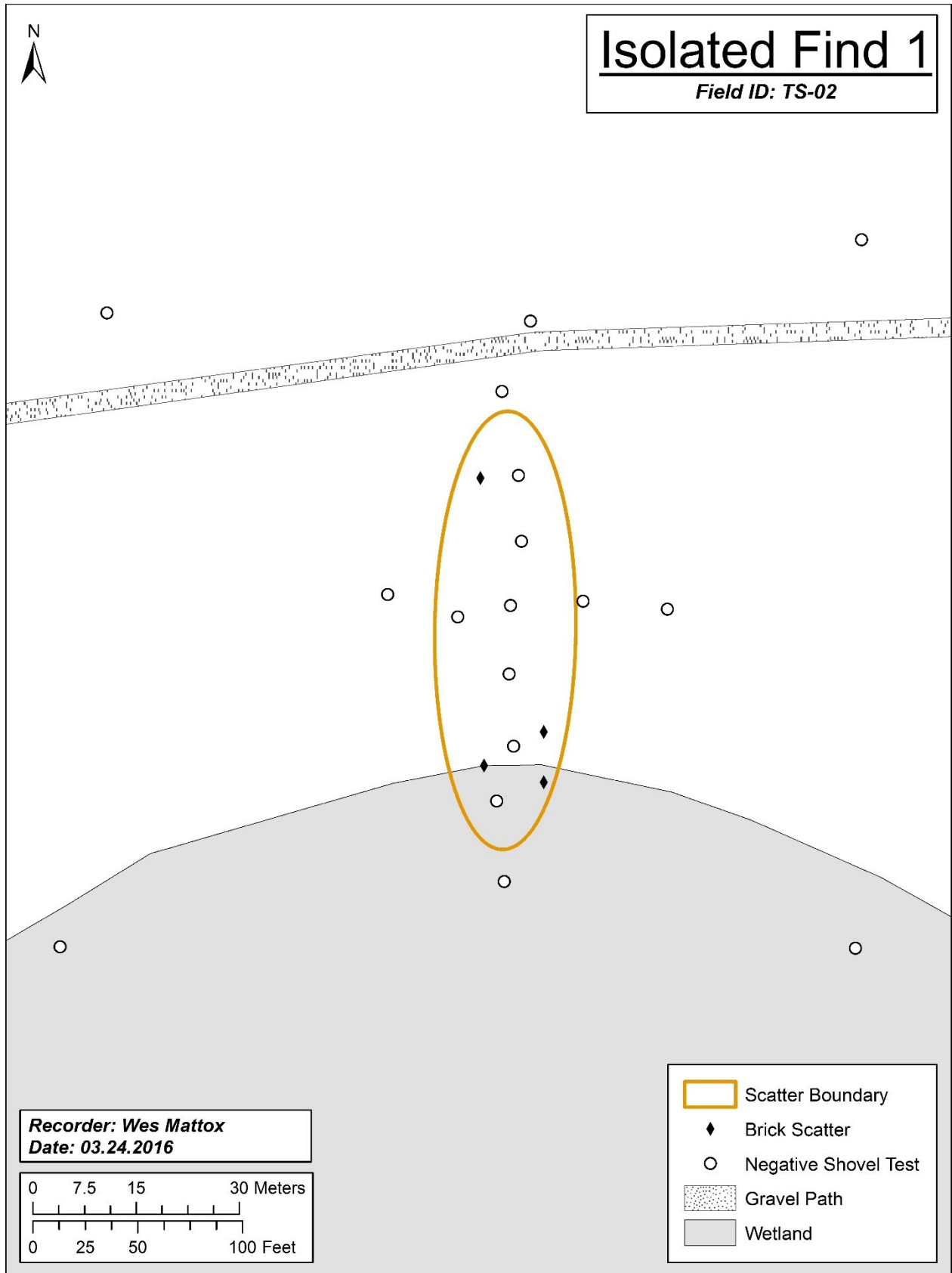


Figure 7. Sketch map of Isolated Find 1.

Isolated Find 1 is generally oval in shape and measures approximately 40 m north-south by 10 m east-west. A gravel path dirt road cuts across the northern portion of the site, and the site is bounded to the south by a small pocket wetland. The overall fragmented nature of the brick and mortar suggests that the site has been disturbed by mechanical clearing.

Isolated Find 1 is a potentially historic brick scatter of unknown age or cultural affiliation. The site appears to be the remains of some type of structure, but the overall dispersed nature of the brick scatter, the lack of large sections of intact brick, the lack of accompanying cultural material, and the lack of subsurface artifacts or features prevents any interpretation of the nature of the site. Due to these factors, the area was found insufficient to be considered an archaeological site, and a trinomial was not requested. Based on these findings, Isolated Find 1 does not appear likely to provide additional information that could contribute to the understanding of the historic occupation of the area. As such, Isolated Find 1 is recommended NOT ELIGIBLE for the NRHP (36 CFR 60.4 [a-d]) or for official designation as a SAL (13 Texas Administrative Code 26.10) and no further work is recommended.

Visitor Center/Aline McAshan Botanical Hall for Children

The Visitor Center at the HANC, previously known as the Aline McAshan Botanical Hall for Children, is a 1-story structural concrete, steel, and glass building with brick cladding. It faces due north towards the parking area, and has a combination of flat and pitched roofs. The building is composed of two squares slightly offset from one another and connected by a steel and glass hyphen that contains the entrance. The westernmost square has concrete support columns, a flat roof, a wide cantilevered overhang, and large metal framed windows that infill the space between columns. The easternmost square is clad in brown brick with steel coping and storefront windows on the south façade only. The vast majority of windows are on the south and west elevations of both of the squares and face the hiking trails of the HANC.

The Visitor Center building sits on a concrete slab foundation, and appears to have been constructed in two, possibly three, phases. Each footprint has a different appearance—concrete, steel, and glass on the westernmost square and brick on the eastern. Both have wide overhanging eaves that extend over the main entrance in the hyphen. A glass side-gabled roof was added over the hyphen at an unknown date and extends along the east-west axis to connect the two square plan buildings physically and visually. The glass on the roof is tinted green to look like weathered copper and allows natural light into the interior space and creates a sense of additional volume. A concrete walkway measuring approximately 6 feet wide wraps around the entire building.

The westernmost square of the building has structural concrete columns and large, aluminum frame windows with screens that infill the space between each column (Figure 8). The roof is primarily flat with steel coping, cantilevers over the concrete walkway to provide protection from the elements. Part of the glass gable roof extends over the westernmost square, so the roof on the westernmost square is no longer entirely flat. The evenly spaced concrete columns, four per elevation, were poured with large exposed aggregate as part of the design and to blend with the natural setting. The window openings are divided evenly into six large panes in a three-over-three pattern. The north elevation of the western square contains a set of floor-to-ceiling double doors in the eastern-most panel of the window opening. An identical set of doors stands exactly opposite on the south elevation. The interior space is used primarily for offices.



Figure 8. Western square of the Visitor Center, facing northeast.

The eastern square of the building has a flat roof with steel coping and is clad in brown brick (Figure 9). Similarly, the roof cantilevers approximately 6 feet from the building plane on the northeast corner to provide additional coverage near the hyphen and the primary entrance. The cantilever also creates a visual link between the styles for the two squares. There are two central, fixed picture window openings, each 3 feet by 4 feet on the north elevation. The east elevation is brick laid up in a common bond with a soldier course at the base foundation level and has metal doors and metal rolling windows arranged in a random pattern. Mechanical equipment for the visitor's center is located along the eastern elevation. Along the south elevation, a covered walkway is supported by brick-clad columns rather than the cantilever used on the western square. The south elevation also has three sets of aluminum-frame storefront windows set back 3 feet from the building exterior. Each set contains one single door centered in the opening with 5 feet sidelights. The door and each sidelight has its own transom. The interior space is used primarily for classrooms, Americans with Disabilities Act (ADA)-compliant restrooms, and storage.



Figure 9. Eastern square of the Visitor Center, facing north.

The hyphen, constructed to connect the eastern and western squares, contains the building's primary entrance and serves as a pass-through for visitors accessing the trails behind the building (Figure 10). The hyphen has a glass pitched roof; it is the only part of the building without a flat roof. The 7 feet, 8 inch tall floor-to-ceiling window walls have a transom extending to the roof line. The hyphen serves as a physical and visual connection between the squares.



Figure 10. Hyphen and main entrance of the Visitor Center, facing south.

The Visitor Center building was designed by noted Houston architect Hugo Victor Neuhaus, Jr., one of Houston's earliest proponents of the ideas of modern architecture associated with architects Ludwig Mies van der Rohe and Philip Johnson (Fox 2010). Other noted buildings designed by Neuhaus include his own NRHP listed house, located in River Oaks, the Nina J. Cullinan House, and the McAllen State Bank Building (Todd 1987; National Park Service 2016). The Aline McAshan Botanical Hall for Children, as it was originally known, was constructed with funds donated by philanthropist Mrs. S.M. McAshan, Jr. in 1965 (Langworthy 1978). The structure was completed in 1968, while Neuhaus was partnered with another Meisian/Johnsonian architect, Burnley Magruder Wingfield, Jr. (Welch 2000; Todd 1987).

Since that time, the building has been altered, namely by the addition of the eastern square, the hyphen, and the subsequent gabled roof of the hyphen. The existence of double doors on the north and south elevations of the westernmost square indicates the square once stood alone, and the dramatic stylistic difference between the eastern and western squares further points to the eastern square's later construction date. The addition of a glass gabled roof to span both squares compromises the architectural integrity of the western square by creating an irreversible change to the original design.

The Visitor Center is a fair to good example of the modernist work of noted Houston architect Hugo Victor Neuhaus, Jr. It has been altered several times in order to accommodate changing needs and programming for the HANC. The building does not rise to the level required for NRHP eligibility under Criterion C. The building retains its integrity of location and setting yet alterations have compromised its integrity of design, materials, workmanship, feeling, and association. SWCA recommends the Visitor Center as NOT ELIGIBLE for listing in the NRHP (36 CFR 60.4 [a-d]) and thus may not be designated as a SAL (13 Texas Administrative Code 26.19) and no further work at this location is recommended.

SUMMARY AND RECOMMENDATIONS

On behalf of Design Workshop, Inc. and the HANC, SWCA conducted an intensive archaeological survey of the proposed HANC improvements in Harris County, Texas. The portion of the HANC to be affected by the proposed improvements consists of an approximately 55-acre area (project area) located in the northern third of the overall 155-acre HANC. Archaeological investigations were conducted in compliance with the Antiquities Code of Texas under Antiquities Permit No. 7592 and with guidelines set forth by the Texas Historical Commission (THC).

The background literature review revealed that no cultural resources surveys had been conducted within the boundaries of the project area, although 12 cultural resources surveys had been conducted within 1 mile of the project area. In addition, five archaeological sites (41HR614, 41HR617, 41HR791, 41HR885, and 41HR1158), five historic structures, and two cemeteries were found to be located within a 1-mile radius of the boundary of the HANC. Site 41HR614, representing the intact remains of a WWI training facility, Camp Logan, has been recorded as a State Antiquities Landmark, and site 41HR617, a prehistoric lithic scatter has been recorded as potentially eligible for State Antiquities Landmark designation. One historic structure, the Meachum and Mellinger House, has been listed on the National Register of Historic Places (NRHP).

During the field investigation, a team of two archaeologists examined only those portions of the HANC where construction activities were anticipated. In accordance with THC standards, SWCA excavated 59 shovel tests within the project area. One new historic archaeological site (41HR1181), representing an early twentieth-century historic dump, was identified and delineated. A second locus of scattered brick was also identified; however, the locus contained no other artifacts and appeared to be displaced. This locus was recorded as Isolated Find 1. In addition, an SWCA architectural historian completed an architectural evaluation of the Houston Arboretum Visitor Center, a potentially historic structure designed by noted Houston architect Hugo Victor Neuhaus, Jr., that has been significantly modified in the past.

In accordance with the Antiquities Code of Texas, SWCA has made a reasonable and good faith effort to identify significant cultural resources within the project area. No properties listed or otherwise eligible for listing in the NRHP, or for eligible for official designation as a State Antiquities Landmark, were identified within the project area. Consequently, SWCA recommends no further archaeological investigation, and that the project be allowed to proceed.

REFERENCES

Abbott, James T.

- 2001 *Houston Area Geoarcheology: A Framework for Archeological Investigation, Interpretation, and Cultural Resource Management in the Houston Highway District*. Archaeology Studies Program Report 27, Environmental Affairs Division, Texas Department of Transportation.

Aiuvalasit, Michael J.

- 2007 The Geoarcheology of the McNeill Ranch Site: Implications for Paleoindian Studies of the Gulf Coastal Plain of Texas. *Bulletin of the Texas Archeological Society* 78:47-64.

Allen, R. D.

- 1915 Texas Bottler's Association Convention. *Southern Pharmaceutical Journal* 7: 338-341.

Aten, Lawrence E.

- 1983 *Indians of the Upper Texas Coast*. New World Archaeological Record, Academic Press, New York.

Aulbach, Louis F.

- 2012 *Buffalo Bayou: An Echo of Houston' Wilderness Beginnings*. Louis F. Aulbach, Publisher. Houston, Texas.

Aulbach, Louis F., Linda C. Gorski, and Robbie Morin

- 2014 *Camp Logan: Houston, Texas 1917-1919*. Louis F. Aulbach, Publisher. Houston, Texas.

Badgley, Kerry

- 1998 MacLaren, Alexander Ferguson. *Dictionary of Canadian Biography*. Vol 14. University of Toronto/ Université Laval. Available at http://www.biographi.ca/en/bio/mac_laren_alexander_ferguson_14E.html. Accessed April 2016.

Barnes, Virgil E.

- 1982 *Geologic Atlas of Texas, Houston Sheet*. Bureau of Economic Geology, The University of Texas at Austin.

Blair, W. Frank

- 1950 Biotic Provinces of Texas. *Texas Journal of Science* 2 (1):93-117.

Bousman, C. Britt, Barry W. Baker, and Anne C. Kerr

- 2004 Paleoindian Archeology in Texas. In *The Prehistory of Texas*, edited by T. K. Perttula, pp. 15-97. Texas A&M University, Anthropology Series Number 9. Texas A&M University Press, College Station.

Britton, Karen Gerhardt, Fred C. Elliot, and E. A. Miller

- 2010 Cotton Culture. *Handbook of Texas Online*. Texas State Historical Association. Available at: <http://www.tshaonline.org/handbook/online/articles/afc03>. Accessed April 2016.

Brown, Kenneth

- 2009 McFaddin Beach. *Texas Beyond History*. Available at: <http://www.texasbeyondhistory.net/mcfaddin>. Accessed April 2016.

Bull, J., and J. Farrand, Jr.

- 1977 The Audubon Society Field Guide to North American Birds: Eastern Region. Fourth Edition. Alfred A. Knopf, New York.

Campbell, Randolph B.

- 2013 Slavery. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://www.tshaonline.org/handbook/online/articles/yps01>. Accessed April 2016.

Carlson, Shawn B., and James E. Corbin

- 1999 Mission Dolores Revisited. *Bulletin of the Texas Archeological Society* 70: 49-57.

Conant, R., and J. T. Collins

- 1998 *Peterson Field Guides: Reptiles and Amphibians Eastern and Central North America*. Third Edition. Houghton Mifflin Company, Boston and New York.

Crook, Wilson W., III, (editor)

- 2016 *Timber Fawn (41HR1165): A Clovis Site in Harris County, Texas*. Report No. 26. Houston Archeological Society. Houston, Texas.

Dickens, Dylan, Rachel George, Chynna Foucek, Christian, Hauser, Lauren Howe-Kerr, Jake Krauss, Aryn Neurock, Kevin Pisters, and Betsy Wittenmeyr

- 2015 Finding the 370th: The Archaeology of a World War I Training Camp in Houston Texas. Poster presented at the 86th Annual Meeting of the Texas Archeological Society, Houston, Texas.

De León, Arnolando

- 2010 Mexican Texas. *Handbook of Texas Online*. Texas State Historical Association. Available at: <http://www.tshaonline.org/handbook/online/articles/fho73>. Accessed April, 2016.

Dunbar James S. and S. David Webb.

- 1996 Bone and Ivory Tools from Submerged Paleoindian Sites in Florida. In: *The Paleoindian and Early Archaic Southeast*. Edited by David G. Anderson and Kenneth E. Sassaman, pp. 331-353. University of Alabama Press, University of Alabama, Tuscaloosa.

Fox, Stephen

- 2007 *The Country Houses of John F. Staub*. Texas A&M UP, College Station, Texas.
- 2010 Neuhaus, Hugo Victor, Jr. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://tshaonline.org/handbook/online/articles/fne43>. Accessed April 2016.

Glassbottlemarks

- 2013 *Boyd's Genuine Porcelain Lined Cap*. GlassBottleMarks. Available at: <http://www.glassbottlemarks.com/boyds-genuine-porcelain-lined-cap/>. Accessed March 2016.

Google Earth

2016 Historical Imagery. -95.452166, 29.763144, Google Earth 2016, Accessed April, 2016

Griffith, Glen, Sandy Bryce, James Omernik, and Anne Rogers

2007 *Ecoregions of Texas*. Project report to Texas Commission on Environmental Quality, Austin.

Henderson, Mary Virginia

1928 Minor Empresario Contracts for the Colonization of Texas, 1825-1834. *The Southwestern Historical Quarterly* 31-32(4 and 1): 295–324 and 1–28.

Henson, Margaret Swett

2010 Harris County. *Handbook of Texas Online*. Texas State Historical Association. Available at: <http://www.tshaonline.org/handbook/online/articles/hch07>. Accessed April 2016.

Hester, Thomas R.

1999 Artifacts, Archaeology, and Cabeza de Vaca in Southern Texas and Northeastern Mexico. *Bulletin of the Texas Archeological Society* 70: 17–28.

Houston Arboretum and Nature Center (HANC)

2016 *Houston Arboretum and Nature Center Master Plan*. Available at: <http://houstonarboretum.org/support/master-plan/>. Accessed March 2016.

Hudson, Charles M.

1997 *Knights of Spain, Warriors of the Sun: Hernando de Soto and the South's Ancient Chiefdoms*. University of Georgia Press, Athens.

Kricher, J., and G. Morrison

1998 *Peterson Field Guides: A Field Guide to Eastern Forests North America*. Houghton Mifflin Company, Boston.

Langworthy, David

1978 ...The Arboretum is Tree-mendous. *Houston Chronicle*. 25 October: Weekend Preview 8-9. Houston, Texas.

Lindsey, Bill

2010 Bottle Dating. *Historic Glass Bottle Identification and Information Website*. Available at <http://www.sha.org/bottle/dating.htm>. Accessed March 2016.

Lockhart, Bill

2006 The Color Purple: Dating Solarized Amethyst Container Glass. *Historical Archaeology* 40(2): 45-57.

Mangum, Douglas G.

2012 *An Archeological Investigation of the Proposed Memorial Park Running Center, Harris County, Texas*. Texas Antiquities Permit 6253. Moore Archeological Consulting, Inc. Report of Investigations No. 609. Houston, Texas.

McComb, David G.

- 1969 *Houston: The Bayou City*. University of Texas Press, Austin, Texas.
- 2010 Houston, TX. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://tshaonline.org/handbook/online/articles/hdh03>. Accessed April 2016.

Moore, Roger G. William E. Moore, and David S. Pettus

- 1989 *An Archeological Survey of Nine Land Units within Memorial Park in Houston, Harris County, Texas*. Moore Archeological Consulting. Report of Investigations No. 24. Houston, Texas.

Moore, Roger G., and Joseph M. Sanchez

- 2002 *An Archeological Assessment of Portions of the City of Houston Memorial Park, Harris County, Texas*. Texas Antiquities Permit 2695. Moore Archeological Consulting, Inc. Report of Investigations No. 306. Houston, Texas.

Molineu, Douglas H., Joseph M. Sanchez, Curtis Dusek, Mark Lozano, Mark B. Wagner, Carol Bookout, and Janet K. Wagner

- 2010 *Archery Range, Memorial Park, City of Houston Parks Department, Houston, Harris County, Texas*. Texas Antiquities Permit 5072. J.K. Wagner & Company, Inc., Houston, Texas.

Moneyhon, Carl H.

- 2010 Reconstruction. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://tshaonline.org/handbook/online/articles/mzr01>. Accessed April 2016.

Nance, Joseph Milton

- 2010 Republic of Texas. *Handbook of Texas Online*. Texas State Historical Association. Available at: <http://www.tshaonline.org/handbook/online/articles/mzr02>. Accessed April 2016.

Nash, Sean R., James Hughey, and Elizabeth Spalding

- 2015 Intensive Archaeological Survey of a 1.3-mile Segment of Buffalo Bayou in Harris County, Texas for HCFCD Project ID W100-00-00-X043. Texas Antiquities Permit 6003. HRA Gray and Pape, LLC., Houston, Texas.

National Park Service

- 2016 *National Register of Historic Places*. National Park Service, U.S. Department of the Interior. Available at: <http://www.nps.gov/nr/>. Accessed April 2016.

Natural Resources Conservation Service (NRCS)

- 2016 Official Soil Series Descriptions. Natural Resources Conservation Service, U.S. Department of Agriculture. Available at: <http://soils.usda.gov/technical/classification/osd/index.html>. Accessed March 2016.

Newcomb, William W., Jr.

- 1961 *The Indians of Texas*. University of Texas Press, Austin.

- 2004 Atakapans and Neighboring Groups. In *Southeast*, edited by R.D. Fogelson, pp. 659–663. Handbook of North American Indians, Vol. 14, W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.
- Orser, Charles E., Jr., and David W. Babson
- 1990 Tabasco Brand Pepper Sauce Bottles from Avery Island, Louisiana. *Historical Archaeology*. 24(3): 106-115.
- Perttula, Timothy K.
- 2004a An Introduction to Texas Prehistoric Archaeology. In *The Prehistory of Texas*. Edited by T. K. Perttula, pp. 5-14. Texas A&M University, Anthropology Series Number 9. Texas A&M University Press, College Station.
- Perttula, Timothy K. (Editor)
- 2004b *The Prehistory of Texas*. Texas A&M University, Anthropology Series Number 9. Texas A&M University Press, College Station.
- Polk, R. L.
- 1920 *Houston City Directory*. Mourrison & Fourmy Directory Co. Houston, Texas.
- Ricklis, Robert A.
- 1994 *Archaeology at the Mitchell Ridge Site, 41GV66, Galveston Island*. Coastal Archaeological Research, Inc. Corpus Christi.
- 1996 *The Karankawa Indians of Texas*. University of Texas Press, Austin.
- 1999 The Spanish Colonial Missions of Espiritu Santo (41GD1) and Nuestra Señora del Rosario (41GD2), Goliad, Texas: Exploring Patterns of Ethnicity, Interaction, and Acculturation. *Bulletin of the Texas Archeological Society* 70: 133–168.
- 2004 The Archeology of the Native American Occupation of Southeast Texas. In *The Prehistory of Texas*, edited by T.K. Perttula, pp. 181-204. Texas A&M University, Anthropology Series Number 9. Texas A&M University Press, College Station.
- Sibley, Marilyn
- 2010 Houston Ship Channel. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://www.tshaonline.org/handbook/online/articles/rhh11>. Accessed April 2016.
- Story, Dee Ann
- 1990 Cultural History of the Native Americans. In *Archaeology and Bioarchaeology of the Gulf Coastal Plain*, edited by D.A. Story, J.A. Guy, B.A. Burnett, M.D. Freeman, J.C. Rose, D.G. Steele, B.W. Olive, and K.J. Reinhard, pp. 163–366. Research Series 38, Arkansas Archaeological Survey, Fayetteville.
- Sutton, A., and M. Sutton
- 1985 *The Audubon Society Nature Guides: Eastern Forests*. Alfred A. Knopf, Inc., New York.

Texas Archeological Sites Atlas (TASA)

- 2016 Texas Archeological Sites Atlas restricted database. Texas Historical Commission. Available at: <http://pedernales.thc.state.tx.us>. Accessed March 2016.

Todd, Anderson

- 1987 Hugo V. Neuhaus, Jr., 1915-1987. *Cite*. 19: 19-20.

Turner, Ellen Sue, Thomas R. Hester, and Richard L. McReynolds

- 2011 *Stone Artifacts of Texas Indians*. Third Edition. Taylor Trade Publishing, Lanham, Maryland.

Tuttle, Michael C.

- 2015 Recordation of a Submerged Archaeological Resource in Buffalo Bayou: Camp Logan Sonar Recordation in Harris County, Texas. Texas Antiquities Permit 6744. HRA Gray and Pape, LLC., Houston, Texas.

U.S. Geological Survey (USGS)

- 1915 Houston Heights 7.5 Minute Quadrangle. Map. 1:24000. United States Department of the Interior, Washington, D.C.
- 1922 Houston Heights 7.5 Minute Quadrangle. Map. 1:24000. United States Department of the Interior, Washington, D.C.
- 1946 Houston Heights 7.5 Minute Quadrangle. Map. 1:24000. United States Department of the Interior, Washington, D.C.

Walter, Tamara L.

- 1999 A Preliminary Report of the 1997 TAS Field School Excavations in Area A at the Mission Espiritu Santo de Zuniga (41VT11), Victoria County, Texas. *Bulletin of the Texas Archeological Society* 70: 97–122.

Werner, George C.

- 2010 Railroads. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://tshaonline.org/handbook/online/articles/eqr01>. Accessed April 2016.

Weddle, Robert S.

- 2010 La Salle's Texas Settlement. *Handbook of Texas Online*. Texas State Historical Association. Available at: <http://www.tshaonline.org/handbook/online/articles/uel07>. Accessed April 2016.

Welch, Frank D.

- 2000 *Philip Johnson and Texas*. University of Texas Press, Austin, Texas.

Williams, Stephen, and James B. Stoltman

- 1965 An Outline of Southeastern United States Prehistory with Particular Emphasis on the Paleoindian Era. In *The Quaternary of the United States*. Edited by H.E Wright and D.G. Frey, pp. 669–683. Princeton UP, Princeton.

Wooster, Ralph A.

2010 Civil War. *Handbook of Texas Online*. Texas State Historical Association. Available at: <https://tshaonline.org/handbook/online/articles/qdc02>. Accessed March 26, 2015.

APPENDIX A

Shovel Test Log

Archaeological Survey of Proposed Houston Arboretum & Nature Center Improvements, Harris County, Texas

Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
03/22/16	ST_16	1	0-45	P	10YR 2/1	clay loam	charcoal, 0-20cmbs = 20% brick fragments	on ridge near improved trail; no brush; low leaf litter; overlooking bayou tributary; dense historic scatter on surface of building debris; primarily poured concrete, brick, glass; levels gradation very slight; 20% GSV	depth	surface: 14 pc glass, 3 pc. Large brick fragments; 0-20: 8 pc. Colorless glass, 2 Houston brick fragments, ~ 30 nails in a rusted mass	TS_01 (41HR1181)	CK
03/22/16	ST_16	2	45-100	P	10YR 4/2	sandy clay loam	5% brick fragments		depth	40-60: 2 pc. Colorless glass, 1 ceramic insulator	TS_01 (41HR1181)	CK
03/22/16	ST_17	1	0-35	P	10YR 2/1	sandy clay loam		10m north of ST_16; dark, low compaction soil; root disturbances; 10% GSV	basal clay	surface: 22 pc. Glass, 18 brick fragments, 4 salt glazed ceramics, 10 pc. Slag; 0-20: 1 wire nail, 4 colorless glass, 1 ceramic insulator, 1 brick fragment	TS_01 (41HR1181)	CK
03/22/16	ST_17	2	35-45	N	10YR 4/2	sandy clay loam		highly oxidized iron soils; soils more saturated and thicker; evidence of redox	basal clay	NCM	TS_01 (41HR1181)	CK
03/22/16	ST_17	3	45-55	N	10YR 6/6	clay			basal clay	NCM	TS_01 (41HR1181)	CK
03/22/16	ST_18	1	0-30	P	10YR 2/1	sandy loam		slope running down to creek; open; 15-30% GSV	other: dense layer of rusted metal	surface: 18 pc. Glass, 16 brick fragments, 8 pc. Slag, 2 pc ceramics; 0-20: 1 colorless lamp glass, 1 UID metal; 20-40: 10 UID metal	TS_01 (41HR1181)	WM
03/22/16	ST_18	2	30-40	P	10YR 6/1	sandy clay			other: dense layer of rusted metal	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_44	1	0-45	P	7.5YR 2.5/1	loam		root disturbance throughout; 10% GSV	other: root impasse	surface: 2 pc. Glass, 9 brick fragments, 5 pc. Slag; 0-20: 8 large brick fragments, 2 pc. Bottle glass, 1 pc. Window glass, 1 fragment oyster shell, 1 UID metal fragment; 20-40: 1 brick fragment, 3 pc. Bottle glass, 1 UID bone fragment, 1 UID metal fragment	TS_01 (41HR1181)	CK
03/23/16	ST_44	2	45-55	N	10YR 4/1	clay loam			other: root impasse	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_45	1	0-25	N	7.5YR 2.5/1	clay loam		on edge of bayou drainage; concrete footings ~1m from test; 40% GSV	compact soil	surface: 2 pc. Slag	TS_01 (41HR1181)	CK
03/23/16	ST_45	2	25-55	N	10YR 5/2	clay			compact soil	NCM	TS_01 (41HR1181)	CK

Archaeological Survey of Proposed Houston Arboretum & Nature Center Improvements, Harris County, Texas

Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
03/23/16	ST_46	1	0-20	N	10YR 4/3	sandy loam		mixed hardwoods, hackberry; on edge of terrace overlooking ravine; 50cm north of boardwalk; 5% GSV	basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_46	2	20-30	N	10YR 6/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_47	1	0-20	N	10YR 4/3	sandy loam		mixed hardwoods, hackberry; on edge of terrace overlooking ravine; 8 m south of boardwalk; 5% GSV	basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_47	2	20-30	N	10YR 6/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_48	1	0-20	P	10YR 4/3	sandy loam		on back of small finger ridge; mixed hardwoods, hackberry; 15% GSV	basal clay	Surface: 14 pc glass, 3 pc. Salt-glazed ceramics, 2 UID metal, 5 brick fragments; 0-20: 5 UID metal fragments, 5 wire nails, 1 pc. Aqua glass bottle (photographed), 2 brick fragments, 1 pc. Slag; 1 pc. Bitumen, 2 oyster shell	TS_01 (41HR1181)	WM
03/23/16	ST_48	2	20-30	N	10YR 6/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_49	1	0-20	N	10YR 4/2	clay loam		on edge of slope just outside of site boundary	basal clay	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_49	2	20-35	N	10YR 6/6	clay			basal clay	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_50	1	0-10	N	10YR 4/2	sandy loam		on terrace; ~15m back from edge of ravine; mixed hardwoods; 5% GSV	basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_50	2	10-30	N	10YR 7/3	sandy loam			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_50	3	30-40	N	10YR 7/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_51	1	0-60	P	10YR 4/1	sandy loam		on terrace; halfway between new and old trails; mixed hardwoods; 5% GSV	depth	Surface: 8 brick, 9 glass, 1 whiteware; 0-20: 4 colorless glass, 1 earthenware, 1 plastic straw, 3 UID metal, 2 wire nails; 20-40: 10 wire nails, 2 colorless glass, 1 UID metal; 40-60: 1 brick fragment, 2 wire nails, 2 colorless glass, 3 UID metal	TS_01 (41HR1181)	WM

Archaeological Survey of Proposed Houston Arboretum & Nature Center Improvements, Harris County, Texas

Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
03/23/16	ST_51	2	60-100	P	10YR 6/4	sandy loam			depth	60-80: 1 oyster shell, 4 wire nails, 2 pc. tin foil, 1 copper wire, 1 pc. melted colorless glass, 2 brown glass, 3 colorless glass, 1 tabasco bottle (photographed); 80-100: 3 wire nails	TS_01 (41HR1181)	WM
03/23/16	ST_52	1	0-10	N	10YR 4/2	clay loam		on slope into bayou	basal clay	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_52	2	10-30	N	10YR 6/6	clay			basal clay	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_53	1	0-20	P	10YR 4/1	sandy loam		on terrace; mixed hardwoods; 5% GSV	basal clay	Surface: 16 brick fragments; 1 concrete post base, 1 ceramic insulator; 0-20 cmbs: 2 wire nails, 1 UID metal fragment	TS_01 (41HR1181)	WM
03/23/16	ST_53	2	20-30	N	10YR 7/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_54	1	0-25	P	10YR 4/1	sandy loam		mixed hardwoods on terrace; 85% GSV	basal clay	Surface: 1 pc glass, 2 pc. Whiteware, 8 brick fragments; 0-20: ~70 UID metal fragments, 1 brick fragment, 1 large chain and hook, 1 wire hoop; 20-25: 7 UID metal fragments	TS_01 (41HR1181)	WM
03/23/16	ST_54	2	25-30	N	10YR 8/2	sandy loam			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_54	3	30-35	N	10YR 7/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_55	1	0-25	N	10YR 4/3	clay loam		Between arboretum driveway and hiking trail; 5% GSV	basal clay	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_55	2	25-35	N	10YR 6/6	clay			basal clay	NCM	TS_01 (41HR1181)	CK
03/23/16	ST_56	1	0-20	N	10YR 4/3	sandy loam			basal clay	NCM	TS_01 (41HR1181)	WM
03/23/16	ST_56	2	20-30	N	10YR 6/8	sandy clay			basal clay	NCM	TS_01 (41HR1181)	WM
03/22/16	ST_23	1	0-30	N	10YR 6/3 w/ 30% 10YR 4/4	clay loam		briar and yaupon; seasonally inundated; crawfish nests; midway between two brick piles	water table	NCM	TS_02	WM
03/23/16	ST_32	1	0-10	N	10YR 5/3	sandy clay loam		area between brick concentrations; soil very dense	basal clay	NCM	TS_02	CK

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Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
								and mucky; no gravel inclusions; yaupon				
03/23/16	ST_32	2	10-30	N	10YR 7/3 w/ 10YR 6/6	clay			basal clay	NCM	TS_02	CK
03/23/16	ST_33	1	0-20	N	10YR 5/2 w/ 30% 10YR 3/3	clay loam		Willow and briars; lots of crawdad burrows; saturated soil; water at 10cmbs	water table	NCM	TS_02	WM
03/23/16	ST_34	1	0-20	N	10YR 5/2 w/ 30% 10YR 3/3	clay loam		Willow and briars; lots of crawdad burrows; saturated soil; water at 10cmbs	water table	NCM	TS_02	WM
03/23/16	ST_34	1	0-15	N	10YR 5/2	sandy clay loam		low brush; yaupon; cypress; low compaction; clay relatively dry compared to ST_32; no mottling	basal clay	NCM	TS_02	CK
03/23/16	ST_34	2	15-30	N	10YR 6/6	clay			basal clay	NCM	TS_02	CK
03/23/16	ST_35	1	0-15	N	10YR 4/2 w/ 10% 7.5YR 6/6	clay loam		slightly drier; yaupon and oak; most trees dead	compact soil	NCM	TS_02	WM
03/23/16	ST_35	2	15-40	N	10YR 5/1 w/ 10% 7.5YR 4/4	Clay			compact soil	NCM	TS_02	WM
03/23/16	ST_37	1	0-15	N	10YR 4/2 w/ 10% 7.5YR 6/6	fine sandy clay loam		slightly drier; yaupon and oak; most trees dead	basal clay	NCM	TS_02	WM
03/23/16	ST_37	2	15-40	N	10YR 6/1 w/ 40% 10YR 7/8	sandy clay			basal clay	NCM	TS_02	WM
03/23/16	ST_38	1	0-20	N	10YR 4/2	fine sandy loam		slightly drier; yaupon and oak; most trees dead; 1 m north of gravel trail	basal clay	NCM	TS_02	WM
03/23/16	ST_38	2	20-35	N	10YR 7/2 w/ 10% 10YR 7/8	fine sandy loam			basal clay	NCM	TS_02	WM
03/23/16	ST_38	3	35-40	N	10YR 7/2 w/ 10% 10YR 7/8	sandy clay			basal clay	NCM	TS_02	WM

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Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
					and 10% 5YR 4/6							
03/23/16	ST_39	1	0-10	N	10YR 5/2	sandy clay loam		low brush; felled tree debris; soil density/compaction increases with depth	basal clay	NCM	TS_02	CK
03/23/16	ST_39	2	10-30	N	10YR 7/3 w/ 10YR 6/6	clay		light redox	basal clay	NCM	TS_02	CK
03/23/16	ST_40	1	0-45	N	10YR 7/3	sandy clay loam		on small pimple mound feature; one brick on surface nearby; low compaction until level 2	basal clay	NCM	TS_02	CK
03/23/16	ST_40	2	45-55	N	10YR 6/6	clay			basal clay	NCM	TS_02	CK
03/23/16	ST_41	1	0-20	N	10YR 4/2	fine sandy loam		slightly drier; yaupon and oak; most trees dead; 1 m south of gravel trail	basal clay	NCM	TS_02	WM
03/23/16	ST_41	2	20-30	N	10YR 7/2 w/ 10% 10YR 7/8 and 10% 5YR 4/6	sandy clay			basal clay	NCM	TS_02	WM
03/23/16	ST_42	1	0-35	N	7.5YR 5/2 w/ 10% 10YR 4/4	silty clay		low area; seasonally inundated; yaupon and dead pine	compact soil	NCM	TS_02	CK
03/23/16	ST_43	1	0-30	N	10YR 5/2	clay loam		yaupon and dead pine	compact soil	NCM	TS_02	CK
03/23/16	ST_43	2	30-35	N	10YR 6/2 w/ 10% 10YR 4/4	clay		saturated; sticky	compact soil	NCM	TS_02	CK
03/22/16	ST_01	1	0-30	N	10YR 6/3 w/ 10YR 4/6	sandy clay loam		adjacent to nature center; saturated soil; heavy redox; probable wetland; cleared of vegetation	water table	NCM		CK
03/22/16	ST_02	1	0-10	N	10YR 5/1	loam		SE corner of survey area; pine and yaupon; nature trail 5m to west; 10% GSV	water table	NCM		WM
03/22/16	ST_02	2	10-35	N	10YR 6/3 w/ 10% 10YR 4/4	silty clay loam	10% roots		water table	NCM		WM

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Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
03/22/16	ST_03	1	0-30	N	10YR 6/1 w/ 7.5YR 5/6	sandy clay loam		off of improved trail; near felled tree; soil saturated; evidence of redox	water table	NCM		CK
03/22/16	ST_04	1	0-50	N	10YR 7/4 w/ 15% 10YR 6/6	silty clay loam		Judgmental test; south edge of property area; briar and oak; 0% GSV; sticky	compact soil	NCM		WM
03/22/16	ST_05	1	0-5	N	10YR 5/3	sandy loam		soils sandy; no gravel/inclusions; near drainage/ gravel walking trail; pine needle ground cover	basal clay	NCM		CK
03/22/16	ST_05	2	5-15	N	10YR 6/2	sandy clay loam			basal clay	NCM		CK
03/22/16	ST_05	3	15-40	N	10YR 6/6	sandy clay		more compact; gradually higher clay content	basal clay	NCM		CK
03/22/16	ST_06	1	0-33	N	10YR 5/1	clay loam		Better drained area; oak and pine; more open, less dense brush; 5% GSV	compact soil	NCM		WM
03/22/16	ST_06	2	33-38	N	10YR 6/3 w/ 40% 7.5YR 6/6	clay	1-2% small round gravel		compact soil	NCM		WM
03/22/16	ST_07	1	0-12	N	10YR 5/4	sandy clay loam		at fence line; pockets of dense brush around few trees	compact soil	NCM		CK
03/22/16	ST_07	2	12-35	N	10YR 6/2	sandy clay	iron inclusions	heavily compacted	compact soil	NCM		CK
03/22/16	ST_08	1	0-35	N	10YR 6/3	sandy loam		Pine and yaupon; 40m from the 610 feeder	basal clay	NCM		WM
03/22/16	ST_08	2	35-40	N	10YR 6/8	sandy clay			basal clay	NCM		WM
03/22/16	ST_09	1	0-18	N	10YR 4/2	sandy clay loam		in drainage/basin cut off by 610 construction; modern trash on surface; somewhat compacted; dense underbrush outside of drainage	basal clay	NCM		CK
03/22/16	ST_09	2	18-35	N	10YR 6/3	sandy clay loam			basal clay	NCM		CK
03/22/16	ST_09	3	35-40	N	10YR 6/6	sandy clay			basal clay	NCM		CK

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03/22/16	ST_10	1	0-15	N	10YR 4/2	sandy clay		in disturbed, cleared area; lots of crawfish burrows; soil mildly saturated; redox throughout	basal clay	NCM		CK
03/22/16	ST_10	2	15-35	N	10YR 7/3 w/ 10YR 6/6	sandy clay			basal clay	NCM		CK
03/22/16	ST_11	1	0-10	N	10YR 5/2	sandy loam		edge of terrace; slight slope; yaupon; 15% GSV	basal clay	NCM		WM
03/22/16	ST_11	2	10-15	N	10YR 7/3	sandy loam			basal clay	NCM		WM
03/22/16	ST_11	3	15-30	N	7.5YR 7/8	sandy clay			basal clay	NCM		WM
03/22/16	ST_12	1	0-25	N	7.5YR 4/2	sandy clay		in clearing off of trail; soils saturated; high oxidation	basal clay	NCM		CK
03/22/16	ST_12	2	25-35	N	10YR 7/6 w/ 5YR 5/8	clay			basal clay	NCM		CK
03/22/16	ST_13	1	0-25	N	7.5YR 4/6	coarse sand		5m from walking trail; 10m from playground; blackberry, hackberry, oak; artificial fill	compact soil	NCM		WM
03/22/16	ST_13	2	25-45	N	10YR 4/1	clay		natural ground surface	compact soil	NCM		WM
03/22/16	ST_14	1	0-20	N	10YR 5/2	sandy clay loam		in thick underbrush near trail; leaf litter cover; oxidized throughout	basal clay	NCM		CK
03/22/16	ST_14	2	20-35	N	10YR 6/6	sandy clay			basal clay	NCM		CK
03/22/16	ST_15	1	0-10	N	10YR 5/1	fine sandy loam		open; oak and briar; 20% GSV	basal clay	NCM		WM
03/22/16	ST_15	2	10-30	N	10YR 7/3	fine sandy loam			basal clay	NCM		WM
03/22/16	ST_15	3	30-35	N	7.5YR 4/6 w/ 30% 10YR 7/6	sandy clay			basal clay	NCM		WM
03/22/16	ST_19	1	0-20	N	10YR 4/1	sandy loam		Finger ridge top; overlooking ravine; mature hardwoods	basal clay	NCM		WM

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03/22/16	ST_19	2	20-40	N	10YR 6/8	sandy clay			basal clay	NCM		WM
03/22/16	ST_20	1	0-25	N	10YR 6/2	sandy clay loam		in upland area near trail; bayou ~40m east; low brush; high soil compaction	basal clay	NCM		CK
03/22/16	ST_20	2	25-35	N	7.5YR 6/8	clay			basal clay	NCM		CK
03/22/16	ST_21	1	0-25	N	10YR 4/3	sandy loam		manicured lawn; 30m west of driveway; on edge of ravine	basal clay	NCM		WM
03/22/16	ST_21	2	25-40	N	10YR 7/6 w/ 40% 10YR 8/2	sandy clay			basal clay	NCM		WM
03/22/16	ST_22	1	0-25	N	10YR 4/2	sandy clay loam		light underbrush; heavy roots;	basal clay	NCM		CK
03/22/16	ST_22	2	25-40	N	10YR 6/3 w/ 10YR 6/8	clay		moist and compacted; light redox mottling throughout	basal clay	NCM		CK
03/22/16	ST_24	1	0-30	N	10YR 6/1 2/ 10YR 6/6	clay loam		in wetland area; leaf litter cover; crawfish burrow disturbance; extremely thick and inundated; redox mottling	basal clay	NCM		CK
03/22/16	ST_25	1	0-28	N	10YR 4/1	sandy loam		open, cleared area; cleared of brush; slight undulations; shovel test is on slight rise; possible pimple mound	basal clay	NCM		WM
03/22/16	ST_25	2	28-32	N	10YR 6/6	sandy clay			basal clay	NCM		WM
03/23/16	ST_26	1	0-20	N	10YR 5/2	sandy clay loam		area surrounded by pocket wetlands; low brush; cypress trees and yaupon; soil sticky and saturated	water table	NCM		CK
03/23/16	ST_26	2	20-40	N	7.5YR 7/3 w/ 10YR 6/6	sandy clay			water table	NCM		CK
03/23/16	ST_27	1	0-20	N	10YR 7/3	sandy loam		slight rise in wetland; wetland vegetation with mature pines; 5% GSV	basal clay	NCM		WM

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03/23/16	ST_27	2	20-40	N	10YR 5/1 w/ 30% 10YR 4/4	clay			basal clay	NCM		WM
03/23/16	ST_28	1	0-15	N	10YR 5/3	sandy loam		on top of small pimple mound between 2 oak trees; thick roots throughout; soils sandy but very moist; no redox; sand and moisture increase with depth	other: root impasse	NCM		CK
03/23/16	ST_28	2	15-60	N	10YR 5/3	very sandy loam			other: root impasse	NCM		CK
03/23/16	ST_29	1	0-15	N	10YR 6/2 w/ 20% 10YR 5/4	clay loam		slight rise in general wetland; palmetto and (dead) pine; crawdads nests; saturated; 15m south of Woodway drive; 10% GSV	compact soil	NCM		WM
03/23/16	ST_29	2	15-35	N	10YR 7/2 w/ 20% 10YR 6/6	clay			compact soil	NCM		WM
03/23/16	ST_30	1	0-30	N	10YR 6/3	fine sandy loam		Pine and yaupon; 0% GSV; 15m south of Woodway; 5m North of gravel path	basal clay	NCM		WM
03/23/16	ST_30	2	30-40	N	7.5YR 5/6	sandy clay			basal clay	NCM		WM
03/23/16	ST_31	1	0-15	N	7.5YR 5/2	sandy clay loam		in less thick pine cover; soils mildly mottled in between levels	basal clay	NCM		CK
03/23/16	ST_31	2	15-35	N	10YR 7/3 w/ 10YR 6/6	sandy clay		blocky and compact	basal clay	NCM		CK
03/23/16	ST_57	1	0-30	N	10YR 4/3	sandy loam		manicured lawn; modern glass throughout	compact soil	NCM		WM
03/23/16	ST_58	1	0-15	N	10YR 5/3	sandy clay loam		test on terrace; low ground cover; visibility low due to leaf litter; high root disturbance	basal clay	NCM		CK
03/23/16	ST_58	2	15-30	N	10YR 6/6	clay			basal clay	NCM		CK
03/23/16	ST_59	1	0-60	N	10YR 6/3	sandy loam		on pimple mound	basal clay	NCM		CK

Date	ST#	Level	Depth cmbs	Pos/ Neg	Munsell	Soil Texture	Inclusions	Description/Comments	Reason for Termination	Artifacts (depth, count, type)	Resource #	Excavator
03/23/16	ST_59	2	65-70	N	10YR 7/3	sandy clay loam		probable B horizon	basal clay	NCM		CK