Volume 2012 Article 38

2012

Archeological Survey Of The Proposed Mary Rhodes Water Pipeline (Phase II) From The Colorado River To The Navidad-Lavaca River Authority's West Water Delivery System, Jackson And Matagorda Counties Texas

Timothy B. Griffith

John E. Dockall

Amy E. Dase

Archeological Survey Of The Proposed Mary Rhodes Water Pipeline (Phase II) From The Colorado River To The Navidad-Lavaca River Authority's West Water Delivery System, Jackson And Matagorda Counties Texas

ARCHEOLOGICAL SURVEY OF THE PROPOSED MARY RHODES WATER PIPELINE (PHASE II) FROM THE COLORADO RIVER TO THE NAVIDAD-LAVACA RIVER AUTHORITY'S WEST WATER DELIVERY SYSTEM, JACKSON AND MATAGORDA COUNTIES, TEXAS

by

Timothy B. Griffith

John E. Dockall

and

Amy E. Dase

Principal Investigator: Ross C. Fields

TECHNICAL REPORTS, NUMBER 89

submitted to

Freese and Nichols, Inc.
Austin, Texas

by

Prewitt and Associates, Inc.
Cultural Resources Services
Austin, Texas

PAI No. 210013

September 2012

TEXAS ANTIQUITIES PERMIT NO. 5688

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

In August 2010 and February–April 2012, personnel with Prewitt and Associates, Inc., performed an archeological survey for the proposed Mary Rhodes water pipeline (Phase II) in Jackson and Matagorda Counties, Texas. The work was done for Freese and Nichols, Inc., and the City of Corpus Christi under Texas Antiquities Permit No. 5688. Field survey targeted the most likely locations for Native American sites, consisting of the 24-acre pump station tract on the Colorado River and 5.35 km of pipeline route at 11 stream crossings, as well as several potential historic localities identified through analysis of historic maps and aerial photographs. In total, 56 shovel tests and 58 backhoe trenches were excavated. A single archeological site was found. This site, 41MG136, is an elevated railroad bed on the floodplain of the Colorado River that was built in the first decade of the twentieth century and abandoned by 1989. It is not considered eligible for listing in the National Register of Historic Places or designation as a State Archeological Landmark. No further archeological work is recommended.

ACKNOWLEDGMENTS

The success of this project was due to the assistance of many individuals. John E. Dockall and Timothy B. Griffith served as project archeologists during the various phases of fieldwork. Ross C. Fields served as principal investigator. Rob Thrift and Aaron Norment provided excellent assistance as field crew. Amy E. Dase conducted historical background research. Anne Carrel, project coordinator at Freese and Nichols, Inc., provided project alignment maps and information in addition to assisting the survey crew with property access. Belo Gajdos with Right of Way and Title Services contacted landowners to obtain permission for access and provided useful information for accessing properties. Charles Rekaway and Cody Glover with the Lower Navidad River Authority provided assistance with land access along the Navidad River. Appreciation is due to all the landowners for their cooperation during this survey. Sandra L. Hannum produced all field maps and illustrations for this report, and Mr. Fields and Elaine Robbins edited it. The archeological background section is a modified version of part of a previous report that Prewitt and Associates produced for the Texas Department of Transportation, Environmental Affairs Division (Fields et al. 2005).

INTRODUCTION

This report details the results of an intensive archeological survey with shovel testing and backhoe trenching along the proposed Mary Rhodes water pipeline (Phase II) in Jackson and Matagorda Counties, Texas (Figure 1). The water transmission project includes construction of an intake pump station and booster pump station on the Colorado River near Bay City and a 66-km-long 54-inch pipeline extending from the pump station tract to the Navidad-Lavaca River Authority's West Water Delivery System just beyond the Navidad River below Lake Texana. The pump stations will impact an area of approximately 24 acres on the east end of the project corridor next to the west bank of the Colorado River. The pipeline will require 50 ft of permanent easement and 50 ft of temporary easement for a total right-of-way width of 100 ft. The permanent Area of Potential Effects for the pipeline be about 248 acres; the temporary easement adds another 248 acres. Hence, the total horizontal Area of Potential Effects will be 520 acres. The minimum depth of the pipeline will be 4 ft, and the maximum depth will be about 15 ft.

The project was completed for the City of Corpus Christi under a subcontract with Freese and Nichols, Inc., and under Texas Antiquities Permit No. 5688 issued by the Texas Historical Commission. The survey was conducted to comply with the requirements of the Antiquities Code of Texas (Texas Natural Resource Code of 1977, Title 9, Chapter 191, as amended) and the implementing regulations (36 CFR 800) for Section 106 of the National Historic Preservation Act of 1966.

ENVIRONMENTAL BACKGROUND

The project area traverses a portion of the Gulf Coastal Plain from the west side of Bay City, Texas, on the Colorado River to the south end of Lake Texana, a distance of about 66 km. From the east end, the corridor crosses six named streams—Wilson Creek, Briar Creek, Tres Palacios Creek, Cashs Creek, East Carancahua Creek, and West Carancahua Creek—and several smaller unnamed tributaries before terminating on the west end at the Navidad River. The subsurface geological deposits throughout the area are Late Quaternary strata of the Beaumont Formation, with Quaternary alluvium mapped only along the Colorado and Navidad Rivers (Bureau of Economic Geology 1987). The other drainages are incised into the Beaumont Formation; the larger ones do contain some Holocene alluvium, but not enough to be mapped in the *Geologic Atlas of Texas,* while the smaller ones lack significant accumulations of Holocene deposits.

The topography of the project area consists of level to slightly rolling coastal plain with low relief created by generally south-flowing streams. Virtually the entire length of the project area crosses land that has been used for agriculture for over a century. Soils vary widely depending on topographic setting. Upland areas are characterized primarily by two soil series, Laewest clay and Texana fine sandy loam, both with 0–1 percent slopes. Laewest clay characterizes the broad coastal prairie uplands, is predominantly clay, and is moderately well-drained but has a high shrink-swell potential and gilgai relief features (Hyde 2002:39; Miller 1997:23). Texana fine sandy loam has a high shrink-swell potential and is moderately well-drained with occasional live oak mottes and small topographic mounds several meters in diameter and approaching a half meter in height (Hyde 2002:50–51; Miller 1997:35). The presence of gilgai microrelief features in areas of Laewest soils and the high shrink-swell potential for both prominent and other minor soil series are known to be significant agents of distorting and, in some cases, thoroughly mixing deposits containing archeological remains, removing any behavioral or temporal associations between recovered archeological materials (Gustavson 1975; Waters 1992:299–300). Soil types are more variable along stream channels and associated small stream valleys and include pockets of Asa, Brazoria, Bacliff, Cieno, Dacosta, Edna, Edna-Cieno, Katy, Livia, and Livco soils.

RESULTS OF THE FILE SEACH

The Texas Historical Commission's Archeological Sites Atlas shows 20 archeological sites within 1 km of the project area. Nineteen of these are in the vicinity of the western end of the project corridor, and 1 site (41JK150) is near the central part. None of these are within or immediately adjacent to the 100-ft-wide pipeline

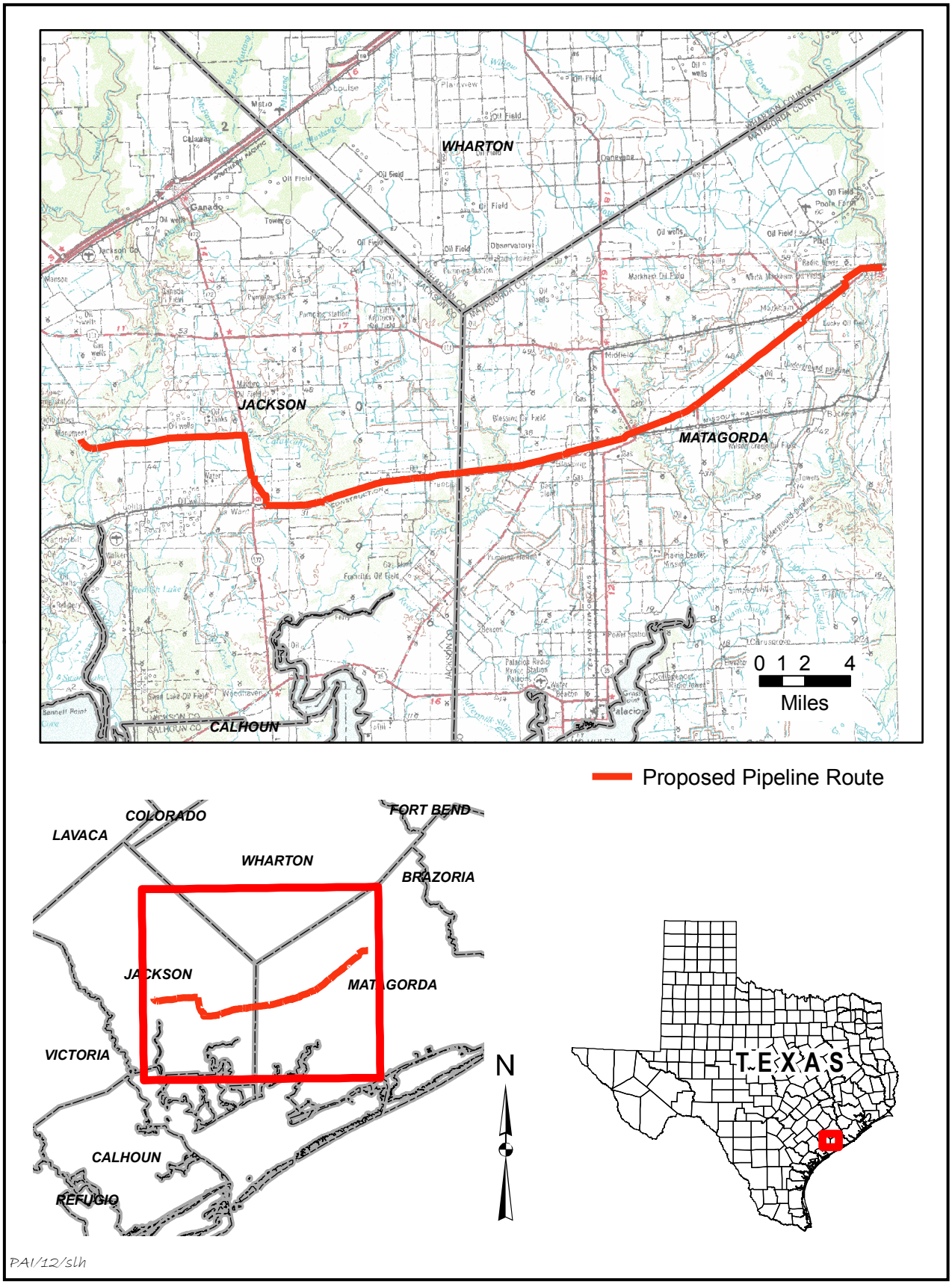

Figure 1. Project location map.

easement, and hence none will be impacted by the proposed project. Most of the recorded sites are concentrated along the Navidad River, the majority surveyed and investigated during archeological work for the Palmetto Bend Reservoir project and Lake Texana (Mallouf et al. 1973; McGuff and Fawcett 1978; Wakefield 1968). Of these sites, 12 were inundated or otherwise impacted when Lake Texana was impounded. Site types represented within 1 km of the project corridor consist of 4 with no data, 1 historic cemetery (Pickering Cemetery, 41JK105), 4 historic house sites (1 of which is 41JK150, the Branch-Bonnot House, a braced-frame house dating to ca. 1861), 7 prehistoric middens associated with *Rangia* sp. shells, 1 lithic scatter, 1 Archaic to Late Prehistoric campsite (41JK41, Atkinson site), 1 Archaic campsite (41JK10), and 1 Late Prehistoric campsite (41JK91, Venom Hill site).

The file search revealed that, other than the work on the Palmetto Bend Reservoir project and Lake Texana at the west end of the project area, there have been few extensive archeological investigations in this part of the coastal plain. The only one near the project area was done in 2007 for the Tres Palacios Gas Storage Project (Brown et al. 2008). It involved intensive survey of 23 miles of a 43-mile pipeline route and associated facilities tracts, totaling about 330 acres, in Wharton and Matagorda Counties. The northwest-southeast route was west of the Colorado River, crossing the eastern part of the Mary Rhodes pipeline route. This survey identified just four historic sites (one farmstead, three artifact scatters, and some earthworks) and one prehistoric site (a sparse lithic scatter), all of which were on facilities tracts rather than along the pipeline route. The single prehistoric site (41WH100) was on a rise near old channels of the Colorado River.

ARCHEOLOGICAL BACKGROUND

Previous Research

Many archeological investigations have been conducted in the central coastal plain of Texas, principally along the coast and inland along the major drainages. Among the more prominent of these are the following: (1) excavations by the University of Texas at Austin and the Works Progress Administration at the Johnson and Kent-Crane sites in the Copano Bay and Aransas Bay areas (Campbell 1947, 1952); (2) Story's (1968) excavations at the Ingleside Cove and Anaqua sites in San Patricio and Jackson Counties; (3) excavations at 41AU37 and 41AU38 along Allen's Creek in southern Austin County by the University of Texas at Austin (Hall 1981); (4) excavations by the University of Texas at San Antonio (UTSA) at the Hinojosa site approximately 60 km inland from Corpus Christi Bay (Black 1986); (5) explorations by the Texas Historical Commission in the projected area of Palmetto Bend Reservoir along the Lavaca and Navidad Rivers of Jackson County (Mallouf et al. 1973); (6) UTSA survey and site testing in the area of Coleto Creek Reservoir in Victoria and Goliad Counties (Fox and Hester 1976; Fox et al. 1979); (7) extensive survey and excavation efforts, primarily by UTSA, at Choke Canyon Reservoir in Live Oak and McMullen Counties (K. Brown et al. 1982; Hall et al. 1982, 1986; Highley 1986); (8) excavations by the Texas Department of Transportation (TxDOT) at the Loma Sandia site in Live Oak County and subsequent analysis by the University of Texas at Austin (Taylor and Highley 1995); (9) TxDOT-sponsored excavations by UTSA at Mission Nuestra Señora del Refugio in Refugio County (Jantz et al. 2002; Tennis 2002); (10) Robert A. Ricklis's (1988, 1989, 1995, 1996) work at the Holmes and McKinzie sites, among others, in the Corpus Christi and Copano Bay area; (11) testing and data recovery excavations at sites along the Victoria Barge Canal in Victoria and Calhoun Counties (Gadus et al. 1999; Ricklis 2011; Weinstein 1992, 2002); and (12) work by the Texas Historical Commission at La Salle's Fort St. Louis and the first location of Presidio La Bahía (Bruseth and Durst 2002; Davis and Bruseth 2000, 2001; Davis et al. 2000), as well as work at other Spanish colonial mission-period sites (Calhoun 1999; Fox and Tomka 2006; Hindes et al. 1999; Ricklis 1999; Walter 1999).

Paleoindian Period

The earliest occupation of the coastal plain occurred in the Paleoindian period ca. 11,000 to 8,000 years ago. The first half of this period is marked by the occurrence of Clovis and Folsom dart points, almost always in isolated contexts.

For instance, a Clovis point was recovered from San Patricio County near the mouth of the Nueces River (Hester 1976), and a Folsom point was recovered on Oso Creek (Hester 1980:6). Excavated Paleoindian components on the coastal plain include the deep terrace sites of Buckner Ranch in Bee County, Berger Bluff in Goliad County, and Johnston-Heller and J-2 Ranch in Victoria County. The Buckner Ranch site produced late Pleistocene fauna and hearth-like clusters of burned rocks, as well as Folsom, Plainview, Scottsbluff, and Angostura points (Sellards 1940). Hester (1976:8–9) reevaluated Sellards's data and concluded that the site "served as a campsite for a succession of Paleo-Indian groups" possibly spanning 3,000 years.

Late Paleoindian points such as Plainview and Golondrina have been recovered from the Johnston-Heller and J-2 Ranch sites (Birmingham and Hester 1976; Fox et al. 1979). Clear Fork tools were recovered at the Johnston-Heller site. The Berger Bluff site, now inundated by Coleto Creek Reservoir, produced a deeply buried hearth dated to ca. 8,000 to 6,000 years ago. This site is of interest because its faunal assemblage includes small animals not thought to be characteristic of a Paleoindian big-game subsistence pattern (Brown 1996:497–498; Weinstein 1992:60). Investigation of these components indicates the earliest Americans' long-lived, slowly changing adaptation to environments near the coast.

Many Paleoindian artifacts are isolated finds in eroded or disturbed contexts. The erosion is in part the result of a dramatic sea level change associated with the end of the last glaciation. At that time, sea level was much lower than today, and the Gulf shoreline was appreciably farther south of its present position. As sea level began to rise, it likely inundated many Paleoindian sites. Both artifacts and fossil bones have been recovered from Texas beaches and are believed to be eroding from submerged, relict deltaic landforms that contain these ancient sites. One such area that has produced artifacts and fossil bones is 41MG4, the Sargent Beach site. The site produced one late Paleoindian Angostura point, as well as Archaic Pedernales and Kent points and fossil bones, including horse, bison, and mammoth teeth. Fossil bones and teeth of mastodon, mammoth, bison, horse, camel, deer, and turtle without associated artifacts have been recovered from several nearby disposal areas for dredged materials along the Gulf Intracoastal Waterway west of the San Bernard River (Black and Cox 1983).

Archaic Period

The Early Archaic spans the period from 8000 to 5000 B.P., when sea level was still well south of its present location. As with Paleoindian sites, few Early Archaic sites are known, and the traditional view is that populations and site densities continued to be low on the entire coastal plain (Story 1985:37). Excavations at the Buckeye Knoll site on the Guadalupe River in Victoria County in 2000–2001 revealed a much more-complicated picture for this interval, however (Ricklis 2011). Buckeye Knoll, with its large cemetery containing exotic offerings, shows that the people who lived on the coastal plain at that time "had long-term connections with cultures far to the northeast, and that the intensity of the connections varied markedly through time" (Ricklis 2011:71).

Projectile points diagnostic of the early part of the Archaic include Andice, Bell, Gower, Martindale, Uvalde, Wells, and related forms (Black 1989:49; Weinstein 1992:57). Inland along the edge of the coastal plain, sites are associated with upland landforms and high terraces, though several components within deep alluvium are known from the Choke Canyon area of Live Oak County (Scott and Fox 1982). Examples of sites from the coastal bend include 41VT17 (Fox and Hester 1976), McKenzie (Ricklis 1988), and Swan Lake (Prewitt et al. 1987). Though the Early Archaic components at these sites are ephemeral, they demonstrate early use of the estuarine bay shore environment. During the late part of the Early Archaic, the number of coastal components increased, as did the intensity of the occupations. It appears that both shellfish and fish were exploited to the extent that these early components likely functioned as fishing camps (Ricklis 1988:101–102, 1995: 272–278).

The coastline reached its present position in the Middle Archaic, which lasted from 5000 to 3000 B.P., with the climate approaching modern conditions at the end of the period (Story 1990:244). These changes may have enhanced coastal resources enough that populations and site densities increased (Story 1985:39, 1990:244). Toward the end of this period,

extensive shell middens appeared, signaling that the bays and estuaries had developed to the extent that shellfish had become a ubiquitous resource. On the coast in Aransas and Nueces Counties, this intensive exploitation of estuarine resources has been given the appellation Aransas focus or complex (Campbell 1947, 1952), with the Middle Archaic manifestation labeled the Ken phase (Weinstein 1992:61). Distinctive shell tools such as *Busycon* whorl scrapers and columella gouges mark Aransas sites. Similar tools have been recovered from shell midden sites as far north along the coast as Lavaca Bay and the lower reach of Caney Creek in Matagorda County (Fritz 1975:129). Projectile points such as Bulverde, Matamoros, and Palmillas mark this phase. Other Middle Archaic period projectile points with inland ties include Morhiss, Nolan, Refugio, and Travis (Black 1989:49; Weinstein 1992:61).

In the inland southern part of the region, data from the Choke Canyon Reservoir sites suggest that open camps along stream courses on natural levees and low terraces marked the Middle Archaic period. Features such as formal hearths, earth ovens, and concentrations of burned rocks point to an emphasis on the use of plant resources (Hall et al. 1986). Possible baking pit features with associated concentrations of burned rocks also have been identified at coastal shell midden sites. One such Middle Archaic shell midden—41CL9 situated in Calhoun County along the upper Guadalupe River estuary—also produced faunal data indicating that terrestrial resources contributed significantly to the coastal resource base (Gadus et al. 1999:35–73).

The Late Archaic period, which dates from ca. 3000 to 1250 B.P., is marked by a continuation and intensification of Aransas adaptations on the coast as represented at sites such as Kent-Crane (Campbell 1958; Corbin 1974). Some sites, such as Mustang Lake on San Antonio Bay and Ingleside Cove on Corpus Christi Bay, produce faunal data that suggest intensive fishing (Ricklis 1995:281–280). Inland, the presence of grinding implements and large deposits of burned rocks at the Choke Canyon sites suggest continued, intensive exploitation of plant resources (Hester 1995:441). Point types found on the coast include Ensor, Darl, and Fairland. Inland point types for this period include Frio, Marcos, Montell, Morhiss, Castroville, and Ellis (Black 1989:51; Weinstein 1992:57). Overall, this period saw a continued increase in populations and trend toward defined territories (Story 1985:44–45, 48).

One indication of population increase is the expansion of formal cemeteries. Though the oldest known cemetery dates to the Early Archaic, cemetery use increased in the Late Archaic and into the Late Prehistoric period (Hall 1995a). An extensive Middle Archaic through Late Prehistoric period cemetery has been excavated at Allen's Creek (Hall 1981). The site, 41AU36, is on the Brazos River approximately 115 km north of the coast. Burials showed an increase in traumatic deaths, specifically during the Late Archaic period, that might be considered evidence of a boost in hostilities suggesting greater territorial competition (Hall 1981:284–285). Closer to the coast, the Blue Bayou cemetery (41VT94) and the Morhiss cemetery (41VT1) are situated on the lower reach of the Guadalupe River in Victoria County (Campbell 1976:81–85; Huebner 1988). The Morhiss cemetery has been dated to the Archaic period by diagnostic projectile points recovered from the associated habitation site. Because shell ornaments and many lithic materials were recovered from the habitation site, investigators have suggested that the inhabitants had both inland and coastal interactions (Hall 1995a:49–50). Similar interactions can be suggested from the inland formal cemetery at the Loma Sandia site in Live Oak County (Taylor and Highley 1995), but Hall (1995b:645–646) points out that the overriding connection there was with cultures of the Rio Grande Plain. These patterns are critical for understanding territorial affiliations across the coastal plain.

Late Prehistoric Period

The Late Prehistoric period began variously along the Texas coastal plain at ca. 1700 to 1250 B.P. It was marked by the addition of pottery and the bow and arrow to an otherwise Archaic technological repertoire (Aten 1983:297–304; Corbin 1976:91; Weinstein 1992:57). Scallorn arrow points, one of the earliest forms found on the coast, have been recovered from burials at the Blue Bayou site dating to the early Late Prehistoric, ca. A.D. 430–990 (Huebner 1988). Scallorn points and expanding-stem arrow point

forms also were recovered from more-inland sites such as the Berger Bluff site in Goliad County (Brown 1983) and sites in the Choke Canyon area of Live Oak County (Hall et al. 1986). In many cases, no ceramics were associated with these components, suggesting separate arrival or development of the two technologies. Similarities between these components and the early Late Prehistoric Austin phase components of central Texas have been acknowledged (Brown 1983:80–81; Weinstein 1992:63).

Slightly later but before A.D. 1000, bone-tempered ceramics and expanding-stem arrow appeared in the Choke Canyon sites (Black 1989:52), and Scallorn points and sandy paste ceramics like pottery from the upper Texas coast appeared on the central coast. Scallorn points and sandy paste ceramics were recovered from the Anaqua site and other sites situated along the lower Lavaca and Navidad Rivers in Jackson County (Mallouf et al. 1973:136; Story 1968), as well as the Kent-Crane site in Aransas County (Cox and Smith 1988). Weinstein (1992:64) suggests that these components are recognizable cultural manifestations that preceded introduction of Rockport ceramics along the south and central coasts.

Rockport ceramics, a sandy paste ware decorated with asphalt designs and incising, occur most often with Perdiz and Fresno points. Other arrow point types occasionally found include Cliffton, McGloin, Padre, Scallorn, Starr, and Young (Corbin 1974:43). The occurrence of these artifact types along the coast—generally in Aransas, Kleberg, Nueces, Refugio, and San Patricio Counties—has been used to define the Rockport phase of the Late Prehistoric-Historic period (Campbell 1952, 1958; Story 1968; Suhm et al. 1954). The Rockport phase has been linked to the historically known Karankawa Indians because that group continued to produce the distinctive asphalt-decorated and asphalt-coated ceramics well into historic times.

Archeological studies of prehistoric and historic Karankawa adaptive strategies suggest that these people took advantage of both coastal estuarine and adjoining prairie-riverine resources. Based on sites in the Corpus Christi Bay and Copano Bay area, Ricklis (1996:100–124) discerned a seasonal pattern in the occupation of coastal and nearby inland sites that may reflect this strategy. Two Late Prehistoric site types have been identified: the shoreline fishing camp with extensive deposits of estuarine resource remains, and the inland hunting camp with large quantities of terrestrial game such as deer and bison (Ricklis 1996:33). Seasonal data based on fish otoliths and *Rangia cuneata* samples indicate that the fishing camps were occupied in the fall through winter or early spring and that hunting camps were occupied in the spring and summer (Ricklis 1996:70–71, 89–95). In this model, fishing camps were occupied at a time of year when a reliable resource—that is, fish—was concentrated along the coast and allowed people to mass. The hunting camps represent population dispersal geared toward more-scattered resources—bison and deer. How far inland the Karankawa may have journeyed on their seasonal round and what interactions they may have had with inland-based groups are questions that require additional research.

Though the Karankawa may have moved inland seasonally to hunt bison and deer, faunal evidence from Hinojosa site in Jim Wells County and the Choke Canyon sites suggests that resident inland groups may have focused both on large game and a wide range of smaller animals (Steele 1986; Steele and Hunter 1986). Recognition of a related lithic tool kit emphasizes the importance of large game such as bison to the subsistence base (Black 1989:53–54). Consisting of Perdiz arrow points, small end scrapers, and beveled knives, this tool kit has been linked to the Toyah phase cultures that appear to have originated on the Southern Plains and moved south to central Texas, probably in response to southward-expanding bison herds (Black 1989:57). The Toyah phase tool kit has been identified at the Hinojosa site and is often found within Rockport phase sites on the central coast (Black 1986:254–255; Ricklis 1995:285, 287), but the mechanisms behind adoption of this Toyah technology and its meaning for the coastal and near-coastal peoples have yet to be fully defined.

Historic Period

Coastal aboriginal groups bore the brunt of early contact with European explorers and colonists. The first encounter was that of the Spanish shipwreck survivor and eventual trader Alvar Nuñez Cabeza de Vaca, who lived and traveled with various aboriginal groups across coastal Texas ca. 1528 (Hester 1999:17–19).

Reestablishing Cabeza de Vaca's movements places him on the Texas coast in the vicinity of San Antonio, Copano, and Corpus Christi Bays (Campbell and Campbell 1981:2–9). A century and a half later, the Karankawa met Robert Sieur de La Salle on his fateful expedition that began along Matagorda Bay in the winter of 1685 (Ricklis 1996:1, 112). Recent work at the site of La Salle's Fort St. Louis (41VT4) and the excavation of La Salle's ship, *La Belle*, in Matagorda Bay have provided new information on this contact and the lives of the Frenchmen who participated in that expedition (Bruseth and Durst 2002; Davis and Bruseth 2000; Davis et al. 2000). The French presence on the Texas coast was short, but the Spanish, with their emphasis on establishing missions and presidios, had a lasting effect (Foster 1995).

Spanish attempts to establish missions and presidios along the coastal plain continued through the 1700s. These included Mission Espíritu Santo, established in 1722 in the present vicinity of Jackson County and then moved to Victoria County in 1726, Presidio La Bahía and Mission Rosario established in 1749 and 1754 in Goliad County, and Mission Nuestra Señora de Refugio, first situated in Calhoun County and then moved to Refugio County in 1795 (Ricklis 1996:145). Recent investigations of some of these sites, especially the work by TxDOT and UTSA at Mission Refugio and Ricklis's excavations at Missions Espíritu Santo and Nuestra Señora del Rosario, have provided important information on mobility patterns, diet, technologies, economic activities, acculturation, demographic patterns, health, and interactions between the Spanish and Native Americans (Calhoun 1999; Jantz et al. 2002; Ricklis 1999; Tennis 2002; Walter 1999). These investigations, as well as work on Late Prehistoric and historic aboriginal sites, indicate that coastal aboriginal groups kept their ethnic identities despite attempts by the Spanish to missionize them, and to some extent they fit the mission system into their aboriginal subsistence pattern (Ricklis 1996:159–168). Consequently, local coastal Native American groups, such as the Karankawa, survived as much-reduced but viable groups into the nineteenth century. Native groups did not, however, survive the aggressive Anglo-American settlement of the Texas coast that took place during the nineteenth and twentieth centuries.

PROJECT DESIGN AND METHODS

Because the file search and literature review indicated that the distribution of Native American sites in this part of the coastal plain is strongly tied to the present Gulf coast and the larger stream and river valleys, parts of the Mary Rhodes pipeline route were deemed to have such a low potential to contain significant archeological sites that intensive survey was not warranted; this is the case for the stretches of flat coastal plain that are well removed from stream crossings and where historic maps and aerial photographs show little likelihood for historic sites. These areas were not surveyed intensively, although they were subjected to reconnaissance during the course of surveying other areas. Intensive survey, based on the potential for Native American sites, was performed in 11 locations at stream crossings (Figure 2). From west to east, these were at the Navidad River, 2 small unnamed tributaries of the Navidad River, West Carancahua Creek, East Carancahua Creek, Cashs Creek, Tres Palacios River, Briar Creek, Wilson Creek, and 2 small unnamed tributaries to the Colorado River. A twelfth survey area consists of the 24-acre footprint of the intake pumping station adjacent to the Colorado River at the east end of the project area and the adjoining eastern terminus of the pipeline route.

The lengths of the route surveyed at the 11 crossings varied from 150 to 800 m and were based on apparent floodplain extent where this was determinable (Table 1). The smaller drainages lack identifiable floodplains and valley walls, however; in all but one of these cases (Crossing 3), survey extended 100 m or more away from the drainage in both directions. In total, 5.35 km of the pipeline route was examined for Native American sites, including the 1.0-km-long eastern end next to the intake pumping station. Survey along some of the smaller stream crossings was accomplished with shovel testing, but backhoe trenching, often accompanied by shovel testing, was needed at the larger crossings. Fifty-six shovel tests and 58 backhoe trenches were excavated. The 14 trenches in the 24-acre intake site on the Colorado River floodplain exceed the minimum rate of subsurface exploration specified for tracts of this size in the Texas Historical Commission's

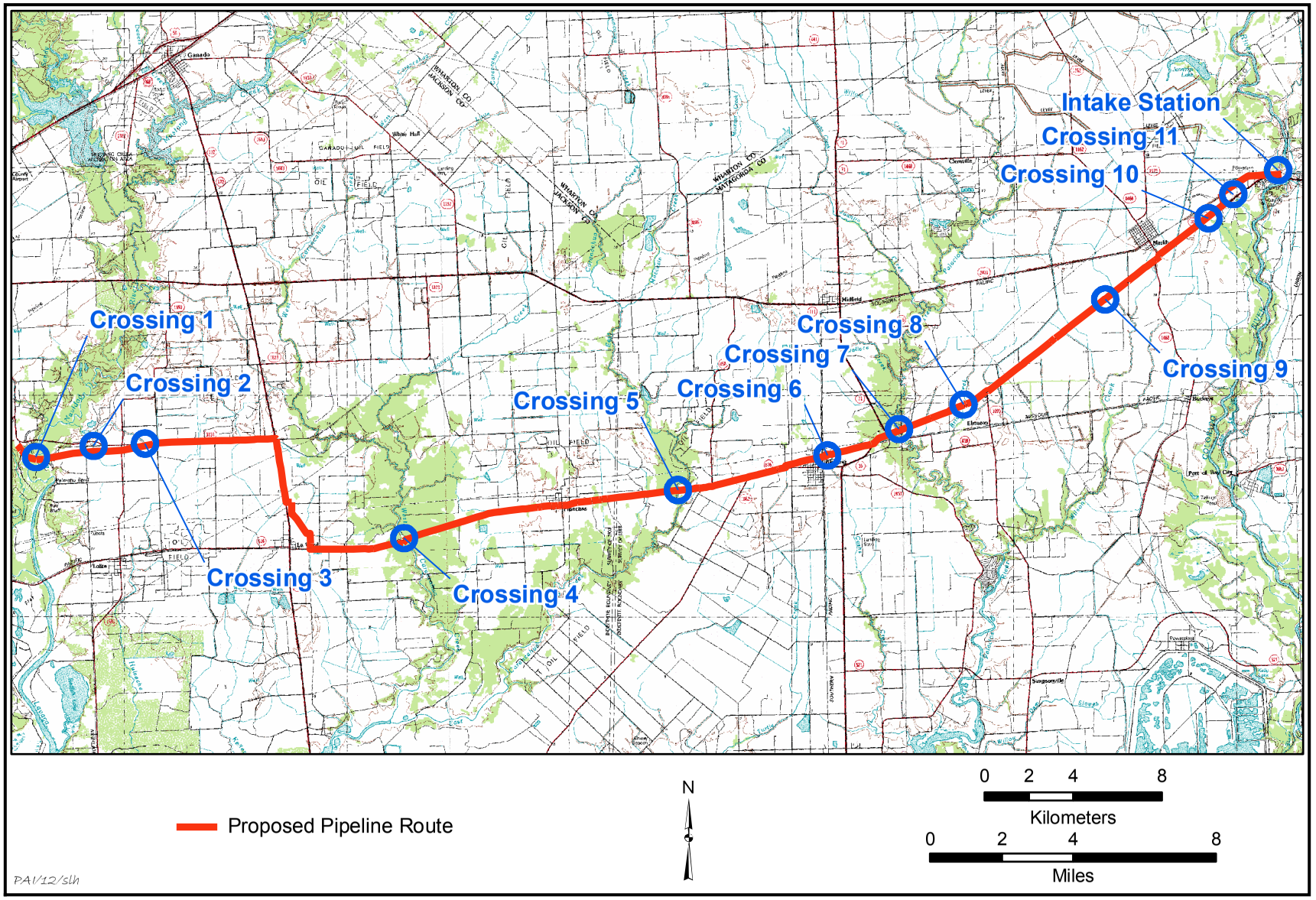

Figure 2. Map showing locations of surveyed stream crossings.

Archeological Survey Standards for Texas (1 shovel test per 2 acres). The 56 tests and 44 trenches in surveyed segments of the pipeline route equate to 19 tests or trenches per kilometer, also exceeding the minimum of 10 shovel tests per kilometer specified for linear projects in the Archeological Survey Standards.

Survey was performed by a crew of two archeologists who walked over 100 percent of each survey area at intervals of 15 m or less, examining the ground surface and existing subsurface exposures, such as cutbanks, for archeological materials. Shovel tests and backhoe trenches were excavated in areas that were judged to have the potential for buried archeological remains and where ground surface visibility was less than 30 percent. Shovel tests were about 30 cm in diameter and were excavated to depths ranging from 20 to 100 cm, averaging 55 cm. The sediments removed were screened through 1/4-inch-mesh hardware cloth or sorted through carefully with a trowel to search for artifacts. Backhoe trenches were 4.7 to 6.1 m long, averaging 5.5 m, and about 1 m wide. They were excavated to depths of 0.8–2.5 m. Most were excavated to 2.0 m or deeper; however, in some areas, disturbed fill and shallow soils precluded the necessity for deep trenches. Due to safety concerns, the portions of trenches that extended below 1.5 m were assessed from the ground surface. The sediments removed from the trenches were not screened, but the trench walls and backdirt piles were examined for artifacts and other cultural materials.

Recognizing that selecting survey areas based on the presence of drainages could introduce a bias against finding historic sites, a series of historic maps and aerial photographs obtained from the Texas Department of Transportation's Texas Historic Overlay and the Texas Natural Resources Information System were examined to gauge the potential for unrecorded historic sites. These include an 1864 map of the full project area, a 1910 USDA soils map for the full area, the 1913 USGS Victoria topographic sheet covering the west end of the route, the 1915 USGS Matagorda topographic sheet covering the eastern terminus of the route, a 1924 map of the Colorado River covering the eastern end of the route, a 1927 map of oil and gas fields covering the full route, the 1929 USGS Blessing topographic sheet covering all but the western end of the route, 1943 aerial photographs of the eastern half of the route (Matagorda County), 1952 topographic sheets for the full route, 1953 aerial photographs for the west half of the route (Jackson County), and recent USGS topographic sheets. These historic sources indicate that, although much of the area in the vicinity of the project corridor was sparsely settled historically, it has been intensively farmed since the late nineteenth and early twentieth centuries with portions also used for cattle ranching and gas production. Analysis of these maps and aerial photographs

Table 1. Survey areas

Crossing	Drainage	Survey Area Length (m)	Backhoe Trenches	Shovel Tests	Results	Floodplain
1	Navidad River	800	10	12	no archeological sites	yes
2	unnamed tributary	200		4	no archeological sites	no
3	unnamed tributary	150		4	no archeological sites	no
4	West Carancahua Creek	500	7	4	no archeological sites	yes
5	East Carancahua Creek	500	8		no archeological sites	no
6	Cashs Creek	500	2	5	no archeological sites	no
7	Tres Palacios River	600	6	8	no archeological sites	yes
8	Briar Creek	250		5	no archeological sites	no
9	Wilson Creek	250		4	no archeological sites	no
10	unnamed tributary	350	5		no archeological sites	no
11	unnamed tributary	250		4	no archeological sites	no
–	Colorado River	1000 (plus 24 acres)	20	6	1 site (41MG136)	yes

identified 12 potential historic localities in the vicinity of the pipeline route (Figure 3). However, as a result of subsequent alterations to the route and closer inspection of the historic aerials, 10 of these were determined to be far enough from the proposed route that they would not be impacted, leaving only 2 that warranted field investigations. These 2 localities were investigated during the second phase of the survey, and neither was found to contain archeological remains.

SURVEY AREA DESCRIPTIONS AND RESULTS

The survey was conducted in two phases. In August 2010 a reconnaissance survey supplemented with shovel testing was conducted along the proposed pipeline corridor. The purpose of this initial stage was to identify areas where trenching would be necessary and areas where shovel testing would suffice; eight of the survey areas were shovel tested during this phase. No potential historic localities were investigated at that time due to a lack of property access. The second phase of survey took place in February–April 2012 and consisted of backhoe trenching or shovel testing at seven survey areas and investigation of two possible historic localities.

Two types of streamside settings were identified during the survey. First, the Colorado, Navidad, and Tres Palacios Rivers and West Carancahua Creek have active floodplains and distinct valley walls. The other eight drainages all are small creeks that are incised into the Beaumont Formation and are in erosional environments with no developed floodplains; many of these have been channelized to varying degrees.

A variety of disturbances were documented along much of the pipeline route. For the most part, the route parallels and is adjacent to the rights of way of State Highway 35 and FM 616, and activities associated with these roads, including drainage ditches, buried utilities, and intersecting roads, have impacted the area. Portions of the route also follow and have been impacted by a railroad right of way, as well as commercial development in the town of Blessing. In addition, much of the route traverses open agricultural fields where plowing is a repeated and ongoing disturbance.

Crossing 1, Navidad River

This crossing is at the Navidad River at the west end of the project area just south of Lake Texana. The river flows north-south with steep cutbanks ca. 5 m high. The well-developed floodplain is 500–600 m wide with steep valley walls on both sides. The valley walls slope up to upland prairies and woodlands. The floodplain on both sides of the river consists of large areas of marshland interspersed with dry wooded areas, resulting in poor surface visibility (less than 10 percent). At least six existing pipelines cross the proposed project area at several locations on both sides of the river. The combination of wetlands and existing pipelines restricted the area available for trenching. Nevertheless, 10 backhoe trenches and 12 shovel tests were excavated over a distance of 800 m, spanning the floodplain and extending up onto the valley walls. All of the shovel tests were west of the river; 7 trenches were west of the river, and 3 were east of it. The shovel tests revealed dense brown clay extending to at least 0.5 m below the surface. The upper parts of the trenches on the western floodplain exposed 1.0 to 1.6 m of silty clays to dense clays above very wet sandy silt, all representing Holocene alluvium. Three of the trenches on the west side filled in with water, causing trench walls to collapse. The trenches on the east side of the river revealed similar stratigraphic profiles. Here, the sediments consisted of a zone of sandy silts and silty clays 0.2–0.6 m thick overlying silty sand alluvium that extended to at least 2.0 below the ground surface. No archeological materials were observed in any of the trenches or shovel tests or on the surface on either side of the river.

Crossing 2, Navidad River Tributary

This small drainage is near the west end of the project area along County Road 428. The stream channel has been significantly modified and has narrow sloping banks. A modern house, barn, and shed are in the area of this crossing. Most the area along the proposed pipeline corridor consists of open pasture with patchy grass and weeds. These conditions provided good surface visibility (50–75 percent). Based on disturbances and the lack of a developed

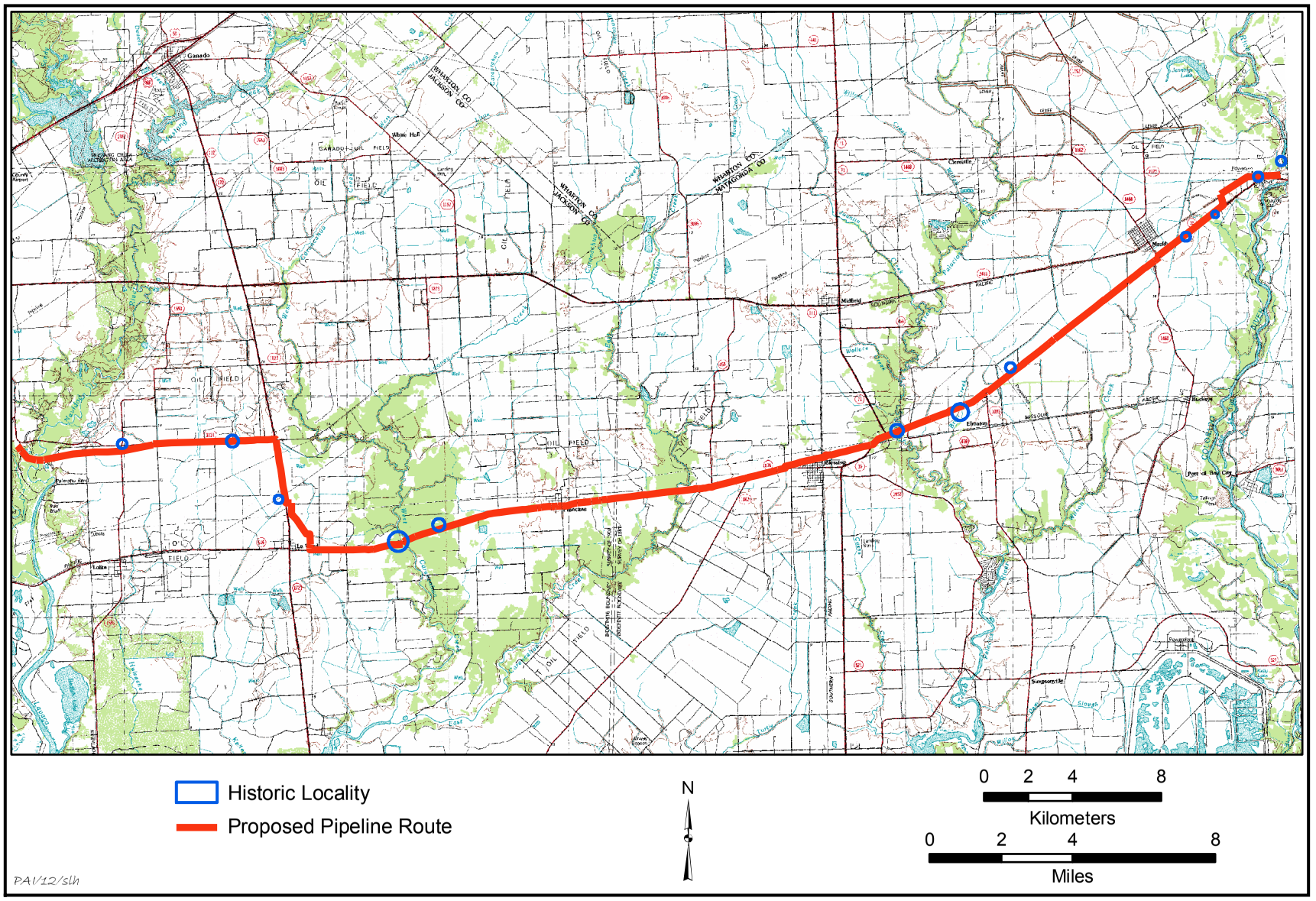

Figure 3. Locations of potential historic localities along or close to the proposed pipeline route.

floodplain, ca. 200 m of the route was subjected to intensive survey at this crossing. The four shovel tests ranged between 45 and 60 cm deep and contained crushed shell and rock in mixed road fill. No archeological materials were recovered from any of these tests or observed on the surface.

Crossing 3, Navidad River Tributary

This crossing is along FM 3131 near the intersection with FM 1593. The drainage is small and narrow and has been modified significantly through channelization on the south side of the road. Both sides of the road contain possible dredged deposits along the banks of the drainage, which lacks a developed floodplain. The proposed pipeline crosses over cultivated fields here, providing excellent surface visibility (up to 100 percent). Based on the disturbances and the lack of a floodplain, survey was limited to a 150-m segment of the route. Four shovel tests were excavated, all containing road fill overlying dark brown clay upland sediments with no evidence of intact alluvial deposits. No cultural materials were found in the tests or observed on the surface.

Crossing 4, West Carancahua Creek

This crossing is on West Carancahua Creek along FM 616 west of Blessing, Texas. West Carancahua Creek flows southward and connects with East Carancahua Creek just north of Carancahua Bay. The proposed pipeline transects this crossing through densely wooded terrain on both sides of the stream. The floodplain is ca. 300–400 m wide with a clear but gradual valley wall to the west. The east side contains severely undulating terrain due to land modifications, eventually sloping upward to an upland prairie where several large marshes are present. Several large manmade berms and gravel piles are on the floodplain east of the creek, and an existing pipeline crosses the project area on the east side of the creek. Because of the dense vegetation, ground surface visibility was generally poor (less than 5 percent). Seven backhoe trenches and four shovel tests were placed over a distance of 500 m at this crossing. Three trenches were west of the creek, two on the floodplain and one near the top of the valley wall. Two shovel tests were west of the creek near FM 616. The trenches exposed generally homogenous dark silty clays and dense clays overlying silty sands and silty clays. Four trenches and two shovel tests were placed east of the creek. The trenches were scattered across the disturbed floodplain and valley slope, while the shovel tests were placed along the FM 616 right of way. Three of these trenches revealed generally homogenous silty sandy deposits to at least 2.0 m below the ground surface. The other trench contained silty clays to dense clays 2.0+ m below the ground surface. Based on the trench exposures, it appears that the floodplain contains Holocene alluvium at least 2.0 m thick. No archeological materials were observed in any of these subsurface tests.

Crossing 5, East Carancahua Creek

This crossing is at East Carancahua Creek along FM 616 west of Blessing, Texas. The stream is deeply incised and has steep sides with gradually sloping terrain to the east and west. No valley walls are evident, and it appears that this is a largely erosional setting with no substantial Holocene alluvial deposits. The proposed pipeline is near the FM 616 right of way where road construction has significantly disturbed much of the area. Several underground utilities are marked along alternating road cuts and fill sections that are ca. 2.0 m high near the bridge over the creek. Drainage ditches 0.5–1.0 m deep parallel the fill sections on both sides of the road. Sparsely scattered to dense hardwood trees grow along both sides of the creek. The area surveyed consisted of ca. 500 m of open pasture land with interspersed large hardwood trees. Surface visibility was less than 10 percent. Eight backhoe trenches were excavated at this crossing. Three of the four trenches west of the creek contained generally homogenous silty sands overlying silty clay to dense silty clay. The trench nearest the creek on the west side contained a very poorly sorted gravelly clay fill probably associated with road construction. The four trenches east of the creek all contained nearly homogenous brown silty clays down to at least 2.0 m. No archeological materials were observed in any of the trenches.

Crossing 6, Cashs Creek

This crossing is at Cashs Creek just north of a railroad right of way north of the town of Blessing. The creek has been significantly channelized, and dredged material has been placed along the east bank. The stream channel is incised as much as 2.0–3.0 m with sloping sides. The terrain east and west of the creek gradually slopes and undulates. To the east of the creek are numerous marshes containing aquatic vegetation and standing water; surface visibility here was moderate (less than 50 percent). No valley walls are evident, and the area appears to be an erosional setting without substantial Holocene alluvial deposits. Two trenches and five shovel tests were excavated along a 500-m segment of the pipeline route at this crossing. The area west of the creek is densely wooded with thick undergrowth; hence, surface visibility was poor (less than 5 percent). The conditions west of the creek prohibited backhoe access, and thus five shovel tests were placed in this area. These tests all contained similar sediments down to 1.0 m consisting of dense brown silty clay. The two backhoe trenches east of the creek extended to 2.0+ m below the ground surface and revealed nearly identical profiles consisting of dense silty clay and dense clay with abundant carbonate nodules in the lower 1.0 m. No archeological materials were observed in any of the subsurface tests.

Crossing 7, Tres Palacios River

This crossing is at the Tres Palacios River along State Highway 35 east of Blessing, Texas. The river is of medium size and flows southeast to Tres Palacios Bay. The proposed pipeline route runs along the south edge of the highway right of way. West of the river, the floodplain extends ca. 400–500 m, while to the east it is only ca. 50–100 m wide. On both sides, the valley walls slope steeply to upland prairies. The area adjacent to the river on the west side has been significantly disturbed by creation of drainages and berms to control flooding and erosion. Here, most the area within 100 m of the channel was marsh and could not be accessed by the backhoe. Several shovel probes in this region revealed saturated deposits. The area west of the marsh is densely wooded with moderate undergrowth and had poor surface visibility (less than 5 percent). East of the river are several large constructed berms stretching in several directions across the narrow floodplain, which contained dense woods and undergrowth in some areas and had poor surface visibility (less than 5 percent).

Survey at this crossing covered ca. 600 m and consisted of six backhoe trenches and eight shovel tests. Three trenches were dug on each side of the river; six shovel tests were placed in the vicinity of a collapsed frame house and associated outbuildings west of the river, and the other two shovel tests were east of the river. The latter two tests revealed disturbed road fill down to 50 cm below the surface. The three trenches west of the river revealed a series of silty clays interspersed with sandy flood deposits down to at least 2.0 m, all representing Holocene alluvium. Trenches to the east contained disturbed mixed fill down to 2.0 m in some areas. No archeological materials were observed in any of the trenches. The collapsed house is about 50 m outside (south) of the proposed pipeline right of way, ca. 200 m west of the river. Other structures nearby, all outside the proposed right of way, are a standing wood-frame garage, a collapsed shed, a well, and a possible cistern. Six shovel tests ranging between 50 and 80 cm deep were placed in the proposed pipeline right of way near this historic locality to determine if an associated archeological component extends into the project area. No cultural materials were observed in any of these tests, and thus no archeological site was recorded inside the proposed pipeline corridor. Based on historic maps and aerial photographs, this locality appears to date to the mid twentieth century.

Crossing 8, Briar Creek

This crossing is at Briar Creek, a very small tributary of the Tres Palacios River. The stream is incised and has no developed floodplain, and it appears that no substantial Holocene alluvial deposits are present. A total of ca. 250 m was surveyed, ca. 125 m on each side of the creek. Road construction associated with adjacent State Highway 35 has disturbed much of the proposed right of way. A narrow corridor of trees and underbrush runs along the stream on both sides, resulting in very poor surface visibility (less than 10). Beyond the tree lines, both east and west, recently plowed and planted fields stretch for ca. 2 km, resulting in

excellent surface visibility (up to 100 percent). Five shovel tests were excavated at this crossing; three to the east and two to the west of the creek. These tests ranged between 40 and 55 cm deep and exposed similar sediments. The upper 20–30 cm contained road fill. Below that was a dense clay that was saturated in several areas. No archeological materials were recovered from any of these tests, and none were observed on the surface.

Crossing 9, Wilson Creek

Crossing 9 is at Wilson Creek, a tributary of the Tres Palacios River, along State Highway 35. The creek has been channelized with the dredged material placed along the banks. The surrounding land has been significantly disturbed by cultivation. These open fields provided excellent surface visibility (up to 100 percent). The project area runs along the south edge of the highway and has been disturbed notably by road construction. There is little to no relief away from the creek and no recognizable floodplain; it appears that no substantial Holocene alluvial deposits are present. Four shovel tests were excavated here, two on each side of the creek, over a distance of about 250 m. These tests ranged between 30 and 40 cm deep and contained dense disturbed sediments consisting mostly of road fill. No archeological materials were found in any of these tests, and none were observed on the surface.

Crossing 10, Colorado River Tributary

This crossing is at a small unnamed tributary of the Colorado River. A 1.5–2.0-m-deep incised channel with sloping banks is present, and there is no definable floodplain; it appears that Holocene alluvial deposits are not present. The stream channel is surrounded by a narrow corridor of hardwood trees and limited undergrowth. An artificial drainage is present along the west side of the crossing and extends ca. 150 m west to a culvert under State Highway 35. The drainage is bordered along its south bank by a 1.0-m-high berm that runs throughout the project area west of the crossing. Two existing pipelines run through the project area east of the channel, and several constructed berms are present east of the crossing as well. Hence, most of the proposed pipeline corridor has been substantially disturbed. Vegetation consists of dense trees and moderate undergrowth, and surface visibility was fair (up to 50 percent). Five trenches were excavated, three east of the drainage and two west of it. They revealed nearly identical stratigraphic profiles containing dark brown sandy silty clay to silty clay above dense brown silty clay to clay with reddish mottles to at least 2.0 m. No archeological materials were identified in any of these trenches.

Crossing 11, Colorado River Tributary

This crossing is just above the head of a small unnamed tributary of the Colorado River along an abandoned railroad right of way north of State Highway 35. This entire area has been severely disturbed by railroad construction, land modification, and cultivation. No drainage channel is evident on the ground today. Four shovel tests were excavated near the State Highway 35 right of way just south of the pipeline corridor. These tests revealed severely disturbed gravel fill on both sides of the crossing. No archeological materials were observed.

Pump Station Tract, Colorado River

This survey area is on the west bank of the Colorado River north of State Highway 35 near the Bay City limits. The main part of the area examined, which will contain the intake pump station to remove water from the river and a booster pump station, covers 520 m north-south by 160–220 m east-west (24 acres). Also included in this survey area is the 1,000-m-long eastern end of the pipeline route, which adjoins the southwest corner of the pump station tract. This area is an extensive floodplain with Holocene alluvium and the gradually sloping valley wall to the west. Most of the area is open undulating pasture, with the western 350 m of the pipeline route being in a wooded area just north of the State Highway 35 right of way. Because of the vegetation, ground surface visibility was generally poor (less than 10 percent). An abandoned channel of the Colorado River traverses the area north-south, along and just west of the west edge of the pump station tract.

Numerous constructed berms or flood-control features are scattered throughout the area. An abandoned railroad bed on introduced fill runs east-west along the south end of the pump station tract. Fourteen trenches were excavated in the 24-acre tract, and 6 were placed along the proposed pipeline running ca. 500 m west from the pump station tract. For the most part, all of the trenches were excavated to 2.0 m or deeper and revealed similar deposits. These consisted of a series of silty clays interspersed with thick laminated silty sands and sandy flood deposits, all representing Holocene alluvium. The westernmost trench contained disturbed gravelly fill in the upper portion of the profile overlying dense silty clays. No archeological materials were observed in any of the trenches.

The elevated portion of the abandoned railroad bed was recorded as site 41MG136. It is ca. 85 m east-west by 25 m north-south and is 4–5 m high. A gravel bed ca. 5 m wide is atop the embankment, and concrete rubble and wood railroad ties are scattered along the slopes at the east and west ends. Portions of the trestles that once adjoined the embankment are still present at both ends of it, and two metal bars were observed on the surface nearby. The railroad right of way is visible on the surface west of the embankment, and extending outside the project area, as a slightly raised area ca. 10 m wide with paralleling sawn wood posts that probably were part of the original trestle; this part of the right of way was not included within the bounds of 41MG136, though. It is shown on the 1910 soils map for the area and a series of subsequent maps, as well as the 1943 aerial photograph (Figure 4). This was once part of the New York, Texas and Mexican Railway. In 1880, planners intended to connect New York with Mexico City using a 350-mile-long route from Rosenberg to Brownsville, and on to Brazos de Santiago. Construction began in 1881, with 91 miles completed between Rosenberg and Victoria by 1882. In September 1885, the Southern Pacific Railroad acquired the line. The stretch linking Bay City with Palacios (including the small part recorded as 41MG136) was built between 1901 and 1903. The line merged with the Galveston, Harrisburg, and San Antonio Railway in 1905 (Rayburn 2012). Based on aerial photographs, it appears that the railway may have remained active until at least 1979, but it was defunct by 1989, by which time the railroad bridge over the Colorado River had been removed.

The western part of the 1,000-m-long eastern end of the pipeline route was investigated because of the presence of a potential historic locality. An 1864 map shows a house in this vicinity, though because of problems with georeferencing, its precise location is uncertain. No structure is shown at this location on subsequent maps or the 1943 aerial photograph. Because of the possibility of a historic site in this area, six shovel tests were excavated immediately south of the proposed pipeline location, which will follow an existing manmade canal in this area, around several modern buildings. These tests, which were 40–60 cm deep, did not uncover any evidence of archeological remains.

ASSESSMENTS AND RECOMMENDATIONS

Intensive archeological survey of the 24-acre pump station tract and 5.35 km of the 66-km-long Mary Rhodes pipeline route, along with reconnaissance survey of the remainder of the pipeline route, identified a single archeological site. This site, 41MG136, is an elevated railroad bed on the floodplain of the Colorado River that was built in the first decade of the twentieth century and abandoned by 1989. For a railroad to be eligible for the National Register of Historic Places, it should retain integrity of location, setting, design, materials, workmanship, feeling, and association. In this case, the railroad bed is in its original location but retains no other aspects of integrity. The immediate surroundings remain relatively unchanged, but trees and other vegetation have been growing within the raised grade of the railroad bed. With the exception of the railroad bed itself and fragments of the adjoining trestles, all original materials have been removed, thus, no semblance of materials, design, or workmanship is present. As a result, the resource lacks integrity of feeling, and its associative qualities have been compromised. Applying the contexts of community planning and development, transportation, and engineering to the railroad bed, it does not have strong enough historical associations with important historical trends, events, or people to be considered eligible for the National Register under Criterion A or B. It does not embody the distinctive characteristics of a style, type, period, or method of construction

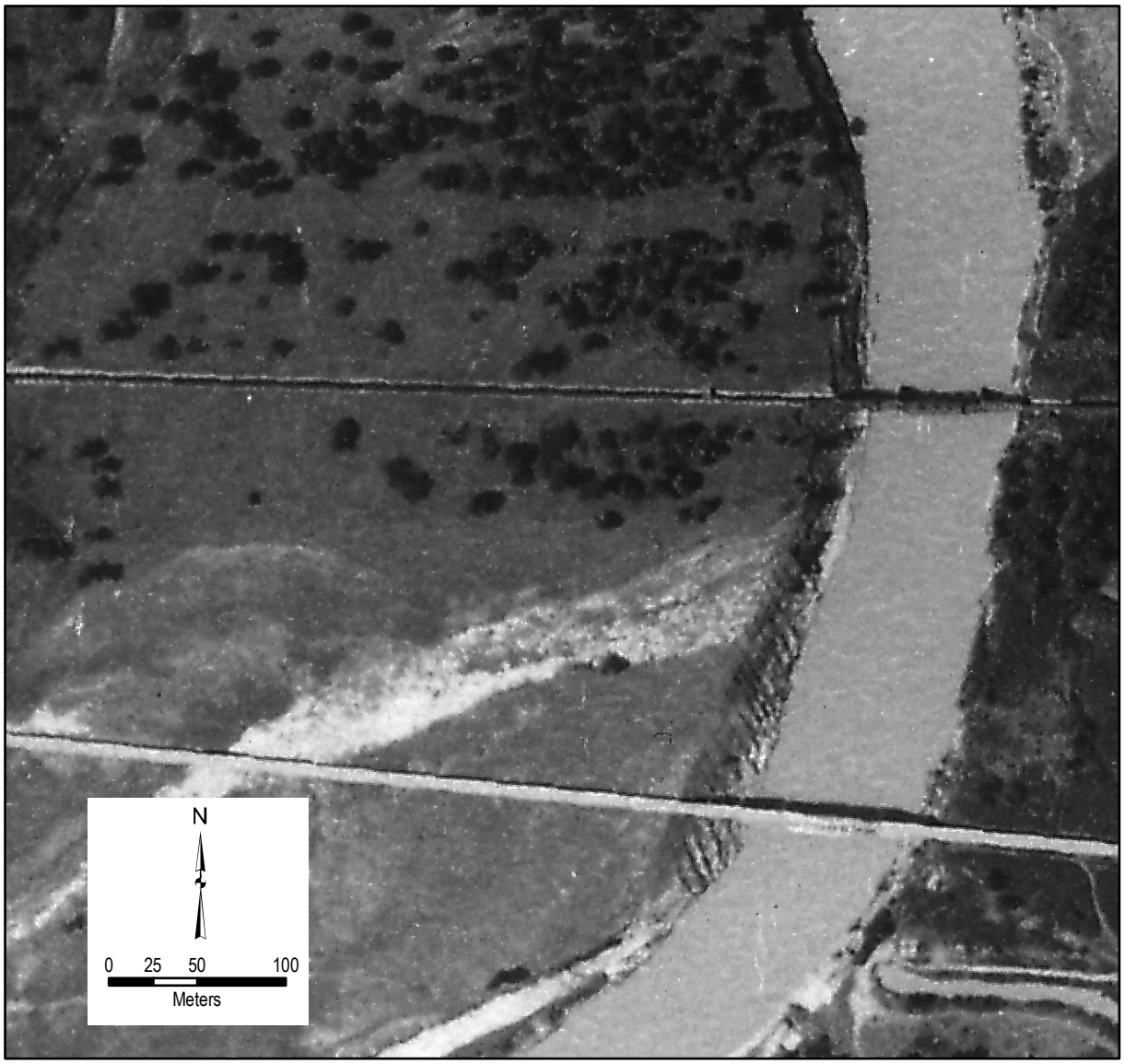

Figure 4. A 1943 aerial photograph showing 41MG136. Site locations are not shown in report copies for public distribution.

or represent design or engineering complexity, and thus it could not be considered eligible for the National Register under Criterion C. It is not eligible for the National Register under Criterion D or for designation as a State Archeological Landmark because it contains no important archeological information.

Much of the project area is in stable or erosional environments where any archeological remains present would be on or near the modern ground surface. The fact that no sites were found in these settings can be attributed to two factors: (1) archeological sites, both Native American and historic, are infrequent in upland sections of this part of the coastal plain, and the odds of a narrow corridor such as the Mary Rhodes pipeline route traversing many sites are low; and (2) with substantial disturbance from plowing and other agricultural practices, road construction, railroad construction, excavation of drainage ditches and construction of berms to control flooding, and placement of buried utility lines and pipelines, ephemeral sites once present in these settings could have been obliterated and thus not be identifiable today.

Only four places have any potential for buried archeological sites with integrity: the floodplains of the Navidad, Tres Palacios, and

Colorado Rivers and West Carancahua Creek. Trenching did not find any sites in those settings, however, and thus the pipeline project will not impact any sites in the upper ca. 2 m of the deposits at those locations. It is possible that very deeply buried sites more than 2 m below the surface could be present on one or more of these floodplains, but identifying such sites during survey, even when backhoe trenching is part of the methodology, is not feasible. Hence, the work reported here represents a reasonable and good-faith effort to ensure that the proposed project will not affect any archeological sites that are eligible for listing in the National Register of Historic Places or designation as State Archeological Landmarks. Since no eligible sites were identified, no further archeological work is recommended.

REFERENCES CITED

Aten, Lawrence E.
1983 *Indians of the Upper Texas Coast.* Academic Press, New York.

Birmingham, W. W., and Thomas Hester
1976 Late Pleistocene Archaeological Remains from the Johnson-Heller Site, Texas Coastal Plain. In *Papers on Paleo-Indian Archeology in Texas: 1,* pp. 15–33. Special Report No. 3. Center for Archaeological Research, The University of Texas at San Antonio.

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

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

Black, Stephen L., and Wayne L. Cox
1983 *A Cultural Resource Survey of Dredge Disposal Sites Along the Gulf Intracoastal Waterway, Brazoria and Matagorda Counties, Texas*. Archaeological Survey Report No. 124. Center for Archaeological Research, The University of Texas at San Antonio.

Brown, David O.
1983 The Berger Bluff Site (41GD30A): Excavations in the Upper Deposits, 1979. Archaeological Survey Report No. 115. Center for Archaeological Research, The University of Texas at San Antonio.

Brown, David O., Dana Anthony, and James T. Jones
2008 *Archaeological Survey for the Tres Palacios Gas Storage Project, Wharton and Matagorda Counties, Texas*. Report of Investigations 20. Anthony and Brown Consulting, Austin.

Brown, Kenneth M.
1996 Berger Bluff. In *The New Handbook of Texas*, 1:497–498. Texas State Historical Association, Austin.

Brown, Kenneth M., Daniel R. Potter, Grant D. Hall, and Stephen L. Black
1982 *Excavations at 41LK67: A Prehistoric Site in the Choke Canyon Reservoir, South Texas*. Choke Canyon Series 7. Center for Archaeological Research, The University of Texas at San Antonio.

Bruseth, Jim, and Jeff Durst
2002 The Story of the First Presidio La Bahia Slowly Emerges. *Current Archeology in Texas* 4(2):1–3. Texas Historical Commission, Austin.

Bureau of Economic Geology
1987 *Geologic Atlas of Texas, Beeville–Bay City Sheet*. Bureau of Economic Geology, The University of Texas at Austin.

Calhoun, Cecil A.
1999 Majolica and Faience from the Presidio Loreto Site (41VT8). *Bulletin of the Texas Archeological Society* 70:339–354.

Campbell, T. N.
1947 The Johnson Site: The Type Site of the Aransas Focus of the Texas Coast. *Bulletin of the Texas Archeological and Paleontological Society* 18:40–75.

1952 The Kent-Crane Site: A Shell Midden on the Texas Coast. *Bulletin of the Texas Archeological and Paleontological Society* 23:39–77.

1958 Archeology of the Central Southern Sections of the Texas Coast. *Bulletin of the Texas Archeological Society* 27:7–46.

1976 Archaeological Investigations at the Morhiss Site, Victoria County, Texas, 1932–1940. In *An Archaeological Survey of Coleto Creek, Victoria and Goliad Counties, Texas*, by Anne A. Fox and Thomas R. Hester, pp. 81–85. Archaeological Survey Report No. 18. Center for Archaeological Research, The University of Texas at San Antonio.

Campbell, T. N., and T. J. Campbell
1981 *Historic Indian Groups of the Choke Canyon Reservoir and Surrounding Area, Southern Texas*. Choke Canyon Series 1. Center for Archaeological Research, The University of Texas at San Antonio.

Corbin, James E.
1974 A Model for Cultural Succession for the Coastal Bend Area of Texas. *Bulletin of the Texas Archeological Society* 45:29–54.

1976 The Archaic of the Texas Coast. In *The Texas Archaic: A Symposium*, edited by Thomas R. Hester, pp. 91–97. Special Report No. 2. Center for Archaeological Research, The University of Texas at San Antonio.

Cox, Kim A., and Herman A. Smith
1988 Kent Crane Revisited. *La Tierra* 15(3):24–28.

Davis, Mike, and Jim Bruseth
2000 The Fort St. Louis Archeological Project, October 1999 through mid-February 2000. *Current Archeology in Texas* 2(1):1–4.

2001 Recent Archeological and Architectural Discoveries at Fort St. Louis. *Current Archeology in Texas*, 3(1):6–7.

Davis, Mike, Jeff Durst, Curtis Tunnell, and Jim Bruseth
2000 The Fort St. Louis Archeological Project: An Update on Recent Discoveries. *Current Archeology in Texas* 1(2):1–4.

Fields, Ross C., Karl W. Kibler, E. Frances Gadus, Douglas K. Boyd, and Timothy B. Griffith
2005 *Archeological Impact Evaluations and Surveys in the Texas Department of Transportation's Abilene, Austin, Brownwood, Bryan, Fort Worth, Waco, and Yoakum Districts, 2001–2003*. Report No. 83, Archeological Studies Program, Texas Department of Transportation, Environmental Affairs Division, Austin. Reports of Investigations No. 143, Prewitt and Associates, Inc., Austin.

Foster, William C.
1995 *Spanish Expeditions into Texas 1689–1768*. University of Texas Press, Austin.

Fox, Anne A., S. L. Black, and S. James
1979 *Intensive Survey and Testing of Archaeological Sites on Coleto Creek, Victoria and Goliad Counties, Texas*. Archaeological Survey Report No. 67. Center for Archaeological Research, The University of Texas at San Antonio.

Fox, Anne A., and Thomas R. Hester
1976 *Archaeological Survey of Coleto Creek, Victoria and Goliad Counties, Texas*. Archaeological Survey Report No. 18. Center for Archaeological Research, The University of Texas at San Antonio.

Fox, Anne A., and Steve A. Tomka
2006 Excavations at Presidio Nuestra Señora de Loreto de la Bahía del Espíritu Santo. *Bulletin of the Texas Archeological Society* 77:33–159.

Fritz, Gayle
1975 *Matagorda Bay Area, Texas: A Survey of the Archeological and Historical Resources.* Research Report No. 45. Texas Archeological Survey, The University of Texas at Austin.

Gadus, E. Frances, Marie E. Blake, Martha Doty Freeman, and Karl Kibler
1999 *National Register Testing of Prehistoric and Historic Sites and Survey of Placement Areas, Channel to Victoria, Calhoun and Victoria Counties, Texas*. Reports of Investigations No. 121. Prewitt and Associates, Inc., Austin.

Gustavson, Thomas C.
1975 *Microrelief (Gilgai) Structures on Expansive Clays of the Texas Coastal Plain, Their Recognition and Significance in Engineering Construction*. Geological Circular 75-7. Bureau of Economic Geology, The University of Texas at Austin.

Hall, Grant D.
1981 *Allens Creek: A Study in the Cultural Prehistory of the Lower Brazos River Valley, Texas*. Research Report No. 61. Texas Archeological Survey, The University of Texas at Austin.

1995a A Perspective on Some Prehistoric Cemeteries in Texas: Loma Sandia in the Regional Setting. In *Archeological Investigations at the Loma Sandia Site (41LK28): A Prehistoric Cemetery and Campsite in Live Oak County, Texas*, by Anna Jean Taylor and Cheryl Lynn Highley, Volume 1, pp. 47–56. Studies in Archeology 20. Texas Archeological Research Laboratory, The University of Texas at Austin.

1995b Prehistoric Cemeteries on the Texas Central Coastal Plain: Interpretations and Hypotheses. In *Archeological Investigations at the Loma Sandia Site (41LK28): A Prehistoric Cemetery and Campsite in Live Oak County, Texas*, by Anna Jean Taylor and Cheryl Lynn Highley, Volume 2, pp. 633–647. Studies in Archeology 20. Texas Archeological Research Laboratory, The University of Texas at Austin.

Hall, Grant D., Stephen L. Black, and Carol Graves
1982 *Archaeological Investigations at Choke Canyon Reservoir, South Texas: The Phase I Findings*. Choke Canyon Series 5. Center for Archaeological Research, The University of Texas at San Antonio.

Hall, Grant D., Thomas R. Hester, and Stephen L. Black
1986 *The Prehistoric Sites at Choke Canyon Reservoir, South Texas: Results of Phase II Archaeological Investigations*. Choke Canyon Series 10. Center for Archaeological Research, The University of Texas at San Antonio.

Hester, Thomas R.
1976 Late Pleistocene Aboriginal Adaptations in Texas. In *Papers on Paleo-Indian Archaeology in Texas: I*, pp. 1–10. Special Report No. 3. Center for Archaeological Research, The University of Texas at San Antonio.

1980 A Survey of Paleo-Indian Remains Along the Texas Coast. In *Papers on the Archaeology of the Texas Coast*, edited by L. Highley and T. R. Hester, pp. 1–22. Special Report 11. Center for Archaeological Research, The University of Texas at San Antonio.

1995 The Prehistory of South Texas. *Bulletin of the Texas Archeological Society* 66:427–459.

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

Highley, Cheryl Lynn
1986 *Archaeological Investigations at 41LK201, Choke Canyon Reservoir, Southern Texas.* Choke Canyon Series 11. Center for Archaeological Research, The University of Texas at San Antonio.

Hindes, Kay V., Anne E. Fox, and E. H. Schmiedlin
1999 An Overview of Test Excavations and Documentary Research at 41VT10, the Tonkawa Bank Site, Victoria City Park, Victoria Texas. *Bulletin of the Texas Archeological Society* 70:79–96.

Huebner, Jeffery A.
1988 *The Archaeology of Blue Bayou: A Late Prehistoric and Archaic Mortuary Site, Victoria County, Texas*. M.A. thesis, Department of Anthropology, The University of Texas at San Antonio.

Hyde, Harold W.
2002 *Soil Survey of Matagorda County, Texas*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station.

Jantz, Lee Meadows, Richard L. Jantz, Nicholas P. Herrmann, Corey S. Sparks, Katherine, E. Weisensee, and Derinna V. Kopp
2002 *Archaeological Investigations at the Last Spanish Colonial Mission Established on the Texas Frontier: Nuestra Señora del Refugio (41RF1), Refugio County, Texas, Volume II, Osteological Analyses*. Archaeological Survey Report No. 315. Center for Archaeological Research, The University of Texas at San Antonio. Archeological Studies Program Report No. 39. Texas Department of Transportation, Environmental Affairs Division, Austin.

Mallouf, Robert J., Daniel E. Fox, and Alton K. Briggs
1973 *An Assessment of the Cultural Resources of Palmetto Bend Reservoir, Jackson County, Texas.* Archeological Survey Report No. 11. Texas Historical Commission and Texas Water Development Board, Austin.

McGuff, Paul R., and William B. Fawcett Jr.
1978 *Phase II: Palmetto Bend Archeological Investigations, Re-evaluative Survey and Testing.* Palmetto Bend Reservoir Series, Volume 4. Research Report 67. Texas Archeological Survey, The University of Texas at Austin.

Miller, Wesley, L.
1997 *Soil Survey of Jackson County, Texas*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station.

Prewitt, Elton R., Susan V. Lisk, and Margaret A. Howard
1987 *National Register Assessments of the Swan Lake Site, 41AS16, on Copano Bay, Aransas County, Texas*. Reports of Investigations No. 56. Prewitt and Associates, Inc., Austin.

Rayburn, John C.
2012 The Handbook of Texas Online, s.v. "New York, Texas and Mexican Railway." Electronic document, http://www.tshaonline.org/handbook/online/articles/eqn02, accessed May 7, 2012.

Ricklis, Robert A.
1988 Archeological Investigations at the McKinzie Site (41NU221) Nueces County, Texas: Description and Contextual Interpretations. *Bulletin of the Texas Archeological Society* 58:1–76.

1989 *Historical Cultural Ecology of the Karankawan Indians of the Central Texas Coast: A Case Study in the Roots of Adaptive Change*. Ph.D. dissertation, Department of Geography, The University of Texas at Austin.

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

1996 *The Karankawa Indians of Texas. An Ecological Study of Cultural Tradition and Change*. 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* 70:132–168.

2011 New Perspectives on the Archaic of the Texas Coastal Plain: The Buckeye Knoll Site (41VT98) on the Lower Guadalupe River near Victoria, Texas. *Bulletin of the Texas Archeological Society* 82:31–76.

Scott, Robert F. IV, and Daniel E. Fox
1982 *Excavations at Sites 41LK31/32 and 41LK202 in the Choke Canyon Reservoir, South Texas.* Choke Canyon Series 8. Center for Archaeological Research, The University of Texas at San Antonio.

Sellards, E. H.
1940 Pleistocene Artifacts and Associated Fossils from Bee County, Texas. *Bulletin of the Geological Society of America* 51:1627–1658.

Steele, D. Gentry
1986 Analysis of Vertebrate Faunal Remains. In *The Clemente and Herminia Hinojosa Site, 41JW8: A Toyah Horizon Campsite in Southern Texas*, by Stephen L. Black, pp. 108–136. Special Report No. 18. Center for Archaeological Research, The University of Texas at San Antonio.

Steele, D. Gentry, and C. A. Hunter
1986 Analysis of Vertebrate Faunal Remains from 41MC222 and 41MC296, McMullen County, Texas. In *The Prehistoric Sites at Choke Canyon Reservoir, South Texas: Results of Phase II Archaeological Investigations*, by G. D. Hall, T. R. Hester, and S. L. Black, pp. 452–502. Choke Canyon Series 10. Center for Archaeological Research, The University of Texas at San Antonio.

Story, Dee Ann
1968 *Archeological Investigations at Two Central Texas Gulf Coast Sites*. Report No. 13. Archeological Program, State Building Commission, Austin.

1985 Adaptive Strategies of Archaic Cultures of the West Gulf Coastal Plain. In *Prehistoric Food Production in North America*, edited by R. I. Ford, pp. 19–56. Anthropological Papers 75. Museum of Anthropology, University of Michigan, Ann Arbor.

1990 Cultural History of the Native Americans. In *The Archeology and Bioarcheology of the Gulf Coastal Plain,* by Dee Ann Story, Janice A. Guy, Barbara A. Burnett, Martha Doty Freeman, Jerome C. Rose, D. Gentry Steele, Ben W. Olive, and Karl J. Reinhard, pp. 163–366. Research Series No. 38. Arkansas Archeological Survey, Fayetteville.

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Taylor, Anna Jean, and Cheryl Lynn Highley
1995 *Archeological Investigations at the Loma Sandia Site (41LK28): A Prehistoric Cemetery and Campsite in Live Oak County, Texas, Volumes. 1 and 2.* Studies in Archeology 20. Texas Archeological Research Laboratory, The University of Texas at Austin.

Tennis, Cynthia L.
2002 *Archaeological Investigations at the Last Spanish Colonial Mission Established on the Texas Frontier: Nuestra Señora del Refugio (41RF1), Refugio County, Texas, Volume I: Archaeological Investigations*. Archaeological Survey Report No. 315. Center for Archaeological Research, The University of Texas at San Antonio. Archeological Studies Program Report No. 39. Texas Department of Transportation, Environmental Affairs Division, Austin.

Wakefield, Walter H.
1968 *Archeological Surveys of Palmetto Bend and Choke Canyon Reservoirs, Texas*. Survey Report No. 5. Texas Archeological Salvage Project, The University of Texas at Austin.

Walter, Tamra L.
1999 A Preliminary Report of the 1997 TAS Field School Excavations in Area A at Mission Espiritu Santo de Zuniga (41VT11), Victoria County, Texas. *Bulletin of the Texas Archeological Society* 70:97–121.

Waters, Michael R.
1992 *Principles of Geoarchaeology: A North American Perspective*. University of Arizona Press, Tucson.

Weinstein, Richard A.
1992 *Archaeology and Paleogeography of the Lower Guadalupe River / San Antonio Bay Region: Cultural Resources Investigations Along the Channel to Victoria, Calhoun and Victoria Counties*, *Texas.* Coastal Environments, Inc., Baton Rouge.

2002 *Archaeological Investigations at the Guadalupe Bay Site (41CL2): Late Archaic through Historic Occupation along the Channel to Victoria. Calhoun County, Texas*. Coastal Environments, Inc., Baton Rouge.