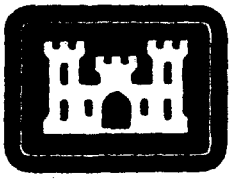

Cultural Resources Series
Report Number: COELMN/PD-94/02

US Army Corps of Engineers
New Orleans District

CULTURAL RESOURCES INVESTIGATIONS FOR ITEM M-178.0 TO 173.2-R, MISSISSIPPI RIVER LEVEES, LOUISIANA

Final Report

May 1994

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Archeological survey was conducted in two areas within Item M-178.0 to 173.2-R. A total of 104.75 acres were surveyed. A total of 65 auger tests and four shovel tests were excavated. Auger tests to a depth of 2 m spaced at 50 m intervals were excavated along the toe of levee between Levee Station 0+00 and 50+68 within the Lafourche Basin Levee district. In addition, auger tests to a depth of 2 m were excavated at 35 m intervals within a proposed borrow area located within the boundaries of the Atchafalaya Basin Levee District between Levee Stations 6168+00 and 6188+00. No archeological sites were located in either of the two survey areas. No further work is recommended.

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DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
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REPLY TO
ATTENTION OF:

April 18, 1994

Planning Division
Environmental Analysis Branch

To The Reader:

This cultural resources effort was designed, funded, and guided by the U.S. Army Corps of Engineers, New Orleans District, as part of our cultural resources management program. The work documented in this report was performed to assess cultural resource impacts which could result from construction of Item M-178.0 to 173.2-R, Philadelphia Point Donaldsonville Levee Enlargement and Concrete Slope Pavement, Atchafalaya Basin and Lafourche Basin Levee Districts. This levee item is a feature of the Mississippi River and Tributaries Project.

This report has been reviewed and accepted by the New Orleans District. We commend the contractor's efforts and careful scholarship.

James M. Wojtala
Technical Representative

Michael E. Stout
Authorized Representative
of the Contracting Officer

for Robert A. Busson Jr.
R. H. Schroeder, Jr.
Chief, Planning Division

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CHAPTER 1
INTRODUCTION

Work reported in this volume was initiated pursuant to Delivery Order 05, Contract DACW29-92-D-0012 with the U.S. Army Corps of Engineers, New Orleans District. The Revised Scope of Services requires a cultural resources investigation along the right descending bank of the Mississippi River from Mile 178.0 to 173.2-R Above Head of Passes (AHP) in Ascension Parish, Louisiana. The study area represents the construction right of way for the Philadelphia Point to Donaldsonville Levee Enlargement along the west bank of the Mississippi River. The project area included Sections 12, 13, 14, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, and 32 in T11 S, R14 E, and Sections 24, 21, 20, 19, 18, 17, 16, 15, and 14 in T11 S, R15 E.

The Revised Scope of Services specifies that a literature search be conducted for the entire project area (Figure 1), and that auger testing be conducted within a 7068-foot (2154.2 m) area within the larger project area. Table 1, taken from the Revised Scope of Services, specifies the nature of the work required within the various portions of the project area. The table delineates these areas in terms of levee stations.

The New Orleans District, Corps of Engineers proposes to bring the levee up to design grade by placing earth fill and surfacing the levee crown. Material will be obtained from a borrow site located on the batture adjacent to Levee Stations 6168+00 to 6188+00. The project will also entail the placement of concrete pavement on the riverside levee slope.

Background information was gathered from a variety of primary and secondary sources available at the Howard-Tilton Memorial Library, Tulane University, and the Hill Memorial Library, Louisiana State University. In addition, cultural resource technical reports, site forms, and National Register nomination forms for the project area and vicinity were examined. Field investigations were conducted in the areas specified in Table 1. Auger tests were excavated at 50 m intervals along the riverside toe of levee in the downriver portion of the area (Lafourche Levee District Stations 0+00 to 50+68). Within the upriver borrow area (Atchafalaya Levee District Stations 6168+00 to 6188+00), auger tests were excavated at 35 m intervals. In order to maximize the potential for the discovery of historic sites, the placement of the auger test in the borrow area was determined in consultation with the New Orleans District's Contracting Officer's Technical Representative. No historic or prehistoric sites were encountered in either of the survey areas.

Chapters 2 through 5 present background information on the geomorphology, natural setting, prehistory, and history of the project area. Chapter 6 summarizes the results of field investigations previously conducted within the vicinity of the project area. Chapter 7 is an overview of field investigations. Stratigraphy observed in the auger tests is presented in Appendices I and II. Chapter 8 summarizes the results of the investigations and provides recommendations.

Table 1. Overview of the Work Required within the Philadelphia Point to Donaldsonville Levee Enlargement.

Levee Station	Description of Construction and Previous Investigations	Cultural Resources Concerns
Atchafalaya Levee District		
6000+00 to 6223+00	Levee Enlargement and concrete slope pavement (LE & CSP) Shenkel (1976)	Historic Background Research
6168+00 to 6188+00	LE & CSP, Borrow site; Shenkel (1976)	Historic Background Research and Auger Testing
Lafourche Levee District		
0+00 to 50+68	LE & CSP	Historic Background Research and auger testing
50+68 to 82+00	LE & CSP Rader (1978)	Historic Background Research

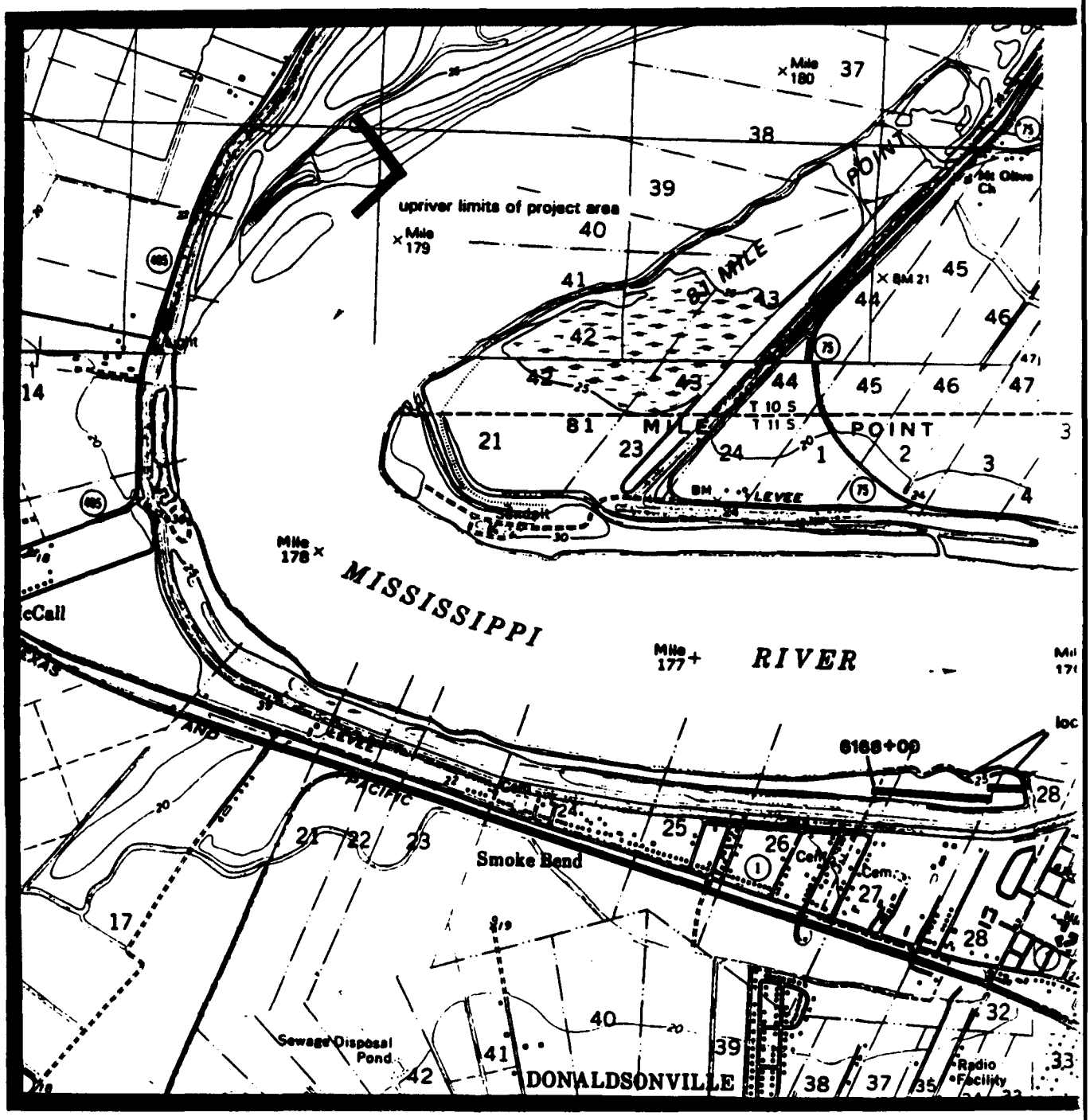
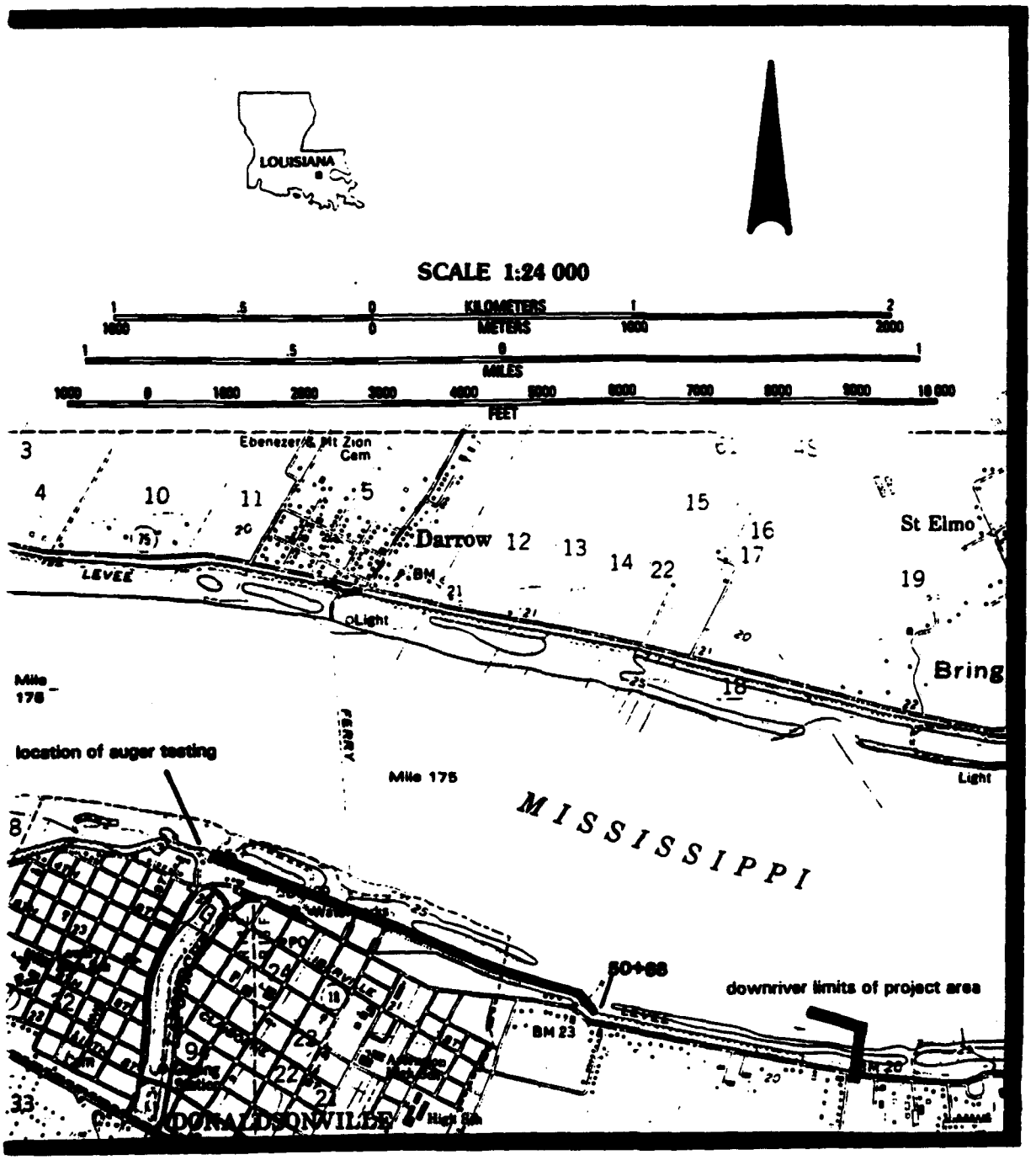


Figure 1. Excerpts from the 1981 Donalds
the 1992 Carville USGS 7.5' series topogra
study area and the locations of auger tests



ldsonville, the 1974 Belle Rose, and
graphic quadrangles showing the
sts.

Dr. Jill-Karen Yakubik served as Principal Investigator for the project, and Hakon Vigander served as Field Archeologist. Crew for the project included Jim Pritchard, Tom Butler, and Aimee Finley.

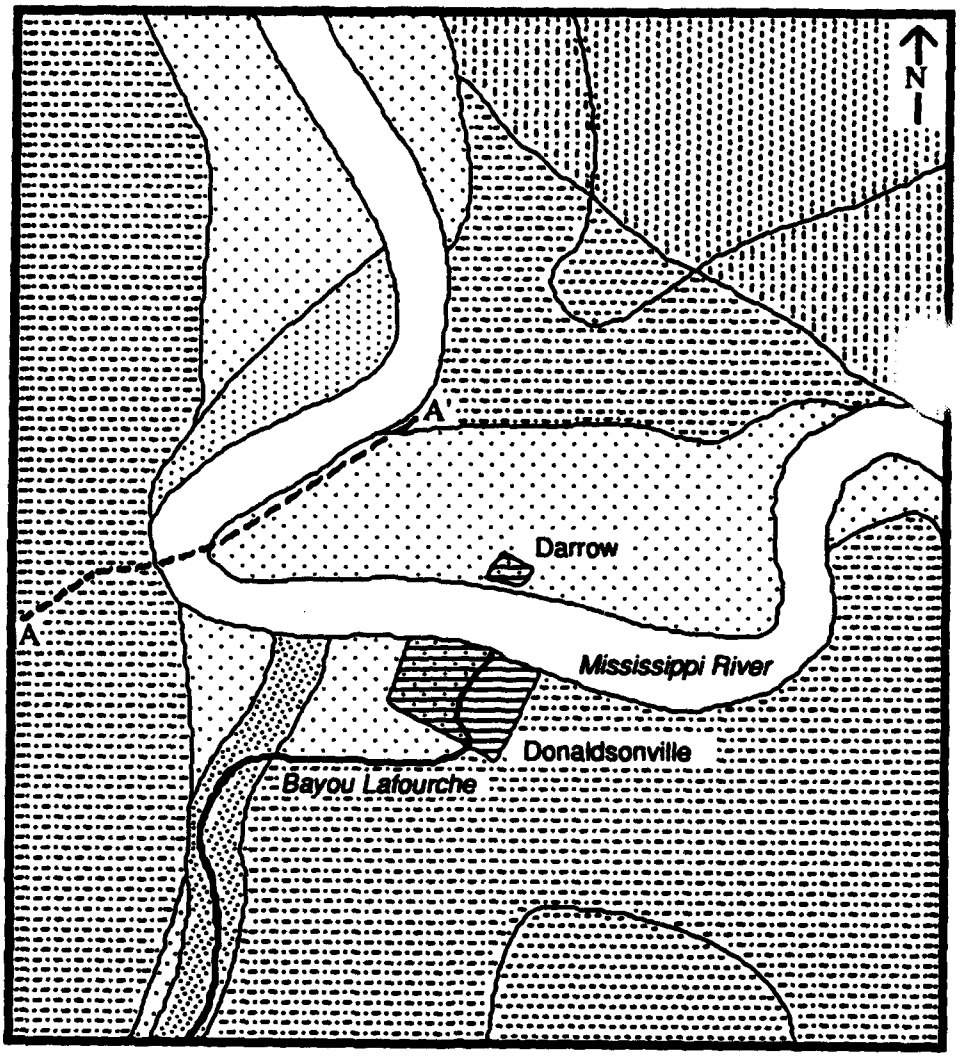
CHAPTER 2
GEOMORPHOLOGY
by Paul V. Heinrich

Throughout the Holocene, the project region has been dominated either directly or indirectly by the fluvial activity within the Mississippi Alluvial Valley. Fluviatile processes and forces have constantly reworked the alluvial plain that occupies this valley and reshaped the biological and depositional environments of this plain. Due to its dynamic nature, the inhabitants of the project region have had to use either settlement selection strategies or, as in historic and modern times, artificial control structures in order to exploit the resources of this alluvial plain. As a result, the numerous environmental factors, which influence the distribution of archeological deposits throughout the project area, need to be understood in order to correctly interpret the archeological record. Therefore, this chapter identifies and briefly describes those factors which influenced the use of the project area by prehistoric and historic Americans and later altered the cultural deposits that they left behind.

Geomorphology

Within Item M-178.0 to 173.2-R, the cutbank that comprises the right descending bank of the Mississippi River consists of natural levee deposits, overlying backswamp, point bar, and abandoned channel deposits (Figure 2). Downstream from M-178-R to center of the mouth of Bayou Lafourche, the cutbank is underlain by natural levee deposits overlying point bar and abandoned channel deposits of the trunk distributary channel of the Lafourche Delta Complex. Reliable data concerning the local thickness of these deposits are lacking. At M-177-R, the modern cutbank truncates an abandoned channel of the Lafourche deltaic system. The edges of the abandoned channel deposits lie about 150 m (500 ft) upstream and 120 m (400 ft) downstream of the boundary line between Secs. 24 and 25, T11 S, R14 E. According to Saucier (1969), the remainder of the cutbank from the mouth of Bayou Lafourche to 173.2-R consists of natural levee deposits overlying backswamp deposits as shown by the cross-section of at M-178.2 (Figure 3). However, the comparison of historic river surveys and current topographic maps indicates that the batture of this segment of the right descending bank is underlain by historic, Mississippi River point bar deposits (Saucier 1969).

The cutbank along which both of the survey areas are located belongs to the active river course of the modern Mississippi River. This channel, which forms the southern Meander Belt No. 1, is flanked by well developed natural levees on both of its banks. The crest of the natural levees rise as much as 6 to 7 m (20 to 23 ft) above mean sea level. They are highest adjacent to channels and courses of the Mississippi River and slope gently away as far as 3 to 6 km (1.8 to 3.7 miles) from the channel margin. On the point bar side and left descending bank of this channel, the natural levees bury point bar deposits that form a narrow, discontinuous meander belt which is approximately 0.5 to 3.0 km (0.3 to 1.8 miles) wide. On the right descending bank, natural levees extend away from Meander



LEGEND

Bayou

A----A' Cross-Section

Natural Levee Overlying Prairie Terrace

Natural Levee Overlying Backswamp Deposits

Natural Levee Overlying Point Bar Deposits

Point Bar

Abandoned Lafourche - Mississippi channel

Backswamp

Prairie

Town

Figure 2. Geomorphic Map of the Vicinity of Survey Area (modified from Saucier 1969).

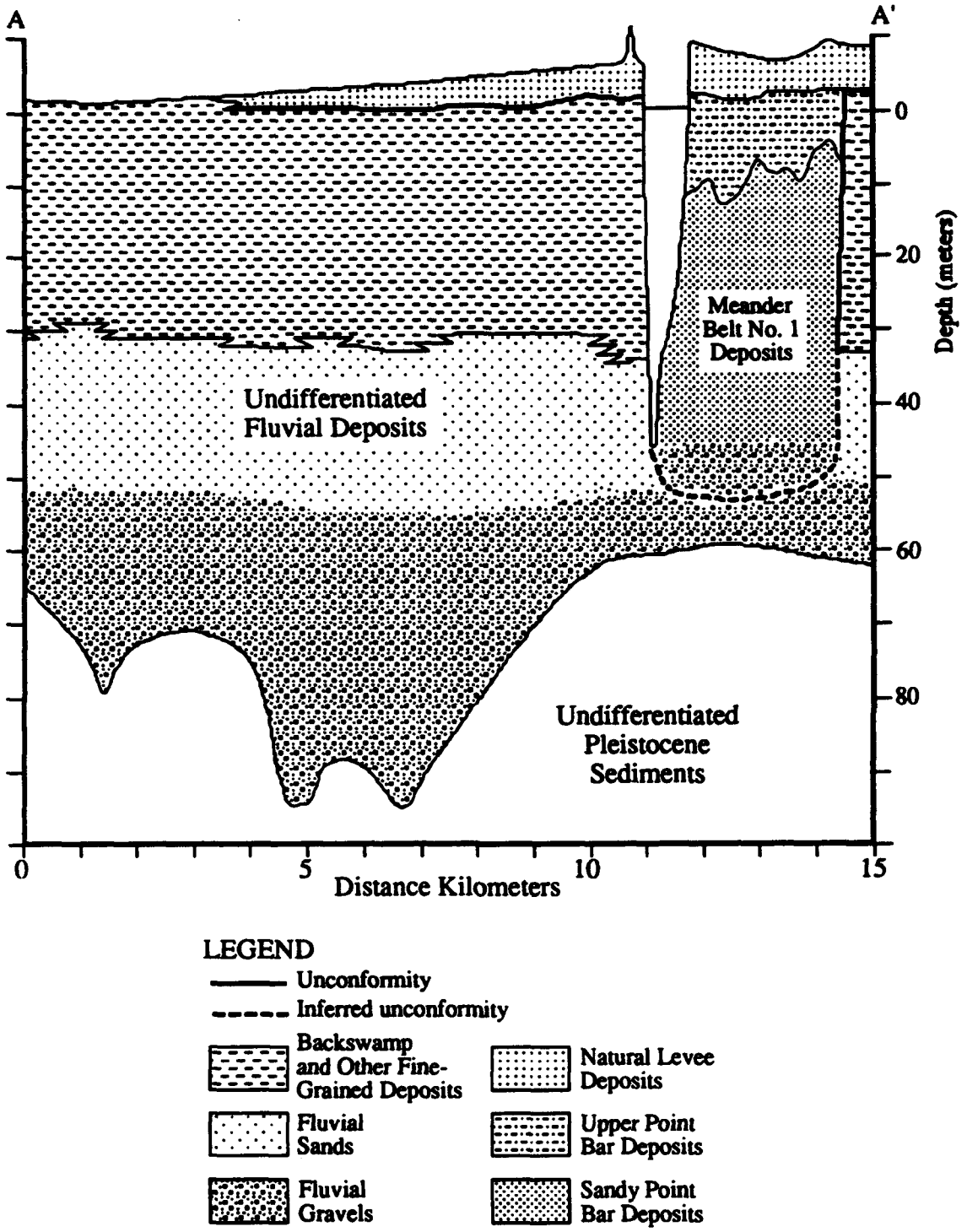


Figure 3. Geologic Cross-Section of Western Portion of Survey Area (modified from Saucier 1969).

Belt No. 1 and cover adjacent portions of the backswamp (Figure 2). Both survey areas lie within batture, which is the slope of the natural levee that is situated between its crest and the bank of the river (Saucier 1969).

Backswamp, also called a "flood basin," comprises the Mississippi Alluvial Plain immediately west of Meander Belt No. 1. Backswamp is that part of an alluvial plain which consists of swamp, lakes, or combination of both. The backswamp consists of environments that range from infrequently flooded forested bottomlands to permanent swamps and lakes. Long and narrow natural levee systems of crevasses, called "crevasse distributaries," often extend from the main natural levee of the meander belt, a significant distance into the backswamp (Saucier 1969, 1974).

Stratigraphy

Within the study region, Meander Belt No. 1 is on the surface of a thick package of meandering river sediments (Figure 3). Adjacent to the modern channel, there are 4 to 6 m (13 to 20 ft) of natural levee deposits covering 44 to 50 m (145 to 165 ft) of point bar deposits. These point bar deposits consist of silty sands and silts that grade downward into clean sands and gravels. A similar, but somewhat thinner package of fluvial deposits comprise the point bar deposits associated with the abandoned distributary channel of the Lafourche Delta Complex. The sediments forming the natural levees are thickest immediately adjacent to the modern and abandoned channels and decrease in thickness away from it. The natural levee sediments typically include stiff to very stiff, mottled brown to grayish brown, silts, silt loams, silty clays, and clays (Saucier 1969, 1974).

The backswamp located west and south of Meander Belt No. 1 is underlain by about 30 m (98 ft) of fine grained, often organically-rich sediments (Figure 3). These sediments are comprised of soft to stiff, dark to light gray clays that contain abundant wood fragments and beds of peat. The backswamp deposits bury older, Late Wisconsinan or Early Holocene fluvial deposits. These clays have been incrementally deposited by floodwaters over most of the Holocene (Saucier 1969, 1974; Saucier and Snead 1989).

Soils

Spicer et al. (1976) has mapped the batture within which both survey areas lie as frequently flooded Convent soils. The Convent series is a somewhat poorly drained, slightly acid Entisol. Convent series consist of a simple A-C horizon sequence that has developed within the silty overbank deposits of the Mississippi River. The A horizon of the Covent series consists of a dark grayish brown silt loam about 10 to 35 cm thick with a weakly developed soil structure. This horizon directly overlies laminated and interbedded silt loams and sandy loams. The Convent series is a very poorly developed soil resulting from the occurrence of recent sedimentation or erosion (Spicer et al. 1976).

Sedimentary Processes

Within the project area, three major depositional environments can be defined on the basis of sedimentary processes. They are the river channel, channel margin, and backswamp environments. Each of these environments are dominated by distinct sedimentary processes that result in recognizable sedimentary facies.

River Channel. The course of the Mississippi River within the project area exhibits slow rates of lateral migration. This is due to the immaturity of this segment of Meander Belt No. 1 and the clayey backswamp sediments into which its river course is cutting. This meander belt is narrow and discontinuous because of its relative immaturity. The upward-fining, point bar sequence of fluvial sands is about 44 to 50 m (145 to 165 ft) which is directly related to the depth of the river channel at deposition. The lower part of a point bar is deposited by lateral accretion and the upper few meters accumulates by overbank sedimentation. Approximately 4 to 6 m (13 to 20 ft) of the natural levee deposits of point bar deposits overlie the upper point bar deposits (Saucier 1974; Galloway and Hobday 1983).

The lateral migration of a channel is accomplished by the active erosion of river currents on the concave bank, called the "cutbank," of a river channel. Scouring by fluvial currents at the base of a cutbank within a river channel causes it to become oversteepened. Eventually, the cutbank is oversteepened to the point that it caves into the river. When this occurs, the channel laterally shifts the cutbank and simultaneously deposits sand and silt onto the opposite convex bank, called the "point bar," of the river channel (Fisk 1947; Flores et al. 1985; Galloway and Hobday 1983).

Channel Margin. During flood stage, floodwaters containing some bedload and considerable amounts of suspended load escape the banks of an active river channel and accumulate along the margin of the channel creating natural levees. If floodwaters uniformly overflow the banks of a channel, they no longer are confined by the channel banks. The waters spread out across the floodplain, causing their velocity to abruptly decrease. The baffling effect of flood plain vegetation causes floodwaters to lose additional velocity as they leave the river channel. As a result of this rapid decrease in velocity, silt and sand suspended within these floodwaters quickly settles out of suspension and accumulates along the margin of the river channel. Only the finer suspended clay is transported by unconfined floodwaters into the backswamp of the flood basin. The silt and sand accumulates incrementally with each flood to build low, wedged-shaped ridges, called "natural levees," paralleling the river banks which slowly decreases in elevation away from the river (Galloway and Hobday 1983; Farrell 1989; Flores et al. 1985).

Natural levees typically consist of fine sandy loams, silts, silt loams, and silty clays. These sediments are usually thickest and coarsest adjacent to the river bank. As they move away from the river, the sediments are thin and decrease in grain size gradually until they interfinger with clay-like flood basin sediments. The sediments of older, relict natural levees of river

channels typically consist of massive, often iron-stained, stiff to very stiff, mottled brown to grayish brown, fine sandy loams, silts, silt loams, and silty clays. In the case of younger, active natural river levees and major crevasse distributary channels, these sediments may exhibit internal bedding and sedimentary structures that reflect rapid deposition by multiple, shallow flow events. The natural levees of the smaller crevasse distributaries consist of stiff gray clay containing a small percentage of silt and fine sand. They contain abundant plant roots and these are sometimes, but not always, oxidized (Galloway and Hobday 1983; Farrell 1989; Flores et al. 1985).

Except for the most immature natural levee, natural levees are subaerially exposed for long periods of time between the brief periods of high river stages when floodwaters overflow them. During subaerial exposure, natural levee sediments are compacted, oxidized, highly leached, and bioturbated by pedogenic processes and weathering. As a result, natural levees contain massive, buried weathering zones containing iron oxides, carbonate nodules, and iron oxide concretions. These characteristics reflect subaerial weathering and soil formation during periods of subaerial exposure of natural levees between flood events (Fisk 1947; Galloway and Hobday 1983).

Eventually, a natural levee aggrades to a level above the bankfull stage of a river such that it cannot be uniformly overflowed by floodwaters. In such a case, floodwaters escape the river and overflow the natural levee through local breaches within the natural levee, called "crevasses." The flow of floodwaters is concentrated within crevasses, often causing them to further cut and widen crevasses creating well-defined channels, called "crevasse channels." It is through these crevasse channels that floodwaters cross natural levees. Typically, a crevasse channel cuts through a natural levee at right angles and is dry except during flood stage. Crevasse channels provide conduits for floodwaters to transport suspended load and some bed load from the river, through the natural levee, and into the near-channel portion of the adjacent flood basin (Fisk 1947; Galloway and Hobday 1983; Farrell 1989).

Where they leave a crevasse channel, sediment-laden floodwaters decrease in velocity and, thus, deposit their load of sands and silts as a crevasse splay. A crevasse splay is a delta-like landform with a distinct triangular or elliptical plan with a radial distributary system composed of anatomizing or straight channels. Often during floods, crevasse splays act like a delta by prograding into a flood basin filled with standing water. During floods, as flow velocity of the floodwater drops, as it spreads across the splay, crevasse splays are aggraded by the accumulation of suspended and bed loads upon its surface (Galloway and Hobday 1983; Farrell 1989; Flores et al. 1985).

Backswamp. The backswamps consist of low, flat areas periodically covered or saturated with water and support a cover of woody vegetation with or without an undergrowth of shrubs. Coleman (1966) has recognized two types of backswamps, well-drained and poorly-drained. Well-drained swamps are swamps characterized by subaerially exposed, as well as

saturated, land during a large part of the year. Inundation occurs primarily during periods of high flooding because of slightly higher elevations and efficient drainage channels. Poorly-drained swamps are swamps inundated more or less permanently by standing, often stagnant, water. Therefore, the reducing and oxidizing conditions that alternate during the accumulation of sediments within well-drained swamps rarely occur. Within poorly-drained swamps, primarily reducing conditions exist. The variations in the oxidizing and reducing conditions found within poorly and well-drained swamps impart a distinctive character to the sediments that define the sedimentary facies characteristic of each type of swamp. Low sedimentation rates and infrequent to frequent subaerial exposure, cause backswamp sediments to be preconsolidated by dewatering to create stiff, but highly fissured clayey deposits (Coleman 1966; Saucier 1974).

The sediments of the well drained swamp facies consist of light gray to light yellowish brown and dark brown, organically-poor clay with scattered silt lenses. Typically, these sediments are highly mixed by floraturbation and, thus, stratification is lacking or vaguely discernable. Well drained swamp deposits are typically highly fissured as a result of periodic desiccation. Faunal remains of any type are rare in well drained swamp facies as a result of the intense leaching and oxidation to which they are subjected. Well drained swamp sediments characteristically contain abundant nodules and small geodes of calcium carbonate ($CaCO_3$) and small nodules of iron oxides. Other diagenetic minerals such as, pyrite (FeS_2) and vivianite ($FeS_3[PO_4]_2 \cdot 8H_2O$) are very rare (Coleman 1966; Krinitzsky and Smith 1969).

Poorly drained swamp facies consist of very organically-rich, black to bluish gray clays with occasional laminations of silt, common laminations of compressed plant remains, and often large fragments of wood. Compressed leaves, twigs, and seeds comprise the organic laminations. Thin beds of woody peat often are also intercalated within the clays. Faunal remains present within poorly drained swamp sediments consist primarily of pulmonate and fresh-water gastropods. Typically, floraturbation has thoroughly mixed these sediments and, thus, these sediments are commonly massive. Pyrite (FeS_2) and vivianite ($FeS_3[PO_4]_2 \cdot 8H_2O$) are the characteristic diagenetic minerals present within poorly drained swamp sediments. Due to full saturation, anaerobic micro-organisms remove oxygen from these sediments causing a deficiency of oxygen within them. As a result, iron and manganese are reduced into soluble forms and bluish, greenish, and grayish sediments called "gleys" are formed (Coleman 1966; Krinitzsky and Smith 1969).

Geologic History

The Mississippi River Alluvial Valley, in which the survey areas are located, is a product of a complex series of geologic events. This alluvial valley was the result of repeated periods of fluvial entrenchment and deposition over the Pleistocene. After the last sea level low stand, during the Wisconsinan Stage about 22,500 to 18,000 radiocarbon years B.P., the Mississippi River has filled the last of these entrenched valleys initially with

braided stream and lastly with meandering river deposits. However, within the survey areas, only the meandering river deposits of its currently active course underlie the meander belt (Autin et al. 1991).

Late Pleistocene Epoch. It was during the Late Pleistocene Epoch, 1.8 million to 10,000 radiometric years B.P., that repeated entrenchment of the Mississippi River formed the Mississippi Alluvial Valley in which the survey areas lie. Terraces along the tributaries of the Mississippi river indicate that it and its associated incised tributaries were established by at least Early Pleistocene. Over time, the Mississippi River both deepened and widened. The location of the entrenched valley has caused it to shift laterally with each period of downcutting. The Mississippi River Alluvial Valley has significantly widened with time and in most areas is as wide as it has ever been (Autin et al. 1991).

Wisconsinan Stage. During the Wisconsinan Stage, 35,000 to 10,000 radiometric years B.P., sea level fluctuated by tens of meters below modern. The lowest stand of sea level occurred between approximately 22,000 to 17,500 radiocarbon years B.P., when sea level dropped as low as 100 m below current mean sea level. This low stand of sea level caused the Mississippi River to entrench its valley at least as far north as the latitude of Baton Rouge. At this time, the floodplain consisted of extensive braidplains formed by braided streams carrying large quantities of glacial outwash (Saucier 1981; Saucier and Smith 1986; Schumm and Brakenridge 1987).

Saucier (1981) and Saucier and Smith (1986) propose that the Mississippi River Alluvial Valley was never completely swept clean of sediments during this low stand of sea level as dramatically illustrated by Fisk (1944). Rather, it was always partially filled with a thick sequence of coarse-grained, fluvial sediments consisting mostly glacial outwash containing sand and gravel. The erosional unconformity which creates the base of the Mississippi Alluvial Valley originated not as the result of the formation of a dendritic stream network, but instead as the result of coalesced channel scouring and lateral planation of both braided and meandering fluvial systems (Schumm and Brakenridge 1987).

Saucier's (1981) hypothesis implies that during the period from 12,000 to 7,000 radiocarbon years B.P. the Mississippi River slowly filled its alluvial valley and created a series of discrete floodplain surfaces which remained stable for periods of hundreds of years. The surface dating to approximately 12,000 radiocarbon years B.P. would lie at relatively shallow depths beneath the surface of the modern alluvial plains. At the latitude of Baton Rouge, it would lie about 25 m below the modern alluvial plain. Further south at the latitude of the survey areas, this surface lies at a depth of 30 m below the modern alluvial plain. Due to the fact that the top of the surface formed by these Pleistocene braided stream deposits are shallower than the 44 to 50 m (145 to 165 ft) depth of cutbank erosion, later meander belt development would have destroyed any preexisting fluvial and prehistoric archeological deposits within area occupied by Meander Belt No. 1. Beneath the backswamp which lies west of Meander Belt No. 1 and the

survey areas, only Late Wisconsinan braided stream deposits and Early Holocene deposits would be preserved (Saucier 1981).

Holocene Epoch. During the Holocene Epoch, the Mississippi River occupied at least five different meander belts. The currently accepted chronology of these meander belts is given by Autin et al. (1991) and Saucier (1981). Saucier (1974, 1981) and Saucier and Snead (1989) illustrate the distribution of the remaining remnants of these meander belts and their reconstructed courses.

Before 4,800 radiocarbon years B.P., the meander belts of the Mississippi lay along the western wall of the Mississippi Alluvial Valley (Saucier 1981). At this time, a poorly developed drainage network within a backswamp probably occupied the survey areas. By 4,800 radiocarbon years B.P., backswamp sedimentation had completely buried terminal Wisconsinan braidplains and an unnamed meander belt of the Mississippi River. Saucier (1969) possibly illustrates fragments of this unnamed meander belt adjacent to the Meander Belt No. 1 north of the survey areas within West Baton Rouge and Iberville Parishes (Saucier 1974, 1981).

About 4,800 radiocarbon years B.P., a channel avulsion established the present course of Mississippi River within what would become Meander Belt No. 2. The channel created by this avulsion slowly extended itself along the eastern valley wall of Mississippi Alluvial Valley. Initially, a nonmeandering channel incised its thalweg into the underlying backswamp deposits and built a low, confining levee during the next few hundred years. As discharge of its course increased, the Mississippi River deepened and widened its channel within the underlying fluvial sediments and aggraded its natural levees. Eventually, this course developed incipient meander loops as small twists and turns in its channel. When the full flow of the Mississippi river was diverted into Meander Belt No. 2, its course developed mature natural levees and meander loops. When diversions upstream created Meander Belt No. 1, the Mississippi River continued to occupy this portion of its river course (Farrell 1989).

Eventually, this segment of the Mississippi River developed mature, high, and confining natural levees. Due to the height and confinement of the natural levee, the deposition of sediments was restricted to the concave side of the meander loop. Also, the height of the levees prevented floodwaters from uniformly overflowing and submerging the entire levee. As a result, the adjacent backswamp was flooded through low area, crevasses, cut by flood waters through the natural levees. With flooding occurring through crevasse rather than uniformly over the crest of the natural levee, most of the natural levee was high and dry during a typical annual flood (Farrell 1989).

Bayou Lafourche is the former trunk distributary channel of the Lafourche Delta Complex. This former trunk distributary channel once fed water and sediment of the Mississippi River into the Lafourche Delta Complex while it was an active delta complex from 4,600 to about 400 radiocarbon years B.P. Until artificially blocked in 1904, a very minor

portion of the discharge of the Mississippi River continued to flow down Bayou Lafourche, particularly during flood stage (Autin et al. 1991).

Historic Development. During historic times, significant changes within the channel of the Mississippi River occurred within the two survey areas. The westernmost auger survey area lies adjacent to the modern bankline within Secs. 27 and 28, T11 S, R14 E and the easternmost edge of Sec. 26, T11 S, R14 E. According to a comparison of river surveys for 1883 and 1921 with current U.S. Geological survey topographic maps, the southward lateral migration of the Mississippi River removed about 100 m (330 ft) of bankline between 1883 and 1921 (Figure 4). Comparison of these data indicates that between 1921 and 1983 the bankline remained within the same position relative the resolution of the river surveys and topographic mapping.

The easternmost auger survey area extends downstream from the mouth of Bayou Lafourche within Sec. 94, T11 S, R14 E for about 1,545 m (5,068 ft) downstream into Sec. 18, T11 S, R15 E. In 1883, all of this survey area lay within the channel of the Mississippi River. By 1921, the Mississippi River had migrated northward where the westernmost third of this survey area might have straddled the bankline at that time (Figure 5). However, the remainder of this survey area still lay within the Mississippi River. Sometime between 1921 and 1983, the northward migration of the Mississippi River created most of the survey area.

Geoarcheology

Fluvial processes and the sediments and surfaces that they have created strongly influence the formation, preservation, and the occurrence of archeological deposits. First, differences in the soil moisture, surface drainage, availability of nature resources, proximity to transportation routes, and hazards posed by flood and cut bank erosion between landforms and surfaces greatly affected how each was utilized by prehistoric inhabitants. In addition, the silty and sandy soils present on natural levees of Mississippi Rivers are ideal for agriculture (Guccione et al. 1988; Spicer et al. 1976).

Second, the environment of deposition directly relates to the preservation of archeological deposits. The vertical accretion of sediments that aggrade natural levees and fill backswamp and abandoned channels preserve the archeological deposits within these environments. However, either the continually wet, swampy, or poorly drained nature of the backswamp and channel environments discourage the accumulation of most archeological deposits within them. Because the lateral accretion of point bar deposits occurs mostly within the river channel, they lack *in situ* archeological deposits, except for sites like historic shipwrecks (Heinrich 1991a, 1991b).

Third, the active lateral migration of the Mississippi River significantly affects the preservation of archeological deposits which predate the abandonment of an abandoned river channel or course segment within a meander belt. While active, a typical Mississippi River channel rapidly

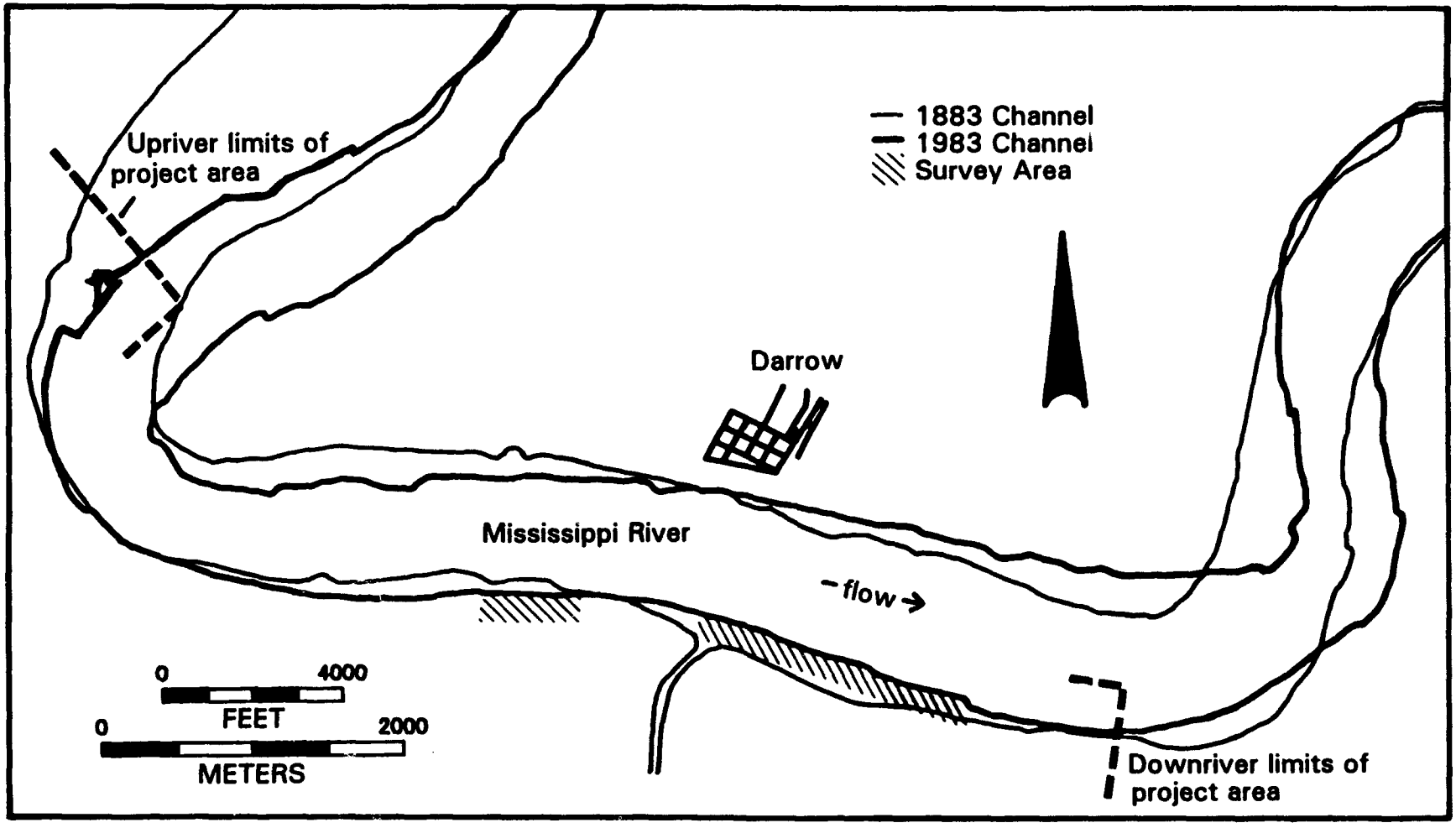


Figure 4. Comparison of the 1883 Mississippi River Commission Chart 69, and the 1983 - 1985 Mississippi River Hydrographic Survey, Charts 36 and 37, showing bankline changes within the study area.

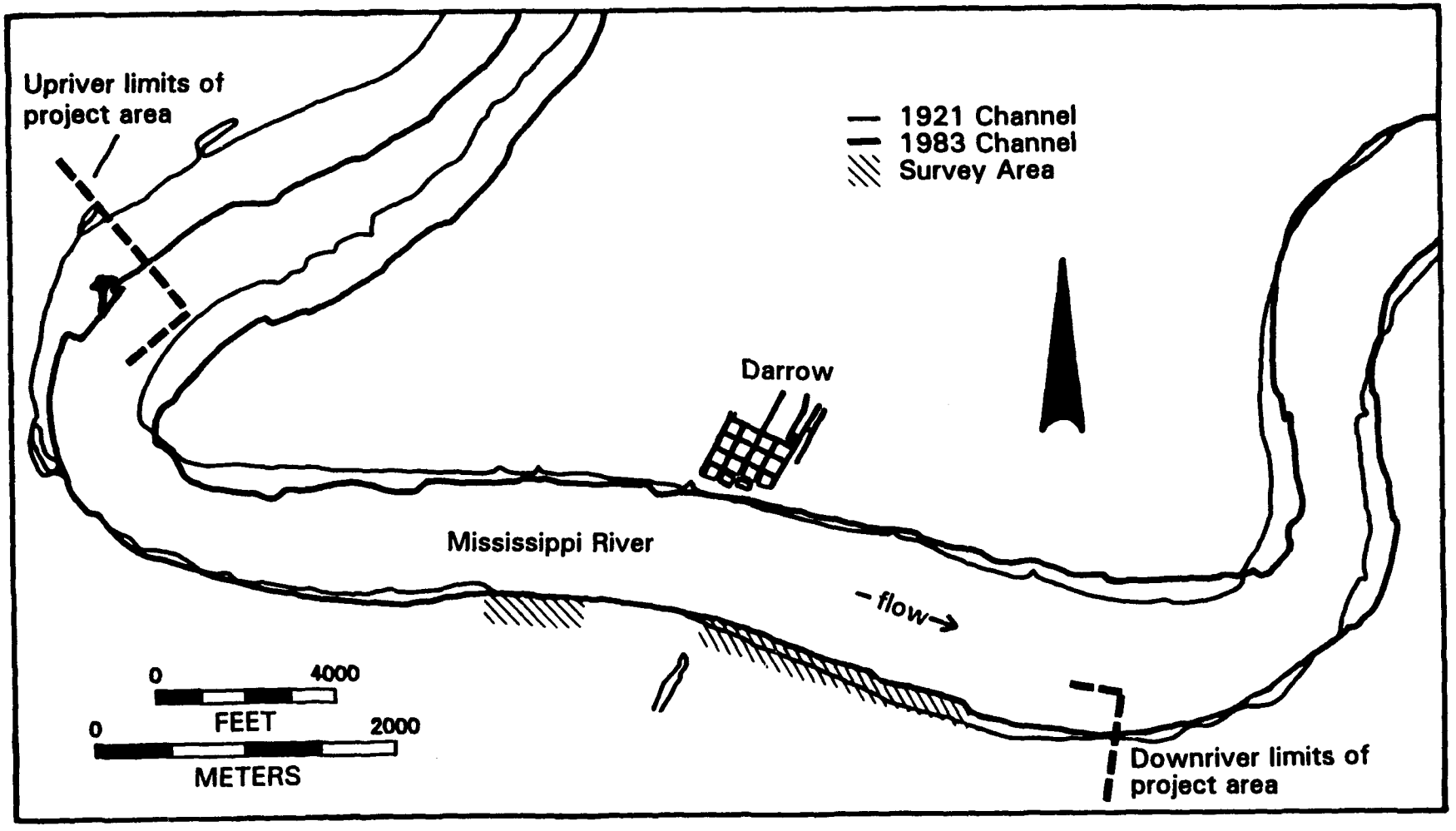


Figure 5. Comparison of the 1921 Mississippi River Commission Chart 69, and the 1983 - 1985 Mississippi River Hydrographic Survey, Charts 36 and 37, showing bankline changes within the study area.

migrates back and forth across its meander belt. As the Mississippi River migrates, its cutbanks consume the fluvial deposits and any enclosed archeological deposits that form the upper 44 to 50 m (145 to 165 ft) of the Mississippi Alluvial Valley. As a result, meandering of an active river channel will destroy all of the archeological deposits that predate the formation of a meander belt and many of the archeological deposits contemporaneous with it. However, it is possible sunken ships which have an intact and solid hull can survive cutbank erosion (Heinrich 1991a, 1991b).

Finally, an active meander belt will bury the contemporaneous archeological deposits not destroyed by lateral migration. An active channel would rapidly migrate away from and bury any archeological deposits that would have formed adjacent to an active point bar. In addition, an active, laterally migrating channel would consume any sites located on or present within the natural levee on its cutbank. If a Mississippi River cutbank was to migrate up to and stop at a preexisting site, that site would be buried beneath natural levee deposits. As a result, only those archeological deposits that date to a few tens of years prior to and postdate the abandonment of the channel will occur as surface sites. Therefore, the active lateral migration of a Mississippi River channel will either bury or destroy those archeological deposits which predate the abandonment of a river channel or course segment on its natural levee (Heinrich 1991a, 1991b).

Project Areas. The westernmost survey area consists of natural levee deposits overlying point bar deposits associated with the trunk distributary channel of the Lafourche Distributary Channel. As a result, the sediments underlying this survey area consist of sediments of the trunk distributary channel of the Lafourche Deltaic Complex that may be as much as 4,500 years old. However, because of the lateral migration of this distributary channel, they are most likely much younger. These sediments are buried by natural levee deposits associated with Meander Belt No.1 which are less than 2,800 years old and are undoubtedly considerably younger because of the lateral migration of the natural levee associated with the cutbank of an active river course.

The easternmost survey area consists entirely of batture created by the lateral migration of the Mississippi River since 1883. As previously noted, all of the survey lay within the Mississippi River according to the 1883 river survey. In fact, most of this survey area was still within the active channel of the Mississippi River and, thus, the sediments underneath it mostly postdate 1921. As a result, the potential for *in situ* prehistoric archeological deposits within this survey area is nonexistent, and the potential for historic archeological deposits is very low and would not, except for shipwrecks, predate ca. 1920's.

CHAPTER 3
NATURAL SETTING

Climate

The climate in Ascension Parish is typified by long, hot, humid summers. Winters alternately receive southern moist tropical air and dry cold fronts from the north. July and August temperatures are usually above 90^{o}, but they rarely exceed 100^{o}. Approximately 17 days per year have temperatures of 32^{o} or less. The growing season is about 277 days (Spicer et al. 1976:52).

The project area is located within the Subtropics, and its weather is strongly influenced by the nearby Gulf of Mexico. Rainfall in the area averages 60.3 inches annually. Periods of greatest rainfall generally occur in July. October is, on average, the driest month. Hurricanes cause occasional excessive rains and damaging winds. Hail and snow rarely occur (Spicer et al. 1976:52).

Flora and Fauna

Prior to clearing and cultivation, the higher portions of the natural levees supported hardwood forests that would have included oak (*Quercus alba*, *Quercus nigra*) and hickories (*Carya* spp.). More water-tolerant oak species (*Quercus pagota*, *Quercus prinus*, and *Quercus nigra*) as well as sweetgum (*Liquidambar stryaciflua*) would have been found within the better-drained backswamp areas and along the lower slopes of the natural levee. The dominant vegetation along the riverbank included willow (*Salix* spp.) and cottonwood (*Populus deltoides*). Stands of bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) dominated permanently-flooded backswamp areas (Kelly 1989:18)

Important fur-bearing species present in the region are the muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), mink (*Mustella vison*), and otter (*Lutra canadensis*). Nutria (*Myocastor coypus*) are a recent introduction and were not present during the prehistoric or historic periods. Other indigenous mammals known to occur in the area include the Virginia opossum (*Didelphis virginiana*), the swamp rabbit (*Sylvilagus aquaticus*), the fox squirrel (*Scirus niger*), the fox (*Vulpes fulva*), the bobcat (*Lynx rufus*), the beaver (*Castor canadensis*), the civet cat or spotted skunk (*Spilogale putoris*), and the white-tailed deer (*Odocoileus virginianus*).

Although the Mississippi River supports various species of freshwater fish, it is relatively unproductive because of high turbidities and strong currents. Freshwater species include largemouth bass, crappie, bluegill, shell cracker, chain pickerel, and white bass. Ducks, including mallards and wood ducks are plentiful. Dove and quail are present but in relatively small numbers (Spicer et al. 1976:35).

CHAPTER 4
ABORIGINAL OCCUPATIONS IN SOUTHEASTERN LOUISIANA

The Poverty Point Period

Few sites dated to the Paleo-Indian or Archaic Periods have been reported in southeastern Louisiana. Although land formation was occurring during the Archaic Period (Chapter 2), sites are probably either deeply buried or in some cases reworked by riverine activity.

The name "Poverty Point" is derived from the type site (16WC5), an area of massive earthwork construction, in northeastern Louisiana. This site is believed to have been a cultural center with trade networks and influence extending throughout the Lower Mississippi Valley. Baked clay balls known as "Poverty Point objects" are one of the important traits that mark the period. Other traits include an elaborate lapidary and microlithic industry, use of steatite vessels, and the use of exotic stone.

The Tchula Period

Tchula period occupations in the Lower Mississippi Valley are associated with the Tchefuncte culture. The period has been called "the early ceramic period" because, with the exception of fiber-tempered pottery, it was the interval during which initial pottery complexes appeared in the Lower Mississippi Valley. Sites are few and scattered, and there are no universal markers. However, within subareas such as South Louisiana, regional markers, primarily Tchefuncte type ceramics, have been identified (Phillips 1970:7, 8, 15, 76).

Peoples of the Tchefuncte culture were the first to engage extensively in the manufacture of ceramics. Fiber-tempered and some grog-tempered or temperless sherds have been recovered from earlier Poverty Point contexts. These may represent primarily trade goods from the earliest pottery-making cultures to the east. The basic Tchefuncte ware is temperless or grog-tempered, with accidental inclusions of small quantities of sand and vegetable fiber. Sand-tempered wares represent a minority constituent of Tchefuncte site assemblages (Shenkel 1984:47-48).

The Marksville Period

The Marksville period is associated with a Hopewellian culture and tradition manifested throughout the Lower Mississippi Valley (Phillips 1970:7, 17-18, 886). The Hopewell culture's two major centers of development were in Ohio and Illinois, and date to between 200 B.C. and A.D. 400. Diffusion of aspects of the culture may have resulted from the activity of traders who established a wide-ranging network, sometimes termed the "Hopewellian Interaction Sphere" (Caldwell 1964).

In addition to diagnostic pottery types of the Marksville period, conical burial mounds were characteristic of the culture. Interments are

generally associated with grave goods. Some of these were manufactured from exotic raw materials (Neuman 1984:142-168).

The Baytown Period

The Baytown period has been defined as the interval between the end of Hopewellian/Marksville culture and the emergence of Coles Creek culture. In the southern half of the Lower Mississippi Valley, there are no area-wide horizon or period markers (Phillips 1970:901).

The Baytown period is sometimes referred to as the "Troyville period" by archeologists in Louisiana. It is often assimilated with the subsequent Coles Creek period because of the lack of diagnostic markers for the period in southeastern Louisiana. The two are together referred to and discussed as "Troyville/Coles Creek cultures" (e.g. Neuman 1984).

The Coles Creek Period

The Coles Creek period is the interval that begins with the emergence of Coles Creek culture in the southern part of the Lower Mississippi Valley and ends with the establishment of "full-blown" Mississippian culture in the northern part of the Valley (Phillips 1970:18). Although it appears to represent a population zenith in the eastern delta province, many sites tentatively classified as Coles Creek may actually be from the Baytown period (Wiseman et al. 1981:3/5).

Coles Creek culture is characterized by small ceremonial centers with mounds. These are surrounded by villages of varying size. The culture developed in the area between the mouth of the Red River and the southern part of the Yazoo Basin. Its influence filtered into the delta region of southeastern Louisiana (Brown 1984:95).

Mounds associated with the Coles Creek culture generally are larger and exhibit more construction stages than those associated with the earlier Marksville culture. A more significant difference is that Coles Creek mounds are pyramidal and flat-topped, and they were used as substructures for religious and/or civic buildings (Neuman 1984:167).

The Mississippi Period

The beginning of the Mississippi period is marked by the emergence of Mississippian culture in the northern part of the Lower Mississippi Valley and Plaquemine culture in the southern part (Phillips 1970:18-19). The Plaquemine culture itself is sometimes considered to be the classic development of temple mound construction in the lower portion of the Lower Mississippi Valley. However, archeological excavations suggest that it actually represents the culmination of developments of the preceding Coles Creek culture. Multi-mound construction and artifact assemblages are evidence that link the two. Absence of European trade goods indicates that the Plaquemine culture reached its zenith prior to contact (Neuman 1984:258-259). Sites dated to the period of contact represent a Delta-

Natchezan phase. Proportions of ceramic types change, some new styles and types appear, and European trade goods are often found in association with the aboriginal materials (Quimby 1957:118-119, 134-144).

Aboriginal Occupation during the Colonial Period

Identities and locations of Indian tribes in Louisiana cannot be determined for any period prior to about 1700, when literate French settlers and visitors began to record their observations regarding aboriginal occupants of the area. Despite these accounts, it remains difficult to sort pre- and post-contact culture traits. This is especially true for the lesser tribes living along the Mississippi River and other areas within southeastern Louisiana (Kniffen et al. 1987:45).

The protohistoric and early historic periods were traumatic for aboriginal society in southeastern Louisiana. The effects of disease and of the ever-increasing European population are reflected in the declining aboriginal population and in the migrations by remnants of various tribes. Internecine warfare typified relations between the various groups (Giardino 1984).

CHAPTER 5
HISTORIC OVERVIEW
by Benjamin Maygarden

The west bank of the Mississippi in the vicinity of Iberville and Ascension Parishes was inhabited at the end of the seventeenth century by the Chitimachas, frequently referred to in historic documents as the Chetimachas. However, Bienville encountered a party of Ouachitas at the head of Bayou Lafourche while ascending the Mississippi in 1699 (Marchand 1931:15). Iberville made an alliance with the Chitimachas in 1699. Numbering approximately 2,600 individuals at this time, they were a powerful tribe in the Gulf region.

In the summer of 1706, the Taensa attacked the Chitimacha, capturing and enslaving a number of them (Swanton 1984:202-203). In November 1706, during this period of general tension in the region, French missionary Father Jean-François Buisson de St. Cosme stopped in the vicinity of Donaldsonville while descending the Mississippi River. The missionary and the three other Frenchmen in his party were killed by a Chitimacha war party that was returning to their habitation after an unsuccessful expedition against the Bayogoulas. Only the missionaries' young slave escaped. The slave reported the event to Lieutenant Louis Juchereau de Saint-Denis, commander at Fort La Boulaye, who was ordered by Bienville to avenge St. Cosme's death. With twenty French soldiers and about 80 warriors from nearby allied tribes, Saint-Denis destroyed a Chitimacha village on Bayou Lafourche and took around 40 prisoners (McWilliams 1953:70-72). The Chitimacha captives were then sold to French settlers for two hundred livres each (Usner 1992:24).

The death of Father St. Cosme triggered a twelve-year war between the Chitimacha and the French. Antoine Le Page du Pratz commented in 1774 that "Prowess is none of the greatest qualities... of the Chitimachas. They were therefore worsted, and the loss of their bravest warriors constrained them to sue for peace..." (Le Page du Pratz 1975:77). The French and their allies captured many Chitimachas during the conflict, resulting in a predominance of Chitimachas among enslaved Indians in the early decades of French settlement in the Louisiana Colony (Swanton 1984:203). A peace was finally concluded in 1718. Chitimacha envoys traveled by canoe to New Orleans, then in the early stages of construction. After smoking the calumet with Bienville and presenting him with presents, including pelts, and the head of St. Cosme's killer (as demanded by the French). A Chitimacha elder delivered an eloquent oration on the war and his tribe's desire for peace. The speech was translated for Le Page du Pratz by his newly purchased Chitimacha slave and is presented in his *Histoire de la Louisiane* of 1758 (Usner 1992:62-63).

By the terms of the peace, the Chitimacha were to settle on the Mississippi River at a point near Plaquemine, and at least part of the tribe, apparently the eastern part, did so in 1719 (Swanton 1984:203). This eastern portion of the Chitimacha had evidently been residing in the vicinity of Donaldsonville. At the time Le St. D'Anville drew up his *Carte de la*

Louisiane in 1732 (Figure 6), a village of the Chitimachas is shown below *Riviere des Piakemines* (Bayou Plaquemine). *La Fourche* ("The Fork") on Le St. D'Anville's map refers to the head of Bayou Lafourche, named *Riviere des Chetimachas* at that time. A raft is shown on Bayou Lafourche below Donaldsonville on the Le St. D'Anville map. "Former villages" of the Chitimacha appear to the south-west of Bayou Plaquemine (in the vicinity of Grand Lake) and south of Lac des Allemands. Swanton (1984) states that in 1739 a settlement of the Chitimacha existed near the head of Bayou Lafourche. By 1758, the Chitimacha living on the Mississippi River consisted of only about 80 warriors and their families. Captain William Pittman, engineer with the British army, stated in 1770 that:

> one league further up (from the Houmas village, at the site of Burnside) is the Fourche de Chetimaches, near which is the village of a tribe of Indians of that name; they reckon about sixty warriors [Pittman 1770 quoted in Marchand 1931:120].

In 1793, only about 27 warriors and families constituted the eastern portion of the tribe (Swanton 1984:203).

The parish of the Ascension, also called the parish of *La fourche de Chetimaches*, had been established prior to 1769, when the Spanish assumed control of the Louisiana colony. The mission church was located at L'Ascension, the present site of Donaldsonville. About 850 Acadian refugees arrived in Louisiana in 1765 and 1766, and many of them settled along what became known as the "first Acadian coast" (St. James Parish) and the "second Acadian coast" (Ascension Parish). In contrast to the large indigo plantations utilizing slave labor that were developing on lower portions of the Mississippi, settlement on the Acadian coasts was based on smaller tracts, typically of three to six arpents front in 1766 and still averaging less than six arpents front in 1769. The Acadians also held fewer slaves than did planters below New Orleans (Goodwin et al. 1985:22-23). In the project area above Donaldsonville, the section frontages on the Mississippi River average about seven arpents, which corresponds to the farm frontage characteristic of the Acadian coasts during the Spanish colonial period. By 1804, however, subdivision of tracts among heirs of the original claimants had made smaller farms typical along the Acadian coasts (Hinks et al. 1992:30).

In a census of 1785, 646 persons were enumerated in the District of La Fourche, consisting of the greater part of modern Ascension Parish and territory on Bayou Lafourche. In 1785, another group of Acadian exiles arrived in the area, settling on both banks of the Mississippi and along Bayou Lafourche. By 1788, the District of La Fourche contained 1164 individuals (Marchand 1931:35-36). Berguin-Duvallon (1806) described the Acadian coasts at the end of the colonial period:

> ...the second Acadian settlement, or parish of the Fourche... extends about six leagues... the country from New Orleans [to Bayou Manchac] is settled the whole way along the river, and presents a scene of uninterrupted plantations in sight of each

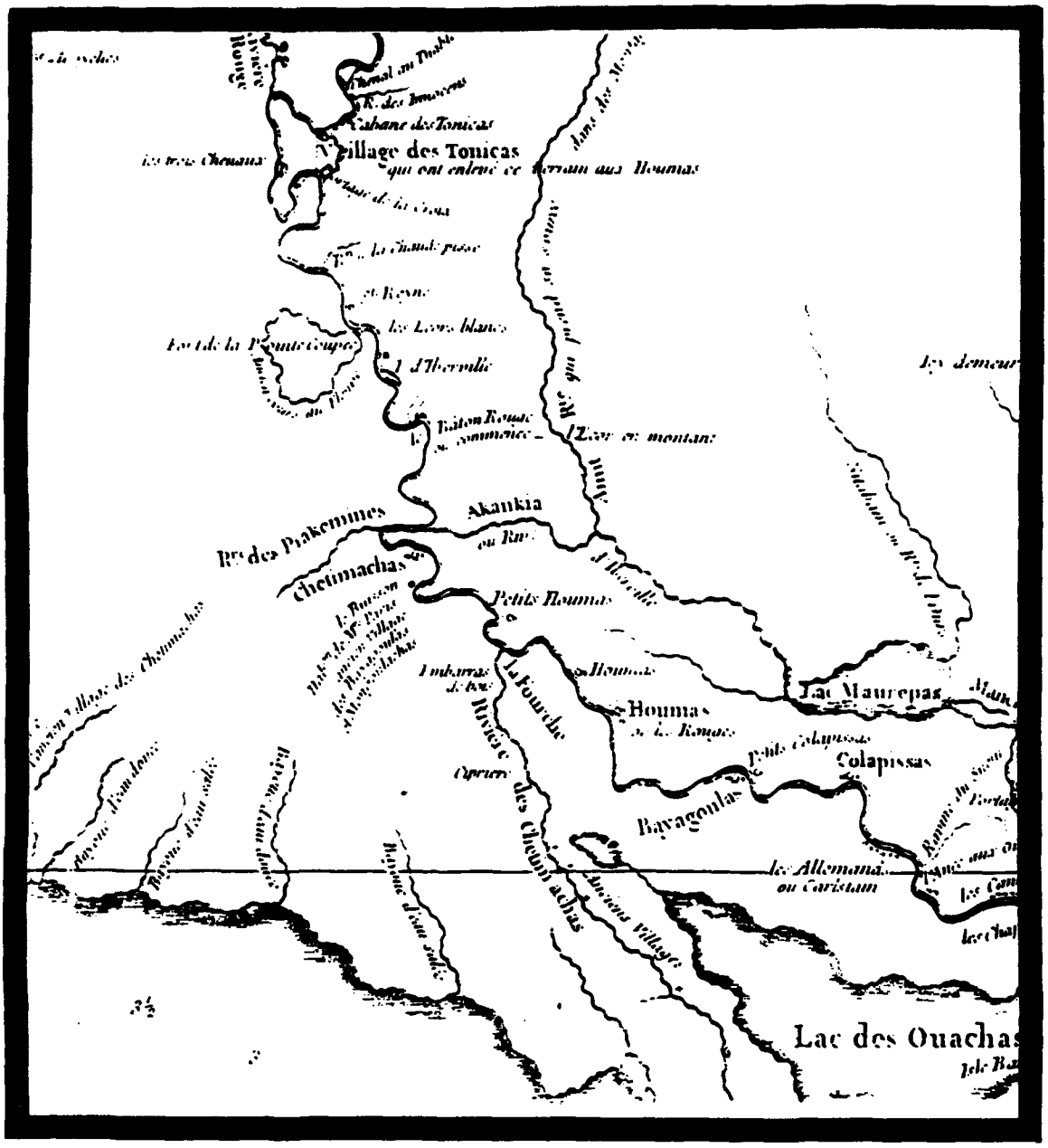


Figure 6. Excerpt from *Carte de la Louisiane* (1732) by Le St. D'Anville showing the la Fourche [sic] region (no scale available).

> other, whose fronts are all cleared to the Mississippi, and occupy on that river from five to twenty-five acres with a depth of forty... A few sugar plantations are formed in the parish of Cabahanose [St. James], but the remainder is devoted to cotton and provisions, and the whole is an excellent soil incapable of being exhausted... [Berguin-Duvallon 1806:167-168].

In 1805, the Legislative Council of the Territory of Orleans determined that "the County of Acadia shall comprehend the parishes of St. James and the Ascension, commonly called the first and second Acadian Coasts" (quoted in Marchand 1931:34). The County of Acadia was split into two jurisdictional regions, St. James Parish and Ascension Parish, in 1845 (Garon 1976:169).

The town that became Donaldsonville was originally incorporated as Donaldson on March 25, 1813. The Spanish government had granted the tract to Peter Landry on November 5, 1775, and on February 10, 1806, William Donaldson purchased from Landry's widow the tract of seven arpents and one toise frontage on the Mississippi. This tract was previously the location of the village of L'Ascension. Within three months of his purchase, Donaldson subdivided his tract. The hamlet was known variously as the Ville de Donaldson or Nouvelle Ville de Donaldson, and in 1808 a post office was established under the name of Donaldsontown. The post office name was changed to La Fourche in 1809, and finally changed to Donaldsonville in 1822; by this time the town itself was usually referred to by its present name (Marchand 1931:119-120).

For obscure reasons, the Louisiana State Legislature resolved on February 4, 1825, to establish Donaldsonville as the seat of the State Government, despite the town having only 600 residents, no facilities for accommodation of representatives, only a weekly mail service, and otherwise the characteristics of a mere village. A sum of $30,000 was appropriated for the construction of a State House at Donaldsonville, while the legislature continued to sit at New Orleans. Judge Francis Xavier Martin described the prospective State Capital in 1827:

> This town, though destined to be the Seat of Government, by an act of the Legislature, is but a small place. It has an elegant brick church, and contains the courthouse and jail of the parish. The Bank of Louisiana has here an office of discount and deposit, and there is a printing office from which an hebdomadary sheet is issued. A large edifice is now rearing for the accommodation of the legislature [Martin 1827 quoted in Marchand 1931:121].

Construction of the State House proceeded in desultory fashion, and on January 4, 1830, the second session of the ninth State Legislature was convened at Donaldsonville. The town and State House were evidently found unsatisfactory by the legislators, since before the session was out they had voted to remove the furniture from the new edifice meant to serve

as the State Capitol building. One week after convening the following session on January 3, 1831, the Legislature adjourned to New Orleans, where they sat for the remainder of the session. Thus ended Donaldsonville's tenure as the State capital. The building constructed to serve the legislature as its seat was demolished in 1848, and its rubble thrown into the head of Bayou Lafourche to help with the problem of caving banks (Marchand 1931:51, 55-57).

William Darby described Ascension Parish in 1816:

> ...On the right bank of the Mississippi, when receding from that river towards the Atchafalaya, the country is annually inundated... This parish, though extending over but 350 square miles, is remarkable for possessing almost every kind of tree and shrub to be found in the state. The *arundo gigantea* grows in immense quantities in all portions of the parish. Much of that majestic grass has been destroyed by the clearing of the lands; but a vast quantity still remains... The thriving town of Donaldsonville, at the efflux of the Lafourche, is the first village on the Mississippi above New Orleans worth notice. The town has been laid out upon the Mississippi, below the discharge of the Lafourche, and extends down both rivers. It is now the seat of justice for the parish, and has a connecting post-office between the countries in the southwestern parts of the state and those parts that lie east of the Mississippi and Atchafalaya [Darby 1816 quoted in Marchand 1931:35].

By the 1820s, Ascension Parish had become integrated into the commercial sugar-growing economy of southern Louisiana, although Donaldsonville was the approximate upper limit of intensive sugar cultivation. Many smaller landowners were displaced from the area by planters with more capital, who consolidated larger tracts and invested in the equipment, machinery, and slave work force required by commercial sugar agriculture. By 1842, the great majority of the 17 sections in the project area fronting on the Mississippi River above Donaldsonville were owned by four planters, who had each consolidated a number of small claims into large-scale sugar plantations (see Figure 7 and Table 2). Many of the newer arrivals in the region were Americans from outside of Louisiana (Goodwin et al. 1985:26-27). An example of these American immigrants is Evan Jones, who arrived on the Acadian Coast in the late-eighteenth century and began cultivating indigo and cotton on a tract that eventually became Evan Hall Plantation. Jones' son-in-law, Henry McCall, acquired the property and began to grow sugar cane. McCall also acquired adjacent tracts from Jean Etienne Bujol. McCall's property was subsequently consolidated with that of Joseph Blanchard by Richard McCall to create McManor Plantation (Hinks et al. 1992:31). Evan Hall-McCall-McManor became one of the most productive Ascension Parish sugar plantations throughout the antebellum and post-Civil War periods.

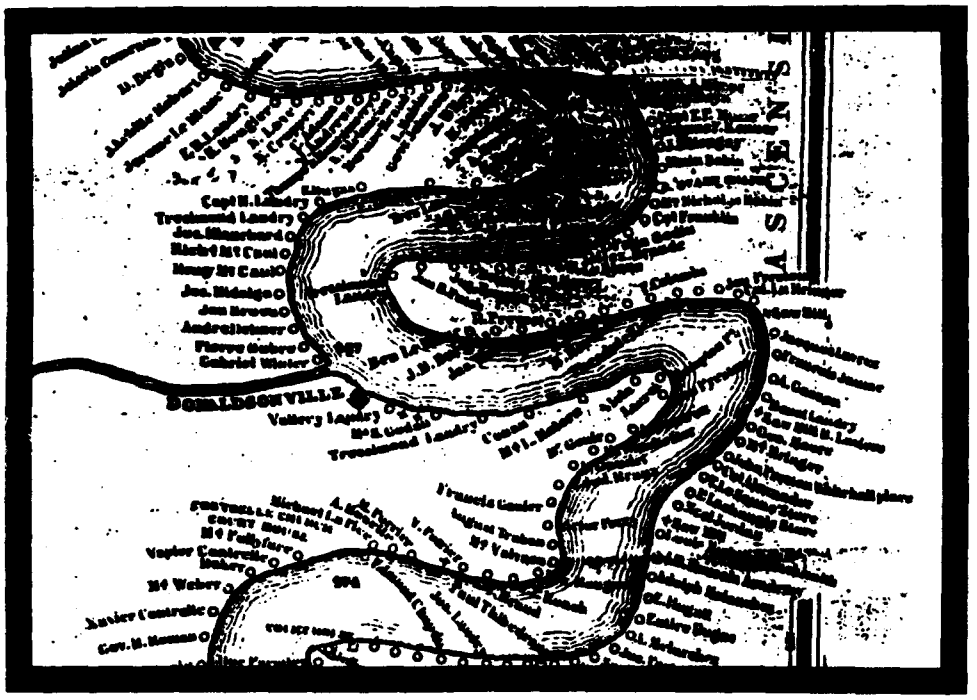


Figure 7. Excerpt from the Porter Map (1842) showing land ownership in the project area (no scale available).

Table 2. Sugar Production (in hogsheads) for Plantations in the Project Area, Selected Years 1844-1862 (from Champomier 1844-1862).

Owner	Plantation	1844	1851	1854	1857	1859	1862
Narcisse Landry	-	772	350	955	206	685	801
Trasimond Landry	-	835	580	1330	115	685	805
Joseph Blanchard	-	288	-	-	-	-	-
Richard McCall	-	282	470	617	40	930	949
Henry McCall	-	1019	733	990	87	2350	-
H.&E.J. McCall	-	-	-	-	-	-	1565
Valery Landry	-	464	160	455	120	433	520
V.&P. Landry	-	-	98	-	-	-	-
Valery Landry	-	188	-	260	40	342	-
Philip Landry	-	-	-	-	-	-	350
Edouard Gaudin	Perseverance	290	257	585	108	445	485
Eloy Melancon	-	43	-	-	-	-	-
Trasimond Landry	Dugas	332	160	437	110	283	265

In 1827, Francis Xavier Martin said of the Ascension Parish region:

> Both sides of the Mississippi, from the city of New Orleans to the town of Donaldsonville... are occupied by the wealthiest planters of the state, principally engaged in the culture of sugar cane. This part of the state has been denominated the German (St. Charles and St. John) and Acadian (Ascension and St. James) coasts, from its original settlers; and the wealth of the present inhabitants has procured for it the appellation of the Golden Coast... Between these two outlets (Bayous Lafourche and Plaquemine) the banks of the Mississippi are thickly settled; but the sugar plantations are few and the planters not so wealthy as below Donaldsonville. Under the Spanish government, it was believed that sugar cane could not well succeed so high up, and there were but two plantations on which it was cultivated; they were close to Donaldsonville [Martin 1827 quoted in Marchand 1931:35].

The antebellum period was one of growth for Ascension parish, and the population had increased to 5,426 persons by 1830; Donaldsonville had one thousand residents in 1840 (Marchand 1931:37, 122). A "Homographic Chart of the Settlements on the Mississippi River" composed by Thomas Porter in 1842 identifies landowners above and below Donaldsonville (Figure 7). Narcisse Landry, Trasimond Landry, Henry McCall, and Valery Landry appear within the survey area on the Porter map. These men all remained major sugar growers throughout the antebellum period. During the 1850s, Richard McCall and Edouard Gaudin also became major growers in the survey area. The annual *Statement of the Sugar Crop Made in Louisiana* by P.A. Champomier shows that these six planters were responsible for 38% to 45% of the total annual sugar production of the west bank of Ascension Parish in the two decades prior to the Civil War. Sugar production for plantations in the survey area for selected years in the antebellum period is provided in Table 2. Included are the state-wide banner crop years of 1854 and 1862 as well as the frost disaster year of 1857.

The well-known *Chart of the Mississippi River from Natchez to New Orleans* by Norman, also known as the Persac Map, shows land ownership in the survey area as of 1858 (Figure 8). The Norman *Chart* shows that several of the leading antebellum planters of Ascension Parish, as classified by journalist J.W. Dorr, resided in the project area (Prichard 1938:1125). These included Narcisse Landry, Trasimond Landry, Richard McCall, Henry McCall, and Valery Landry. Some of these planters also owned tracts outside of the project area. Notable on the Norman *Chart* is the designation of an upriver suburb of Donaldsonville, above present-day Port Barrow, as *La Faubourg Boucanne*. This translates approximately as "the barbecue suburb" and is evidently the original name of the Smoke Bend settlement. Below Donaldsonville and within the project area appears another, smaller zone of heavy subdivision entitled *La Pipe*, or "the pipe" (meaning either a small cask or a tobacco smoking implement). The derivation of these place-names, and why they were so heavily subdivided in the antebellum period, is not known.

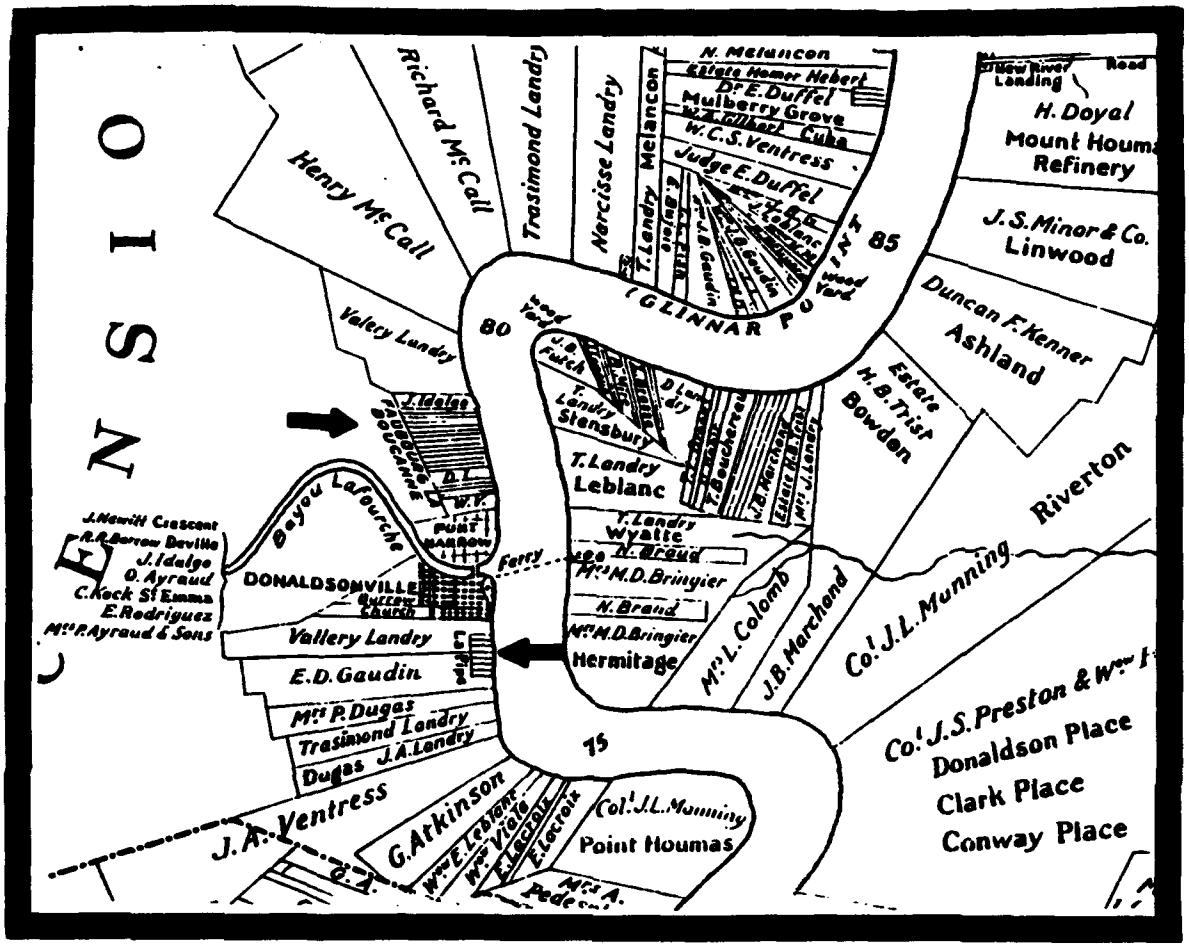


Figure 8. Excerpt from Norman's (1858) *Chart of the Mississippi River from Natchez to New Orleans* showing land ownership in the project area and indicating the location of "Faubourg La Boucanne" [sic] and "La Pipe" (no scale available).

J.W. Dorr traveled through Ascension parish during a tour of Louisiana in 1860 and made the following remarks on the area:

> Donaldsonville is a well-built town of about two thousand inhabitants. It is laid out with right-angular regularity, and the streets are very pleasant, handsome residences being not infrequent upon them, and handsome trees everywhere... The population of Donaldsonville is almost exclusively Creole, there being but a small proportionate infusion of the Anglo-American breed of bipeds.
>
> It is an exceedingly quiet place, and but few of its people appear to be engaged in any business or occupation... The principal business of the town is done by N. Maurin, J.R. Fayette and J. Gourdan, wholesale and retail grocers and dealers in plantation supplies; A.M. Templet, Schender & Landry and B. Mollere, general merchandise; and L. Lion, Murx & Elie, L. Kahn and S. Sterne, dry goods. There are a number of small shops, and a full assortment of bar-rooms...
>
> Donaldsonville has a finely and substantially constructed wharf, the first this side of New Orleans on the right bank, and boasts two hotels... There is a spacious and handsomely built market house in the town, two churches and an institution conducted as a school by the Sisters of Charity... An U.S. Surveyor-General's office is located here.
>
> The Court-House building is handsome and massive, and with the mention of the armory and drill-room buildings of... the Cannoneers of Donaldsonville, we complete our list of the public buildings.
>
> *Le Drapeau de L'Ascension* is published here, in French...
>
> Ascension is one of the largest sugar-producing parishes in the State, there being but three others which ordinarily make heavier crops... The total area of Ascension is the extent of nearly 125,000 acres, of which about 85,000 are uncultivated, about 20,000 in cane, 17,000 in corn, and 400 in cotton. The cotton culture is carried on a small scale by small planters, located at a distance from the river banks, who cannot afford to go into the heavier business of sugar-making...
>
> The assessed value of property in Ascension is nearly $9,000,000, and it pays a state tax of over $28,000, of which the mill tax for the support of public schools constitutes about one third-- nearly $9,000. There are eight school districts and twelve public schools and about 1300 educable children in the parish. The total population is between fourteen and fifteen thousand, of whom about seven thousand are slaves. There are four sugar refineries on a large scale, on the plantations of

> Messrs. Kenner, McCall, Hewitt, and Mme. Bringier; and a number of the most magnificent sugar estates in Louisiana are in this parish, chief among which may be mentioned the great plantations of Messrs. Burnside, Kenner, T. Landry, N. Landry, V. Landry, Manning, McCall, J. Hewitt, Doyle, Ventress, Jno. Thompson, Dr. Duffel, Mme. Bringier, etc...[Prichard 1938:1122-1125].

The Civil War was a disaster for the Louisiana sugar plantations, and more specifically for the town of Donaldsonville and the large planters of Ascension Parish. The area was unscathed by military activity until after the fall of New Orleans to Federal troops in April 1862. The Mississippi River was subsequently full of Federal transports, and Confederate guerillas were sniping at Union vessels as they passed on the Mississippi River in front of Donaldsonville. After several weeks of this situation, Union Admiral Farragut warned the local citizenry that if Federal vessels were again fired upon, the Navy would bombard the area from nine miles above Donaldsonville to six miles below the town (Winters 1963:152-153). Apparently, pleas from the citizens of Donaldsonville to cease firing upon Union vessels were ignored by the guerillas, and in early August 1862, an "old cannon" was fired from the Donaldsonville wharf at the Union steamer *Laurel Hill*, killing the pilot (Marchand 1931:65). Farragut ordered the town bombarded as soon as the populace could be evacuated. The residents of Donaldsonville and Port Barrow left their homes and sought refuge in the countryside. At around 11 o'clock on the morning, several Federal gunboats opened fire on Donaldsonville, and an hour and a half later a contingent of soldiers came ashore and set fire to the hotels, warehouses, some dwellings, and other buildings (Winters 1963:153).

Donaldsonville, located strategically at the head of Bayou Lafourche, was occupied from the autumn of 1862 until after the conclusion of hostilities. Union general Godfrey Weitzel arrived in Donaldsonville on October 25, 1862, with 5,000 men, and his troops plundered the already devastated town before most of them marched down Bayou Lafourche the following day (Winters 1963:159). The First Louisiana Regiment (Union) under Colonel Richard C. Holcomb remained at Donaldsonville, and in November or December 1862, engineers constructed Fort Butler at the head of Bayou Lafourche in Port Barrow. Probably built from a plan by Lt. John C. Palfrey, Fort Butler was a star-shaped earthwork fortification, 380 feet in length on its river side, and surrounded by a deep, brick-lined moat. It mounted seven 24-pounder cannon, one three-inch rifled cannon, and one 30-pounder Parrott gun (Casey 1983:36-37). An engineering drawing of Fort Butler in 1865 appears as Figure 9.

In June 1863, General Alfred Mouton, commanding the Confederate forces in the Lafourche district, ordered two brigades to seize Fort Butler and Donaldsonville. The assault on Fort Butler began just after midnight on the morning of June 28th. A sharp contest followed in the darkness, but the Confederate troops could not overcome the defenders. As daylight arrived, the Federal gunboats *Princess Royal, Winona,* and *Kineo* brought their fire to bear on the attacking Confederate troops. The assault ceased

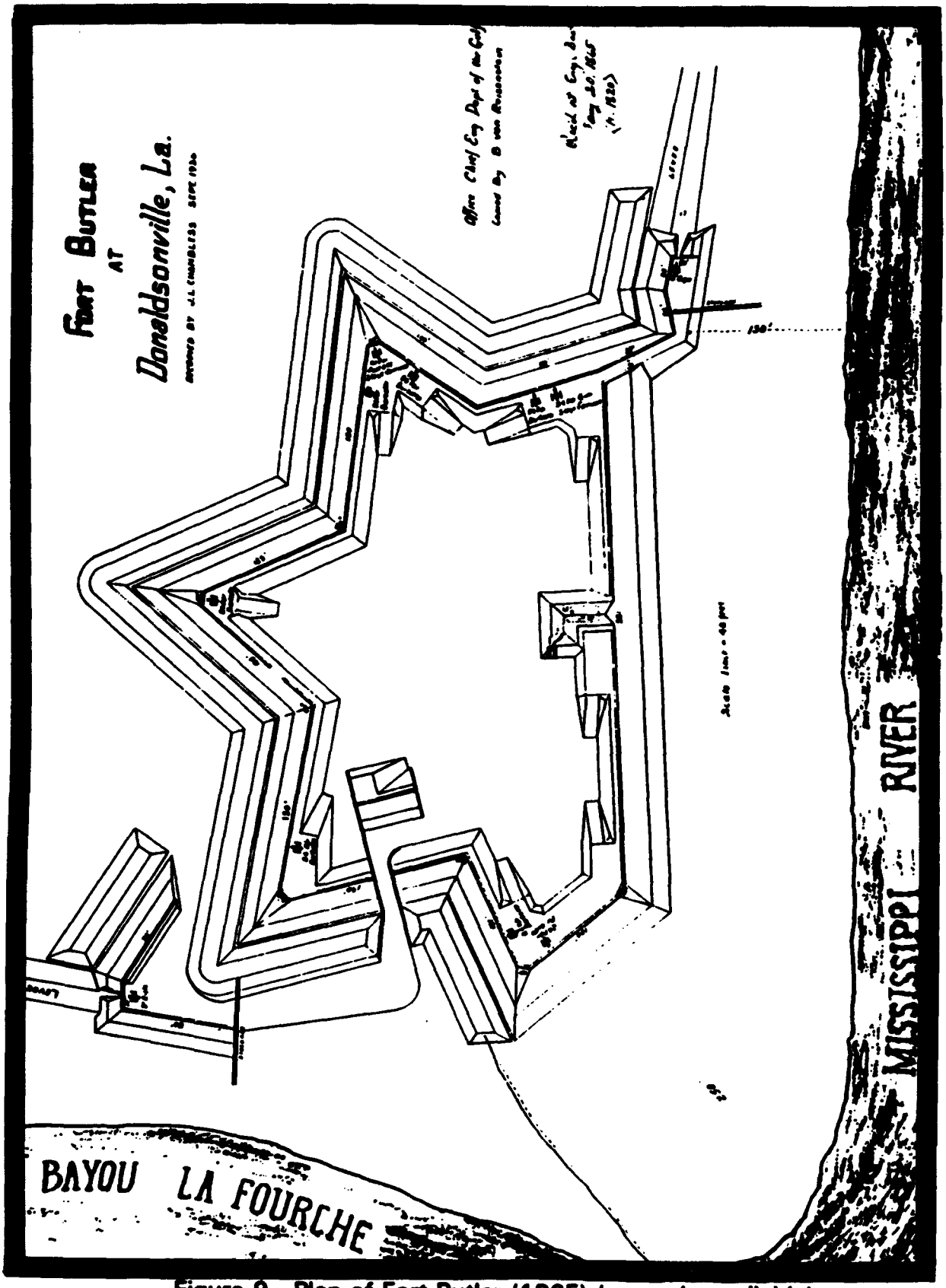


Figure 9. Plan of Fort Butler (1865) (no scale available).

with substantial loss of life on the Confederate side. However, Confederate troops continued to invest the fort until mid-July 1863. For a time the Confederates harassed Mississippi River traffic with artillery fire from positions behind the levee below Donaldsonville. General Mouton withdrew his forces from the Donaldsonville area as Union troops concentrated at Brashear City (Morgan City) and Thibodeaux in late July 1863 (Winters 1963:290-293).

The effects of the Civil War were disastrous for the dominant sugar economy of southern Louisiana and Ascension Parish. Capital losses for the sugar planters were vast with the emancipation of slaves, the destruction of sugar houses and equipment, and the damaging of levees. There was substantial change in the ownership of plantations in the project area. In some cases plantations were subdivided and sold. In other cases, planters consolidated tracts into larger plantations. Table 3 provides an indication of the frequent changes in ownership that characterized plantations in the project area in the period between the end of the Civil War and 1900. Evan Hall-McCall-McManor Plantation, alone among the large plantations in the project area, remained under relatively stable ownership during the generation after the Civil War. This pattern of ownership turnover was prevalent throughout the sugar-producing region of Louisiana. Some of the immediate post-war problems were solved by the conversion of sugar plantations to rice cultivation, which was a less capital-intensive form of commercial agriculture. Eventually, wage labor systems evolved to alleviate the labor problems facing sugar growers, and the emergence of the central factory system made it unnecessary for smaller planters to invest in sugar processing and refining machinery and equipment (Goodwin et al. 1985:36).

For the most part Ascension Parish remained primarily engaged in sugar cultivation in the decades following the Civil War, and Bouchereau's *Statement of the Sugar Crop Made in Louisiana* provides no indication that plantations in the survey area undertook commercial rice growing. The sugar production of the major plantations in the survey area for selected years in the period 1869-1890 is presented in Table 4 and for selected years 1895-1915 in Table 5. Figure 10 is a portion of the land ownership map by C. Dickinson (1883) showing land ownership in the study area. Table 3 is a list of owners of plantations in the survey area in the years selected for the production tables, from Bouchereau's *Statement*. The Mississippi River Commission (MRC) survey map of 1883 (Figure 11) shows a concentration of buildings, probably including the sugar house, on New Hope Plantation near the Mississippi River. The McManor sugar house was slightly more than one half-mile from the levee. The Evan Hall plantation sugar house, which processed greater quantities of cane than any other sugar house in the survey area at this time, lay over one and a half miles from the river and was connected to Evan Hall landing by what was probably a narrow-gauge rail line. The Souvenir plantation sugar house, interestingly, was near the New Orleans, Texas, and Pacific Rail Road line, and may have shipped its processed sugar by rail rather than by the traditional riverboat.

Table 3. Major Plantation Owners in the Project Area, 1868-1900 (from Bouchereau 1868-1900).

Owner	Plantation
John Burnside Oliver Beirne W.P. Miles	Ascension
Wilkinson & Thomas Borland & Thomas General A. Thomas Oliver Beirne W.P. Miles	New Hope
R. McCall Est. R. McCall McCall & Legendre	McCall/McManor
McCall Bros.	Evan Hall
Valery Landry P.R. Landry Dr. J.C. Legare Leon Godchaux Lemann Co., Ltd.	Souvenir
Henry Gerger	(no name)
Henry Cook	(no name)
Lemann & Jacob Bouligny, Hanson & Lemann Lemann & Hanson Bernard Lemann & Bro. Braud & Bros. Lemann Co., Ltd.	Peytavin
Edouard Gaudin, Sr. Frilloux & Gaudet Arthur Claverie Citizen's Bank Bernard Lemann & Bro.	Esperance/Perseverance
John S. Wallis Citizen's Bank Lemann, Hanson & Lum Bernard, Lemann & Bro.	Dugas

Table 4. Major Plantations in the Project Area: Sugar Production (in hogsheads), Selected Years, 1869-1890 (from Bouchereau 1869-1890).

Plantation	'69	'71	'73	'75	'77	'80	'85	'90
Ascension	-	690	283	240	618	456	134	2,038
New Hope	-	440	220	270	425	239	539	
McCall/McManor	-	290	213	185	200	875	859	1,257
Evan Hall	810	835	340	620	950		1,473	2,633
Souvenir	195	246	85	148	288	125	570	796
Peytavin	170	275	175	360	575	403		-
Esperance/ Perseverance	180	166	115	192	280	230	727	-
Dugas	-	26	125	107	210	205		-

Table 5. Major Plantations in the Project Area: Sugar Production (in pounds), Selected Years, 1895-1915 (from Bouchereau 1895-1915).

Plantation	1895	1900	1905	1915
New Hope	5,326,022	1,194,163	4,449,679	-
Evan Hall	7,128,834	2,341,819	6,210,000	3,919,455
Souvenir	3,698,261	-	-	-
Peytavin	2,879,961	-	-	-

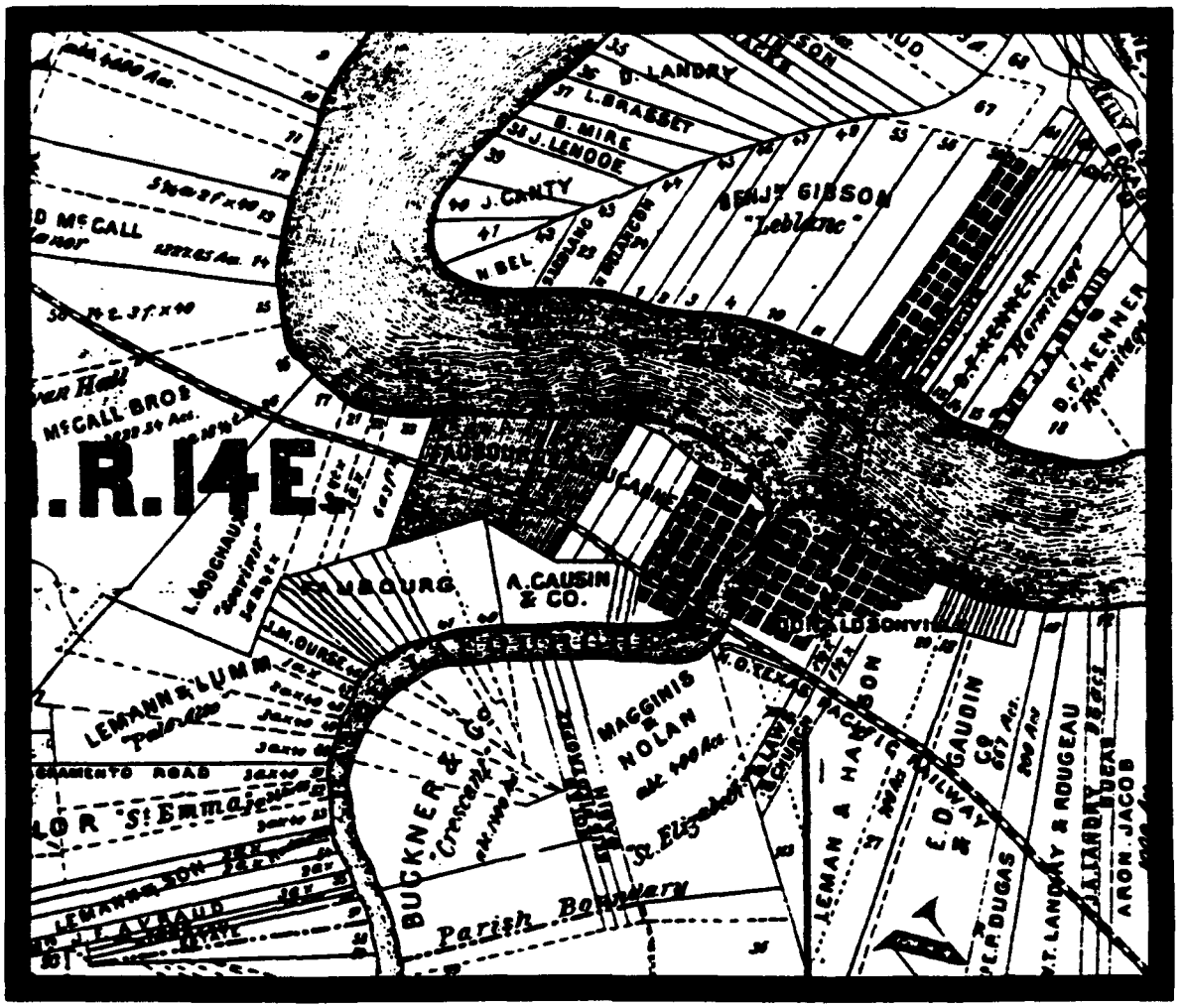


Figure 10. Map by C.H. Dickenson (1883) showing land ownership in the project area and the location of "Faubourg Laboucanne" [sic] to the west of Port Barrow (no scale available).

During the Reconstruction era, social and political tensions came to the surface in Ascension Parish. During the early 1870s, Donaldsonville and Ascension Parish suffered from a weakness of civil authority. A mob seized and burned a commercial vessel at Donaldsonville in 1870. The same year, a large crowd of freedmen from St. James and Ascension marched on Donaldsonville, allegedly intent on burning the town. The mayor and a prominent local lawyer were slain while trying to dissuade the crowd from entering the town. The militia was called out to maintain order; barrooms in Donaldsonville were closed until ballot boxes were removed from the town (Marchand 1931:77-78), suggesting that the unrest may have had a political basis.

Despite the Reconstruction-era instability in Ascension Parish, the overall parish population grew from 11,577 persons in 1870 to 16,895 individuals a decade later. Throughout the remainder of the nineteenth century, population continued to increase, reaching 24,142 persons by 1900. However, the Ascension Parish population declined by a total of 30 per cent between 1900 and 1930 (Marchand 1931:79). The sugar-producing areas of Louisiana experienced an overall decline of one-sixth in population in the first three decades of the twentieth century. This was due to a series of developments in the economy of sugar agriculture, including the impact of mosaic disease upon sugar cane, which played havoc with production until the advent of resistant varieties of cane (Begnaud 1980:45).

The riverfront of Donaldsonville was still characterized by wharves, landings, light industrial activity, and municipal utility facilities in 1920 (Maygarden et al. 1994:5-10). The MRC survey map of 1921 (Figure 12) indicates the expansion of Donaldsonville and Port Barrow since the 1883 MRC survey. By 1921, the downriver extent of the residentially developed portion of Donaldsonville had grown to include most of the river frontage of what had been the tract owned by Valery Landry below Donaldsonville and above the area that had been known as La Pipe. Development in 1921 extended to modern-day Lee Street. In 1883, Magnolia Street appeared to be the upriver limit of residential expansion on Port Barrow's river frontage. By 1921, residential development extended a number of blocks farther west into the area formerly referred to as the Faubourg La Boucanne. Above Donaldsonville, large plantations remained characteristic of the survey area; the major plantations in the project area above Donaldsonville maintaining their frontage on the Mississippi River included New Hope, Evan Hall/McManor, and Souvenir. New Hope and Evan Hall plantations remained major commercial sugar producers into the twentieth century. New Hope plantation even increased in size, at the expense of McManor. Below Donaldsonville, the larger plantations had declined as commercial agricultural entities since 1900. Downriver from Donaldsonville, Peytavin, Esperance/Perseverance, and Dugas plantations were operated together by Bernard Lemann and Brother into the 1880s, but commercial sugar production had ceased by 1890.

After 1945, technological innovations in the cultivation and harvesting of sugar cane largely eliminated the traditional gang labor

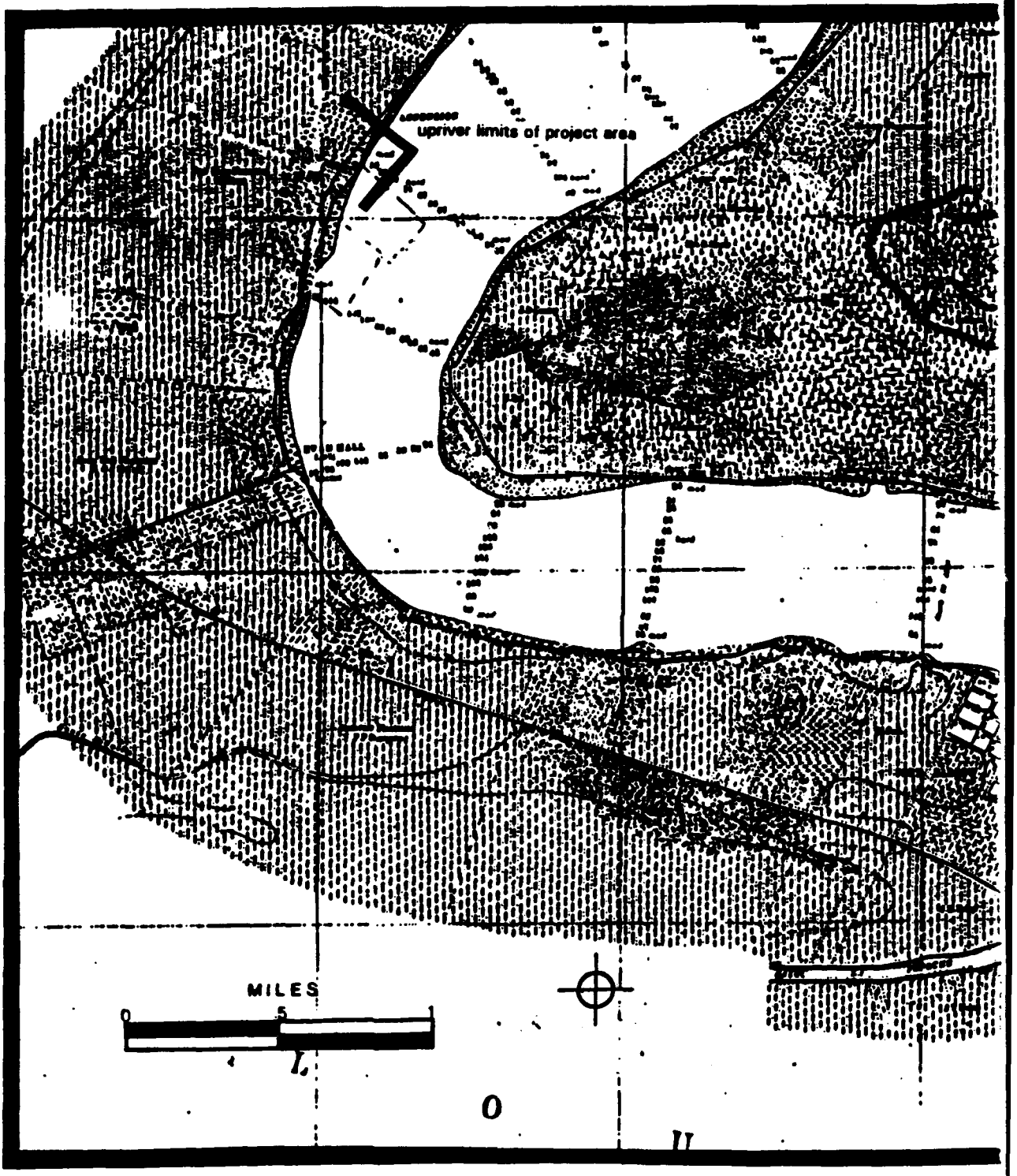


Figure 11. Excerpt from Chart No. 69 of the Commission survey showing the project area.

f the 1883 series Mississippi River area.

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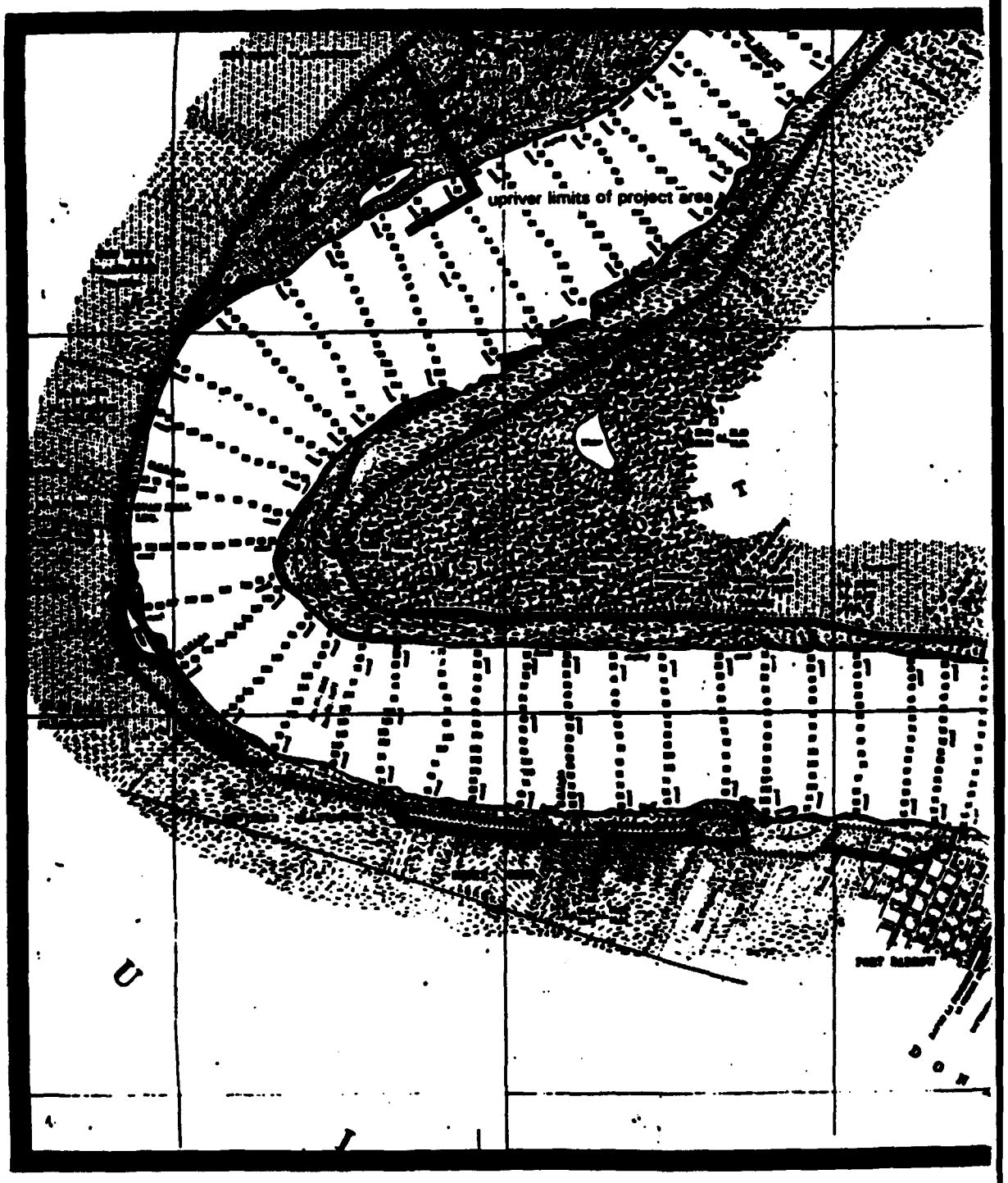
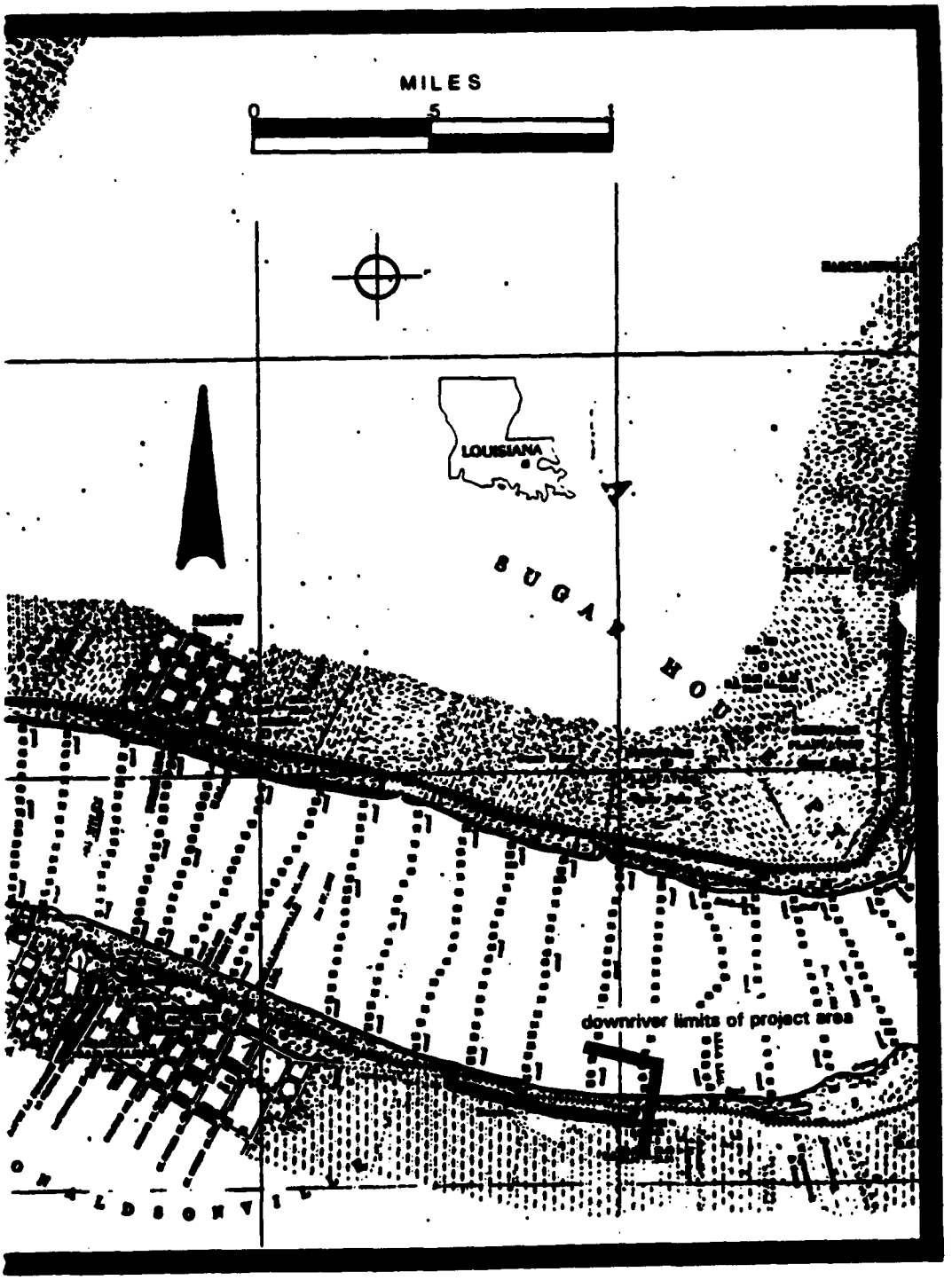


Figure 12. Excerpt from Chart No. 69 of
Commission survey showing the project a



39 of the 1921 Mississippi River
ject area.

2

methods and concentrated dwelling patterns of laborers that had characterized sugar plantations since the Civil War. Up to the Second World War, more than three-quarters of the cane acreage in Louisiana was tended and harvested by resident laborers, who were preferred on large sugar plantations to sharecroppers. The mechanization of sugar harvesting after the 1940s played the major part in reducing the demand for labor on sugar plantations. These laborers usually resided in a quarters complex with houses arranged in rows along the main plantation road, often in the same quarters utilized in the antebellum period. This typical pattern of worker residence on sugar plantations is in contrast to the dispersed residence pattern of tenants and sharecroppers on cotton plantations. Most of the churches and schools that would have served the population of sugar plantation laborers were located in small communities where seasonal, nonresident plantation workers and others lived, rather than on the plantations themselves (Yakubik et al. 1992:63). Examination of the 1883-series and the 1921 Mississippi River Commission Surveys (Figures 11 and 12) also indicated that structures, probably houses and outbuildings associated with small farmsteads or residences, were during this period located in the vicinity above Donaldsonville and within the project area. Thus, before 1920, the Smoke Bend settlement (formerly the *Faubourg La Bouccane*), had become a nucleus of stores (Maygarden et al. 1994:5-10), residences, and other amenities that may have served the communities of sugar plantation workers living on the large plantations upriver, or in Smoke Bend itself.

While Ascension Parish has remained a major sugar-growing area into the present, its agricultural base has greatly diversified since the Second World War. Furthermore, the chemical, aluminum, and fertilizer industries have established over a dozen major production facilities (*Petrochemical Industry Map* 1992) in Ascension Parish since World War II, transforming the once strictly agricultural economy of the area.

CHAPTER 6
PREVIOUS INVESTIGATIONS

Introduction

This chapter discusses the previous cultural resources investigations conducted adjacent to and in the vicinity of the project area. Since 1975, there have been nine cultural resources surveys conducted in and around the project area. The location, methodology, and results of these surveys are discussed in chronological order. Also, a brief discussion is included of eight sites found in the vicinity of the project area as well as the Donaldsonville Historic District.

Gary G. Stopp, Jr. (1975)

In 1975, Gary G. Stopp, Jr. (1975:1) conducted a "ground survey" of the Donaldsonville plant expansion site for CF Industries, Inc. This area was located on the former Dugas Plantation. The boundary of Stopp's survey is downriver and approximately 300 m (984.3 feet) east of the project area in Sec. 11 of T11 S, R15 E. In his letter report, Stopp did not describe his approach for assessing potential cultural resources on the Dugas Plantation. The only reference to his methodology was the statement that, "a ground survey was conducted" (Stopp 1975:1). Subsurface testing apparently was not undertaken. No cultural resources were encountered during the survey. His recommendation was that the proper state agencies should be notified if resources were discovered during construction. It is unknown if archeological deposits were indeed encountered during construction. The report indicates that the effort was minimal, which was not atypical of cultural resource surveys from this time period.

Richard J. Shenkel (1976)

Richard J. Shenkel (1976:1) conducted a "comprehensive on-ground survey" of the Smoke Bend Revetment Item for the New Orleans District, Corps of Engineers. The survey covered 4.4 km (14,485 feet) on the right descending bank of the Mississippi River near M-177.5 in Secs. 12, 13, 14, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, and 32 of T11 S, R14 E. The investigation included a portion of the current project area located from Sta. 6000+00 to 6223+00 in the Atchafalaya Basin Levee District.

Shenkel's methodology consisted of surficial examination of the exposed cutbank and batture. Shenkel reported that, "close examination of the area did not reveal any surface evidence of cultural materials" (Shenkel 1976:1). However, the report was not sufficiently detailed to evaluate how systematic the investigation was; Shenkel did not specify what a "detailed on-ground search" or "close examination" entailed. Shenkel recommended no further work because no cultural remains were encountered. He also stated that construction workers "should be altered [*sic*] to exercise appropriate pre-cautions" (Shenkel 1976:1). The report does not indicate that any background research was undertaken.

The major drawback to this report is its brevity and lack of detail. It is difficult to assess the thoroughness of the investigation because the methodology was not made explicit. However, the lack of subsurface testing should not necessarily be faulted given the depositional environment of the batture. Cultural resources are usually observed eroding from the bankline or redeposited on the river's edge during batture survey. Many if not most batture sites are identified in this manner. Thus, if one assumes that a systematic examination of the bankline was undertaken, coverage was probably adequate. As was the case with Stopp (1975), both the level of effort and reporting were typical of the period in which the work was undertaken.

Robert W. Neuman (1977)

Robert W. Neuman (1977) conducted a background check and survey for the Ascension Parish Sewerage Districts Numbers 2, 3, and 4. Data available from the Division of Archeology did not permit the exact location of this project to be determined. Neuman's approach consisted of "on-the-site survey, via vehicle and on foot, by professional personnel" (Neuman 1977:1). No other methodological details were provided, and subsurface testing evidently was not undertaken. A coherent synthesis of the regional prehistoric cultural periods was presented in the report. Historic research included examination of historic maps and aerial mosiacs. No cultural resources were encountered during survey (Neuman 1977:5). Assuming that the area surveyed was not located on the batture, subsurface testing should have probably been undertaken.

Burt F. Rader (1978)

Burt F. Rader (1978) conducted a pedestrian survey of the Aben Revetment Area for the New Orleans District, Army Corps of Engineers. The survey covered 5.2 km (17,000 feet) of revetment right-of-way on the right descending bank of the Mississippi River in Secs. 17, 16, 15, 14, 11, 10, 7, 6, 5, 4, 3, 2, 8, and 1 of T11 S, R15 E. The investigation included portions of the current project area downriver from river Sta. 50+68 in the Lafourche Basin Levee District.

Rader presented the various sources he used during his background research (Rader 1978:1). He described his survey as a "transect along the bankline with irregular perpendicular transects back on to the batture spaced approximately every 50-100 meters maximum spacing" (Rader 1978:2). Besides the transect survey, Rader examined "all clear areas, erosion scars, slump areas, dead falls, old barrow pit edges and areas disturbed by construction activity" (Rader 1978:2). Also, Rader reported that, "due to at least one to two feet of relatively recent alluvium, no extensive subsurface testing was implemented" (Rader 1978:2). However, occasional small "cat holes" were made with an entrenching tool into thickly vegetated areas of the batture in the areas of high relief (Rader 1978). These "cat holes" were used to "locate a truncated relief feature or stratum that would yield depositional information or cultural material" (Rader 1978:2).

Rader briefly discussed the culture history of the area. He also mentioned Shenkel's (1976:2) cultural resource survey. Furthermore, Rader offered a short discussion on the lack of known existing cultural resources in the project area and vicinity (Rader 1978:2).

Rader attributed his negative field results to the active nature of the Mississippi River in the project area (Rader 1978:4). According to Rader, the westward progression of the river would have destroyed any cultural resources (Rader 1978:4). Rader also stated that "the remains of non-recorded historic structures on the batture, if present, would be obscured by the very recent depositions of alluvium from flood waters in 1973" (Rader 1978:4).

Rader gave a thorough report on his survey of the Aben Revetment in Ascension Parish. His survey methods were discussed in an explicit fashion. Although subsurface testing was not incorporated into the survey, Rader's decision was justified in the report.

Gregory J. Ducote (1980)

Gregory J. Ducote (1980) conducted a pedestrian survey of the construction area for the replacement of the Bayou Lafourche bridge and approaches on LA 943. The survey area was located on Bayou Lafourche 4.83 km (three miles) southwest of Donaldsonville in Secs. 106 and 50 of T11 S, R14 E. A description of the physical setting, including information on floral and faunal communities as well as soil types, was presented. There was also a short review of the pertinent literature, including previous investigations and historical research. The discussion of field survey methods and findings was concise and thorough.

The survey methodology consisted of intensive pedestrian investigation along the right-of-way and "all exposed areas including a drainage ditch, road cuts, borrow pit edges, and shorelines" (Ducote 1980:4). Shovel tests measuring 50 x 50 cm to 40-60 cm depth were also excavated. However, Ducote did not discuss the determining factor for the placement of shovel tests or for the number of tests excavated. In addition, the map showing the location of the shovel tests is so small that it is difficult to see how many were excavated.

Except for a late-twentieth-century surface garbage scatter, the survey did not record any cultural resources. Ducote reported that, "no sites, prehistoric or historic, will be adversely affected by the proposed project" (Ducote 1980:4).

The report also included an addendum discussing the history and environmental setting of Bayou Lafourche. This addendum presented the settlement and subsistence patterns expected along the bayou's natural levees (Ducote 1980). The addendum also provided a coherent synthesis of prehistoric cultural periods for the area. Finally, the addendum incorporated a discussion of the history of Palo Alto Plantation, which is located 425 m north of the project area.

George J. Castille (1980)

In 1980, the City of Donaldsonville contracted Coastal Environments, Inc., to undertake a survey of a portion of the city for the purpose of preservation planning. Following background archival research, windshield reconnaissance was undertaken. The survey team drove along the city streets photographing representative house types. Not all of the houses were photographed (Castille 1980).

The survey covered over 80 blocks within the city limits. Over 100 structures in excess of 50 years old were noted. Most of these were shotguns, bungalows, and Creole cottages. The majority of the structures that were more than 50 years old were located north of the Texas and Pacific Railroad line, while those that predated 1900 generally were within the developed area of the town shown on the 1884 MRC Map (Castille 1980).

During the survey, Castille (1980:10-13) located the remains of the Union Fort Butler (16AN36). The site evidently was identified by surficial manifestations, since Castille (1980:10) gave no indication that subsurface testing was undertaken. A Creole-type house was built on the site sometime prior to 1922. Two features associated with the fort were located to the southwest of the house. The first feature, located 12 m southwest of the house, was an *in situ* brick foundation remnant. No details of the appearance of this feature were provided. The second feature, locate 15 m southwest of the house, was a partially-filled ditch measuring approximately five feet deep and 20 feet across (Castille 1980).

Castille (1980:13-14) recommended that the project area east of Bayou Lafourche and north of the railroad was potentially eligible for inclusion on the National Register as a Historic District. Similarly, he recommended that portion of the project area north of West Seventh Street and east of Magnolia Street on the west side of Bayou Lafourche as potentially eligible as a Historic District. These areas recommended by Castille are discussed in further detail at the end of this chapter.

Castille's report lacked a concise description of his methodology. Information on the differentiation of house-types (photographed versus not photographed) was not presented. In addition, the report lacked a discussion of the NRHP criteria utilized in evaluating the study area. However, it was apparently adequate for planning purposes, since the Donaldsonville Historic District was named to the National Register (below).

Malcolm K. Shuman and Dennis C. Jones (1985)

Surveys Unlimited Research Associates conducted a Level II cultural resources survey of a pipeline right-of-way for Ford, Bacon, and Davis. The proposed pipeline extended through Iberville, Assumption, and Ascension Parishes. That portion in Ascension Parish was located 4 to 5 miles south of the city of Donaldsonville on Bayou Lafourche. The Shuman and Jones

(1985) report contained a brief discussion on the physical geography, flora, and fauna found in the project area. They included a general discussion of the cultural periods and historic settlement patterns of the project area. A very brief discussion was also given of the previous investigations conducted in the immediate area (Shuman and Jones 1985).

Malcolm K. Shuman and Dennis C. Jones conducted a background review of the relevant literature for the project area (Shuman and Jones 1985). In addition, local informants were interviewed. However, Shuman and Jones offered no details pertaining to the individuals interviewed and types of questions asked. A pedestrian survey via vehicle, foot, and canoe was undertaken. During survey, "the investigators looked for nonconformities, structures, and surface scatters/exposed deposits" (Shuman and Jones 1985:20). Shovel tests were excavated in "high probability locations" (Shuman and Jones 1985:21). No information was provided on the placement or the intervals of these shovel tests (Shuman and Jones 1985). In sum, the report lacks methodological detail. No prehistoric or historic resources were encountered in Ascension Parish during the survey.

David B. Kelly (1989)

Coastal Environments, Inc., conducted archeological investigations of four revetment items located on the Mississippi River for the New Orleans District, Army Corps of Engineers. The Aben Revetment Area originates at Sta. 82+00 and is located downriver and immediately adjacent to the present project area. Survey of this area was conducted during 1988 (Kelly 1989). The survey utilized shovel tests and auger tests along 6060 feet (1847 m) of the batture from M-173.1 to 174-R (Kelly 1989:94).

The report provided a concise discussion of the environmental setting focusing primarily on geology and geomorphology as well as the flora found in the four revetment areas. No information on the faunal communities was provided. A general overview of previous investigations was included as well as an in-depth regional culture history (Kelly 1989).

Kelly's research plan for the survey combined archival investigations and deep subsurface testing. During field survey, a grid was established in each of the revetment areas. The grid was described as a "baseline laid out along the riverbank and lines perpendicular to it extended to the levee or the limit of the right-of-way" (Kelly 1989:33). Kelly stated that the riverbank was examined by "intensive survey" (Kelly 1989:33), and that the rest of the revetment area was investigated using shovel or auger tests at 50 m intervals along 20 m transects. Auger tests were used in areas where overburden was deemed greater than 50 cm (Kelly 1989). Depths of auger tests and size of shovel tests were not given.

Although no prehistoric remains were encountered within the Aben Revetment Item area, three historic sites (16AN42, 16AN43, and 16AN44) were documented. 16AN42, the Dugas Plantation Site, is located one mile (1.609 km) downriver from the City of Donaldsonville. The site abuts and

extends about 80 m into the current project area. This large, multicomponent site included intact late-nineteenth-century rice flumes. One of these irrigation structures was made out of wood, and the other was of iron pipe. A concrete foundation and a buried layer of brick rubble were also noted. Surface scatters indicated at least two periods of occupation: early- to mid-nineteenth century and late-nineteenth to early-twentieth century (Kelly 1989:115-123). The site was recommended as ineligible for inclusion on the National Register of Historic Places (Kelly 1989:134-135).

16AN43 is located 0.4 km (0.25 mile) downriver from 16AN42 on Stella Plantation (Kelly 1989:123-131). The site consisted of the *in situ* structural remains and cultural deposits of a nineteenth-century sawmill. Features included two large concrete foundations and the remains of a wooden structure. Kelly (1989:135) recommended additional excavations to determine its National Register eligibility.

16AN44 is located one mile downriver from 16AN43. The site consists of a large, L-shaped, concrete machinery foundation. Kelly suggested that the feature, which had no associated cultural deposits, was the foundation for a steam engine formerly attached to the Riverside Plantation warehouse. The site was evaluated as ineligible for inclusion on the National Register of Historic Places (Kelly 1989:131-135).

Kelly's report is concise and thorough. Investigations are well-presented, and recommendations are solidly justified.

Stephen Hinks et al. (1992)

In 1992, R. Christopher Goodwin and Associates, Inc., conducted a Phase I archeological survey of the planned Smoke Bend Revetment extension for the New Orleans District, Army Corps of Engineers. The survey area was located on the right descending bank of the Mississippi River between River Miles 179.1 and 178.5 (Hinks et al. 1992:51). Shovel and auger tests were excavated within 40 acres of the project area that map research indicated would contain pre-1921 deposits.

The Hinks et al. (1992) report provided an in-depth discussion on the natural setting of the project area. A general synthesis of the prehistory of the project area was contained in the report. In addition, a lengthy historic overview and land tenure history was provided.

Using Mississippi River Commission Charts, it was determined that there were only 40 acres of land within the Smoke Bend Revetment Item that pre-dated 1921. Therefore, it was decided that a regime of subsurface testing would be implemented for these 40 acres. The survey grid was composed of two separate baselines at each end of the project area. These baselines were perpendicular to the Mississippi River and Atchafalaya Basin Levee (Hinks et al. 1992).

Baseline "A" was placed downriver, and it contained four transects paralleling the levee. Baseline "B" was established upriver and contained

one transect between the levee and the existing borrow pit, and eleven transects between the borrow pit and the Mississippi River. The survey transects were spaced 20 m apart. There were a total of 144 shovel tests (30 x 30 x 50 cm) excavated every 50 m along each transect lane (Hinks et al. 1992).

Additionally, five auger tests were excavated 20 to 25 m from the riverside levee toe near the 1880s Mississippi River bankline. The auger tests, which measured 6 cm in diameter, were excavated to a depth of two meters to test for buried cultural deposits.

No prehistoric artifacts were recovered, but modern refuse was observed, particularly in the vicinity of the McManor Light. A cobalt Milk of Magnesia bottle was the only diagnostic artifact recovered. No archeological sites were identified (Hinks et al. 1992:53).

The survey report was concise and informative. The conceptualization and implementation of the methodology was described in detail, although the rational for the placement of the auger tests was not fully explicated.

National Register Properties in the Vicinity of the Project Area

Two properties located in Donaldsonville are listed on the National Register of Historic Places. The Landry Tomb was placed on the National Register in 1982. The tomb is attributed to James Dakin, the architect of the Baton Rouge Old State Capitol. The tomb is located on Claiborne and Saint Benson streets in the Ascension Parish Catholic Church Cemetery. The tomb is located approximately four city blocks due south from Lafourche Basin Levee District Sta. 30+00. The second locale is the Italianate Lemann Store, which was placed on the National Register in 1982. The structure dates to 1877-78 and includes a 1895 addition. The store is located at 314 Mississippi St. (La. Hwy 18 Bypass) on the north side of the road. This is adjacent to the south side of the levee, approximately at Lafourche Basin Levee District Sta. 16+00. These structures will not be affected by levee enlargement because they are located on the landside of planned construction.

The Donaldsonville Historic District was listed on the National Register of Historic Places on January 19, 1984. The district is located north of the Texas and Pacific Railroad tracks, and it includes about 50 city blocks. The northern boundary of the district is parallel and adjacent to the levee from Lafourche Basin Levee District Sta. 0+00 to approximately Sta. 37+00. The district boundaries were drawn to encompass the majority of historic resources present (National Register of Historic Places Inventory - Nomination Form).

The district is significant both for the quality of representative architectural types and the community planning design. In terms of architecture, the Donaldsonville Historic District "is the finest collection of structures from the Pre-Civil War Era to 1933 to be found in any of the

Mississippi River Parishes above New Orleans" (National Register of Historic Places Inventory - Nomination Form). In respect to community planning design, the district "incorporates formal planning features, which is unusual for community planning" (National Register of Historic Places Inventory - Nomination Form).

The district is comprised of "635 structures closely packed in a fifty block area with only 23% intrusion" (National Register of Historic Places Inventory - Nomination Form). This makes the historic area unusually large and cohesive. Another unique aspect of Donaldsonville's Historic District is that it possesses working-class areas which include both housing (shotgun houses, cottages, and bungalows) and neighborhood stores (National Register of Historic Places Inventory - Nomination Form). Such areas are most often altered by renewal projects, destroyed by fire, or abandoned. The working-class area of the Donaldsonville Historic District has undergone little alteration and has maintained its original design and appearance (National Register of Historic Places Inventory - Nomination Form).

The Donaldsonville Historic District also includes an impressive assemblage of late-nineteenth- and early-twentieth-century commercial buildings. It encompasses a wider range of commercial structures than is typical of most towns along the Mississippi River. The district contains the false front structures, provincial Italianate buildings, a number of neoclassical buildings, and two Romanesque Revival office buildings (National Register of Historic Places Inventory - Nomination Form).

The National Register of Historic Places Inventory - Nomination Form states that, "Donaldsonville is one of three Mississippi River towns north of New Orleans whose community plan goes beyond the normal speculative grid plan." One of the best examples of formal town planning on the River, the city includes a semicircular park as well as an open public square at the end of an axial street. These Baroque features appear to be unique (National Register of Historic Places Inventory - Nomination Form).

Although the district is adjacent to the levee on La Hwy 18 Bypass (Mississippi St.), there is a narrow corridor of undeveloped land between the structures and the landside toe of the levee. The Donaldsonville Historic District will not be impacted by the planned enlargement because construction is planned for the levee crown and the riverside toe of levee.

Other Archeological Sites in the Vicinity of the Project Area

Additional archeological sites located in the vicinity of the project area include McCall (or Evan Hall) Plantation (16AN18), Noel Plantation (16AN19), New Hope Plantation (16AN20), Ascension Plantation (16AN21), and Delicia Plantation (or the LeBlanc Farm; 16AN22). None of these nineteenth/twentieth century plantations have been formally evaluated. However, Palo Alto Plantation (16AN25), and St. Emma Plantation, both located southwest of Donaldsonville on Bayou Lafourche, were listed on the National Register of Historic Places in 1977 and 1980, respectively. The

centerpieces of both these sites are their mid-nineteenth-century, Greek Revival great houses.

CHAPTER 7
FIELD INVESTIGATIONS

Introduction

Archeological survey was conducted in two areas within Item M-178.0 to 173.2-R. The first area was located within the boundaries of the Lafourche Basin Levee District between Levee Stations 0+00 and 50+68. Construction in this area will consist of the placement of earth fill and surfacing the levee crown to bring it up to design grade. In addition, concrete slope pavement will be added to the riverside levee slope. The second survey area is a proposed borrow area located within the boundaries of the Atchafalaya Basin Levee District between Levee Stations 6168+00 and 6188+00. No archeological sites were located in either of the two survey areas.

Lafourche Basin Levee District, Station 0+00 to 50+68

Survey of this area consisted of the placement of auger tests at 50 m intervals along the riverside toe of levee (Figure 13). The placement of auger tests was designed to identify sites which could potentially become impacted from construction associated with the placement of concrete pavement on the riverside toe slope of the existing levee. All auger tests were excavated to a depth of 2 m. Stratigraphy was recorded in each test. Excavated soil was screened through 1/4" mesh. Auger Test 1 was placed at the riverside toe of levee at Levee Station 50+68. The remaining tests were placed at 50 m intervals extending upriver towards Levee Station 0+00 on a bearing of 292^{o}. A total of 31 auger tests were excavated during the initial survey in this area. Additional testing was conducted around each auger test containing artifacts. The stratigraphy observed in each auger test is presented in Appendix I.

Brick and coal were encountered below 50 cm depth in Auger Tests 7 (300 m upriver from Station 50+68) and 12 (550 m upriver from Station 50+68). Bracketing tests were excavated 10 m east and 10 m west of each of these positive auger tests. The bracketing tests were also located adjacent to the toe of levee. With the exception of a modern clear glass sherd recovered at 39 cm from the test located at 290 m upriver from Station 50+68, both of these bracketing tests were negative (Figure 13).

Amorphous, corroded metal was recovered within the uppermost 25 cm within Auger Test 9 (400 m upriver from Station 50+68), and glass fragments were collected from a similar depth in Auger Test 11 (500 m upriver from Station 50+68). Screened shovel tests were excavated 10 m east and 10 m west of each of the two positive tests because the cultural remains were located at shallow depths. These shovel tests measured 30 x 30 cm and were excavated to a depth of 50 cm. The tests bracketing A.T. 9 (390 and 410 m upriver from Station 50+68) contained modern rubbish, including plastic, electrical fuses, linoleum, amorphous metal, and modern glass. Both of the shovel tests bracketing A.T. 11 (490 and 510 m upriver from Station 50+68) were negative (Figure 13).

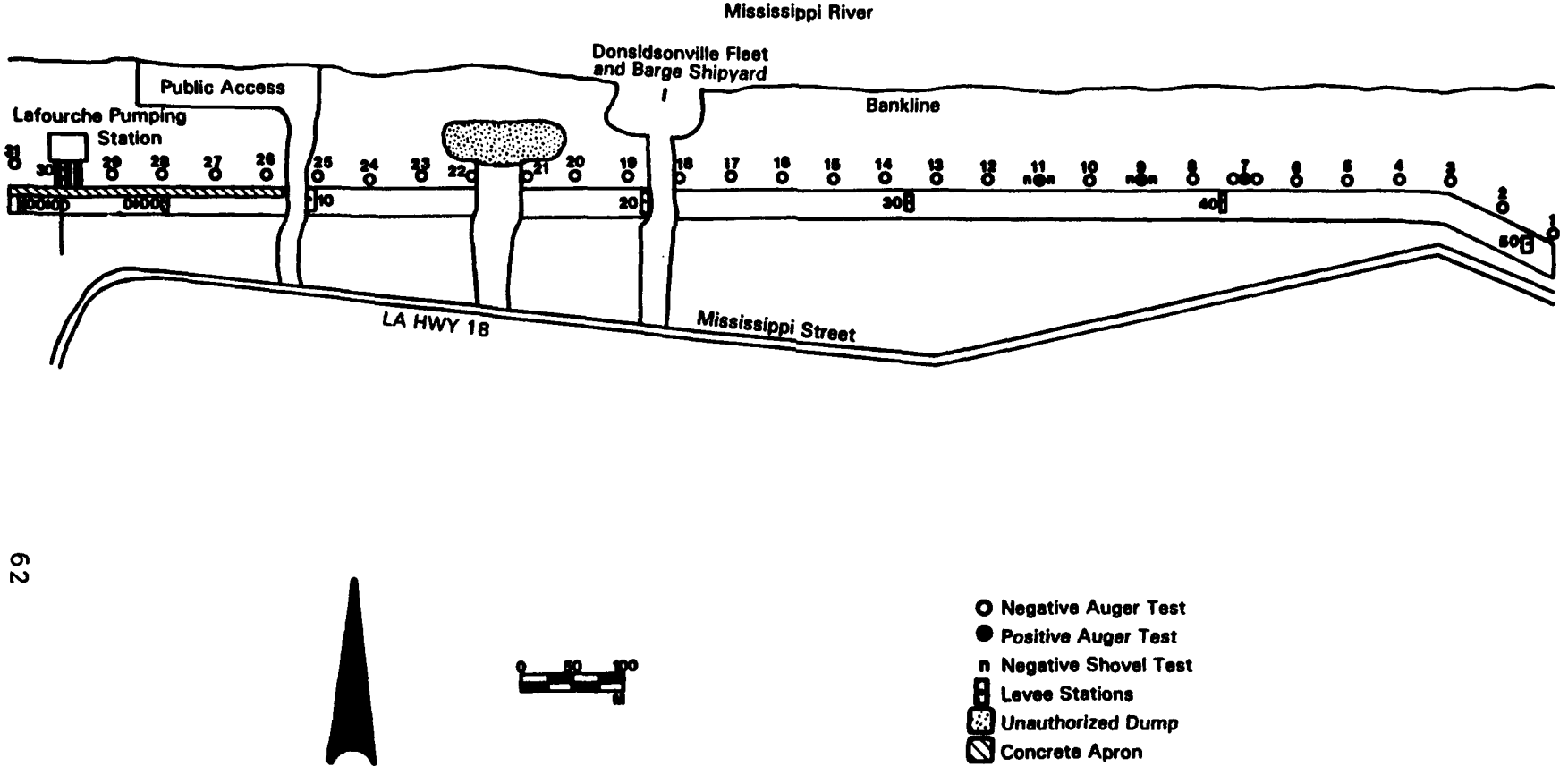


Figure 13. Map of Auger Tests within the Lafourche Basin Levee District.

While modern trash was present throughout the survey area, the area located between the Donaldsonville Fleet and Barge Shipyard (approximately 850 m upriver from Station 50+68) and a public access road onto the batture (approximately 1200 m upriver from Station 50+68) is a venue for large-scale unauthorized dumping. Trash in this area consisted of couches, recliners, and other household items. Tires, car parts, and bags of garbage were also noted. The refuse was most heavily concentrated between 950 and 1050 m upriver from Station 50+68 in the vicinity of a second levee access road. Almost all auger tests within this area of unauthorized dumping contained contemporary refuse such as modern bottle fragments, corroded amorphous metal, and plastic. No pre-World War II remains were recovered from auger tests or noted on the surface within this dumping area.

Impenetrable material was encountered at depths of 120 to 170 cm below surface in Auger Tests 28 through 30 (1350 to 1450 m upriver from Station 50+68). No sample of the material could be extracted, and attempting to force the test only bent the auger. It should be noted that the levee had a concrete apron in the area of these tests.

Atchafalaya Basin Levee District, Station 6168+00 to 6188+00

The initial survey of the proposed borrow area consisted of the placement of 19 auger tests excavated to a depth of 2 m and spaced at 35 m intervals. The transect was oriented parallel to the levee and the borrow pond (Figure 14). Excavated soils were screened through 1/4" mesh. The first test was placed at Levee Station 6168+00, and subsequent tests extended downriver to Station 6188+00. Auger Tests 1 through 15 were excavated in the southern portion of the proposed borrow area, along the edge of an existing borrow pond (Figure 14). As shown in Figure 15, this area is located landward of the former U.S. Smoke Bend (1926-1927) levee. Auger Tests 16 through 19 were offset 60 m riverward, and are located riverward of the former levee. Fifteen additional auger tests were excavated around each of the initial auger tests which contained artifacts. The placement of the auger tests was determined in consultation with the NOD's Contracting Officer's Technical Representative in order to maximize the potential for the discovery of intact archeological deposits. As was the case in the previous survey area, stratigraphy was recorded for each auger test (Appendix II).

Modern refuse, consisting primarily of beer cans, plastic containers, and metal buckets, was noted throughout the survey area. In addition, evidence of contemporary illegal dumping was observed at the riverside toe of levee adjacent to an access road onto the batture. Material in this area consisted of wood paneling, boards, and other modern construction debris. Vegetation was dense throughout the survey area.

One sherd of classic ironstone and fragments of amorphous metal were recovered between 50-60 cm below surface in Auger Test 3 (70 m downriver from Station 6168+00). Four bracketing auger tests were

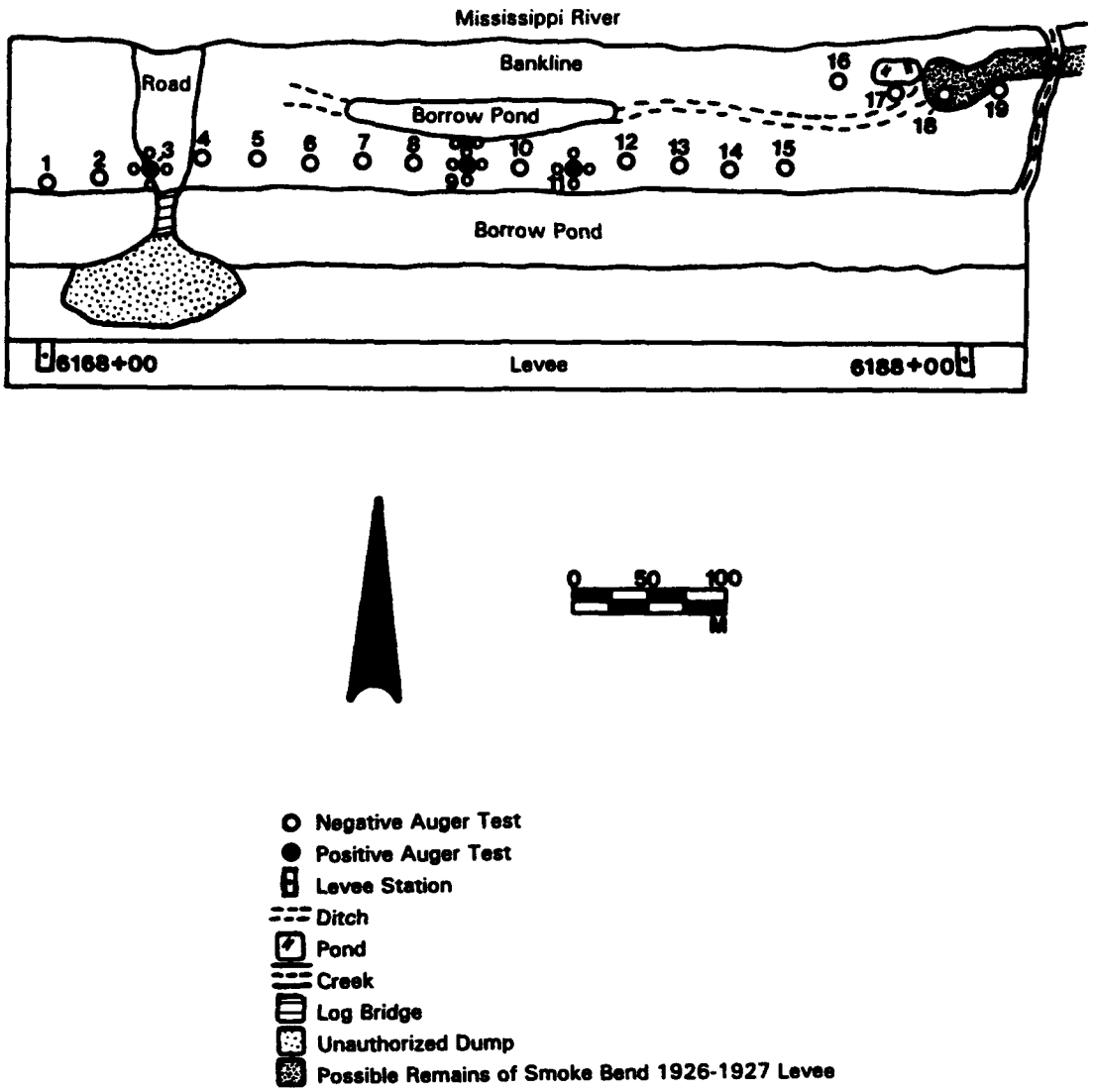


Figure 14. Map of Auger Tests within the Atchafalaya Basin Levee District.

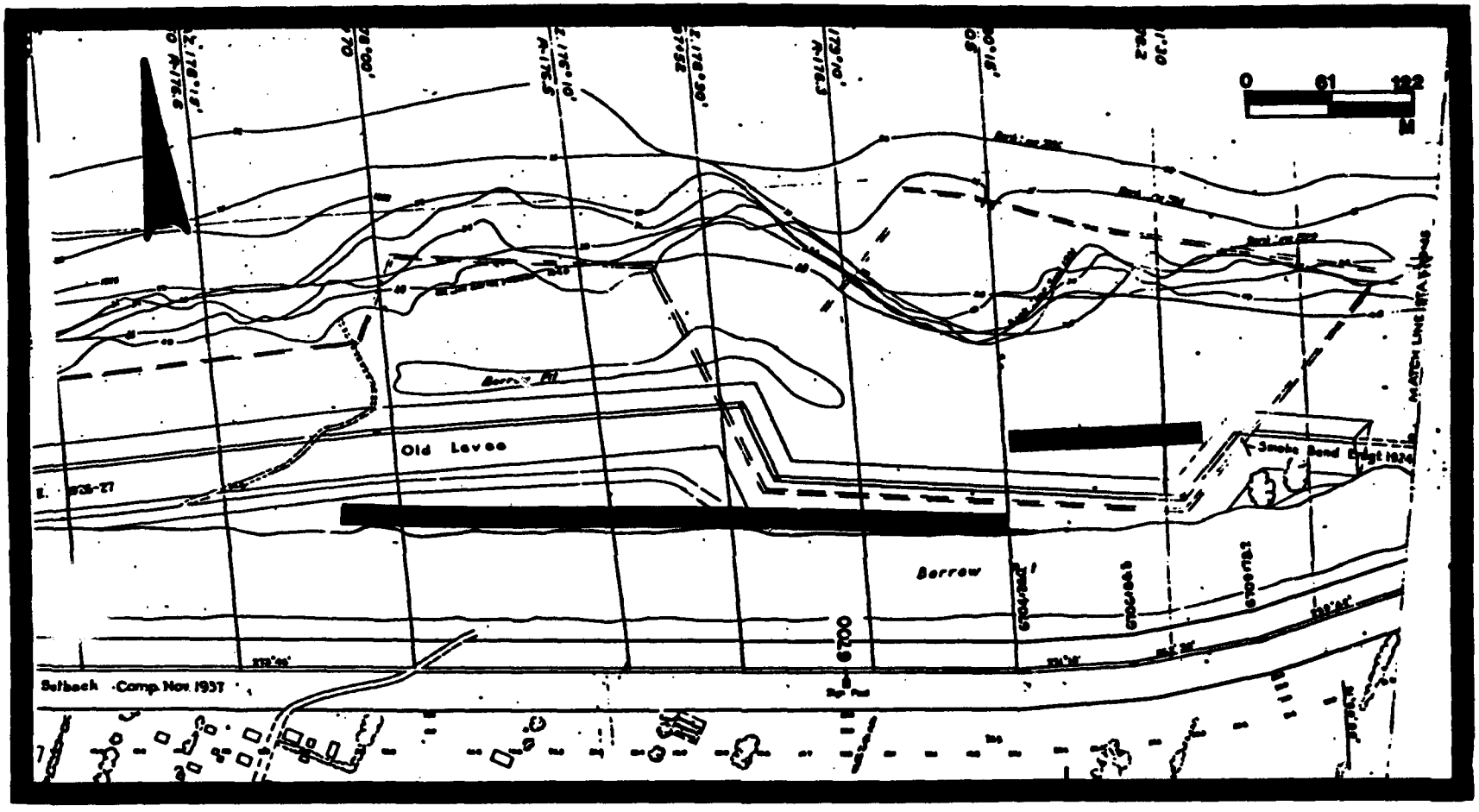


Figure 15. Excerpt from the Caving Banks Survey showing the locations of the survey transects (shown by the heavy line) relative to the position of the 1926-1927 Smoke Bend levee.

excavated in this area (Figure 16). One test was excavated 9 m to the south of the positive test; those to the north, east, and west were spaced 10 m distant. All of the bracketing tests were negative with the exception of a few tiny (<1/4") brick fragments recovered between 25-56 cm in the eastern bracketing test. The stratigraphy recorded for these tests is presented in Appendix II.

Charcoal, brick fragments, and one sherd of clear glass were recovered from Auger Test 9 (280 m downriver from Station 6168+00) at depths ranging from 25 to 55 cm below surface. Again, four bracketing auger tests to 2 m were placed 10 m to the north, south, east and west of the positive test (Figure 17). The northern test yielded a few tiny (1/4") brick fragments at 65 cm below surface. Three additional tests were excavated 5 m to the east, west, and south of the northern test. The presence of an inundated borrow pit precluded the excavation of a test to the north. Only the southern of these tests, located 5 m north of the original positive Auger Test 9, was positive, and it only contained a few tiny (<1/16") brick fragments. The stratigraphy observed in all of these tests is presented in Appendix II.

Brick sherds measuring less than 1/16" were recovered from between 42-156 cm in Auger Test 11 (352 m downriver from Station 6168+00). Four bracketing 2 m auger tests were placed 10 m to the north, south, east, and west of the positive test (Figure 17). All of the bracketing tests were negative. The stratigraphy recorded for each of these tests is presented in Appendix II.

Possible remains of the 1926-1927 Smoke Bend Levee were encountered at Auger Tests 18 and 19 (595 m and 630 m downriver from Station 6168+00). Here, a large mound extended to the northeast and then turned east to parallel the river (Figure 14). Trees located on top of the old levee appeared to be fairly young (20 to 30 years old). Interestingly, Auger Test 18 which was excavated on what was formerly the riverside slope of the levee recovered almost exclusively sand. Soils within A.T. 19, which was located on the former landside slope of the levee, included sandy silts and sandy clays. No cultural material was found in association with the old levee. It should be noted that this feature is located on the extreme downriver end and outside of the proposed borrow area.

Observations on Stratigraphy Within Auger Tests Within the Lafourche Basin Levee District (by Paul V. Heinrich)

Stratigraphic profiles of all auger tests excavated during field investigations are described in Appendices I and II. Auger tests were observed to penetrate two different stratigraphic units. The uppermost stratigraphic unit consists of a predominantly gray (10YR 5/1) to brown (10YR 5/3) firm silty clay that becomes thinner and pinches out further away from the artificial levee. This unit was absent from Auger Test 31, which was located within the batture approximately 15 m away from the artificial levee. The available evidence indicates that this lithologic unit

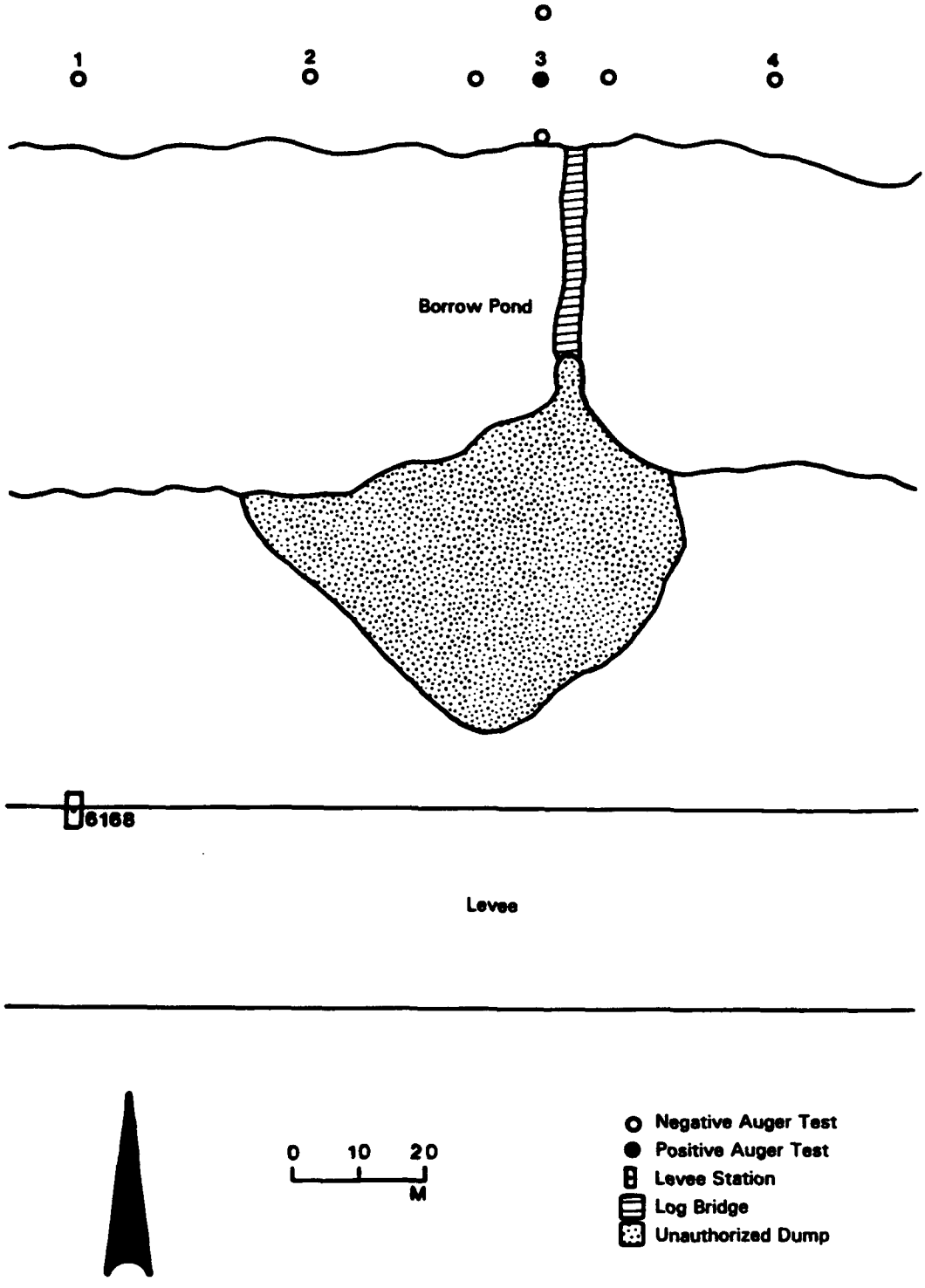


Figure 16. Detailed map of positive Auger Test within the Atchafalaya Basin Levee District survey area.

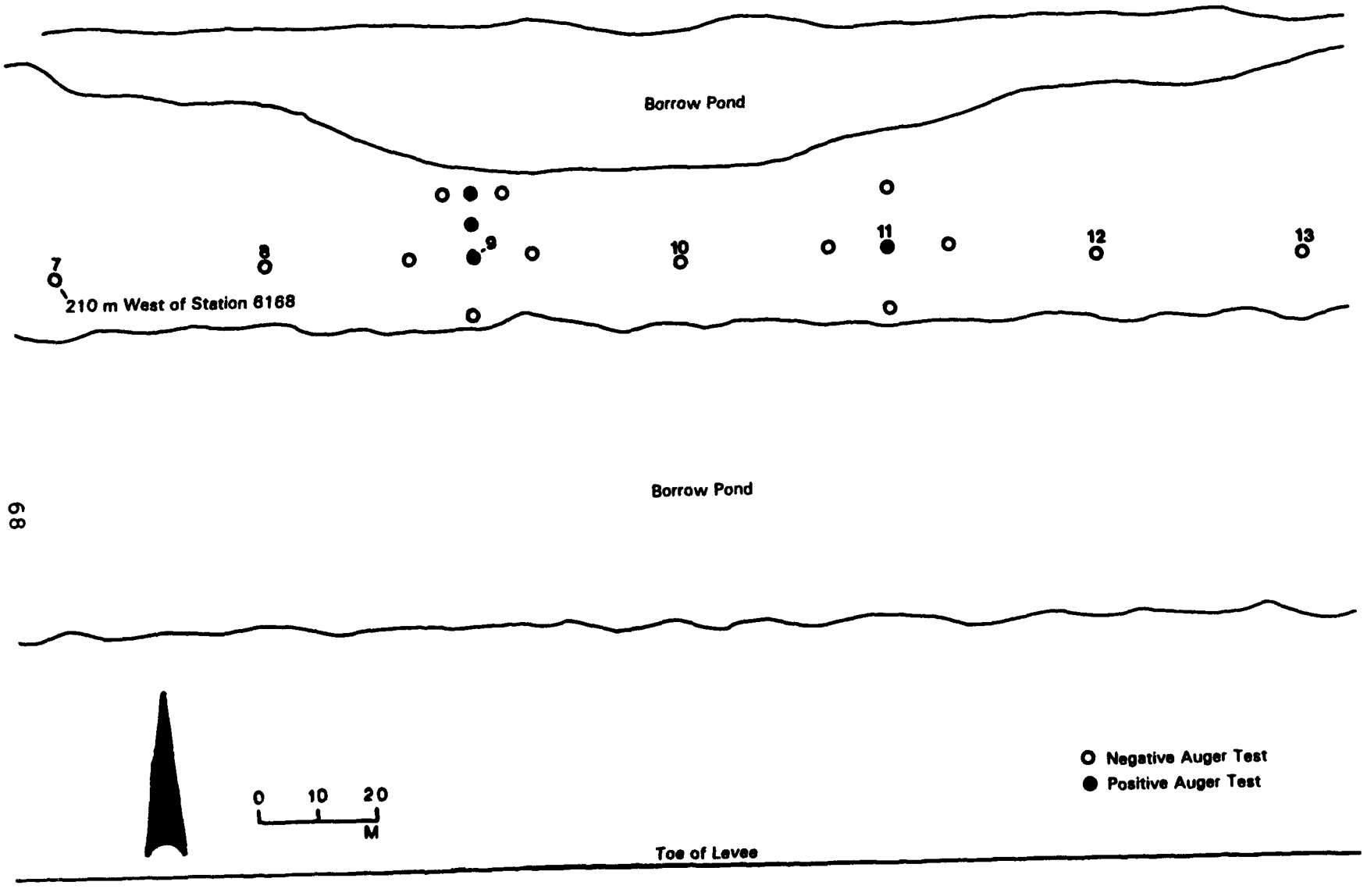


Figure 17. Detailed map of positive Auger Tests 9 and 11 within the Atchafalaya Basin Levee District survey area.

consists of artificially placed materials associated with the adjacent artificial levee.

Stratigraphic Unit 1 overlays a predominantly dark bluish gray (5B 4/1) to bluish gray (5B 5/1), soft sandy clay to clay loam or silt clay loam. In addition to the dominant colors, minor mottles of dark brown (10YR 5/3), black (2.5Y 2/0), dark reddish brown (5YR 3/3) brown (10YR 5/3), and other colors occur. With increased depth, this fully saturated unit becomes sandier and thus, significantly less cohesive. This stratigraphic unit is typical of overbank sediments that accumulate on the batture of the Mississippi River. The dark bluish gray and bluish gray colors are caused by gleying of these sediments as a result of their poorly drained and continually saturated condition.

CHAPTER 8
SUMMARY AND RECOMMENDATIONS

Background research and archeological survey was conducted adjacent to the riverside toe of the existing levee in Item M-178.0 to 173.2-R. Two areas within the entire project area were subject to intensive cultural resources investigations. The first area is located within the boundaries of the Lafourche Basin Levee District between Levee Stations 0+00 and 50+68. The second survey area is located on the batture within the limits of a proposed borrow area within the Atchafalaya Basin Levee District between Levee Stations 6168+00 and 6188+00. A total of 65 auger tests to depths of 2 m and four shovel tests measuring 30 x 30 x 50 cm were excavated within both areas.

Examination of the 1883-series and the 1921 MRC Survey (Figures 11 and 12) showed that structures, probably houses and outbuildings associated with small farmsteads, were formerly located in the vicinity of the Atchafalaya Basin Levee District survey area. Cultural materials collected during auger testing within the area located between Station 6168+00 and 6188+00 in the Atchafalaya Basin Levee District indicates that the sites of structures appearing on the MRC charts were likely distant from the area surveyed. Tiny brick fragments and an occasional ceramic or glass sherd are not unusual in agricultural fields. Thus, it appears that this area was the cultivated rather than residential portion of the farmsteads shown on the MRC maps. Due to the paucity and condition of remains, a site number was not assigned, and no further work is recommended in this area.

The geomorphic research for the Atchafalaya Basin Levee District portion of the project area indicates that there is a moderate probability for the occurrence of prehistoric sites. The batture along the right descending bank is underlain by historic Mississippi River point bar deposits (Saucier 1969). These point bar deposits are associated with the trunk distributary channel of the Lafourche Distributary Channel and have a date of less than 4500 years B.P. The burial of these sediments by natural levee deposits associated with Meander Belt No. 1, which are younger than 2800 years old, and the lateral migration of the Mississippi River suggests an even younger age for the batture deposits. However, no prehistoric sites were discovered during survey. Then too, historic materials encountered during auger testing in this portion of the project area were recovered from depths exceeding 1 m below surface. Thus, it is likely that any prehistoric sites located in the Atchafalaya Basin Levee District survey area would also be deeply buried. Such sites, if present, are necessarily difficult to identify, even with the use of deep auger tests.

Within the Lafourche Basin Levee District survey area, the auger tests were placed adjacent to the toe of the levee. A considerable amount of modern refuse was recovered in this area. This was consistent with expectations based upon the geomorphic and historic background research.

The geomorphic evidence suggests that the batture between Sta. 0+00 to 50+68 of the Lafourche Basin Levee District was located in the channel of the Mississippi River in 1883. Sometime between 1921 and 1983, the northward migration of the Mississippi River created most of the survey area. Thus, the batture entirely postdates 1921. There is no potential for *in situ* prehistoric archeological deposits within this area. In addition, the possibility for historic archeological deposits, with the exception of shipwrecks, is very low.

Historic data indicate that the batture fronting Donaldsonville has never been characterized by industrial or residential development. While there were formerly some industrial buildings located along the landside toe of levee in the Lafourche Basin Levee District, improvements to the batture were restricted to the wharf presently located adjacent Levee Sta. 20+00 (Maygarden et al. 1994).

No archeological sites were identified in either of the two survey areas. The paucity of cultural resources is consistent with expectations based on the historical and geomorphic evidence. From these data, it is concluded that construction will not adversely impact any significant archeological deposits in the survey area. The evidence also suggests that levee enlargement will not adversely effect the Donaldsonville Historic District. Therefore, no further work is recommended for the project area.

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APPENDIX I
STRATIGRAPHY IN AUGER TESTS WITHIN THE LAFOURCHE BASIN LEVEE DISTRICT

A.T. 1 (at Station 50+68)

0-0.67 m	10YR 4/1 (dark gray) silty clay with 10YR 3/1 (very dark gray) mottling
0.67-0.8 m	10YR 5/1 (gray) silty sandy clay with 10YR 3/6 (dark yellowish brown) mottling
0.8-0.95 m	10YR 5/3 (brown) sandy clay
0.95-1.46 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown) mottling
1.46-2.00 m	10YR 6/1 (gray) sandy clay with 10YR 5/8 (yellowish brown) mottling

A.T. 2 (50 m Upriver From Station 50+68)

0-0.54 m	10YR 4/1 (dark gray) silty clay
0.54-1.6 m	10YR 5/2 (grayish brown) sandy silty clay with 10YR 6/8 (brownish yellow) mottling
1.6-1.93 m	10YR 5/1 (gray) sandy silty clay with 10YR 5/8 (yellowish brown) mottling
1.93-2.15 m	5B 4/1 (dark bluish gray) clay

A.T. 3 (100 m Upriver From Station 50+68)

0-0.38 m	10YR 3/3 (dark brown) silty clay
0.38-1.2 m	10YR 4/3 (dark brown) sandy silty clay with 7.5YR 4/0 (dark gray) mottling
1.2-1.59 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/4 (dark brown) and 7.5YR 5/8 (strong brown) mottling
1.59-2.0 m	5B 4/1 (dark blue gray) clay

A.T. 4 (150 m Upriver From Station 50+68)

0-0.3 m	10YR 3/2 (very dark grayish brown) silty clay
0.3-0.9 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) mottling
0.9-1.52 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown) mottling
1.52-2.0 m	5B 4/1 (dark blue gray) sandy clay

A.T. 5 (200 m Upriver From Station 50+68)

0-0.96 m	10YR 3/3 (dark brown) silty clay with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling
0.96-1.46 m	10YR 4/2 (dark grayish brown) sandy silty clay with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling
1.46-2.0 m	5B 4/1 (dark blue gray) sandy clay

A.T. 6 (250 m Upriver From Station 50+68)

0-0.73 m	10YR 4/1 (dark gray) silty clay with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling
0.73-1.13 m	10YR 4/4 (dark yellowish brown) sandy clay with 7.5YR 5/8 (strong brown), 2.5Y 2/0 (black), and 10YR 5/1 (gray) mottling
1.13-1.33 m	10YR 4/4 (dark yellowish brown) sandy clay with 10YR 5/1 (gray) mottling
1.33-1.70 m	10YR 5/3 (brown) sandy clay with 10YR 5/1 (gray), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.70-1.88 m	10YR 5/1 (gray) sandy clay with 2.5Y 3/4 (dark reddish brown) mottling
1.88-2.10 m	N4 (dark gray) sandy clay with 7.5YR 5/0 (gray) mottling

A.T. 7 (300 m Upriver From Station 50+68)

0-0.62 m	10YR 4/3 (dark brown) silty clay with 7.5YR 5/8 (strong brown) mottling
0.62-1.40 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) and 10YR 5/1 (gray) mottling brick sherds (<1/8") and coal fragments at 0.77 m
1.40-2.0 m	7.5YR 5/0 (gray) sandy clay

Bracketing Test For A.T. 7 (290 m Upriver From Station 50+68)

0-0.25 m	10YR 4/3 (dark brown) silty clay with 10YR 5/1 (gray), 10YR 5/8 (yellowish brown), and 7.5YR 4/6 (strong brown) mottling
0.25-0.79 m	10YR 5/1 (gray) silty clay with 10YR 5/8 (yellowish brown), 7.5YR 4/6 (strong brown), 2.5Y 2/0 (black), and 5YR 3/3 (dark reddish brown) mottling modern clear glass sherd at 0.39 m
0.79-1.0 m	5B 4/1 (dark blue gray) sandy clay with 10YR 5/3 (brown), 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling
1.0-1.40 m	10YR 5/3 (brown) sandy clay with 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling with pockets of 10YR 7/1 (light gray) sand
1.40-1.70 m	5B 5/1 (bluish gray) sandy clay with 10YR 5/3 (brown), 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling
1.70-2.04 m	5B 5/1 (bluish gray) and 5B 4/1 (dark blue gray) sandy clays

Bracketing Test For A.T. 7 (310 m Upriver From Station 50+68)

0-0.51 m	10YR 5/3 (brown) silty clay with 10YR 5/8 (yellowish brown), 7.5YR 4/6 (strong brown), and 10YR 5/1 (gray) mottling
0.51-1.04 m	5B 4/1 (dark blue gray), 10YR 5/1 (gray), and 10YR 5/3 (brown) clayey sands
1.04-2.06 m	5B 4/1 (dark blue gray) sandy clay

A.T. 8 (350 m Upriver From Station 50+68)

0-0.62 m	10YR 4/3 (dark brown) silty clay with 7.5YR 5/8 (strong brown) mottling
0.62-1.30 m	10YR 4/3 (dark brown) to 10YR 5/2 (grayish brown) sandy clay with 7.5YR 5/8 (strong brown) mottling
1.30-1.70 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown) and 7.5YR 3/4 (dark brown) mottling
1.70-2.0 m	7.5YR 5/0 (gray) sandy clay

A.T. 9 (400 m Upriver From Station 50+68)

0-0.66 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown) mottling amorphous metal at 0-0.25 m
0.66-1.56 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), 10YR 7/1 (light gray), and 2.5Y 2/0 (black) mottling
1.56-2.15 m	7.5YR 5/0 (gray) sandy clay

A.T. 10 (450 m Upriver From Station 50+68)

0-0.96 m	10YR 5/1 (gray) sandy silty clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling
0.96-1.56 m	10YR 5/1 (gray) sandy clay with 7.5YR 6/0 (gray) and 10YR 4/3 (dark brown) mottling
1.56-2.05 m	7.5YR 5/0 (gray) sandy clay

A.T. 11 (500 m Upriver From Station 50+68)

0-1.15 m	10YR 5/1 (gray) sandy silty clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling glass sherd at 0.25 m
1.15-1.70 m	10YR 4/3 (dark brown) sandy clay
1.70-2.02 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 12 (550 m Upriver From Station 50+68)

0-0.78 m	10YR 5/1 (gray) sandy silty clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling coal at 0.70 m
0.78-0.89 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling with pockets of 10YR 7/1 (light gray) sand brick sherds (<1/8") at 0.80-0.85 m
0.89-1.76 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 2.5Y 2/0 (black) and 7.5YR 5/8 (strong brown) mottling
1.76-2.0 m	7.5YR 5/0 (gray) clay

Bracketing Test For A.T. 12 (540 m Upriver From Station 5[illegible]68)

0-1.0 m	10YR 5/1 (gray) silty clay with 5YR 3/3 (dark reddish brown), 10YR 5/4 (yellowish brown), and 7.5YR 4/6 (strong brown) mottling
1.0-1.53 m	10YR 5/3 (brown) sandy clay with 5B 4/1 (dark blue gray) and 10YR 5/8 (yellowish brown) mottling with pockets of 10YR 7/1 (light gray) sand
1.53-1.93 m	5B 4/1 (dark blue gray) sandy silty clay with 5YR 3/3 (dark reddish brown) mottling
1.93-2.0 m	5B 4/1 (dark blue gray) sandy silty clay

Bracketing Test For A.T. 12 (560 m Upriver From Station 50+68)

0-0.25 m	10YR 4/3 (dark brown) silty clay with 10YR 5/1 (gray) and 10YR 5/8 (yellowish brown) mottling
0.25-0.73 m	10YR 5/1 (gray) silty clay with 10YR 5/3 (brown), 10YR 5/8 (yellowish brown), and 2.5Y 2/0 (black) mottling with pockets of 10YR 7/1 (light gray) sand
0.73-1.10 m	10YR 5/3 (brown) and 10YR 4/3 (dark brown) sandy silty clays with 10YR 5/1 (gray), 10YR 5/8 (yellowish brown), and 2.5Y 2/0 (black) mottling
1.10-1.43 m	5B 5/1 (bluish gray) and 10YR 5/1 (gray) sandy clays with 10YR 5/3 (brown) and 10YR 5/8 (yellowish brown) mottling
1.43-1.69 m	10YR 5/3 (brown) sandy clay with 5B 5/1 (bluish gray) and 10YR 5/8 (yellowish brown) mottling
1.69-2.0 m	5B 5/1 (bluish gray) sandy clay

A.T. 13 (600 m Upriver From Station 50+68)

0-1.09 m	10YR 5/1 (gray) silty clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling
1.09-1.68 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 2.5Y 2/0 (black) and 7.5YR 5/8 (strong brown) mottling
1.68-1.99 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 2.5Y 2/0 (black), 10YR 2/2 (very dark brown), and 7.5YR 5/8 (strong brown) mottling
1.99-2.03 m	7.5YR 5/0 (gray) clay

A.T. 14 (650 m Upriver From Station 50+68)

0-0.43 m	10YR 5/2 (grayish brown) silty clay with 10YR 4/3 (dark brown) and 7.5YR 5/8 (strong brown) mottling
0.43-1.15 m	10YR 5/1 (gray) silty clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.15-1.71 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 2.5Y 2/0 (black), and 7.5YR 5/8 (strong brown) mottling
1.71-1.89 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling
1.89-2.10 m	7.5YR 5/0 (gray) clay

A.T. 15 (700 m Upriver From Station 50+68)

0-1.23 m	10YR 5/1 (gray) silty clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.23-1.50 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 2.5Y 2/0 (black) and 7.5YR 5/8 (strong brown) mottling
1.50-1.70 m	10YR 5/1 (gray) sandy silty clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling
1.70-1.95 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling
1.95-2.10 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 16 (750 m Upriver From Station 50+68)

0-0.50 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) mottling
0.50-0.92 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
0.92-1.31 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling with pockets of 10YR 7/1 (light gray) sand
1.13-1.72 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.72-2.03 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 17 (800 m Upriver From Station 50+68)

0-0.60 M	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) and 10YR 4/3 (dark brown) mottling
0.60-1.18 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling
1.18-1.83 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 2.5Y 2/0 (black) and 7.5YR 5/8 (strong brown) mottling
1.83-2.0 m	7.5YR 5/0 (gray) sandy clay with pockets of 10YR 7/1 (light gray) and 10YR 6/3 (pale brown) sands

A.T. 18 (850 m Upriver From Station 50+68)

0-0.75 m	10YR 5/2 (grayish brown) silty clay with 10YR 4/3 (dark brown) and 7.5YR 5/8 (strong brown) mottling modern refuse, brick sherds, oyster shells, charcoal, modern brown bottle glass
0.75-1.23 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 2.5Y 2/0 (black), and 7.5YR 5/8 (strong brown) mottling
1.23-1.36 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 10YR 7/1 (light gray), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling
1.36-1.83 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling
1.83-2.0 m	7.5YR 5/0 (gray) clay

A.T. 19 (900 m Upriver From Station 50+68)

0-0.37 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) mottling modern refuse, modern clear bottle glass sherds, amorphous metal
0.37-1.10 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling
1.10-1.45 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown) and 5YR 3/3 (dark reddish brown) mottling
1.45-2.0 m	7.5YR 6/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 20 (950 m Upriver From Station 50+68)

0-0.28 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) mottling
0.28-0.73 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown), 10YR 7/1 (light gray), and 10YR 4/3 (dark brown) mottling
0.73-1.18 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling
1.18-1.45 m	10YR 5/1 (gray) sandy clay with 10YR 7/1 (light gray), 5YR 3/3 (dark reddish brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.45-1.70 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown) mottling
1.70-1.95 m	10YR 5/1 (gray) sandy clay with 5YR 3/3 (dark reddish brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.95-2.10 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 21 (1000 m Upriver From Station 50+68)

0-0.25 m	10YR 5/2 (grayish brown) silty clay piece of a drill bit
0.25-0.45 m	10YR 5/1 (gray) and 10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) mottling with pockets of 10YR 6/1 (gray) sand
0.45-1.30 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling with pockets of 10YR 6/1 (gray) sand; 5YR 3/3 (dark reddish brown) mottling at 1.18
1.30-2.10 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling slag at 1.44-1.47 m and 1.65 m

A.T. 22 (1050 m Upriver From Station 50+68)

0-0.23 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 5/8 (strong brown) and 10YR 4/3 (dark brown) mottling modern refuse, pop top, aluminum foil
0.23-0.60 m	10YR 5/1 (gray) silty clay with 10YR 4/3 (dark brown), 10YR 7/1 (light gray), and 7.5YR 5/8 (strong brown) mottling modern refuse, amorphous metal, oyster shell
0.60-1.20 m	10YR 4/3 (dark brown) and 10YR 5/1 (gray) sandy clays with 7.5YR 5/8 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling
1.20-1.50 m	10YR 5/1 (gray) sandy clay with 7.5YR 5/8 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black), and 10YR 7/1 (light gray) mottling cinders and slag at 1.30 m
1.50-1.70 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown) and 2.5Y 2/0 (black) mottling modern refuse, modern clear glass, modern ironstone at 1.55 m
1.70-2.0 m	7.5YR 6/0 (gray) sandy clay modern clear glass, wire nail, cinder

A.T. 23 (1100 m Upriver From Station 50+68)

0-0.63 m	10YR 5/1 (gray) sandy silty clay with 7.5YR 5/8 (strong brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) mottling
0.63-0.84 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays modern clear jar top, amorphous metal
0.84-1.90 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown), 2.5Y 2/0 (black) mottling with pockets of 10YR 6/1 (gray) sand amorphous metal, slag, cinders, and charcoal
1.90-2.0 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 24 (1150 m Upriver From Station 50+68)

0-0.08 m	10YR 5/2 (grayish brown) silty clay
0.08-0.32 m	5YR 5/8 (yellowish red) silty clay with 10YR 5/1 (gray) mottling
0.32-0.52 m	5YR 5/8 (yellowish red) and 10YR 5/1 (gray) sandy silty clays with 7.5YR 5/8 (strong brown) mottling
0.52-1.15 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown) and 7.5YR 5/8 (strong brown) mottling amorphous metal at 1.0 m
1.15-2.0 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 7.5YR 5/8 (strong brown), 2.5Y 2/0 (black), and 5YR 3/3 (dark reddish brown) mottling modern light green soda bottle neck at 1.30-1.36 m

A.T. 25 (1200 m Upriver From Station 50+68)

0-0.50 M	10YR 5/2 (dark brown) silty clay with 10YR 5/1 (gray) and 7.5YR 5/8 (strong brown) mottling modern beer bottle top
0.50-0.66 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown) mottling
0.66-0.86 m	10YR 5/1 (gray), 10YR 5/4 (yellowish brown), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) all mottled, no primary color modern refuse, clear glass, amorphous metal
0.86-1.20 m	10YR 6/1 (gray) sand with 10YR 5/1 (gray), 10YR 4/3 (dark brown), 10YR 5/4 (yellowish brown), and 7.5YR 5/8 (strong brown) mottling amorphous metal
1.20-1.70 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 10YR 5/4 (yellowish brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.70-2.04 m	7.5YR 6/0 (gray) sandy clay amorphous metal at 1.70 m

A.T 26 (1250 m Upriver From Station 50+68)

0-0.65 M	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown) and 7.5YR 5/8 (strong brown) mottling
0.65-0.85 m	10YR 5/2 (grayish brown) sandy clay with 10YR 6/1 (gray), 7.5YR 5/8 (strong brown), and 10YR 4/3 (dark brown) mottling modern clear glass, gravel, amorphous metal
0.85-1.50 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 2.5Y 2/0 (black), 7.5YR 5/8 (strong brown), and 5YR 3/3 (dark reddish brown) mottling amorphous metal
1.50-1.65 m	10YR 5/1 (gray), 10YR 4/3 (dark brown), and 2.5Y 2/0 (black) sandy clays
1.65-1.95 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark gray), 7.5YR 5/8 (strong brown), and 5YR 3/3 (dark reddish brown) mottling
1.95-2.0 m	2.5Y 2/0 (black) sandy silt

A.T. 27 (1300 m Upriver From Station 50+68)

0-0.50 m	10YR 5/2 (grayish brown) and 10YR 4/3 (dark brown) sands
0.50-0.60 m	10YR 5/1 (gray) and 5YR 3/3 (dark reddish brown) sandy clays
0.60-1.05 m	10YR 5/2 (grayish brown) sandy clay with 10YR 4/3 (dark brown), 10YR 6/1 (gray), and 7.5YR 5/8 (strong brown) mottling modern clear glass
1.05-1.11 m	10YR 5/1 (gray) sandy clay with 10YR 4/3 (dark brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
1.11-2.0 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clays with 5YR 3/3 (dark reddish brown) and 2.5Y 2/0 (black) mottling

A.T. 28 (1350 m Upriver From Station 50+68)

0-0.71 M	10YR 5/2 (grayish brown) sandy silt with 10YR 7/1 (light gray) and 10YR 5/4 (yellowish brown) mottling
0.71-1.20 m	10YR 5/1 (gray) sandy silty clay with 10YR 4/3 (dark brown), 7.5 YR 5/8 (strong brown), and 10YR 7/1 (light gray) mottling impenetrable object at 1.20 m

A.T. 29 (1400 m Upriver From Station 50+68)

0-0.26 m	10YR 5/2 (grayish brown) sandy silt
0.26-1.45 m	10YR 5/1 (gray) sandy silty clay with 5YR 3/3 (dark reddish brown), 10YR 5/6 (yellowish brown), and 7.5YR 5/8 (strong brown) mottling
1.45-1.71 m	7.5YR 6/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling impenetrable object at 1.71 m

A.T. 30 (1450 m Upriver From Station 50+68)

0-0.30 m	10YR 5/2 (grayish brown) silty clay with 10YR 5/6 (yellowish brown) and 7.5YR 5/8 (strong brown) mottling
0.30-0.66 m	10YR 5/1 (gray) sandy clay with 10YR 5/6 (yellowish brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
0.66-0.88 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) sandy clay with 10YR 5/6 (yellowish brown), 7.5YR 5/8 (strong brown), and 2.5Y 2/0 (black) mottling
0.88-1.30 m	10YR 5/1 (gray) sandy clay with 10YR 5/6 (yellowish brown), 10YR 4/3 (dark brown), 2.5Y 2/0 (black), and 7.5YR 5/8 (strong brown) mottling
1.30-1.48 m	7.5YR 6/0 (gray) sandy clay impenetrable object at 1.48 m

A.T. 31 (at Station 00+00)

0-1.16 m	10YR 5/3 (brown) silty clay with 10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) mottling
1.16-1.80 m	10YR 5/1 (gray) silty sandy clay with 10YR 5/8 (yellowish brown) and 7.5YR 4/6 (strong brown) mottling
1.80-2.0 m	5B 4/1 (dark blue gray) clay with 5YR 3/3 (dark reddish brown) and 10YR 5/1 (gray) mottling

APPENDIX II
STRATIGRAPHY IN AUGER TESTS WITHIN THE ATCHAFALAYA BASIN LEVEE DISTRICT

A.T. 1 (Station 6168+00)

0-0.40 m	10YR 4/1 (dark gray) silty clay with 7.5YR 5/8 (strong brown) and 10YR 6/2 (light brownish gray) mottling
0.40-0.94 m	10YR 5/4 (yellowish brown) sandy silty clay with 10YR 6/1 (gray) and 7.5YR 5/8 (strong brown) mottling
0.94-1.22 m	10YR 5/4 (yellowish brown) sand
1.22-1.45 m	10YR 5/1 (gray) sandy clay with 5YR 4/6 (yellowish red) mottling
1.43-2.0 m	7.5YR 5/0 (gray) clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 2 (35 m Downriver From Station 6168+00)

0-0.20 m	10YR 4/3 (dark brown) silty clay
0.20-0.70 m	10YR 5/1 (gray) sandy silty clay with 10YR 5/3 (brown) and 7.5YR 4/6 (strong brown) mottling
0.70-1.35 m	10YR 5/3 (brown) sandy clay with 7.5YR 4/6 (strong brown) mottling
1.35-1.68 m	10YR 5/1 (gray) sandy clay with 5YR 4/4 (reddish brown) and 10YR 5/3 (brown) mottling
1.68-2.0 m	7.5YR 5/0 (gray) clay with 5YR 3/3 (dark reddish brown) mottling

A.T. 3 (70 m Downriver From Station 6168+00)

0-0.40 m	10YR 5/3 (brown) sandy clay with 10YR 5/1 (gray) mottling amorphous metal
0.40-0.93 m	7.5YR 5/0 (gray) and 7.5YR 4/6 (strong brown) silty clays classic ironstone at 0.50-0.55 m
0.93-2.02 m	7.5YR 5/0 (gray) sandy clay with 5YR 3/3 (dark reddish brown), 7.5YR 4/6 (strong brown), and 2.5Y 2/0 (black) mottling

Bracketing Tests For A.T. 3:

9 m South of A.T. 3

0-0.25 m	10YR 5/3 (brown) and 10YR 5/1 (gray) sandy clayey silts
0.25-0.92 m	10YR 5/3 (brown) sandy silt with 10YR 7/1 (light gray), 7.5YR 4/6 (strong brown), 2.5Y 2/0 (black), and 10YR 5/1 (gray) mottling
0.92-1.34 m	5B 6/1 (bluish gray) and 10YR 5/1 (gray) silty clays with 7.5YR 4/6 (strong brown) and 10YR 4/3 (dark brown) mottling
1.34-2.04 m	5B 6/1 (bluish gray) sandy clay with 10YR 5/1 (gray), 7.5YR 4/6 (strong brown), and 2.5Y 2/0 (black) mottling

10 m North of A.T. 3

0-0.70 m	10YR 5/3 (brown) and 10YR 5/1 (gray) sandy clayey silts with 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown) and 2.5Y 2/0 (black) mottling
0.70-1.57 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) sandy silty clays with 7.5YR 4/6 (strong brown) mottling
1.57-2.04 m	5B 5/1 (bluish gray) sandy silty clay with 7.5YR 5/0 (gray) and 7.5YR 4/6 (strong brown) mottling

10 m East of A.T. 3

0-0.25 m	10YR 4/3 (dark brown) sandy silt
0.25-0.56 m	10YR 5/1 (gray) sandy silty clay with 10YR 4/3 (dark brown) and 7.5YR 4/6 (strong brown) mottling brick sherds (<1/4")
0.56-1.10 m	10YR 5/1 (gray) and 5B 6/1 (bluish gray) silty clays with 10YR 4/3 (dark brown), 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling
1.10-2.0 m	5B 6/1 (bluish gray) sandy silty clay with 7.5YR 4/6 (strong brown) and 10YR 5/1 (gray) mottling

10 m West of A.T. 3

0-0.25 m	10YR 4/3 (dark brown) silt with 10YR 6/1 (gray) and 10YR 6/4 (light yellowish brown) sands
0.25-0.80 m	10YR 4/3 (dark brown) sandy silt with 10YR 5/1 (gray) and 10YR 5/3 (brown), and 7.5YR 4/6 (strong brown) mottling
0.80-1.87 m	10YR 5/1 (gray) sandy silty clay with 2.5Y 3/4 (dark reddish brown), 7.5YR 4/6 (strong brown), 2.5Y 2/0 (black), and 5B 6/1 (bluish gray) mottling
1.87-2.04 m	5B 6/1 (bluish gray) silty clay with 7.5YR 4/6 (strong brown) and 10YR 5/1 (gray) mottling

A.T. 4 (105 m Downriver From Station 6168+00)

0-0.59 m	10YR 5/3 (brown) sandy clay with 10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) mottling
0.59-1.52 m	10YR 5/1 (gray) clay with 7.5YR 4/6 (strong brown) and 5B 5/1 (bluish gray) mottling
1.52-2.0 m	5B 5/1 (bluish gray) clay with 7.5YR 4/6 (strong brown) mottling

A.T. 5 (140 m Downriver From Station 6168+00)

0-0.40 m	10YR 5/1 (gray) sandy clay with 10Yr 5/3 (brown) and 7.5YR 4/6 (strong brown) mottling
0.40-0.78 m	10YR 4/3 (dark brown) sandy clay with 7.5YR 5/0 (gray) mottling
0.78-0.95 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/6 (strong brown) mottling
0.95-1.35 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/6 (strong brown) and 5B 5/1 (bluish gray) mottling
1.35-2.0 m	5B 5/1 (bluish gray) and 10YR 5/1 (gray) clays with 7.5YR 4/6 (strong brown) mottling

A.T. 6 (175 m Downriver From Station 6168+00)

0-0.30 m	10YR 4/1 (dark gray) sandy silt
0.30-0.65 m	10YR 4/3 (dark brown) and 10YR 5/1 (gray) sandy clays with 7.5YR 4/6 (strong brown) mottling
0.65-1.0 m	10YR 5/1 (gray) clay with 7.5YR 4/6 (strong brown) mottling
1.0-2.0 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) clays with 7.5YR 4/6 (strong brown) mottling

A.T. 7 (210 m Downriver From Station 6168+00)

0-0.30 m	10YR 4/3 (dark brown) and 10YR 5/1 (gray) sandy clays with 7.5YR 4/6 (strong brown) mottling
0.30-0.85 m	10YR 5/1 (gray) sandy clay with 10YR 5/3 (brown) and 7.5YR 4/6 (strong brown) mottling
0.85-1.02 m	10YR 5/3 (brown) sand
1.02-1.20 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/6 (strong brown) mottling
1.20-1.38 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) sandy clays with 7.5YR 4/6 (strong brown) mottling
1.38-2.0 m	5B 5/1 (bluish gray) and 10YR 5/1 (gray) sandy clays with 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling

A.T. 8 (245 m Downriver From Station 6168+00)

0-0.10 m	10YR 4/1 (dark gray) silt
0.10-0.90 m	10YR 5/1 (gray) sandy clay with 10YR 5/3 (brown) and 7.5YR 4/6 (strong brown) mottling
0.90-1.65 m	10YR 5/1 (gray) sandy clay with 10YR 5/3 (brown), 7.5YR 4/6 (strong brown), and 5B 5/1 (bluish gray) mottling
1.65-2.0 m	5B 5/1 (bluish gray) and 10YR 5/1 (gray) sandy clays with 10YR 5/8 (yellowish brown) mottling

A.T. 9 (280 m Downriver From Station 6168+00)

0-0.25 m	10YR 5/3 (brown) sandy clay with 10YR 5/8 (yellowish brown) mottling
0.25-0.71 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/6 (strong brown) and 5B 5/1 (bluish gray) mottling clear glass sherd from 0.25-0.55 m, charcoal from 0.55-0.71 m
0.71-1.18 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/6 (strong brown), 5B 5/1 (bluish gray), and 5YR 3/3 (dark reddish brown) mottling brick sherds (<1/8") from 1.01-1.25 cm
1.18-2.0 m	5B 5/1 (bluish gray) sandy clay with 10YR 5/1 (gray), 7.5YR 4/6 (strong brown), and 5YR 3/3 (dark reddish brown) mottling

Bracketing Tests For A.T. 9:

10 m South of A.T. 9

0-0.05 m	10YR 4/3 (dark gray) silt
0.05-0.60 m	10YR 5/2 (grayish brown) sandy silt with 10YR 7/1 (light gray), 7.5YR 4/6 (strong brown), and 10YR 5/1 (gray) mottling
0.60-1.14 m	10YR 5/1 (gray) sandy silty clay with 10YR 4/4 (dark yellowish brown) and 7.5YR 4/6 (strong brown) mottling
1.14-2.04 m	10YR 5/1 (gray) silty clay with 5B 6/1 (bluish gray), 7.5YR 4/6 (strong brown), and 2.5Y 2/0 (black) mottling

10 m East of A.T. 9

0-0.05 m	10YR 4/1 (dark gray) silt
0.05-0.78 m	10YR 5/2 (grayish brown) silty clay with 10YR 5/1 (gray), 10YR 4/3 (dark brown), and 7.5YR 4/6 (strong brown) mottling
0.78-1.82 m	10YR 5/1 (gray) silty clay with 5B 5/1 (bluish gray), 5YR 3/3 (dark reddish brown), and 7.5YR 4/6 (strong brown) mottling
1.82-2.0 m	10YR 5/1 (gray) silty clay with 7.5YR 4/6 (strong brown) mottling

10 m North of A.T. 9

0-0.10 m	10YR 4/3 (dark brown) silt
0.10-0.71 m	10YR 5/1 (gray) sandy silty clay with 10YR 4/3 (dark brown) and 7.5YR 4/6 (strong brown) mottling and pockets of 10YR 7/1 (light gray) sand brick sherds (1/4") at 0.65 m
0.71-1.0 m	10YR 5/1 (gray) clay with 10YR 4/3 (dark brown), 7.5YR 4/6 (strong brown), and 2.5Y 3/4 (dark reddish brown) mottling
1.0-1.47 m	10YR 5/1 (gray) clay with 7.5YR 4/6 (strong brown) and 5B 6/1 (bluish gray) mottling
1.47-1.61 m	10YR 5/1 (gray) and 10YR 5/3 (brown) clays with 7.5YR 4/6 (strong brown) and 5B 6/1 (bluish gray) mottling
1.61-2.05 m	10YR 5/1 (gray) clay with 5B 6/1 (bluish gray), 7.5YR 4/6 (strong brown) and 2.5Y 3/4 (dark reddish brown) mottling

10 m West of A.T. 9

0-0.10 m	10YR 4/1 (dark gray) silt
0.10-0.60 m	10YR 4/3 (dark brown) silt with 10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) mottling and pockets of 10YR 7/1 (light gray) sand
0.60-1.17 m	10YR 5/1 (gray) silty clay with 5B 6/1 (bluish gray), 7.5YR 4/6 (strong brown), and 2.5Y 2/0 (black) mottling
1.17-2.05 m	10YR 5/1 (gray) and 7.5YR 4/0 (dark gray) sandy clays with 2.5Y 3/4 (dark reddish brown) and 7.5YR 4/6 (strong brown) mottling

Additional Bracketing Tests Surrounding Test 10 m North Of A.T. 9:

5 m North of A.T. 9

0-0.30 m	10YR 5/1 (gray) sandy silt with 10YR 5/3 (brown) and 10YR 7/1 (light gray) mottling
0.30-0.53 m	10YR 5/2 (grayish brown) silty clay with 7.5YR 4/6 (strong brown) and 10YR 5/1 (gray) mottling
0.53-1.04 m	10YR 5/1 (gray) silty clay with 7.5YR 4/6 (strong brown), 5B 6/1 (bluish gray), and 2.5Y 2/0 (black) mottling brick sherds (<1/16") at 0.97 m
1.04-1.40 m	10YR 5/1 (gray) and 5B 6/1 (bluish gray) sandy silty clays with 5YR 3/3 (dark reddish brown), 7.5YR 4/6 (strong brown), and 2.5Y 2/0 (black) mottling
1.40-1.65 m	5B 5/1 (bluish gray) sandy clay with 5YR 3/3 (dark reddish brown) mottling
1.65-2.04 m	10YR 5/3 (brown) sandy silty clay with 5YR 3/3 (dark reddish brown), 10YR 5/1 (gray), and 5B 6/1 (bluish gray) mottling

5 m East, 10 m North of A.T. 9

0-0.10 m	10YR 4/1 (dark gray) silty clay
0.10-0.68 m	10YR 5/3 (brown) and 10YR 5/1 (gray) silty clays with 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 10YR 7/1 (light gray) mottling
0.68-1.54 m	10YR 5/1 (gray) silty clay with 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown) and 5B 5/1 (bluish gray) mottling
1.54-1.80 m	5B 5/1 (bluish gray) silty clay with 5Yr 3/3 (dark reddish brown) mottling
1.80-2.01 m	10YR 5/1 (gray) and 10YR 5/3 (brown) silty clays with 5YR 3/3 (dark reddish brown) mottling

5 m West, 10 m North of A.T. 9

0-0.20 m	10YR 4/1 (dark gray) silty clay
0.20-0.67 m	10YR 5/1 (gray) and 10YR 5/3 (brown) sandy silty clays with 7.5YR 4/6 (strong brown) mottling
0.67-1.0 m	10YR 5/1 (gray) silty clay with 7.5YR 4/6 (strong brown), 5B 6/1 (bluish gray) and 5YR 3/3 (dark reddish brown) mottling
1.0-1.65 m	5B 6/1 (bluish gray) and 10YR 5/1 (gray) silty clays with 7.5YR 4/6 (strong brown), 2.5Y 2/0 (black) and 5YR 3/3 (dark reddish brown) mottling
1.65-2.10 m	10YR 5/1 (gray) sandy silty clay with 5YR 3/3 (dark reddish brown), 7.5YR 3/4 (dark brown), and 5B 5/1 (bluish gray) mottling

A.T. 10 (315 m Downriver From Station 6168+00)

0-0.10 m	10YR 4/1 (dark gray) silt
0.10-0.27 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) silty sandy clays with 7.5YR 4/6 (strong brown) mottling
0.27-1.58 m	10YR 5/1 (gray) clay with 5B 5/1 (bluish gray) and 7.5YR 4/6 (strong brown) mottling
1.58-2.0 m	5B 5/1 (bluish gray) clay with 7.5YR 4/6 (strong brown) and 2.5Y 4/4 (reddish brown) mottling

A.T. 11 (352 m Downriver From Station 6168+00)

0-0.10 m	10YR 4/1 (dark gray) silt
0.10-0.42 m	10YR 5/1 (gray) and 10YR 4/3 (dark brown) silty sandy clays with 7.5YR 4/6 (strong brown) mottling
0.42-0.81 m	10YR 5/1 (gray) silty clay with 7.5YR 4/6 (strong brown) and 5B 5/1 (bluish gray) mottling with pockets of 10YR 7/1 (light gray) and 10YR 5/3 (brown) sands brick sherds (<1/16")
0.81-1.13 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) clays with 7.5YR 4/6 (strong brown) and 5YR 3/3 (dark reddish brown) mottling brick sherds (<1/16")
1.13-2.0 m	5B 5/1 (bluish gray) clay with 5YR 3/3 (dark reddish brown) and 7.5YR 4/6 (strong brown) mottling brick sherds (1/16")

Bracketing Tests For A.T. 11

10 m East of A.T. 11

0-0.05 m	10YR 4/1 (dark gray) silty clay
0.05-0.80 m	10YR 5/1 (gray) clayey silt with 7.5YR 4/6 (strong brown) and 10YR 4/3 (dark brown) mottling
0.80-2.0 m	5B 5/1 (bluish gray) silty clay with 5YR 3/3 (dark reddish brown) and 10YR 4/1 (dark gray) mottling

10 m South of A.T. 11

0-0.05 m	10YR 4/1 (dark gray) silty clay
0.05-1.56 m	10YR 5/1 (gray) silty clay with 10YR 5/3 (brown), 7.5YR 4/6 (strong brown), and 5YR 3/3 (dark reddish brown) mottling
1.56-2.0 m	5B 5/1 (bluish gray) silty clay with 7.5YR 4/6 (strong brown), 5YR 3/3 (dark reddish brown), and 2.5Y 2/0 (black) mottling

10 m North of A.T. 11

0-0.10 m	10YR 4/1 (dark gray) silty clay
0.10-0.30 m	10YR 5/3 (brown) sandy silt with 7.5YR 4/6 (strong brown) and 10YR 5/1 (gray) mottling
0.30-2.0 m	10YR 5/1 (gray) and 5B 6/1 (bluish gray) sandy silty clays with 5YR 3/3 (dark reddish brown), 10YR 5/8 (yellowish brown), and 10YR 5/3 (brown) mottling

10 m West of A.T. 11

0-0.05 m	10YR 4/1 (dark gray) silty clay
0.05-0.25 m	10YR 5/1 (gray) silty clay with 10YR 5/3 (brown) and 5YR 3/3 (dark reddish brown) mottling
0.25-1.38 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) silty clays with 10YR 4/3 (dark brown), 5YR 3/3 (dark reddish brown), and 7.5YR 4/6 (strong brown) mottling
1.38-1.67 m	10YR 5/1 (gray) silty clay with 5YR 3.3 (dark reddish brown), 5B 6/1 (bluish gray), 2.5Y 2/0 (black), and 7.5YR 4/6 (strong brown) mottling
1.67-1.92 m	5B 5/1 (bluish gray) sandy silty clay with 5YR 3/3 (dark reddish brown) and 10YR 5/1 (gray) mottling
1.92-2.0 m	10YR 5/1 (gray) clay

A.T. 12 (385 m Downriver From Station 6168+00)

0-0.30 m	10YR 4/3 (dark brown) sandy silty clay with 10YR 5/3 (brown) mottling
0.30-0.44 m	10YR 5/1 (gray) clay with 7.5YR 4/6 (strong brown) mottling
0.44-0.60 m	10YR 5/1 (gray) clay with 10YR 5/2 (grayish brown) mottling and pockets of 10YR 5/3 (brown) sand
0.60-1.55 m	10YR 5/1 (gray) clay with 7.5YR 4/6 (strong brown) and 2.5Y 2/0 (black) mottling and pockets of 10YR 7/1 (light gray) sand
1.55-1.87 m	10YR 5/1 (gray) clay with 2.5Y 3/6 (dark red) and 2.5Y 3/3 (dark reddish brown) mottling and pockets of 10YR 7/1 (light gray) sand
1.87-2.0 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) clays with 7.5YR 4/6 (strong brown) and 2.5Y 3/6 (dark red) mottling

A.T. 13 (420 m Downriver From Station 6168+00)

0-0.50 m	10YR 5/1 (gray) silty sandy clay with 7.5YR 4/6 (strong brown) mottling and pockets of 10YR 7/1 (light gray) sand
0.50-0.90 m	10YR 5/1 (gray) and 10YR 7/1 (light gray) clayey sands
0.90-1.10 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) clays with 2.5Y 2/0 (black), 5YR 3/3 (dark reddish brown), and 2.5Y 3/6 (dark red) mottling
1.10-1.40 m	10YR 6/1 (gray) sandy clay with 10YR 6/8 (brownish yellow) mottling
1.40-1.90 m	5B 5/1 (bluish gray) sandy clay with 2.5Y 2/0 (black), 10YR 5/8 (yellowish brown), 5YR 4/6 (yellowish red), and 2.5Y 3/6 (dark red) mottling
1.90-2.0 m	10YR 5/1 (gray) clay with 10YR 5/8 (yellowish brown) mottling

A.T. 14 (455 m Downriver From Station 6168+00)

0-0.10 m	10YR 4/1 (dark gray) silty clay
0.10-0.50 m	10YR 5/1 (gray) sandy silty clay with 7.5YR 5/8 (strong brown) and 10YR 5/8 (yellowish brown) mottling and pockets of 10YR 7/1 (light gray) sand
0.50-2.0 m	10YR 5/1 (gray) and 5B 5/4 (bluish gray) sandy clays with 7.5YR 5/8 (strong brown) and 2.5Y 3/6 (dark red) mottling

A.T. 15 (490 m Downriver From Station 6168+00)

0-0.10 m	10YR 4/1 (dark gray) silty clay
0.10-0.23 m	10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) silty clays
0.23-0.77 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) silty clays with 7.5YR 4/6 (strong brown) and 2.5Y 2/0 (black) mottling
0.77-1.90 m	10YR 5/1 (gray) and 5B 5/1 (bluish gray) sandy clays with 7.5YR 4/6 (strong brown), 5YR 5/8 (yellowish red), and 2.5Y 3/6 (dark red) mottling
1.90-2.03 m	10YR 5/1 (gray) sandy clay with 7.5YR 4/6 (strong brown) and 5B 5/1 (bluish gray) mottling with pockets of 10YR 7/1 (light gray) sand

A.T. 16 (525 m Downriver From Station 6168+00)

0-0.20 m	10YR 4/1 (dark gray) silty clay
0.20-0.48 m	10YR 7/1 (light gray) sandy clay with 10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) mottling
0.48-1.18 m	10YR 5/3 (brown) sand
1.18-1.36 m	10YR 5/1 (gray) clay with 5YR 3/3 (dark reddish brown) mottling
1.36-2.02 m	10YR 5/1 (gray) sandy clay

A.T. 17 (560 m Downriver From Station 6168+00)

0-0.05 m	10YR 4/1 (dark gray) silty clay
0.05-0.25 m	10YR 3/3 (dark brown) clayey silt with 10YR 5/3 (brown) mottling
0.25-0.51 m	10YR 5/3 (brown) sandy clayey silt with 10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) mottling
0.51-1.09 m	10YR 5/1 (gray) and 10YR 5/3 (brown) sandy clayey silts with 7.5YR 4/6 (strong brown) mottling
1.09-2.04 m	10YR 5/1 (gray) and 10YR 5/3 (brown) sandy clays with 5B 6/1 (bluish gray) and 5YR 3/3 (dark reddish brown) mottling

A.T. 18 (595 m Downriver From Station 6168+00)

0-0.05 m	10YR 4/3 (dark brown) sandy silt
0.05-2.04 m	10YR 5/3 (brown) and 10YR 6/3 (pale brown) sands

A.T. 19 (630 m Downriver From Station 6168+00)

0-0.31 m	10YR 5/3 (brown) and 10YR 6/3 (pale brown) clayey sands
0.31-0.50 m	10YR 5/3 (brown) sandy clayey silt with 10YR 5/1 (gray) and 7.5YR 4/6 (strong brown) mottling
0.50-0.77 m	10YR 5/2 (grayish brown) sandy clay with 10YR 5/8 (yellowish brown) and 2.5Y 3/4 (dark reddish brown) mottling
0.77-1.12 m	10YR 5/1 (gray) clay with 10YR 5/8 (yellowish brown) mottling
1.12-1.27 m	10YR 5/2 (grayish brown) sandy silty clay
1.27-2.04 m	10YR 5/1 (gray) silty clay with 7.5YR 4/6 (strong brown), 5B 6/1 (bluish gray), and 10YR 5/2 (grayish brown) mottling

APPENDIX III

REVISED SCOPE OF SERVICES

CELMN-PD-RN June 7, 1993

REVISED SCOPE OF SERVICES
CONTRACT DACW29-92-D-0012
DELIVERY ORDER 05 *revisions in bold face

LAND USE HISTORY AND CULTURAL RESOURCES INVESTIGATIONS FOR ITEMS M-225.5 TO 207-R AND M-178.0 TO 173.2-R, MISSISSIPPI RIVER LEVEES, LOUISIANA.

1. Introduction
This delivery order calls for a cultural resources investigation of Item M-178.0 to 173.2-R Philadelphia Point-Donaldsonville Levee Enlargement and Concrete Slope Pavement, Mississippi River Levees, Ascension Parish, Louisiana. The cultural resource investigations will consist of varying levels of investigation within the entire project reach. Included in this effort will be the development of land use histories in support of a hazardous, toxic and radioactive wastes (HTRW) assessment for Items M-225.5 to 207-R (Plaquemine to Brusly Levee Enlargement) and M-178.0 to 173.2-R AHP (Philadelphia Point to Donaldsonville Levee Enlargement) as shown on Attachment 1 (File Nos. H-8-30653, H-8-30710).

The Contractor will conduct background archival research, survey to identify cultural resources, research of historic and present land uses to aid in the identification of possible HTRW contamination sites, and provide independent comprehensive draft and final reports for the cultural resource and HTRW components of the investigation. The contract period for this delivery order is 37 weeks.

2. Study Area
The proposed levee work for the Mississippi River mainline levee protection system is located on the right descending bank, from Station 4030+00 to 4600+00 and 6000+00 to 6223+32 of the Atchafalaya Basin Levee District and from Station 0+00 to 102+00 of the Lafourche Basin Levee District (approximate river miles 225.5 to 207 and 178 to 173.2 AHP) as shown on Attachment 1. The project will consist of placing earth fill and surfacing the levee crown to bring the levee crown up to design grade, and placing concrete slope pavement on the existing riverside levee slope. A proposed borrow area is located from stations 6168+00 to 6188+00 within the Atchafalaya Basin Levee District.

3. Background Information
Portions of Item M-178.0 to 173.2-R and contained within the boundaries of the Atchafalaya Basin Levee District were previously investigated for cultural resources as part of the Smoke Bend Revetment Project (Shenkel 1976). Portions of Item M-178.0 to

173.2-R within the boundaries of the Lafourche Basin Levee District were previously investigated for cultural resources as part of the Aben Revetment (Rader 1978; Kelley 1989). Table 1 provides a description and location of previous cultural resources investigations conducted within Item M-178.0 to 173.2-R.

4. Study Requirements

The study will be conducted utilizing current professional standards and guidelines including, but not limited to:

a. the National Park Service's National Register Bulletin 15 entitled, "How to Apply the National Register Criteria for Evaluation";

b. the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation as published in the Federal Register on September 29, 1983;

c. Louisiana's Comprehensive Archaeological Plan, dated October 1, 1983;

d. The Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties".

The work to be performed by the Contractor will be divided into three phases. Phase 1 will consist of a literature search, records review, historical background research, and the development of a land use history. During this phase, work to be performed as part of an "initial assessment" (ER1165-2-132 Section 9a) (Attachment 2) of potential HTRW problems will include interpreting information obtained during historical research to identify the potential for pre-1940 HTRW sites and assess modern (post-1940 to present) land uses with the aim of identifying HTRW sites. Phase 2 will consist of subsurface auger testing and cultural resources site inventory within portions of the project area. Table 1 provides a description of the level of effort anticipated for each segment within the project area. Phase 3 will consist of data analyses and report preparation.

a. Phase 1: Literature Search and Records Review. The Contractor shall commence, upon work item award, with a literature, map, and records review specific to Item M-178.0 to 173.2-R. This phase will include, but not be limited to review of historic maps, the State Archeologist's site and standing structure files, the National Register of Historic Places, archeological reports, historic archives, census records, and other public or courthouse records. At a minimum, the literature and records review will establish the distribution of archeological sites in the vicinity and their proximity to the study area; identify previously recorded sites, standing structures, National Register of Historic Places properties and National Landmarks in proximity to the project reach; provide national, regional and local context for assessing the historical, architectural and archeological significance of cultural resources located in the project area; and predict where resources may be expected within the project area. Economic and social trends, geomorphological data, major natural events, and all previous construction affecting land use patterns and

the state of preservation of known or predicted resources will be analyzed and presented in terms of the specific project area.

The Contractor also will collect information for a detailed land use history of Items M-225.5 to 207-R and M-178.0 to 173.2-R AHP and document license/permit actions, HTRW violations, enforcement or litigation actions. Sources consulted during the research should include, but not be limited to aerial photographs, topographic maps, real estate records, city directories, and records contained at various state or local regulatory/response agencies etc. Further guidance for this study is provided in an HTRW study conducted for the Inner Harbor Navigation Canal (IHNC), a report entitled "Guidelines and Methods for Conducting Property Transfer Site Histories" by Colten and Mulville-Friel (1990), and in a list of Louisiana Regulatory Agencies of HTRW interests (Attachments 3, 4, and 5). **A full chain of title will is not required under this effort.**

b. Phase 2: Field Investigations and Site Identification. Field investigations shall commence in Item M-178.0 to 173.2-R upon completion of the Phase I research and as soon as the Mississippi River reaches or falls below a stage of 18 feet NGVD, as measured at the Donaldsonville Gauge. Due to heavy sedimentation, conditions are not suited for surface collecting or shovel testing within the project area. Therefore, field survey will rely most heavily on the use of hand augers to identify any resources within the project area. Auger testing will be conducted in areas where previous levee construction or borrow excavations have not substantially altered the project area and within areas to be impacted during construction. Auger tests will be excavated at 35 m intervals within the 2000 ft area located from Sta. 6168+00 to 6188+00 and at 50 m intervals within the 5068 ft area located from Sta. 0+00 to 50+68. All auger tests will be excavated to a minimum depth of 2 meters to identify and inventory cultural resources which may be contained within each of these two segments of project area. See Table 1.

The field investigations will provide information to identify resources and enumerate project effects on each resource located within the study area. Up to two additional field days will be allotted for additional auger testing to delineate and map the boundaries of resources encountered during the field investigations. All resources identified will be marked using flagging tape and will be identified with reference to the adjacent levee stations. Any outstanding balance of this work effort will be applied to archeological investigations which will be coordinated with and approved by the COR.

All areas investigated and resources identified within the project boundaries will be recorded (in ink) to scale on the aerial mosaic project maps and the appropriate 7.5 minute quadrangle. The quadrangle maps also will be used to illustrate site forms. Copies of completed Louisiana State site forms showing the location and approximate limits of all sites identified along with copies of the project maps showing the location of

all excavations and resources identified will be returned to the COR upon completion of the fieldwork.

c. Phase 3: Analyses and Report Preparation. All data collected in conjunction with the cultural resources investigations will be analyzed using currently acceptable scientific methods. The Contractor shall catalog all artifacts, samples, specimens, photographs, drawings, etc., utilizing the format currently employed by the Louisiana State Archeologist. The catalog system will include site and provenience designations.

All literature, map search, field and laboratory data will be integrated to produce graphically illustrated, scientifically acceptable reports discussing the project as a whole. The contractor will synthesize the archeological, historical, and geological information obtained during phase 1 with the results and observations of the field survey to assess the nature of the resource base in this reach. The Contractor will complete and file state site forms with the Office of the Louisiana State Archeologist and cite the resulting state-assigned site numbers in all draft and final reports of this investigation. The Contractor shall provide preliminary site assessments and discussions on the potential project impacts for any given resource identified within this reach.

All data collected in conjunction with the HTRW component of the project will be collated and analyzed in order to present a chronological discussion of land use history and provide all available data on the commercial and industrial uses in each reach. Any areas identified as containing potential HTRW concerns will be recorded on a copy of the project maps and on the appropriate 7.5 minute quadrangle. The draft and final HTRW reports will include a description of the proposed project and the methods and analytical techniques utilized in the study. Any figures, tables, graphs, maps, photographs or appendices which complement the narrative, illustrate known or suspected HTRW sites, or provide information on the types of wastes anticipated, methods of disposal, ownership of facilities, or activity areas will be included in the discussion.

5. Reports.

a. Monthly Progress Reports. One copy of a brief and concise statement of progress shall be submitted with and for the same period as the monthly billing voucher throughout the duration of the delivery order. These reports, which may be in letter form, should summarize all work performed, information gained, or problems encountered during the preceding month. A concise statement and graphic presentation of the Contractor's assessment of the monthly and cumulative percentage of total work completed by task shall be included each month. The monthly report should also note difficulties, if any, in meeting the contract schedule.

b. Draft and Final Reports . Independent draft and final reports are required for the cultural resources and HTRW components of this work effort.

Five copies of a draft report, integrating all phases of the cultural resources investigation will be submitted to the COR for review and comment 16 weeks after delivery order award. This schedule assumes that Mississippi River stages will not hinder conduct of field operations. For each week that the survey areas are inundated during the fieldwork phase of the project (approximately weeks 5 through 7 after delivery order award), the schedule for draft report submission will be adjusted 1 week. The Contractor must fully coordinate any problems with high water levels in the survey areas with the COR. The report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 7 weeks after receipt of the draft cultural resource reports. Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 7 weeks. Upon approval of the preliminary final report by the COR, the Contractor will submit one reproducible master copy, one copy on floppy diskette, 35 copies of the final report, and all separate appendices to the COR within 7 weeks. A copy of the Scope of Services shall be bound as an appendix with the final report. In order to preclude vandalism, the draft and final reports shall not contain specific locations of archeological sites.

A detailed outline of the draft report for the HTRW component of this work effort will be submitted for approval by the COR 5 weeks after delivery order award. Upon the COR's approval of the report outline the Contractor will prepare four copies of the draft HTRW report within 6 weeks (11 weeks after delivery order award). The draft and final reports shall follow the same format as described above, with the following exception: page numbering with Arabic numerals will begin with the first page of Chapter 1 of the report. An appendix listing all sources consulted during the research will be included in the draft report. Included in this listing will be a point of contact, where appropriate, and a brief assessment of the research value of the source. Sources that proved to be fruitless shall also be listed.

The COR will provide all review comments to the Contractor within 3 weeks after receipt of the draft reports (14 weeks after delivery award date). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary final report to the COR within 2 weeks (16 weeks after delivery order date). Upon approval of the preliminary final report by the COR, the Contractor will submit one reproducible master copy, one copy on floppy diskette, 20 copies of the final report and all separate appendices to the COR within 3 weeks (19 weeks after delivery order award).

6. Attachments.

Attachment 1: Design Plans H-8-30653 and H-8-30710 showing each item in the study area (2 copies).

Attachment 2: U.S. Army Corps of Engineers ER 1165-2-132.

Attachment 3: Report entitled A Land Use History of Areas Adjacent to the Inner Harbor Navigation Canal Lock, New Orleans prepared by Goodwin et al. (1992).

Attachment 4: Report entitled Guidelines and Methods for Conducting Property Transfer Site Histories. Prepared by Craig E. Colten and Diane Mulville-Friel (1990) for the Illinois Hazardous Waste Research and Information Center (HWRIC RR-049).

Attachment 5: Source List of Louisiana Regulatory Agencies (Of HTRW Interest).

7. References.

Shenkel, J. Richard

1976 Cultural Resource Survey of the Proposed Smoke Bend Revetment Ascension Parish, Louisiana. Letter Report submitted to the U.S. Army Corps of Engineers, New Orleans District.

Rader, Burt F.

1978 Cultural Resource Survey of Aben Revetment Ascension Parish, Louisiana. Report submitted to the U.S. Army Corps of Engineers, New Orleans District.

Kelley, David B.

1989 Archeological and Historical Investigations of Four Proposed Revetment Areas Located Along the Mississippi River in Southeast Louisiana. Report No. COELMN/PD-88/12 submitted to the U.S. Army Corps of Engineers, New Orleans District.

Table 1. Item Mile 178.0 to 173.2-R Status.

Levee Station	Description of Work and Previous Cultural Resources Investigations	Cultural Resources Concerns	HTRW Concerns
Atchafalaya Levee District			
Sta. 4030+00-4650+00 (M-225.5 to 207.0-R	Levee Enlargement and Concrete Slope Pavement (LE & CSP)	No Work Required	Land use History and Identification of Possible HTRW Concerns
Sta. 6000+00-6223+00	LE & CSP, Surveyed by Shenkel (1976)	Historic Background Research	Same as Above
Sta. 6168+00-6188+00 (2000 ft)	LE & CSP, Borrow site; Surveyed by Shenkel (1976)	Historic Background Research and Auger testing	Same as Above
Lafourche Levee District			
Sta. 0+00-50+68 (5068 ft)	LE & CSP; Previously Un-surveyed	Historic Background Research and Auger testing	Same as Above
Sta. 50+68-82+00	LE & CSP; Surveyed by Rader (1978)	Historic Background Research	Same as Above
Sta. 82+00-94+00	LE & CSP; Surveyed by Rader (1978), Kelley (1989)	No Additional Work	Same as Above
Sta. 94+00-102+00	LE & CSP; Surveyed by Kelley (1989)	No Additional Work	Same as Above