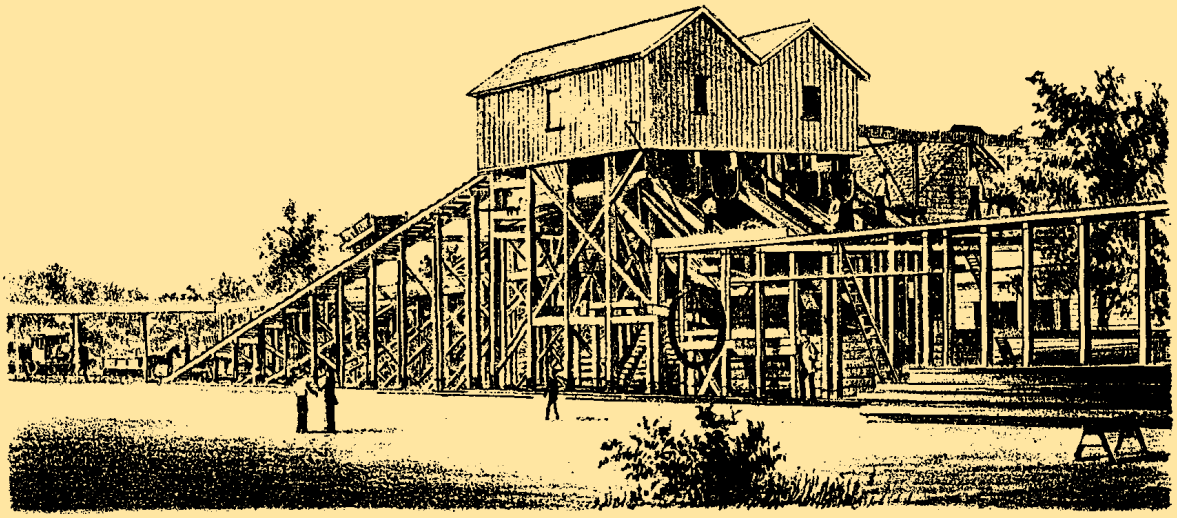
Archaeological Data Recovery at Archaeological Sites 38DR60/81 and 38DR192 The Appian Way DevelopmentTract

Final Report



Brockington and Associates, Inc.
Atlanta Charleston Raleigh
2003

Archaeological Data Recovery at Archaeological Sites 38DR60/81 and 38DR192 The Appian Way Development Tract

Final Report

Prepared for

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Executive Summary

Archaeological data recovery investigations were conducted at 38DR60/81 between 9 November and 10 December 1999 and at 38DR192 between 19 November 1999 and 14 January 2000. These investigations were conducted as per the Treatment Plan and Memorandum of Agreement (MOA) between Sailford Land Company, LLC, the State Historic Preservation Officer (SHPO), and the South Carolina Bureau of Ocean and Coastal Resource Management (OCRM). The investigations were conducted in partial fulfillment of the stipulations of the MOA.

Site 38DR60/81 occupies 6.3 hectares (300 by 210 meters) in the 59.6 hectare Appian Way Development Tract. Site 38DR60/81 is the remains of the Ashley Phosphate Company's late nineteenth century mine, mill, and fertilizer works. The site is listed on the National Register of Historic Places (NRHP) as a component of the Ashley River Historic District. The site was first systematically investigated during a survey of the Appian Way Tract (Bailey 1999). Investigators recorded several intact features, including three brick-lined cisterns, numerous brick walls, and possible chimney bases. Bailey (1999) recommended preservation or data recovery at the site.

Data recovery investigations at 38DR60/81 focused on phosphate era artifact producing areas (e.g., houses, office, kitchen), and on the areas where colonial/antebellum artifacts were concentrated to recover any intact deposits or features associated with the eighteenth to nineteenth century Childs Plantation that may be present. During the data recovery investigations at 38DR60/81, investigators hand excavated 11 shovel tests and 14 meters^2 through a combination of one 2 by 2 meter test unit and five 1 by 2 meter test units. Additional areas totaling approximately 80 meters^2 were excavated mechanically with a smooth bladed backhoe. Investigators conducted block excavation at the remnants of a structure (Structure 1) in the northern portion of 38DR60/81. Structure 1 was a multi-room, single story building with a chimney and likely was the commissary used by the laborers at the phosphate works.

Deposits associated with the Childs Plantation have been severely disturbed by late nineteenth century phosphate mining activities. These activities dramatically altered the landscape. Mining, building construction, and excavation of a large marl pit destroyed altered the natural landscape as it appeared prior to the Civil War. These activities also destroyed buildings, roads, gardens, and vegetation associated with the antebellum cultural landscape.

In addition to the archaeological investigations at 38DR60/81, we also prepared an historic context for the phosphate era in South Carolina. The data recovery investigations at 38DR60/81

recovered a sample of significant information from the site. This sample, combined with the development of the historic context, was employed to address the research questions outlined in the approved treatment plan. These investigations are sufficient to mitigate the adverse effect that proposed land disturbing activities will have on this NRHP site. Land disturbing activities at 38DR60/81 should be allowed to proceed as planned.

Site 38DR192 occupies 5.4 hectares (45 by 120 meters) in the 59.6 hectare Appian Way Development Tract. Site 38DR192 is located along the marshes of the Ashley River near the middle of the project tract. The site includes the remains of the H. Bulwinkle phosphate works that operated during the late nineteenth century. In 1993, the site was listed on the NRHP as a component of the Ashley River Historic District. The only artifacts noted during the survey (Bailey 1999) field investigations were two large grinding stones on the surface in the northern portion of the site. Investigators recorded several features at the site, including two large brick foundations, a deep mine or mill pond, four brick rubble piles, an eroded dike or causeway, and an earthen causeway that crosses the marsh and leads to the Ashley River. Bailey (1999) recommended either preservation of the site or data recovery investigations at the site should preservation not be feasible.

Data recovery investigations at 38DR192 entailed mechanical scraping of areas where architectural features were expected. The site was divided into two loci. Locus A includes the northern half of the site which contains a substantial brick foundation (Structure 1), a brick rubble pile (Structure 2) near the edge of the mill pond, and the mill stones. Structure 1 is composed of two large brick foundations, which secured a steam engine and wheel. Structure 2 was encountered beneath the brick rubble pile and is composed of two joined brick foundations. The function of Structure 2 is unclear, though, like Structures 1 and 3, it is almost certainly associated with the H. Bulwinkle phosphate mine and mill works that operated during the late nineteenth century.

Locus B includes the southern half of the site which contains two brick rubble piles (Structure 3) near the river causeway. Structure 3 was encountered beneath the brick rubble. Structure 3 appears to be the remnants of a one story, two room house or office associated with the operation of Bulwinkle's phosphate mine and mill. The earthen causeway that extends from the mainland south to the Ashley River is included within Locus B. The causeway lies along the OCRM wetland critical line, therefore mitigation was not necessary and was not conducted.

The data recovery investigations at 38DR192 recovered a sample of significant information from the site. This sample, combined with the development of the historic context mentioned above was employed to address research questions consistent with the periods and type of occupation outlined above and in the treatment plan. These investigations are sufficient to mitigate the adverse

effect that proposed land disturbing activities will have on this NRHP site. Land disturbing activities at 38DR192 should be allowed to proceed as planned.

Data recovery investigations were also conducted at Spring Farm Plantation (38DR161) for this project. Those investigations are documented in a separate report.

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Chapter I. Introduction and Methods of Investigation

Introduction

Archaeological data recovery investigations were conducted at 38DR60/81 between 9 November and 10 December 1999. Archaeological data recovery investigations were conducted at 38DR192 between 19 November 1999 and 14 January 2000. These investigations were conducted as per the Treatment Plan and Memorandum of Agreement (MOA) between Sailford Land Company, L.L.C., the State Historic Preservation Officer (SHPO), and the South Carolina Bureau of Ocean and Coastal Resource Management (OCRM). The investigations were conducted in partial fulfillment of the stipulations of the MOA.

Site 38DR60/81 occupies 6.3 hectares (300 by 210 meters) in the 59.6 hectare Appian Way Development Tract. Figure 1 shows the location of the site on the USGS Ladson and Stallsville, South Carolina topographic maps. Site 38DR60/81 is the remains of Ashley Phosphate Company's late nineteenth century mine, mill, and fertilizer works. The site is listed on the National Register of Historic Places as a component of the Ashley River Historic District. The site was systematically investigated during a survey of the Appian Way Tract (Bailey 1999). Several intact features were recorded, including three brick-lined cisterns, numerous brick walls, and possible chimney bases.

The phosphate works were constructed on a portion of the eighteenth/nineteenth century Childs Plantation. No features associated with the antebellum occupation of the site were identified during the survey; however, two artifacts (one Colonoware sherd and one Staffordshire sherd) were recovered during the survey investigations. While archival research indicates the majority of buildings and structures associated with Childs Plantation lie northeast of the project tract, a 1787 plat shows a garden and structure(s) (green house?) within the boundaries of 38DR60/81. The late nineteenth century industrial use of the site likely affected the antebellum component; however, Bailey (1999) believed some information potential may remain in this portion of Childs Plantation. Bailey (1999) recommended preservation or data recovery at the 38DR60/81.

The goals of the data recovery investigations at 38DR60/81 are: to determine if any intact cultural deposits associated with the pre-phosphate occupation of Childs Plantation exist; to adequately document those remains if they do exist; and to develop an historic context for phosphate mining, milling, and the production of fertilizer in the region. This was accomplished through a combination of field investigations, laboratory analysis, and archival research.

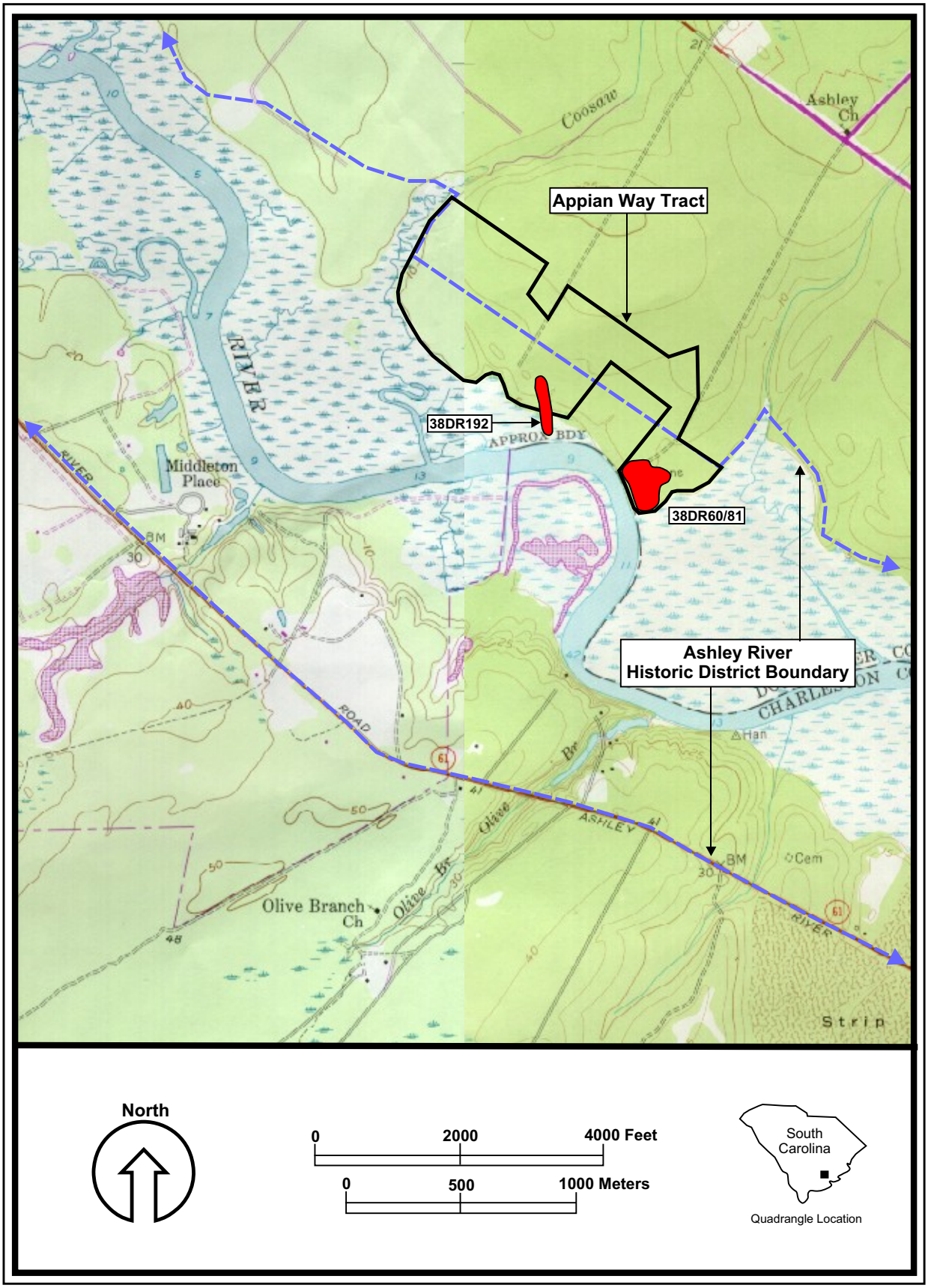


Figure 1. The locations of 38DR60/81 and 38DR192 in the Appian Way Tract (USGS 1979 *Ladson* and *Stallsville*, *SC* quadrangles).

Site 38DR192 occupies 5.4 hectares (45 by 120 meters) in the 59.6 hectare Appian Way Development Tract. The site includes the remains of the H. Bulwinkle phosphate works that operated during the late nineteenth century. In 1993, the site was listed on the NRHP as a component of the Ashley River Historic District. Site 38DR192 is located along the marshes of the Ashley River near the middle of the project tract (see Figure 1). The only artifacts noted during the survey investigations were two large grinding stones on the surface in the northern portion of the site. Several features were recorded at the site, including two large brick foundations, a deep mine or mill pond, four brick rubble piles, an eroded dike or causeway, and an earthen causeway that crosses the marsh and leads to the Ashley River. Bailey (1999) recommended either preservation of the site or data recovery investigations at the site should preservation not be feasible. Data recovery investigations at 38DR192 entailed mechanical scraping of areas where architectural features were expected.

The data recovery investigations at 38DR60/81 and 38DR192 recovered a sample of significant information from each site. These samples, combined with the development of the historic context for the phosphate period were employed to address research questions consistent with the periods and type of occupation of each site outlined in the treatment plans. These investigations are sufficient to mitigate the adverse effect that proposed land disturbing activities will have on these NRHP sites. Land disturbing activities at 38DR60/81 and 38DR192 should be allowed to proceed as planned.

The remainder of Chapter I presents a discussion of archival, field, and laboratory methods utilized to collect the data necessary to address specific research questions described in detail below. Chapter II provides a natural overview of the project area as well as a history of the phosphate period in South Carolina. Chapter III discusses the results of the field investigations and presents conclusions and management recommendations for 38DR60/81. Chapter IV discusses the results of the field investigations and presents conclusions and management recommendations for 38DR192. A summary of the project is provided in Chapter V. Artifact inventories are attached as Appendix A. Appendix B presents the resume of the Principal Investigator.

Research Design

Because industrial sites such as these produce very few artifacts and features are usually not especially informative, archaeological investigations were a relatively small component of the data recovery plans for 38DR60/81 and 38DR192. There are two primary objectives for the data recovery investigations at 38DR60/81 and 38DR192, to develop an historic context for the phosphate period

and to answer the following specific research questions. The objectives were accomplished through archival research, archaeological excavation, and laboratory analyses.

> Was the phosphate industry a reflection of the stillbirth of the New South or did it mark the beginning of a continuous if not steady path toward industrialization?
>
> Labor systems were undergoing a major transformation during the 1870s and 1880s. What role did the phosphate industry play in this restructuring process? Many owners experimented with convict labor, for example. What were the labor issues for the owners and workers? How did each group attempt to deal with or change their situations?
>
> The social order of the plantation period was completely dismantled after the Civil War. Many of the new industries and businesses during this period tried to promote a new racial harmony. This is reflected in many advertisements placed in newspapers and in educational pamphlets produced by some of the larger corporations. Did the phosphate industry have a real impact on racial relations? If so, was the impact positive or negative in the eyes of the owners and workers?
>
> Did the phosphate industry and the promise of fiscal salvation drive technological advancements, or did the industry simply borrow common industrial practices? How is this reflected in the archaeological record? Does the archaeological record reflect changes and/or modifications of systems or did the processes remain the same throughout the history of the mill? How do phosphate mills compare to other types of contemporary mills, such as grist or saw mills (e.g., postbellum Georgia grist and saw mills documented in Espenshade and Gardner 1989; mid-nineteenth century sugar mills documented in Brooker 1994).
>
> Around the turn of the century, many large conglomerates began gobbling up mills and suffering major financial crisis forming huge corporations such as Virginia and Carolina Chemical. This is a national trend (e.g., US Steel). Does the phosphate industry reflect that trend? How did the large mill of the Ashley Phosphate Company (38DR60/81) and the much smaller Bullwinkle Mill (38DR192) change through this phase of industrialization?
>
> What effect does phosphate mining and processing have on earlier archaeological sites and landscape features? Site 38DR60/81 lies in the vicinity of the eighteenth/early nineteenth century Childs Plantation. Investigators will assess the impact phosphate mining the archaeological remnants of Childs.

Archival Research

While substantial research was conducted for the survey report (Bailey 1999), the project historian conducted additional research at various repositories across the state. Some of the repositories and collections housed there include:

The SC Historical Society	Ashley Phosphate Company records Vertical files of miscellaneous Phosphate information 19th century journal of Daniel Cannon Webb of Chatsworth Plantation
The Charleston County Library	Sanborn Fire Insurance Company maps
Drayton Hall	Secondary and primary sources on file
The Charleston Museum	The Major E. Willis Collection (10+ vols. and 1 box of vertical files)
SC Dept. of Archives & History	Government census and economic records
Dorchester County Library	Secondary and primary sources on file

The research was used to provide an overall context for the history of the phosphate industry in the state, specifically along the Ashley River. Most of the research questions presented above are addressed in the history of the phosphate industry presented in Chapter II.

Field Investigations

Data recovery investigations at 38DR60/81 included a combination of close interval shovel testing, block hand excavations, hand stripping and cleaning of features, and mechanical trenching and scraping. Data recovery investigations at 38DR192 entailed mechanical scraping of areas where architectural features were expected. How and when each of these techniques was employed is described below.

30 by 30 cm Shovel Tests (38DR60/81). During the data recovery investigations at 38DR60/81, investigators excavated 11 shovel tests at 10 meter intervals around Provenience 3.1, which produced one Colonoware sherd. All soil was screened through ¼ inch mesh hardware cloth. All shovel tests were backfilled upon completion. These efforts were intended to collect additional data to assess the potential for intact archaeological deposits associated with Childs Plantation to remain at the site.

Block Hand Excavations (38DR60/81). The field investigators reestablished the site grid established during the survey investigations (Bailey 1999). The site grid is aligned at 45˚. All references to the spatial relationships of units and features encountered in the excavations are made with respect to the site grid. The elevation of the ground surface of the areas of investigation and the location of excavations areas and features were recorded using a transit and stadia rod.

Investigators excavated a total of 14 meters^2 in and around artifact/feature concentrations with an emphasis on the concentration of artifact producing shovel tests documented during the survey investigations (Bailey 1999) and the additional shovel testing described above. These efforts were focused on Structure 1 and the area of the former Childs Plantation settlement.

Investigators excavated the A horizon in a single, natural level; the soil from beneath the A horizon was excavated in 10 cm arbitrary levels. All soil was screened through ¼ inch mesh hardware cloth. Brick and mortar were weighed and discarded in the field. Plan views of the bottom of the excavation levels in each unit were drawn and photographed; at least one wall of each unit was drawn and photographed. Investigators drew and photographed all encountered features.

Mechanical Scraping. Following the hand excavations at 38DR60/81, the Sanborn map of the Shley Phosphate Company was digitally scanned and imported into AutoCAD. A transit and stadia rod were used to record control points on landscape and cultural features shown on the map and clearly present in the field (e.g., the three cisterns). The points were entered in AutoCAD and the Sanborn map was imported into the file as a layer. Distances and angles to other structures shown on the Sanborn map were calculated, taken back to the field, and shot with the transit and stadia rod. Selected areas were scraped with the backhoe to locate specific structures.

At 38DR192, investigators conducted mechanical scraping of areas where architectural features were expected. The site was divided into two loci expected to contain architectural features. At each site, a smooth bladed backhoe was used to remove the topsoil horizon. The blade of the backhoe measures approximately 0.7 meters wide. The field director monitored closely all mechanical excavations. All mechanical scrapes were backfilled upon completion.

Laboratory Analyses

All recovered artifacts were transported to the Brockington and Associates, Inc., Mt. Pleasant laboratory facility, where they were washed, cataloged, and analyzed. Laboratory personnel

assigned distinct provenience numbers to artifacts from each supplemental shovel test. They separated artifacts from each provenience by class/type and assigned catalog numbers.

Post-Contact artifact analysis also was based on observable stylistic and technological attributes. Artifacts were identified by material of manufacture (e.g., ceramic, glass, metal), color, function, and method of manufacture, when possible. Temporally diagnostic artifacts were compared to published analytical sources. Artifact analysts utilized sources typically used for the types of artifacts recovered in the region (Brown 1982; Cushion 1972; DeBolt 1988; Godden 1964; Ketchum 1983; Kovel and Kovel 1953, 1986; Miller 1980; Nelson 1968; Noël Hume 1970; South 1977).

Typological identification as manifested by technological and stylistic attributes also served as the basis for Pre-Contact artifact analysis. Laboratory personnel classified all Pre-Contact ceramic sherds larger than 2 by 2 cm by surface decoration and aplastic content. When recognizable, diagnostic attributes were recorded for residual sherds, i.e., those smaller than 2 by 2 cm. Nondiagnostic residual sherds were tabulated as a group. Sherds and other diagnostic artifacts then were compared to published type descriptions from available sources (Anderson et al. 1982; Blanton et al. 1986; DePratter 1979, 1984; Espenshade and Brockington 1989; South 1976; Trinkley 1980, 1981a, 1981b, 1981c, 1989, 1990; Williams and Shapiro 1990).

Artifacts and research materials associated with this project currently are stored at the Mt. Pleasant office of Brockington and Associates, Inc. Upon acceptance of the final report, Brockington and Associates, Inc., will deliver the curation package to the SCIAA.

Chapter II. Natural and Cultural Settings

Natural Setting

Present Conditions

Site 38DR60/81 and 38DR192 are located within the Appian Way Tract in Dorchester County. The tract is bordered to the north by an undeveloped parcel owned by Dorchester County and the Woodington and Palmetto residential subdivisions, to the east by an unnamed tributary of the Ashley River, to the south by the Ashley River, and to the west by Coosaw Swamp (see Figure 1). A sewer line runs from the Dorchester County Wastewater Treatment Plant southwest along the edge of the Appian Way Tract and Coosaw Swamp. With the exception of this sewer line and a few small dirt roads across the tract, the tract is undeveloped and wooded.

Vegetation at the Appian Way Tract consists of mixed pine and hardwood forest with moderate to very dense undergrowth. Soils on the majority of the project tract consist of Mouzon fine sandy loam with very small pockets of Coosaw loamy fine sand. These soils are present at site 38DR161. Coosaw soils are found on low ridges and are somewhat poorly drained. Mouzon soils are low, flat, and poorly drained (Eppinette 1990). The condition of all of the soils on the tract was worsened by phosphate mining in the late nineteenth-early twentieth century which left acres of deep, parallel ditches across much of the Appian Way Tract. A view of the area containing 38DR60/81 and 38DR192 is presented in Figure 2. On-site soils were noted as shallow, clayey, and wet. Relatively small patches of shallow wetlands extend across portions of the tract.

Past Environments

For a detailed description of the geological history of the South Carolina coast, the reader should refer to Winker and Howard (1977), Herrick and Vorhis (1963), Colquhoun and Johnson (1974), Cooke (1936, 1943), and Dubar et al. (1974). A summary is presented below.

The rocks and sediments of the Quaternary period (i.e., approximately 60 million years before present to the present) characterize the South Carolina coast and Inner Coastal Plain. The Quaternary period, in general, for this area has been a record of advancing and retreating coastline. Hence, the rocks and sediments (i.e., limestones, clays, silts, shales, and siltstones) generally are

Figure 2. View of a portion of the Appian Way Tract as it appears today, showing the effects of phosphate mining.

sedimentary in origin (i.e., particles were transported and deposited by a variety of water dynamic processes).

The Late Quaternary period is subdivided into two epochs, the Pleistocene and the Holocene. Geological activity during the Pleistocene Epoch (approximately two million years ago until 10,000 years ago) resulted in the formation of a series of terraces, extending approximately 95 kilometers inland from the present coastline. Each terrace unit denotes the location of a 'fossil' coastline containing sediments characteristic of barrier islands, tidal lagoons, and salt marshes. The Appian Way Tract lies on the Talbot and Penholoway terraces.

Regional research in palynology, historic biogeography, and coastal geomorphology allows a general reconstruction of Holocene (10,000 years ago until the present) changes in the environment. Pollen data from Florida, Georgia, North Carolina, and Virginia indicate that the Late Pleistocene was a time of transition from full glacial to Holocene (modern) environmental conditions (Whitehead 1965, 1973; Watts 1980). Upper Coastal Plain forests of the Late Pleistocene (as reflected in the White Pond pollen record) were dominated by oak, hickory, beech, and ironwood (Watts 1980:192); presumably, similar forests covered the Lower Coastal Plain during this same period. This deciduous forest occurred in a cooler, moister climate than exists in the region today (Braun 1950; Barry 1980).

The general warming trend at the onset of the Holocene is reflected in sea level changes. Beginning approximately 17,000 years before present (BP), sea level began to rise from its Late Pleistocene low of approximately 90 meters below modern mean sea level (Colquhoun and Brooks 1986; Howard et al. 1980). By 7,000 years BP, sea level had risen dramatically to within 6.5 meters of present levels.

As drier and still warmer conditions became prevalent during the Early Holocene, pines and other species suited to more xeric conditions increased. The southern forests at 7,000 years BP were beginning to resemble those of modern times (Watts 1980:194). The Early Holocene also was the end of a period of extinction for many large Pleistocene mammals.

On a regional level, vegetation and climate have remained effectively static since the Early Holocene. Along the South Carolina sea marshes and major river drainages such as the Ashley, however, the local plant and faunal communities undoubtedly were affected by continued change in sea level. Shellfish resources were of major importance to the Pre-Contact inhabitants of the study area, and the sea level changes starting after 2500 BC probably produced conditions conducive to local shellfish beds.

Cultural Setting

Historic Overview

The Carolina Coast was first permanently settled by Europeans in 1670. The earlier Spanish attempt to settle at San Miguel de Gualdape (1526), to the north, and the Spanish settlement at Santa Elena (1566-1587) to the south apparently had limited impact on the study area. The establishment of Charles Towne by the British in 1670, however, sparked a period of intensive fur trade with the Indians of the region and provided a base from which settlers spread quickly. Charles Towne was settled under the proprietary system, and did not become a royal colony until 1719.

Early economic development in the region focused upon Indian trade and naval stores production. Trade with the Indians was pursued aggressively through the beginning of the eighteenth century, but by 1716 conflicts with the Europeans, followed by disease, had drastically reduced or displaced the local native population, although trade with the native groups located farther inland continued until the end of the eighteenth century. Naval stores production likewise flourished for a short period with the encouragement of bounties provided by the Crown. However, England failed to recognize the extensive supplies of the pinelands on the Carolina coastal strand, and the production of naval stores quickly surpassed demand.

The new colony was organized with the parish as the local unit of government. St. George's Parish-Charleston, containing the Appian Way Tract, was created by the Church Act of 1706. The church building itself was to serve both religious and political purposes. As Gregorie (1961:5) explains, "the parish church as a public building was to be the center for the administration of some local government in each parish, for at that time there was not a courthouse in the province, not even in Charleston."

Although the early colonists considered the soils to either side of the Ashley River not favorable for agriculture, the direct access to Charleston provided by the river made the area quite desirable for settlement by some of the wealthiest people in the region. The settlements typically were located on bluffs within a few hundred yards of the river. The advent of tidal rice agriculture in the mid 1700s made the land favorable for cash crop agriculture further increasing the value of the lands of the upper Ashley River.

Grand plantation settlements dotted the banks of the river from the early 1700s to the end of the Civil War. On the east side of the Ashley River, plantation complexes were located west of Dorchester Road and the land to the east of Dorchester Road was used for rice cultivation or was

wooded. The Appian Way Tract includes portions of four eighteenth century tracts; Baker's, Spring Farm, Chatsworth, and Child's. Figure 3 shows a map of plantations along the Ashley River with the tract imposed. Former plantation complexes or house sites that are now recorded archaeological sites on the east side of the river also are shown.

After 1720, the economy of the region shifted to farming and stock husbandry. By that time, plantations had been established well up the Ashley River. By this date, rice accounted for half the colony's profits, and its importance grew over the next 140 years. Rice was complemented by the introduction of indigo as a cash crop in the middle to late eighteenth century. While rice production was restricted to the river marshes, indigo grew best in well drained soils. Cotton also became an important crop. Plantations along the Ashley River and the other streams of the parish focused on the production of these crops.

Indigo was first grown in the colony in 1740, and its introduction to the colony is traditionally attributed to the Pinckney family. In 1744, the Pinckneys gave small quantities of the seed to many of the local planters and, spurred by the successful cultivation efforts of Eliza Pinckney, indigo soon became a common and very profitable crop. Some planters were able to double their capital every three to four years. The volume of exports reached its peak in 1755 when 303,531 pounds of indigo blocks were exported from Charleston. England was the major market for indigo grown and processed in South Carolina, and the industry declined after the American Revolution (Pinckney 1976).

The Revolutionary War marks the beginning of a long period of decline for the once grand Colonial Ashley River Plantations. A plat by Joseph Purcell dated 1787 shows the lands that include the project tract and how they were being used (Figure 4). Figure 5 shows an overlay of the Purcell plat onto the modern USGS topographic maps. Table 2 gives a breakdown in acres of land use on these plantations in 1787.

Table 1. Land Uses in 1787 for Four Plantations in the Project Area (Smith n.d.:248).

Tract (west to east)	Garden	Upland Fields	Woods (Pine)	Woods (Mixed)	Impounded Marsh (Rice)	Unimproved Salt Marsh	Total Acres
Baker's	--	123 (old)	85	--	32 (old)	8	248
Spring Farm	--	163.5	--	185.5	50.5 (old)	42	441.5
Chatsworth	12	28.5	128	140	--	2	310.5
Child's	--	47	--	143	--	59.5	249.5

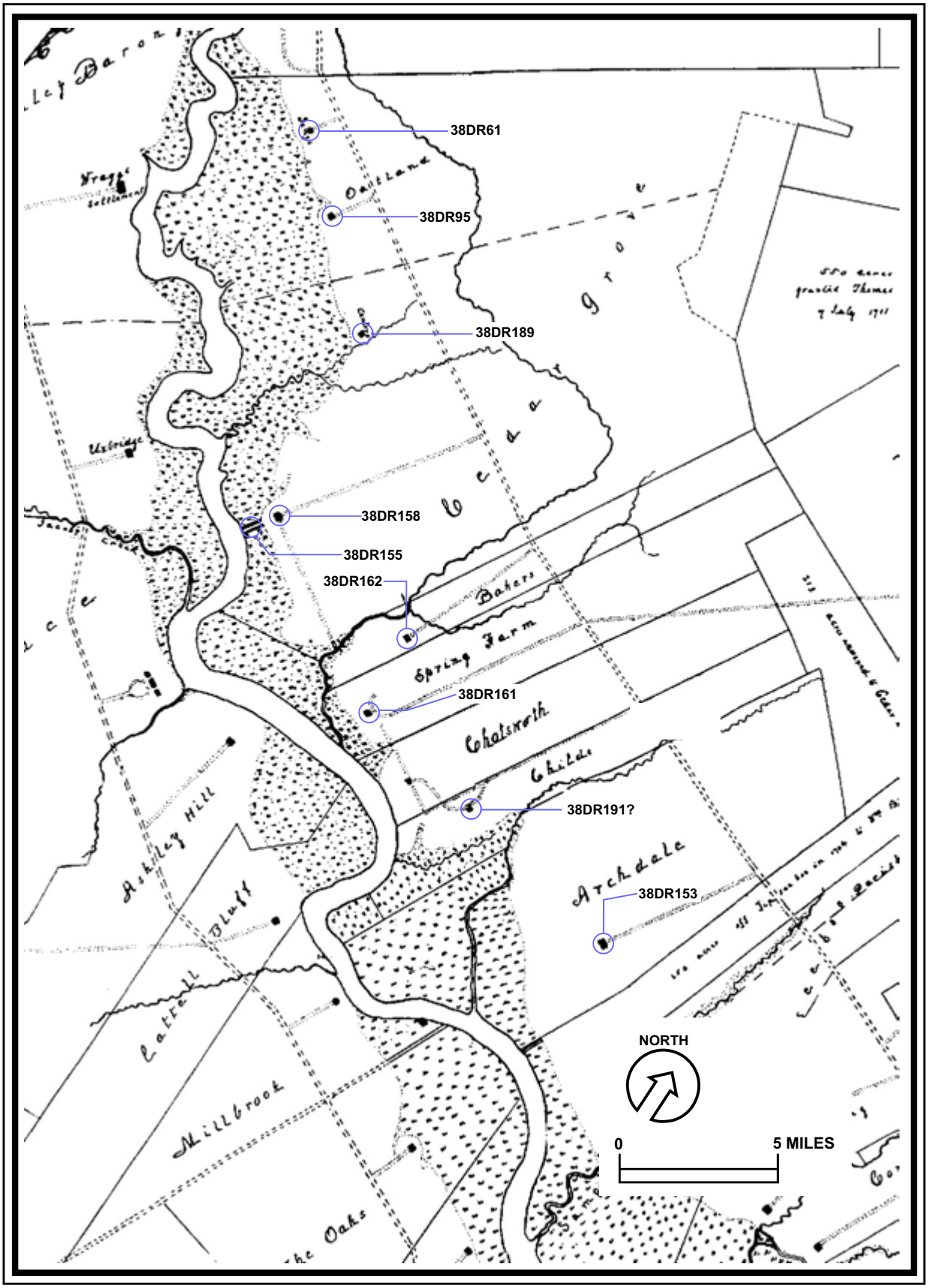


Figure 3. A map of historic plantations along the Ashley River (Smith 1988).

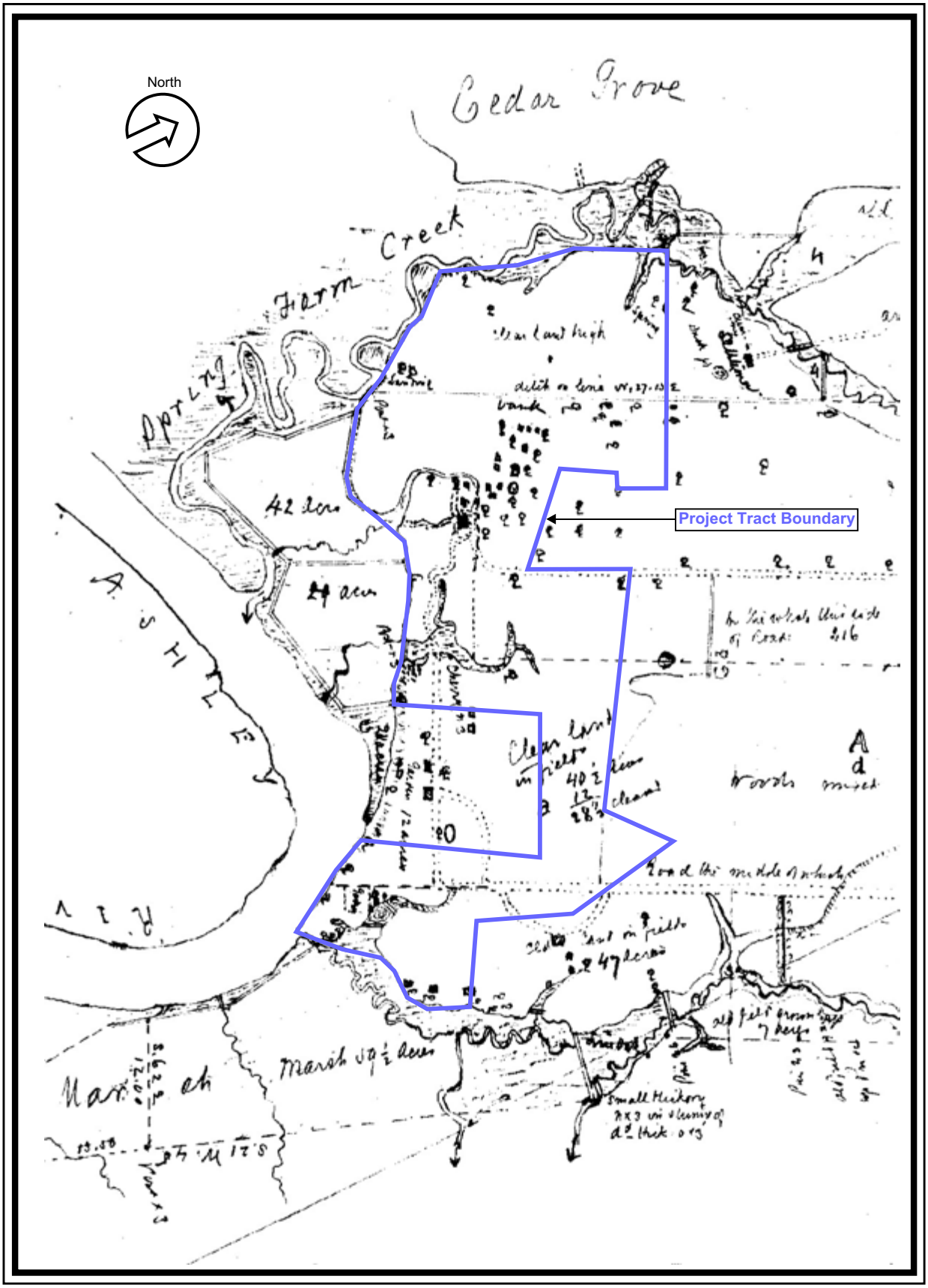


Figure 4. A 1787 plat of Baker's, Spring Farm, Chatsworth, and Child's Plantations showing the location of the Appian Way Tract (Smith n.d.:248).

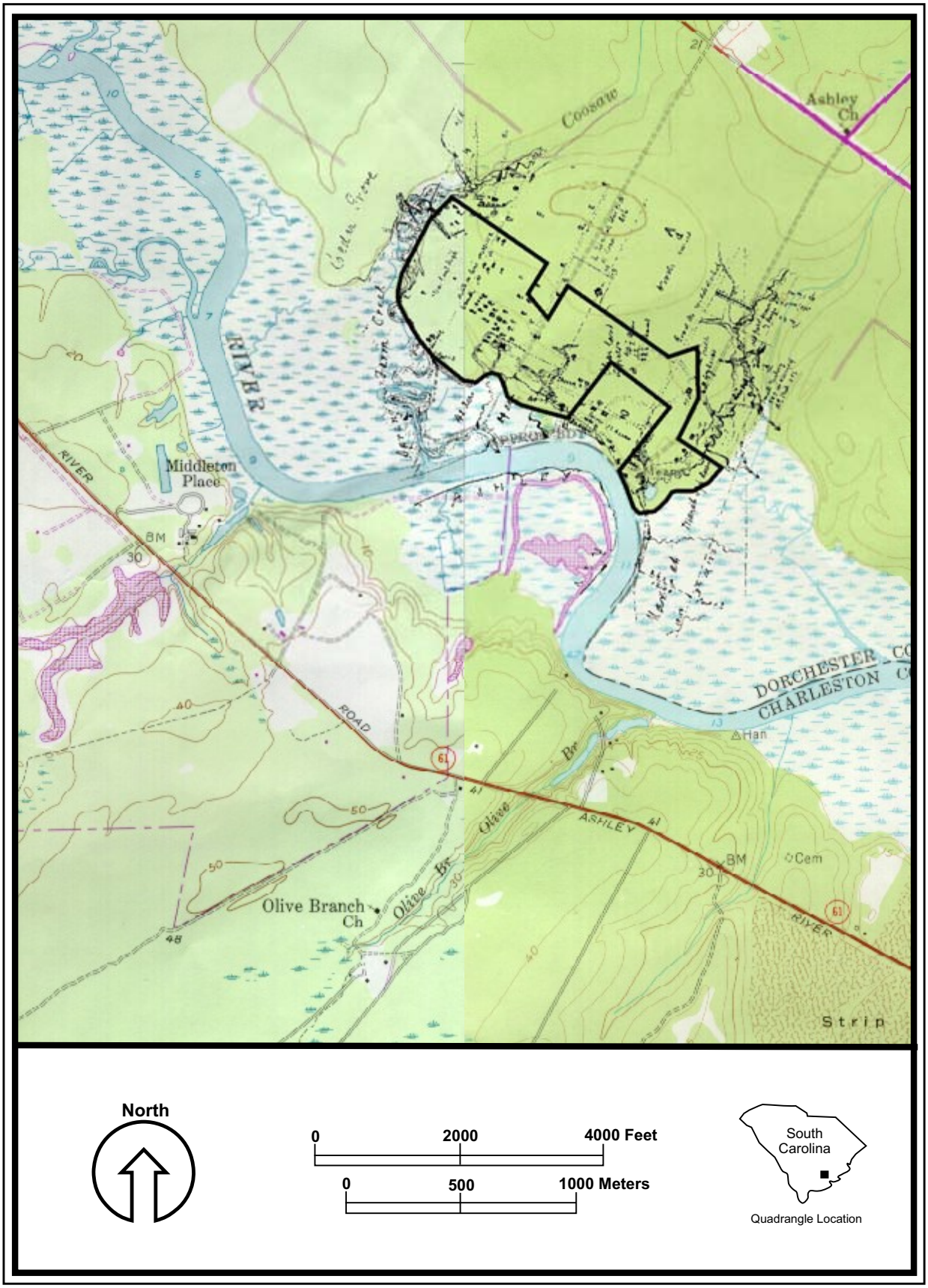


Figure 5. An overlay of the 1787 plat on the modern USGS topographic maps.

Most of the land that is included in the Appian Way Tract is listed as agricultural land; wooded areas are north, near and across Dorchester Road. All of the tidal rice lands are listed as old, suggesting that rice was no longer the cash crop for these plantations. Income likely was generated from cutting the timber lands on the interior portions of the property, with provisions and cotton being produced on portions of the upland fields toward the river. Cattle were raised and set to pasture freely in the woods.

Of the four plantations in the project area, only two of the settlements associated with these plantations were within the Appian Way Tract. These include Spring Farm and Child's (see Figure 3). The relatively small settlement of Baker's Plantation was north of the Appian Way Tract, and Chatsworth settlement appears to have been within what is now a private out parcel along the river. Sites 38DR60/81, the Ashley Phosphate works, operated on what was Childs Plantation and 38DR192, the H. Bulwinkle phosphate works, operated near the line between what were Spring Farm and Chatsworth Plantations.

Spring Farm Plantation was owned by Walter Izard at the time of the 1787 survey. He acquired the property in 1785 from Benjamin Waring. Walter Izard died in 1788 and the property was transferred to his brother Ralph Izard, Jr. Ralph Izard also owned Fair Spring Plantation farther upstream and his country estate called Schieveling downstream and across the River from Spring Farm. In 1795, Ralph Izard transferred Spring Farm to Dr. Samuel Wilson (Charleston County Register of Mesne Conveyance P6:350). Wilson was a practicing physician in Charleston and had extensive aviaries to which Audubon frequently refers in *Birds of America (1936)*. Wilson lived on Archdale Street in Charleston and not on the Spring Farm property. He sold Spring Farm and Baker's to Thomas Whaley in 1802, but purchased neighboring Chatsworth in 1805 from John Robert Poinsett.

Child's Plantation seems to have been unimproved for the late seventeenth and most of the early eighteenth centuries. By 1750, a house had been built on the property. An advertisement for the sale of the 81 ha (200 acre) plantation by Joseph Child in the 19 November 1750 edition of the South Carolina Gazette described the property as:

> . . . of good corn and indigo land besides some marsh . . . It is pleasantly situated opposite to Mr. William Cattell's on one of the best places on that river for a store; has a small dwelling house thereon (the river running just by the back door and a fine fish-pond before the front) and other buildings (Smith 1988b:132).

The 1787 plat shows the location of this settlement and the pond which appears as a dammed portion of a small drainage (see Figure 4).

Rice and cotton agriculture continued to play a role in the economy of St. George's Parish during the first half of the nineteenth century, but not to the extent they had in the eighteenth century, especially before the Revolutionary War. The early plantations along the Ashley River were in decline long before the Civil War. Upon traveling along the Ashley River as Agricultural and Geological Surveyor in 1843, Edmund Ruffin described the scene.

> . . .the river banks offer many beautiful sites for residences, which were preferred as such by the early settlers, & for a long time the Ashley River plantations were the most highly appreciated and productive lands in the colony. Now these lands are almost left untilled, are rarely inhabited by the proprietors . . . & the whole presents a melancholy scene of abandonment, desolation & ruin. . . But little rice is made, & only by a few persons. One occupant only on the left bank cultivates cotton for sale. . . .The principal business now pursued is cutting wood to sell in Charleston (Mathew 1992:78).

Spring Farm Plantation was owned by Philip Moore during the first half of the nineteenth century. Moore was a cabinet maker in Charleston at the turn of the century. Beginning in 1816, he is listed in census records as a lumber sawyer. He was probably getting much of his lumber from his Spring Farm property. Moore lived at Spring Farm by 1830. In 1827, his son-in-law Archibald Pepper and brother Daniel purchased neighboring Cedar Grove Plantation and began harvesting the hardwood timber there as well (Philips 1999).

Philip Moore died in 1857 and is buried at the family cemetery on Spring Grove (*Charleston Mercury*, 1 July 1857, page 2; Charleston County Library, Charleston). Also buried in the cemetery (38DR193) are his wife Bethseba Harriet Hamlin Moore (d. 1840), their daughter Josephine G. Moore Swinton (d. 1852), their son George Moore (d. 1840), and grandchildren James and Ana Marie Jenkins (Philips Collection, Summerville).

Chatsworth Plantation was an exception to the agricultural decline of the region. The land was owned and operated by Daniel Cannon Webb during the first half of the nineteenth century. He purchased Chatsworth and two adjacent tracts of pine land from Samuel Wilson in 1817 (Philips 1999). Webb lived on the property for 35 years planting rice, cotton, and subsistence crops, and harvesting timber on his pine lands.

Emancipation of the slaves and the dissection and redistribution of some of the plantations at the end of the war effectively destroyed the plantation system of production. Figure 6 shows the project area in 1863. Benjamin Rhett was the owner of Spring Farm (including Baker's), W.G. Capers was the owner of Chatsworth, and Mellichamp was the owner of Childs. After the war, large scale agriculture became more expensive and many of the large plantations fell into further disrepair.

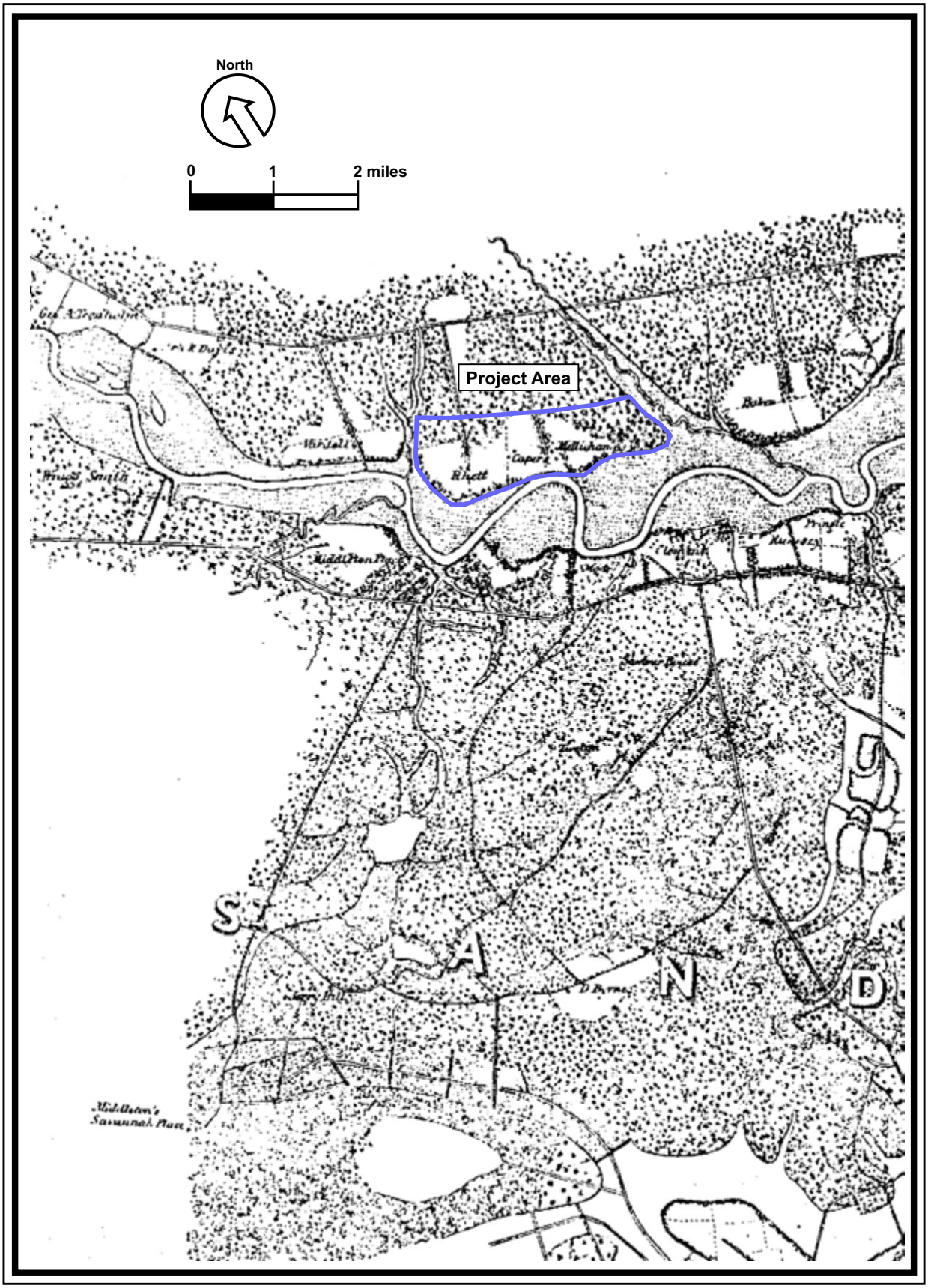


Figure 6. The project area in 1863 (Davis et al. 1983: Plate 131).

Laborers left the large plantations to take jobs in the state's growing textile industry in the Piedmont. Many landowners continued to farm on a smaller scale, and forest products remained important economically.

The immediate future of the area was not in agriculture or forest products but in phosphate mining. Underground phosphate deposits had been discovered along the Ashley River in the 1840s, and their commercial potential as a fertilizers was recognized shortly after the Civil War. Francis S. Holmes, owner of Ingleside Plantation located about four miles north of the Appian Way

A History of the Phosphate Industry in South Carolina

Introduction. In the 1870s, technological advancements coupled with the discovery of unique geological strata in the Coastal Plain ushered industry into the Lowcountry of South Carolina. The manufacture of inexpensive plant fertilizers that could be sold to both domestic and foreign markets presented new economic potential for the region, offering jobs and an important commodity for farmers. Newly freed African Americans who were seeking employment as wage laborers found work in the mines and in the fertilizer production facilities. The demand for low skilled laborers skyrocketed as the new industry grew. Some Charlestonians were hopeful that a new industry meant that Charleston would flourish once again, but most Charlestonians were skeptical and suspicious, and less than eager to support the change. It was only as a result of northern backing pushed through by carpet-baggers that started industrialization in Charleston. As the profit margin for the new industry quickly grew, local entrepreneurs cautiously began to follow suit and invest.

Quickly, industrialization in the region began to take its toll, and many of the fears of local Charlestonians became realized. Industrialists ravaged the once winsome local landscape of the Holy City. Where beautiful antebellum plantation homes had dotted the banks of local rivers such as the Ashley and Cooper Rivers, the late nineteenth century mining industry ushered in the obtrusive sight of industrial barges, wharves, fertilizer mills, phosphate drying sheds, and smoke stacks. The riverbanks of the Lowcountry literally were gutted and carted off piecemeal as companies dug ruthlessly for their precious crude phosphates to sell.

Despite the economic promise that phosphate mining may have held for the Lowcountry and even the state of South Carolina, the fertilizer industry soon collapsed. Soon after its inception, the mining and production of superphosphates in South Carolina came to a standstill, and the industry declined steadily after 20 meager years. The importance of this period in Charleston's history is readily apparent today in the form of large phosphate pits, some as large as 10 feet deep, along with

mottled local soils, and disturbed archaeological and historic sites. Street names like Ashley Phosphate Road within Charleston County hint at an important history that has not truly been told.

Schick and Doyle (1985), in one of the few articles addressing this industry in the Lowcountry, refer to the mining and manufacturing of high quality phosphate fertilizers during the late nineteenth century as the "Stillbirth of the New South." Their metaphor suggests promise and unfulfilled potential, but it also suggests that it held potential for the entire state of South Carolina and the even for the entire southern United States.

How did the phosphate industry in South Carolina compare with the state or national trend towards industrialization? Was the phosphate industry a reflection of a stagnating New South or did it mark the beginning of a continuous if not steady path toward industrialization or the region? Did the industry have any impact on social relations in the South, especially racial relations, and if so, was this impact positive or negative? Did the industry drive technological advancements or borrow from common industrial practices? These and many other questions remain unanswered by the limited current literature.

A wealth of historical data are peppered throughout innumerable personal letters, diaries, and ledgers of the individuals who owned and operated mining and fertilizer companies. In conjunction with archaeological data from phosphate mills such as 38DR60/81 and 38DR192 (formerly associated with the Atlantic Phosphate Works and later the Ashley Phosphate Company), these historical sources provide invaluable evidence on industrialization and economic history in the late nineteenth century South.

A Market for Fertilizer. Viable and abundant land, along with labor and capital, all became increasingly scarce in the post-war South of the late nineteenth century, requiring farmers to maximize their yield-per-acre. As a result, sharecropping became a way of life for many southern families, white and black alike. Unlike the large plantation systems of the years before, these small-scale farmers were forced to use every bit of available lands for production, increasing the need for rich fertilizers that could replenish the drained soils.

The broad application of commercial fertilizers to the soil was rarely practiced in the antebellum South. There was no need. Planters had abundant lands to farm and a huge labor force to work the grounds. Furthermore, antebellum plantation owners had little or no liquid capital to invest in costly fertilizers, since most resources were tied up in the slaves and in the land. The use of slave labor further prohibited planters from purchasing fertilizers for their crops. Planters presumed that enslaved laborers could not be trusted to till expensive fertilizers deeply into the soils,

and it was known commonly that fertilizers such as guano, if not applied to the soil appropriately, could permanently damage the fields (Genovese 1965).

The practice of monocropping, according to Genovese (1965), was common on large cotton plantations in Mississippi and Louisiana, where the overplanting of single crops such as cotton or corn exhausted the vital nutrients from the soils. In the Coastal Plain of South Carolina, however, monocropping was practiced less frequently. The parcels of land were smaller, as they were broken up by large bodies of water, and planters learned quickly of the need to rotate crops and to practice methods that could prevent soil exhaustion. Where monocropping was practiced along the coast, copious amounts of land and cheap labor allowed planters to temporarily fallow selected parcels or fields of land within a plantation, replenishing some of the lost nutrients. Planters, therefore, devised a variety of techniques to revitalize their precious soils. Rosengarten (1986) writes in a biography of Thomas Chaplain, a Sea Island Cotton planter from St. Helena Island, South Carolina,

> "The production of a crop took eighteen months, from the first manuring through the final baling and shipping, so work on one year's crop overlapped with work on the next. Soon after the last picking of cotton, the vegetation in the fields was hoed under. This was called *listing*. *Tracking* the land came next – laying out the beds so that water would flow into the ditches that interlaced the fields. Some planters used the same beds year after year, but Chaplain rotated his" (Rosengarten1986:70).

Such practices as the one described above ameliorated the land well enough when land and workers were plentiful during the antebellum period; however, after emancipation fields became severely depleted as there were not enough workers to help plant, harvest and tend the precious soils. The sale of lands also limited the ability of planters to fallow and plant simultaneously. This was compounded by a paucity of natural fertilizers such as manures from barnyard animals, their difficult application to the fields, and a dearth of laborers with the knowledge to apply the fertilizers.

Various natural fertilizers (including decomposed vegetation, shell, and crushed limestone) were used historically to replenish soil nutrients. A rich fertilizer was found in the ash of ground animal bones, from which emerged the term "bonfire." Cottonseed commonly was used by planters in the corn fields, while barnyard manures were applied to cotton crops (Genovese 1965). Such methods were employed more frequently in the northern part of America, with smaller agricultural plots. In the antebellum South natural manures were not abundant enough to fertilize the large plots of land, some of which spanned hundreds of acres.

The mass production of fertilizers did not occur in the United States until the mid-nineteenth century. It was in 1830 that the first bone mills were established in this country. Animals such as

large bison were killed in drives on the western plains and were processed in bone mills, creating plant food for use on domestic crops. About the same time, the German explorer Humboldt introduced phosphoratic Peruvian guano to Europe after a mapping expedition in South America. Guano was introduced to America in 1832, and by the 1840s to1850s, guano became a highly profitable import from Peru. Guano's use as a plant fertilizer had been known for centuries. Inca populations (ca. 2000 BC to 1300 AD) of South America had exploited the phosphate-rich guano from the Chincha islands off the coast of Peru. Guano is a combination of fossilized bones of ancient birds and fish, mixed with bird excrement and formed over millions of years. Guano offers a very rich fertilizer that is high in elements that are essential for proper plant growth such as nitrogen, phosphorous, potassium sulfur, sodium, chloride, magnesium, silicon, iron, and manganese. While it is a powerful fertilizer, Guano unfortunately produces extremely strong odors, limiting its utility for large-scale usage (O'Connor 2000).

Some nineteenth century planters, faced with the challenges of soil exhaustion, began seeking new alternatives. As early as 1832, Edmund Ruffin, who was seeking a means to increase production and fertilize his own plantations in Virginia, advocated marling for agricultural crops including corn, cotton and potatoes. Ruffin contended that the rich carbonate of lime found in marls could be a source of plant fertilizer; phosphates, however, he believed useless for the task. Other planters began experimenting with phosphate fertilizers by the 1840s (Mathew 1992, Stephens 1988).

By the mid-1850s, widely circulated agricultural periodicals and prominent southern planters such as Ruffin were extolling the benefits of fertilizers on crops. Planters began to understand the need for both phosphates and alkali salts for crop growth, and to understand that nitrogen compounds were necessary for healthy nonleguminous crops. As a result, fertilizers such as Peruvian guano seemed like a magic bullet for the barren soils, and the market for these chemical manures grew rapidly. From 1847 to 1848, a modest 1,000 tons of guano were exported into this country from Peru. This figure climbed to 163,000 tons by 1853-1854. American guano was available as a fertilizer, but was by far inferior to the Peruvian import in quality, ultimately costing the planter or farmer more capital as nearly three times the quantity of American to Peruvian guano had to be applied to the fields (Genovese 1965; O'Connor 2000).

Guano was an excellent fertilizer for crops such as wheat, and was well used in Virginia, Delaware, and Maryland with their relatively small crop lands. Not all plants reacted equally, however. Tobacco plants responded poorly to guano, since the fertilizer toughened the leaves of this plant. The adoption of guano was apparently not widespread in the lower southeast, according to Genovese (1965). When used, it was more often applied by planters in the Coastal Plain than those

of the inland, and then it was used only on sorely depleted soils. Genovese (1965) further states that this is not surprising given the ample cost of covering large parcels of land on southern plantations with these fertilizers. The following presents the views of one Louisiana agriculturalist regarding the use of natural fertilizers on crops.

> In respect to our worn out lands, it is almost useless for anyone to waste paper and ink to write the Southern planter telling him to manure. It is well enough for Northern farmers to talk; they can well afford to fertilize their little spots of ten or a dozen acres; but a Southern plantation of 500 or 600 acres in cultivation would require all the manure in the parish and all the force to do it justice... Again, we have no time to haul the large quantities of manure to the field, for it generally takes until January to get all our cotton, and we have to rush it then, to get time to make repairs before we go to plowing for our next crop (Peacocke 1846).

Unfortunately for most planters, expensive chemical fertilizers were not a viable option during the antebellum period, as capital was bound in land and slaves. Reliable fertilizers that could be easily used during the antebellum period were very costly and relatively hard to procure. The components to produce inexpensive chemical fertilizers en mass were only just being experimented with during this period. Marl, a mixture of clay containing chalk from the calcified bones of ancient fauna, was discovered in New Jersey in the late eighteenth century. Phosphate (the mineral which contains the element phosphorous) from the calcified bones in these marls had potential as a fertilizer, but it was not until the nineteenth century that the commercial value of marling (mining of marl beds for phosphate) for fertilizer was fully appreciated. Marl can be mined for mineral phosphate, which in turn can be pulverized and added to agricultural crops, providing rich nutrients for the root system of many domesticates. Nineteenth-century scientists realized that although phosphate is necessary for plant growth, the crude phosphate is less a effective plant fertilizer as an insoluble raw mineral.

Technological innovations during the mid-nineteenth century, however, would change the way that farmers could use the phosphates for their crops. European scientists began to experiment with crude phosphate in the 1830s, and Justus Von Liebig in 1840 "recommended the use of sulphuric acid as a solvent for the phosphate of lime in bones, to render it available for plant food" (Chazal 1904:34). A technique for adding vitriol (sulfuric acid) to crude phosphate was employed to produce "super phosphate of lime", and the procedure was patented in 1842 by John Bennet Lawes. This superphosphate, unlike raw phosphate, was water soluble and could be produced in a fine, dry powder state, rendering it a more efficacious fertilizer that could be easily transported domestically or to a foreign market. It also meant easier application of the fertilizer to the fields. With this technological achievement, the stage was set for a brand new industry.

The Dawn of a New Industry. It was during the latter part of the nineteenth century that the port city of Charleston, South Carolina became the center of a short-lived boom in the production of phosphate fertilizers. Geological surveys of the state showed an abundance of phosphate-rich marl lying in Charleston river beds and underground. As early as 1795, the fossilized bones and teeth of prehistoric fauna had been recovered from Oligocene marls within Biggin Swamp in the Cooper River. Early writers, such as Dr. David Ramsey in 1797, referred to the phosphate beds of South Carolina, but the first scientific studies of these marls was not until 1837. Initial research on the marls was conducted by Francis S. Holmes. Figure 7 presents a photo of Holmes taken in his plantation near Goose Creek, South Carolina in 1875.

Figure 7. Professor Francis S. Holmes in 1875 at Ingelside Plantation (Courtesy of the Charleston Museum).

In 1843, shortly after Holmes' discovery, Edmund Ruffin first published on the location of the Charleston phosphate deposits. Ruffin, who had been commissioned by the state of South Carolina to conduct an agricultural survey, focused primarily on the marl beds and phosphate deposits (Mathew 1992). Upon Ruffin's retirement from this position, Professor M. Toumey took over the agricultural survey in 1846, and continued to map the state's phosphates deposits (Chazal 1904). This calcareous stratum of the Charleston Basin became so well known to scientists, that it

was labeled the "Fish Bed of the Charleston Basin" by the renowned Swiss-born American geologist Professor J. Louis Agassiz. Figure 8 presents a map of the geological strata and phosphate deposits for the Charleston Basin.

The full boundaries of the Charleston deposits were not mapped until 1870-1872, when N. S. Shaler of the US Coast Survey charted the extent of the phosphate deposits in the rivers of South Carolina (Chazal 1904). Phosphate deposits in South Carolina run parallel to the coast for approximately 70 miles. The beds extend south from the Wando River near Charleston to the Broad River, and continue inland from the coast for approximately 30 miles. The phosphate beds within the Ashley River extend north of Bee's Ferry in Charleston for approximately 10 miles.

Phosphate within the Charleston Basin outcrops on the banks of the Cooper, Ashley, Stono, Edisto, Coosaw and Combahee Rivers, as well as along the tributaries of each of these rivers. According to a geological survey of the Charleston area phosphates by Malde (1959), the South Carolina marine deposits range from the Oligocene to the Pleistocene epochs in age. The oldest formation that is exposed through river outcrops in the Charleston Basin is an Oligocene period formation known as the Cooper marl. The Cooper marl contains approximately equal amounts phosphate and calcium carbonate (limestone). Malde (1959) describes the Copper marl formation, stating that it "dips southward from 8 to 14 feet per mile and overlies beds of Eocene age upturned on the north. From a thickness of 200 feet near Charleston the Cooper marl thins and pinches out 20 miles north. It thickens southwestward to at least 280 feet" (Malde 1959).

The four youngest Pleistocene formations containing phosphatic rich soils in the Charelston area, in ascending order are: the Ladson formation (ca. 450,00-400,00 years before present [ybp]), Ten Mile Beds (ca. 240,00 - 200,000 ybp), Wando Formation (ca. 130,000 - 70,000 ybp), and Socastee Formation (ca. 120,000 ybp). The Ladson Formation, approximately 35-40 feet thick, is characterized by phosphate at the bottom stratum, topped by layers of fine sand, and medium grained sand, with coarse sand at the top. The Ten Mile Beds, approximately 45-50 feet thick, consists of a clayey sand and clay facies, underlain by a clean sand facies, underlain by a fossiliferous sand facies. The Wando Formation, approximately 85 feet thick, is characterized by a clayey sand and clay facies, clean sand facies, and shelly sand facies. The basal contact is usually marked by a thick layer of coarse-grained sand, black phosphate pebbles, and worn and rounded bones and teeth. This basal layer is ambiguously mentioned in the literature as the "Ashley River phosphate beds." The Socastee Formation is comprised of nonmarine sediments overlain by marine sediments and extends to Winyah bay (Sanders 2002).

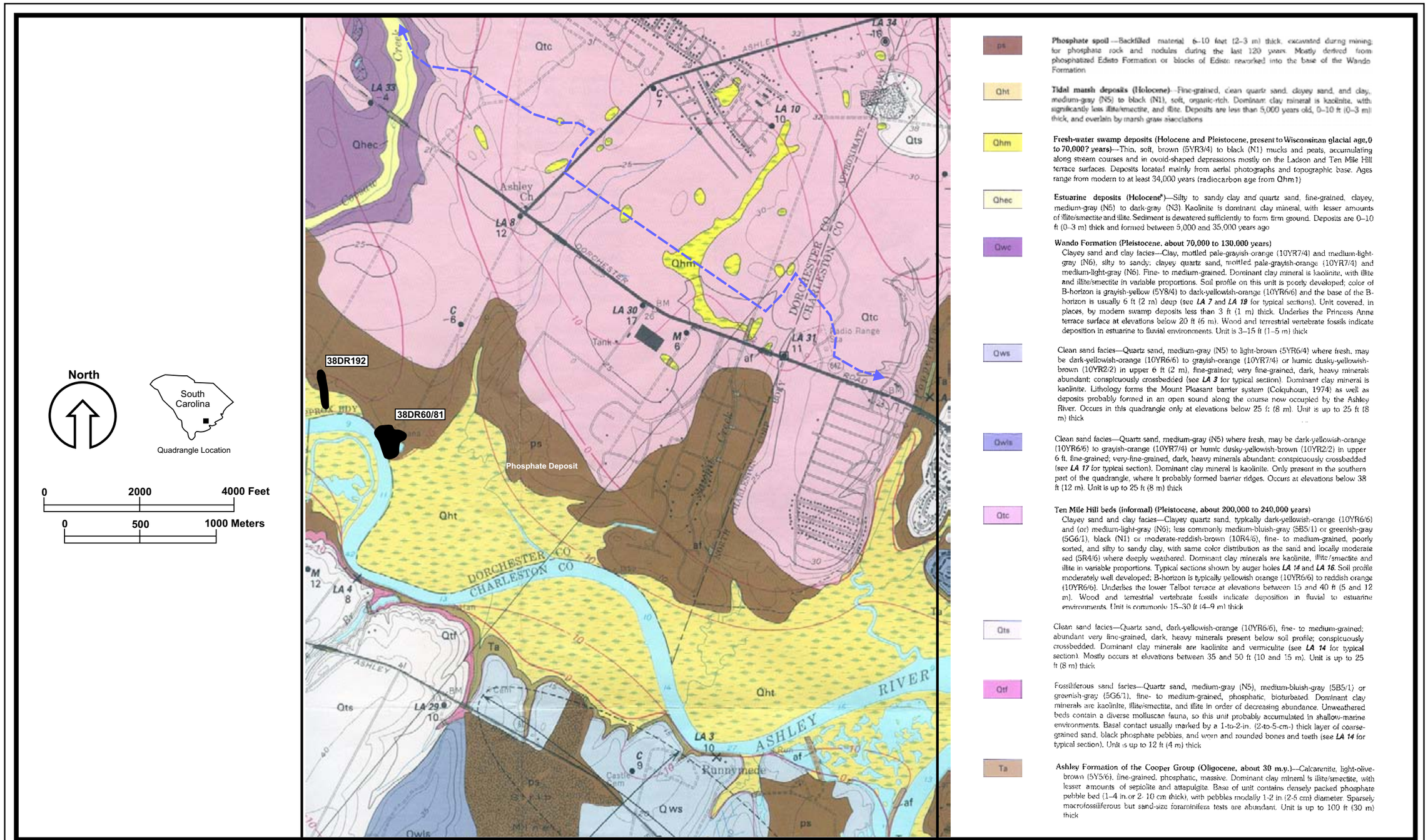


Figure 8. A map showing the location of 38DR60/81 and 38DR192 and phosphatic deposits (Courtesy of the Charleston Museum).

Most of the exploited phosphates in the Charleston area came from younger, Pleistocene age deposits, generally close to the surface. A large portion of these outcrops were destroyed by the phosphate mining industry of the early twentieth century, limiting complete study to hand coring and loose interpretation. These outcrops were originally though to be the lower facies in the Ladson Formation which is reworked Cooper Marl (Malde 1959). While excavating a giant ground sloth fossil, a few miles northeast of Charleston on SC Route 642, an intact phosphate bed was located. This created the first opportunity in recent times to record the stratum in situ and determine its formation of origin. The upper portion of the excavated section consists of a 32 inch deposit of the Wando Formation, with the bottom 8 inches consisting of lag deposits of large phosphate rocks and reworked bone. The site area is located within the heart of the old phosphate mining region, thus lending credit to the theory that the majority of the phosphatic outcroppings in this area are from the lower Wando Formation (Sanders 2002).

Geologically, the mineral phosphate is taken up over thousands of years in sedimentary rocks, shell, bones, teeth, and coprolites. Phosphate nodules occur in a variety of shapes and sizes, ranging from less than a single ounce to hundreds of pounds (Figure 9). The smell of the mineral is unique and phosphate nodules omit a "peculiar odor bearing a slight resemblance to burning horn" when rocks were rubbed together (Chazal 1904:10). Mineralogically, the phosphate rock that found within the Charleston Basin is comprised of carbonate-fluorapatite which is an combination of phosphate radical PO_4 with water, calcium, and the trace elements fluoride and uranium, expressed chemically as $Ca_{10}\ PO_4\ CO_3\ F_{2\text{-}3}$.

Phosphate nodules outcrop in both land and river deposits in the Charleston area, and average approximately 28 percent P_2O_5, which calculates to 61 percent phosphate of lime (Malde 1959). This average far exceeded those of the coprolite deposits of the London Basin in England, increasing the marketability of American phosphates abroad (O'Connor 2000). The external appearances of the Charleston river and land mineral differ substantially due to variance in the chemical composition of each. River phosphates appear darker in color, almost black, compared with the tan-colored land deposits, and are much softer in texture than the land phosphates as well. The land rock contains higher amounts of phosphate of lime, making it soft (O'Connor 2000).

New technologies were developed in the northern United States during the mid-nineteenth century that utilized sulfuric acid to convert crude phosphate into fertilizer that could be readily absorbed by plants. By 1867, the marl beds of the Cooper River in Charleston were being exploited for crude phosphate, a mineral that was already known to replenish nutrient poor soils, but had not been used commercially as it was not readily absorbed by plants in its crude form.

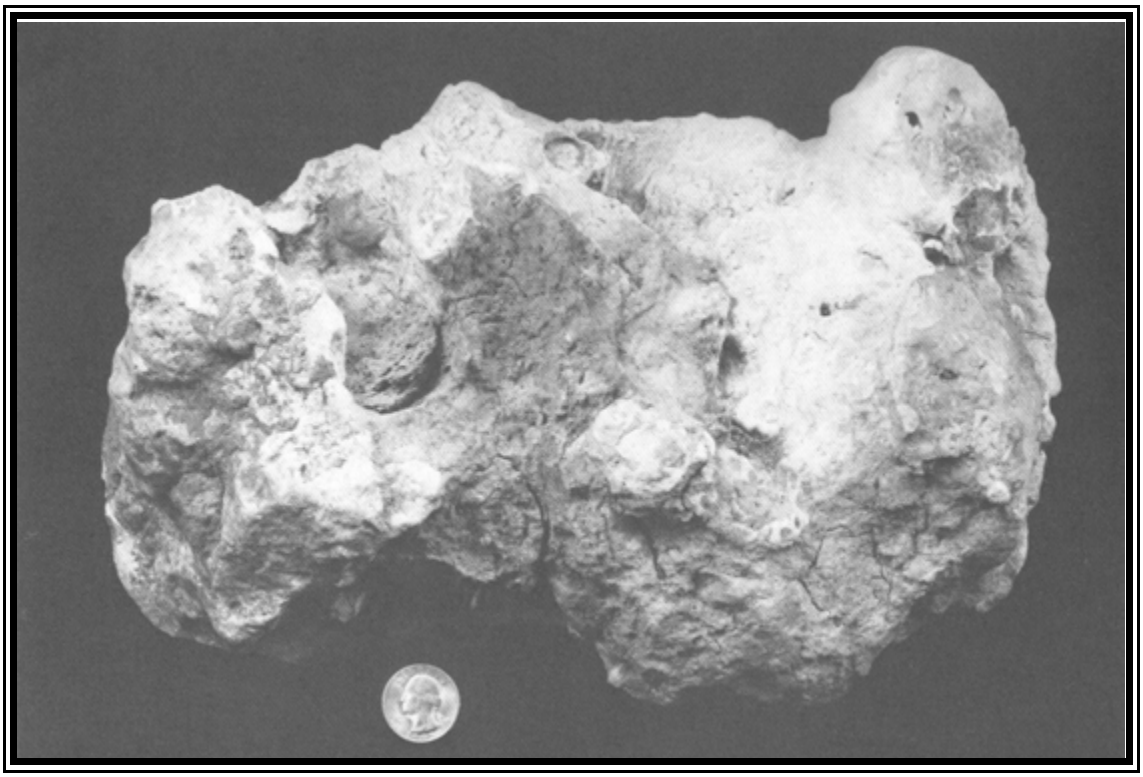


Figure 9. A view of a typical phosphate nodule (Stephens 1988:42).

The presence of phosphate-rich marl beds had been discovered as early as 1837 by naturalist Francis Holmes in Charleston. While collecting ancient bones and teeth from the marl beds of the Ashley river, he noted that the marl, especially the bones, was rich in the mineral phosphate. Holmes was a successful planter in the community, but had little formal education, having withdrawn from school at the young age of 14. He nonetheless made a name for himself by publishing on various topics in agriculture, including the use of marls for fertilization. Holmes experimented with various techniques in marling his own crops to increase production (Stephens 1988).

During the 1840s, Holmes became a well-respected naturalist and an authority in geology, as he began to amass and display an impressive collection of fossils, and to publish scientific papers in widely circulated journals. His work gained the recognition by such prominent scientists as paleontologist Louis Agassiz, and anthropologist Samuel Morton. In 1850, the College of Charleston constructed a new museum, and with encouragement from Agassiz, the board of trustees elected Holmes as its curator. Soon thereafter, Holmes was appointed to a position of Professor of Geology and Paleontology at the College of Charleston. Much of Holmes' geological knowledge was acquired as Michael Tuomey's assistant and through readings. Eventually, Holmes was awarded an honorary Masters degree from the University of Alabama, and an honorary doctorate;

however, he remained self-educated throughout his life. His lack of formal education may have been a source of insecurity for Holmes, since it caused some strife in his career with some members of the academic community that refused to acknowledge him professionally (Stephens 1988). Holmes eventually was dismissed from his position as Professor of Geology during economic cutbacks, but he appealed to the Charleston Museum's board of trustees to allow him to retain his position as Curator. Although he stayed on with the Museum, it was with a reduction in his salary by more than half. In January 1869, Holmes ultimately decided to resign from the museum, and to open the door to new ventures such as the phosphate industry (Stephens 1988).

There is some discrepancy in the literature over whether it was Professor Holmes or Dr. St. Julien Ravenel of Charleston who first saw the phosphatic marl beds of South Carolina as marketable for use as a fertilizer; nonetheless, it is amply clear that Professor Holmes, along with Dr. N. A. Pratt of Georgia, founded the first phosphate mining company in the state. Dr. Pratt (formerly a chemist with the Nitre and Mining Bureau) met Holmes during the war while inspecting the Ashley River beds for saltpetre (Stephens 1988:44).

With a knowledge of how to produce their new plant fertilizer from phosphate, Pratt and Holmes were faced with the problem of convincing local businessmen of Charleston to invest in such a potentially high-risk endeavor during the economically troubled times of Reconstruction. Furthermore, many southerners resisted change, and clung tightly to tradition and to the notion of the Old South. This meant that even though agriculture was not especially lucrative during the Reconstruction period, it was a tradition, and as a result it held a far superior status to most Southern gentlemen than did industry.

In 1868, however, Pratt and Holmes were able to persuade northern entrepreneurs from Philadelphia to provide them with a backing of one million dollars in capital. This investment was used to establish the first phosphate mining operation in South Carolina, and the Charleston Mining and Manufacturing Company began its operation along the Ashley River (Stephens 1988:44). Dr. Pratt served as the company chemist, and Professor Holmes served as the company president (Sanders and Anderson 1999, Shick and Doyle 1986).

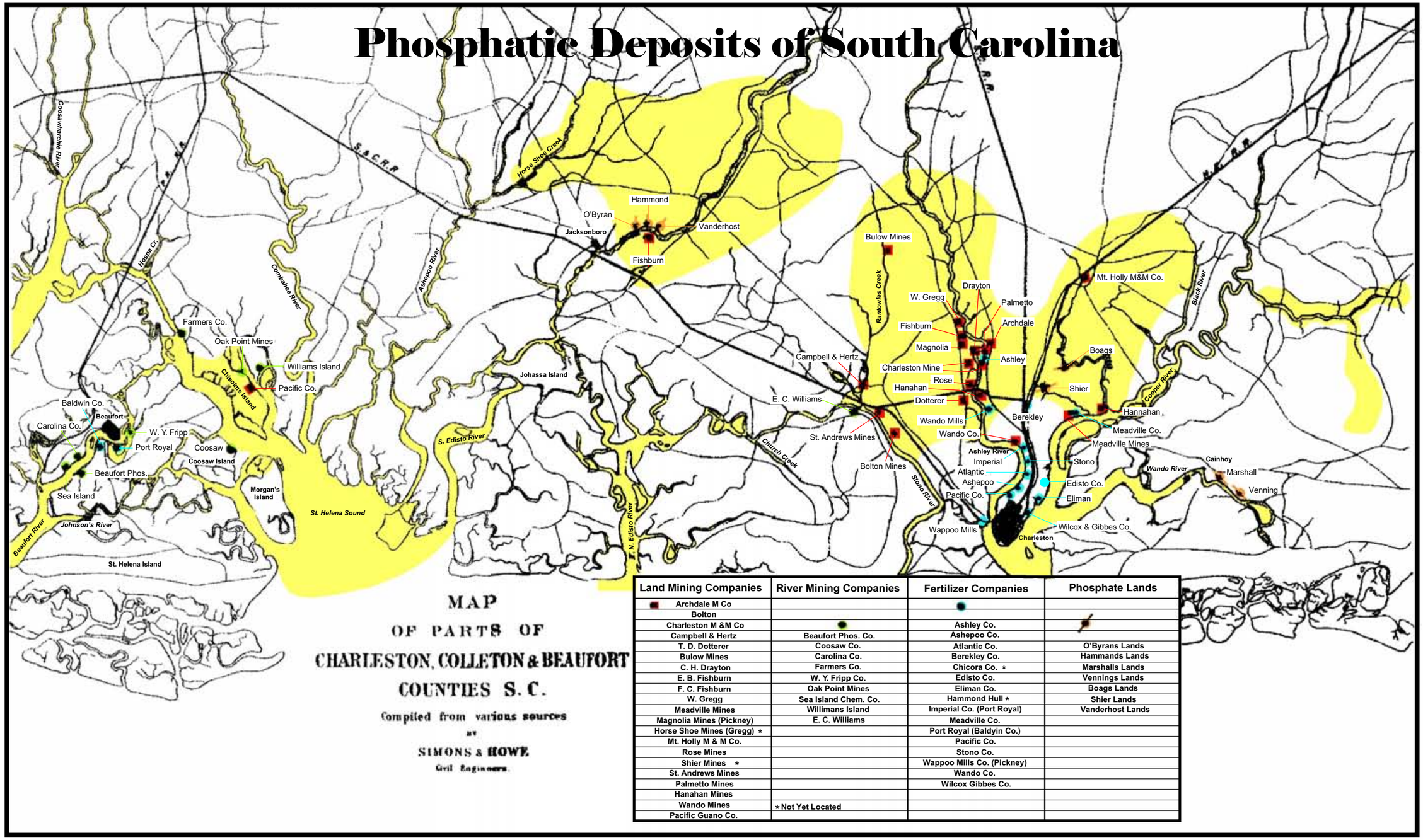
The Charleston Mining and Manufacturing Company quickly purchased most of the available land deposits of phosphate near the Cooper and Ashley Rivers in Charleston. The company leased as much as 10,000 acres along the Ashley River by 1868. Rice production along the Ashley River had been in steady decline since the Revolutionary War, and by the end of the Civil War planters found themselves heavily in debt with no available capital. Phosphate deposits were easily obtained from the former rice planters who quickly sold or rented their lands to the new industrialists to

alleviate their economic woes. In this manner, Charleston Mining and Manufacturing quickly accumulated over 10,000 acres of leased land by July 1868 (Shick and Doyle 1986).

Between 1867 and 1870, many of the local investors who were originally hesitant to support Pratt and Holmes, realized the fortune that could be made in the phosphate mining industry. Times were economically tough, but many of those who had resisted change made a turn and invested in industry. As early as 1890, approximately $3 million had been invested in the rents paid for phosphate lands and an additional $2.6 million in capital had been invested in the necessary equipment for processing the mineral (Shick and Doyle 1986:8). Numerous phosphate mining companies cropped up along the Ashley River in Charleston during the late nineteenth century. Figure 10 shows a map of the location of land mining companies, river mining companies, fertilizer companies and phosphatic lands in the region during the late nineteenth century.

The numerous land mining companies along the Ashley River included Atlantic Phosphate (later reorganized as the Ashley Phosphate Company and the mining operation associated with the current project tract), Palmetto Mining and Manufacturing Company, Cherokee Mines, Pickney Mines, Drayton Mines, Gregg Mines, and Millbrook Mines. Mines near Stono River included: Bolton Mines, St. Andrew's Mines, and Bulow Mines. Mines along other navigable rivers in the Charleston area included: Pacific Guano Company on Chisolm Island, Oak Point Mines Company at Kean's Neck, Pon-Pon Mines at Edisto, and Horseshoe Mines near the Ashepoo, among others. Charleston Mining and Manufacturing was by far the largest of the companies. Of all land mining operations started in the state between 1867 and 1891, the capital investment of Charleston Mining and Manufacturing equaled one-third of the total invested in the market (Shick and Doyle 1986:8).

In the beginning, only the land deposits were exploited by the mining companies. River phosphate rock was not mined until 1870, but it quickly became preferred to the land rock as the river phosphate was easier to excavate. Generally, the river beds lay nearer the surface; although, they did vary in depth between 3 to 36 inches. It was more common to find shallow outcroppings, and most of the mineable beds averaged approximately 8 or 9 inches below the ground surface. The especially good deposits were encountered at depths of only 12-16 inches below ground surface (Chazal 1904:9). This compared quite favorably to the deposits sometimes in excess of 10 feet or more on land. Furthermore, in order to access the soft phosphate of the land deposits, it was necessary hand excavate or utilize picks and shovels to remove it from the clay marl beds. The clay of the land deposits was more difficult to separate from the phosphate nodules than that of the river deposits, and as such, companies fiercely competed for access to mining the Charleston area rivers (Reid 1876, O'Connor 2000).



Land Mining Companies	River Mining Companies	Fertilizer Companies	Phosphate Lands
Archdale M Co			
Bolton			
Charleston M &M Co		Ashley Co.	
Campbell & Hertz	Beaufort Phos. Co.	Ashepoo Co.	
T. D. Dotterer	Coosaw Co.	Atlantic Co.	O'Byrans Lands
Bulow Mines	Carolina Co.	Berekley Co.	Hammands Lands
C. H. Drayton	Farmers Co.	Chicora Co. *	Marshalls Lands
E. B. Fishburn	W. Y. Fripp Co.	Edisto Co.	Vennings Lands
F. C. Fishburn	Oak Point Mines	Eliman Co.	Boags Lands
W. Gregg	Sea Island Chem. Co.	Hammond Hull *	Shier Lands
Meadville Mines	Willimans Island	Imperial Co. (Port Royal)	Vanderhost Lands
Magnolia Mines (Pickney)	E. C. Williams	Meadville Co.	
Horse Shoe Mines (Gregg) *		Port Royal (Baldyin Co.)	
Mt. Holly M & M Co.		Pacific Co.	
Rose Mines		Stono Co.	
Shier Mines *		Wappoo Mills Co. (Pickney)	
St. Andrews Mines		Wando Co.	
Palmetto Mines		Wilcox Gibbes Co.	
Hanahan Mines			
Wando Mines	* Not Yet Located		
Pacific Guano Co.			

Figure 10. A map showing the location of phosphate mining and fertilizer production companies in the region (Courtesy of the Charleston Museum).

While land deposits were held as private property, quickly bought up by individual companies, the state of South Carolina owned the mineral rights to the riverine phosphate beds. Originally, access to these river deposits was on a first come first serve basis, but some controls were placed on the riverine phosphates with the Phosphate Act of 1870. This legislation "granted to certain persons and their associates the right to dig and mine in the beds of navigable streams and waters of the State for phosphate rocks and phosphate deposits, for a period of twenty-one years" (Taylor 1999:422). It was first vetoed Govenor R.K. Scott, but the act was eventually passed (Snowden 1920). Pressure from lobbyists shortly thereafter lead to the Act of 1876, which overturned the twenty-one year limitation and gave a "practically perpetual charter, conditioned only on the prompt payment of the royalty" (Chazal 1904:56).

River mining companies began to spring up around Charleston in the 1870s. Companies included the Marine and River Company (which collapsed in 1882), and the Coosaw Company (which mined the Coosaw River from 1870 to 1894). According to Chazal (1904), other river companies included Palmetto Phosphate Company (Ashley and Wando Rivers), Farmer's Phosphate Company (Bull and Coosaw Rivers), Sea Island Chemical Company (Johnson and Beaufort Rivers), and the Carolina Mining Company (Broad, Johnson, Morgan, Bull and Coosaw Rivers). Companies, such as the Coosaw Mining Company, paid the state for exclusive river mining rights, and in return, river mining became a very lucrative business for these companies. Phosphate mining brought between $300,000 to $400,000 annually into South Carolina by the early 1880s, and State of South Carolina was receiving revenues of $1 per ton for all phosphate rock mined out of the river beds (Snowden 1920). By 1890, these state revenues came to over $250,000 per year (Moore 1978:371).

In the 1890s, however, Governor Benjamin Tillman argued that since such large profits were being generating from the sale of phosphates, the royalties paid to the state should legitimately be increased from $1 to $2 per ton of rock. Tillman's distaste for the Lowdcountry, especially Charleston, was thinly veiled as an attempt by the Governor to "lessen the burden of the tax payers and elevate the financial credit of the State" (Snowden 1920:1,008). Furthermore, in 1891 Tillman argued that the State had already lost in excess of $132,000 dollars in royalties, since the mining companies (specifically Coosaw River Mining) were "not making due allowance for the moisture expelled in drying the rock" (Snowden 1920:1008). The case went to the United States federal courts in the 1890s, which slowed production for these river mining companies. Several companies went under around this same time. Eventually, the State of South Carolina won its case, but was only allowed to collect the royalties lost during the fiscal year of 1891 (Snowden 1920).

The Production of Superphosphates. The mining of crude phosphates was just one stage in the production of soluble phosphoric acid (superphosphate) fertilizers. Although some of the

pulverized raw mineral was sold directly for use on fields, the majority of phosphate was chemically altered by fertilizer companies. There was variation among the setup of these production facilities, but the primary process remained the same. Typical components of the plant included: washing and drying houses, boiler houses, a mill building, storage houses, acid chambers, wharves, and rail spurs. Figure 11 is a plan of a typical fertilizer operation on the Ashley River.

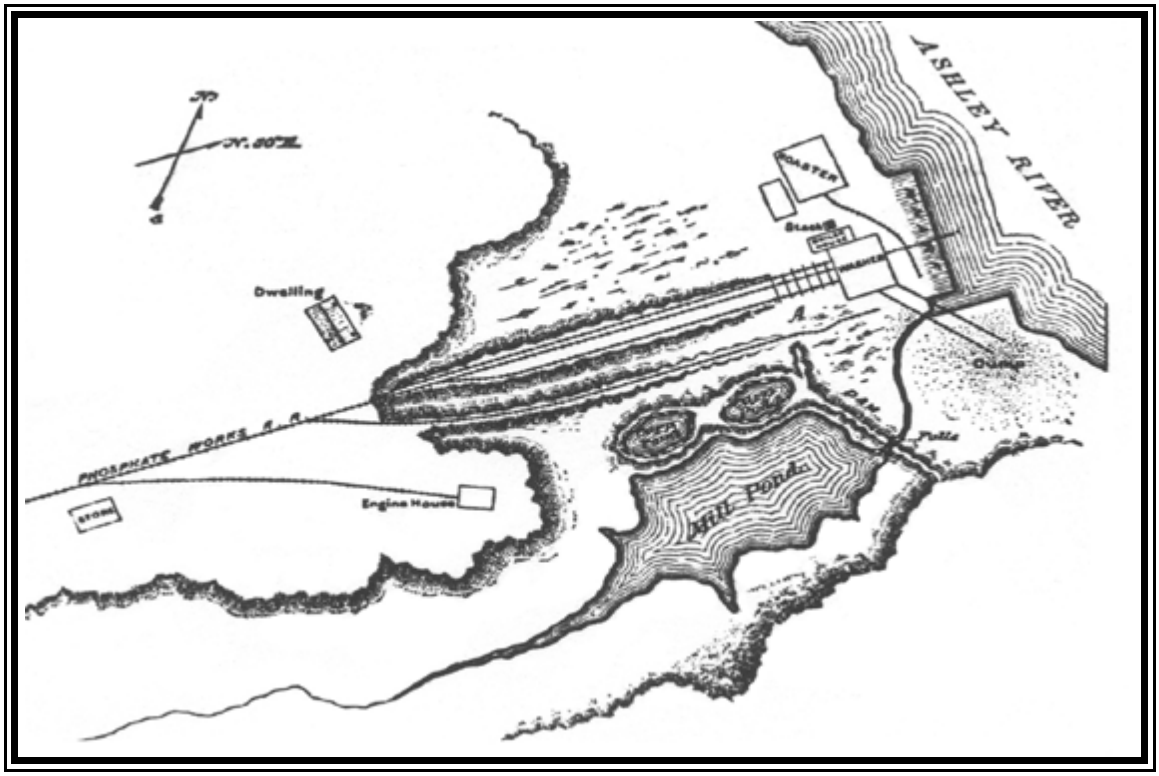
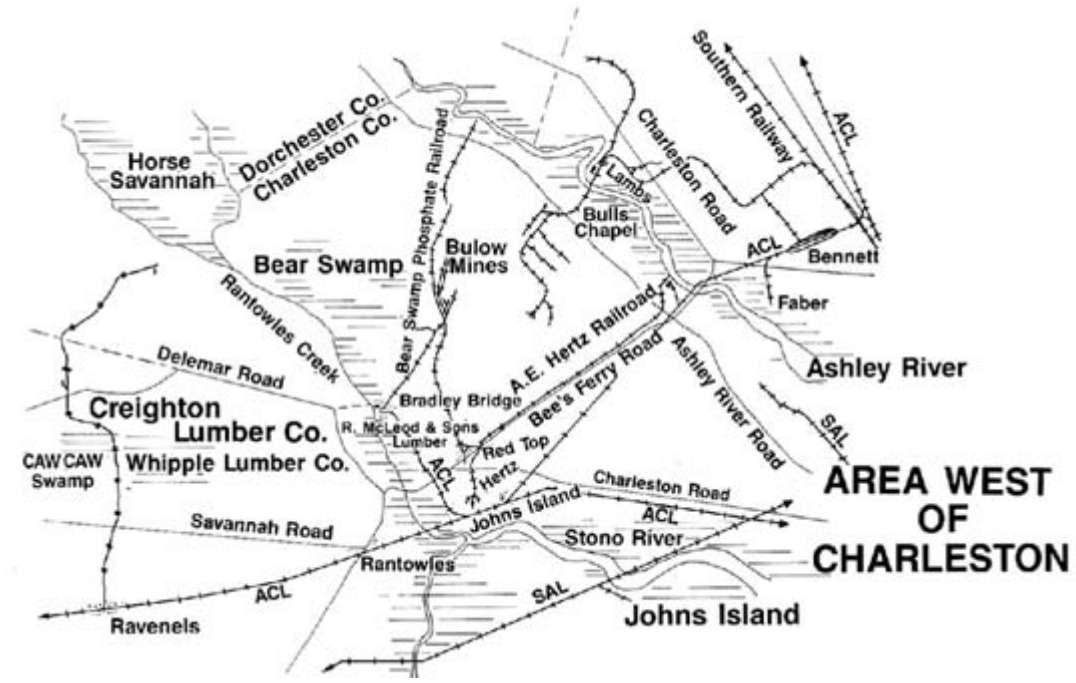


Figure 11. Plan view of a typical fertilizer operation, showing the location of rail lines, washer, housing, and general store (SCHS misc. vertical file).

By the 1880s, worker villages, including housing, general stores and medical facilities, were located near the mines (Schick and Doyle 1985:17). While many companies housed all of their facilities near the wharves, some fertilizer companies maintained offices in downtown Charleston. Ashley Phosphate Company, the fertilizer company associated with 38DR60/81, had two offices on East Bay Street.

The crude phosphate was transported out, generally by rail or by river barge, from the mines to the fertilizer production facilities. Rail lines were dominated by the lumber industry in the state. Rail lines were owned by Julian Ravenel of Wando Phosphate Company, and R.L. McLeod and Sons who purchased the Bulow Mines (Fetter 1990:43). Figure 12 (top) shows a map of the rail network



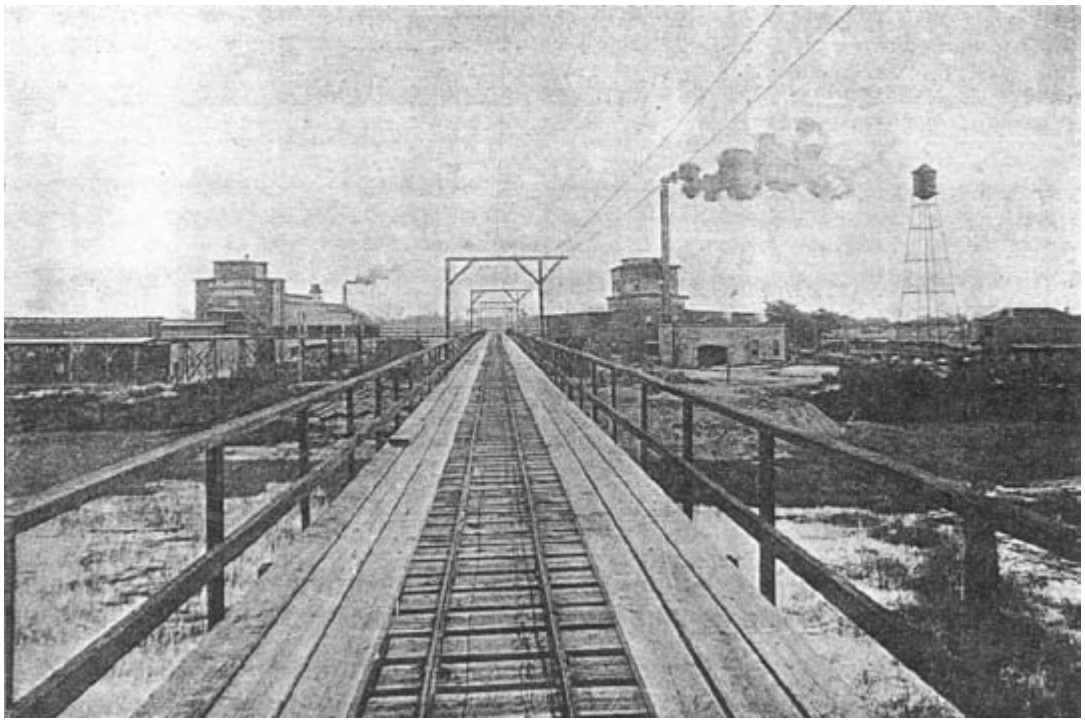


Figure 12. A plan of the railroad network west of the Ashley River (top) [Fetters 1990:43] and a view of a rail spur leading to a fertilizer plant (bottom)[SCHS misc. vertical file].

west of the Ashley River in the early twentieth century. Figure 12 (bottom) shows a picture of a rail spur leading to a fertilizer plant. Figure 13 (top) is a drawing of a typical wharf at a fertilizer plant.

The crude phosphate was transported by conveyor or wheelbarrow to a steam-powered washing room where the rock was cleaned of dirt and debris. Figure 13 (bottom) is a drawing a phosphate washing facility. Figure 14 is detailed drawing of a washing facility showing the workers engaged in various tasks around the building. The cleaned phosphate nodules were transferred to large drying rooms. In the drying house, furnaces heated the air and thoroughly dried the phosphate rock. The heated air was supplied from the adjacent Boiler and Engine house. Boiler engines were powered by wood, coal or a combination both. The product was then transported to the mill building where it was ground in crushers to a fine powder. The phosphate was then stored temporarily in on-site storage houses, or immediately moved to a mixing house where was is mixed with sulfuric acid (also called vitriol). Figure 15 (top) is a view of a typical fertilizer storage/mixing facility.

The addition of sulfuric acid to crude phosphate was necessary to produce phosphoric acid. The first sulfuric acid to be manufactured in South Carolina (or anywhere south of Baltimore, Maryland) was by the Sulfuric Acid and Superphosphate Company in Charleston in December of 1868 (*Rural Carolinian* 1873). Production of sulfuric acid began with raw sulfur in the form of brimstone or pyrite. The sulfuric acid was produced within facilities known as acid chambers (shown in Figure 15, bottom), which were constructed of lead to contain the lethal gases and liquids that were released. In these chambers, the pyrite ore was burned and allowed to combine with atmospheric oxygen. This in turn created sulphurous acid which possessed only two-thirds of the necessary oxygen for sulfuric acid. The final one-third of the oxygen that was required to make sulfuric acid could not be taken up naturally from the available atmospheric oxygen and had to be forced chemically. To complete the process, nitric acid vapor (from nitrate of soda) was released into the chamber. Oxygen molecules from the nitric acid vapor combine with the sulfurous acid to create sulfuric acid (SO_3), a chemical solid that fell to the floor of the acid chamber. The nitric acid then borrowed oxygen molecules from the atmosphere and was again ready to complete the process of converting sulfurous acid.

Within the mixing houses, fixed amounts of cleaned and ground phosphate and sulfuric acid were combined in large iron tubs. After mixing, the phosphoric acid required several weeks to a month to dry. The amount of drying time for the product was relative to the amount of sulfuric acid added, which controlled the degree of solubility of the superphosphate. Once dry, the product was disintegrated and screened and ready for packaging to be sold. The following excerpt from the *Rural Carolinian* in 1873 details the process of altering raw phosphates at the Sulfuric Acid and Superphosphate Company in Charleston:

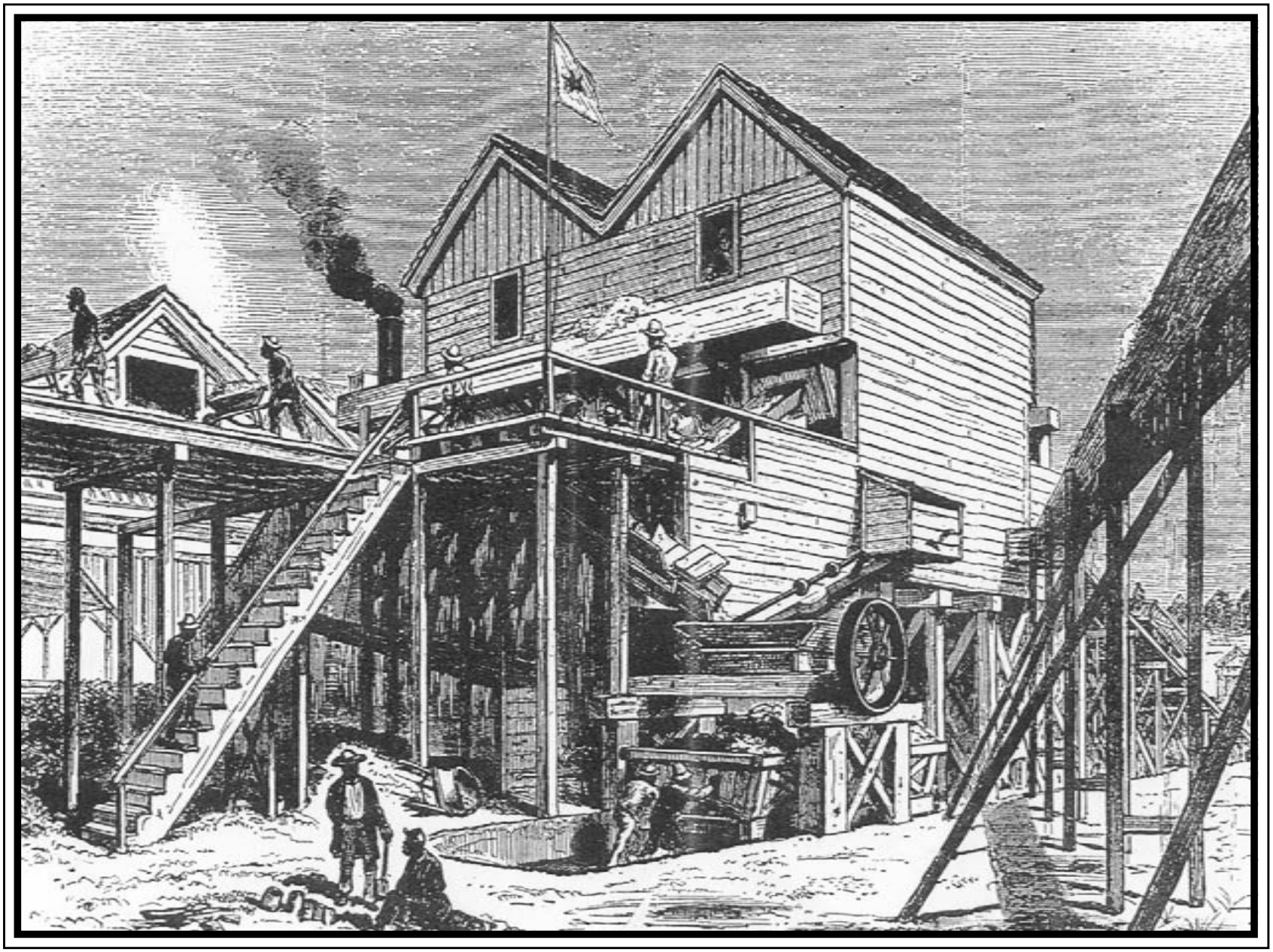
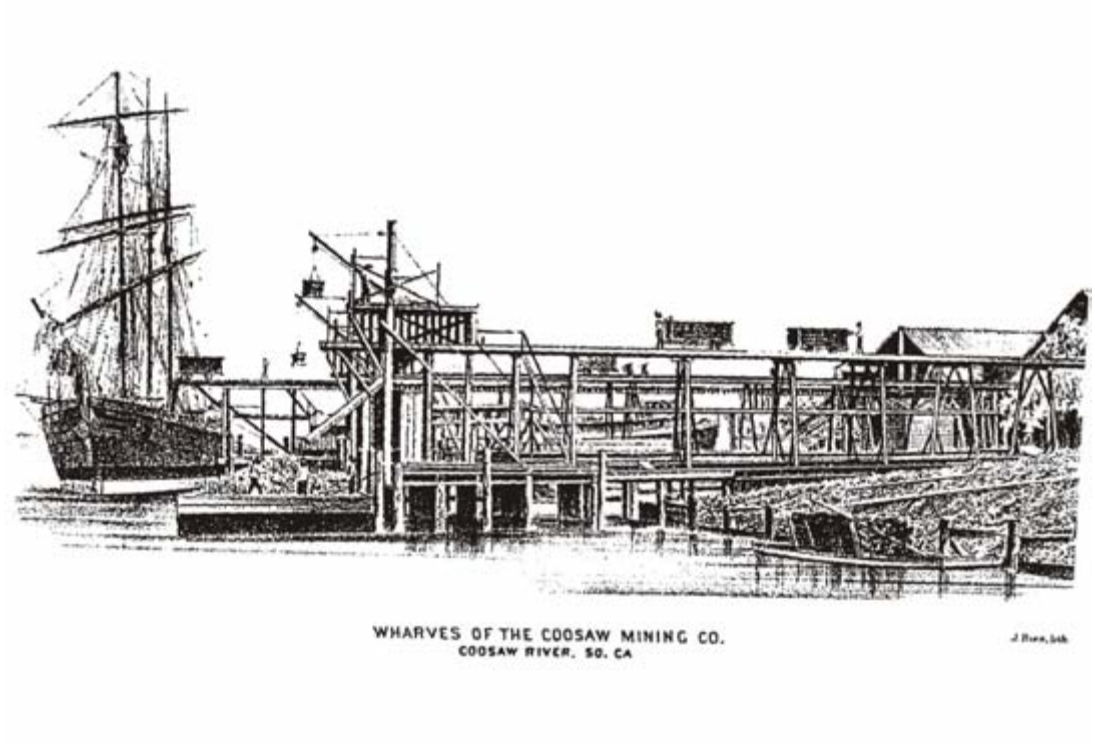


Figure 13. A depiction of a typical phosphate washer from the 1890's (Haskell nd).



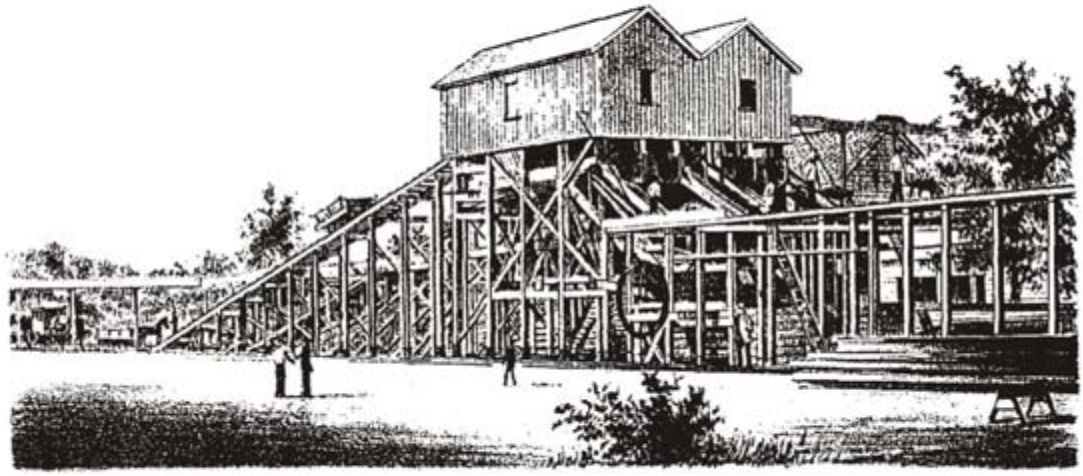
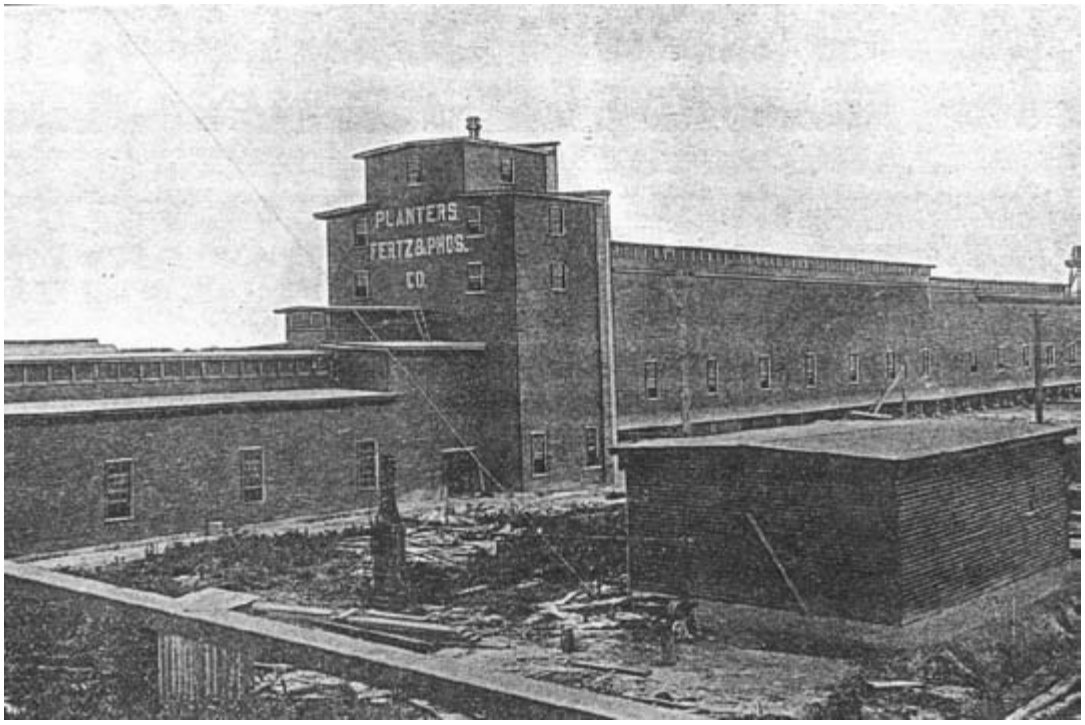


Figure 14. A drawing of a typical wharf setting at a fertilizer plant (top) and a phosphate washing facility (bottom) [SCHS misc. vertical file].



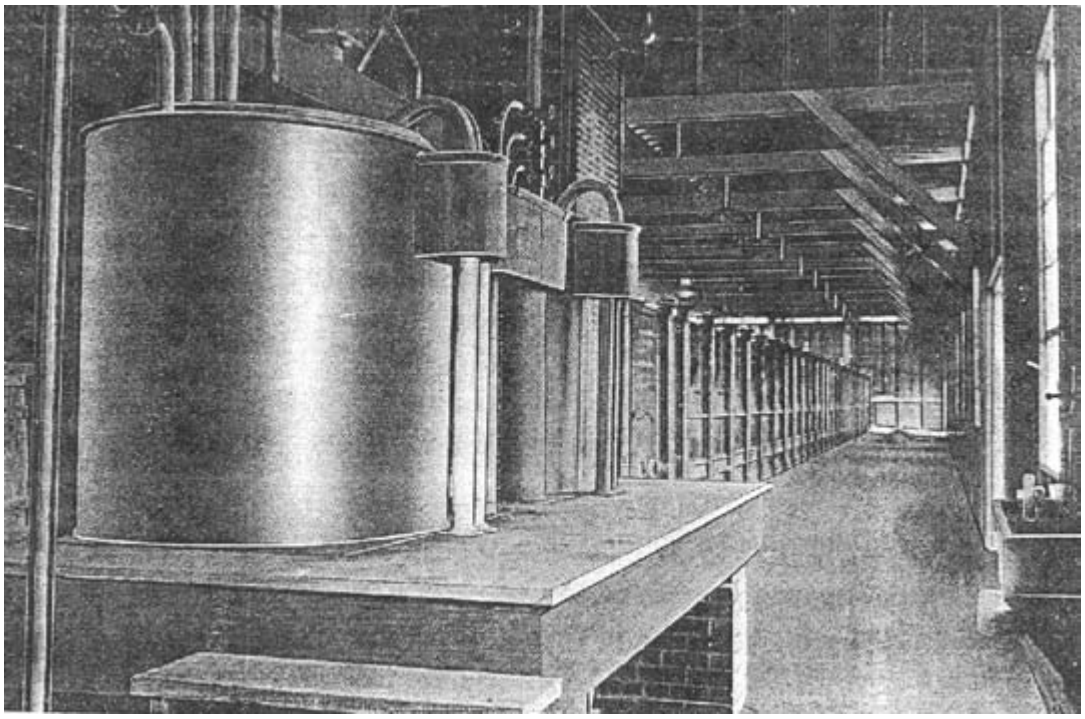


Figure 15. A view of a fertilizer storage and mixing facility (top) and the acid chambers (bottom) [SCHS misc. vertical file].

> The rock...is transported to the wharf of the Company, where it is discharged by a derrick, which is driven by a wire rope 320 feet from the engines. A shed 200 feet long, paved with brick and supported by iron pillars, extends backwards from the wharf. On this brick pavement is laid two rows of pine wood; overhead is a railroad, on which run the cars into which the rock is discharged, and from which it is dumped upon the wood beneath. When the cargo has been thus discharged, the wood is set fire to and the "kiln" burns and is dried; by the well considered arrangements of this Company, the consumption of wood is reduced to one cord or of wood to forty tons of rock, thus obviating some of the damage done by too much heat, while the rock is still thoroughly dried.
>
> The dried rock is loaded into cars, which are then hoisted up an inclined plane into the mill, and dumped into crushers. ...Mill-stones are...four feet in diameter and make 170 revolutions per minute. The amount ground depends entirely upon the degree of fineness to which it is ground; in this mill the rock is ground so that it will pass through a screen of 80 wires to the inch, and the product is about 3 tons per pair of stones per day of 10 hours.
>
> The mixing is done in a tub of cast iron 8 feet in diameter, which revolves 20 times per minute, and in which are small ploughs which revolve 160 times per minute. Into this tub a weighed quantity of the powdered rock is thrown... a known weight of acid is now run in and the revolving ploughs thoroughly incorporate the phosphate and the acid... Up to 5 per cent of Soluable Phosphoric Acid the mass comes from the mixing tub dry, and can be screened at once and packed in sacks; but when enough acid is added to render 11, 12 and 13 per cent soluble, then the mass comes from the mixing tub a semi-fluid and will flow like mud 30 or 40 feet, and must be left for a time varying from two weeks to two months to harden...
>
> Disintegrating and screening is the last process in the manufacture; the mass from the mixing tub, after standing for a time is mined out and loaded in cars, which are elevated to a machine called an integrator...The stuff is fed in at the centre, dashed to pieces by the bars at the periphery, and falling through these is received in a revolving screen, after passing through which it is ready for market (*Rural Carolinian* 1873:203-204).

One of the first challenges facing the fertilizer production companies was how to market their product to the average consumer. Farmers across the South faced low crop yields during the Reconstruction period due to nutrient exhausted soils during the Post-War years. While the farmers knew that something needed to be done to help their crops, most mid-nineteenth century farmers knew little, if anything, about new chemical fertilizers. It was, therefore, the job of the new fertilizer producers to teach as well as to advertise their products to the consumer. Several examples of late nineteenth century phosphate advertisements from the Charleston area are shown in Figures 16 and 17. In addition to advertisements to market fertilizers, some companies printed "primers" to teach the farmers about the purpose and usage of fertilizer products. Examples from the Ashley Phosphate Company primer are shown in Figures 18 and 19.

THE

ATLANTIC

PHOSPHATE COMPANY

OF

CHARLESTON, S. C.

F. J. PORCHER, President.
F. J. PELZER, Treasurer.

DIRECTORS.

WM. LEBBY.
L. D. DESAUSSURE.
WM. P. HALL.
B. G. PINCKNEY.

CHARLESTON, S. C.
WALKER, EVANS & COGSWELL, PRINTERS,
Nos. 3 Broad and 109 East Bay Streets.
1871.

TRY THE

ATLANTIC PHOSPHATE.

USE

ATLANTIC

Acid Phosphate

IN COMPOSTING COTTON SEED.

The ATLANTIC PHOSPHATE is guaranteed to be a first-class Fertilizer.

PHOSPHATE, $55.00 per ton. Cash, or $60.00 per ton, on time, with interest at the rate of 12 per cent. per annum.

ACID PHOSPHATE, $35.00 per ton Cash, or $40.00 per ton on time, with interest at the rate of 12 per cent. per annum.

Figure 16. An Ashley Phosphate Company advertisement for the fertilizer produced at 38DR60/81 (SCHS misc.vertical file).

PALMETTO

Mining and Manufacturing Co.,

OF SOUTH CAROLINA.

MINES AND FACTORY SITUATED ON ASHLEY RIVER.

THOMAS D. EASON, *President.*

C. R. HOLMES, *Treasurer.*

DIRECTORS.

CHAS. H. WEST. T. D. EASON.

ROBT. Q. PINCKNEY. JNO. S. FAIRLY.

C. R. HOLMES.

Will furnish in quantities to suit purchasers, the Pure Ashley River Phosphate Rock and the Ground Bone Phosphate, which we guarantee to be fully up to standard.

Planters will be supplied on reasonable terms with the Ground Bone Phosphate, which is highly recommended as a basis for a compost.

THURSTON & HOLMES, Agents,

ADGER'S NORTH WHARF,

CHARLESTON, S. C.

Figure 17. An advertisement for the Palmetto Mining and Manufacturing Company on the Ashley River (Shick and Doyle 1985:13).

THE

Ashley Phosphate Co.

CHARLESTON, S. C.

SOLUBLE GUANO, highly ammoniated;
DISSOLVED BONE, highest grade;
ACID PHOSPHATE, for composting;

ASH ELEMENT, made of Floats,
for Cotton, Grain and Peas;

GENUINE LEOPOLDSHALL KAINIT,
Imported direct from the Mines in
Germany, and warranted pure;

GENUINE FLOATS, of highest grade,
Product of the Duc Atomizer;

SMALL GRAIN SPECIFIC;
COTTON AND CORN COMPOUND;

GROUND DRIED FISH AND BLOOD;
GROUND RAW BONE;
N. S. LAND PLASTER;
COTTON SEED MEAL;

PERUVIAN GUANO; S. C. MARL.

Special formulas made carefully to order, of best material.

Special inducements for cash orders.

For terms, Illustrated Almanacs and Colored Humorous and Analytical Cards address the Co.

THE

ASHLEY PRIMER.

FOR GOOD BOYS ONLY.

Delightful task! to rear the tender thought,
To teach the young idea how to shoot
To pour the fresh instruction o'er the mind,
To breathe th' enlivening spirit, and to fix
The generous purpose in the glowing breast.—*Thomson.*

PUBLISHED BY
ASHLEY PHOSPHATE COMPANY,
CHARLESTON, S. C.

Figure 18. An excerpt from the Ashley Phosphate Company's "Ashley Primer" (SCHS misc. vertical file).

B BUG.

See the bug. No! this is not a bug. It is a worm now. It will be a bug one day. He has come to eat the planter's cotton. He has come too late. This wise Planter put Ashley Fertilizer on his crop. His crop grew before the worm grew. The largest bug is the hum-bug. There are none of these bugs among Fertilizer companies. Oh! no.

C CUSS.

The bad boy uses cuss words. Does his Pa ever catch him? Yes, sometimes. What does he give him? He gives him a licking. When that boy grows up, he will be too big to lick. Then he can cuss. What makes good farmers cuss? For a mean man to sell him bad fertilizer. Is Ashley a bad fertilizer? O No, it is a good one. Only good men sell it.

Figure 19. An excerpt from the Ashley Phosphate Company's "Ashley Primer" (SCHS misc. vertical file).

Consumption of phosphate fertilizers steadily grew throughout the 1870s and 1880s, and so did the number of companies producing fertilizer. Numerous production companies sprang up in the state during the late nineteenth century to manufacture crude phosphates into fertilizers. The first was the Wando Phosphate Company, established in 1867 with a capital investment of $300,000 by Dr. St. Julien Ravenel, a former professor of chemistry at the Medical College of Charleston. Dr. Ravenel was also the chemist and scientific advisor for the Pacific Guano Company that was established in September of 1869 with one million dollars in capital. Pacific Guano owned its own mines on Chisolm's Island, as well as temporarily owning mines in the Edisto region (Chazal 1904).

By 1870, both the Atlantic (38DR60/81) and Stono Phosphate Companies had moved into the Charleston area to produce fertilizers. Earlier involvement of some of the managers from these companies in the Peruvian guano trade gave them experience in application and marketing of phosphate fertilizers (O'Connor 2000). The Stono Phosphate Company was established with $350,000 capital and was owned primarily by planters and merchants from the Piedmont of South Carolina as well as investors from North Carolina and Georgia. Professor Lewis R. Gibbes was the chemist of Stono Phosphate Company, and J. D. Aiken & Company were the business managers (Holmes 1870).

Located on the banks of the Ashley River at Brown's Wharf, about a mile north of the Charleston city limits, the Atlantic Phosphate Company was organized with $200,000 capital in the year 1870. The company was managed with Mr. Francis J. Pelzer as president and Mr. F. S. Rogers as the treasurer. Total lands encompassed by these works was 90 acres, which was large compared to many of the other fertilizer production plants. Atlantic Phosphate included two mills (one three story and one four story), a storehouse, and four acid chambers divided into two buildings. Twelve additional buildings stood on the property. Within the mill house lay twelve enormous sets of buhrstones [limestone grinding stones] and other equipment; the drying house at the site was powered by two steam engines. The Atlantic Phosphates did as much as $400,000 in transactions annually. It was reorganized under the name of the Ashley Phosphate Company in 1881.

The Ashley Phosphate Company was managed by two gentlemen previously employed as the Secretary-Treasurer and the book-keeper of the Stono Company, Dr. F. L. Frost and Mr. J. P. DeSaussure, respectively. The new managers apparently expanded the facility. Frost placed an advertisement in the 1883 phosphate almanac and handbook in which he proclaimed, "With greatly extended facilities for business, and with greater experience, and much enlarged range of operations, we are in better condition to serve. . . As in the past, so in the future, our labors shall be 'Pro Bono Publico' and our motto "Excelsior'" (Phosphate Pamphlets 1880-1882, Willis n.d.). Despite these improvements, annual trade from the Ashley Phosphate Company was more modest, and only

reached between $200,000 to $250,000. Chazal (1904) describes the Ashley Phosphate Company in the following excerpt.

> [T]his (phosphate) deposit lies on both sides of the Ashley River. East of the river it began at a point about a mile below Bee's Ferry... and extended to a point just above the present Ashley Works, a distance of some 10 miles. The upper portion of the deposit has not proven of much value, on account of insufficient quantity or too great depth below the surface, and comparatively little rock has been taken therefrom (Chazal 1904:3-4).

Despite the reduced income realized by the newly reorganized Ashley Phosphate Company, entrepreneurs continued to invest in the industry and numerous fertilizer and start up new companies. In 1880, South Carolina ranked second with $3,993,300 in aggregate capital invested behind Maryland which had only slightly more with $4,271,870 in invested capital. New York stood a distant third with a mere $1,000,000 invested in the phosphate industry (Willis n.d.). That year, 190,000 tons of phosphate rock were mined in South Carolina. By 1884, there were 14 land mining companies, 11 river mining companies, and 11 fertilizer manufacturing companies mining and processing 409,000 tons of the rock a year (Willis n.d.). A few of the fertilizer production companies in the Charleston area included the Sulfuric Acid and Superphosphate Company, Pacific Guano Company, Ashepoo Phosphate Company, Edisto Phosphate Company, Etiwan Works, and Wappoo Mills. In addition to its mining operations, Charleston Mining and Manufacturing Company opened a fertilizer production plant in 1890. It was the first fertilizer plant in the United States to produce "triple-super phosphate" (Johnson 1983). Some of the fertilizer production plants in other areas of the state included: Columbia Phosphate Company (Columbia), Globe Phosphate Company (Columbia), Royster Guano Company (Columbia), Darlington Fertilizer Company (Darlington), Anderson Oil and Fertilizer Company (Anderson), Greenville Fertilizer Company (Greenville), and Blacksburg Company (Blacksburg). By the 1880s, numerous companies were mining and producing both river and land-derived phosphate fertilizers in the Lowcountry.

Industry and the New Labor Force. During the antebellum years, enslaved African Americans served as the primary labor force for agriculture. In the years following the Civil War, however, sharecropping and tenancy by white and black families alike, emerged across the South in response to the labor shortage in agriculture. In sharecropping, the landowner provided all of the supplies and seed for farming, while the agricultural laborers provided their labor; the landowner therefore owned the crop, and the laborer received a share of the crop in pay. Under tenancy, the laborer supplied the supplies, tools, stock, seed, and provisions, while the landowner provided only the land. The tenant controlled the crop, and would give between one-quarter and one-third of the crop to the landowner as rent.

With the increased demand for fertilizer and the rapid growth of the industry, there was an increasing demand for laborers in the region. As a result, many men in the Lowcountry found employment in the new industry. During the 1880s and 1890s, many African Americans found employment in the phosphate mines and the fertilizer production facilities.

Initially, phosphate mining was done using only the most basic means. Phosphate deposits extensive enough to mine were found using a pointed steel rod. Soundings were taken every 100 feet and a map showing the results was made. Test pits then were dug to determined the depth and quality of the deposit. If a deposit was at least 12 inches thick it was profitable to dig up to seven feet down to get it. If the deposit was only six inches thick it would have to be very shallow to be worth mining. Land mines were lain out in fields 600 by 800 feet. A platform was constructed in the center of the field. A tram line was constructed through the field and beside the platform where the rock was piled. Workers began digging a trench along the side of the area to be mined. Then, working away from the trench, the overburden was removed with picks and shovels and placed behind them exposing the phosphate deposit in front. The workers placed the rock into tram cars which were hauled by mules. Figure 20 is a picture of workers loading rail cars with phosphate rock.

Figure 20. A view of miners loading phosphate rock into rail cars.

The rock was then washed by hand using stiff straw brooms. Innovation came in the form of the steam engine. The engines were used to pump the water out of the mines, to operate river mining dredgers, and to operate mechanical washers. As phosphate rocks were removed from the land, men deposited them into wheelbarrows, and dumped the nodules into steam-powered machines where the rocks were cleaned. The washers were wood or iron. A shaft with steel teeth rotated slowly, moving the rock up an inclined trough and against a falling stream of water. Another improvement to the trough washer was the introduction of a cylindrical washer with spiral iron flanges. The large cylinder rotated around a perforated iron pipe that distributed powerful jets of water (Shepard n.d.)..

Once the phosphate rocks were clean, they were either dried and ground on site or shipped by barges along the river to fertilizer companies where this process, along with other chemical processes, would be conducted. Grinding the rock was initially done by turning huge grinding stones, or buhrstones. Two large grinding stones were found at 38DR192 (see Chapter IV). The invention of a machine that ground the rock using centripetal force eliminated the need for the cumbersome stone grinding. Even with the use of machines at the mines, the unskilled manual laborers provided the primary labor behind the mining of the phosphate rocks. Figures 21 and 22 present line drawings of laborers digging up and washing the phosphate rocks.

Phosphate mining posed numerous health hazards to workers. The brutal summer climate compounded the already strenuous working conditions for the men. The physical demands were not so far removed from the days of slavery for many of the newly freed African Americans employed by the mines; however, for northerners, the work often was overly demanding, and the subtropical climate unforgiving to the unseasoned laborers. Other industrial health hazards included exposure to low levels of radioactivity, emitted as trace elements of uranium along with phosphates in the marl. Uranium is highly carcinogenic with long term exposure. Inhalation posed additional dangers and health effects to the laborers.

Mining was treacherous work, especially in the river beds. Manual laborers, with little more than a rope tied around the mid-section, dove from the sides of boats to extract the precious nodules from the river beds.

> Laborers dug rock from creeks and streams at low tide or dove to the river bottoms to dislodge deposits; 'negroes stripped to the waist, descended to the river bottom with grappling hooks and iron baskets. They filled the baskets, surfaced, and dived again.' Even where steam dredges were used by the large companies, much of the rock broken up by the mechanical 'dipper' had to be pulled from the water by men with tongs in small boats that followed behind the dredge. The rock collected in this

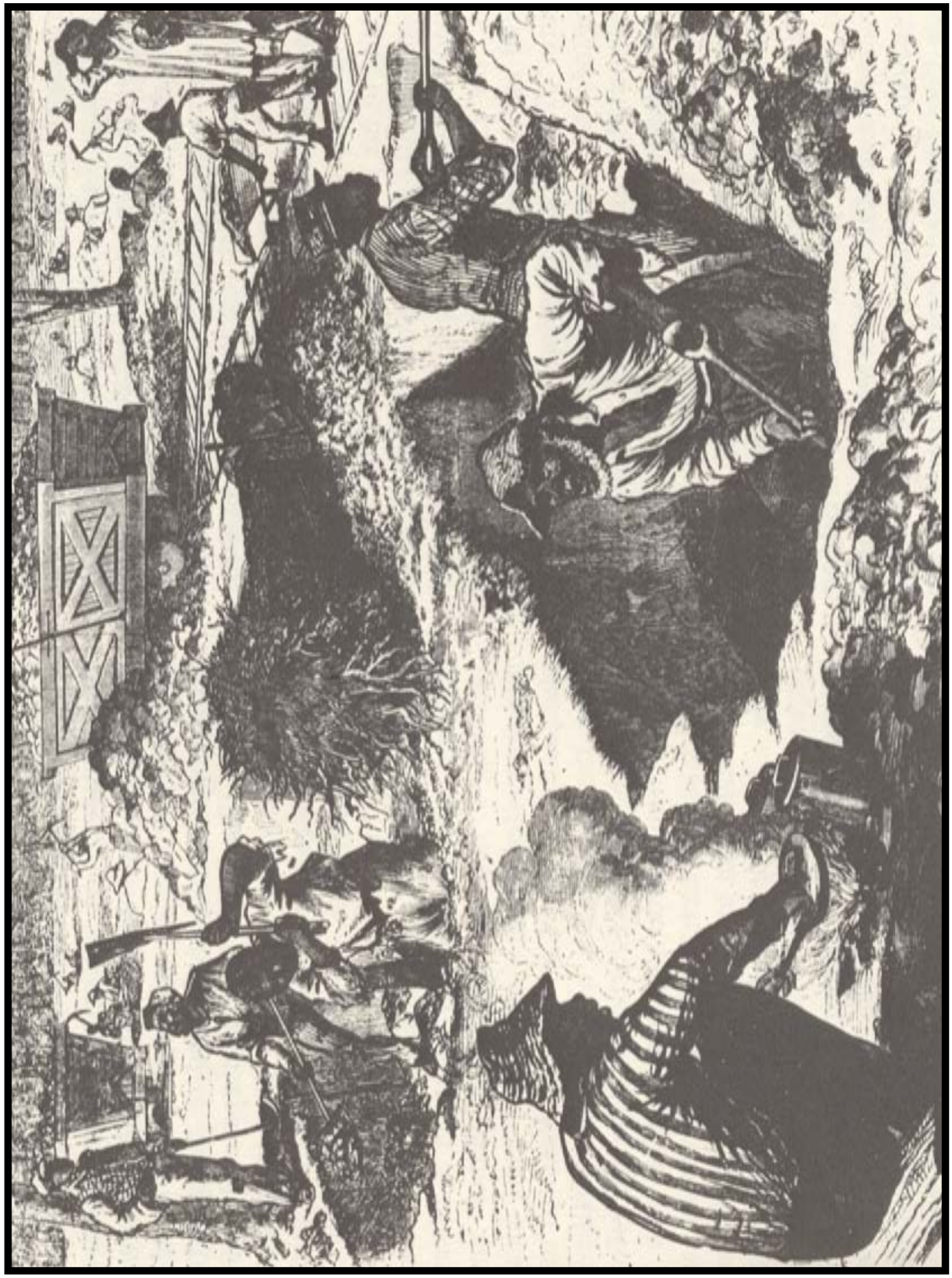


Figure 21. A depiction of phosphate miners near the City of Charleston (Courtesy of the Charleston Museum).

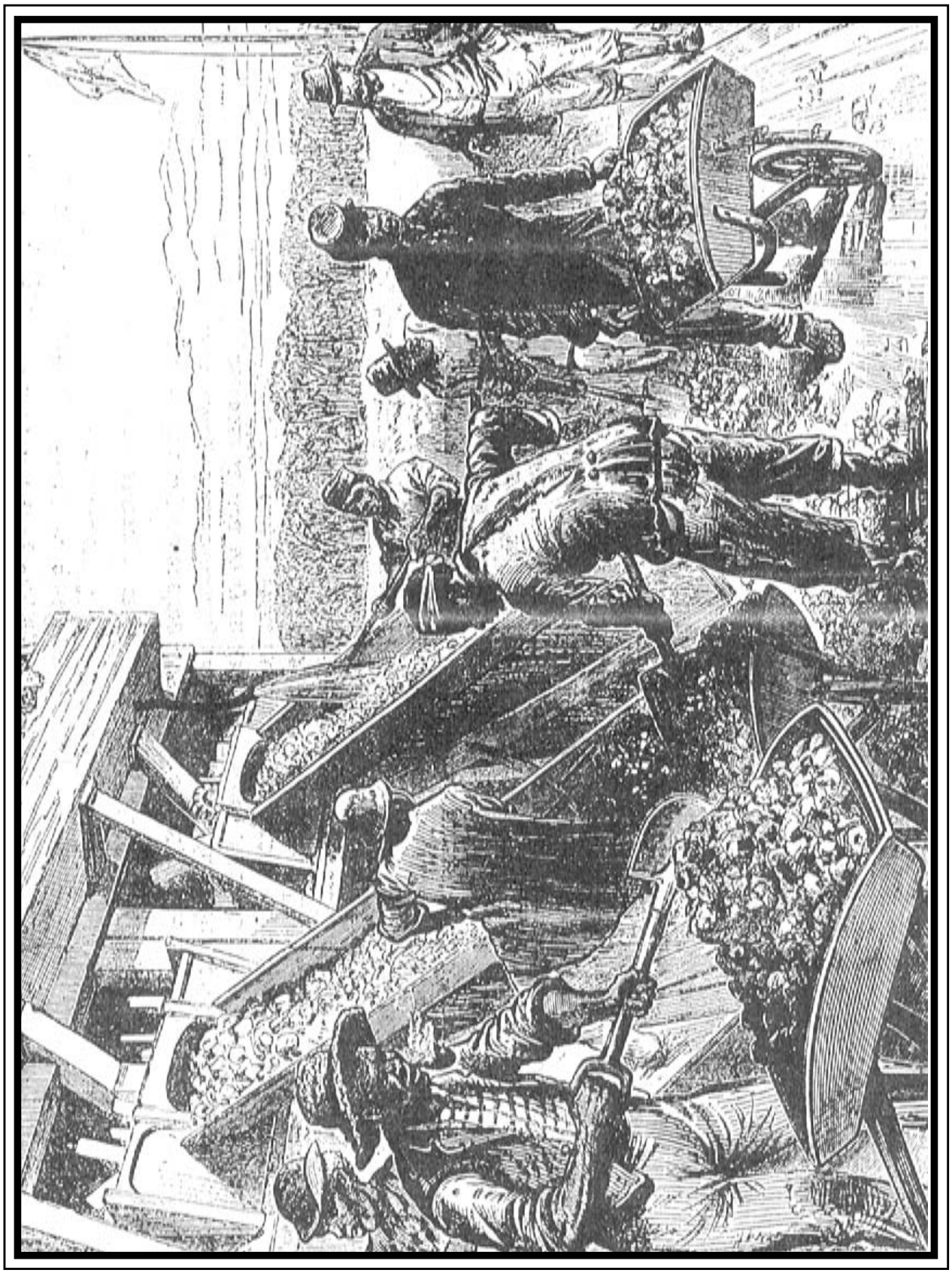


Figure 22. Laborers washing the phosphate rocks (Courtesy of the Charleston Museum).

> manner was loaded on barges (known as lighters) where other workers methodically removed marl, sandstone, oyster shells, and the like (Shick and Doyle 1986:12).

The river phosphates were then transported to plants owned by the river mining companies, and phosphates were subjected to the steam powered washing and crushing machines.

For river and land miners alike, intense heat and vectorn-borne illnesses such as yellow fever and malaria took a toll. Local freedmen of African descent had advantages over the imported white laborers from the north. Not only were they acclimatized to the southern heat and humidity, but many of the freedmen whose ancestors originated in West Africa, possessed a genetic advantage in endemic malarial, and possibly yellow fever, environments such as that of coastal Carolina. As a result, African Americans typically were affected less often by such illness. When they were affected, the laborers of African descent faired better at withstanding the active summer months of the mining industry (Kiple 1984; Pollitzer 1999).

Exact labor figures have not been calculated for the state's phosphate industry. Freedmen were attractive to mining companies as a relatively inexpensive labor force that was already present locally in large numbers. Many former slaves who left the large plantations of South Carolina were often taken on as wage laborers in the growing textile industry of the Piedmont. For the freedmen who remained in the Lowcountry, the burgeoning phosphate industry meant jobs.

> The phosphate mining industry obtained the majority of its laborers from the Negroes who lived in the surrounding neighborhoods. Many of the Negro farmers in the coast region commended the farm work to their families and obtained employment at the phosphate works as a means of increasing the family income (Wright, The phosphate industry of the US, 83 in A. A. Taylor 1924 Journal of Negro History Vol 9 Issue 3, p. 312).

In the phosphate mines, the freedmen preferred a labor system similar to that of the antebellum period. Rather than being paid for the amount of phosphate that was produced, workers were paid by the completed task rather than by the amount of time that was worked. Each task, such as digging out a phosphate stratum or wheeling the phosphate nodules over to the cleaners, was paid various wages. For example, digging a pit or ditch 15 feet long by six feet wide would earn a workers approximately 25-30 cents per vertical foot dug. Ditches were often dug four to seven feet deep, as soils were removed to expose the phosphate rock that lay beneath. Rock was then shoveled out by hand into wheel barrows and carried over to mechanical washers. Finally, the rock was stored in drying sheds or loaded onto barges or rail cars for shipment. Some facilities were equipped with wood-burning furnaces to speed up the drying process. The work was hard, conditions were poor,

and the pay was low, but through the task system, workers retained "some control over the pace of work and daily wages paid"(Shick and Doyle 1986:12).

Turbulent labor relations drove owners to search for alternate labor sources in South Carolina's phosphate mines. Several of the mining operations in the Charleston area employed convicted criminals as part of their labor force. As early as 1881, Gregg Mines (see Figure 10), which was located on the west bank of the Ashley River, began replacing free African wage laborers with men from the local Penitentiary. Colonel Gregg, the proprietor, firmly believed that the freedmen laborers were "untrustworthy" (*Charleston News and Courier* 1884). There was enormous competition for acquiring workers due to the harsh work conditions, and the convicts were available. According to Mr. Robert S. Pringle of Gregg Mines, this was not an economic decision since the cost of convict labor was greater than that of free wage laborers. Rather, the primary advantage was that convict laborers were easily supplied. Drayton Hall employed in excess of 100 convicts simultaneously in its mining operation, but most companies employed far fewer (*Charleston News and Courier* 1884).

Special precautions were taken with the convict laborers. Unlike the African American workers whose work week ended at noon on Saturday and began on Monday, convicted laborers got only Sundays, July 14th, and Christmas Day off. The convicts worked in separate fields and under harsher supervision by armed men (Willis n.d.). Skilled laborers including carpenters and blacksmiths were employed at the washers. Secure stockades were constructed around these mining operations, and the convicts worked in chains, under close supervision. At night, the convicts employed by Drayton Hall were chained together along a single chain running through the sleeping areas for additional security. According to the *Charleston News and Courier* in 1884, the convicts reported being well-treated, well-fed and, securely housed. Local physicians who visited the mines and cared for the sick, however, attested that the harsh work in the phosphate pits often took its toll on the men *(Charleston News and Courier* 1884).

In addition to freedmen and convict laborers who worked the mines, a few companies experimented with hiring Irish, Italian, and Polish immigrants from the northeastern United States. Such labor practices were short-lived, generally before the 1880s, and were attempted by mining operations with financial backing in the north, such as the Charleston Mining and Manufacturing Company. The northern immigrant laborers typically were unaccustomed to extreme work conditions and the summer climate of the Lowcountry, and as a result they did not fare well in the mining industry. African Americans continued to predominate the labor force as northern laborers were quick to leave the mines and the South (Shick and Doyle 1986:15).

Problems with labor relations notwithstanding, there were advantages to employing a predominantly African American labor force. Most of the freedmen workers were locals who were already acclimatized to the harsh seasonal heat and humidity of the southern Coastal Plain, making it somewhat easier for them to withstand the stresses of work along the coast in the summer. Haskell (n.d.) visited the phosphate mines in the 1890s and wrote the following description:

> Little do they care those dusky laborers, for the beating of the tropic sun! Well seasoned are they to all intensities of heat, and even now and here they must have their dearly-loved fire, where they cook their midday meal of hoecake and bacon, and around which they gather after sunset, when the gnats become troublesome, and exchange their rough and witty sayings, their novel views of men and things (Haskell n.d.).

The labor problems of river mining were somewhat different than those of the land mining operations. River mining companies frequently had to employ local workers from the Sea Islands off of the coast of South Carolina. Most of these men worked in agriculture as well as in the mining industry, which in turn necessitated more flexible seasonal work schedules, including free weekends and more time off during summer months to work the crops. Agricultural production in the state created heavy seasonal fluctuations in the labor force not only for the river operations but also for land mining companies, since the summer months were often the most valuable times in the fields (Shick and Doyle 1986).

Some labor problems for land mining operations were partly solved in the mid-1880s when companies established villages for the workers. These villages were permanent, year-around settlements in which the workers paid to live. Villages were located near the mines and provided access to everything the laborers could need, including housing and medical care. Commissaries were open for the men to purchase desired goods. Some of the stores were operated by the mine itself and some by private merchants. The credit that was extended to the mine workers for everything from rent to medical care to provisions in the stores generally created a system of indebtedness that tied the men to the mines for long periods of time. Haskell (n.d.) stated that the freedmen workers in the phosphate mines were the highest paid laborers in the state of South Carolina during Reconstruction, making as much as $2 per day. Other sources suggest more modest incomes were actually paid to phosphate miners since they worked by tasks, with paid wages widely ranging between $3.50 to $7.50 per month. As workers often charged their rents and provisioning during the month, little of this meager income generally remained after the monthly accounts were settled, and as a result, many of the men were trapped into a vicious cycle of work and debt (Shick and Doyle 1986). The newly acquired social freedom of the many African American men who

worked in the industry was limited substantially by new economic chains that bound them to the mines.

Contradictory to the mining operations, the most active time of the year for fertilizer production facilities was in the winter months. While unskilled labor predominated the labor in the mines, production at the plants required both skilled engineers and chemists as well as unskilled workmen. Little information has been compiled on the level of skill for the labor force, the treatment of workers, or the wages paid in the production of superphosphate fertilizers. As with the mines, there were numerous potential health dangers to the men who worked at the fertilizer production plants. Everything from unloading the phosphate at the wharf to working around enormous milling stones presented ongoing dangers. Sulfuric acid manufacture was probably the most dangerous of all aspects of production. Chambers that were not well-maintained posed threats not only to the men through chemical burns and inhalation of highly poisonous gases, but leaky chambers also affected local crop lands and polluted the environment. As with labor information, information on work hazards and health effects of fertilizer production has yet to be synthesized.

Attitudes of racism and colonialism continued to prevail during the years following the Civil War, especially in the southern United States. As a result, labor relations in the Reconstruction South were highly volatile. Planters and industrialists fought to retain their antebellum "paternalistic control over labor which amounted to an authoritarian system of 'industrialized plantations'" (Shick and Doyle 1986:2). At the same time, some African American laborers, empowered by their freedom, challenged employers and some went far enough to organize labor unions. Nevertheless, labor unions were never very successful in the South, probably resulting from the widespread availability of unemployed workers in the region who were willing to work for low wages and to tolerate harsh work conditions. Discrimination effectively served to limit the degree of organization among African Americans in the region. Fear of unemployment was sometimes secondary to fear of physical harm to self and family, all of which in varying degrees limited African Americans from uniting against their employers. Marxist historians contend that there is evidence to suggest that the class system of the Old South remained firmly in place during Reconstruction, and even through the 1960s. They hold that the class system was necessarily responsible for a declining economy, but nevertheless, it was in place and had a significant effect. Planters and the rising southern middle class, forced control over many freed African Americans through Jim Crow laws as well as more covert means of discrimination as a means to instill fear. Economic historians argue that the poor economy of the late nineteenth century resulted not from labor relations, but rather from supply and demand, placing the blame on the marketplace and consumers (Shick and Doyle 1986:2-3). Although the causation behind the stagnant southern economy remains a hotly debated topic, one

thing is certain; labor relations were changing significantly and quickly in the Reconstruction South and in the US as a whole.

The Decline of the Industry. Superphosphate of lime was a valuable fertilizer for a variety of crops such as cotton, tobacco and grains. In southern states, especially those with clayey soils (with the exception of Louisiana, Texas and parts of Florida), these fertilizers were essential to maximize crop yields. The amount of phosphate fertilizer produced in Charleston started at a mere six tons in the year 1867. By 1876, in just 10 years of production, a total of 132,626 tons annually of crude phosphates were coming from the state. This increased to 163,220 tons in 1877, to 210,323 in 1878, and declined slightly to 199,365 tons in 1879. Between 1876-1881, the bulk of phosphates produced in the state were shipped to a foreign market each year. During 1880-1881, the trend reversed and domestic use exceeded foreign shipments (Taylor 1924) During 1881-1882, 117,470 tons were used domestically while only 29,026 tons were exported to foreign ports (Willis n.d.).

Foreign exports started out very strong, growing during the 1860s and 1870s, but declined in the 1880s. In 1868 foreign exports began at a mere 208 tons. By 1875-1879, these figures rose to between 70,546 and 119,566 tons. The export market turned in 1880, and only totaled 61,375 tons. This decline, however, had an inverse correlation with the domestic market, for phosphate consumption which sharply increased in 1880. The following figures by decade show the rapid growth and decline of the South Carolina phosphate industry for the total tons of crude phosphate produced in the state: 1870 – 65,241 tons; 1880 – 190,763 tons; 1890 – 586,758 tons; 1900 – 428,562 tons; 1910 – 179,659 tons; 1920 – 44,141 tons (Taylor 1924; Willis n.d.).

The production of phosphates for fertilizer along the banks of the Ashley River continued to increase until the earthquake of 31 August 1886 (Figure 23). The earthquake caused severe damage to many of the buildings in the area. The significant shift of a large lead shield used in the fertilizer process at the Ashley Phosphate Company's works was noted by Clarence Edward Dutton (Dutton 1890). The earthquake of 1886 marked the beginning of the decline in the phosphate industry along the Ashley River.

The late 1870s saw a trend towards consolidation in the South Carolina phosphate industry. An increasingly competitive market created a financial crisis for many of the smaller companies who were forced to sell out during the 1890s. In 1897, Virginia-Carolina Company bought out the largest mining operation in the state, the Charleston Mining and Manufacturing Company. The Virginia-Carolina Company proceeded to take over most of the phosphate companies in the Charleston area, including the Ashley Phosphate Company. In 1963, the Virginia-Carolina Company was purchased by Mobil Corporation, which continues to be held liable for the environmental hazards at many of

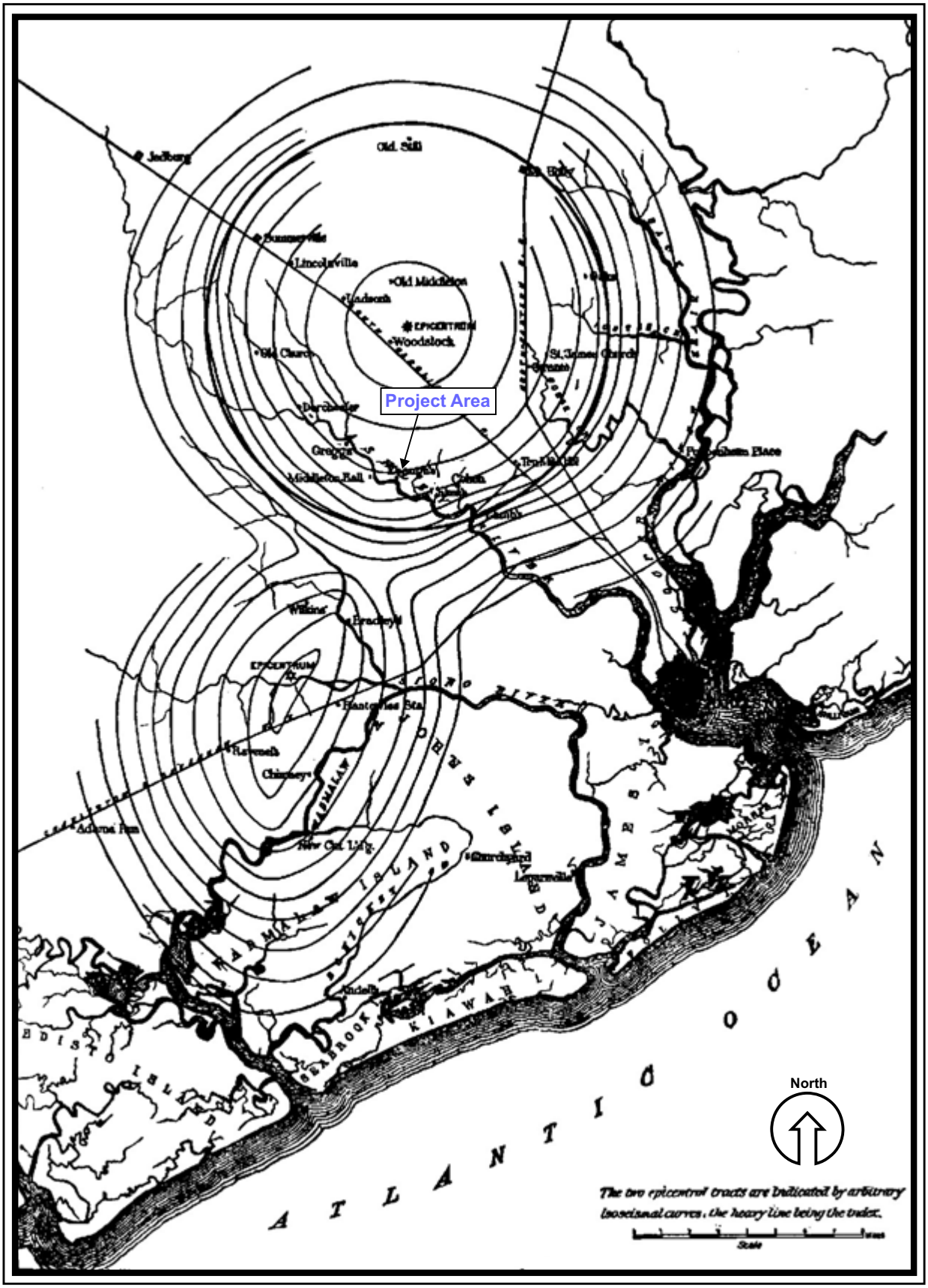


Figure 23. The earthquake map of 1886 (Dutton 1890).

these former mining and production sites today. The phosphate industry mirrored, albeit on a much smaller scale, the general trend towards consolidation among other industries of the late nineteenth and early twentieth centuries. For example, the steel industry of the northeastern United States was being taken over by US Steel.

By 1885, the state of South Carolina already was producing one-half of the world's phosphates, with the height of the phosphate boom between 1880-1882. The industry quickly took a turn, and upon discoveries of rich phosphate beds in Florida and Tennessee, the mining and production of phosphates in South Carolina began to decline in the late 1880s. Internal politics in the state exacerbated the rapid decline of the industry. Governor Benjamin Tillman was convinced that the phosphate industry was cheating the state out of revenues, and in 1891, Tillman name a commission to control all river phosphate mining in South Carolina. In 1892, the case made its way to the US Supreme Court, who ruled in favor of the state to suspend Coosaw River bed mining (Stockton 1970). By the late 1890s, these political decisions accompanied by the discovery of phosphates of even higher grade in Florida and Tennessee caused a serious decline in the South Carolina phosphate industry.

The phosphate boom began in 1865, and died out as quickly as it began, rapidly declining in the last decade of the nineteenth century. No phosphate mining has been done in Charleston since 1938, and very little since 1920, although fertilizer production in the state continued on a smaller scale. For the most part, the South Carolina phosphate boom is long forgotten. A statue erected in 1892 in White Point Gardens to celebrate the phosphate industry was replaced by a bandstand at the site in 1906. Hills along the Ashley River, such as those seen on SC Route 61, as well as street names such as the well-known Ashley Phosphate Road remind us of this brief but prosperous period in the South Carolina Lowcountry.

Summary. The Reconstruction period was economically and politically turbulent for the state of South Carolina, and the Lowcountry certainly was no exception. As one of the largest port cities in the southeastern United States, Charleston had thrived during the antebellum period. Sea Island Cotton and rice were produced locally and abundantly, and a class of wealthy elite planters had homes in the city. A vast network of rivers, large and small, tied Charleston to the State's waterways, the Atlantic Ocean, and thus, to the rest of the world. These waterways provided important trade routes for transporting the numerous locally produced goods to both domestic and foreign markets.

Despite the antebellum prosperity of many Charlestonians, the City and her citizens suffered disastrous economic effects during the years succeeding the Civil War. Emancipation of the

enormous enslaved African labor force, along with the dissection and redistribution of the majority of the large Sea Island Cotton and rice plantations in the Coastal Plain, were exacerbated by poor leadership in the City of Charleston. All of these factors collided during Reconstruction, ultimately destroying the economic infrastructure of the city. Coastal plantations fell into disrepair during the years of the war, as energy and resources, particularly labor, were diverted to the battle for Southern independence. After the Civil War, planters were left without enough laborers to plant and tend the fields. All aspects of the plantation system such harvesting, processing, and transportation of cash crops to market, became too costly for many southern planters to sustain. Those who owned plantations tried by any means possible to retain their lands. Some rented out parcels to tenant farmers, and then farmed smaller parcels themselves. In the end, however, many planters were forced to abandon the only way of life that their families had known for centuries, and to sell off their plantations as new industry moved into the area and quickly bought up the lands for the minerals that lay beneath the soils.

With an opulence of land and labor, efficiency had not been a primary concern of the antebellum planters. Emancipation, however, brought about enormous changes for the South, as formerly enslaved African laborers eagerly fled the fields and their bonds at the hands of the white planters. Faced with uncertainty about where to go, or what to do, some freedmen remained on plantations as wage laborers, but many freedmen quickly headed out in search of higher wages and a better way of life. Many freed African Americans took jobs in the State's growing textile industry in the Piedmont.

A paucity of jobs, and fierce competition faced the men and women who remained in the Lowcountry working in the fields. The resulting poverty and the depressed southern economy of the postwar years impacted white and black families alike. African American men and women and poor whites often lacked specialized employment skills. It was these men and women who faced the most difficulty in obtaining jobs in the state. Racial issues were heated and many freedmen simply refused to work for white employers out of fear, and sometimes pride. The men and women who found jobs faced open discrimination. Overt racism was compounded through the legalization of Jim Crow laws during the late nineteenth and early twentieth centuries across the South. Although the Emancipation Proclamation had granted freedom under the United States Constitution to enslaved Africans in 1863, the strongly institutionalized class system of the Old South retained its paternalistic hold on African Americans as late as the 1960s, as the South clung fast to its traditions. Many southerners fought change, all change, with a vengeance.

The labor shortage and disruption of the plantation system was only the tip of the iceberg facing southern planters during Reconstruction. Overuse of soils had rendered the agricultural fields

practically useless for large scale cultivation. Fields were exhausted of their vital nutrients, and without adequate labor and arable land there seemed little economic hope for a return of the Old South during the late nineteenth century. The industrialism that was growing fast in the north was not present in the coastal southeast prior to the Civil War, nor was it desirable to most southerners even after the War. Many late nineteenth century southerners longed for a return of the Old South's traditions and social system. Eventually, however, some South Carolinians saw industrialism as a way out of the economic problems of the South. Slowly, some came to support the ideal of a New South, and became committed to business ventures outside of agriculture, such as the phosphate industry (Cobb 1988).

Shick and Doyle (1986) refer to the South Carolina phosphate industry as the "stillbirth of the New South." The metaphor of a stillbirth aptly suggests a tragic ending to a promising beginning for the industry. The "New South" is a concept that originated with editor of the *Atlanta Constitution* editor Henry W. Grady, in 1886. Political proponents of the New South welcomed growth, change, and bourgeois industrialism, and some may argue, at any cost. By contrast, supporters of the Old South longed for antebellum days past. Aristocratic elitism, with a firm class system, and an economy anchored in agriculturalism, the Old South and its supporters valued tradition above all else (Cobb 1988). Editor Francis Dawson of Charleston's *News and Courier* was an avid supporter of the New South, but most Charlestonians were little interested in anything short of reviving the Old South. Historian Walter Edgar states that "if ever there was a place that rejected the New South, it was the port city"(Edgar 1998:425).

There have been varying views among historians regarding the politics surrounding industrialism and the New South. Historian Eugene Genovese (1965) portrays the southern agriculturalists of the Reconstruction period as strict opponents of industrialization, but according to Cobb (1988), some recent historical interpretations suggest planters who were simply conservative when it came to investments, preferring to stick with more traditional roles, although with lesser income, rather than venturing into risky unknown business endeavors. Furthermore, the role of southern planter was a more socially desirable role than that of industrialist to many South Carolinians and to Southerners in general (Cobb 1988).

During the late nineteenth century, Charleston, which was formerly the largest city in South Carolina, declined economically and socially. Poor leadership and a city governed by old men with old ideals, along with heavy cutbacks, lead to decline in the infrastructure of the city. This coupled with a fear of change on the part of many Charleston businessmen, limited the potential for growth in the city. Natural disasters, such as the1886 Category 3 hurricane and tidal surge, and the 1886

earthquake, devastated the charleston, caused widespread damage and disease, and only heightened the problems for the already deteriorating city infrastructure (Edgar 1998).

The phosphate industry was just one more symptom of a struggling New South in many ways, especially in Charleston. Although at the state level and on a national level there was a trend towards widespread industrialization (e.g., textiles in the South Carolina piedmont, and US Steel in the northeastern US), this trend was not reflected in the Lowcountry of South Carolina. Schick and Doyle (1985:2) argue that "this prosperity did not lead to sustained economic development" in the region. A few technological advancements were seen with the phosphate industry, but these remained largely limited to the industry. Phosphate production and development did little to spark technological advancements in other areas either. The technology, such as the use of acid chambers, that was developed for the fertilizer industry was specifically developed for that industry, and had no application outside of that industry. Therefore, while the phosphate fertilizer industry did lead in technological developments for its field, it held little economic potential outside of that arena.

Like technology, social relations in the region were not impacted in a profound way by the short-lived industry. The industry provided jobs to many unemployed and formerly enslaved African American men, but it also served to tie the men to their jobs, creating a vicious cycle of debt and indebtedness by the labor camps that housed the men. Labor relations were changing everywhere in the late nineteenth century United States, but the phosphate boom between 1867 and 1920 did little in fact to affect race and class structure or conservative mores in the New South labor relations in the region (Schick and Doyle 1985:2). Social relations in the South remained firmly entrenched in Old South morals and values, well into the twentieth century.

Economically, the phosphate industry promised hope of a New South to a small number of capitalists in the Lowcountry, but phosphate mining did little overall to stimulate economic development in the region. The mining of phosphates in South Carolina, and the resulting prosperity from the fertilizer industry, lasted for roughly 20 years, after which the state's resources were exhausted and those wanting to mine for phosphates moved to Florida where resources were abundant. Although the late nineteenth century phosphate industry and the resulting economic prosperity was short-lived, it was highly localized in the hands of a few wealthy capitalists.

In the process of industrialization, many rich cultural resources in the Lowcountry also were carted away with the phosphates. Today, over 100 years later, Charleston is left with the environmental aftermath of a short-lived industry. The phosphate industry of the late nineteenth century had a tremendous environmental impact on the landscape along both sides of the Ashley River. The effects are observed today as the EPA has identified many of these former mining sites

as hazardous waste sites (April 2002 www.epa.gov). The river, once lined with so many elegant plantation homes with formal gardens and fields a century before, took on a harsh industrial landscape during Reconstruction. Large wharves, tram railroads, mills, storage sheds, and smoke stacks instead dotted the Charleston rivers. The effects to the local culture history and archaeological research has been devastating as well. Numerous archaeological sites such as 38DR60/81 and 38DR192, as well as historic cemeteries (e.g., 38CH1932) from earlier periods were affected or destroyed by mining efforts. As a result, studies the of the South Carolina phosphate mining industry tell us much more than just a history of a short-lived industry in the state. Rather, such studies additionally offer an explanation for the state of cultural resources in the region. Future investigations of the industry and of sites such as 38DR60/81 and 38DR192 may provide a wealth of information on industry and its economic and environmental impacts.

Chapter III. Results and Recommendations for 38DR60/81

Previous Investigations at 38DR60/81

Brockington (1977) recorded site 38DR60 in an archaeological reconnaissance of the proposed Ashley River waste treatment plant. Mike Harmon (1980, 1981) revisited the site during two reconnaissances for wastewater treatment facilities in Dorchester County. Harmon (1980:5) stated:

> Architectural remains were located at site 38DR60. . . These remains consist of an old phosphate processing mill site. . . Presumably, the main house was located just west of the mill in an area which has been badly disturbed by both road construction and phosphate mining. . . Partially intact brick footings were located approximately 95 m north of this area. . . Finally, a 19th century cemetery is located west of the main house site facing the river. . .
>
> Although site 38DR60 apparently lies outside of the immediate project boundaries, its position makes this a highly sensitive archaeological area. . . This site is potentially eligible for placement on the National Register of Historic Places.

Site 38DR81 was recorded by Amy Castleberry and Tommy Charles in 1983 (site form on file at the SCIAA). Charles described the site as follows:

> . . . located just downstream (approx. ½ mile) from site 38DR60 which is also a phosphate processing plant and may be part of that plant–this site is somewhat larger in area and has more brick piers. . . also there are three brick cisterns located on the site.

Because no systematic investigation of this site was conducted for either investigation, the site's boundaries and components were ambiguous. As a result, sites 38DR60 and 38DR81 were combined. Site 38DR60/81 is listed on the NRHP as a nineteenth century industrial site and a contributing element of the Ashley River Historic District (Edmonds 1993).

Bailey (1999) revisited site 38DR60/81 during the cultural resources survey of the Appian Way Tract. During the survey investigations excavated 82, 30 by 30 cm shovel tests at 15 and 30 meter intervals within the site boundary (Bailey 1999). Eight (15 percent) of these shovel tests produced artifacts; 25 produced brick only. Figure 24 presents a plan of 38DR60/81. In the northern portion of the site, the remnants of two structures are located just above a small drainage. The easternmost structure is defined by a chimney base, a brick pier, and a brick foundation base. No artifacts were recovered from shovel tests excavated in the immediate area surrounding this structure.

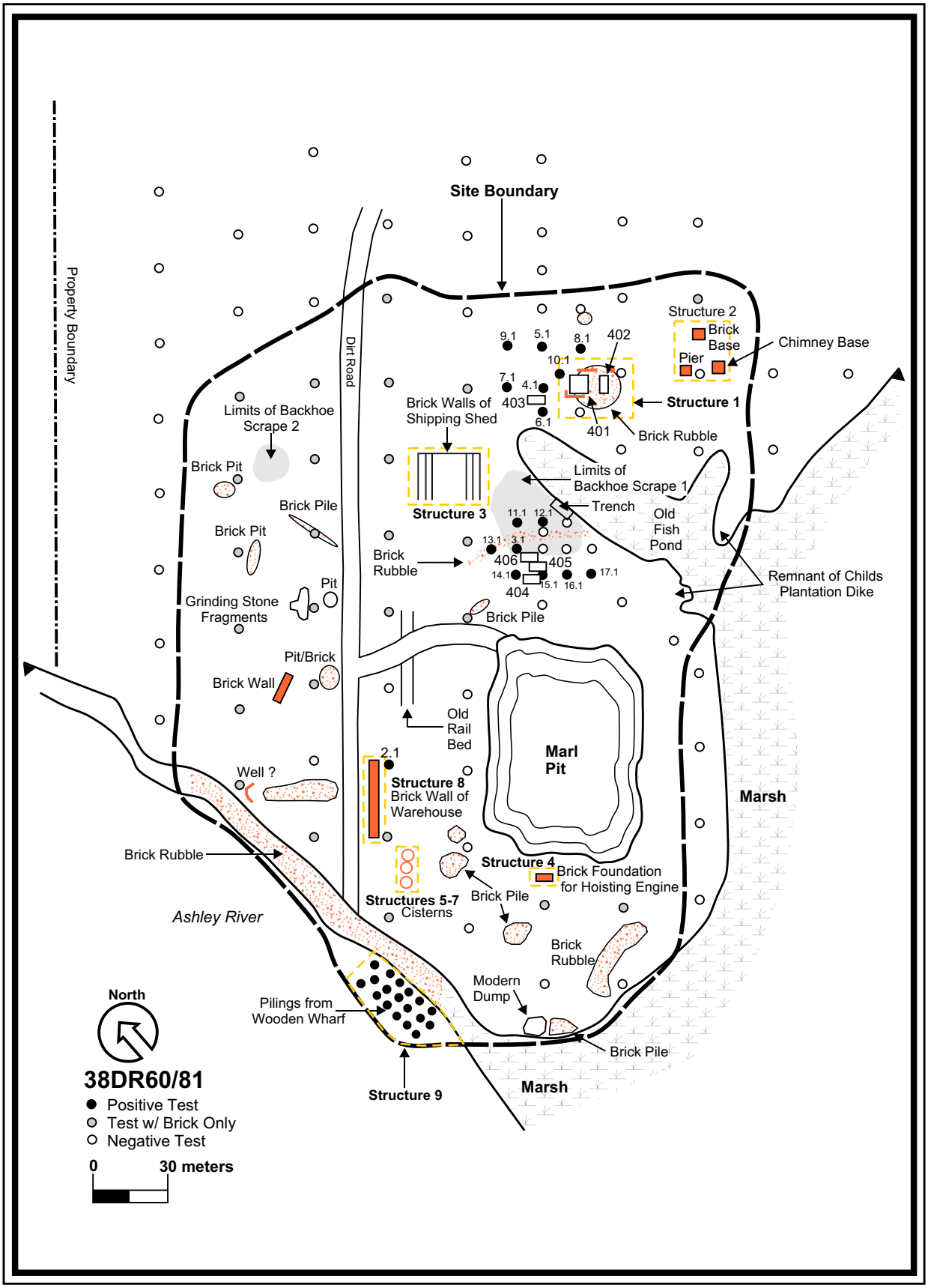


Figure 24. Plan of 38DR60/81.

The other structure, located approximately 30 meters to the west, is defined by a chimney base, a brick wall or pier, and a brick rubble pile. Seven of the eight positive shovel tests (Proveniences 3.1-9.1) excavated at 38DR60/81 were in the immediate vicinity of this structure (see Figure 24). Shovel tests in this area of the site revealed a brown loamy sand 0-40 cm bs underlain by a fine yellow sand 40-50 cm bs. Artifacts were recovered from 0-25 cm bs in this area..

The 14 artifacts recovered from the seven positive shovel tests (Proveniences 3.1-9.1–see Figure 24) in the area of the second structure include one Pre-Contact eroded sherd, one Staffordshire sherd, one Colonoware sherd, two light blue/blue bottle glass fragments, one amethyst bottle glass fragment, one aqua bottle glass fragment, one clear bottle glass fragment, one common cut nail, four unidentifiable nails, and one unidentifiable iron/steel fragment, as well as 15 grams of oyster shell. Investigators recovered a large portion of a brown salt glazed stoneware bottle embossed with "GEORG KREUZ", "AHRWEILER", "RHEINPREUSSER" from a surface collection (Provenience 10.0–see Figure 24). One polychrome hand painted pearlware sherd was recovered from the only other positive shovel test excavated by Bailey (1999) (Provenience 2.1), located in the southern portion of38DR60/81. For a complete artifact inventory, see Appendix A.

These artifacts and architectural features likely are the remnants of worker's houses and commissary associated with the phosphate mining and milling operations of the 1870s-1900s. The plan of a phosphate mill across the river (see Figure 11) shows a "dwelling" inland from the industrial components of the operation and off to one side of the railroad, just as these structures appear to be situated. The Colonoware and Staffordshire sherds likely are associated with the eighteenth century use of the area, then known as Child's Plantation. The single Pre-Contact sherd cannot be associated with a particular Native American period of occupation.

Investigators identified a raised earthen rail bed near the middle of the site. The berm was oriented roughly perpendicular to the river and Dorchester Road and likely carried a tram to and from the Ashley Phosphate Company's facilities and markets. Other features include a large pond, three large brick cisterns, and several possible structures indicated by brick walls or rubble piles.

Following the archival research and field investigations and discussions with Keith Derting, Site File Director at the South Carolina Institute of Archaeology and Anthropology (SCIAA), the boundaries of 38DR60/81 were redefined to include only the remains of the Ashley Phosphate Company's mine and mill works (Bailey 1999). The remains of the H. Bulwinkle mine and mill works located west of 38DR60/81 were assigned a separate site number (38DR192, see Chapter IV). Site 38DR60/81 was already listed on the NRHP as a contributing element of the Ashley River Historic District. Bailey (1999) recommended preservation or data recovery at the site.

Data Recovery Excavations at 38DR60/81

Investigators reestablished the site grid from the survey field investigations (Bailey 1999) using a transit. The elevation of the ground surface in the areas of investigation was recorded using a transit and stadia rod. The site grid is aligned at 45˚. All references to the spatial relationships of units and features encountered in the excavations will be made with respect to the site grid. Hand excavations were focused in the two artifact producing areas of the site; one in the northeast portion of the site and one in the central portion of the site. The mechanical excavation were spread across the site in both artifact producing areas and areas where structures were indicated on historic maps and plats but that failed to produce artifacts during the survey investigations. Figure 25 is a copy of the Sanborn Fire Insurance Company's plan of the Ashley Phosphate Companies fertilizer facilities at the site.

The Search for Childs Plantation and the Ashley Phosphate Company's Manger's Complex

30 by 30 cm Shovel Tests. During the present data recovery investigations at the site, investigators explored the potential for intact remnants of Childs Plantation to have survived the extensive ground disturbance caused by the phosphate mining operations. We excavated 11 shovel tests at 10 meter intervals around Provenience 3.1, which produced one Colonoware sherd (see Figure 24). A total of 46 artifacts was recovered from the seven positive 30 by 30 cm shovel tests (Proveniences 11.1-17.1)–see Figure 24) excavated around Provenience 3.1. Two of the additional shovel tests (Proveniences 13.1 and 14.1) produced artifacts that may be associated with the occupation of Childs Plantation. These artifacts include two Pre-Contact residual sherds, one dot and trailed slipware sherd, one lead glazed redware sherd, one undecorated creamware sherd, two Colonoware sherds, one unidentifiable burned sherd, two dark olive green bottle glass fragments, two clear bottle glass fragments, 10 burned glass fragments, four light blue flat glass fragments, 11 unidentifiable square nails, three unidentifiable nails, one iron shutter hook, and four unidentifiable iron/steel fragments, as well as 79.5 grams of brick, 8.0 grams of mortar, 2.5 grams of faunal material, and 9.82 grams of petrified faunal material. Table 2 presents a summary of the artifacts recovered from the data recovery survey shovel tests at 38DR60/81. For a complete artifact inventory, see Appendix A.

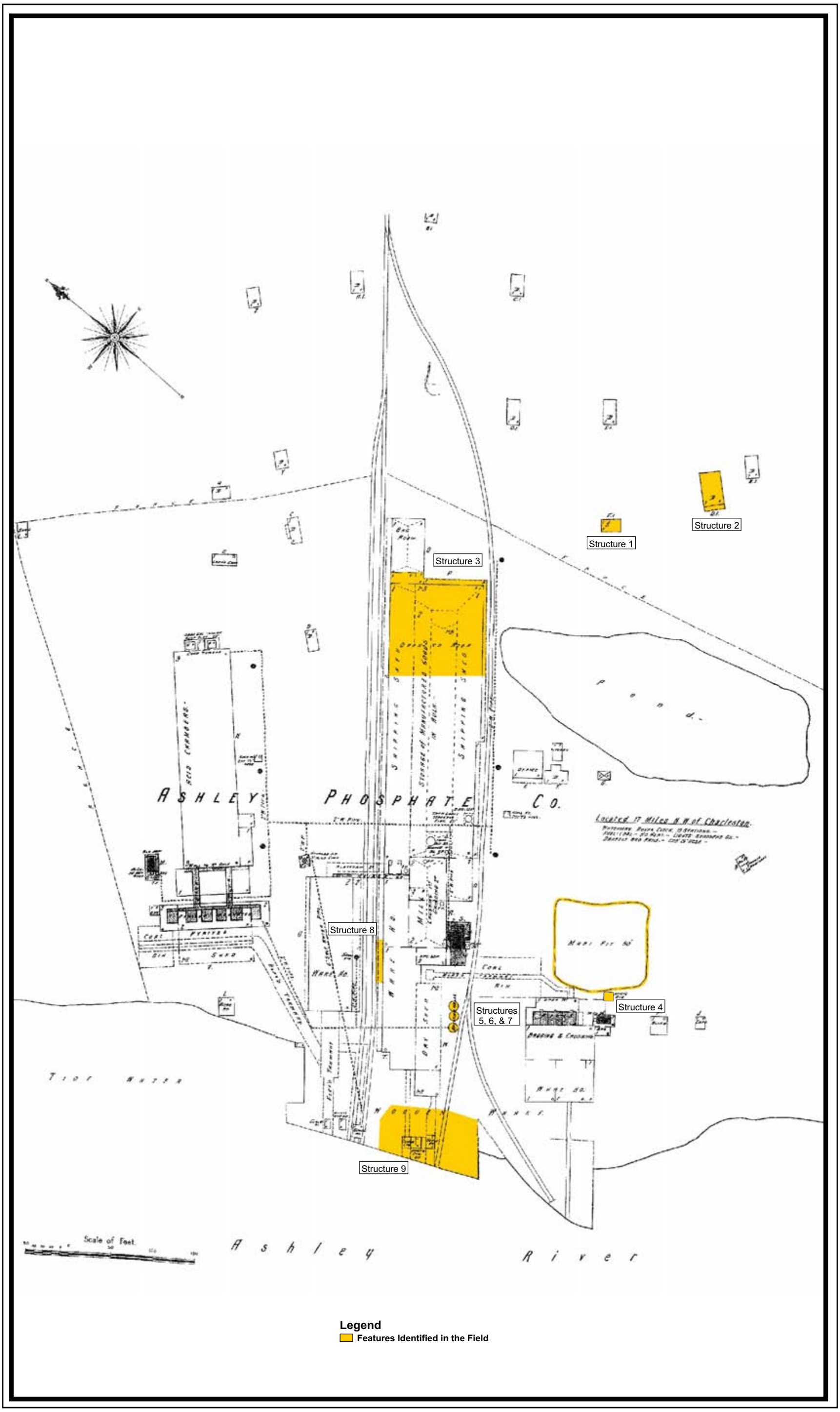


Figure 25. A copy of the Sanborn Fire Insurance Company's 1902 plan of the Ashley Phosphate Company fertilizer facilities at 38DR60/81 (Charleston County Library, Charleston).

Table 2. Artifacts Recovered from Data Recovery Shovel Tests at 38DR60/81.

Artifact Type	Total
Pre-Contact residual sherd	2
Buffware	1
Redware	1
Creamware	1
Ironstone	1
Colonoware	2
Burned sherd	1
Bottle glass	4
Burned glass	10
Flat glass	4
Nails	14
Iron shutter hook	1
Unidentifiable iron/steel	4
Total	**46**
Brick (g)	79.5
Mortar (g)	8.0
Faunal (g)	2.5
Petrified faunal (g)	9.8

Units. Investigators hand excavated a total of 14 meters^2 in and around the artifact producing shovel tests and architectural features recorded during Bailey's (1999) survey investigations (see Figure 24). Units 404-406 were excavated near the pre-phosphate period artifact concentration (in the area of Proveniences 3.1 and 11.1-17.1). This area also corresponds with three structures labeled office, residence, and kitchen on the Sanborn Fire Insurance Map (see Figure 25). A discussion of each unit is presented below.

Unit 404. Unit 404 is a 1 by 2 meter unit located in the central portion of 38DR60/81 between Proveniences 14.1 and 15.1 (see Figure 24). Soils consisted of a humus layer of a 10YR3/2 very dark grayish brown silty root mat at 0-10 cm bs over a 10YR3/2 very dark grayish brown sandy silt at 10-27 cm bs in the eastern portion of the unit and at 10-52 cm bs in the western portion of the unit. This was underlain by a 10YR6/4 light yellowish brown sandy silt at 27-33 cm bs and 10YR4/6 dark yellowish brown clay at 33-36 cm bs in the eastern portion of the unit. Investigators excavated Unit 404 to the base of Level 6 (52 cm bs) to examine two suspected features. They determined that these were non-cultural stains and excavations were halted at the base of Level 6. Figure 26 displays a view and profile of the north wall of Unit 404.

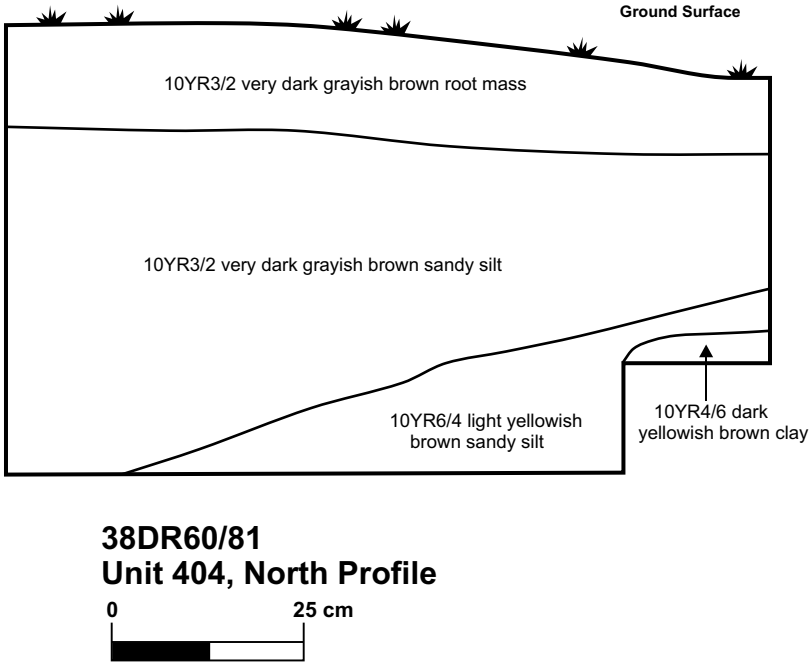


Figure 26. View and north profile of Test Unit 404 at 38DR60/81.

A total of 30 artifacts (20 percent of artifacts recovered from Unit 404) was recovered from Level 1, including one Deptford Check Stamped sherd, two Pre-Contact residual sherds, one lead glazed redware sherd, one undecorated creamware sherd, one unidentifiable burned sherd, one amethyst bottle glass fragment, three clear bottle glass fragments, four window glass fragments, five unidentifiable square nails, two common cut nails, three unidentifiable nails, one iron bolt or bracket, one piece of chain, one rimfire cartridge, one 1943 United States nickel, one 1942 United States dime, and one unidentifiable lead object, as well as 500 grams of brick, 3.4 grams of mortar, 61.5 grams of burned glass, 2.8 grams of oyster shell, and 4.0 grams of charcoal.

A total of 51 artifacts (34 percent) was recovered from Level 2, including one Wilmington Fabric Impressed sherd, one unidentifiable simple stamped sherd with limestone temper, three eroded sherds with coarse sand temper, three residual sherds, one orthoquartzite flake fragment, one Astburyware (redware) sherd, one sponged whiteware sherd, three Colonoware sherds, one Colonoware residual sherd, three dark olive green bottle glass fragments, one light blue bottle glass fragment, two amethyst panel bottle glass fragments, four clear mold blown bottle glass fragments, seven clear bottle glass fragments, five window glass fragments, seven unidentifiable square nails, four unidentifiable nails, two kaolin pipe stem fragments, one brass shoe buckle, 17.6 grams of brick, 74.5 grams of mortar, 42.3 grams of coal slag, 9.8 grams of oyster shell, and 12.1 grams of faunal material.

A total of 32 artifacts (21 percent) was recovered from Level 3, including one Refuge Dentate Stamped sherd, two Deptford Check Stamped sherds, two Deptford Simple Stamped sherds, one eroded sherd with limestone temper, 12 residual sherds, one undecorated Delft sherd, one dot and trailed slipware sherd, two undecorated slipware sherds, two clear bottle glass fragments, one light blue flat glass fragment, one wrought nail, two unidentifiable nails, two kaolin pipe stem fragments, two kaolin pipe bowl fragments, 214.1 grams of brick, 5.8 grams of mortar, and 4.1 grams of faunal material.

A total of 29 artifacts (19 percent) was recovered from Level 4, including two Wilmington Simple Stamped sherds, one Wilmington Cord Marked sherd, one Wilmington Fabric Impressed sherd, two eroded sherds with grog temper, twelve residual sherds, one piece of coastal plain chert shatter, four dark olive green bottle glass fragments, four clear bottle glass fragments, one unidentifiable nail, and one iron band, as well as 0.5 grams of faunal material.

Eight artifacts (5.0 percent) were recovered from Level 5, including three Wilmington Simple Stamped sherds, one eroded sherd with coarse sand temper, and four residual sherds, as well as 100 grams of brick and 1.5 grams of faunal material.

Two artifacts (1.0 percent) were recovered from Level 6, including one Wilmington Fabric Impressed sherd and one residual sherd, as well as 5.5 grams of faunal material. Investigators halted excavations in Unit 404 at the base of Level 6. Table 3 summarizes the artifacts recovered from Unit 404. For a complete artifact inventory, see Appendix A.

Table 3. Artifacts Recovered from Unit 404.

Artifact Type	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Total
Refuge Dentate Stamped			1				**1**
Deptford Check Stamped	1		2				**3**
Deptford Simple Stamped			2				**2**
Wilmington Simple Stamped				2	3		**5**
Wilmington Cord Marked				1			**1**
Wilmington Fabric Impressed		1		1		1	**3**
Unidentifiable simple stamped		1					**1**
Eroded sherds		3	1	2	1		**7**
Residual sherd	2	3	12	12	4	1	**34**
Orthoquartzite flake fragment		1					**1**
Coastal plain chert shatter				1			**1**
Delft			1				**1**
Redware	1	1					**2**
Buffware			3				**3**
Creamware	1						**1**
Whiteware		1					**1**
Colonoware		4					**4**
Unidentifiable burned sherds	1						**1**
Bottle glass	4	17	2	8			**31**
Flat glass	4	5	1				**10**
Nails	10	11	3	1			**25**
Iron bolt or bracket	1						**1**
Iron band				1			**1**
Chain	1						**1**
Kaolin pipe fragments		2	4				**6**
Brass shoe buckle		1					**1**
Rimfire cartridge	1						**1**
Coins	2						**2**
Unidentifiable lead object	1						**1**
Total	**30**	**51**	**32**	**29**	**8**	**2**	**152**
Brick (g)	500	17.6	214.1		100		**831.7**
Mortar (g)	3.4	74.5	5.8				**83.7**
Coal slag (g)		42.3					**42.3**
Burned glass (g)	61.5						**61.5**
Charcoal (g)	4.0						**4.0**
Oyster shell (g)	2.8	9.8					**12.6**
Faunal (g)		12.1	4.1	0.5	1.5	5.5	**23.7**

Figure 27 shows a sample of artifacts recovered from the units in this area, including Unit 404. The majority of the artifacts (34 percent) were recovered from Level 2 (10-20 cm bs) of Unit 404. The residual Pre-Contact sherds account for 76 percent of the artifacts recovered from Unit 404. They were recovered from all levels of Unit 404. Refuge, Deptford, and Wilmington sherds were recovered from Levels 3-6 (20-52 cm bs). However, there appears to be some mixing of these Pre-Contact artifacts, as evidenced by the Early Woodland Refuge Dentate Stamped sherd in Level 3 underlain by Middle to Late Woodland Wilmington sherds in Levels 4-6. These diagnostic Pre-Contact sherds are associated with an Early to Late Woodland occupation of the area. Post-Contact artifacts and brick were recovered from Levels 1-5 (0-50 cm bs). The majority of the Post-Contact artifacts are bottle glass fragments. Investigators recovered four Colonoware sherds from Level 2 (10-20 cm bs) of Unit 404. The Colonoware sherds indicate an African American slave occupation in the area. The highest concentration of brick was recovered from Level 1 (0-10 cm bs). Clear, amethyst, and molded brown bottle glass recovered from Unit 404 are a reflection of activities associated with the phosphate mining period. The mid-twentieth century coins recovered from the unit likely were deposited during Boy Scout camping expeditions on the site.

In general, we found very few artifacts that could be associated with either the antebellum Childs Plantation or the postbellum phosphate industry. Only Colonoware, creamware, and buffware sherds (n=8) are indicative of an antebellum occupation. No features associated with the former plantation of the phosphate company were identified in the unit.

Unit 405. Unit 405 is a 1 by 2 meter unit located just north of Unit 404 (see Figure 24). Soils consisted of a 10YR3/2 very dark grayish brown sandy loam 0-12 cm bs, over a 10YR3/3 dark brown sandy loam at 12-30 cm bs, and a 2.5Y5/6 light olive brown sandy clay 30+ cm bs. Investigators encountered Feature 603 (burned post) and a possibly associated modern Boy Scout campfire at the base of Level 1. Investigators excavated Unit 405 in natural stratigraphic levels. Figures 28 and 29 display the north profile and plan of Unit 405.

A total of 45 artifacts (34 percent of artifacts recovered from Unit 405) was recovered from Level 1, including two eroded sherds with coarse sand temper, three residual sherds, one undecorated slipware sherd, two undecorated creamware sherds, one Mocha pearlware sherd, one undecorated ironstone sherd, five Colonoware sherds, six Colonoware residual sherds, three dark olive green bottle glass fragments, six cobalt blue bottle glass fragments, three light blue flat glass fragments, one clear flat glass fragment, seven unidentifiable nails, one kaolin pipe bowl fragment, one kaolin pipe stem fragment, one brass button, and one bone handle cooking tool (possibly a knife), as well as 60 grams of brick, 0.7 grams of roofing slate, and 13 grams of oyster shell. The button is embossed with the South Carolina state seal on a lined field and the motto “Animis opibus que

Figure 27. Artifacts recovered during excavtions near the former Childs Plantation settlement.

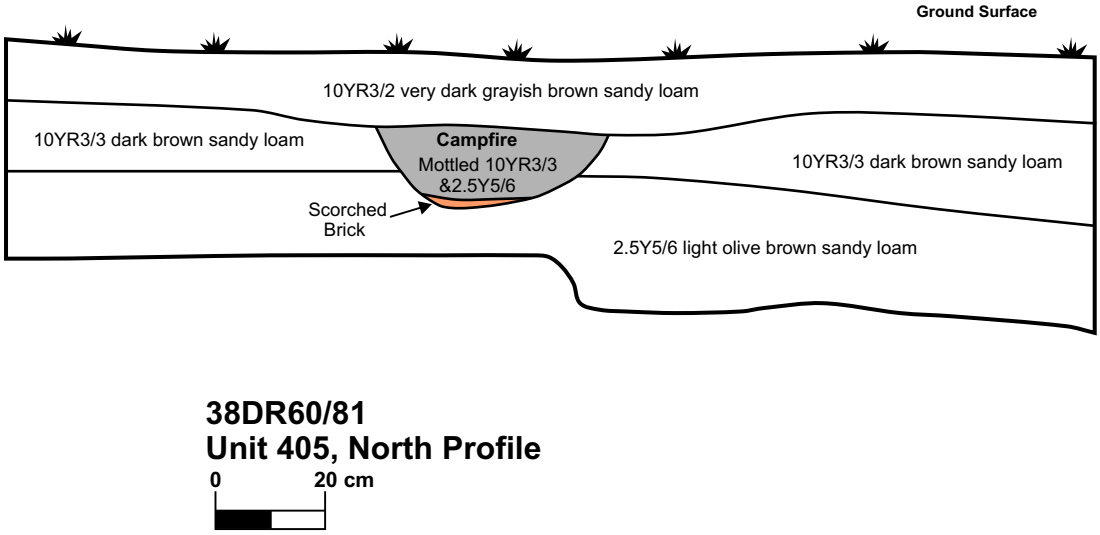
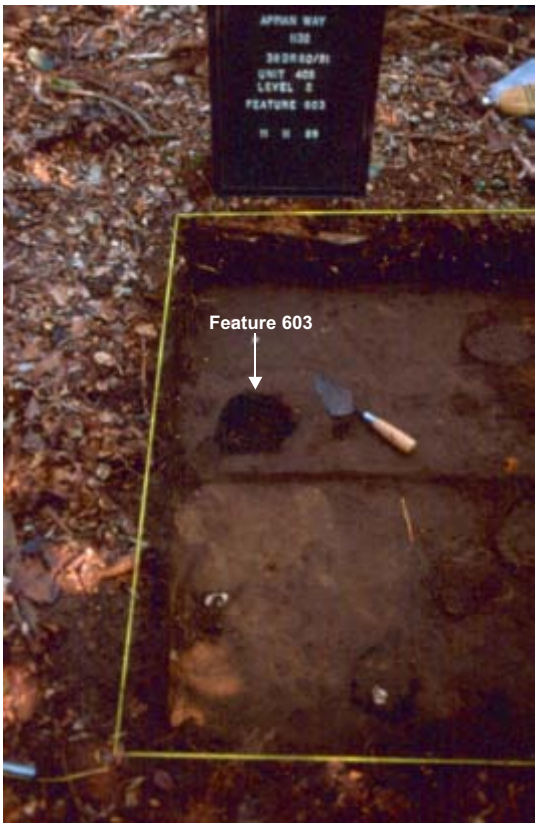
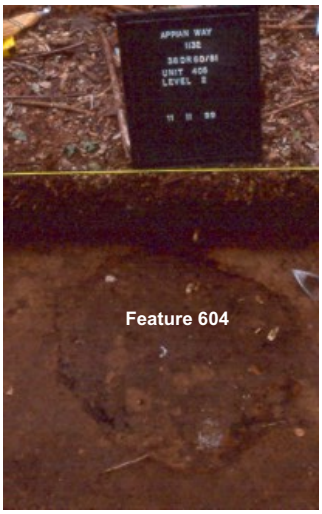


Figure 28. View and north profile of Unit 405 at 38DR60/81.





38DR60/81, Unit 405
Plan View

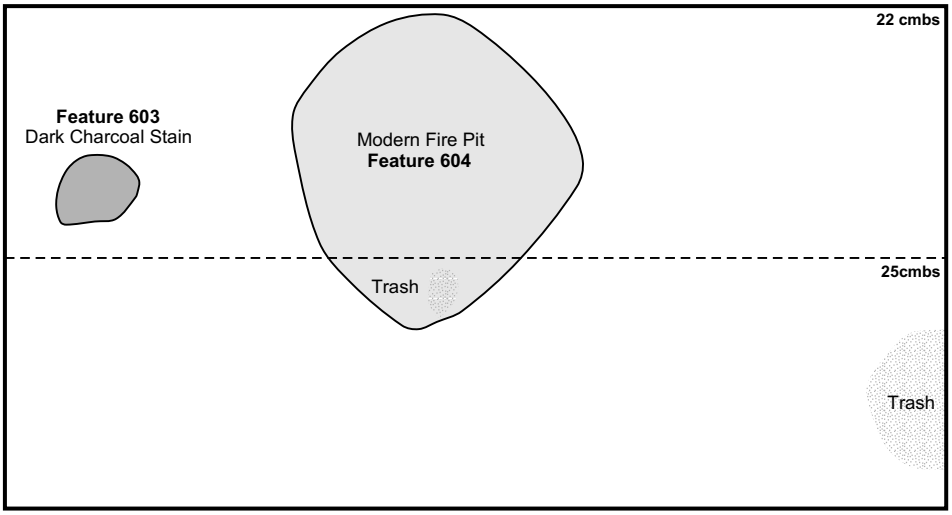


Figure 29. View and plan of Unit 405 at 38DR60/81.

parati," which means Prepared in mind and resources. The word "Waterbury" is stamped on the back. The button was likely manufactured by the Scovill Manufacturing Company between 1850 and 1860 (Alphaeus 1977:240-241). Investigators noted but did not collect 10 Boy Scout era tent stakes. Investigators identified a circular burned area (Feature 603) containing aluminum foil and tin can fragments near the base of Level 1 as a modern Boy Scout campfire. This feature is discussed in detail below.

A total of 85 artifacts (65 percent) was recovered from Level 2, including one Deptford Cord Marked sherd, one burnished sherd with coarse sand temper, seven eroded sherds with coarse sand temper, nine residual sherds, one blue painted Delft sherd, one undecorated Delft sherd, one lead glazed redware sherd, one Chinese blue underglazed porcelain sherd, one British Brown stoneware sherd, four undecorated creamware sherds, one blue transfer printed pearlware sherd, four undecorated pearlware sherds, one undecorated whiteware sherd, 11 Colonoware sherds, 15 Colonoware residual sherds, two olive green bottle glass fragments, three clear mold blown bottle glass fragments, three window glass fragments, three unidentifiable square nails, 13 unidentifiable nails, one spike, and one kaolin pipe stem fragment, as well as 92.7 grams of brick, 41.6 grams of oyster shell, and 12.8 grams of faunal material. Investigators also encountered and discarded many modern artifacts in Level 2, including a Lipton soup cup, parts of tin and aluminum cans, and fragments of glass plates. This modern debris was scattered in and around the area of burned wood and modern refuse believed to be a Boy Scout campfire.

Investigators excavated Level 3 to sterile clay. One Deptford Check Stamped sherd (1.0 percent), as well as 29 grams of brick, was recovered from Level 3. Investigators encountered a large amount of modern debris in the southeast portion of Level 3. Table 4 summarizes the artifacts recovered from Unit 405. For a complete artifact inventory, see Appendix A.

The majority of the artifacts (65 percent) were recovered from Level 2 (12-30 cm bs) of Unit 405. Interestingly, 28 percent of the artifacts recovered from Unit 405 are Colonoware sherds. These artifacts were recovered from Levels 1 and 2 (0-30 cm bs) of Unit 405. The Colonoware sherds, redware, creamware, pearlware, and Delft are all indicative of an eighteenth/nineteenth century occupation, likely to be Childs Plantation. Deptford Check Stamped and Deptford Cord Marked sherds were recovered from Levels 2 and 3 (12-50 cm bs). These sherds are associated with an Early to Late Woodland occupation of the area. Modern refuse was encountered in all levels of Unit 405. This refuse is likely associated with the Boy Scout presence in the area. Some artifacts, such as brown bottle glass and ironstone may be associated with phosphate era activities at the site.

Table 4. Artifacts Recovered from Unit 405.

Artifact Type	Level 1	Level 2	Level 3	Feat.603	Total
Deptford Check Stamped			1		**1**
Deptford Cord Marked		1			**1**
Unidentifiable burnished sherd		1			**1**
Eroded sherds	2	7			**9**
Residual sherd	3	9			**12**
Delft		2			**2**
Redware		1			**1**
Buffware	1				**1**
Porcelain		1			**1**
Stoneware		1			**1**
Creamware	2	4			**6**
Pearlware	1	5			**6**
Whiteware		1			**1**
Ironstone	1				**11**
Colonoware	11	26			**37**
Bottle glass	9	5			**14**
Flat glass	4	3			**7**
Nails	7	16			**23**
Spike		1			**1**
Kaolin pipe fragments	2	1			**3**
Brass button	1				**1**
Bone handle cooking tool	1				**1**
Total	**45**	**85**	**1**	**0**	**131**
Brick (g)	60	92.7	29		**181.7**
Mortar (g)				5.0	**5.0**
Roofing slate (g)	0.7				**0.7**
Oyster shell (g)	13	41.6		1.0	**45.6**
Faunal (g)		12.8			**12.8**
Charcoal (g)				25.44	**25.44**

The antebellum occupation is represented by only a few artifacts including 18 European American ceramics and 37 Colonoware sherds. In addition, these artifacts occur together with modern refuse and Pre-Contact artifacts. Obviously, these deposits are severely compromised by post-depositional activities.

Features 603 and 604. Feature 603 was encountered at the base of Level 1 in the northern portion of Unit 405 (see Figure 29). Feature 603 is roughly circular with a diameter of 14 cm. The fill of the feature is black charred wood. The top of Feature 603 is 12 cm bs and the base is 23 cm bs. Investigators excavated the entire feature with a trowel and bagged the fill for flotation analysis. Cultural material recovered from Feature 603 includes 5.0 grams of mortar, 1.0 gram of oyster shell,

and 25.44 grams of charcoal. Feature 603 appears to be the remnants of a burned post, possibly associated with the nearby modern Boy Scout campfire (Feature 604).

Investigators encountered the remains of a probable Boy Scout campfire (Feature 604) approximately 30 cm east of Feature 603 at approximately 12 cm bs. Burned clay was present along the outer edges of this circular fire pit with charred modern refuse, including tin cans and aluminum foil, located within the burned area (see Figure 29). Investigators did not collect any material from this feature.

Unit 406. Unit 406 is a 1 by 2 meter unit located in the central portion of 38DR60/81 near Provenience 3.1 and just north of Unit 405 (see Figure 24). Soils consisted of a 10YR2/1 black sandy loam 0-15 cm bs, over a 10YR3/4 dark yellowish brown sand at 15-25 cm bs. This was underlain by a 10YR5/4 yellowish brown silty sand mottled with a 7.5YR4/6 strong brown sandy clay at 25-47 cm bs over a 7.5YR4/6 strong brown clay at 47+ cm bs. Investigators halted excavations in Unit 406 upon reaching sterile clay across the entire unit.

A total of 107 artifacts (65 percent of artifacts recovered from Unit 406) was recovered from Level 1, including one Wilmington Check Stamped sherd, one piece of milky quartz shatter, one split pebble, one undecorated Delft sherd, one Chinese undecorated porcelain sherd, one lead glazed redware sherd, four undecorated creamware sherds, one blue shell edged pearlware sherd, four undecorated pearlware sherds, 18 Colonoware sherds, 48 Colonoware residual sherds, six dark olive green bottle glass fragments, two clear bottle glass fragments, two window glass fragments, two unidentifiable square nails, nine unidentifiable nails, two kaolin pipe stem fragments, and three unidentifiable iron/steel fragments, as well as 321.2 grams of brick, 131.2 grams of oyster shell, and 11.8 grams of faunal material. Investigators encountered an iron pipe with a diameter of approximately 3.0 centimeters running diagonally (grid northwest-southeast) through Unit 406 approximately 8.0 cm bs. The function of this pipe is unknown, but it may be associated with the phosphate mining activities at the site..

A total of 50 artifacts (30 percent) was recovered from Level 2, including one eroded Stallings sherd, three unidentifiable plain sherds with coarse sand temper, one eroded sherd with grog temper, four residual sherds, one heat treated Coastal Plain chert Morrow Mountain projectile point, one piece of milky quartz shatter, one cobble, one undecorated Delft sherd, three lead glazed redware sherds, one undecorated creamware sherd, one brown salt glazed stoneware sherd, five Colonoware sherds, 14 Colonoware residual sherds, one glass plate/dish fragment, four dark olive green bottle glass fragments, three unidentifiable nails, two kaolin pipe stem fragments, one kaolin pipe bowl fragment, and two unidentifiable iron/steel fragments, as well as 73 grams of brick, 38

grams of oyster shell, and 147.7 grams of faunal material. The majority of the faunal material was located in the southwest portion of Level 2. This concentration of faunal material was not associated with any type of pit feature or burning episode and was not treated as a cultural feature. Figure 30 presents a view of the faunal material in Level 2 of Unit 406.

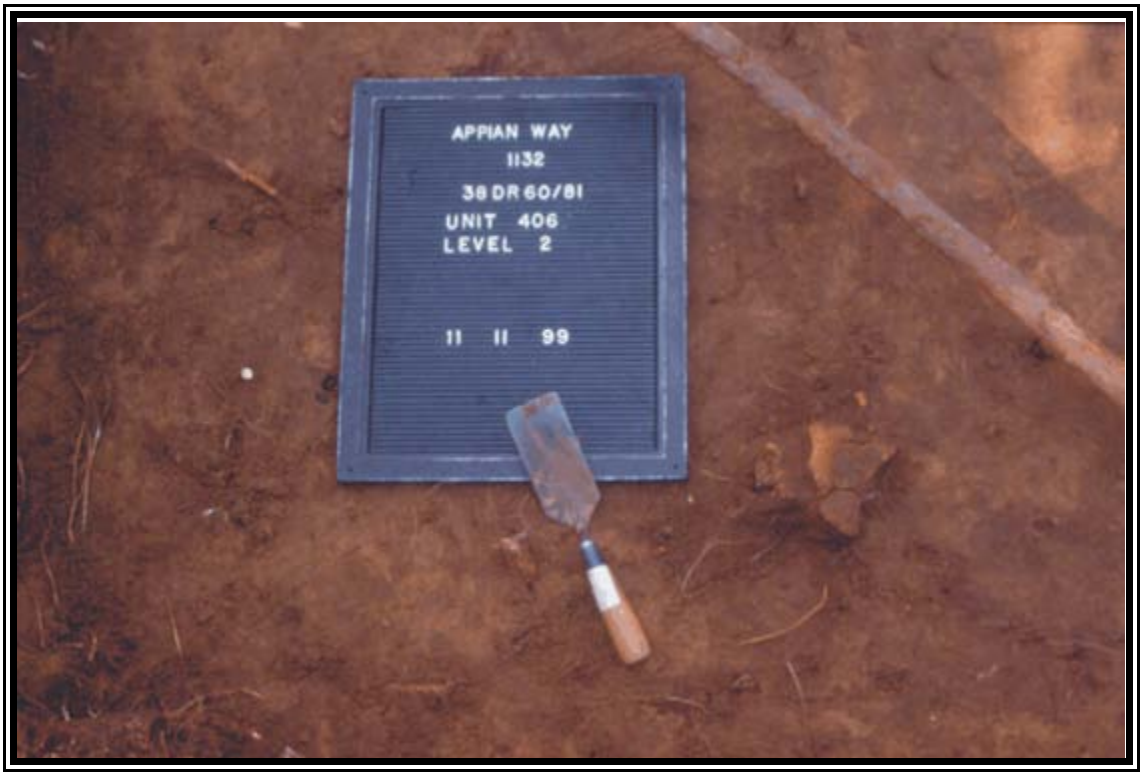


Figure 30. A view of faunal material and an iron pipe in Unit 406, Level 2.

Seven artifacts (5.0 percent) were recovered from Level 3, including one unidentifiable plain sherds with coarse sand temper, two residual sherds, three pieces of baked clay, and one dark olive green bottle glass fragment, as well as 2.0 grams of oyster shell. Investigators excavated Level 4 to sterile clay. No artifacts were recovered from Level 4. Table 5 summarizes the artifacts recovered from Unit 406. For a complete artifact inventory, see Appendix A.

The majority of the artifacts (65 percent) were recovered from Level 1 (0-15 cm bs) of Unit 406. Colonoware sherds account for 52 percent of the artifacts. These artifacts were recovered from Levels 1 and 2 (0-25 cm bs) of Unit 406. They are associated with an African Amercian slave occupation in the area. One Wilmington Check Stamped sherd was recovered from Level 1. This sherd is associated with a Middle Woodland occupation of the area. One eroded Stallings sherd and one Morrow Mountain projectile point were recovered from Level 2. These artifacts are associated

Table 5. Artifacts Recovered from Unit 406.

Artifact Type	Level 1	Level 2	Level 3	Total
Stallings eroded		1		**1**
Wilmington Check Stamped	1			**1**
Unidentifiable plain sherds		3	1	**4**
Eroded sherds		1		**1**
Residual sherd		4	2	**6**
Baked clay			3	**3**
Coast Plain chert Morrow Mountain p.p.		1		**1**
Milky quartz shatter	1	1		**2**
Cobble		1		**1**
Split pebble	1			**1**
Delft	1	1		**2**
Porcelain	1			**1**
Redware	1	3		**4**
Creamware	4	1		**5**
Stoneware		1		**1**
Pearlware	5			**5**
Colonoware	66	19		**85**
Glass plate/dish		1		**1**
Bottle glass	8	4	1	**13**
Flat glass	2			**2**
Nails	11	3		**14**
Kaolin pipe fragments	2	3		**5**
Unidentifiable iron/steel	3	2		**5**
Total	**107**	**50**	**7**	**164**
Brick (g)	321.2	73		**442.2**
Oyster shell (g)	131.2	38	2.0	**171.2**
Faunal (g)	11.8	147.7		**159.5**

with a Middle Archaic to Ceramic Late Archaic occupation of the area. The fragments of baked clay recovered from Level 3 appear to be the result of the heating of the clay subsoil rather than an intentionally produced Archaic baked clay object.

As we saw in the other two units, only a small assemblage of artifacts, 18 European American sherds and 85 Colonoware sherds, is associated with the antebellum occupation at the site. In addition, most of the Colonoware sherds are residual, a testament to the severe post-depositional effects that mining has had on the site.

Mechanical Trenching and Scraping. The structure(s) associated with Childs Plantation are shown on a 1787 plat on the south side of a drainage that was diked to form a fish pond (see Figure 2). Remnants of the dike remain on the south side of the former pond (see Figure 24). A

trench was excavated between the two eroded causeways, parallel to the southern edge of the drainage (see Figure 24). This 1.0 by 10 meter trench was excavated in 10 cm levels to a depth of 2.0 meters bs. Figure 31 is a plan view of the trench during excavation. Soils are mottled 0-1.5 meters bs and are underlain by a layer of buried trees, shrubs, and other rotting plant matter. Black wetland soils were encountered 2.0 meters bs. It is likely this area of the site was wetlands filled with overburden from the marl pit which was excavated during the phosphate mining activities at the site.

Investigators also mechanically stripped a 40 by 20 meter area between the wetland area believed to be the plantation period fish pond and Units 404-406 (see Figure 24). This area was heavily wooded but a moderate amount of brick rubble was noted on the surface. Figure 32 is a view of this scraped area. Investigators did not identify any features in this scrape area. It would appear that any remains of the structure(s) shown on the 1787 plat were destroyed during the excavation of the marl pit and phosphate mining trenches, and construction/demolition of the manager's complex.

Summary. Artifacts recovered from Units 404, 405, and 406 are moderate in number and range from the Archaic period to the mid-1900s, with artifacts from the Woodland and antebellum periods forming the majority of the assemblage. Artifacts that likely are associated with the occupation of Childs Plantation were recovered from all levels of the three units and include Colonoware, delftware, creamware, slipware, redware, pearlware, porcelain, and British Brown sherds, as well as a brass button. Very few artifacts that can definitively associated with the phosphate period were recovered, although it is likely that some of the metal and glass artifacts are from this period. With the exception of a burn stain (Feature 603) noted in Level 2 of Unit 405 likely associated with a Boy Scout camp site, no features were encountered in any of the three units.

Disturbances associated with the phosphate works shown on the 1888 Sanborn Fire Insurance map and noted in the field include construction of the large mill pond or marl pit just south of the artifact concentration, construction and subsequent destruction of the manager's house, kitchen, and office in the immediate vicinity of the artifact concentration, and construction of a ditch and warehouse facility just west of the artifact concentration. All of the artifacts from the shovel tests and units are small (2.0-4.0 cm in diameter) and there is obvious, significant ground disturbance in the immediate area. Any remnants of Childs Plantation that may have been present were obliterated during the construction and operation of the phosphate works on the site. Excavations in this area, however, did not reveal any evidence of the phosphate company's manger's complex believed to have been in this area.

Figure 31. A view of the backhoe trench near the former Childs Plantation fish pond.

Figure 32. A view of the mechanically scraped area near the former Childs Plantation.

Excavations in the Ashley Phosphate Company's Labor Camp

Investigators noted brick rubble pile and articulated brick that appeared to be a chimney base near Provenience 10.1 (see Figure 24). These features were designated Structure 1. A view of the chimney base is presented in Figure 33. Structure 1 is shown as a store in the vicinity of several domestic structures on the Sanborn Fire Insurance map of the Ashley Phosphate Company's facilities. This likely is where employees obtained most of their provisions. Figure 34 presents a plan of Structure 1 showing the placement of hand excavations units and hand stripping. Investigators excavated one 2 by 2 meter unit (Unit 401) and one 1 by 2 meter unit (Unit 402) inside Structure 1 and one 1 by 2 (Unit 403) near but outside Structure 1. Each of these excavation units is discussed below.

Figure 33. View of the chimney base at Structure 1, 38DR60/81.

Unit 401. Unit 401 is a 2 by 2 meter unit located in the northern portion of 38DR60/81. Soils consisted of an organic layer 0-5 cm bs, over a 10YR2/1 black sandy silt 5-12 cm bs, and a 10YR4/3 brown clay at 12-20 cm bs. Investigators halted excavations in Unit 401 in the clay at the base of Level 2. A brick wall(s) (Feature 601) running north-south through the unit with an extension running east-west was encountered in the center of Unit 401. Figure 35 displays a profile of the south wall of Unit 401.

A total of 707 artifacts (56 percent of artifacts recovered from Unit 401) was recovered from Level 1, including one glass plate/dish fragment, 18 light blue bottle glass fragments, four clear mold blown bottle glass fragments embossed with "Palmetto Brewing Co. Charleston S.C.", 14 light blue flat glass fragments, 342 unidentifiable square nails, 169 common cut nails, 17 common wire nails, 102 unidentifiable nails, 10 screws, two spikes, two screw hooks, one staple, one iron pintle, two iron bolts or brackets, seven nut and bolt assemblies, five nut, washer, and bolt assemblies, one iron eye bar, one metal pipe/pipe fitting, one kaolin pipe stem, six chimney (lamp) glass fragments, and one white glass four holed button, as well as 60.11 kg of brick, 18.5 grams of mortar, and 982 grams of burned glass. Burned wood was encountered in the western portion of the unit, possibly the burnt remnants of a door or wooden timbers. Figure 36 shows a sample of artifacts recovered from Structure 1.

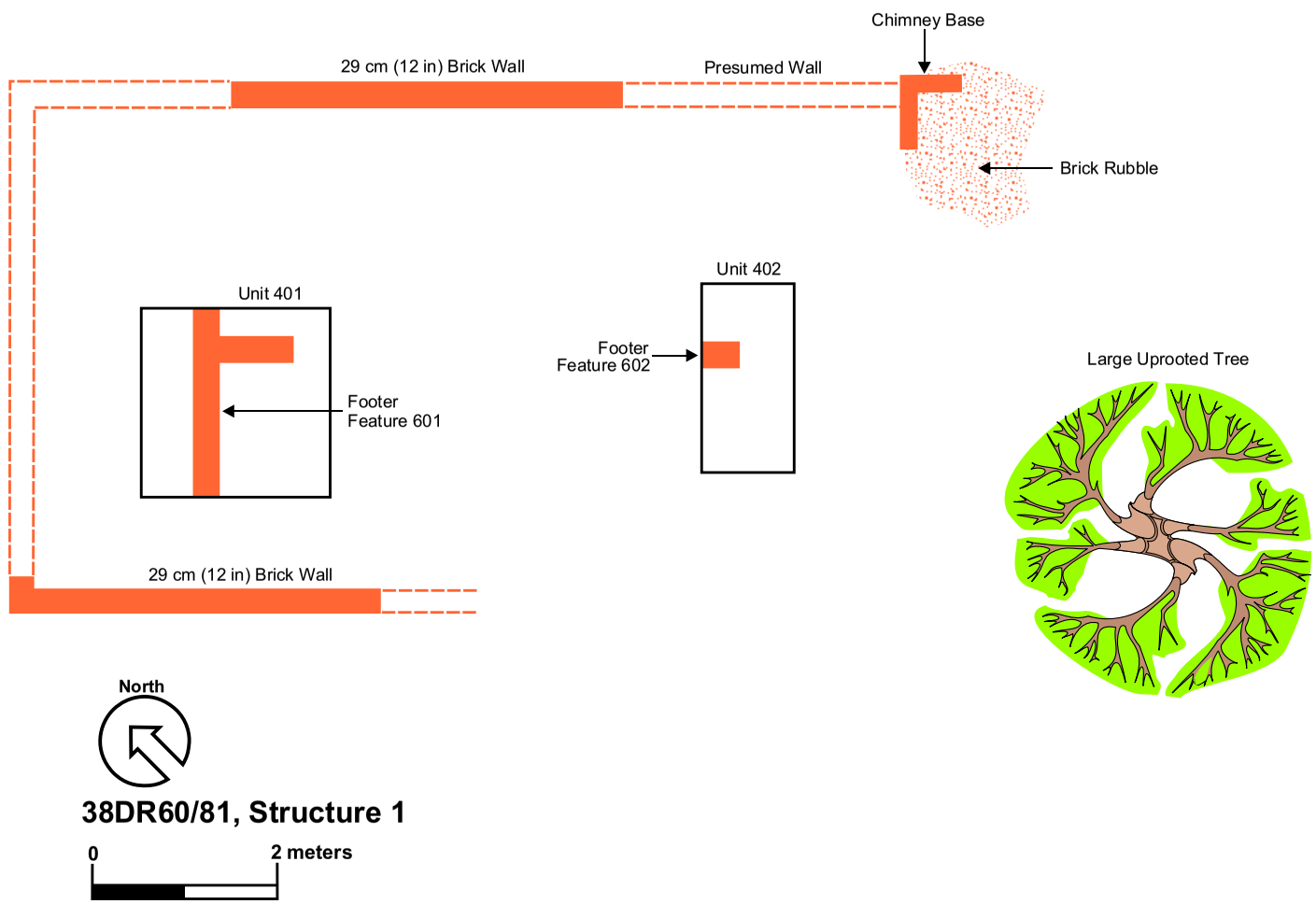


Figure 34. Plan of Structure 1 at 38DR60/81.

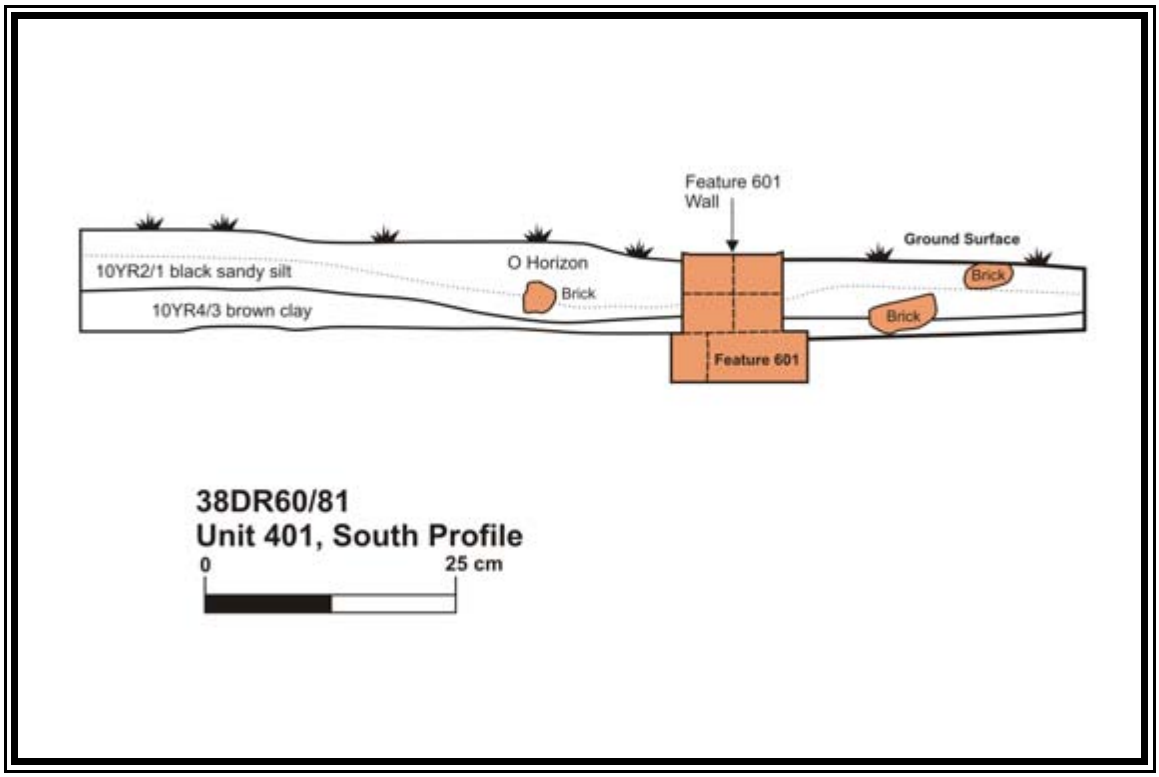


Figure 35. South profile of Unit 401 at 38DR60/81.

A total of 558 artifacts (44 percent of artifacts recovered from Unit 401) was recovered from Level 2, including five light blue bottle glass fragments, 13 light blue flat glass fragments, 232 unidentifiable square nails, 88 common cut nails, 19 common wire nails, 189 unidentifiable nails, four spikes, three screw hooks, one staple, one tack, one iron band, one scale weight, and one white glass four holed button, as well as 10 kg of brick, 337.5 grams of burned glass, and 6.5 grams of faunal material. Investigators halted excavations in Unit 401 at the base of Level 2. Table 6 summarizes the artifacts recovered from Unit 401. For a complete artifact inventory, see Appendix A.

The overwhelming majority (92 percent) of the artifacts recovered from Unit 401 are nails. Nearly all of the recovered artifacts are from the Architectural Group (South 1977). These artifacts are undoubtedly associated with a structure in this area, a portion of which (Feature 601) passes through Unit 401. This feature will be discussed in detail below. Investigators recovered a very small amount of Kitchen Group artifacts (n=55; 4.0 percent of artifacts recovered from Unit 401), suggesting that this structure may have been industrial rather than residential. Investigators recovered a large amount of burned glass and also encountered burned wood, suggesting that this structure was likely destroyed by fire.

Figure 36. A sample of artifacts recovered from excavtions at Structure 1.

Table 6. Artifacts Recovered from Unit 401.

Artifact Type	Level 1	Level 2	Total
Glass plate/dish	1		**1**
Bottle glass	22	5	**27**
Flat glass	14	13	**27**
Nails	630	528	**1,158**
Screws	10		**10**
Spikes	2	4	**6**
Screw hooks	2	3	**5**
Staple	1	1	**2**
Tack		1	**1**
Iron pintle	1		**1**
Iron bolt or bracket	2		**2**
Nut and bolt assembly	7		**7**
Nut, washer, and bolt assembly	5		**5**
Iron eye bar	1		**1**
Iron band		1	**1**
Metal pipe/pipe fitting	1		**1**
Kaolin pipe stem	1		**1**
Chimney glass	6		**6**
Scale weight		1	**1**
Button	1	1	**2**
Total	**707**	**558**	**1,265**
Brick (kg)	60.11	10	**70.11**
Mortar (g)	18.5		**18.5**
Burned glass (kg)	0.98	0.34	**1.32**
Faunal (g)		6.5	**6.5**

Feature 601. Feature 601 was encountered in the central portion of Unit 401 at the top of Level 1. The feature is composed of a brick wall running north-south through Unit 401 with a second short segment of a brick wall running perpendicular (east-west) to the north-south section, forming a "T" configuration. Figure 37 displays a view and plan of Unit 401 showing Feature 601. The north-south segment is approximately 12 inches wide and at least 6.5 feet long. The north-south brick wall is three brick courses wide and two brick courses tall. The upper brick course (two brick courses wide) rests upon the wider brick course (three brick course wide) at the base of the feature. The east-west segment is approximately 12 inches wide and 3.0 feet long. The east-west wall segment is constructed in the same fashion as the north-south section. All bricks are joined by mortar. Mortar is present along the top of the upper course of bricks. This suggests that at least one additional brick course was originally present on the feature. The top of the feature is 2.0 cm above the ground surface and the base is 24.0 cm bs. Feature 601 is a brick footer for a structure that once stood in this area.

38DR60/81, Unit 401
Plan View, Feature 601

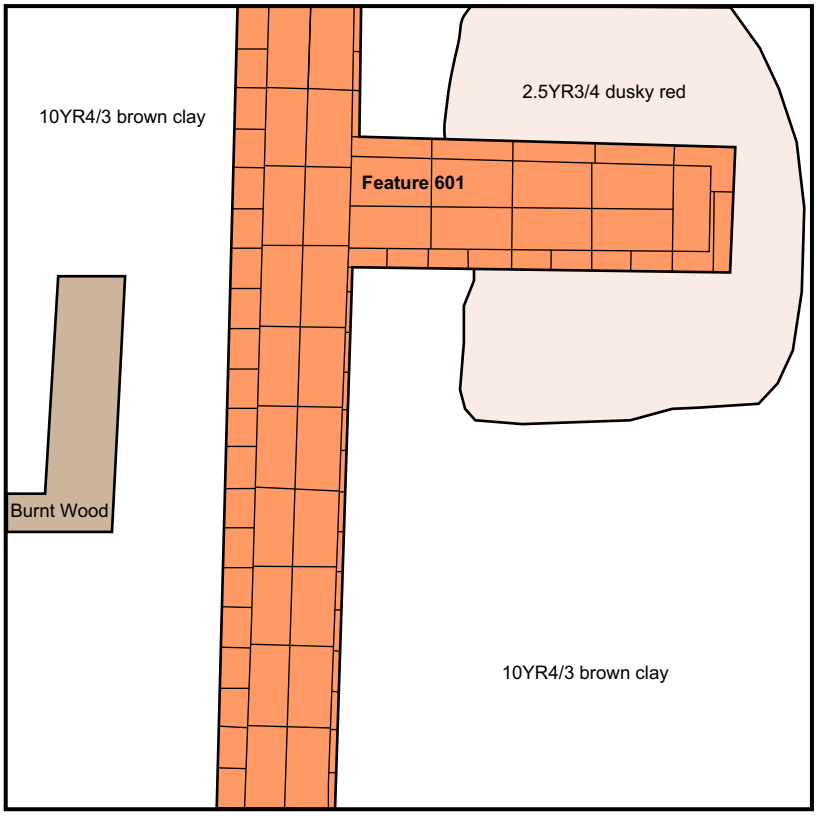


Figure 37. Plan of Unit 401 at 38DR60/81 showing Feature 601.

Unit 402. Unit 402 is a 1 by 2 meter unit located in the northern portion of 38DR60/81. Soils consisted of a 10YR2/1 black sandy silt 0-9 cm bs over a 10YR4/3 brown clay at 9-19 cm bs. Investigators halted excavations in Unit 402 at the 2.5Y5/4 light olive brown clay encountered at the base of Level 2. A brick wall (Feature 602) running east-west was encountered in the western portion of Unit 402. Figure 38 displays a profile of the east wall of Unit 402.

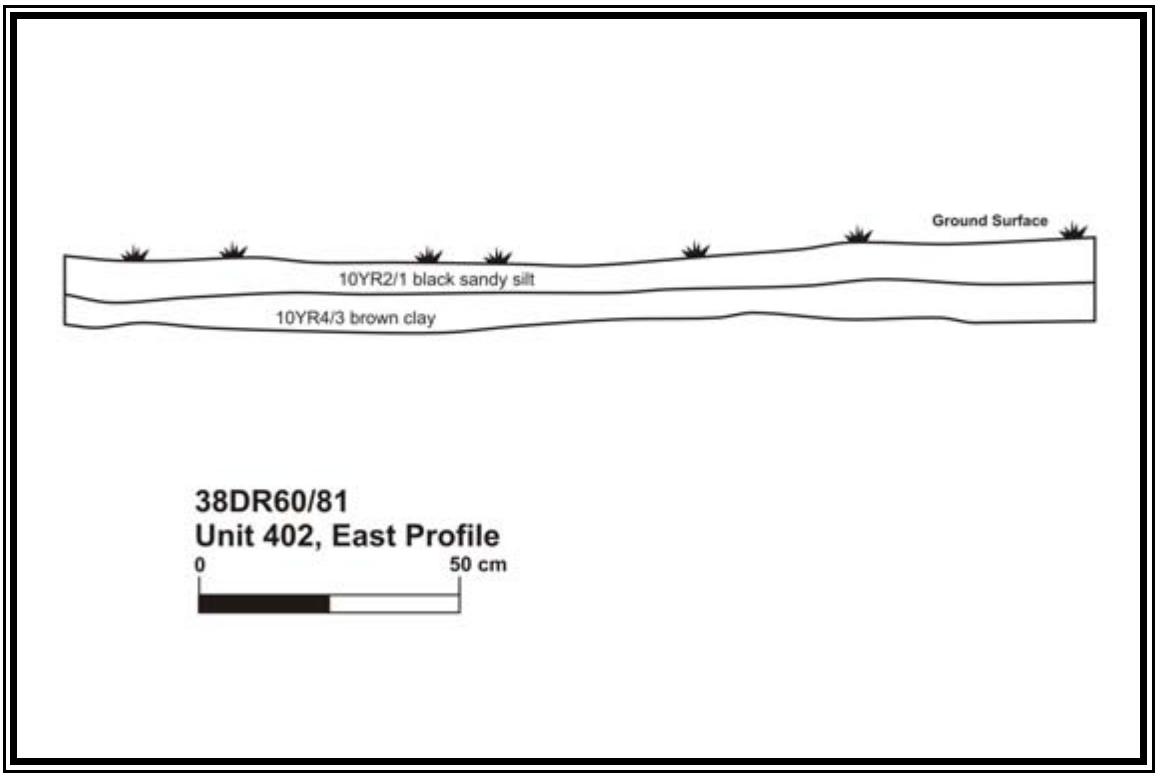


Figure 38. East profile of Unit 402 at 38DR60/81.

A total of 318 artifacts (91 percent of artifacts recovered from Unit 402) was recovered from Level 1, including 129 unidentifiable square nails, 26 common cut nails, three common wire nails, 154 unidentifiable nails, one spike, one bolt, one washer, one iron hasp, one escutcheon, and one unidentifiable iron/steel fragment, as well as 20 kg of brick and 592 grams of burned glass (see Figure 36).

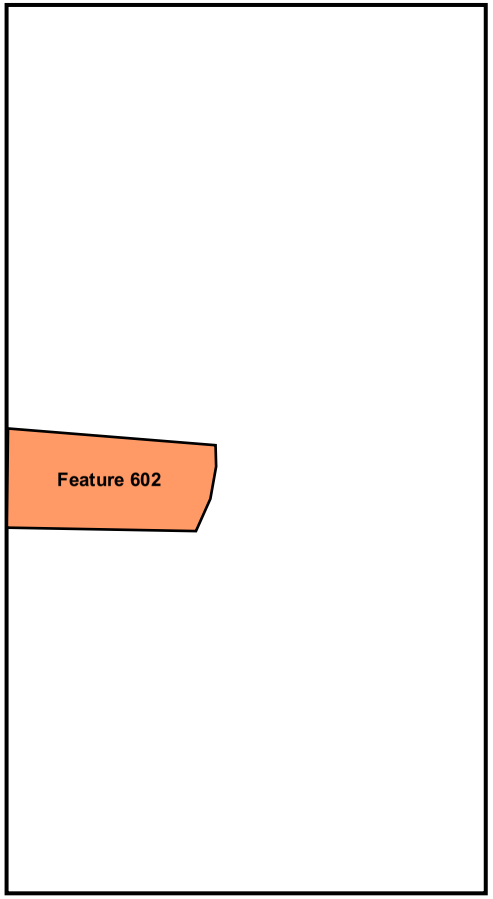
A total of 31 artifacts (9.0 percent) was recovered from Level 2, including six unidentifiable square nails, seven common cut nails, 10 unidentifiable nails, and eight pieces of burned glass, as well as 18.8 grams of brick. Burned clay was encountered in Level 2. Investigators halted excavations in Unit 402 at the base of Level 2. Table 7 summarizes the artifacts recovered from Unit 402. For a complete artifact inventory, see Appendix A.

Table 7. Artifacts Recovered from Unit 402.

Artifact Type	Level 1	Level 2	Total
Burned glass		8	**8**
Nails	312	23	**335**
Spikes	1		**1**
Bolt	1		**1**
Washer	1		**1**
Iron hasp	1		**1**
Escutcheon	1		**1**
Unidentifiable iron/steel	1		**1**
Total	**318**	**31**	**349**
Brick (kg)	20	0.02	**20.02**
Burned glass (g)	592		**592**

Again, the overwhelming majority (96 percent) of the artifacts recovered from Unit 402 are nails. Nearly all of the recovered artifacts are from the Architectural Group. These artifacts are undoubtedly associated with a structure in this area, a portion of which (Feature 602) is present in Unit 402. This feature will be discussed in detail below. Investigators recovered a very small amount of Kitchen Group artifacts (eight pieces of burned glass; 2.0 percent of artifacts recovered from Unit 402), although it is unclear if this glass was bottle glass or flat glass. The small number of possible Kitchen Group artifacts suggests that this structure may have served an industrial purpose rather than a residential one. Investigators encountered baked/burned clay in Unit 402, suggesting that this structure was likely destroyed by fire.

Feature 602. Feature 602, a brick wall running east-west, was encountered in the western portion of Unit 402 at the top of Level 1. A view and plan of Feature 602 is shown in Figure 39. The brick wall is approximately 12 inches wide and is at least 1.5 feet long. The wall is three brick courses wide and two brick courses tall. The upper brick course (two brick courses wide) rests on the wider brick course (three brick course wide) at the base of the feature. All bricks are joined by mortar. Mortar is present along the top of the upper course of bricks. This suggests that at least one additional brick course originally was present on the feature. The top of the feature is at the ground surface and the base is 26 cm bs. Feature 602 is a brick pier for a structure that once stood in this area. Feature 602 is aligned with the "T" brick footer (Feature 601) in Unit 401 (see Figure 33). Feature 602 may be a continuation of the east-west wall of Feature 601. Portions of two additional walls associated with Structure 1 were exposed by hand stripping (see Figure 33). A chimney base is also located in the area of Structure 1 (see Figure 33).



38DR60/81, Unit 402
Plan View, Feature 602

Figure 39. View and plan of Feature 602 in Unit 402 at 38DR60/81.

Unit 403. Unit 403 is a 1 by 2 meter unit located in the northern portion of 38DR60/81 (see Figure 24). The unit was placed between Proveniences 4.1, 6.1, and 7.1, approximately 15 meters west of the brick rubble and architectural features encountered in Units 401 and 402. in effort to recover additional artifacts associated with Structure 1. Soils consisted of a humus layer of a 10YR2/1 black sandy silt at 0-5 cm bs over a 10YR4/4 dark yellowish brown sandy loam with moderate to heavy root disturbance at 5-20 cm bs over a 10YR4/4 dark yellowish brown clay at 20-25 cm bs.

Five artifacts (22 percent of artifacts recovered from Unit 403) were recovered from Level 1, including one brown panel bottle glass fragment, two amethyst bottle glass fragments, one amethyst mold blown bottle glass embossed with the South Carolina Dispensary emblem, and one clear bottle glass fragment, as well as 21.6 grams of oyster shell.

A total of 18 artifacts (78 percent) was recovered from Level 2, including one brown panel bottle glass fragment, three light blue bottle glass fragments, four amethyst bottle glass fragments, four amethyst mold blown bottle glass fragments, two clear bottle glass fragments, and three light blue flat glass fragments, as well as one rimfire cartridge. No artifacts were recovered from Level 3. Table 8 summarizes the artifacts recovered from Unit 403. For a complete artifact inventory, see Appendix A.

Table 8. Artifacts Recovered from Unit 403.

Artifact Type	Level 1	Level 2	Total
Bottle glass	5	14	**19**
Flat glass		3	**3**
Rimfire cartridge		1	**1**
Total	**5**	**18**	**23**
Oyster shell (g)	21.6		**21.6**

Investigators recovered a very small amount of artifacts from Unit 403. In contrast to the dense concentrations of Architectural Group artifacts recovered in Units 401 and 402, only three Architectural Group artifacts (window glass) were recovered from Unit 403. Investigators encountered no evidence of burning in Unit 403. The area of Unit 403 is clearly outside the structure encountered in Units 401 and 402. The artifacts from Unit 403 likely are associated with Structure 1.

Summary. One 2 by 2 meter unit (Unit 401) and two 1 by 2 meter units (Units 402 and 403) were excavated in the northern portion of the site where a brick feature and a small number of

artifacts were noted during the survey investigations (Bailey 1999). Portions of a continuous 12 inch wide brick wall (Structure 1) were exposed through unit excavation and with shovel and trowel outside the unit blocks.

Excavators drew and photographed all encountered features, including a brick wall "T" exposed in Unit 401 and a brick pier exposed in Unit 402. The pier is aligned with the "T"-shaped wall section in Unit 401. Portions of two additional walls were exposed by hand stripping. A chimney base is also located in this area. The eastern portion of the structure was disturbed by a large uprooted tree (see Figure 33).

Unit 403 was excavated approximately 15 meters west of Structure 1. Soils are shallow and produced small amounts of bottle glass. There was no evidence architectural features or of burning of any of the artifacts.

Structure 1 likely served as a commissary for the employees at the Ashley Phosphate mine. The building appears to have been destroyed by fire. The Sanborn map of the facility shows Structure 1 as a one-story store with a wood shingled roof (see Figure 25). The building was located outside the main fence, between the main operating facilities and the residential buildings. The artifacts recovered, including substantial amounts of bottle glass and hardware and a scale weight, support this conclusion. Based on the number of beer and dispensary bottles recovered, even after the building was burned, alcohol apparently was available to the workers at the commissary.

Additional Mechanical Scraping and other Features/Structures

Exploratory Scraping. Following the hand excavations, the Sanborn map was digitally scanned and imported into AutoCAD (see Figure 25). A transit and stadia rod were used to record control points on landscape and cultural features shown on the map and clearly present in the field (e.g., the three cisterns). The points were entered in AutoCAD and the Sanborn map was imported into the file as a layer. Distances and angles to other structures shown on the Sanborn map were calculated, taken back to the field, and shot with the transit and stadia rod.

Selected areas were scraped with the backhoe to locate specific structures. Archaeologists scraped areas in the field to locate small, less imposing structures such as the carpenter's shop, the office, and the domestic buildings shown on Sanborn Map rather than the large, imposing industrial facilities such as the storage warehouse, the railroad, and the acid chambers. Archaeologists avoided excavations within 100 feet of the OCRM Critical Line. The area is being preserved in a vegetative

set-back designed to protect the scenic views from Middleton Place and along the Ashley River. Archaeologists also avoided excavations in the areas around the acid chambers and furnaces as shown on the Sanborn Map. These areas may have toxic soils containing lead, mercury, and arsenic (Porter 1999). The exploratory scraping in areas based solely on historic map days failed to produce any evidence of former buildings. We identified five buildings during the mechanical excavations. These are discussed in detail below.

Structure 3. Investigators noted six parallel brick walls on the surface in the central portion of the site. These 9 inch walls are joined at one end by a perpendicular 9 inch wall. Figure 40 is a plan and view of Structure 3. The location, size, and orientation of the structure corresponds with the manufactured goods storage and shipping shed shown on the Sanborn Fire Insurance Map (see Figure 25). The Sanborn map indicates that this large and imposing building was 370 feet by 118 feet, was wood framed and three stories in height with a Monitor style roof open on the sides for ventilation. Covered platforms extended off either side of the shed to rail lines. The phosphate crushing and grinding mill extended off the south end of the building. A small bag room extended off the north end of the building (see Figure 25).

Structure 4 and the Marl Pit. A small brick pad was identified on the south edge of a large pond (see Figure 24). The pad is in the location of a structure labeled Hoisting Engine on the Sanborn Fire Insurance Map (see Figure 25). The pond is labeled "Marl Pit." Figure 41 is a view of the marl pit as it looked during the field investigations. The pond is roughly square and approximately 100 feet long on each side. The function of a marl pit in the operations of the phosphate facility is not clearly understood; however a plan of Gregg's phosphate work across the Ashley River from 38DR60/81 shows a large pond labeled "Mill Pond" (see Figure 11). The man-made pond at 38DR60/81 may have been used in the operation of the milling and processing facilities.

Structures 5, 6, and 7- The three Cisterns. Three large cisterns lie side-by-side in the south-central portion of the site (see Figure 24). Figure 42 is a view of the cisterns looking northeast. The features are constructed of a single course of bricks held together by mortar. Each cistern is approximately 12 feet in diameter. At the time of the field investigations, the cisterns were filled with water approximately 10 feet bs. Small diameter iron pipes leads into/out of each of the cisterns approximately 8 feet bs. The Sanborn Fire Insurance map of the facility shows a 2 inch water pipe leading from the cistern closest to the river to the pyrite furnaces (see Figure 25).

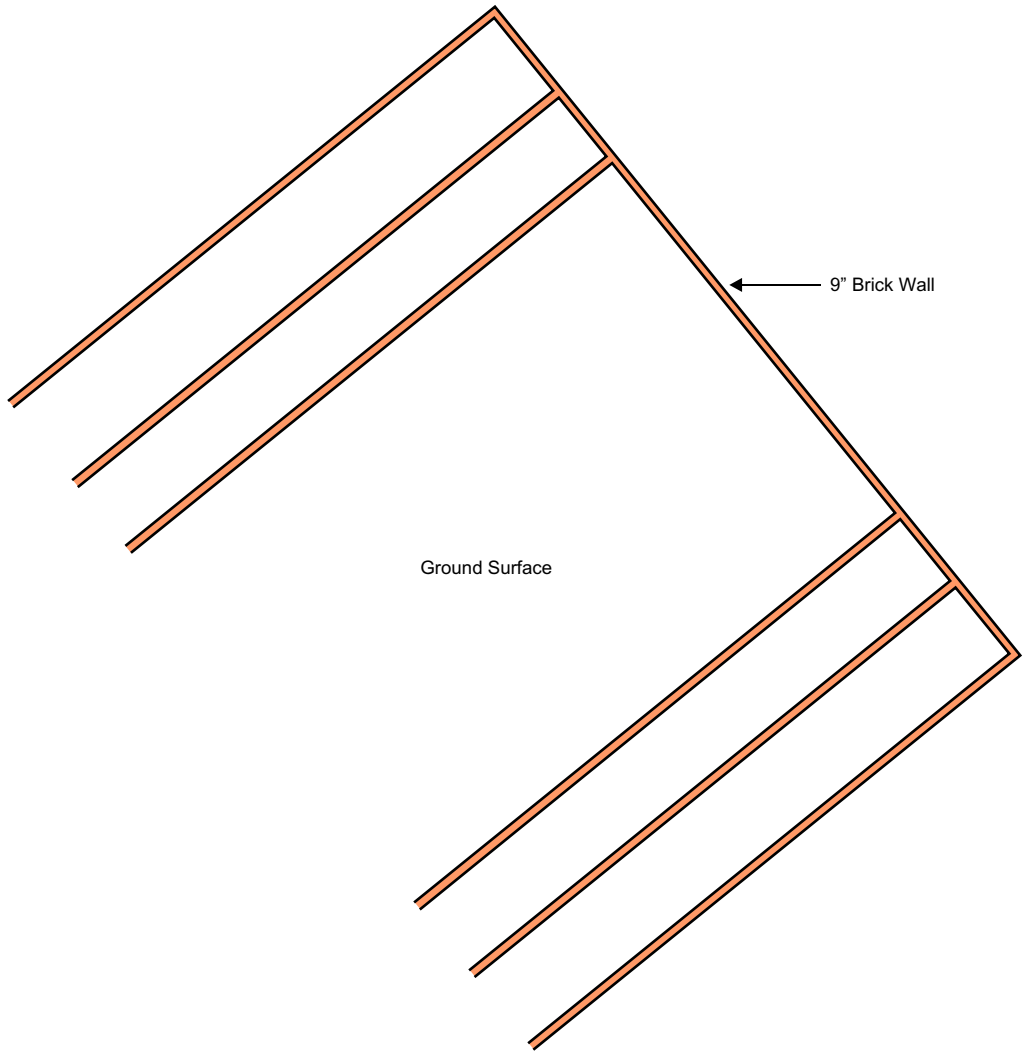


Figure 40. Plan and view of Structure 3, 38DR60/81.

Figure 41. View of the marl pit during the field investigations.

Figure 42. View of the three cisterns at 38DR60/81 looking northeast.

Structure 8. Investigators identified a 12 inch brick wall just above the ground surface in the central portion of the site (see Figure 24). Figure 43 is a view of this feature. This wall corresponds with a structure identified as a wood-framed warehouse facility on the Sanborn map (see Figure 25).

Structure 9. Investigators noted several wooden pilings in the Ashley River (see Figure 24). Figure 44 is a view of the pilings during the field investigations. The piling supported a large wooden wharf from which barges were loaded and unloaded. According to the Sanborn map, a tram extended out across the wharf (see Figure 25). An engine hoist and at least four scales for lifting and weighing goods at the dock also stood here. This facility would have provided a decidedly industrial character to the river.

Summary and Management Recommendations

Data recovery investigations focused on 1) the areas where colonial/antebellum artifacts were concentrated to recover any intact deposits or features associated with Childs Plantation that may be present, and 2) phosphate period artifact producing areas (e.g., houses, office, kitchen). Investigators hand excavated a total of 11 shovel tests and 14 meters^2 at 38DR60/81. Additional areas totaling approximately 800 meters^2 were excavated mechanically. Excavations in the northeastern portion of the site (Units 401-403) produced moderate amounts of late nineteenth to early twentieth century artifacts and several intact brick features (Structure 1) associated with a labor camp.

Shovel testing and the excavation of Units 404-406 produced artifacts from the Archaic period through the middle twentieth century, including moderate amounts of colonial/antebellum artifacts. The components are mixed vertically and the artifacts are small, suggesting significant disturbance in this portion of the site. We did not identify any intact features associated with either Childs Plantation of the phosphate works in this area. Late nineteenth to early twentieth century occupation of the site dramatically altered the landscape. Mining, building construction, and excavation of the marl pit destroyed or at least altered the natural landscape as it appeared prior to the Civil War. These activities also destroyed buildings, roads, gardens, and vegetation associated with the antebellum cultural landscape.

Additional mechanical scraping and trenching was conducted in areas likely to contain features associated with the Ashley Phosphate Works as indicated in the archival research. Efforts to locate structures using data from the Sanborn map and a laser transit in the field proved

Figure 43. View of Structure 8 at 38DR60/81.

Figure 44. View of the wharf piers at 38DR60/81.

unsuccessful. The reasons for this are unclear; however, recent efforts to locate features associated with the historic Roswell Mill using Sanborn maps, digital laser Total Station, Arcview, and ArcGIS revealed inaccuracies with the Sanborn maps making their usefulness limited in this capacity (Gardner et al. 2003). Sanborn maps are used to locate buildings quite successfully in confined, urban settings, however their accuracy may be somewhat reduced for large scale, more complex maps such as often were made for industrial sites. The maps may still be useful in locating buildings in this type of setting. However, we recommend that multiple point be verified and triangulated in the field and compared to the Sanborn maps so that adjustments can be made as necessary.

The data obtained through the field investigations conducted at 38DR60/81 will be combined with that from 38DR192 discussed below as well as the history of the phosphate industry in South Carolina presented in Chapter II.

Chapter IV. Results and Recommendations for 38DR192

Previous Investigations at 38DR192

The remains of the H. Bulwinkle phosphate works were recorded in 1977 as site 38DR60 (Brockington 1977). The site was revisited by Michael Harmon in his 1980 and 1981 reconnaissance studies (Harmon 1980,1981). No systematic investigation of the site was conducted; however, it seems that Harmon (1980) was referring to the H. Bulwinkle mill site in his discussion of 38DR60. Site 38DR60 was combined with 38DR81 as a result of the ambiguous components and boundaries of both sites. In 1993, 38DR60/81 was included as a contributing element of the Ashley River Historic District (Edmonds 1993).

Bailey (1999) revisited site 38DR60/81 during the cultural resources survey of the Appian Way Tract. Following the archival research and field investigation portions of the survey and discussions with Keith Derting, Site Files Director at the SCIAA, the boundaries of 38DR60/81 were redefined to include only the remains of the Ashley Phosphate Company's mine and mill works; the remains of the H. Bulwinkle mine and mill works located west of 38DR60/81 were assigned a separate site number (38DR192).

Figure 45 presents a plan of 38DR192. Investigators excavated seven shovel tests within the boundaries of 38DR192. Five of the tests produced small brick fragments only. The remaining two tests produced no cultural materials. The only artifacts noted during the survey investigations were two large grinding stones on the ground surface in the northern portion of the site. The size and weight of the stones made them impractical to move at the time, so they were left in the field.

Bailey (1999) recorded several features at 38DR192. These features included two large, parallel brick foundations, a deep mine or mill pond, four brick rubble piles, an eroded dike or causeway, and an earthen causeway that crosses the marsh and leads to the Ashley River.

Bailey (1999) concluded that site 38DR192 represented the remains of the H. Bulwinkle phosphate mine and mill works that operated during the late nineteenth century. Site 38DR192 is listed on the NRHP as a contributing element of the Ashley River Historic District. The site is listed on the NRHP nomination form as 38DR60 and includes ". . . an eighteenth/nineteenth century rice plantation owned by the Izard family and a nineteenth/twentieth century phosphate mining operation . . ." (Edmonds 1993:Sec. 7, page 3). No evidence of the plantation settlement was recorded in the area of 38DR192. Bailey (1999) concluded that "It is likely that the Izard Plantation referred to is

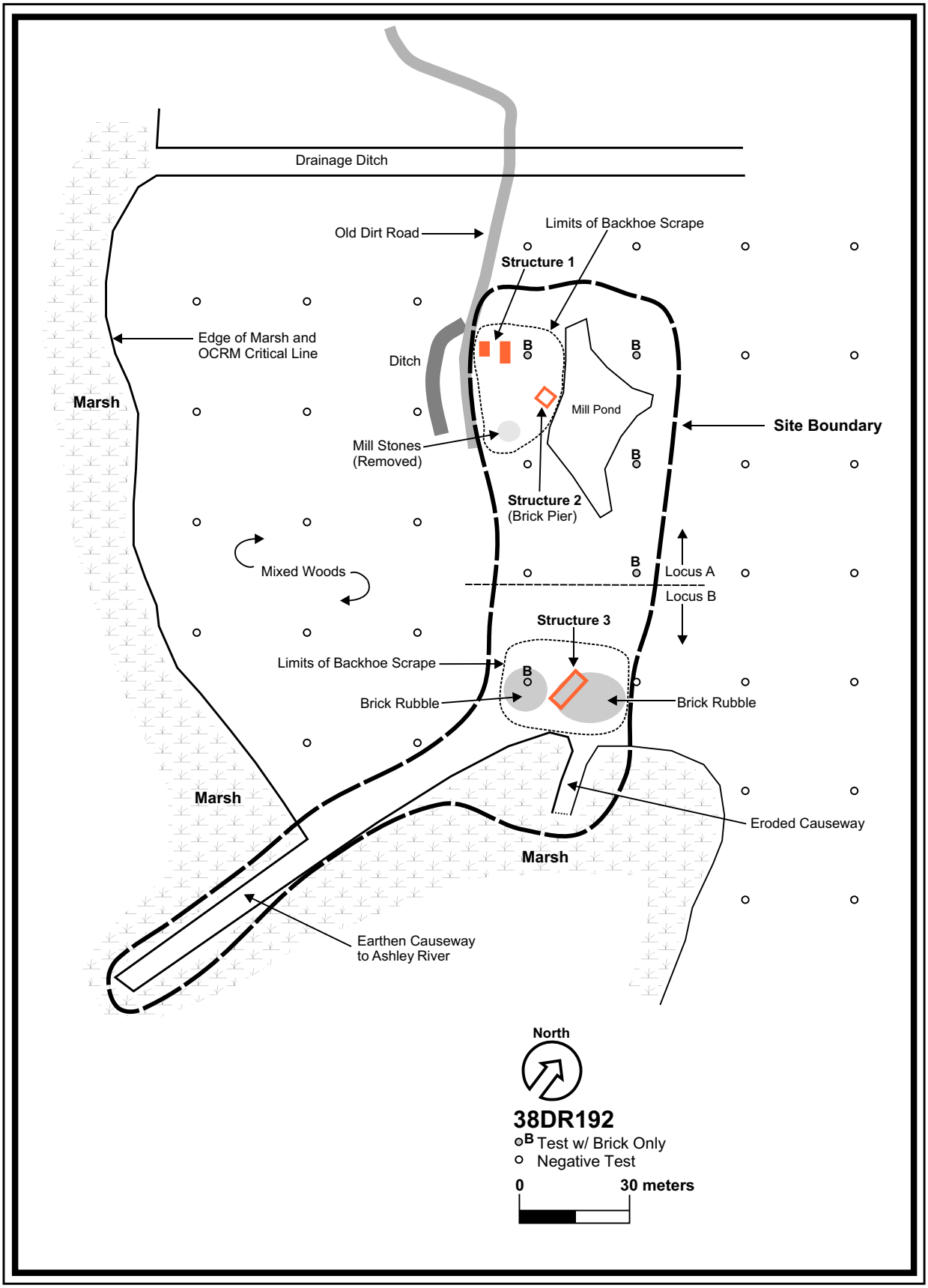


Figure 45. Plan of 38DR192.

Spring Farm Plantation recorded as 38DR161 and listed on the NRHP; therefore, 38DR192 is on the NRHP but it contains only the remains of the H. Bulwinkle phosphate mine and mill." Bailey (1999) recommended either preservation of the site or data recovery investigations at the site should preservation not be feasible.

Data Recovery Investigations at 38DR192

Field investigations at 38DR192 entailed mechanical scraping of areas where architectural features were expected. The site was divided into two loci (see Figure 45). Locus A includes the northern half of the site which contains two large brick foundations (Structure 1), a brick rubble pile (Structure 2) near the edge of the mill pond, and the mill stones. Locus B includes the southern half of the site which contains two brick rubble piles (Structure 3) near the river causeway. The field director monitored closely all mechanical excavations.

Locus A

Investigators inspected the mill stones and the area immediately around them under the assumption that because of the size and weight of the stones they probably had not been moved far from where they were used. Investigators hand stripped the stones, exposing two complete and one partial wheel. Figure 46 presents views of the grinding wheels as they were exposed in the field. The granite wheels are four feet in diameter and eight inches thick. The two complete wheels contain an iron key in the center for turning. One of the sides on each stone is grooved with a series of flutes leading from the center of the wheel to the outer edge. This fluting allowed the ground phosphate rock to flow out of the system. Archaeologists scraped an area approximately 10 by 10 meters and 50 cm deep around the mill stones with a smooth bladed backhoe (see Figure 45). No features were encountered in this area. The mill stones were subsequently removed and transported to the courtyard of the Summerville-Dorchester Museum at 100 E. Doty Avenue in Summerville to whom they were donated for permanent display.

Investigators mechanically scraped the area immediately around the two large brick foundations to identify buried architectural features (see Figure 45). None were found. The two foundations were designated Structure 1. Figure 47 presents a plan and view of Structure 1. The smaller foundation measures approximately 5.5 feet by 2.5 feet. This foundation is seven graduated brick courses tall. Mortar is present on top of the upper brick course, suggesting that at least one more brick course may have existed. A 1 inch threaded bolt with a 2¾ inch square bolt is present

Figure 46. Views of the mill stones at 38DR192.

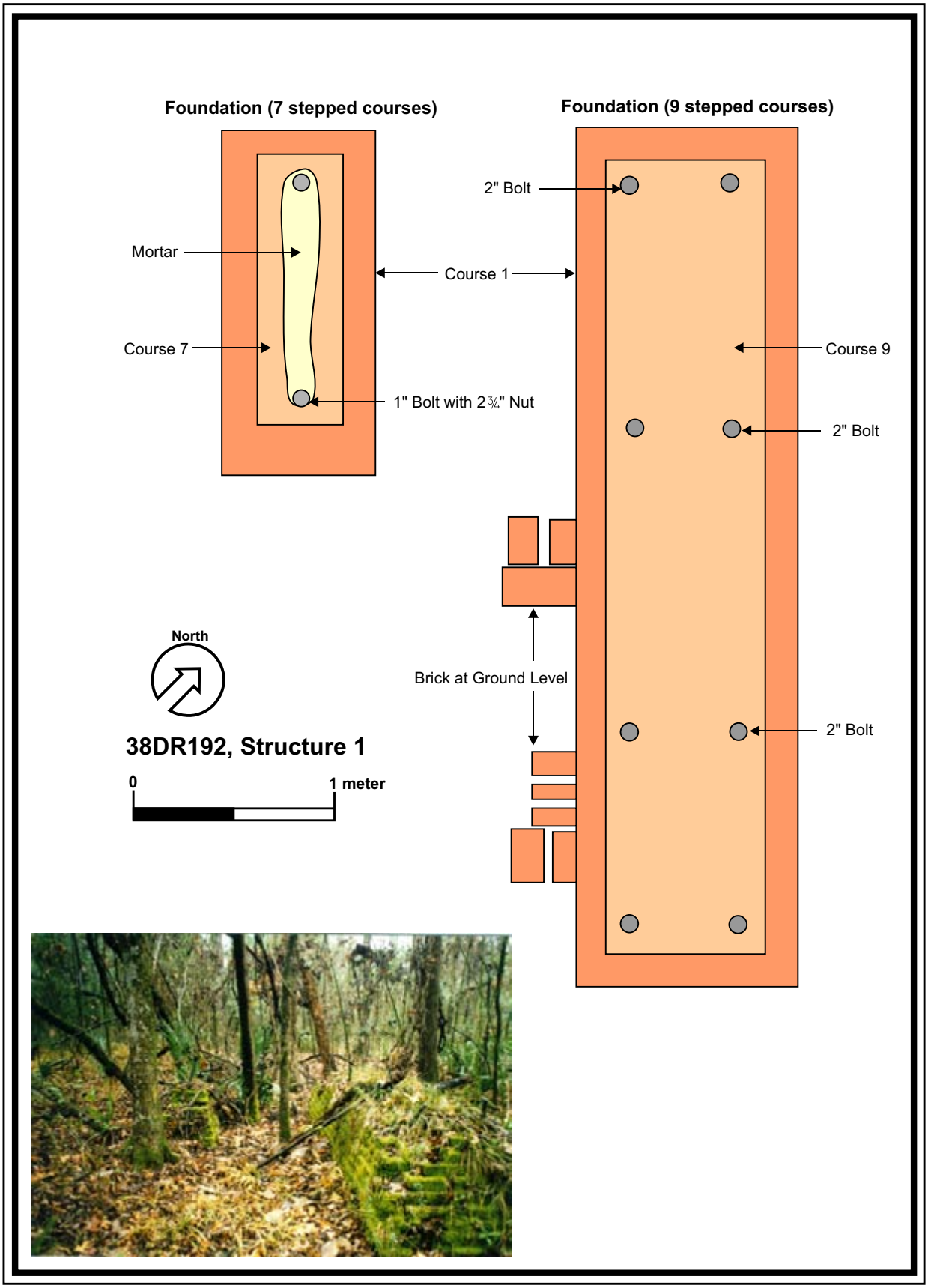


Figure 47. Plan of Structure 1 at 38DR192.

at each end of the upper course of brick. The larger foundation measures approximately 13.7 feet by 3.5 feet. This foundation is nine brick courses tall. No mortar was present on top of the upper brick course. Eight 2 inch threaded bolts are spaced along the top of the upper course of brick. Figure 48 presents views of a steam engine and wheel with the same type of foundation configuration as encountered at Structure 1 at 38DR192. The engine is bolted to the larger foundation. A wheel is bolted between two foundations, with the axle mounted on the smaller foundation and the back of the larger one. Structure 1 likely served to secure a steam engine and wheel similar to the arrangement shown in Figure 48. No artifacts were found in or around Structure 1.

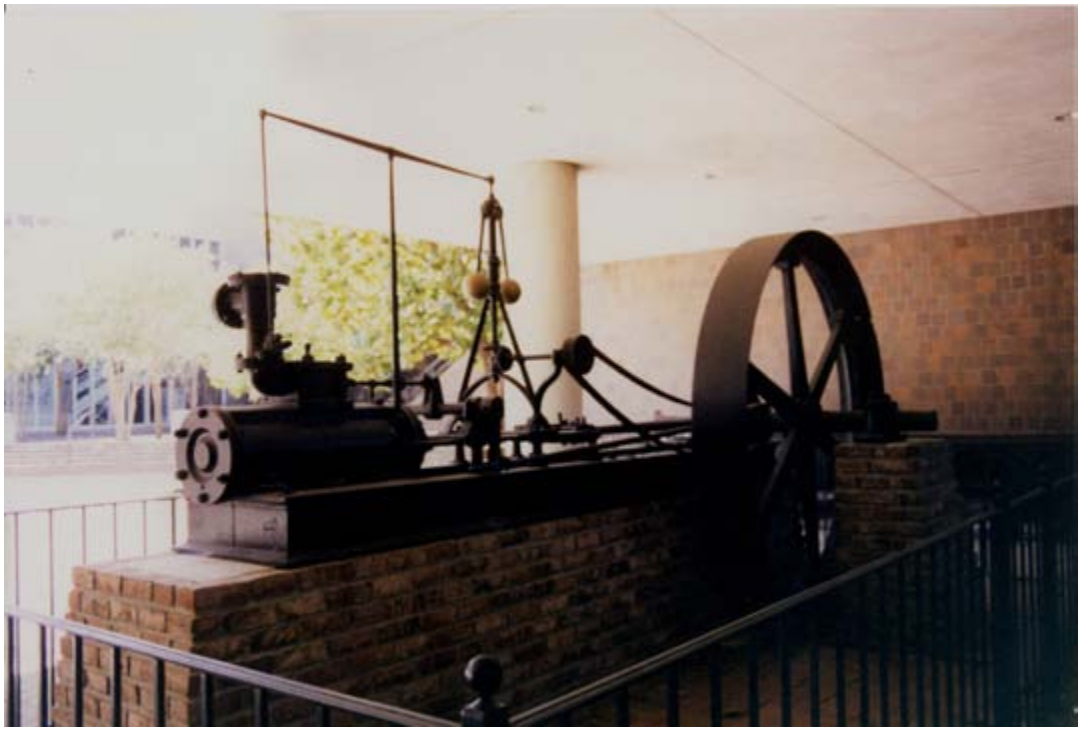
Investigators mechanically in and around the small brick rubble pile near the mill pond to identify buried architectural features (see Figure 45). These excavations revealed the remnants of an additional structure (Structure 2). Figure 49 presents a plan and view of Structure 2. Investigators encountered a three foot by two foot brick foundation at 10 cm bs. The foundation is a 9 inch wide (two brick course) wall. The interior of the three by two foot foundation is filled with 10YR2/1 clayey sand and brick rubble. A four by two foot brick foundation joins the smaller three by two foot brick foundation to the west. This foundation also was encountered at 10 cm bs. The larger foundation is a 5 inch wide (one brick course) wall. The interior is the four by two foot foundation is filled with 10YR5/8 sandy clay and brick rubble. No artifacts were found in or around Structure 2. The function of Structure 2 is unclear, though it is almost certainly associated with the H. Bulwinkle phosphate mine and mill works that operated during the late nineteenth century.

Locus B

Investigators mechanically scraped the area on and around the brick rubble piles in Locus B for buried architectural features (see Figure 46). Large amounts of brick rubble were noted 0-30 cm bs. Investigators exposed a continuous 9 inch wide, two brick course wide wall, which forms a rectangular brick foundation measuring 37 by 15.5 feet, approximately 30 cm bs. This architectural feature was designated Structure 3. Figure 50 presents a plan and view of Structure 3.

Investigators exposed an area of flat-laid brick outside the northwest corner of the foundation (see Figure 50). This area measures approximately 3.0 by 2.0 meters. This may have been the location of an entrance into the structure.

Investigators also encountered a brick chimney base inside the brick foundation, which was the interior of Structure 3 (see Figure 50). Figure 51 presents a detailed plan and view of the



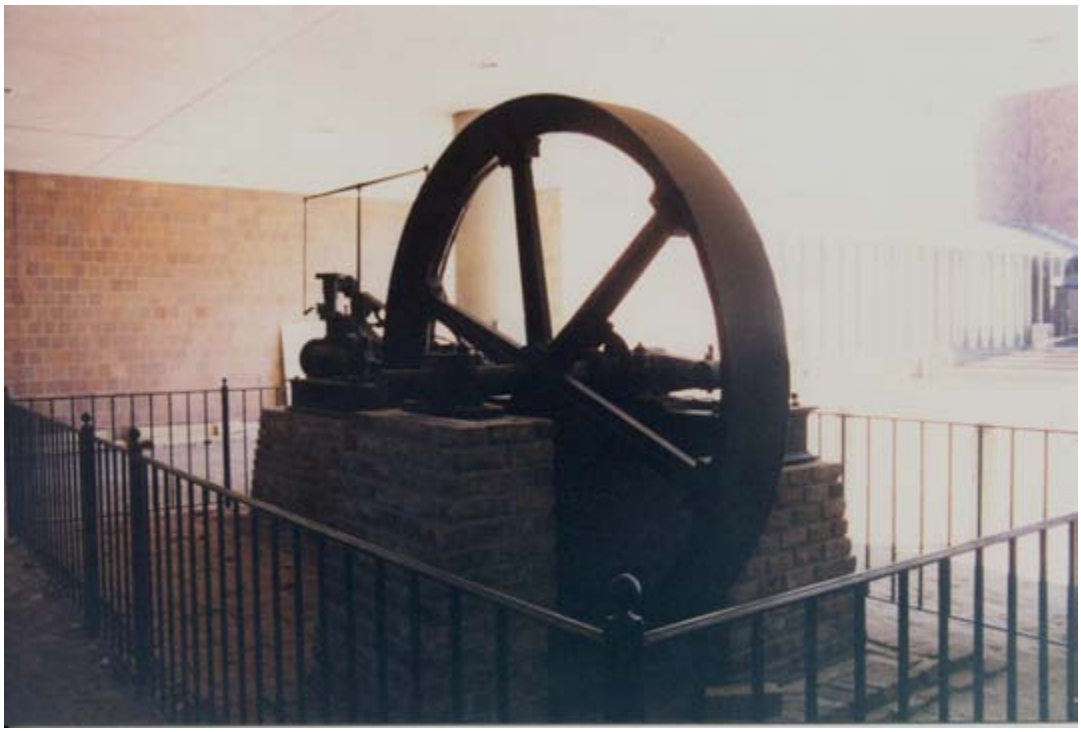


Figure 48. Views of a steam engine and wheel at the Charleston Museum.

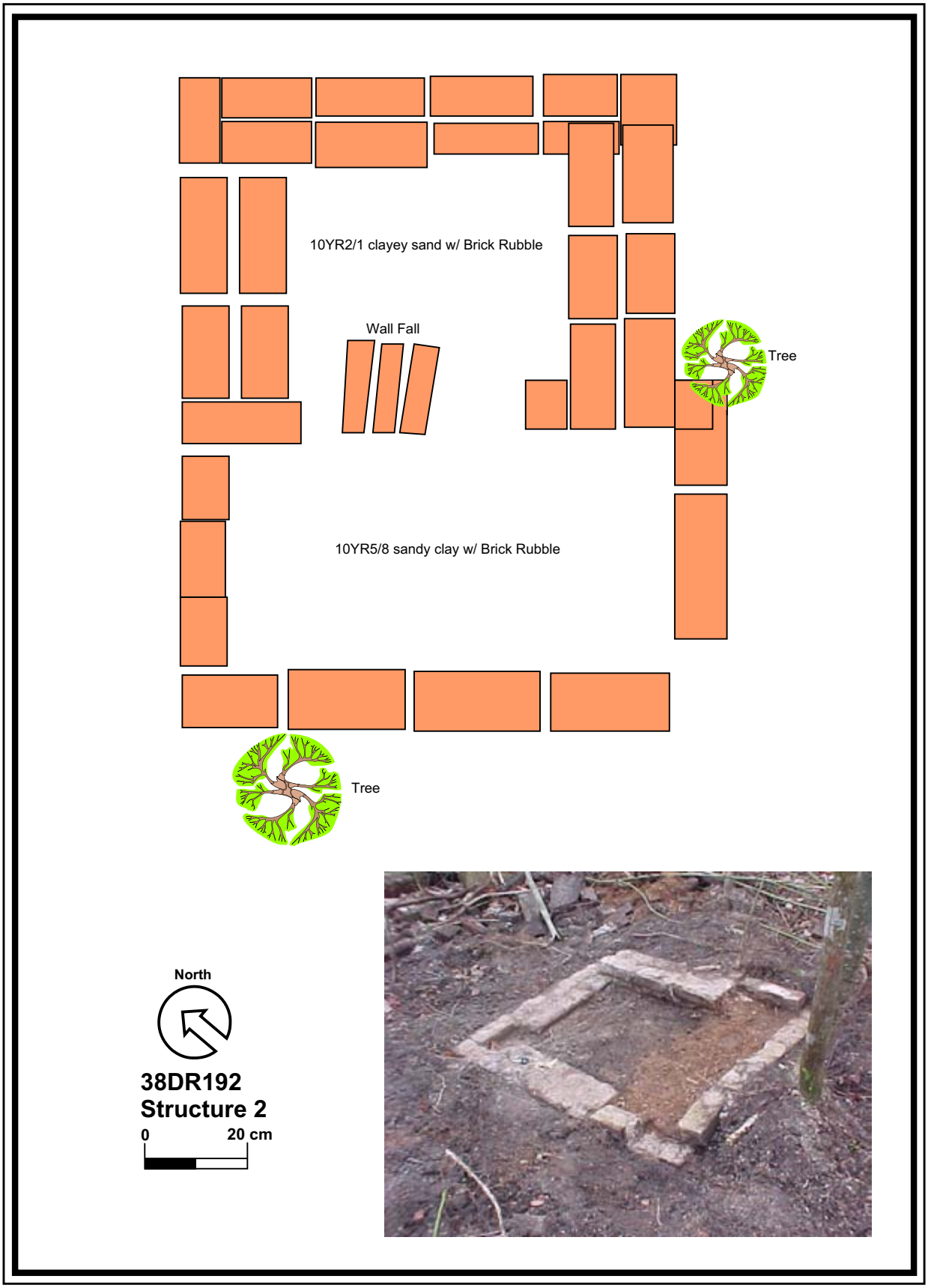


Figure 49. Plan of Structure 2 at 38DR192.

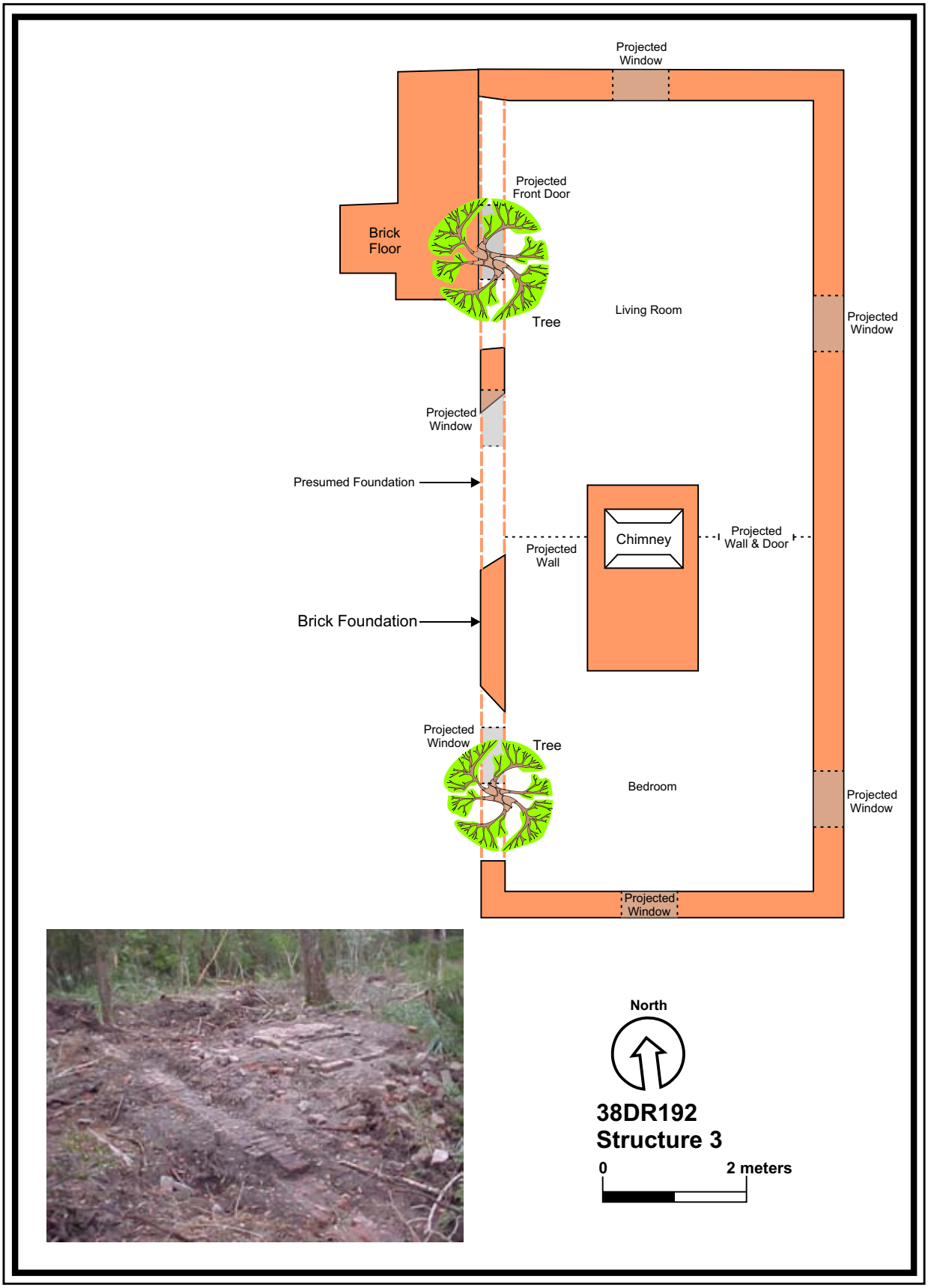


Figure 50. Plan of Structure 3 at 38DR192.

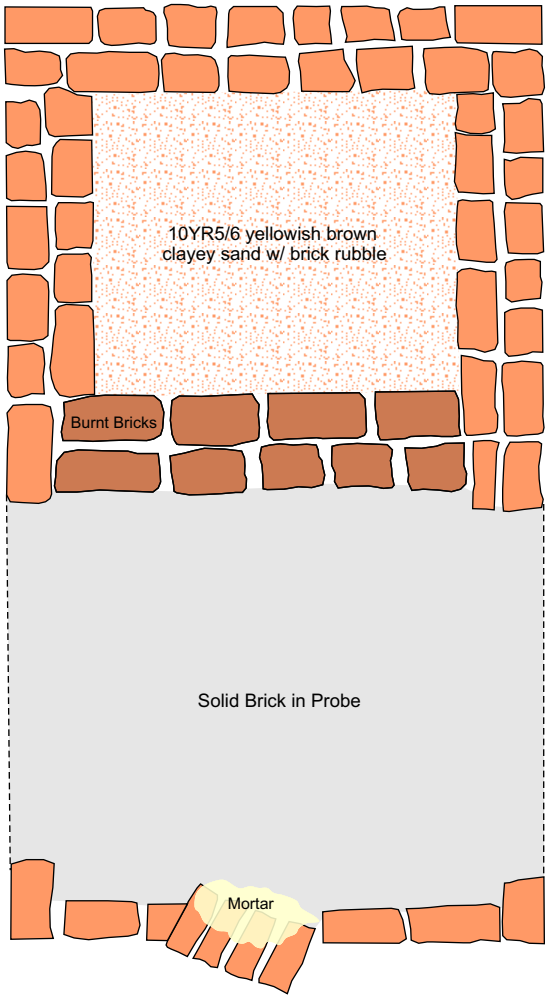


Figure 51. Plan of chimney base in Structure 3 at 38DR192.

chimney base. The chimney base measures approximately 8 by 4.5 feet. The firebox is located in the northern portion of the chimney base. The firebox measures approximately 2.6 by 3.1 feet and is filled with 10YR5/6 yellowish brown clayey sand and brick rubble. The firebox is enclosed to the north, east, and west by a 9 inch, two brick course wall. The solid brick area to the south of the firebox measures approximately 4.6 by 4.6 feet.

Investigators recovered a total of 11 artifacts from the surface in an around Structure 3. These artifacts include two undecorated ironstone sherds, one whole clear mold blown pickle jar, one amber mold blown bottle glass fragment, one dark olive green bottle glass fragment, two light blue flat glass fragments, one cut nail, one padlock, one iron eye bar, and one piece of unidentifiable iron/steel, as well as 21.02 grams of faunal material. Figure 52 presents views of some of the artifacts recovered at 38DR192. Structure 3 appears to be the remnants of a one story, two room house or office associated with the operation of Bulwinkle's phosphate mine and mill.

The earthen causeway that extends from the mainland south to the Ashley River is included within Locus B. The causeway lies along the OCRM wetland critical line, therefore mitigation was not necessary and was not conducted.

Summary and Management Recommendations

Data recovery investigations at 38DR192 entailed mechanical scraping of areas where architectural features associated with the late nineteenth century H. Bulwinkle phosphate works were expected. The site was divided into two loci. Locus A includes the northern half of the site which contains two large brick foundations (Structure 1), a brick rubble pile (Structure 2) near the artifact sample from 38DR192. edge of the mill pond, and the mill stones. Structure 1 is composed of two large brick foundations, which secured a steam engine and wheel. Structure 2 was encountered beneath the brick rubble pile and is composed of two joined brick foundations. The function of Structure 2 is unclear, though, like Structures 1 and 3, it is almost certainly associated with the H. Bulwinkle phosphate mine and mill works that operated during the late nineteenth century.

Locus B includes the southern half of the site which contains two brick rubble piles (Structure 3) near the river causeway. Structure 3 was encountered beneath the brick rubble. Structure 3 appears to be the remnants of a one story, two room house or office associated with the operation of Bulwinkle's phosphate mine and mill. The earthen causeway that extends from the mainland south to the Ashley River is included within Locus B. The causeway lies along the OCRM wetland critical line, therefore mitigation was not necessary and was not conducted.

Figure 52. An example of artifacts recovered from 38DR192.

The investigations described above were conducted as proposed in the SHPO-approved Treatment Plan for data recovery at this site. The data recovery investigations at 38DR192 recovered a sample of significant information from the site. This sample can be employed to address research questions consistent with the periods and type of occupation outlined above and in the Treatment Plan. Completion of the investigations is sufficient to mitigate the adverse effect that proposed land disturbing activities will have on this NRHP site. Land disturbing activities at 38DR192 should be allowed to proceed as planned.

A portion (the causeway) of 38DR192 lies along the OCRM wetlands critical line of the Ashley River. These data recovery excavations **do not** mitigate any potential adverse effect to the causeway or the Ashley River Historic District and Middleton Place scenic corridors. As stipulated in the Memorandum of Agreement, the property owner shall provide proposed project plans to the SHPO and provide the SHPO the opportunity for an on-site visit to ensure, under the conditions of the Ashley River Special Area Management Plan, the new construction will have no negative effect on these scenic corridors. Activities that may compromise the stability or integrity of the causeway should be avoided.

Chapter V. Project Summary

The phosphate mining and fertilizer production industry in South Carolina has received little attention from historians and archaeologists. Generally, it has been dismissed by both disciplines as a harsh, although brief period in our history when opportunistic Northern capitalists sought quick profits and former planters desperately tried to find value in their land while freed slaves struggled to make a living any way they could. To be sure the story of the phosphate period appears at first glance to hold none of the pioneering spirit of the colonial period, the romance of the plantation period, or glory of war. Archaeologists typically view phosphate mining as a destructive force that destroys other archaeological sites rather than as important sites themselves.

The historic context for the phosphate period in South Carolina developed for this project reveals a complex world derived through a unique combination of environmental, political, economical, and social conditions. The phosphate period had profound impacts on all of these; however the extent of the impacts is only just beginning to be understood by historians and environmental scientists.

Archaeologically, the value of phosphate and fertilizer production facility sites is not yet known. Like other industrial sites such as brickyards, very few artifacts are in or near the facilities themselves. From the investigations conducted for this project, it seems that future work may focus on mechanical scraping and architectural and photo documentation of the various buildings associated with these facilities so that researchers can use comparative data to interpret and evaluate sites in the future. Archaeological research can provide useful information at the sites, particularly around domestic buildings. Domestic buildings, however, are likely to only be present in the large fertilizer plants like 38DR60/81 and not at the smaller mining operations like at 38DR192. Archaeological investigations can also reveal technological improvements made to a given site. For example, at 38DR192, we saw mill stones lying beside the base of a steam engine indicating the stones had been replaced or at least supplemented by mechanical milling.

Data recovery excavations conducted at 38DR60/81 and 38DR192 have made a significant contribution to our knowledge and understanding of the phosphate industry in South Carolina. This work mitigates the adverse effects that residential development of this property will have on these sites. Additional management of 38DR60/81 and 38DR192 is not warranted. These data recovery excavations **do not** mitigate any potential adverse effect to the causeway at 38DR192 or the Ashley River Historic District and Middleton Place scenic corridors. As stipulated in the Memorandum of Agreement, the property owner shall provide proposed project plans to the SHPO and provide the

SHPO the opportunity for an on-site visit to ensure, under the conditions of the Ashley River Special Area Management Plan, the new construction will have no negative effect on these scenic corridors. Activities that may compromise the stability or integrity of the causeway should be avoided.

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Appendix A.

Artifact Inventory

Artifact Catalog

Brockington and Associates, Inc. uses the following proveniencing system. Provenience 1 designates general surface collections. Numbers after the decimal point designate subsequent surface collections, or trenches. Proveniences 2 to 200 designate shovel tests. Controlled surface collections and 50 by 50 cm units are also designated by this provenience range. Proveniences 201 to 400 designate 1 by 1 m units done for testing purposes. Proveniences 401 to 600 designate excavation units (1 by 2 m, 2 by 2 m, or larger). Provenience numbers over 600 designate features. For all provenience numbers except the numbers after the decimal point designate levels. Provenience X.0 is a surface collection at a shovel test or unit. X .1 designates level one, and X.2 designates level two. For example, 401.2 is Excavation Unit 401, level 2. Flotation samples a designated by a 01 added after the level. For example, 401.201 is the flotation material from Excavation Unit 401, level 2.

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Site Number	Page Number
38DR161	**A - 1**

Site Number: 38DR161

PROVENIENCE NUMBER: 1 . 0 General surface collection

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		hand painted ironstone	
2	5		undecorated ironstone	2 mend, ironstone makers mark with unicorn
3	1		blue transfer printed whiteware	

PROVENIENCE NUMBER: 1 . 1 Structure 2, general surface collection

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		dark olive green mold blown bottle glass	
2	1		undecorated ironstone	
3	2		unidentifiable nail	
4	4		spike	
5	1		horse shoe	
6	1		iron hinge (architectural)	
7	1		amber panel bottle glass	whole bitters bottle embossed with "WAMPOO BITTERS", "SIEGEL & BRO NEW YORK"

PROVENIENCE NUMBER: 1 . 2 Structure 1, chimney 1, general surface collection

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		clear bottle glass	
2	2		amethyst panel bottle glass	
3	1		unidentified lead object	
4		11.51	faunal remains	

PROVENIENCE NUMBER: 1 . 3 Structure 1, chimney 2, general surface collection

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		stoneware ginger beer/ink bottle	
2	1		mold decorated ironstone	
3	1		undecorated ironstone	
4	2		light blue bottle glass	
5	2		dark olive green bottle glass	
6	1		amber panel bottle glass	
7	1		molded/pressed tumbler (glass)	
8	1		ink jar/bottle	
9	2		unidentifiable nail	
10		18.00	faunal remains	
11	1		brick tile	

PROVENIENCE NUMBER: 2 . 1 Transect 3, shovel test 6

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		black transfer printed whiteware	
2	2		dark olive green bottle glass	
3	1		light blue bottle glass	
4	2		clear flat (window) glass	
5	14		light blue flat (window) glass	
6	1		common cut nail	
7	1		unidentifiable nail	
8	1		unidentifiable iron/steel	
9	3		unidentifiable iron/steel	discarded in lab
10		1,000.00	unglazed brick fragments	discarded in field

PROVENIENCE NUMBER: 3 . 1 Transect 3, 15m N of shovel test 6

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		undecorated pearlware	
2	1		blue transfer printed pearlware	
3	5		light blue flat (window) glass	
4	1		plain kaolin pipe stem	
5	1		unidentified brass object	
6	2		unidentifiable square nail	
7		0.20	roofing slate	
8		1,000.00	unglazed brick fragments	discarded in field

PROVENIENCE NUMBER: 4 . 1 Transect 3, 15m E of shovel test 6

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		light blue flat (window) glass	
2	1		common cut nail	
3	1		spike	
4		100.00	unglazed brick fragments	discarded in field

PROVENIENCE NUMBER: 401 . 1 Excavation unit 401, level 1

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		annular yellowware	
2	2		British Brown stoneware	
3	2		Jackfield (redware)	
4	5		blue shell edged pearlware	
5	7		blue transfer printed pearlware	
6	4		blue hand painted pearlware	2 mend
7	4		undecorated creamware	2 mend
8	11		undecorated pearlware	2 mend

9	2		unidentified burned ceramic	
10	1		eroded body sherd, fine/medium sand temper	
11	2		glass buttons	white, 4 holed
12	1		clear salt glazed stoneware	
13	1		bone button	embossed with "Co. 1851. P=T"
14	1		aqua bottle glass	
15	1		iron clothing rivet	
16	9		dark olive green bottle glass	
17	9		brown bottle glass	
18	10		amber bottle glass	
19	8		clear bottle glass	
20	2		clear panel bottle glass	1 embossed with "URNS & CO Philadelphia, PA"
21	31		not used	
22	650		light blue flat (window) glass	
23	1		iron belt buckle	
24	1		screw	
25	29		unidentifiable nail	
26	60		unidentifiable square nail	
27	45		common cut nail	
28		45.20	faunal remains	
29		66,000.00	unglazed brick fragments	discarded in field
30	1		petrified material	

PROVENIENCE NUMBER: 401 . 2 Excavation unit 401, level 2

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	5		blue shell edged pearlware	
2	3		green shell edged pearlware	
3	7		blue transfer printed pearlware	
4	2		annular pearlware	
5	3		lead glazed redware	
6	1		hand painted/overglaze enamel creamware	
7	5		undecorated creamware	
8	17		undecorated pearlware	
9	1		unidentified burned ceramic	
10	1		lamp part (metal)	brass
11	1		molded kaolin pipe bowl	
12	1		plain kaolin pipe stem	
13	3		dark olive green bottle glass	
14	2		olive green bottle glass	
15	8		clear bottle glass	
16	63		light blue flat (window) glass	
17	7		unidentifiable nail	
18		250.00	unglazed brick fragments	discarded in field
19	1		blue hand painted pearlware	

PROVENIENCE NUMBER: 401 . 3 Excavation unit 401, level 3

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	3		blue transfer printed pearlware	
2	1		lead glazed redware	
3	1		undecorated pearlware	
4	1		dark olive green bottle glass	
5	3		unidentifiable nail	
6	10		light blue flat (window) glass	

7	3		eroded body sherd, coarse sand temper	
8		100.00	unglazed brick fragments	discarded in field
9	1		clear bottle glass	
10	1		light blue bottle glass	

PROVENIENCE NUMBER: 401 . 4 Excavation unit 401, level 4

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		lead glazed redware	
2	1		undecorated creamware	
3	1		undecorated pearlware	
4	1		residual sherd	
5	2		light blue flat (window) glass	

PROVENIENCE NUMBER: 402 . 1 Excavation unit 402, level 1

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		glass buttons	white, 4 holed
2	43		light blue flat (window) glass	
3	1		common cut nail	
4	36		unidentifiable square nail	
5		1.60	faunal remains	
6		74,000.00	unglazed brick fragments	discarded in field
7		16,000.00	mortar	discarded in field

PROVENIENCE NUMBER: 402 . 2 Excavation unit 402, level 2

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		green shell edged pearlware	
2	1		buffware with undecorated slip	
3	1		Westerwald stoneware	
4	1		undecorated ironstone	
5	2		clear bottle glass	
6	1		dark olive green bottle glass	
7	1		aqua bottle glass	
8	4		amber bottle glass	
9	1		molded/pressed unidentifiable form tableglass	
10	280		light blue flat (window) glass	
11	29		unidentifiable nail	
12	9		unidentifiable square nail	
13		4.40	faunal remains	
14		750.00	unglazed brick fragments	discarded in field
15		100.00	mortar	discarded in field

PROVENIENCE NUMBER: 402 . 3 Excavation unit 402, level 3

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		fabric impressed body sherd, grog temper	Wilmington
2	4		residual sherd	
3	8		unidentifiable nail	
4	2		unidentifiable square nail	
5	3		dark olive green bottle glass	
6	1		clear bottle glass	
7	31		light blue flat (window) glass	
8		3.90	faunal remains	
9		150.00	unglazed brick fragments	discarded in lab

PROVENIENCE NUMBER: 403 . 1 Excavation unit 403, level 1

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		undecorated ironstone	
2	1		glass buttons	white, 4 holed
3	2		light blue bottle glass	
4	4		clear bottle glass	
5	6		light blue flat (window) glass	
6	2		clear flat (window) glass	
7		23.90	roofing slate	
8	2		spike	
9	1		iron/steel harmonica part	
10	25		unidentifiable square nail	
11	16		unidentifiable nail	
12		6,000.00	unglazed brick fragments	discarded in field
13		38.80	mortar	discarded in lab

PROVENIENCE NUMBER: 403 . 2 Excavation unit 403, level 2

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		lead glazed redware	mend
2	4		blue shell edged pearlware	mend
3	2		undecorated pearlware	
4	1		undecorated creamware	
5	1		glass buttons	white, 4 holed
6	1		iron/steel harmonica part	
7	2		amber bottle glass	
8	2		dark olive green bottle glass	
9	1		washer	
10	32		light blue flat (window) glass	
11	9		clear bottle glass	
12	6		spike	
13	3		light blue bottle glass	1 embossed with "...YDIA E PIN…" "TABLE CON…"
14	1		shotgun shell	
15	1		lead/graphite pencil	
16	1		miscellaneous hardware	nut, washer and bolt
17	2		unidentifiable iron/steel	discarded in lab
18		4.80	roofing slate	
19	28		unidentifiable square nail	
20	23		unidentifiable nail	
21		94.10	faunal remains	
22		3,500.00	unglazed brick fragments	discarded in field

PROVENIENCE NUMBER: 403 . 3 Excavation unit 403, level 3

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		Chinese export overglaze porcelain	
2	1		redware with combed slip	
3	1		polychrome hand painted pearlware	
4	4		undecorated pearlware	
5	2		residual sherd	
6	2		dark olive green bottle glass	
7	8		light blue flat (window) glass	
8	1		brass eyelet (clothing)	
9	2		unidentifiable square nail	
10	1		unidentifiable nail	

11	1		pharmaceutical bottle	embossed with "CHEESEBROUGH MFG. CO. VASELINE"
12		100.00	unglazed brick fragments	discarded in lab

PROVENIENCE NUMBER: 404 . 1 Excavation unit 404, level 1

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	5		buffware with combed slip	mend
2	1		Canaryware (buffware)	
3	6		Jackfield (redware)	
4	1		Philidalphia red bodied slipware	
5	2		green shell edged pearlware	mend
6	1		undecorated Delft	
7	1		glaze absent Delft	
8	1		annular creamware	
9	2		polychrome hand painted pearlware	
10	3		annular pearlware	
11	1		not used	
12	1		Mocha on creamware	
13	1		Mocha pearlware	
14	1		alkaline glazed stoneware	
15	1		clear salt glazed stoneware	
16	1		Chinese export overglaze porcelain	
17	7		Chinese undecorated porcelain	2 mend
18	1		decal decorated porcelain	
19	6		blue shell edged pearlware	2 mend
20	15		blue hand painted pearlware	4 mend
21	35		blue transfer printed pearlware	9 mend
22	49		undecorated pearlware	2 mend
23	15		undecorated ironstone	7 mend
24	43		undecorated creamware	
25	1		molded kaolin pipe bowl	
26	1		plain kaolin pipe bowl	
27	4		plain kaolin pipe stem	
28	2		glass buttons	cobalt blue, 2 holed
29	1		glass buttons	white, 2 holed
30	3		glass buttons	white, 4 holed
31	5		brass eyelet (clothing)	
32	0		not used	
33	1		cobalt blue bottle glass	
34	3		amber bottle glass	
35			not used	
36	80		dark olive green bottle glass	
37	2		light green bottle glass	
38	7		light blue bottle glass	
39	9		light blue panel bottle glass	
40	25		clear bottle glass	
41	29		burned glass	
42	2		glass stemware	
43	7		molded/pressed tumbler (glass)	
44	527		light blue flat (window) glass	
45	17		clear flat (window) glass	
46	8		molded/pressed unidentifiable form tableglass	
47	15		unidentifiable iron/steel	discarded in lab
48	1		drawer pull	iron
49	3		iron band	

50	1		spike	
51	2		screw	
52	12		common cut nail	
53	172		unidentifiable square nail	
54	82		unidentifiable nail	
55		3.70	roofing slate	
56		92.00	faunal remains	
57	1		brass clasp	hair barrette
58	1		center fire cartridge	.38 caliber
59	3		rimfire cartridge	.22 caliber
60	4		leather harness	brass rivets from harness
61	1		miscellaneous hardware	flange
62	1		miscellaneous hardware	brass hook
63		15,000.00	unglazed brick fragments	discarded in field
64		50.00	oyster	discarded in lab

PROVENIENCE NUMBER: 404 . 2 Excavation unit 404, level 2

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	5		blue hand painted pearlware	2 mend
2	1		Westerwald stoneware	
3	1		green shell edged pearlware	
4	3		Chinese undecorated porcelain	
5	1		Jackfield (redware)	
6	2		undecorated pearlware	
7	5		blue transfer printed pearlware	
8	9		undecorated pearlware	
9	1		cobalt blue bottle glass	
10	3		aqua bottle glass	
11	14		dark olive green bottle glass	
12	94		light blue flat (window) glass	
13	16		clear bottle glass	
14	3		burned glass	
15	6		unidentifiable square nail	
16	24		unidentifiable nail	
17		5.90	faunal remains	
18		150.00	mortar	discarded in lab
19		3,000.00	unglazed brick fragments	discarded in lab

PROVENIENCE NUMBER: 404 . 3 Excavation unit 404, level 3

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		blue hand painted pearlware	
2	8		blue transfer printed pearlware	2 mend
3	1		amber bottle glass	
4	4		dark olive green bottle glass	
5	1		clear bottle glass	
6	31		light blue flat (window) glass	
7	12		unidentifiable nail	
8		8.80	faunal remains	
9		5,500.00	unglazed brick fragments	discarded in field

PROVENIENCE NUMBER: 404 . 4 Excavation unit 404, level 4

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		blue transfer printed pearlware	
2	2		dark olive green bottle glass	

3	19		light blue flat (window) glass	
4	4		unidentifiable nail	
5		1.60	faunal remains	
6		60.00	unglazed brick fragments	discarded in lab

PROVENIENCE NUMBER: 405 . 1 Excavation unit 405, level 1

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		lead glazed redware	
2	3		undecorated pearlware	2 mend
3	1		annular pearlware	
4	1		unidentified burned ceramic	
5	1		plain body sherd, coarse sand temper	
6	2		glass buttons	white, 4 holed
7	1		coin	1882 Indian head penny
8	1		iron shoe buckle	
9	2		dark olive green bottle glass	
10	1		clear free blown bottle glass	
11	9		amber bottle glass	
12	9		light blue bottle glass	
13	18		clear bottle glass	3 embossed with SC Dispensary emblem
14	87		light blue flat (window) glass	
15	1		large spoon	
16	1		washer	
17	1		screw	
18	1		iron belt buckle	
19	2		iron band	
20	2		unidentifiable iron/steel	
21	1		brass nail	
22	1		common cut nail	
23	41		unidentifiable square nail	
24	13		unidentifiable nail	
25	5		unidentifiable iron/steel	discarded in lab
26		58.50	faunal remains	
27		41,000.00	unglazed brick fragments	discarded in field
28		1,000.00	mortar	discarded in field
29	1		clear mold blown bottle glass	

PROVENIENCE NUMBER: 405 . 2 Excavation unit 405, level 2

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		redware with dot and trail slip	
2	2		green shell edged pearlware	
3	1		undecorated porcelain	
4	1		lead glazed redware	
5	7		blue transfer printed pearlware	
6	2		polychrome hand painted pearlware	mend
7	5		blue shell edged pearlware	
8	31		undecorated pearlware	11 mend
9	3		dark olive green bottle glass	
10	3		olive green bottle glass	
11	7		amber bottle glass	
12	8		clear bottle glass	
13	12		light blue bottle glass	
14	1		amber panel bottle glass	

15			not used	
16	1		glass buttons	white, 2 holed
17	1		glass buttons	white, 4 holed
18	48		light blue flat (window) glass	
19	1		leather harness	rubber covered iron buckle
20	13		unidentifiable square nail	
21	1		iron hinge (architectural)	
22	1		unidentifiable iron/steel	
23	20		unidentifiable nail	
24		31.00	faunal remains	
25		500.00	mortar	discarded in lab
26		4,500.00	unglazed brick fragments	discarded in lab

PROVENIENCE NUMBER: 405 . 3 Excavation unit 405, level 3

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		polychrome hand painted pearlware	
2	1		lead glazed redware	
3	1		feather/molded, no color, creamware	
4	6		blue shell edged pearlware	4 mend
5	7		blue transfer printed pearlware	
6	4		unidentified burned ceramic	
7	1		undecorated creamware	
8	9		undecorated pearlware	
9	3		dark olive green bottle glass	
10	1		colonoware body sherd	
11	3		unidentifiable iron/steel	discarded in lab
12	3		eroded body sherd, coarse sand temper	
13	5		residual sherd	
14	17		light blue flat (window) glass	
15	2		light blue bottle glass	
16	7		clear bottle glass	
17	1		center fire cartridge	
18		1.10	faunal remains	
19		1,000.00	unglazed brick fragments	discarded in field
20		22.00	oyster	discarded in lab

PROVENIENCE NUMBER: 405 . 4 Excavation unit 405, level 4

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	1		lead glazed redware	
2	1		blue shell edged pearlware	
3	1		mold decorated porcelain	
4	1		light blue flat (window) glass	
5	1		fabric impressed body sherd, coarse sand temper	Deptford
6	1		simple stamped body sherd, coarse sand temper	Deptford

PROVENIENCE NUMBER: 406 . 1 Excavation unit 406, level 1

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1	2		green shell edged pearlware	
2	1		green shell/feather edge creamware	
3	31		blue shell edged pearlware	3 mend
4	2		polychrome hand painted pearlware	
5	5		blue hand painted pearlware	3 mend
6	1		lead glazed redware	
7	54		blue transfer printed pearlware	8 mend
8	1		Whieldon (creamware)	

9	8		annular creamware	
10	2		feather/molded, no color, creamware	
11	1		Westerwald stoneware	
12	1		clear salt glazed stoneware	
13	3		Chinese undecorated porcelain	
14	3		Chinese export overglaze porcelain	
15	2		not used	
16	1		decal decorated porcelain	
17	2		Black Basalt stoneware	
18	83		undecorated pearlware	2 mend
19	33		undecorated creamware	
20	22		undecorated ironstone	
21	8		unidentified burned ceramic	5 mend
22	1		glass buttons	white, 4 holed
23	3		plain kaolin pipe stem	
24	1		bone toothbrush	
25	1		fabric impressed body sherd, coarse sand temper	Deptford
26	1		annular ironstone	
27	1		finger painted pearlware	
28	4		annular pearlware	
29	1		Chinese blue underglazed porcelain	
30	1		redware with undecorated slip	
31	4		redware with combed slip	
32	2		clear salt glazed stoneware	Albany slipped interior
33	2		alkaline glazed stoneware	
34	4		undecorated whiteware	2 mend
35	2		shell button	2 holed
36	2		bone button	4 holed
37	2		plain body sherd, coarse sand temper	
38	1		eroded body sherd, fine/medium sand temper	
39	2		residual sherd	
40	1		etched unidentifiable form tableglass	
41	7		clear bottle glass	
42	8		amber bottle glass	
43	20		dark olive green bottle glass	
44	20		light blue bottle glass	
45	7		light blue panel bottle glass	5 mend, embossed with "COCA BEEF TONIC"
46	373		light blue flat (window) glass	
47	52		burned glass	
48	1		wire	
49	2		fire cracked rock	
50	266		unidentifiable nail	
51	86		unidentifiable square nail	
52	17		common cut nail	
53	3		spike	
54	1		spring	
55	1		miscellaneous hardware	iron ring
56	13		unidentifiable iron/steel	discarded in lab
57		22.00	charcoal	
58		151.90	faunal remains	
59		129.00	marble	
60	1		staple	
61	1		kettle	fragment
62	1		miscellaneous hardware	brass hook

63	1		iron hasp (architectural)	
64	1		lamp part (metal)	metal cap, possibly a fuel cap
65		50.00	mortar	discarded in lab
66		76.00	glazed brick fragments	discarded in lab
67		750.00	oyster	discarded in lab
68		288,000.00	unglazed brick fragments	discarded in field

PROVENIENCE NUMBER: 603 . 401 Feature 603, excavation unit 404, level 4, flotation

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1		0.53	flotation - light fraction	
2		1.00	oyster	discarded in lab

PROVENIENCE NUMBER: 604 . 401 Feature 604, excavation unit 404, level 4, flotation

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1		8.50	flotation - light fraction	
2	1		blue hand painted pearlware	
3	1		undecorated creamware	
4	1		glaze absent Delft	
5	13		light blue flat (window) glass	
6	1		dark olive green mold blown bottle glass	
7	1		unidentifiable form tableglass	
8	2		unidentifiable nail	
9		13,045.50	unglazed brick fragments	discarded in lab
10		1.70	oyster	discarded in lab

PROVENIENCE NUMBER: 605 . 401 Feature 605, excavation unit 404, level 4, flotation

Catalog #	*Count*	*Weight*	*Artifact Description*	*Comments*
1		19.43	flotation - light fraction	
2	1		undecorated creamware	
3	4		light blue flat (window) glass	
4	1		clear bottle glass	
5		8.50	unglazed brick fragments	discarded in lab
6		1.50	periwinkle	discarded in lab
7		1.00	oyster	discarded in lab

Appendix B.

Resume of Principal Investigator

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Education

1997 M.A. The Citadel and The University of Charleston, Charleston, S.C. (History)

1990 B.A. The George Washington University, Washington, D.C. (Anthropology)

Employment

Branch Chief, Brockington and Associates, Inc., 2002 to present

Archaeologist, Brockington and Associates, Inc., 1996 to 2001

Research Associate, Brockington and Associates, Inc., 1993 to 1995

Archaeological Field Technician, Brockington and Associates, Inc., 1992

Reports And Papers Presented

Historian

1993 (with Eric C. Poplin)
Cultural Resources Reconnaissance of the Hibri Tract, Charleston County, South Carolina. Prepared for the South Carolina Real Estate Development Board, Columbia, South Carolina.

1993 (with Eric C. Poplin and Elsie I. Eubanks)
Cultural Resources Survey of the Hibri Tract, Charleston County, South Carolina. Prepared for the South Carolina Real Estate Development Board, Columbia.

1993 (with Eric C. Poplin and David C. Jones)
An Intensive Cultural Resources Survey of a Lake Marion Transmission Line Right-of-Way, Berkeley and Clarendon Counties, South Carolina. Prepared for Newkirk Environmental Consultants, Inc., Charleston, South Carolina.

1993 (with Eric C. Poplin)
Cultural Resources Reconnaissance of Selected Portions of Sunny Point Farms, Wadmalaw Island, South Carolina. Prepared for Sunny Point Farms, Wadmalaw Island, South Carolina.

1993 (with Eric C. Poplin and Elsie I. Eubanks)
Cultural Resources Survey of the Silverman Tract, Charleston County, South Carolina. Prepared for the Southern National Bank of South Carolina, Charleston.

1994 (with Eric C. Poplin and David C. Jones)
An Intensive Cultural Resources Survey of Two Proposed New Mining Areas, Blue Circle Cement, Inc., Harleyville, Dorchester County, South Carolina. Prepared for Kilpatrick and Cody, Atlanta, Georgia.

1994 (with Eric C. Poplin and Elsie Eubanks)
Cultural Resources Survey and Testing of the Ellis Tract, Charleston County, South Carolina. Prepared for the Ellis Family, Charleston, South Carolina.

1995 (with Eric C. Poplin and Elsie Eubanks)
Cultural Resources Survey and Testing of the Bulls Bay Overlook Tract, Charleston County, South Carolina. Prepared for Reg Tisdale, Indianapolis, Indiana.

1995 *The Use of Plats in Historical Archaeology: The H.A.M. Smith Plat Collection at the South Carolina Historical Society*. Paper presented at the South Carolina Archaeological Society Annual Meeting, Columbia, 1 May.

1995 *Cultural Resources Survey of Selected Improvements of the Columbia Metropolitan Airport, Lexington County, South Carolina*. Prepared for LPA Group, Inc., Columbia.

1996 (with Eric C. Poplin)
Archaeological Survey of the Proposed East and West Access Shafts for the Bushy Park Water Tunnel, Berkeley County, South Carolina. Prepared for the Commissioners of Public Works, City of Charleston, South Carolina.

1996 (with Tina Rust)
Archaeological Survey of the Proposed Naval Nuclear Power Training Command Facility, Naval Weapons Station- Charleston, Berkeley County, South Carolina. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

1996 (with Todd McMakin and Eric C. Poplin)
Historic Resources Survey of 1,700 Acres of US Forest Service Land, Camp Shelby, Mississippi. Prepared for the Mississippi Military Department, Jackson.

1996 *Archaeological Reconnaissance of the Oak Park Tract, Mt. Pleasant, South Carolina*. Prepared for Marc Copeland, Mt. Pleasant.

1996 (with Tina Rust and Eric C. Poplin)
Cultural Resources Survey of a 15 Acre Tract, E.I. DuPont de Nemours' Cooper River Plant, Berkeley County, South Carolina. Prepared for E.I. DuPont de Nemours' and Company, Charleston.

1996 *Archaeological Reconnaissance of the Clubhouse Road Mine Site, Dorchester County, South Carolina*. Prepared for Sabine and Waters, Summerville.

1996 (with Eric C. Poplin)
Archaeological Survey of the McGinnis-Horres Tract, James Island, South Carolina. Prepared for Patrick N. McGinnis and Marietta M. Horres.

1996 (with Tina Rust and Eric C. Poplin)
Archaeological Monitoring of a Proposed Water Line Easement, Fort Johnson (38CH69), Charleston, South Carolina. Prepared for City of Charleston Commissioners of Public Works, Charleston.

1996 *Cultural Resources Overview of the Wescot Tract, Dorchester County, South Carolina.* Prepared for The Westvaco Corporation, Summerville.

1996 Archaeological Reconnaissance, Davis Road Mine Site, Beaufort County, South Carolina. Prepared for Cleland Construction Company, Hilton Head Island, South Carolina.

1997 (with Eric C. Poplin)
Archaeological Reconnaissance and Assessment, Legend Oaks Plantation and Country Club, Dorchester County, South Carolina. Prepared for Trico Engineering Consultants, Inc., North Charleston.

1997 (with Tina Rust and Eric C. Poplin)
Cultural Resources Survey of the Proposed Palmetto Parkway Corridor, Charleston and Dorchester Counties, South Carolina. Prepared for the Charleston County Department of Public Works, Charleston.

1997 (with Todd McMakin and Eric C. Poplin)
Cultural Resources Survey of the Godley Tract-Phase I, Chatham County, Georgia. Prepared for the Branigar Organization, Savannah.

1998 (with Todd McMakin)
Cultural Resources Survey of the Fabian Tract, Charleston County, South Carolina. Prepared for Albert Weber Manufacturing Company, Summerville, South Carolina.

1998 (with Keith Stephenson)
Archaeological Survey of the Carolina Nurseries Property Management Tract, Berkeley County, South Carolina. Prepared for Carolina Nursery, Inc., Charleston.

1998 (with Tina Rust and Eric C. Poplin)
Archaeological Data Recovery at 38CH1402 and 38CH1405, Park West Tract, Charleston County, South Carolina. Prepared for Land Tech Charleston, L.L.C., Charleston.

Archaeologist/Co-Author

1993 (with Eric C. Poplin and David C. Jones)
Fort Jackson Military Reservation Historic Preservation Plan- Volume I: Cultural Resources Management Plan. Prepared for the Fort Jackson Directorate of Public Works and the US Army Corps of Engineers- Savannah District, Savannah, Georgia.

1993 (with Eric C. Poplin)
Fort Jackson Military Reservation Historic Preservation Plan- Volume III: Archaeological Site Database. Prepared for the Fort Jackson Directorate of Public Works and the US Army Corps of Engineers- Savannah District, Savannah, Georgia.

1993 (with Eric C. Poplin an Kenneth F. Styer)
Cultural Resources Survey For FY 93 Timber Harvest Areas and Testing of 10 Separate Sites, Fort Jackson, South Carolina. Prepared for the US Army Corps of Engineers-Savannah District, Savannah, Georgia.

1996 (with Bruce Harvey and Eric C. Poplin)
Cultural Resources Inventory of Proposed Development Areas in the Kaminski Tract, Georgetown and Horry Counties, South Carolina. Prepared for Canal Industries, Incorporated, Conway.

1996 (with Bruce Harvey, W.A. McElveen, and Eric C. Poplin)
Archaeological and Architectural Survey for Proposed Improvements to McCrays Mill Road, Sumter, South Carolina. Prepared for LPA Group, Inc., Columbia.

1996 (with Bruce Harvey)
Cultural Resource Reconnaissance for the Extension of Red Bay Road, Sumter, South Carolina. Prepared for LPA Group, Incorporated, Columbia.

1997 (with Todd A. McMakin, Tina R. Rust, and Eric C. Poplin)
Archaeological Data Recovery in the SC151 Widening Project, Chesterfield County, South Carolina. Prepared for South Carolina Department of Transportation, Columbia.

1998 (with E. Poplin, B. Harvey, and T. McMakin)
Phase I Cultural Resources Survey of Selected Areas on the Marine Corps Air Station Beaufort, Beaufort County, South Carolina. Prepared for The United State Marine Corps and the US Army Corps of Engineers-Savannah District.

1998 (with Eric C. Poplin and Bruce Harvey)
Archaeological Data Recovery at 38GE334, Prince George River Tract, Georgetown County, South Carolina. Prepared for the Prince George Development Corporation, Georgetown.

2000 (with Eric Poplin and Bruce Harvey)
National Register of Historic Places Evaluation of 29 Archaeological Sites Charleston Naval Weapons Station, Berkeley and Charleston Counties, South Carolina. Prepared for US Navy, Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Principal Investigator/Project Manager

1995 *Cultural Resources Survey of the Rice Fields South Tract, Georgetown County, South Carolina*. Prepared for Planning/Design Resources, Pawleys Island.

1995 *Cultural Resources Survey of the Proposed 46 Acre Catawba River Park, York County, South Carolina*. Prepared for the City of Rock Hill.

1995 *An Intensive Cultural Resources Survey of the McCurry Tract, Calhoun County, South Carolina*. Prepared for Blue Circle Cement Company, Harleyville, South Carolina.

1995 *An Archaeological Reconnaissance of the Sandpit Road Mine Site, Dorchester County, South Carolina*. Prepared for Banks Construction Company, North Charleston, South Carolina.

1995 *An Archaeological Reconnaissance of the Norman Landing Mine Site, Dorchester County, South Carolina*. Prepared for Truluck Construction Company, Charleston, South Carolina.

1995 *An Archaeological Reconnaissance of the Keiffer Tract, Jasper County, South Carolina*. Prepared for Coastal Concrete, Hilton Head Island, South Carolina.

1995 *An Intensive Archaeological Survey of a 34 Acre and a 7 Acre Portion of the Ponds Plantation Tract, Dorchester County, South Carolina*. Prepared for Ralph B. Simmons, Jr., Anderson.

1995 *Cultural Resources Survey of the Savannah Quarters Tract-Southwest Quadrant, Chatham County, Georgia*. Prepared for Hall Development Company, Myrtle Beach.

1996 *Archaeological Reconnaissance of the Cone Mine Site, Dorchester County, South Carolina*. Prepared for Palmetto Sand Company, Summerville.

1996 *Cultural Resources Overview, Tega Cay Development Tract, York County, South Carolina*. Prepared for Tega Cay Communities, LLC.

1996 *Cultural Resources Survey of the Waddell Road Realignment Corridor, Beaufort County, South Carolina*. Prepared for Andrews Engineering Company, Port Royal.

1997 *Cultural Resources Reconnaissance of the Palmetto Commerce Park, Charleston County, South Carolina*. Prepared for Palmetto Commerce Park, LLC, Charleston.

1997 *Cultural Resources Reconnaissance of the Whitehall II Tract, Dorchester County, South Carolina*. Prepared for Civil Site Environmental, Inc., Charleston, South Carolina.

1997 Intensive Cultural Resources Survey of the Myrtle Beach National Tract, Horry County, South Carolina. Prepared for Coastal Science Associates, Inc., Columbia, South Carolina.

1997 *Cultural Resources Reconnaissance of the Ingleside Plantation Tract, Charleston County, South Carolina*. Prepared for the Albert Weber Manufacturing Company, Summerville, South Carolina.

1997 *Archaeological Monitoring of Selected Areas of the Octagon House (38LU7), 619 East Main Street, Laurens, South Carolina*. Prepared for Landmark Asset Services, Winston-Salem, North Carolina.

1997 (with Bruce Harvey)
Cultural Resources Inventory of the I'On Development Tract, Mt. Pleasant, South Carolina. Prepared for The Graham Company, Mt. Pleasant.

1998 (with Eric C. Poplin)
Archaeological Survey of MGI Industry's Proposed Nitrogen Gas Line, Berkeley County, South Carolina. Prepared for Kenco Associates, Inc., Ashland, Kentucky.

1998 *Archaeological Reconnaissance Survey of the Proposed Dirt Cheap Inc. Borrow Pits, City of Charleston, Berkeley County, South Carolina*. Prepared for Bridge Creek, LLC, Mt. Pleasant, South Carolina.

1998 (with Harry Pecorelli and Todd McMakin)
Archaeological Survey of a Proposed Mine Site at the Ponds Plantation, Dorchester County, South Carolina. Prepared for Palmetto Sand Company, Inc., Ridgeville, South Carolina.

1998 *Cultural Resources Reconnaissance of Cummings Point, Charleston County, South Carolina. Prepared for Mr. Jack Theimer, San Francisco, California.*

1998 (with Scott Wolf)
Cultural Resources Survey of the Harmony Industrial Park, Georgetown County, South Carolina. Prepared for DDC Engineers, Inc., North Myrtle Beach, South Carolina.

1999 *Cultural Resources Inventory of the Appian Way Tract, Dorchester County, South Carolina*. Prepared for Ford Development, Inc., Dallas, Texas.

1999 *Archaeological Survey of the Whitehall II Tract, Dorchester County, South Carolina.* Prepared for Civil Site Environmental, Inc., Charleston, South Carolina.

1999 *Archaeological Testing of 38HR371 and 38HR372, Horry County, South Carolina*. Prepared for Taylor, Mahon, and Associates, Inc., Pawleys Island, South Carolina.

1999 (with Harry Pecorelli, III and Bruce G. Harvey)
Cultural Resources Inventory of Tilly Island, Colleton County, South Carolina. Prepared for Tilly Island, L.L.C., Charleston, South Carolina.

1999 (with Scott Wolf)
Archaeological Reconnaissance and Intensive Survey of Friendfield Plantation on the Sampit River, Georgetown County, South Carolina. Prepared for the National Trust for Historic Preservation, Washington, DC.

1999 *Archaeological Testing of 39 Hagood Avenue, Charleston, South Carolina.* Prepared for The Citadel Alumni Association, Charleston, South Carolina.

1999 *Cultural Resources Reconnaissance and Intensive Survey of Cherokee Plantation, Colleton County, South Carolina*. Prepared for The Carnegie Club, Ltd., England.

1999 *Cultural Resources Survey of Molasses Creek Crossing, Charleston County, South Carolina.* Prepared for George Christodal, Mt. Pleasant, South Carolina.

1999 *Archaeological Survey of The Hill at Legend Oaks, Dorchester County, South Carolina.* Prepared for Asset Corporation of the South, L.L.C., Charlotte, North Carolina.

1999 (with David Baluha)
Cultural Resources Reconnaissance of the 23.33 Acre Lowcountry Business Park, Mount Pleasant, South Carolina. Prepared for Seamon, Whiteside and Associates, Inc. Mount Pleasant, South Carolina.

1999 (with Kara Bridgman and Bruce Harvey)
Cultural Resources Inventory of the Briars Creek Tract, Johns Island, Charleston County, South Carolina. Prepared for Koenig Construction Company, Johns Island, South Carolina.

2000 (with Eric Poplin and Stephen Roberts)
Cultural Resources Survey of Darrell Creek Phase II Tract, *Charleston, South Carolina*. Prepared for Ed Goodwin, Charleston, South Carolina.

2000 (with Pat Hendrix)
Cultural Resources Survey of Rushland Plantation, Johns Island, South Carolina. Prepared for Hoffman, Lester, and Associates, Inc., Charleston, South Carolina.

2000 *Archaeological Reconnaissance Survey of the Proposed Expansion to the Basic Science Building College of Dental Medicine, Medical University of South Carolina, Charleston.* Prepared for The Medical University of South Carolina, Charleston, South Carolina.

2000 (with Kara Bridgman)
Cultural Resources Inventory of the Oyster Point Tract, Mount Pleasant, Charleston County South Carolina. Prepared for Pulte Home Corporation, Duluth, Georgia.

2000 (with Bruce Harvey and Joshua Fletcher)
Intensive Cultural Resources Survey of the New Long Point Road Right *of Way*, *Charleston, South Carolina.* Prepared for Transystems, Inc., Greenville, South Carolina.

2000 (with Gwendolyn Burns and Pat Hendrix)
Cultural Resources Survey of the Stono River at Limehouse Bridge Tract, Charleston County, South Carolina. Prepared for Ford Development Corporation, Dallas, Texas.

2000 (with Dave S. Baluha and Pat Hendrix)
Cultural Resources Survey of an 8 Hectare Parcel of the Ashley Park Tract, Charleston County, South Carolina. Prepared for Meridian Place, LLC, Charleston.

2000 (with Gwendolyn Burns and Pat Hendrix)
Cultural Resources Survey of the Bolton Bees Ferry Tract, Charleston County, South Carolina. Prepared for Getrag Precision Gear Company, North Charleston, South Carolina.

2000 (with Joshua N. Fletcher)
Cultural Resources Survey of the Reserve at Lake Keowee, Pickens County, South Carolina. Prepared for The Reserve at Lake Keowee, LLC, Sunset, South Carolina.

2000 *Archaeological Reconnaissance Survey of the Seabreeze Development, City of Charleston, South Carolina*. Prepared for Nelson, Mullins, Riley, and Scarborough, LLP, Charleston.

2000 (with Kara Bridgman)
Cultural Resources Inventory of the Elms at Charleston, Tracts A and B, Charleston County, South Carolina. Prepared for The Herman Group, LLC, Charleston.

2000 (with Dave Baluha and Pat Hendrix)
Cultural Resources Survey of Fenwick Tract D, Johns Island, South Carolina. Prepared for Trico Engineering Consultants, Inc., North Charleston, South Carolina.

2000 (with Pat Hendrix)
Archaeological Survey of 35 Acres in Port Royal, Beaufort County, South Carolina. Prepared for Tony Porter, Beaufort.

2000 Archaeological Testing of Selected Portions of Cedar Grove Plantation (38DR158), Whitehall II Development Tract, Dorchester County, South Carolina. Prepared for Floyd Whitfield.

2001 (with Dave Joyner and Pat Hendrix)
Cultural Resources Survey of Roddin's Island, Berkeley County, South Carolina. Prepared for The Daniel Island Company, Charleston, South Carolina.

2001 (with Pat Hendrix)
Cultural Resources Survey and Archaeological Testing of Rushland Plantation, Johns Island, South Carolina. Prepared for IBG Partners, LLC, Washington, DC.

2001 (with Bruce G. Harvey)
Cultural Resources Survey of the SC Route 290 Realignment, Spartanburg County, South Carolina. Prepared for the South Carolina Department of Transportation, Columbia and Davis and Floyd, Greenwood, South Carolina.

2001 (with Eric D. Sipes and Pat Hendrix)
Cultural Resources Survey of Alternate No. 2, Jasper County Greenway Business Park Entrance, Sergeant Jasper State Park, Jasper County, South Carolina. Prepared for Thomas and Hutton Engineering Company, Savannah.

2001 (with Kristrina A. Shuler and Bruce G. Harvey)
Intensive Cultural Resources Survey of the Butternut Road Tract, Dorchester County, South Carolina. Prepared for Merryland Investment Company, Inc., Augusta, Georgia.

2001 (with Josuah N. Fletcher)
Archaeological Testing of 38BU1843, Heyward Pointe Tract, Beaufort County, South Carolina. Prepared for D'Amico Management Associates, Hilton Head, South Carolina.

2001 (with J.N. Fletcher, K.A. Shuler, and P. Hendrix)
Intensive Cultural Resources Survey of the Eastern Sandhills at Buckwalter Tract, Beaufort County, South Carolina. Prepared for RRZ, L.L.C., Bluffton, South Carolina.

2001 *Archaeological Testing of 38BU1283, Habersham Tract, Beaufort County, South Carolina.* Prepared for the Habersham Land Company, Beaufort.

2001 (with David S. Baluha and Michael P. Hendrix)
Cultural Resources Survey and Testing of the Parrot Point Tract, Charleston County, South Carolina. Prepared for Ford Development Corporation, Dallas, Texas.

2001 (with Patrick Hendrix)
Cultural Resources Survey of the Battery Haig Development Tract, Charleston County, South Carolina. Prepared for Harry Huffman and Joe Vaughn, Greenville, South Carolina.

2001 *Cultural Resources Survey and Archaeological Testing of the Fenwick FHP Tract, Johns Island, South Carolina.* Prepared for Laplante Associates, Kiawah Island, South Carolina.

2001 *A Comparison of Life on Agricultural and Industrial Plantations in the South Carolina Lowcountry.* Paper presented at the Southeastern Archaeological Conference, Chattanooga, Tennessee.

2001 (with David S. Baluha and Michael P. Hendrix)
Cultural Resources Survey of Bannockburn at Waterford Plantation, Georgetown County, South Carolina. Prepared for Overland Road, LLC. Garden City, South Carolina.

2002 (with Eric D. Sipes and Pat Hendrix)
Cultural Resources Survey and Testing of the Persimmon Hill Tract, Berkeley County, South Carolina. Prepared for Hussey, Gay, Bel, and DeYoung, Inc., Mt. Pleasant, South Carolina.

2002 (with Kristrina A. Shuler and Pat Hendrix)
Cultural Resources Survey of the Summerville on the Ashley II Tract, DorchesterCounty, South Carolina. Prepared for Trico Engineering, Charleston, South Carolina.

2002 (with Joshua Fletcher and Pat Hendrix)
Cultural Resources Survey of The Orange Hill Tract, Charleston County, South Carolina. Prepared for Orange Hill Plantation, LLC, Johns Island, South Carolina.

2002 (with Joshua Fletcher)
Cultural Resources Reconnaissance of the Seven Eleven Tract, Pickens County, South Carolina. Prepared for Nexson, Pruitt, Jacobs, Pollard, and Robinson, Columbia, South Carolina and Greenwood Development Company, Greenwood, South Carolina.

2002 (with Joshua N. Fletcher and Pat Hendrix)
Cultural Resources Survey of of the Rose Bank Plantation Tract, Charleston County, South Carolina. Prepared for BB& T, Charleston, South Carolina.

2002 (with Eric D. Sipes and Pat Hendrix)
Cultural Resources Survey of the Proposed Shulerville/Honey Hill Water Extension Project in the Francis Marion National Forest, Berkeley County, South Carolina. Prepared for Berkeley County Water and Sanitation Authority, Goose Creek, South Carolina.

2002 (with Kristrina A. Shuler and Bruce G. Harvey
Cultural Resources Survey of the Proposed Mill Pond Road Extension Project, Horry County, South Carolina. Prepared for the LPA GROUP, INC., Columbia South Carolina, the City of Conway, South Carolina, and the South Carolina Department of Transportation, Columbia.

2002 (with David S. Baluha amd Bruce G. Harvey)
Archaeological Testing at 38LX416, Lexington County, South Carolina. Prepared for Wilbur Smith Associates, Inc., Columbia and the South Carolina Department of Transportation, Columbia.

2002 (with Joshua N. Fletcher and Jeff Bowdoin)
Late Discovery Investigations at 38BK1823 Harper Tract, Berkeley County, South Carolina. Prepared for Greenwood Development, North Charleston, South Carolina.

2002 (with Kristrina A. Shuler, David Dellenbach, Pat Hendrix and Bruce G. Harvey)
Intensive Cultural Resources Survey of the Carnes Crossroads Tract-South Parcel, Berkeley County, South Carolina. Prepared for Hoffman, Lester and Associates, Charleston, South Carolina.

2002 (with Eric D. Sipes and Michael P. Hendrix)
Cultural Resources Survey and Testing of a Proposed Residential Development at Kensington Plantation, Georgetown County, South Carolina. Prepared for Prince George Premier Properties, Georgetown, South Carolina.

2002 (with David S. Baluha, Kristrina Shuler and Michael P. Hendrix)
National Register of Historic Places Evaluation of Sites 38GE334 and 38GE550 at the Bannockburn at Waterford Plantation Tract, Georgetown County, South Carolina. Prepared for Overland Road LLC., Garden City, South Carolina.

2002 (with Pat Hendrix)
Cultural Resources Survey of the Proposed Seacoast Chapel and Education Building, Mt. Pleasant, South Carolina. Prepared for the Seacoast Church, Mt. Pleasant, South Carolina.

2002 (with Pat Hendrix)
Cultural Resources Investigations of 25 Lamboll Street,Charleston, South Carolina Charleston County, South Carolina. Prepared for Historic Charleston Foundation, Charleston, South Carolina.

2002 (with Pat Hendrix, Carol Poplin and Bruce Harvey)
Cultural Resources Management Plan for the City of North Charleston, Planning Area Three Dorchester County, South Carolina. Prepared for the City of North Charleston and The South Carolina Department of Archives And History.

2002 *Cultural Resources Investigations of the Charleston Orphan Chapel, Charleston County, South Carolina*. Prepared for McAlister Construction Company, Charleston, South Carolina.

2002 (with Pat Hendrix)
Cultural Resources Survey of the St. John's Golf Tract, Charleston County, South Carolina. Prepared for CHJM LLC, Charleston, South Carolina.

2002 (with Eric C. Poplin and Kristrina A. Shuler)
Archaeological Testing of 38AB633, 38AB1001, and the Little River Flood Plain Sc Route 72 Improvements Project, Abbeville County, South Carolina. Prepared for Wilbur Smith Associates, Inc. Columbia, South Carolina, and South Carolina Department of Transportation, Columbia, South Carolina.

2002 (with Pat Hendrix)
Archaeological Survey of North Main Street, (US 21/321) Improvements From near Elmwood Avenue (US 21/76/176/321) to near Fairfield Road (US 321). Prepared for the City of Columbia and South Carolina Department of Transportation, Columbia, South Carolina.

2002 (with David S. Baluha and Pat Hendrix)
Cultural Resources Survey of Hamlin Park, Mt. Pleasant, Charleston County, South Carolina. Prepared for the DR Horton Company, Charleston, South Carolina.

2002 (with Kristrina A. Shuler and Michael P. Hendrix)
Cultural Resources Survey of the Mixson Mines Tract, Dorchester County, South Carolina. Prepared for Landmark Construction, North Charleston, South Carolina.

2002 (with David S. Baluha, Pat Hendrix and Bruce Harvey)
Cultural Resources Survey of a Portion of the Oakland Plantation Tract, Mt. Pleasant, Charleston County, South Carolina. Prepared for Avtex Commercial Properties Corporation, Greenville, South Carolina.

2002 (with Eric D. Sipes and Michael P. Hendrix)
Cultural Resources Survey of the McLaura Hall Tract, Charleston County, South Carolina. Prepared for Habit Properties, Inc., Atlanta, Georgia.

2003 (with Eric C. Poplin and David S. Baluha)
Intensive Cultural Resources Survey of Selected Portions of the Charleston Naval Weapons Station, Berkeley County, South Carolina. Prepared for the US Navy, Facilities Engineering Command, North Charleston, South Carolina.

2003 (with Kristrina A. Shuler)
Archaeological Survey of The Berlin Myers Parkway (SC Route 165) Extension Project, Alternate 2 Dorchester County, South Carolina. Prepared for The South Carolina Department of Transportation, Columbia, South Carolina and Davis & Floyd, Inc. Greenwood, South Carolina.

2003 (with Joshua N. Fletcher and Pat Hendrix)
Cultural Resources Survey of the Morgan Tract Chatham County, Georgia. Prepared for Phillip Morgan, III Savannah ,Georgia.

2003 (with Eric D. Sipes and Susannah Munson)
Cultural Resources Survey of the Laurel Park Tract, Charleston County, South Carolina. Prepared for Meridian Development, Mt. Pleasant, South Carolina.

2003 (with Kristrina A. Shuler and Pat Hendrix)
Cultural Resources Survey of Ireland Creek Disposal Area, Colleton County, South Carolina. Prepared for the Natural Resources Conservation Service and US Army Corps of Engineers, Mobile District.

2003 (with David S. Baluha and Susannah Munson)
Cultural Resources Survey of the Rumphs Hill Creek Tract, Dorchester County, South Carolina. Prepared for Berenyi Incorporated, Charleston, South Carolina.

2003 (with Kristrina A. Shuler and Pat Hendrix)
Cemetery Relocation at the Future Site of the Children's Research Institute Medical University of South Carolina, Charleston County, South Carolina. Prepared for the Medical University of South Carolina, Charleston, South Carolina.