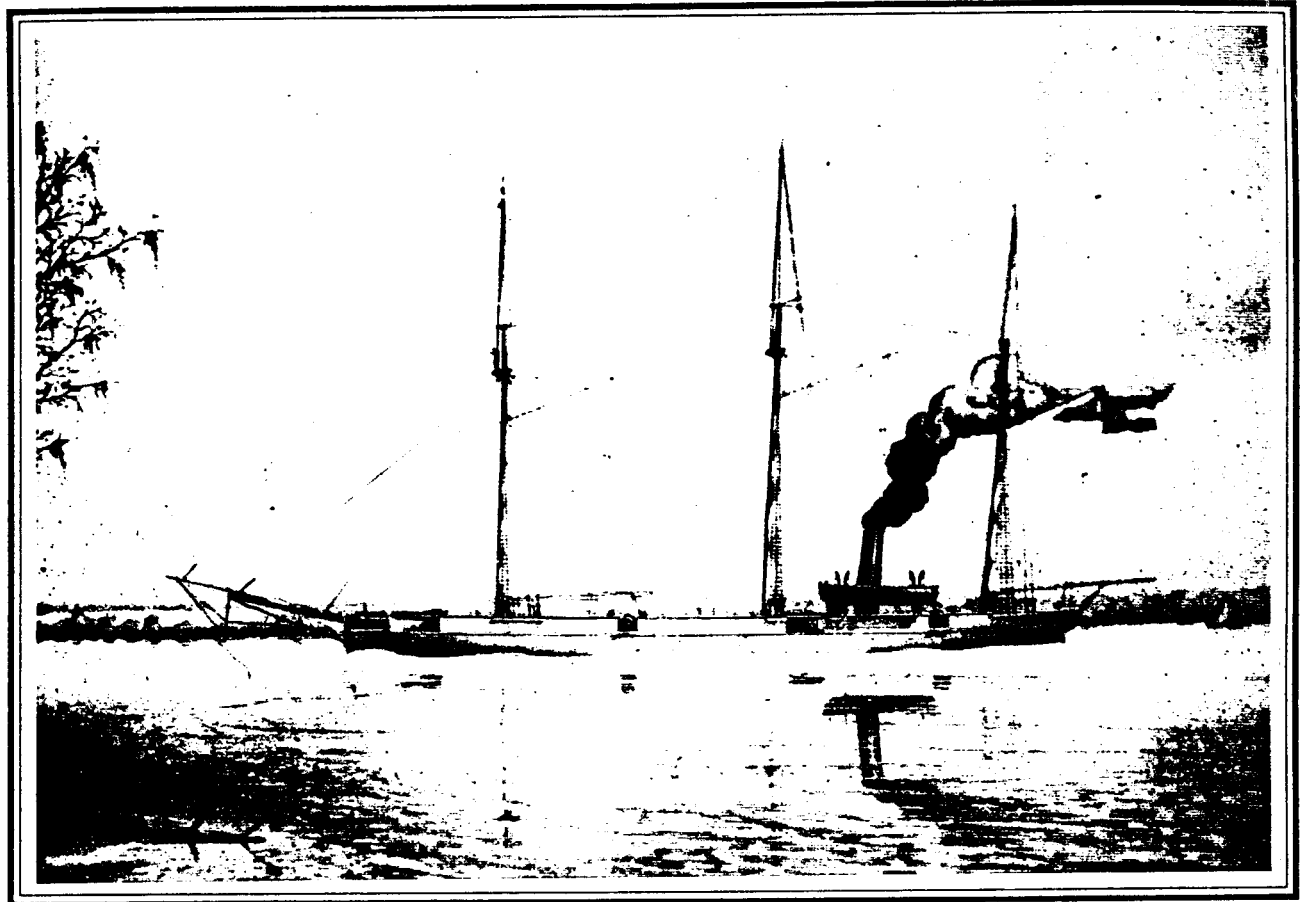


# *CSS Chattahoochee*



*An Investigation of the Remains  
of a  
Confederate Gunboat*

# An Investigation of the Remains of the Confederate Gunboat *CSS Chattahoochee*

Produced for  
The James W. Woodruff, Jr.  
Confederate Naval Museum  
Columbus, Georgia

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## ABSTRACT

In the Spring of 1865, the Confederate gunboat CSS *Chattahoochee* was scuttled and burned in the Chattahoochee River south of Columbus, Georgia. During the Civil War Centennial the vessel's remains were relocated and the stern of the warship salvaged and preserved at the James W. Woodruff, Jr., Confederate Naval Museum in Columbus. In 1984, East Carolina University and the Confederate Naval Museum cosponsored an investigation designed to relocate the CSS *Chattahoochee*, determine the amount of surviving hull structure, and assess the potential for additional research, recovery, and exhibition. The wreck was relocated using a proton precession magnetometer and wreck structure exposed on the bottom surface was mapped. A test excavation was carried out near the south end of the wreckage to facilitate assessing the nature and scope of the archaeological record and generate data concerning the remaining wreck structure. Data recovered during the investigation contributed to a better understanding of the wreck and its scientific and educational value. On the basis of this reconnaissance, it is apparent that the remains of the CSS *Chattahoochee* contain a variety of artifacts associated with use of the ship. In addition, the remaining wreck structure survives in good condition below the turn of the bilge and could be raised, conserved, and displayed in conjunction with the stern of the warship presently on exhibit at the Confederate Naval Museum in Columbus.

## ACKNOWLEDGMENTS

This investigation of the remains of the Confederate gunboat CSS *Chattahoochee* was initiated by Robert Holcombe, Director of the Confederate Naval Museum in Columbus, Georgia. In 1982, Mr. Holcombe approached the staff of the Program in Maritime History and Underwater Research and suggested a jointly sponsored project to relocate the CSS *Chattahoochee's* remains and carry out a reconnaissance investigation of the wreck. Local funding, support, and arrangements for the project were handled by Mr. Holcombe and any success achieved during the investigation must be credited to his industry and perserverance. Thomas Boyd, President of the First National Bank of Columbus, arranged support for the project in the form of a generous grant to the Confederate Naval Museum. That support provided the operational funds that made the project possible. We are also indebted to the United States Army, Fort Benning. In addition to providing personnel and technical support, the U. S. Army provided the vessels that served as work platforms during the investigation. Personnel from the 36th Engineering Group, 43rd Engineering Battalion, and the 586th Engineering Company assisted in project operations. Special thanks must go to Mr. Bill Walton of the Fort Benning Public Affairs Office for his considerable assistance. Archaeologist Frank Schnell of the Columbus Museum of Arts and Sciences contributed his time to the project and provided informative lectures on local prehistoric traditions. The excellent art work of Kaea Morris and Frank Cantalas must be recognized as it contributed significantly to the research. Ms. Morris' illustrations of the artifacts, inked drawings of Kevin Foster's machinery illustrations, and Mr. Cantalas' site plans provide the graphics for this report. Robert Holcombe must also be credited for developing the lines for the CSS *Chattahoochee* that appear in this report. In the final stages of production Robert Holcombe, Frank Cantalas, and Dr. Carl Swanson assisted in proofreading the report. The authors would like to express their additional appreciation to Kaea Morris for the energy and persistence she invested in editing, layout, and printing that brought the report to publication. A final thanks must be extended to Ms. Mary Miller for her assistance in making arrangements for printing the final report. Without the combined effort of all these individuals the project would not have been possible.

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## INTRODUCTION

During the Civil War Centennial interest in Confederate warships in the Chattahoochee River resulted in the recovery of the stern of the gunboat CSS *Chattahoochee*. Today those remains are on exhibit at the James W. Woodruff Jr. Confederate Naval Museum in Columbus, Georgia. In an effort to relocate the CSS *Chattahoochee's* remaining hull structure and assess the potential for research, recovery, and exhibition the Confederate Naval Museum requested assistance from the East Carolina University Program in Maritime History and Underwater Research in 1983. The following year an investigation of the CSS *Chattahoochee* was carried out in conjunction with the East Carolina University Field School in Maritime History and Underwater Archaeology.

The staff and students enrolled in the field school program conducted a remote sensing survey of the Chattahoochee River below Columbus that located the wreck site near Broken Arrow Creek. With assistance from the United States Army at Fort Benning, the remains of the CSS *Chattahoochee* were mapped and a limited test excavation carried out to assess surviving hull structure and determine the nature and scope of the archaeological record associated with the shipwreck. In conjunction with the on-site research activity, students in the program also documented the stern of the CSS *Chattahoochee* on display at the Confederate Naval Museum and completed an inventory of previously recovered artifacts associated with the ship. Project activities were documented using a small television system and a short video production was prepared to illustrate the nature of project activities.

## PROJECT RESEARCH OBJECTIVES

The investigation undertaken during the 1984 Field School in Maritime History and Underwater Archaeology was designed to accomplish a number of historical and archaeological objectives. As the exact location of the remains of the CSS *Chattahoochee* was unknown, the first objective was to relocate the wreckage. The search was to be carried out in the vicinity of Broken Arrow Creek where the stern section had been recovered in the 1960's. A proton precession magnetometer was to be used to identify magnetic anomalies that could be associated with the Confederate warship. All targets with signatures corresponding to the anticipated magnetic characteristics of the CSS *Chattahoochee* would be systematically examined by divers until the wreck was identified.

Once that identification was made, the precise location of the ship would be established in conjunction with a terrestrial baseline surveyed in on the east bank of the Chattahoochee River. Using a similar river-bottom baseline to control data collection, exposed portions of the wreck would be mapped *in situ* in three dimensions. The site plan would provide sufficient insight into the nature and orientation of vessel remains to permit identification of the most appropriate location for a test excavation.

The test excavation would be designed to expose a cross section of the surviving hull structure. In addition to providing data concerning the structural integrity of the hull, excavation of the cross section would generate information about the nature and scope of the archaeological record associated with the wreck. Data concerning the nature, extent, and condition of structural remains at the site would be necessary for assessing both the feasibility and desirability of recovery and display. The excavation would also provide insight into the potential for additional archaeological research.

## PROJECT LOCATION AND ENVIRONMENT

Today the remains of the CSS *Chattahoochee* lie in the Chattahoochee River near the confluence with Broken Arrow Creek (Figure 1). There the west bank of the Chattahoochee River marks the boundary between Alabama and Georgia and makes up the western perimeter of the United States Army Base at Fort Benning. The wreck site is in Chattahoochee County, Georgia, nine miles south of Columbus at 32° 21' 57" North Latitude and 84° 59' 00" West Longitude. The wreck lies near the center of the navigation, channel and the keel is aligned southeast to northwest more or less with the course of the river (Figure 2). Water depth at the site varied during the project because of hydroelectric power demands at several dams upstream. During periods of relatively low current sixteen feet of water was recorded at the stern and eighteen feet at the bow. Visability was related to both flow at the dam and rainfall. During the project it varied from zero to two feet. River current was controlled by the dam and local rainfall. During the project it was estimated at between 5 and 2.0 knots. In the vicinity of the wreck the Chattahoochee River bottom consists of well sorted coarse sand lying on a bed of clay.

The on-site environment is a factor of the condition of the Chattahoochee River. The Chattahoochee winds through the low hills of the Georgia Piedmont eroding red clay banks and depositing light, sandy loam and loose clay sediment

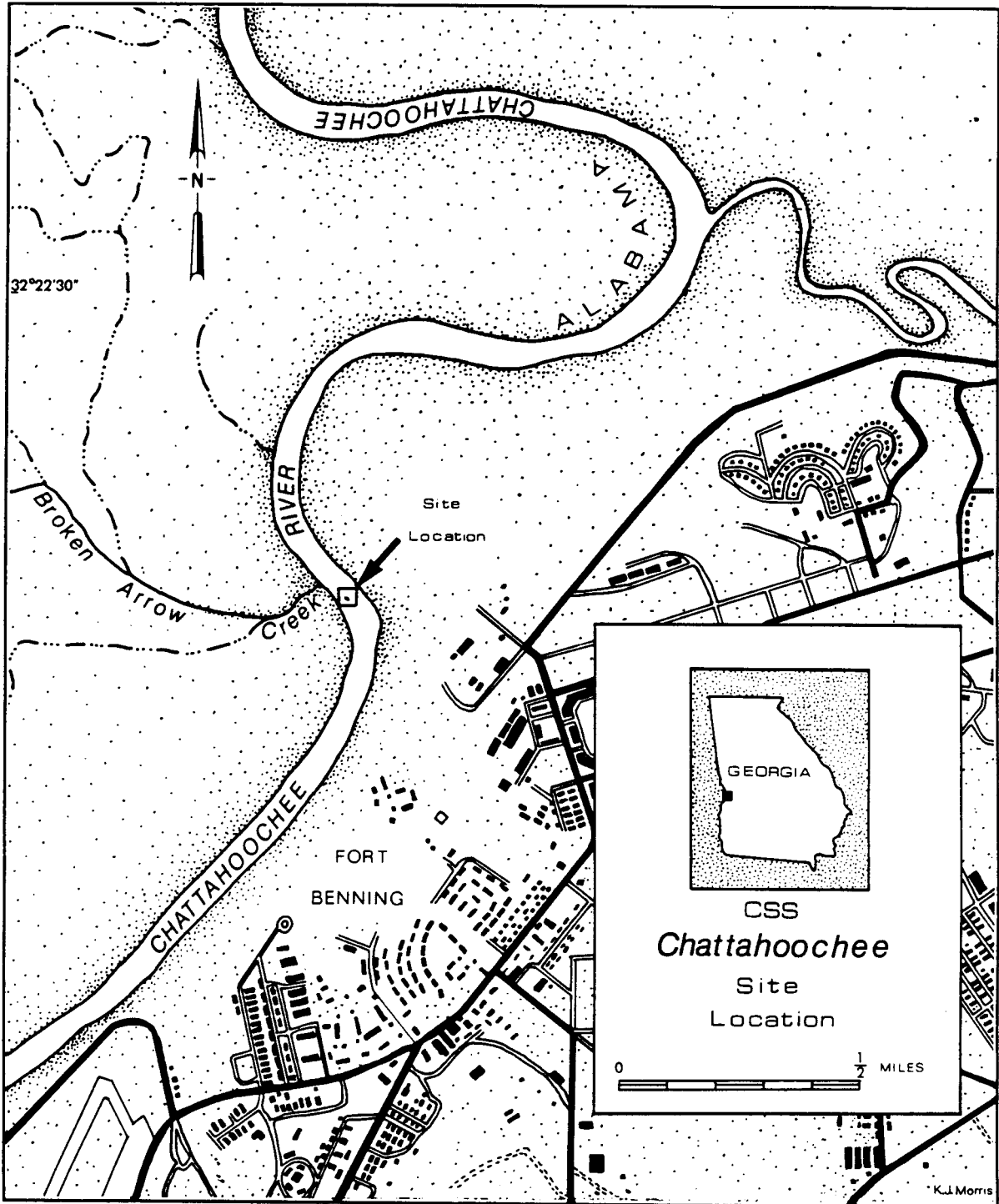


Figure 1. Project Location Map.

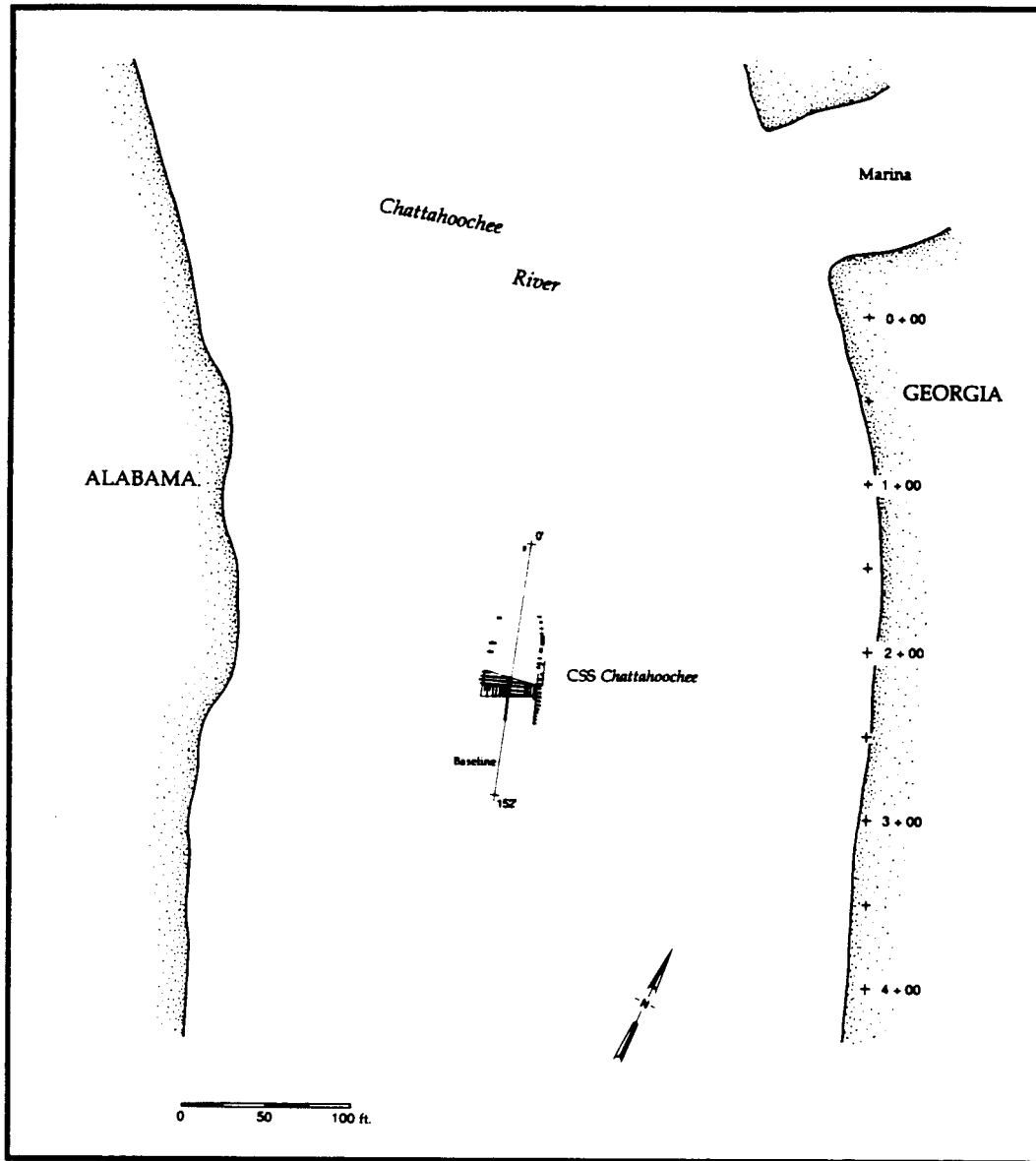


Figure 2. 1984 Location of the Remains of the CSS *Chattahoochee*

on a consolidated clay bottom. The river current flows southward at the CSS *Chattahoochee* site, and although it is immediately below the fall, line tidal currents above and below the site do not influence the river. Since the Civil War, the natural current has been affected by the construction of hydro-electric dams. The normally moderate current of approximately 1/2 knot is increased to around 2 knots by the periodic opening of dams upstream to generate electricity.

electricity. Another man-made impact on the river in the vicinity of the CSS *Chattahoochee* is the sewage that is dumped into the river at, above, and below Columbus. Because of the volume of that waste, the *Chattahoochee* has a very high coliform bacteria count and has been classified as a "Class 4" industrial river.

The *Chattahoochee* River has its headwaters in the southern Appalachian Mountains at Unicoi Gap which is upstream several miles from Helen, Georgia. Its drainage area is over 17,000 square miles above Columbus, Georgia. The river basin is facing in a southerly direction with an elevation of over 4,000 feet above sea level at its headwaters. This geographical configuration allows moist air from the Gulf of Mexico to cool as it increases in elevation over the piedmont and mountains. The atmospheric cooling that occurs generates as much as 80 inches of precipitation in the mountains as compared to about 50 inches in the lower elevations of the basin. Much of the precipitation falls in the early winter and late summer. The response of the *Chattahoochee* River to this precipitation regime is a high flow or flooding in the winter and spring and low flow during the early summer and fall.

At and below Columbus, the *Chattahoochee* River historically had a normal depth of about eight feet. That depth increased or decreased with the occurrence of precipitation. At peak flow the channel was scoured sufficiently to maintain depths required by most steamers, but during lower flow the channel tended to narrow and fill in with sediments. As the shoals increased in area and the water over them decreased, the channel became more treacherous for steamers. During the fall and early summer when stream flow was sufficiently slow to allow shoaling, steamboat navigation tended to be minimal. When the stream flooded in the winter, spring, and to some extent in the late summer, steamboat navigation resumed. Today, fluctuation of the river has been controlled by numerous dams and reservoirs above and below Columbus, and navigation is possible during all but the most extreme conditions. The city of Columbus was established in relation to an abrupt change in the slope of the river known as a fall zone. At Columbus the stream bottom is 185.14 feet above sea level, while 39 miles upstream at West Point the stream bottom is 551.67 feet. Further upstream at Atlanta the stream bottom is 750.10 feet. This indicates an abrupt change upstream from Columbus with a fall of 9.4 feet per mile. However, the fall rate downstream from Columbus is less than a foot per mile to *Appalachicola* Bay. The older geological structures and materials above Columbus have a relatively thick veneer of old saprolitic soils which are easily eroded. As the soils are eroded and then transported during high flows, they are moved and washed, creating a considerable sediment load and a reddish-brown color to the stream.

At low flow the sediment load is greatly diminished and the water is less turbid. Below the fall line the much younger geologic formations have a slight slope toward the Gulf of Mexico consisting of grayish, loosely consolidated, but stratified marine deposits. The soils are commonly a yellow sand. While the stream is about 185 feet above sea level, the surrounding hills reach elevations of over 300 feet. It is common to observe swamps or sand bars on one side of the river and steep slopes on the other.

### SITE FORMATION PROCESSES

The location of the CSS *Chattahoochee's* hull was documented during an engineering survey of the river in 1870 (Figure 3). It was located at the upstream end of a point bar along the right bank of the river at Broken Arrow Bend. That location was 13.7 miles downstream from the railroad bridge in Columbus. It seems likely that when the gunboat was towed downstream from the Columbus Navy Yard it grounded by the bow on a sand bar on the west bank of the river. The current forced the stern toward the west bank. There the CSS *Chattahoochee* burned almost to the waterline and sank. In April 1865, the stream was probably above its normal level due to spring rainfall and related flooding. The heavy water flow around the remaining hull structure scoured a depression in the unconsolidated river bottom sediments and the wreck settled into the bottom.

Subsequent flooding probably scoured out sand around the CSS *Chattahoochee*, and the hull was forced downstream from its original location by the current. It is possible that this happened more than once. Known floods in 1886, 1901, 1907, 1919, and 1929, appear to have contributed not only to change in the location of the boat, but the configuration of the river itself (Figure 4). For example, the discharge at Columbus on 15 March 1929 was 198,000 cubic feet per second, with a river level of 53.2 feet above river bottom (Table 1). Under these extreme conditions it is very likely that the wreck could slide along the bottom as the sand was scoured away, and move downstream with the current. In contrast to the flood of 1929, the average flow of the river is 6,620 cubic feet per second. As the boat found another resting place downstream and the flood level decreased, the wreck was surrounded by sand again. This could have happened with each flood. It is also possible that the remains of the CSS *Chattahoochee* were moved during attempts to recover the wreck in the 1960's. Today the location of the CSS *Chattahoochee* is about one hundred and fifty feet from the wreck location established in 1870.



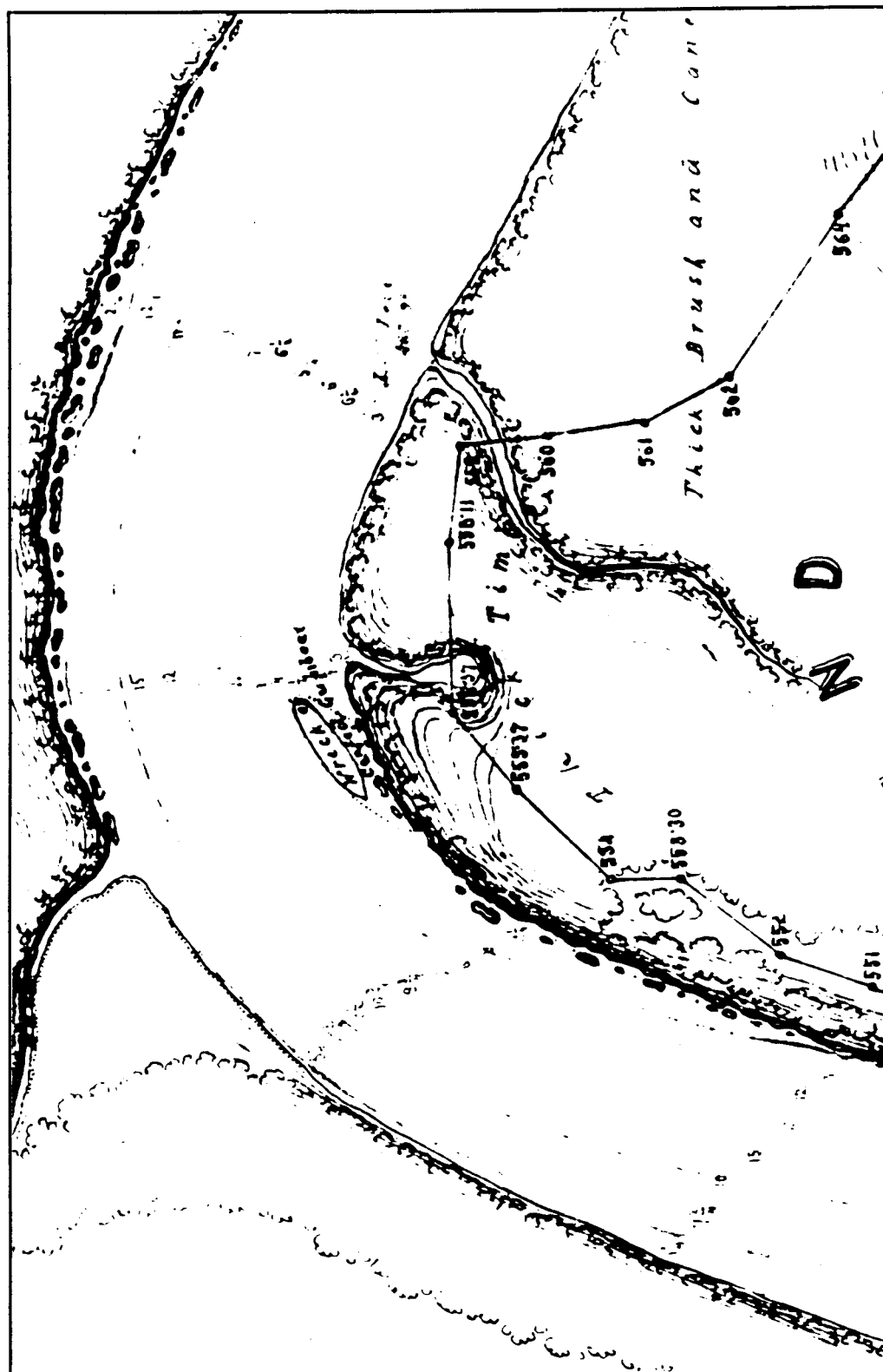


Figure 3. 1870 Chattahoochee River Survey Map.

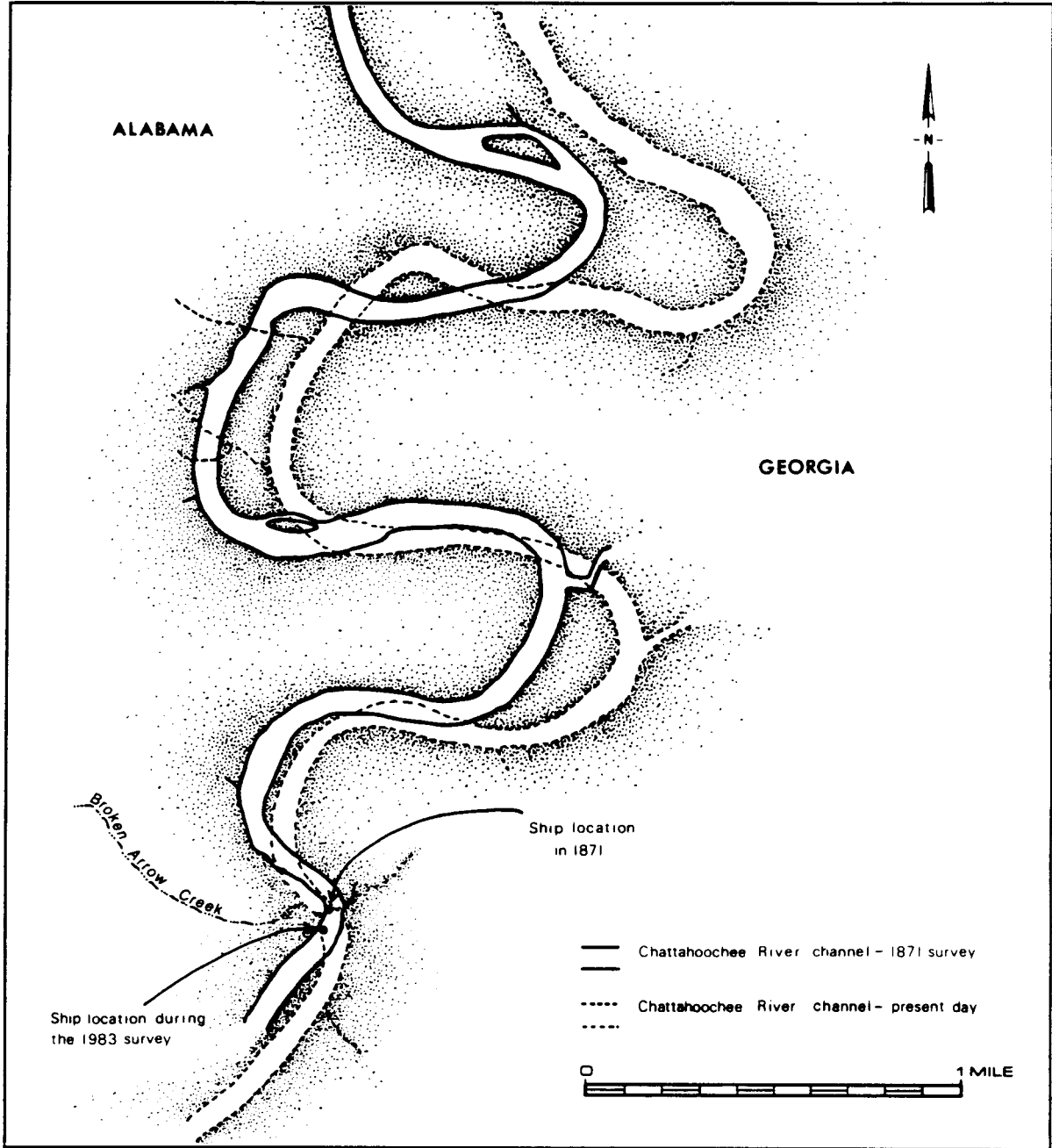


Figure 4. Chattahoochee River Channel Migration.

**TABLE 1**  
**SELECTED HISTORIC FLOODS**  
**ON THE CHATTAHOOCHEE RIVER**

LOCATION	QMAX	DATE	FLOOD STAGE
Near Leaf, Ga.	17,500cfs	Aug 23, 1967	15.4'
Near Cornelia, Ga.	24,800cfs	Mar 12, 1963	20.6'
Near Buford, Ga.	55,000cfs	Jan 8, 1946	32.6'
Near Norcross, Ga.	55,000cfs	Jan 8, 1946	27.7'
At Atlanta, Ga.	59,000cfs	Jan 9, 1946	28.0'
Near Whiteburg, Ga.	59,000cfs	Jan 10, 1946	25.1'
At West Point, Ga.	134,000cfs	Dec 10, 1919	30.0'
" " " "	92,500cfs	1886	25.6'
At Columbus, Ga.	145,000cfs	Feb 26, 1961	47.8'
" " "	198,000cfs	Mar 15, 1929	53.2'
At Alaga, Ga.	112,000cfs	Mar 24, 1943	42.2'
" " "	207,000cfs	Mar 18, 1929	46.0'

QMAX = Maximum stream discharge  
cfs = cubic feet per second

During the summer of 1984, the river level varied only slightly. The upper section of the Walter F. George Reservoir reaches Columbus as its full pool level is 190 feet above sea level. Its minimum pool level is about 184, but it can be reduced to 164 feet if necessary. Because the pool level varies, the base level of the stream changes downstream from Columbus for approximately 8 miles. This means that when the pool is low and the stream is above normal, stream flow increases at the CSS *Chattahoochee* site. Increased stream flow also occurs when the sluices at the Bartletts Ferry Dam are open. This flow is sufficient to slowly move the smallest sediments along the channel bottom, but not fast enough to substantially change the configuration of the channel bottom.

In addition to the physical characteristics of the river, another important consideration is its water quality (Table 2). The most interesting characteristic of water quality at the CSS *Chattahoochee* site was the bacteria counts. This proved to be a particularly important consideration as it caused severe ear infections during the survey.

**Table 2**  
**SELECTED WATER QUALITY DATA**  
**FROM THE CHATTAHOOCHEE RIVER IN THE VICINITY**  
**OF COLUMBUS, GEORGIA**

LOCATION	1982	1982	1982	1982
	YEARLY MEAN	YEARLY MEAN	YEARLY MEAN	YEARLY MEAN
	FECAL COLIFORM	WATER TEMP (C)	PH	D.O.
0001 Upstream Bartlett Ferry Dam	85	21.9	6.93	9.5
2001 Columbus WTP Intake	163	21.8	6.75	8.6
6001 Downstream WTP	21,739	20.1	6.54	9.6
8001 Downstream Oswichee Creek	28,073	20.5	6.55	9.1
9001 Omaha	3,586	20.9	6.59	8.8
	JAN. to SEPT. 1983	JAN. to SEPT. 1983	JAN. to SEPT. 1983	JAN. to SEPT. 1983
0001	81	20.6	6.96	9.7
2001	160	20.5	6.60	9.1
6001	18,014	19.1	6.47	9.4
8001	3,961	19.3	6.41	9.2
9001	381	22.4	7.17	9.8

D.O.= dissolved oxygen

## HISTORICAL BACKGROUND

As has historically been the case with river systems in the eastern United States, the fall zone of the Chattahoochee offered inducements which attracted early Georgia settlers. The fall line environment offered an important water-borne trade route that connected the Georgia piedmont with the Gulf of Mexico 260 miles to the south. As the area was settled during the industrial revolution, another major consideration was that the falls offered an ideal location for mills and industries requiring water for power. Although the earliest settlers established themselves in the Columbus area during the first quarter of the nineteenth century, the settlement remained little more than a crossroads for more than a hundred years. During the War of 1812, the Chattahoochee River settlement benefitted from a slight increase in vessel traffic, but it was not until 1828 that Columbus was granted a charter and thereby recognized as a town. At that time the settlement consisted of little more than an undetermined number of residences, a few commercial enterprises, and one hotel.

The introduction of steam navigation on the Chattahoochee River opened the way for the first significant development in Columbus during the second quarter of the nineteenth century. Early in the 1830's the *Steubenville*, the first steamboat to reach Columbus, began operations on the river. Within a decade at least sixteen vessels were making voyages between Columbus and Apalachicola Bay, Florida. River traffic and agriculture helped Columbus become a small city by 1835 and contributed to its development as an industrial center during the next decade. In 1844, there were 207 business houses and five cotton warehouses that processed from 60,000 bales to 78,000 bales of cotton annually. By 1860, Columbus was considered the largest industrial center south of Richmond and one of the few places in the South with iron working capabilities. In addition to river transportation, Columbus also developed important rail connections with Atlanta and Montgomery, Alabama, by way of the West Point and Montgomery Railroads.

The secession of southern states and subsequent formation of the Confederate States of America enhanced the importance of Columbus. Although a Union blockade of the Gulf of Mexico severely curtailed the shipment of cotton and other agricultural commodities, Columbus benefited from a dramatic but temporary increase in demand for its industrial products. As the war progressed, established industries expanded, and new ones organized to supply the State of Georgia and the Confederacy with war materials that included uniforms, stores, swords, rifles, harnesses, ammunition, paper, glass, wagons, and ordnance.

To protect Columbus from a riverine invasion, and possibly challenge the Union blockade of the Gulf of Mexico, the Confederacy decided to build several warships to defend the Chattahoochee River.

In October 1861, the Confederate States officially established a Navy Yard "at or near Saffold" to construct a gunboat for protection against attacks by the Union Navy. The Saffold site was chosen due to the availability of timber. Live oak stands near Saffold were adequate and pine could be found in abundance (ORN II: II, 53). On the same day a Navy Yard was established at Saffold, a contract was signed with David S. Johnston, a wealthy Early County, Georgia landowner, to construct a gunboat at the site. According to Johnston's contract the vessel was to be launched within the space of 120 days. The ship was to be 130 feet long, 30 feet in beam, and 10 feet in depth of hold.

The keel, stem, stern-post, planking, and floor timbers of the CSS *Chattahoochee* were to be made of hard white oak while the keelson, first futtocks and top timbers, deck beams, ceiling, gun deck, and berth deck were to be made of yellow pine (Martin Papers, 493). Power for the vessel was to be provided by two horizontal cylinder steam engines supplied by boilers with 800 square feet of fire surface. Mr. Johnston was to be paid the sum of \$47,500 in six equal installments during the construction of the gunboat. The Saffold gunboat was later named the CSS *Chattahoochee* in honor of the river she was constructed to defend (Joint Confederate Congress, 440-441).

Construction of the CSS *Chattahoochee* proved to be a formidable task both for the Confederate Navy and David S. Johnston. To supervise construction of the gunboat the Confederate States Navy appointed Lieutenant Augustus McLaughlin. McLaughlin was responsible for insuring that construction of the vessel was carried out in accordance with Johnston's Confederate Navy contract. McLaughlin was also responsible for coordinating the installation of machinery, ordnance, and equipage. Although construction of the gunboat began immediately after the contract was signed, the work fell immediately behind schedule. In December flooding of the Chattahoochee inundated the Saffold shipyard and stopped work on the vessel. By February 17, 1862, the construction deadline for the CSS *Chattahoochee*, the vessel was six or seven months behind schedule.

Johnston's problems were compounded by labor shortages that were so characteristic of all Confederate naval construction. On March 4, 1862 advertised in the *Columbus Daily Sun*:

**HANDS WANTED AT THE C.S. NAVY YARD LOCATED ON THE CHATTAHOOCHEE RIVER AT SAFFOLD, EARLY COUNTY, GEORGIA TO BUILD GUNBOATS**

Twenty ships' carpenters, jointers, caulkers, and hands accustomed to ship and steamboat work are wanted at the Confederate States Navy Yard to work on gunboats...as several gunboats are under contract steady employment and good wages. All hands employed at the Confederate States Navy Yard are exempt from military duty and anyone in the Army can be furloughed to work here.

D.S. Johnston

Confidence in Johnston's ability to meet his contractual obligations began to dwindle almost immediately. In June 1862, Lieutenant McLaughlin asked that a steamboat captain stop at the Navy Yard to consult with the master carpenter about Johnston's progress. There were rumors that the civilian contractor was more interested in building his facility for long-term personal gain than for completing the wartime project (ORN II:II 208-209). Whether there was any evidence of impropriety or profiteering is uncertain, but Lieutenant McLaughlin's records show he greatly increased his level of direct involvement in the CSS *Chattahoochee*'s construction. It was also apparent that problems with the CSS *Chattahoochee*'s machinery were contributing to the delay.

The warship's machinery and ordnance came from an iron works up river in Columbus, Georgia. Shortly after the beginning of the war the Columbus Iron Works, a firm engaged in the manufacture of steam machinery, had contracted with the War Department to cast small cannon. In 1862, after investigating the city's "general fitness for the location of extensive government works," the Navy Department acquired control of the Columbus Iron Works as well as others to utilize the facilities for the manufacture of marine machinery. For the remainder of the war the iron works manufactured boilers, engines, and other machinery for Confederate warships. Work on the gunboat progressed very slowly because everything the Columbus Iron Works sent down to outfit the vessel had to be returned for alterations (Dent, 6 September 1862).

On July 22, 1862, Lieutenant Catesby ap R. Jones, former commander of the CSS *Virginia*, was ordered to take command and complete the CSS *Chattahoochee* for service. By 22 November 1862, all officers and crew had moved onto the gunboat. As J. Horry Dent, CSS *Chattahoochee*'s third assistant engineer wrote "...It is a very crowded affair. There is not much comfort now aboard and I see no prospect of it when we are settled..."(Dent, 29 November 1862). The gunboat at this time housed ten officers, and 100 crewmen and one assistant surgeon (ORN, II: XVII). Many of the officers and crewmen had served with Captain Jones on the CSS *Virginia* during the celebrated engagement with the USS *Monitor*.

The gunboat was built as a three-masted twin screw schooner with a shallow draft hull configuration. Dent wrote on 6 September 1862:

...Capt. Jones is now having two masts placed in her and is fitting her out expressly for sea. I can't say what his prospects are. I understand the Yankees blockade Apalachicola very effectively as they know of this boat. she will be a very uncomfortable sea boat as she is very shallow and bottom so [?] broad. She will be a perfect old tub at sea.

Finally, in late November 1862, the Confederate Navy Department honored its contract with D. S. Johnston and accepted the completed CSS *Chattahoochee*. Apparently, the Saffold builder had hoped to persuade the Navy to construct the ironclad CSS *Jackson* at his yard, but the Navy's dissatisfaction over the CSS *Chattahoochee* destroyed this possibility. "So this will be the end of the Navy Yard," Dent wrote his father (Dent, 29 November 1862). By the first week of December, Johnston was "winding up his business" as all his workers were transferred to Columbus (Dent, 7 December 1862). The gunboat was finally delivered to the Confederate Navy on December 8, 1862. Johnston's operation had fallen victim in part to a policy change which consolidated construction work at Columbus under the Navy's more direct control. This was probably in part due to the problems the Confederate States Navy encountered with Johnston.

Early in 1863, the CSS *Chattahoochee*'s ordnance was brought on board. According to the official record the gunboat was to carry "one IX inch gun, one 32 pound rifle and four 32 pounders, 42 hundredweight" (ORN, II, XVII: 864). When the CSS *Chattahoochee* was finally commissioned on January 1, 1863, Captain Jones and his officers expected to take the gunboat down the river and challenge the blockading vessels in the Gulf of Mexico. However the concern



over the threat of invasion superceded the necessity to challenge the Union Navy. Citizens near Columbus, who were concerned about the delays both in construction of the CSS *Chattahoochee* and in placing obstructions in the river, wrote to the Secretary of War in October 1862 asking that something be done about river defense. On 5 November 1862, the Columbus city council took up the issue by adopting the following resolution:

Whereas it is of the greatest importance that our city should be made secure from the approach of the abolitionist armies, and whereas there are many good and well grounded reasons to fear their approach by way of the Chattahoochee River. Resolved that this council do hereby appropriate the sum of \$3,000 of aid in placing of obstructions in the said river, under the direction of the officers having work in charge.

Work on the obstructions had been in progress several months when the CSS *Chattahoochee* was placed into service in January 1863. The Confederate gunboat was to serve as a final safeguard in the Chattahoochee River defense system. Since the machinery on the vessel had not been completed, it was suggested that it be towed down the river. In this way the ordnance on the gunboat could be put to use while work continued on the installation of the machinery (ORA, I, XIV: 729). General Howell Cobb, commander of the defence operations along the Apalachicola River system, responded to Jones' consent to cooperate in defending the river: "I am gratified to know that I shall have your cooperation in the defence of the river, whilst I regret on your account that you cannot have a larger and more congenial field of operations" (Cobb, December 1862). On 11 January 1863, Horry Dent wrote his father expressing Catesby ap R. Jones' view regarding the obstructions, "Capt. [Jones] is still under the impression that he is still going to sea. Notwithstanding the clamor of the people along the river, He knows as any sensible man ought to know if the Yankees can come up the River, the *Chattahoochee* will be no impediment to them."

During the first week of January, the CSS *Chattahoochee's* engineers began testing the engines. As the steam guage began to rise, boiler rivets popped loose causing a dangerous loss of steam. When the steam pressure guage reached 21 pounds steam also escaped from the cylinders which had been "cast too porous" and there was "too much play in the cylinder heads." Instead of

recasting the cylinders and heads, the decision was made to repair them. Work continued on the engines until, the evening before the vessel was to cast off for Chattahoochee, Florida. When the CSS *Chattahoochee's* air pump gear failed, the steamer *Uchee* had to serve as a tug for the voyage downriver. Within two hours of departure, the gunboat ran aground while trying to negotiate a short bend in the river. The rudder was smashed, the stern post was sprung, and the ship began to leak badly. Pumps on board were able to keep enough water out to keep the vessel afloat. At one point on this maiden voyage the vessel had to be towed down river while men on shore manned lines to keep her in the channel. The thirty mile trip to Chattahoochee, Florida, took more than twenty hours.

In describing the maiden trip downriver, Lieutenant George Gift, one of the ship's officers, wrote to Ellen Shackelford that the engine failure would mean, "We are doomed to abide at Chattahoochee six weeks to two months." (Gift, 25 January 1863). On 30 January 1863, Gift wrote Miles Collier that the ship was; "in a splendid condition for service, a strong leak and no engines. I wish the confounded vessel in Jerico. If our engines had been successful and no accident had occurred, we would have had conversation with the blockaders off Apalachicola before today.

The CSS *Chattahoochee* became nothing more than a floating battery. The ship's officers and crew, however, continued to drill the gun crews, and go about their duties as though the situation were more hopeful.

As pumps continued to remove the leaking water, carpenters from Johnston's shipyard were contracted to repair the vessel. Materials were ordered to construct a coffer dam around the stern section of the ship; this would create a dry dock from which to repair the leaks (Johnson Papers, 3 February 1863). After the Navy's difficulties with Johnston as a contractor, he probably would not have been their first choice. However, Johnston's location near the gunboat made him the only choice for such work.

By 1 March 1863, the obstructions in the river were completed, closing off the Chattahoochee River from the gulf. At this time Commander Jones was reassigned to command another vessel, and Lieutenant John Julius Guthrie replaced him in command of the gunboat. Guthrie was a North Carolinian and, like so many of his fellow officers, had served in the U.S. Navy. Lieutenant Guthrie concentrated on getting the CSS *Chattahoochee's* repairs completed. On 30 March Guthrie wrote General Cobb that the gunboat was "sufficiently finished

to make a trial trip" and needed a trial run to test the "efficiency and fitness for the defense of the river" (Guthrie, 30 March 1863). On 7 April the Confederate warship left Chattahoochee, Florida and headed for the completed obstructions downstream. Finally, 424 days after the 1861 contract was signed, the CSS *Chattahoochee* was underway as an armed, fully outfitted ship-of-war.

At the obstructions the officers and crew encountered a warm, humid climate, swamps and mosquitos breeding in the muddy river. The batteries surrounding the obstructions were poorly constructed and were manned and armed by "very raw, green unsophisticated infantry troops." To demonstrate the gunboat's fire power for the soldiers, Guthrie ordered target practice with the ship's battery. To Guthrie's satisfaction the gunboat "showed no signs of injury from the firing, everything resisting the repeated shocks in a very satisfactory manner" (Guthrie, 10 April 1863). Another officer, Lieutenant George Gift wrote of the exercise on 11 April 1863: "I confess that I hardly believed it to be in the power of guns and men to hit such small marks as ours did repeatedly. Not a shot was fired after the proper elevation was given that would not have badly injured a ship." After this brief shakedown cruise, the vessel returned to Chattahoochee, Florida.

The gunboat's inactivity persuaded one officer, Gift, to propose a plan to capture Apalachicola. With a group of men from the CSS *Chattahoochee* he planned to travel as far south as the Jackson River, six miles north of Apalachicola. Dressed in Union uniforms, the Confederates would approach and capture the USS *Port Royal* (ORN, I:XVII, 866). Gift was unable to carry out this plan, for two weeks later the CSS *Chattahoochee* became involved in the most important operation of her career. During the last week of May, the schooner *Fashion* was captured while loading cotton just above Apalachicola. Union forces towed the vessel out of the river to the blockading squadron in the Gulf of Mexico. News of the capture caused great concern in Chattahoochee, Florida. Aboard the CSS *Chattahoochee* Guthrie decided to attempt crossing the obstructions to recapture the *Fashion*.

At noon on the 27th, the CSS *Chattahoochee* was lying at anchor at Blountstown Bar. Because of low water, Guthrie ordered an overnight wait in hopes that the river would rise. The river did not rise, and at 10 the following morning the order was given to raise steam in preparation for returning to Chattahoochee. When the order to raise steam was given, there was an argument in the engine room as to how much water the boilers contained. As the engines were started and water poured into the boilers, they exploded.

Panic spread throughout the vessel. Fourteen men died outright from the explosion or were scalded to death. Since the boilers were within three feet of the ship's magazine, one of the gunners warned of an explosion, sending the crew into further panic and sending many of them over the sides and into the river. As the ship began to sink, Guthrie ordered the magazine flooded to prevent further explosions, and then abandoned the vessel (ORN, I:XVII, 868-871).

The rather confusing process of attending the wounded, rescuing survivors, and salvaging the very valuable guns from the wreck proved to be slow. The steamer *William H. Young* reached the *CSS Chattahoochee* about midnight on the 27th, about twelve hours after the accident. She transported the officers and crew to Chattahoochee, Florida. The wounded, as well as two guns recovered from the wreck, were taken to Columbus. It was later learned that the steam gauge on the *CSS Chattahoochee* was out of order the previous day and on the day of the explosion only showed seven pounds of steam (ORN, I:XVII, 869-871)

For months no attempt was made to recover the *CSS Chattahoochee*, and the warship remained in the river below Blountstown. It was not until mid-August 1863 that the Confederates attempted to raise the wreck and return it to Columbus for repairs. David S. Johnston once again was contracted to work on the vessel. He had the vessel raised and towed from its resting place near Blountstown to the Saffold Ship Yard. There Johnston undertook the tremendous task of overhauling the gunboat for service again. On 26 December 1863, Lieutenant McLaughlin at Columbus wrote to Catesby ap R. Jones on the *CSS Chattahoochee's* condition:

My Dear Jones:

The *Chattahoochee*, her officers and men, have been turned over to me. I have succeeded in having her towed to this place, and will commence work on her at once. She is not badly damaged as I had supposed. The deck immediately over the boiler on the port side was raised by the explosion some 6 inches. Beyond that there has been no damage to the boiler. Mr. Warren has not had the opportunity to examine the boiler. From a casual observation he thinks she can soon be in running order; the machinery has not been injured. It has been to me still more a matter of surprise why that vessel should have been allowed to sink. A pine plug driven into the feed pipe, which had been blown off, would have been all that was necessary.

McLaughlin also complained that Johnston had pilfered from the ship:

Nearly all her outfit has been plundered, and in some instances sold and given away by those who were left in charge. Things were scattered around, some at the arsenal, Johnston's and Eufaula. Johnston had the entire control in raising the vessel. She has been stripped of everything that could be converted into money.

(McLaughlin, 26 December 1863)

To make matters worse, William Brooks the major lumber supplier, had been furnishing lumber to civilians instead of meeting his contract to the Navy Yard for repair of the CSS *Chattahoochee*.

Work progressed slowly on the gunboat. The engines were overhauled and repaired. Two boilers were shipped from Wilmington, North Carolina, where they had been salvaged from the wreck of the ironclad CSS *Raleigh*. Two anchors, 180 fathoms of chain, and a bell, along with other material were taken from the wreck of a light boat in Front Creek off the St. John's River in East Florida. The rigging and sails of the CSS *Chattahoochee* had been removed, and efforts were made to trace them down at the Marion, South Carolina, station (McLaughlin, 11 February 1864). The ship's medicine chest was also lost, and the galley turned up on the CSS *Tennessee* at Mobile, Alabama (McLaughlin, 4 February 1864).

Finally, almost 12 months after the disastrous boiler explosion the rebuilt CSS *Chattahoochee* was placed in commission again on 20 April 1864. The ship was supplied with three months provisions for the 90 men on board, and equipped with two 32 pounders. Although the vessel's machinery was still not operable, the gunboat got underway for the obstructions. Using sails because the boilers had not been replaced, the gunboat travelled only six miles downriver before running aground at Woolford's Landing. On the morning of the 29th the river rose enough to enable the CSS *Chattahoochee* to continue on her way. On May 2nd McLaughlin received a telegram advising him that the vessel was aground again, this time at Francis' Landing. The following day, the report came that the gunboat had at last miraculously reached Eufaula, Alabama, a trip of eighty-five miles in two weeks.

The CSS *Chattahoochee* remained at Eufaula until early June. On 10 June the warship was ordered back to Columbus to have the repairs to her machinery completed. On 2 July 1864, the gunboat docked at the Confederate Navy Yard (Figure 5). For the next nine months the vessel remained at Columbus, her

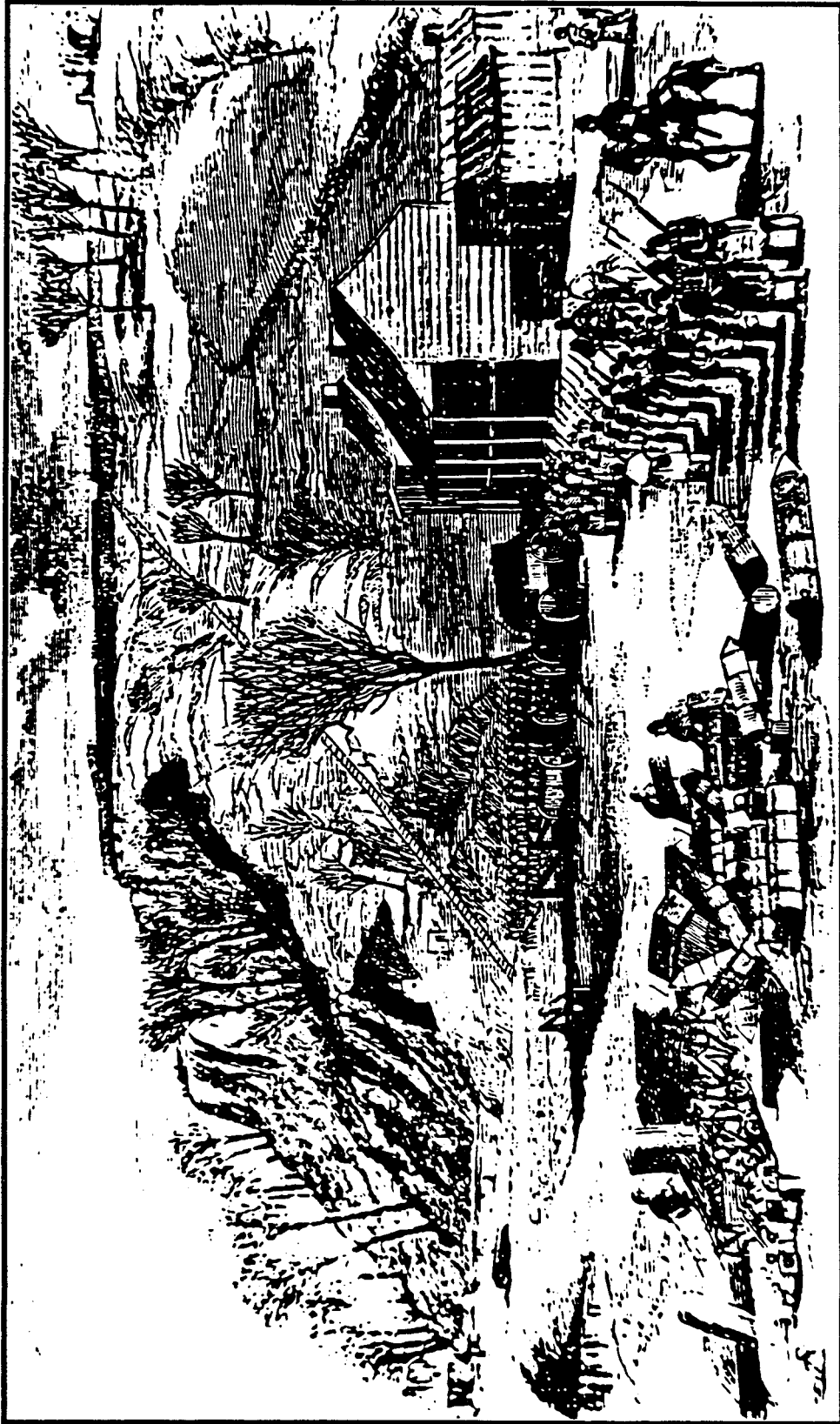


Figure 5. Contemporary Lithograph of the Columbus Navy Yard from Frank Leslie's Illustrated News.

machinery still not repaired. In the spring of 1865, Major-General James H. Wilson led a Union cavalry raid through Alabama and into Georgia. His objective was the destruction of Confederate industries, including the establishments at Columbus. After a brief action with the weak Confederate forces defending the city, Columbus was occupied on 16 April 1865. The action was described in the Navy Yard log:

Sunday 16 Easter Sunday--weather pleasant-- The excitement in town intense--Began early this morning loading stores and [?] on *Chattahoochee* and *Jackson* about noon sent the *Chattahoochee* off in tow of the *Young* in charge of Master Vaughn. As the Union forces approached, the *Young* attempted to tow the *Chattahoochee* to safety. Seeing that they would be unable to escape down river, the *Chattahoochee's* crew doused the vessel with 10 barrels of kerosene and, lighting slow fuses, made their escape by land. The vessel was left to burn 15 miles below Columbus.

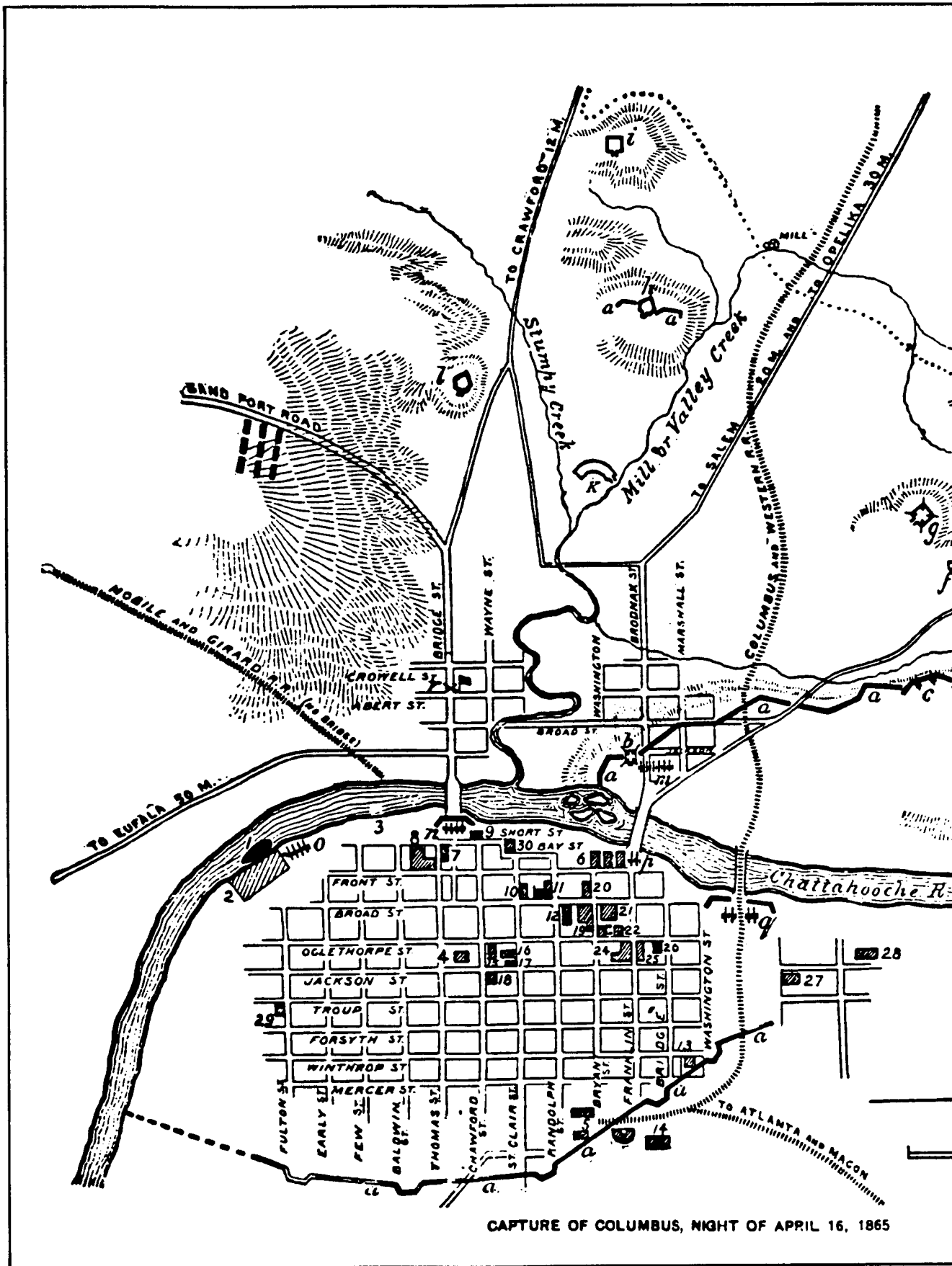
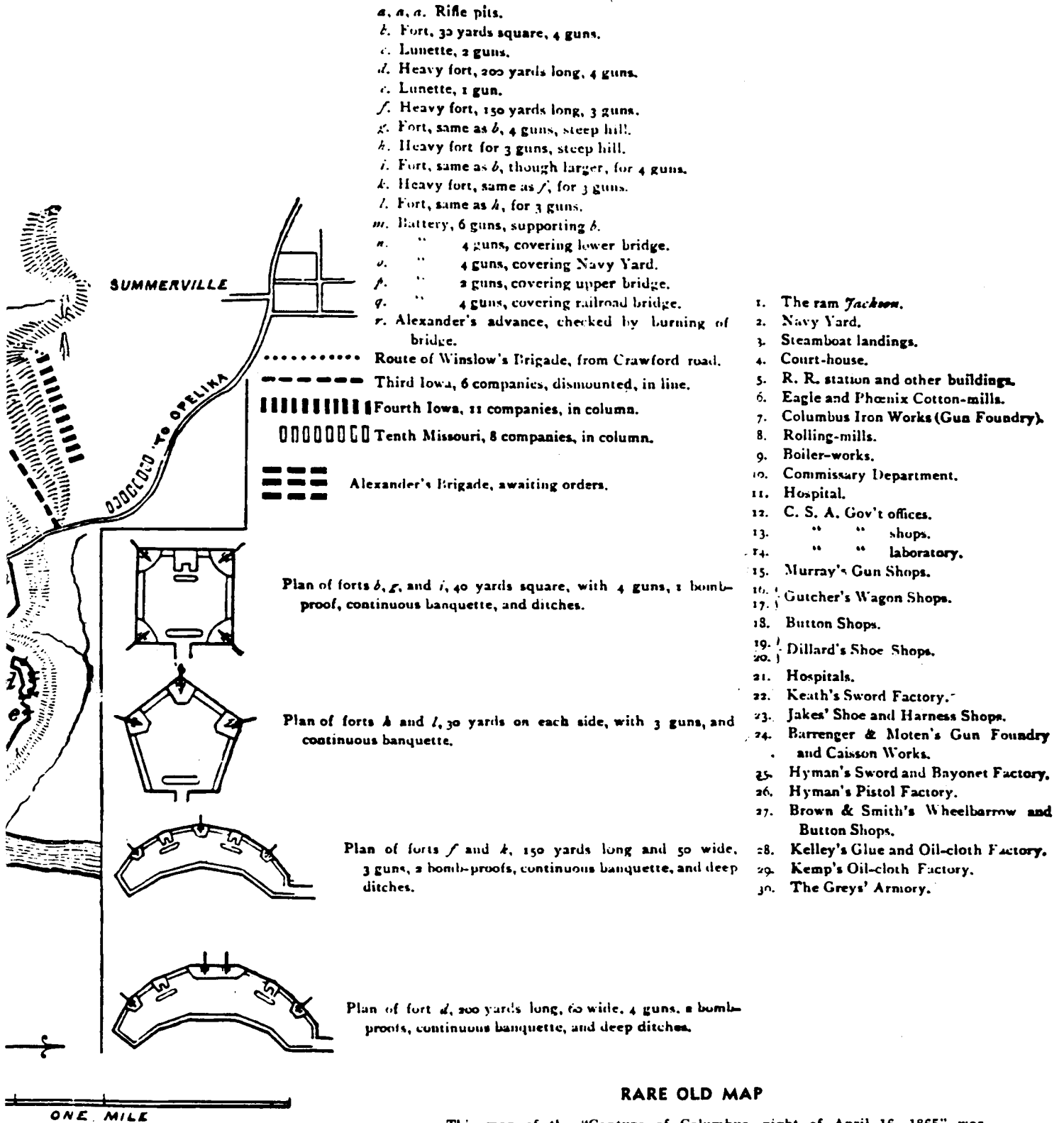


Figure 6. Contemporary Map of Columbus, Georgia and Defenses.





### RARE OLD MAP

This map of the "Capture of Columbus, night of April 16, 1865" was found in a book owned by B. C. Yates, Marietta, entitled "Story of a Cavalry Regiment—Fourth Iowa Veterans Volunteers," by William Forse Scott. It is published here through the cooperation of Columbus Chamber of Commerce.

## PREVIOUS INVESTIGATIONS

During the late 1950's and early 1960's the United States Army Corps of Engineers initiated a series of studies of the Chattahoochee River in conjunction with proposed improvements to navigation. Surveys carried out to support improvements to navigation included the location and subsequent removal of snags and obstructions from the channel. During the project the remains of the CSS *Chattahoochee* were located and subsequently identified as a serious threat to safe navigation. The stern of the warship was found well within the designated channel. To insure that the CSS *Chattahoochee* would not interfere with vessel traffic, the decision was made to remove the wreck.

Once plans for the removal of the CSS *Chattahoochee* were made public, interested Columbus citizens made known their objections to the destruction of the wreck. The Confederate Gunboat Association, Inc., was formed in the interest of salvaging the Confederate warship and developing an exhibit to provide public access to the remains. Working in conjunction with the United States Army Corps of Engineers, the Confederate Salvage Association formulated a plan to preserve and exhibit the CSS *Chattahoochee's* remains. Following the successful recovery of the remains of the ironclad CSS *Jackson* (Figure 7) in the spring of 1964, the Corps of Engineers snagboat *Montgomery* was brought up the Chattahoochee River to the wreck site.

During the summer of 1964, the *Montgomery's* crew and divers worked to raise the remains of the CSS *Chattahoochee* (Figure 8). A series of cables were placed under the remains of the hull and sediment and debris removed from the interior prior to attempting a lift. Unfortunately, the recovery effort was only partially successful. While approximately thirty feet of the stern of the CSS *Chattahoochee* was raised by the *Montgomery* (Figure 9) the main section of the hull broke away and settled back to the river bottom. The stern section of the CSS *Chattahoochee*, along with the remains of the ironclad CSS *Jackson* were transported to Columbus. There the stern section was placed on temporary public display in an open field until a shelter was constructed in conjunction with the opening of the James W. Woodruff Confederate Naval Museum in 1968 (Figure 10). After the stern section was recovered little attention was directed to the remaining ship structure. As interest faded, the precise location of the CSS *Chattahoochee's* remains became increasingly obscure.

In 1982, the Confederate Naval Museum sponsored an investigation of the Chattahoochee River in the vicinity of Columbus. A remote sensing survey and diving reconnaissance was initiated to determine if a large collection of captured



Figure 7. Excavation of the Remains of the CSS *Jackson*.



Figure 8. United States Corps of Engineers Snag Boat *Montgomery* at Broken Arrow Bend in 1964.

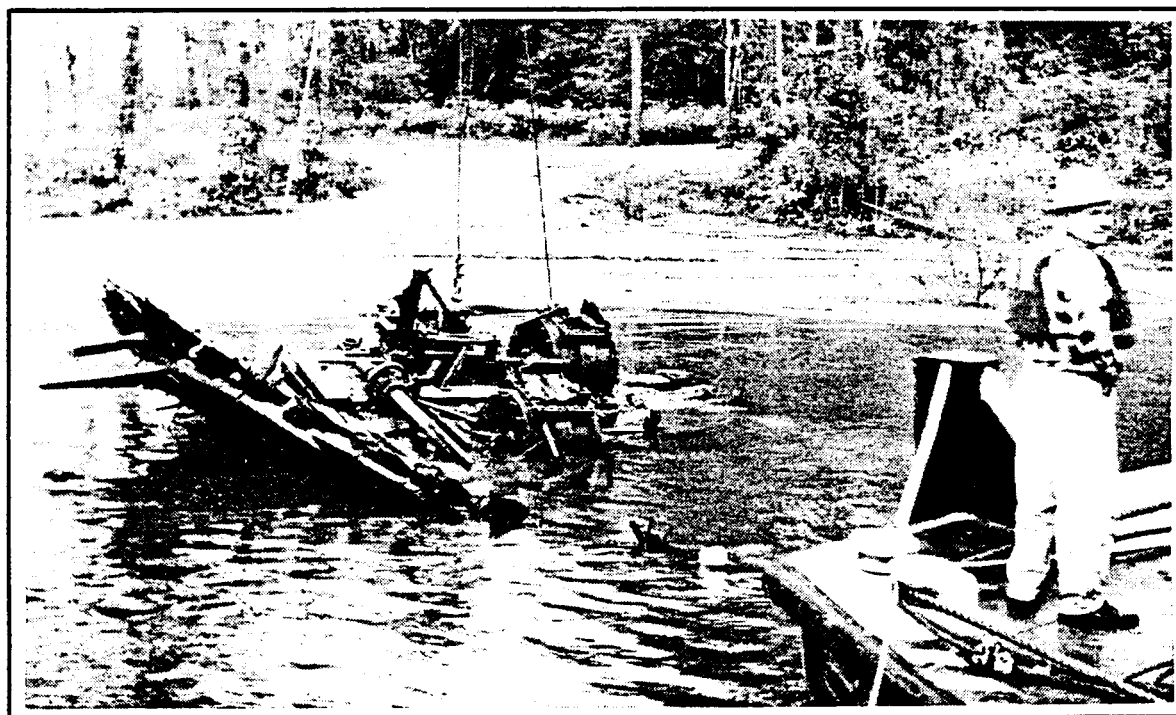


Figure 9. The Stern of the CSS *Chattahoochee* Being Recovered by the *Montgomery* During the Summer of 1964.

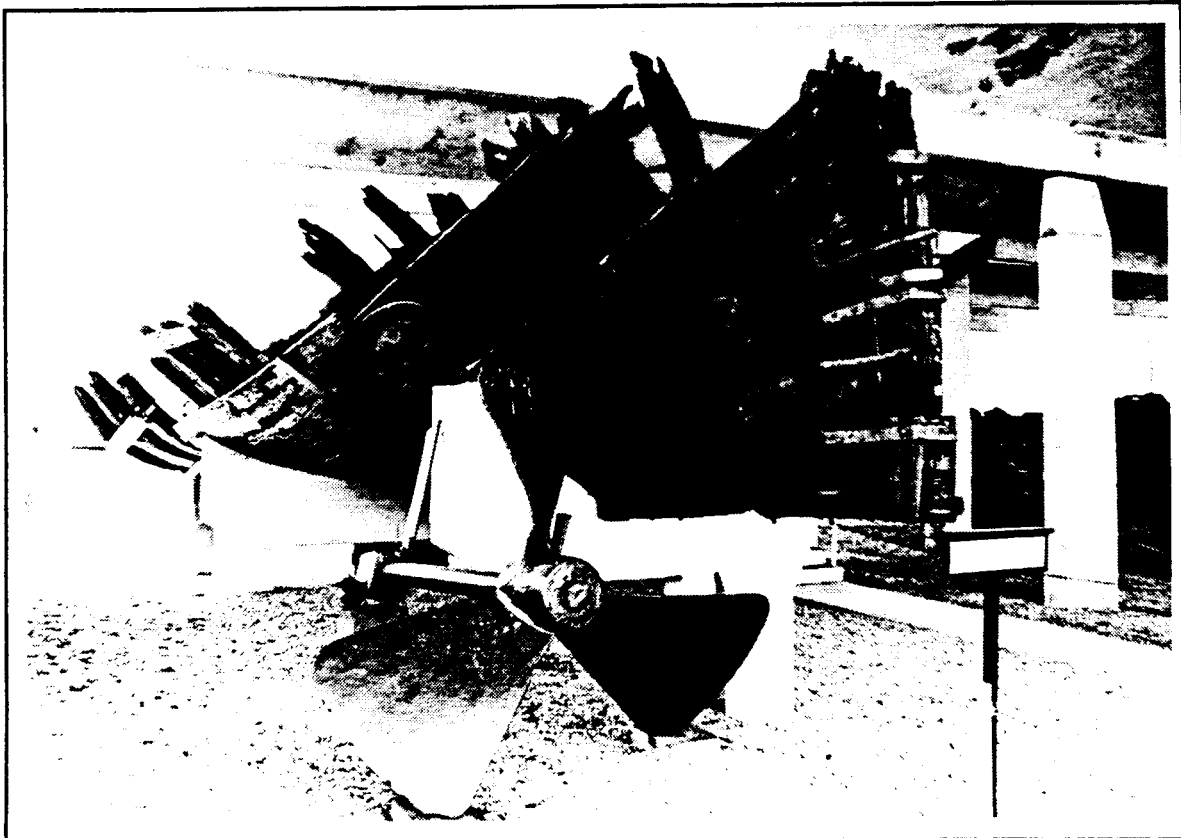


Figure 10. The Stern of the CSS *Chattahoochee* on Display at the Confederate Naval Museum in Columbus, Georgia.

Confederate ordnance had been thrown into the river by Union troops under the command of General J. H. Wilson. While the reconnaissance survey failed to locate any Confederate ordnance, a variety of vessels and a dock or shipway associated with the Confederate Navy Yard were located and examined. Prior to completion of the investigation a magnetometer reconnaissance was carried out south of Columbus to locate magnetic targets that might represent the remains of the CSS *Chattahoochee*. While the survey identified several targets that could represent the Confederate warship, no target assessment diving was carried out to confirm the nature of material generating each magnetic signature.

In the spring of 1984, Mr. Rick Anuskiewicz, then with the United States Army Engineer District, Savannah, carried out a remote sensing reconnaissance to locate and refine magnetic targets in the Chattahoochee River in the vicinity of the location of the gunboat. The survey resulted in the location of several targets

with signature characteristics similar to those expected in association with the CSS *Chattahoochee*. The most appropriate target locations were identified for additional investigation during the 1984 East Carolina University Field School in Maritime History and Underwater Archaeology.

## DESCRIPTION OF THE FIELD RESEARCH

Field research activity was initiated on 19 June 1984. Using a 24-foot survey vessel and a Littlemore Scientific proton precession magnetometer a survey of the Chattahoochee River was initiated north of Broken Arrow Creek. Due to the narrow and restricted nature of the Chattahoochee River, the survey was carried out without precise positioning control. On shore visual and navigation references were used in annotating the magnetic record and survey lanes were run parallel to the river bank at distances of approximately fifty feet to assure reliable target identification.

The survey identified two targets that generated magnetic signatures of sufficient intensity and duration to be considered worthy of in-water inspection. At both sites material generating the magnetic signatures was found to be covered by debris, sand, and bottom sediments. Probing the target sites provided no additional insight into the nature of target material.

The following day the remote sensing investigation was extended south in the immediate vicinity of Broken Arrow Creek. Information provided the Confederate Naval Museum by a participant in the 1960 salvage project indicated that the wreck lay somewhere between mile board 145 and the mouth of Broken Arrow Creek. In this area the magnetometer identified three additional targets. At the first target site an examination of the bottom surface confirmed that the magnetic anomaly was created by an automobile. Investigation of the river bottom at the site of the second signature produced no evidence of cultural material. The source of the anomaly was completely covered by river bottom sediments.

Examination of the final magnetic target site confirmed that the signature was associated with the remains of a vessel (Figure 11). The site was buoyed and a more detailed investigation carried out to determine if the wreck could be the CSS *Chattahoochee*. A brief reconnaissance of the exposed structure established that the wreckage consisted of the lower hull of a wooden ship and confirmed that a substantial portion of the bow or stern was missing. Exposed sections of the vessel's keel, frames, and bilge ceiling were found to compare favorably in size and configuration with construction details of the CSS *Chattahoochee's*

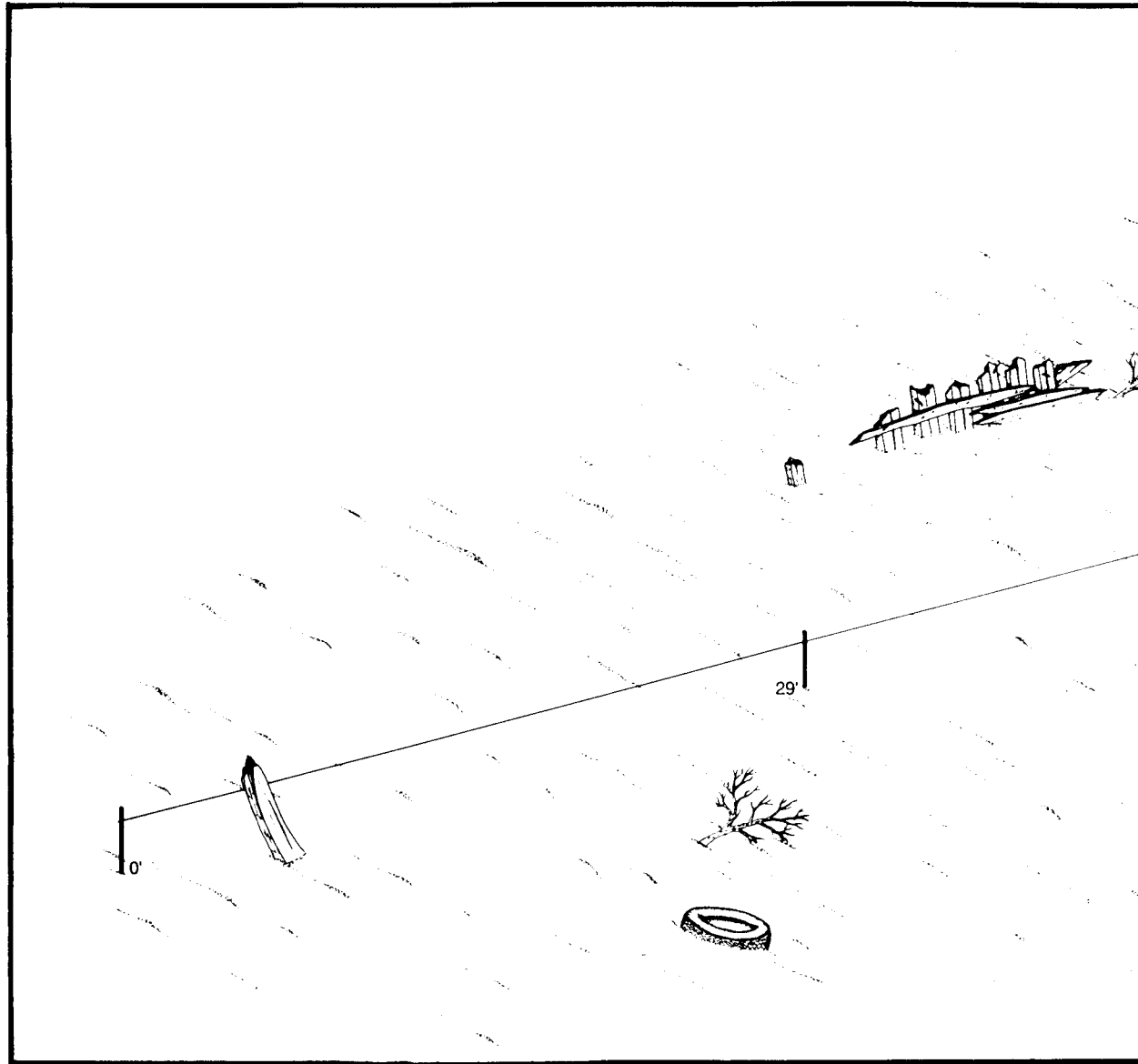
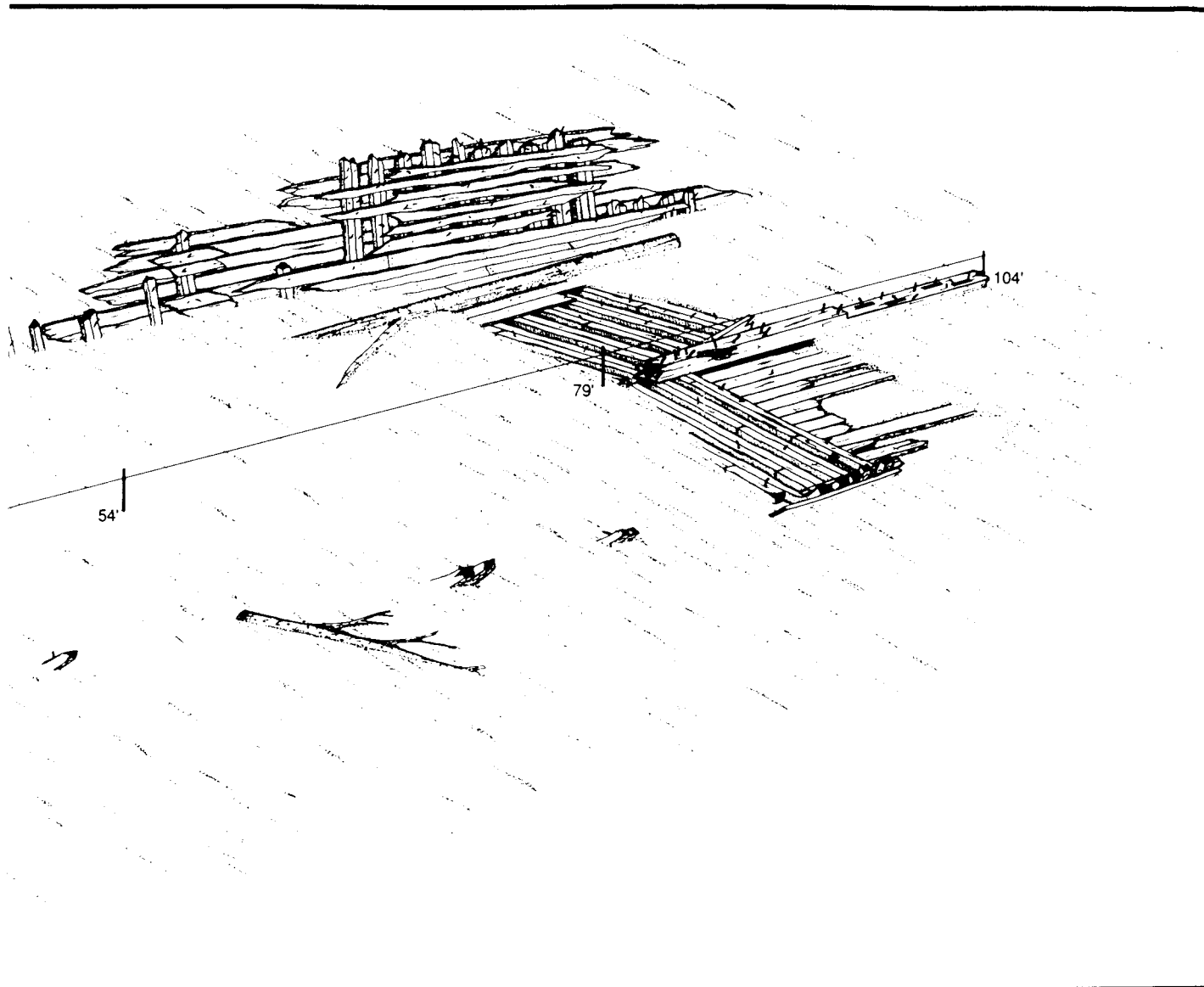


Figure 11. An Artist's Concept of the Exposed Remains of the CSS *Chattahoochee* P and Underwater Archaeology



ared During the 1984 East Carolina University Field School in Maritime History



stern on exhibit at the Confederate Naval Museum. On the basis of data from the reconnaissance investigation, the wreckage was tentatively identified as the CSS *Chattahoochee*.

On 21 June 1984, the United States Army Engineer Battalion from Fort Benning, Georgia, launched and assembled a complex of aluminum bridge pontoons to provide a support platform for a more detailed investigation of the vessel at Broken Arrow Bend. The assembled pontoon bridge sections were moved up river to the wreck site and a trailer containing diving and support equipment was loaded onboard (Figure 12). With buoys providing a surface reference to the wreck, the pontoon platform could be positioned over the site using a three point anchoring system (Figure 13). The three point mooring provided stability in the varying currents and permitted the pontoon platform to be moved out of the navigation channel secured to the Alabama bank of the Chattahoochee each night.

Once the pontoon platform was configured to support diving operations, more complex mapping and testing of the wreck was initiated. On 22 June, an on-site baseline was deployed through the wreck site on an axis aligned as closely as possible with exposed sections of the keelson. The baseline extended south 152 feet 2 inches from a point estimated to correspond with the northern extremity of vessel structure to a point well beyond the southern extremity of exposed articulated hull. Each end of the baseline and a series of points along its length were identified by sections of pipe driven into the bottom. These references would provide reliable stations for mapping, probing, and control of a test excavation (Figure 14).

To tie the on-site baseline into the Georgia State Plane Coordinate System a second baseline was established on the Georgia bank of the Chattahoochee River. That 375 foot-long baseline was established by personnel from the United States Army. Army surveyors tied the river bank baseline to the on-site datum system by turning angles to a series of buoys that identified the north and south extremities of the underwater baseline.

The riverbank baseline was divided into 25 foot segments. At each station a series of transects across the river were run using a precession fathometer. Fathometer data were used to develop a bathymetric map of the wreck site environment (Figure 15). Within this context the remains of the CSS *Chattahoochee* were mapped. Mapping of the wreck site was carried out using trilateration. Using datum stations along the bottom surface baseline, the location of exposed elements of the hull were established by underwater tape



Figure 12. Pontoon bridge Vessel Provided by the United States Army to Support Investigation of the Remains of the *CSS Chattahoochee*.

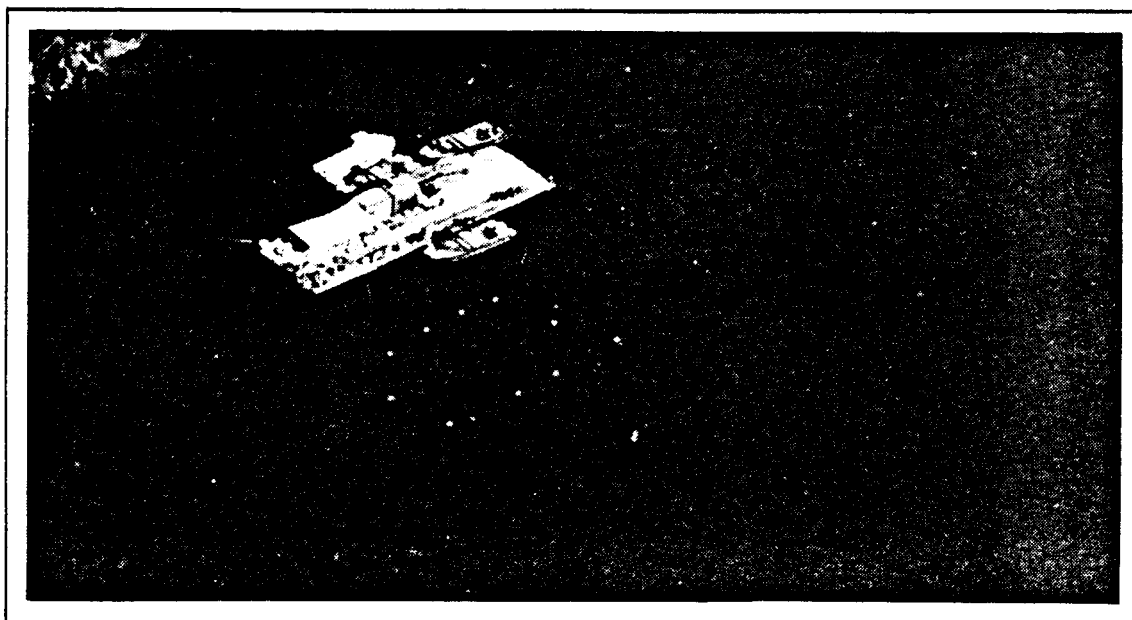


Figure 13. Aerial View of the Pontoon Vessel Anchored Adjacent to Buoys Identifying the Remains of the *CSS Chattahoochee*.

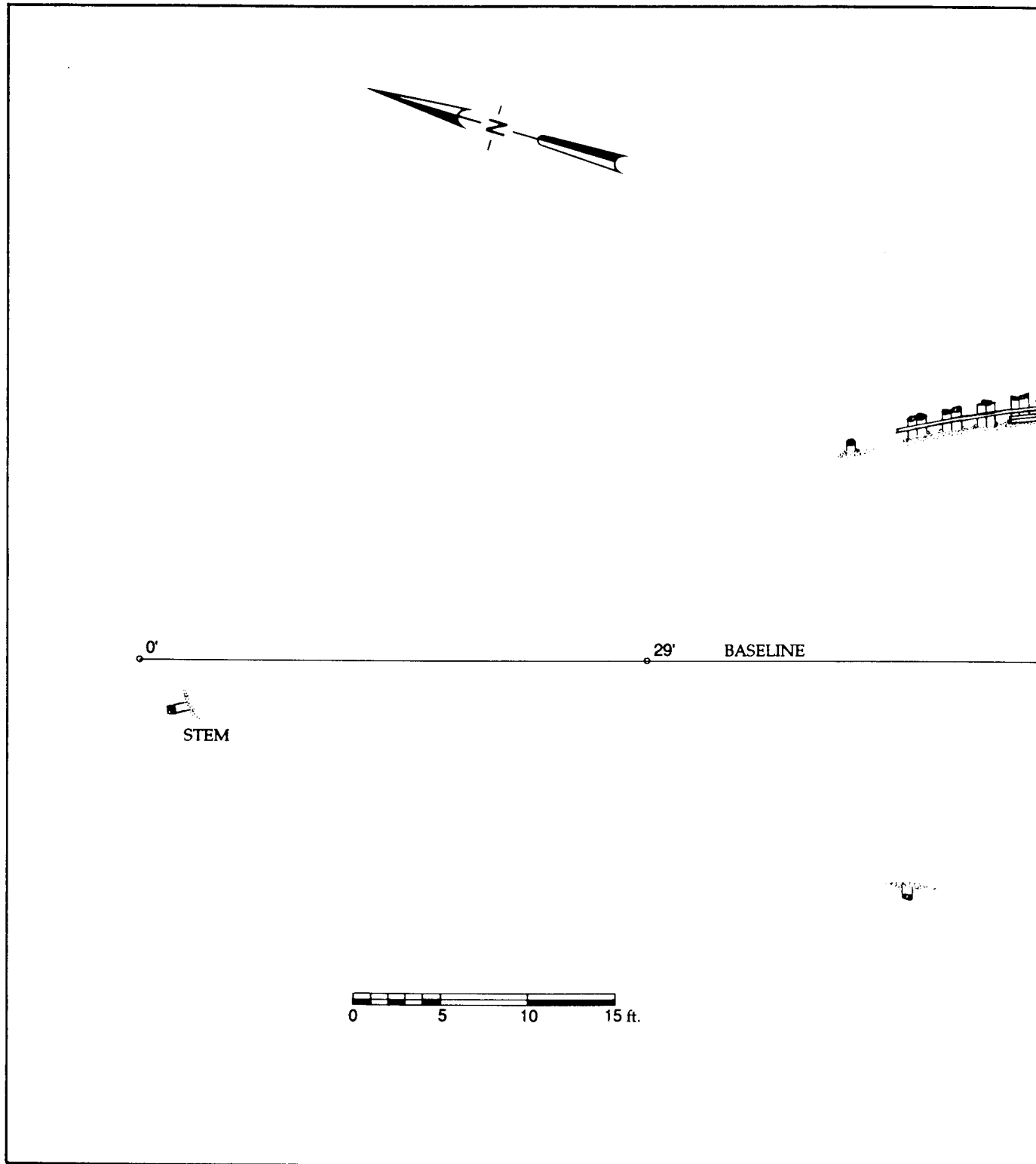
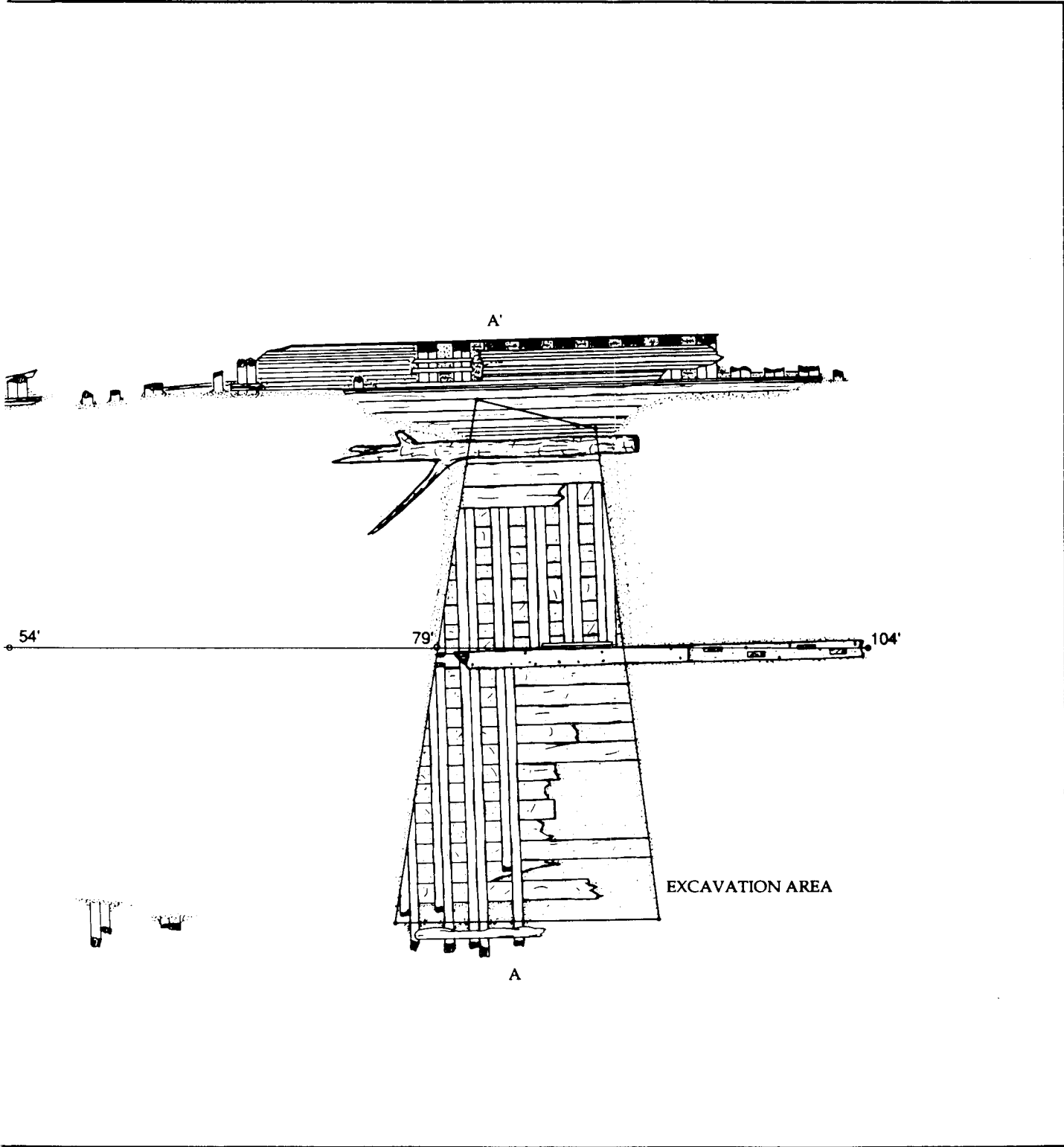


Figure 14. Site Plan of Exposed Remains of the CSS *Chattahoochee* Illustrating the Location



the Underwater Baseline and Test Excavation.

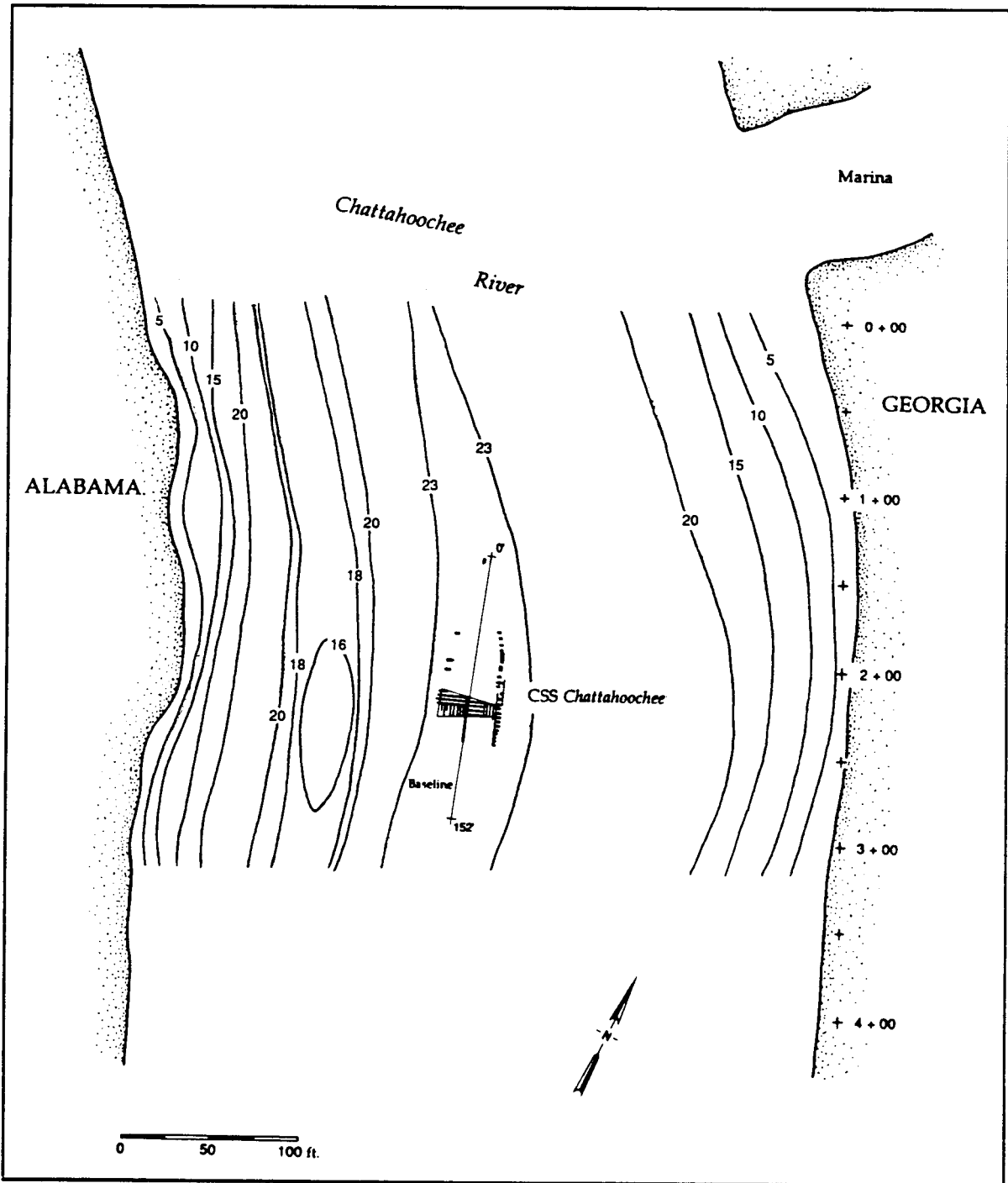


Figure 15. Site Plan Showing River Bathymetry in the Vicinity of the CSS Chattahoochee.

measurements. By taking measurements from two or more stations along the baseline, the position of each exposed element of the wreck could be identified accurately and plotted on a scaled plan. Once this plan confirmed the extent and orientation of articulated hull structure, additional datum stations and reference lines were established to identify the location of a test trench (Figure 16).

The test trench was laid out perpendicular to the exposed keelson near the southern extremity of exposed wreckage. As soon as the bottom surface within the test area was mapped, excavation was initiated. While scuba equipped teams completed site mapping and recording of the exposed hull structure, additional teams equipped with surface supplied communications masks began to systematically remove sediment in the test area. Water powered induction dredges were employed to remove sand and sediment and transport them to an area outside the hull near the southern extremity of the baseline.

Cultural material exposed by the excavation was mapped *in situ* using trilateration from datum points identifying the test trench. Once mapped, artifacts were recovered and transported to the pontoon platform. There they were tagged, cataloged, and wet packed for transportation to the Confederate Naval Museum. At the museum each artifact was photographed and repacked for transportation to a temporary conservation laboratory at East Carolina University.

When excavation of the test trench was complete, the exposed section of the wreck was mapped using trilateration. Details of the hull structure were documented on the site plan and a cross sectional profile of the hull was recorded (Figure 17). A bubble level was used to maintain accurate elevations along the athwartship section.

To provide insight into the nature and extent of unexposed hull structure a series of profiles of the site were established by probing. Using the on-site baseline as a reference, a series of athwartships transects were laid out within the hull. These were positioned every ten feet along the baseline and extended beyond the confines of articulated structure. At stations located every two feet along each athwartships reference line, measurements were made to the wreck using a ten foot hydraulic probe powered by a small high pressure water pump. Vertical measurement was controlled using the bubble level, and depths below datum were recorded on the pontoon platform using diver to surface communications.

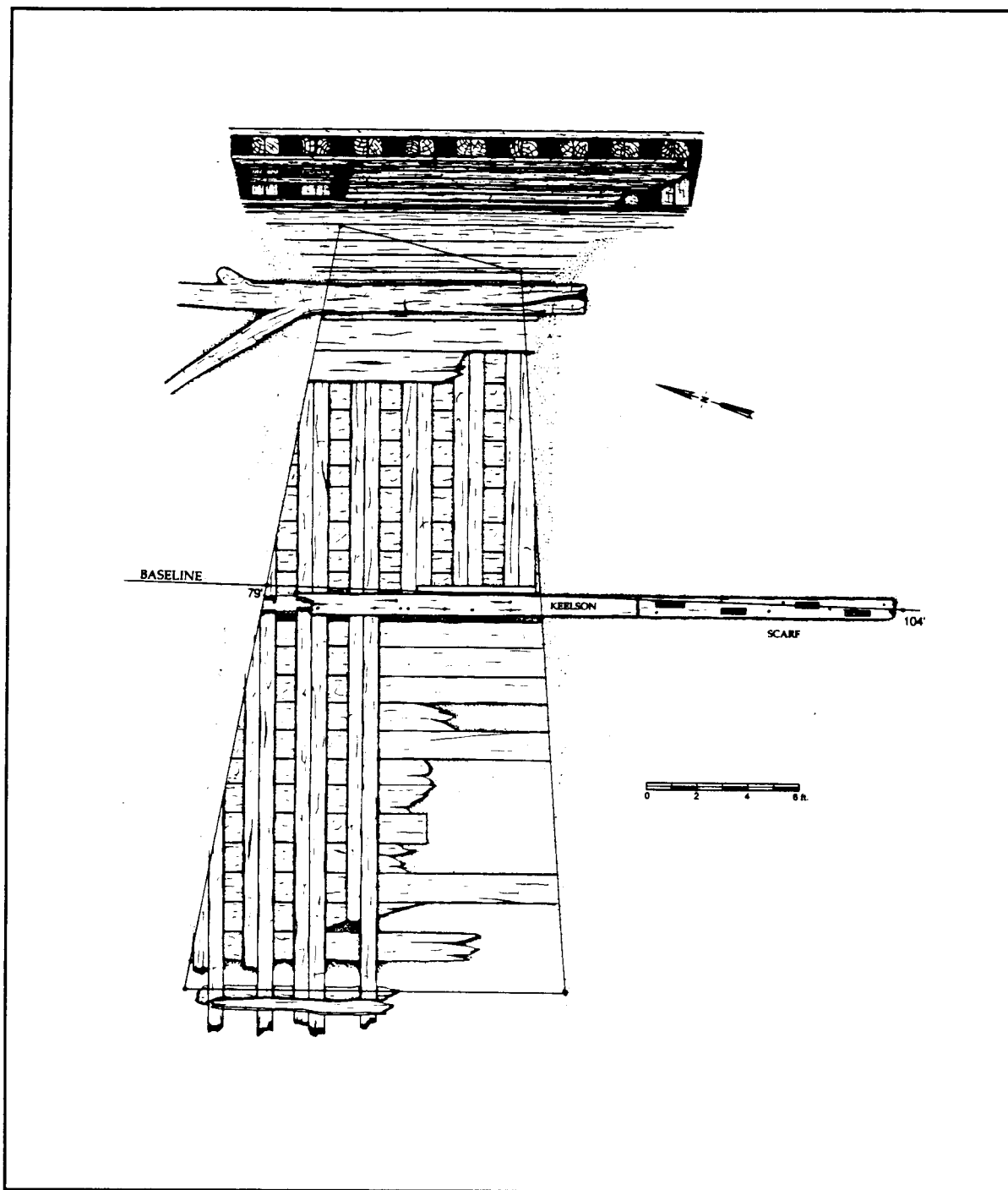


Figure 16. Plan of the Remains of the CSS *Chattahoochee* Exposed by Test Excavation.

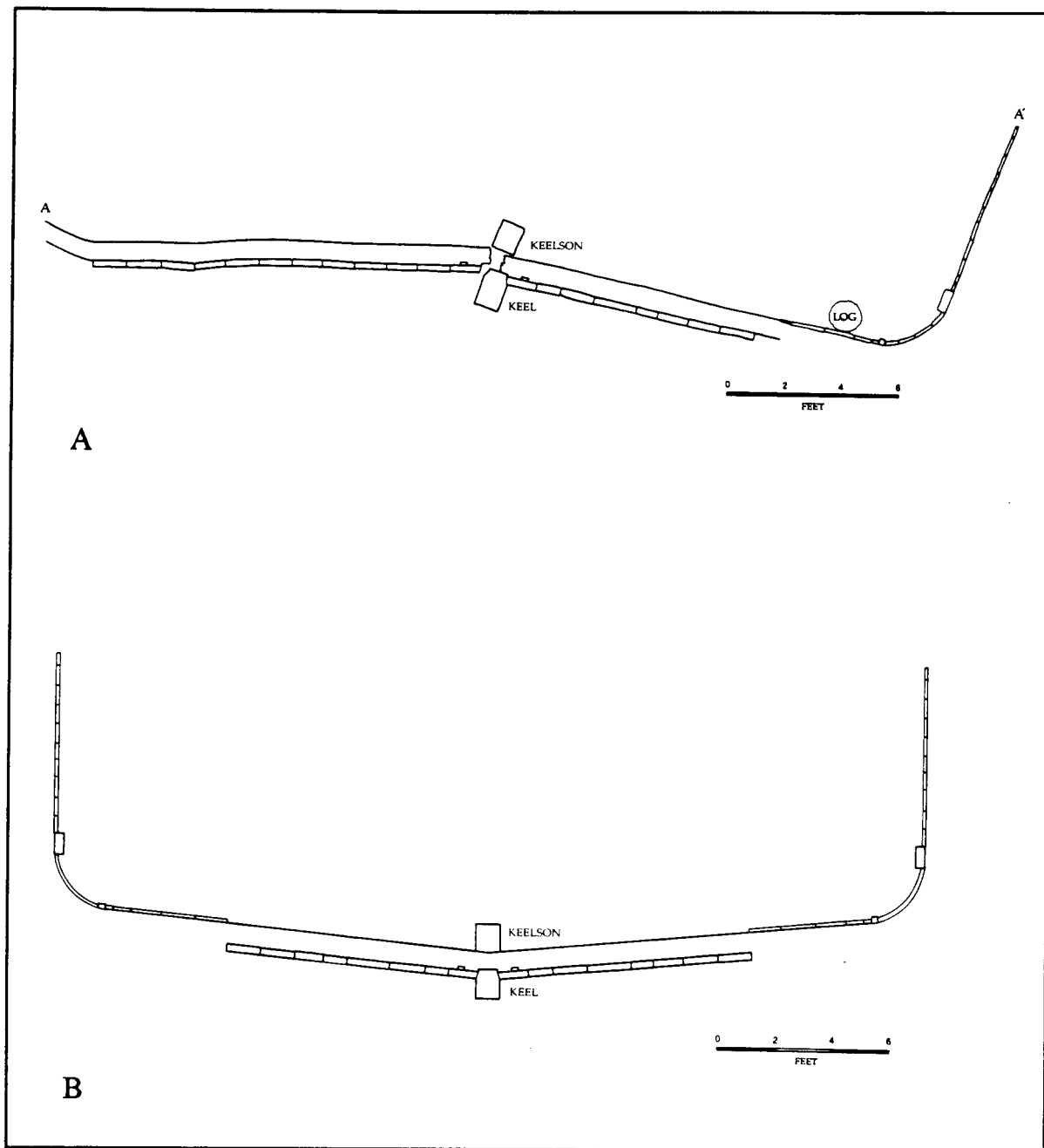


Figure 17. A: Profile of the CSS *Chattahoochee*'s Hull as Recorded on the Site.  
B: Profile of the CSS *Chattahoochee*'s hull as Reconstructed Based on Information Recovered from Surviving Structural Remains.



Systematic probing of the wreck identified the ship's stem. Although obscured by a concentration of snags and debris, the badly deteriorated remains of the stem post were located immediately southwest of the north baseline extremity. The stem was mapped *in situ* by triangulation from datum points on the baseline. Probing also located a concentration of iron shot along the keelson near the stempost. Several of the iron shot were recovered so that their size could be compared with historical records of the CSS *Chattahoochee's* ordnance.

A series of reconnaissance dives along the Alabama shore line west of the surviving hull structure were carried out during the final week of on-site research activity. The dives were conducted to locate and identify material associated with the CSS *Chattahoochee* that had been removed from the hull and redeposited outside the channel at the time the stern was salvaged. Although scheduling prevented development of a plan of the debris, the investigation identified a variety of disarticulated planks, futtocks, and timbers.

The final aspect of on-site activity involved removal of all but the permanent datum stations on the river-bottom baseline. As the Chattahoochee River currents had begun to recover that section of the hull exposed by excavation, no backfilling of the test trench was determined necessary. Once the wreck environment had been cleared, mooring anchors used to position the bridge pontoon were recovered, and on-site activity terminated.

At the same time work was being carried out on the remains of the CSS *Chattahoochee* at Broken Arrow Bend, previously recovered material from the wreck was being cataloged at the Confederate Naval Museum. Artifacts associated with the CSS *Chattahoochee* and parts of the ship's machinery were identified and documented. Remains of the CSS *Chattahoochee's* stern and steam machinery on display at the museum were recorded photographically and with measured drawings. Finally, lines of the stern section were recorded using a three dimensional XYZ coordinate system (Figure 18). That system consisted of a baseline laid out beneath and parallel to the keel. At five foot intervals along the baseline perpendiculars were extended from the centerline of the hull to the extremity of the starboard side of the surviving hull structure. At intervals of six inches or a foot measurements were made from the perpendicular to points on the hull directly above each station. These measurements were made using a plum bob to increase accuracy. Variations in height from the baseline were taken along the bottom of the keel at each perpendicular to permit correction of distortion of the hull caused by the varying elevations of concrete pilings supporting the CSS *Chattahoochee's* stern. The configuration of the hull was

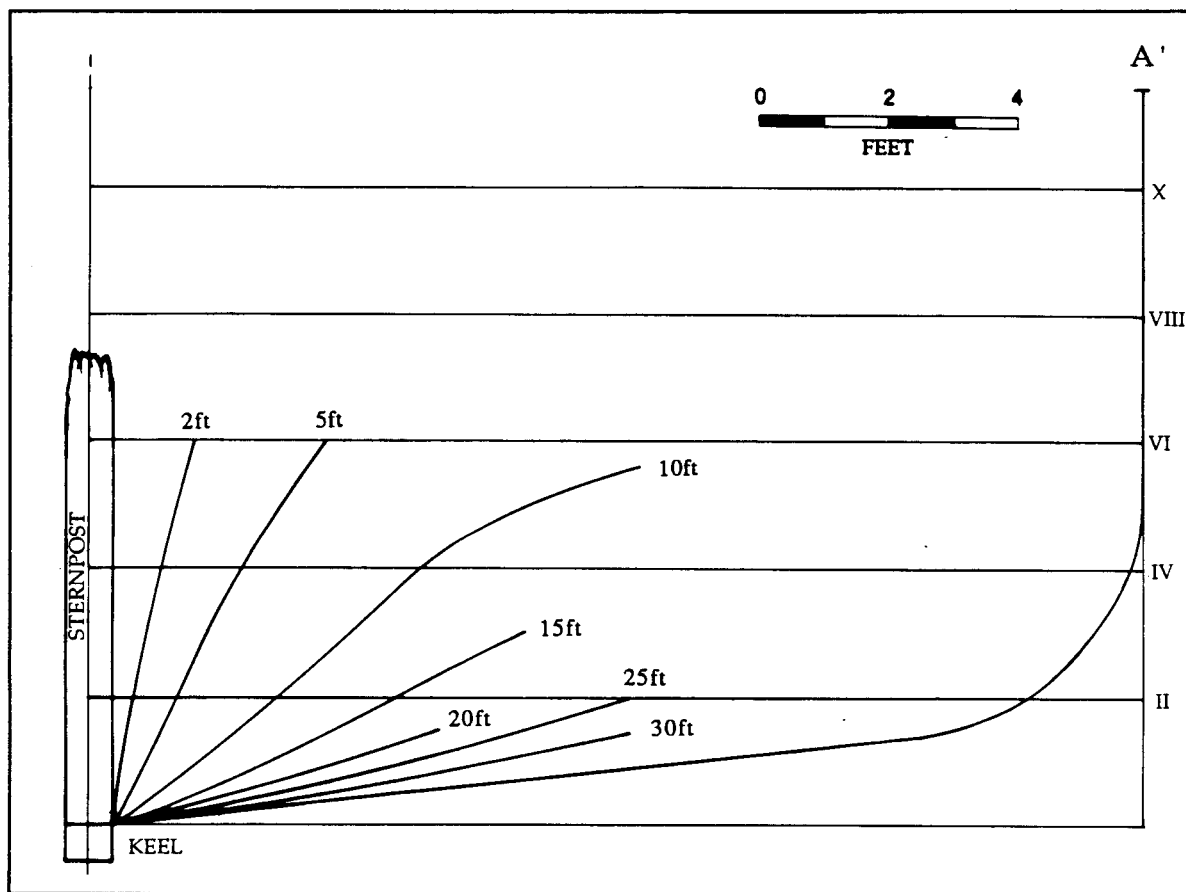


Figure 18. Lines of the CSS *Chattahoochee*'s Stern and Midship Section Taken from the Surviving Hull Remains.

recorded as a table of offsets that were plotted to produce the after hull lines. These data were combined with that taken from the submerged hull remains and developed into a set of hypothetical hull lines.

#### DESCRIPTION OF THE FINDINGS

Surviving structural remains of the CSS *Chattahoochee* were found immediately north of the mouth of Broken Arrow Creek. As a result of either modern salvage activity or environmental conditions the present location of the CSS *Chattahoochee* does not correspond with 19th century identification of the wreck site. Also, due to the removal of the vessel's ordnance, machinery,

and substantial portions of the hull itself, the wreck produced a magnetic signature considerably smaller than anticipated. With the sensor towed on the surface in sixteen feet of water at a vessel speed of two knots, the anomaly produced a maximum intensity of only twenty-six gammas and a maximum duration of only 16 two-second pulses. Although the magnetic data were not contour plotted, a series of transects across the wreck site confirmed that the signature was dipolar in nature.

Mapping of the site established that the hull lay parallel to the channel on an axis of 37 degrees magnetic. The bow was found upstream and was identified by four feet of the stempost that protruded above the sediment. Approximately 126 feet downstream from the stempost the broken keelson was exposed to confirm that the stern had been removed or destroyed (Figure 14).

Investigation of the surviving wreck structure confirmed that, with one exception, only the lower hull of the CSS *Chattahoochee* survives intact (Figure 11). With the exception of a small section of the starboard side of the hull ninety feet aft of the stempost, almost no structure survives above the turn of the bilge. The singular exception is a ten foot long section of the hull that survives to the approximate level of the gun deck. That section consists of exterior hull planking, futtocks, and ceiling planking. Although much of the interior surface of the ceiling was burned, evidence of white paint was found on unburned planks near the turn of the bilge.

The majority of surviving wreck structure lies beneath the coarse sand bottom sediment. Systematic hydraulic probing of the site confirmed that as much as four feet of sediment has accumulated within the confines of the hull structure. Below this layer of protective sediment the hull remains are well preserved and essentially intact. Both probing and examination of the hull exposed by test excavation revealed that structural preservation was excellent. All wood was found to be sound and iron fastenings revealed only nominal levels of surface deterioration. Thus, while the wreck structure exposed to the water column environment has suffered a degree of surface erosion, all the articulated wreck structure can be considered to retain a high degree of its original engineering integrity.

The test excavation also provided insight into the nature and scope of the archaeological record associated with the CSS *Chattahoochee*. Although a variety of artifacts were recovered from the small test trench, no evidence of a complex stratigraphic record was found (Figure 16). Sediment within the confines of the hull suggest a high level of environmental activity and extensive resorting due to the strong currents created by discharging damed water to

generate electric power. The sediment profile in the test excavation strongly suggests that cultural material associated with the gunboat will only be found beneath the sediment on the bilge ceiling. While the horizontal distribution of cultural material may preserve some evidence of on-board activity centers, it is reasonable to expect little additional insight from the stratigraphic record. In spite of extensive site disturbance associated with attempted salvage, a limited amount of cultural material survives within the confines of the hull. While the archaeological context preserves somewhat limited insight into the nature of specific human activity on-board the CSS *Chattahoochee*, samples recovered from the test excavation confirm that recovery of surviving artifacts could significantly contribute to the effectiveness of exhibits designed to present the CSS *Chattahoochee* to the general public.

Although of limited archaeological value, it is also apparent that the river bottom outside the hull may also contain material associated with the CSS *Chattahoochee*. The nature of salvage activity, the destruction that accompanied efforts to recover the shipwreck, and the migration of the wreck from its nineteenth-century location strongly suggest that material associated with the vessel could have been redeposited at several locations (Figure 3). The presence of disarticulated structural evidence adjacent to the Alabama bank of the river confirms that this is the case. While little archaeological insight can be generated by recovery of the material, it could prove valuable in presenting the CSS *Chattahoochee* to the general public.

On the contrary, surviving hull structure preserves a variety of architectural, construction, and engineering information that is unavailable in the historical record. Recovery of this data will be critical to accurate reconstruction of the CSS *Chattahoochee* and may well represent the most valuable aspect of the shipwreck. Although the 1984 investigation generated limited architectural, construction, and engineering data, examination and documentation of the sectional profile did provide some new insight into the vessel's design and construction. The cross section revealed that the gunboat was built with a beam considerably wider than the specifications identified in the Confederate Navy Department's contract with David S. Johnston (Figure 17). The reconstructed cross section also confirmed that the CSS *Chattahoochee* had a limited amount of deadrise amidships. Unfortunately, the one section of the ship's hull that survived above the turn of the bilge was badly damaged, and no accurate indication of tumblehome could be determined.

The composite framing pattern revealed a room and space of 24 inches and light oak scantlings measuring only 7 inches sided and 8 to 8 1/2 inches moulded near the keel. On either side of the keel a 1 inch high by 2 1/2 inch wide limber had been cut into each floor. Exterior planking was found to be pine and measured 3 inches in thickness and approximately ten inches in width. The planking was found to be fastened with a combination of treenails and iron spikes. The ceiling planking was found to be 1 1/2 inches in thickness and varied randomly between 8 to as much as 10 inches in width. A thick strake at the turn of the bilge and another four feet above the turn of the bilge were the only exceptions to the otherwise uniform ceiling. The exposed keelson proved to be pine and measured 10 inches sided and 12 inches moulded. The keelson was attached to the floors and keel by staggered sets of iron drift pins located approximately every 12 inches on the exposed section (Figure 17). A scarph located immediately south of the test excavation proved to be the diagonal variety cut with 2 inch vertical extremities and a length of 72 inches. Two 2 inch by 2 1/2 inch by 10 inch mortise were cut into the face of the scarph to retain blocks of similar size that would enhance strength (Figure 16).

Structural evidence exposed by the test excavation also confirmed that the CSS *Chattahoochee* was constructed with light scantlings. Clearly, the ship was built in accordance with design criteria more suitable for a merchant vessel than a warship. The exposed hull remains appeared to be highly unsuitable for either carrying heavy ordnance or affording protection for the crew. Room and space measurements, the exterior planking, and bilge ceiling all resembled a commercial bottom.

While on-site investigation confirmed that the vessel was built according to most of the contract specifications, documentation revealed several significant variations. The most significant of these was in the moulded beam of the vessel. While the contract called for a maximum moulded dimension of 30 feet, on-site measurements confirmed that the ship was actually built 32 feet in the beam (Figure 17). This would have had a significant impact on the vessel's performance. The increased displacement would have reduced draft but also created a slower hull speed. Lines of the ship developed from data taken from both the stern section on exhibit at the Confederate Naval Museum and the surviving hull remains at Broken Arrow Creek confirm that the CSS *Chattahoochee* was a beamy vessel with 12 degrees of deadrise amidships (Figure 17). Lines of the hull were generated using the limited archaeological data (Figure 19). The configuration of the stern confirmed a short run aft and suggested a rather full body forward. This configuration seems to confirm J. Horry Dent's suspicions that the CSS *Chattahoochee* would be "a very

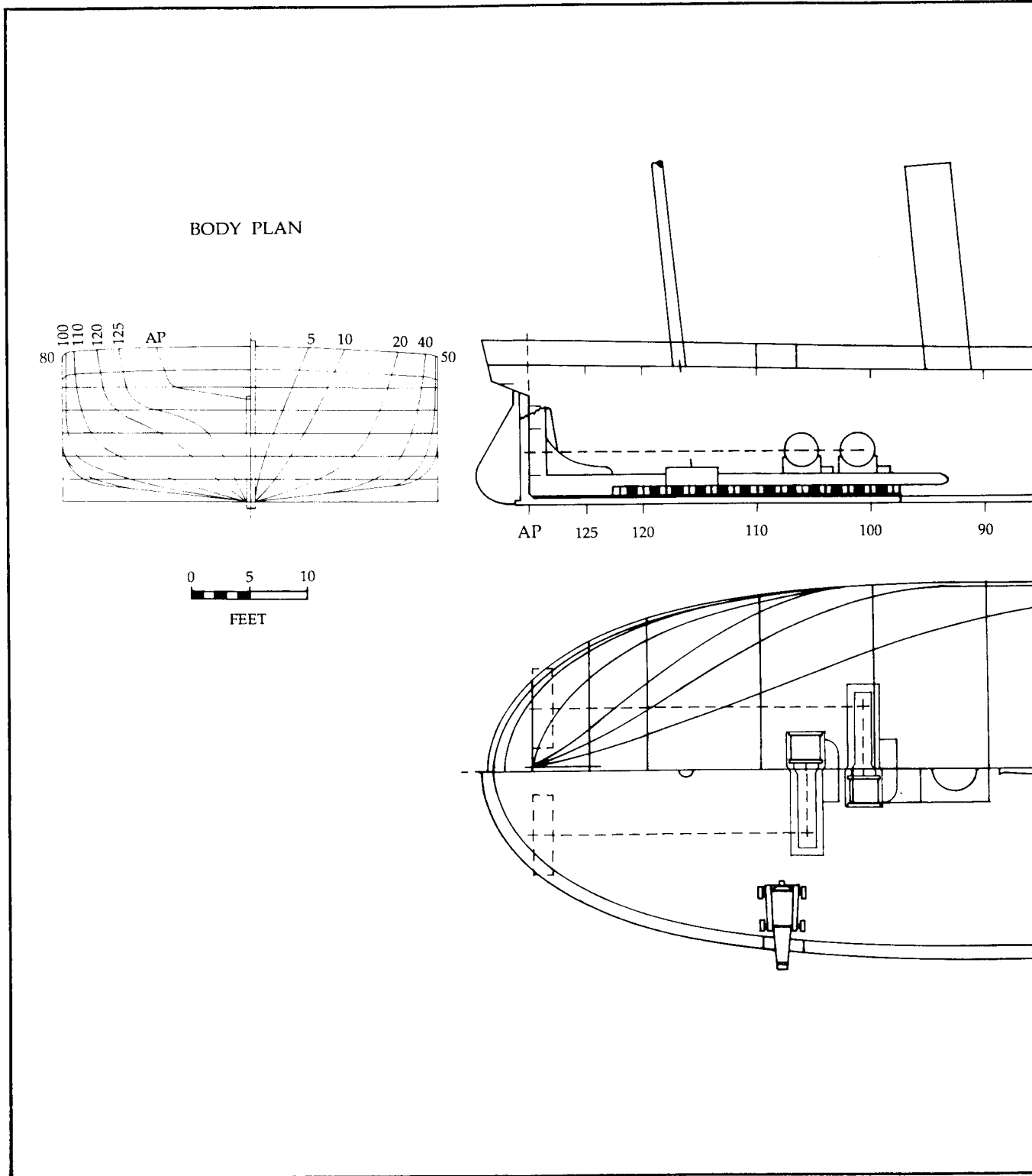
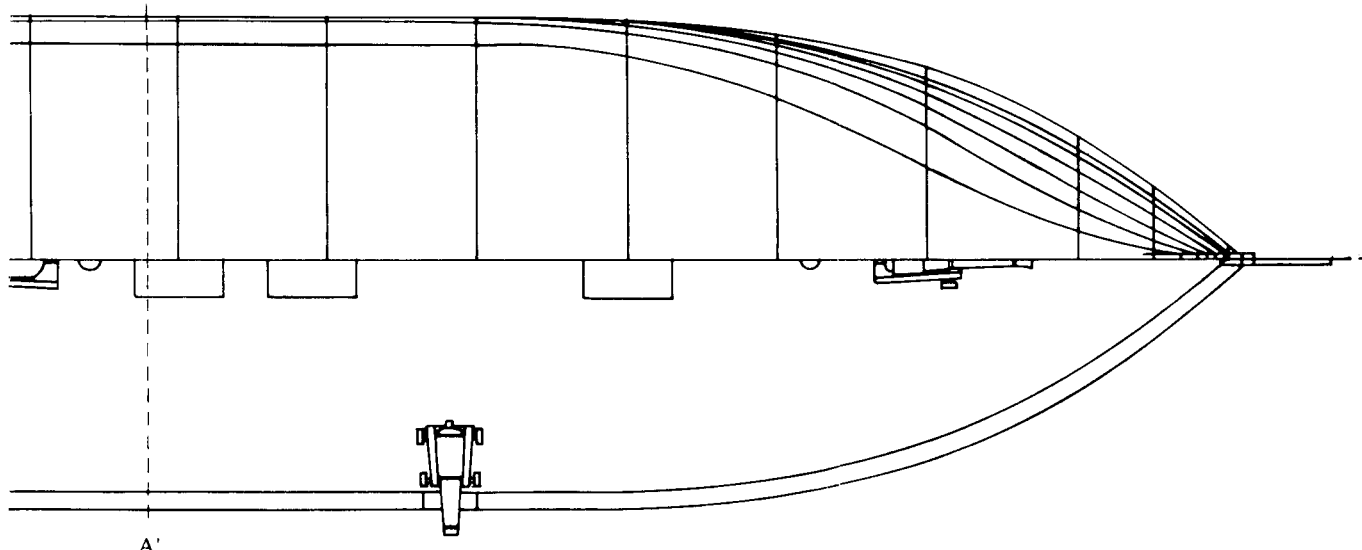
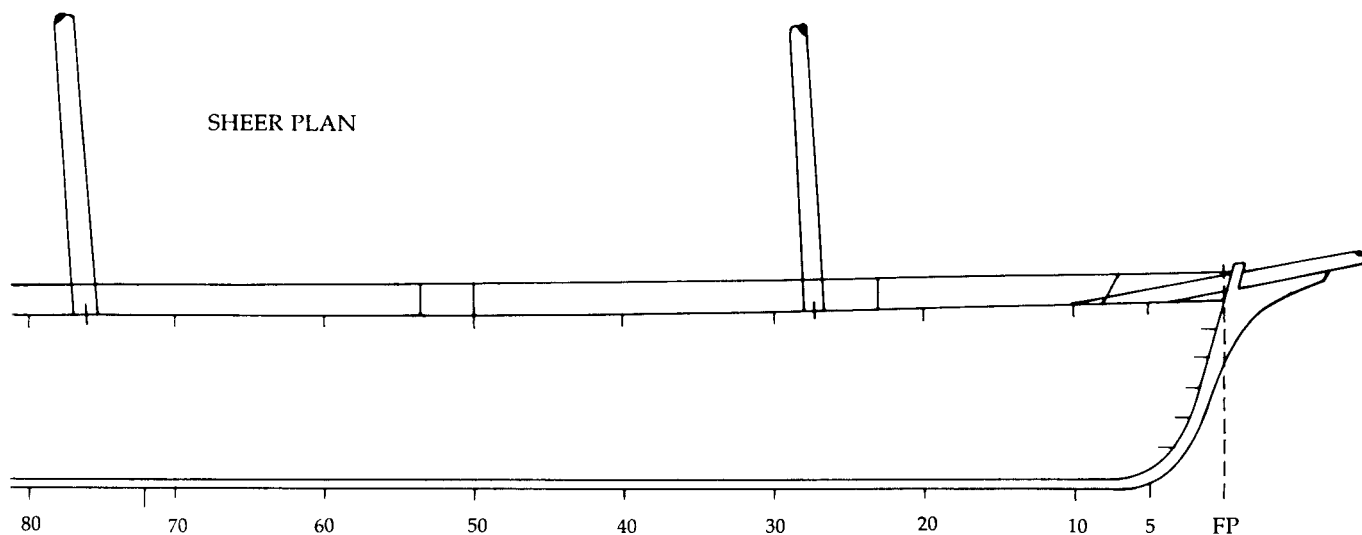


Figure 19. Lines of the CSS *Chattahoochee* Developed From Available Historical



Archaeological Data.

uncomfortable sea boat as she is very shallow and bottom so [?] broad." (Dent, 6 September 1862). Unfortunately, no information concerning the displacement of the CSS *Chattahoochee* survives in the historical record making it even more difficult to determine accurately the configuration of the ship's hull. Data from surviving Macon Class gunboat plans was used to develop the CSS *Chattahoochee's* deck arrangement. While the lines may not be an entirely accurate reflection of the vessel launched by David S. Johnston's Saffold, Georgia, shipyard, they can only be refined by additional historical or archaeological data.

In conjunction with the CSS *Chattahoochee's* stern section, the steam propulsion system was recovered in 1964 and is preserved at the Confederate Naval Museum in Columbus (Figure 20). At the time the Confederate gunboat was launched its machinery represented a reasonably successful mixture of new and established technology. The engineering plant included two independent engines each driving a separate screw propeller. While this aspect of the design represented a relatively new propulsion concept, the other elements of the propulsion system were conventional. The greatest advantage of the twin-screw arrangement was that it enabled a ship to turn around in little over her own length. High maneuverability was very desirable for a gunboat designed to operate in the narrow and twisting Chattahoochee River, and twin-screw propulsion offered the best means of obtaining it.

Independent twin-screw propulsion had been used on a few tugboats, Great Lakes steamers, and local craft but was generally unpopular in the United States prior to 1861. The first ocean-going twin-screw was the steamer *Flora*, a highly publicized ship laid down in Great Britain slightly before the CSS *Chattahoochee* and in operation long before the warship was completed. *Flora's* owners sent her to run the Union blockade. The twin-screw propulsion enjoyed an immediate popularity and became the machinery of choice among many Confederate naval officers.

CSS *Chattahoochee* was powered by two horizontal direct-acting, low-pressure, condensing, reciprocating steam engines (Figure 21). Each engine has a single cylinder 28-inches in diameter with a 20-inch stroke. The cylinders are attached to iron engine beds which were attached to wooden engine timbers. The engine beds are attached to the hull by heavy bolts extending through the engine beds and hull. Engine mounting bolts were all hand forged, with square-heads, and square nuts. Each bolt was driven through a square washer and the hull from the outside of the vessel. Each was secured on the inside by a round washer and square nut. The outside bolt heads were counter sunk and protected by wooden blocks inlet flush with the surface of the hull. Engine parts requiring periodic removal all employed hexagonal bolt heads, round washers, and hexagonal nuts.



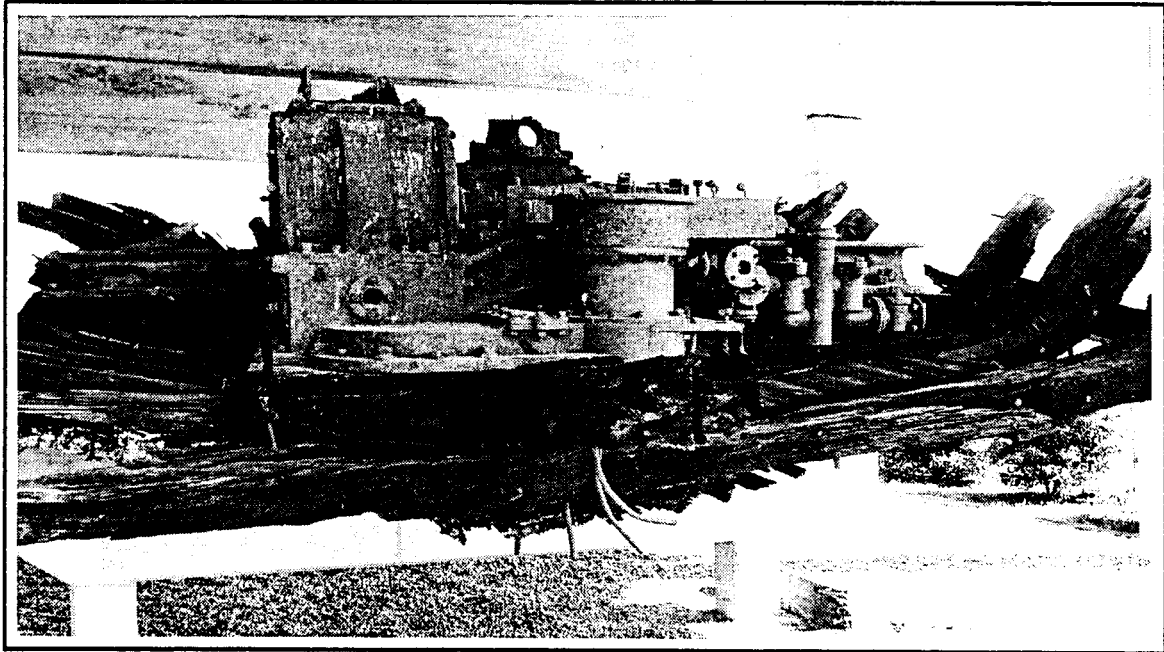


Figure 20. CSS *Chattahoochee's* Steam Machinery on Exhibit within the Remains of the Stern.

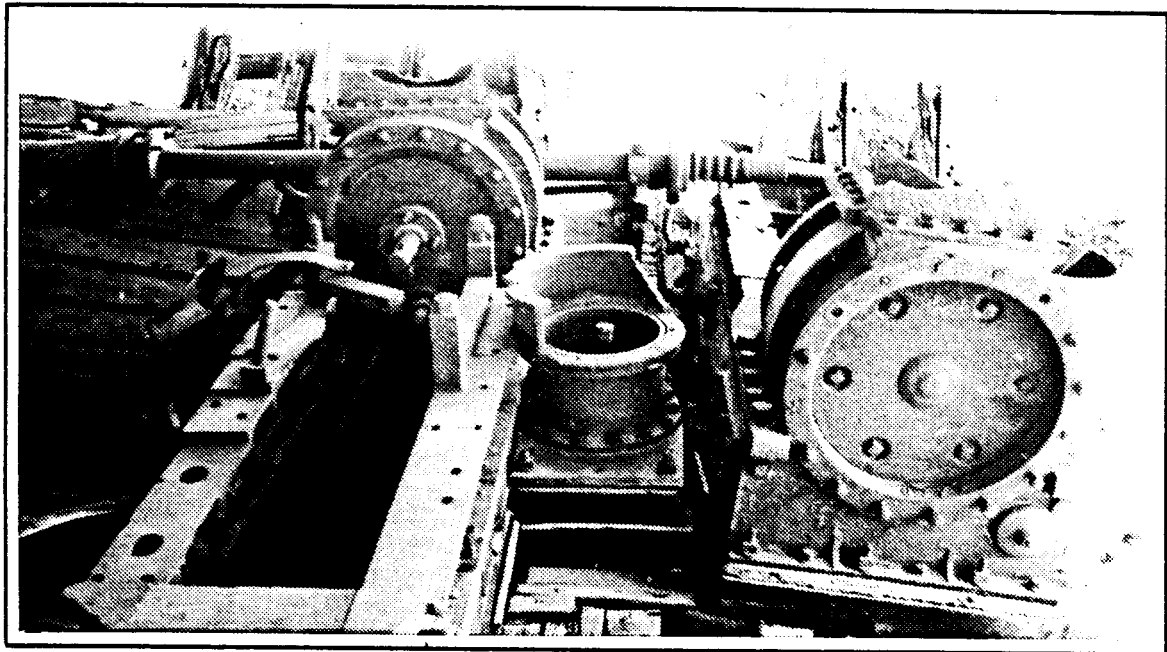


Figure 21. Athwartships Configuration of the CSS *Chattahoochee's* Engines

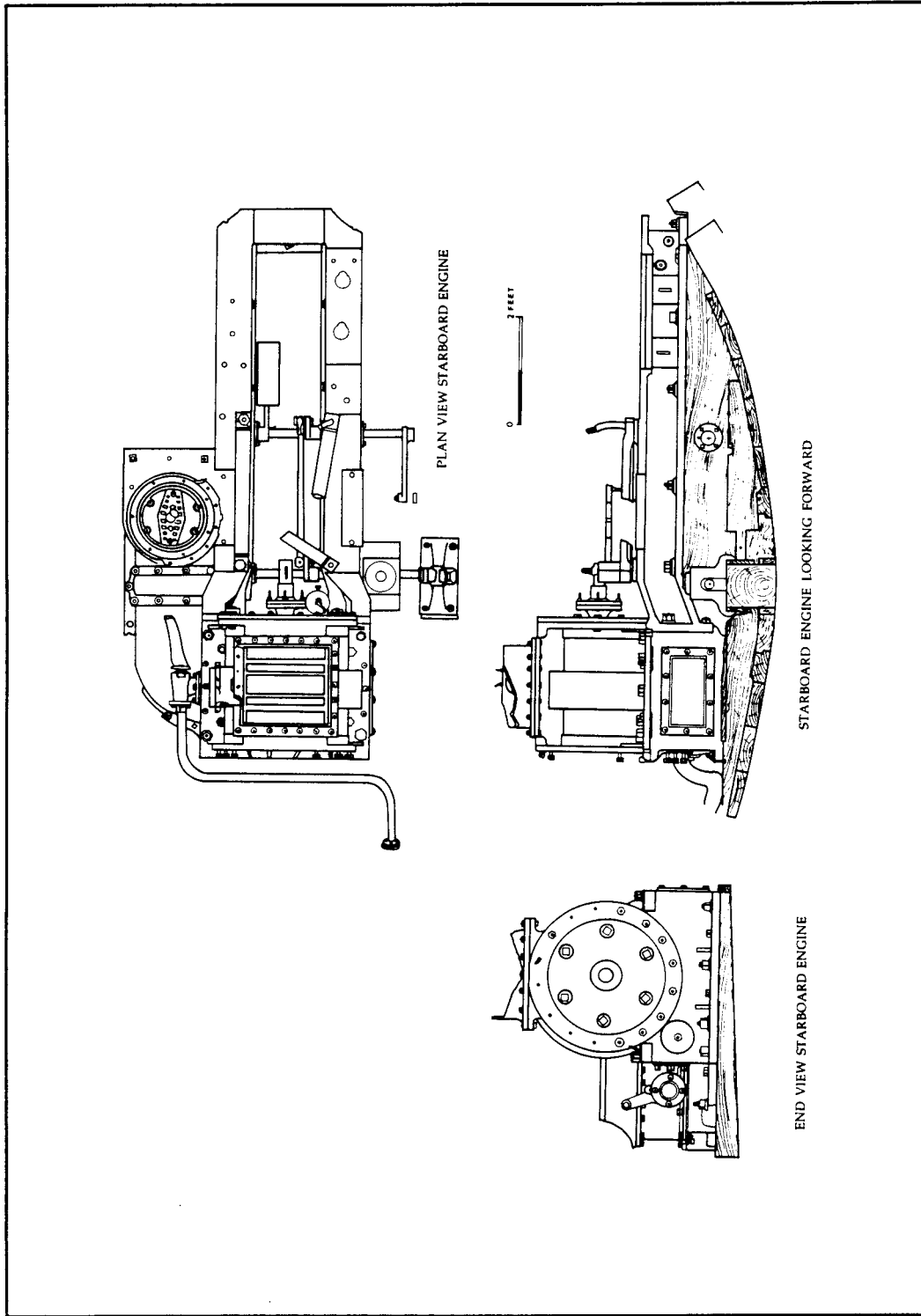


Figure 22. Drawing of the CSS Chattahoochee's Starboard Engine.

*Chattahoochee's* engines faced in opposite directions to allow them to fit compactly in the stern (Figure 19). The engine that drove the starboard propeller has its cylinder nearest the stern, with the back of the cylinder just inboard of the port propeller shaft. The engine that drove the port propeller is forward of the aft engine and faces the opposite direction. Consequently it has been fitted with a correspondingly longer propeller shaft. Each engine could be run independently of the other for turning or economy in running.

On each engine a single piston rod moved the crosshead back and forth within crosshead guides attached to the top of the engine frame (Figure 23). A single connecting rod transmitted the linear motion of the crosshead to the engine crank. The crank web on each engine was a flat disc attached to the propeller shaft. Each shaft was fitted with an offset or concentric pin on the forward face for the connecting rod. The CSS *Chattahoochee's* cranks were of an unusual design. The large disc-shaped cranks served both as a fly wheel and as a jacking gear. They acted to maintain the rotary motion of the single-cylinder engines, creating a more even motion through the water. The outside rim of each crank had 1-inch diameter round holes spaced evenly around the perimeter. The holes allowed a crowbar to be used to "jack" the engines off dead center to assist when starting or reversing them.

Each engine's stroke was controlled by a simple slice valve atop the cylinder. Steam was admitted to the cylinder by a "D" valve sliding on a planed surface with three ports. The valve gear was more complicated. A pair of eccentrics operated off each propeller shaft, aft of, and alongside the engine frame (Figure 24). Because of the large diameter and the short stroke of the pistons, the usual arrangement of valve gear with a single eccentric rod running from the propeller shaft to the steam valve could not be used. Instead, the linear motion produced by the eccentrics moved one of two arms of a bell crank, depending on which eccentric, forward or reverse, was engaged. A second, longer pair of arms on the bell crank transmitted the linear motion produced by the eccentrics to the valves atop each cylinder. Adjustment of the valve gear allowed controlled admission of steam into the cylinders for greater speed or economy, and allowed the engines to be stopped or reversed (Figure 25).

A water jet condenser served each of the CSS *Chattahoochee's* cylinders and converted steam to water that could be returned to the boilers. The condensers were placed directly under and bolted to the steam cylinders (Figure 26). The condenser casting formed a direct connection with an air pump located adjacent to the crosshead slide. The steam vented into the condenser was cooled by raw water from a through-hull fitting which fed through a series of strainers (Figure 27). A small pump exhausted discharge water by way of a through-hull fitting.

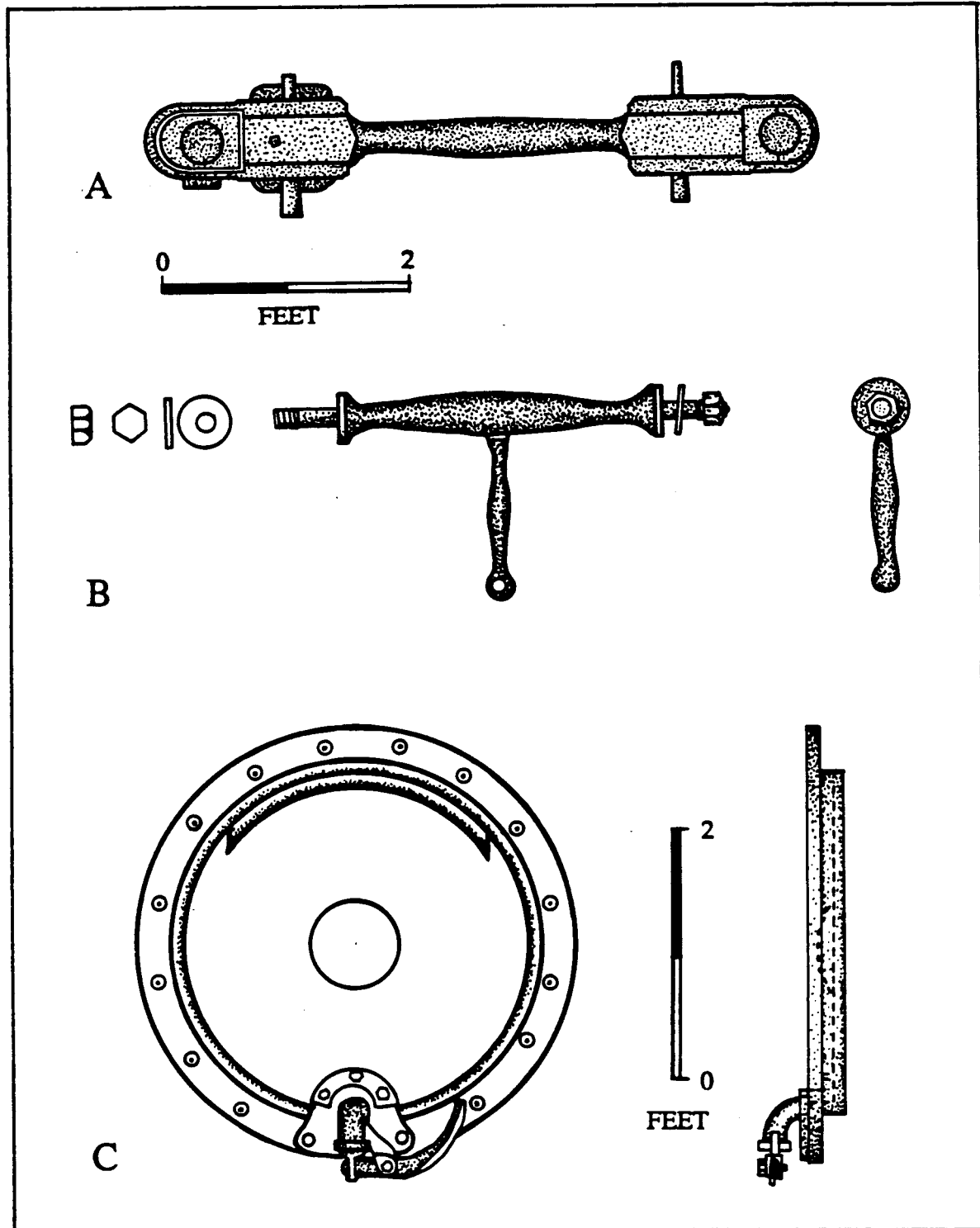


Figure 23. Illustration of the CSS *Chattahoochee's* Connecting Rod (A), Valve Chest Rocker Arm (B), and Cylinder Head (C).

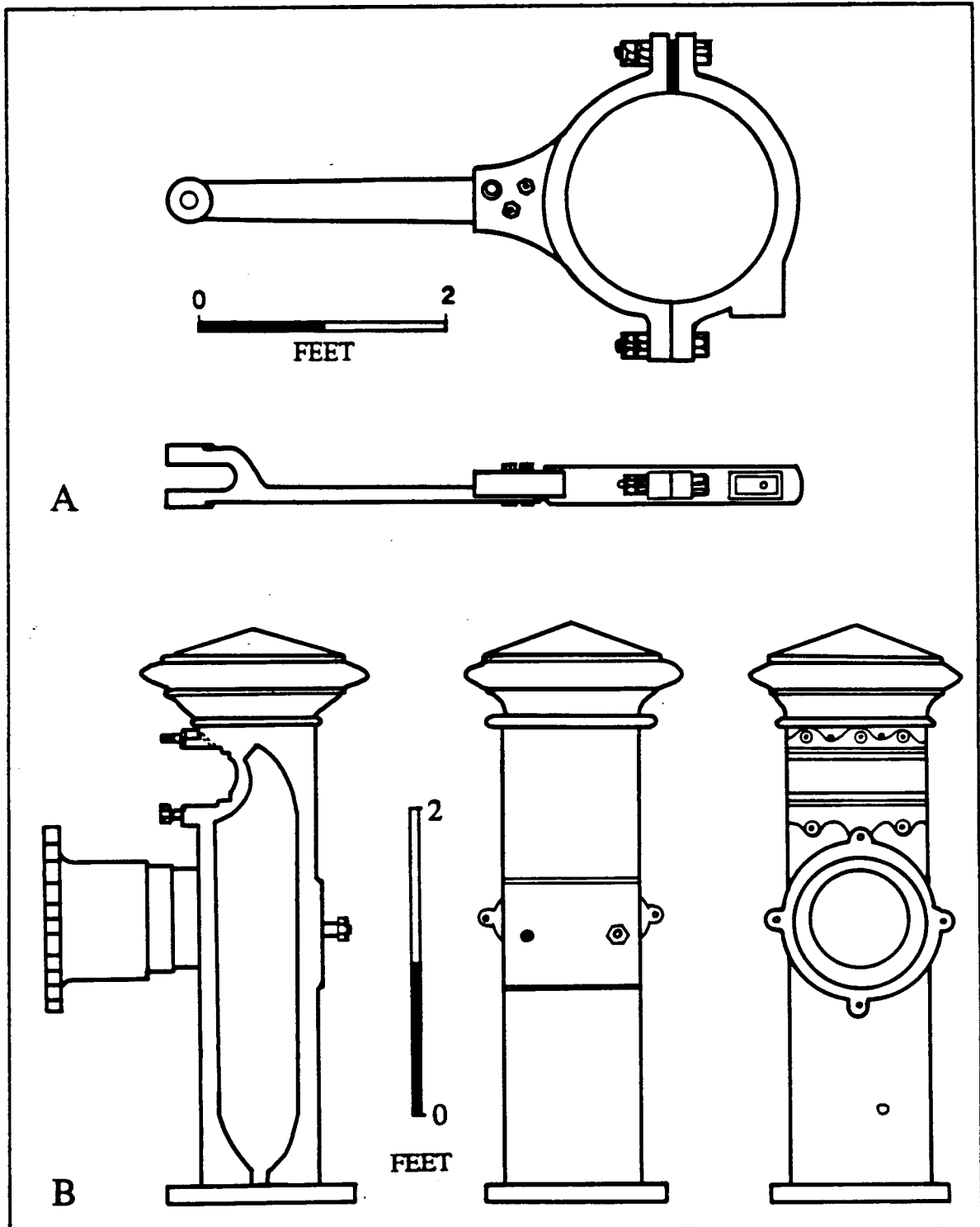


Figure 24. Illustration of one of the CSS *Chattahoochee's* Eccentric Rods (A) and an Orate Casting Designed to Serve both as a Pillow Block for the Air Pump Bell Crank Shaft and a Steam Pipe Elbow.(B)

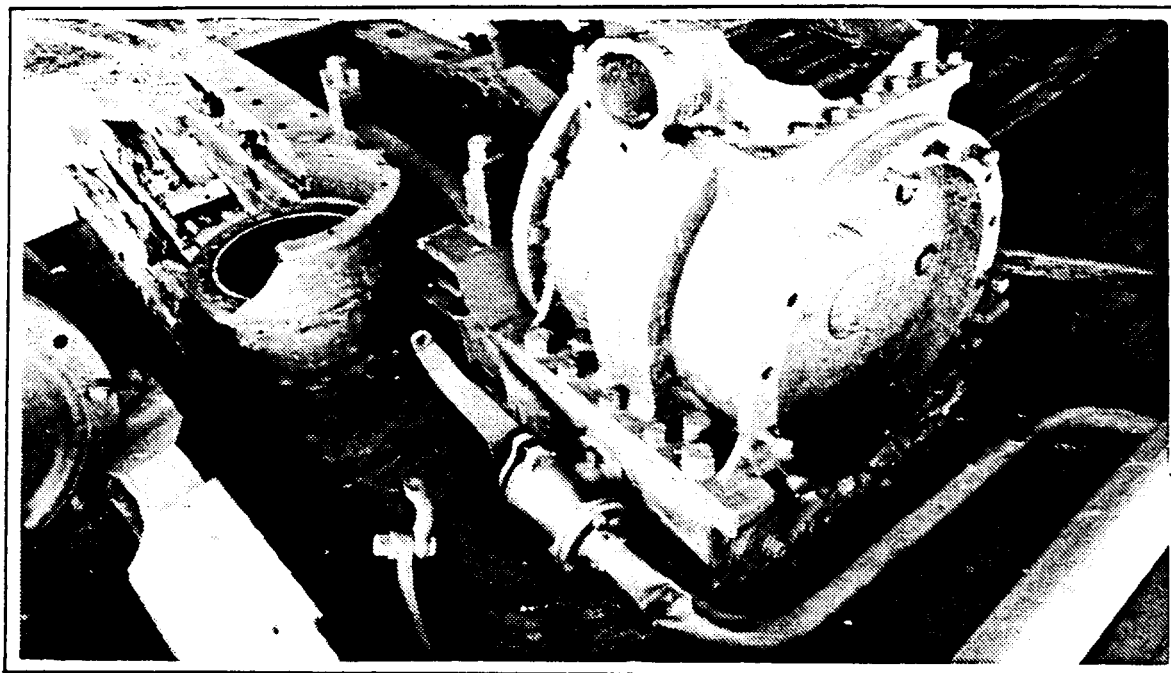


Figure 25. Starboard Steam Cylinder, Valve Chest, and Air Pump Showing Damage Done in Scuttling the *CSS Chattahoochee*.

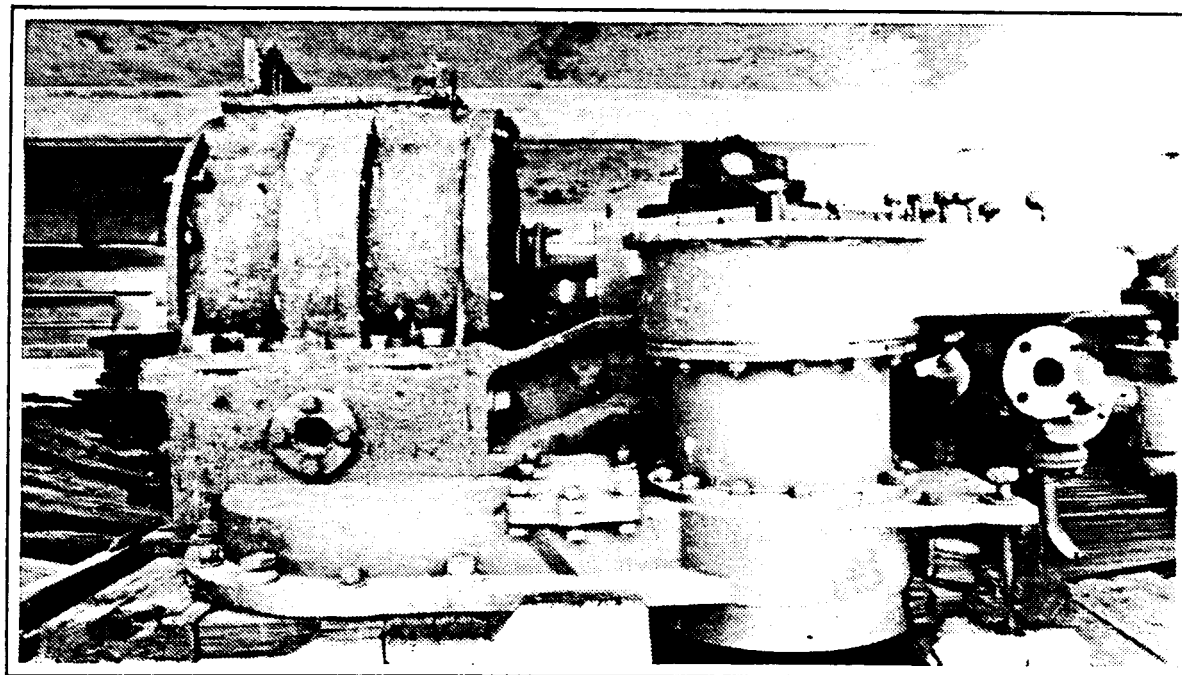


Figure 26. Port Steam Cylinder Showing the Condenser Underneath and its Associated Air Pump.

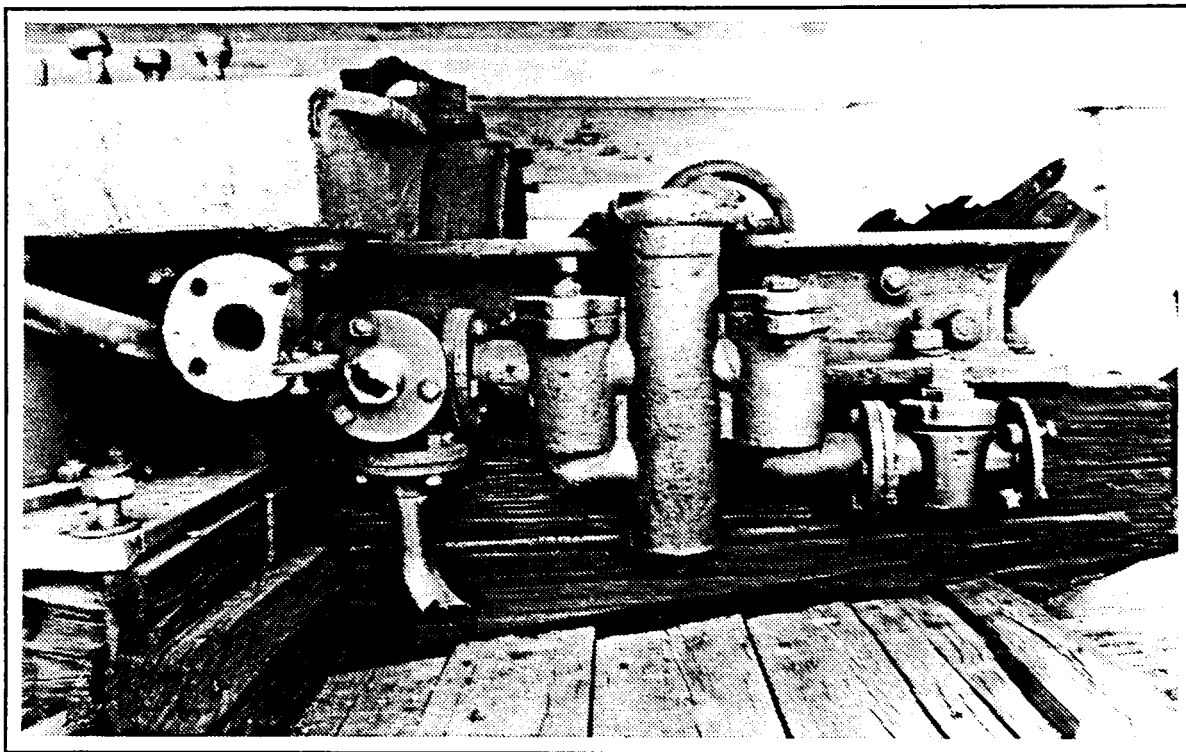


Figure 27. A Complex Valve and Strainer Serving the Port Condenser Raw Water Intake.

The boilers of CSS *Chattahoochee* were placed just forward of the engines. The original boiler was 20 feet in length. After the boiler explosion and salvage in 1863, two 12 foot boilers were to be fitted in place of the wrecked originals. These boilers had been recovered from the stranded ironclad CSS *Raleigh* and would have offered the advantage of being shorter in length, allowing more room in the hull for stowage and living space.

The CSS *Chattahoochee's* screw propellers were each 90-inches in diameter with variable pitch on the three fans, or blades (Figure 10). Each propeller was a single iron casting. The pitch and the thickness of the fans were greatest near the hub and diminished toward the tips of the propellers. The width of the fans increased from 19-inches at the hub to 38 inches at the fan tips. The centers of the screws were 9-feet, 10-inches apart. The screw propellers turned inward on each side of, and parallel to, the stern post and rudder. Inward turning screws thrust the water from the propellers toward the rudder for better steering.

The port propeller was held on the shaft by one-and-a-half-inch thick, three-and-one-half-inch wide iron key that passed completely through the propeller hub and shaft. The key on the surviving propeller is much too long, extending nearly a foot on each side of the hub. In view of the care taken to streamline the rest of the propeller and hub, it probably represents a repair of expediency, rather than a design feature. The port propeller and shaft were damaged by being used as the attachment point for the cables used to lift the stern during the 1964 salvage operations. The shaft was twisted to the side and finally broke loose along with the propeller shaft bracket. The outboard end of the port shaft, the propeller shaft bracket, and propeller are displayed presently alongside the stern at the Confederate Naval Museum. The starboard propeller and shaft are not now present at the museum. It is not known whether they were recovered before the vessel was abandoned. It is likely that they were destroyed when the Columbus Navy Yard was captured in 1865.

The propeller shafts are large forgings that taper from six inches in diameter at the outside of the stern glands to five and one half-inches at the propeller. The shaft forgings were left rough except where they passed through bearings or at the extreme end, where they were turned smooth to reduce friction and provide a good fit. The propeller shafts are each supported by three bearings: multiple-collar thrust bearings were bolted directly to the after side of each iron engine frame; stern glands, through-hull fittings for the shafts, supported the center for each propeller shaft; and bronze bearings mounted in brackets outside the stern, supported the outer extremity of each shaft, just ahead of the propellers. Each stern gland is composed of two large iron fastenings that interlock through the hull and a separate packing retainer attached to the inboard end by adjustable bolts. The gland packing held by the retainer kept the shaft fitting and hull water-tight.

Bearings are subject to considerable stress and must work with a minimum of friction. Internal bronze bearings in the stern glands and the fairwaters reduced friction while requiring only infrequent replacement. Most bearings only had to withstand the force of gravity and the twisting stress of torque, but thrust bearings had to be made of an easily replaceable material to transmit the entire power of the engines to the hull. CSS *Chattahoochee*'s thrust bearings appear to have had Babbitt metal liners (Figure 21). Babbitt metal is an excellent bearing material composed primarily of lead. Babbitt required occasional replacement if allowed to heat up but could be easily recast to fit. All types of bearings required lubrication to prevent heating, the stern gland and cutlass bearings all used tallow or grease.



No Babbitt metal bearing liners are in place, but a considerable quantity of melted lead was found scattered over portions of the CSS *Chattahoochee's* hull forward of the engine room by the 1984 field work. The material has not been tested but may be Babbitt metal or another similar bearing alloy. The machinery exhibits many signs of damage from the scuttling; destruction of the bearings would be another primary consideration of engineers bent on destroying their vessel. It may be supposed that the crew of CSS *Chattahoochee* removed and destroyed the Babbitt bearings along with the smashing of pipes and the breaking of castings that preceded her sinking. It is obvious from the condition of the CSS *Chattahoochee's* steam plant that Confederate engineers were thorough in their attempt to destroy the gunboat. Before scuttling the ship much of the machinery was destroyed. Both valve chest castings were broken along with the starboard air pump housing (Figure 21 and Figure 23). The aft crosshead slide on the starboard engine was broken, and both slides on the port engine were removed. The cylinder heads were removed, and many head bolts were broken off in the cylinder casting (Figure 21). Once this destruction was complete raw water intake and discharge pipes were cut or smashed to flood the hull (Figure 28).

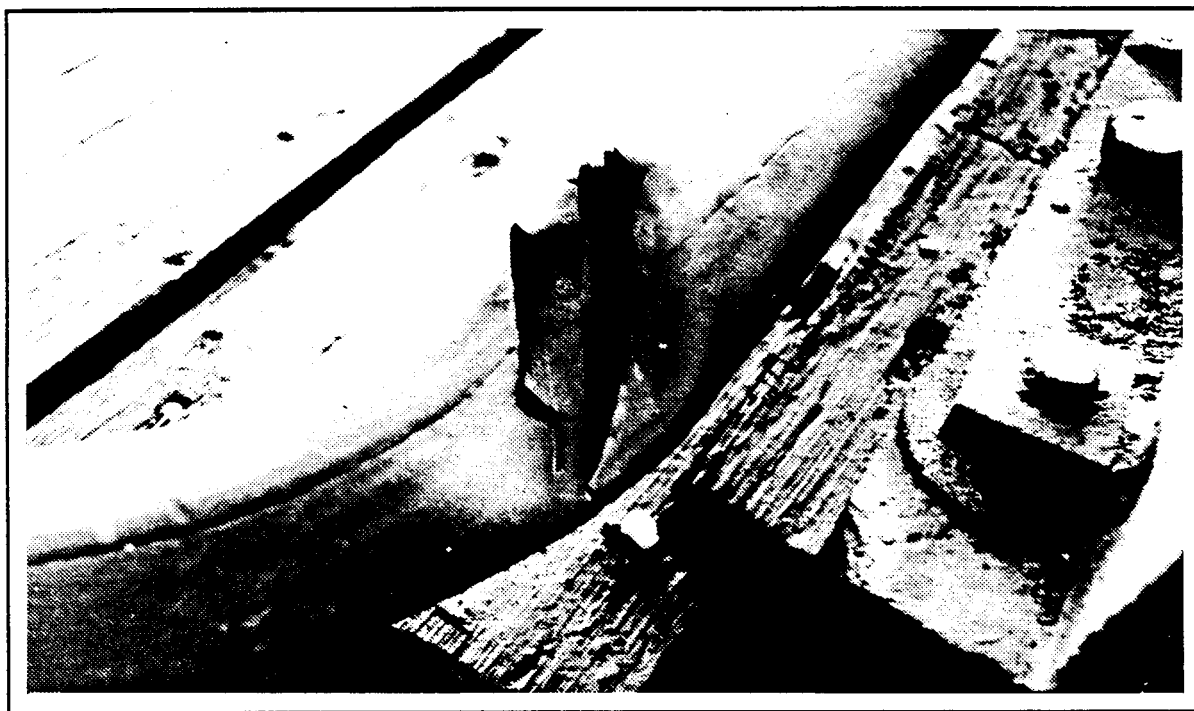


Figure 28. Damage to Starboard Condenser Raw Water Discharge Pipe Produced by Confederates Responsible for Destroying the CSS *Chattahoochee*.

## CONSERVATION AND THE ARTIFACTS

Material recovered from the CSS *Chattahoochee* consisted of 143 artifacts. Most proved to be iron fasteners and hardware associated with the ship that was deposited inside the hull when the CSS *Chattahoochee* was burned. The collection of fasteners included a variety of industrially produced drift pins, spikes varying from 4 to 6 inches in length, and nails of several smaller sizes. Most spikes came from the deck as the vessel burned or from ceiling planking that was ripped out of the gunboat during salvage operations. Due to the number and uniform nature of the fasteners only a representative sample were documented for inclusion in this report. Hardware associated with the vessel included two cast iron deck grates, the remains of a leather fire hose with a brass coupling, an iron fire hose coupling spanner, machinery wedge, and a variety of iron rings, washers, and nuts. Although the test excavation location was almost amidships, most of the material recovered was associated with the vessel's engineering space.

In addition, numerous samples of wood from the CSS *Chattahoochee's* hull and interior structures were recovered. A limited amount of ordnance was removed from the wreck. Most of this material consisted of round shot for the CSS *Chattahoochee's* 32-pounders (Figure 29). Shipboard life was reflected in several fragments of dark green bottle glass, a single ceramic sherd, and several pieces of brass from shipboard furniture. While several fragments of animal bone could represent supplies, it is also possible that they are modern contamination deposited by the river currents.

Although modern salvage activity could have destroyed virtually all of the archaeological record associated with the CSS *Chattahoochee*, the dearth of artifacts within the surviving hull structure suggests that the vessel may have been partially stripped before being scuttled and burned.

## CONSERVATION

Conservation of material recovered from the CSS *Chattahoochee* proved to be a relatively simple matter as preservation in the fresh water was excellent for both organic and inorganic material. Artifact preservation at the site was found to be a factor of the physical, chemical, and biological environment of the wreck. With the exception of fragments of the hull exposed in the water column, most

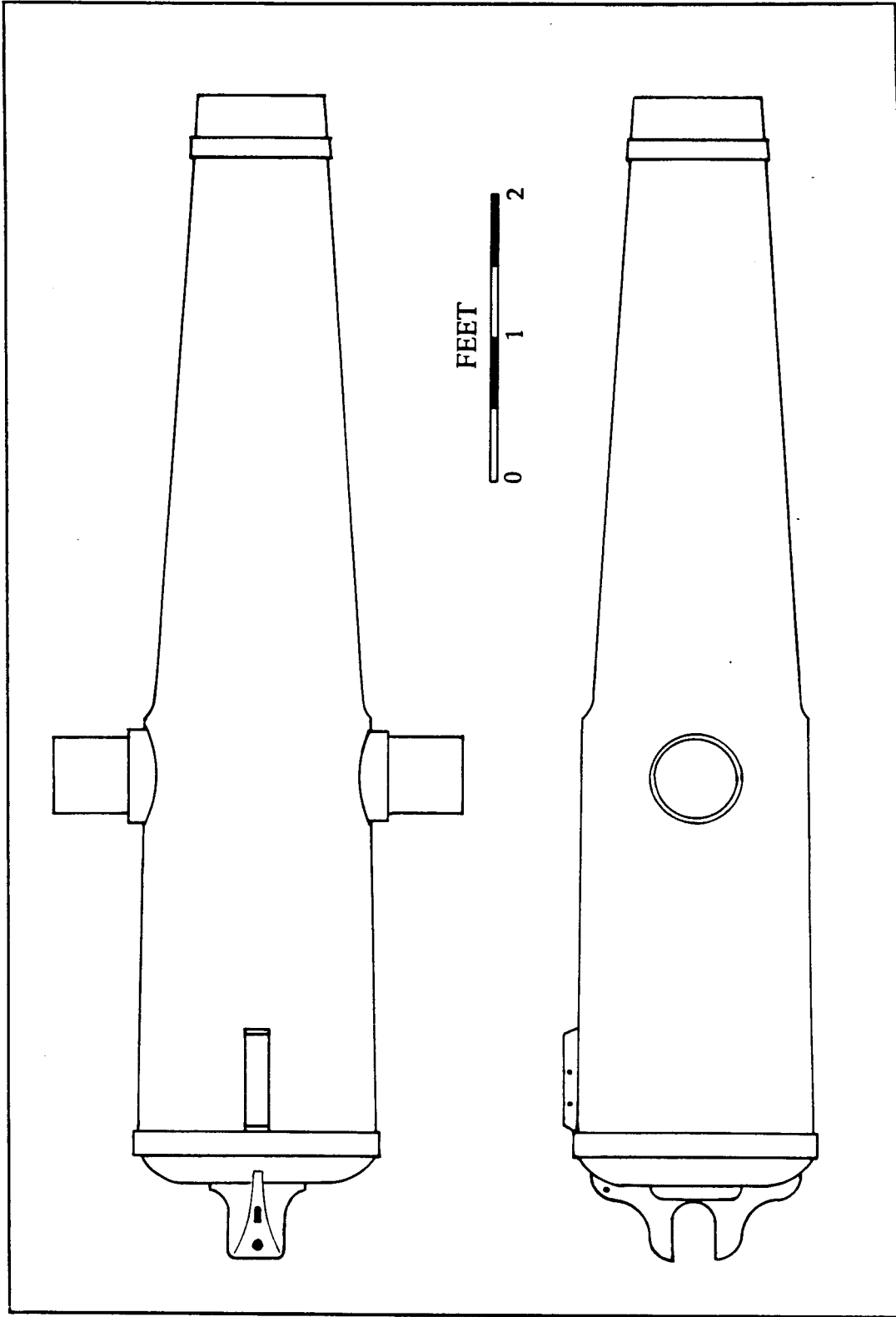


Figure 29. Illustration of a 32-Pounder of 46 Hundredweight Similar to Those Aboard the *CSS Chattahoochee*.

of the surviving structure is imbedded in the bottom of the Chattahoochee River. Though silt laden, the water at this point in the river is fresh with some nutrient pollution from a nearby sewage outlet.

With few exceptions the environment surrounding the wreck site is conducive to excellent artifact preservation. River environments are generally categorized as high energy and therefore unfavorable to artifact preservation. However, the thick deposits of sand and silt in the Chattahoochee River, act as a protective physical buffer for buried artifacts. The cushioning, unconsolidated sand and silt insulate artifacts from the eroding effects of river current and the sand blasting consequence of water borne particulate matter. Also, while cushioning objects in a physically supportive matrix, the silt offers protection against rapid extreme temperature changes which can damage even the most durable of materials.

Of primary concern to the conservator, chemically, is the presence of high levels of chlorides in the environment. The negatively charged chloride ion, released from the dissolution of salt, suspended in an aqueous environment helps promote the corrosion of virtually all metals. Furthermore, the infiltration of salts into glass and ceramics can cause the breakdown of even these durable materials. Fortunately, the chloride level at the wreck site is relatively low with a PH level more than 7 thus simplifying conservation procedures primarily aimed at chloride removal. Though other chemical pollutants can also have a deleterious affect on water soaked artifacts, none were observed in the treated artifacts .

River bed environments often display numerous biozones and a plethora of biological activity. This is particularly the case at the confluence of fresh river water as it enters salt water. The remains of the CSS *Chattahoochee*, however, lie in a strictly fresh water biozone. Organic artifacts showed no sign of attack from marine macro-organisms such as ship worms, piddocks, and gribbles as would be the case in brackish water with salinity over twelve parts per thousand.

At the micro-biological level the burial of artifacts in the bottom silt helped protect them from aerobic bacterial decomposition. Studies have shown greatly reduced bacterial activity within a few centimeters of the bottom surface with a cessation of virtually all aerobic bacterial activity below a depth of 20 inches. Conversely, anaerobic bacterial activity may increase beyond this point creating interesting dilemmas for the conservator. Some mixotrophic microorganisms such as sulfate reducing and methanogenic bacteria can colonize anaerobic environments such as the CSS *Chattahoochee*. These bacteria create a cathodic depolarizing environment conducive to metal corrosion and the acidic

breakdown of organic materials. The formation of corrosion blisters on the surface of some of the iron artifacts recovered tend to indicate that there was indeed some anaerobic bacterial corrosion occurring on site.

Conservation of CSS *Chattahoochee*'s artifacts followed the basic tenets of conservation such as reversibility of process and the concept of minimal intervention. The lack of chlorides greatly simplified laboratory techniques allowing conservation procedures for most artifacts to fall into two categories, that of cleaning and coating. Cleaning is the removal of all foreign matter and decomposition residue. Afterward most artifacts were coated with a moisture barrier to prevent additional breakdown due to ambient humidity or airborne pollution. As artifacts must be treated according to their composition the following procedures were used.

### **Iron**

Wrought iron artifacts made up the vast majority of treatment subjects from the CSS *Chattahoochee*. Most of the smaller wrought iron objects were mechanically cleaned with bristle brushes and rinsed several time in fresh water. They were then given a final rinse in distilled water baked at 350 degrees for two days and coated with microcrystalline wax to prevent further moisture absorption. As these objects were kept in lab storage for up to a year after treatment, their appearance could be monitored. Only one of the hundreds of wrought iron artifacts treated showed any sign of corrosion after several months. It was reprocessed, coated and after several months of observation, showed no further signs of active corrosion.

Two, thirty-two pound cast iron shot as well as two, eight inch shells were treated with electrolytic reduction before being mechanically cleaned and rinsed. An aesthetically pleasing tannic acid coating was applied before the artifacts were coated with microcrystalline wax. Tannic acid gives the artifact a dark color and is viewed as being a corrosion inhibitor. Their general appearance with a rough exterior concreted with small amounts of vitrified sand and charcoal may be indicative of the intense heat produced in the fire that destroyed the ship. As the sand and charcoal was determined to make an interesting exhibit, no attempt was made to air abrade the artifacts.

### **Brass**

Brass objects retrieved from the CSS *Chattahoochee* were in remarkable condition. Most were simply rinsed, mechanically cleaned and stored in plastic bags. Their condition made further treatment unnecessary. To minimize the

impact of conservation, no coatings such as benzotriazol or Incralac were applied following cleaning. If at some future date a coating is deemed necessary, it can be easily applied.

### **Glass**

Dark green bottle glass was retrieved in quantity from the archaeological site. The glass displayed no telltale rainbow discoloration due to partial decomposition. As the glass manifested no devitrification its cleaning and rinse were all that was deemed necessary for conservation.

### **Ceramic**

Little ceramic or brick ballast was recovered from the wreck site. This material was cleaned mechanically and, as it contained no stains, was rinsed and gradually dried.

### **Wood**

Wooden artifacts from the wreck site were by far the most complex items brought in for treatment. Wood degrades according to its type as well as its environmental conditions, so a number of different conservation methods were used in its treatment.

Wood ranged in degradation from Christensen's Class A: very soft with little cellulose remaining to Class C: little deterioration and non permeable. By far the most abundant wood retrieved was Class B: which contained a thin layer of Class A over a core of Class C. Class A wood was treated with polyethylene glycol (PEG) blend. This is a mixture of PEG 400 and PEG 1450. After cleaning and rinsing the wood was immersed in increasing PEG/water concentrations until 50 percent was achieved. The wood was then removed from the tank, cleaned of excess PEG and allowed to slow dry.

Class B wood was also treated with PEG 540 Blend. The PEG 400 being of lighter molecular weight was able to bulk the wood cell walls while the PEG 1450 impregnated the interstitial spaces and hardened on cooling, creating an artificial rigidity in the Class A layer. This wood was also slow dried after removal from a 50 percent solution.

Class C wood included some oak but mainly two lignum vitae gun tompions. This wood was treated with PEG 400 to achieve maximum penetration and cell wall bulking. The tompions were sent to the Confederate naval museum in containers of PEG 400 not to be opened until 1991 giving them four years of penetration. As an adjunct to the PEG treatments for the wooden artifacts

several pieces were treated with sucrose. Solution concentrations were increased as with PEG except that 100 percent solutions were achieved. The sucrose worked well on Class B & C but gave more erratic results than PEG in its anti-shrinkage efficiency.

#### **Leather**

A leather fire hose proved to be a difficult conservation problem as it was held together with brass rivets and contained an attached brass coupling. The brass was mechanically cleaned and the leather soaked in PEG 400 to soften its collagen fibres and make them less brittle after the drying process. This method seems to have worked well but the long term effects of PEG on Brass are not yet known.

#### **Bone**

The pieces of bone retrieved from the site were mechanically cleaned and stains removed with a soak in 3 percent hydrogen peroxide. They were then dehydrated in methyl alcohol and slow dried. As the bone was in good physical condition no further treatment was deemed necessary.

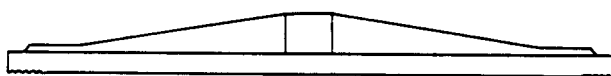
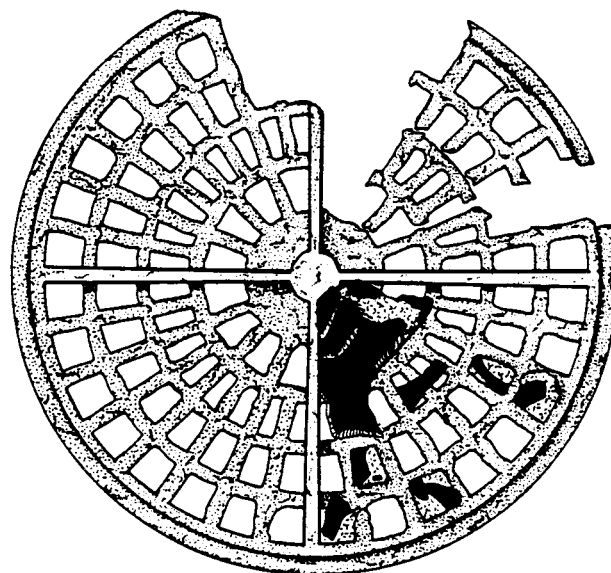
## THE ARTIFACTS

Number	Artifact	Number	Artifact
CH-1-84	Deck Grate	CH-38-84	Washer
CH-2-84	Vent Grate	CH-39-84	Rivet
CH-3-84	Vent Grate	CH-40-84	Spike with Burn Marks
CH-4-84	Fire Hose	CH-41-84	Rose Head Nail
CH-5-84	Drift Pin	CH-42-84	2-3 5/16" Cut Nails
CH-6-84	Wedge	CH-43-84	1 1/2" Brass Screw
CH-7-84	2-Bolts and Brass Nuts	CH-46-84	2" Brass Nail
CH-8-84	Brass Nut	CH-48-84	1 1/2" Brass Tack
CH-9-84	Brass Hex Nut	CH-50-84	32 lb. Cannon Ball
CH-10-84	Spanner Wrench	CH-51-84	32 lb. Cannon Ball
CH-11-84	Open End Hex Wrench	CH-52-84	Block of Coal
CH-13-84	6" Spike	CH-53-84	Latch Hook
CH-14-84	Iron Plate with Hook	CH-54-84	5 1/2" Spike
CH-16-84	Iron Wire	CH-55-84	Nondescript Iron Piece
CH-17-84	Iron Ring	CH-56-84	Iron Caster
CH-18-84	Iron Ring	CH-57-84	2-3 1/2" Nails
CH-19-84	Iron Hinge	CH-58-84	4" Nail
CH-20-84	Nut	CH-59-84	13/8" Metal Cylinder with Brass Pin
CH-21-84	Belt Buckle Pin	CH-60-84	2-Drift Pins with Charcoal
CH-22-84	Brass Staple	CH-61-84	93/8" Spike
CH-23-84	Brass Stopper	CH-62-84	3-Spikes
CH-24-84	Lock Plate	CH-63-84	8" Drift Pin
CH-25-84	Ceramic Sherd	CH-64-84	3-9" Spikes
CH-26-84	Doorknob Mechanism	CH-65-84	6" Spike
CH-27-84	Brass Weight	CH-66-84	1 1/2" Nail
CH-29-84	Nut and Bolt	CH-67-84	2-5/16" Rings
CH-30-84	Tapered Drift Pin	CH-68-84	17/8" Washer
CH-31-84	Drift Pin	CH-69-84	Brass Fire Hose Rivets
CH-32-84	Wheel Key	CH-70-84	1 1/2" Brass Screw
CH-33-84	Iron Rectangular Object	CH-71-84	Wood Sample with Axe Marks
CH-35-84	Washer		
CH-36-84	Hinge		
CH-37-84	Wheel Key		

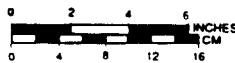
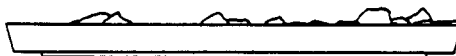
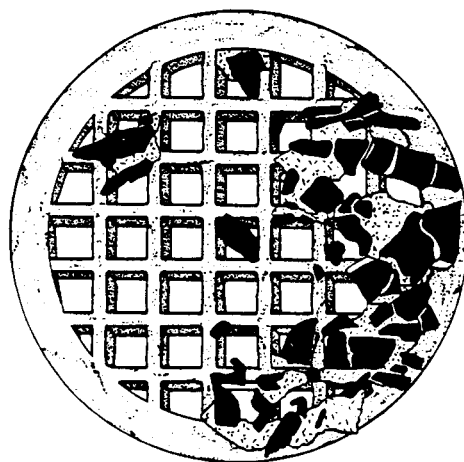


Number	Artifact	Number	Artifact
CH-72-84	6-5 1/2" Spikes with Red Paint	CH-109-84	4-6" Nails
CH-73-84	5-5 " Spikes with Red Paint	CH-110-84	8-2" Nails
CH-74-84	4-4" Nails	CH-111-84	2" Brass Nail
CH-75-84	5-2 1/2" Nails	CH-112-84	2 Brass Rivets
CH-76-84	2-2" Nails	CH-113-84	4-1 1/2" Brass Screws
CH-77-84	1 1/2" Nail	CH-114-84	1 1/2" Brass Screw
CH-79-84	7 3/4" Spike	CH-115-84	1" Copper Screw
CH-80-84	4" Spike	CH-116-84	3/4" Screw
CH-82-84	3 1/2" Spike	CH-117-84	2" Nail
CH-83-84	2-8" Spikes	CH-120-84	8" Shell
CH-84-84	6 1/4" Spike	CH-121-84	8" Shell
CH-85-84	Wedge	CH-126-84	Intact Bottle
CH-86-84	Brass Plate with Hinge	CH-127-84	Wood Block (2 3/4" x 3 1/2" x 2 3/8")
CH-87-84	Nondescript Piece of Lead	CH-128-84	Wooden Wedge
CH-88-84	Hex Head Nut and Bolt	CH-129-84	Wood Dowel (10 1/2" x 1 5/8")
CH-89-84	Square Nut and Bolt	CH-130-84	Wood Block
CH-90-84	3-Brass Rivets	CH-131-84	Wood Panel with Tongue and Groove
CH-91-84	4" Nail	CH-132-84	Wooden Piece
CH-93-84	1 1/2" Brass Screw	CH-133-84	Wood Plank (3 1/2" x 12 1/2" x 11/16")
CH-94-84	1" Brass Screw	CH-134-84	Wood Piece with Worm Holes
CH-95-84	2-Pieces of Grating	CH-135-84	Wooden Block with Treenail Groove (8" x 7/8")
CH-96-84	2-32 lb. Cannon Balls	CH-136-84	Wood Piece
CH-97-84	9" Piece of Wood with Nails	CH-137-84	Wooden Block
CH-98-84	2-6 1/4" Spikes	CH-138-84	Wood Block (2 3/4" x 1 3/4" x 7/8")
CH-100-84	5 1/2" Spike with Red Paint	CH-139-84	2 Wood Strips (6 1/2" x 9 1/2")
CH-101-84	4-5 1/4" Spikes	CH-140-84	Wood Strips
CH-102-84	6-4" Spikes	CH-142-84	Charred Wood Piece
CH-103-84	5-4" Spikes	CH-143-84	Wooden Block
CH-104-84	3-3 3/4" Spikes	CH-144-84	Bottle Pontil
CH-105-84	5-4" Nails	CH-145-84	Bottle Pontil
CH-106-84	4 -3 1/2" Nails	CH-146-84	Pebble Samples
CH-107-84	28-2 1/2" Nails		
CH-108-84	2 Broken Spikes		

<b>Number</b>	<b>Artifact</b>
CH-155-84	Brick
CH-156-84	Brick with Metal Remains
CH-163-84	Piece of Bone
CH-170-84	Pelvic Bone
CH-171-84	Jaw Bone
CH-172-84	Iron Rail
CH-176-84	Brick
CH-177-84	Brick
CH-179-84	Glass Bowl Bottom, Clear
CH-181-84	"C" Shaped Iron Ring
CH-190-84	Nondescript Metal Possibly a Nail
CH-191-84	8" Spike
CH-194-84	3 1/4" Spike
CH-195-84	Wood Knee
CH-196-84	Gun Tompion (Lignum vitae)
CH-197-84	Gun Tompion (Lignum vitae)

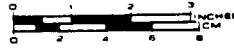


*Chattahoochee:* 1, 95  
*Provenance:* Engineering space  
*Description:* Iron ventilation grate

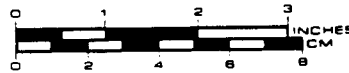
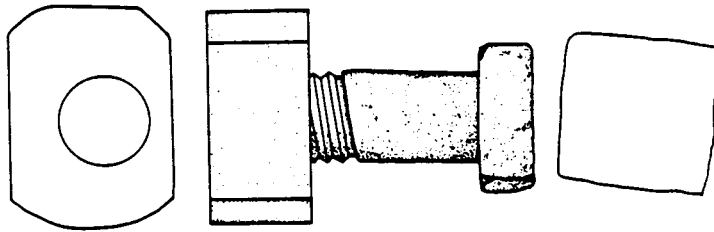


*Chattahoochee:* 2  
*Provenance:* Engineering space  
*Description:* Iron ventilation grate with charred wood fragments

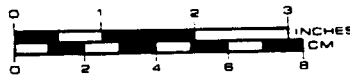
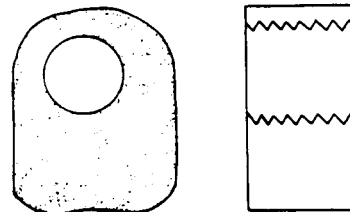
*Chattahoochee:* 6  
*Provenance:* Engineering space  
*Description:* Iron wedge



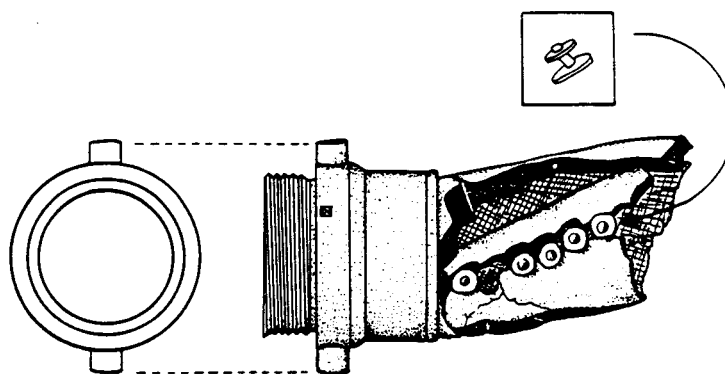
*Chattahoochee:* 7  
*Provenance:* Engineering space  
*Description:* Brass bolt and nut



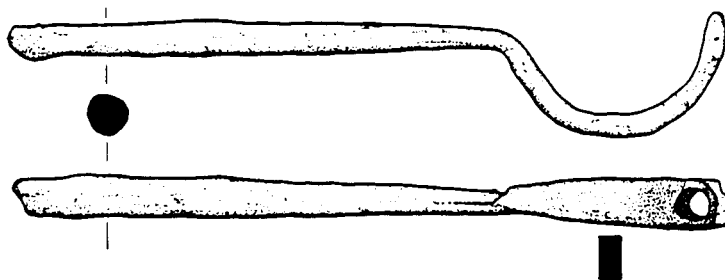
*Chattahoochee:* 8  
*Provenance:* Engineering space  
*Description:* Brass nut



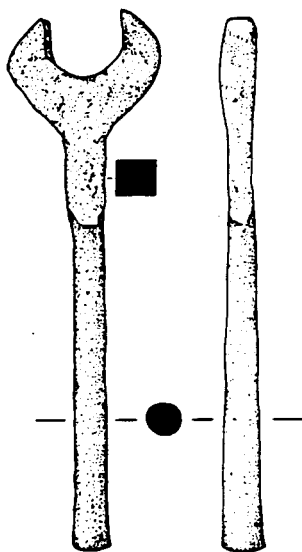
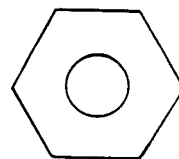
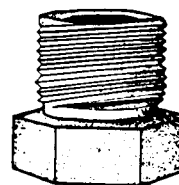
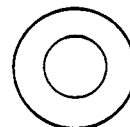
*Chattahoochee:* 4, 69  
*Provenance:* Engineering space  
*Description:* Leather hose with brass coupling



*Chattahoochee:* 10  
*Provenance:* Engineering space  
*Description:* Iron hose coupling spanner



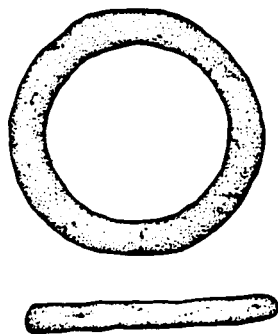
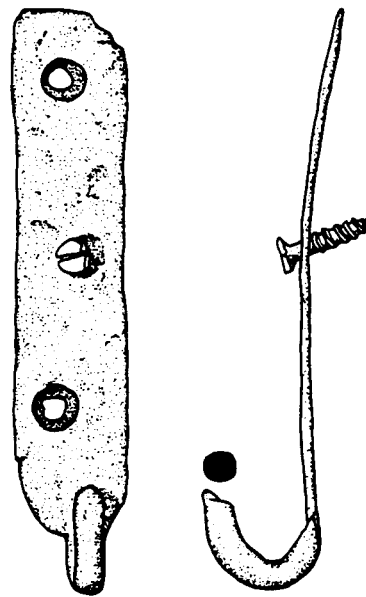
*Chattahoochee:* 9  
*Provenance:* Engineering space  
*Description:* Brass tube compression nut



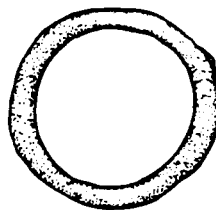
*Chattahoochee:* 11  
*Provenance:* Engineering space  
*Description:* Iron spanner



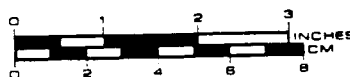
*Chattahoochee:* 14  
*Provenance:* Engineering space  
*Description:* Iron hook



*Chattahoochee:* 17  
*Provenance:* Engineering space  
*Description:* Iron ring

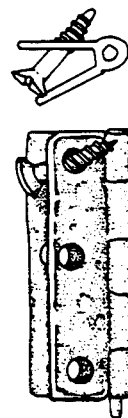


*Chattahoochee:* 18  
*Provenance:* Engineering space  
*Description:* Iron ring

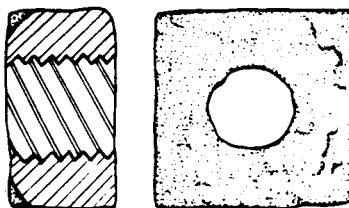




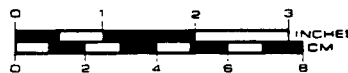
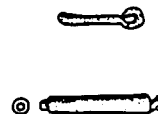
*Chattahoochee:* 19  
*Provenance:* Engineering space  
*Description:* Brass cabinet hinge



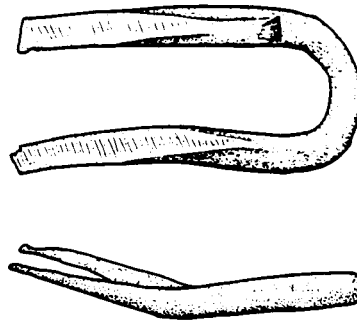
*Chattahoochee:* 20  
*Provenance:* Engineering space  
*Description:* Iron nut



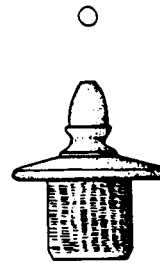
*Chattahoochee:* 21  
*Provenance:* Engineering space  
*Description:* Iron buckle fragments



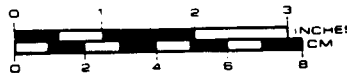
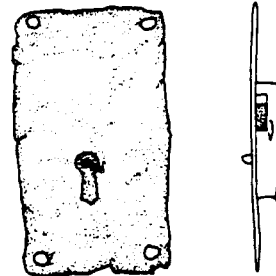
*Chattahoochee:* 22  
*Provenance:* Engineering space  
*Description:* Brass staple



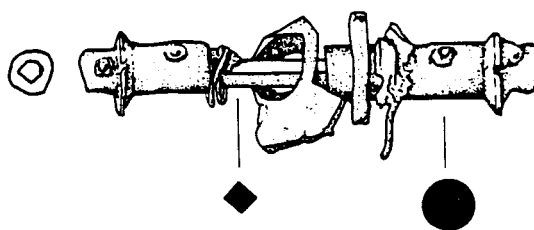
*Chattahoochee:* 23  
*Provenance:* Engineering space  
*Description:* Brass finial



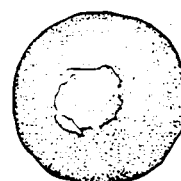
*Chattahoochee:* 24  
*Provenance:* Engineering space  
*Description:* Iron cabinet or trunk  
lock and escutcheon plate



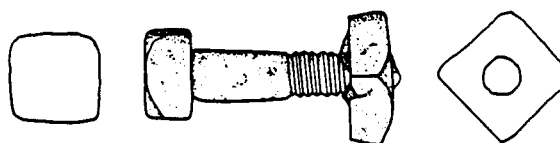
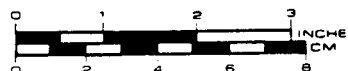
*Chattahoochee:* 26  
*Provenance:* Engineering space  
*Description:* Iron door handle with escutcheon plate fragments



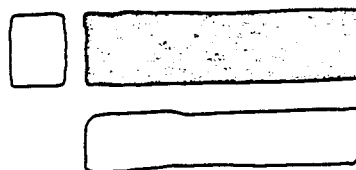
*Chattahoochee:* 27  
*Provenance:* Engineering space  
*Description:* Brass weight



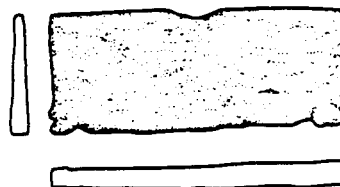
*Chattahoochee:* 29  
*Provenance:* Engineering space  
*Description:* Iron bolt and nut



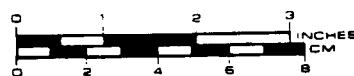
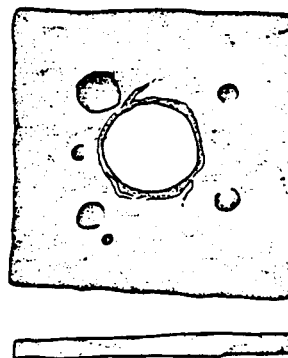
*Chattahoochee:* 32  
*Provenance:* Engineering space  
*Description:* Iron shim



*Chattahoochee:* 33  
*Provenance:* Engineering space  
*Description:* Iron shim



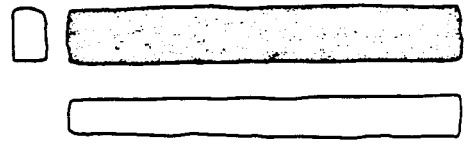
*Chattahoochee:* 35  
*Provenance:* Engineering space  
*Description:* Iron spacer



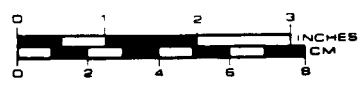
*Chattahoochee:* 36  
*Provenance:* Engineering space  
*Description:* Brass cabinet hinge

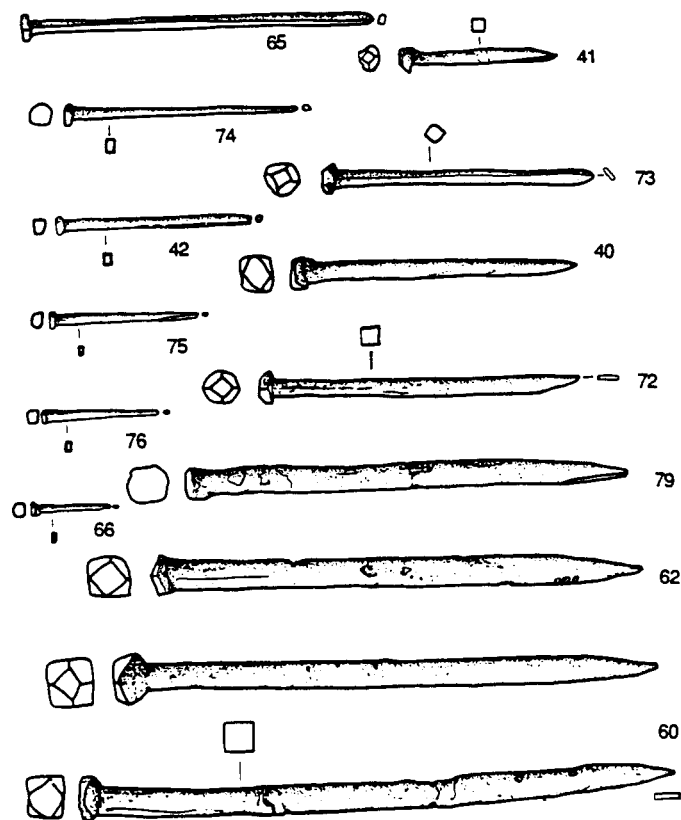


*Chattahoochee:* 37  
*Provenance:* Engineering space  
*Description:* Iron shim

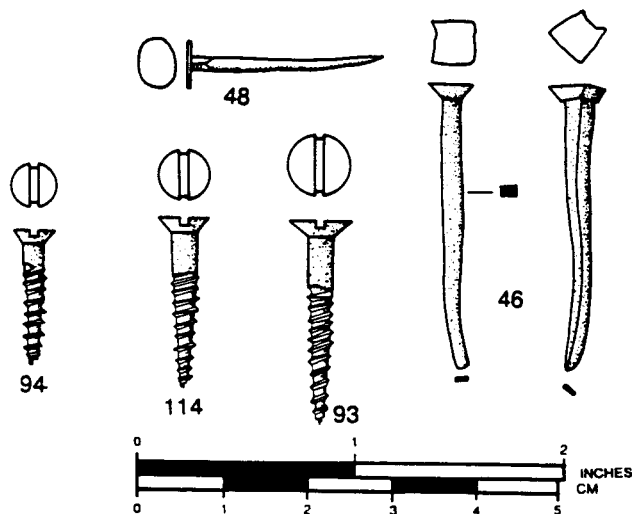


*Chattahoochee:* 39  
*Provenance:* Engineering space  
*Description:* Brass rod with roves





*Chattahoochee:* 40,41,42,60,62,65,66,72,73,74,75,76,79  
*Provenance:* Engineering space  
*Description:* Iron fastening assortment

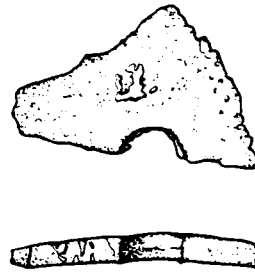


*Chattahoochee:* 46,48,93,94,114  
*Provenance:* Engineering space  
*Description:* Brass wood screws and nails

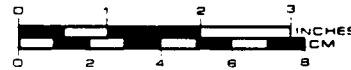
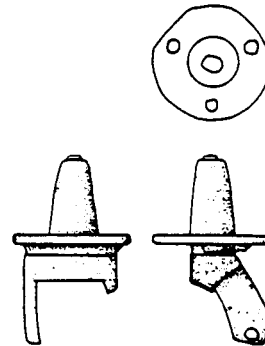
*Chattahoochee:* 53  
*Provenance:* Engineering space  
*Description:* Iron hook



*Chattahoochee:* 55  
*Provenance:* Engineering space  
*Description:* Unidentified iron object

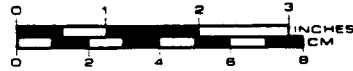
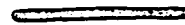
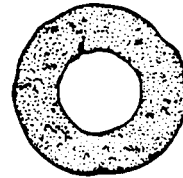


*Chattahoochee:* 56  
*Provenance:* Engineering space  
*Description:* Brass caster

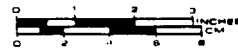




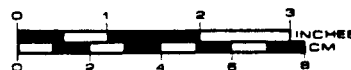
*Chattahoochee:* 68  
*Provenance:* Engineering space  
*Description:* Iron washer



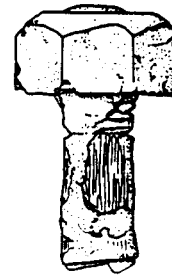
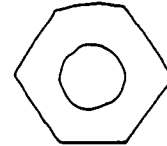
*Chattahoochee:* 85  
*Provenance:* Engineering space  
*Description:* Iron wedge



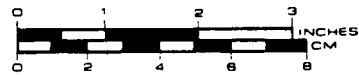
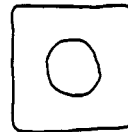
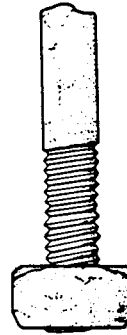
*Chattahoochee:* 86  
*Provenance:* Engineering space  
*Description:* Iron hasp



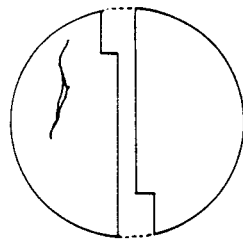
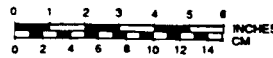
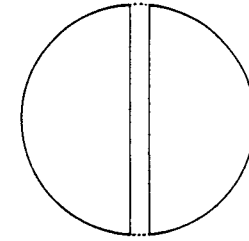
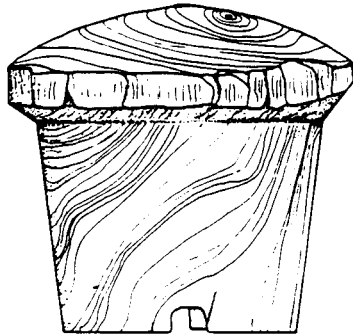
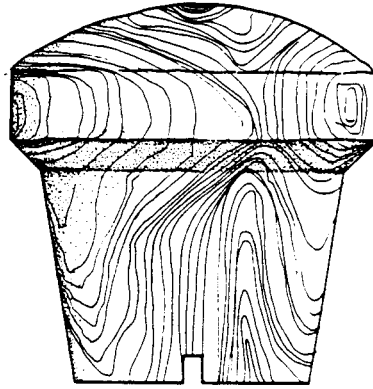
*Chattahoochee:* 88  
*Provenance:* Engineering space  
*Description:* Iron nut and stud



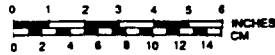
*Chattahoochee:* 89  
*Provenance:* Engineering space  
*Description:* Iron nut and stud



*Chattahoochee:* 122  
*Provenance:* Chattahoochee River, south  
of Confederate Navy Yard  
*Description:* Wooden tompon



*Chattahoochee:* 123  
*Provenance:* Chattahoochee River, south  
of Confederate Navy Yard  
*Description:* Wood tompon



## CONCLUSIONS AND RECOMENDATIONS

Relocation and examination of the remains of the CSS *Chattahoochee* confirmed that a substantial portion of the lower hull of the gunboat survives intact and is well preserved within the bottom sediment of the Chattahoochee River near Broken Arrow Creek. Below the turn of the bilge most of the hull survives from the stem aft to the point where the stern section broke away during efforts to raise the wreck. Surviving remains preserved within the river bottom sediment exhibited a high degree of preservation and structural integrity confirming that intact recovery is a viable future option.

If recovered, the remaining vessel structure could be preserved and combined with the stern section presently maintained by the Confederate Naval Museum to develop a major exhibit on the CSS *Chattahoochee*. Using the technique employed by the National Park Service to exhibit the remains of the USS *Cairo* at the Vicksburg National Military Park, the Confederate Naval Museum could reassemble the surviving hull remains and reconstruct the missing portions of the structure using the ghosting technique employed with the USS *Cairo*'s remains. That exhibit could be additionally enhanced by the display of machinery and artifacts recovered from the shipwreck site and historical material preserved in archival collections.

Regardless of a decision to recover, preserve, and display the remains of the CSS *Chattahoochee*, additional investigation of the wreck would be of value. A comprehensive excavation of the site would expose the remaining hull structure and permit a detailed plan of the site to be prepared. This would recover important structural evidence preserved at the site. In addition to documentation of architectural and construction details, a complete excavation would recover additional artifacts associated with the CSS *Chattahoochee* that could be used in museum exhibits associated with the ship. Treatment of material recovered in conjunction with this investigation of the wreck confirmed that conservation problems and expenses would be minimal when compared to the preservation of artifacts from a more destructive environment. The low cost of conserving material recovered from the CSS *Chattahoochee* represents a major advantage in planning additional on-site research. The CSS *Chattahoochee* is one of the few surviving sources of vessel specific information on Confederate gunboats. Because only limited historical evidence associated with the design and construction of this class of warship survives, the CSS *Chattahoochee* is of considerable importance. For the Columbus Naval Museum the vessel represents an irreplaceable asset. If museum development is to be

based on exhibition of material from the CSS *Chattahoochee* serious consideration must be given to additional investigation and ultimate recovery of the Confederate warship. Finally, to insure that the option to investigate and perhaps recover the CSS *Chattahoochee* remains open, the Confederate Naval Museum should work with local, state, and federal agencies to insure that the site is protected.

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## APPENDIX

**CSS *Chattahoochee* Contract Specifications**  
 William F. Martin Papers, #493

Specifications for a Steam Gun Boat, 130 feet long, 30 feet beam moulded, and 10 feet depth from the lower edge of the rabbet on the Keel to the top of the deck beam at the side of the vessel. Spring of beam, three inches, draft of water, when loaded for sea, six feet.

**Keel**

The keel will side 10 inches and mould 10 inches, the floors jogging one inch into it, and projecting six inches below the planking: to be of white oak.

**Stem &c**

The stem, stern-post, dead wood, apron &c will side 9 inches, and the keel tapered on each end to suit them, the whole to be fastened through with iron bolts  $7/8$  inch in diameter and not over 18 inches asunder. The stemson and stern post to be of white oak.

**Frame**

The frames will be placed 2 feet apart from centre to centre, fastened through the keel and keelson with two  $7/8$  inch bolts in each; the futtocks all siding 7 inches and when framed together will show a space of 10 inches between the frames, to be bolted together with three  $3/4$  inch iron bolts in each scarp. The floor timbers and the crooked futtocks in the bilge of white oak, to be of the natural growth; the first futtocks and top timbers may be of heart yellow pine. The frame will be double to the port sill line, and oak standcheons from thence to the rail, one on every other frame, with a plank sheer three inches thick let over. The main rail will be four inches thick, to be cut off in the wake of the pivot guns, with a hammock rail and nettings on top.

**Deck Beams**

Of yellow pine sided 10 inches and moulded 7 inches, spring three inches, to be placed five feet apart with fore and aft stuff and two ledges between each.

**Clamps and Knees**

To have a thick pine clamp and a hanging knee under the end of each beam, sided to 5 inches and bolted through with  $3/4$  inch iron bolts and rivetted on rings on the knees.

**Keelson**

Of yellow pine sided 10 inches, moulded 12 inches to be planked with 1 1/2 inch pine plank tongued and grooved.

**Planking**

The bottom plank to be of white oak, three inches thick fastened with two spikes and two locust or white oak treenails in each frame and to be butt bolted with 3/4 inch iron bolts driven through and rivetted on rings.

**Bends**

May be of yellow pine, or oak, 5 inches thick fastened with two spikes and two through bolts of 5/8 inch diameter in each frame, the bolts to be driven through and rivetted on rings.

**Water Ways**

Of yellow pine

**Ceiling**

Of yellow pine 1 1/2 inches thick spiked on.

**Limbers**

To be cut over each garboard strake for water courses and boards fitted over them.

**Spirketting**

Of pine or oak 3 inches thick fastened with spikes.

**Gun Deck**

Of yellow pine three inches thick fastened with iron spikes and plugged over the heads.

**Berth Deck**

To be laid in hatches (so as to get in barrles &c) of 1 1/2 inch yellow pine and fastened to the carlings with wrought nails.

**Boats &c**

Two good boats complete, 16 feet long, and two sets or iron davits, with boat tackle of blocks and falls complete for hoisting &c., all to be fitted.

To be fitted with rudder, stem plates, hawser pipes, chain nippers, cat heads, air ports, cable bitts &c. Two good pumps, one head pump, two anchors and chain cables, and the necessary eye and ring bolts for gun tackle; the joiners work according to the drawing, such as cabin, ward-room, shell-room, shot and chain lockers, hatches, windlass &c.

The outside work all to be planed off - the nail and bolt holes filled up with putty, and to have two good coats of paint as desired. The inside work to have two good coats of paint also as desired. All the work between decks to be planed. The whole to be done in a workman-like manner and of good materials to the satisfaction of the Department.

It is expressly understood that the Department desires to get a vessel complete and any little things which may have been omitted are to be furnished without cost to the Government.

The furniture is not included in the requirement, nor is the armament.