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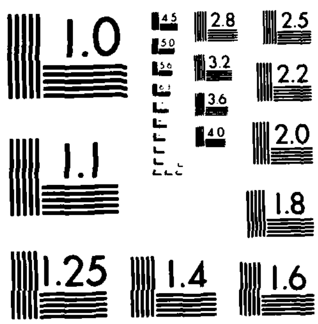
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1.6
1.8
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2.8
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4.0

AD-A152 171

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April 1978

Final Report
Contract No. DACW 54-77-C-0039

EXPLORATORY REMOTE-SENSING SURVEY OF THE FOLLY RIVER-STONO INLET, SOUTH CAROLINA, IMPROVEMENT PROJECT

Prepared for:

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April 21, 1978

Final Report
GSRI Project No. 215-879-11

Contract No. DACW 54-77-C-0039

EXPLORATORY REMOTE-SENSING SURVEY OF THE FOLLY RIVER-STONO INLET, SOUTH CAROLINA, IMPROVEMENT PROJECT

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A-1

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Final Report

EXPLORATORY REMOTE-SENSING SURVEY OF THE FOLLY RIVER-STONO INLET, SOUTH CAROLINA, IMPROVEMENT PROJECT

Introduction

The proposed modification to Folly River will include creation of the following:

1. An entrance channel 12 feet deep by 100 feet wide, extending a distance of about one nautical mile
2. A channel within Folly River, 10 feet deep and 80 feet wide, extending a distance of about 3.5 nautical miles
3. A channel within Folly Creek, 10 feet deep and 80 feet wide, extending a distance of about 4.5 nautical miles

Concern for the future disposition of cultural materials in the Folly River-Stono Inlet area was expressed in a letter dated March 16, 1977, written by John Califf III, an environmental specialist in the Historic Preservation Division of the South Carolina Department of Archives and History, and addressed to Col. Harry S. Wilson, Jr., District Engineer, Charleston District Corps of Engineers. The letter states, in part, that:

> Preliminary research I did shows that Stono Inlet was in the main route for transcontinental shipping from the early 1700s for ships entering Charleston Harbor. The sand bars around the inlet are extensive and are the largest sandbars near Charleston Harbor, making them an ideal spot for ships lost in the storms to rest. There are very many documented cases of shipwrecks off Charleston Harbor, some of which are likely to be in the Stono Inlet. During the 1812 war period, a fort was built on the land opposite Bird Key Island, and later a Confederate fort was built in the area. The inlet was a scene of battles during the 1812 war and a major spot for Union fleet maneuvers during the Civil War. Folly Island was a major Union base during the siege of Charleston.
>
> Smaller ferries, barges, and sailing boats used the Folly and Stono rivers to service coastal plantations and after the 1820s, steamboats were used. In the late 1800s ships mined phosphate in the rivers.

Study Objectives

The objective of the study was to perform an exploratory remote-sensing survey of the shoaled areas of the Folly River and Stono Inlet, South Carolina, an area covering approximately two miles. The survey was designed to locate, through the use of a proton precession magnetometer, any historically significant shipwreck material lying on or beneath this project area.

Area of Study

The area of study included approximately 2.0 statute miles of the underwater areas in and adjacent to the Folly River and Stono Inlet, South Carolina, delineated as dark channel areas on the map included with this report. The minimum extent of the survey included the three shoaled areas shown on the map, plus the underwater area of at least 300 feet beyond the edge of each shoal.

Period of Performance

The study was performed between October 27 and October 29, 1977, with the survey itself being conducted on October 28.

Sea State and Weather

On the day of the survey, the weather was clear, but turned hazy. There was one- to two-foot seas, with substantial ground swells breaking over the seaward and leeward shoals. The sea was calm in the proposed channel between the shoals and in the inland areas.

Survey Personnel

The following personnel from the Corps of Engineers were involved in the exploratory remote-sensing survey: Craig Schillinger, boat operator; Shari Stiles, archeological assistant; Mike Corkran, archeologist; and Richard Roach, project engineer. Allen R. Saltus of Gulf South Research Institute was consulting archeologist.

Survey Equipment

The following equipment was used to conduct the survey:

1. A G806 proton precession magnetometer with analog recorder, capable of sampling ± gamma sensitivity, with a repetition rate of about one second or better
2. Motorola Mini-Ranger III Navigation Ranging System
3. BCD output to interface the navigation system digital recorder with the magnetometer
4. Marine and land magnetometer sensor heads
5. A 20-foot survey boat (Simmons) with a 70-horsepower outboard motor
6. Sufficient DC power sources and recharges to permit operation of the magnetometer and navigation/ranging system for eight hours per day
7. Hewlett-Packard 9810 programmable calculator with 9862a x-y plotter capable of converting range-range values from the navigation/ranging system to an x-y grid and post plot

Survey Methodology

As previously stated, the exploratory survey was conducted using a G806 proton precession magnetometer and a Mini-Ranger III (MRS III) positioning system. The magnetometer is a precise electronic instrument that measures the earth's magnetic intensity. In a mobile survey, this magnetic field varies only slightly. When ferrous masses are encountered, the variation is accentuated to the point that it becomes abnormal, or anomalous. Magnetic intensity is measured in gammas, which are usually displayed in a five-whole-digit readout and recorded on a two-digit (0-99 or 100-997) stripchart. A one-ton mass at 30 meters would cause a three-gamma inflection; at 20 meters, a 10-gamma inflection; and at 10 meters, a 90-gamma inflection.

The Mini-Ranger system accurately (± meter) locates the position of the vessel with respect to two known relocatable geographic points. The system operates on the principle of radar. The elapsed time between the transmitted signal and the response signal from the receive and transmit reference station (RT station) is used as a base to determine the distance from the known point. This event occurs in milliseconds alternately with both RT stations. The result, therefore, is the display of two known distances from the reference stations which are of a known distance apart. Trilateralization produces a fix on the position of the vessel, which is reproducible in chart form.

During the exploratory magnetic survey, the magnetometer system, which included an airborne sensor and a Hewlett-Packard HP7155A analog recorder, was interfaced with a Mini-Ranger III survey system, which included a digital recorder that recorded not only the magnetic value at a point, but also the two distances from known points, thus providing navigational control. The airborne sensor was affixed to an aluminum pole which extended some four meters in front of the Mini-Ranger antenna. The latter was located approximately in the center of the survey vessel (a 20-foot Simmons equipped with a 70-horsepower Johnson outboard motor). The placement of the airborne sensor minimized the magnetic effects of electronic gear, the outboard motor, and the portable gas tanks.

The survey procedure involved the following steps. Radar receive-and-transmit reference stations were set up on either side of Stono Inlet. A reference station, noted as Code #3, was situated on Kiawah Island at a survey point designated as #350, Kiawah Island development point. This point was at X = 284,166.72N and Y = 2,304,041.20E. Transmit-and-receive reference station Code #4 was established on Folly Island, at a point along the Corps of Engineers island baseline. The terra-cotta-pipe-filled concrete marker with an unstamped Corps of Engineers brass marker was noted as Station 108+09.96. This point was at X = 294,870.49N and Y = 2,316,843.61E.

After the reference points were established and the stations set up, the crew proceeded to the offshore survey area. Using marker buoys and the definite swell action over the shoals, the crew began the survey, with the Kiawah Island reference point, Code #3, as a focal point. Arcs were then traversed at 50-meter land spacings running approximately the 12-foot level, or leeward of the 12-foot level, seaward to a point where the vessel could no longer go safely into the shoal situations. This procedure began landward and proceeded seaward, covering slightly more than one statute mile. Seven runs were made with less than ± three-gamma noise. One ton of ferrous metal would be detected at 90 feet from the sensor, or would be apparent in the survey. Because no magnetic anomalies were noted other than those associated with the channel markers, it was not necessary to run subsequent anomaly checks or to run diagonal lines over the area to obtain additional data on anomaly contours. (A sample of the data output is included as an attachment to this report.)

The two Folly River areas included one area just inside Stono Inlet from Bird Key (between survey points 0+00 and 31+30) and one area inside Folly Island (between survey points 90+90 and 108+10). Both areas were surveyed using visual navigation since geomorphological features were readily available by which to assure complete coverage of the area to be dredged. No anomalies were detected in either area.

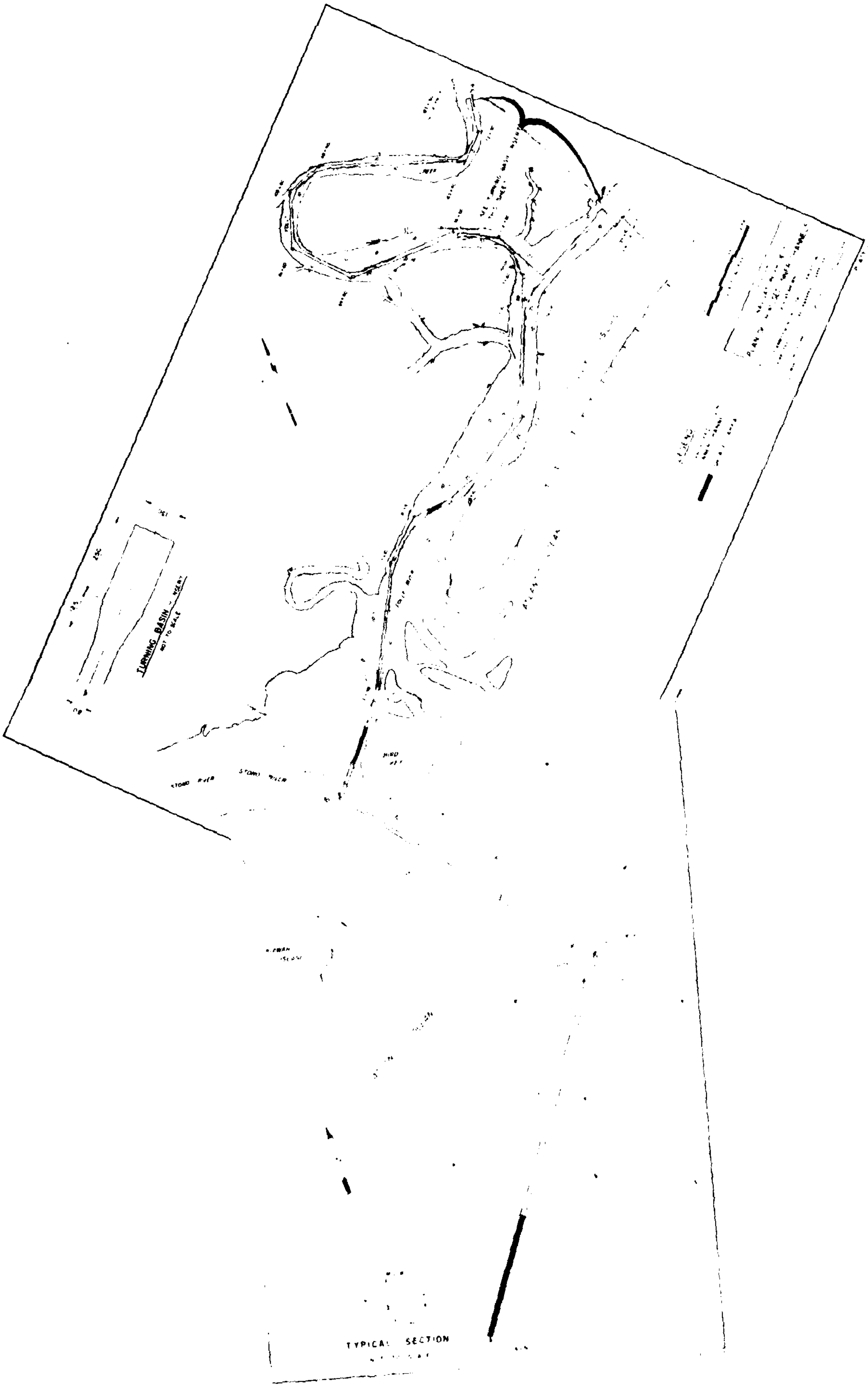
Survey Results

No cultural materials were detected during this survey of the proposed construction plans for the Folly River/Stono River project. The study area, as previously indicated, consists of the channel, which is flanked seaward by a massive shoal. On the day of the survey, the sea was relatively calm, but large ground swells were breaking over this shoal. The fact that no magnetic anomalies were detected by the survey crew could be attributed to one or both of the following factors:

1. Any vessel that may have been wrecked on the shoals because of high wave energy forces in the area may have broken up entirely in the shoal area before it reached the channel, with all debris being distributed along the bottom in the shoal area only.
2. If any portion of a shipwreck were to reach the channel, the size and concentration of the debris, and its distribution along the bottom, would constitute such a small mass that it could not be detected by survey equipment.

Although the latter situation is possible, it is not so likely as the former (i.e., debris from any ships wrecked seaward of the shoal was deposited in the shoal area and did not reach the channel).

Based on the results of this survey, however, it can be safely assumed that no items such as cannons, anchors, or shipwreck debris occur within the area of proposed construction.


TURNING BASIN - WEST
NOT TO SCALE
STONO RIVER
TYPICAL SECTION

Attachment

DATA OUTPUT: ARC 4100m
FROM CODE #3

Digital Print Output

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	52828	.3.04094.7	.4.04635.4
	52825	.3.04093.3	.4.04675.8
	52830	.7.04092.3	.4.04657.4
	52827	.3.04092.5	.4.04659.5
	52825	.3.04091.7	.4.04650.3
	52820	.3.04091.0	.4.04643.1
	52823	.3.04091.6	.4.04635.1
*	52816	.3.04092.0	.4.04627.1
*	52803	.3.04091.5	.4.04617.6
*	5[illegible]801	.3.04091.0	.4.04613.0
*	52812	.3.04091.3	.4.04601.4
	52820	.3.04093.1	.4.04594.2
	52822	.3.04092.6	.4.04595.2
	52818	.3.04094.5	.4.04577.4
	52822	.3.04095.4	.4.04571.5
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	52821	.3.04105.1	.4.04483.2
	52823	.3.04103.5	.4.04474.2
	52824	.3.04101.2	.4.04465.1
	52819	.3.04098.2	.4.04473.5
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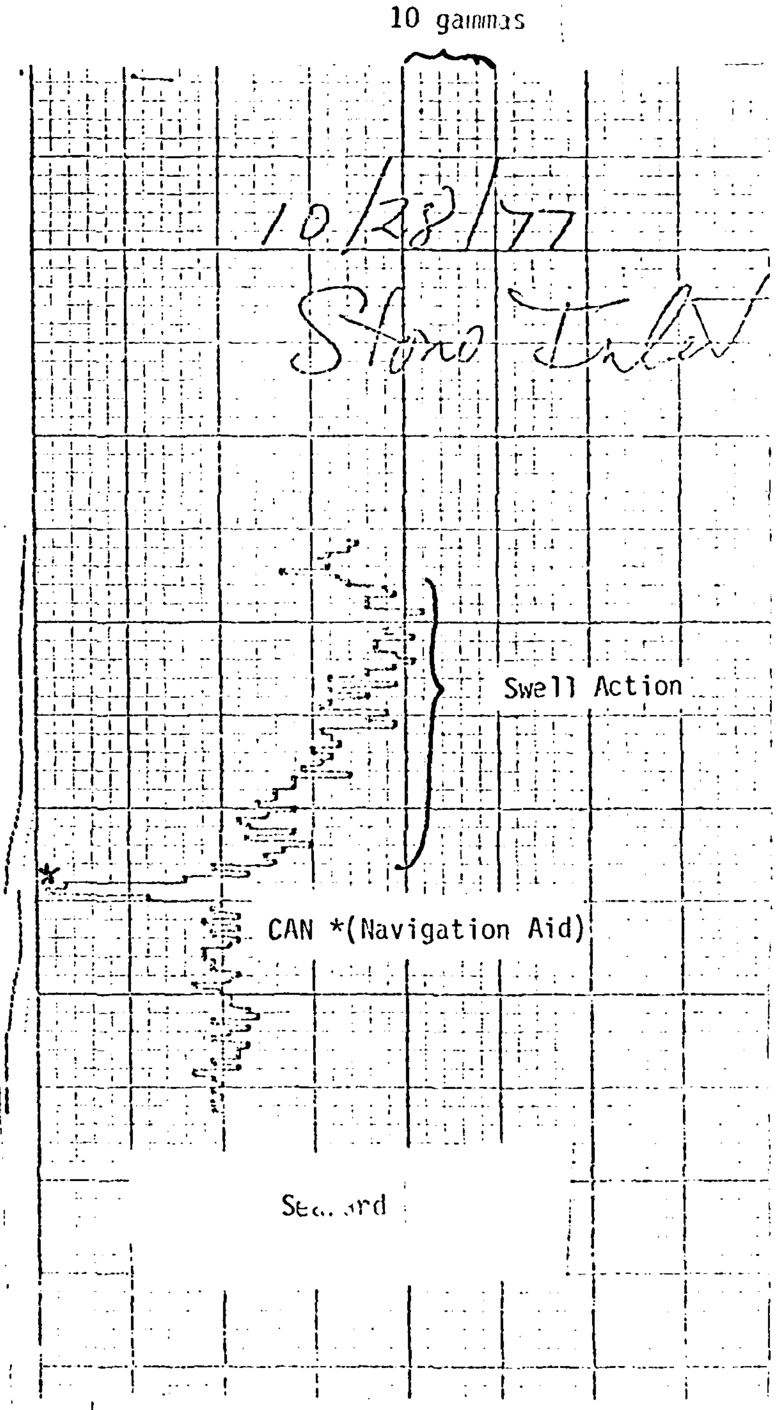
Analog Output



Data Output

Arc 4100m from Code #3

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