

Fort Sumter Historic Structure Assessment Report

FORT SUMTER
NATIONAL MONUMENT

SOUTH CAROLINA

National Park Service
November 30, 1992



TABLE OF CONTENTS

PART I	EXECUTIVE SUMMARY & COMMENTS.....	1
PART II	ADMINISTRATIVE DATA.....	1
PART III	HISTORY OF FORT SUMTER.....	1
III.1	<u>USE HISTORY</u>	
.01	WAR OF 1812.....	1
.02	BUILDING OF FORT SUMTER.....	1
.03	FEDERAL OCCUPATION.....	4
.04	CONFEDERATE OCCUPATION.....	7
.05	FEDERAL REOCCUPATION.....	10
III.2	<u>CONSTRUCTION HISTORY</u>	
.01	CONSTRUCTION: 1820-1861.....	1
.02	CONFEDERATE OCCUPATION: 1861-1865.....	3
.03	GILLMORE RECONSTRUCTION: 1868-1878.....	6
.04	FIELD REPORTS BETWEEN GILLMORE & HUGER CONSTRUCTION.....	12
.05	BATTERY HUGER.....	13
.06	WORLD WAR I.....	14
.07	WORLD WAR II.....	15
.08	TRANSFER OF FORT TO NATIONAL PARK SERVICE.....	15
.09	FORT SUMTER DEVELOPMENTS: 1949-PRESENT.....	15
PART IV	INVENTORY AND CONDITION ASSESSMENT REPORT (ICAP)	
IV.1	<u>PROJECT STATEMENT</u>	1
IV.2	<u>DEFINITIONS</u>	3
IV.3	<u>LIST OF SYMBOLS/ABBR/DEF</u>	5
IV.4	<u>PRODUCTS LIST</u>	9
IV.5	<u>REPORT PROPER</u>	1
.01	EXECUTIVE SUMMARY.....	1
.02	FEATURE INVENTORY.....	7
.03	WORK RECOMMENDATIONS.....	11



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TABLE OF CONTENTS

FOSU
HISTORIC FORT SUMTER

PART	V	APPENDIX.....	1
	V.1	<u>IDENTIFICATION SYSTEM</u>	2
	V.2	<u>LIST OF INVENTORY FORMS</u>	16
	V.3	<u>MATERIALS</u>	18
	.00	MATERIAL LIST.....	19
	.01	BRICK (MA12 Brick).....	20
	.02	MORTAR TYPES (>MO--).....	21
	V.4	<u>METHODS OF CONSTRUCTION</u>	22
	.00	METHODS OF CONSTRUCTION LIST.....	23
	.01	BRICK BOND.....	23
	.02	JOINT TYPES.....	24
	V.5	<u>INTERVIEWS</u>	25
	.00	INTERVIEW LIST.....	25
	.01	Mr. Lewis Scott.....	26
	.02	Mr. Maurice Williams.....	27
	.03	Mr. Wayne Fanning.....	28
	V.6	<u>REPORTS</u>	29
	.00	LIST OF REPORTS.....	29
	.01	FEDERAL REPORTS, SERO STUDY 1992.....	30
		Corps of Engineers Report: Battery Huger Removal, 1992 See Park Files	
	.02	S.C. Air Quality Annual Report 1992 See Park Library Holdings	
	.03	CORPORATE REPORT, Law Engineering See Park Library Holdings	
	.04	VARIOUS RIPRAP REPORTS See Park Files	
	V.7	<u>DRAWINGS</u>	39
	.00	LIST OF DRAWINGS.....	39
	.01	HISTORIC CONSTRUCTION.....	40
	.02	HABS DRAWINGS LIST.....	47
	.03	HSAR/ICAP IDENTIFICATION SYSTEM.....	50

TABLE OF CONTENTS

FOSU
HISTORIC FORT SUMTER

V.8	<u>PHOTOGRAPHS</u>	52
.00	LIST OF PHOTOGRAPHS.....	53
V.9	<u>BIBLIOGRAPHY</u>	54
V.10	<u>PERSONNEL</u>	56

EXECUTIVE SUMMARY OUTLINE

PART I EXECUTIVE SUMMARY & COMMENTS

.0 GENERAL

.1 ENVIRONMENTAL

- A. EROSION
- B. INTRUSIONS
- C. THERMAL CYCLES

.2 STRUCTURAL

- A. CASEMATES
- B. SCARP WALL ALIGNMENTS
- C. ESPLANADE & ORIGINAL WHARF

.3 CONCLUSIONS

EXECUTIVE SUMMARY0. GENERAL

Historic Fort Sumter is to be preserved as a stabilized ruin according to the park's Management Objectives. While the park's Cultural Resources Management Program addresses numerous issues, this HSAR Report reveals the need for additional project statements and preservation clarifications.

The two major factors adversely affecting Historic Fort Sumter's structural integrity and historic fabric are ENVIRONMENTAL and PHYSICAL. These two factors' most serious aspects are discussed here.

1. ENVIRONMENTAL FACTORSA. EROSION

- a) Underwater Erosion has the potential to undermine the fort's footings. Shifts along the harbor floor, heavy ship traffic, and possible dredging could all have an adverse effect on the footings. Earlier this year, a civil engineering survey was made to determine the exact elevation of a selected brick course and the precise configuration of Fort Sumter's perimeter. This should be updated regularly to detect changes. In addition, a systematic gathering of, evaluating, and responding to other harbor data must be continued.
- b) Surface Seawater Erosion is continual at the base of the Exterior Scarp Wall, slowly destroying the brick and mortar. This masonry must be systematically repaired.
- c) Wind Erosion is destroying the Exterior Scarp Wall in much the same manner as Surface Seawater Erosion. Wind-driven sand particles act like a coarse sandpaper. Over time, much of the historic brick will be lost, and must be replaced in order to maintain the structural integrity of the wall. Known commercial brick has not proved to be a satisfactory match of the non-standard sized historic brick. Efforts should continue to locate more sympathetic replacement brick.

B. INTRUSIONS

- a) Precipitation has an adverse effect on all exposed masonry surfaces. It has the most adverse effect when allowed to penetrate the wall surface, either from above or through weakened joints. Sealing these exposed surfaces could minimize this damage.
- b) Runoff of precipitation from the Parade Ground into the Casemate, Barracks and Officer's Quarters has a detrimental effect. Known remedies have adverse ramifications. A study to determine the best solution should be made and implemented.
- c) Sand is being washed onto and covering up the Esplanade. Although possibly being protected by the sand, this unique feature is being lost from view. Further investigation should be made to determine if this feature could be uncovered and displayed.
- d) Sand and Sea are claiming the artifacts deposited outside the scarp wall. Although not presently part of the Fort Sumter structure, many are unique and therefore irreplaceable. A separate investigation should be undertaken to determine the extent and disposition of these items.
- d) Dirt deposited by Gillmore in the 1870's, and further deposited by the construction of Battery Huger in 1898, is covering casemate remains and parade ground areas. When funds are available, preliminary archeological and structural investigations are suggested to determine the extent of these remains and feasibility of exposure.
- e) Visitors impact the historic fabric. This creates a classic tension between its enjoyment and preservation. As the structure continues to age and becomes more vulnerable and as visits increase, this impact will be even greater. This situation should be closely monitored and evaluated.
- f) Battery Huger, constructed in 1898, straddles the Parade Ground. A separate study addresses the feasibility of its removal.

C. THERMAL CYCLES

THERMAL CYCLES stress the stability of the Fort by causing it to expand and contract unevenly, resulting in thermal cracks and material rupture. At the time of construction, current methods of installing expansion joints were unknown. Since known correction methods would damage the historic fabric equal to or possibly greater than existing thermal cycles, on-going maintenance methods should be continued.

2. PHYSICAL FACTORS

A. CASEMATE ROOFS

- a) Structural Integrity of the CASEMATE ROOFS has been weakened over the years due to man-made and natural causes. A monitoring system devised by Law Engineering is currently in place and readings should be continue to be taken. Several CASEMATE ROOFS in the Left Gorge Angle and one at the Left Flank will need to be rebuilt and/or repaired before visitor access resumes.
- b) Waterproof Integrity of the CASEMATE ROOFS (First Tier) has always been less than ideal because they were not originally designed as roofs. Modifications of the roofs to make them more nearly waterproof would possibly destroy some of the Gillmore 1870 historic fabric. However, much of the more important original construction would be protected. Cracks should be sealed, the roof surface coated, and precipitation should be routed to all drains.

B. SCARP WALL

- a) Alignment of the exterior SCARP WALL deviates from the original. As with the Fort's foundation and casemate roofs, the scarp wall alignment should be monitored regularly to determine any further deviations requiring action.

- b) Foundations of the SCARP WALL are being exposed in many places by loss of the original granite esplanade and/or foundation coverings. Of particular significance are the Right Gorge Angle foundations. These are particularly vulnerable to undermining by underwater erosion previously noted. The Right Gorge Angle scarp walls are in poor condition and could fail from additional stresses caused by weakened and/or destroyed foundations. The granite esplanade and foundation coverings similar to the original, should be installed.

C. **ESPLANADE & ORIGINAL WHARF**

The ORIGINAL WHARF AND ESPLANADE are being broken off by the sea at the edges. Their foundations and/or footings need to be replaced and/or repaired to reverse this trend.

3. **CONCLUSION**

Additional action, as summarized above and elaborated in this Historic Structures Assessment Report, must be taken in order to stabilize and preserve historic Fort Sumter.

ADMINISTRATIVE DATA

WHAT: HISTORIC STRUCTURE ASSESSMENTS REPORT

WHERE: HISTORIC FORT SUMTER
FORT SUMTER NATIONAL MONUMENT

DATE: INSPECTION AND CONDITION ASSESSMENT REPORT 1992

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INTRODUCTION

A BRIEF HISTORY OF FORT SUMTER

1. WAR OF 1812

- 1.1 The need for better coastal defenses was realized during the War of 1812. Not only was Washington burned due to inadequate defenses, but numerous British Ships were seen "daily on the [South Carolina] coast ... sounding the Bar." Under the Madison administration in 1815, the President formally recommended to Congress the improvement of maritime defenses. Charleston was placed under the first order of cities to receive coastal fortifications based upon a revised report of 24 March 1816. Within this report a recommendation was made that the existing Charleston Harbor forts "be augmented by the erection of a new fort which would effectively close the harbor entry to hostile ships."¹

2. BUILDING OF FORT SUMTER

- 2.1 Beginning in 1829 Lt. Henry Brewerton, Supervisory Engineer, Corps of Engineers, enacted plans to receive stone for a new man-made island in the middle of Charleston Harbor. This island would rise from a shoal that sat beneath the existing water level. When the contracted stone quarrier shipped only 1,000 tons of stone for the new mole by mid-1830, with a total of 7,000 tons by 1831, Chief Engineer Charles Gratiot requested and received permission to purchase stone on the open market. The mole was quickly completed to a foundation bearing point by 1834. Instead of the palmetto grill specified in the original drawings Capt. W. A. Eliason (succeeding engineering officer--Winter 1834) proposed a system of stone and brick underpinning piers. Below the piers, Lt. T. S. Brown (next engineering officer--Summer 1834) suggested a split granite pier support from the low water to high water levels and masonry construction from the high water mark. The main piers now rested on dry granite triangular bases.²

- 2.2 The fortification construction was halted from 1834 to 1841. Several litigations were brought against the Federal Government questioning the right to the land and the right to build the fort. The first action was brought by a private citizen, William Laval, claiming rights to all "exposed shoals" given to him by the South Carolina government. The second action was brought by the state when, through a committee, they questioned if construction "would effect navigation and commerce of Charleston Harbor." The committee also questioned "by what authority the Federal Government had undertaken work on the fort." Both comments and actions were an exercising of "State's Rights" by South Carolina. This occurred after Andrew Jackson had negated South Carolina's "Nullification Act."³
- 2.3 Work continued after South Carolina invalidated Laval's claim and ceded the shoal to the Federal Government. Restarting in 1841, the entire foundation was completed by 1845. Further modifications occurred to the original plan and scope of work. These changes aided quicker construction of the foundation by the alleviation of high water flooding of the day's work. Changes included the construction of the stone wharf which "facilitated the unloading of supplies," and raising of the rear gorge wall.⁴ The building of the rear gorge necessitated further modification of the piers and the laying/construction of the foundation wall. The basic stone foundation was completed between 1842-1845 and by autumn of 1845:

three courses of cut stone and concrete had been laid, ... the masonry upper part of the foundation [was] brought up to a point close to parade level.⁵

- 2.4 By the year 1845, the foundations were ready to receive the pier construction and scarp construction; however, there were indications the fort mole was under too much compression. Therefore a foundation load test was performed at the main pier locations to gauge subsidence. Executed in 1845-46, the loading exceeded the proposed total load and showed that the mole had only sunk two and one-half inches. However, elevations run over the fort's 163 year history shows that the fort has been sinking.⁶

- 2.5 From 1846 to 1860 the major scarp walls, casemates, embrasures, piers, barracks, and associated structures were constructed at the site. The construction of all elements on and within the Fort, at this time, used state of the art materials. Although used experimentally and in lesser quantities at other sites, the builders made extensive use of concrete. This element was used only in a compression state here. The material was comprised of sand, water, oyster shells (as a binder/filler) and oyster shell lime.
- 2.6 Wrought-iron joists were used in a bearing capacity. These were seated in the enlisted man's barracks partition walls in "joist pockets," the joists were additionally supported by corbelled brick consoles. Not being able to span great distances, the joists rested upon three wrought-iron girders that ran transversely through the large rooms. The girders sat in, on the inside end, the centrally located fireplace or the casement arches. The joists and girders supported the second and third barracks floors.⁷
- 2.7 Most factors of the original construction have been touched upon in the original Historic Structure Reports. Analysis of the original drawings exhibits details never before addressed. These few items are dealt with in the following paragraphs.
- A. Barracks roof construction. The system designed exhibits a double rafter system. That is, a rafter system below the principal rafters. These 6"x 6" rafters were connected to a 2½"x ½"x 10" member, with the far end being 3½" diameter connector. The connector was attached to the roof joist on what looks like an axle. It appears that the internal rafter system was designed to absorb bombardment of the external roof system.⁸
- B. Windows. Elaborate detail was found in the drawings and substantiated in photographs and pen and ink etchings from Harper's Weekly. The loophole windows on the gorge side to the interior side were designed to be finished with panelled reveals, tapered out to the interior living area and encased with a Federal style molding. This detail occurred on the first and second floor level. Gorge loopholes on the first

floor where doorways occurred (appropriately labelled barricade doors) and finished out in the same panelled reveal and molding but was not tapered. It was flush with the side walls.'

C. Architectural Features. Entrance doors to the barracks were vertical double panel single leaf doors. Lower story windows were shuttered with movable louvers. Upper story windows had no shutters.

D. Stairs. Circular stairs were always referred to as Iron stairs. The major part of the stairs being the main support column and tread lip were iron. However, the stair tread and riser were of one-piece construction. The tread and riser unit construction was composed of granite designed to fit within the wall and graduating to the tread lip. The wide end of the stair tread fit within a receiving hole in the brick wall. The tapered end was rounded with the stair column fitting through. Remnants of this original construction can be seen in the stair tower locations, besides one found outside of the gorge wall. (See Sht 48, dwr 66, & historic photo(s))

2.8 Based on information from the first report, existing photographs and etchings, and original drawings, an architectural style can be attached to the officers' and enlisted mens' quarters. The style is categorized as Greek Revival with influences of Federal architecture. The Greek style is seen in the etching of Major Anderson's office. The window detail is composed of an architrave surround capped by a decorative cornice. The entire room is finished out with a decorative cornice. All woodwork is attributed to the Greek Revival period. This same feature is seen in the nine over nine double hung windows. The windows possess lighter muntins and rails than in earlier windows. With ability to manufacture thinner panes of glass, muntins and rails did not have to be as thick as in Colonial and Federal style architecture.

3. DECEMBER 26, 1860--ABANDONMENT OF FORT MOULTRIE BY MAJ. ANDERSON AND OCCUPATION OF FORT SUMTER.

3.1 The fort was essentially ready for occupation. All major work had been completed, except for finishing touches

within the enlisted man's barracks and flagging in the first tier and second tier casemates. With the election of Abraham Lincoln, tensions heightened between North and South. Major Anderson felt that Fort Moultrie was an untenable position and proceeded to move his entire command to the island fort.¹⁰

- 3.2 Anderson immediately set about finishing the fort for military readiness. This included setting up guns in casemates and on the barbette where he had guns to place. Elevating the problem was the lack of guns and supplies at the fort.

A. In other openings, he closed the embrasures or sealed the opening where an embrasure was to be emplaced (primarily the second tier, but also the first). Three options were exercised on the second tier embrasures where 8' x 8' openings existed. These were, (1) loose-laid brick of 3 courses on the Right Face, (2) brick set in mortar of 2 courses on Left Face and, (3) the remainder left entirely open. This occurred in those embrasures that were not finished out or did not have guns for emplacement.

B. In the first tier loopholes, Anderson had filled the openings. Consisting of stones lined with lead and then sealed with concrete they held up remarkably well. This is evidenced by Capt. J. G. Foster in his official report of the bombardment.

- 3.3 Within the first tier casemates where the blue stone flagging was to be laid, not all was put in-place. This flagging was stockpiled within the parade grounds for installation by the remaining workmen. Anderson proceeded to employ the workmen in fortifying the embrasures and casemates with the blue stone.

- 3.4 April 11, 1861

A. By this time the fort had been readied for an impending attack. On this date, General G. T. Beauregard sent a communication to Major Robert Anderson asking him to surrender and evacuate his garrison from Fort Sumter. Anderson's response was; "I regret that my sense of honor, and ... my obligations to my Government, prevent my

compliance."¹¹

B. On April 12, 1861 at 4:30 AM, the combined cannons of Morris Island, James Island, Sullivan's Island, Castle Pinckney and a floating battery opened up on Sumter.

1. In all, a total of thirty guns and seventeen mortars fired on the fort. Sumter's return fire was not too effectual except on Fort Moultrie. The Federals disabled two guns in two embrasures.
2. Damage sustained at Sumter on the first day was fire in the barracks at three separate times, apparently from enemy shells. The enemy's fire improved during the first day damaging, by fire, the barrack roof of the left flank and the stair towers located here. Guns fired from Sullivan's Island's western batteries damaged the Gorge Wall Officers' Barracks. The falling shells also took out three water cisterns impeding the extinguishing of the fires.¹²
3. April 13, 1861, the confederates continued firing upon the fort. According to Capt. J. G. Foster's report:

It soon became evident that [the enemy] were firing hot shot from a large number of their guns, especially from those in Fort Moultrie, and at nine o'clock I saw volumes of smoke issuing from the roof of the officer's quarters.¹³

- (A) The ensuing bombardment set the woodwork in the west barracks on fire. Captain Foster's report continued stating the fire reached grenades stored in the stair towers and implement rooms. When they exploded, the grenades destroyed the West Gorge Angle stairs and severely damaged the other gorge stairs.¹⁴

4. OCCUPATION BY CONFEDERATE FORCES

4.1 APRIL 14, 1861

- A. Fort Sumter was abandoned by the Federals after a formal surrender to Confederate Forces. Serious damage was sustained by the fort during the confederate bombardment, but the fortification was still operable.
- B. Under the command of Major John Johnson, Engineering Battalion, Confederate States of America, the fort was cleared of debris, stabilized, finished out (as near as possible) to the original plans, and modified and modernized for Confederate Occupation.

4.2 For the period of 1861 to April 1863 the fort was under normal military operations. There were no altercations between Federals and Confederates. By normal military operations, it is meant that armament was installed where missing and the bastioned men were put through preparatory training exercises.

5. BEGINNING OF THE FEDERAL PUSH TO RETAKE FORT SUMTER

5.1 APRIL 7, 1863

- A. Early in April 1863, the Federals began exercises to retake Sumter. This involved use of monitors and the ironclad steamer "New Ironsides." The engagement lasted only a day with heavy damage inflicted upon the ironclads', forcing them to withdraw. The ironclad and monitors fired a total of 154 shots. The Confederates volleyed a total of 520 shots at the ships.
- B. Damage to Fort Sumter was slight on the exterior, but exhibited that the firepower of the Federal guns had increased. Drawings of the engagement showed that one shot had breached the wall. The engagement in August of 1863 would be more devastating to the fort.¹⁵

5.2 AUGUST 7, 1863 TO AUGUST 16, 1863

- A. The Federals were still trying to capture Charleston's harbor fortifications and the city. The Confederates realizing that another attack was eminent were issued:

instructions...to expedite ... in Fort Sumter ... the Sand-bag [sic] chemise to the gorge wall, the interior traverses, merlons [and] embrasures.¹⁶

- B. On August 9, 1863, the shelling from the enemy (Federal) batteries was heavy and rapid. On August 11, 1863, 7:00 AM, the enemy batteries opened up on Battery Wagner; Sumter's cannons returned fire on the enemy batteries to aid Wagner. By August 12 at 5:45 AM, an enemy battery, located northwest of Craig's Hill, opened fire on Sumter with an 8 in. Parrott from a distance of 4400 yds. Of the eleven shots fired, four missed, three struck the outside walls, four struck inside the fort. From the 13th to the 16th of August, Fort Sumter was again fired upon by the 8 in. Parrotts with increased precision. Joining in were the guns of the ironclads and monitors under Admiral Dalghren's command.¹⁷

5.3 AUGUST 17, 1863 TO AUGUST 23, 1863

- A. The Federals began an unprecedented bombardment of Sumter using the land-based Parrot guns capable of firing 30 lb to 300 lb shells on Fort Sumter. On the 17th in a 24 hour period, 951 shots fell on Sumter with 448 striking the outside walls, 223 striking inside the fort. Of the period 18-23 August 1863, 5,643 total shots were fired; 2,643 inside, 1,699 outside, 1,301 missed. After this shelling, the Confederates reported that:

all ... guns remaining in the fort were unserviceable, and the damage to the gorge wall and the northwest face by the reverse fire was great; but the sand that had been placed on the outside of the gorge wall in conjunction with the filling up of the barracks and casemates with cotton bales, and ... the crumbling of the masonry [showed that] the enemy's powerful artillery [made] little impression [on the remainder].¹⁸

5.4 AUGUST 23, 1863 TO DECEMBER 30, 1863

- A. The land-based batteries, monitors and ironclad, kept up the bombardment of Fort Sumter. It is interesting to note that in September of 1863, specifically the 8th and 9th days, the Federals launched an amphibious attack on the fort. They intended to invade the fort through the ruined gorge wall. A force of 870 men in thirty plus launches moved against the fort at 1:00 AM. The Confederate forces repulsed the attack with small arms fire and hurling pieces of the wall at the invading squadron.¹⁹ The Federals evidently believed the Fort to be inactive. This is seen through a communication between Gen. Q. A. Gillmore and Signal Officer Adams (of Admiral Dalghren's flagship). Gillmore asked at 11:35 AM September 2, "Any return fire from Sumter?," to which Adams answered "Not to my knowledge."²⁰
- B. The last recorded correspondence on the Confederate side regarding the fort, was between Gen. P. G. T. Beauregard and Gen. S. Cooper. In this communique Beauregard states that the "enemy's fire on Sumter has ceased again for the present."²¹ In fact, this was the last determined bombardment of Sumter. Further bombardment of the Fort continued through 1864 and up until 1865, but less frequent.
- C. If the Federals had known of the devastation caused by the explosion in the southwest gorge wall magazine it is probable the fort could have been taken. It would have necessitated further heavy bombardment, but by this time the U.S. Navy ship Ironsides had been recalled for action in the northern theater. As well, Major-General Gillmore departed for Fort Monroe, succeeded by Maj.-Gen. John G. Foster, responsible for building the fort.²²
- D. Foster began another bombardment in July of 1864, ceasing only in August when Foster's supply of ammunition began to dwindle. Foster was also called upon to redeploy four troop regiments to the Virginia theater.

5.5 FEBRUARY 17, 1865

- A. The Confederates garrisoned at Forts' Sumter and Moultrie, Castle Pinckney, and the City of Charleston withdrew leaving Charleston defenseless. The Confederates were facing the Federals to the east at James Island and in the harbor, to the south at Savannah, and to the West in Columbia.²³

5.6 APRIL 14, 1865

- A. Under General Orders No. 50, Major-General Anderson raised the original flag over Fort Sumter. Occurring at Noon, the raising was to have a "corresponding salute by Ft. Sumter's cannons and every fort and every rebel battery that fired upon Sumter."²⁴

6. THE FORT IN 1868

6.1 1868-1878

- A. Following an 1868 inspection, a plan of reconstruction was issued in early 1870, with work beginning in January of 1870. Major-General Q. A. Gillmore, who tried to destroy the fort in 1863-64, was now placed in charge of retrofitting it for coastal defense. Inspection of the fort in 1868, and as seen through historic photographs, drawings and historic Corps of Engineers Records, showed that approximately 120 linear feet (LF) of the left flank face and half of the left gorge wall angle still retained the full height to the terreplein. Fifty-four LF remained to the second tier level. The right flank, right flank angle and right gorge angle were destroyed from the fire of Battery Wagner, as were the left face casemates due to reverse fire.²⁵ This same report also addressed the parts of the wall in Cardinal directions. These descriptions are reused, to an extent, in this report. Reference is made to the enclosed sketch detailing the wall's cardinal direction and its historic nomenclature. (See Fig. 1)
- B. It appeared that the gorge wall was totally destroyed, but part of it was protected by the ensuing rubble from the upper tiers, casemates and officer's quarters. The gorge wall was also protected by

Confederate measures to reinforce the fort's construction. However, the eastern portion of the gorge wall was razed to the foundation from the sally port to the right gorge angle. The western portion was not as badly damaged having destruction only to the sills of the second story loopholes. The right gorge angle, right flank, and right flank angle were destroyed to the foundation level of the scarp wall. Behind this destruction and beneath all the debris lay the shattered casemates. The Northeast angle (between the Right Face and Flank) still retained its height to the second tier casemate top. (See Fig. 2-4.)²⁶

- C. The sandbagging of interior architectural supports aided not only the gorge wall, but also most of the embrasures and casemates. When reconstruction began, it became obvious that the fort was severely damaged in the casemate arches on the faces mentioned above. Due to the devastation the fort was taken down to the scarp wall foundations along the entire right flank, eastern gorge wall and its corresponding angles. Gillmore set about clearing the debris and rubble, and began developing new plans. Casemates that could be retained, would be; but basically this was a new fort built upon the remains of the old. The first plan and sections, dated August 1, 1868, points to this conclusion.²⁷
- D. Later plans changed the scope of the project and portions of the construction seen today. Briefly, the changes in the parapet wall and coping are viewed in the last of the Sumter drawings in this time period. The remainder of the second tier scarp wall was to act as a parapet and retaining wall for the new parade ground revetments. Ten guns would be mounted "en barbette." Concrete entries (galleries) would lead to the magazines and casemates access.
- E. Beginning in 1868, Major-General Gillmore submitted a plan for reconstruction and estimate. The original plan called for rebuilding the scarp walls in granite or gneiss reopening all the embrasures on the fort and construction of an earthen revetment above the scarp walls. This plan was rejected by the Board of Engineers for fortifications. A revised plan was accepted.

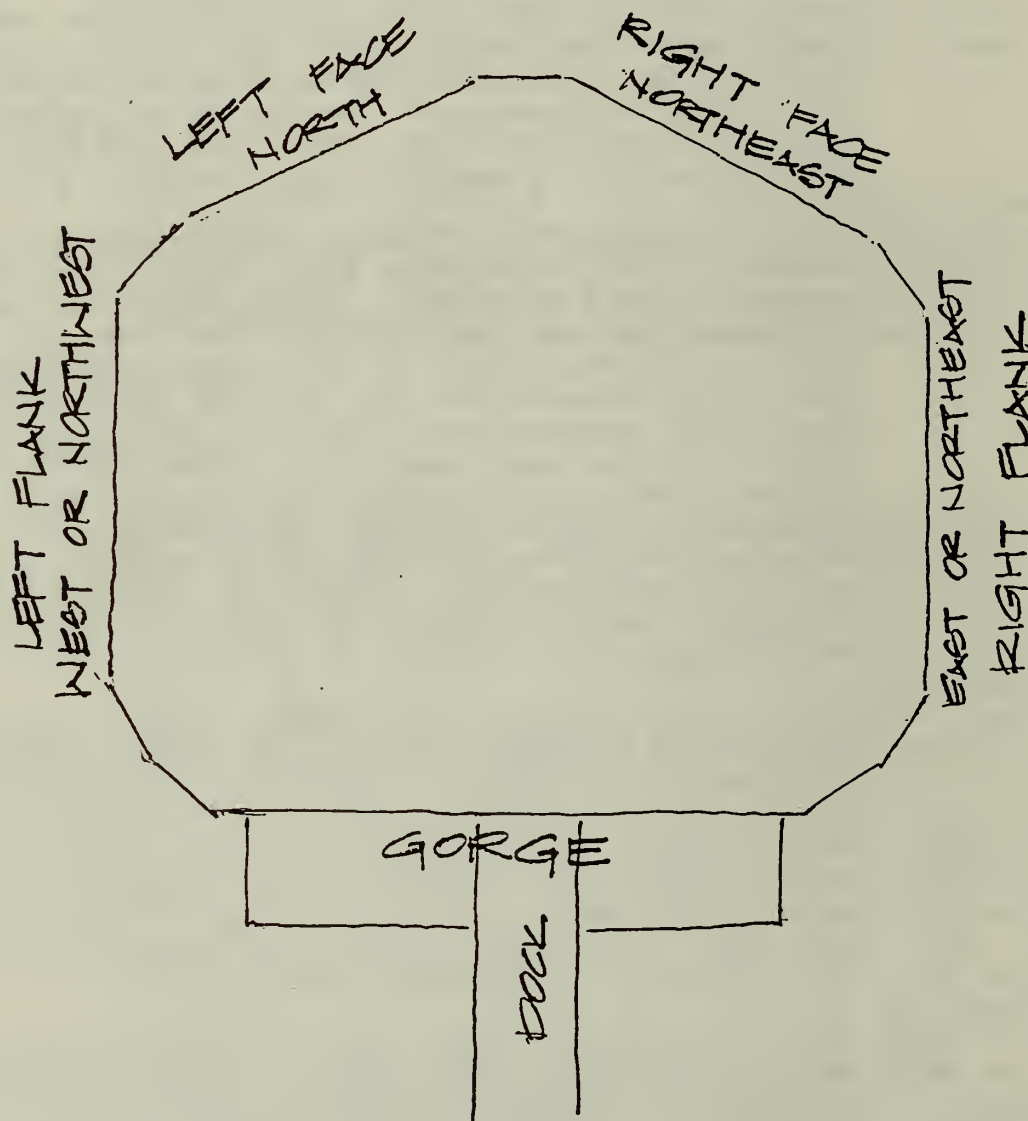


Fig. 1. Correlation between
Gillmore Cardinal Directions and Original
Wall designations

FORT SUMTER--Elevations and Sections, February, 1865.

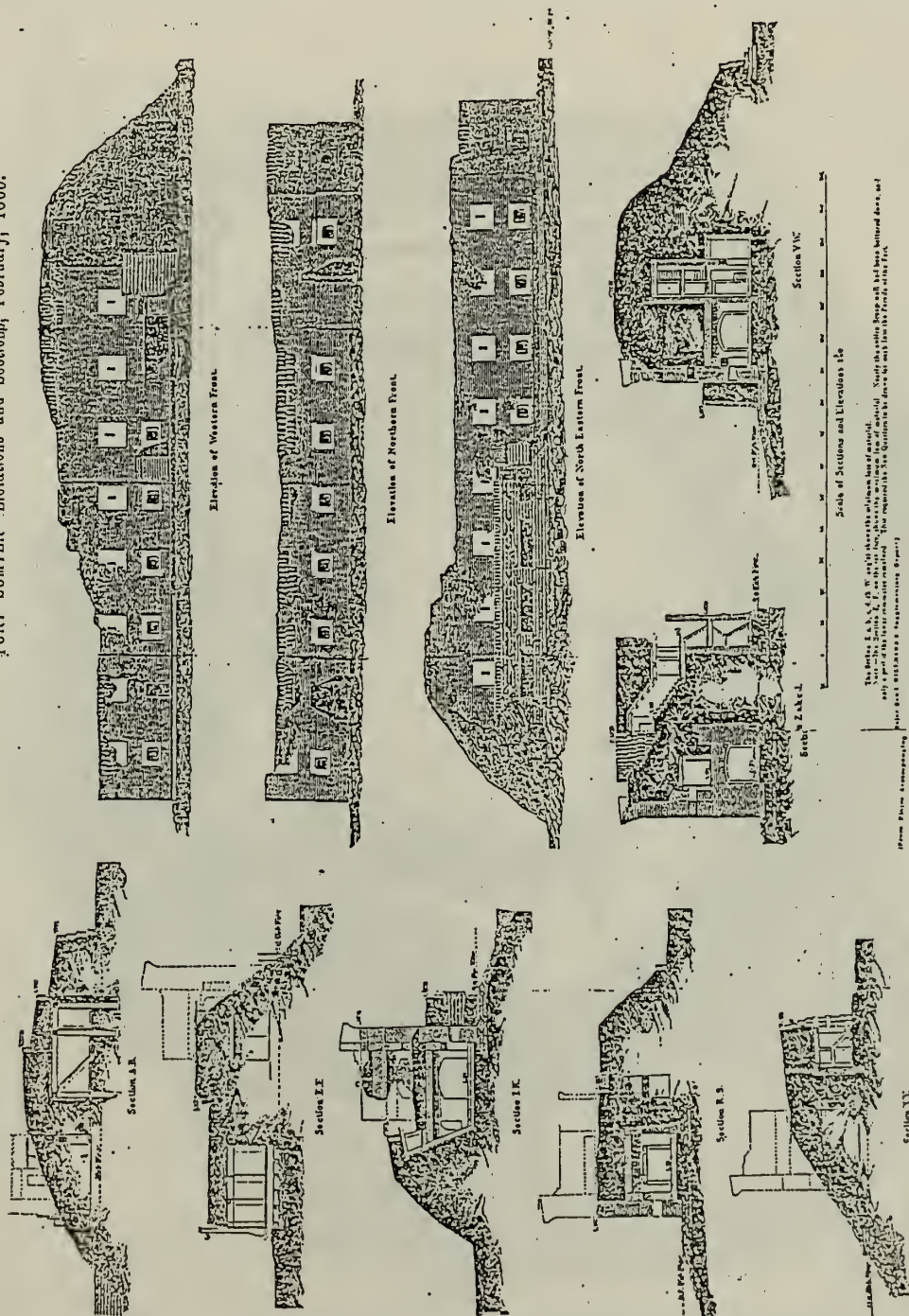


Fig. 2. Elevations and Sections of Fort showing sustained damage by Federal bombardment.

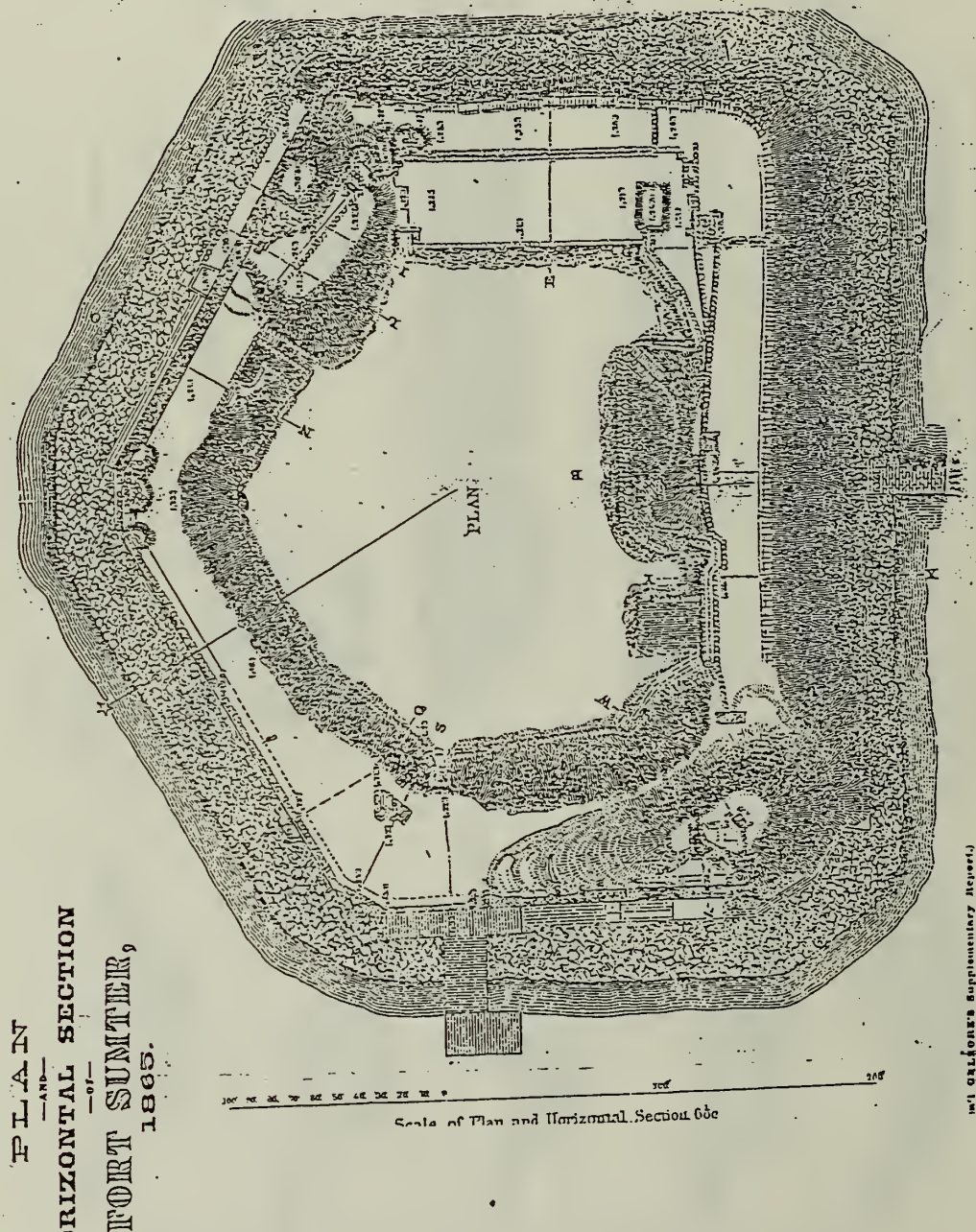


Fig. 3. Plan of Fort at Parade Level showing sustained damage by Federal bombardment

PLAN
—AND—
—OF—
HORIZONTAL SECTION
FORT SUMTER,
1865.

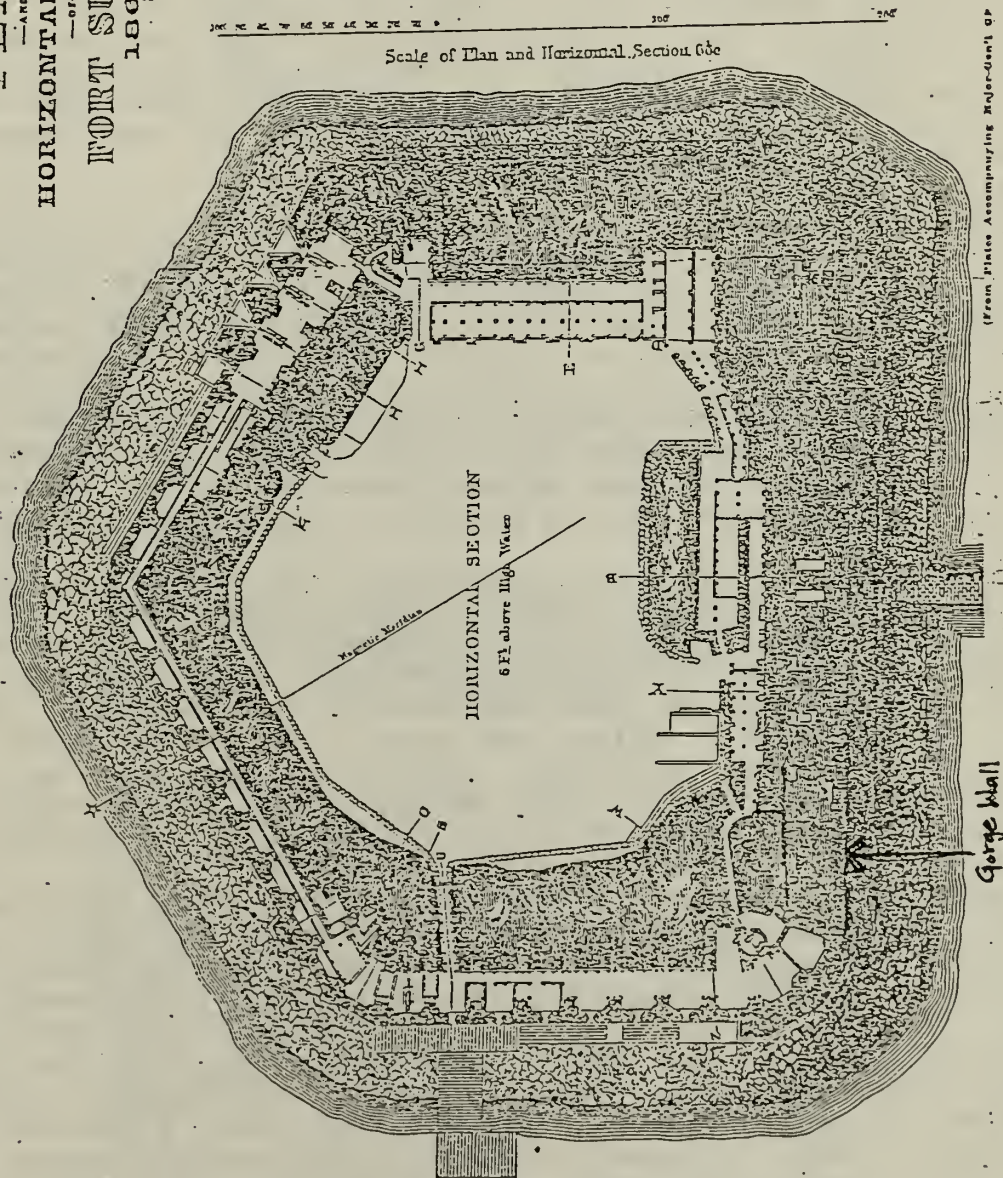


Fig. 4. Plan of Fort at approximate Second Tier Level, showing sustained damage by Federal bombardment.

6.2 Work continued on reconstruction in 1870-1877.

A. The Report of Operations for the reconstruction era has aided in the history of Sumter's condition, destruction, dismantling and reconstruction. These reports detail where and when work was performed. While very specific in what section work was being performed and the quantity of material out-laid, these reports were general and vague as the exact area and type of work was performed.

1. Report of Operations also tell more in-depth the nature of damage sustained and work required to improve the areas. They also tell the type of material used and the reuse of existing materials in the reconstruction. This reuse of material is still evident in the fort today, as well as the use of new material. For example, the older brick that was taken down from the remaining second tier casemates and reduced scarp walls was cleaned to be reused or was broken up for concrete.²⁸
2. It is apparent though that new brick was used in the reconstruction. This is most notable in the new sallyport (NW face) and the scarp walls on the NW, SW, SE, NE, and N walls. This new brick work also meant that new mortar was installed in the joints. References were made in the Operations reports regarding repairs to scarp walls. The scarp walls also received new brick coping in preparation of a new artificial stone coping.²⁹
3. The Report of Operations also detail what arches and casemates were repaired and which were dismantled. The casemates on the Southeast wall (Right Flank) and the North Wall (Left Face) were too badly damaged to be retained. The North face units had their embrasures sealed, but were relatively intact. Iron traverses, pintles, pintle sleeves, embrasure concrete, bluestone were left in-place; however, the casemate arches were destroyed upon the discovery that they were shattered beyond repair. The arches in the Right Face and Left Flank were retained but substantially rebuilt to accommodate Gillmore's fortification design. Corps of Engineers' reports

of operations detail where work progressed in the casemate areas. The rebuilt casemates and parapet walls were topped with a concrete (stucco) and asphalt admixture to seal the casemates, both on the top and on the new rear retaining walls. After preparation they were back-filled with sand and built up to create an earthen revetment.³⁰ Remnants of this admixture can be seen today on all the casemates. Upon rebuilding the scarp wall coping they were finished out with the artificial stone coping, anchored in place by a lead sleeve set into the brick wall and into the "stone."

- 6.3 By 1877 the Gillmore plan was complete, but lacked the necessary armament, carriages, chassis or traverses to finish out the fort.
- 6.4 No money was appropriated for FY 1878. From this point a Fort Keeper and/or a light house keeper was in charge of the fort.

7. FORT SUMTER 1899

- 7.1 Preliminary studies were performed to see if the rock mole could support an Endicott Board Battery. These initial studies performed in 1895 indicated that the mole and sand were too unstable to support such a massive load.
- 7.2 Spring of 1898 showed that war with Spain was inevitable. With this awareness the War Department took actions to enhance and strengthen major coastal and shoreline defenses. Within the Charleston, South Carolina area the following fortifications were constructed: Batteries Huger, Thompson, Logan, Gatson, Capron and Butler. These are referred to as Endicott Batteries through the construction efforts of the Endicott Board, set up in 1885. The board was charged with the responsibility for the "restoration of coastal fortifications." The shore forts and batteries were "hurriedly improvised measures taken ... to protect Atlantic ports from ... the Spanish Fleet."³¹

A. Of these Spanish-American batteries, Huger was constructed within the middle of Fort Sumter. The battery was cast-in-place concrete approximately three

feet to five feet thick through the supporting walls, but was thicker to the northeast, southeast, and south faces. Thicknesses varied through the roof of the structure depending upon the battery usage. That is, through the northwest side (walkway location) the concrete was three feet thick while above the powder magazine it is about twelve feet thick.

- B. To support this massive load an alternate foundation system needed to be found other than a pile footing structure. Soundings and tests performed in the parade ground determined that conventional pile footers would not support the battery's weight. Instead, Huger was floated upon a series of I-Beams laid in a cross grid pattern, then held in place by poured concrete.³²
- C. The rebuilt casemates on the Right Face were sealed at the embrasure first, then holes were drilled through the tops of the casemates. The cannons, carriages, and chassis were buried by pouring in sand through the holes. However, only the first five (beginning at the Salient Angle) were completely buried. The sixth was partially buried and the other two were not filled. This is evidenced by the concrete patches in the arch roofs. The Left face casemates were left intact.

8. THE FORT FROM 1900-1945

8.1 Changes

- A. 1900-1902 exhibited the finishing-out of Huger. This included building and cutting down scarp walls and removal of earthen revetments to accommodate the firing of the two new guns. This resulted in the loss of the artificial stone existing around the perimeter of the Right Flank and Left Face coping. Towards the front of Battery Huger, the remaining cannon found at Sumter were moved and buried.
- B. Previous storms had showed that the earthen revetments were unstable, especially to the seaward side. To prevent erosion of the new fill in front of the battery, a concrete "slope" (a concrete cap with minimal slope) was constructed along with the building up of the scarp wall. Stretching twenty (20) feet

towards the battery, this was installed in 1902.

C. Between the Endicott Battery period and World War I, the fort went through minor changes. Under the watchful eye of an Ordinance Sergeant, it was reactivated in 1917 when war in Europe was eminent.

1. The changes that occurred to the fort are detailed in the Chronological Time Frame Section. Most changes were still carried out by the Army Corps of Engineers until 1931 when Fort Sumter was officially transferred to the Army's Harbor Post Command. After possession, the Post Command made some changes to the interior casemate floors along the Left Flank side. Other alterations included the addition of the parapet wall on the Left Face scarp wall at two points: first, at the angle of the Left Shoulder down to the Left Flank angle and, second, at the Salient Angle into a portion of the Left Flank wall.
2. From 1917 to 1940 the fort was manned by a small garrison. Rearmament of Battery Huger occurred in this time with two distinct periods. The first change-out occurred in 1917 with the replacement of the Endicott guns with more advanced weaponry. The second period replaced the "advanced weaponry" with World War II gun emplacements.
3. Other work that has been discovered in current in-house files include numerous estimates for repointing the brick at Fort Sumter. Some of this work was carried out while other proposals were not appropriated.

THE FORT FROM 1947 TO PRESENT

9. National Park Service Occupation

9.1 Transfer to the National Park Service

- A. In 1947 the Department of Defense, through the War Assets Administration Board, officially transferred Fort Sumter to the National Park Service. Initially the Park Service, under its General Policy Statement, set the period of interpretation to a time of 1860 to

1865. This period would not have recognized the changes that occurred in the 1868-78 period, the 1898 increased fortifications, nor the influence of World War II. World War II now has gained significance historically and architecturally.

B. The Park Service desired to know what existed in the fort from the time period of 1820-1865. They initiated an archaeological study in the existing parade ground level (at this time six (6) feet above present level) to the West of Battery Huger. This entailed dismantling of the c. 1890s light house keeper's residence and the c. 1920s barrack housing and latrine.

C. Some archaeological excavations were performed in 1951, but the major excavation was performed in 1959. This dig led to the discovery of the "intact casemates" on the Right Face and Left Flank and the demolished casemates on the Left Face. It is theorized that casemate remains may exist on the Right Flank and some remains of the officers' housing along the unexcavated gorge wall.

10. Findings for 1992 Historic Structure Assessment Report

10.1 "Intact Casemates"

The quotes were placed around the "intact casemates" clause above because it is known that major work was performed on the Right Face and Left Flank casemates by Major Gillmore's Engineers. This work is viewed in the Chronological Time Frame Section and is broken down by the sections the engineers worked upon.

A. This made the fort an entirely new structure from the 1870s, but adds dimension in the discerning of construction times, historic construction periods, and historical architecture.

1. While it is known that the right and left casemates were reconstructed and repointed, the left face casemates were largely left untouched by Gillmore.

2. The casemates retain a high caliber of intact construction techniques and material. All iron

traverse rails are original 1840-60 pieces. The rails were laid in sections, two to the inner traverse and three pieces for the outer traverse. They were fastened into place by a brass screw approximately 1" in diameter by 2½ to 3" in length. then a cap was placed over the screw to provide a smooth even surface for the traverse wheels.

3. The embrasure sandstone was covered with the concrete similar to the exterior coating. The coatings have since eroded away and the sandstone is now under severe duress from natural sandblasting. In casemate ---LFC-6, right of the cistern at ---LFC-5, the sandstone was exploded off from the bombardment. It exposed the crushed brick aggregate concrete and the iron pin that held the four part sandstone embrasure cover in place.
 - a. Within these same embrasures a coloration was noted on the concrete coating in the ceiling. This same color has been verified on the interior and exterior and in some joints of the stucco. Having a red oxide tint to it, it is considered to be the original colors of all embrasures that pre-date the Gillmore remodelings. When embrasures are repaired, this color should be matched and incorporated in the new stucco coating.³³
4. In casemate ---LFC-7, the remains of an iron handle is imbedded in the brick of the closed embrasure. This piece may be part of the stone shutter system for closing the lower tier embrasures. An iron receiver has been located on exterior embrasures of the Left Flank as have iron loops on the embrasure interiors; same face.
5. All flagstone and granite blocks (for traverse rails) are original. This is true not only on the Left Face but also the Right Face. These features existed also in the Left Face until removed in 1931. The area behind the flagstone or granite block was replaced with brick dry-laid and set into a sand bed prior to being back-filled with the sand and earthen revetment.
 - a. In the water at low tide, numerous granite

blocks have been found. These blocks differ from the imbedded blocks and are probably the raised blocks for the "en barbette" gun mounts.

- b. Also in the water were located quarter section square granite blocks with quarter circles cut out of them. These are probably pintle sleeve blocks for the "en barbette" guns.³⁴
 - c. The guns mounted on the barbette tier were of two types based upon the physical and photographic evidence. The two types were the center pintle mount and the forward pintle mount.
6. The flagstone in the Left Face casemates have suffered from severe duress. They appeared to have been damaged from shelling, but sand pressure on already fractured stone will further shatter rock. There is fracturing of the flagstone from settlement of the casemate floors. This is most evident in the Right Face casemates. These casemates also retain the granite paving blocks used on the second tier casemates.

10.2 Other Findings of Original Construction Material

- A. Circular stair towers located at the corners of the angles reveal original stone steps and/or landings still exist in the circular walls.
1. Although sheared and splintered off during the Gillmore reconstruction, they reveal original construction techniques and patterns. One intact stair tread was located in the water outside of the gorge area.
 2. No trace has yet been found of the iron stair referred to Frank Barnes Historic Structure Report. This iron stair evidently refers to the iron column and tread lips for construction of the stairs. The stair steps were part of the circular brick wall structure, set into niches in the wall and tied to the center column.
 3. The most intact of the original stair landings appear in two places. First, at ---LGA-1, or, at the angle between the officers' and enlisted mens' barracks. Second, at ---RSA-1, or at juncture between the Right Face and Right Flank.

- a. Both of these stair towers retain original features although both were modified during the Gillmore Reconstruction.
 - b. The first stair tower retains not only the main landing, but also the first stair tread of the circular stair. The second stair was modified in the 1870s with the addition of walls and an elevation change at the rear, making it even with the new Gillmore casemate passageway access.
- B. Reference was made in the original Historic Structure Report about earthen downspouts being placed in the recesses between the piers. These earthenware conduit pipes drained the third and second tiers. These earthenware pipes were visible in historic photographs. The pictures were taken soon after the fort was occupied by Confederate troops in 1861.³⁵

11. Mortar Joints and Masonry

11.1 Interior

- A. The repaired casemates vary in terms of repair. In some places it encompassed completely new brick within the casemate arches, piers and/or outer piers or just required repointing with new Portland Cement. The Gillmore repointing is evidenced by pronounced, articulated joints. Remnants of these joints can be seen most vividly in the sallyport casemate arch ceiling, and in selected arches on the Right Flank.
- B. Original flush joints of the 1845-1860 period were extremely hard to find but are located at the baseline level of the casemates. The casemates on the left face exhibit the best of this period for, again, no record was found for major work on this face other than the dismantling of casemate arches, piers, and reinforcing piers.

11.2 Exterior

- A. On the exterior face of the scarp wall the brick masonry has three distinct time periods of construction. The lower level (construed to be from

top of embrasure edge to the foundation, but can vary) is from the 1845-1860 era. Above this arbitrary line is the Gillmore reconstruction, rebuilding, repointing; however, most of the masonry has been repointed previously.

11.3 Gorge wall, eastern half

- A. This wall exhibits the most major change dating from the Post-Gillmore modifications. The wall appears to have two reconstructions and additions from Battery Huger. The area considered to be the front of Huger had the earthen revetment removed necessitating the removal of the artificial stone coping and the building up of the wall to protect Huger.
- B. The May Report of 1902 details the use of stone for concrete to close the opening in the South wall. This concrete is still visible today, but shifting out; probably from the earth shifting behind it. The brick wall to the front was also constructed at this time period of 1902, but could feasibly date to 1930. The latter date is arrived at due to the consistency of the brick masonry. The wall was built up to a new elevation at the same time as the wall construction on the Right Flank was brought up to its new elevation.

12. Copings

- 12.1 Very little of the Gillmore "Artificial Stone" copings exist today. What remains is in a very serious state of deterioration. It remains on the Right Face but has been shifted out of position. One block was completely blown off onto its top by Hurricane Hugo. The stones on the Left Flank, Left Gorge Angle and Left Shoulder Angle retain the most intact configuration. Evidence of previous inappropriate repairs show an effort to preserve and stabilize these elements, but they are under effects of spalling, severe wind erosion, and loss of adhesion.
- 12.2 All other copings occurred during the Huger reconstruction or Post-construction era. The time frame extends from 1900 to the 1930s.

ENDNOTES

1. Fort Sumter Historic Structure Reports: 1829-1899, "Fort Sumter: Chronological Construction History With Architectural Detail," p.3.

2. Ibid., p. 4-5. Some of the information contained within the first Historic Structure Report (HSR) is restated within this document. However, this project is not designed to be a restatement of previous studies. Not all facts and figures will be generated in this report. If readers desire more concrete figures and construction documentation they are referred to the original bound volumes of the HSRs contained in the Fort Sumter Library.

3. Ibid., p. 6. The Nullification Act was South Carolina's answer to any legislation passed by the Federal Government that the state did not wish to abide by; if they (the state) felt that it countermanded or effected state legislation, they would just nullify the law.

4. Ibid., p 7.

5. Ibid., p 8.

6. Ibid., p 9. Again, for more detailed information on the fort and its foundation problems, readers are referred to the original HSR and especially endnote number 46. The chronological construction section details this information besides recording it in the endnotes.

7. Sheet 74, Drawer 66 (Engr. Dept., 21 Jan 1855), and Sheet 63, Drawer 66 (Engr. Dept., 21 Jan 1855).

8. Sheet 48, Drawer 66 (Engr. Dept., 13 Aug 1851).

9. This supposition is substantiated by rules of military life. That is, officers receive special treatment before enlisted men. Going on this hypothesis and with officers having families at the fort, it is probable that their quarters were completed first for immediate occupation. A reveal is an area of wall between the window or doorway and the outer surface of the interior wall.

10. The War of the Rebellion: Official Records of the Union and Confederate Armies, Series 1, Vol. 1, Part 1. Washington: Government Printing Office, 1880. p. 3

11. Ibid., p 13.

12. Ibid., pp 20-21.

13. Ibid., p 22

14. Ibid. pp 22-23.

15. Ibid., pp 252-253.

16. The War of the Rebellion: Official Records of the Union and Confederate Armies, Series I, Vol 28, Part 1. Washington: Government Printing Office, 1890. p. 122. Chemise, according to Webster's New International Dictionary, is defined as "a lining, or secondary wall, as of an earthwork, or of an outer wall."

17. Ibid., 81-84.

18. Ibid., p 84.

19. Ibid., pp 724-725. It is interesting to note that the Federal correspondence showed disharmony between Army and Navy in regards as to who was to lead the invading party.

20. Ibid., p. 77.

21. Ibid., p. 594.

22. John Johnson, The Defense of Charleston Harbor, Including the Fort Sumter and the Adjacent Islands: 1863-1865, pp 193-195. U. S. Department of the Interior, Fort Sumter: Anvil of War, Washington: Division of Publications, National Park Service, n.d., pp 47-49.

23. General Sherman after completing his March to the Sea, had by this time reached Savannah and was about to turn Northwest to Columbia, slicing through the remains Hood's Army of Tennessee.

24. War of the Rebellion: Series I, Vol. 28, Part II., p. 34.

25. Fort Sumter Photographic Collection, Folder 10, 1865. National Archives Record Center, Corps of Engineers Records, Report of Operations, March 1873. Hereinafter cited as NARC. These records have proved invaluable to ascertain what was repaired, demolished and replaced in the reconstruction.

26. War of the Rebellion, Series I, Vol. 28, Part 1, General Reports, Report of General G. T. Beauregard, p.81. On the 8th of Sept., 1863, "Instructions were given to the chief engineer to expedite the putting up in Fort Sumter of the sand-bag chemise [sic] to the gorge wall, the interior traverses, merlons, embrasures." NARC, Inspection report, Maj. Q. A. Gillmore to Brig. Gen. A. A. Humpherys, August 1, 1868. It is interesting to note that this inspection did not and could not review the casemates and entire facades to the debris and sandbagging of the interior.

27. Sheet 88, Drawer 66 (Engineer's Office), August 1, 1868. Plans and Sections, Fort Sumter, SC by Q. A. Gillmore. Readers are again referred to the original Historic Structure Reports for a complete chronology of Gillmore's redesign, changes, and appropriations given for the coastal fortification.

28. NARC, Corps of Engineer's Reports of Operations, 1868-1878. Readers are referred to these reports for exact chronology of operations undertaken on and in the Fort. Examples of original brick cleaned and broken up for concrete aggregate can be seen in the Right Face, parapet level. Here, the cleaned brick was crushed and used as an aggregate binder for the concrete. The concrete was used to even the top level prior to backfilling the casemates and construction of the earthen revetment. The same crushed brick can be seen in concrete debris (located in the water at low tide) on the southwestern face. The debris are remnants of the tunnel system constructed by Gillmore to access the buried casemates.

29. NARC, Corps of Eng'r's Report of Operations, March, 1873, Northeast wall had 90 LF by 1 foot Scarp wall built. Report of Operations, July 13, 1874, Scarp wall face repaired and raised to receive artificial stone coping. The artificial stone was nothing more than Rosendale Cement, Water, and sand mixed together to form a concrete stone.

30. Although the records state the southeast wall (Right Flank) had all casemates removed and the wall rebuilt, it is believed that remnants still exist under the earthen fill. Supporting this documentation is a brick wall that exposed on the surface in the area to the right and in front of Huger. Test

probes on the wall show that it exists from the batter edge to Right Flank parapet and is approximately three (3) wythes thick. A wythe is one brick course to the end course side.

31. Maurice Matloff, ed. Army Historical Series: American Military History. Washington: Government Printing Office, 1969, reprint 1973. p. 294. A preliminary study by the Army Corps of Engineers on Huger's underpinning estimated the total weight at 40,000 tons.

32. Letter from Captain Abbott to Brig.-Gen. W. P. Craighill, September 9, 1895, Records of the War Department, Office of the Chief of Engineers, National Archives and Records Administration.

33. The red color has been found in many embrasure coatings. When viewed under fluorescent light it irradiates an earthen tone similar to the brick clay. This same red color has been found in the embrasures at Fort Pulaski, Georgia, indicating that this was a standard military construction practice; however, more investigation should be done into this area. This investigation should include the color content for proper restoration (if and when needed), the reasoning behind the coloring, and any associated military specifications.

34. The same square granite blocks were located in the "en barbette" guns at Fort Pulaski. The blocks at Pulaski differ because they are one piece not four sections as Sumter's.

35. William C. Davis, ed., Shadows of the Storm: The Images of War: Volume I: 1861-1865, New York, Doubleday and Co., 1981, p 112. The photographs clearly show the recess in the outer piers with the earthenware or terra cotta pipes fitted within the recesses. Although terra cotta drain pipes are visible today in numerous recesses around the fort, they are replacement features from the 1870s. The only original terra cotta (TC) pipe system found was in the stair tower located at the Southwest magazine. It is known that this is the original TC because the brick retaining rings evident in this downspout recess are missing in all others today.

*CHRONOLOGICAL TIME FRAME--FORT SUMTER
CONSTRUCTION AND PRESERVATION*

I. CONSTRUCTION--1820-1861

1826--Final soundings prove feasibility of Fort Sumter construction on mid-channel shoal.¹

1828--Lt. Henry Brewerton named as engineer-in-charge of fort's construction.

1829--New York quarrier awarded contract for stone (Mole and Foundation).

1830--Mid-year--only 1,000 tons of stones had been quarried and sent to Fort Sumter.

1831--only 7,000 tons added to existing pile. Chief Engineer Charles Gratiot asked for rescinding of present contract and Fort Sumter engineer allowed to contract on his own. Permission granted.

1832--22,000 tons laid.

1833--16,500 tons laid.

1834--two revisions to foundation plans. Winter-- Capt. W. A. Eliason named as Engineer. Requested that palmetto grillage underpinning be revised to stone and masonry underpinnings. Summer--1834--Lt. T. S. Brown named as Engineer, revised foundation plan to a split granite construction from low water to high water level.² Main piers of superstructure would rest on triangular bases of dry granite.

Fall 1834--Litigation on who owns Sumter shoal. First, private citizen says state deeded all shoal lands to him. Second, state questions by what authority the feds have to take state land for fortification purposes. Court decision in Fort's favor in December of 1837. State had already agreed to grant shoal to Federal Government.

1841-1845--Foundation work resumed and completed. Wharf design

rejected. Changed to stone dock extending 140' from esplanade and rising 5' above ordinary high water. The wharf allowed uninterrupted disembarking of supplies and, along with construction of rear wall, facilitated faster completion of mole (prevented flooding of mole by high tide).

1842-1845--basic stone foundation completed

1845-1860--construction of fort by sections. This is noted partially in the following sections:

A. CONSTRUCTION DETAILS OF FORT: 1840-1860

1. Middle Casemate--Flank

Three parts: scarp wall, adjoining inner pier, and outer or rear pier. Scarp=7' thick wall rammed-filled with concrete surrounded by brick shell of "well-burned" and sound brick. Inner pier= 2'-6"x 5'-0"; Outer pier= 7'-0"x 5'-0". Main or communication arches with span of 12'-6" curved between two piers skewbacks received the imposts. Platform arches (supporting 2nd floor) curved laterally from the main casemate main arches spanning a distance of 15'-6"; recess arch of 1'-6" x 2'-6" of 14' span was turned in front of the embrasure. Smaller recess arches 1'-8" x 1'-8" x 6" were to the right and left, topped by small arches (8" x 6").³

2. Embrasure

Unit construction--formed by four molded concrete blocks fitted into 8' x 6' space; oblong opening w/long axis perpendicular to floor (41" x 22") narrower opening obtained by "flaring cheeks" with a gun elevation 10°. Cast-iron rimmed edge to prevent damage from muzzle blast. Interior of embrasure lined with red free-stone set 15" into concrete, secured by iron clamps. 6½" diameter opening in embrasure sill lined with ¾" cast-iron sheath received 32" length by 4" diameter pintle, extending down through two sets of granite blocks to withstand violent recoils.

Gun mounts consisted of two iron racers set in 6" rectangular granite blocks. Blocks were set into 18" x 18" concrete footings on lower tier--second tier; blocks set into brick platform arch. Drainage of casemates was to rear with slope of 1".

3. Middle Casemate--Face

Differs from flank casemates in only two points. First, lower tier was lined on the parade side by 3' passageway formed by half-arches turned from the outer main piers; 3' square. Second, vertical embrasure dimension 9" less than flank embrasure dimension. Long axis opening was 32" (compared to 41") allowing gun declination of 5°, ample range for covering the narrow channel.

All other construction specifications remain the same.

Concrete composed of oyster lime binders, oyster shells for "gravel fill, and cement.

Brick is of the "best Carolina grey," well burned for strength. Brick contains high level of iron conferring another definition as "iron spot brick."

Original terreplein level was curved and sloped to the parade for water drainage, topped with concrete to provide seat for iron racers of the barbette guns.

II. CONFEDERATE OCCUPATION-1861-1865

1861--Upon occupying Fort Sumter the Confederates set about cleaning up debris and stabilizing damaged areas. Major damage occurred to officer's quarters and magazines within fort's perimeter. On the exterior, major damage was to the gorge wall, although damage did occur to other portions of the scarp wall. The gates of the sallyport were destroyed as was the left gorge magazine and stair tower. The right gorge stair and magazine were partially destroyed. This destruction occurred by stored grenades exploding in the magazines.⁴

Additional steps were implemented to finish and to restore the fort to its original design. On the second tier the open embrasure spaces were completed with the elongated rectangular opening as seen in the historic photographs. Three casemates at the salient angle were completed and armed (unknown if this is first or second tier). Additionally, the confederates instituted changes to reinforce the original plan. Quoting from John Johnson's book The Defense of Charleston Harbor, Including Fort Sumter and the Adjacent Islands: 1863-1865, the following was constructed:

A large traverse of concrete cased with brick was built at

the eastern angle of the ramparts to protect the barbette guns of the right face ... The magazines, at the eastern and western extremities of the gorge, were strengthened by an exterior work of stone masonry, buttressing or reinforcing the gorge-wall [sic] at each locality to a height of about fifteen feet. ... The brick barracks for soldiers' quarters on the ... eastern and western [flanks] were rebuilt, but with reduced height. So, in part, were the officers' quarters on the gorge.⁵

At the same time as the above changes were occurring, the Confederates added "modern" conveniences. This included a shoe-factory [sic], gas-works (lighting), a bakery, a forger, a salt-to-fresh water conversion machine, and a fire-engine.⁶ Within the parade ground the hot-shot furnaces were restored.

1862-1863--Little information was discovered on fortification improvements, in terms of construction, undertaken by the Confederates. However, estimating time frames of construction based on the above paragraphs, it is entirely feasible that construction/reconstruction and additions spanned a two year period.

1863

7 April--First attack by ironclad squadron, repulsed, but damaging to fort. Eleven inch shot to the "massive walls, piers, and arches seemed to tremble to their foundations," but the fort did not lose "its fighting capacity or ... efficiency."⁷

20 July--work of filling up officers' quarters on with wet cotton-bales [sic] laid in sand; cutting of new sallyport in left flank.

4-8 August--filling of upper and lower rooms of gorge; Sandbagging of gorge wall by Confederates "to reinforce exterior of gorge" in preparation on impending attack.⁸ There was some fortification of casemates at this time to prevent breaching. This is noted by the following excerpt:

The casemates on the eastern face were still filled with sand, and gave some protection to the garrison from shells.⁹

The confederates, especially during lulls in the bombardment, reinforced the casemates and scarp walls with corn cob and cotton cribbing. However, the major reinforcement was through

the cascading debris falling into the casemates and on the exterior of the scarp walls. The damage to the fort by Federal bombardment was devastating. By September 3, 1863, the Confederates noted the following damage:

The northeast and northwest *terre-pleins* [sic] had fallen in, and the western wall had a crack entirely through, from parapet to berme. The greater portion of the southern wall was down, the upper east magazine penetrated, and the lower east magazine wall cracked. The eastern wall itself nearly shot away, and large portions down, ramparts gone, and nearly every casemate breached.¹⁰

11 December--A lull in bombardment occurred. The Confederates were taking advantage of this lull by restocking on supplies from the on-site Commissary Store. This store was located next to the spiral stair in the Southwestern angle (Gorge angle) and adjacent to a Powder Magazine. At quarter past nine in the morning this magazine blew up probably from a hot spark, but it is unknown what exactly caused the explosion. It is known that no fire came from the Federal cannons until after the explosion became evident. The ensuing fire within the fort caused cracking and adhesion loss in the mortar and cracked the bricks in the stair tower and magazine. The inner magazine chamber arch had collapsed filling the area with gorge wall debris, while the arch of the commissary room was now "hanging [in a] most precarious condition."¹¹ Within the casemates that fire burned through, the sandbag protection was replaced with planks and timber.

1864-65

Confederates still occupying fort, repairing where needed and sandbagging/cribbing to prevent collapse. Casemates on Northeast face (Right Flank) had temporary barracks for soldiers constructed in front of the debris. These barracks were sided in heavy timber and extended out into the parade ground. To the parade side were chimneys constructed of reused Sumter bricks.¹²

It is believed that the mass of curved brick located in the officer's barracks area [to left of magazine (facing gorge wall)] was constructed by the confederates; however, it is possible that this piece was constructed as part of the Gillmore Reconstruction.¹³

III. GILLMORE RECONSTRUCTION-1868-1878¹⁴

1868--Inspection report performed on Sumter. Written by Maj. Gen. Q. A. Gillmore to Brig. Gen. A. A. Humpherys. Went around fort listing portions by Cardinal direction as follows: Gorge Wall=South, Right Flank=Southeast or (East), Right Face=Northeast, Left Face=North, Left Flank=Northwest (or West). This report detailed damage as follows:

Gorge east of the sally port to junction of SE Face destroyed from foundation to within 18" of foundation. SE face destroyed scarp wall to foundation. NE face, nearly all casemates and embrasures will have to be rebuilt to restore original design. N face, Injured by reverse fire. Half of these casemates may be saved. NW face, no damage could be seen; 120 LF remained to the terreplein height and 90 LF remained of the second tier casemates. Gorge west of the sally port, most of the debris and washed away by the rain, wind, and sea. The wall was intact from the second story loopholes down. At the angle between the NE and N face the casemates remained to the second tier with graduations down to the SE/NE angle. Interesting was the comment of barracking the men in the casemates.¹⁵

27 Aug.--Estimate submitted by Gillmore for reconstruction. It included Stone masonry, Brick masonry with the bricks to be taken from the existing walls and arches. The total for the entire project including the modifications proposed by him was \$546,749.00.

1870--17 Jan--Gillmore sent overseas to investigate & report on "Beton Coiznet," a french method of making concrete using gravel in a mortar mixture of cement and sand.

29 Mar--Captain of Engineers Ludlow to Gillmore stating the gorge debris must be removed before any work can occur.

1871--Estimate for Sumter as proposed to Board of Engineers of Fortifications. The estimate was approved with construction beginning soon after.

1872--27 Feb--Gillmore to Humpherys: "do not believe it probable that any casemate room can be secured on SE face ... without building new piers or arches. A portion of the main sally-port [sic] arch remains standing."

4 Mar--Ludlow believed that more parade piers on NE are

shattered or gone.

5 Mar--Gorge and SE Faces Engineers removed debris, discovered "shattered portions and broken casemates in rear."¹⁶ NE face debris on 2nd floor tier removed, two 2nd tier cases remained as support for lighthouse. NE casemate, adjoining the one on the most Northerly was partially cleared with the following discoveries: sand bed was unsound, the parade pier was shot away and replaced with timber. Probable work to be done; E and SE angle to receive partial scarp wall construction, NE faces to be cleaned out and remove NW scarp wall to 22' elevation

23 Mar--Ludlow to Gillmore: Is the scarp wall construction to be concrete with brick facing? Facing done could be done at same time as concrete construction.¹⁷

31 Mar--hopes to begin construction on the gorge and SE scarp walls but adds:

If you think it proper I will go to work at once on the N face ... the arches must be examined, ... if ... shattered the parapet will not be secure. It would [be] better work to [remove] the arches ... and fill the casemates with sand.¹⁸

9 May--Report of Operations--Terreplein positions #4-5 prepared on North Face (i.e., the North casemates had been back filled with sand and earth after removing the shattered arches); 87,000 brick laid & 53,000 brick cleaned (reusing of old brick).

11 Jun--Terreplein barbette gun mounts started on N face. Excavation of material on SE & East gorge complete except for a portion of the circular stair & two piers.

13 Jun--Proposed Sallyport change to present location. Proposal by submitted Ludlow to Gillmore.

25 Oct--Gillmore submits plan for NW & NE casemate rebuilding and Ludlow's changing of Sallyport to NW face (5 months after Ludlow proposed it).

Report of Operations--Gorge (east half) and SE face (flank wall) reconstructed, they only need coping. Broken arches in the rear of SE face removed and the site leveled and a new service magazine was constructed in the angle (gorge/Right Flank)

NE casemates--cleaned out sand, uncovered top and rear for rebuilding. Second tier casemates removed and scarp wall taken down to the recess arch level.

N Face (Left Face)--Middle casemates uncovered, scarp wall cut

down to elevation 18' [Ludlow wishes to construct service magazine on the N. Face.] New "en barbette" gun mounts prepared.

Report of Operations--Dec 1872--D. P. Heap has replaced Ludlow as Capt. of Engineers at Fort Sumter. 2800 cubic yards (CY) of earth removed from NE face to parapet of SE face.

NE--Flagging from NE casemates (2nd tier) removed, finish removing soil from NE Casemates, begin foundations of easterly 3 casemates retaining walls. Repair casemate piers and clean top of casemate arches prior to strengthening with new brick

1873--Report of Operations--January--Stone stairway removed in angle of NE & SE faces. Repairs continued on casemate piers and arches.

8 Jan--raised and removed flagging from NE Casemates (2nd tier)

4 Feb--remainder of flagging removed from NE Casemate tops; cut-out and removed concrete topping of NE casemates; cut-out and removed stairway steps. Rebuilt buttress, repaired piers of NE casemate faces and new arch turned over one of NE casemates; skewbacks cut-in piers for new retaining walls. Gorge wall: old sallyport torn down and removed.

Report of Operations--February--removed debris of old arches on North face and cut down scarp wall on N. Face. Continue rebuilding arches and piers NE casemates; remove debris from top of NW casemates arches and cut-down scarp wall on NW face.

Report of Operations--March

NE--90 LF by 1' of scarp wall built, 3 retaining walls built and strengthened and partially rebuilt 4 casemate arches.

N--removed 20 LF by 7' Deep scarp wall and one casemate arch

SE--Revetment construction: 84 LF x 7' H.

Gorge--Revetment construction: 21 LF x 9' H

N & NW--6 casemates had 740 cy sand & rubbish removed; on NW face 54 LF x 9' H and 120 LF x 15' H of scarp wall removed.

Probable work: continue removing old scarp wall from N, NW, and Gorge, continue filling N casemates with sand.

11 Apr--Gillmore to Humpheries:

With amount of destruction on North only Northeast and Northwest embrasures can be retained. North piers and arches removed and filled with sand. Two on North at the Northeast face are okay, they need strengthening by one brick course, otherwise demolish and fill with sand.¹⁹

Report of Operations--April

SE--Covered/graded 142 LF of parapet, 1' deep

Gorge--Covered/graded 57 LF of parapet, 1' deep

NE--Built 1 strengthening arch over casemate, finished building one retaining wall and finished 1 strengthening arch over casemate. Repaired scarp wall and 1 embrasure, built up scarp wall at angle between NE & SE faces, plastered 5/re-plastered 2 retaining walls.

N--tore down 1 casemate arch.

12 May--of two arches in N casemate found intact, the second was found to be substandard.

Report of Operations--May

NE--Completed Service magazine, plastered outside & partial inside, built 156 LF of scarp wall, tore down 24 cy of scarp wall at N-NE angle; dismantled and reerected at Gorge wall Ordinance Sergeant's Quarters.

N--20 cy of scarp wall torn down, removed earth from top of two casemate arches and, from inside one, tore down casemate arch, repaired all of scarp wall except embrasures.²⁰

Probable operations include: NE, wall brick coping construction; N, prepare face for brick coping; NW, Repair scarp wall, prepare face for brick coping.

Report of Operations--May (filed 2 Jun 73)

Made 128 blocks of Artificial Stone Coping.

Probable Operations: Continue making artificial stone for coping.

Report of Operations--June

N--pulled down and removed one casemate

NW--Pulled down and removed 3 casemate arches, cut out part of second tier embrasure to repair scarp wall.

Report of Operations--July

NE--built 4 and plastered 1 retaining walls, removed 200 cy of earth, bricks and concrete on NE, N, and NW face; removed 112 square yards (SY) of flagging. Cut out and removed old plaster beds. All of this was performed to construct strengthening arch.²¹ Ten casemates were strengthened with 12 retaining walls built.

N--Thirty-three cy of revetment placed; built and pointed brick scarp wall from the NE face to angle between N & NW face, pulled down and removed one arch. Three shattered casemate arches demolished.

NW--Three shattered casemate arches demolished. Finished 108 LF of Brick coping, repaired scarp wall breaks.²²

September--Hurricane struck Charleston, damage to

reconstruction is unknown due to sparse report to the War Department.

Report of Operations--November

N--Repairing scarp wall (probably rebuilding and repointing).

NE & SE Angle--Construction of scarp wall coping.

NE--repairing of inside casemate arches.

NW--building of retaining walls at casemates. Also the stone stairway and forming flag of stair were removed.

Probable Operations: begin repairs to NW casemates.

13 December--Original traverse irons replaced due to gun chassis difference. This is seen in remains of iron traverses in NE casemates.

26 December--A Mr. Gould is to "purchase necessary pipes for draining casemates, he is to select cast iron, galvanized iron or earthen pipes."²³

Report of Operations--December

NW--brick laid for communicating arch and pier repair.

NE--Repair of embrasures and repairing casemate floors with new flagging. N & NE embrasures repaired inside and out. Eight 100 pdr. Parrotts installed in NE casemates

Masonry work (734 cubic feet) as follows: N face scarp wall repair, scarp wall coping at NE and SE angle, repair of NE Casemate arches, NW face retaining wall.

1874

Report of Operations--February

Leaders from NE casemates to cistern installed, oyster shell covering spread over NE casemates, NW: rebuilt masonry of communication arches and retaining walls (new construction)

Probable Operations: continue NW repairs, open new sallyport entry through Northwest wall.

Report of Operations--March

NW--rebuilding and strengthening of casemates.

18 April--NE face new scarp wall construction.

Report of Operations--25 April

SE--Two masons building scarp wall, 2 laborers making artificial stone, 3 excavating for new sallyport, 2 cutting down old wall and piers on the NW face.

23 May--NW wall masonry embrasure repaired and construction of new sallyport proceeding.

30 May--Masonry laid for NW scarp wall face, Portland cement for coping of scarp wall expended, Artificial stone laid on South wall at the angle between NE and SE, and on NE wall.

13 June--Brick expended for filling around sallyport opening.

Report of Operations--13 July

NE--casemate arches strengthened with three at the N-NE angle strengthened, scarp wall face raised to design elevation, 30 LF from NE angle covered in concrete backing with drains and spouts put in, Face, scarp walls and embrasures repaired (repointed ?).

NW--four northerly casemates repaired and strengthened, scarp wall face repaired (repointed ?) and raised to receive artificial stone coping, 9 casemates readied for concreting and asphalt topping. Topped with artificial stone.

SE--pan coupe at Gorge wall and scarp wall topped with artificial stone.

Gorge--old sallyport bricked up.

1875

Report of Operations--Jan 1875

NW--new sallyport construction progressing

NE--coping of scarp wall continuing

concrete and asphalt coating of casemate roofs.

1876--Major work on casemates completed. Work is now concentrated on NW front. This entails back-filling of casemates and building of revetments and breast heights for "en barbette" guns.

1877--Final drawing dated June 1877, shows as-built construction of Fort Sumter.

1878--Report of Operations--June

This report makes mention of cracks in parados walls at the extremities of the NW front. This is construed to be the retaining walls placed in the rear of the casemates. These cracks possibly originated from the pressure of the sand and earth revetment placed behind and overtop of the casemates.²⁴ Cracks were also noted in the passageways to casemates on the NE front. Again, this points to the conclusion that undue pressure was placed upon the casemates from the finished revetment.

IV. FIELD REPORTS BETWEEN GILLMORE AND HUGER CONSTRUCTION

1883--Report of Operations--June 6

Casemate platforms for gun mounts nos. 1-8 are "old but serviceable." There are no traverse circles or cannon. Casemates 9-19 that contain the 100 pdr Parrotts, the iron carriage and chassis on permanent front pintle platforms, the 4" iron pintle is in need of cleaning and painting.

1885--24 September

Storm of Aug. 24-25 necessitated repairs. Mainly this meant cleaning sand out of casemates from water intrusion, i.e., flooding.

29 December--report notes cracks in arches of casemates where guns are mounted. The report continues in explanation that it is unknown when the cracks opened.

1887--Earthquake August 31, 1886.

Reports of damage to Sumter not noted until June 30, 1887. Most damage occurred to Ordinance Sergeant's House and sallyport cisterns. The latter having cracks in them. There is a reference to the "old cracks in the Fort walls have probably opened up a little." The most serious is Gun no. 1 in the passage to the parade level.

29 November--Sallyport casemate has cracks in arch, believed to be result of earthquake damage. Eleven casemates have several bad cracks and leak. The cement stuccoing is exfoliating from this moisture and is causing rusting of guns, traverses and chassis. The cracks in the NW casemate leak and have possibly opened. The iron postern door is "rusted away."

1891-1892

The second casemate from the pan coupe was designated as the torpedo mining room from an engineer's report that stated: "The brick are soft and rotten, with the arch only one foot thick at the crown and is badly cracked in two directions." The ensuing plan (and as constructed) showed the removal of the arch and the "unsound" piers and reinforcing of the scarp wall with four feet of concrete.

This showed the rebuilding of the northernmost casemate into a torpedo mining magazine. It was constructed of concrete and had an exterior opening through the existing embrasure (the embrasure opening being modified).

V. BATTERY HUGER CONSTRUCTION: 1895-1898, 1902-1905

1895

20 July--Study of Fort Sumter showed that the scarp walls had settled somewhat, but not very greatly for no cracks were seen on the exterior.

30 September--Preliminary studies for the building of Huger within Fort Sumter. The study evaluated the different methods of foundation footings. The total estimated weight of Huger was approximated at 40,000 tons. Material was to be Rosendale (natural) Cement where permissible and Portland Cement where extra strength and hardness was needed. Initial engineering studies explored piles with concentrated loads of 2,000 lbs per 4" diameter pipe pile. The test period showed that pilings could not work to support Huger.²⁵

1896-1899--Construction of Huger takes place.

1901--Grading of the southeast area in front of the battery with "the lower portion of the slope for about 20 feet ... covered with concrete ... 1 foot thick ... [to protect the revetment from] the wash of the waves during storms."²⁶

1902--Further construction commences on Fort Sumter. This appears to be finishing touches to Huger.

Jan. 1902--Old concrete and brick wall was cut down in the rear ... [and] removed to hole in front of battery ... [the] old guns will be placed in hole in front of battery.²⁷

Feb. 1902--About 120 LF of coping was cut from top of front wall and moved to rip-rap placement. In other words the artificial stone coping was removed because the wall needed to be built up to a higher elevation. The added wall height was needed for protecting Huger from incoming fire.

Mar 10, 1902--Cutting down of wall in front and the wall and magazine in rear. Covering up of guns and moving of old carriages. Repairing break in front wall and blasting down of old wall.²⁸

May Report--Progress of Work--Breaks in the exterior wall were cut out and rebuilt with brick and portland cement. The 15" and 200 Pdr. Parrott were buried and Breast Height walls blasted out (used for rip-rap). The old magazine was also

blasted out and used outside of walls for rip-rap. The old wall in the rear was cut down and the stone used for concrete to close the opening in the south wall (Gorge area). Raking and repointing of the outer wall continued. A break at the NE corner was grouted shut. This was near the SE Wall.

July Report--Request for funds to continue repointing of outer walls at Sumter.

1904--1500 bricks brought to Fort Sumter 750 to be used for the Fort, 750 to be used for the new latrine. 19 Aug--report issued on condensation problem within the casemates still accessible, i.e., able to enter.

1904-1906--No major work or reference to the fort, e.g. repointing, cracks, differential settlement, was noted in the files. The next file discovered was 1916.

VI. WORLD WAR I

1917--29 May--Proposal to prepare casemates for barracking of men.

4 Sep--small caretaking garrison posted to fort prior to activation in 1917. No major work or reports noted on the fort.

1918-1919--Two barracks buildings constructed on Fort Sumter parade ground.²⁹

1925--1918-19 Barracks buildings torn down Jan 31, 1925.

1930s--Original flagging and granite traverses were removed and replaced with concrete floor. This date is approximate based on photographic evidence.³⁰

1931--July--Harbor Defense Commanders took over repair and maintenance of Fort Sumter from U. S. District Engineers. It was found that Battery Huger's "increased weight had evidently caused the island to settle to such a degree that the base rings were seriously out of level."³¹

1932--Estimate of work for FY 1932: Repair outside masonry on old Fort \$475.00. Paint all outside masonry one coat of coal tar and Kerosene \$110.00³²

1933--Jan 9--estimate to point all walls \$4,627.00

1935--November 22--Estimate to point up all walls where needed,

inside and out of the old fort.

1937--November 23--Annual estimate: Estimate of pointing up all walls where needed, \$4981.00

1938--December 29--Request of \$1300.00 to point out brick walls at old Fort Sumter. Answered that no funds were available

1940--Replacement of stone breakwall at sea level

VII. WORLD WAR II

1941-1945--Unknown treatment of exterior and interior faces

1947--Army deactivates Forts Moultrie and Sumter, and associated Batteries.

VIII. TRANSFER OF FORT TO NATIONAL PARK SERVICE

1948--August--Transfer of Fort Sumter to National Park Service through War Assets Administration. First superintendent of Park arrives on site 31 Oct 1948.

IX. FORT SUMTER DEVELOPMENTS--1949-Present

1949-Jan 3--First report on future of Sumter. Stated that Moultrie and the later fortifications not part of interpretive time period. All interpretation about Civil War would be at Sumter for time period of 1860-65. Establishment of work program consisting of:

1. Removal of all barracks buildings and other structures not involved with Coast Guard.
2. Removal of piling, walk and tower on south side.
3. Repair break in west side seawall--water entry at high tide
4. New power cable to Sumter
5. Temporary restroom facilities
6. Archaeological investigation to begin
7. Open embrasures on West Face (bricked and closed)
8. History markers and signage installed.
9. First endeavor is to restore West portion of the fort, close up ex. Sallyport and reintroduce original Sallyport.

6/30/49--Contract for signs to be erected atop Battery Huger. Describes sign content and type of material to be used.

1950--20 April--Continuation of earlier report (see attached work

record) and the hiring of Frank Barnes, Historian who assembled first HSR.

12/15/59--Battery Huger Development Specification--Deals with the construction of the museum within the disappearing gun emplacement and ensuing specifications. Work began 3/7/60 and completed 12/16/60. Three change orders were issued beginning 4/22/60

6/10/59--Specifications for masonry repair at Fort Sumter. This work program explains a lot of what has transpired to the brick.

1965--Doors and Shutters for left flank. Started 27 Apr 65, completed 28 Jun 65. Work involved installation of sallyport door, postern gate, cypress shutters for gun embrasures.

1966-1969--Maintenance file on repointing work performed around fort, primarily on officer's and enlisted men's barracks. Although, there was work performed to clear grass and debris from the surviving remnants of the brick work. Work also was performed on the esplanade to clear and restore element.

1966--Replacement of Underwater power transmission cable. Started 30 Sep 66, completed 3 Mar 67.

1969--HVAC Rehabilitation for Battery Huger Visitor Center.

1971--Streambank and Shore Protection Contract, Placement of 1200 cy of fill, 1800 Tons rip-rap, 500 tons of core material, 16,500 of filter material. Contract awarded 16 Feb 71, started 4 Apr 71, completed 5/26/71.

1972--May 26--Bid Specifications for Rip-Rap (Phase 2) Project No.392-21404. Started 10 Jul 72, Completed 8 Aug 72.

1985--Repointing of casemate arch in ---LGA-2, to close the space between the bricks.. At this time a visible crack was 3/8" wide from brick to brick. In 1992, this crack has reappeared from further separation. It now measures 3/4" from brick to brick. It has increased an additional 3/8" over seven years. This same arch is now being analyzed by Law Engineering with crack detectors in place over the opening.

1990--Project analysis plan entitled "Foundation Investigation." First proposed in Fiscal Year 1989. Proposal explains this is an:

ongoing study regarding the structural integrity of FOSU ... to determine why and to what extent the cracking in casemates is caused by structural instability of the Fort and to determine if Battery Huger can be removed safely from the

Parade ground.

Cost estimate is appraised at \$50,000.00. See later note for further information on Huger analysis.

Proposal to remove rip-rap away from base of foundation wall due to pounding effects of waves on foundation wall. Don Gronwaldt, Chief of Maintenance, Fort Sumter National Monument, explained that during storms the breaking waves were crashing into the exposed rip-rap and causing reverberations in the scarp wall. This was and is causing damage to the exposed brick face. After Hurricane Hugo, rip-rap was found displaced approximately six (6) feet from its original location.

Construction of new wharf and laying of electric cable due to damage sustained by Hurricane Hugo.

1991--Proposal and assessment (Section 106/110 Compliance) was submitted to SHPO, SERO, and ACHP. This was a clearance request for a geotechnical investigation on feasibility of removing Battery Huger. Approved August 8, 1991. This was followed with proposal and assessment for erection of new wood frame wall on top of Battery Huger concrete coping. This was approved Aug. 28, 1991.

Of the two proposals, the former has had core samples performed. The analysis of the investigation has determined the removal of Battery Huger would have no adverse effect on Fort Sumter. The estimated cost of removal in 1992; 4.3 million dollars. The second project was completed in August 1992.³³

ENDNOTES

1. Frank Barnes, Fort Sumter Historic Structure Reports, 1820-1899, September, 1950. All information and dates have been generated/obtained from the Historic Structure Report prepared by Frank Barnes and is cited here for all-inclusion.

2. Instead of a large rock rubble stone foundation, Lieutenant Brown suggested a stone foundation that is split, or sheared off, creating square edges for building purposes, but not finished and "dressed" like veneer stone. This split granite can be viewed today on the North or Left Face exterior at extreme low water.

3. The term "scarp" is taken from the french "escarp." It is defined in Colonel H. L. Scott's Military Dictionary: Comprising Technical Definitions as "the side of the ditch next to the place which , in permanent fortifications, is usually faced with masonry. At Fort Sumter, it is defined as the solid wall fronting the harbor and stretching back to the casemate edges. It is from this wall that all casemate arches and piers spring.

4. The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, Ser. I, Vol. I, Washington: Government Printing Office, 1880, pp 22-23,24. Hereinafter cited as Official Records.

5. John Johnson, The Defense of Charleston Harbor, Including Fort Sumter and the Adjacent Islands: 1863-1865, Charleston: Walker, Evans, & Cogswell, 1890, pp 19-20. John Johnson was a Major of Engineers, Confederate States of America assigned to the Charleston Harbor Command. Other information regarding educational background has not been obtained.

6. Ibid., p 20. The addition of a fire-engine [sic] is interesting, but understandable if one considers that the Confederates watched the roofs and magazines burn uncontrollably during their bombardment, but at the same time they add gas works for interior lighting, conversely creating a very hazardous, explosive condition.

7. Ibid., p 56. If this note is any indication of what the men felt, then also the foundations were shaken. This bombardment of eleven inch guns and the later 100 and 200 pounder Parrott guns have probably severely undermined and weakened the brick structure.

8. Ibid., Appendix A, p ix.

9. Official Records, Ser. 1, vol. 28, pp 84-87.

10. Official Records, Ser. I, Vol. 28, p 87. The damage wrought in this bombardment belied the devastation that ensued from 1863-1864. After each bombardment, the confederates were able to brace the casemates and arches from the debris, sand outside the fort and from the parade ground.

11. Johnson, Defense of Charleston, pp 189, 193. Mention is made in Johnson's book about the audible cracking of the masonry while the commissary was cooling. This information also adds to the condition of the fort through the effects of fire and internal explosion. Using this information, we can now extrapolate that the two room powder magazine was converted (to the stair tower side) into the commissary; the adjoining room remained the magazine. After the explosion the commissary was subdivided, triangularly, to accommodate the commissary and the storing of ordinance.

12. Interior view of Fort Sumter, c. 1864, Fort Sumter Historic Photograph Collection.

13. An analysis of the historic drawings to the just-completed HABS drawings shows that this piece did not exist by 1860. Examination of the brick work shows construction of post-1860, but the brick dates from the 1861-1874 period.

14. Records of the War Department, Office of the Chief Engineer, National Archives and Records Administration. Hereinafter cited as the Gillmore Reconstruction when quoted or paraphrased, otherwise all information is taken from these primary sources, but is not officially footnoted. It should be noted that not all information found in the records has been transcribed just that information that is germane to the rebuilding of Fort Sumter. This information aids in determining alterations that have occurred to the 1860 fort.

15. Gillmore Reconstruction, 1 Aug 1868.

16. Gillmore Reconstruction, Mar 5, 1872.

17. Gillmore Reconstruction, Feb 23, 1872. It is unknown at this time if this construction was undertaken by Captain Ludlow.

18. Gillmore Reconstruction, February 17, 1872, letter to Gen. A. A. Humphries from Maj. Q. A. Gillmore.

19. Fort Sumter reconstruction, Records of the War Department, Office of the Chief of Engineers, National Archives and Records Administration. The paragraph has been paraphrased to reduce space and unnecessary jargon, but the essential gist has been retained.

20. While not explicit in the area of work performed, it is theorized that the outside scarp wall was repointed, but the embrasures were left alone. If this is correct, than the outside scarp wall embrasures are the most original of all embrasure openings.

21. The plaster beds refers to the bluestone flagging beds that existed on the second tier.

22. Uncertain as to the meaning, it is conjectured that the scarp wall had cracks and bombardment holes in face. This necessitated the rebuilding and repointing of the exterior face.

23. Gillmore Reconstruction, December 26, 1873 letter to Maj. Q. A. Gillmore.

24. Webster's New World Dictionary defines parados as "a natural or artificial defense against reverse fire." This undoubtedly means the "new" retaining walls, since a lot of Sumter's destruction originated from reverse fire into the casemates. Gillmore had in his design walls to prevent this type of destruction.

25. Battery Huger Construction, Letter from Captain Abbot to Brig. Gen. Wm. P. Craighill, September 30, 1895, Records of the War Department, Office of the Chief Engineer, National Archives and Record Administration, hereinafter referred to Huger Construction. Whereas the total estimate for Huger is estimated at 40,000 tons it more reasonable to believe it to be between 45-50,000 tons.

26. Huger Construction, Proposal of Work, 1901.

27. Records of the War Department, Office of the Chief Engineer, National Archives and Records Administration. Hereinafter cited as Huger Construction, basically 1895-1945. It is not yet determined as to "front of battery" meaning the filled area currently to the seaward side or this meaning to the parade ground. While the former makes more sense, numerous cannon were discovered in the parade level during the 1951 and 1959 archaeological excavations. However, for the discussion here, it is construed that front refers to the present filled area seaward of Huger and the rear as that area of the present parade level.

This still does not elaborate upon which wall is considered the rear, that is, the Left Flank or Left Face. The same criteria exists for the front of Battery Huger.

28. The blasting down of the hold wall refers to the center pintle mount breast high works placed in the Gillmore Reconstruction. This blasting no doubt also had an effect on the condition of arches and walls at Fort Sumter. This also the only documentation discovered referring to the burying of the guns in the Right Face casemates. A reference to the condensation problem in the exposed casemates also leads to the supposition that the filled casemates were excessively moisture laden. This sentence has been highlighted to note the repair work performed at this time and indicating the effect of blasting on the original fort.

29. Records of the War Department, Office of the Chief Engineer, Record Group A 50-23, Box 19C. This information was deciphered from the Charles Snell research notes. These notes and the rough draft of Battery Huger Historic Structure Report aided invaluablely to the research of Sumter. The information is for the period of 1933-1941, but has generated some information to the period of 1918-1925.

30. Fort Sumter Historic Photographs, Photographic File FOSU 18. This photograph was taken from Casemate ---LFK-3 toward the Sallyport ---LFK-4. It shows the original cistern, but to the front edge can be seen the remains of flagstone and the granite traverse. The date is approximated because no date is associated with the photo other than the file nomenclature. However, the succeeding entries in this time period establish the date to 1931-1932 after the Army Post Harbor Command took possession.

31. Maj. R. T. Gibson, "Leveling Base Rings at Fort Sumter," Coast Artillery Journal, Vol. 74, Sept-Oct, 1931, p 457. This article is important since it clearly demonstrates that the fort was, and is sinking, both equally and differentially settling. This leveling of the base rings was also noted in the Records of the War Department, Report of Conditions at Fort Sumter. Evidently this did not get approved, otherwise evidence would be seen on the exterior walls of the coal tar and kerosene admixture.

32. Records of the War Department, Office of the Chief Engineer, Record Group A 50-23, Box 19 C, National Archives and Records Administration.

33. The investigation was undertaken because of concerns of a spring back effect on the remains of Fort Sumter with the removal of Battery Huger. The findings concluded that any spring back was

minor to negligible on the scarp walls.

PROJECT STATEMENT

The Inventory and Condition Assessment Program (ICAP) is a systematized methodology to inventory and to assess the condition of, or inspect, maintenance features, and a computer program to manage the substantial volume of information developed under the program.

The inventory and condition assessment is based on a comprehensive field inspection/investigation conducted by Park, Regional Office, or Denver Service Center (DSC) staff and/or private architectural/engineering (A/E) contractors. The inspection team prepares a report assessing the findings of the inspection and recommending, where necessary, appropriate repair treatments. For prehistoric and historic buildings these recommendations are consistent with the "Standards of Managing Historic and Prehistoric Structures (Including Ruins)" in the Cultural Resource Management Guideline, NPS-28. A comprehensive building report for non-historic buildings is titled "Inventory and Condition Assessment Report." For prehistoric and historic buildings, a comprehensive building report is titled "Historic Structure Assessment Report." A comprehensive building report consists of the following information:

1. **General Data** - Background, size and geographical information.
2. **Historical Data** - For historic and prehistoric buildings the historic significance of each feature is identified. A documentation list and the Cultural Resources Management Bibliography (CRBIB) information is also furnished.
3. **Inventory Data** - Descriptions of features. These were supplemented by detailed inventory forms to assess the entire fort. These forms were begun but, to-date, have been completed.
4. **Condition Assessment Data** - Deficiencies identified through the inspection process, with corrective work

recommendations. For the quantities shown column a total of 3 has been entered with variations on the amount of GOOD, FAIR and POOR; usually 1 GOOD, 1 FAIR, 1 POOR. These are dummy entries allowing access to Deficiency and Work Recommendation entry sections. Dummy entries are also noted by three asteriks (***) at the end of each deficiency section. Work was initiated on a Lotus 1-2-3 Spreadsheet w/HABS dimensions and other observations, and is being completed.

5. **Cost Data** - Estimated costs for all recommended work broken down into material and labor. For this particular project, cost estimates were not prepared due to time constraints.
6. **Graphic Data** - A site sketch, and plan drawings are also included.

DEFINITIONS

FEATURE CONDITION

The conditions of GOOD, FAIR, and POOR correlate to the Maintenance Management (MM) Conditions "1" as good, "2" as fair and "3" as poor. For historic and prehistoric structures, it is also used as part of the criteria in establishing the significance of a feature.

A feature is GOOD when:

- the feature meets the established MM program condition guidelines, and
- the feature is intact, structurally sound and performing its intended purpose, and
- the feature needs no repair or rehabilitation, and only routine and preventive maintenance is required.

A feature is evaluated as FAIR when:

- the feature generally meets the MM program condition guidelines and provides an adequate level of service, or
- there are early signs of wear, failure, or deterioration, though the feature is generally structurally sound and performing its intended purpose, or
- there is failure of a sub-component of the feature, or
- replacement of up to 25% of the feature or replacement of a defective sub-component is required.

A feature is evaluated as POOR when:

- the feature does not meet the MM program condition guidelines, or
- the feature is no longer performing its intended purpose, or

- the feature is missing, or
- deterioration or damage effects more than 25% of the feature and cannot be adjusted or repaired, or
- the feature shows signs of imminent failure or breakdown, or
- the feature requires major repair or replacement

TREATMENT RATINGS

For historic and prehistoric buildings only, there are four categories that pertain in ICAP and the Historic Structure Assessment Report. These categories are explained below:

1. HISTORIC (H)

Those items that fit within the category of Fort Sumter of being constructed between 1826 to a cut-off date of 1892. These items must be preserved with removal and replacement of materials only when imminent loss or destruction will occur to the artifact or fabric.

2. NONHISTORIC (N)

Those items constructed at or repaired at Fort Sumter post-1892 (includes Battery Huger) up to World War II and some repair work performed by the National Park Service up to 1970. Repair or replacement of these items are considered to be minimal when compared to the preservation of historic fabric.

3. TREAT AS HISTORIC (T)

Those items performed by the National Park Service after 1970. These items are approved historic preservation techniques and measures that sustain and lengthen the overall life of historic fabric.

4. UNKNOWN (U)

Those items that have no historic, nonhistoric, or treat as historic category attached to them. A determination has not been made on the historicity of the

fabric, element, or artifact. It is to be treated as historic fabric, but can be replaced or repaired.

LIST OF SYMBOLS AND ABBREVIATIONS

brick	brk
building	bldg
ceiling	clg
center	cntr
concrete	conc
concrete masonry unit	CMU
construction	const
corresponding	corres
crack(s)	crk(s)
cross-reference	cross-ref
diameter	dia
each	EA, ea
East	E
electric	elec
electrolysis	elect'l
elevation	elev
embrasure	Emb
equal	eq
equivalent	equiv., eqv
existing	ex, extg
exterior	ext
floor	fl, flr
foundation	fnd
galvanized	galv
hardware	hdwe
interior	int
level	lvl
Linear Feet	LF
material	mat
metal	mtl
North	N
on center	oc
opening	opn'g, opng
original	orig
parade ground	PGrnd
piece(s)	pc(s)
receiver	rec'r
repoint	rpnt

repointing	rpnt'g
required	req'd
rough opening	r.o.
rustoleum	rustol'm
scupper	scup
South	S
square feet	SF
square yard	SY
sheet metal	sht mtl
stainless steel	SS
steel	stl
traverse	trav
typical	typ
tower	twr
West	W
with	w/
without	w/o
wood	wd
World War II	WWII
window	wdo

FORT SUMTER CASEMATE, FACE, & PIER DEFINITIONS
--

FACES

Left Flank	LFK
Left Shoulder Angle	LSA
Left Face	LFC
Salient	SALNT
Right Face	RFC
Right Shoulder Angle	RSA
Right Flank	RFK
Right Gorge Angle	RGA
Right Gorge Wall	RGW
Center Gorge Wall	CT-GW
Gorge Wall	GW
Left Gorge Wall	LGW
Left Gorge Angle	LGA

CASEMATES

Designated by hyphens followed by the FACE designation, another hyphen, then the number as seen in the two (2) following examples:

Left Face Casemate #2 ---LFC-2

Right Gorge Wall #4 ---RGW-4

PIERS

Wall Piers are designated similarly except the number begins first, followed by the number symbol, then the FACE designation, followed by the hyphens. Example:

Pier 1, Right Face 1#RFC---

GENERIC TERMS:

All Casemates: at symbol	@
Right portion	}
Left portion	{
Upper portion	^
Parade Ground	PGrnd
Wall portions lettered	
A to N, hence Wall portion	
A on the Right Face Case-	
mate would be labelled:	A--RFC-2

Examples:

All Left Flank Csmtes	---LFC-@
Right portion of	
Right Flank Csmte 2	}--RFK-2
Left portion of Left	
Face Casemate 5	{--LFC-5

See Appendix for V.2.2 for more detailed information and for a complete list of the Fort's numbering designations.

PRODUCTS LIST

The following products are specified within the ICAP HSAR Work Recommendations. While specified within the program, they have been worded to reflect that approval and acceptance must be obtained from the National Park Service's Park Historic Architecture Division, Southeast Regional Office. The listed products have been used satisfactorily on historic preservation projects and have been approved for use within Investment Tax Credit Rehabilitation projects; however, Fort Sumter is a National Historic Monument. It must not have products applied to it that may irreversibly harm or destroy the historic fabric or identity.

The list is not all-inclusive nor should it be considered so. Other products on the open market may have equal or equivalent value and could be substituted if approved by the National Park Service through the Park Historic Architecture Division and/or through Fort Sumter National Monument.

PRODUCTS

PRO-SO-CO, Inc.

Chemical cleaners and preservatives for a variety of materials and applications. Information on these materials can be obtained from PRO-SO-CO's regional office in Stone Mountain, Georgia (404) 939-9890, ask for Customer Service.

SURE KLEAN Weather Seal H40, deep penetrating water repellent and consolidating treatment, highly hydrophobic yet is impermeable to liquid water. Designed for masonry surfaces in a vertical application.

SURE KLEAN Saltguard, designed for concrete flatwork, it is proposed to be used on the conc/asphalt topping

installed by Gillmore's Engineers as a parging coat on the casemate roof structures and on the Gillmore Concrete/brick aggregate admixture. This product was selected since it goes on clear but protects horizontal surfaces from the effects of chloride salts.

SURE KLEAN Lime Putty Remover, designed for removal of excess calcium leaching through the mining casemate roof.

SURE KLEAN Efflorescence Control System, a two part system designed to remove and control salt deposits on stone and masonry surfaces; it is safe for sandstone surfaces unless used in a repeated application. Part A effectively removes salt deposits, while Part B controls and restricts the recurrence of efflorescence. Recommended for the mining casemate roof and for sandstone embrasures on the Left Face.

RUSTOLEUM

Excellent family of paint products for retarding and entrenching rust and its damaging effects. Rustoleum offers rust inhibitors, rust primers, and rust inhibiting paint. For minor rust areas Rustoleum also offers a good line of rust remover/neutralizer; however, the best method to-date for rust neutralizing is by electrolysis.

ELASTOMERIC SEALANTS

The following products are recommended for back-sealing cracks and openings along the scarp wall and casemate roof juncture, and in widened cracks within the casemate roofs.

GRAF WESTERN
3M
TRIMCO

} [All products are considered equal in material composition and workmanship]

BACKER ROD

Open to selection provided that it is a foam type either open cell or closed cell, minimum size 1/8" diameter.

FORT SUMTER NATIONAL MONUMENT

FORT SUMTER

HISTORIC STRUCTURE ASSESSMENT REPORT

FOSU-0394-0-HBU

--EXECUTIVE SUMMARY-----

SIGNIFICANCE: Significance is obtained through coastal fortification design, first shot of the Civil War, Confederate occupation and Federal bombardment, reconstruction for coastal fortification in 1868-1878, and the mining casemate construction in 1891-92.

DESCRIPTION: Face brick with conc. fill 5'-0" thick at the scarp wall, graduating upward. Originally three tiers high, it is now 1 tier w/terreplein level(2 flrs)

--IDENTIFICATION/MANAGEMENT INFORMATION-----

OTHER NAMES:

ASSET ADDRESS

PARK ORGCODE: 5430
FORT SUMTER
DISTRICT ORGCODE: 0394
1214 MIDDLE STREET
SULLIVAN'S ISLAND, SC 29482
LOCATION: MAN-MADE ISL. IN CHAS.HBR 1 MI. SOUTH OF FOMO.
COUNTY: CHARLESTON

ASSET INFORMATION

MANAGEMENT UNIT: FOSU/BLDG/BLGR/CYCL/GMTC/PM
YCC /

MANAGEMENT CATEGORY: A DATE: 08/01/78

ELEVATION: 6 FT

UTM COORDINATES: 17/604285/3625316

REAL PROPERTY INFORMATION

ACQUISITION DOCUMENT: PL- 80- -504
ACQUISITION COST: \$ 0
ACQUISITION DATE: 1948
FUNCTION NUMBER: 05
FUNCTION DESIGNATION: EDUCATION
TOTAL IMPROVEMENT/MODIFICATION COSTS: \$ 653307

OTHER PROPERTY INFORMATION

NPS LEGAL INTEREST:
NOF - NONE/Federal Agency Owned-NPS
MANAGEMENT AGREEMENT: NONE

NUMBERING INFORMATION

NUMBER ON BUILDING: NONE
LCS ID NUMBER: 00394
HOUSING NUMBER: NONE
ENERGY NUMBER:
CONCESSIONER NUMBER:

APPRAISAL INFORMATION

REPLACEMENT COST:
APPRAISAL YEAR:
APPRAISAL SOURCE:
PERCENT OCCUPIED: 0%
DATE OF CONSTRUCTION: 1820-1860

SIZE INFORMATION

TOTAL FLOOR AREA: 16873 SF
FIRST FLOOR AREA: 16873 SF
ADDITIONAL FLOOR AREA: 0 SF
TOTAL BASEMENT AREA: 0 SF
FINISHED BASEMENT AREA: 0 SF
UNFINISHED BASEMENT AREA: 0 SF
ROOF AREA: 9614 SF
PERIMETER LENGTH: 1215 LF
NUMBER OF STORIES: 2
NUMBER OF ROOMS: 39
NUMBER OF BATHROOMS: 0

SUMMARY COST INFORMATION

TOTAL: \$ 650
CRITICAL: \$ 0
SERIOUS: \$ 650
MINOR: \$ 0

--IDENTIFICATION / MANAGEMENT INFORMATION (cont)-----

CODE INFORMATION	OPERATIONS INFORMATION
APPLICABLE CODES:	Open to the public
Southern	HOURS: 10:00 AM - 4:00 PM
NFPA-101	
National Electrical Code	TREATMENT RESPONSIBILITY
	INTERIM TREATMENT: NPS
OCCUPANCY CLASSIFICATION: HISTORIC SITE- RUIN	APPROVED ULTIMATE TREATMENT: NPS
OCCUPANCY LOAD: 385	ROUTINE MAINTENANCE: NPS
HAZARD OF CONTENTS: ORDINARY	CYCLIC MAINTENANCE: NPS
SEISMIC ZONE: 3	ULTIMATE TREATMENT: APPROVED DATE: 01/01/75
CONSTRUCTION TYPE: III	DOCUMENT: B - GMP
	TREATMENT TYPE: PRESERVATION

--SIGNIFICANCE-----

SIGNIFICANCE: National
NATIONAL REGISTER STATUS: 1 - Entered - Documented DATE: 10/15/66
NHL STATUS: No

--HISTORICAL INFORMATION-----

PERIOD OF CONSTRUCTION: Historic	CURRENT FUNCTION:
HISTORIC FUNCTION:	EDUCATION
DEFENSE	MUSEUM (EXHIBITION HALL)
FORTIFICATION	NPS CONCESSION

--DOCUMENTATION-----

DSC PARKCODE:
DRAWINGS:

TITLE	DOC ID #	DATE	LOCATION
Records of the War Department	DWR 66	1828-1849	National Archives and Records Administration
Historic American Building Survey	SC-194	Sum 1959	Library of Congress, Photographs and Prints Coll.
Historic American Buildings Survey	SC-194	Summer'91	Fort Sumter National Monument, Sullivan's Is. SC
Fort Sumter Elevation Traverse	NONE	Sum 1992	Fort Sumter National Monument, Sullivan's Is., SC

REPORTS:

TITLE	DOC ID #	DATE	LOCATION
SEE APPENDIX FOR LISTING	NONE		Park Library and File Holdings

--HISTORICAL DOCUMENTATION-----

HABS NUMBER: SC-194	HAER NUMBER:	NATIONAL REGISTER NUMBER: 66000101
CULTURAL RESOURCES MANAGEMENT BIBLIOGRAPHY (CRBIB)		
AUTHOR: Frank Barnes, Historian	DATE: 09/1950	CRBIB NUMBER:
TITLE: Fort Sumter Historic Structure Report		
AUTHOR: Rock L. Comstock, Historian	DATE: 06/1955	CRBIB NUMBER:
TITLE: Excavation Report: Fort Sumter National Monument		
AUTHOR: Horace J. Heely, Jr., Historian	DATE: 05/1956	CRBIB NUMBER:
TITLE: Excavation Report: Fort Sumter National Monument		
AUTHOR: Horace J. Heely, Jr., Historian	DATE: 03/1957	CRBIB NUMBER:
TITLE: Excavation Report: Fort Sumter National Monument		
AUTHOR: W. P. Crawford	DATE: 09/1977	CRBIB NUMBER:
TITLE: Historic Resources Management Plan for Fort Sumter National Monument		

--MAJOR IMPROVEMENTS / MODIFICATIONS-----

CONSTRUCTION DATE: 1820-1860	CONSTRUCTION: Built	TEXT: Date of original construction
COST: \$ 0	DESIGNER: Corps of Engineers	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1868-1878	CONSTRUCTION: Reconstruction	TEXT: Reconstruction of Coastal Fortification
COST: \$ 545000	DESIGNER: Corps of Engineers	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1891-1892	CONSTRUCTION: Altered	TEXT: Torpedo Mining Room in ---LFK-7 Casemate
COST: \$ 0	DESIGNER: Corps of Engineers	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1895-1898	CONSTRUCTION: Altered	TEXT: Endicott Board gun battery built Sumter(Sub-Asset)
COST: \$ 0	DESIGNER: Corps of Engineers	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1900-1915	CONSTRUCTION: Altered	TEXT: Modifiying Ext. & Int. brick (tied to Battery)
COST: \$ 0	DESIGNER: Corps of Engineers	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1949-1957	CONSTRUCTION: Restoration	TEXT: Begin'g of NPS restoration of Sumter to orig. app.
COST: \$ 0	DESIGNER: In-house, some contract laborers	DESIGNER'S OCCUPATION: Unknown
CONSTRUCTION DATE: 1959	CONSTRUCTION: Stabilization	TEXT: Repointing of face brick, some new brick const.
COST: \$ 0	DESIGNER: Eastern Off., Div. of Des. & Const.	DESIGNER'S OCCUPATION: Architect
CONSTRUCTION DATE: 1961	CONSTRUCTION: Restoration	TEXT: Doors and Shutters for Fort's Left Flank
COST: \$ 2325	DESIGNER: Eastern Service Center	DESIGNER'S OCCUPATION: Architect
CONSTRUCTION DATE: 1972	CONSTRUCTION: Stabilization	TEXT: Phase II Rip-rap protection
COST: \$ 42064	DESIGNER: Eastern Service Center	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1971	CONSTRUCTION: Stabilization	TEXT: Streambank, shore protection, repair earthwk, etc.
COST: \$ 63918	DESIGNER: Eastern Service Center	DESIGNER'S OCCUPATION: Engineer
CONSTRUCTION DATE: 1992-1992	CONSTRUCTION: Altered	TEXT: Wooden wall built on gorge wall/increas. security
COST: \$ 0	DESIGNER: SERO/John Tucker	DESIGNER'S OCCUPATION: Park Staff
CONSTRUCTION DATE: 1991-1992	CONSTRUCTION: Reconstruction	TEXT: Rebuilt LFC9 casemate roof.
COST: \$ 0	DESIGNER: SERO/Historic Architecture Div.	DESIGNER'S OCCUPATION: Architect
TOTAL IMPROVEMENT/MODIFICATION COSTS: \$ 653307		

--INSPECTION TEAM INFORMATION-----

EVALUATION PROCEDURE

Fort Sumter's configuration (a pentagon) and its complex interior challenged existing recording formats for assessment. Mr. Clark obtained/installed ICAP software, Version 1.2. Mr. Wylie developed the recording forms on WordPerfect 5.1. A new nomenclature system for casemates/piers was developed and transferred to existing HABS drawings. Mr. Hatcher assisted in a structural assessment of the fort's artillery comprising a separated ICAP report. Resource inspection took place from June 1992 to September 1992.

INSPECTION TEAM

DATE OF INSPECTION: 07/20/92

DATE OF INITIAL INSPECTION: 06/30/92

INSPECTION TEAM PERSONNEL:

Stephen M. Clark
Historical Architect
National Park Service
1214 Middle Street
Sullivan's Island, SC 29482
(803) 883-3124

Rick Hatcher
Historian
National Park Service
1214 Middle Street
Sullivan's Island, SC 29482
(803) 883-3124

James H. Wylie
Architect
National Park Service
2795 Arden Road NW
Atlanta, GA 30327
(404) 355-3951

AREAS: Entire Fort

AREAS: Casemate Furnishings

AREAS: Fort Sumter

TIMES:

TIMES:

TIMES:

INSPECTION: 420 HRS.

INSPECTION: 14 HRS.

INSPECTION: 420 HRS.

REPORT PREPARATION: 280 HRS.

REPORT PREPARATION: HRS.

REPORT PREPARATION: 220 HRS.

DATA ENTRY

DATE OF DATA ENTRY: 07/22/92

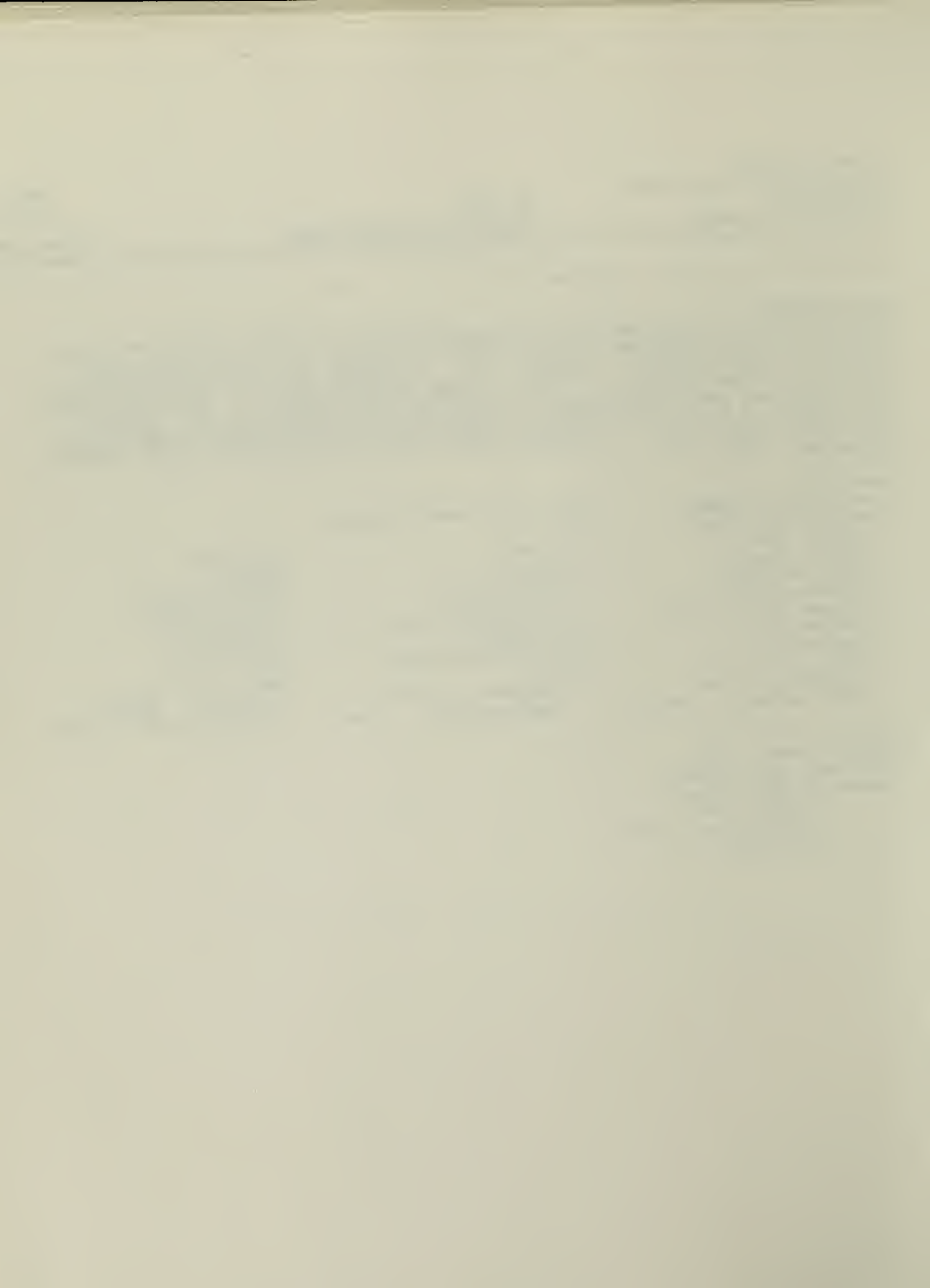
NAME: Stephen Clark & Jim Wylie

ADDRESS: Fort Sumter National Mon.

1214 Middle Street

Sullivan's Island, SC 29482

(803) 883-3124



FORT SUMTER NATIONAL MONUMENT

FORT SUMTER

HISTORIC STRUCTURE ASSESSMENT REPORT

FOSU-0394-0-HBU

--ASSET INFORMATION-----

PRIMARY ASSET

LOCATION IN PARK: MAN-MADE ISL. IN CHAS.HBR 1 MI. SOUTH OF FOMO.

CURRENT USE: EDUCATION

MANAGEMENT UNIT: FOSU/BLDG/BLGR/CYCL/GMTC/PMP

YCC /

MANAGEMENT CATEGORY: A DATE: 080178

INSPECTION DATE: 07/20/92

--FEATURE INVENTORY-----

Feature Loc Code	MM Code	Feature Name - Material/Type	Meas Unit	Total Inventory	Condition Good	Quantities Fair	Poor
----	----	-----	----	-----	-----	-----	-----
---GW-@	4111	Ext. Wall Structure - Masonry-Brick	SF	3278.010	1878.010	1000.000	400.000
---CT-GW	4111	Ext. Wall Structure - Concrete	SF	314.940	312.940	2.000	
---LFC-1	4111	Ext. Wall Structure - Masonry-Brick	SF	268.390	260.390	4.000	4.000
---LFC-2	4111	Ext. Wall Structure - Masonry-Brick	SF	241.340	240.340		1.000
---LFC-3	4111	Ext. Wall Structure - Masonry-Brick	SF	239.680	138.680	100.000	1.000
---LFC-4	4111	Ext. Wall Structure - Masonry-Brick	SF	238.580	230.580	1.000	7.000
---LFC-5	4111	Ext. Wall Structure - Masonry-Brick	SF	239.680	226.680	1.000	12.000
---LFC-6	4111	Ext. Wall Structure - Masonry-Brick	SF	239.680	229.680		10.000
---LFC-7	4111	Ext. Wall Structure - Masonry-Brick	SF	239.680		239.680	
---LFC-8	4111	Ext. Wall Structure - Masonry-Brick	SF	237.470	230.470		7.000
---LFC-9	4111	Ext. Wall Structure - Masonry-Brick	SF	279.980		253.980	26.000
---LFC-@	4230	Int. Floor Covering/Surface - Masonry-Brick	SF	697.500		616.500	81.000
---LFK-1	4111	Ext. Wall Structure - Masonry-Brick	SF	332.940	300.040	6.250	26.650
---LFK-2	4111	Ext. Wall Structure - Masonry-Brick	SF	282.730	221.730	57.000	4.000
---LFK-3	4111	Ext. Wall Structure - Masonry-Brick	SF	281.450	178.450	3.000	100.000
---LFK-4	4111	Ext. Wall Structure - Masonry-Brick	SF	175.860	175.860		
---LFK-5	4111	Ext. Wall Structure - Masonry-Brick	SF	296.050	240.050		56.000
---LFK-6	4111	Ext. Wall Structure - Masonry-Brick	SF	314.340		292.340	22.000
---LFK-7	4111	Ext. Wall Structure - Masonry-Brick	SF	314.340	232.040	82.300	
---LFK-8	4111	Ext. Wall Structure - Masonry-Brick	SF	382.080	274.080	108.000	
---LFK-8	4230	Int. Floor Covering/Surface - Masonry-Brick	SF	272.000		272.000	
---LGA-1	4111	Ext. Wall Structure - Masonry-Brick	SF	301.500	246.500		55.000
---LGA-2	4111	Ext. Wall Structure - Masonry-Brick	SF	368.120	344.120	2.000	22.000
---LSA-1	4111	Ext. Wall Structure - Masonry-Brick	SF	367.250	361.250	6.000	
---RFC-1	4111	Ext. Wall Structure - Masonry-Brick	SF	389.950	100.000		289.950
---RFC-2	4111	Ext. Wall Structure - Masonry-Brick	SF	349.280	119.280	119.000	111.000
---RFC-3	4111	Ext. Wall Structure - Masonry-Brick	SF	356.450			356.450
---RFC-4	4111	Ext. Wall Structure - Masonry-Brick	SF	368.330			368.330
---RFC-5	4111	Ext. Wall Structure - Masonry-Brick	SF	377.780			377.780
---RFC-6	4111	Ext. Wall Structure - Masonry-Brick	SF	365.800		146.300	219.500
---RFC-7	4111	Ext. Wall Structure - Masonry-Brick	SF	364.780		312.780	52.000

--FEATURE INVENTORY-----

Feature Loc Code	MM Code	Feature Name - Material/Type	Meas Unit	Total Inventory	Condition Good	Quantities Fair	Poor
-----	----	-----	----	-----	-----	-----	-----
---RFC-8	4111	Ext. Wall Structure - Masonry-Brick	SF	363.180	14.530	290.540	58.110
---RFC-9	4111	Ext. Wall Structure - Masonry-Brick	SF	413.450	118.070	165.380	130.000
---RFK-a	4111	Ext. Wall Structure - Masonry-Brick	SF	2719.910	19.910	900.000	1800.000
---RGA-1	4111	Ext. Wall Structure - Masonry-Brick	SF	348.770		174.770	174.000
---RGA-2	4111	Ext. Wall Structure - Masonry-Brick	SF	419.050		209.050	210.000
---RSA-1	4111	Ext. Wall Structure - Masonry-Brick	SF	397.830	198.915		198.915
---SALNT	4111	Ext. Wall Structure - Masonry-Brick	SF	391.580	111.580	191.800	88.200
1335CC10	1335	Manhole - Concrete	EA	4.000			4.000
2#LGA---	4150	Ext. Door Unit - Masonry-Brick	EA	3.000	1.000	1.000	1.000
2-CC10	4211	Int. Wall Structure - Concrete	SF	3.000	1.000		2.000
2-CE10	4210	Int. Wall Covering/Surface - Cement	SF	3.000	1.000		2.000
2-GS11	3113	Class B Lawn (General Purpose) - Grass-Sod	AC	3.000	1.000	1.000	1.000
2-MA12	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000		2.000
2-MA19	4146	Ext. Window Sill - Masonry-Granite	EA	2.000	2.000		
2130XX10	2130	Paved Walk - Not Applicable	LF	3.000	3.000		
3113GS11	3113	Class B Lawn (General Purpose) - Grass-Sod	AC	2.000		1.000	1.000
3322ME99	3322	Flag Pole - Metal-Other	EA	6.000	6.000		
3361MA12	3361	Retaining Wall - Masonry-Brick	SF	472.000	150.000	322.000	
3361MA12	4411	Foundation Wall Structure - Masonry-Brick	SF	244.500		236.000	8.500
4110PA13	4110	Ext. Wall Covering/Surf. - Paint-Oil	SF	275.000		275.000	
4110PS10	4110	Ext. Wall Covering/Surf. - Plaster/Stucco	SF	957.000	805.000	39.700	112.300
4111CC10	4111	Ext. Wall Structure - Concrete	SF	3.000	1.000		2.000
4113MA99	4113	Ext. Wall Trim - Masonry-Other	LF	281.200		218.760	62.440
4115ME20	4115	Ext. Column/Post - Lead	EA	19.000		2.000	17.000
4130MA19	4130	Ext. Floor Covering/Surface - Masonry-Granite	SF	8860.440		8489.610	370.830
4140CC10	4140	Ext. Window Unit - Concrete	EA	29.000	10.000	12.000	7.000
4145ME18	4145	Ext. Window Hardware - Metal-Case Iron	EA	6.000		3.000	3.000
4146MA19	4146	Ext. Window Sill - Masonry-Granite	EA	34.000	27.000	7.000	
4146MA21	4146	Ext. Window Sill - Masonry-Marble	EA	2.000	1.000	1.000	
4148WD23	4148	Ext. Window Shutter - Wood-Tongue & Groove	EA	7.000		7.000	
4151WD15	4151	Ext. Door Frame - Wood-Frame	EA	2.000	2.000		
4152WD99	4152	Ext. Door - Wood-Other	EA	4.000	4.000		
4153LFK4	4153	Ext. Door Trim - Masonry-Granite	LF	36.000	36.000		
4155ME18	4155	Ext. Door Hardware - Metal-Case Iron	EA	65.000	22.000	32.000	11.000
4156MA19	4156	Ext. Door Sill/Threshold - Masonry-Granite	EA	6.000	4.000	2.000	
4210PA13	4210	Int. Wall Covering/Surface - Paint-Oil	SF	3.000	1.000	1.000	1.000
4210PA99	4210	Int. Wall Covering/Surface - Paint-Other	SF	29.000		20.000	9.000
4210PS10	4210	Int. Wall Covering/Surface - Plaster/Stucco	SF	5.000		2.000	3.000
4211BRKS	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000	2.000	
4211CC10	4211	Int. Wall Structure - Concrete	SF	3.000	1.000	2.000	
4211LFCa	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000

--FEATURE INVENTORY-----

Feature Loc Code	MM Code	Feature Name - Material/Type	Meas Unit	Total Inventory	Condition Quantities		
					Good	Fair	Poor
4211LFA	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4211LGA	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4211LSA1	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4211MA25	4211	Int. Wall Structure - Masonry-Tabby	SF	3.000	3.000		
4211QTRS	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4211RFA	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000		2.000
4211RSA	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000		2.000
4211SALT	4211	Int. Wall Structure - Masonry-Brick	SF	3.000	1.000		2.000
4218MA12	4218	Int. Fireplace - Masonry-Brick	EA	13.000	5.000	6.000	2.000
4221CC10	4221	Int. Ceiling Structure - Concrete	SF	3.000	1.000	1.000	1.000
4221MA12	4221	Int. Ceiling Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4230BRKS	4230	Int. Floor Covering/Surface - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4230CC10	4230	Int. Floor Covering/Surface - Concrete	SF	3188.000	3156.000	32.000	
4230GS10	4230	Int. Floor Covering/Surface - Grass	SF	3.000	1.000	1.000	1.000
4230GS99	4230	Int. Floor Covering/Surface - Grass-Other	SF	88.000		88.000	
4230LSA	4230	Int. Floor Covering/Surface - Masonry-Flagstone	SF	101.000			101.000
4230LSA1	4230	Int. Floor Covering/Surface - Masonry-Brick	SF	171.500	51.450	120.050	
4230MA18	4230	Int. Floor Covering/Surface - Masonry-Flagstone	SF	3.000	1.000	1.000	1.000
4230MA19	4230	Int. Floor Covering/Surface - Masonry-Granite	SF	1321.000		1289.000	32.000
4231LFC5	4231	Int. Floor Structure - Masonry-Granite	SF	416.000		416.000	
4231LFC4	4231	Int. Floor Structure - Masonry-Granite	SF	504.000	494.000	10.000	
4231MA12	4231	Int. Floor Structure - Masonry-Brick	SF	3.000	1.000	1.000	1.000
4231MA19	4231	Int. Floor Structure - Masonry-Granite	SF	453.000		442.000	11.000
4231MA25	4231	Int. Floor Structure - Masonry-Tabby	SF	3.000	1.000	2.000	
4231RFC5	4231	Int. Floor Structure - Masonry-Granite	SF	416.000	412.000	4.000	
4240CC10	4240	Int. Window Unit - Concrete	EA	29.000	2.000	15.000	12.000
4240MA12	4240	Int. Window Unit - Masonry-Brick	EA	14.000	12.000	2.000	
4240MA23	4240	Int. Window Unit - Masonry-Sandstone	EA	104.900	62.750	31.700	10.450
4240WD15	4240	Int. Window Unit - Wood-Frame	EA	1.000		1.000	
4245ME18	4245	Int. Window Hardware - Metal-Case Iron	EA	3.000	1.000	1.000	1.000
4250CC10	4250	Int. Door Unit - Concrete	EA	2.000		2.000	
4250CE10	4250	Int. Door Unit - Cement	EA	1.000		1.000	
4250MA12	4250	Int. Door Unit - Masonry-Brick	EA	11.000	2.000	4.000	5.000
4252WD12	4252	Int. Door - Wood-Plank/Board	EA	1.000	1.000		
4255ME14	4255	Int. Door Hardware - Metal-Bronze	EA	6.000	4.000		2.000
4260PA13	4260	Interior Finish - Paint-Oil	SF	1100.000		970.000	130.000
4271MA19	4271	Int. Stair/Ramp Structure - Masonry-Granite	EA	4.000	4.000		
4311CC10	4311	Roof Structure - Concrete	SF	3.000		3.000	
4311MA12	4311	Roof Structure - Masonry-Brick	SF	3.000	1.000		2.000
4312CE10	4312	Roof Sheathing - Cement	SF	3.000	1.000	1.000	1.000
4315MA12	4315	Parapet - Masonry-Brick	SF	52.000	19.000	29.000	4.000

--FEATURE INVENTORY-----

Feature Loc Code	MM Code	Feature Name - Material/Type	Meas Unit	Total Inventory	Condition Quantities		
					Good	Fair	Poor
4315MA99	4315	Parapet - Masonry-Other	SF	122.700	91.190	31.510	
4322ME18	4322	Roof Vent - Metal-Case Iron	EA	2.000		2.000	
4350CL11	4350	Drainage System - Clay-Ceramic	EA	36.000	15.000	11.000	10.000
4350ME18	4350	Drainage System - Metal-Case Iron	EA	21.000		18.000	3.000
4351CL11	4351	Gutter/Downspout - Clay-Ceramic	LF	21.170	13.750		7.420
4351ME21	4351	Gutter/Downspout - Metal-Galvanized Ste	LF	3.000	1.000	1.000	1.000
4352CL11	4352	Scupper/Canale - Clay-Ceramic	LF	3.000		3.000	
4352ME18	4352	Scupper/Canale - Metal-Case Iron	LF	1.000			1.000
4352ME21	4352	Scupper/Canale - Metal-Galvanized Ste	LF	5.000		5.000	
4352PV10	4352	Scupper/Canale - Plastic/Vinyl	LF	3.000	1.000		2.000
4360AS10	4360	Roof Finish - Asphalt	SF	3.000			3.000
4410MA19	4410	Foundation Wall Covering/Surf. - Masonry-Granite	SF	3.000	1.000	1.000	1.000
4411MA12	4411	Foundation Wall Structure - Masonry-Brick	SF	3.000	1.000	2.000	
4413MA12	4413	Foundation Vent - Masonry-Brick	EA	11.000		11.000	
4460MA19	4460	Foundation Finish - Masonry-Granite	SF	6519.200		6470.950	48.250
4520ME19	4520	Built-in Furnishing - Metal-Wrought Iron	EA	32.950		19.900	13.050
4710XX12	4700	FIRE/LIFE/HEALTH/SAFETY - Not Applicable	EA	1.000			
4900GR17	4900	GENERAL BUILDING - Rip Rap		3.000	1.000	1.000	1.000
4900XX10	4900	GENERAL BUILDING - Other		3.000	1.000	1.000	1.000
4910SA10	4910	Site Feature - Sand	EA	1.000		1.000	
5800XX10	5800	BLDG/GRDS UTILITIES - Other	EA	1.000			
5821MA18	5821	Pump - Masonry-Flagstone	EA	2.000	1.000		1.000
6430MA19	6430	Dock/Wharf - Masonry-Granite	EA	2457.000	567.000	1785.000	105.000
6430XX10	6430	Dock/Wharf - Other	EA	1.000	1.000		
7110MA19	7110	Monument - Masonry-Granite	EA	1.000	1.000		
7310XX10	7310	Fortification - Not Applicable	EA	1.000			
8343MA21	8343	Plaque - Masonry-Marble	EA	1.000	1.000		
@#@FC-EF	4420	Pier - Masonry-Brick	EA	16.000	8.000	5.000	3.000
@#LFC---	4211	Int. Wall Structure - Masonry-Tabby	SF	70.000	10.000	60.000	
@#LFC-GH	4420	Pier - Masonry-Brick	EA	8.000			8.000
@#RFC-GH	4211	Int. Wall Structure - Masonry-Brick	SF	1536.000	1536.000		
@#RFC-GH	4420	Pier - Masonry-Brick	EA	8.000	5.000		3.000

National Park Service
Inventory/Condition Assessment Program
Southeast Region
FORT SUMTER NATIONAL MONUMENT

BATTERY HUGER
HISTORIC STRUCTURE ASSESSMENT REPORT

Page 10
12/04/92
FOSU-0394-0-HBU

--A S S E T I N F O R M A T I O N-----

SUBORDINATE ASSET FOSU-0391-1-HFT LOCATION IN PARK: WITHIN FORT SUMTER; FORT LOCATED 1 MI FROM FOMO
CURRENT USE: BATTERY (DEFENSE)
MANAGEMENT UNIT: FOSU/

MANAGEMENT CATEGORY: A DATE:
INSPECTION DATE: 07/20/92

The database contains no features for this asset.

--WORK RECOMMENDATIONS--

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4111	EXT BRICK WALL @ GORGE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Wall miss'g brk wythes & 1/2"- 1" joint depth, especially at ---LGW-4-6, more structural crks at this end, Plant growth in joints, roots damaging brk	Remove all plants by hand or spray w/EPA app'd herbicide. Hand rake all joints of loose mat, repoint wall. Monitor crks for shift/separation. Recommend apply'g Weather Seal	400.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 1 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Rip-rap at fnd base damaging wall; 2 SF of brick area needs repointing. Wall under effects of pounding surf & wind-blown water/sand.	Cross-ref Harbor & Rip-rap Recommendations, Repoint wall. Recommend application of weather seal for wall sealing and consolidation.	4.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 3 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	1 SF needs immediate repointng as does area that is missing mortar entirely.	Repoint wall w/approved mortar mix. Recommend application of weather seal after wall has benn stabilized.	1.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 4 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Spalling of exterior wall by wave action & freeze/thaw cyc Evidence of wall erosion; Crk noted 2'-4" lt of lt emb edge from parapet down to foundation	Monitor crk for further sep., repoint wall if no indication of crk movement. Recommend application of Weather Seal after wall has been stabilized	7.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 5 CISTERN CSM EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	1SF of spalled brick, 1SF of brick needs repointing, 10 SF needs to be monitored for re- pointing.	Repoint brick w/app'd mortar mix. Recommend application of Weather Seal after wall is stabilized.	12.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 9 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	10 SF needs immediate repointng Rip-rap/wave action damaging lower wall (10SF)--SHIFT CRK-- 6SF spalled, angle juncture at top wall shifting out.	Cross-ref 4910SA10 & 4900GR17. Determine cause of shift, and repoint w/mortar w/20% total vol portland to tot. of lime, sand, cement. Recommend apply- ing Weather Seal.	26.000	SF	\$ 0 0 0 =====

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4111	LEFT FLANK - 1 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	8.25SF severely spalled brk 18.4SF water stain from earth abutting masonry wall, rising damp; 2 brk wythes missing in wall surface, wall weathering	Remove earth cover, replace brk w/matching brk, repoint wall. Recommend application of Weather Seal.	26.650	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 2 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	3SF needs immediate repointing 1SF of brk is missing in wall surface; no support for upper brk courses.	Replace missing brk w/matching unit in color, size, consis- tency; repoint wall after re- pair/stablization. Recommend applying Weather Seal	4.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 6 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	5SF of wall needs immediate repointing, 17SF missing one full brick wythe in wall sur- face, no support for upper brks.	Replace missing brk w/brk that matches in color, consistency, texture; repoint brk joints.	22.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT GORGE ANGLE-1 CASEMA EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Struc. crks in wall, possibly active, 55SF of spalled wall surface at GW juncture, Conc. globs on wall surface, wall will need repointing in 2-5yrs	Monitor cracks for movement, remove conc. globs from brick surface; repoint wall. Recommend applying Weather Seal to brick after wall stabilization.	55.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT GORGE ANGLE 2-CASEMAT EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	22SF brk spalled/eroded/abrad- ed. Rising damp in wall, noted by wet stains on wall surface coorelates to earth cover abut ting wall. Repoint in 2-5 yrs	Remove earth cover back from wall, repoint entire wall as necessary. Recommend applying Weather Seal to consolidate wall surface.	22.000	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 1 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Structural crks point to poss wall shift outward, brk is severely eroded/abraded Lt&Rt of Emb & below; needs repointg Rip-rap damaging wall	Cross-ref 4910SA10 & 4900GR17 for rip-rap recommendation. Monitor wall/consult eng. for wall problems. Hand rake joint and repoint wall. Recommend applying Weather Seal	289.950	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4111	RIGHT FACE - 2 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: U	Rip-rap in lwr wall area frac- turing brk, entire wall needs immediate repointing.	Cross-ref 4910SA10 & 4900GR17 for rip-rap recommendation. Hand rake joints of loose mat. repoint wall. Recommend apply- ing Weather Seal.	111.000	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 3 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Severe eroding/abrading of brk face, some spalling noted. Brk joints recessed 1/2"-1" depth, Rip-rap/wave action abrading fracturing wall surface	Rake all joints of loose mor- tar mat by hand, repoint wall Cross-ref 4910SA10 & 4900GR17 for riprap problem addressment Recommend apply'g Weather Seal	356.450	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 4 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Brk severely eroding/abrading, joints eroded 1/2"-1" depth; fracturing of brk from rip-rap wave action. Spalling noted, use of portland mortar in wall	Remove later portland mortar mix, hand rake loose mortar; repoint wall. Cross-ref 4910SA 10 & 4900GR17 for Rip-rap prob Recommend Weather Seal after efflorescence (salt) removal.	368.330	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 5 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	377.78SF immediate repointing; wall surface severely eroded/ abraded, 7SF spalled wall area Lwr wall rip-rap/wave action damage, can't fully assess.	Cross-ref 4910SA10 & 4900GR17 for rip-rap problem & repair Recommend applying Weather Seal.	377.780	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 6 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	219.5SF immediate repointing 3SF spalled, 1 brk wythe miss- ing from face, Rip-rap/wave action damaging wall surface.	Cross-ref 4910SA10 & 4900GR17 for rip-rap prob.; replace brk wythe w/matching unit, repoint wall. Recommend application of Weather Seal.	219.500	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 7 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	52SF of wall spalled/abraded/ fractured from rip-rap/wave action; mainly in lower wall. Wall in need of repointing.	Cross-ref 4910SA10 & 4900GR17 for addressing rip-rap problem Replace missing brk wythes w/ matching units, repoint wall. Recommend applying Weather Seal.	52.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4111	RIGHT FACE - 8 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Loss of mortar bet. brks below 1" depth; hole in brk at 7#RFC pier; Rip-rap/wave action spalling/fracturing wall	Cross-ref 4910SA10 & 4900GR17 for rip-rap work, replace brks damaged below 1 wythe, repoint wall. Recommend application of Weather Seal.	58.110	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 9 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	5SF of brk face spalled & frac tured, majority in lower lvl; Rip-rap/wave action spalling. Mortar joint loss beyond 1" in majority of wall area.	Repoint wall w/app'd mortar mix. Cross-ref 4910SA10 & 4900 GR17 for rip-rap work. Recom- mend application of Weather Seal.	130.000	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT BRICK WALL, RT FLANK EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Brk spalling in numerous areas of wall surface. Mortar eroded beyond 1/2"-1" in joints, loss of brk wythes. Structural crks from parapet to foundation.	If needed for wall stability, replace brick w/matching unit; repoint wall. Monitor crks for widening. Recommend applying Weather Seal.	1800.000	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT BRICK WALLS ---RGA-1 EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Lower wall eroded/abraded/spal ling; loss of mortar joints of 1/2"-1" depth. Structural crks in wall, particularly at angle maybe shifting.	Monitor crks for further move- ment. Remove all loose mortar mat by hand, repoint wall. Recommend apply'g Weather Seal	174.000	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT BRICK WALLS ---RGA-2 EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Lower brks eroding/abrading/ spalling, joints also. Rip-rap wave action fracturing brk. Struct crk deflection in wall corres to deflection ---RFG-1	Monitor crk for additional de- flection. Consult Struct Eng. Remove loose mortar mat thru hand raking, repoint wall. Cross-ref 4910SA10 & 4900GR17 for riprap. Apply Weather Seal	210.000	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT BRICK WALLS ---RSA-1 EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Lower brks/mortar eroding/abra ding/spalling. Rip-rap/wave action fracturing brk. 3SF brk wythes missing; struc crk may- be shifting (prev. patched)	Cross-ref 4910SA10 & 4900GR17 for rip-rap recommendation. Re move loose mortar, replace brk wythes w/matching brk, repoint wall; monitor wall for further shifting, apply Weather Seal.	198.920	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4111	SALIENT CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	6SF of spalled brk under shift crk at corner w/---LFC-9; apex Some repointed w/portland mor- tar mix. Rip-rap/wave action spall damage, lower wall 82.2SF	Monitor crk for further shift- ing of wall, stabilize before proceeding; repoint wall. Recommend applying Weather Seal.	88.200	SF	\$ 0 0 0 =====
						\$ 0
4150	POSTERN ENTRY 2#LGA-- EXT. DOOR UNIT MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Baseline brk spalling 2#LGA--B & postern arch, miss'g brk wythes in arch faces; unsupp. Ext brk faceseroded, mortar *** powdery	Match miss'g brk, insert into miss'g wythes; Monitor brk for future spalling. Hand rake all loose mortar mat, repoint with app'd mix. Recommend applying Weather Seal to exterior.	1.000	EA	\$ 0 0 0 =====
						\$ 0
3113	2ND TIER GRASS SOD/PGROUND CLASS B LAWN (GENERAL PURP GRASS-SOD CONDITION: POOR SOURCE: RATING: N	Earth over -->RFC-2 & ---RFC-1 retains moisture; seep'g down, floods area. Destroys hist mat biological growth on walls. ***	Remove earth cover, slope area to meet to lower grade area. Stabilize fill, seed & sod new slope. Clean walls w/mild de- tergent fortified w/bleach.	1.000	AC	\$ 0 0 0 =====
						\$ 0
3113	LOWER PARADE GROUND CLASS B LAWN (GENERAL PURP GRASS-SOD CONDITION: POOR SOURCE: RATING: N	Lower PGrnd is at higher elev from sand/dirt accumulation & protect historic PGrnd, pond'g water ---LFC-@ csmtes, excer- bating deterioration w/in.	Study problem to allieviate ex water retention w/o disruption of historic parade ground. If needed install perforated ground drain to drain csmtes.	1.000	AC	\$ 0 0 0 =====
						\$ 0
4110	EXT EMBRASURE FINISH EXT. WALL COVERING/SURF. PLASTER/STUCCO CONDITION: POOR SOURCE: RATING: H	Combined deficiencies; 56.1 is exposed conc. aggregate; 56.2 is missing embrasure coating to brick face. Poor quality repair and material selection	Remove all loose and unsound material, score surface for positive adhesion, repair and replace with new material matching color, consistency and finish.	112.300	SF	\$ 0 0 0 =====
						\$ 0
4113	CONCRETE COPING, GILLMORE EXT. WALL TRIM MASONRY-OTHER CONDITION: POOR SOURCE: RATING: H	Several units spalling, 2 unit on Rt Face flipped, eroding & splitting, All on Rt. Face have shifted out of position. Rt. Face severe erosion.	Two flipped pieces repaired by consolidation with reinforcing added; same treatment, spalled units. Reposition Rt. Face units; monitor all for further erosion, twice yearly.	62.440	LF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM CODE	LOCATION FEATURE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4115	LEAD ANCHORS, COPING STONE EXT. COLUMN/POST LEAD CONDITION: FAIR SOURCE: RATING: H	Two posts remain in relatively intact state but suffering from rusting/delamination of metal material. Water entry thru top.	Treat metal by electrolysis or by wire brushing to bare metal prime with rust inhibitor, paint with rustoleum or equal. Inspect yearly, paint when needed. Seal tops.	2.000	EA	\$ 0 0 0 =====
						\$ 0
4115	LEAD ANCHORS, COPING STONE EXT. COLUMN/POST LEAD CONDITION: POOR SOURCE: RATING: H	Seventeen pipes remain either flush or 2"-4" above wall top; all under rusting/delamination explosion of metal surface. Water entry through tops.	Electrolysis treat and/or wire brush, seal tops, prime with rust inhibitor, paint w/Rus- toleum or equal;Inspect yearly paint as needed.	17.000	EA	\$ 0 0 0 =====
						\$ 0
4140	EXT. CONC EMBRASURES EXT. WINDOW UNIT CONCRETE CONDITION: POOR SOURCE: RATING: H	Major exposed areas of aggre- gate, loss of plaster coating/ historic conc./aggregate to weather/elements/natural sand- blasting.	Insure no loose or unsound aggregate is in emb. surround; Repair surround as detailed in emb. surround coating section. INSPECT YEARLY, after winter season.	7.000	EA	\$ 0 0 0 =====
						\$ 0
4145	EMBRASURE HARDWARE EXT. WINDOW HARDWARE METAL-CASE IRON CONDITION: POOR SOURCE: RATING: H	1 remain may not be original, all others just remain in sur- face of embrasure top; severe rusting/exploding of metal, loss of historic fabric.	Chemically strip metal, wire brush to bare metal, prime w/ rust inhibitor, paint w/rus- toleum or equal. Inspect yearly; repeat above procedure every 10 years.	3.000	EA	\$ 0 0 0 =====
						\$ 0
4155	EXTERIOR METAL HARDWARE EXT. DOOR HARDWARE METAL-CASE IRON CONDITION: POOR SOURCE: RATING: H	1. Sallyport floor bolt scrap- ing cistern flr (throw bolt). 2. Mag. threshold & hinges rusting/exploding, in severe state of erosion.	1. Realign/adjust bolt, paint all bolts as necessary. 2. Treat metal in-place, wire brush to bare mtl, prime (rust inhibitor), paint w/rustoleum or equal, Inspect yearly.	11.000	EA	\$ 0 0 0 =====
						\$ 0
4210	INT. CASEMATE PAINTING INT. WALL COVERING/SURFACE PAINT-OTHER CONDITION: POOR SOURCE: RATING: H	Casemates along Lt. Face paint ed in Apr. 1861, probably calcimine composition. Exposed to weathering; erosion of orig color/whitewashing.	Repaint with calcimine based paint or equivalent color to replicate Civil War occupation colorings.	9.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4210	OFF. QTRS. LOOPHOLES INT. WALL COVERING/SURFACE PLASTER/STUCCO CONDITION: POOR SOURCE: RATING: H	Little of plaster left in opgs What remains is unstable, poss loss in immediate future. See Fair/Serious cat. for prod mat LISTED AS EA NOT SF	Anchor remaining portion if possible or remove and catalog for museum; determine extent of mat'l found in 1959 (if possible), install new plaster to these limits.	3.000	SF	\$ 0 0 0 =====
						\$ 0
4211	INT BRK, ALL LEFT FACE INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Rising damp/salt deposits in int wall, undermining wall in- tegrity. Loss of mortar joints thru above & wind-blown eros. ***	Arrest water entry, See 4910SA 10 & 4900GR17 recommendations. Hand rake joints of loose mor- tar, repoint joints. Recommend apply'g Weather Seal to consol- idate wall, reduce erosion.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4211	INT BRICK WALL, ---LFK-a INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Moisture intrusion in walls by rising & falling damp, freeze/ thaw cycles, spalling, some non-support of brk seen. ***	Arrest water/damp intrusion. See 4360AS10, 4230CC10 for re- commendation. Remove loose mor- tar, repoint joints. Install SS plate(min. thickness) at unsupported brk, replace brk	1.000	SF	\$ 0 0 0 =====
						\$ 0
4211	INT BRICK WALL, ---LGA-a INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Rising/falling damp, spalling of brk, missing wythes (unsup- ported), 10SF of common wall & 25SF other wall areas-repoint ***	Arrest water entry, See 4360AS 10, 4312CE10, ---LGA-1 & -2. Prep. Shop Dwgs re-anchoring/ stabilizing unsupported wythes Hand rake joints of loose mat, repoint joints.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4211	INT BRICK WALL ---LSA-1 INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Shell damaged/razed csmtc brk coming loose & falling out in unsupported brk areas. Surface salts in brk w/surface erosion ***	Monitor wall for surface ero- sion, arrest salt deposition. Prepare shop dwrgs to anchor loose &/or unsupported brk, match/replace miss'g, recently loose brk, repoint.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4211	INT BRK, ALL RIGHT FACE INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Rising/falling damp in wall surfaces, seaward side & roof. Causing brk spall'g, rodded joint loss, moss growth. ***	Arrest water entry, See 4360AS 10, 4312CE10, 4910SA10, 4900GR 17 recommendations; Hand rake loose mortar, repoint w/rodded joints, wash walls w/mild de- tergent & bleach.	2.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL

4211	INT BRICK WALL ---RSA-a INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: U	Fall'g damp/water entry by sod cover above, algae growth on veneer/mortar, no spall'g seen minor loss of rodded joints. ***	Arrest water entry, See 2-GS11 4360AS10 & 4312CE10 for recommendations. Hand-rake mortar joints, repoint w/rod'd joints Wash wall w/mild detergent & fortified w/bleach.	2.000	SF	\$ 0 0 0 =====
4211	INT BRICK WALLS SALIENT INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Falling/rising damp to seaward side; from roof causing loss of rodded joints, brk spall. Moss growth on brk veneer/mortar. ***	Arrest water entry, See 4360AS 10, 4312CE10, 4910SA10, 4900GR 17 for recommendations. Hand rake joints of loose mat, re-point w/app'd mix, wash walls w/mild detergent & bleach	2.000	SF	\$ 0 0 0 =====
4221	CSMTE CLGS, BRICK INT. CEILING STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Severe brk spalling in intact csmtes from wtr intrusion & freeze/thaw cycles. Loss of brk course/struct. integrity. ***	Alleviate/arrest water intrusion, replace brick as needed for integrity of surrounding brick; repoint as spec'd previously, inspect yearly.	1.000	SF	\$ 0 0 0 =====
4230	GRASS FLOORS O QTRS/BARRAC INT. FLOOR COVERING/SURFAC GRASS CONDITION: POOR SOURCE: RATING: T	Portions of Barrack flr w/lawn covering fnd/flr remains. Root Struct. damag'g flr/fnd remain Settlement in covered areas. ***	Remove sod, dirt & sand from flr & fnd remains. Excavate & reestablish lvl surface. Keep clear of plant growth yearly. SEE 4231MA12 FOR CONNECTING WORK.	1.000	SF	\$ 0 0 0 =====
4230	CASEMATE FLOORS INT. FLOOR COVERING/SURFAC MASONRY-FLAGSTONE CONDITION: POOR SOURCE: RATING: H	---RFC-a settling: drops of 1" overall 3"-4" front to back, stone heaving/crk'g, delam. by rising/falling & stand'g water ***	Cross-ref 4910SA10, 4900GR17: rising damp; 2-GS11 & 4312CE10 for falling damp; Watch csmtes for future settlement, realign heaved stones. Explore options for clear/positive flow of wtr	1.000	SF	\$ 0 0 0 =====
4231	BRICK FLOORS: BARRACKS INT. FLOOR STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Brk flr'g at ---LFK-4 to -2 under severe erosion from ped traffic, depressed 4"-6" or greater, covered in sand. ***	Remove & store brks, excavate to sound layer, establish firm fnd, relay brks. Explore establishment of elevated, non-permanent walkway across brk.	1.000	SF	\$ 0 0 0 =====

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4240	EMBRASURES-CONCRETE INT. WINDOW UNIT CONCRETE CONDITION: POOR SOURCE: RATING: H	Loss of plaster coating on ---LFK-2 except for LFK-7 & -8 accelerating exfoliation of conc. & brick aggregate.	Remove all loose material in emb. areas, apply new plaster coating with matching material and finish in approved coloration.	12.000	EA	\$ 0 0 0 =====
						\$ 0
4240	EMBRASURE SANDSTONE INT. WINDOW UNIT MASONRY-SANDSTONE CONDITION: POOR SOURCE: RATING: H	Primarily Lt.Face, Rt.Face & Lt Flank. Severe erosion/pitting of Sandstone surface by wind-blown sand, some water erosion by evaporation	Monitor stone yearly, those areas not damaged by War shall be repaired by consolidation. Arrest water intrusion, especially on the Rt. and Lt. Faces.	10.450	EA	\$ 0 0 0 =====
						\$ 0
4245	EMBRASURE HARDWARE INT. WINDOW HARDWARE METAL-CASE IRON CONDITION: POOR SOURCE: RATING: H	Emb eyeholes, Emb shields, pintle sleeves, other Emb shutter hdwe rusting, exploding, delaminating surface mtl. ***	Treat mtl for rusting; if possible electrolysis treat, wire brush to bare mtl, prime w/rust inhibitor and paint w/rustoleum or eq.	1.000	EA	\$ 0 0 0 =====
						\$ 0
4260	INTERIOR FINISHES INTERIOR FINISH PAINT-OIL CONDITION: POOR SOURCE: RATING: H	Existing, remaining ironwork hardware in embrasures; consists of emb. shields and shutter anchors, rusting and bare metal.	Wire brush and scrap metal to bare surface, treat and prime with rust inhibitor, paint w/ black rustoleum or equal.	130.000	SF	\$ 0 0 0 =====
						\$ 0
4315	BRICK PARAPET PARAPET MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Loss of brick and mortar 1.9 SF on LFC, .18 SF on RFC needs repointing, 2 SF mortar in 1902 parapet on LFC. Cross-ref Featloc. 4352CL11, ME18 & ME21	Patch brick with closely matching replacement, repoint joint with portland based mixture, portland not to exceed 20% of the total volume of sand, lime and cement mixture.	4.000	SF	\$ 0 0 0 =====
						\$ 0
4350	MINING CASEMATE DRAINAGE DRAINAGE SYSTEM CLAY-CERAMIC CONDITION: POOR SOURCE: RATING: H	Original tiles are cracked, spalling, retaining water w/o draining to parade drains.	Repair with consolidated material. Remove all low spots and create positive flow to parade ground drains	10.000	EA	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS--

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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CRITICAL						
4350	CAST-IRON DRAINS DRAINAGE SYSTEM METAL-CASE IRON CONDITION: POOR SOURCE: RATING: H	Two drain caps missing from casemate roofs; one clogged w/ sand, one does not have drain or opening through brick.	Clear all drain pipe entries. Create drainage point at rebuilt casemate at gutter low-point (8#LFC---). Connect new drain lines at rebuilt casemates.	3.000	EA	\$ 0 0 0 =====
						\$ 0
4351	METAL DOWNSPOUTS GUTTER/DOWNSPOUT METAL-GALVANIZED STE CONDITION: POOR SOURCE: RATING: N	Piping not connected in some locations. Many pipes are clogged/stopped up; not draining to below ground cisterns. ***	If necessary, remove piping, unclog drains, create positive and clear flow to cisterns; reconnect all pipes and replacing piping where and if needed	1.000	LF	\$ 0 0 0 =====
						\$ 0
4360	ASPHALT/CEMENT ROOF FINISH ROOF FINISH ASPHALT CONDITION: POOR SOURCE: RATING: H	Historic waterproof parging system no longer performing. water seepage damaging lower csmtes. Crks in csmte roofs. ***	Retain hist. fabric; explore use of PRO-SO-CO Consolideck H40 for sealing/consolidating fabric. Widen crks, install backer rod, seal w/elastomeric sealant.	3.000	SF	\$ 0 0 0 =====
						\$ 0
4410	EXT. FOUNDATION COVERING FOUNDATION WALL COVERING/S MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Known missing in ---RGA-a allowing foundations to be undermined.	Remove random Rip-Rap, replace similar to original construct. Search for other missing areas and replace as noted above.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4410	EXT. FOUNDATION COVERING FOUNDATION WALL COVERING/S MASONRY-GRANITE CONDITION: POOR SOURCE: RATING: H	Portions known missing @ (---RGA-a) causing foundation to be extremely vulnerable to wave erosion. Other areas may be missing, are unaccessible.	Remove existing random granite Rip-Rap and replace with granite similar to original const. Survey for additional missing areas.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4460	EXT. FOUNDATION ROCK FOUNDATION FINISH MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Remaining Granite Foundation Finish is not coverig brick foundation all around perimeter of scarp wall.	Inventory perimeter more thoroughly and treat any additional missing material the same as noted in 4460MA19-POOR	6470.950	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
4460	EXT. FOUNDATION ROCK FOUNDATION FINISH MASONRY-GRANITE CONDITION: POOR SOURCE: RATING: H	No Foundation Covering at ---RGA-a, (& some missing a ---LFC-a) exposing foundation to being undermined by the shifting sand caused by tides.	Replace immediately with Granite Material similar to Original Construction. (after removing random Rip-Rap)	48.250	SF	\$ 0 0 0 =====
4520	IRON TRAVERSES BUILT-IN FURNISHING METAL-WROUGHT IRON CONDITION: POOR SOURCE: RATING: H	Units delaminated/rusted to one layer, many sit in water or under high moisture/humid- ity content, prevalent on Lt. & Rt. Faces.	Remove/arrest water source as addressed in Harbor and Lawn sections. Treat iron w/elect'l brush to bare metal, prime & paint w/rustoleum or equal. Inspect yearly.	13.050	EA	\$ 0 0 0 =====
4900	NON HISTORIC RIP-RAP GENERAL BUILDING RIP RAP CONDITION: POOR SOURCE: RATING: N	Granite Rip-Rap added to orig. fnd covering; water action damaging brick veneer, cutting fracturing veneer ***	Remove all Non Historic Gran. Rip-Rap where it touches Ext Brk Scarp Wall.	1.000		\$ 0 0 0 =====
4420	INTERIOR PIERS AT LINE EF PIER MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Surface remains of piers at 3#LFC, 5#LFC & 7#LFC-EF. Wind- blown erosion; traffic erosion Pgrnd lvl chg, root struc dam- aging fabric.	Expose buried piers and keep clear. Reduce pedestrian traf- fic across remains.	3.000	EA	\$ 0 0 0 =====
4420	BUTTRESS PIERS-FND REMAINS PIER MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Buttress Pier fnds under heavy pedestrian traffic. Pgrnd lvl change, remains barely to non- visible. Root structure damag- ing to remains.	Excavate sand/dirt build-up, Reduce heavy visitor flow across remains. Keep clear of sand, dirt & debris monthly in warm seasons.	8.000	EA	\$ 0 0 0 =====

CRITICAL TOTAL: \$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4111	EXT BRICK WALL @ GORGE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brk surfaces severely damaged by bombardment; eroded/abraded brk; spalling, past repoint'g w/portland content cement, numerous structural crks in brk	Monitor crks for separation, widening, shifting. Remove later mortar, rake joints by hand & repoint mortar joints. Recommend applying weather seal to wall surface.	1000.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 1 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Structural cracks in masonry prev. patched, but show signs of active movement; could be related to thermal movements or differential settlement	Monitor cracks carefully for movement. See poor category for additional work.	4.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 2 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Brick face split/sheared off by rip-rap/wave action; 1 SF of veneer spalled, indications of 1902, 1940s, and 1960s repointing.	Cross-ref to 4910SA10 and 4900 GR17 for proposed recommendations. Recommend application of weather seal after repointing of wall surface.	1.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 3 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Repointed in past w/portland based mortar, wall will probably need repointing w/in next 2-5 years.	Monitor repointed portland areas for signs of degradation. Remove portland mortar mix and repoint wall.	100.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 4 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Cable anchor in wall, 3 holes ea 1-1/2" to 2" dia. Previous repointing, will probably need repointing in 2-5 years.	Remove cable anchor, fill all holes w/brick consolidated mat. Repoint wall when needed.	1.000	SF	\$ 0 0 0 =====
4111	LEFT FACE - 6 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	8 SF of 1959 portland repointing, 2 SF of fracture damage from Rip-rap emplacement. Wall will need repointing in 2-5 years.	Monitor portland repointing area for spalling damage, remove portland mortar & repoint wall w/in 2-5 year period. Recommend apply'g weather seal for wall consolidation.	10.000	SF	\$ 0 0 0 =====

--WORK RECOMMENDATIONS--

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4111	LEFT FACE - 7 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	1 SF of spalled brick below parapet level above center of Emb., Wall will need repoint'g in 2-5 years.	Monitor brick for future spall ing. repoint wall w/in 2-5 years. Recommend application Weather Seal to consolidate wall.	239.680	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FACE - 8 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Structural crk seems stable, Rip-rap, wave action has frac- tured wall surface at fnd; Wall will need repointing in 2-5 years.	Monitor crk, cross-ref to work in 4910SA10 and 4900GR17 for Rip-rap/wave action wall sur- face degradation; repoint wall in 2-5 years recommend apply- Weather Seal.	7.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FACE - 9 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	3 Cracks notated in wall above Emb opg., Entire wall will need repointing in 2-5 years Face shifted, brk area patched w/portland mortar mix.	Monitor all cracks for separa- tion, repoint wall w/in time frame noted. Remove high port- land content mix, repoint wall	253.980	SF	\$ 0 0 0 =====
						\$ 0
4230	LEFT FACE CASEMATES-ALL INT. FLOOR COVERING/SURFAC MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Rear portion of flr severely settled at outer pier line. Pgrnd grade at higher elev. Ponding after heavy rains, ex- tends beyond trav, lasts days	Excavate Pgrnd to elev lower than casemates. Insure clear & positive drainage. If needed, excavate brk flr, create new lvl sub-base, re-lay flr.	81.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 2 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	1SF of wall repointed c. 1959 w/overlapping joints, portland mortar mixture. 56SF is spall ing and badly weathering.	Monitor wall for any signs of deterioration, i.e., addition- al spalling, fracturing of brk etc.; recommend application of Weather Seal.	57.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 3 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	100SF of wall is badly spalled weathered/eroded; joints are tight, very little loss of material, compression.	Monitor wall for additional surface loss, loss of mortar joints; repoint as needed. Recommend applying Weather Seal to consolidate/seal wall.	100.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4111	LEFT FLANK - 5 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	54SF of wall area spalled/ eroded/weathered. 2SF of wall area needs immediate repoint'g Crk in wall below Emb to fnd. Wall repoint'g in 2-5 years	Repoint 2SF of wall area immed iately, remainder w/in 2-5 yrs Monitor wall for movement &/or further spalling. Recommend application of Weather Seal.	56.000	SF	\$ 0 0 0 ===== \$ 0
4111	LEFT FLANK - 6 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	292.34SF severely eroded/spall /abrasion, 96SF prev. repoint in portland mortar; repoint wall remainder in 2-5 years	Monitor wall for further loss of veneer, especially at port- land mortar areas. Remove port land mortar, repoint w/in 2-5 years. Recommend application of Weather Seal.	292.340	SF	\$ 0 0 0 ===== \$ 0
4111	LEFT FLANK - 8 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	96SF prev. repointed painted sign area, 12 SF will need re- pointing w/in 2-5 years.	Monitor 96SF area for degrada- tion/spalling of wall surface Repoint 12SF w/in time frame noted or sooner if needed.	108.000	SF	\$ 0 0 0 ===== \$ 0
4111	LEFT GORGE ANGLE 2-CASEMAT EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Structural crk correlates to crk in ---LGA-1, 2SF of brick needs repointing in 2-5 years	Monitor cracks for further separation, stabilize as need- ed, Repoint wall in area need- ed w/in 2-5 years.	2.000	SF	\$ 0 0 0 ===== \$ 0
4111	LEFT SHOULDER ANGLE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Structural crk in wall, para- pet to fnd.; rip-rap covers base, some rip-rap/wave damage to fnd, 2SF +/- needs repoint- ing.	Monitor wall crk for further sep.; Cross-ref to 4910SA10 & 4900GR17 for rip-rap recommen- dation; Repoint wall after any stabilization is undertaken.	6.000	SF	\$ 0 0 0 ===== \$ 0
4111	RIGHT FACE - 2 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: U	Upper wall brk & mortar erod- ing. 172SF brk 1902 or later replacement w/portlant cement mortar; Wall needs repointing.	Remove later mortar mix, hand rake joints & repoint wall. Recommend applying Weather Seal to consolidate brk/mortar surfaces.	119.000	SF	\$ 0 0 0 ===== \$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4111	RIGHT FACE - 6 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brick eroding by natural sand- blasting; prev. repointing w/ portland content mortar, wall will need repointing w/in 2-5 years.	When remaining wall needs re- pointing, remove portland con- tent, repoint entire wall. Recommend apply'g Weather Seal for wall consolidation.	146.300	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 7 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Entire brk wall surface under wind/sea erosion, mortar joint eroded by 1/2" or more. Separ- ation crk viewed in face. 20SF repointed w/portland in past.	Monitor crk for further separ- ation, stabilize. Remove port- land mixture & repoint wall in in 2-5 years. Recommend apply- ing Weather Seal	312.780	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 8 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brick face is severely eroded and abraded w/80% veneer loss from wind/sea action; salt deposits evident on wall from these actions.	Monitor wall for future degra- dation. Replace brks where whole units have been lost, matching in color and consis- tency, Recommend application of Weather Seal.	290.540	SF	\$ 0 0 0 =====
						\$ 0
4111	RIGHT FACE - 9 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	60% of brk face above rip-rap line is severely eroded/abrad- ed, repointed previously with portland mortar; lateral shift crk 3'below para, 11' horz.	Stabilize shift crk, monitor portland repoint'g areas for further wall degradation. Recommend application of Weather Seal.	165.380	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT BRICK WALL, RT FLANK EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Mortar & brk suffering from wind-blown sand, abrading & eroding surface/joints.)PGrnd Lawn area moisture from above seeps thru wall ---RfK-a.	Monitor brick for further ero- sion of surface veneer. Recom- mend applying Weather Seal and removal of earth fill behind ---RfK-a to allievate water seep.	900.000	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT BRICK WALLS ---RGA-1 EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Wall repointed in past w/port- land content mortar w/joints overlapping brk face; found in mid-wall, full length. Entire wall needs repoint'g 2-5 years	Remove portland mortar from brk face and joints. Rake out loose joints by hand, repoint wall w/portland based mortar w/ portland not exceeding 20% of total lime, sand, & cement.	174.770	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4111	EXT BRICK WALLS ---RGA-2 EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Upper wall repointed prev. w/ portland mortar & extends down into some of lwr wall portion. Wall repoint'g slated in 2-5 years.	Remove portland mortar from joints using hand methods; re- point wall insuring no overlap of mortar onto adjacent brks.	209.050	SF	\$ 0 0 0 =====
						\$ 0
4111	SALIENT CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	274SF of wall needs repointing w/in next 2-5 years; some brk repointed w/portland content mortar.	Monitor wall surface repointed w/portland content for spall- ing; repoint wall. Recommend applying Weather Seal.	191.800	SF	\$ 0 0 0 =====
						\$ 0
4150	POSTERN ENTRY 2#LGA-- EXT. DOOR UNIT MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Algae growth at baseline brk wall int. side 2#LGA--B; brk loss at Gillmore door hinge loss of upper brk support. ***	Arrest water entry, See 4230CC 10. Monitor missing brk areas for loosening up'r courses; prep shop dwg to reanchor brk, OR, replace miss'g brk wythes. Clean brk w/detergent & bleach	1.000	EA	\$ 0 0 0 =====
						\$ 0
4211	2ND TIER INT CONC SCARP WA INT. WALL STRUCTURE CONCRETE CONDITION: POOR SOURCE: RATING: H	Eastern end towards ---RSA-1 is breaking down/apart, many aggregate pcs loose from loss of brk coping & nat sandblst'g ***	Research appropriateness of adding PRO-SO-CO's Siloxane sealant for stemming further fabric loss; monitor wall sur- face yearly for further fabric loss and deterioration.	2.000	SF	\$ 0 0 0 =====
						\$ 0
4210	2ND TIER CEMENT WALL COATI INT. WALL COVERING/SURFACE CEMENT CONDITION: POOR SOURCE: RATING: H	Cement coming off, allow'g wtr to penetrate behind coating & into brk surface entrap'g wtr & causing spalling lwr csmtes. ***	Remove all flaking cement and patch insuring positive anchor of new surface coat. Areas of major cracks/separations, in- stall backer-rod and seal with elastomeric sealant.	2.000	SF	\$ 0 0 0 =====
						\$ 0
4211	2ND TIER INT BRK SCARPWALL INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Loose/miss'g brk @ ang corners & mortar joint separation crks in wall. Water entry points to lower wall w/mortar joint loss ***	Replace missing brk w/matching units, repair/repoint joints as needed.	2.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS--

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
3113	LOWER PARADE GROUND CLASS B LAWN (GENERAL PURP GRASS-SOD CONDITION: FAIR SOURCE: RATING: N	Right PGrnd at front of Huger (Bottom of slope) is ponding water RFC-2, particularly at csmtes ---RFC -9,-8, &-7. Sand/dirt build-up in csmtes.	Study problem & prepare plans to provide clear and positive drainage of csmtes. If needed install new drains and pipes. Keep csmtes clear of sand/dirt yearly.	1.000	AC	\$ 0 0 0 =====
						\$ 0
3113	LOWER PARADE GROUND CLASS B LAWN (GENERAL PURP GRASS-SOD CONDITION: FAIR SOURCE: RATING: N	Sand/dirt buildup has hidden fnds in officers' qtrs & brks. Root structure has deleterious effect on masonry.	Expose fnd remains, keep clear of sand/dirt accumulation on a yearly basis.	1.000	AC	\$ 0 0 0 =====
						\$ 0
3361	GILLMORE RETAINING WALL RETAINING WALL MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	---LFC-8: lintel failure w/crk from wall apex to stl lintel. ---RFC-1: Rear retaining wall broken/steps down from right to left, retains earth slope	---LFC-8: Cross-ref to 4250ME 18, repoint joints, apply new cement cover. ---RFC-1: Moni- tor wall for erosion of joints & loss of fabric.	322.000	SF	\$ 0 0 0 =====
						\$ 0
4411	GILLMORE RETAINING WALL FOUNDATION WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Bricks missing in retaining wall foundations, a few found loose, mortar missing in some joints.	Replace missing brks w/close matching replacements. Repoint joints with mortar matching to that used in the Gillmore Reconstruction.	8.500	SF	\$ 0 0 0 =====
						\$ 0
4110	EXT EMBRASURE FINISH EXT. WALL COVERING/SURF. PLASTER/STUCCO CONDITION: FAIR SOURCE: RATING: H	Cement coating is loose on many embrasures. Material may slough off within the next 2-5 years.	Monitor coatings for further sloughing. When necessary remove to sound layer, score for positive anchor and re- patch matching to existing consistency and color.	39.700	SF	\$ 0 0 0 =====
						\$ 0
4111	EXT GORGE WALL; CONC PORTI EXT. WALL STRUCTURE CONCRETE CONDITION: POOR SOURCE: RATING: N	Deflection in wall from earth fill behind. Earth fill part of Huger completion. ***	Monitor wall for further deflection. If movement noted, excavate earth under controled archaeological dig and stabil- ize wall.	2.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4130	ESPLANADE EXT. FLOOR COVERING/SURFAC MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Esplanade is being covered w/ sand by tides and covering up orig fabric. Plant material growing in joints. Natural Elements undermining fnd?	Remove sand & plant growth & investigate building protect- ive shoal/levee outboard of esplanade to protect same of further sand deposits.	8489.610	SF	\$ 0 0 0 =====
						\$ 0
4130	ESPLANADE EXT. FLOOR COVERING/SURFAC MASONRY-GRANITE CONDITION: POOR SOURCE: RATING: H	Portions of esplanade at ---RGW-1 & -2 missing exposing foundation, possibly undermin- ing fnd by tidal action.	Replace missing pcs w/material similar to original. Portions may be salvaged from beach in front of esplanade.	370.830	SF	\$ 0 0 0 =====
						\$ 0
4140	EXT. CONC EMBRASURES EXT. WINDOW UNIT CONCRETE CONDITION: FAIR SOURCE: RATING: H	Aggregate exposed minimally to elements/weather/natural sand- blasting; loss of exterior plaster coating. Not enough aggregate exposed for repair.	Monitor emb. surfaces for fur- ther loss of coating/exposure of conc. aggregate; repair when needed or if aggregate material loss is seen. INSPECT YEARLY, after winter season.	12.000	EA	\$ 0 0 0 =====
						\$ 0
4145	EMBRASURE HARDWARE EXT. WINDOW HARDWARE METAL-CASE IRON CONDITION: FAIR SOURCE: RATING: H	2 intact embrasure shutter eyes, 1 partial, rusting.	Chemically strip, wire brush to bare metal, prime w/rust inhibitor, paint w/rustoleum or equal, inspect yearly; re- paint as necessary; repeat above procedure every 10 years	3.000	EA	\$ 0 0 0 =====
						\$ 0
4155	EXTERIOR METAL HARDWARE EXT. DOOR HARDWARE METAL-CASE IRON CONDITION: FAIR SOURCE: RATING: H	Minor rusting of metal work on doors and assembly; some evi- dence of metal work exploding	Remove rust to bare metal, prime w/rust inhibitor, paint w/rustoleum or equal. Inspect metal surfaces yearly, repaint as needed.	32.000	EA	\$ 0 0 0 =====
						\$ 0
4210	INT. CASEMATE PAINT INT. WALL COVERING/SURFACE PAINT-OIL CONDITION: FAIR SOURCE: RATING: H	Paint washing off of ex brk surface. Some paint historic, some non-his-toric. Non-his- toric applied over historic. ***	Monitor painted surfaces for further erosion and washing. Cross-ref 4210PA99 for calci- mine paint notes & recommen- dations.	1.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS--

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4210	OFF. QTRS. LOOPHOLES INT. WALL COVERING/SURFACE PLASTER/STUCCO CONDITION: FAIR SOURCE: RATING: H	Most intact of plaster surface areas in loophole window opgs. Many unsound areas in plaster, some exfoliation/loss of mat. LISTED AS EA NOT SF	Monitor surface for further loss of material; reattach unsound mat w/plaster washers anchored into brick; apply new finish coat over remainder if proven loss recent (Post-1898)	2.000 SF	\$	0 0 0 =====
4211	INT BRK, ALL LEFT FACE INT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Shell damage with miss'g brk wythes in wall faces & arches Some areas unsupported, allows brk to fall out. ***	Monitor walls w/miss'g wythes for further loss. Prepare shop dwgs detailing re-anchoring/re placing recently lost brks. Hand rake joints of loose mor- tar, repoint w/ app'd mix.	1.000 SF	\$	0 0 0 =====
4211	INT BRICK WALL, ---LFK-a INT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Fracturing of brk from Dec 11, 1863 explosion, Struct. crk at csmte front prob. from bombard &/or related to diff. settl'g. ***	Monitor fractured brk in areas of no corresponding support. Install SS plate (min. thick) if brks begin fall'g out. Cont crk monitor'g for any movement	1.000 SF	\$	0 0 0 =====
4211	INT BRICK WALL, ---LGA-a INT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Structural crks in brk arch @ Emb & into face, algae/moss growth on brk faces, washing of paint from brk surfaces. ***	Monitor crks-future separation Consult Engr if needed. Clean brk w/mild detergent fortified w/bleach to kill algae/moss. See Poor Work Recommendation for water arrestment.	1.000 SF	\$	0 0 0 =====
4211	INT BRICK WALLS, OFFCRS' QT INT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brick work loose from corres- ponding courses, many loosen- ing from plant growth in brk. ***	Remove plant growth from brick joints either by hand-methods or by EPA app'd herbicide. Re-anchor and repoint brick joints.	1.000 SF	\$	0 0 0 =====
4211	INT BRICK WALLS, OFFCRS' QT INT. WALL STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Magazine wall supported by two conc. post & beam. Brk at wall apex loose from corres courses Plant growth in wall surface. ***	Monitor wall for further move- ment/subsidence. Consult engr if needed. Replace & mortar loose bricks back into wall. Remove plant growth by hand or spray w/EPA app'd herbicide.	1.000 SF	\$	0 0 0 =====

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS

4218	FIREPLACES:QUARTERS/BARRAC INT. FIREPLACE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Barracks: Cast Iron Lintel/Tie Rod expanding, causing damage to brk, metal plate in top in intact Barracks fireplace. Mtl Lintel, ---LGW@ exploding	Tie-rod and ends removed perm- anently non-ferrous caps in- stalled. Remove lintels & in- stall new non-ferrous lintels. Rebuild brick jack arch; treat ex. metal and move to museum.	2.000	EA	\$ 0 0 0 =====
4221	MINING CSMT CEILING STRUCT INT. CEILING STRUCTURE CONCRETE CONDITION: POOR SOURCE: RATING: H	Structural crk in csmt clg.; corres. to crk seen in ext. mining csmt. Conc noted as exfoliat'g, expos'g aggregate ***	Insure stability of roof conc. Widen crack as necessary, insert backer rod & seal crk w/elastomeric sealant. Patch exfoliating areas w/new admix- ture, matching orig.	1.000	SF	\$ 0 0 0 =====
4221	CSMTE CLGS, BRICK INT. CEILING STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Loss of rodded joints in case- mate ceilings and growth of moss/algae on brick from water infiltration. ***	Reduce and alleviate water intrusion in csmte ceilings, repoint with portland content not to exceed 20% vol. of tot. sand, lime & cement mixture.	1.000	SF	\$ 0 0 0 =====
4230	GRASS FLOORS O QTRS/BARRAC INT. FLOOR COVERING/SURFAC GRASS CONDITION: FAIR SOURCE: RATING: T	Officers' Qtrs flr/fnd remains covered by grass. Root struc- ture damaging to tabby conc & brk. ***	Remove earth cover from all tabby & brk areas, stabilize remains as req'd or directed & app'd. Keep clear of sand/dirt yearly.	1.000	SF	\$ 0 0 0 =====
4230	INT FLAGSTONE FLR ---LSA-1 INT. FLOOR COVERING/SURFAC MASONRY-FLAGSTONE CONDITION: POOR SOURCE: RATING: H	Heavy fracturing from shelling sand load, & gravel makes area susceptible to further break- age; heavy plant growth bet. stone joints	Remove gravel fill. Spray joints with herbicide or remove plants by hand-method. Herbicides shall not damage or discolor stone in any way.	101.000	SF	\$ 0 0 0 =====
4230	CASEMATE FLOORS INT. FLOOR COVERING/SURFAC MASONRY-FLAGSTONE CONDITION: FAIR SOURCE: RATING: H	Flagstne ---LFC-@: replcmnt orig pcs press crk'g from bury ing. Ponding ---LFC-5 to-7 w/ delam. of stone. Plant growth *** between pcs.	Insure clear & positive drain- age of csmtes. Explore options to alleviate water retention in csmtes. Monitor crk'd pcs for fabric loss; remove plants w/EPA app'd herbicide.	1.000	SF	\$ 0 0 0 =====

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4230	CASEMATE FLOORS INT. FLOOR COVERING/SURFAC MASONRY-GRANITE CONDITION: POOR SOURCE: RATING: H	Cracks & shearing of granite in ---RFC-4, heaving of stone in center of ---RFC-2, possi- bly related to settlement.	Monitor cracks for further spreading; remove heaved stone determine nature of problem & reset stone in flush, plane condition.	32.000	SF	\$ 0 0 0 =====
						\$ 0
4231	BRICK FLOORS: BARRACKS INT. FLOOR STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Barrack flr'g ---LFK-5 to -7 depressed, has wind-blown ero- sion/pedestrian traffic, sand build-up; plant growth bet brk ***	Remove brk & store, excavate depressed areas, establish firm fnd, relay brk; keep sand & plants off/away from brk. Reduce pedestrian traffic thru area. SEE POOR FOR POSS. SOL.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4231	TRAVERSE MOUNTS INT. FLOOR STRUCTURE MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	1. Traverses have rust stains from deteriorating trav. mtl carriage racers. 2. Shear crks in stone, shear- of stone face in some trav.	1. No action is required since stone is not being effected adversely, leave as is. 2. Monitor stones for shear'g of face, large pcs reattach w/ SS rods, epoxy jointing.	442.000	SF	\$ 0 0 0 =====
						\$ 0
4231	TRAVERSE MOUNTS INT. FLOOR STRUCTURE MASONRY-GRANITE CONDITION: POOR SOURCE: RATING: H	Two trav stones missing/buried Portion under concrete in rear section of Lt Face casemates. Exposure may exacerbate public safety hazard, e.g., tripping	Remove conc: stone traverse surfaces; insure public safety by warning signs, possible barricading off if hazard pre- sents itself.	11.000	SF	\$ 0 0 0 =====
						\$ 0
4231	OFFICERS' QUARTERS SUBFLR INT. FLOOR STRUCTURE MASONRY-TABBY CONDITION: FAIR SOURCE: RATING: H	Lawn cover detrimental to oys- ter shell concrete, feeding off of it. ***	Remove lawn from intact areas of tabby subfloor, stabilize concrete; keep clear of sand and lawn yearly.	2.000	SF	\$ 0 0 0 =====
						\$ 0
4240	EMBRASURES-CONCRETE INT. WINDOW UNIT CONCRETE CONDITION: FAIR SOURCE: RATING: H	---LFC-a bombardment damage, some signs of erosion. ---RFC-a in very good shape, but suffering from moisture intrusion, breakdown of mater.	Monitor both areas for signs erosion and exfoliation of his- toric fabric, repair ---RFC-a embrasures only, insure firm anchoring of new face.	15.000	EA	\$ 0 0 0 =====
						\$ 0



---WORK RECOMMENDATIONS-----

MM CODE	LOCATION FEATURE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4240	EMBRASURE SANDSTONE INT. WINDOW UNIT MASONRY-SANDSTONE CONDITION: FAIR SOURCE: RATING: H	Varying deteriorations consist of high moisture infiltration, previous shell damage, fracturing and wind-blown erosion Some cracking of stone.	Monitor stone for further erosion and cracking. Moisture infiltration from sea water on Rt. & Lt Faces, and migration on Lt. Flank, arrest water intrusion.	31.700	EA	\$ 0 0 0 =====
						\$ 0
4250	MINING CASEMT DOOR OPENING INT. DOOR UNIT CONCRETE CONDITION: FAIR SOURCE: RATING: H	Water leaching through conc salt deposits forming on ceiling & on floor; drippage.	Remove salt deposits from conc using Pro-So-Co or equal line of chemical poultices and lime putty remover.	2.000	EA	\$ 0 0 0 =====
						\$ 0
4250	DOOR 8#LFC--- INT. DOOR UNIT CEMENT CONDITION: FAIR SOURCE: RATING: H	Steel lintel deteriorating in header opening. Rust expanding mtl, lintel failure, crks in wall graduating from arch to lintel	Replace with stainless steel lintel, prime and paint with appropriate black paint per manufacturer's recommendations	1.000	EA	\$ 500 150 195 =====
						\$ 845
4260	INTERIOR FINISHES INTERIOR FINISH PAINT-OIL CONDITION: FAIR SOURCE: RATING: H	Paint on embrasure openings is slowly eroding, beyond exfoliation of conc. coating.	Record and chemically analyze embrasure coloring, restore color to repaired embrasure coatings, past and future.	970.000	SF	\$ 0 0 0 =====
						\$ 0
4311	MINING CASEMATE STRUCTURE ROOF STRUCTURE CONCRETE CONDITION: FAIR SOURCE: RATING: H	Struct. crk in conc. perpendicular to arch ridgeline; through cmste underside. Spalling/exfoliation, hairline crk'g:conc ***	Monitor crk for further sep & stability, when determined install backer rod & seal crk w/ elastomeric sealant. Repair spalled areas & apply new cement skim coat.	3.000	SF	\$ 0 0 0 =====
						\$ 0
4311	EXPOSED BRICK ROOF STRUCTURE ROOF STRUCTURE MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Loose and/or missing brick allowing water to enter ceilings and/or walls. ***	Replace all missing brick and/or seal up to prevent water from entering structure.	2.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4312	CEMENT/ASPHALT ROOF PARGIN ROOF SHEATHING CEMENT CONDITION: FAIR SOURCE: RATING: H	Portions letting loose in sub- structure; hollow sound when tapped. Moisture enters under, seps more, internal brk seep'g ***	New topping needs to be fully anchored to brk walls/surfaces while preserving ex.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4312	CEMENT/ASPHALT ROOF PARGIN ROOF SHEATHING CEMENT CONDITION: POOR SOURCE: RATING: H	Cement configuration trapping water and allowing it to pene- trate structure below. Other cement loose or missing. ***	Remove all loose cement and patch. To create positive drainage, score existing good cement for proper bonding and add cement coating as necessary for proper drainage.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4315	BRICK PARAPET PARAPET MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brick mortar loss, .21 SF on RFC, 2 SF at pipe on LFC and 26.5 SF at the salient angle needs repoint. ---LSA-1, WWII tower fnd allowing water entry	Replace mortar with portland based mortar mix; portland not to exceed 20% total volume of sand, lime and cement mixture Adhere to Pres. Brief No. 2. Repoint tower foundation.	29.000	SF	\$ 0 0 0 =====
						\$ 0
4322	MINING CSMT C.I. ROOF VENT ROOF VENT METAL-CASE IRON CONDITION: FAIR SOURCE: RATING: H	Front Vent edge damaged from insertion of wood block. Rear Vent has stopper at lower elevation; is retaining water in bottom.	Remove plugs from both vents; cap vents with flat plate, 1" larger than vent dia. support by 4 L straps welded in place. Leave 1" space at pipe apex.	2.000	EA	\$ 0 0 0 =====
						\$ 0
4350	CAST-IRON DRAINS DRAINAGE SYSTEM METAL-CASE IRON CONDITION: FAIR SOURCE: RATING: H	Three drain caps broken at bottom. Sand collecting at downspout inlet under cap; inadequate drainage in most casemate gutters above piers.	Inspect broken drain caps bi- yearly to insure no further deterioration occurring. Sweep and clear drains monthly for adequate drainage. Treat, prime, paint metal yearly.	18.000	EA	\$ 0 0 0 =====
						\$ 0
4352	TERRA COTTA SCUPE ---LFC-@ SCUPPER/CANALE CLAY-CERAMIC CONDITION: FAIR SOURCE: RATING: N	Scuppers added @ WWII redesign No longer perform design func- tion; loose-fitting causing water entrapment & downward migration.	Remove scuppers and infill with brick and mortar matching original; ENTERED AS EA NOT L.F.	3.000	EA	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
4352	CAST IRON SCUPPER ---LFC-3 SCUPPER/CANALE METAL-CASE IRON CONDITION: POOR SOURCE: RATING: N	Scuppers @ ---LFC-3 no longer functioning; deteriorating & having adverse effect on the masonry scarp wall. ***	Remove scupper completely and repair remaining holes.	1.000	LF	\$ 0 0 0 =====
						\$ 0
4352	PVC SCUPPERS, RT. FLANK SCUPPER/CANALE PLASTIC/VINYL CONDITION: POOR SOURCE: RATING: N	Thru-wall drain pipe; invert set too high, w/line blockage. Doesn't extend beyond wall far far enough; damp cond. in brk. ***	Correct invert elevation, insure clear & positive drain- age thru pipe; extend pipe be- yond wall surface w/min water contact on wall surface.	2.000	LF	\$ 0 0 0 =====
						\$ 0
4411	STEPPED BRICK FOUNDATION FOUNDATION WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Stepped foundation exposed by sloughing of original Granite cover, later Rip-Rap emplace- ment damaging stepped brick. ***	Seek alternative for Rip-Rap protection as noted in Harbor section. Re-establish orig. granite cover.	2.000	SF	\$ 0 0 0 =====
						\$ 0
4520	IRON TRAVERSES BUILT-IN FURNISHING METAL-WROUGHT IRON CONDITION: FAIR SOURCE: RATING: H	Rusting, exploding, delaminat- ing from water intrusion. Missing in several places w/in casemates. Rails under duress from visiting public.	Treat by electrolysis or wire brush to bare metal, prime w/ rust inhibitor, paint w/rustol eum or equal. Inspect yearly Repaint as needed; reduce foot traffic on material.	19.900	EA	\$ 0 0 0 =====
						\$ 0
4900	NON HISTORIC RIP-RAP GENERAL BUILDING RIP RAP CONDITION: FAIR SOURCE: RATING: N	Added Rip-Rap not protecting Ext. Brick Scarp wall as intended. ***	Engage an Expert to come up with a Rip-Rap design that absorbs impact of water forces acting on brk w/o causing neg. eddies & undermining fnd.	1.000		\$ 0 0 0 =====
						\$ 0
4910	HARBOR FLOOR SITE FEATURE SAND CONDITION: FAIR SOURCE: RATING: U	Harbor Floor is sloughing from dredging and natural shifting. David Richardson has noticed Dock water depth greater from 1990 to 1992.	Monitor water depth and elev- tion changes to Fort; develop plan to stem sloughing of sand bed into harbor channel such as proposed by D. Richardson, FOSU Maintenance staff.	1.000	EA	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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SERIOUS						
6430	ORIGINAL GRANITE DOCK DOCK/WHARF MASONRY-GRANITE CONDITION: POOR SOURCE: RATING: H	Material lost yearly from natural actions of wave, tides and sinking. Plant growth and sand undermining dock. QUANTITY LISTED IN SF NOT EA	Granite blocks missing since 1878 shall be re-installed to present appearance to inter- preted time. All other blocks shall be cleaned of sand/plant and inspected yearly.	105.000	EA	\$ 0 0 0 =====
4420	INTERIOR PIERS AT LINE EF PIER MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	2#LFC--- mortar loss in lower courses. @#LFC--- brks loose & sep'g from adjoin'g brks, some w/no support from lower brick courses.	Hand rake loose material, re- point w/new mortar. Install thin SS plates where brks have no support from lower courses Provide firm & positive anchor for upper courses.	5.000	EA	\$ 0 0 0 =====
4211	ALL INT L.FACE PIERS, TABB INT. WALL STRUCTURE MASONRY-TABBY CONDITION: FAIR SOURCE: RATING: H	Exposed piers open to wind- blown sandblasting, low-lying and surface level piers sus- ceptible to abrasion by man. Many covered by sand/earth.	Clear off and expose remaining piers, barricade same in a visible configuration. Monitor remains yearly and record for further material loss.	60.000	SF	\$ 0 0 0 =====
4420	BUTTRESS PIERS PIER MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Three piers excavated in 1959 being buried by Pgrnd elev chg abraded by visitor traffic, plant growth root structure damaging remains.	Excavate pier fnd remains. Reduce traffic flow across remains. Keep sand and dirt off of remains.	8.000	EA	\$ 0 0 0 =====
SERIOUS TOTAL:						\$ 845

MINOR

4111	CENTER GORGE WALL AREA EXT. WALL STRUCTURE CONCRETE CONDITION: FAIR SOURCE: RATING: H	Concrete in generally good condition in orig. Sallyport opng. All traces of orig Sally port removed. Side pilasters in sand, right of wharf.	Study and record remaining pcs of orig. sallyport. Develop plan for artifactual remains	2.000	SF	\$ 0 0 0 =====
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--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
4111	LEFT FACE - 5 CISTERN CSM EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Portland mortar repointing 1SF below rt corner of Emb, w/add- ing of new brick, c. 1959. Wall will need repointing w/in 2-5 years.	Monitor areas of portland re- pointing, exchange new brick for suitable matching replace; repoint wall after removing 1 SF of portland mortar.	1.000	SF	\$ 0 0 0 =====
						\$ 0
4230	LEFT FACE CASEMATES-ALL INT. FLOOR COVERING/SURFAC MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brk flring behind or replaced outer traverse block, settling under wind-blown sand, pedes- trian traffic-sand abrasion.	Sweep or blow sand out daily during heavy tourist months. Inspect flr yearly for signs of abrasion, excessive wear, or noticeable material loss.	616.500	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 1 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	6.25SF repointed w/high port- land content cement; structure crack in wall, possibly active	Monitor wall area for crack movement, possible spalling from portland cement. Remove portland from joints & repoint wall.	6.250	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 3 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	3SF needs repointing now, rest of wall will need repointing w/in 2-5 years.	Repoint wall section needing immediate repointing; repoint remaining wall area w/in 2-5 year time frame.	3.000	SF	\$ 0 0 0 =====
						\$ 0
4111	LEFT FLANK - 7 CASEMATE EXT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Repointed prev. with portland mortar. Lower wall elev. (emb. to fnd.) covered by earth fill Damp areas viewed in wall sur- face. Repoint wall in 2-5 yrs.	Monitor portland repointed areas for degradation of wall. When repointing needed, rake portland joints clean, repoint Monitor wall for moisture re- lated damage from earth fill.	82.300	SF	\$ 0 0 0 =====
						\$ 0
4230	BRICK CASEMATE FLOORS INT. FLOOR COVERING/SURFAC MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Plant growth between dry laid brk. Grade lvl change of Pgrnd in-filling rear of casemate, burying brk; root structure feeding on/damaging brk.	Remove plant shoots from brk joints or spray with EPA app'd herbicide. Excavate Pgrnd to inner edge of outer casemate pier, exposing brk. Keep clear of sand/debris yearly	272.000	SF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
1335	CISTERN MANHOLE COVERS MANHOLE CONCRETE CONDITION: POOR SOURCE: RATING: N	Poor replacement manholes that do not reflect historicity of the cistern slabs.	Replace with granite covers, or with granite faced concrete covers.	4.000	EA	\$ 0 0 0 =====
						\$ 0
3113	2ND TIER GRASS SOD/PGROUND CLASS B LAWN (GENERAL PURP GRASS-SOD CONDITION: FAIR SOURCE: RATING: N	Earth covering remains. Water retent/migrate in earth, poss. effect'g brk, conc, artifacts; soil press., water migrate in *** ---RFC-a wall	Engineering analysis to study buttress effect on ext. wall. Appropriate funds for exploratory excavation of any remains	1.000	AC	\$ 0 0 0 =====
						\$ 0
4411	GILLMORE RETAINING WALL FOUNDATION WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Under heavy pedestrian traffic with wind and surface carried sand present on top; abrading surface of historic fabric.	Sweep, vaccum or blow sand off of brk surface. Inspect brks & joints for erosion, repoint joints as needed. Explore alternatives for reducing wear & abrasion; Inspect yearly.	236.000	SF	\$ 0 0 0 =====
						\$ 0
4110	EXT. WALL PAINT EXT. WALL COVERING/SURF. PAINT-OIL CONDITION: FAIR SOURCE: RATING: N	Oil-based paint c.1920 located bet 6#LFK---& 0#LSA---, fading Non-historic sign, painted for warning;"cable crossing area," 1 of 2, 2nd blasted off by sea	Let it naturally erode/fade from surface.	275.000	SF	\$ 0 0 0 =====
						\$ 0
4113	CONCRETE COPING, GILLMORE EXT. WALL TRIM MASONRY-OTHER CONDITION: FAIR SOURCE: RATING: H	Cast stone is severely eroding and abrading from wind-blown sand. Previously patched and mortared, mortar is glaring white. No reinforcing in units	Monitor stone for further erosion of material. When needed patch and fill cracks with composite mortar mix that replicates original finish.	218.760	LF	\$ 0 0 0 =====
						\$ 0
4146	WIND. SILLS/RADIATING SLOT EXT. WINDOW SILL MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Radiating slots ---LFK-1 to 3 & ---LGA-2 have shear cracks ---LFC-a have bombardment shear fractures, loss was noted in ---LFC-6.	Monitor all slot sills for further cracking and shearing of material, reinstall sheared material by SS bolts set in epoxy and glued together, fill joint with consolidated mortar	7.000	EA	\$ 0 0 0 =====
						\$ 0

-----WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
4146	WINDOW SILLS-OFF. QTRS. EXT. WINDOW SILL MASONRY-MARBLE CONDITION: FAIR SOURCE: RATING: H	Gray marble cracked in two places, previously patched w/ high sand content mortar; patch used as filler, portion of marble sheared off.	Monitor marble for cracking. Remove marble piece for work; remove ex. mortar, drill rec'r holes, install epoxy coated SS rods, epoxy glue (color to match) pieces, reinstall.	1.000	EA	\$ 0 0 0 =====
4148	NEW EMBRASURE SHUTTERS EXT. WINDOW SHUTTER WOOD-TONGUE & GROOVE CONDITION: FAIR SOURCE: RATING: N	Wood embrasure covers are not historically accurate.	Replace with system similar to original embrasure shutter system.	7.000	EA	\$ 0 0 0 =====
4156	DOOR SILLS/THRESHOLDS EXT. DOOR SILL/THRESHOLD MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Excessive traffic on granite entry blocks at the magazine entries.	Monitor blocks for any dips or abrasion in surface. Explore feasibility of walkway laid on top, minimally attached to preserve element.	2.000	EA	\$ 0 0 0 =====
4210	INT. CASEMATE PAINT INT. WALL COVERING/SURFACE PAINT-OIL CONDITION: POOR SOURCE: RATING: H	Rebuilt Casemate Ceiling Struc at ---LFC-9 is not painted. ***	Paint rebuilt Casemate Ceiling to match adjacent casemates; color to match orig coloration	1.000	SF	\$ 0 0 0 =====
4210	INT. CASEMATE PAINTING INT. WALL COVERING/SURFACE PAINT-OTHER CONDITION: FAIR SOURCE: RATING: H	Casemates on Lt. Flank & Gorge angles repainted, paint wash- ing off from water intrusion. Rebuilt csmt ---LFC-9 was not repainted.	Remove/arrest water intrusion in casemates; repaint csmts w/ approved calcimine based paint or equivalent approved color.	20.000	SF	\$ 0 0 0 =====
4211	INT BRK WALLS, BARRACKS INT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brks susceptible to standing water, poss. loss of joints, tapered wall pier repointed in c. 1966-68. ***	Monitor wall for joint erosion at base, When needed, remove mortar by hand-raking, repoint	2.000	SF	\$ 0 0 0 =====

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
4211	INT CONC: GORGE SCARP WALL INT. WALL STRUCTURE CONCRETE CONDITION: FAIR SOURCE: RATING: H	Tabby Conc. of wall const & loophole filling. Eroding by wind-blown sand. To-date no indication of degradation. ***	Yearly, inspect Tabby/Oyster shell conc for degradation & loss of mat. If noted, advise Park Hist Arch Div for treat- ment plan.	2.000	SF	\$ 0 0 0 ===== \$ 0
4211	INT BRICK WALL ---LSA-1 INT. WALL STRUCTURE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Brk arches & walls remains of 1863-1865 bombardment; brk shows result of damage besides Gillmore razing. ***	Monitor wall for signs of ero- sion & deterioration of shell damaged areas.	1.000	SF	\$ 0 0 0 ===== \$ 0
4218	FIREPLACES:QUARTERS/BARRACK INT. FIREPLACE MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Fireplce foundation remains under wind-blown erosion; foot traffic abrasion. Plant growth in some fireplace units.	Remove all plant growth from fireplaces. Make accessible fireplaces in barrack areas inaccessible; monitor brick for future abrasion.	6.000	EA	\$ 0 0 0 ===== \$ 0
4221	MINING CSMT CEILING STRUCT INT. CEILING STRUCTURE CONCRETE CONDITION: FAIR SOURCE: RATING: H	Hairline cracks in ceiling of mining casemate due to age. ***	Monitor ceiling for further separation of cracks.	1.000	SF	\$ 0 0 0 ===== \$ 0
4230	BRICK FLOOR, BARRACKS INT. FLOOR COVERING/SURFAC MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: N	Brick heaving due to uneven settlement of sand bed. ***	Monitor for visitor hazard and rebuild if necessary.	1.000	SF	\$ 0 0 0 ===== \$ 0
4230	BRICK FLOOR, BARRACKS INT. FLOOR COVERING/SURFAC MASONRY-BRICK CONDITION: POOR SOURCE: RATING: N	Brick floor holding water in heavy rains and wind-blown sand/dirt accumulating. ***	Explore alternative methods to reduce flooding of barracks floors beyond lower'g ex Pgrnd Keep area free & clear of sand & dirt accumulation.	1.000	SF	\$ 0 0 0 ===== \$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
4230	CONC. FLR, LT FLANK CSMTE. INT. FLOOR COVERING/SURFAC CONCRETE CONDITION: FAIR SOURCE: RATING: N	Moisture is entrapped by conc- rete floor and is evident in historic masonry walls that abut floor. SF based on 190' x 2" at perimeter.	Minimally, install expansion joint at perimeter to aid in dissipation of moisture. Long term, remove floor and return to hist. appearance. Monitor flr for increased moisture	32.000	SF	\$ 0 0 0 =====
4230	---LFK-8, CASEMATE FLOOR INT. FLOOR COVERING/SURFAC GRASS-OTHER CONDITION: FAIR SOURCE: RATING: T	Grass area behind brick case- mate floor, installed to sta- bilize sand, it has slowly built up over time.	Excavate area to elev below csmte floor elev, slope away from csmte, sod and seed area.	88.000	SF	\$ 0 0 0 =====
4230	INT BRICK FLOOR ---LSA-1 INT. FLOOR COVERING/SURFAC MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Abrading conditions of wind- blown sand, surface sand, and constant foot traffic. Brick is settling as it progresses to parade ground.	Monthly, remove sand from area by sweeping, vaccuming or by blowing. Of these, the least harmful is vaccuming. Period- ically check on erosion and settlement of resource.	120.050	SF	\$ 0 0 0 =====
4230	CASEMATE FLOORS INT. FLOOR COVERING/SURFAC MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Settlement of casemate floors especially at Huger construc- tion, ponding of water after heavy storms at rear. 1" drop bet trav. & flr in some csmtes	Provide clear/positive drain'g of csmtes; explore installing yard drain & pipe to cistern.	1289.000	SF	\$ 0 0 0 =====
4231	CISTERN CSMT FLR ---LFC-5 INT. FLOOR STRUCTURE MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Cistern has heave cracks from shelling. Concrete patch in the center. Rust stains from shell storage and traverse rusting.	Monitor cracks for further movements. Monitor floor for pedestrian hazards.	416.000	SF	\$ 0 0 0 =====
4231	CISTERN CSMT FLR ---LFC-4 INT. FLOOR STRUCTURE MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Multiple cracks running thru cistern floor, some vert. sep. bet. levels where crks. occur; surf. abrasion by foot traffic & barrel bolt scraping floor	Monitor surface for deterior- ation of floor thru constant foot traffic; cross-ref to 4155ME18 for floor bolt recom- mendation	10.000	SF	\$ 0 0 0 =====

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
4231	CISTERN CSMT FLR ---RFC-5 INT. FLOOR STRUCTURE MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Moist areas noted at perimeter and slab junctures, sheared faces on E(-RFC-5 & E)-RFC-5 slabs.	Monitor sheared areas for ad- ditional shearing and moist areas for increased levels. Arrest moisture intrusion by Cross-ref 4900GR17 work and by regrading parade level.	4.000	SF	\$ 0 0 0 =====
						\$ 0
4240	INT. WINDOW UNITS INT. WINDOW UNIT MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Openings at enlisted mens' barracks open to and suscepti- ble to public abuse, some loss of mortar and brick.	Repoint brick using portland content, not to exceed 20% of the total volume of lime, sand and cement content. Barricade window remains to reduce man- inflicted wear.	2.000	EA	\$ 0 0 0 =====
						\$ 0
4240	MINING CASEMATE LOUVER INT. WINDOW UNIT WOOD-FRAME CONDITION: FAIR SOURCE: RATING: U	Louvers are rotting.	Explore replacing ex. louver w/door similar to orig. Repair prime, and paint ex. louver.	1.000	EA	\$ 0 0 0 =====
						\$ 0
4245	EMBRASURE HARDWARE INT. WINDOW HARDWARE METAL-CASE IRON CONDITION: FAIR SOURCE: RATING: H	Pintle sleeves and Emb shields covered in conc., protecting feature, but causing damage by entrapped water. ***	Remove cement from mtl surface keep clear & clean of repair cement. Treat mtl electrolysis wire brush, prime w/rust in- hibitor, paint w/rustoleum or eq.	1.000	EA	\$ 0 0 0 =====
						\$ 0
4250	INT. DOOR OPNG, BRICK INT. DOOR UNIT MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Some door thresholds are miss- ing & not evident w/in QTRS/ BARRACKS areas.	Possibility of existance w/in QTRS/BARRACKS areas, explora- tory research shall be under- taken if any repair work is performed in these areas	4.000	EA	\$ 0 0 0 =====
						\$ 0
4250	INT. DOOR OPNG, BRICK INT. DOOR UNIT MASONRY-BRICK CONDITION: POOR SOURCE: RATING: H	Remants of interior door units in Barracks barely visible, buried beneath sod if any exist (located at 4#LFK--G)	Be aware of poss. remains be- fore repairing/stablizing brk Barrack flr'g.	5.000	EA	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS-----

MM	LOCATION FEATURE CODE MATERIAL/TYPE	DEFICIENCY CODE	RECOMMENDATION	QUANTITY	UN	MAT LABOR MARK-UP
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MINOR						
4255	GILLMORE DOOR HARDWARE INT. DOOR HARDWARE METAL-BRONZE CONDITION: POOR SOURCE: RATING: H	Mining casemate entry is missing corres. hinge eyes on rt jamb of mining csmte door.	Install period pcs for orig. door; check feasibility on re- introduction of 1891 door.	2.000	EA	\$ 0 0 0 =====
						\$ 0
4315	GILLMORE PARAPET PARAPET MASONRY-OTHER CONDITION: FAIR SOURCE: RATING: H	Brick missing at ---LFK-1 &-2 some portions extend into Gillmore csmte roof concrete. Believed to channel water to roof drains (not needed now)	Monitor area for loss of Gill- more conc., If further loss seen, repair conc and reintro- duce brick parapet; insure positive drainage to drains.	31.510	SF	\$ 0 0 0 =====
						\$ 0
4350	MINING CASEMATE DRAINAGE DRAINAGE SYSTEM CLAY-CERAMIC CONDITION: FAIR SOURCE: RATING: H	Hexagon tiles replacement units cemented in-place, one is spalling, one is cracked, poor replacement pieces.	Patch cracked & spalled units.	11.000	EA	\$ 0 0 0 =====
						\$ 0
4351	RECESSED DOWNSPOUTS GUTTER/DOWNSPOUT CLAY-CERAMIC CONDITION: POOR SOURCE: RATING: H	Numerous terra cotta pipes broken off, plant sprouts w/in pipes, open to public; possi- bility of vandalism, further damage.	Remove all plant growth from pipes, inside and out. Inspect & remove plant growth monthly during warm months.	7.420	LF	\$ 0 0 0 =====
						\$ 0
4351	METAL DOWNSPOUTS GUTTER/DOWNSPOUT METAL-GALVANIZED STE CONDITION: FAIR SOURCE: RATING: N	Downspouts missing paint, flaking and peeling in many areas. ***	Remove all loose paint to bare metal, prime surface and paint with black rustoleum or equal.	1.000	LF	\$ 0 0 0 =====
						\$ 0
4352	GALV. METAL PIPE/SCUPPER SCUPPER/CANALE METAL-GALVANIZED STE CONDITION: FAIR SOURCE: RATING: N	Under precast conc coping embedded in scarp wall width ---LFK3. Poss. causing damage to Scarp Wall. Crack noted beneath pipe on exterior.	Remove pipe and replace with matching brick and motar.	5.000	LF	\$ 0 0 0 =====
						\$ 0

--WORK RECOMMENDATIONS--

MM	LOCATION FEATURE	DEFICIENCY				MAT
CODE	MATERIAL/TYPE	CODE	RECOMMENDATION	QUANTITY	UN	LABOR MARK-UP
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MINOR						
4413	OFF. QTRS. FND. VENTS FOUNDATION VENT MASONRY-BRICK CONDITION: FAIR SOURCE: RATING: H	Bricked up prob'ly dur'g Civil War. Difficult to see/find on exterior face; located on wall base at ---LGW-a & a portion of ---RGW-a.	Note existance & location for any possible masonry repair and/or replacement of ext/int Gorge wall at lower level.	11.000	EA	\$ 0 0 0 ===== \$ 0
4900	ALL OF HISTORIC FORT SUMTE GENERAL BUILDING OTHER CONDITION: FAIR SOURCE: ICAP TEAM RATING: H	Note: Quantities shown as: 3 Total: 1 Good, 1 Fair, 1 Poor are generally dummy entries for access to Def. & Work Rec. Sections. -SEE EXEC. SUMMARY-	Finish compiling quantities. A LOTUS 1-2-3 spreadsheet w/ HABS field dimensions & other observations has been started but not completed. (4900XX10) is an example of this system.	1.000	EA	\$ 0 0 0 ===== \$ 0
4900	ALL OF HISTORIC FORT SUMTE GENERAL BUILDING OTHER CONDITION: POOR SOURCE: ICAP TEAM RATING: H	Note: Material and Labor cost were not within the time scope of this ICAP Report.(Also note existance of detail inventory forms for detailed inventory.)	Complete Cost and Quantiy entries. Complete detailed inventory forms.	1.000	EA	\$ 0 0 0 ===== \$ 0
5821	PUMP COVERS, BARRACKS PUMP MASONRY-FLAGSTONE CONDITION: POOR SOURCE: RATING: H	Settlement of earth under ele- ment, piece has cracked in two ***	Re-establish level surface in barracks area, reset pump stone in plane condition.	1.000	EA	\$ 0 0 0 ===== \$ 0
6430	ORIGINAL GRANITE DOCK DOCK/WHARF MASONRY-GRANITE CONDITION: FAIR SOURCE: RATING: H	Loss of finish granite blocks at end of wharf past 27'. Sand, barnacles, plant growth covering original fabric. QUANTITY LISTED AS SF NOT EA	Wharf shall be inspected on a yearly basis for further loss of stone. Sand, plants and barnacles removed to recover fabric; keep clean yearly.	1785.000	EA	\$ 0 0 0 ===== \$ 0
MINOR TOTAL: \$						0
GRAND TOTAL: \$						845

APPENDIX

V.1. IDENTIFICATION LABELLING SYSTEM

I. CATEGORY: ALL

ALL OF HISTORIC FORT SUMTER

---FOSU ALL OF HISTORIC FORT SUMTER

II. CATEGORY: ALL CASEMATE & PIERS

ALL CASEMATES & GORGE WALL AREAS IN ALL OF HISTORIC FORT SUMTER

---@@@-@ ALL CASEMATES

ALL PIERS IN ALL OF HISTORIC FORT SUMTER

@#@@@--- ALL PIERS

III. CATEGORY: GROUPED CASEMATE & PIERS ACCORDING TO LOCATION

(Locations located LEFT or RIGHT of an imaginary Centerline running from the Centerline of Exterior of the Original Sallyport (called Bottom of Axis) and continuing through the Centerline of Exterior of the Salient Casemate (called Top of Axis)).

Note: Items LEFT of Centerline are numbered Sequentially and Clockwise beginning at the Original Sallyport.

Items RIGHT of Centerline are numbered Sequentially and COUNTER- Clockwise beginning at the Original Sallyport.

ORIGINAL SALLYPORT (Bottom of Centerline Axis of Fort).....

---CT-GW ORIGINAL SALLYPORT AND CENTER OF GORGE WALL

ALL ITEMS LEFT OF CENTERLINE OF FORT

LEFT SIDE of GORGE WALL

@#LGW--- ALL LEFT GORGE PIERS
---LGW-@ ALL LEFT GORGE WALL AREAS

LEFT GORGE ANGLE

@#LGA--- ALL LEFT GORGE ANGLE PIERS
---LGA-@ ALL LEFT GORGE ANGLE CASEMATES

LEFT FLANK (Gillmore: N.W. Face)

@#LFK--- ALL LEFT FLANK PIERS
---LFK-@ ALL LEFT FLANK CASEMATES

LEFT SHOULDER ANGLE

@#LSA--- ALL LEFT SHOULDER ANGLE PIERS
---LSA-@ ALL LEFT SHOULDER ANGLE CASEMATES

LEFT FACE (Gillmore: N. Face)

@#LFC--- ALL LEFT FACE PIERS
---LFC-@ ALL LEFT FACE CASEMATES

LEFT OF SALIENT PIER

@#LOS--- LEFT OF SALIENT PIER

SALIENT CASEMATE (& Centerline Axis of Fort).....

---SALNT SALIENT CASEMATE

ALL ITEMS RIGHT OF CENTERLINE OF FORT

RIGHT OF SALIENT PIER

@#ROS--- RIGHT OF SALIENT PIER

RIGHT FACE (Gillmore: N. E. Face)

---RFC-@ ALL RIGHT FACE CASEMATES

@#RFC--- ALL RIGHT FACE PIERS

RIGHT SHOULDER ANGLE

---RSA-@ ALL RIGHT SHOULDER ANGLE CASEMATES

@#RSA--- ALL RIGHT SHOULDER ANGLE PIERS

RIGHT FLANK (Gillmore: S. E. Face)

---RFK-@ ALL RIGHT FLANK CASEMATES

@#RFK--- ALL RIGHT FLANK PIERS

RIGHT GORGE ANGLE

---RGA-@ ALL RIGHT GORGE ANGLE CASEMATES

@#RGA--- ALL RIGHT GORGE ANGLE PIERS

RIGHT SIDE of GORGE WALL

---RGW-@ ALL RIGHT GORGE WALL AREAS

@#RGW--- ALL RIGHT GORGE PIERS

IV. CATEGORY: INDIVIDUAL CASEMATE & PIERS ACCORDING TO LOCATION

(Locations located LEFT or RIGHT of an imaginary Centerline running from the Centerline of Exterior of the Original Sallyport (called Bottom of Axis) and continuing through the Centerline of Exterior of the Salient Casemate (called Top of Axis).

ORIGINAL SALLYPORT (Bottom of Centerline Axis of Fort).....

---CT-GW ORIGINAL SALLYPORT AND CENTER OF GORGE WALL
 (BATTERY HUGER In-fill)

ALL ITEMS LEFT OF CENTERLINE OF FORT

LEFT SIDE of GORGE WALL

1#LGW---	LEFT GORGE PIER # 1
---LGW-1	LEFT GORGE WALL AREA - 1 (BATTERY HUGER In-fill)
2#LGW---	LEFT GORGE PIER # 2
---LGW-2	LEFT GORGE WALL AREA - 2 (BATTERY HUGER In-fill)
3#LGW---	LEFT GORGE PIER # 3
---LGW-3	LEFT GORGE WALL AREA - 3 (Parlor)
4#LGW---	LEFT GORGE PIER # 4
---LGW-4	LEFT GORGE WALL AREA - 4 (Kitchen)
5#LGW---	LEFT GORGE PIER # 5
---LGW-5	LEFT GORGE WALL AREA - 5 (Magazine)
6#LGW---	LEFT GORGE PIER # 6
---LGW-6	LEFT GORGE WALL AREA - 6 (Magazine)

LEFT GORGE ANGLE

0#LGA---	LEFT GORGE ANGLE PIER # 0
---LGW-1	LEFT GORGE ANGLE CASEMATE - 1 [C-1]
1#LGA---	LEFT GORGE ANGLE PIER # 1
---LGW-2	LEFT GORGE ANGLE CASEMATE - 2 [C-2]
2#LGW---	LEFT GORGE ANGLE PIER # 2

LEFT FLANK (Gillmore: N.W. Face)

---LFK-1	LEFT FLANK CASEMATE - 1 [B-1]
1#LFK---	LEFT FLANK PIER # 1
---LFK-2	LEFT FLANK CASEMATE - 2 [A-1]
2#LFK---	LEFT FLANK PIER # 2
---LFK-3	LEFT FLANK CASEMATE - 3 [A-2]
3#LFK---	LEFT FLANK PIER # 3
---LFK-4	LEFT FLANK CASEMATE - 4 [A-3] (New SALLYPORT) (Cistern)
4#LFK---	LEFT FLANK PIER # 4
---LFK-5	LEFT FLANK CASEMATE - 5 [A-4]
5#LFK---	LEFT FLANK PIER # 5
---LFK-6	LEFT FLANK CASEMATE - 6 [A-5]
6#LFK---	LEFT FLANK PIER # 6
---LFK-7	LEFT FLANK CASEMATE - 7 [A-6] (Mining Csmte)
7#LFK---	LEFT FLANK PIER # 7
---LFK-8	LEFT FLANK CASEMATE - 8 [B-1]

LEFT SHOULDER ANGLE

0#LSA---	LEFT SHOULDER ANGLE PIER # 0
---LSA-1	LEFT SHOULDER ANGLE CASEMATE - 1 [C-3]
1#LSA---	LEFT SHOULDER ANGLE PIER # 1

LEFT FACE (Gillmore: N. Face)

---LFC-1	LEFT FACE CASEMATE - 1 [B-2]
1#LFC---	LEFT FACE PIER # 1
---LFC-2	LEFT FACE CASEMATE - 2 [A-7]
2#LFC---	LEFT FACE PIER # 2
---LFC-3	LEFT FACE CASEMATE - 3 [A-8]
3#LFC---	LEFT FACE PIER # 3
---LFC-4	LEFT FACE CASEMATE - 4 [A-9]
4#LFC---	LEFT FACE PIER # 4
---LFC-5	LEFT FACE CASEMATE - 5 [A-10] (Cistern)
5#LFC---	LEFT FACE PIER # 5
---LFC-6	LEFT FACE CASEMATE - 6 [A-11]
6#LFC---	LEFT FACE PIER # 6
---LFC-7	LEFT FACE CASEMATE - 7 [A-12]
7#LFC---	LEFT FACE PIER # 7
---LFC-8	LEFT FACE CASEMATE - 8 [A-13]
8#LFC---	LEFT FACE PIER # 8
---LFC-9	LEFT FACE CASEMATE - 9 [B'-2]

LEFT OF SALIENT PIER

0#LOS--- LEFT OF SALIENT PIER

SALIENT CASEMATE (& Centerline Axis of Fort)-----

---SALNT SALIENT CASEMATE

ALL ITEMS RIGHT OF CENTERLINE OF FORT

RIGHT OF SALIENT PIER

0#ROS--- RIGHT OF SALIENT PIER

RIGHT FACE (Gillmore: N. E. Face)

---RFC-9	RIGHT FACE CASEMATE - 9 [B'-3]
8#RFC---	RIGHT FACE PIER # 8
---RFC-8	RIGHT FACE CASEMATE - 8 [A-14]
7#RFC---	RIGHT FACE PIER # 7
---RFC-7	RIGHT FACE CASEMATE - 7 [A-15]
6#RFC---	RIGHT FACE PIER # 6
---RFC-6	RIGHT FACE CASEMATE - 6 [A-16]
5#RFC---	RIGHT FACE PIER # 5
---RFC-5	RIGHT FACE CASEMATE - 5 [A-17] (Cistern)
4#RFC---	RIGHT FACE PIER # 4
---RFC-4	RIGHT FACE CASEMATE - 4 [A-18]
3#RFC---	RIGHT FACE PIER # 3
---RFC-3	RIGHT FACE CASEMATE - 3 [A-19]
2#RFC---	RIGHT FACE PIER # 2
---RFC-2	RIGHT FACE CASEMATE - 2 [A-20]
1#RFC---	RIGHT FACE PIER # 1
---RFC-1	RIGHT FACE CASEMATE - 1 [A-13]

RIGHT SHOULDER ANGLE

1#RSA---	RIGHT SHOULDER ANGLE PIER # 1
---RSA-1	RIGHT SHOULDER ANGLE CASEMATE -1
0#RSA---	RIGHT SHOULDER ANGLE PIER # 0

RIGHT FLANK (Gillmore: S. E. Face)

---RFK-8	RIGHT FLANK CASEMATE - 8 (Buried)
7#RFK---	RIGHT FLANK PIER # 7 (Buried)
---RFK-7	RIGHT FLANK CASEMATE - 7 (Buried)
6#RFK---	RIGHT FLANK PIER # 6 (Buried)
---RFK-6	RIGHT FLANK CASEMATE - 6 (Buried)
5#RFK---	RIGHT FLANK PIER # 5 (Buried)
---RFK-5	RIGHT FLANK CASEMATE - 5 (Buried)
4#RFK---	RIGHT FLANK PIER # 4 (Buried)
---RFK-4	RIGHT FLANK CASEMATE - 4 (Buried)
3#RFK---	RIGHT FLANK PIER # 3 (Buried)
---RFK-3	RIGHT FLANK CASEMATE - 3 (Buried)
2#RFK---	RIGHT FLANK PIER # 2 (Buried)
---RFK-2	RIGHT FLANK CASEMATE - 2 (Buried)
1#RFK---	RIGHT FLANK PIER # 1 (Buried)
---RFK-1	RIGHT FLANK CASEMATE - 1 (Buried)

RIGHT GORGE ANGLE

2#RGA---	RIGHT GORGE ANGLE PIER # 2 (Buried)
---RGA-2	RIGHT GORGE ANGLE CASEMATE - 2 (Buried)
1#RGA---	RIGHT GORGE ANGLE PIER # 1 (Buried)
---RGA-1	RIGHT GORGE ANGLE CASEMATE - 1 (Buried)
0#RGA---	RIGHT GORGE ANGLE PIER # 0 (Buried)

RIGHT SIDE of GORGE WALL

---RGA-6	RIGHT GORGE WALL AREA - 6 (Buried)
6#RGA---	RIGHT GORGE WALL PIER # 6 (Buried)
---RGA-5	RIGHT GORGE WALL AREA - 5 (Buried)
5#RGA---	RIGHT GORGE WALL PIER # 5 (Buried)
---RGA-4	RIGHT GORGE WALL AREA - 4 (Buried)
4#RGA---	RIGHT GORGE WALL PIER # 4 (Buried)
---RGA-3	RIGHT GORGE WALL AREA - 3 (Buried)
3#RGA---	RIGHT GORGE WALL PIER # 3 (Buried)
---RGA-2	RIGHT GORGE WALL AREA - 2 (In-filled with BATTERY HUGER)
2#RGA---	RIGHT GORGE WALL PIER # 2 (In-filled with BATTERY HUGER)
---RGA-1	RIGHT GORGE WALL AREA - 1 (In-filled with BATTERY HUGER)
1#RGA---	RIGHT GORGE WALL PIER # 1 (In-filled with BATTERY HUGER)

THE JOURNAL OF THE ROYAL ANTHROPOLOGICAL INSTITUTE	
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.08 --[2ND TIER ELEVATIONS]
 .10 --[2ND TIER SCARP ELEVATIONS]
 .11 --[2ND TIER SCARP ELEVATION OF PIERS]
.09 --[BUILT-IN ARMAMENT HARDWARE]

V.2

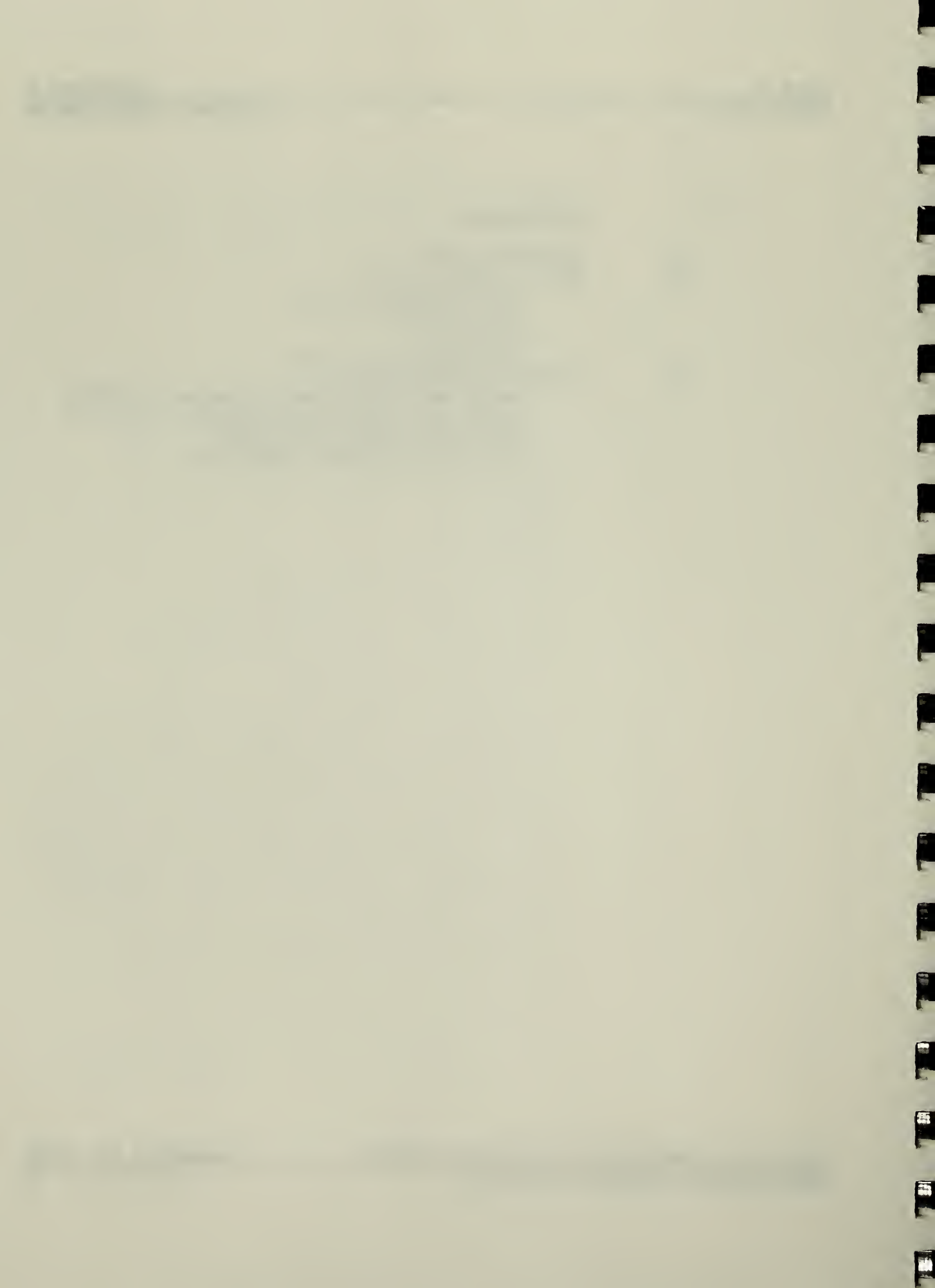
LIST OF INVENTORY FORMS

Inventory Forms are located at Fort Sumter
in the FOSU library, Visitor's Center.

- .01 --[SITE]
- .02 --[EXTERIOR FLOOR PLANS]
 - .10 --[RIP/RAP]
 - .20 --[ESPLANADE]
 - .21 --[ORIGINAL WHARF]
- .03 --[EXTERIOR WALL ELEVATIONS]
 - .10 --[EXTERIOR WALL ELEVATIONS of CASEMATES]
 - .11 --[EXT. WALL ELEVATION of @ NEW SALLYPORT]
 - .111 --[EXTERIOR WALL ELEVATION @ POSTERN]
 - .20 --[EXTERIOR ELEVATIONS of GORGE WALL]
 - .21 --[EXT. PARADE GROUND ELEV. OFFICER'S QUARTERS]
 - .30 --[EXT. PARADE GROUND ELEV. ENLISTED BARRACKS]
- .04 --[FLOOR PLANS]
 - .10 --[FLOOR PLAN OF CASEMATES]
 - .11 --[FLOOR PLAN OF CISTERN CASEMATES]
 - .121 --[FLOOR PLAN OF CIRCULAR STAIR]
 - .20 --[FLOOR PLAN OF OFFICER'S QUARTERS]
 - .30 --[FLOOR PLAN OF ENLISTED BARRACKS]
- .05 --[INTERIOR ELEVATIONS]
 - .10 --[INT. ELEV. of SCARP WALL @ CASEMATES]
 - .11 --[INT. ELEV. of PIERS @ CASEMATES]
 - .111 --[INT. ELEV. of OUTER PIERS @ CASEMATES]
 - .120 --[ELEV. of CSMTE REMAINS @ PARADE GROUNDS]
 - .121 --[ELEV. of STAIR REMAINS @ PARADE GROUNDS]
 - .20 --[INT. ELEV. of WALLS: OFFICER'S QUARTERS]
 - .21 --[INT. ELEV. of "PIERS": OFFICER'S QUARTERS]
 - .212 --[ELEV. OFFICER'S QTRS PARADE GROUND WALLS]
 - .30 --[INT. ELEV. of WALLS: ENLISTED BARRACKS]
 - .31 --[INT. ELEV. of "PIERS": ENLISTED BARRACKS]
 - .312 --[ELEV. ENLIST BARRACKS P. GROUND WALLS]
- .06 --[REFLECTED CEILING PLANS]
 - .10 --[REFLECTED CEILING PLAN @ CASEMATES]
 - .11 --[REFLECTED CEILING PLAN @ CASEMATE PIERS]
- .07 --[ROOF LAYOUT]
 - .10 --[ROOF LAYOUT of CASEMATES]
 - .11 --[ROOF LAYOUT of CASEMATES @ PIERS]
 - .20 --[ROOF LAYOUT (TOP) of OFFICER'S QUARTERS]
 - .30 --[ROOF LAYOUT (TOP) of ENLISTED BARRACKS]

V.3 MATERIALS

- .00 MATERIAL LIST
- .01 BRICK (MA12 Brick)
 - Best Carolina Grey
 - Salvageable
 - Unknown
 - Old Carolina Brick
- .02 MORTAR TYPES (>MO--)
 - Early-Mid 19th Century Mortar (Tabby)
 - Late 19th Century Portland
 - Mid 20th Century Portland
 - Late 20th Century Portland



.00

MATERIALS

>CC10 CONCRETE
>CE10 CEMENT
>CL10 Clay-ceramic
>GS10 Grass
>GS99 Other Ground Cover
>GR17 Rip-Rap
>MA12 Masonry-Brick
 Best Carolina Grey
 Salvageable
 Unknown
 Old Carolina Brick
>MA18 Flagstone
>MA19 Granite
>MA21 Marble
>MA23 Sandstone
>MA25 Tabby
>MA99 Masonry-Other (Pre-cast Concrete)
>ME18 Cast Iron
>ME19 Wrought Iron
>ME20 Lead
>ME99 Metal-Other (Woven Wire Mesh)
>MO?? MORTAR TYPES
 Early- to Mid-19th Century Mortar
 (Tabby)
 Mid- to Late-19th Century Portland
 Mid-20th Century Portland
 Late-20th Century Portland
>PA13 Paint-Oil
>PA99 Paint-Other (Calcimine Paint)
>PS10 Plaster/Stucco
>PV10 Plastic/Vinyl
>SA10 Sand
>WD12 Wood Plank/Board
>WD15 Wood Frame
>WD23 Wood Tongue & Groove

BRICK TYPES
{ICAP MATERIAL/TYPE CODE: MA12}

1. EARLY- TO MID-19TH CENTURY

1.1 FORT SUMTER ORIGINAL

A. "BEST CAROLINA GREY"

1. Material: Heavy Iron Content (Iron Spot)
2. Color:

- a. Original Brick Color varies from Orange-Red to Lt. Brown.
- b. Spalled Brick Color is Deep Red.
- c. Size: 9"x 4" x 3"
- d. Core: Solid

2. LATE-19TH CENTURY

A. REUSING OF SALVAGED BRICK

1. Documented in Gillmore Records

3. EARLY- TO MID-20TH CENTURY

A. NEW BRICK

4. MID-20TH CENTURY

4.1 1959 RESTORATION

A. MANUFACTURER UNKNOWN

5. LATE-20TH CENTURY

5.1 1991 RESTORATION (In SALIENT MAIN VAULT)

A. "OLD CAROLINA BRICK" RICHTEC?

1. The first part of the document is a list of names and addresses of the members of the committee.

2. The second part of the document is a list of names and addresses of the members of the committee.

3. The third part of the document is a list of names and addresses of the members of the committee.

4. The fourth part of the document is a list of names and addresses of the members of the committee.

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9. The ninth part of the document is a list of names and addresses of the members of the committee.

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11. The eleventh part of the document is a list of names and addresses of the members of the committee.

12. The twelfth part of the document is a list of names and addresses of the members of the committee.

13. The thirteenth part of the document is a list of names and addresses of the members of the committee.

14. The fourteenth part of the document is a list of names and addresses of the members of the committee.

15. The fifteenth part of the document is a list of names and addresses of the members of the committee.

MORTAR TYPES

1. EARLY- TO MID-19TH CENTURY

1.1 FORT SUMTER MORTAR (TABBY): Hypothetical Mix based on normal construction techniques}

A.	Sand:	1/2	Part
B.	Lime:	1/2	Part (Oyster Lime Content)
C.	Portland:	None	
D.	Water		

2. LATE-19TH CENTURY PORTLAND

2.1 Reconstruction after Civil War? Portland Cement Introduced.

A.	Sand:	1 1/2-2	Parts
B.	Lime:	1	Part
C.	Portland:	2	Parts
D.	Water		

3. MID-20TH CENTURY PORTLAND

3.1 1959 Batch Mixed (Based on DSC Specifications)

A.	Sand:	3	Parts
B.	Lime Putty	1	Part
C.	Portland:	1	Part
D.	Water		

4. LATE-20TH CENTURY PORTLAND

4.1 1991 Restoration Mortar, Hand Mixed (Source: Masonry Restoration Technician SERO Preservation Section)

A.	Sand:	2 1/2	Parts
B.	Lime:	1/2	Part
C.	Portland:	1/2	Part
D.	Water		

Mathematics - 100

Answer

1. The first part of the question

is about the area of a rectangle.

The area of a rectangle is given by

the formula: $\text{Area} = \text{length} \times \text{width}$

So, if the length is 10 and the width is 5,

the area is $10 \times 5 = 50$.

2. The second part of the question

is about the perimeter of a rectangle.

The perimeter of a rectangle is given by

the formula: $\text{Perimeter} = 2 \times (\text{length} + \text{width})$

So, if the length is 10 and the width is 5,

the perimeter is $2 \times (10 + 5) = 30$.

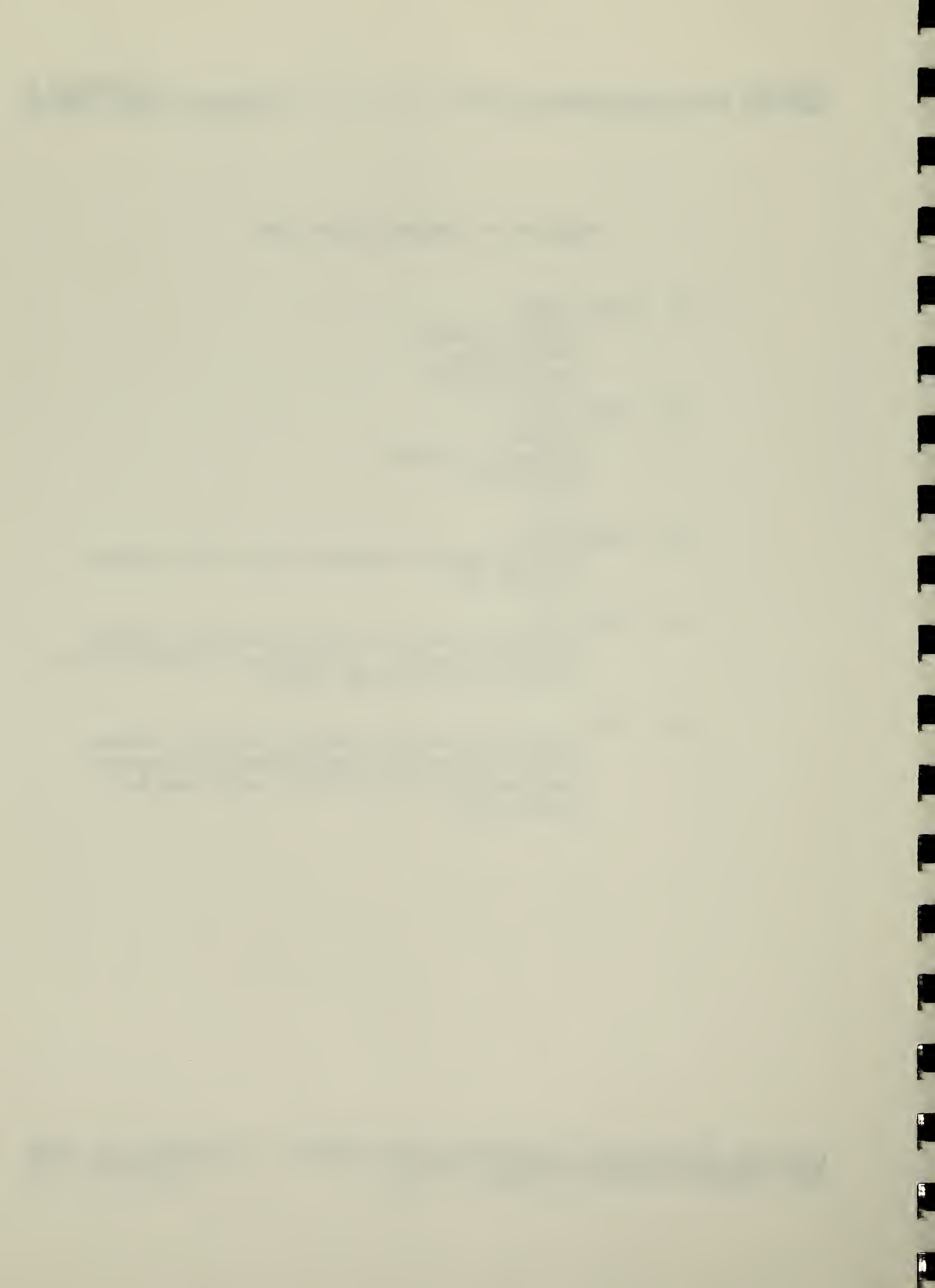
Mathematics - 100

V.4 METHODS OF CONSTRUCTION

- .00 METHODS OF CONSTRUCTION LIST
- .01 BRICK BOND
- .02 JOINT TYPES

METHODS OF CONSTRUCTION LIST

- .01 BRICK BOND
 - Soldier Course
 - Common Bond
 - English Bond
- .02 JOINT TYPES
 - Flush
 - Raised or Rodded
 - Irregular
 - Tuck
- .03 FOUNDATION
 - English Bond, stepped brick over granite foundation
- .04 SCARP WALL
 - English Bond with tabby concrete (oyster shell aggregate) interstices; constructed on foundation detailed above.
- .05 PIERS
 - English Bond with tabby concrete (oyster shell aggregate) interstices constructed (believed) over role mole and sand bed foundation.



BRICK JOINT TYPES

1. EARLY- TO MID-19TH CENTURY

1.1 FORT SUMTER ORIGINAL

A. FLUSH: Even with Brick.

2. MID- TO LATE-19TH CENTURY

2.1 REPOINTING

A. RAISED OR RODDED: Clean, squared joints that project above Brick face.

3. MID-20TH CENTURY

3.1 1959 RESTORATION

A. IRREGULAR: Irregular Random Joint overlapping Brick face; very coarse, uneven joints

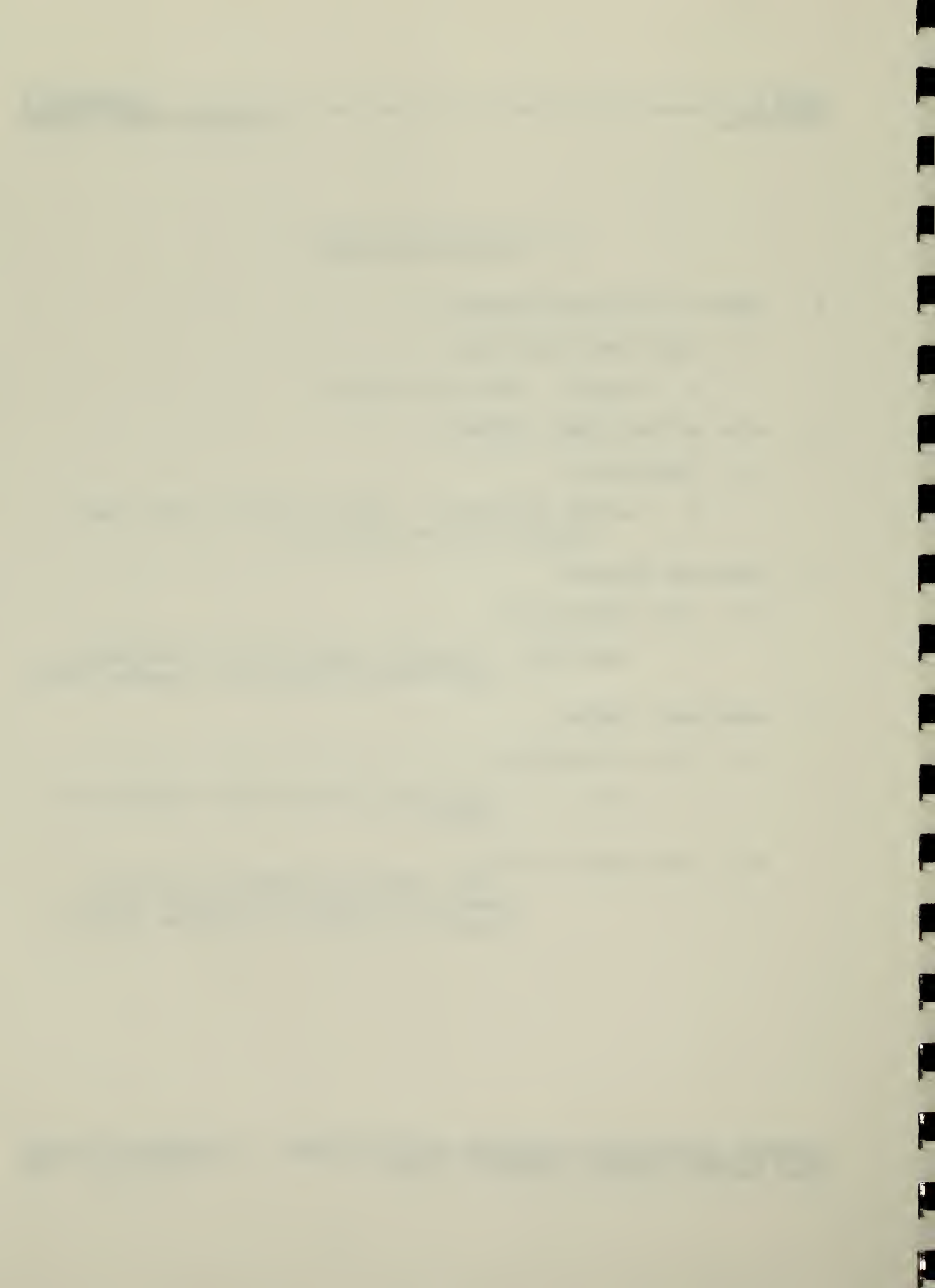
4. LATE-20TH CENTURY

4.1 1991 RESTORATION

A. TUCK: Rectangular Struck Joint inboard of Brick.

4.2 1992 RODDED JOINTS:

Test sample performed in rebuilt casemate to exhibit different mortar samples and widths of squared joints.



INTERVIEW LISTS

V.5

- .00 INTERVIEW LIST
- .01 Lewis Scott, Mason, SERO Preservation Team
- .02 Maurice Williams, 1941 Occupant at FOSU
- .03 Wayne Fanning, South Carolina Environmental
Quality Control

INTERVIEW: MASON, SOUTHEASTERN REGIONAL OFFICE PRESERVATION TEAM

Interview with Lewis Scott, Mason, SERO Preservation Team
17 June 92 by Steve Clark

Discussed with Mr. Scott what was found when dismantling the brick casemate and arch. He stated that there appeared to be a difference between mortar types in the brick as he progressed from exterior brick to interior. He indicated there were possibly two different types of mortar composition, i.e. one was later repointing. The interior mortar appeared to be a heavy lime and sand mixture. The exterior was portland, lime and sand mixture.

NOTE: This could be repointing from 1870's but also from 20th century. It could be that the interior mortar is part of the original mortar and is composed of "Tabby," i.e. high oyster shell lime, sand, and water used.

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1801.

2. The second part is a report from the Secretary of the Treasury, dated January 1, 1801.

3. The third part is a report from the Secretary of the Navy, dated January 1, 1801.

4. The fourth part is a report from the Secretary of the War, dated January 1, 1801.

5. The fifth part is a report from the Secretary of the Interior, dated January 1, 1801.

6. The sixth part is a report from the Secretary of the State, dated January 1, 1801.

7. The seventh part is a report from the Secretary of the War, dated January 1, 1801.

8. The eighth part is a report from the Secretary of the Navy, dated January 1, 1801.

9. The ninth part is a report from the Secretary of the Treasury, dated January 1, 1801.

10. The tenth part is a report from the Secretary of the State, dated January 1, 1801.

11. The eleventh part is a report from the Secretary of the War, dated January 1, 1801.

12. The twelfth part is a report from the Secretary of the Navy, dated January 1, 1801.

13. The thirteenth part is a report from the Secretary of the Treasury, dated January 1, 1801.

14. The fourteenth part is a report from the Secretary of the State, dated January 1, 1801.

15. The fifteenth part is a report from the Secretary of the War, dated January 1, 1801.

16. The sixteenth part is a report from the Secretary of the Navy, dated January 1, 1801.

17. The seventeenth part is a report from the Secretary of the Treasury, dated January 1, 1801.

INTERVIEW: 1941 OCCUPANT: MR. MAURICE WILLIAMS

Mr. Maurice Williams was stationed at Fort Sumter as a Army Medic in 1941. On 2 August 1992, Mr. Williams visited the fort (via Fort Sumter Tours, Inc.) for the first time since he was stationed there. He informed his presence to Ms. Shari North, Seasonal Ranger, who in turn informed Jim Wylie, who was at the fort working on the 1992 Historic Structure Assessment Report. Mr. Wylie helped Mr. Williams get his bearings in the much changed Fort (since 1941).

All the Left Flank Casemates had curved brick retaining walls on the parade ground side with dirt against them and on top of the vaults. This resulted in a higher elevation on the entire Left Side. A tunnel led from the Left Flank -4 Casemate (New Sallyport) to the higher parade ground.

Mr. Williams recalled living in the Left Flank Casemates which housed sleeping quarters, kitchen and the dispensary. About 40 men were stationed at the fort and they all lived there except for the personnel living then in the wooden structures above.

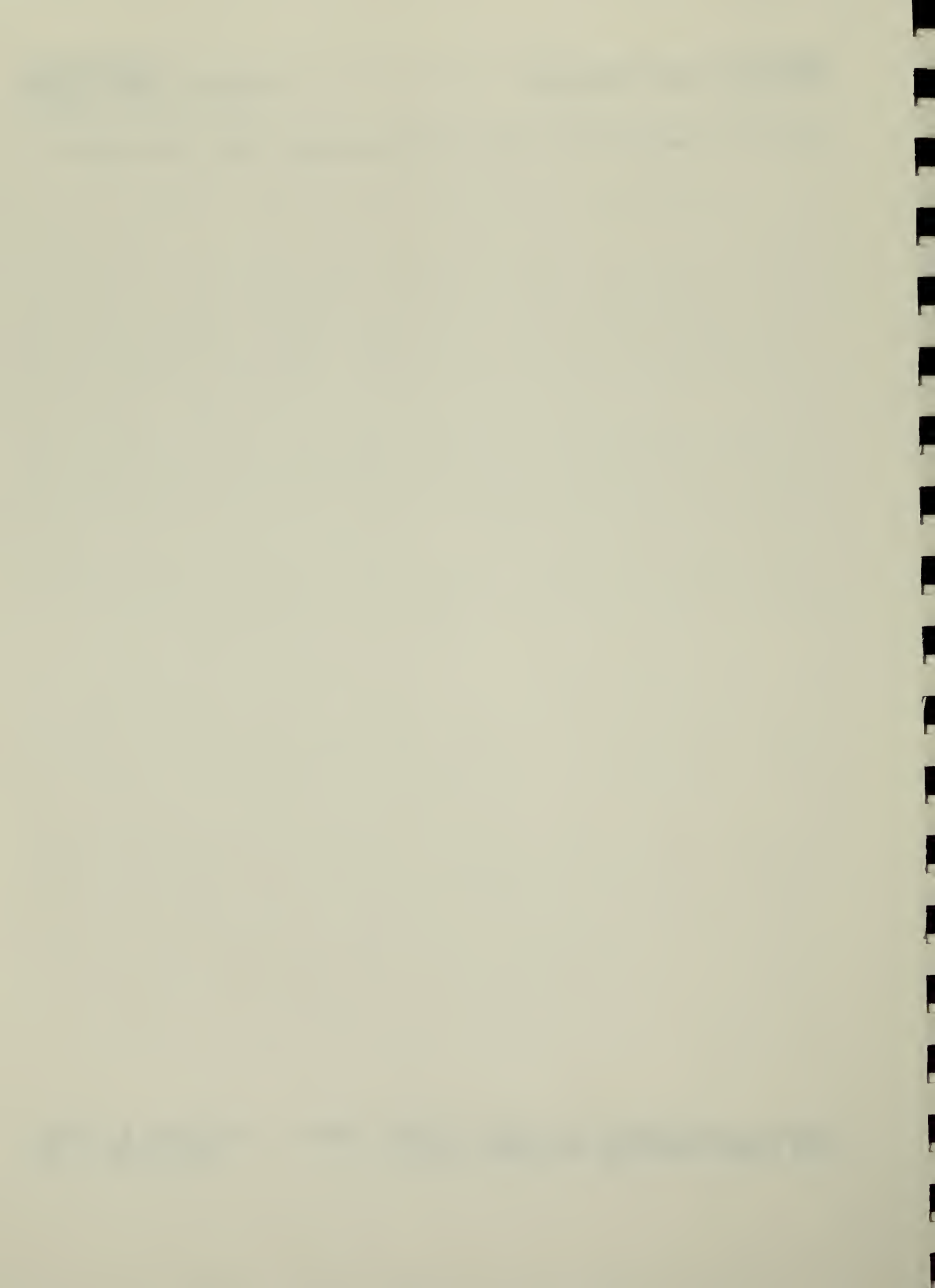
There was a sand floor for all the Left Flank Casemates (save Casemate ---LFK-4: The New Sallyport and Cistern Casemate.)

Mr. Williams stated that the sand floor was the worst part of living at the fort. The bunks could not easily be kept level and an occupant would have to jiggle the bed around each night for it to settle properly in the sand. Keeping sand out of the sheets was nearly impossible, no matter how hard one tried.

Life at the fort was very simple. One got up, groomed, shaved and dressed, ate breakfast, cleaned up, ate lunch and napped. Mr. Williams passed his time mostly by reading. There was no major medical incident requiring his emergency services during his 6 month assignment. Pay was \$21 a month and once a month the personnel would take the Coast Guard Boat to Charleston. The boat docked at the wooden dock whose foundations can still be seen outside the fort. Mr. Williams showed a composite photograph made from two photographs from a tower (whose foundations can still be seen) off the Left Portion of the Gorge Wall. This composite 1941 photograph is being reproduced and included in the Photographic Archives along with a 1941 photograph of him in army uniform standing next to one of the 15" Rodman guns.

Mr. Williams visited the Park Library located in the Fort Moultrie

Visitor's Center and talked with Rick Hatcher, Park Historian.



INTERVIEWS: SOUTH CAROLINA ENVIRONMENTAL QUALITY CONTROL

NOTES ON ENVIRONMENTAL AIR POLLUTANT DISCHARGE

07-06-92

Discussion between Wayne Fanning of the South Carolina Environmental Quality Control and Steve Clark. He has stated that the particle discharge from surrounding industries and electrical generation is meeting EPA established guidelines. The minimum standard for total particle content emitted from the various industries, but the content is SO₂, N, and Ozone. They are meeting the minimum standard.

Particle analysis has been performed at various sites around Charleston. Because of the proximity of Cape Romain NWR, the standards for EPA emissions must be met. Back in 1971-1973, the air emissions exceeded the minimum. Since that time, Charleston has been in compliance.

The electrical generation plants for SCE&G are located in two areas. One is the Haygood Station. It is normally off-line and is used only for peak demands. The other station is the Williams Station on the Cooper River. It has the capacity of using Diesel Fuel #2 or coal. The primary fuel is coal, producing SO₂ discharge from this plant.

Mr. Bruce Hennesey of South Carolina Quality Control provided more exact information on the particle breakdown in emission content and the use of fuel at the Williams Station.

This information is necessary to determine what, if any effect, air pollutants have on Fort Sumter.

Mr. Hennesey transmitted a copy of the 1990 Air Quality Annual Report. He also said that the Williams Station is within current guidelines for SO₂, but under the new Clean Air Act, they need to install a new scrubber.

REPORT LISTS

- .00 LIST OF REPORTS
- .01 FEDERAL REPORT, SERO STUDY, 1992
 - Corps of Engineers Report:
 - Battery Huger Removal, 1992
 - See Park Files
- .02 S.C. Air Quality Annual Report 1992
 - See Park Library Holdings
- .03 CORPORATE REPORT, Law Engineering
 - See Park Library Holdings
- .04 VARIOUS RIPRAP REPORTS
 - See Park Files

THE FOLLOWING IS A PARTIAL LIST OF EXISTING REPORTS. NUMEROUS OTHER REPORTS EXIST AT THE PARK AND IN THE REGIONAL OFFICE. CONSULT PARK AND SERO LIBRARY HOLDINGS

- .04 --MODIFICATION, BATTERY HUGER
- .05 --PRESERVATION
 - .10 NATIONAL PARK SERVICE TRANSFER
 - .20 ORIGINAL RENOVATION
 - .30 ARCHEOLOGICAL EXCAVATION
 - .40 CENTENNIAL IMPROVEMENTS
- .06 --POST CENTENNIAL IMPROVEMENTS
 - REPOINTING SCARP WALLS, Phase I
 FORT SUMTER NATIONAL MONUMENT
 IFB 5000-83-27
 Bid Opening: July 6, 1983
 - REPOINTING SCARP WALLS, Phase II
 FORT SUMTER NATIONAL MONUMENT
 S7217
 Contract # CX 5000-3-817
 1984
 - REPOINTING SCARP WALLS, Phase III
 FORT SUMTER NATIONAL MONUMENT
 S7217
 Contract # CX 5000-4-1070
 1985
 - REPAIRING FORT SUMTER DOCK
 FORT SUMTER NATIONAL MONUMENT
 Contract # CX 5000-7-1069
 1988
 - L7423 DAMS & DREDGING
 US CORPS OF ENGINEERS 1984
 - PROJECT ANALYSIS/ADVANCE ACQUISITION
 PLAN: SOUTHEAST REGION Priority 01
 Foundation Investigation 1987 \$50,000
 - PROJECT ANALYSIS/ADVANCE ACQUISITION
 PLAN: SOUTHEAST REGION Priority 07
 Move Rip Rap 1987 \$150,000
- .07 --DELTA SURVEY 1992
- .08 --LOTUS 1-2-3 CALCULATIONS

SEVERE IMPACT, LOADING

1. ITEM #1

1.1 CAUSE: BOMBARDMENT
1.2 EVIDENCE: CIVIL WAR
1.3 OBSERVANCE: DAMAGED STRUCTURE ROOF CRACKS
1.4 ANALYSIS: SEVERE COMPRESSION FORCES--INACTIVE
1.5 ACTIVE CAUSE: NO

2. ITEM #2

1.1 CAUSE: HEAVY EQUIPMENT
1.2 EVIDENCE: CASEMATE IN-FILL
1.3 OBSERVANCE: DAMAGED STRUCTURE ROOF CRACKS
1.4 ANALYSIS: SEVERE COMPRESSION FORCES--INACTIVE
1.5 ACTIVE CAUSE: NO

3. ITEM #3

1.1 CAUSE: EARTHQUAKE
1.2 EVIDENCE: RECORDED 1886
1.3 OBSERVANCE: UNABLE TO DOCUMENT DAMAGE OR EFFECT
1.4 ANALYSIS: " " "
1.5 ACTIVE CAUSE: NO

STRUCTURE

1. ITEM #1

1.1 CAUSE: CHANGE IN MATERIAL GEOMETRY
1.2 EVIDENCE: PATCHED ROOF @ PENETRATIONS
1.3 OBSERVANCE: STABILIZED
1.4 ANALYSIS: NO EVIDENCE OF NEGATIVE EFFECT
1.5 ACTIVE CAUSE: YES

2. ITEM #2

1.1 CAUSE: CHANGE IN MATERIAL GEOMETRY
1.2 EVIDENCE: MOISTURE DEBRIS IN ROOF CRACKS
1.3 OBSERVANCE: CONSTANT
1.4 ANALYSIS: POTENTIAL NEED TO REPAIR
1.5 ACTIVE CAUSE: YES

3. ITEM #3

1.1 CAUSE: LATERAL MOVEMENT
1.2 EVIDENCE: NONE
1.3 OBSERVANCE: CONTINUE TO MONITOR, ESP LEFT GORGE
ANGLE
1.4 ANALYSIS: MAY NEED TO PROVIDE REINFORCEMENT
1.5 ACTIVE CAUSE: YES

FOUNDATION

1. ITEM #1

1.1 CAUSE: DIFFERENTIAL SETTLE
1.2 EVIDENCE: BATTERY HUGER
1.3 OBSERVANCE: EFFECT STABILIZED 50+ YEARS AGO
1.4 ANALYSIS: INACTIVE-PAST CAUSE
1.5 ACTIVE CAUSE: NO

2. ITEM #2

1.1 CAUSE: REGULAR SETTLEMENT
1.2 EVIDENCE: SAGGING MORTAR LINE AT SALIENT ANGLE
1.3 OBSERVANCE: APPEARS STABLE
1.4 ANALYSIS: PAST CAUSE
1.5 ACTIVE CAUSE: NO

3. ITEM #3

1.1 CAUSE: UNSTABLE FOUNDATION
1.2 EVIDENCE: WALL DEFORMATION
1.3 OBSERVANCE: NO CONCLUSIVE EVIDENCE
1.4 ANALYSIS: CONTINUE MONITORING
1.5 ACTIVE CAUSE: NO

ENVIRONMENTAL

1. ITEM #1

- 1.1 CAUSE: THERMAL LOADING
- 1.2 EVIDENCE: CEILING CRACKS
- 1.3 OBSERVANCE: EXPANDS AND CONTRACTS
- 1.4 ANALYSIS: CYCLIC, SEASONAL
- 1.5 ACTIVE CAUSE: YES

2. ITEM #2

- 1.1 CAUSE: SCOURING/FOUNDATION EROSION
- 1.2 EVIDENCE: "SOUNDS OF WAVES", CHANNEL CURRENTS
- 1.3 OBSERVANCE: MONITORING IN PLACE
- 1.4 ANALYSIS: MONITORING TO CONTINUE
- 1.5 ACTIVE CAUSE: YES

3. ITEM #3

- 1.1 CAUSE: WAVE AND WIND ACTION
- 1.2 EVIDENCE: ISLAND CONDITIONS
- 1.3 OBSERVANCE: IRREGULAR, CYCLIC; MOST SEVERE AT SALIENT ANGLE
- 1.4 ANALYSIS: POTENTIAL FOR MAJOR IMPACT
- 1.5 ACTIVE CAUSE: YES

OBSERVATIONS

1. GROUND PLAN

1.1 MONITORS

- A. ---LGA-1
- B. ---LGA-2
- C. 1#LSA--A
- D. 2#LSA--A
- E. SALNT
- F. ---RFC-9

1.2 MORTAR LINE OF EXTERIOR WALL "SAGGING" TOWARD SALIENT ANGLE

1.3 HEAVIEST WAVE AND WIND ACTION, SCOURING AT SALIENT ANGLE

2. PLAN OF RIGHT FACE AND SALIENT ANGLE

1.1 UNSTABLE AREA WHERE STAIR WAS REMOVED

- A. SALIENT ANGLE

1.2 LARGE VERTICAL CRACKS IN COMMUNICATION (TRANSVERSE) ARCHES--REPAIRED JUNE 1992

- A. 9#LFC--A
- B. 1#LOS--A

1.3 SEVERELY DETERIORATED CASEMATE (VAULT)--REPLACED JUNE 1992

- A. ---LFC-9

1.4 SLIGHT MOVEMENT IN SALIENT ANGLE DETECTED BY MONITORS

1.5 REPAIRS TO EXISTING ELEVATION APPEAR STABLE

- A. ---RFC-8

3. ELEVATION OF CASEMATES

- 1.1 (VERTICAL) CEILING CRACK AND ROOF CRACKS PARALLEL TO
EXTERIOR WALL EXTENDING ENTIRE LENGTH OF RIGHT FACE
- 1.2 LARGE CRACK EXTENDING ACROSS ROOF TO EXTERIOR WALL

RECOMMENDATIONS FOR STRUCTURAL STABILIZATION		FACTORS			
	NUMBER OF DAYS	COST	VISUAL IMPACT	COMPLIANCE NEEDED	ADDRESSES OTHER POTENTIAL CAUSES
=====					
1. DEMOLITION					
A. CASEMATE	30	\$15,700	--	--	--
B. TRANSVERSE	20	\$20,700	--	--	--
2. BRICKWORK					
A. REBUILD CASEMATE	30	\$23,500	EXCELLENT	--	--
B. REBUILD TRANSVERSE ARCHES	15	\$11,800	EXCELLENT	--	--
C. CAP OFF AND STABILIZE	5	\$2,600	POOR	--	--
D. FLUSH MORTAR JOINT AT CASEMATE CLG	5	\$3,130	GOOD	--	--

PART V
SCHEMATIC STRUCTURAL STABILIZATION

APPENDIX 6
S. E. REGION

E.	RODDED MORTAR JOINT AT CASEMATE CLG	10	\$6260	EXCELLENT	--	--
3.	REINFORCEMENT					
A.	TIE RODS	5	\$3,000	ACCEPTABLE	--	--
B.	BUTRESSES	30	\$21,000	ACCEPTABLE	--	--
C.	WIRE MESH	1	\$2,000	--	--	--
4.	CONNECTION					
A.	TIE INTO EXISTING	--	--	EXCELLENT	--	--
B.	EXPANSION JOINT AT SALIENT ANGLE	--	\$1,000	GOOD	--	--
C.	SEAL ROOF CRACKS	10	\$7,000	GOOD	--	--
	RECOMMENDED TOTAL=		\$78,700			

* ALL RECOMMENDATIONS TO COMPLY WITH THE SECRETARY OF THE INTERIOR'S STANDARDS

DRAWINGS LIST

- .00 LIST OF DRAWINGS
 - .01 HISTORIC CONSTRUCTION
 - .02 HISTORIC AMERICAN BUILDING SURVEY (HABS) DRAWINGS
 - .021 HISTORIC AMERICAN BUILDING SURVEY (HABS) FIELD NOTES
 - .03 MODIFIED HABS DRAWINGS WITH HSAR/ICAP IDENTIFICATION SYSTEM
 - .04 DELTA SURVEY (1992)
See Park Files
- .01 DRAWINGS
 - .01 MODIFIED HISTORIC AMERICAN BUILDING SURVEY (HABS) DRAWINGS SHOWING HSAR IDENTIFICATION SYSTEM
 - .02 SOUTHEAST REGION (Dated 02/26/92)

Please note these drawings are contained at the back of this report. They are numbered separately from this report. Originals can be viewed in the Park's Files.

HISTORIC CONSTRUCTION DRAWINGS

A LIST OF DRAWINGS AVAILABLE THROUGH THE NATIONAL ARCHIVES
REGARDING FORT SUMTER NATIONAL MONUMENT

The following list of drawings is catalogued according to drawer and sheet number and is on file under the "Records of the War Department, Office of the Chief of Engineers" at the National Archives. Photostats of the originals are available at the Visitors Center of the Fort Sumter National Monument. They are similarly filed as to drawer and sheet number, which for the most part are in chronological order.

- Drawer 66 - Sheet A -- Five hand-written pages of history and condition of the fort in 1886 and plan of reconstruction
- Sheet 1 -- Plan for Fort adopted December 5, 1828
 - Sheet 2 -- Plan, sections, conditions of foundations in the years 1831-35
 - Sheet 3 -- Condition of Work (plan) in 1831-33 and proposed alteration, 1834
 - Sheet 4 -- Plan of Wharf
 - Sheet 5 -- Plat map exhibiting portion of shoal ceded U.S.
 - Sheet 6 -- Section, profile, showing arrangement of foundations
 - Sheet 8 -- Foundation, September 30, 1841
 - Sheet 9 -- Condition of Work on September 30, 1842
 - Sheet 10 -- Sketch of foundations, 1843
 - Sheet 11 -- Condition of Work on September 30, 1843
 - Sheet 12 -- Condition of Work on September 30, 1844
 - Sheet 13 -- Foundations, 1845
 - Sheet 14 -- Series of profiles, 1845

- Drawer 66 - Sheet 15 -- Sketch of part of gorge wall with proposed modifications, 1845
- Sheet 16 -- Similar sketches of gorge wall, 1845
 - Sheet 17 -- Condition of Work on September 30, 1845
 - Sheet 18 -- Soundings about the fort, 1845
 - Sheet 19 -- Elevations of typical embrasure
 - Sheet 20 -- Sketch of pavement of casemate
 - Sheet 21 -- Drawing of proposed tide gauge
 - Sheet 22 -- Sketch showing arrangement of quarters and barracks on gorge wall
 - Sheet 23 -- Sketch of proposed modification of gorge wall
 - Sheet 24 -- Soundings, 1846
 - Sheet 25 -- Plans of three stories of officers' quarters along gorge, 1846
 - Sheet 26 -- Plans of first floor of East flank and second floor of Southeast flank, 1846
 - Sheet 27 -- Plan of first and second floors, Northeast face, 1846
 - Sheet 28 -- Sections of gorge wall, 1846
 - Sheet 29 -- Sections of Southeast flank, 1846
 - Sheet 30 -- Sections of Northeast face, 1846
 - Sheet 31 -- Sections through stair-tower and casemate and salient angle, 1846
 - Sheet 32 -- Plan of barbette tier, Northeast face, roof adjacent casemates, 1846
 - Sheet 33 -- Plan of barbette tier, East flank, third story soldiers' barracks, 1846

- Drawer 66 - Sheet 34 -- Sketch of postern at sally-port of gorge,
1846
- Sheet 35 -- Sections and elevations through gorge,
1846
 - Sheet 36 -- Condition of Work: plan, sections and
elevations, 1846
 - Sheet 37 -- Chimney flues in barracks, 1847
 - Sheet 38 -- Machinery designed for portcullis
 - Sheet 39 -- Condition of Work: plan, elevations and
details, September 30, 1847
 - Sheet 41 -- Condition of Work on September 30, 1848
 - Sheet 42 -- Condition of Work on September 30, 1849
 - Sheet 43 -- Condition of Work on September 30, 1850
 - Sheet 44 -- Details of drainage system in casemates
 - Sheet 45 -- Soundings around wharf, 1851
 - Sheet 46 -- Plan of magazine at gorge wall, 1851
 - Sheet 47 -- Sketch of stairways at angle conditions
 - Sheet 48 -- Plan of roof over casemates of part of
gorge wall, West flank angle
 - Sheet 49 -- Sketch of iron stairways in barracks
 - Sheet 50 -- Section of tablet of parade wall
 - Sheet 51 -- Sketch of the positions of barbette guns,
1851
 - Sheet 52 -- Arrangement of traverses and centers of
barbette guns, 1852
 - Sheet 53 -- Plans and elevations of officers'
quarters, 1851

- Drawer 66 - Sheet 54 -- Plans, sections and elevations of
loophole windows and doorways in gorge
wall
- Sheet 55 -- Plans of a portion of the front wall of
barracks
 - Sheet 56 -- Side chimneys in barracks
 - Sheet 57 -- Gable chimneys in barracks
 - Sheet 58 -- Plan, section and elevation of loophole
window
 - Sheet 59 -- Section through middle of first pier at
left gorge angle
 - Sheet 60 -- Details of flooring system of barracks
 - Sheet 61 -- Condition of Work, September 30, 1851
 - Sheet 62 -- Plan of roof over casemates
 - Sheet 63 -- Sketch including masonry dimensions of
first floor of Southeast Barracks
 - Sheet 64 -- Sketch of stairs at three port angles
 - Sheet 65 -- Elevation of barracks in relationship to
parade ground, 1854
 - Sheet 66 -- Similar elevation of officers' quarters,
1854
 - Sheet 67 -- Plan of Barbette tier at left gorge angle
 - Sheet 68 -- Plan of a portion of right flank wall and
third story barracks
 - Sheet 69 -- Plan of barbette tier at Northeast face
 - Sheet 70 -- Section through the middle of first pier
at left gorge angle, 1854
 - Sheet 71 -- Sketch of the positions of barbette guns,
1854

- Drawer 66 - Sheet 72 -- Plans and elevations of iron water tanks for all quarters, 1855
- Sheet 73 -- Sketch of arrangement of pintle centers, etc, on gorge wall, Northeast and north faces, 1855
 - Sheet 74 -- Sections of flooring system in barracks
 - Sheet 75 -- Sketch of the proposed arrangement of barracks floors, 1856
 - Sheet 76 -- Sections of flooring system in barracks
 - Sheet 77 -- Design of brick coping and supporting corbels
 - Sheet 78 -- Plans, sections and elevations of embrasures, 1856
 - Sheet 79 -- Sketch of barbette tier
 - Sheet 80 -- Plans, sections and elevations for boat harbor adjacent to esplanade, 1858
 - Sheet 81 -- Plan of right gorge angle, 1860
 - Sheet 82 -- Plans of fort in 1861
 - Sheet 86 -- Plans and profiles of the fort at the time of its capture on February 18, 1865
 - Sheet 88 -- General Gillmore's plan for the reconstruction of the fort, 1868
 - Sheet 89 -- Revised plan by the Board of Engineers, Chief of Engineers General A.A. Humphreys, 1870
 - Sheet 90 -- Sketch showing the proposed location of the dock, 1870
 - Sheet 91 -- Plan and elevations of the proposed wharf, 1870

- Drawer 66 - Sheet 92 -- Plans and profiles showing modifications to the 1870 plan, December 1871
- Sheet 93 -- Sketch, 1872
 - Sheet 94 -- Plan of Northwest face, showing modifications proposed and sally-port, October, 1872
 - Sheet 95 -- Plan of Northeast face and part of Southeast North face showing proposed modifications, October, 1872
 - Sheet 96 -- Plan showing proposed emplacements of four siege piers, 1874
 - Sheet 97 -- Barbette plan showing Northwest front, November, 1875
 - Sheet 98 -- Proposed modifications of the traverses, May, 1874
 - Sheet 99 -- Plan and elevations of boat harbors
 - Sheet 100 - Plan and elevations as the fort appeared June 1, 1877
 - Sheet 101 - Sections and elevations (unfinished), 1888
 - Sheet 102 - Proposed arrangement of torpedo cables, 1891
 - Sheet 103 - Proposal for mining casemate, April 1891
 - Sheet 104 - Sketch showing damage by hurricane, August, 1893
 - Sheet 105 - Diagram showing proposed work, September 1895
 - Sheet 106 - Scene showing borings made, August, 1893
 - Sheet 107 - 1 - I-beams of gun and battery

- Drawer 66 - Sheet 107 - 2 - First floor of gun and battery
- Sheet 107 - 3 - Second floor of gun and battery
 - Sheet 107 - 4 - Top floor of gun and battery
 - Sheet 107 - 5 - Longitudinal section
 - Sheet 107 - 6 - Cross sections
 - Sheet 109 - 2 - Drawing showing outlines for 12-inch emplacements and building site for quarters, 1898
 - Sheet 109 - 3 - Drawing showing old and works and new battery
- Drawer 64 - Sheet 8A -- Chart of eastern extremity of Charleston Harbor showing the location of the proposed fort, 1828
- Sheet 81 -- 3 - Barbette plan with sections showing the condition of work and proposed gun-lift battery, April, 1893
 - Sheet 87 -- 4 - Casemate plan showing the condition of work and proposed gun-lift battery, April, 1893

The above Appendix A was taken from the Historical American Building Survey 1991 (HABS No. SC-194) which was a written historical report based on a Historical Research Management Plan prepared by John T. Willett for the Fort Sumter National Monument, May 9, 1949. This list was submitted to the National Archives by Fort Sumter National Monument and to a great extent photostats of these drawings were provided. Mr. Willett also requested a list of manuscript correspondence that served as the basis of the work done by historians at the Park in the subsequent years (Please see the Management Plan for this list).

LIST OF HISTORIC AMERICAN BUILDING SURVEY (HABS) 1991 DRAWINGS

A LIST OF DRAWINGS COMPLETED BY THE 1991 FIELD RECORDING TEAM
OF THE HISTORIC AMERICAN BUILDINGS SURVEY

The Fort Sumter Field Recording Project was undertaken by the HABS/HAER division, Robert J. Kapsch, Chief; and was directed by Joseph Balachowski, HABS Architect, in conjunction with the National Park Service -- Southeast Regional Office and Fort Sumter National Monument. The 1991 measured drawings were prepared by Supervising Architect James N. Ferguson (University of Florida), Architecture Technicians Richard S. Naab, Foreman (The Catholic University of America), Peter Stehrer (HTBLA - Krems, Austria -- US/ICOMOS), Edward A. Stork (Santa Clara University) and Thomas W. Williams (Auburn University).

Sheet 1	-- Title Sheet showing the evolution of the fort from 1860 - 1991
Sheet 2	-- Site Plan and History
Sheet 3	-- Composite Ground Plan
Sheet 4	-- Composite Roof Plan
Sheet 5	-- Northwest Quadrant of Ground Plan, scale: 1/8" = 1'- 0"
Sheet 6	-- Northeast Quadrant
Sheet 7	-- Southeast Quadrant
Sheet 8	-- Southwest Quadrant
Sheet 9	-- Northwest Quadrant of Roof Plan, scale: 1/8" = 1'- 0"
Sheet 10	-- Northeast Quadrant
Sheet 11	-- Southeast Quadrant
Sheet 12	-- Southwest Quadrant
Sheet 13	-- Section and Elevation of Left Half of Right Face Wall, scale: 1/4" = 1'- 0"

- Sheet 14 -- Section and Elevation of Right Half of Right Face Wall
- Sheet 15 -- Section and Elevation of Left Half of Left Flank Wall, scale: $1/4" = 1'-0"$
- Sheet 16 -- Section and Elevation of Right Half of Left Flank Wall
- Sheet 17 -- Axonometric of Typical Casemate Type A, scale: $1/4" = 1'-0"$, and detail of embrasure, scale: $1" = 1'-0"$
- Sheet 18 -- Axonometric of Typical Casemate Type B and detail of embrasure
- Sheet 19 -- Axonometric of Typical Casemate Type C
- Sheet 20 -- Axonometric Details of Recessed Arch and Embrasure, scale: $1" = 1'-0"$
- Sheet 21 -- Wall Section, scale: $1" = 1'-0"$
- Sheet 22 -- Second Tier, Barbette Level and Elevation of Gorge Wall as the fort appeared in 1860
- Sheet 23 -- First Tier and Section through Casemates as the fort appeared in 1860
- Sheet 24 -- Reproduction of "Fort Sumter as It Appeared at the Time of Its Capture, February 18, 1865"

LIST OF HISTORIC AMERICAN BUILDING SURVEY (HABS) 1991
FIELD NOTE DRAWINGS

NOTE: LIST COVERS OF HABS FIELD NOTES:

1. FOLDER # 1

1.1 MEASURED BY: RIGHT FACE WALL AND PORT OF RIGHT
SHOULDER BY RICHARD NAAB, THOMAS
WILLIAMS, PETER STEHRIER, EDWARD STORK

1.2 DATE MEASURED: JUNE 12 - JULY 24, 1991

1.3 HABS SURVEY #: SC-194

2. FOLDER # 2

2.1 MEASURED BY:

2.2 DATE MEASURED: JUNE 12 - JULY 24, 1991

2.3 HABS SURVEY #: SC-194

HSAR/ICAP IDENTIFICATION SYSTEM DRAWINGS

Comprised of fifteen (15) sheets, the drawings are essentially the HABS drawing sheets, but modified by Steve Clark to clarify certain areas, and to apply the established casemate/pier identification labelling system. This system allows readers to establish points referred to in the printout of the HSAR/ICAP (See Chapter 4). The drawings also label fabric and/or features found at the Fort but not clarified or depicted sufficiently in previous drawings and/or reports. Please note that these drawings have been reduced and cannot be scaled.

Sheet 1	--	Left Face Casemates, First Tier Level
Sheet 2	--	Right Face Casemates, First Tier Level
Sheet 3	--	Right Gorge Wall, Right Flank (Portion), and Typical Casemate Floor Plans with fabric/feature labelling; First Tier Level
Sheet 4	--	Left Gorge Wall, Left Flank (Portion) with remains of Officers' Quarters and Enlisted Mens Barracks
Sheet 5	--	Left Face, Second Tier Level
Sheet 6	--	Right Face, Second Tier Level
Sheet 7	--	Right Gorge Wall and Right Flank (Portion) at Upper Parade Ground Level
Sheet 8	--	Left Gorge Wall and Left Flank (Portion), Second Tier Level
Sheet 9	--	Elevation and Section through Casemates, Left Half of Right Face
Sheet 10	--	Elevation and Section through Casemates, Right Half of Right Face
Sheet 11	--	Elevation and Section through Casemates, Left Half of Left Flank

- Sheet 12 -- Elevation and Section through Casemates, Right
Half of Left Flank
- Sheet 13 -- Axonometric, Typical Casemate with labelling of
fabric/features
- Sheet 14 -- Axonometric, Typical Embrasure with labelling of
fabric/features
- Sheet 15 -- Typical Section through Scarp Wall

PHOTOGRAPHS LIST

- .00 LIST OF PHOTOGRAPHS
- HISTORIC PHOTOGRAPHS
- HISTORIC AMERICAN BUILDING SURVEY
(HABS)
- .01 --list of photographs 1952
- .02 --list of photographs 1991
- HSAR VIDEO 1992
- COMPUTERIZED VIDEO 1992
Harper's Ferry Center, Jerry Petsche
- .01 PHOTOGRAPHS
Those photographs contained within the Park
files in the Visitors Center, not yet
catalogued.

HISTORIC PHOTOGRAPHS

(In FOSU Library, Photo Index)

<u>Negative #</u>	<u>Subject</u>	<u>Classification #</u>
2087	Exterior	ID/HP, fs 1891-1
2088	Interior gorge	ID/HP, fs 61-3
2093	Exterior left flank	ID/HP, fs 65-2
2302	Ruins near sallyport and flagstaff	ID/HP, fs 1861-8
2305	Southern flag over Ft. Sumter, April 16, 1861	ID/HP, fs 61-10
2308	Right Shoulder	ID/HP, fs 63-4
2828	Interior in 1865, right flank and face	ID/HP, fs 65-6
2829	Right flank interior	ID/HP, fs 65-7
2830	Ft. Sumter from Morris Island	ID/HP, fs 63-5
2831	Ft. Sumter - viewed from gorge wall interior	ID/HP, fs 60-11
2832	Gorge wall	ID/HP, fs 63-6
3446	Exterior right face	ID/HP, fs 1864-14
3480	Gorge	ID/HP, fs 1863-11
4036	Interior face of gorge showing officers' quarters	ID/HP, fs 1861-24

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*NOTE: The Historic American Building Survey 1991 (HABS No. SC-194) is herein included in this Bibliography.

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.00 PERSONNEL LIST

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Historic Architecture Division
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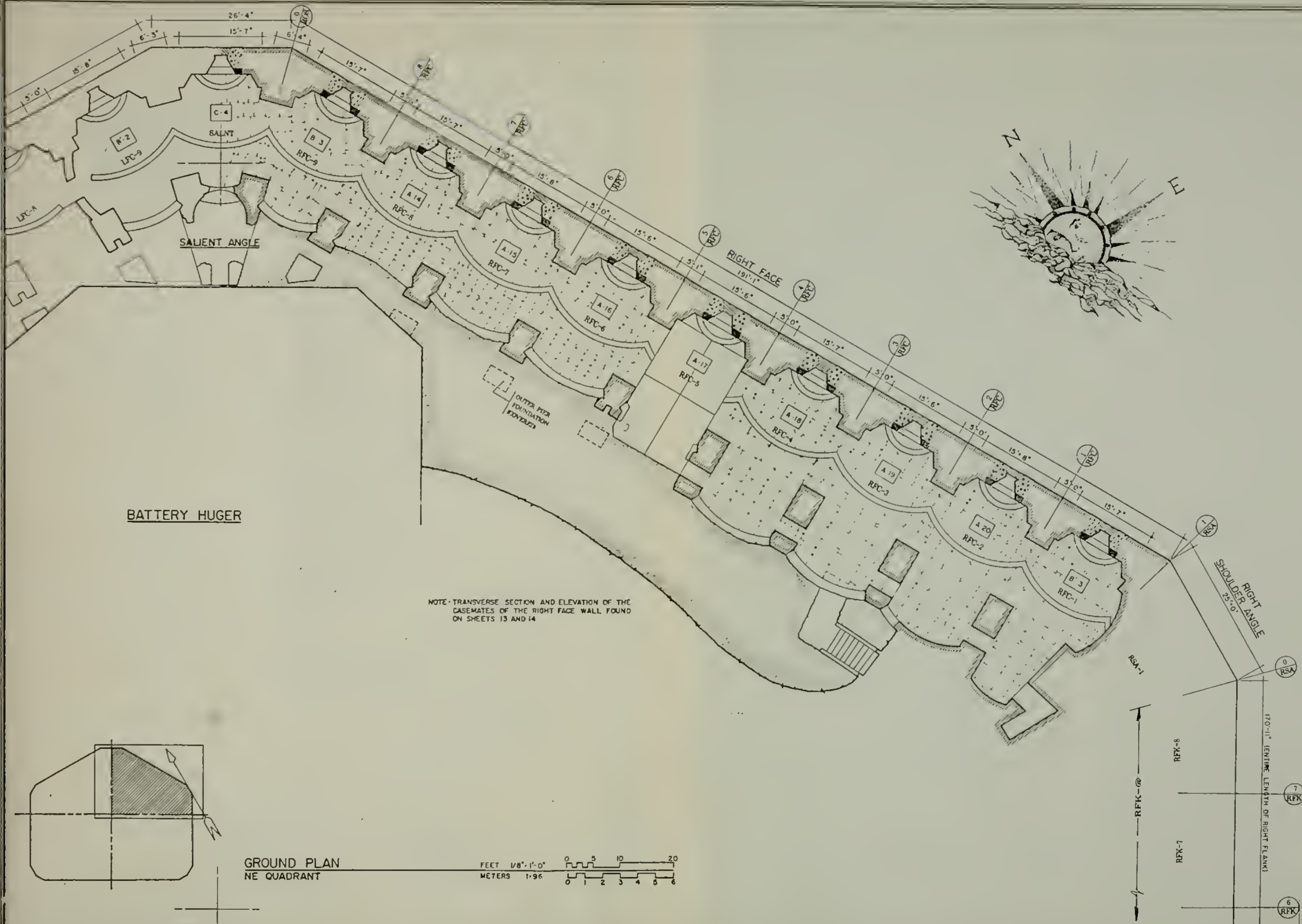
Mr. Ross Hunt, Mason
SERO Preservation Crew, Dry Tortugas
Fort Jefferson, FL

FORT SUMTER NATIONAL MONUMENT

Mr. Don Gronwaldt, Maintenance Mechanic Foreman
Mr. David Richardson, Maintenance Mechanic
Mr. Billy Richardson, Maintenance Mechanic
Mr. Charles Pinckney, Mason
All Parties may be reached at (803) 883-3124

US CORPS OF ENGINEERS, Charleston, SC

Mr. Doug Holmes
Mr. Mark Nelson
Reached through the Charleston, SC Federal
Building, US Army, Corps of Engineers



HSAR/ICAP IDENTIFICATION SYSTEM

FORT SUMTER RECORDING PROJECT 1991
 HELGREN, BOB, STAFF
 UNITED STATES DEPARTMENT OF THE ARMY

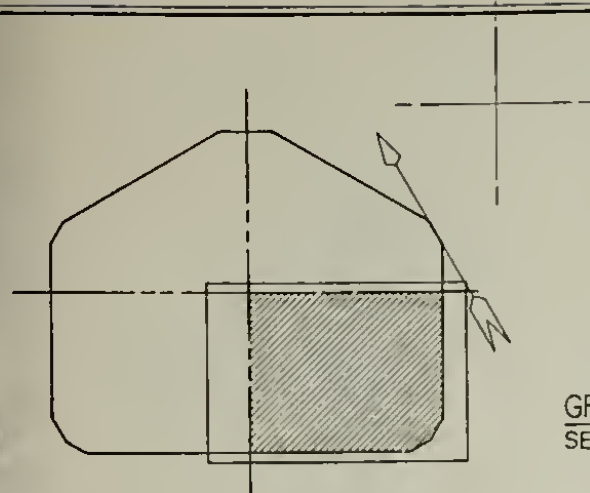
CHARLESTON HARBOR

FORT SUMTER NATIONAL MONUMENT

1214 MIDDLE STREET SULLYVAN'S ISLAND

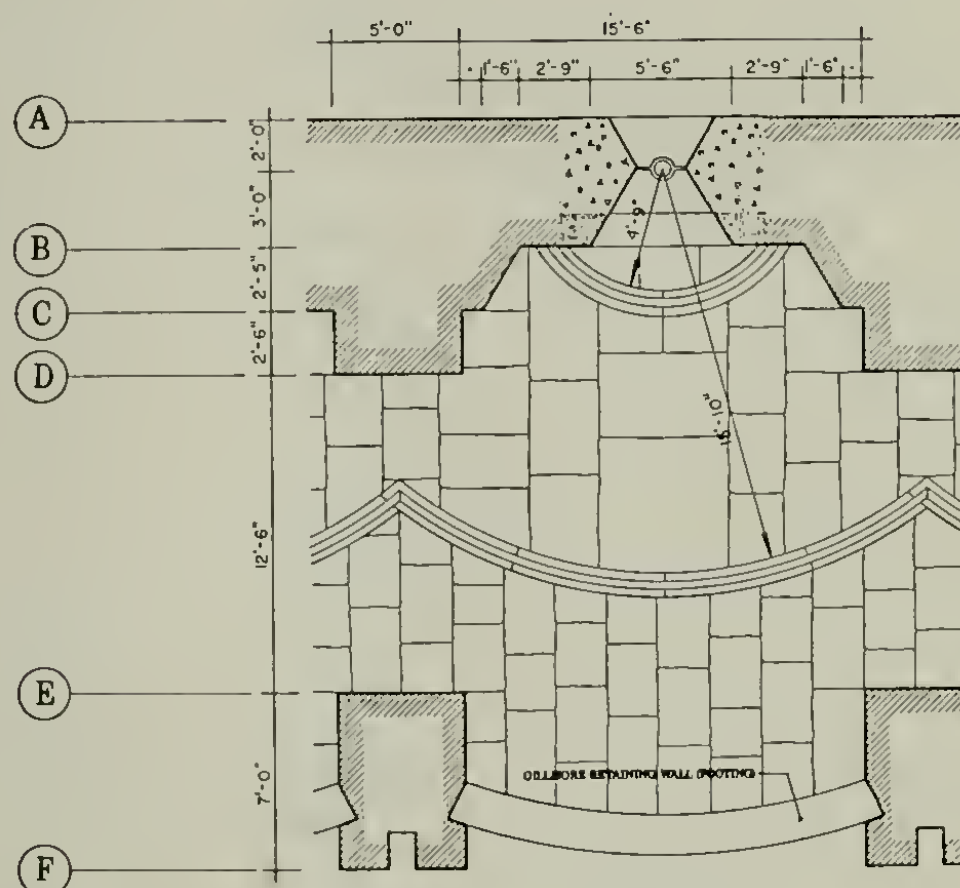
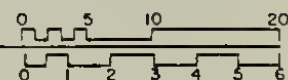
CHARLESTON COUNTY SOUTH CAROLINA

UNIVERSITY OF MICHIGAN
HISTORIC AMERICAN
BUILDINGS SURVEY
BOX 6 101 481070

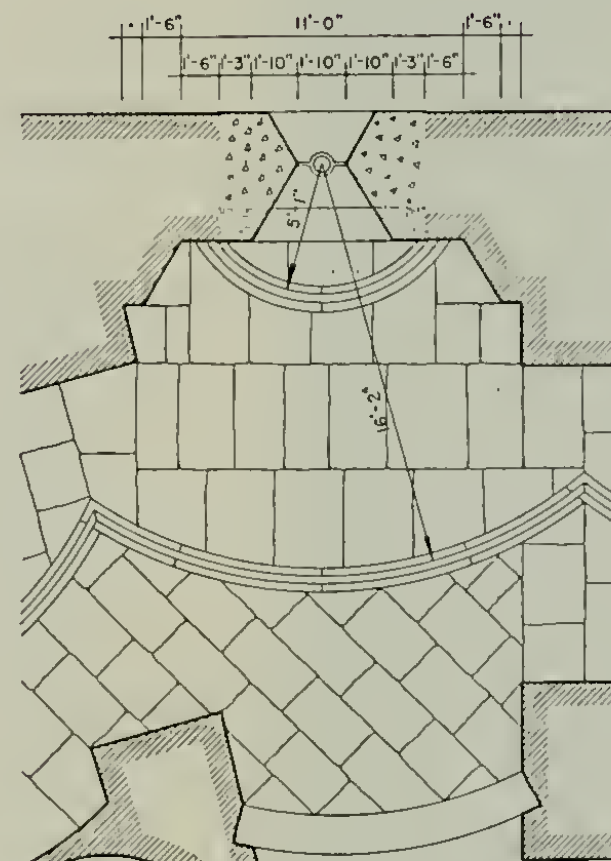


GROUND PLAN
SE QUADRANT

FEET 1/8"=1'-0"
METERS 1:96

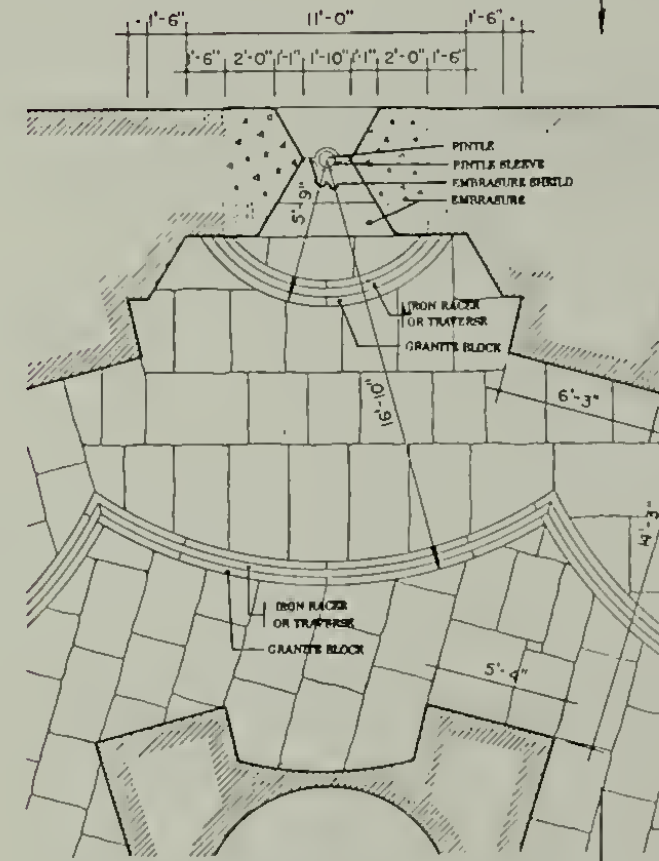


TYPE A



TYPE B

TYPE B IS THE MIRROR IMAGE OF TYPE A



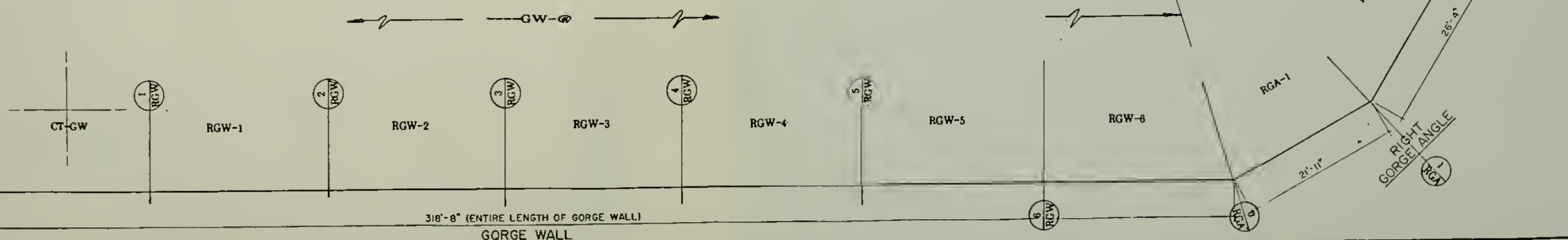
TYPE C

FEET 1/4"=1'-0"
METERS 1:48



TYPICAL CASEMATE PLANS

NOTE: THE DIMENSION MARKED WITH A DOT (·) VARIES BETWEEN 9" AND 12"
· SEE SHEETS 17, 18, AND 19 FOR AXONOMETRICS AND ELEVATIONS OF EMBRASURES OF TYPICAL CASEMATES
· SEE SHEETS 20 AND 21 FOR FURTHER DRAWINGS INDICATING METHODS AND MATERIALS OF CONSTRUCTION OF CASEMATES



HSAR/ICAP IDENTIFICATION SYSTEM

SHEET 3 OF 15

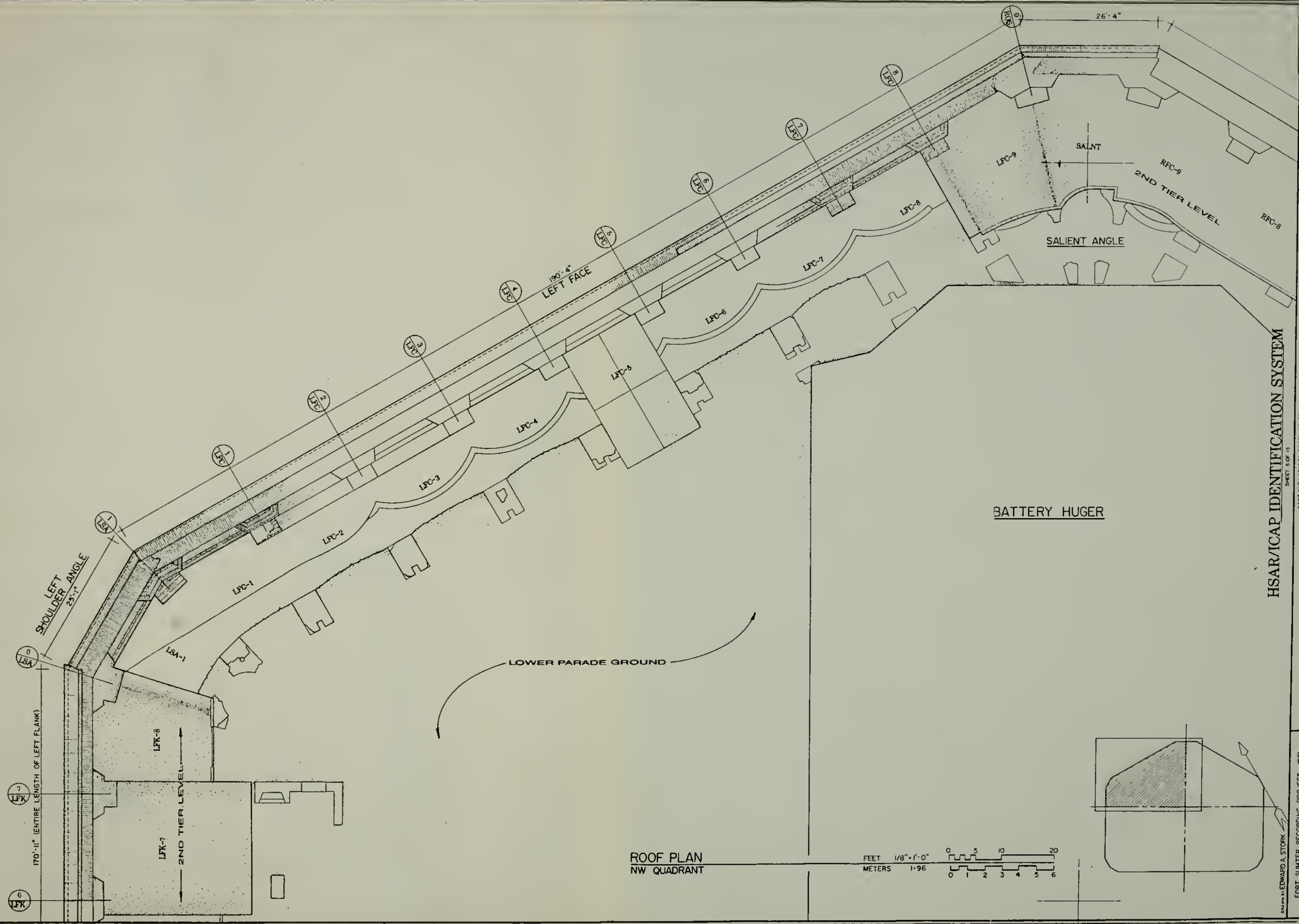
NAME AND LOCATION OF STRUCTURE
FORT SUMTER NATIONAL MONUMENT
1214 MIDDLE STREET · SULLIVAN'S ISLAND · CHARLESTON COUNTY · SOUTH CAROLINA

CHARLESTON HARBOR

FORT SUMTER RECORDING PROJECT 1991

UNIVERSITY OF SOUTH CAROLINA

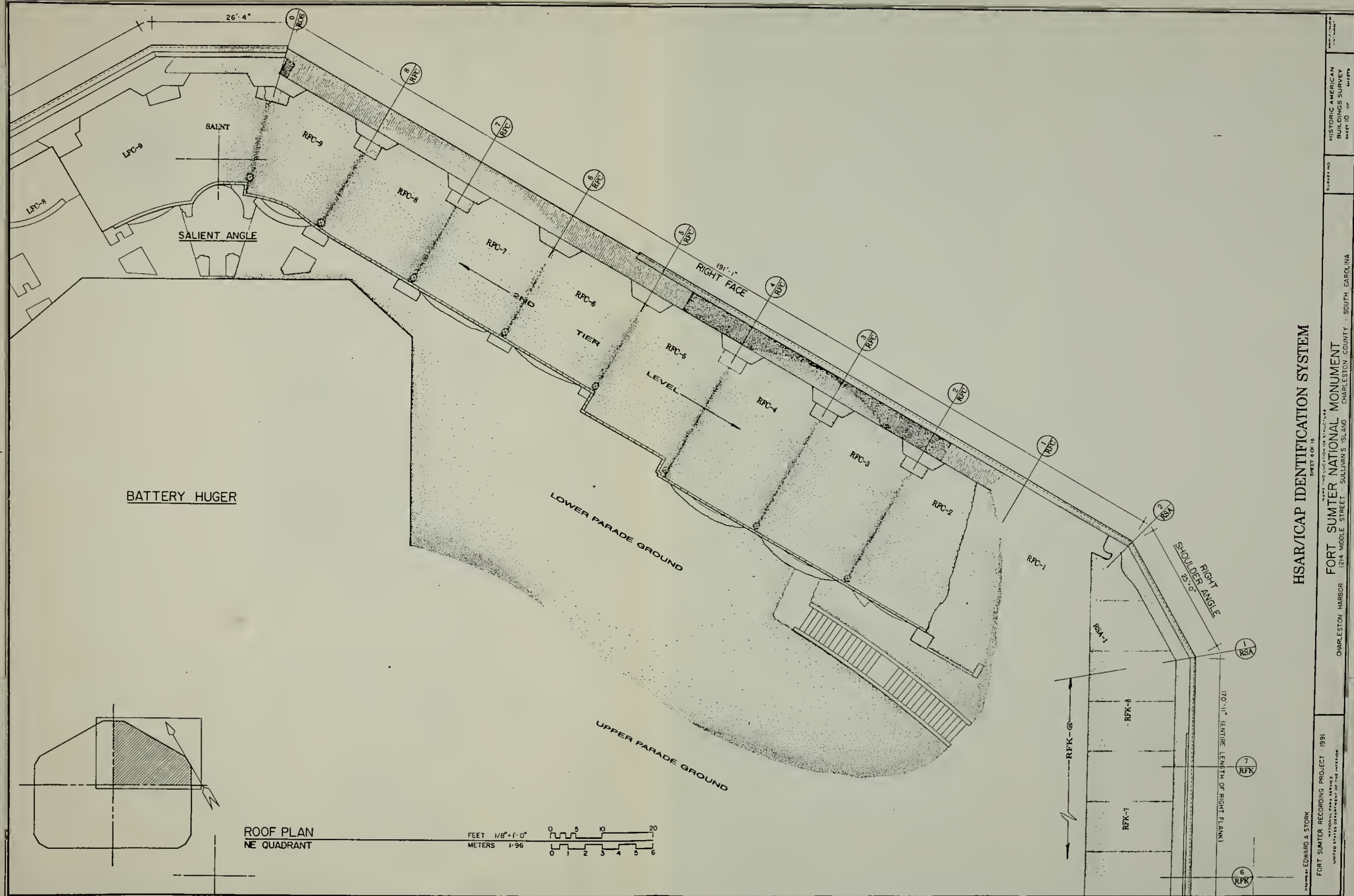
HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 7 OF 15



ROOF PLAN
NW QUADRANT

FEET 1/8" = 1'-0"
METERS 1:96

HSAR/ICAP IDENTIFICATION SYSTEM



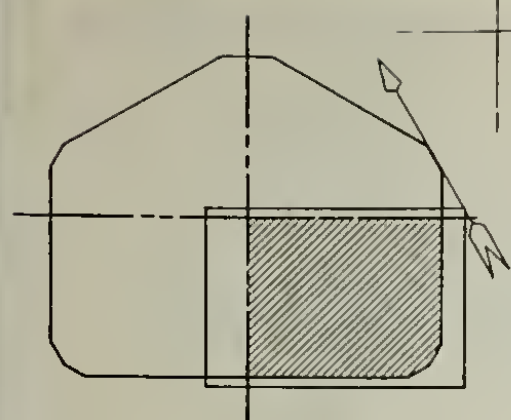
HSAR/ICAP IDENTIFICATION SYSTEM

FORT SUMTER NATIONAL MONUMENT
1214 MIDDLE STREET · SULLYVAN'S ISLAND · CHARLESTON COUNTY · SOUTH CAROLINA

FORT SUMNER RECORDING PROJECT - 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

WATSON, L. ANN, 1904-1980

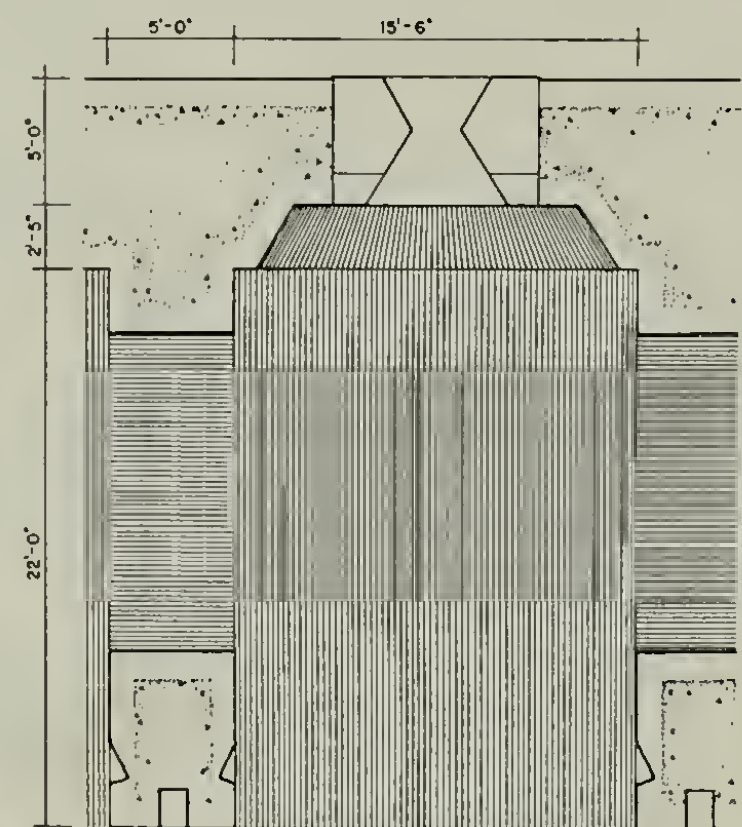
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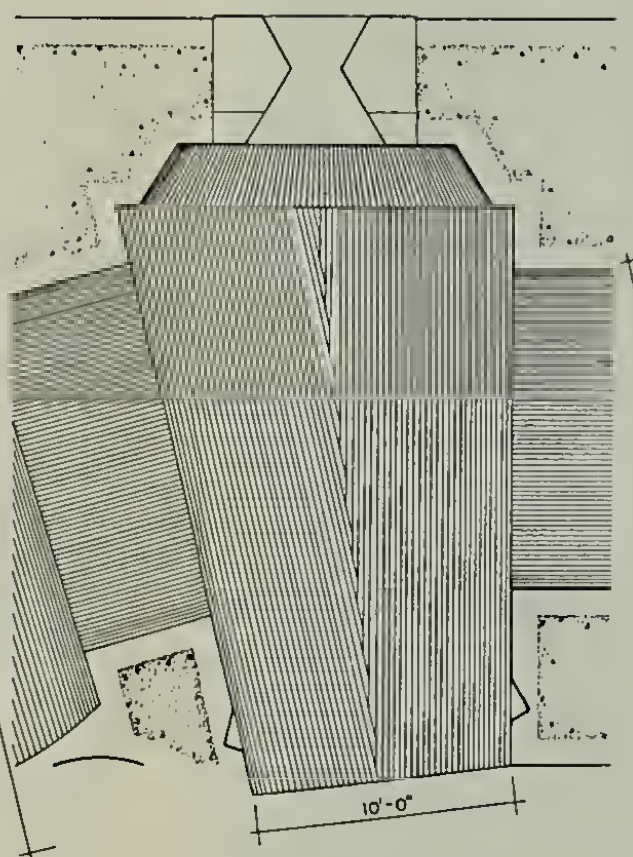
ROOF PLAN
SE QUADRANT

FEET 1/8"=1'-0"
METERS 1:96

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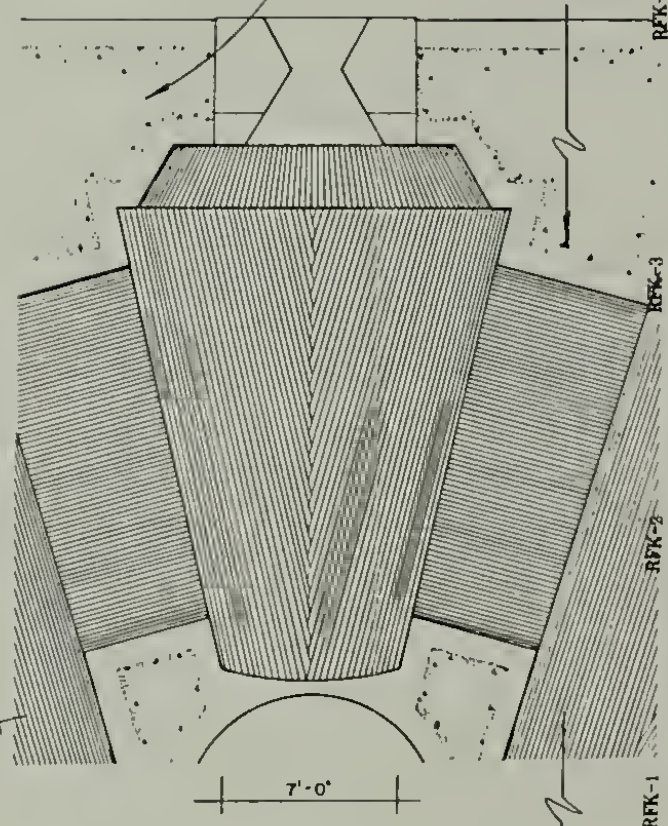


TYPE A



TYPE B

TYPE B' IS THE MIRROR IMAGE OF TYPE B



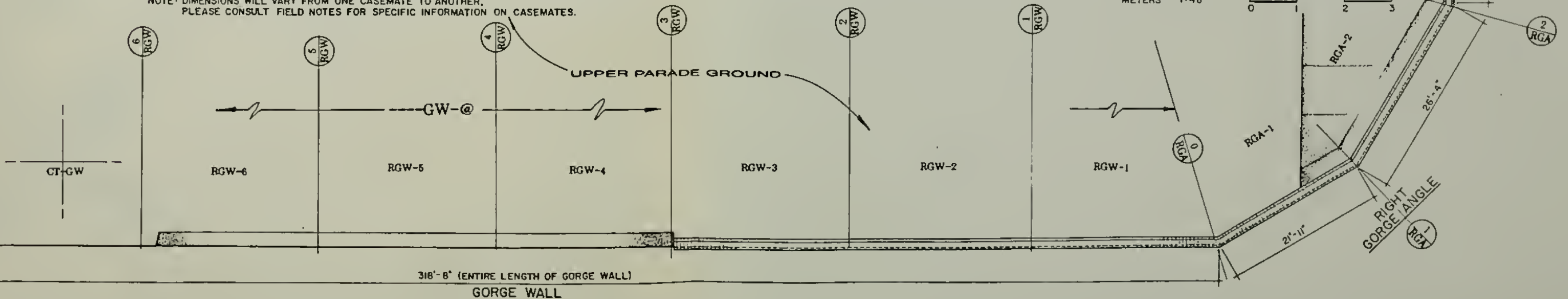
TYPE C

TYPICAL REFLECTED CEILING PLANS OF CASEMATES

NOTE: DIMENSIONS WILL VARY FROM ONE CASEMATE TO ANOTHER.
PLEASE CONSULT FIELD NOTES FOR SPECIFIC INFORMATION ON CASEMATES.

FEET 1/4"=1'-0"
METERS 1:48

0 5 10
0 1 2 3



HSAR/ICAP IDENTIFICATION SYSTEM

DATE AND LOCATION OF SURVEY
FORT SUMTER NATIONAL MONUMENT
1214 MIDDLE STREET · SULLY'S ISLAND · CHARLESTON COUNTY · SOUTH CAROLINA

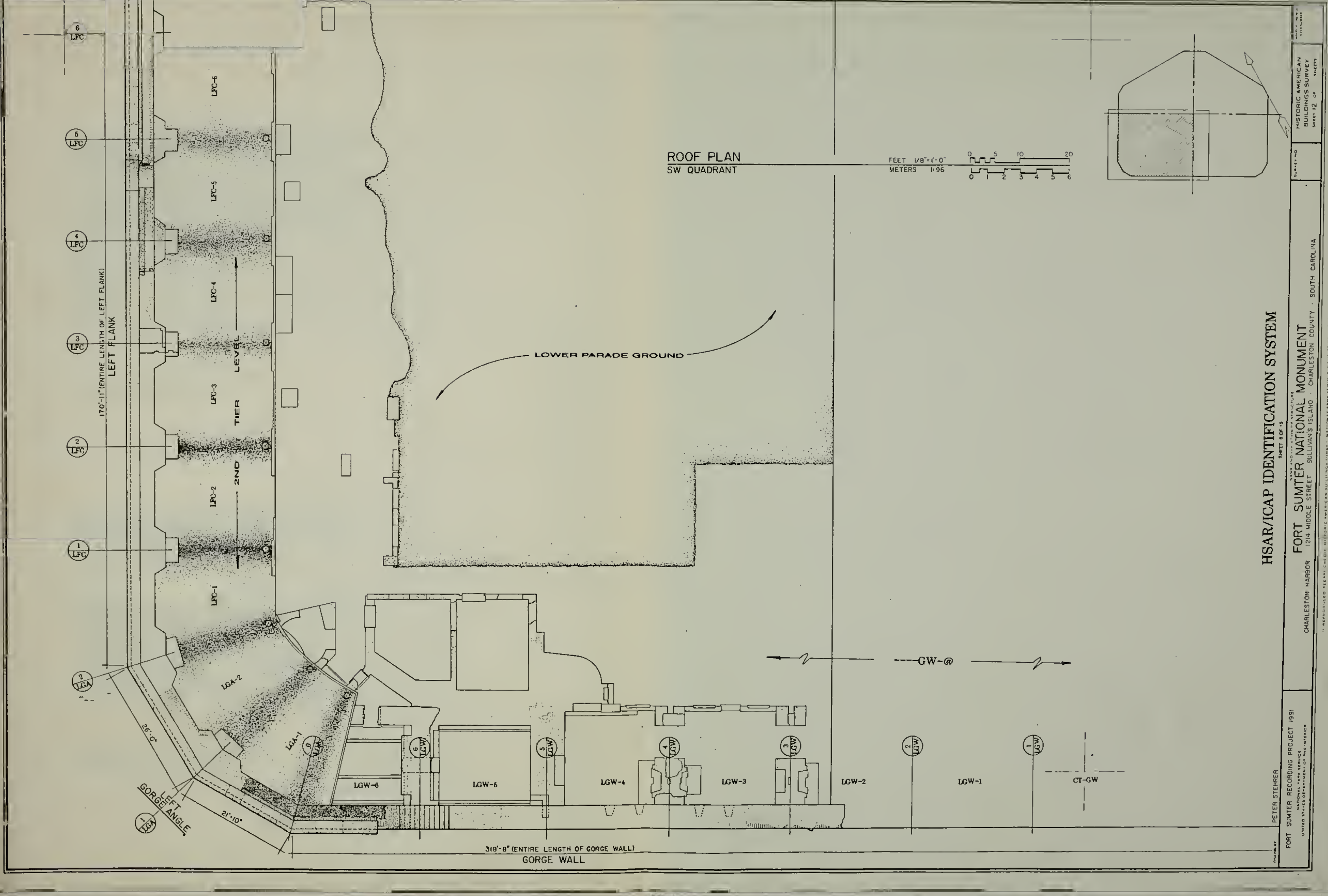
CHARLESTON HARBOR

FORT SUMTER RECORDING PROJECT 1991

UNIVERSITY OF SOUTH CAROLINA

REPRODUCED PLEASE CREDIT: HISTORIC-C-AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE, MAP OF DELINEATION, DATE OF THE DRAWING

BY PETER STEHRER



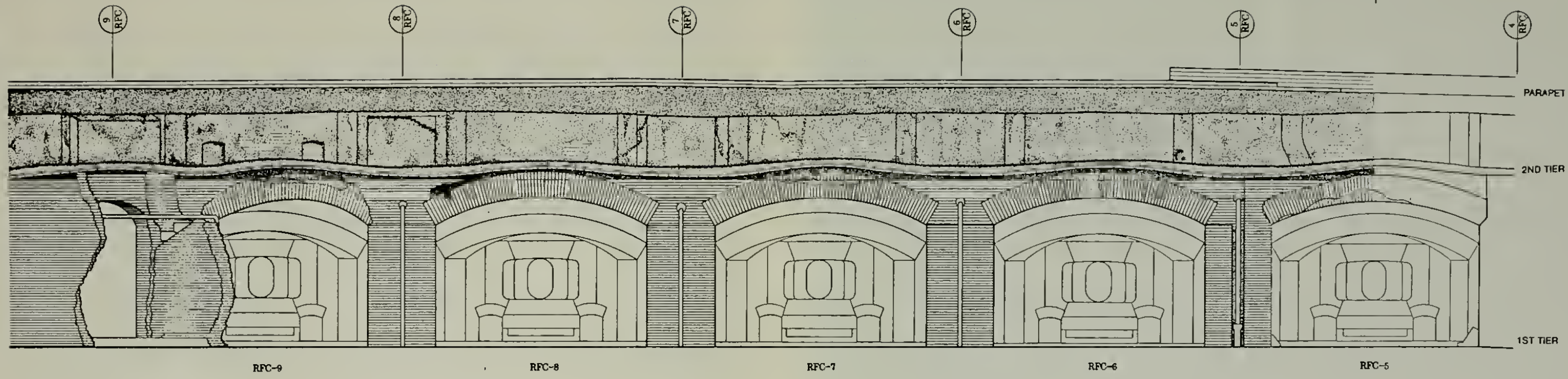
HSAR/ICAP IDENTIFICATION SYSTEM

FOR SUMTER RECORDING PROJECT 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

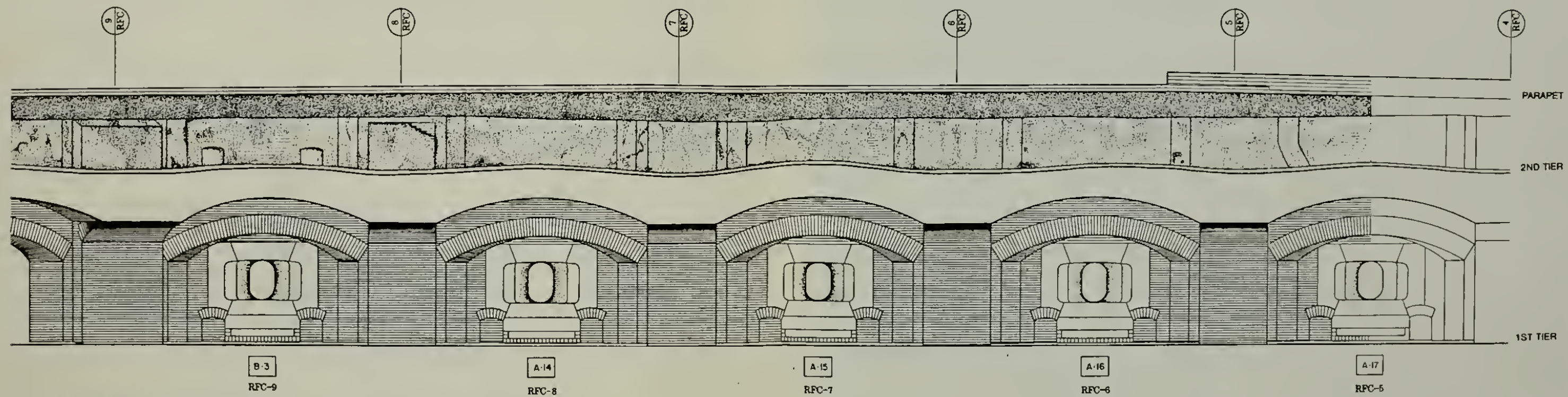
CHARLESTON HARBOR 1214 MIDDLE STREET SULLIVAN'S ISLAND CHARLESTON COUNTY SOUTH CAROLINA

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 12 OF 12

REPRODUCED HEREIN FOR THE NATIONAL PARK SERVICE BY THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION



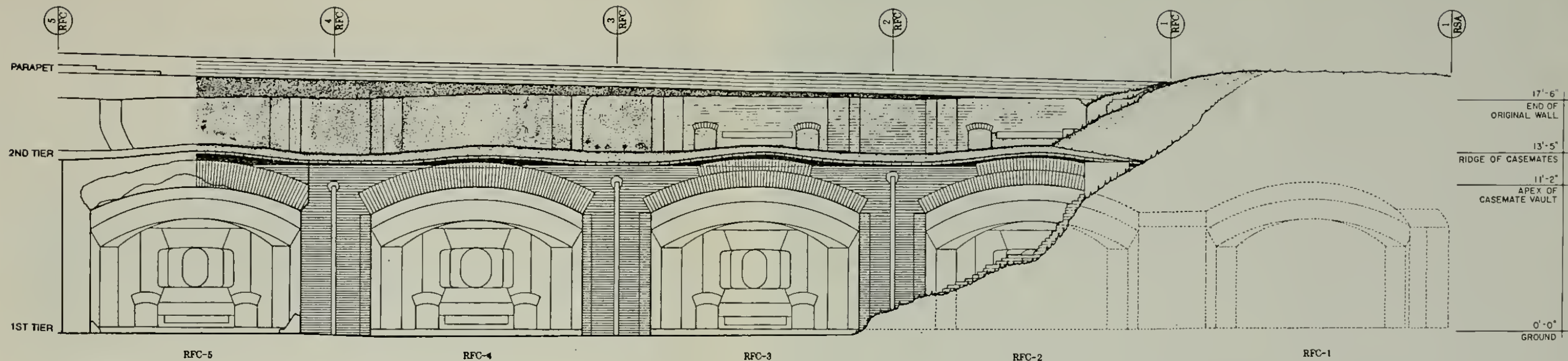
ELEVATION OF CASEMATES
LEFT HALF OF RIGHT FACE WALL



SECTION THROUGH CASEMATES
LEFT HALF OF RIGHT FACE WALL



HSAR/ICAP IDENTIFICATION SYSTEM

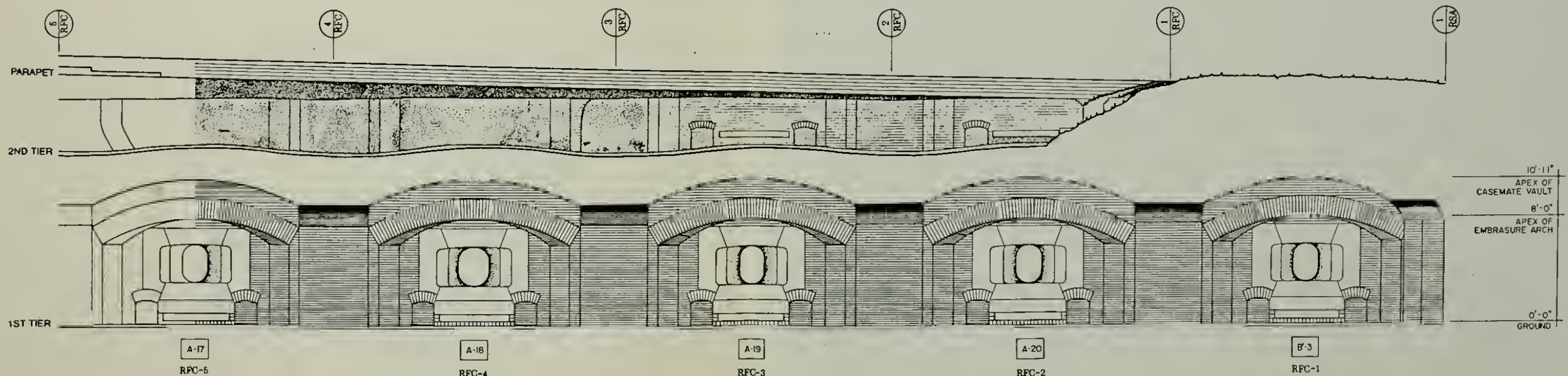


ELEVATION OF CASEMATES
RIGHT HALF OF RIGHT FACE WALL

MATERIALS

BRICK
BRICK RUBBLE
CONCRETE
BROWNSTONE
GRANITE

CASEMATES AND WALL
ADDED PARAPET
COVERING REMNANTS OF
SECOND TIER WALL
EMBRASURE CASING
LINTEL BELOW EMBRASURE



SECTION THROUGH CASEMATES
RIGHT HALF OF RIGHT FACE WALL

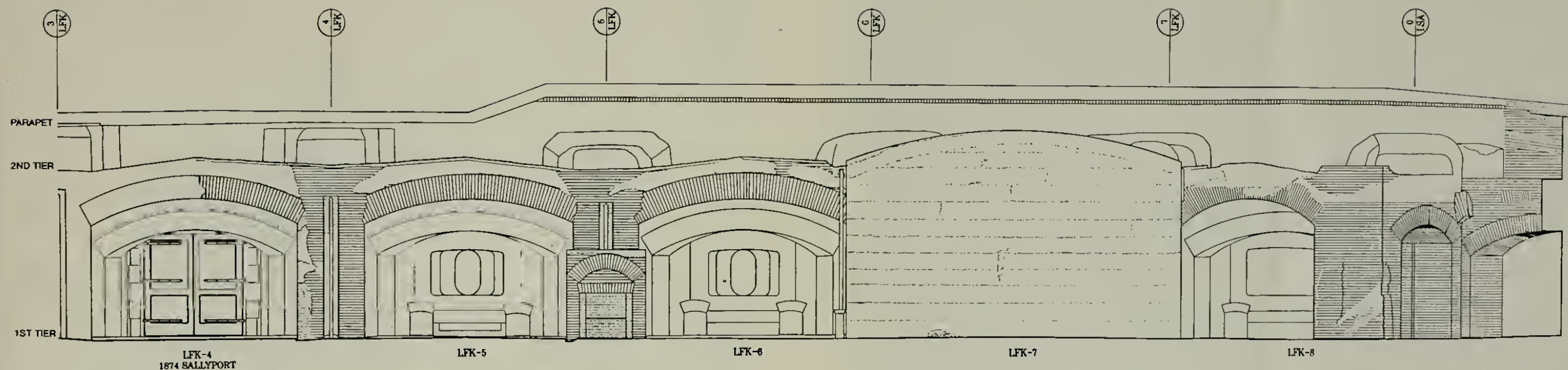


HSAR/ICAP IDENTIFICATION SYSTEM

EDWARD A. STORK
FORT SUMTER RECORDING PROJECT 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
FORT SUMTER NATIONAL MONUMENT
1214 MIDDLE STREET SULLYVAN'S ISLAND
CHARLESTON COUNTY SOUTH CAROLINA

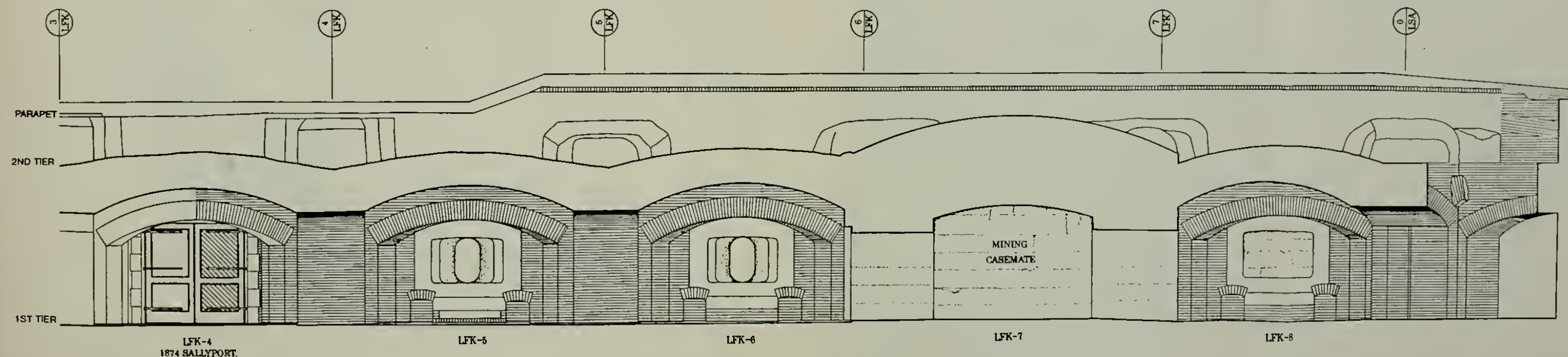
HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 14 OF 14



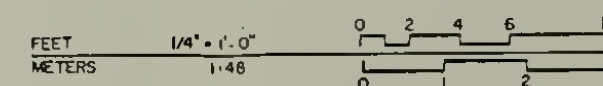
ELEVATION OF CASEMATES
RIGHT HALF OF LEFT FLANK WALL

MATERIALS

BRICK	CASEMATES, WALL AND ADDED PARAPET
CONCRETE	COVERING REMNANTS OF SECOND TIER WALL
BROWNSTONE	EMBRASURE CASING
GRANITE	UNTEL BELOW EMBRASURE



SECTION THROUGH CASEMATES
RIGHT HALF OF LEFT FLANK WALL



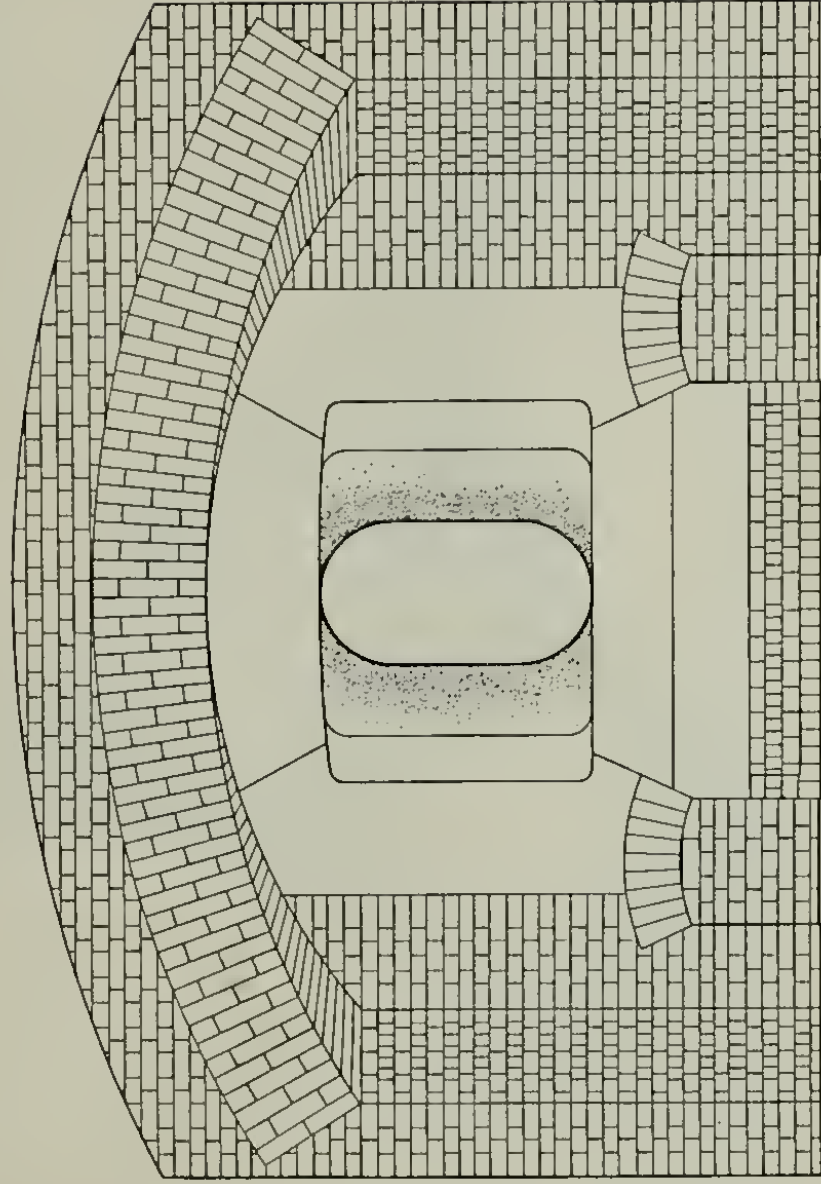
HSAR/ICAP IDENTIFICATION SYSTEM

THOMAS W. WILLIAMS
FORT SUMTER RECORDING PROJECT 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

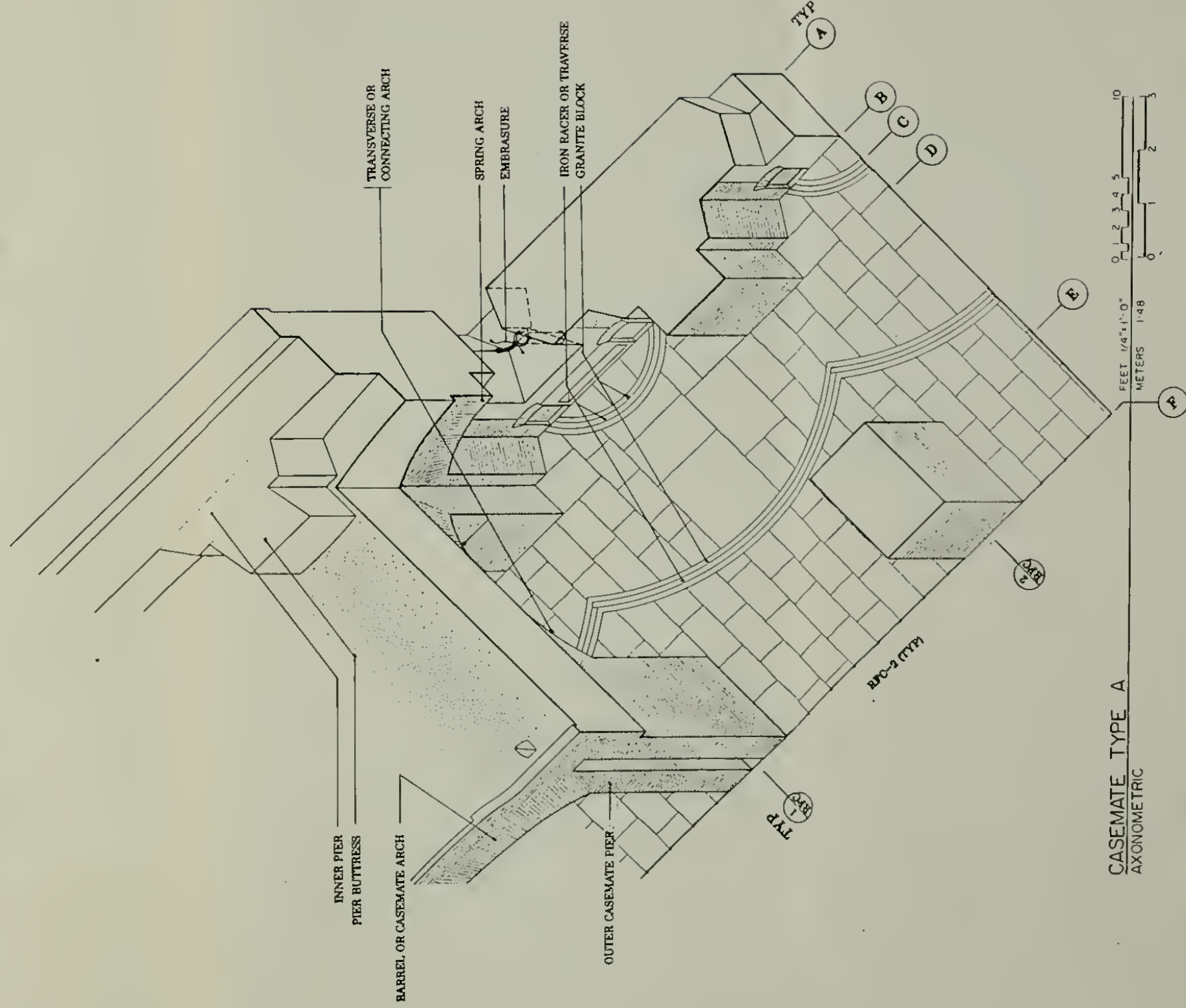
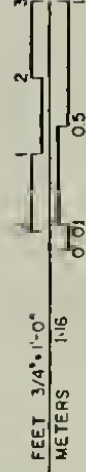
NAME AND LOCATION OF STRUCTURE
FORT SUMTER NATIONAL MONUMENT
CHARLESTON HARBOR 1214 MIDDLE STREET SULLIVAN'S ISLAND CHARLESTON COUNTY SOUTH CAROLINA

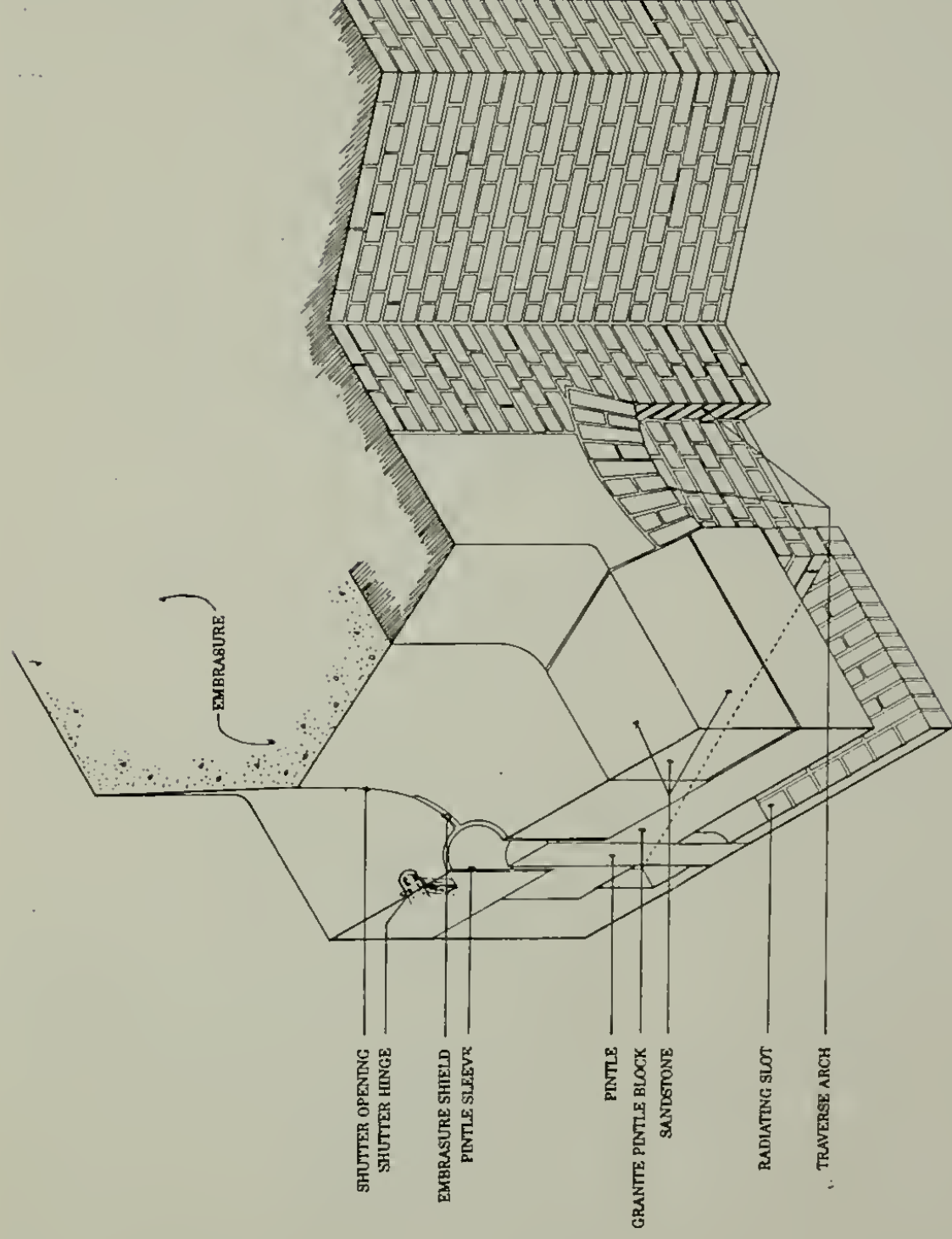
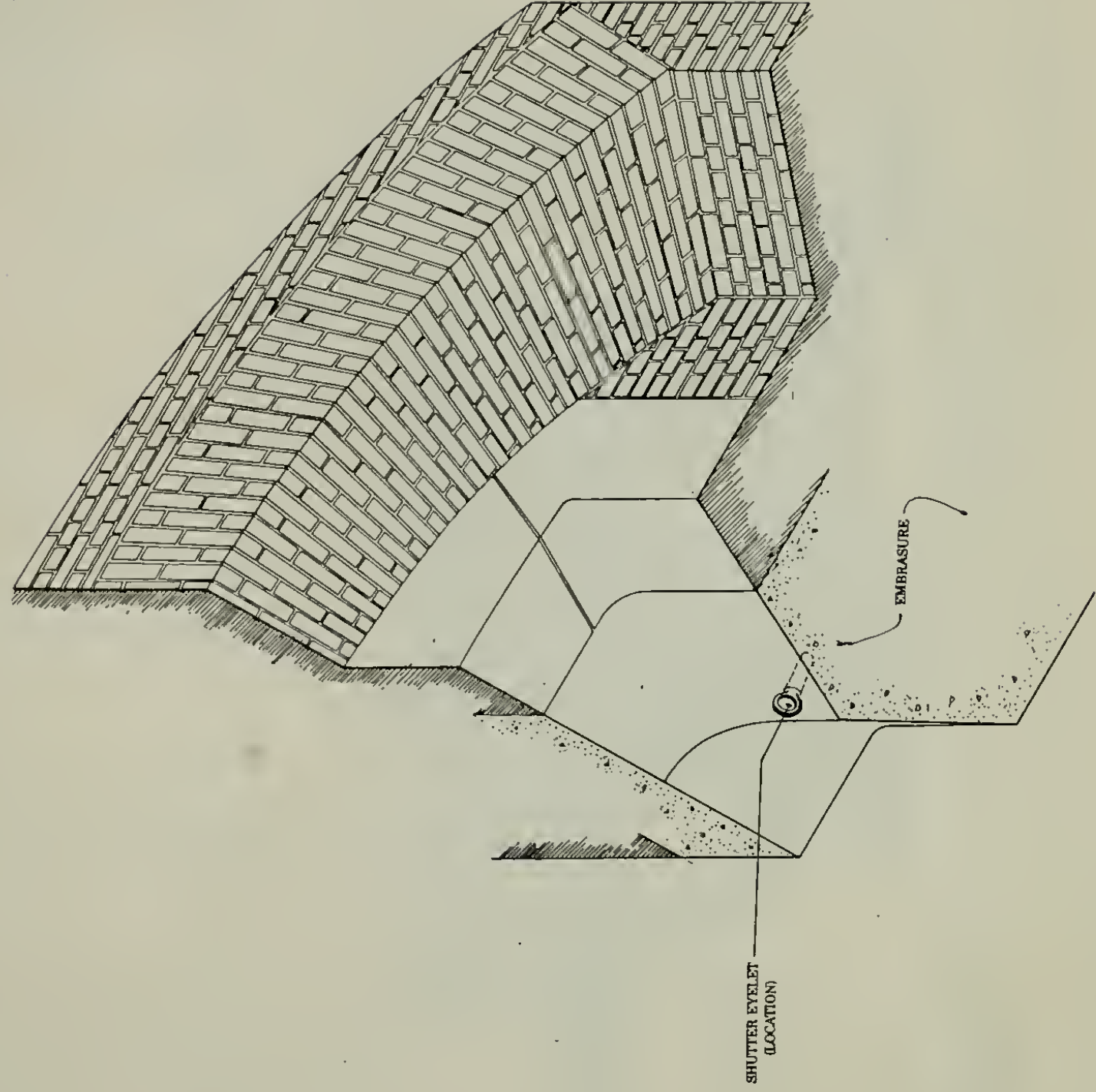
HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 15 OF 15

IF REPRODUCED PLEASE CREDIT: HISTORIC AMERICAN BUILDINGS SURVEY NATIONAL PARK SERVICE NAME OF DRAWING OR DATE OF THE DRAWING



TYPICAL INTERIOR ELEVATION
EMBRASURES OF LEFT FLANK CASEMATES





CORNER DETAIL OF CASEMATE
AXONOMETRIC



HSAR/ICAP IDENTIFICATION SYSTEM

THOMAS W. WILLIAMS
FORT SUMTER RECORDING PROJECT 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

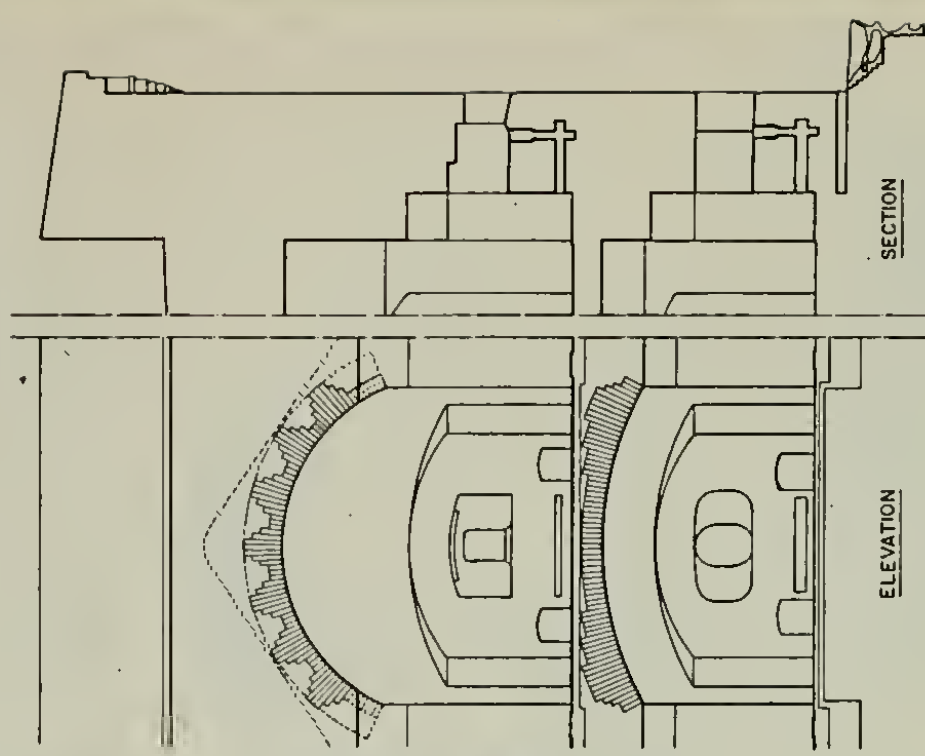
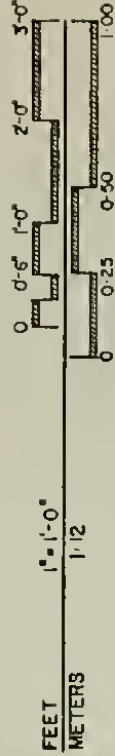
NAME AND LOCATION OF STRUCTURE
FORT SUMTER NATIONAL MONUMENT
CHARLESTON HARBOR 1214 MIDDLE STREET SULLYMAN'S ISLAND CHARLESTON COUNTY SOUTH CAROLINA

HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 20 OF 20

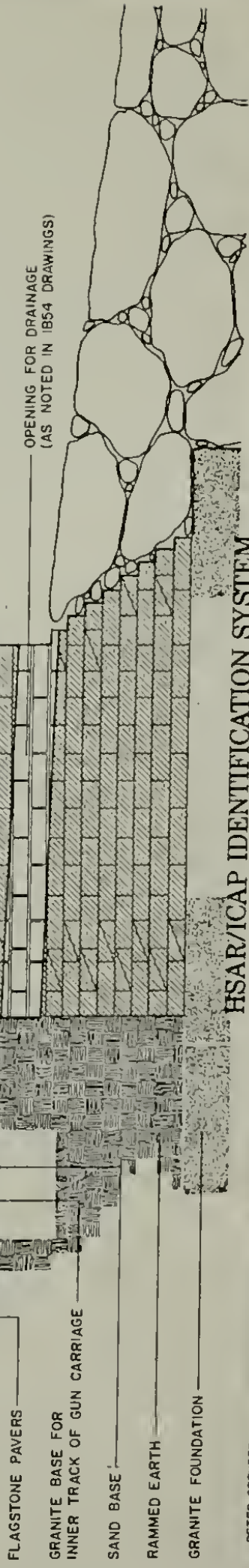
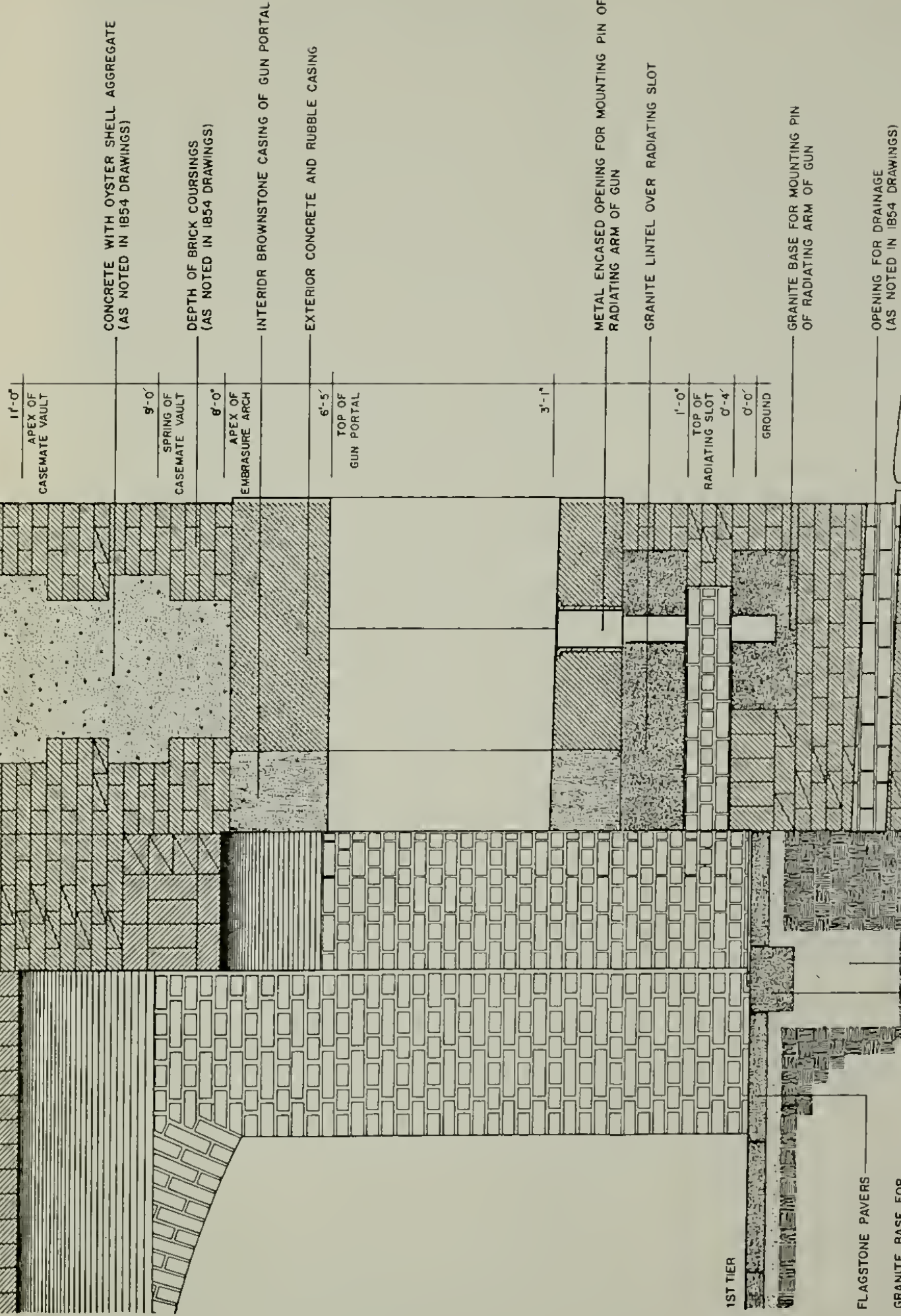
REPRODUCED ALASKA CREDIT HISTORIC AMERICAN BUILDINGS SURVEY NATIONAL PARK SERVICE, NAME OF BUILDING, DATE OF THE DRAWING

TYPICAL WALL SECTION

-DASHED LINES INDICATE THE EXTENT OF THE WALL PRIOR TO 1860.
-PLEASE REFERENCE THE 1854 DRAWING BELOW.



THE DRAWING ABOVE SHOWS THE EXTENT OF THE FIRST AND SECOND CASEMATES AS THEY WERE PLANNED IN 1854.



HSAR/ICAP IDENTIFICATION SYSTEM

FOOT SUMTER RECORDING PROJECT 1991
UNITED STATES OF AMERICA
DRAWN BY PETER STENNER

CHARLESTON HARBOR · 1214 MIDDLE STREET · SULLIVAN'S ISLAND · CHARLESTON COUNTY · SOUTH CAROLINA

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 21 OF 24

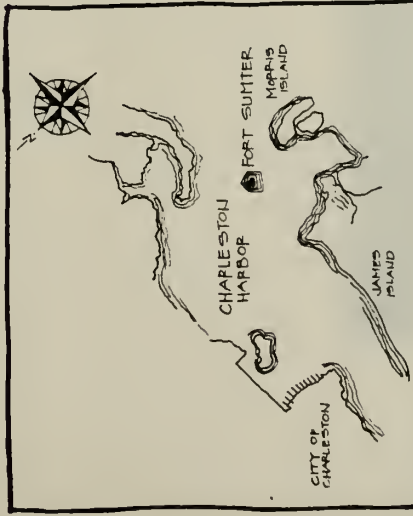


FORT SUMTER

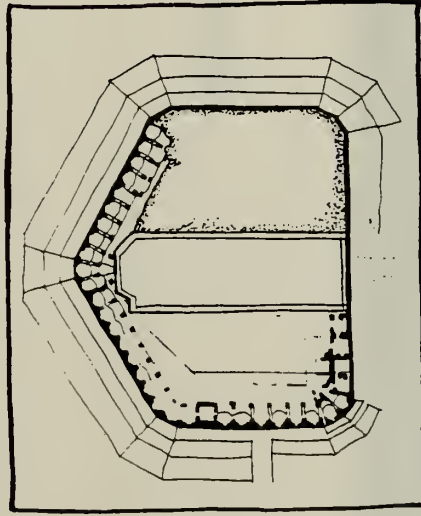
NATIONAL MONUMENT
SULLIVAN'S ISLAND, SC

SCHEMATIC PRESENTATION

FEBRUARY 26, 1992



SITE PLAN



GROUND PLAN

STRUCTURAL STABILIZATION

INTENT:

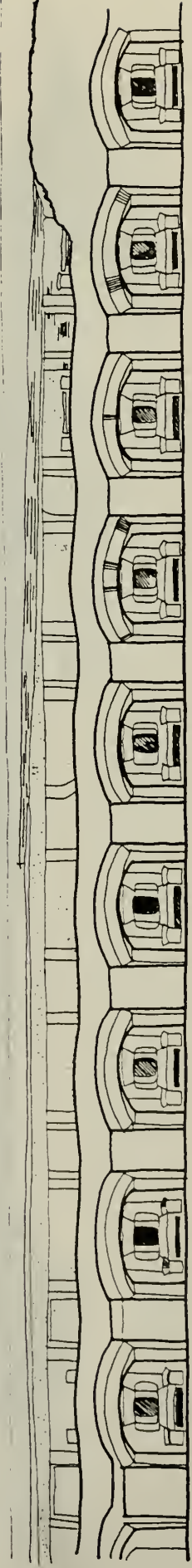
- 1 OBSERVE & MONITOR
STRUCTURAL PERFORMANCE
- 2 IDENTIFY CAUSES OF
STRUCTURAL DETERIORATION
- 3 PRESENT ALTERNATIVES &
SOLUTIONS

PURPOSE:

VISITOR SAFETY

VISITOR ENJOYMENT

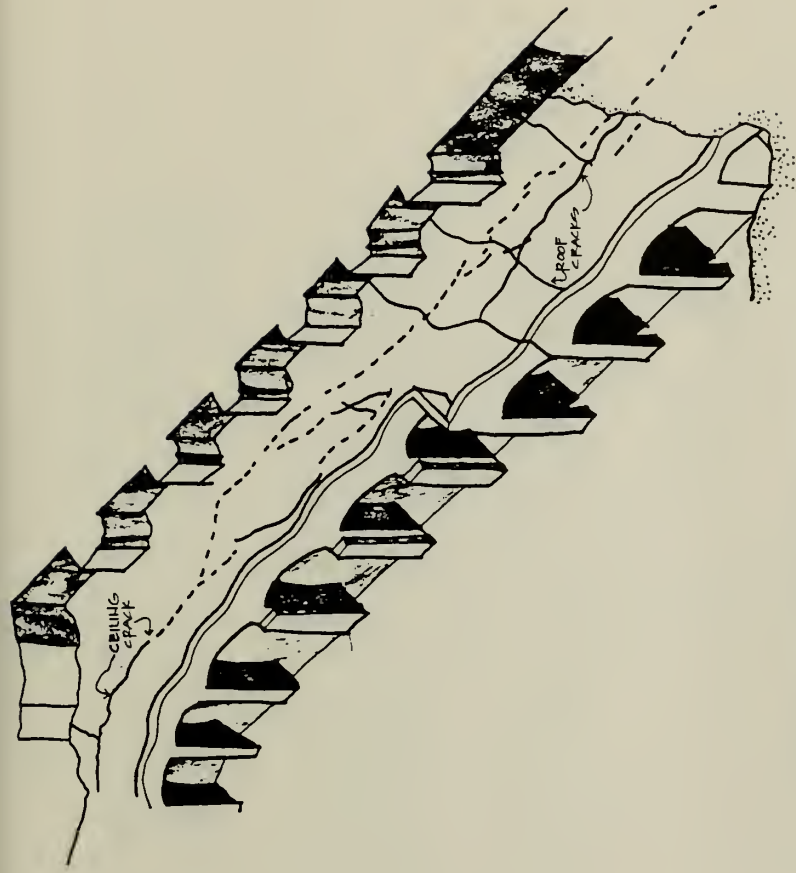
PREVENT FURTHER
DETERIORATION



SECTION THROUGH CASEMATES

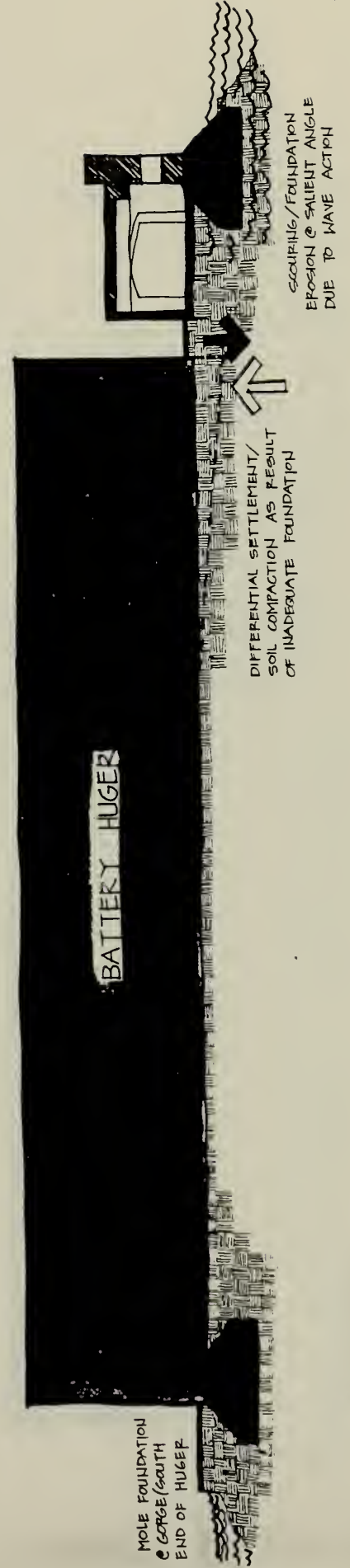
CONCEPTUAL MODEL

STRUCTURAL FORCES	EVIDENCE	SOLUTION
A. TENSION, LATERAL MOVEMENT	INCONCLUSIVE	<ul style="list-style-type: none"> TIE RODS BUTTRESSES
B. COMPRESSION - EXCESSIVE LOADING, STRUCTURAL BENDING	NONE	<ul style="list-style-type: none"> REBUILD W/ LIGHT. MATERIAL REINFORCE VAULTS
C. ROTATION, OVERTURNING, DIFFERENTIAL SETTLEMENT	NONE	<ul style="list-style-type: none"> STABILIZE FOUNDATION



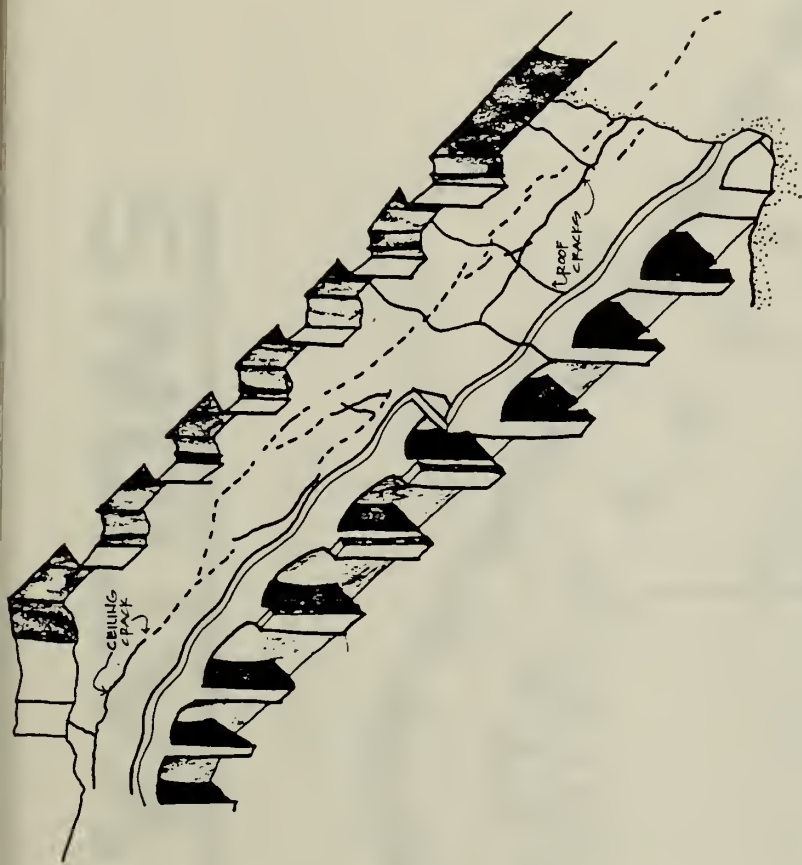
AXONOMETRIC OF FIGHT FACE

--- CEILING CRACKS
--- ROOF CRACKS

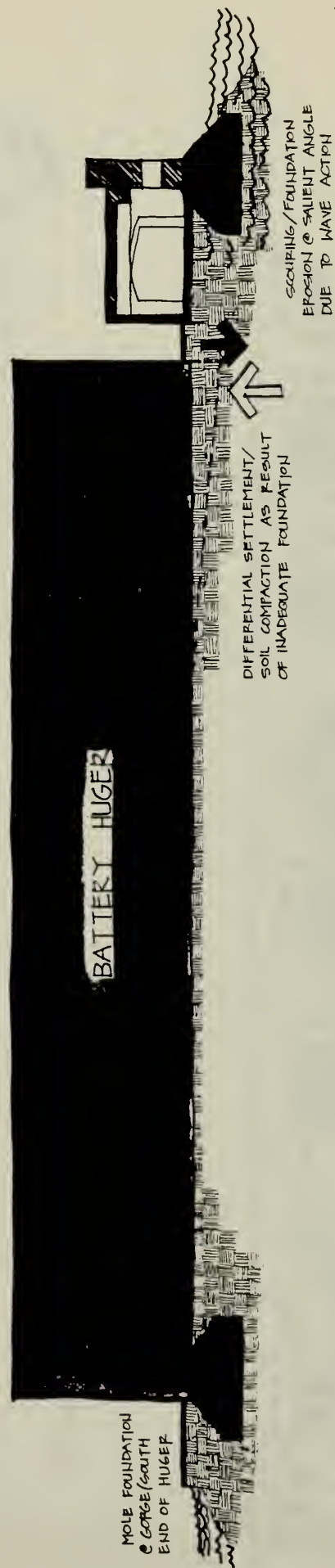


SITE SECTION

CONCEPTUAL MODEL		
STRUCTURAL FORCES	EVIDENCE	SOLUTION
A. TENSION, LATERAL MOVEMENT	INCLUSIVE	• TIE RODS • BUTTRESSES
B. COMPRESSION - EXCESSIVE LOADING, STRUCTURAL BENDING	NONE	• REBUILD W/ LIGHT. MATERIAL • REINFORCE VAULTS
C. ROTATION, OVERTURNING, DIFFERENTIAL SETTLEMENT	NONE	• STABILIZE FOUNDATION



AXONOMETRIC OF RIGHT FACE
 - - - - - CEILING CRACKS
 - - - - - ROOF CRACKS



SITE SECTION

1 OBSERVATIONS



• HEAVIEST WAVE & WIND ACTION,
GROUPING @ SALIENT ANGLE

• MORTAR LINE OF
EXTERIOR WALL
"SAGGING" TOWARDS
SALIENT ANGLE

MONITORS

MONITORS

ENTRANCE →

MONITORS

BATTERY HUGER

• SEVERELY DETERIORATED
CASEMATE

• LARGE VERTICAL
CRACKS IN
TRANSVERSE ARCHES

UNSTABLE AREA
WHERE STAIR WAS
REMOVED

SALIENT ANGLE

BATTERY HUGER

• SLIGHT MOVEMENT IN SALIENT
ANGLE DETECTED BY MONITORS

REPAIRS TO EXISTING ELEVATION
APPEAR STABLE

RIGHT FACE

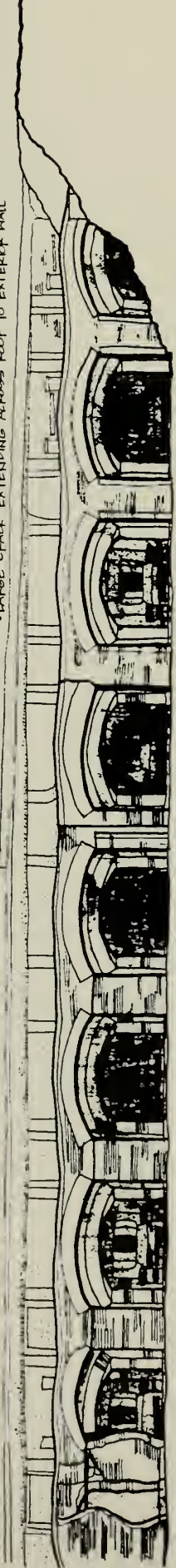
INFILL AREA

GROUND PLAN

PLAN ENLARGEMENT - RIGHT FACE & SALIENT ANGLE

• (VERTICAL) CEILING CRACKS & ROOF CRACKS PARALLEL TO EXTERIOR
WALL EXTENDING ENTIRE LENGTH OF RIGHT FACE

• LARGE CRACK EXTENDING ACROSS ROOF TO EXTERIOR WALL



ELEVATION OF CASEMATES

CAUSES - → EVIDENCE - → OBSERV. - → ANALYSIS

A. SEVERE IMPACT, LOADING

1. BOMBARDMENT	CIVIL WAR	DAMAGED STRUCTURE	SEVERE COMPRESSIVE FORCES - INACTIVE
2. HEAVY EQUIP.	CASEMATE INFILL	ROOF CRACKS	
3. EARTHQUAKE	RECORDED 1806	UNABLE TO DOCUMENT DAMAGE OR EFFECT	

B. STRUCTURE

1. CHANGE IN MATERIAL, GEOMETRY - incl. DEMO.	PATCHED ROOF & PENETRATIONS MOISTURE, DEBRIS IN ROOF CRACKS	STABILIZED CONSTANT	NO EVID. OF NEG. EFFECT POTENTIAL NEED TO REPAIR
2. LATERAL MOVEMENT	NONE	CONT. TO MONITOR - ESP. LEFT GORGE ANGLE	MAY NEED TO PROVIDE REINFORCEMENT

C. FOUNDATION

1. DIFFERENTIAL SETTLE.	BATTERY HUGER	EFFECT STAB 50 YRS AGO?	INACTIVE - PAST CAUSE
2. REGULAR SETTLEMENT	SAG. MORTAR LINE → SALIENT ANGLE	APPEARS STABLE	PAST CAUSE
3. UNSTABLE FOUNDATION	WALL DEFORMATION ?	NO CONCLUSIVE EVIDENCE	CONTINUE MONITORING

D. ENVIRONMENTAL

1. THERMAL LOADING	CEILING CRACKS	EXPANDS & CONTRACTS	CYCLIC, SEASONAL
2. SCOURING/FDN EROSION	"SOUNDS OF WAVES", CHANNEL CURRENTS	MONITORING IN PLACE	MONITOR. TO CONTINUE
3. WAVE, WIND ACTION	ISLAND CONDITIONS	IRREGULAR, CYCLIC, MOST SEVERE @ SALIENT ANGLE	POTENTIAL FOR MAJOR IMPACT

* ACTIVE CAUSES

RECOMMENDATIONS FOR STRUCTURAL STABILIZATION

FACTORS

NUMBER OF DAYS	COST	VISUAL IMPACT	COMPLIANCE NEEDED	ADDRESSES OTHER POTENTIAL CAUSES
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1. DEMOLITION

<input checked="" type="checkbox"/> a. CASEMATE	30	\$15,700.	-	-
<input checked="" type="checkbox"/> b. TRANSVERSE ARCHES (ADJACENT)	20	\$20,700.	-	-

2. BRICKWORK

<input checked="" type="checkbox"/> a. REBUILD CASEMATE	30	\$23,500.	EXCELLENT	-	NO
<input checked="" type="checkbox"/> b. REBUILD TRANSVERSE ARCHES	15	\$11,800.	EXCELLENT	-	NO
<input type="checkbox"/> c. CAP OFF AND STABILIZE	5	\$2,600.	POOR	-	NO
<input type="checkbox"/> d. FLUSH MORTAR JOINT @ CASEMATE CEILING	5	\$3,130.	GOOD	-	-
<input checked="" type="checkbox"/> e. RODDED MORTAR JOINT @ CASEMATE CEILING	10	\$6,260.	EXCELLENT	-	-

3. REINFORCEMENT

<input type="checkbox"/> a. TIE RODS	5	\$3,000.	ACCEPTABLE	-	YES
<input type="checkbox"/> b. BUTTRESSES	30	\$21,000.	ACCEPTABLE	-	YES
<input type="checkbox"/> c. WIRE MESH (OR OTHER STEEL)	1	2,000.	-	-	YES
<input checked="" type="checkbox"/> d. NONE	-	-	-	-	-

4. CONNECTION

<input checked="" type="checkbox"/> a. TIE IN TO EXISTING	-	-	EXCELLENT	NO	NO
<input type="checkbox"/> b. EXPANSION JOINT @ SALIENT ANGLE	-	\$1,000.	GOOD	NO	YES
<input checked="" type="checkbox"/> c. SEAL ROOF CRACKS (Etc.)	10	\$7,000.	GOOD	NO	NO

☒ RECOMMENDED TOTAL \$78,700.

☒ ACTUAL TOTAL

* ALL RECOMMENDATIONS TO COMPLY WITH SECRETARY STANDARDS.

