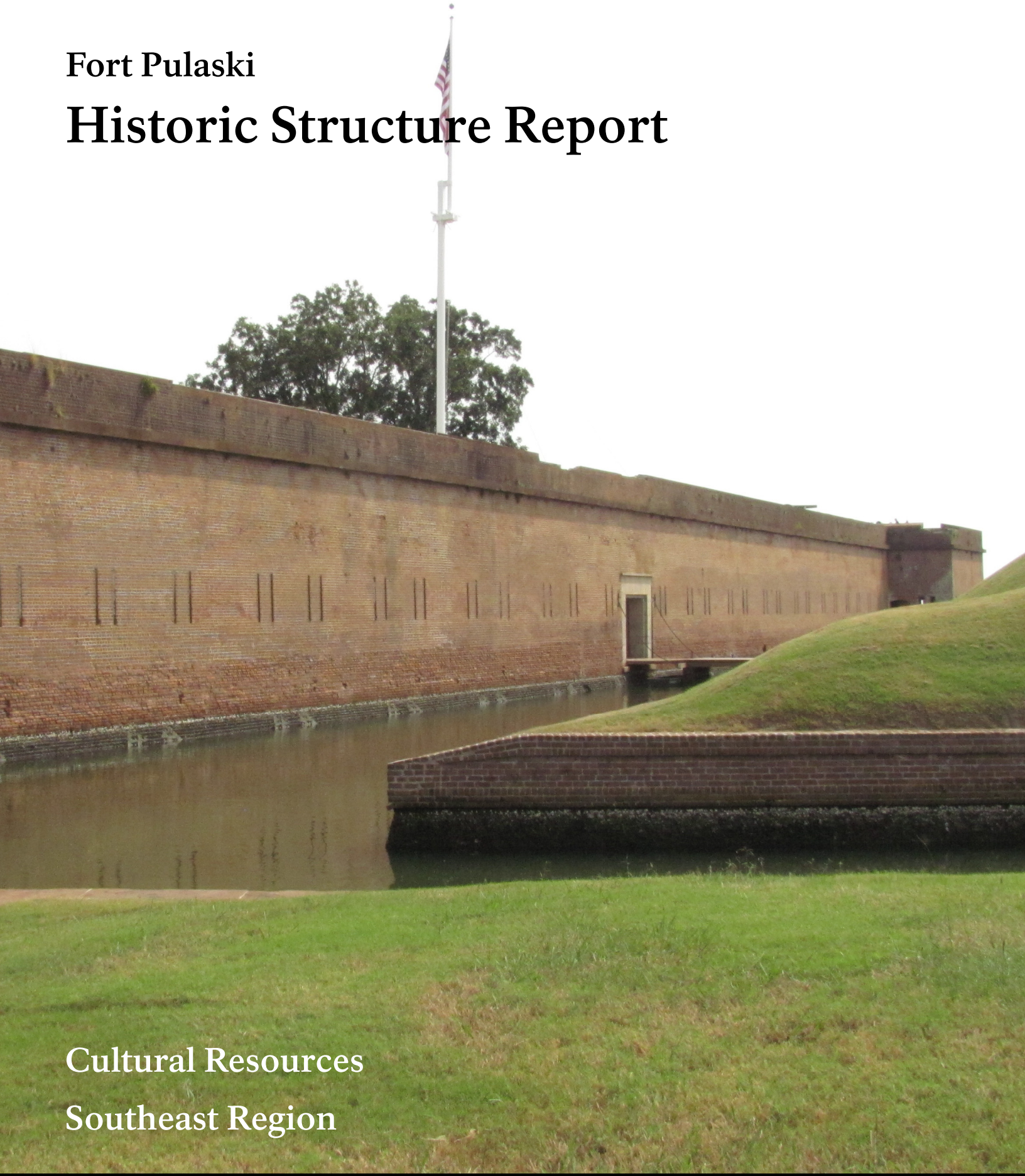
National Park Service
U.S. Department of the Interior

Fort Pulaski National Monument
Georgia

Fort Pulaski
Historic Structure Report



Cultural Resources
Southeast Region

Fort Pulaski

Fort Pulaski National Monument, Chatham County, Georgia

Historic Structure Report

October 2014

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About the front cover: View of Fort Pulaski looking east, September 2012.

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Fort Pulaski

Fort Pulaski National Monument, Chatham County, Georgia

Historic Structure Report

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Foreword

We are pleased to make available this historic structure report, part of ongoing efforts to provide comprehensive documentation for the historic structures and landscapes of National Park Service units in the Southeast Region. Many individuals and institutions contributed to the successful completion of this work. We would particularly like to thank the staff of Fort Pulaski National Monument, Katherine Purcell, Mike Weinstein, Gloria Swift, Joel Cadoff, Jerry Turner, and Laura Rich Acosta, for their assistance throughout the process, and Superintendent Melissa Memory. Special thanks go to Tommy Jones and Ali Miri for their project leadership from the Southeast Regional Office and to the dedicated staff of WJE for their outstanding work and responsiveness to the needs of Fort Pulaski. We hope that this study will prove valuable to park management in their treatment of the fortification and to everyone in understanding and interpreting the Fort Pulaski Monument.

Dan Scheidt, Chief
Cultural Resource Partnership and Science
Southeast Regional Office
October 2014

Management Summary

Management Summary

At the request of the National Park Service (NPS), Wiss, Janney, Elstner Associates, Inc. (WJE) has developed this Historic Structure Report (HSR) for Fort Pulaski National Monument on Cockspur Island, near Savannah in Chatham County, Georgia. Figure 1 is a map of the state of Georgia showing the location of Fort Pulaski. Figure 2 is a map of Fort Pulaski National Monument showing the location of the fort.

Fort Pulaski is listed in the National Register of Historic Places as the best preserved and most original of a system of eastern coastal forts designed by the French military engineer Simon Bernard while in the employment of the U.S. Army Corps of Engineers. The Fort Pulaski complex is significant in the areas of architecture, engineering, and military history. Specifically, Fort Pulaski is noteworthy for the fact that its construction, designed to resist cannon fire, rapidly failed when under attack by rifled artillery—an event that signaled the beginning of a new approach to fortification architecture and construction.

Historical Data

Coastal defenses at Cockspur Island were first developed during the French and Indian War of the eighteenth century. Following the British invasion of Washington, D.C., during the War of 1812, the U.S. government planned fifty new forts as part of a third system of national coastal defenses, which included Fort Pulaski to defend the approaches to Savannah. Plans were completed in 1831 for a single level brick masonry fort topped by an open terreplein.

Construction began in 1833 but progressed slowly due to frequent storms and limited funding. The overall structure was not completed until 1839, and the demilune and interior were not fully completed until early in 1847. As completed, the five-sided masonry fort included a central parade ground surrounded by casemates. A gorge along the west elevation included officers' quarters, while casemates were present on the remaining four sides of the fort. Above the interior casemates and gorge rooms was a terreplein. The fort was designed to hold 146 guns, but by 1860 only twenty guns had been installed, and the fort was manned only by a peacetime caretaker and an ordnance sergeant.

After the election of Abraham Lincoln, southern states began to consider secession from the Union. South Carolina seceded on December 20, 1860, and less than a week later, a small U.S. Army garrison occupied Fort Sumter in Charleston Harbor. Local leaders in Savannah were concerned that federal forces would soon occupy all military fortifications throughout the South, including nearby Fort Pulaski. Georgia Governor Joseph E. Brown therefore ordered the Georgia militia to seize Fort Pulaski on January 2, 1861. The militia encountered no resistance at the almost unmanned fort.

Georgia troops, supported by slave labor from nearby rice plantations, quickly began to prepare the fort for possible attack. War officially began with the Confederate assault on Fort Sumter in April 1861. In the fall of 1861, Union forces moved south by sea to begin a planned naval blockade of the South. The Union forces quickly captured forts at Hilton Head and Bay Point Islands in South Carolina. The Confederates responded by strengthening the defenses of Fort Pulaski,

including moving an artillery battery from Tybee Island to the fort. The abandonment of Tybee Island by the Confederates allowed Union forces to move south to Tybee Island and prepare for a blockade of Fort Pulaski.

By early 1862, Union forces had established gun positions along the Savannah River and blockaded Fort Pulaski. Fort Pulaski had a six-month supply of food in January 1862, making surrender of the fort inevitable if the blockade could not be broken. Despite this advantage, Union Brig. Gen. Thomas Sherman still sought a quick capture of the fort and the City of Savannah rather than waiting for the Confederates to surrender due to a lack of food.[1]

The main Union position was on Tybee Island, 1 to 2-1/2 miles away from the fort, which was too far for conventional smoothbore guns and mortars to be effective against a heavy masonry wall. Federal Capt. Quincy Adams Gillmore was familiar with a new weapon, the rifled gun, with which the U.S. Army began experimenting in 1859. In late 1861, convinced that the rifled gun could breach the walls of Fort Pulaski from Tybee Island, Gillmore persuaded Sherman of his plan to attack the fort from that location. Union troops erected eleven batteries of guns and mortars on the northwest shore of Tybee Island, facing Fort Pulaski. By April 9, preparations were ready for the attack.

On the morning of April 10, the Union assault began. By the end of the day, the Confederate defenders were aware that Fort Pulaski was in significantly damaged condition, as the 7-1/2 foot thick wall at the southeast corner now had an intact thickness of only 3 feet. The bombardment of Fort Pulaski continued at dawn the next morning. Shortly after noon, the southeast angle of the fort was in ruins, with two sizeable holes present, making the inside of the fort visible from Tybee Island. At approximately 2:30 p.m. on April 11, the Confederate flag was lowered, a gun was fired from the casemate, and a white sheet was raised. Fort Pulaski was surrendered to Union control.

The 48th New York arrived at Fort Pulaski in June 1862 and was charged with making repairs to the damaged fort, which included rebuilding the fort's southeast corner. In addition, the batteries on Tybee Island were dismantled, with some of the guns relocated to Fort Pulaski. By June 1863, the Fort's garrison was largely reduced to a holding force as fighting continued elsewhere.

In October 1864, a group of 520 Confederate prisoners were transferred from Morris Island, near Charleston, to Fort Pulaski. At the end of the war, several Confederate leaders were brought to Fort Pulaski, where many remained prisoner for several months.

Following the war, the U.S. Army sought to modernize the fort in response to its failure to withstand the Union fire directed at it in 1862. Beginning in 1869, the Corps of Engineers made a series of improvements to the fort. These improvements included remodeling the demilune, installing new underground magazines and passageways, and constructing gun emplacements. Construction on Fort Pulaski stopped in 1872 after the Corps of Engineers made plans to construct a new fort on nearby Tybee Island. In 1873, the remaining Army units stationed at the fort were withdrawn and Fort Pulaski was officially closed, although it remained under army administration as a military reservation.

After the 1893 Sea Islands Hurricane destroyed the Cockspur Island lighthouse keeper's house, a two-story house for the keeper was constructed on top of the terreplein near the southwest corner of Fort Pulaski. The lighthouse keeper lived in and maintained the home until 1906; the building was destroyed by fire in 1925.

In 1924, Fort Pulaski was established as a national monument. The national monument was transferred to National Park Service

1. Brig. Gen. Thomas Sherman (1813–1879) is not to be confused with Gen. William Tecumseh Sherman (1820–1891).

administration in 1933. Several New Deal agencies, including the Civil Works Administration (CWA), the Civilian Conservation Corps (CCC), and the Public Works Administration (PWA), played a role in the preservation of Fort Pulaski during the 1930s.[2]

The CWA completed several small projects at Fort Pulaski between December 1933 and April 1934, including the removal of vegetation from the parade ground and the walls of the fort, and partial excavation of the main feeder canal.

The CCC performed work at Fort Pulaski National Monument from 1934 to 1941, including landscape and drainage work throughout Cockspur Island. The CCC constructed a sidewalk on the parade ground, excavated the moat surrounding the fort, and filled the swampy areas in the parade ground.

The PWA workers, who included skilled craftsmen, completed projects within the fort. In September 1934, after months of planning, the PWA began restoration work at Fort Pulaski. One of the earliest projects undertaken by the PWA was the repair of the lead roof at the terreplein. The PWA also installed three water storage tanks. In 1935, the PWA restored the officer's quarters and the barracks rooms, which were located in the gorge on the west side of the fort. During the restoration, electricity and phone service was added to the rooms in the gorge. An administrative office, museum, and comfort stations were constructed in the restored rooms in the gorge. Repairs were also made to the gorge walk, and the covered veranda (missing since it had been removed at the start of the Civil War) was reconstructed. The PWA also erected a new flagpole and reconstructed the drawbridge.

Several Mission 66 era projects were undertaken at Fort Pulaski National Monument in the late 1950s, including a series of repairs to the fort. Smaller maintenance and repair projects have continued at the park from the 1960s to the present day.

Treatment and Use

Fort Pulaski is a nationally significant structure. The building is preserved and interpreted for the public and is anticipated to remain in this use. The recommended overarching treatment for the structure itself is therefore *Preservation* to support continued protection of historic character-defining features as well as allowing non-intrusive features related to visitor support and park operations to remain. For the landscape features of the demilune, parade ground, and terreplein, the relevant treatment approach is *Rehabilitation*, as preservation of the landscape is not feasible.

Fort Pulaski has generally been maintained in fair condition over the past fifty years, although certain materials require maintenance and repair. Examples include localized brick masonry joint repointing, repainting of wood components, repair of cracked and displaced paving, and interior plaster repair and repainting.

Administrative Data

Locational Data

Building Name: Fort Pulaski

Location: Fort Pulaski National Monument, Georgia

LCS Number: Fort Pulaski and associated structures are listed in the List of Classified Structures (LCS) as follows:

- Fort Pulaski: LCS 000368 (HS-01)
- Demilune: LCS 090084 (HS-08)
- Moat: LCS 090083 (HS-07)

2. Unlike the WPA and the CCC, the PWA provided public funds to engage private companies for construction projects.

Related Studies

Edward L. Trout, Park Historian, *National Register of Historic Places Registration Form: Fort Pulaski National Monument*. Approved by the National Register, December 3, 1975.

Fort Pulaski, vicinity of Savannah, Chatham County, Georgia, Historic American Building Survey documentation, GA- 2158, 1935–1936, 1992, 1997, and 2002.

Susan Hitchcock, *Cockspur Island Historic District, Fort Pulaski National Monument Cultural Landscape Report*. Atlanta, Georgia: National Park Service, Southeast Regional Office, Cultural Resources Division, August 2011.

J. Faith Meader, New South Associates, and Cameron Binkley, editor, National Park Service. *Fort Pulaski National Monument Administrative History*. Atlanta, Georgia: National Park Service, Southeast Regional Office, Cultural Resources Division December 2003.

Cultural Resource Data

Fort Pulaski was listed in the National Register of Historic Places in 1975 for its significance in architecture, engineering, and military history.

Period of Significance: 1829–1895[3]

Proposed Treatment: Preservation (Rehabilitation of landscape features)

Project Scope and Methodology

The goal of the HSR is to develop planning information for use in the repair, maintenance, and preservation of this historically significant structure. First developed by the National Park Service in the 1930s, HSRs are documents prepared for a building, structure, or group of buildings and structures of recognized significance to record and analyze the property's initial construction and subsequent alterations through historical, physical, and pictorial evidence; document the performance and condition of the structure's materials and overall physical stability; identify an appropriate course of treatment; and, following implementation of the recommended work, document alterations made through that treatment.

The HSR addresses key issues specific to Fort Pulaski, including the history and construction chronology of the building; the existing physical condition of the exterior envelope, structural systems, and primary interior spaces and features; and the historic significance and integrity of the structure.

Assessment of landscape features beyond the perimeter of the fort and its moat is outside the scope of this study. These areas were previously addressed in the Fort Pulaski Cultural Landscape Report, which provided recommendations for maintaining the historic character of the fort's setting.

The following project methodology was used for this study.

Research and Document Review.

Archival research was performed to gather information about the original construction and past modifications and repairs for use in assessing existing conditions and developing treatment

3. The findings of this Historic Structure Report concur with the Cultural Landscape Report for Fort Pulaski National Monument, which identifies a secondary period of significance, 1933–1942, associated with the New Deal era activities at Fort Pulaski and on Cockspur Island. Refer to the Significance and Integrity chapter for further discussion.

recommendations for the fort. Documents reviewed included maps, drawings, specifications, historic photographs, and other written and illustrative documentation about the history of construction and repairs to the fort. The research for this study built upon prior historical and archival research by the National Park Service and others, as outlined in the bibliography provided with this report. Primary reference material for this study was obtained from the Fort Pulaski archives and facilities collections. Additional research material was obtained from the National Park Service Technical Information Center (TIC) in Denver.

Condition Assessment and Documentation. Concurrent with the historical research, a condition survey of Fort Pulaski was performed and observations documented with digital photographs, field notes, and annotation on baseline drawings. For purposes of the field survey, copies of architectural drawings from original construction and later alterations were provided to the project team by the NPS TIC. The condition assessment addressed the exterior and primary interior spaces and features of the fort.

Development of History, Chronology of Construction, and Evaluation of Significance. Based on historical documentation and physical evidence gathered during the study, a context history and a chronology of design and construction were developed. An evaluation of the significance was also prepared, taking into consideration guidelines provided by *National Register Bulletin: How to Apply the National Register Criteria for Evaluation*.[4] This evaluation of history and significance provided the basis for the development of recommended treatment alternatives.

Guidelines for Preservation. Based on the evaluation of historical and architectural significance of the structure, guidelines were prepared to assist in the selection and implementation of preservation treatments.

Treatment Recommendations. The Secretary of the Interior's Standards for the Treatment of Historic Properties guided the development of treatment recommendations for the significant exterior and interior features of the buildings, as well as for the features of the landscape included in this study. Following the overall treatment approaches of *Preservation* for the fort, and *Rehabilitation* for the landscape, the specific recommendations were developed to address the observed existing distress conditions as well as long-term preservation objectives.[5]

Preparation of Historic Structure Report. Following completion of research, site work, and analysis, a narrative report was prepared summarizing the results of the research and inspection and presenting recommendations for treatment. The HSR was compiled following the organizational guidelines of NPS *Preservation Brief 43: The Preparation and Use of Historic Structure Reports*, with modifications to organizational structure for purposes of this project.[6]

4. *National Register Bulletin: How to Apply the National Register Criteria for Evaluation* (Washington, D.C.: National Park Service, National Register of Historic Places, 1990, revised 1995).
5. Kay D. Weeks and Anne E. Grimmer, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (Washington, D.C.: National Park Service, Historic Preservation Services, 1995).
6. Deborah Slaton, *Preservation Brief 43: The Preparation and Use of Historic Structure Reports* (Washington, D.C.: National Park Service, Technical Preservation Services, 2005).

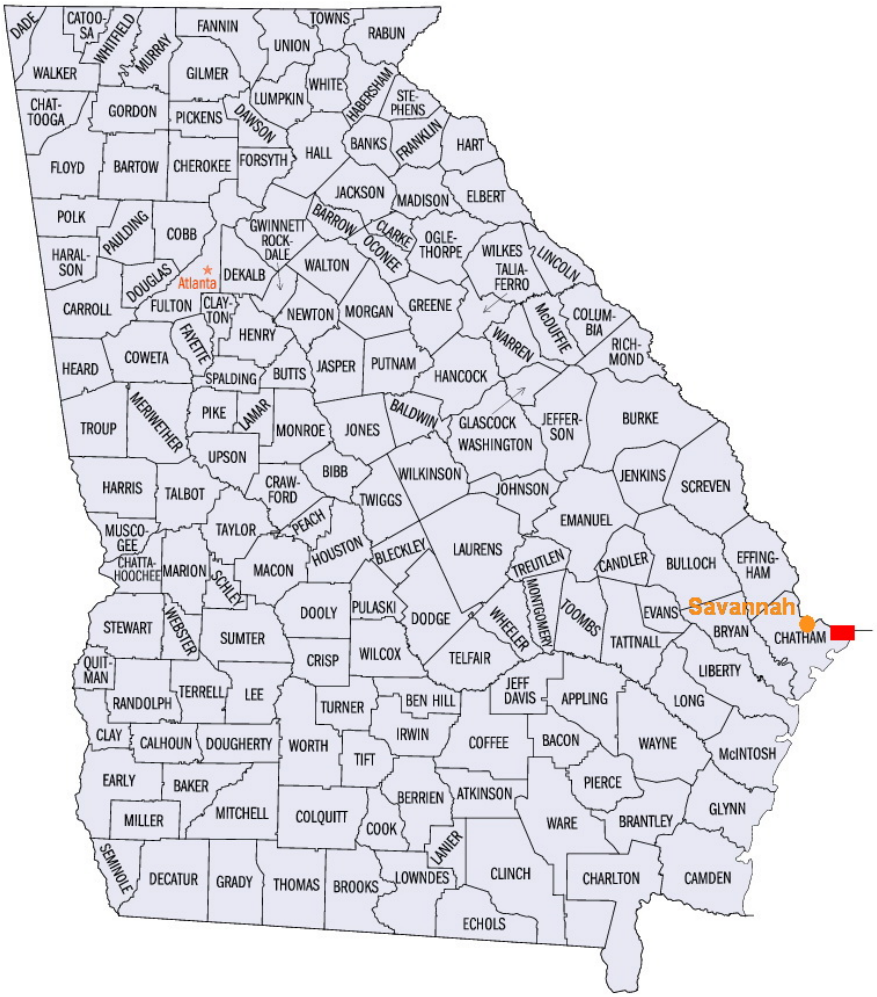


FIGURE 1. Map of Georgia showing location of Fort Pulaski National Monument (red rectangle) on the coast near Savannah (not to scale). Source: U.S. Census Bureau, modified by the authors.



FIGURE 2. Park map of Fort Pulaski National Monument. Source: NPS.

Developmental History

Early History of Cockspur Island

Archeological studies have not yet been conducted to confirm prehistoric occupation of Cockspur Island. However, archeological studies at nearby Whitemarsh and Wilmington Islands have found evidence of human habitation during the Middle Woodland (500 B.C. to A.D. 500) and Late Woodland (A.D. 500 to A.D. 1100) periods.[7]

When Spanish explorers traveled along the Georgia coast during the early 1500s, the Euchee tribe inhabited nearby Tybee Island. By 1580, Franciscan missionaries from Spain began to establish missions along the southern Georgia coast. The northernmost mission established was the Mission Santa Catalina de Guale, which sat near the mouth of Ogeechee River, approximately fifteen miles southwest of Cockspur Island. The Franciscan missions continued to thrive along the Georgia and Florida coast until the 1670s, when the British began to settle in the Carolinas. Colonization of the Carolinas by the British led to conflicts with the Spanish. A series of raids on the missions by American Indians allied with the British eventually caused the Spanish to leave Georgia and retreat into Florida. By 1686, Juan Márquez Cabrera, the Spanish Governor of Florida, ordered the removal of all missions north of Amelia Island.[8]

On January 30, 1733, six British ships led by Gen. James Oglethorpe sailed into the Savannah River, passing Cockspur Island (then known as Peeper Island) before landing and establishing Savannah at Yamacraw Bluff. Oglethorpe led several subsequent expeditions to Savannah from England. On a later voyage in 1736, Oglethorpe's party, which included John Wesley, the founder of the Methodist Movement, stopped at Cockspur Island on its way up the Savannah River.

In 1758, William DeBrahm and Henry Yonge, joint surveyors-general for the Georgia colony, surveyed Cockspur Island following the purchase of 150 acres by Charleston planter Jonathan Bryan. At this time, 20 acres of land at the eastern end of the island were reserved for public use.[9]

During the French and Indian War (known in Europe as the Seven Years' War) in 1756–1763, colonial leaders were concerned by the possibility of an attack on Savannah by the Spanish based in St. Augustine. These concerns led to the construction of Fort George on the east end of Cockspur Island, beginning in 1761. The fort consisted of a small wooden palisade with a blockhouse in the center. While the fort served as protection for Savannah, it was also utilized for

7. J. Faith Meader, and Cameron Binkley, ed., *Fort Pulaski National Monument Administrative History* (Atlanta, Georgia: National Park Service, 2003), 3, citing John H. Jameson Jr., *Archeological Issues at Fort Pulaski National Monument, Georgia* (Tallahassee, Florida: Southeast Archeological Center, National Park Service, 1998).
8. Susan Hitchcock, *Fort Pulaski National Monument Cockspur Island Historic District Cultural Landscape Report*. (Atlanta, Georgia: National Park Service, 2011), 5.
9. Ibid., 6, citing Guy Prentice, "Trip Report on Site Condition Assessments, Fort Pulaski National Monument, GA, November 28–December 2, 2005" (Tallahassee, Florida: Southeast Archeological Center, 2006), 49.

customs and quarantine enforcement. The fort was abandoned in 1776 at the beginning of the Revolutionary War.[10]

Several high ranking British officials, including James Wright, the Royal Governor of Georgia, took refuge on Cockspur Island during the Revolutionary War. For a short time, the island was the Loyalist capital of the Georgia colony, until the British reoccupied Savannah in 1778. At that time, the island was once again abandoned.[11]

Following the conclusion of the Revolutionary War, the United States sought to establish a coastal defense system. In 1794, Congress passed legislation calling for a system of fortifications known as the "First American System of Fortifications." Soon, the Secretary of War ordered new forts to be built to protect the major coastal cities. The new forts would be wooden structures consisting of batteries, magazines, and barracks or blockhouses. Small cannon were placed on the upper stories of the structures.[12]

As part of this new coastal defense system, a new fort was constructed on Cockspur Island to protect Savannah. Named after Revolutionary War hero Nathanael Greene, Fort Greene was constructed between 1794 and 1795 near the site of Fort George. As of 1800, sixty-five officers occupied Fort Greene, which was largely used as a quarantine station during most of its history. In 1804, a hurricane struck Cockspur Island, destroying Fort Greene and killing half of the soldiers stationed at the island.[13]

In 1807, fearing an attack by the British, Congress authorized the construction of the "Second American System of Fortifications." The new defense system would consist of fortifications with high stone and masonry walls and multilevel tiers with internal casemates and gun positions. The second defense system was under development when the War of 1812 broke out.[14]

Planning of Fort Pulaski

The War of 1812 occurred in part as a result of issues unresolved at the conclusion of the Revolutionary War in 1783. On June 18, 1812, the United States declared war on Great Britain in response to British attempts to restrict trade (in part brought about by Britain's ongoing war with France), the British Royal Navy's impressment of American seamen, and British support of American Indian tribes' resistance to territorial expansion by the United States. The war was fought partly at sea and on the Great Lakes and Lake Champlain, and involved British blockades of the Atlantic Coast and attacks on coastal resources. Fighting also occurred on both sides of the U.S.-Canada border, along the Gulf Coast of the United States, and in the Mid-Atlantic region. British forces entered Chesapeake Bay and captured Washington, D.C., in August 1814, where they burned government buildings including the White House. In September 1814, Fort McHenry in Baltimore withstood extensive bombardment by the British Navy. The war ended with the Treaty of Ghent, signed on December 24, 1814, but not ratified until the following February. On January 8, 1815, not knowing that the treaty had been signed, British forces attacked New Orleans but were defeated by American forces led by Andrew Jackson.

The War of 1812 resulted in significant damage to the United States' coastal defense system, including the new fortifications under development. As a result, Congress created the Board of Fortifications for Sea Coast Defense in 1816. Shortly after, the United States government engaged French military engineer Simon Bernard. Bernard, along with U.S. Army engineers, designed

10. Ibid., 6, citing National Park Service, "Cultural Landscape Inventory (CLI) Fort Pulaski National Monument" (Atlanta, Georgia: Southeast Regional Office, 2000), 5.
11. Ralston Lattimore, *Fort Pulaski National Monument* (Washington, D.C.: National Park Service, 1954), 2.
12. Ibid., 8, citing Prentice, 2006, 52.
13. Lattimore, 3.
14. Meader, 5–6, citing John Whiteclay Chambers, ed., *The Oxford Companion to American Military History* (Oxford: Oxford University Press, 1999), 275–276.

a new coastal defense system known as the "Third System of Defense." The defense system would include the construction of a permanent system of modern masonry fortifications along the Atlantic and Pacific coasts. One of the 200 new forts proposed was to be constructed at the mouth of the Savannah River.[15] Other forts constructed as part of this system of defense included Fort Adams in Newport, Rhode Island; Fort Jefferson in the Dry Tortugas, Florida; and Fort Sumter near Charleston, South Carolina. Forty-two forts were ultimately constructed or modified as part of this system.[16]

In September 1828, the Board of Fortifications for Sea Coast Defense approved Bernard's recommendation to construct a fort on Cockspur Island near the mouth of the Savannah River. In December of that year Maj. Samuel Babcock began to conduct a topographical survey of the island.[17] Babcock was also charged with constructing the workmen's village, a dock, and a system of ditches and embankments.[18]

In 1829, Robert E. Lee, then a recent graduate of West Point, was assigned to serve as assistant engineer under Babcock. Lee would eventually oversee the completion of several tasks when Babcock's health began to deteriorate.[19]

Despite the preparations being made by Major Babcock on the island, the State of Georgia and a collection of private owners held the title to Cockspur Island. In 1830, 150 acres of privately owned land on the island were deeded by Alexander Telfair to the United States government.[20]

Lt. Joseph K. F. Mansfield took control of the engineering commission for fort construction from Major Babcock in December 1830 after the latter resigned his commission. Lieutenant, later Captain, Mansfield was to oversee construction of the fort for the next fourteen years.[21] Robert E. Lee continued work on the island under Lieutenant Mansfield until 1831, when Lee received a new assignment in Virginia.

Early plans, completed in 1827, called for a two-level fort to be constructed (Figure 3 and Figure 4). However, the final plans, as revised per recommendations made by Mansfield and approved by the Board of Fortifications in September 1831, proposed a single level fort topped with an open terreplein (Figure 5). The fort was five-sided in plan, with the gorge containing personnel quarters along the west side.[22] As recommended by Mansfield, the foundation design was changed from stone to brick masonry supported on timber piles.[23]

15. Ibid., 6.
16. At least a portion of each of the forty-two forts constructed as part of the "Third System of Defense" is extant. Some of the forts have been significantly modified, while others are presently in a ruinous state. Including Fort Pulaski, eleven of these forts are under National Park Service administration. These forts include Fort Tompkins and Fort Richmond (Staten Island, New York), Fort Hancock (Sandy Hook, New Jersey), Fort Monroe (Hampton, Virginia), Fort Sumter (Charleston, South Carolina), Fort Jefferson (Dry Tortugas, Florida), Fort Pickens (Pensacola, Florida), Fort Massachusetts (Ship Island, Mississippi), and Fort Point and Fort Alcatraz (San Francisco, California).
17. Rogers W. Young, "The Construction of Fort Pulaski," *The Georgia Historical Quarterly* 20 (1936), 42.
18. Meader, 6, citing Willard B. Robinson, *American Forts: Architectural Form and Function* (Urbana: University of Illinois Press, 1977), 86–88.
19. Ibid., 6, citing Rogers W. Young, *Robert E. Lee and Fort Pulaski*, Popular Series 11 (Washington, D.C., National Park Service, 1947).
20. Ibid., 6, citing, "Title Abstract for Cockspur Island," 2000, park files, Fort Pulaski National Monument.
21. Young, 43.
22. The west wall is termed the gorge as it is the far side of the fort from the direction of enemy attack, assuming a naval assault from the east.
23. Ibid.

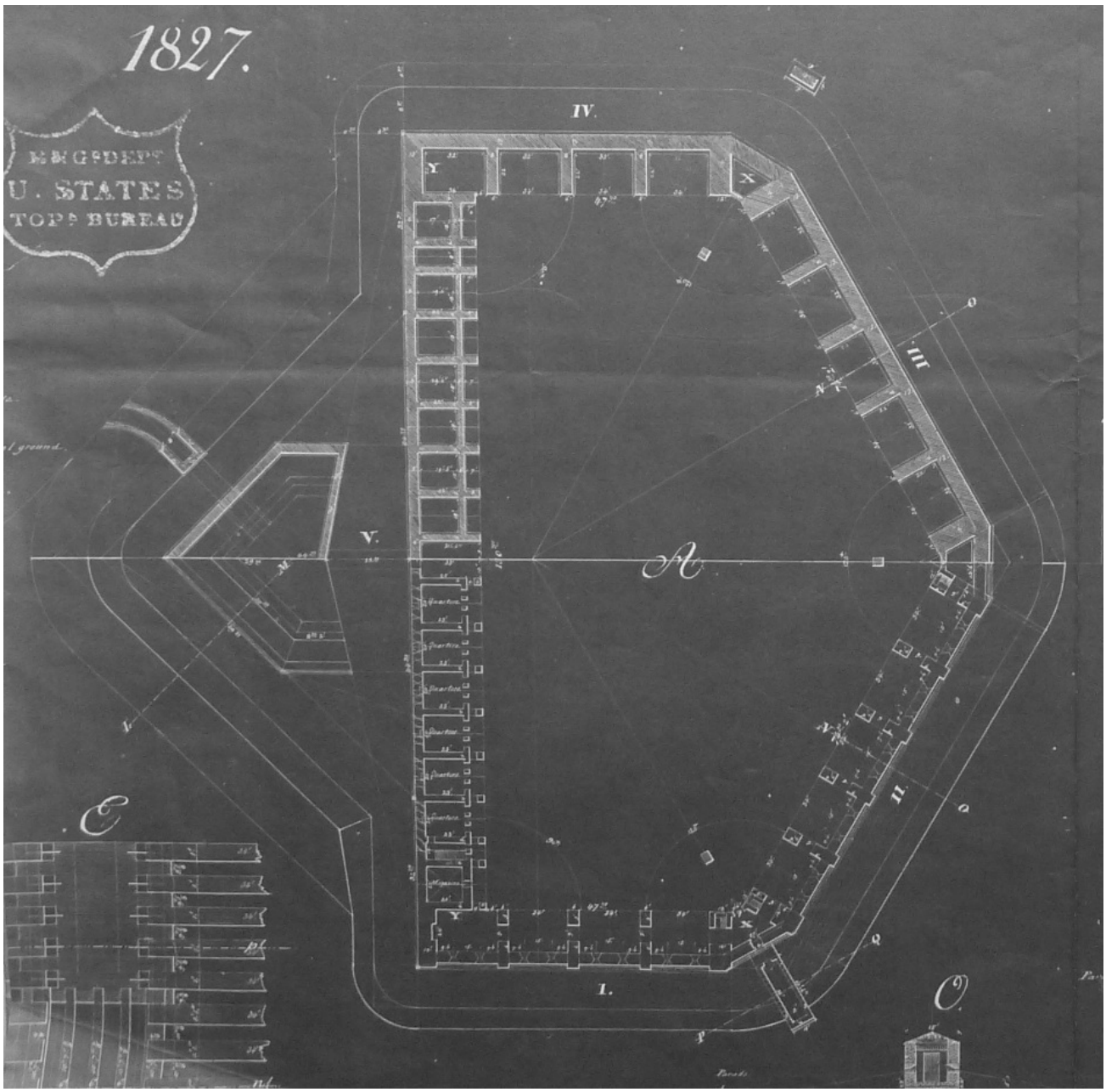


FIGURE 3. Initial plans of Fort Pulaski, 1827. Note the wide casemates, each with two embrasures, and the small demilune. Source: Fort Pulaski National Monument.

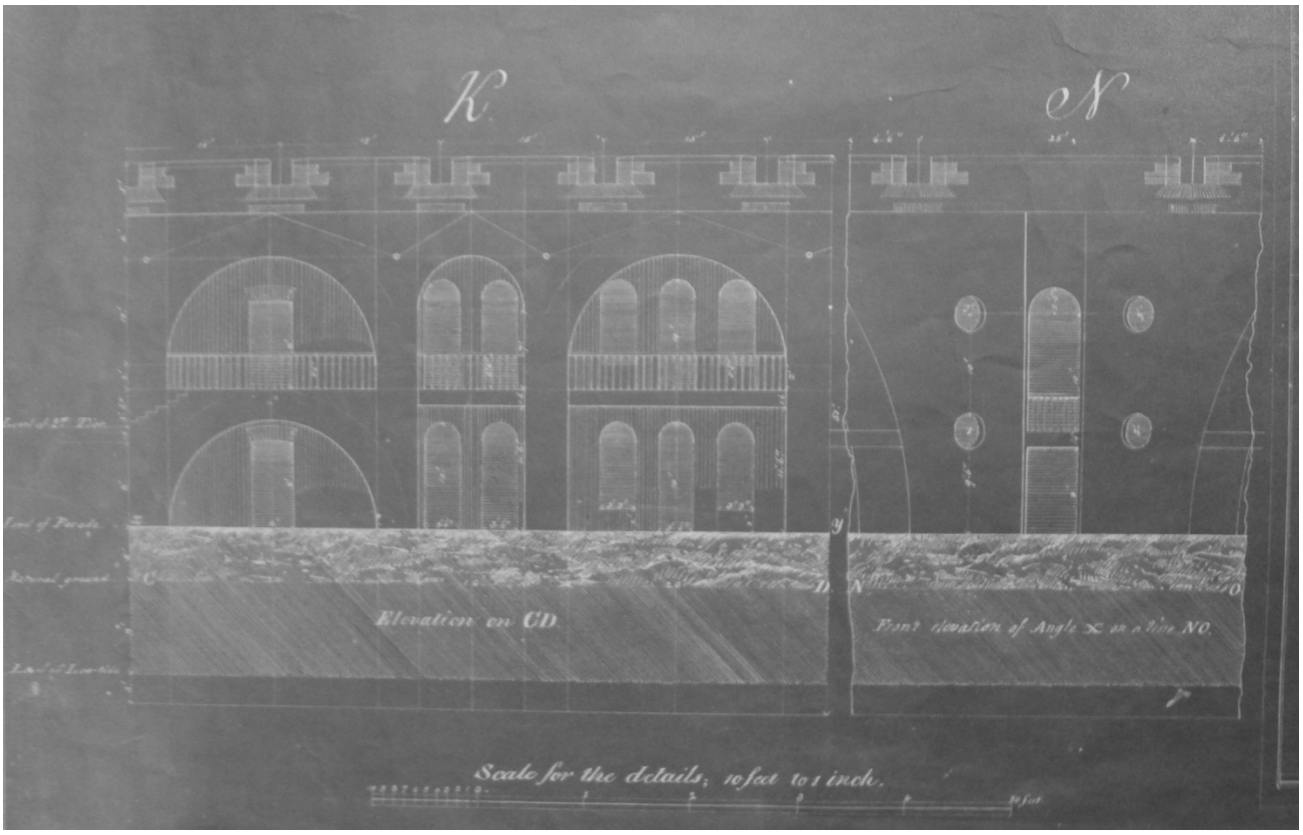


FIGURE 4. An early drawing of Fort Pulaski. Note that this drawing called for two levels in addition to the terreplein. Source: Fort Pulaski National Monument.

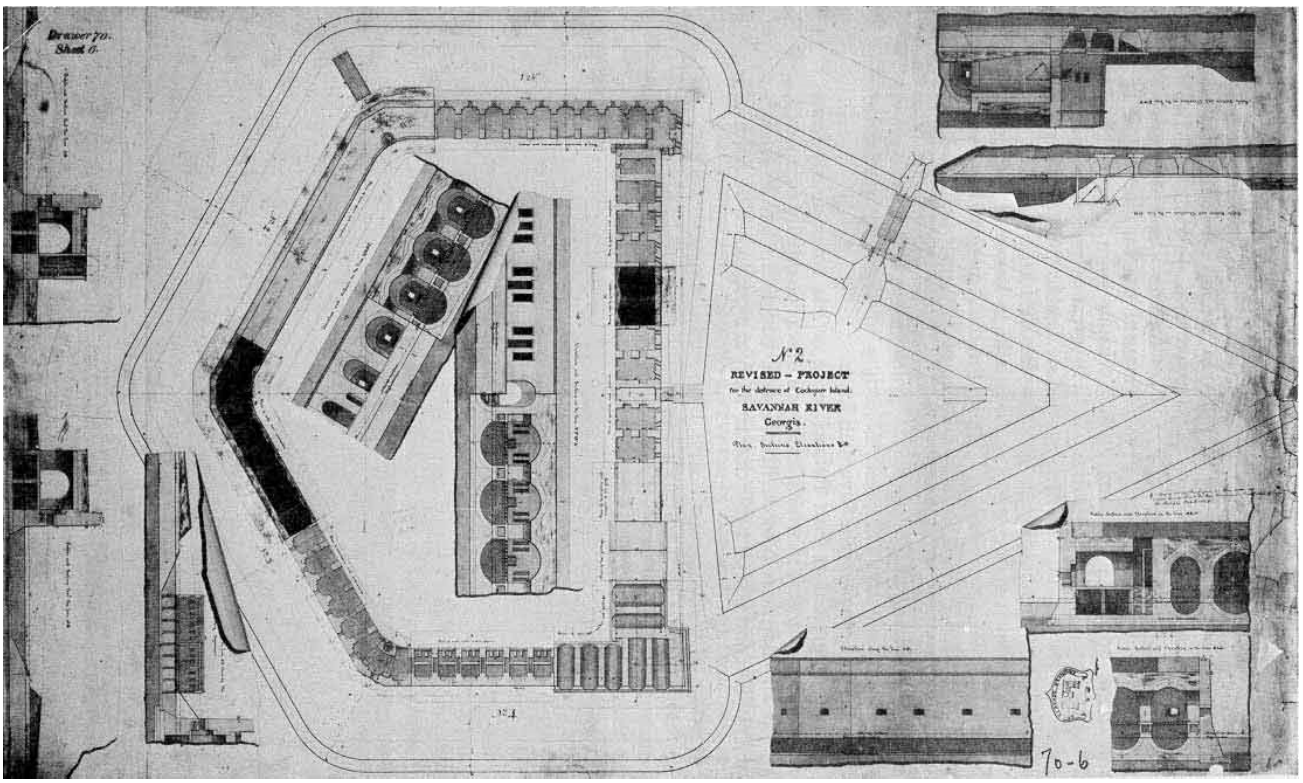


FIGURE 5. 1831 plan of Fort Pulaski, showing the fort as it was constructed. Source: Fort Pulaski National Monument.

Construction of Fort Pulaski

The new fort planned for Cockspur Island was named for Polish Count Casmir C. Pulaski in recognition of his role in the Siege of Savannah during the American Revolution.

In the spring of 1831, work began on a new wharf at the southern shore of Cockspur Island. A lime house, blacksmith shop, and carpenter shop were constructed nearby, while a 25-foot-wide canal that connected the south channel to the fort site was excavated.[24] Materials were transferred from the south wharf to the fort on a mule-drawn railroad.

Beginning in late 1831, work began on the fort site. First, the site was excavated and timber piles were driven into the ground. Yellow pine timber grillage was added atop the piles (Figure 6 and Figure 7). Timber was generally obtained from south Georgia. The area adjacent to the fort foundations was excavated to form a canal, allowing building materials to be transported by boat to the location where they were needed.[25]

In 1833, masonry work began with the foundation at the north and northeast sides of the fort.[26] The brown brick used to construct the walls were manufactured at the Hermitage Plantation, approximately 2 miles west of Savannah. The red brick used in the embrasures, arches, and parade ground walls came from brick manufacturers in Baltimore, Maryland, and Alexandria, Virginia. The granite was quarried in New York, while the brown sandstone came from the Connecticut River Valley.[27] In all, as many as 25,000,000 bricks were used to construct the 32-foot-high walls of the fort. Sand for the mortar was obtained from the bed of the Savannah River, 10 miles upstream from Cockspur Island.[28] Research since the 1930s has established that the mass of masonry was constructed using lime putty mortar, with natural cement (likely Rosendale cement from New York) mortar in a cocoa brown color used for the final pointing of exposed joints.[29] The fort was constructed using slave labor from nearby rice plantations. In addition, military servicemen as well as skilled masons and carpenters, many of whom were recruited from northern states, participated in construction.[30]

By October 1834, the masonry was completed to heights between seven to twelve feet above the timber grillage.[31] Frequent storms and the inability of Congress to appropriate funds delayed the construction of the fort. Little construction was accomplished during 1835 and 1836. In 1837 the masonry work again moved forward rapidly, and by October, all the embrasures and piers of the north and northeast sides were completed, and seven embrasures and piers were completed on the southeast side. Along the west side, the piers and walls were constructed up to the level of the casemate floors.[32] The progress continued in 1838; by November of that year the outer walls at the north and northeast sides were completed to a height one foot above the casemate arches, while at the south and southeast sides the outer walls were within two feet of the underside of the casemate arches. The casemate vaulting was completed on all four of these sides.[33] The general structure of the fort was completed by October 1839, including the terreplein walls, all of the casemate vaulting, and the cisterns.[34]

In 1840, the casemates were plastered, and wooden floors were laid in the casemates

24. Historic American Building Survey (HABS), *History of Fort Pulaski and Cockspur Island*. Addendum to Fort Pulaski (Washington, D.C., HABS No. GA-2158, 1998), 6.
25. Young, 43.
26. Ibid.
27. Lattimore, 9.
28. Young, 43.
29. Memorandum to Regional Director from Superintendent Ralston B. Lattimore, Fort Pulaski National Monument, "Construction Jobs, Repairs to Brickwork," October 27, 1959.
30. Lattimore, 9.
31. Young, 44.
32. Ibid.
33. Ibid. In July 1838, Mansfield was promoted to the rank of Captain.
34. Ibid., 44.

(Figure 8). The wooden main gate doors were built and installed, and the first twenty 32-pounder cannon were mounted in the fort.[35] Lack of an appropriation of funds meant that little was accomplished in 1841. Limited funding allowed work to resume between late 1841 and July 1842, during which time the inner wall facing the parade ground was finished above the casemates to the intended height and the stone coping installed. The stairways up to the terreplein level were also completed; at the southwest and northwest stairs, tall brick masonry walls surrounded the stairwells at the terreplein level.

In January 1842, the lead roofing work over the casemates began. As described in a letter to Captain Mansfield, the roofing process began by spreading pitch over the plastered brick masonry. Next, lead sheets were laid and each joint soldered. Brick arches were then built over the low point of each roof (between each casemate) to protect the drainage roof valley gutter. Shells and gravel were placed over the gutter, and sand was layered up to the finished level of the terreplein.[36] Also in 1842, stone masonry bases for the casemate guns were installed; the exposed masonry joints were pointed; two shot furnaces were built in the parade ground; the wood-framed bulkhead doors at the casemates and the wood shutters for the embrasures in the outer wall were built; fireplaces and wood floors were built in the quarters on the west side gorge; and preparations were made in the quarters for lath and plaster and other finishing work.[37]

Work in 1843 mainly consisted of finishing work such as lathing and plastering and building door and window frames in the quarters, some final masonry work, and plastering the cistern walls. Similar work continued in the quarters in 1844, by which time seven of the rooms had been nearly completed. In 1844–1845, digging of the moat around the fort and demilune proceeded, including construction of the masonry walls at the outer perimeter of the moat. The terreplein and parade ground were also graded to their finished level at this time.[38] By the end of September 1846, the fort was almost completed, including finish carpentry work in the quarters; doors at the entrances to the spiral stairways at casemates 13, 26, and 39; and installation of fireplace mantelpieces.[39] The veranda along the front of the gorge was one of the final portions of the fort to be constructed. The plans for the veranda were not approved until September 1846, with work beginning by October and completed in November 1846.[40] Between October 1846 and March 1847, painting throughout the fort was completed, the portcullis was constructed, the drawbridges were constructed and installed, iron railings were placed around the spiral stairways at the terreplein level, and the demilune was graded (Figure 9 and Figure 10).[41]

When completed in March 1847, the five-sided masonry fort included a central parade ground surrounded by casemates. A gorge along the west elevation included officers' quarters, while casemates were present on the remaining four sides of the fort. Above the interior casemates and gorge rooms was a terreplein. The fort was designed to hold 146 guns. The demilune area was surrounded by a breast-high masonry wall, protected on its exterior by embanked earth. The demilune included emplacements for an additional twenty-eight guns. A shot furnace was located within the demilune.

35. Ibid., 44–45.
36. Young, 46, citing letter to Col. J. G. Totten, Chief of Engineers, to Captain J. K. F. Mansfield, November 27, 1841, No. 9, *Letters to Officers of Engineers,* Engineer Department, 170–173.
37. Young, 46–47.
38. Young, 47–48.
39. Young, 49.
40. Young, 49; Ralston B. Lattimore, Historical Assistant Fort Pulaski National Monument, to Reaville M. Brown, Acting Superintendent, Fort Pulaski National Monument, Savannah, August 29, 1934. Park files, Fort Pulaski National Monument.
41. Young, 49–50.

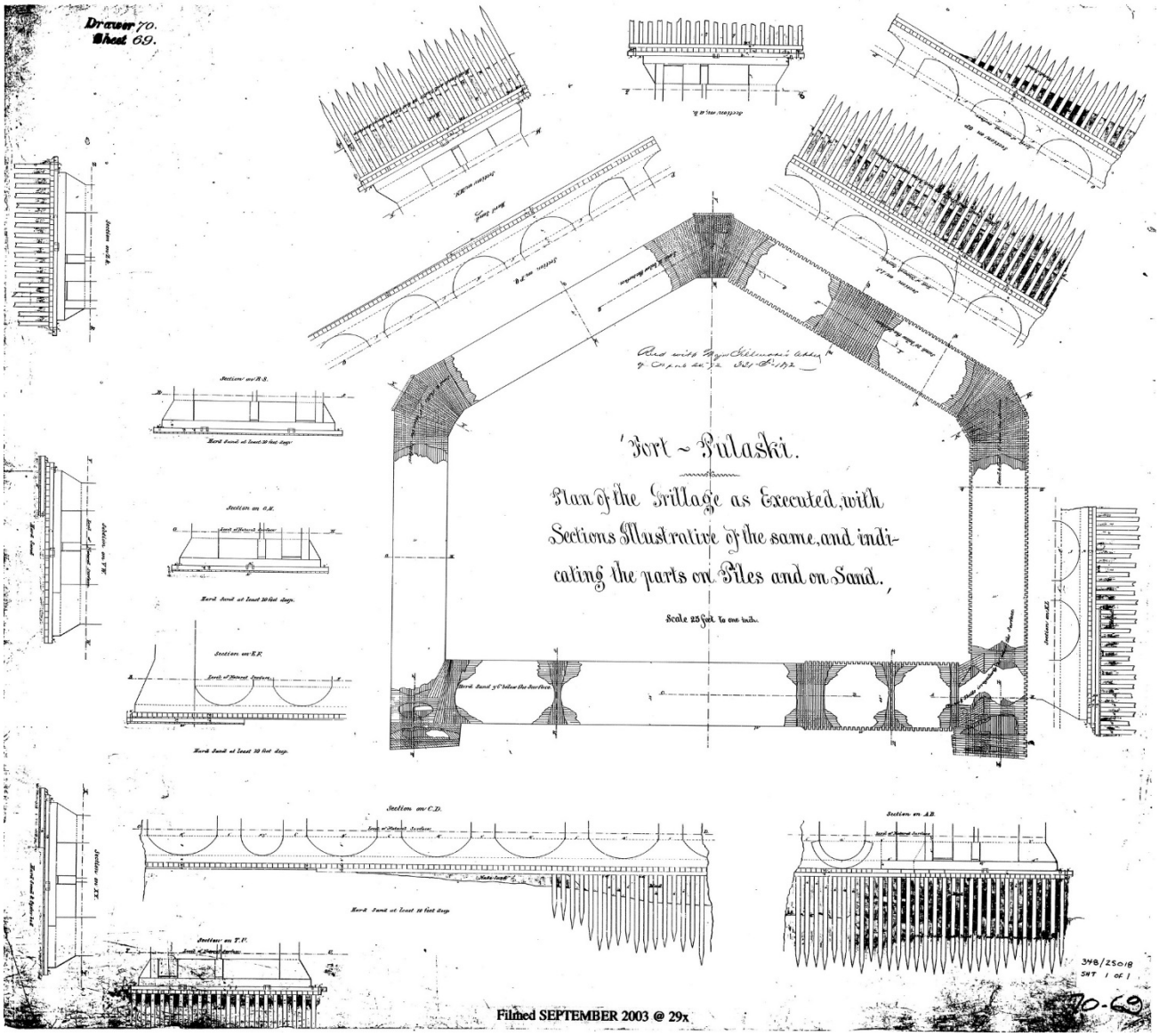


FIGURE 6. Early drawing showing the as-built piles and grillage for the fort. Source: NPS drawing 348-25018.

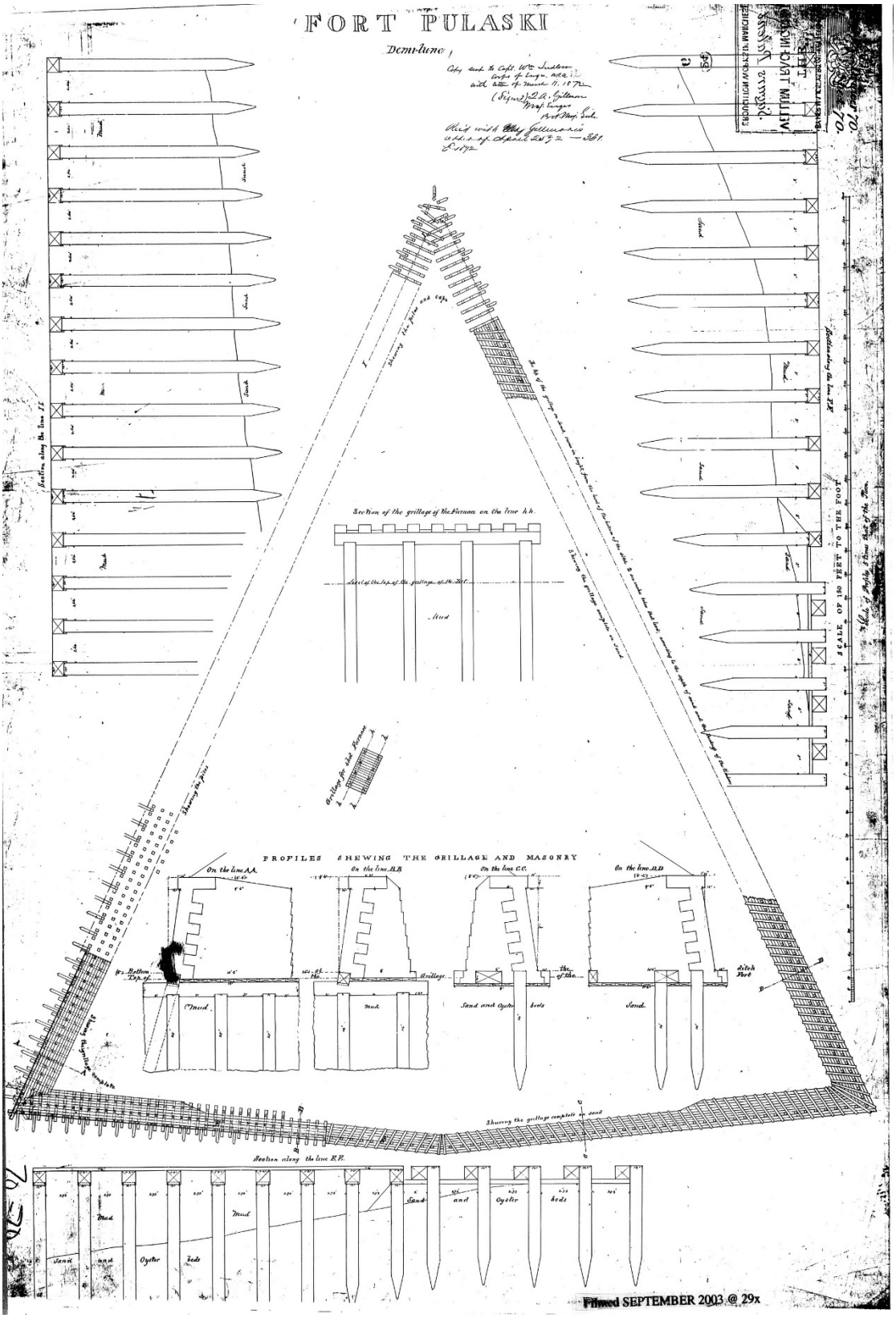


FIGURE 7. Early drawing showing the as-built piles and grillage for the demilune. Source: NPS drawing 348-25008.

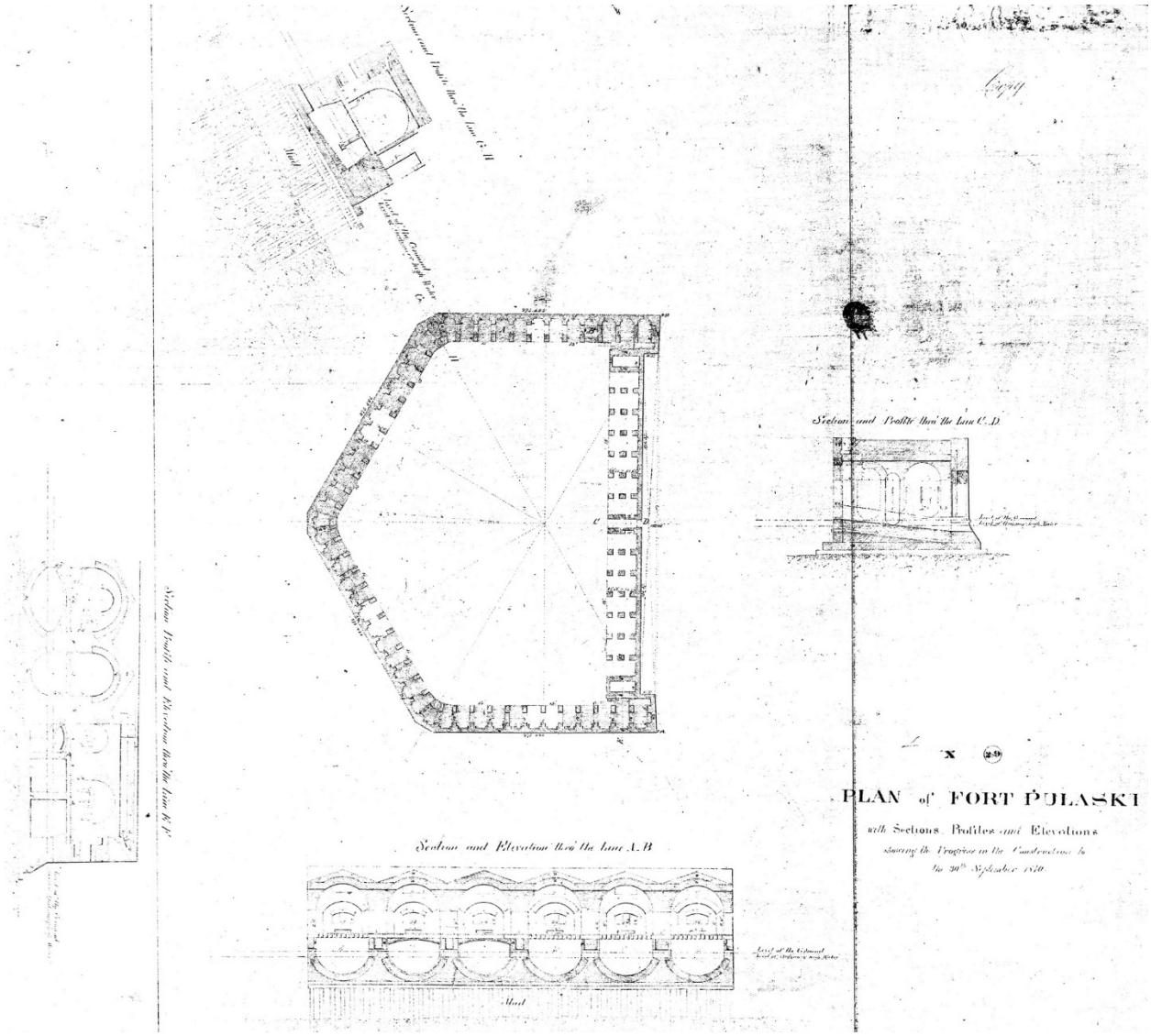




FIGURE 8. Fort Pulaski, showing the work completed through September 30, 1840 (upper image). Note the cross section (enlarged copy of sepia print, lower image), which shows the timber pile and grillage foundation, and the curved masonry footing that supports the brick masonry walls and vaults. At the second and third casemates from the left in this drawing, brick masonry vaults creating two cisterns are shown. The masonry structure also supports the brick floors of the casemates above. The remaining casemates have wood floors. Source: NPS drawing 348-60071.

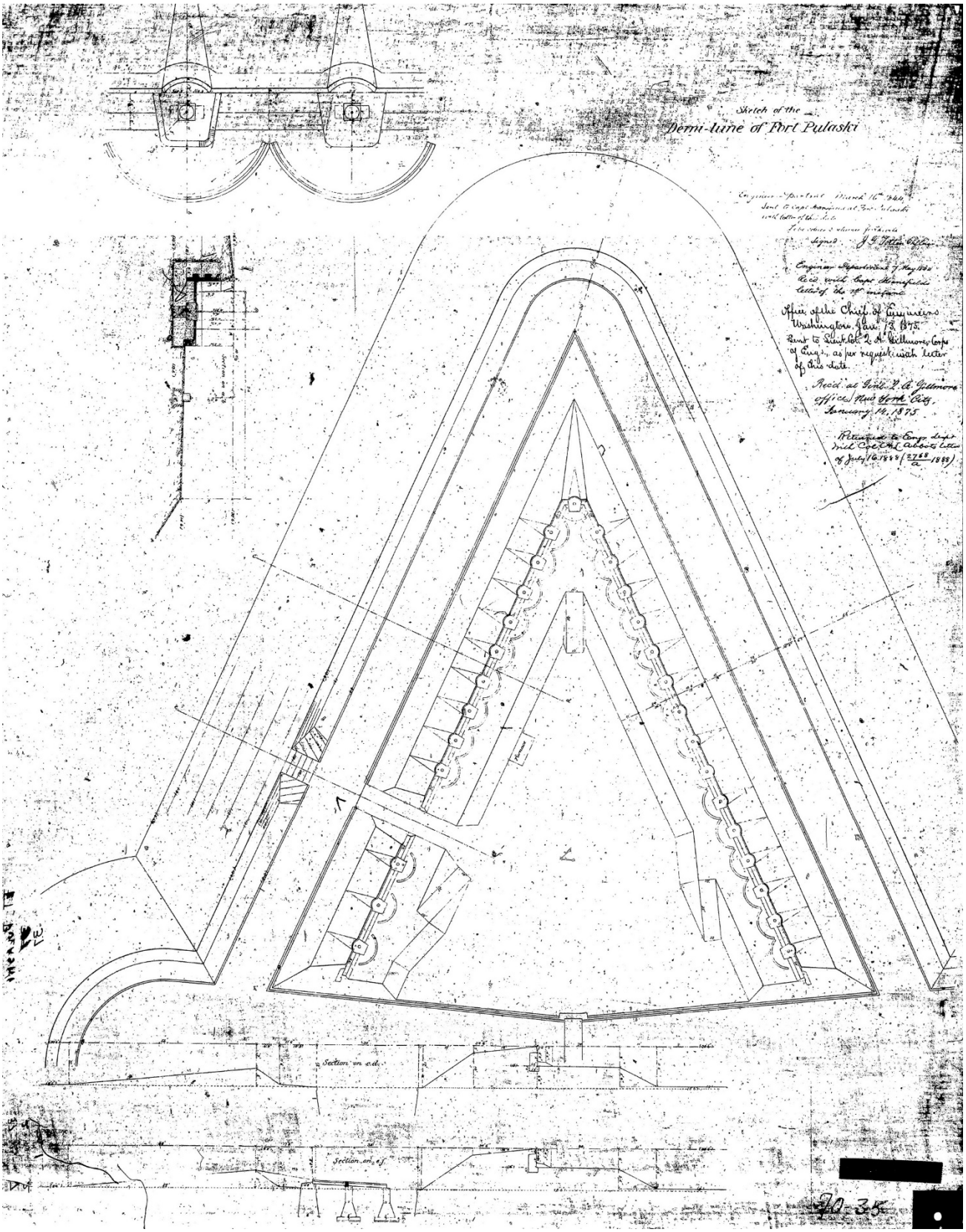


FIGURE 9. Drawing for the demilune showing gun emplacements and shot furnace and drawbridge along the south side, 1844, with later notations. Source: NPS drawing 348-60056.

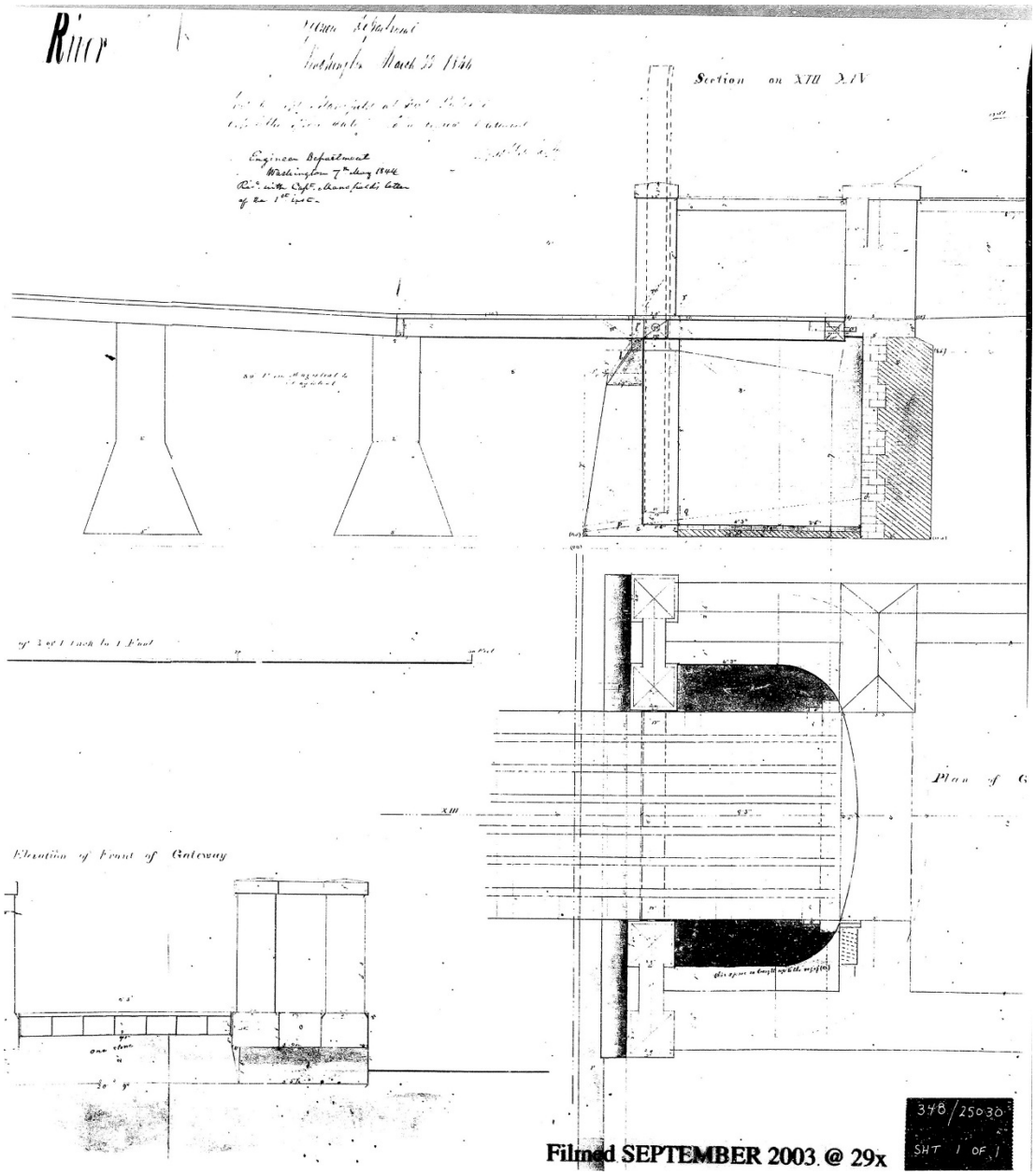


FIGURE 10. Design for the outer drawbridge on the south side of the demilune, 1844. Source: NPS drawing 348-25030.

Modifications to the Fort, 1847–1860. Following completion of the fort in 1847, little activity occurred at Fort Pulaski until the start of the Civil War. Typically, only a caretaker and an ordnance sergeant were stationed there. Maintenance activities included cutting weeds and grass; painting the quarters; and repointing of the brick masonry.[42] The fort was also affected by the hurricane of September 8, 1854. In 1855, twenty-six new gun platforms were planned for the terreplein; construction of these platforms proceeded, but only thirteen had been completed by 1860.[43] By 1860, only twenty guns had been mounted, and the fort had yet to be garrisoned. [44]

42. Young, 51.
43. Young, 50.
44. "SEAC: Echoes from the Past: The Archeology of Fort Pulaski" (Tallahassee, Florida: Southeast Archeological Center).

The Civil War

After the election of Abraham Lincoln, southern states began to consider secession from the Union. South Carolina seceded on December 20, 1860, and, less than a week later, U.S. Army Maj. Robert Anderson moved the small garrison under his command from Fort Moultrie on Sullivan's Island in Charleston Harbor to nearby Fort Sumter, which was situated in the center of the harbor. The movement of troops, which Anderson ordered due to fear of attack, infuriated the people of Charleston and eventually citizens throughout the southern United States.[45]

The possession of Fort Sumter by Federal troops concerned leaders in Savannah, who thought that the U.S. government would soon occupy all of the military fortifications throughout the South, thus controlling major harbors throughout the southern United States. As a result, popular opinion in Savannah supported the seizing of Fort Pulaski before the U.S. government could send a garrison to defend it.[46]

On January 1, 1861, Georgia Governor Joseph E. Brown arrived in Savannah at the request of Col. Alexander R. Lawton, commander of the 1st Volunteer Regiment of Georgia. After several meetings, the governor ordered the Georgia militia to seize Fort Pulaski on January 2, 1861, the same date that Georgia held an election for a special state convention which was to meet to consider secession from the Union.[47]

Early on the morning of January 3, 1861, troops marched through the streets of Savannah before boarding the Federal steamboat *Ida* and traveling down the Savannah River toward Fort Pulaski. Under command of Colonel Lawton, the troops reached Cockspur Island at noon. The troops marched into Fort Pulaski, and meeting no resistance, took possession of the fort. The flag of Georgia was raised above the gorge. The governor ordered the troops to hold the fort and abandon it only under new orders from him or under pressure from a hostile force.[48]

At the time the State of Georgia took possession of Fort Pulaski, the moat was filled with mud and no serviceable guns were present within the fort. As a result, Georgia troops and slaves from nearby rice plantations worked to prepare the fort against a possible Federal attack.[49] By the end of January, Georgia had officially seceded from the Union, and on February 8 became one of the founding states of the Confederate States of America.

Early in the morning of April 12, 1861, a Confederate mortar at Fort Johnson fired a shell that burst over nearby Fort Sumter, starting the Civil War. During the summer of 1861, Union forces developed plans for a naval blockade of the South, which included recapturing the southern seacoast fortifications. In order to implement this plan, on October 29 fifty-one vessels set out to sea in three columns. The ships contained an Army force of more than 12,500 men under the command of Brig. Gen. Thomas Sherman. The convoy encountered a storm near Cape Hatteras, altering the initial plan to bombard the coast with three waves of troops. As a result of the storm, several ships were lost, severely handicapping the Union. The convoy reassembled off Port Royal Sound, South Carolina, near Confederate fortifications on Hilton Head and Bay Point Islands. The Union forces bombarded the forts, leading the Confederate forces to abandon their fortifications.[50]

The fall of the forts at nearby Hilton Head and Bay Point Islands caused Robert E. Lee, now a Confederate General, to return to Fort Pulaski in November 1861. Lee, in an attempt to strengthen the Confederacy's coastal defense system, adopted a new strategy, which involved shifting forces from surrounding islands to the mainland. As part of this strategy, an artillery battery at nearby Tybee

45. Lattimore, 11–12.
46. Ibid., 12.
47. Ibid., 12–13.
48. Ibid., 14.
49. Ibid., 12.
50. Ibid., 17–19.

Island was dismantled, and its heavy guns were moved to Fort Pulaski.[51]

Following the abandonment of Tybee Island by Confederate forces, Union troops occupied the island and established a permanent garrison by the end of 1861. Following the occupation of the island, Union troops prepared for an attack on Fort Pulaski. By early 1862, the waterways north of Cockspur Island had been improved and were guarded.[52]

On the morning of February 13, 1862, the Confederate supply ship *Ida* began to travel down the Savannah River on a routine trip to Fort Pulaski. The boat was met by a brief barrage from a battery of heavy guns constructed by Federal troops on the north bank of the river near Venus Point. Nine shots were fired at the ship before the Federal guns recoiled off their platforms. This was the last trip of the *Ida* to Fort Pulaski. The following week, Union troops completed the blockade of Fort Pulaski by constructing another battery on the south bank of the Savannah River and stationing two companies of infantry along the banks of the river. In addition, the telegraph line between Savannah and Cockspur Island was destroyed. By the end of February 1862, the only communication between the fort and Savannah was made by courier. At the time of the blockade, 385 officers and men were stationed at Fort Pulaski.[53]

Fort Pulaski had a six-month supply of food in January 1862, making surrender of the fort inevitable if the blockade could not be broken. Despite this advantage, Union Brig. Gen. Thomas Sherman still sought a quick capture of the fort and the City of Savannah rather than waiting for the Confederates to surrender due to a lack of food and other supplies.[54]

The Attack on Fort Pulaski

The defenders of Fort Pulaski believed that the fort's 7-1/2-foot solid masonry walls could not be breached, as the marshes surrounding the fort made it impossible for ships to safely come within shooting range of the fort, while Tybee Island, at 1 to 2-1/2-miles away, was thought to be too far for land batteries to be effective. At this time, smoothbore guns and mortars were not capable of breaching a heavy masonry wall at a distance beyond 700 yards.[55]

However, Federal Capt. Quincy Adams Gillmore was familiar with a new weapon, the rifled gun, with which the United States Army began experimenting in 1859. Early in his career, Gilmore assisted in constructing fortifications at Hampton Roads in Virginia. In late 1861, convinced that the rifled gun could breach the walls of Fort Pulaski from Tybee Island, Gillmore presented his plan to attack the fort to Sherman. Despite being skeptical of the effectiveness of rifled guns, Sherman approved Gillmore's plan.[56]

On February 19, Gillmore was sent by Sherman to take command of the troops on Tybee Island in preparation for the bombardment of Fort Pulaski.[57] Union troops erected eleven batteries of guns and mortars facing Fort Pulaski on the northwest shore of Tybee Island. This work was performed at night, with each night's work concealed by camouflage before dawn.[58] Despite the amount of work being performed by Union troops, Col. Charles H. Olmstead, the Confederate commander of Fort Pulaski, wrote that "signs of activity on the part of the enemy were heard but not seen . . . the morning light revealed nothing to the closest scrutiny."[59]

Preparations for the attack continued through March and early April 1862. On March 31, Maj. Gen. David Hunter replaced General Sherman,

51. Ibid., 19.
52. Quincy A. Gillmore, *Siege and Reduction of Fort Pulaski National Monument* (1862; reprint, Gettysburg: Thomas Publications, 1988).
53. Lattimore, 22–23.
54. Ibid., 23–24.
55. Ibid., 25–28.
56. Ibid., 28.
57. Ibid., 23–24.
58. Ibid., 28–29.
59. Meader, 9, citing Charles H. Olmstead, "Fort Pulaski," *The Georgia Historical Quarterly* 1, no. 2 (June 1917), 98–105.

who was relieved of his command. Despite the change in command, Gillmore was retained, and the plan for the bombardment of Fort Pulaski was not changed.

In spring 1862, as the Union troops made their final preparations for the bombardment of Fort Pulaski, Confederate forces prepared to defend the fort from the attack. The Confederate troops believed that the anticipated bombardment of the fort would only pave the way for a direct assault by Union infantry forces.[60] In preparation for the Union attack, the veranda in front of the officers' quarters at the fort was removed and replaced with a passage covered with timbers and soil (Figure 11 and Figure 12). Similar timbers were put in place in front of the casemates around the fort. Holes were dug in the terreplein to help the gunners protect themselves, and trenches were dug in the parade ground to prevent shells from rolling.[61] Earthen or sandbag mounds were built on the terreplein to help protect the gunners. Wood sentry boxes were also built on the terreplein (Figure 13).

By the afternoon of April 9, Union forces were ready to proceed with the attack on Fort Pulaski. Orders were given that the battle was to begin the next morning.

Early in the morning of April 10, 1862, a Confederate lieutenant noticed changes in the Tybee Island landscape. Brush and trees had been removed; the ridge had been leveled; and several objects, which appeared to be guns, were visible. Union Lt. J. H. Wilson took a small boat with a white flag from Tybee Island up the South Channel, eventually landing at Cockspur Island. Wilson delivered a formal demand for surrender to the Confederate forces at Fort Pulaski. After receiving the demand to surrender, Colonel Olmstead replied:

> Sir, I have to acknowledge receipt of your communication of this date, demanding the unconditional surrender of Fort Pulaski. In reply I can only say, that I am here to defend the Fort, not to surrender it.[62]

At 8:10 a.m. on the morning of April 10, a 13-inch mortar shell was fired by Union forces from Battery Halleck on Tybee Island (Figure 14). The mortar shell traveled slowly over the fort before exploding in the air. The majority of the early shots fired by Union forces exploded in the air or fell outside of the fort. The few shells that fell on the parade ground of the fort resulted in little or no damage. Approximately two hours into the battle, a shot went through an embrasure and dismounted a casement gun. At approximately 11:00 a.m., the halyards on the flagpole were cut by a shell fragment, causing the flag to fall down into the fort. The flag was raised again shortly thereafter on a cannon ramrod at the northeast wall of the fort.

60. Lattimore, 28–29.
61. Ibid., 31.
62. Ibid., 31–32.



FIGURE 11. Fort Pulaski in April 1862. Note the sallyport between the earthen mounds on timber cribbing, and the enclosing walls and roof at the terreplein level over the south stair. A wood flagpole is present at the terreplein over the sallyport. Also note the earthen mound near the south stair. In the foreground, the parade ground appears to have been excavated a few deep, presumably to create trenches and provide the earth used for the protective construction. Source: HABS, image GA-2158-39.

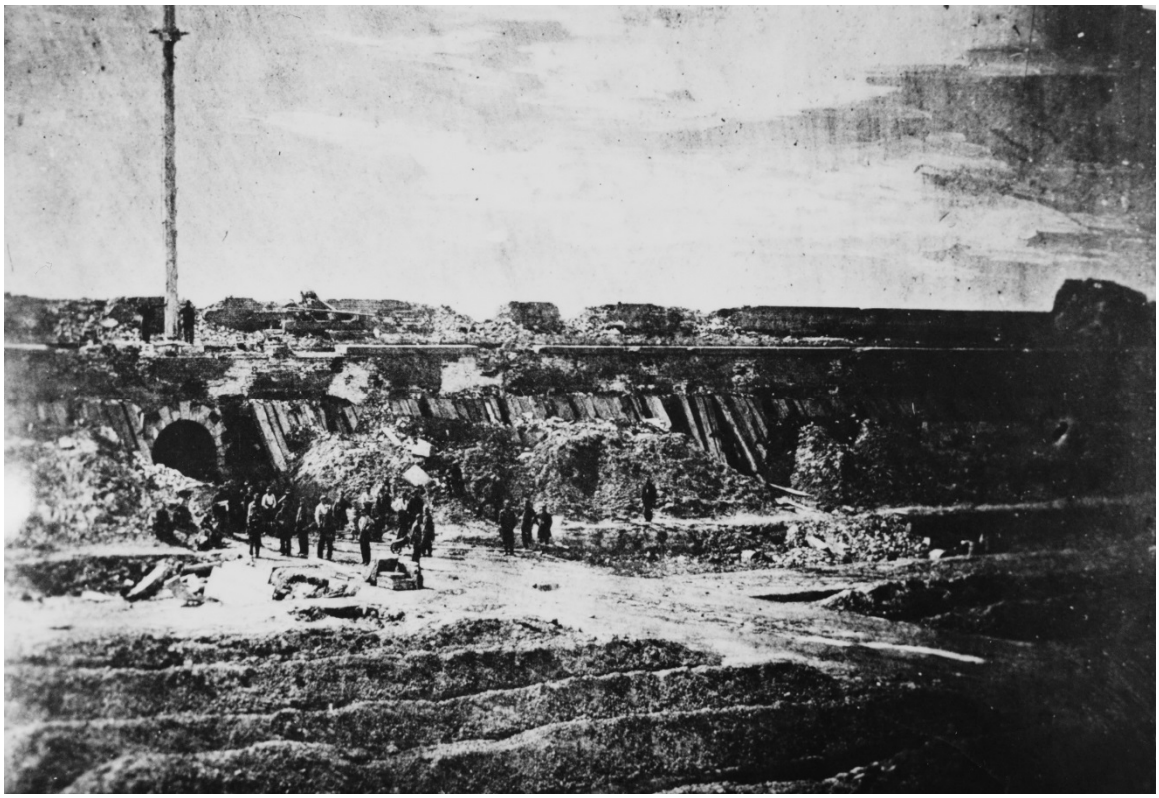


FIGURE 12. Fort Pulaski in 1862. Timbers and soil replaced the veranda along the gorge wall. Note the trenches in the parade ground in the foreground of this view. Source: HABS, image GA-2158-56.



FIGURE 13. Fort Pulaski during the Civil War, circa 1862, view of the southeast angle. Note the toppled wood sentry box at right, the grass cover and earthen mounds on the terreplein, the damaged iron railing around the staircase, and the wood protective cribbing at the casemates below. Source: Fort Pulaski National Monument, Haas & Peale photograph.

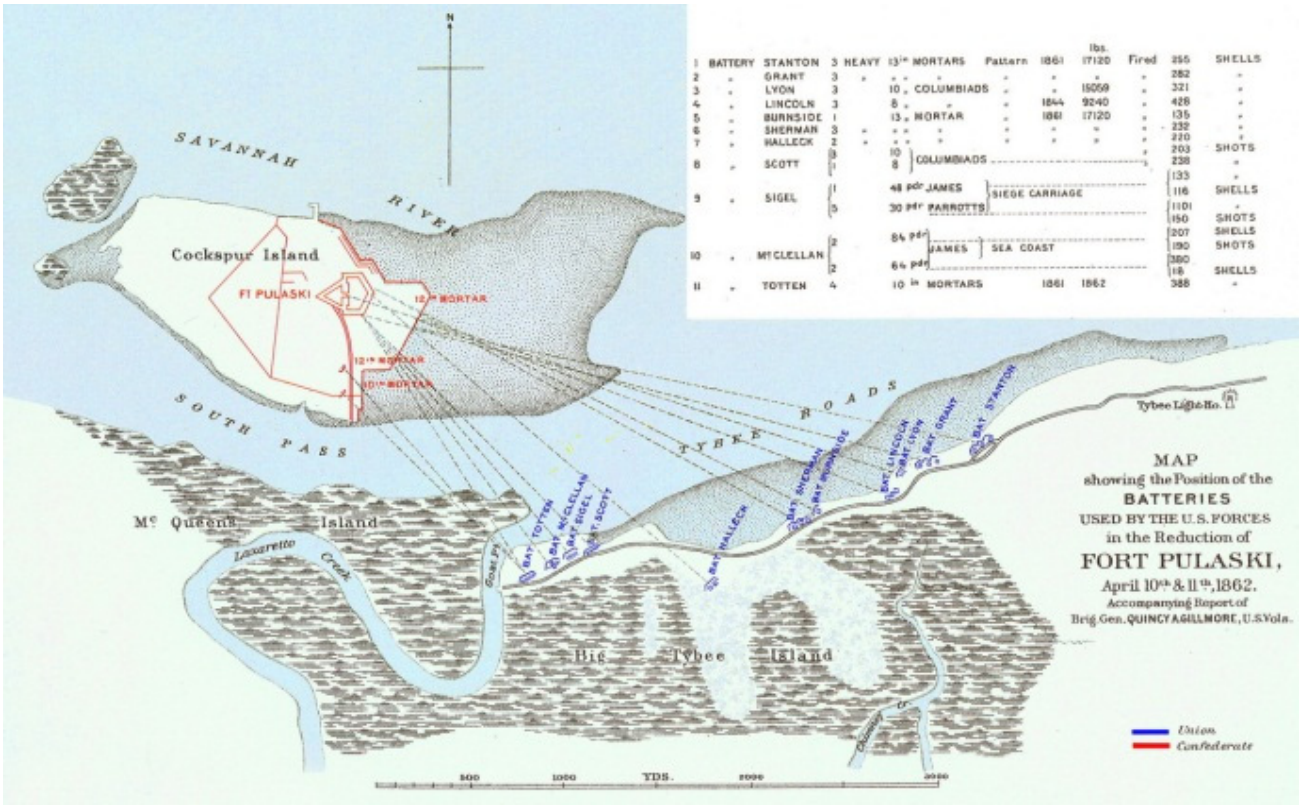


FIGURE 14. A map showing the Union attack on Fort Pulaski in April 1862. Source: Fort Pulaski National Monument.

By noon, forty-seven indentations were visible along the southeast face of the fort, including damage to several of the embrasures. By the end of the day, despite the visible dents and scars in the fort walls, Union forces on Tybee Island believed that Fort Pulaski was still largely intact and capable of resisting additional fire. However, the Confederate defenders were aware that Fort Pulaski was in far worse condition, as the 7-1/2 foot thick wall at the southeast corner now had an intact thickness of only 3 feet (Figure 15).[63]

The bombardment of Fort Pulaski continued at dawn the next morning. Union forces continued to work toward breaching the walls of the fort as Confederate forces directed fire toward Tybee Island. Later in the morning, the Union gunboat *Norwich* began firing toward the northeast face of the fort but, due to the distance from which it was firing, the boat was unable to cause any substantial damage.[64]

Shortly after noon, following a barrage of Union fire, the Confederate guns located on the ramparts of the fort were no longer being fired. The southeast angle of the fort was in ruins with two sizeable holes present, making the inside of the fort visible from Tybee Island (Figure 16 through Figure 21).[65]

At approximately 2:30 p.m. on the afternoon of April 11, the Confederate flag was lowered, a gun was fired from the casemate, and a white sheet was raised. Gillmore and his aides left Tybee Island for Cockspur Island in a small boat. Upon landing at the island, Gillmore made his way to Fort Pulaski, where he was met by Colonel Olmstead at the entrance. The two met privately for an hour. The flag of the United States of America was raised, and Fort Pulaski was once again under Union control.[66]



FIGURE 15. The southeast corner of Fort Pulaski following the attack in April 1862. Source: Fort Pulaski National Monument.



FIGURE 16. The southeast corner of Fort Pulaski following the attack, 1862. Source: Fort Pulaski National Monument. Photograph by P. Haas.

63. Ibid., 32–33.
64. Ibid., 33–34.
65. Ibid., 34.
66. Ibid., 34.



FIGURE 17. Fort Pulaski following the attack, 1862. Source: Fort Pulaski National Monument.

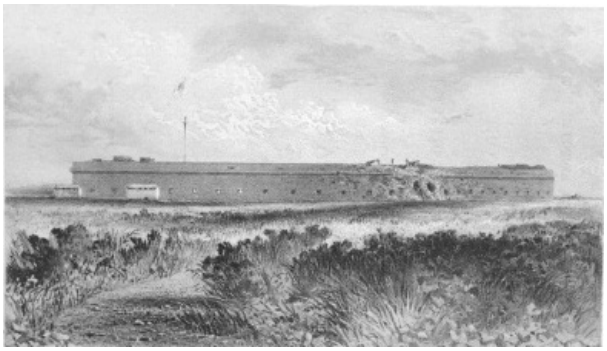


FIGURE 18. View of Fort Pulaski following the April 1862 attack. Source: Fort Pulaski National Monument.



FIGURE 19. Fort Pulaski, 1862, following the Union attack. Source: Fort Pulaski National Monument.

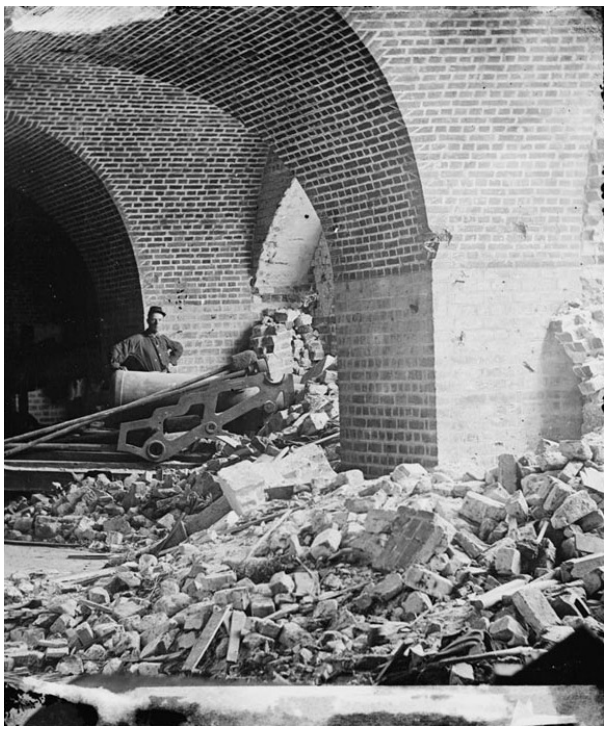


FIGURE 20. Fort Pulaski, 1862, showing damaged casemate masonry at the southeast corner. Source: Fort Pulaski National Monument.



FIGURE 21. Fort Pulaski, 1862, showing damage at the northwest corner of the fort. Source: Fort Pulaski National Monument.

Following the successful siege of Fort Pulaski by Union forces, General Hunter noted:

> The result of this bombardment must cause a change in the construction of fortifications as radical as that foreshadowed in naval architecture by the conflict between the *Monitor* and *Merrimac*. No works of stone or brick can resist the impact of rifled artillery of heavy caliber.[67]

The Confederate forces captured at Fort Pulaski were sent to Governor's Island in New York Harbor. The officers were later transferred to Johnson's Island near Sandusky, Ohio, while the other troops were sent to Fort Delaware. Several of the Confederate prisoners were exchanged for Union prisoners in August, while the officers were exchanged at Vicksburg, Mississippi, in September.[68]

Fort Pulaski under Union Control

The 7th Connecticut Regiment, a company of the 3rd Rhode Island Heavy Artillery, and a detachment of the Volunteer Engineers were the first Union troops to garrison Fort Pulaski following the Confederate surrender (Figure 22). One of the first efforts made by the Union forces was to erect a wood-framed signal station on the terreplein at the east angle of the fort, allowing the troops at Fort Pulaski to communicate with the Union forces 21 miles away at Hilton Head, via intermediate stations at Braddock's Point and Pope's Plantation.[69] The 48th New York relieved the 7th Connecticut in June (Figure 23 through Figure 31). Upon arriving at Fort Pulaski, the 48th New York was charged with making repairs to the damaged fort, which included rebuilding the fort's southeast corner. The outer wall was rapidly rebuilt in solid brick masonry, omitting the embrasures of the original design. Apparently, the tall walls at the terreplein level alongside the northwest and southwest stairs were also removed (compare Figure 21 to Figure 23). Wood-framed sentry boxes were built on the terreplein at the north-northeast angle and south-southeast angle. A second door opening was created at casemate 59 in the gorge, and an iron boiler for desalinization of water with a chimney was added to the gorge at this location. In addition, the parade ground was regraded at this time.[70] The batteries on Tybee Island were dismantled, with some of the guns relocated to Fort Pulaski.[71]

67. Ibid., 35–36.
68. Ibid.
69. Henry S. Tafft, *Reminiscences of the Signal Service in the Civil War* (Providence: Rhode Island Historical Society, 1903), 11.
70. Based on archival photographs dating to 1862, it appears the parade ground was regraded following the retaking of the fort by Union forces. Compare Figure 12 to Figure 26.
71. Ibid., 37.



FIGURE 22. The 7th Connecticut Regiment at Fort Pulaski, 1862, north side of the fort. Source: Fort Pulaski National Monument.



FIGURE 23. The band of 48th New York at the northwest corner of Fort Pulaski, 1862–1863. At the gorge, at left, note that that no colonnade or roof is present, there are shutters on the doors and windows, and a two-color paint scheme is used on the doors. At the terreplein above, two earthen mounds are visible. Note the bunk beds and other items related to the quartering of troops in the casemates. Source: Fort Pulaski National Monument.



FIGURE 24. Gun demonstration at Fort Pulaski, along the north wall, 1862–1863. Note the shot furnace near the north-northeast angle in the parade ground at the right edge of this view, and the sentry box at the terreplein above. Source: Fort Pulaski National Monument.

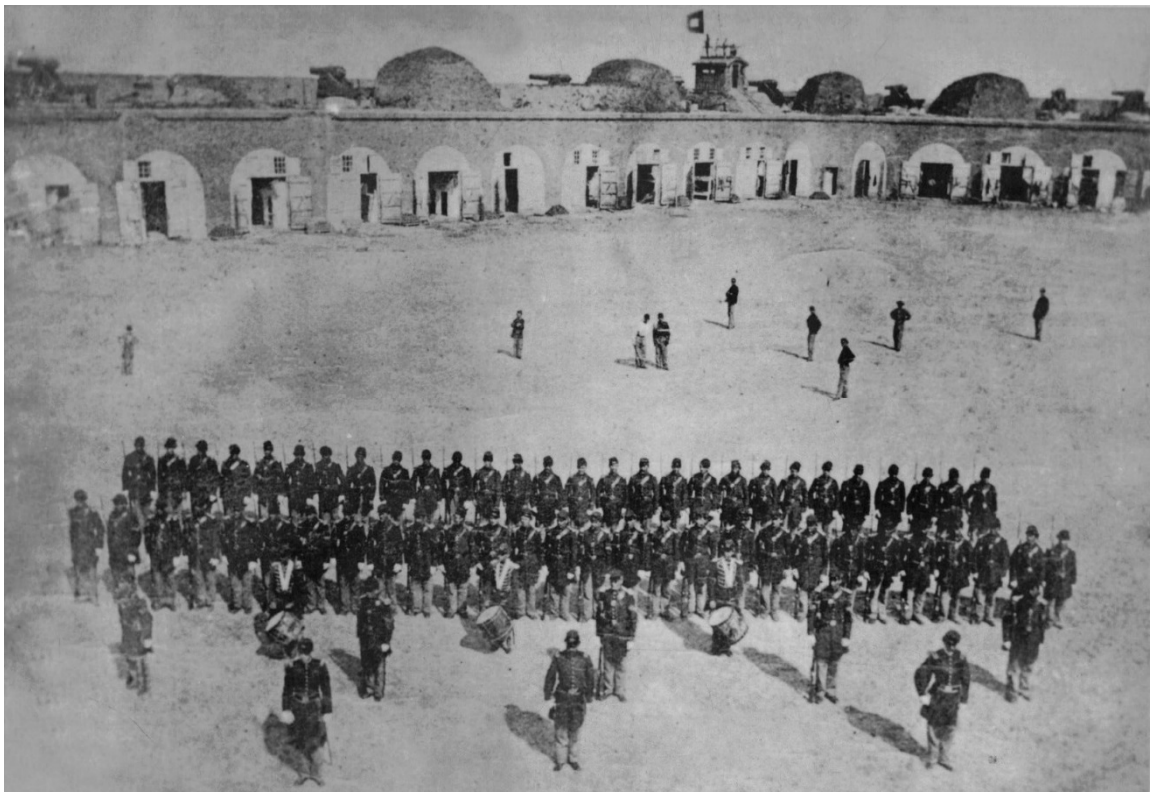


FIGURE 25. Baseball game of the 48th New York at Fort Pulaski, 1862–1863, view showing the northeast and southeast walls of the fort. Note the signal station flying a signal flag at the east angle and the earthen or sandbag mounds at the terreplein. Source: Fort Pulaski National Monument.



FIGURE 26. The 48th New York at Fort Pulaski, 1862–1863, view looking northeast. Note the signal station at the east angle and the earthen or sandbag mounds at the terreplein. The entire parade ground has been re-leveled and appears to be bare earth. Source: Fort Pulaski National Monument.



FIGURE 27. The 48th New York at Fort Pulaski, 1862–1863, looking southeast. Near the south-southeast angle at right, note the shot furnace at the parade ground and the wood sentry box at the terreplein level. Near the east angle at left, there is a wood signal station and several earthen or sandbag mounds at the terreplein. Source: Fort Pulaski National Monument.



FIGURE 28. Members of the 48th New York at the terreplein on the south side of the fort, 1862–1863. Note the wood sentry box at the south-southeast angle at the terreplein level and the shot furnace at the parade ground below. Source: HABS, image GA-2158-87.

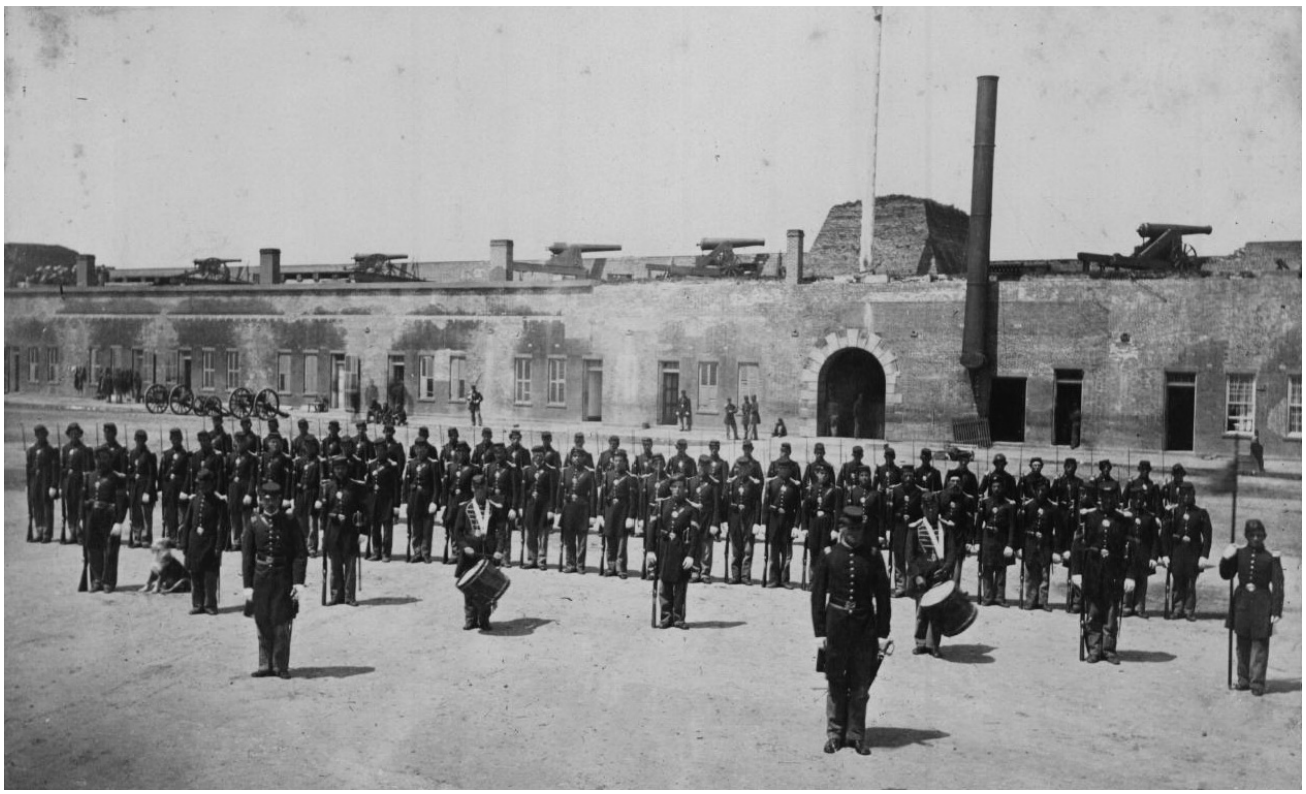


FIGURE 29. Members of the 48th New York at the fort, 1862–1863, showing the gorge wall. Note the tall chimneys for the gorge room fireplaces, the iron desalinization boiler flue and modified opening at casemate 59 to the right of the sallyport, and the earthen or sandbag mound on the terreplein above. Source: Fort Pulaski National Monument.

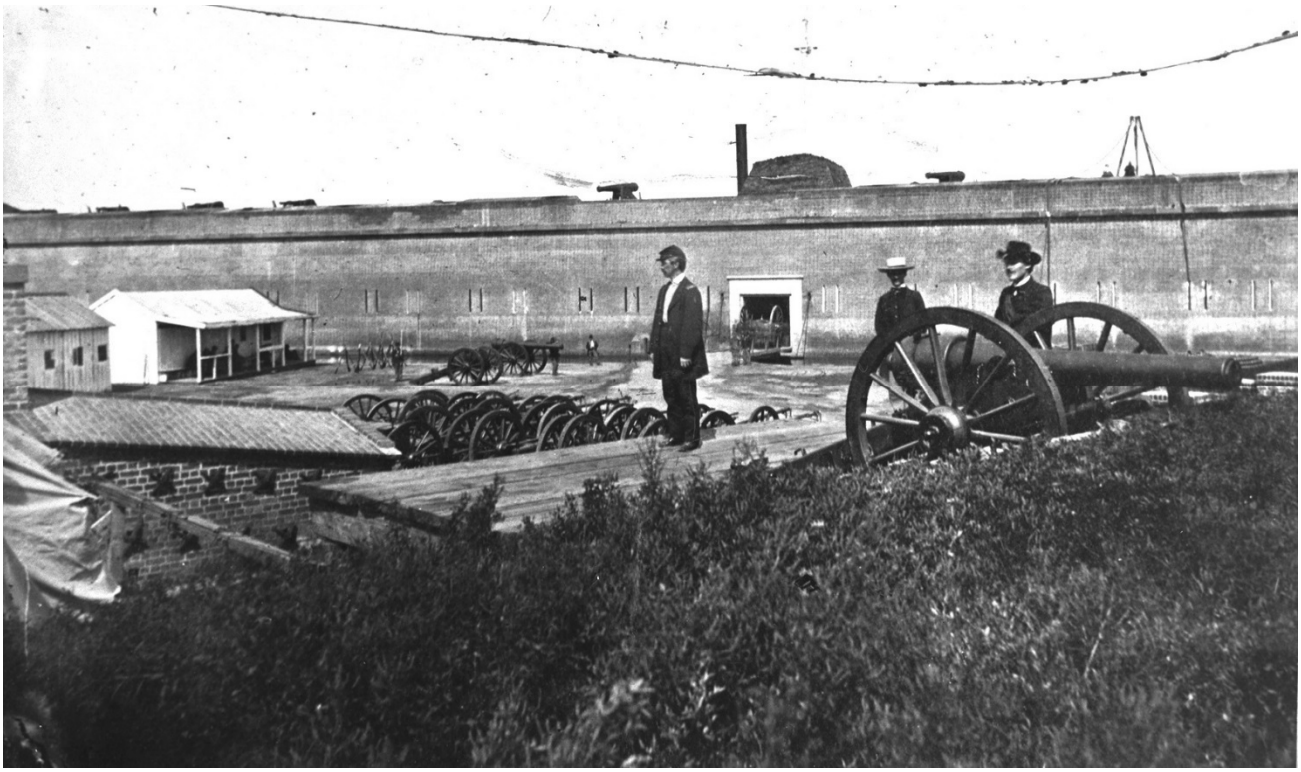


FIGURE 30. The entrance of the fort, view from the southwest, 1863. Note perimeter earthworks at the demilune. At left in the foreground is a shot furnace. At left behind the shot furnace is the storehouse for the kitchen (left) and the dining room for the enlisted men (right, with porch). Source: HABS, image GA-2158-37.



FIGURE 31. Approach to Fort Pulaski, April 1862. Note the sentry box at the drawbridge to the demilune, and the low earthworks surrounding the demilune. Source: Library of Congress, Prints & Photographs collection, image LC-DIG-cwpb-00774, call number LC-B811-189 [P&P] LOT 4166-G. Photograph by Timothy O'Sullivan.

By June 1863, the fort's garrison was largely reduced to a holding force as battles raged elsewhere.

The Immortal Six Hundred. In June 1864, in an effort to end the bombardment of Charleston by Federal forces, Confederate Gen. Samuel Jones informed Union Gen. J.G. Foster that fifty Federal officers, including five generals, were being held in a portion of the city that was exposed to heavy fire from Federal forces. In response, Foster ordered fifty-five prisoners who were Confederate officers to be transferred to a stockade on Morris Island, near the gunfire from Fort Sumter. Eventually, on August 3, 1864, the two sides exchanged the prisoners.

On the same day, Jones ordered 600 Federal officers to be placed in the residential section of Charleston, which at the time was under heavy bombardment. As a result, 600 Confederate prisoners of war were transferred to Morris Island. Yellow fever hit Charleston in October 1864, at which time, Jones moved the Federal prisoners out of Charleston. Foster soon followed suit, moving the Confederate prisoners to Fort Pulaski.

In October 1864, 520 Confederate prisoners were transferred from Morris Island near Charleston to Fort Pulaski. Of the remaining eighty prisoners who were housed at Morris Island, forty-nine were in hospitals, thirteen were unaccounted for, six were taken to a prison on Hilton Head Island, four had escaped, four had died, and two were exchanged for Federal prisoners, while two took oaths of allegiance to the United States.

Upon their arrival, the "Immortal Six Hundred" as they were called, were welcomed and told by the commander of the post, Col. Phillip P. Brown, Jr., that he planned to make the fort the model military prison. At the time, Brown had requisitioned blankets, clothing, and full army rations. Unfortunately, his requisitions were ignored, and as a result, blankets and clothing could not be issued to the prisoners. Garrison supplies were used to help feed the prisoners, while fuel was scarce on the island. When winter came, there was no wood or coal available to heat the casements occupied by the prisoners. By December 1864, Brown was ordered to impose a starvation ration, and for forty-three days, the prisoners were forced to survive on a diet of cornmeal and pickles. Stray cats and dogs were often captured and eaten by the starving prisoners.[72]

Gen. William Sherman secured the surrender of Savannah in December 1864, and on January 21, 1865, Fort Pulaski was placed under the command of Bvt. Maj. Gen. Cuvier Grover. The Confederate prisoners at the fort were placed on full rations following an inspection by Grover's medical director. On March 5, the 465 "Immortal Six Hundred" survivors were returned to Fort Delaware.[73]

On April 29, 1865, Union forces fired 200 guns from the ramparts of Fort Pulaski to celebrate the surrender of Gen. Robert E. Lee and the end of the Civil War.

Following the war, several Confederate leaders were brought to Fort Pulaski, where many remained prisoner for several months. Included in this group were Confederate Secretary of State Robert M. T. Hunter, Secretary of the Treasury George Trenholm, and Secretary of War James A. Seddon.[74]

72. Lattimore, 39–40.
73. Ibid., 40. A monument to the "Immortal Six Hundred" has been erected just outside Fort Pulaski.
74. Ibid., 40–41.



FIGURE 32. The southeast and northeast walls of the fort, circa 1864–1865. The earthen or sandbag mounds on the terreplein have been removed, but the signal station remains above casemate 27. The chimney of the southeast shot furnace is visible at right, and low plants are growing in the parade ground. Source: Fort Pulaski National Monument.



FIGURE 33. The gorge wall of the fort, circa 1864–1865. The earthen or sandbag mounds on the terreplein have been removed. Note the sidewalk paving in front of the gorge and the low plants growing on the parade ground. Source: Fort Pulaski National Monument.

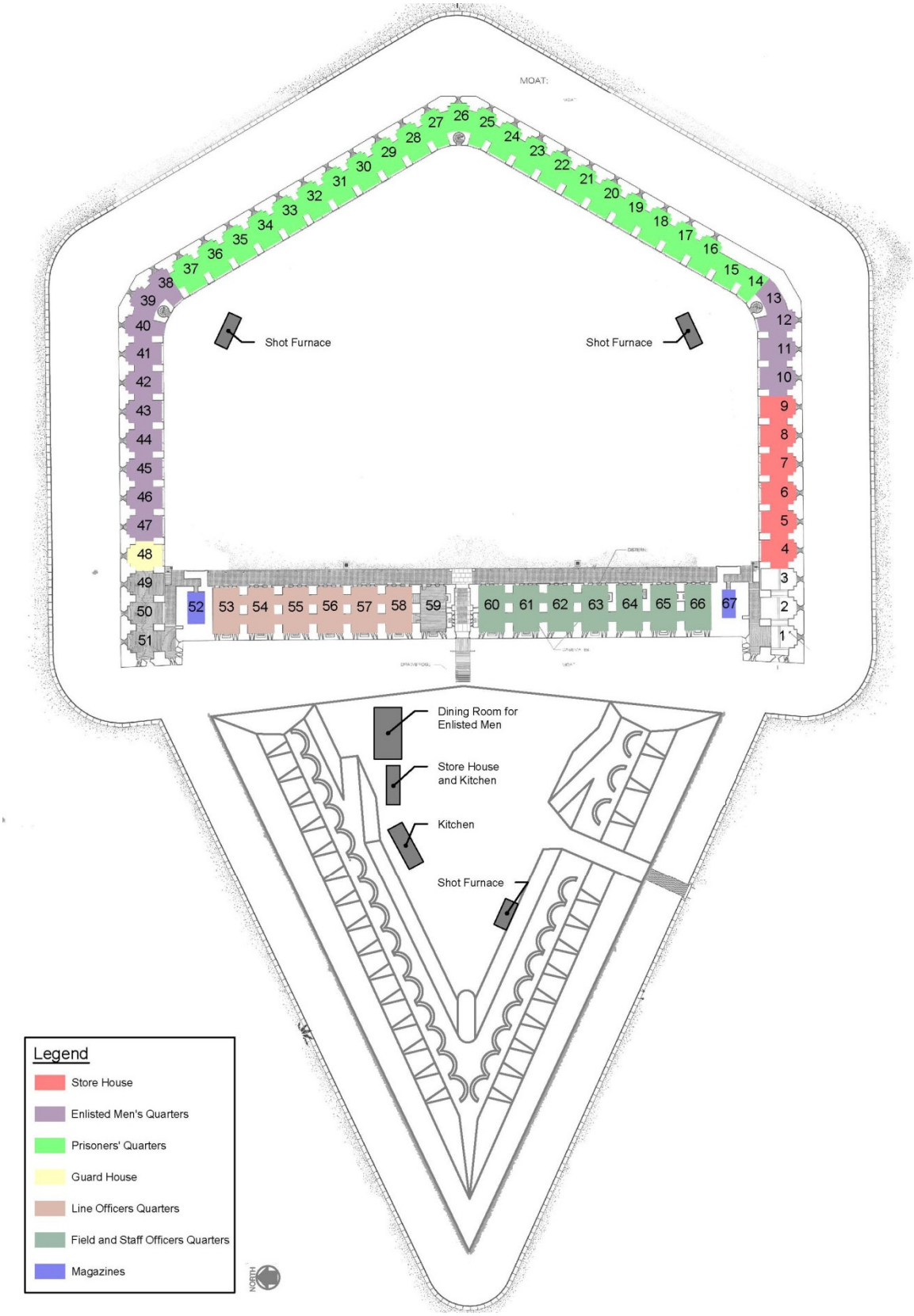


FIGURE 34. Plan of Fort Pulaski showing the use of various spaces by Union forces, 1865. Source: Plan prepared by the authors using HABS drawings, based upon an extract from volume 3 of the private diary of Edward L. Molineux, Colonel, 159th New York volunteers (February 12–March 7, 1865), copied by Petersburg National Military Park, August 20, 1959.

Fort Pulaski after the Civil War

Following the war, the U. S. Army sought to modernize the fort in response to its having failed to withstand the Union fire directed at it in 1862. Beginning in 1869, the U.S. Army Corps of Engineers under the direction of General Gillmore made a series of improvements to the fort. These improvements included remodeling the demilune, installing new earth-sheltered magazines and passageways, and constructing gun emplacements (Figure 35). Funds were also made available to make repairs to the drawbridge wharf [*sic*], sea walls, and roads.[75]

Construction on Fort Pulaski stopped in 1872 after the Corps of Engineers made plans to construct a new fort on nearby Tybee Island. In October 1873, the remaining Army units stationed at Fort Pulaski were withdrawn and on October 25, the fort was officially closed. In 1875, the Army acquired land on Tybee Island for a new fort. By 1880, only an Army ordnance sergeant serving as a caretaker inhabited Fort Pulaski, and the fort was set aside by the Army as a military reservation for potential future use.[76]

Fort Pulaski as a Military Reservation, 1873–1898

During the 1880s, the only residents of Cockspur Island were the ordnance sergeant who inhabited the fort and two lighthouse keepers.[77]

A hurricane hit the Georgia coast on August 27, 1881, causing significant damage to several structures on Cockspur Island. This storm destroyed the lighthouse keeper's house as well as the construction village that had been built in 1831 for the fort. The fort itself was left largely undamaged by the storm.

In 1884, the Corps of Engineers assumed responsibility for the maintenance of Fort Pulaski. At this time General Gillmore returned to the fort to inspect the site.[78] The Corps of Engineers, in an attempt to improve navigation, constructed a series of jetties at the mouth of the Savannah River. The construction of the jetties led to sand depositions that expanded the east side of Cockspur Island.

On August 27, 1893, a major storm later known as the Sea Islands Hurricane struck the coast, bringing a 16 foot storm surge and killing between 1,000 and 2,000 persons in Georgia and South Carolina. At Cockspur Island, the lighthouse keeper's house was again destroyed. After the 1881 and 1893 hurricanes, the lighthouse keepers resided inside casemates at the fort.[79]

In the late 1890s, Congress appropriated funds to allow the War Department to bolster coastal defenses. Despite being unable to resist attack by rifled cannon during the Civil War, Fort Pulaski was still militarily important due to its location. Therefore, in 1895, a new earth-sheltered magazine was constructed near the southeast corner of the demilune (Figure 36).[80]

75. Meader, 13, citing Quartermaster Gen. to Belknap, Secretary of War, December 4, 1869, Townsend, Adj. Gen., to Maj. Gen. Halleck, August 25, 1870.
76. Ibid., citing *Preliminary Inventory of the Records of U.S. Army Continental Commands, 1821–1920*, Volume IV, Military Installations, 1999, R.G. 393, National Archives, Washington, D.C.
77. *Fort Pulaski National Monument Landscape, Cultural Landscape Inventory,* (Atlanta: NPS-SERO, 2012), 49–50.
78. Meader, 13, citing Colonel Gillmore to Capt. Thomas Baily, 5 December 1884, "Fort Pulaski National Monument," Georgia State Historic Preservation Office files, Atlanta, Georgia.
79. Letter from Capt. J. C. Sanford, U.S. Corps of Engineers, to Light-House Board, Washington, D.C., May 11, 1901. National Archives, R.G. 26.
80. Hitchcock, 47.

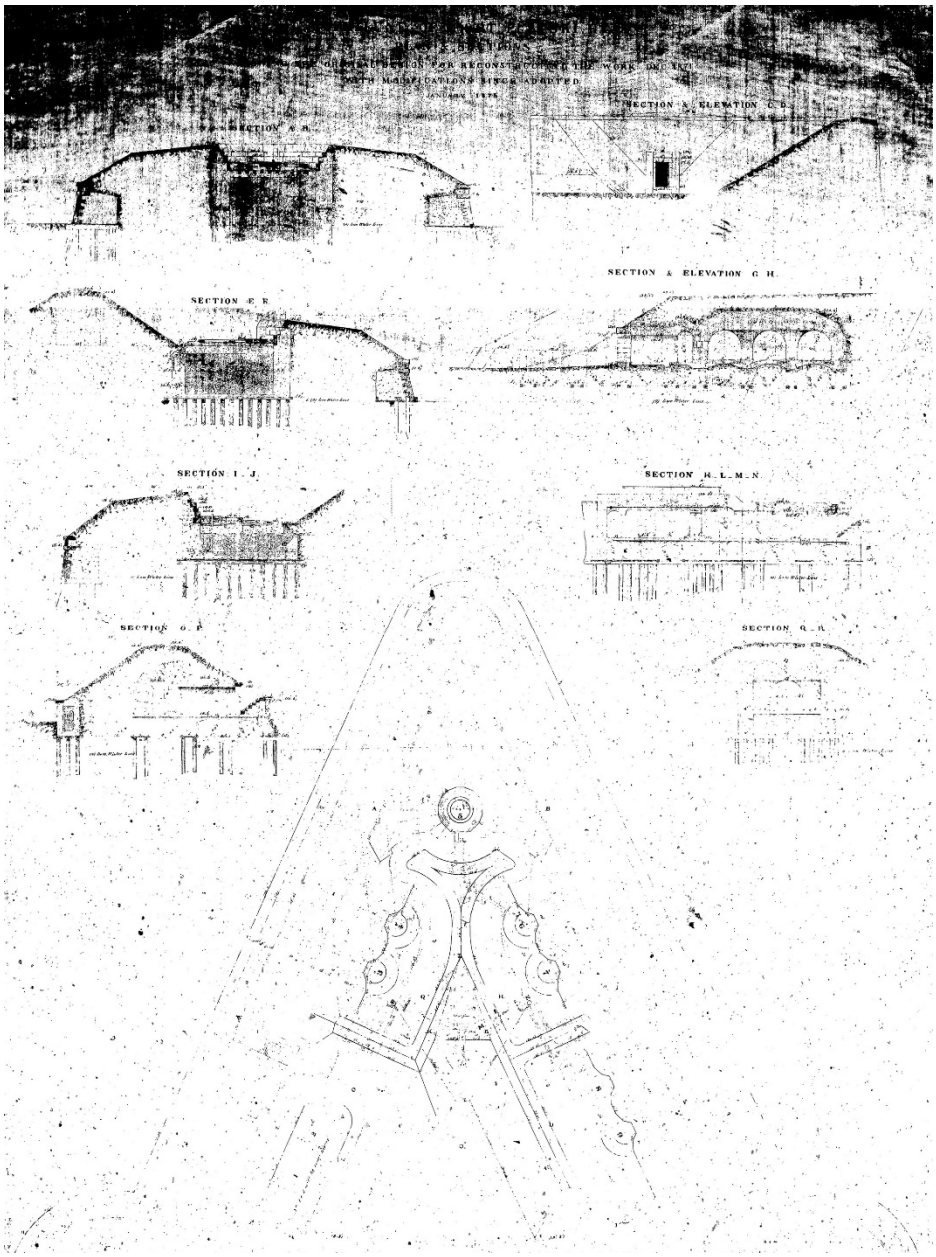


FIGURE 35. Drawings for the new magazines at the demilune of Fort Pulaski as completed, drawing dated 1875. Source: NPS drawing 348-60077.

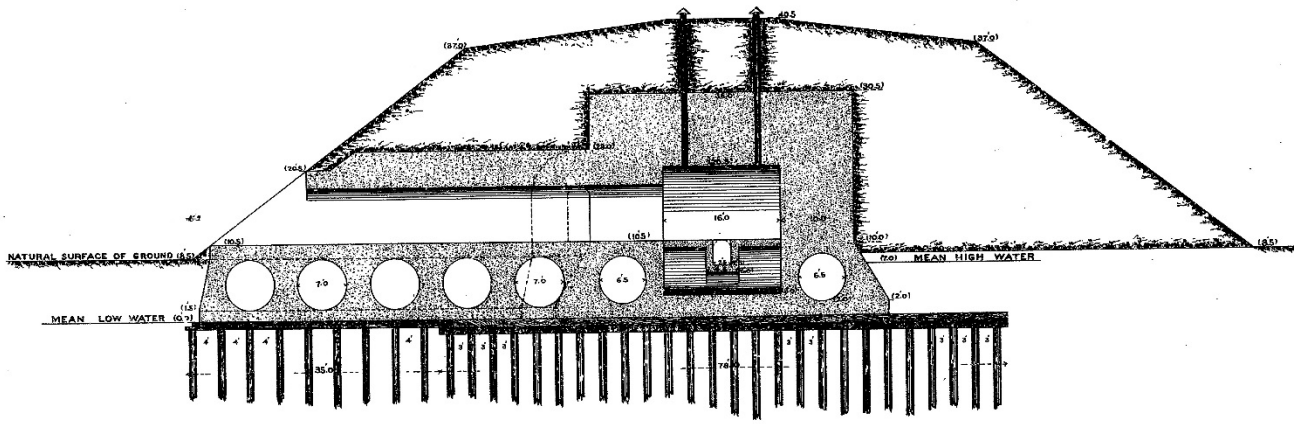


FIGURE 36. Cross section of mining casemate, 1893. Source: NPS drawing 348-25006, sheet 2.

The few soldiers garrisoned at the fort during this time were charged with manning the guns that had been installed in the demilune and at Battery Horace Hambright, which was located on the north shore of Cockspur Island. In addition, the forces at Fort Pulaski also controlled the mines situated in the north channel of the Savannah River; an opening was made through the north outer fort wall below casemate 46 for the control wires running out to the mines. The threat of hostilities with Spain also motivated Congress to appropriate funds to construct Fort Screven on Tybee Island. The new fort was completed in 1897.[81]

At some point in the late nineteenth century, the War Department built a wood-framed dwelling atop the terreplein for the ordnance sergeant assigned to reside at Fort Pulaski (Figure 37), likely following either the 1881 or 1893 hurricanes. Although in the early 1900s, the Light-House Board considered building a second dwelling for the lighthouse keepers atop the fort, this plan did not go forward. In 1906, the ordnance sergeant at Fort Pulaski was reassigned, and the fort and the wood-framed dwelling were left vacant by the War Department.[82] Accordingly, in 1907, lighthouse keepers moved into the dwelling, which was divided into two sets of quarters for the keeper and assistant keeper.[83] The War Department entrusted minimal caretaking of the fort to the lighthouse keeper.

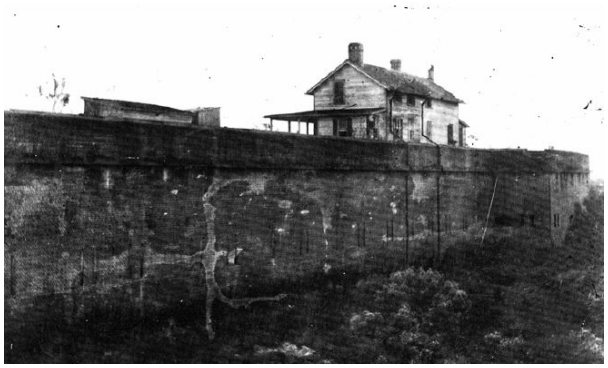


FIGURE 37. Caretaker's house on the terreplein at Fort Pulaski, circa 1900. Source: Fort Pulaski National Monument.

Early Preservation of Fort Pulaski, 1898–1924

By the early twentieth century, Fort Pulaski was showing signs of deterioration, and the parade ground, terreplein, and demilune were becoming overgrown with vegetation (Figure 38 through Figure 43; see also Figure 44). Around 1908, the lighthouse keeper who served as caretaker was given approval by the War Department to plant about thirty fig trees on the parade grounds.[84]

In 1913, an inspection of the fort was undertaken. The inspection found that the lighthouse keeper had vacated the fort, leaving the structure without a caretaker. As a result, efforts were made to find a full-time custodian, as well as to procure funding to make repairs to the fort. Col. Dan C. Kingman of the Corps of Engineers described the condition of Fort Pulaski in a letter to the Adjutant General at Governor's Island:

> Fort Pulaski is a fine specimen of a brick fort. . . . The wet ditch is filled with mud and grown up with weeds, the drawbridge is gone,

81. Lattimore, 42; Meader, 13, citing Jaymi Freiden, "History by the Sea," *Savannah Morning News*, October 24, 1999.
82. Letter from Capt. G. P. Howell, U.S. Corps of Engineers, to Light-House Board, Washington, D.C., March 31, 1906. National Archives, R.G. 26.
83. Letter from Capt. G. P. Howell, U.S. Corps of Engineers, to Light-House Board, Washington, D.C., January 16, 1907. National Archives, R.G. 26.
84. Memorandum from Chief of Publications Ralston B. Lattimore to the Custodian of Fort Pulaski, dated July 2, 1948. The documentation that discusses the planting of the fig trees does not address the original intent of their planting. It is assumed the trees were planted to provide fresh fruit.

> and the gates are in such condition as would hardly exclude anyone who cared to enter it. I think that all these forts should be maintained. The time may come when they will be found useful . . . it seems a pity to see the forces of nature gradually destroying them.[85]

Following the inspection of the fort and the plea for funding, F. M. Lales became the full-time caretaker of Fort Pulaski. Receiving no pay, Lales was permitted to reside in the home situated on the terreplein of the fort in exchange for maintaining the house and adjacent grounds while preventing trespassers from entering the fort.[86] Lales remained in this role for only a few weeks before resigning due to his inability to make a living on Cockspur Island.[87] J. Harry McLendon soon accepted the position of caretaker. McLendon remained in this role until 1916, when poor health forced him to resign.[88]



FIGURE 39. Casemates and the parade ground, circa 1900. Source: HABS, image GA-2158-65.



FIGURE 40. The west exterior wall of the fort, circa 1907. Source: Library of Congress, image LC-D4-70130, glass plate negative by Detroit Publishing Co., gift of the State Historical Society of Colorado, 1949.

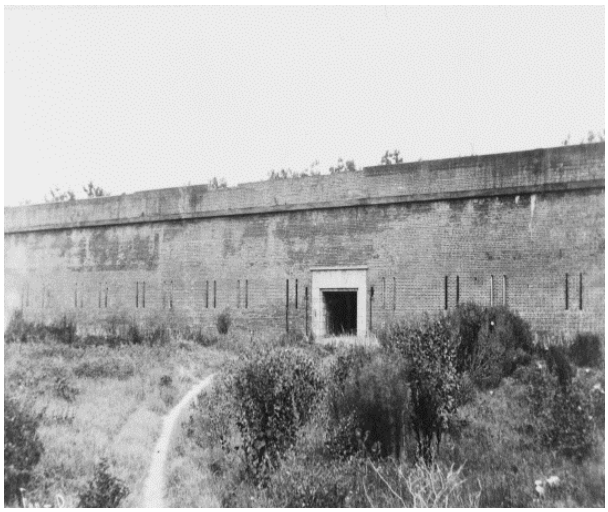


FIGURE 38. The sallyport, 1900. Source: HABS, image GA-2158-40.

85. Meader, 15–16, citing Col. Kingman to Adjut. General, Headquarters Eastern Division, Governors Island, New York, February 18, 1913, R.G. 77, Box 1, National Archives, Atlanta.
86. Ibid.
87. Ibid., citing William H. Myers to District Engineer's Office, Savannah, July 4, 1914, R.G. 77, Box 1, National Archives, Atlanta.
88. Ibid., citing J. H. McLendon to Thomas Lynch, Fort Screven, July 28, 1916, R.G. 77, Box 1, National Archives, Atlanta.



FIGURE 41. The southeast exterior wall of the fort showing Civil War damage, circa 1907. Source: Library of Congress, image LC-D4-70133, glass plate negative by Detroit Publishing Co., gift of the State Historical Society of Colorado, 1949.



FIGURE 42. The parade ground and casemates, circa 1907. Source: Library of Congress, image LC-D4-70132, glass plate negative by Detroit Publishing Co., gift of the State Historical Society of Colorado, 1949.



FIGURE 43. Interior of the casemates, circa 1907. Source: Library of Congress, image LC-D4-70131, glass plate negative by Detroit Publishing Co., gift of the State Historical Society of Colorado, 1949.

On July 17, 1915, the War Department announced that Fort Pulaski had been selected for consideration as a national monument under the American Antiquities Act. However, efforts to preserve the site were postponed due to World War I.[89] In 1917, after visiting the fort, Col. John Millis, the District Engineer of the Corps of Engineers in Savannah, recommended its immediate preservation. Millis, with the help of Thomas Purse, Secretary of the Savannah Board of Trade, sought War Department funds to be used for the improvement of Fort Pulaski. In December 1917, $500 was made available, allowing the ridge around the fort to be cleared, affording visitors arriving at the site by boat a better view of the fort.[90] Peach and fig trees present in the parade ground were left standing, as they yielded fruit.[91] As the work to clear the ridge around the fort was undertaken, Civil War era artifacts were found, as were the gravestones of Lt. Robert Rowan, who died in 1800, and an unidentified infant.[92] In 1918, an additional $2,300 was made available for the "Preservation and Repair of old Fort Pulaski."[93]

89. Lattimore, 43.
90. Meader, 18, citing Thomas F. Lynch to District Engineer's Office, Savannah, December 11, 1917, R.G. 77, Box 1, National Archives, Atlanta.
91. Hitchcock, 60, citing John Millis, U.S. Army Corps of Engineers, to Chief of Engineers, February 25, 1918, R.G. 77, Box 1, National Archives, Atlanta.
92. Ibid.
93. Ibid., citing Millis to Lynch, February 26, 1918, R.G. 77, Box 1, National Archives, Atlanta.



FIGURE 44. Aerial view of Fort Pulaski, before 1925. Note the overgrowth of trees and shrubs at the parade ground and demilune, low plants in the former moats, caretaker's house atop the terreplein, and small outbuilding on the parade ground. Source: Fort Pulaski National Monument.

Fort Pulaski National Monument, 1924–1933

As improvements were made at Fort Pulaski, more groups and individuals became interested in its preservation. The City of Savannah expressed interest in acquiring the fort and converting the site to a public park, while the Savannah Board of Trade inspected the site and concluded that a preserved Fort Pulaski could attract tourists from around the world.[94] Soon, the Savannah Board of Trade, along with Col. F. W. Alstaetter, Colonel Millis's successor as District Engineer, campaigned for the fort to be declared a national monument. In January 1924, Congressman Charles G. Edwards of Georgia introduced legislation that would designate Fort Pulaski as a national monument. Later that year, on October 15, Fort Pulaski was made a national monument in a proclamation by President Calvin Coolidge.[95] The fort was to be managed by the U.S. War Department, which also maintained other Civil War sites such as Antietam, Gettysburg, and Shiloh national military parks.

Following the declaration of Fort Pulaski as a national monument, the Directors of the Savannah Board of Trade pledged their support for the

94. Ibid., citing "Make Pulaski Public Park," *The Savannah Press*, June 10, 1924, R.G. 77, Box 1, National Archives, Atlanta.

95. Lattimore, 43.

restoration of the fort. In January 1925, Maj. Dan I. Sultan of the Corps of Engineers inspected the fort and made recommendations for its preservation. Major Sultan estimated that initially $6,930 would be necessary to preserve the landscape surrounding the fort, including the nearby ditches and embankments.[96] These funds would not be sufficient to restore the fort itself, as the Corps of Engineers sought first to make the property and structure accessible to visitors. A walkway inside the fort was proposed, as was the repair of the caretaker's house. An estimate to rebuild the drawbridge was also included. In addition to the recommended improvements, $1,500 was earmarked for maintenance.[97]

In spring 1925, the interiors of the officers' quarters at the southwest side (casemates 60 through 66) were destroyed by a fire caused by a lightning strike. The fire also destroyed the caretaker's house at the southwest corner of the fort.[98]

Supervision of Fort Pulaski was transferred from the Corps of Engineers office in Savannah to the Quartermaster Department of the Army in August 1925. As a result, the Quartermaster at Fort Screven on Tybee Island was placed in charge of Fort Pulaski.[99]

Attempts to obtain funding for the preservation of Fort Pulaski continued in January 1926, when Congressman Edwards introduced legislation that would transfer the fort to the City of Savannah while providing an appropriation of $100,000 for the preservation of the structure.[100] The War Department opposed the bill, wanting to retain the fort for future use. As a result, the bill failed. A year later, Edwards introduced another bill, calling for an appropriation of $12,040 to rebuild the caretaker's house, which had burned in 1925. The appropriation would also be used to provide a salary for a caretaker and to maintain the fort for one year. Congress rejected this legislation as well.[101]

The Stewardship of the National Park Service

On June 10, 1933, President Franklin D. Roosevelt signed Executive Order 6166, through which the National Park Service gained jurisdiction over all historic sites, battlefields, monuments, and parks previously administered by the War Department, the Department of Agriculture, and the Office of Public Buildings and Public Parks of the National Capitol.[102] As a result, Fort Pulaski National Monument and approximately 20 acres of adjacent land were placed under the administrative responsibility of the National Park Service.

Following the transfer of Fort Pulaski to the National Park Service, the State of Georgia donated 297.39 acres to the Department of the Interior in 1935. This included the east end of Cockspur Island, as well as portions of the former right-of-way of the Central of Georgia Railroad on McQueen's Island, south of Cockspur Island. An act of Congress extended the western boundary of the monument to the eastern property line of the

96. Meader, 18 citing U.S. Army Corps of Engineers, "Estimate on Maintenance and Preservation of Fort Pulaski," January 1925, R.G. 77, Box 1, National Archives, Atlanta.
97. Ibid., citing Major Dan Sultan, District Engineer, to Major Tompkins, February 9, 1925, R.G. 77, Box 1, National Archives, Atlanta.
98. Lattimore, 53, and Meader, 14, citing Brown, Savannah Quarantine Station, to Howard, District Engineer's Office, Savannah, June 20, 1925, "Civil Works Project Files—Savannah," R.G. 77, Box 1, National Archives, Atlanta.
99. Meader, 20, citing, "Fort Pulaski in Charge Quartermaster," *The Savannah Press*, 13 August 1925, RG 77, Box 1, National Archives, Atlanta.
100. Ibid., citing, "Edwards Wants to Save Fort Pulaski," *The Savannah Press*, 7 January 1926, RG 77, Box 1, National Archives, Atlanta.
101. Ibid., citing, "Introduces Bill for Fort Pulaski," *The Savannah Morning News*, January 19, 1927, R.G. 77, Box 1, National Archives, Atlanta.
102. Barry Mackintosh, *The National Parks: Shaping the System* (Washington, D.C.: U.S. Department of the Interior, 1991), 24.

U.S. Public Health Service Quarantine Station situated on the west end of the island. This expanded the size of the monument to nearly 500 acres in size. The legislation also authorized the Secretary of the Interior to accept lands, easements, and improvements on nearby McQueen's and Tybee islands. A bridge was also to be constructed between Cockspur Island and McQueen's Island with these funds.[103]

New Deal Programs at Fort Pulaski, 1933–1941

At the time the National Park Service gained jurisdiction over Fort Pulaski, several new agencies were created as part of Franklin Roosevelt's New Deal program. These agencies, including the Civil Works Administration (CWA), the Civilian Conservation Corps (CCC), and the Public Works Administration (PWA), all played a role in the preservation of Fort Pulaski during the 1930s.

The first New Deal agency to perform work at Fort Pulaski was the CWA. Established in November 1933, the CWA was intended to employ four million American workers in the winter of 1933–1934. The CWA was expected to undertake small projects that required a minimal amount of materials and could be completed by February 1934.[104]

In December 1933, a unit of 212 CWA personnel began work at Fort Pulaski and elsewhere on Cockspur Island. By late April 1934, the CWA had completed several small projects, including the removal of vegetation from the parade ground and the walls of the fort, and construction of a landing walk for ferry transport on the south channel. Ferry service between Cockspur Island and Lazaretto Creek Landing along the Tybee Highway (U.S. Highway 80) operated regularly from May 1934 to May 15, 1938, when the bridge over the South Channel was opened. CCC enrollees operated the ferries (Figure 45).[105] The wharf on the mainland side was located where an abandoned railroad trestle existed for the former Central of Georgia Railway bridge over Lazarette Creek, which was close to the highway. The wharf on Cockspur Island was on the south side of the island, just west of the feeder canal. As built in 1934–1935, the wharf consisted of an 8-foot wide, 105-foot long timber pier, with a ramp and floating deck at the end. Along the west edge of the feeder canal, a 40-foot wide, 75-foot long slip was excavated for freighters, with timber bulkheads around the slip.[106] During this time, the National Park Service operated an office for visitor contact in Savannah. Workers also partially excavated the main drainage canal prior to the termination of CWA funds.[107]

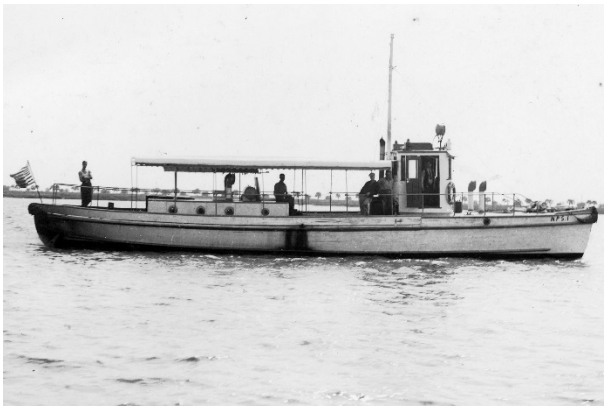


FIGURE 45. The 67-foot diesel motorboat, known as "NPS-1" used for regular ferry service, 1934–1938. The boats were operated by CCC personnel. Source: Fort Pulaski National Monument.

The CCC, initially called Emergency Conservation Work (ECW), was established on March 31, 1933, under the Federal Unemployment Relief Act. The goal of the CCC was to mobilize unemployed labor forces to perform work such as reforestation, land reclamation, and building of roads and trails. The national park system, together with state parks,

103. Farris Cadle, "Title Abstract for Cockspur Island," 2000. Park files, Fort Pulaski National Monument
104. Meader, 24, citing "Superintendent's Annual Report," 1937. Park files, Fort Pulaski National Monument.
105. Summary of Accomplishments of Civilian Conservation Corps, June 5, 1940, park files, FPNM.
106. "Report of Wharf Construction, Public Works Project 548," National Park Service, May 29, 1936.
107. Superintendent's Annual Report, 1936. Park files, Fort Pulaski National Monument.

was the beneficiary of much CCC work. By October 1933, there were 102 CCC camps in national parks around the country.

In May 1934, CCC Camp 460 was established along the northwest shore of Cockspur Island. Initially, 175 CCC workers were part of the camp. By mid-1934, the number of CCC enrollees at Fort Pulaski had fallen to thirty. The size of the CCC camp rose to 242 workers in January 1935, following a request by the superintendent of Fort Pulaski for the continuation of the CCC program at the fort. Although the CCC enrollees continued their work on the island, a substantial portion of funds and labor was taken from the Fort Pulaski camp and reallocated to the CCC camp at Robert Fechner Park, located southeast of Savannah, in 1938. As a result, major work at the fort was left unfinished, and maintenance of the park declined. The CCC continued to have a presence at Fort Pulaski until May 1941, when CCC Camp 460 was transferred to Florida.[108]

The first projects undertaken by the CCC at Fort Pulaski included landscape and drainage work, in addition to mosquito control (Figure 46).[109] This work included excavation of the moat surrounding the fort and the rebuilding of five miles of dikes (Figure 47 through Figure 49). In all, 35,000 cubic yards of earth were excavated from the moat.[110] Numerous iron and glass artifacts were unearthed during the excavation. The objects were later cleaned and placed on display in the museum.[111] Following the restoration of the outer dike and the installation of new tide gates, salt water was reintroduced to the moat at Fort Pulaski in December 1935 (Figure 50).



FIGURE 46. View from the west toward the fort, 1934. Source: HABS, image GA-2158-1, Charles E. Peterson, photographer.



FIGURE 47. The parade ground prior to CCC efforts involving filling, grading, drainage infrastructure, and seeding, 1934. Note the missing veranda as well as the missing windows and doors. Source: HABS, image GA-2158-5, T. T. Waterman, photographer.

108. Superintendent's Annual Reports, 1938, 1939, park files, Fort Pulaski National Monument.
109. Meader, 26, citing "Cockspur Island Now Modernized," *Savannah Morning News*, October 21, 1934, in "The Story of Fort Pulaski, Savannah River, Georgia," 1945, The Gamble Collection, Savannah Public Library, Savannah.
110. Summary of Accomplishments of Civilian Conservation Corps, June 5, 1940. Park files, Fort Pulaski National Monument.
111 Narrative report by Ralston B. Lattimore, August 18, 1935.



FIGURE 48. View to the demilune from the sallyport, May 15, 1934. Note plant growth in the moat, the narrow drawbridge walkway, and dense plant growth on demilune. Source: Superintendent's Annual Report, fiscal year ending June 30, 1938, 25.

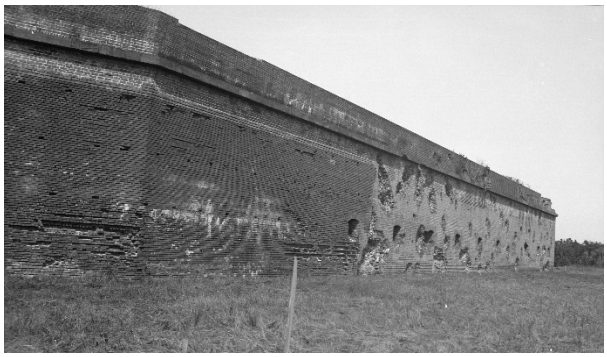


FIGURE 49. The unexcavated moat, prior to CCC work, 1934. Note the rebuilt southeast corner of the fort at left. Source: HABS, image GA-2158-3, T. T. Waterman, photographer.



FIGURE 50. The moat and west elevation of the fort following restoration, 1936. Note the dredging steam shovel in the background at left. Source: HABS, image GA-2158-9.

Material removed from the moat by CCC enrollees was later used to raise the surface level of the parade ground within the fort between 1934 and 1936. Reports documenting the work suggested that the CCC workmen needed to add up to 2 feet of fill to address settling of the parade ground.[112] The parade ground was then planted with Chinese centipede grass (*Eremochloa ophiuroides*).[113] By February 1936, National Park Service personnel had overseen several related projects, including the establishment of a drainage system for the parade ground, and the provision of water to address the irrigation needs of the turf.[114] In addition to the new drainage system installed in the parade ground, an old well was cleaned out, "but was thought of no particular interest, since nothing could be found in the records for

112. Summary of Accomplishments of Civilian Conservation Corps, June 5, 1940. Park files, Fort Pulaski National Monument.
113. Report by Ralston B. Lattimore, August 18, 1935.
114. John C. LeBoy, "Yearly Report for Restoration of the Fort Pulaski National Monument," (Fort Pulaski National Monument, n.d. [1935], archived as NPS 348/D-65), 23; and Historic American Building Survey (HABS), *History of Fort Pulaski and Cockspur Island*. Addendum to Fort Pulaski (Washington, D.C., HABS No. GA-2158, 1998), 6.

restoring it."[115] Later, the CCC was tasked with adjusting the drainage system within the fort, along with fine grading, soil preparation, and seeding in order to promote a healthy stand of grass.[116]

PWA Restoration of the Fort, 1934–1936. In addition to the CWA and the CCC, the PWA also played a major role in the rehabilitation of Fort Pulaski and Cockspur Island during the 1930s. Created by the National Industrial Recovery Act signed into law by President Franklin Roosevelt on June 16, 1933, the PWA oversaw the construction of large public works projects, such as buildings, bridges, dams, and housing, as well as efforts that required special expertise in historic building repair and restoration.[117]

While the majority of the work by CCC labor at Fort Pulaski National Monument had been performed outside of the fort itself, the PWA workers, who were generally skilled craftsmen, completed many of the projects within the fort.

In 1934, the condition of the fort was documented in detailed drawings prepared by the PWA (refer to Appendix B; note that the casemate numbering is incorrect). These drawings show that wood floors were completely absent in casemates 1 through 5 and 60 through 67 at the southwest portion of the fort, as well as at casemates 21 through 26 on the southeast wall or in casemate 57. The brick walk along the north side of the parade ground had disappeared. Foundations for the two shot furnaces were visible at the southeast and northeast corners of the parade ground. A boiler was located in casemate 59, with an irregular circular hole through the exterior wall for the iron flue that was present during the Civil War era.

In September 1934, after months of planning, the PWA began restoration work at Fort Pulaski. A variety of projects were completed in the first year of work at the fort between September 1934 and July 1935. For the masonry and plaster work performed at this time, sand was obtained from deposits on Cockspur Island.[118] Apparently, portland cement, lime, and other materials were purchased from commercially available sources. Through June 1936, the PWA projects at Fort Pulaski totaled $93,876.[119] The PWA restoration work was organized as distinct but overlapping and simultaneous projects, as follows:

Project 545-A involved reconstruction of the decayed wood floors within the casemates. Work began on September 4, 1934. A few areas of intact, undamaged wood flooring were left in place, but in most casemates, the wood floors were taken up. Intact original pieces of wood were then recut as needed and relaid in the rear portions of selected casemates, with new material used to fill in the remaining areas. The grooves for the original gun carriages were cut into all the new or relocated original material. It was decided not to reinstall a wood floor in the southwest bastion, casemates 49 through 51. All of the work, except for one casemate (either 47 or 48) had been completed by July 1935. Available reports indicate that casemates 12, 18, 37, 38, and 46 as well as other cross-vault areas between casemates contain flooring of original material at their back half (either left in place or salvaged and reinstalled in 1934–1935).[120] The timber used for supporting joists was treated with creosote.[121] Based on the

115. LeBoy, 24.
116. *A Summary of Work Accomplishments of the Civilian Conservation Corps*, June 5, 1940, park files, Fort Pulaski National Monument.
117. Meader, 28, citing Michael S. Holmes, *The New Deal in Georgia: An Administrative History* (London: Greenwood Press, 1975).
118. LeBoy, 24.
119. Superintendent's Annual Report, 1937. Park files, Fort Pulaski National Monument.
120. LeBoy, 2. Note that LeBoy numbers the casemates beginning with 1 at the northwest bastion and proceeding clockwise around the fort. Therefore, the casemates he identifies as original (6, 14, 15, 34, and 40) actually correspond to casemates 46, 38, 37, 18, and 12.
121. Oliver G. Taylor, *Final Report on Repairs to Fort and Adaption of Certain Space for Museum and Exhibition Purposes, Fort Pulaski National Monument, Savannah, Georgia, F.P. 545-A* (National Park Service, October 6, 1936).

physical appearance of the floor, it appears that additional casemates also contain partially original wood floors (refer to the Significance and Integrity chapter of this report). As part of the casemate floor project, the supporting brick masonry walls were repaired as needed, and numerous 6-inch by 12-inch wood joists supporting the casemate floors were removed and replaced. At the eight casemate cisterns, new reinforced concrete covers were installed at the manhole openings.



FIGURE 51. The casemates at the north side of the fort during flooring replacement, 1935. Source: Taylor, 4.



FIGURE 52. Casemates 22 through 26 before the installation of new wood flooring, 1935. Source: Taylor, 5.

Project 545-H was related to the casemate floor project. When the outer wall was rebuilt at casemates 13 through 15 during the Civil War, the brick masonry was partially supported on the wood casemate floor. By 1934, this wood floor had deteriorated, and portions of the brick were unsupported. In October 1934, wood formwork was built and a new concrete foundation wall was installed to support these Civil War-era brick masonry walls, below the level of the casemate floors.[122]

122. LeBoy, 12.



FIGURE 53. The casemates at the north side of the fort during flooring replacement, 1935. Source: Taylor, 19.

Projects 545-B and 545-C involved repair of the terreplein waterproofing. Selected portions of the terreplein fill were excavated, and the lead roof below was repaired (Figure 54 through Figure 58; also refer to Figure 106 at the end of this chapter). At each area excavated, the masons rebuilt the latticed brickwork over the lead, and damaged brick abutment walls were repaired. At a section of the inner wall along the west side near the flagpole where the original sandstone copings were missing (approximately aligned to casemates 57 through 60), a concrete coping was installed. Cementitious parging was applied atop brick masonry parapets at the west outer wall. Cast iron vent frames were salvaged and reset in cement mortar. The original lead roofing was found to consist of sheet lead weighing approximately 2-1/2 pounds per square foot. The scuppers at the inside wall were cleaned out and repaired. At the southeast corner above casemates 13 through 15 rebuilt during the Civil War, a new lead flashing roofing was installed. All of the terreplein gun mounts were repaired during this project; the gun mount at position 13-14 had to be dismantled and rebuilt in order to repair the roofing in this area, and the gun mount at position 25-26 had to be temporarily shored so that the roofing could be repaired below it.[123] Tree roots were removed from the parapet walls, and salt was placed in the cracks to discourage additional vegetative growth.

In addition to the roof repairs, the PWA also installed three steel water storage tanks at the terreplein along the west side of the fort (Figure 57, and refer to Figure 106 at the end of this chapter). Two of the tanks had a 2,000 gallon capacity and were connected to the fire suppression line. The third tank held 1,500 gallons and supported domestic water needs. All tanks were supplied by a new artesian well located on the parade ground, near the northwest corner, that was pumped to the tanks by a gasoline-powered pump.[124]

After this PWA work, the terreplein was refilled, graded, and sodded by the CCC by early 1936 (Figure 58).[125] The caption of a photograph included in a summary of the work performed by the CCC between 1934 and 1940 suggests that sand was used in re-establishing a level area of soil

123. Ibid., 4, 8–9.
124. Report of the Construction of Office, Recreation House, Comfort Stations, and Water sewage Systems, May 29, 1936. Park files, Fort Pulaski National Monument. By 1952, it was reported in a memoranda dated October 31 from Superintendent Ralston Lattimore that the storage tanks were insufficient for watering the grass and protecting against fire. Minor improvements were made in 1962.
125. Superintendent's Annual Reports 1936, 1937. Park files, Fort Pulaski National Monument.

atop the terreplein.[126] At the top of the northwest and southwest staircases, low brick masonry walls with stone copings were added at the terreplein level around the opening.

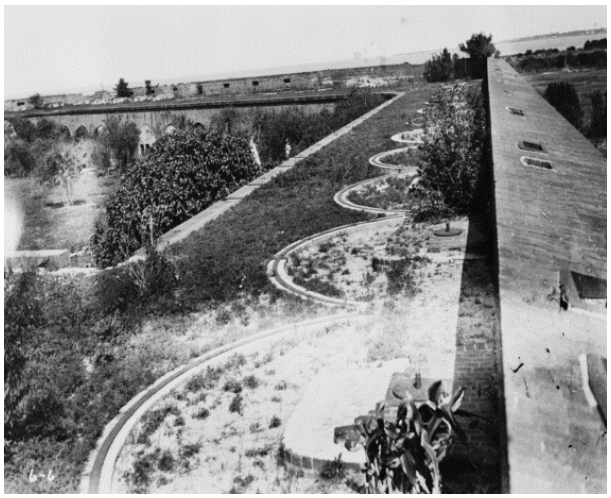


FIGURE 54. The terreplein and parade ground, April 25, 1934. Source: HABS, image GA-2158-17.



FIGURE 55. Excavation of the terreplein to replace the waterproofing over the casemates, 1934. This view is looking northwest along the northeast face of the fort, with the east stairway in the foreground. Source: HABS, image GA-2158-94.



FIGURE 56. Excavation of the terreplein to replace the waterproofing over the casemates, 1934–1935. This view is looking northeast along the southeast face of the fort, with the southeast stairway in the foreground. Source: Taylor, 8.



FIGURE 57. Two water storage tanks installed above the sallyport, November 15, 1935. Source: Superintendent's Annual Report, fiscal year ending June 30, 1936, 24.

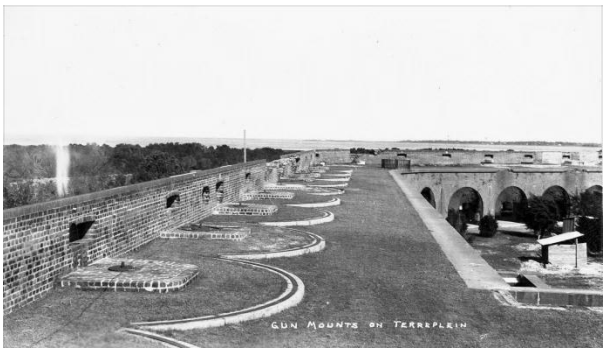


FIGURE 58. The north side of the completed terreplein, 1936. Note the small trees and temporary work shed in the parade ground. Source: Superintendent's Annual Report, fiscal year ending June 30, 1936, 23.

126. Summary of Accomplishments of Civilian Conservation Corps," June 5, 1940, NPS number 348/D-104. Caption for photograph dated April 22, 1936; the photograph itself is missing from archived copy of the report.

Projects 545-N, 545-R, 545-T, and 545-Z involved repairs to the masonry of the outer walls. Suspended scaffolding was placed on the walls. Most areas were repointed using a lime-cement mortar, but the areas damaged during the Civil War were not repointed. At the demilune, the moat wall was repaired from the point opposite the sallyport, southward to the southeast corner. The southeast corner was found to be badly deteriorated, so the brick masonry in this area was completely taken down and rebuilt.[127]

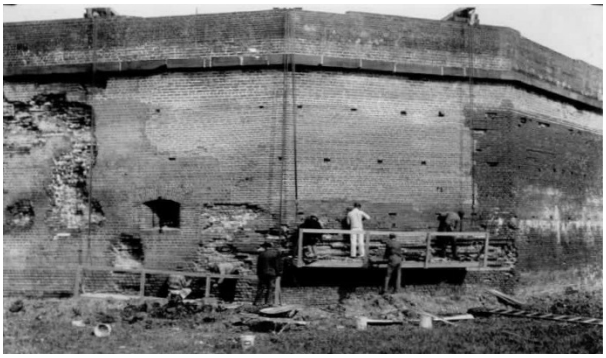


FIGURE 59. Repointing at the southeast angle, 1935. Source: Taylor, 9.



FIGURE 60. Repointing at the northwest bastion, 1935. Source: Taylor, 10.

Project 545-J was the reconstruction of the walls along the northwest stairway to the terreplein. At the start of this work, the stairway walls were described as being "only supported by wood braces." Therefore, the walls were dismantled down to the level of the stair treads and rebuilt using salvaged original brick and a lime putty mortar. The bricks were individually numbered and returned to their original locations during this work to maintain the evidence of Civil War damage to the walls. The roof was rebuilt and covered with lead sheet, and three new circular wood louvers were installed.[128]



FIGURE 61. Northwest staircase prior to repair, 1934. Source: Taylor, 14.



FIGURE 62. Northwest stair after repair, 1936. Source: Taylor, 15.

Project 545-U was for repair of ironwork throughout the fort. The three circular railings

127. LeBoy, 5–6.

128. Ibid., 9–10.

around the terreplein spiral staircases required work. At the northeast stair, the railing was taken apart and rebuilt. At the east stair, one missing section was replaced, and a new top rail was installed. At the southeast stair, no railing was present, so an entirely new iron railing was fabricated and installed. All three of these railings were painted with red lead primer and black paint. The wood door to the northwest bastion was taken down, the iron hinges were repaired, and the door was reinstalled. At the sallyport, the outer door lower hinges were dismantled, straightened, and reinstalled so that the doors would operate.[129]



FIGURE 63. East stair before repair of railing, 1934. Note the missing segment of railing on the far side. Source: Taylor, 17.



FIGURE 64. East stair after repair of railing, 1936. Source: Taylor, 17.

Projects 545-M and 545-O were the restoration of the officers' quarters and barracks, which were located in the gorge on the west side of the fort (Figure 65 through Figure 73). An administrative office, museum, and comfort stations were to be located in the restored rooms in the gorge. At the north side rooms, all of the original lath and plaster was judged to be too deteriorated to be repaired and was removed. According to Ralston Lattimore, Historical Assistant for the restoration of Fort Pulaski, ghosting on the plaster walls in the north gorge rooms indicated that the rooms housed multiple triple-height bunks constructed of wood. The top bunk was just under the height of the vaulted roof, and there were at least twelve bunks per casement.[130] Also, all of the flooring and supporting wood joists were removed from the north side rooms. Intact joists were recut and salvaged for use at the south side, while entirely new joists were installed at the north half. New flooring was installed throughout the north half, while ". . . old floor [was] relaid in Rooms No. [56] and [58]."[131] For the south half rooms, the interiors had previously been destroyed by fire, so wood-framed floor structures were installed in casemates 60, 61, 62, 64, 65, and 66. No floor was installed in casemate 63, where the brick cistern was left exposed.

The fireplaces throughout the gorge were repaired and reconstructed as part of this work. At the officer's quarters on the west side of the gorge, the existing black marble mantel caps, bases, and shelves for the side mantels were determined to be original features. New marble mantels were designed that incorporated these original elements.[132] The fireplaces in casemates 62 and 64 were removed, since these casemates were designated to receive restroom facilities. At the

129. Ibid., 11.
130 Ralston B. Lattimore to Custodian of fort Pulaski, July 2, 1948. Park files, Fort Pulaski National Monument.
131. LeBoy, 15. Note that LeBoy incorrectly numbers the gorge casemates from south to north rather than from north to south; therefore, he identifies the two northern casemates with relaid original flooring as 61 and 63, corresponding to rooms 56 and 58 as correctly numbered.
132. Construction Memorandum from John C. LeBoy dated April 20, 1935, 1.

north section of the gorge, wood mantels painted black were installed at all of the fireplaces.[133]

Throughout the gorge rooms, new lath and plaster walls, plaster ceilings with wood louvers, interior doors and millwork, and fixtures were installed as part of this work. The millwork was painted with four coats of paint. The interior millwork was painted gray, while the exterior millwork was painted white.[134] Some surviving original interior door frames north of the sallyport were repaired.[135] Wood-framed screen doors and screen windows were added to some openings. Also:

> Exterior windows and doors were placed in all rooms as well as interior connecting and closet doors with transoms. Four rifle loop frames, sash, and screens were erected in each room. Baseboards and wood thresholds were erected in all rooms that were restored.[136]

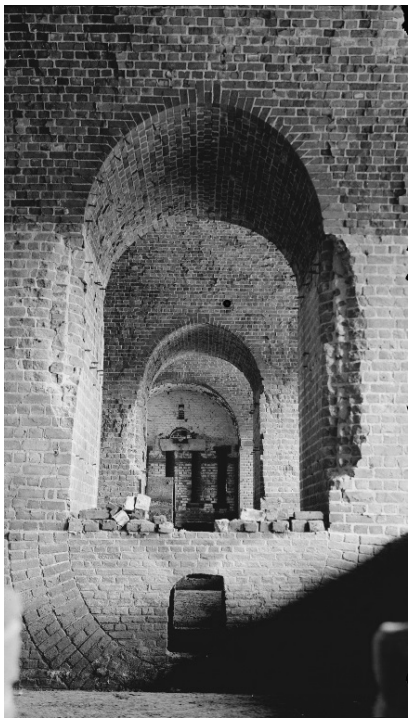


FIGURE 65. Interior of casemate 62, looking north toward the interior wall of the sallyport, May 1934. Source: HABS, image GA-2158-6, Charles E. Peterson, photographer.



FIGURE 66. One of the gorge rooms at the north half, likely casemate 57, prior to restoration, 1934. Source: Taylor, 26.

133. LeBoy, 16.
134. According to correspondence between Ralston B. Lattimore to Verne E. Chatelain, dated August 17, 1935, at the beginning of the project, the walls were found to have a kalsomine (lime wash) finish. It was assumed at the time that the kalsomine was a non-original finish applied when the fort was occupied by fort and lighthouse keepers. The park chose to use a flat white or oyster white paint finish because there was no historic evidence regarding the original finish.
135. LeBoy, 16, 17.
136. Ibid., 16. Although not specifically stated, this passage implies that all of the windows and doors throughout the gorge rooms were entirely new in 1934–1935.

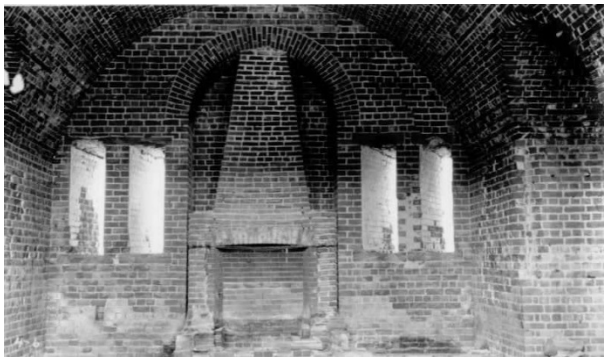


FIGURE 67. Casemate 66 prior to restoration, 1934. Source: Taylor, 30.

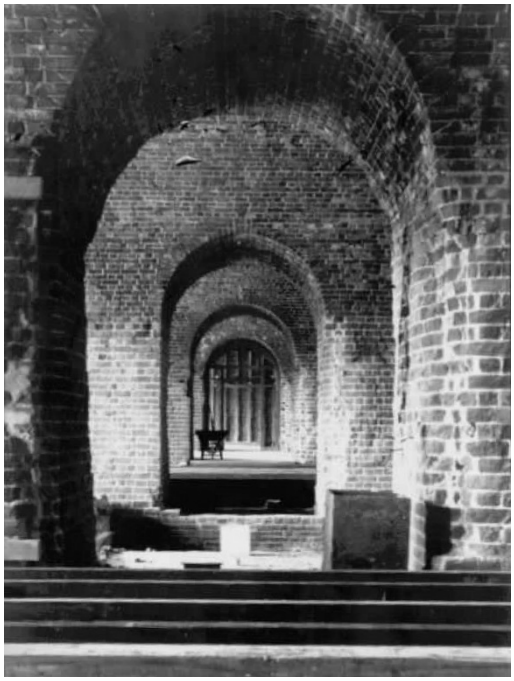


FIGURE 68. Gorge rooms before restoration, 1934. Source: Taylor, 28.



FIGURE 69. Installation of new wood framing at the gorge rooms, 1935. Source: Taylor, 27.



FIGURE 70. Completed restoration, likely casemate 57, 1936. Source: Taylor, 26.

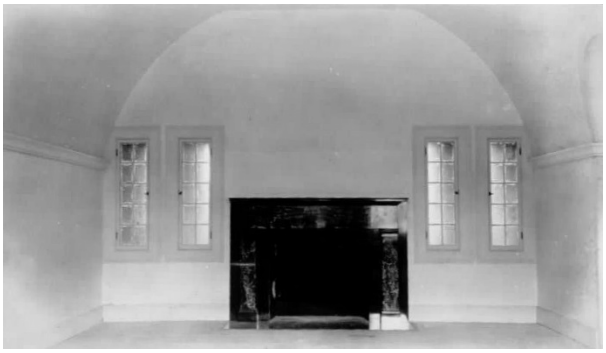


FIGURE 71. Casemate 66 after restoration, 1936. Source: Taylor, 30.



FIGURE 72. Gorge rooms after restoration, 1936. Source: Taylor, 29.

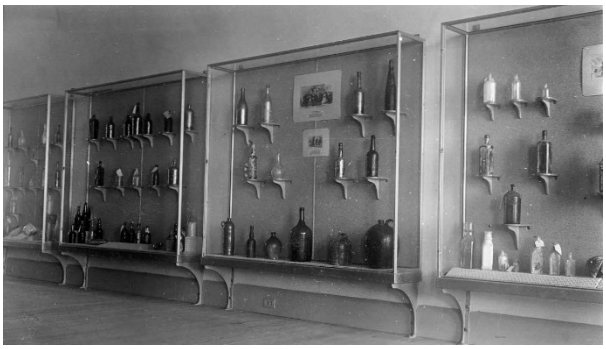


FIGURE 73. Bottles retrieved from the excavation of the moat on display in casemate 66, 1939. Source: Superintendent's Annual Report, fiscal year ending June 30, 1939, 24.

Project 545-P was the electrical portion of the restoration work. During the work at the gorge rooms, electric wiring and phone service were added. The conduit was routed below the floor of the gorge rooms to a transformer and electrical panel between casemates 58 and 59. The transformer was supported on a new concrete floor and enclosed behind an 8-inch-thick brick wall.[137]

Electrical work was also implemented to light the magazines in the demilune. Trenches were dug in the earthen cover for cabling, and the 5 to 6 foot tabby concrete structures were drilled to receive conduit and ceiling fixtures.[138]

Project 545-S was the plumbing portion of the work. This included both subsurface drainage piping in the parade ground and irrigation water supply for watering the grass of the parade ground. Plumbing was installed for the comfort stations in casemates 62 and 64, connected to a pump in casemate 59.[139] (When the fort opened to the public, it contained segregated restroom facilities. Casemate 62 was divided into two parts, with the front portion, accessed from the parade ground, for "white" women and the rear part, accessed from casemate 61, for "white" men. Casemate 64 was similarly divided into two parts, with the front portion divided into two compartments for "colored" men's and women's restrooms, and the rear part a storage room.)

Project 545-W was the reconstruction of the covered veranda along the gorge (Figure 75 through Figure 77). The original veranda, constructed in 1846 under the direction of Lieutenant Alexander had been removed at the start of the Civil War. [140] Documentation of the original veranda was not available at the time.[141] As stated at the time:

> In as much as there was no available old drawing of the work, the Branch of Plans and Design submitted two schemes for Washington's approval and prepared from descriptions in reports furnished by the Historical Division. On March 1, 1935, Scheme No. 1 was approved . . . . Working drawings were prepared . . . . Work started on May 7, 1935. Twelve by twelve inch brick columns were erected with brownstone bases and caps. Wood lintels 10" × 12" were placed over these columns and enclosed with a wood entablature. The section over the sallyport and the adjoining ones on either side were supported by a steel beam on steel columns with anchors set in the column to guy the flag pole. Drains for the roof have been erected in the center of six piers, and connected to the roof gutter by lead ferrules. The downspouts have been connected to the parade ground drainage. Entire roof was framed and erected and covered with 40 pound old style tin. Three coats of paint were applied to all wood and tin on this work.[142]

137. Ibid., 22.
138. Ibid.
139. Ibid., 23.
140 Monthly Narrative report, May 1935, Acting Superintendent Reaville Brown. Park files, Fort Pulaski National Monument.
141. LeBoy, 19; Superintendent's Annual Report, 1937, park files, Fort Pulaski National Monument.
142. LeBoy, 19.

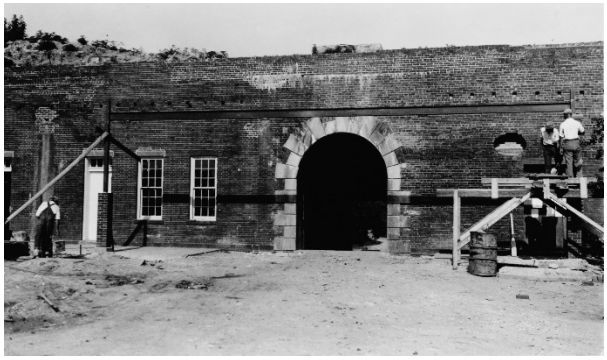


FIGURE 74. Brick masonry repairs underway at the gorge on the west side of the fort, 1935. Note the large circular hole for the former boiler flue at casemate 59, at right. Source: HABS, image GA-2158-10.

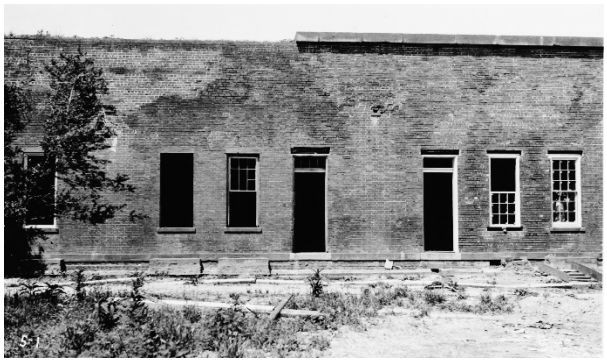


FIGURE 75. The west side of the parade ground during installation of doors and windows at casemates 56 and 57, 1935. Source: HABS, image GA-2158-14.



FIGURE 76. The west side of the parade ground following reconstruction of the veranda, casemates 56 and 57, circa 1935. Note screen door at the door opening at the entrance to casemate 56 at right. Source: HABS, image GA-2158-15.



FIGURE 77. The reconstructed veranda, circa 1935. Source: HABS, image GA-2158-12.

Project 545-I was the construction of new walkways in the parade ground. Sand was conveyed to the parade ground by the CCC as part of the preparation of the gorge walks. The work, completed in 1936 by the PWA was described as follows:

> The entire concrete foundation for the granite curbing of the gorge walk was poured. Necessary forms were built and pulled on completion. Before laying the brick walk a fill of oyster shell and sand was placed. The granite curbing was set for the gorge walk and the sidewalk brick laid in a grouting of mortar and joints filled with mortar. On all other sections of walks, the brick was laid in a grouting and joints filled with gravel sand. All brick curbings were laid in mortar. The granite apron in front of the sally-port has not been placed. Before brick of the north walk was laid, a reinforced concrete slab was poured for this section was filled over a bog hole. The outer edge of this slab rests on piling while the inner edge is supported by the ledge made for the brick drain which conveys water to the cisterns.[143]

In ***Project 545-X,*** the PWA erected a new flagpole. The annual report noted, "An 85 foot top mast type flag pole of Oregon pine was erected at the location of the original pole over the sally-port."[144]

Project 545-Y was the construction of new drawbridges at the main entrance. The drawbridge project was described as follows:

> It was proposed to erect a drawbridge at the main entrance to the fort at the sally-port. This

143. Ibid., 13.

144. Ibid., 20.

> bridge had been dismantled previous to the fort being declared a national monument. Some parts of the mechanism in the walls remained, these parts were removed and put in working order for the restoration of the bridge. An old drawing was obtained from Washington as well as letters relative to this work were supplied by the Historical Division. Drawings were prepared and material for mechanism purchased, including the wood timbers and decking. The large block (granite) which supports the axle around which the chains wound had to be removed on the south side of the sally-port because it was damaged badly by fire which destroyed the officer's quarters. The granite has not been replaced. Appropriation was used up before this work could be completed. The demi-lune drawbridge at the crossing of the moat was also dismantled and all working parts of the mechanism possible put in working order and new parts purchased after drawings were prepared from old drawings and letters. Timbers and decking have also been purchased. This bridge has not been restored because of lack of appropriation.[145]

The drawbridge project was completed in June 1936.[146]



FIGURE 78. Completed drawbridge at sallyport, 1936. Source: Taylor, 37.



FIGURE 79. Completed outer drawbridge at demilune, 1936. Source: Taylor, 38.

Project 545-L was the construction of wood enclosure walls at casemates 15 through 24 on the southeast side of the fort. The walls were built using tidewater red cypress (presumably *Taxodium distichum*) painted with three coats of oyster white paint. Some fragments of one original enclosure wall survived at casemate 18 to guide the reconstruction (Figure 80 through Figure 83). Also, all available original iron hinges and pintles salvaged from the fort were used on these reconstructed walls, with new iron hardware matching the original fabricated as needed. At casemates 18 through 21, the iron bars that defined the Civil War prison at the fort were reconstructed; "one set" of iron bars had survived and was repainted in place (Figure 84 and Figure 85). The prison bars were primed with red lead and painted black.[147]

145. Ibid., 21.
146. Superintendent's Annual Report, 1937. Park files, Fort Pulaski National Monument.
147. LeBoy, 14; Superintendent's Annual Report. Park files, Fort Pulaski National Monument.

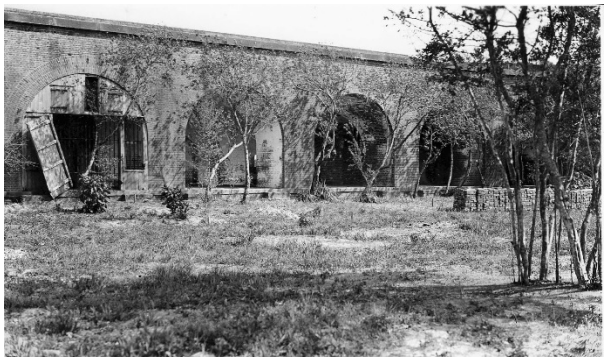


FIGURE 80. The condition of the casemates and parade ground before repair work, May 15, 1934. Source: Superintendent's Annual Report, fiscal year ending June 30, 1936, 20. Note the surviving wood and iron prison bar fragments in the casemate at left (probably casemate 18) and the low level of the parade ground soil and grass relative to the casemate masonry sills.

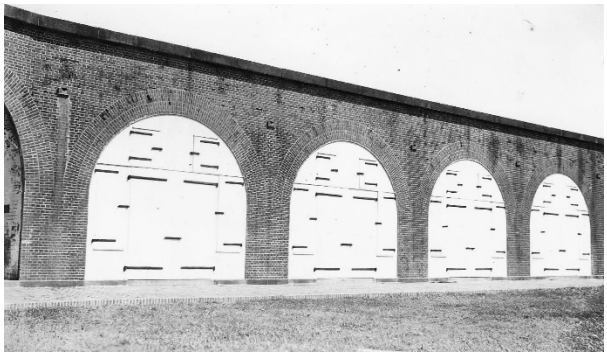


FIGURE 81. Restored casemates 21 through 24 with wood enclosure walls, June 30, 1936. Note the brick sidewalk at the parade ground. Source: Superintendent's Annual Report, fiscal year ending June 30, 1936, 20.



FIGURE 82. The reconstructed wood enclosure walls at the southeast side of the fort, casemates 15 through 24, in 1938. Source: Superintendent's Annual Report, fiscal year ending June 30, 1938, 28.

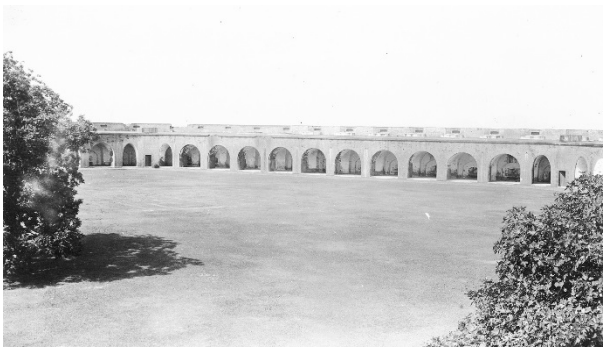


FIGURE 83. The parade ground looking northeast, June 30, 1937. Source: Superintendent's Annual Report, fiscal year ending June 30, 1937, 1. Note that casemates 30 and 31 are not enclosed.

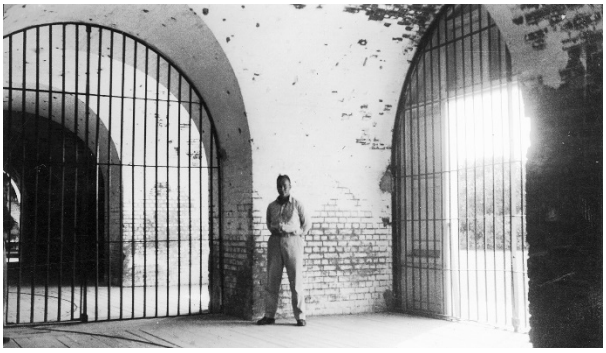


FIGURE 84. The reconstructed prison in casemate 18, in 1937. Note wood enclosure wall at exterior. Source: Superintendent's Annual Report, fiscal year ending June 30, 1937, 12.



FIGURE 85. The reconstructed prison in casemates 18 through 21, in 1937. Source: Superintendent's Annual Report, fiscal year ending June 30, 1937, 12.

Later Work by the PWA, 1937–1940. Construction of a bridge to Cockspur Island began on January 9, 1937, using PWA funds. The work was delayed by the necessity of using much longer timber piles than originally assumed. Finally, on April 23, 1938, the concrete and wood bridge was completed. It opened to traffic on May 13.[148] Prior to constructing the bridge, the NPS acquired 278 acres of land on the south side of the river on McQueen's Island for the bridge approach.[149]

Sidewalks were added at the northwest and southwest corners of the parade ground in November 1938, to connect the sidewalk at the casemates to the colonnade paving (Figure 86).

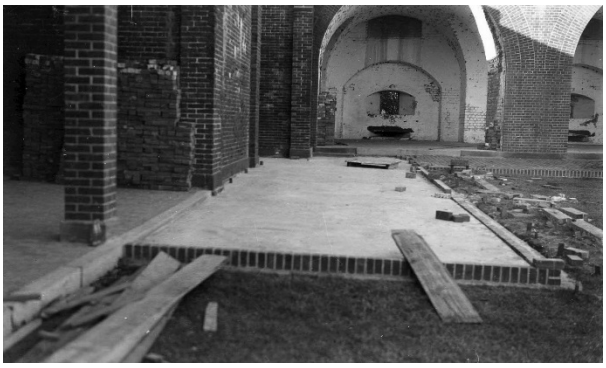


FIGURE 86. Construction of the sidewalk at the northwest corner of the parade ground, November 1938. Source: Superintendent's Annual Report, fiscal year ending June 30, 1939, 12.

Additional work on the demilune conducted during the 1930s included filling of low areas with material excavated from the moat by the CCC.[150] The demilune work also included installation of a new paved path to connect the two drawbridges. Some vegetation was removed to expose the entrances to the magazines. Based on fragments of an original door found in the magazines, new wood doors with iron hardware were fabricated and installed (Figure 87 through Figure 89).[151]



FIGURE 87. Visitors touring the fort, May 15, 1938. Note plant growth at demilune. Source: Superintendent's Annual Report, fiscal year ending June 30, 1938, 44.



FIGURE 88. A reconstructed wood door at the demilune, 1938. Source: Superintendent's Annual Report, fiscal year ending June 30, 1938, 29.

148. Superintendent's Annual Report, 1937. Park files, Fort Pulaski National Monument.
149. Meader, 29, citing "General Information Report, Fort Pulaski National Monument," 1940, microfiche files, NPS-SERO.
150. Meader, 28.
151. Superintendent's Annual Report. Park files, Fort Pulaski National Monument.



FIGURE 89. View to the demilune from the sallyport, June 30, 1938. Note walkways and plant growth on demilune. Source: Superintendent's Annual Report, fiscal year ending June 30, 1938, 26.

The PWA extended water and sewer systems and electricity service to the national monument beginning in late December 1938. CCC labor was used to install an electric power cable from U.S. 80 to the fort and administrative buildings on Cockspur Island. To support electrical service in the fort, a transformer was placed in the southeast magazine at the demilune.[152]

Cockspur Island was affected by the August 11–12, 1940, hurricane, resulting in damage to the dikes and earthworks on the island. The damage was repaired by CCC labor in the fall and winter of 1940.[153]

The entrance of the United States into World War II in December 1941 prompted the termination of New Deal era programs such as the CCC and PWA. The U.S. Navy established a section base on Cockspur Island in late 1941. The base, which was used to support coastal patrol ships, remained active until 1947.[154] During this time, the fort was maintained by one laborer and was closed to the public.[155]

152. Ibid, citing "Superintendent's Monthly Report," October, November 1940. Park files, Fort Pulaski National Monument. Lattimore, 54.
153. Supplemental Application, Form 10-352, Job No. 135, Hurricane Damage Repairs at Fort Pulaski National Monument, James W. Holland, Superintendent, January 25, 1941.
154. Meader, 29.
155. "Mission 66 for Fort Pulaski National Monument" (National Park Service, n.d. [circa 1960]), 3–4.



FIGURE 90. Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Note the orientation of the flagpole. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1196.



FIGURE 91. Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1205.



FIGURE 92. View of Civil War damage at Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1208.



FIGURE 93. View of Civil War damage at Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1211.



FIGURE 94. The east angle of Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1200.



FIGURE 95. The northeast angle of Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1203.



FIGURE 96. An unrestored gorge room at Fort Pulaski in the late 1940s, photographed by Frances Benjamin Johnston. Although the exact location is unknown, this appears to be casemate 61, the present-day park archives. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1198.



FIGURE 97. View through the casemates on the north wall of Fort Pulaski in the late 1940s, view from casemate 48 looking east, photographed by Frances Benjamin Johnston. Source: Library of Congress Prints and Photographs Division, Washington D.C., call number LC-J7-GA-1201.

Fort Pulaski after World War II, 1947–1957. In July 1947, while the fort was still under Navy management, the fort's flagpole was replaced by the Bibb Painting and Decorating Company of Macon, Georgia. The new flagpole, composed of a lower mast and an attached upper mast, was reportedly installed "backwards," with the upper mast attached to the moat-facing side of the lower mast, as opposed to the side facing the parade ground as seen in Civil War-era photographs. It was determined that the flagpole would remain in this new orientation.[156]

After the war, all of the buildings associated with the Navy's occupation of the fort were removed from the island. On October 15, 1947, Fort Pulaski National Monument reopened to the public. At that time, the park staff consisted of a superintendent, historical aide, cashier, and two laborers. Visitation to the fort soon eclipsed and doubled annual pre-war visitation to the park. [157]

Early in 1951, the main drawbridge at the sallyport was replaced, matching the earlier PWA design.[158]

Also in 1951, a brick column at the base of the gorge veranda was removed and replaced with a new brick column, built using portland cement and hydrated lime mortar. The cause of the distress to the column was attributed to settlement of the footing and uneven loading of the bearing cap. Settlement of the adjacent sidewalk was also noted at this time.[159]

In 1957, repairs were made to the flagpole that included the replacement of the cross arm between the upper and lower mast, replacement of the upper mast and ball assembly, and removal of deteriorated portions of the lower mast. As a result of the repairs, the height of the flagpole was reduced by 8 feet 8 inches. At the time of the repairs, the park discussed installing lightning protection, which had previously not been incorporated.[160]

Mission 66 at Fort Pulaski, 1956–1966

In the years following World War II, visitation at national parks grew significantly. In 1940, there were 17 million visitors to national parks; by 1955, there were over 55 million visitors. As park use grew, however, national park budgets remained unchanged.[161]

By the 1950s, conditions in the national parks were generally in a state of deterioration. Improvements had not been made to public facilities since the New Deal-era programs of the 1930s. The desperate need for building maintenance and funding was further amplified by the rapid increase in visitors following World War II. At Fort Pulaski National Monument, the fort and its surroundings fell into a state of disrepair.[162]

In February 1955, Conrad Wirth, the director of the National Park Service, conceived a comprehensive conservation program to revitalize the national parks. The ten year capital program, which would be called Mission 66, aimed to modernize and expand the national park system. Wirth put together a working committee as well as a steering committee to help outline the scope and budget of the program. He also instructed park

156. Correspondence between Deputy Chief Engineer, Oliver G. Taylor and Acting Superintendent Reaville M. Brown, dated July 1947.
157. "Mission 66 for Fort Pulaski National Monument," 3–4.
158. Ralston B. Lattimore, Project Completion Report, March 5, 1951.
159. Correspondence between Superintendent Ralston B. Lattimore and Assistant Regional Director Edward S. Zimmer, dated January 24 and January 26, 1951. The exact location of the brick column along the porch is not noted.
160. Correspondence between Superintendent Ralston B. Lattimore and the Regional Director, dated July 13, 1957.
161. Ethan Carr, *Mission 66: Modernism and the National Park Dilemma*, 4.
162. Meader, 24, citing "Superintendent Lattimore's Monthly Reports," August 1950.

superintendents to prepare lists of work that needed to be done in the various parks.[163]

The Mission 66 program sought to improve conditions at the parks not only through the construction of new roads, trails, and visitor facilities but also through the establishment of increased operating budgets to maintain the parks in the future.

In 1956, the Mission 66 Final Prospectus for Fort Pulaski National Monument was completed. The document called for all park structures to be properly maintained and made safe, while new interpretive services were also proposed. Most importantly, the prospectus called for an increase in funds and personnel to allow for the proper maintenance and interpretation of the national monument.[164]

Several Mission 66 projects were undertaken at Fort Pulaski National Monument beginning in the late 1950s. Some of the early projects included the reconstruction of the parking area; improvements to the water, power, drainage, dike, and telephone systems; and a series of repairs to the fort.[165]

Architect J. W. McBurney was contracted by the park in 1958 to collect mortar and brick samples from the fort to help determine the cause of their deterioration. McBurney stated that the spalling and cracking of the brick at Fort Pulaski resulted from the crystallization of soluble salts in the pores of the brick units. After performing laboratory analysis, McBurney made recommendations for future repair and treatment methods. The recommendations included developing waterproofing methods to keep water out of the masonry walls. McBurney also recommended waterproofing the moat, and terminating the waterproofing at the fort wall, just above the water line. Finally, McBurney recommended the replacement of any damaged lead flashing over the casemates.[166]

McBurney's report noted, "The parapets on the terreplein are in generally good condition. One of the confusing things in the inspection was the uncertainty in recognizing what was original masonry and what was more or less modern repairs and replacements."[167]

McBurney also noted that some of the scuppers were found to be discharging water after a rain while others were not. He noted three possible reasons:

> . . . 1) the weep holes were clogged; 2) the water was discharging through pipes into cisterns or into the moat; or 3) the rain water was passing through holes in the 1/8" thick lead flashing into the masonry below. There was a significant correlation between the functioning or non-functioning of the weep holes and the degree of disintegration of the masonry on the sides and backs of the brick columns below. Where the weep holes were draining, there was usually less damaged observed on the brick and mortar below.[168]

Several repairs were made to the fort in 1958. The casemates at the gorge were repointed and relined, while new waterproofing was installed at the gorge wall, including its parapet. Smaller projects included the repair of rifle loop holes at the sallyport, the repair of brick and stone work at gun positions, and repairs to the electrical system at the passageways under the demilune.[169] In 1959–1960, significant masonry repointing repairs were performed at Fort Pulaski (Figure 98 through Figure 100). The original brick setting mortar was

163. Carr, 10.
164. Meader, 30, citing, "Mission 66 for Fort Pulaski National Monument," 1956, park files, Fort Pulaski National Monument.
165. Ibid., 31, citing "Mission 66 Final Prospectus," 1956, park files, Fort Pulaski National Monument.
166. J. W. McBurney, "Report on Fort Pulaski," July 15, 1958, park files, Fort Pulaski National Monument.
167. McBurney, 2.
168. Ibid., 2.
169. Meader, 31–32, citing Superintendent Lattimore to Regional Director, October 26, 1958, park files, Fort Pulaski National Monument.

reported to be a lime mortar containing no cement with a brown-colored natural cement pointing mortar.[170] Because of similarity in color to the existing, Rosendale natural cement was used to perform the repair work.[171] Some masonry surfaces, particularly the broken surfaces exposed at Civil War shell damage locations, were treated with Dehydratine 25, a silicone-based water repellant. The inner and outer perimeter of the terreplein was excavated, and the top surfaces of the vaults were waterproofed with plaster coated with mastic (Figure 101 and Figure 102, and refer also to Figure 106 at the end of this chapter).

One year after the masonry repair project was initiated, the natural cement mortar was reassessed and found to have curing issues. Therefore, it was decided to change the standard mortar mix to a Type 1 portland cement with two parts sand. Cement colors were added to match the original brown color.[172] By October 1962, general repointing and major repairs to the brick and stone masonry had been completed. The project cost approximately $58,000 and included much of the exterior and interior parade ground walls. A mason was kept on staff to perform maintenance and small repairs.[173]



FIGURE 98. Joint repair at the east exterior wall of the gorge, 1960. Source: Completion Report of Construction Project, Repairs to Brickwork, Fort Pulaski, first portion. November 20, 1960.



FIGURE 99. Joint repairs at the parapet coping of the southwest bastion, 1960. Note vegetation on demilune beyond. Source: Completion Report of Construction Project, Repairs to Brickwork, Fort Pulaski, first portion. November 20, 1960.

170 Superintendent Ralston B. Lattimore to Regional Director, Region One, dated October 27, 1959. Park files, Fort Pulaski National Monument.

171. Superintendent, Fort Pulaski National Monument, to Regional Architect, Region One, November 18, 1959. Park files, Fort Pulaski National Monument.

172. Superintendent Lattimore to Regional Director, May 1, 1960. Park files, Fort Pulaski National Monument.

173. Narrative Report, dated May 31, 1963. Park files, Fort Pulaski National Monument.



FIGURE 100. Masonry repairs on the south exterior wall, 1961. Source: Completion Report of Construction Project, Repairs to Brickwork, Fort Pulaski, second portion. July 14, 1961.



FIGURE 101. Waterproofing at the southwest stair to the terreplein, 1960. Source: Completion Report of Construction Project, Repairs to Brickwork, Fort Pulaski, first portion. November 20, 1960.



FIGURE 102. Excavation at the terreplein, northeast side, 1960. Source: Completion Report of Construction Project, Repairs to Brickwork, Fort Pulaski, first portion. November 20, 1960.

The wood portcullis at the sallyport was reconstructed in 1960. At the same time, the hardware at both drawbridges was cleaned and repainted.[174]

As during the New Deal era, the parade ground was again filled and regraded. Described as part of project B-8, the work involved "tedious hand labor, not at all popular" with park personnel.[175] The first project occurred in 1956. Here, low areas were filled and re-graded using approximately 1,000 cubic yards of fill, composed of fine gravel and silt from the Savannah River, to raise the level of the parade ground from between 6 and 9 inches. Reports of the work noted, "It was not necessary to reseed or sod. Native Bermuda which was raised with the original cover came up through the

174. Regional Administrative Officer, to Superintendent Fort Pulaski National Monument, February 20, 1961. Park files, Fort Pulaski National Monument.

175. "Completion of Construction Project: Improvement to grass cover, terreplein, parade ground, glacis, parking area and other areas in the vicinity of Fort Pulaski," 1961.

fill and recovered the entire area within six months."[176]

In mid-summer 1960, the National Park Service again regraded the parade ground. The construction report on the work noted that

> . . . In the past two years the parade ground has been regraded twice. This was necessary because of the uneven settling of the ground. In the process of reestablishing the proper grade, more than 1,200 cubic yards of sand fill had to be used and with this sand was introduced the seeds of many undesirable plants, including crab grass. Much of the undesirable vegetation has been eliminated by the use of chemicals, but many hundreds of man hours were expended digging crab grass out by the roots. The crab grass and cockspur problem will unfortunately be a part of permanent maintenance.[177]

In March 1961:

> Approximately 8 acres [were] limed in the amount of one ton of pulverized lime to the acre. This was done at the suggestion of the agronomist attached to the USDA Plant Introduction Station near Savannah, who has advised us freely on numerous occasions. On the heel of the liming, the same areas were treated with 5-10-15 [fertilizer] at the rate of 1,000 lbs. to the acre. The fertilizer was divided into three equal parts and was spread at intervals of about 10 days.[178]

To enhance views associated with the fort:

> . . . vegetation which covers the glacis surrounding the fort [was] cut back to the top of the inner slope next to the moat in order that the fort and moat can be framed in a wide band of green lawn. To achieve this effect required the removal of more than 1,000 trees.[179]

The demilune was repaired and restored in 1960. By 1960, the structure had become heavily overgrown with trees and shrubs, making an understanding of the military features difficult for visitors to discern. Hundreds of trees, shrubs, and vines were removed from the earthen structure, although several large cedar trees were left in place. Hulled Bermuda grass seed, treated with root tone, was sowed during the late winter on the terreplein of the fort and on all bald slopes of the demilune. Grass planted on the newly cleared earthen embankments quickly covered all exposed sections of the earthwork.

To create a looped walking path through the demilune, a brick stairway was constructed leading out of the pintle gun pit to the shoulder of the earthwork, and a new brick walk was provided to connect visitors with a second stairway providing access to the south side gun pits. Remains of an iron gun platform were removed from the south gun pit due to safety concerns (Figure 103 through Figure 105).[180] The new circulation features were described in the construction report as designed by the park superintendent. The walks were intended to correct problems associated with visitors climbing over the parapet and causing

176. "Completion of Construction Project: Improvement to grass cover, terreplein, parade ground, glacis, parking area and other areas in the vicinity of Fort Pulaski," 1961.
177. "Completion of Construction Project: Improvement to grass cover, terreplein, parade ground, glacis, parking area and other areas in the vicinity of Fort Pulaski," 1961.
178. "Completion of Construction Project: Improvement to grass cover, terreplein, parade ground, glacis, parking area and other areas in the vicinity of Fort Pulaski," 1961. The numbers refer to the percentage content of nitrogen (5.0), phosphorus (10.0), and potassium (15.0), respectively.
179. Completion Report of Construction Project: Improvement to grass cover, terreplein, parade ground, glacis, parking area and other areas in the vicinity of Fort Pulaski, 1961. Park files, Fort Pulaski National Monument.
180. Mission 66 Completion Report. Fort Pulaski National Monument, June 23, 1960. Park files, Fort Pulaski National Monument.

erosion of the earthen demilune structure. Elsewhere, eroded sections of the demilune were repaired and reshaped, and work was undertaken to reestablish grass cover throughout.[181] Other work conducted during this period included waterproofing, concrete, and masonry repairs.

In 1962, a new well was drilled in the parade ground, adjacent to the front door of casement 60, to supplement the existing well installed in 1936. However, when the well was connected to the storage tanks, housed in the terreplein, the water became contaminated with bacteria.[182]

The largest Mission 66 project undertaken at Fort Pulaski was the construction of a new freestanding visitor center. Construction of the visitor center began in late 1962, and the building was completed and opened to the public in October 1964. The one story brick structure, which was circular in plan, was designed by the NPS Eastern Office of Design and Construction in Philadelphia.[183]



FIGURE 103. The south face of the demilune covered with vegetation, circa 1959. Source: Completion Report of Construction Project, Restore Demilune and Battery Hambright. November 20, 1960.



FIGURE 104. The south face of the demilune after clearing of woody vegetation and establishment of grass cover, 1960. Source: Completion Report of Construction Project, Restore Demilune and Battery Hambright. November 20, 1960.



FIGURE 105. Newly constructed brick staircase and walk at north rifle pit of demilune, 1960. Source: Completion Report of Construction Project, Restore Demilune and Battery Hambright. November 20, 1960.

181 Completion Report of Construction Project: Restore Demilune and Battery Hambright, 1960, park files, Fort Pulaski National Monument.

182 Ralston Lattimore to J.F. Odum, Superintendent of the Cherokee Filtration Plant, October 8, 1962. Park files, Fort Pulaski National Monument. In his correspondence, Lattimore identifies the need for a new chlorinator. Despite the apparent urgent need, a new water and sewer system was not installed until 2001.

183. Ibid., 30–31, citing "Superintendent's Monthly Report," October 1964, park files, Fort Pulaski National Monument.

Continued Maintenance of Fort Pulaski, 1966 to present

1966–1970s. Following the conclusion of the Mission 66 program in 1966, maintenance became the top priority at Fort Pulaski National Monument. Smaller projects continued to be undertaken at the park during the 1970s. Asphalt walks and roads in the park were covered with a pebble aggregate mixture in 1972, in order to have a more historic appearance.

By early 1972, seven rooms along the gorge were refurnished to help better interpret garrison life in the fort. At this time, wood framed alcoves with large single-pane glass windows were added to limit visitor access into the officers' quarters.[184]

In 1974, a new flagpole was installed at the fort. The previous flagpole had been struck by lightning on July 31, 1970, and was damaged beyond repair. The 95-foot flagpole, which was a reconstruction of the historic flagpole, was lifted into place by a U.S. Army helicopter.[185] The non-historic orientation of the previous 1947 flagpole was retained in the design of the new flagpole.

The drawbridge at the sallyport was reconstructed in 1975.[186]

The remaining large cedar trees in the demilune were removed in 1977.

1980s–1990s. Maintenance and repair of the fort and other structures within the boundaries of the national monument continued in the early 1980s. During this time, extensive repairs were made to the bridge over the south channel. Also at this time, the restrooms in Fort Pulaski were renovated. Existing toilet fixtures, partitions, and accessories were removed and replaced. The ceramic tile floors and wainscot were also replaced.[187] In 1985, a prefabricated "Bally" building was installed in one of the casemates in the gorge of the fort. The new feature was used for the storage of museum collections and archival materials.

Also in the 1980s, timber cribbing was added in front of casemate 30 to interpret the Confederate defensive measures.

Joint repointing and other masonry repair work was performed on the fort and the demilune during the early 1990s. Included in this work was the repointing of the gorge wall in 1993.[188]

The restrooms at the fort were renovated again in 1997, when they were reconfigured to be universally accessible, at a cost of $141,000.[189]

Since 2000. In 2000, in response to continued leaking in the casemates near the spiral stairs, earth and gravel were removed from above casemates 38 through 41. A waterproofing coating identified as Polyurea 540 was applied to vertical walls in the excavated area. An adjacent area was later excavated, with the coating applied to 100 linear

184. Development Package Proposal, Transparent Alcoves in Furnished Rooms. March 14, 1972. Park files, Fort Pulaski National Monument.
185. Grady Webb, Superintendent Fort Pulaski National Monument, to Lt. Col. Charles L Moore, March 19, 1974, park files, Fort Pulaski National Monument.
186. Meader, 32, citing "Superintendent's Annual Report," 1972–1977, park files, Fort Pulaski National Monument.
187. "Summary of Work. Fort Pulaski National Monument." Date unknown, park files, Fort Pulaski National Monument. Grady Webb is listed as the Park Superintendent on the document; he served as superintendent from 1973 to 1982.
188. Chief, Historic Architecture Division, Southeast Region to Superintendent, Fort Pulaski National Monument, April 1, 1993. Park files, Fort Pulaski National Monument.
189. Ibid., 32–33, citing, "Superintendent's Annual Reports," 1990–1999, park files, Fort Pulaski National Monument.

feet of vertical walls (refer to Figure 106 at the end of this chapter).[190]

The water and sewer system at Fort Pulaski was replaced in the summer of 2001. The work included installation of a new 300-gallon pressurized water tank, chlorinator, and electrical panel, as well as a new concrete wellhead cover and pipes between the well and holding tank. A non-historic brick wall was removed in the passageway between the guardroom and the quartermaster room to allow for the new equipment. A wood-framed wall was constructed in its place to conceal the new equipment. The former water storage tanks at the fort terreplein were removed and disposed of (refer to Figure 106 at the end of this chapter).[191]

Painting and sealant work was performed at the windows, exterior doors, and exposed roof framing at the gorge (casements 53 through 66) and gorge veranda. The work was performed in 2002 and included priming wood-framing members to encapsulate remnants of lead-containing paint, repainting, and installation of perimeter sealant.[192]

A wood-framed partition was constructed at casemate 43 in 2002.

Also in 2002, non-historic wood paneled wall finishes likely dating to the 1960s were removed from casemate 65.

In 2003, new metal downspouts were installed at the veranda on the west side of the parade ground. When the veranda was reconstructed in the 1930s, downspouts were erected within the columns. These proved problematic over the years, as the downspouts would frequently become blocked, causing water to overflow onto the adjacent wood ceiling. The new downspouts were installed outboard of the existing columns, and the design was based on historical accounts indicating that the original veranda porch had external downspouts.[193]

Also in 2003, two segments of iron prison bars, previously installed by the CCC in the 1930s, were removed, sandblasted, repaired, primed, and painted with a two-part epoxy paint.[194]

In February–March 2005, new interior finishes were installed in casemate 65, including a new finish floor, new wood wall and ceiling framing with insulation, and new wood lath and plaster wall and ceiling finishes.[195]

In 2009, the park implemented regular flushing of the moat with Savannah River water. According to a report titled *Water Quality and Nuisance Species*

190. Superintendent, Fort Pulaski National Monument, to Project Files, Fort Pulaski National Monument, October 31, 2000, park files, Fort Pulaski National Monument. PMIS 8997.
191. John Breen, PMIS Project Detail Sheet: Complete Report. Upgrade Hazardous Water and Sewer Systems to Meet Health and Environmental Codes. November 5, 2001, Fort Pulaski National Monument, park files, Fort Pulaski National Monument. PMIS 12177.
192 Various project records for PMIS 51063 including contracts, Summary of Work, submittals, and a site visit report, dated June 5, 2002. Park file 2002.4.5 Lead Paint Abatement, Fort Pulaski National Monument.
193. Assessment of Actions Having an Effect on Cultural Resources, February 25, 2003. Fort Pulaski National Monument, park files, Fort Pulaski National Monument. The document cites a quote from "The Memoirs of Charles H. Olmstead," Lilla Mills Hawes, ed., *Collections of the Georgia Historical Society* XIV (Savannah: The Georgia Historical Society, 1964), 84.
194 John Breen, PMIS Project Detail Sheet: Repaint Fort Pulaski Prison Bars. February 3, 2003, Fort Pulaski National Monument, park files, Fort Pulaski National Monument. PMIS No. 94034
195. "Craft Assistance for the Restoration of the Officer Quarters Casemate, Fort Pulaski National Monument, Savannah, Georgia, Historic Structures Record of Treatment," Work Order 5420-5003-CMS, (Frederick, Maryland: National Park Service, Historic Preservation Training Center, 2005).

Management in the Fort Pulaski National Monument Moat, flushing of the moat will increase the dissolved oxygen rate in the water and will mitigate the summer fish kill and suppress the growth of invasive species such as Lesser Duckweed (*Lemna minor*) and Widgeon Grass (*Ruppia maritime*).[196]

Lead paint was abated from the casemate enclosures built in the 1930s at the southeast side of the fort in 2010–2011, and a new enclosure at casemate 47 was built in 2012.

The bridges at the demilune and sallyport were rebuilt in 2011.

Since 2000, repointing work was performed throughout the fort, particularly at the interiors of the casements. Significant repointing work was undertaken in casemates and bastions from 2011 through 2013, including at the terreplein gun mounts above casemates 1–2, 4–20, and 34–51. Repointing of fireplaces throughout the fort began in 2012. Repainting, repair, and maintenance of the cannon and carriages is ongoing.

In 2012, plaster repairs were made in Colonel Brown's Quarters, Colonel Olmstead's Quarters, and the Chapel. Also in 2012, a wood wall and door assembly was constructed at casemate 47. Work in Colonel Olmstead's Quarters included the removal of the plaster cornice and the re-plastering of the channel left in place after the cornice's removal. In addition, existing hairline cracks were repaired, and several sections of delaminated plaster were resurfaced. The removal of the damaged plaster cornice, which did not date to the fort's period of significance, created a channel approximately 7 to 11 inches in height near the top of the walls. Metal lath was cut to match the profile of the channel and fastened into place. A two-coat plaster system consisting of a 1-1/2-inch-thick base coat and a 1/4-inch-thick finish coat was applied over the lath. A section of the plaster cornice was left in place within the display booth. To repair an average hairline crack, approximately 2 inches of the plaster finish coat was removed from each side of the crack. Mesh fiberglass tape set in a layer of bonding adhesive was subsequently placed over the crack. A layer of plaster finish coat was then applied over the crack. At areas of delamination, loose plaster was scraped from the wall and sanded smooth. The repaired areas were then coated with a bonding adhesive prior to the application of a layer of plaster finish coat. The plaster repair processes used in Colonel Olmstead's Quarters were similar to the repairs undertaken in other rooms along the gorge in the early 2010s.[197]

196. Kayla Nimmo and Eva M. DiDonato, *Water Quality and Nuisance Species Management in the Fort Pulaski National Monument Moat,* Natural Resource Report NPS/SECN/NRR–2009/134 (Fort Collins, Colorado: National Park Service Natural Resource Program Center, July 2009).

197. K. D. Purcell, *Completion Report: Olmstead's Quarters* (Fort Pulaski National Monument, March 2012).

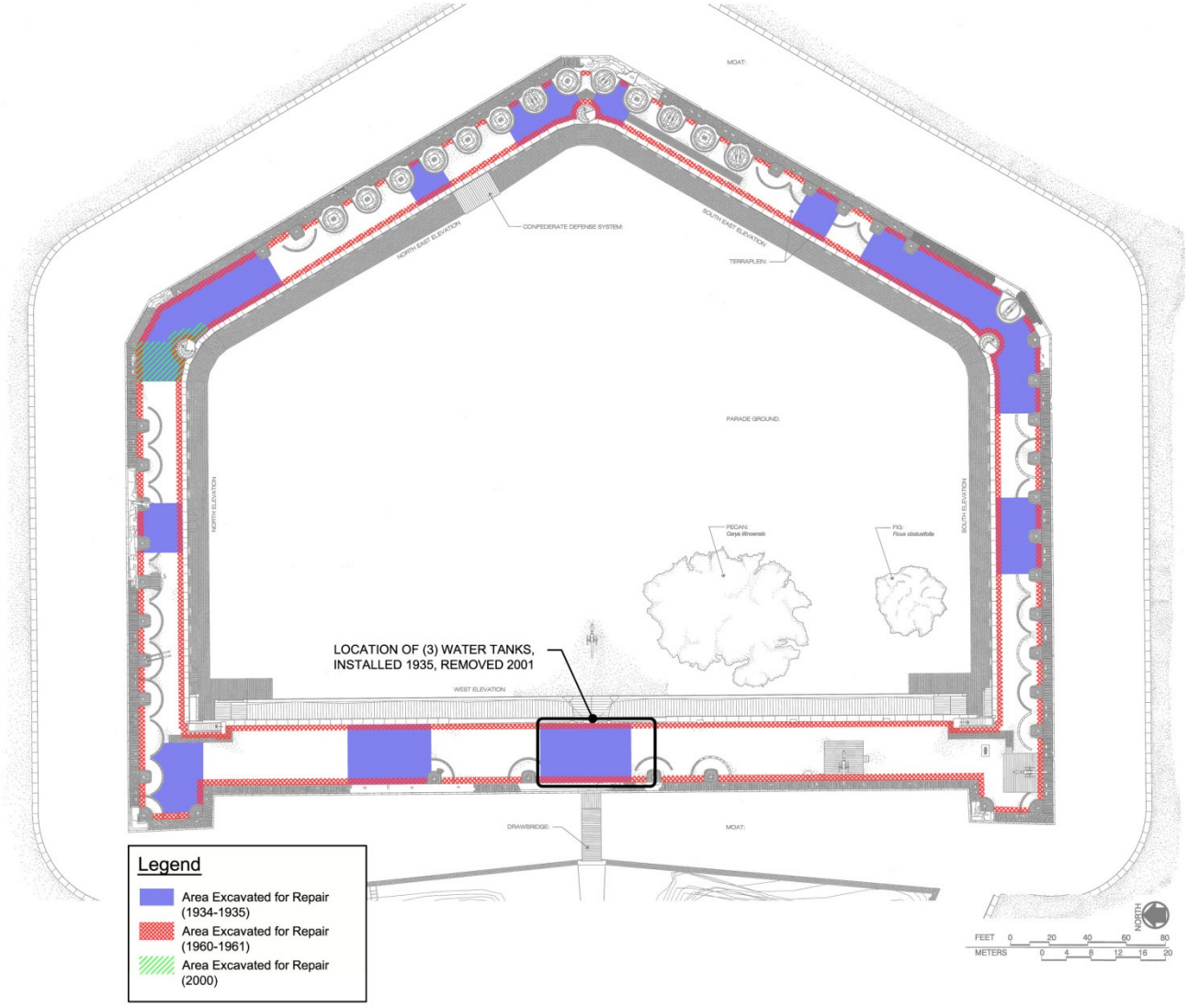


FIGURE 106. Plan of the terreplein, color coded to show excavation for repairs in the 1930s, 1960s, and recent years. Source: HABS drawing annotated by the authors.

Fort Pulaski Chronology

1761	Construction began on Fort George on the east end of Cockspur Island.
1794–1795	Fort Greene was constructed on Cockspur Island near the site of Fort George.
1828	The Board of Fortifications for Sea Coast Defense approved French military Engineer Simon Bernard's recommendation to construct a fort on Cockspur Island.
1833	Construction on Fort Pulaski began with the driving of timber piles into the ground.
1839	The general structure of Fort Pulaski was completed.
1847	Construction of Fort Pulaski was completed.
1861	January 2: The State of Georgia held a special election for a state convention to consider secession. January 3: The Georgia militia seized Fort Pulaski. April 12: The Civil War began after shots were fired at Fort Sumter in Charleston Harbor.
1862	April 10: Union forces attacked Fort Pulaski from nearby Tybee Island April 11: Confederate troops surrendered following the breach of the walls of the fort. The fort would remain under Union control for the remainder of the war.
1864	October: 520 Confederate prisoners known as the "immortal Six Hundred" were transferred to Fort Pulaski where they were imprisoned.
1865	The Civil War concluded.
1869–1872	The demilune was remodeled, and new underground magazines and passageways were constructed.
1872	Construction at Fort Pulaski was halted when the Corps of Engineers made plans to construct a new fort on Tybee island.
1873	October 25: Fort Pulaski was officially closed.
1884	The Corps of Engineers assumed responsibility for the maintenance of Fort Pulaski.
1893	Following a hurricane, a new Cockspur Island lighthouse keeper's house was constructed on the terreplein of Fort Pulaski.
1895	A new earth-sheltered magazine was constructed near the southeast corner of the demilune as the War Department bolstered coastal defenses.
1915	The War Department announced that Fort Pulaski had been selected for consideration as a national monument under the American Antiquities Act.
1917	The ridge around the fort was cleared.
1924	President Calvin Coolidge signed a proclamation declaring Fort Pulaski a national monument.
1925	Lightning struck the fort, causing significant fire damage.
1933	The National Park Service gained jurisdiction over Fort Pulaski.
1933	Vegetation removed from the parade ground and the walls of the fort.
1934	Landscaping and drainage work at Fort Pulaski; moat excavated.
1935	Terreplein excavated and lead roof repaired. Officers' quarters and barracks restored, colonnade reconstructed. Casemate enclosure walls built at casemates 15 through 24. Brick sidewalk built in front of casemates.
1936	New flagpole erected; drawbridge reconstructed.
1937	Prison bar enclosure reconstructed at casemates 18 through 21.
1938	Sidewalk extension at northwest and southwest corners. Water, sewer, and electricity service extended to fort. Wood doors restored at demilune.
1941–1947	Fort Pulaski is used to support coastal patrol ships during World War II. The fort remains active until 1947.

1958	The casemates at the gorge were repointed and relined, while new waterproofing was installed at the gorge wall.
1959	Significant repointing repairs were performed throughout the fort.
1960	The wood portcullis was reconstructed. The demilune landscape was also restored at this time.
1964	A freestanding visitor center was completed adjacent to the fort.
1972	Seven rooms along the gorge were refurnished while wood frame alcoves with large single-pane glass windows were added to limit visitor access into the officers' quarters.
1974	A new, 95-foot flagpole was installed at the fort.
1975	The drawbridge at the sallyport was reconstructed.
1985	A prefabricated "Bally" building was installed in one of the casemates in the gorge of the fort.
1980s	Existing toilet fixtures, partitions, and accessories in the restrooms were removed and replaced. The ceramic tile floors and wainscot were also replaced at this time.
1997	The restrooms at the fort were renovated and reconfigured to be universally accessible.
1990s	Repointing and other masonry work was performed at the fort and the demilune during the early 1990s.
2000	Waterproofing was applied to vertical walls above four casemates near the spiral staircases where earth and gravel was removed at the terreplein level.
2001	The water and sewer system was replaced.
2003	New metal downspouts were installed at the veranda on the west side of the parade ground.
2000s	Repointing work was performed throughout the fort, particularly at the interiors of the casements.
2012	Plaster repairs were made in Colonel Brown's quarters and the chapel.

Physical Description and Condition Assessment

Setting and Moat

Fort Pulaski is located on the east end of Cockspur Island near the mouth of the Savannah River northeast of the city of Savannah, Georgia. Cockspur Island is edged to the north by the river, and to the south by South Channel. Tybee Island faces Cockspur Island to the east at the end of the channel. The fortification that is the focus of this study falls within Fort Pulaski National Monument, a unit of the national park system. The Fort Pulaski National Monument Visitor Center is situated directly west of the fort, near a parking lot for visitors. The fort itself is accessed by a sidewalk that extends southeast from the visitor center. The landscape immediately surrounding Fort Pulaski is maintained in mown grass and is mostly clear of trees. Woodland edges the open landscape of the fort to the north and south.

The fort is composed of a five-sided masonry enclosure surrounded by a moat, approximately 40 feet wide, and an adjacent earthen structure referred to as the demilune to the west (Figure 107 through Figure 109).



FIGURE 107. The west portion of the moat between the fort and the demilune. (Unless otherwise noted, all photographs in this chapter were taken by the authors in September 2012.)



FIGURE 108. A view of the moat that surrounds the demilune west of the fort.

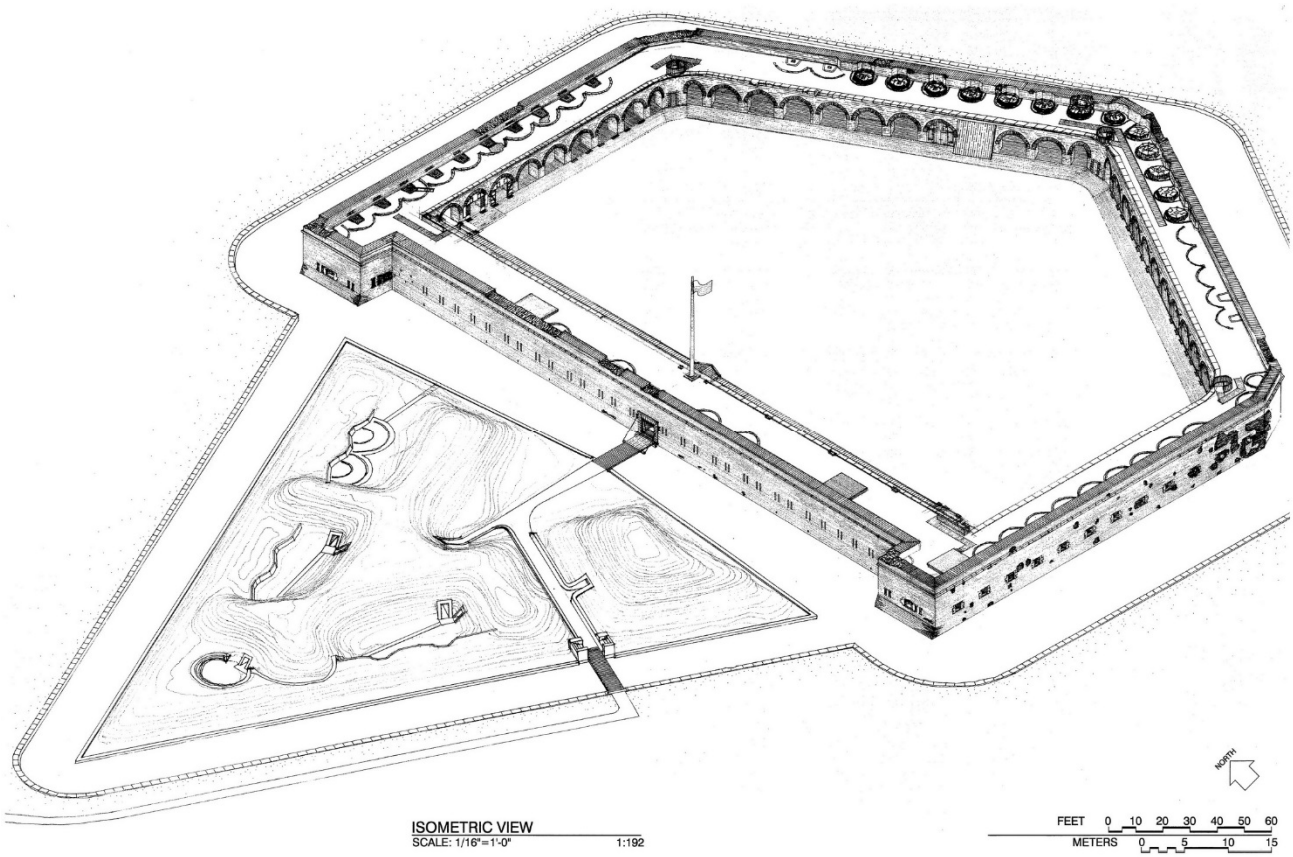


FIGURE 109. Isometric view of Fort Pulaski. Source: HABS, GA-2158, sheet 6, drawn by Antonio Valdivia and Jeffrey Dehaven, 2002.

The moat is watered based on an engineered system that uses the tidal fluctuations of the Savannah River. A feeder canal extends from the moat south to the Savannah River and channels water into the moat (Figure 110). Where the feeder canal enters the moat, there is a lock that can be used to control the movement of tidal water through the canal and into the moat (Figure 111). At most times, the canal lock is kept closed, and the water level in the canal remains static. During warm months, and in times of algae blooms, park staff open the canal lock for several days and allow the water level in the moat to ebb and flow with the tides, helping to flush the system and improve the water quality in the moat. At the end of the process, the lock is closed at high tide to maintain the preferred water level.



FIGURE 110. The feeder canal that extends from the moat to the Savannah River.



FIGURE 111. The lock that controls the flow of tidal water into the feeder canal and the moat that surrounds Fort Pulaski.



FIGURE 112. The brick walls that help define the moat. The arched opening connects the canal lock to the moat.

The outer edges of the 7-foot-deep moat are brick masonry walls with a sandstone coping (Figure 112). Typically, about three courses of brick masonry are exposed above the water line. When the canal lock is open and the water level is allowed to fluctuate with the tides, up to a dozen courses of brick masonry are exposed. At and below the water line, the surface of the brick masonry is covered with heavy organic growth including oyster shells.

A drawbridge crosses the moat, connecting the demilune to the rest of the island and allowing visitors to access the fort (Figure 113). The drawbridge is supported by two brick masonry piers with sandstone copings; the piers are located within the moat. The brick matches the type used in construction of the moat walls. Originally, the drawbridge included an operable portion between the north moat wall and a recessed wall within the demilune, although the existing replica drawbridge is fixed. The iron drawbridge mechanism is still present at the brick masonry wing walls on either side of the bridge at the demilune side (Figure 114). The drawbridge is constructed of wood planks supported by wood joists.



FIGURE 113. A wood drawbridge crosses the moat, connecting the demilune with the surrounding landscape of Cockspur Island.



FIGURE 114. The demilune end of the drawbridge, showing the brick masonry wing walls and drawbridge mechanism.

Demilune

Exterior

Located directly west of Fort Pulaski, the demilune is a triangular piece of land, surrounded by a moat, which contains a perimeter parapet. (A demilune is an outwork in front of a fort typically shaped like a crescent moon.) The demilune at Fort Pulaski was originally designed to support a battery of gun emplacements and a system of internal earth-sheltered magazines.

The demilune area was part of the pre-Civil War design of the fortification, but it was greatly modified in the latter half of the nineteenth century when the existing magazines and gun emplacements were built. Like the fort, the demilune is edged by masonry walls along the moat. The demilune moat walls are the same height as the moat outer perimeter walls, but do not include a sandstone coping; the brick masonry instead continues upward to a brick rowlock coping course.

The demilune features two internal enclosed magazines. The larger of the two is located at the southeast corner of the demilune. The second is more irregularly shaped. It extends across the western half and north side of the demilune and consists of four individual magazines and connecting corridors, which lead to eight exterior entrances. The walk used by visitors to access the demilune falls between the two magazines.

The demilune is accessed from the south via the stationary wood drawbridge over the moat described above. It connects to a concrete walk that extends to the center of the demilune. It is edged to either side by walls, approximately 3 feet tall, composed of tabby concrete that is formed from a mixture of lime, sand, and crushed shells. Midway along the path is an entrance into the southeast magazine. The recessed entryway is defined by concrete walls and a stone surround. The door itself is constructed of vertical wood planks and has iron hardware (Figure 115).

The path continues to the center of the demilune, where it intersects a second paved path that extends east toward the fort and west to a recessed entry into the second magazine complex (Figure 116). The walls of the recessed bunker entry follow the grade of the earthwork parapet and are topped with a stone coping. There is no door within the western magazine entrance portal, which leads to a series of earth-sheltered hallways and rooms.



FIGURE 115. The recessed entry to the southeast magazine at the demilune.



FIGURE 116. The central recessed entryway to the west magazine complex.

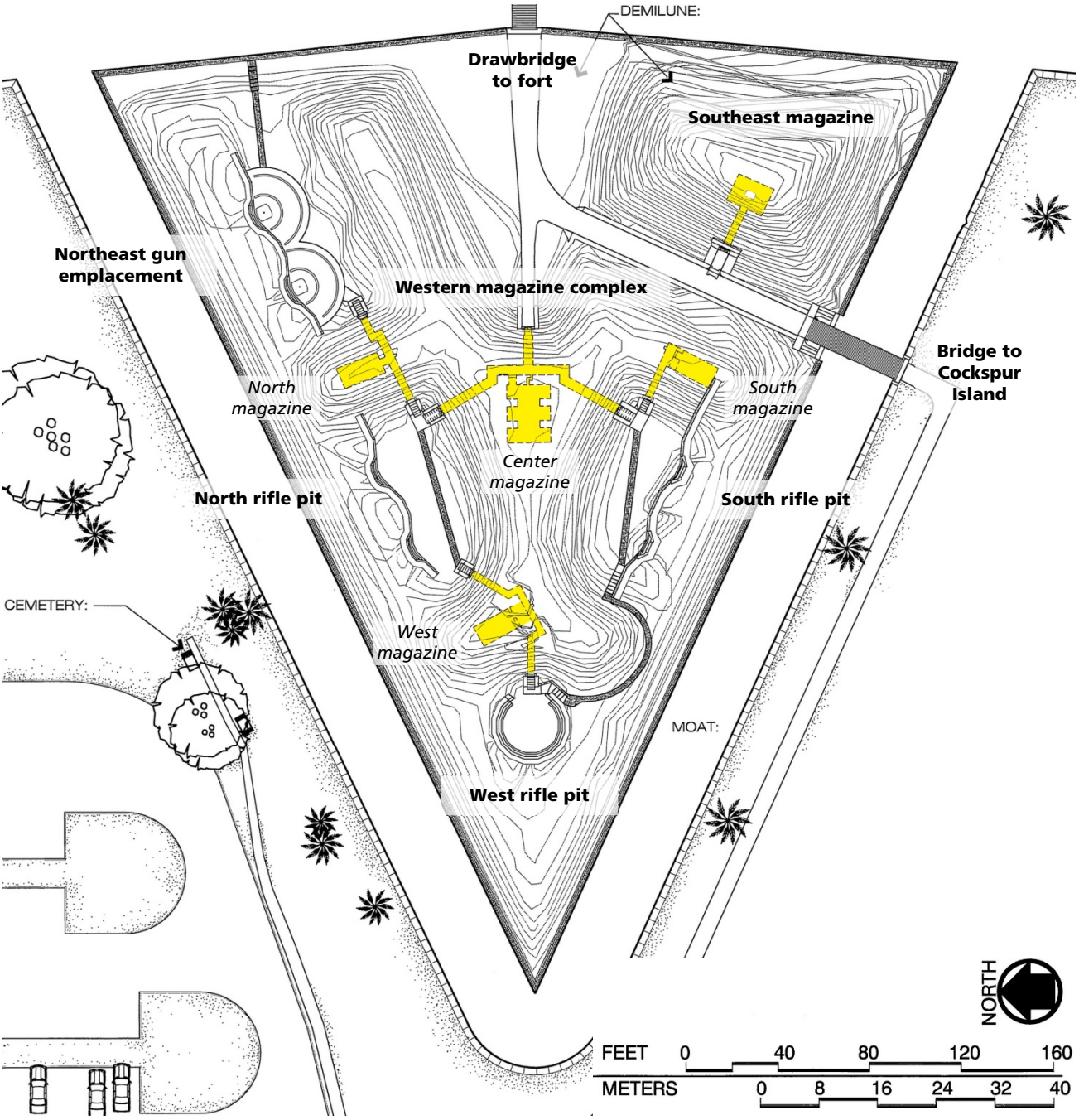


FIGURE 117. Plan of the demilune. The interior earth-sheltered magazines and tunnels are highlighted in yellow. Source: HABS, GA-2158, sheet 7, drawn by Tim Whittaker and Marc Frame, 2002, annotated by the authors.

The irregular shape of the west magazine complex also defines several outdoor spaces that face the moat. At the west end of the demilune is a circular rifle pit. The perimeter of the rifle pit is defined by a three-tier brick masonry retaining wall with sandstone copings at each tier (Figure 118). Sunken stairs along the east side of the rifle pit connect to an entrance leading to the west magazine (refer to discussion of Interior Rooms, below). At the south side of the rifle pit, brick stairs ascend to a path that leads to a second rifle pit along the south side of the demilune (Figure 119 and Figure 120).

From this path, brick stairs descend into the south rifle pit (Figure 121). The rifle pit has a brick masonry retaining wall along its south side, topped by a sandstone coping. At two locations, the wall features three intermediate tiers with sandstone copings, set into angled bays within the wall (refer

to Figure 121). A brick path in the rifle pit connects from the stairs at the west end to a concrete sidewalk that links two sunken entrances into the magazine complex (Figure 122). One entrance leads to the main magazine corridor, and the other leads to a smaller south magazine (refer to discussion of Interior Rooms, below).



FIGURE 118. The perimeter of the west rifle pit is defined by a three-tier brick masonry retaining wall.



FIGURE 119. Brick stairs at the south side of the rifle pit.



FIGURE 120. Brick path along the south side of the demilune connecting the west rifle pit to the south rifle pit.



FIGURE 121. Looking west in the south rifle pit.



FIGURE 122. Entrances to the magazines at the east end of the south rifle pit.

Symmetrical with the south rifle pit is the north rifle pit, which is also accessed from sunken entrances to the magazine complex. At the east end there are two sunken entrances (Figure 123); one leads to the main magazine corridor, and the other leads to the smaller north magazine space (refer to discussion of Interior Rooms, below). At the west end is a single sunken entrance leading to the smaller west magazine space (Figure 124). A brick path connects these entrances. Along the north side of the rifle pit is a brick masonry wall. Like the south rifle pit, portions of the wall feature tiers at angled bays (Figure 125).

At the northeast corner of the demilune is a gun emplacement with mounts for two cannon (Figure 126). Along the north side of the gun emplacement is a brick masonry retaining wall with brick rowlock coping. Angled bays with offset tiers correspond to each cannon mount. Each mount has a central iron plate with an iron pivot to receive the cannon carriage, two concentric iron tracks for the carriage wheels, and a base of concrete paving. At the west end of the northeast gun emplacement is a sunken entrance leading to the smaller north magazine space; concrete paving links this entrance to the first cannon mount (Figure 127). At the east end of the gun emplacement, a brick path leads east toward the moat; brick steps descend from this path to the coping of the demilune moat wall (Figure 128).



FIGURE 123. At the east end of the north rifle pit there are two sunken entrances.



FIGURE 124. At the west end of the north rifle pit is a single sunken entrance.



FIGURE 125. The north rifle pit wall with tiers at angled bays.



FIGURE 126. The northeast gun emplacement.



FIGURE 127. Entrance at the west end of the northeast gun emplacement.



FIGURE 128. The path from the northeast gun emplacement ends at brick stairs that descend to the moat wall.

Interior Rooms

The demilune includes five earth-sheltered interior magazines as well as connecting corridors.

The southeast magazine is separate from the remainder of the interior spaces and consists of a single interior space reached via an entrance hallway from the exterior door at the east side of the main outside path across the demilune.

The central entrance of the demilune facing the drawbridge and sallyport leads to the center magazine. From the entrance, a hallway, approximately 5 feet in width, with tabby concrete floors and walls and a tabby concrete barrel-vaulted ceiling, extends west before ending at another perpendicular hallway that runs north-to-south (Figure 129). At the end of this hallway is a small air vent opening in the tabby concrete walls for the center magazine (Figure 130). The center magazine entrance is offset toward the north and includes stone masonry jambs, threshold, and lintel, and a wood door on iron hinges (Figure 131). The interior of the center magazine includes three barrel-vaulted bays running north-south and a central connecting barrel vault running east-west (Figure 132). Granite masonry is used at the base of each vault pier. At either end of the north-south corridor outside the center magazine, angled corridors lead to exterior doorways at the north and south rifle pits (Figure 133).



FIGURE 129. An interior hallway, approximately 5 feet in width, leading to the center magazine.



FIGURE 130. Vent opening to the center magazine.



FIGURE 131. Entrance door to the center magazine.



FIGURE 132. Interior of the center magazine.



FIGURE 133. Hallway from the center magazine to the south rifle pit.

The south magazine is accessed via a short entrance corridor from an exterior doorway at the east end of the south rifle pit. The entrance corridor is a tabby concrete barrel-vaulted space ending at the magazine. The outer wall of the magazine is granite masonry, and the door to the magazine is a non-original wood door with iron hardware (Figure 134). The south magazine is a single barrel-vaulted space built of tabby concrete.

The west magazine is located off a corridor connecting the west rifle pit to the north rifle pit. The corridor has tabby concrete walls and barrel-vaulted ceiling; the wall outside the west magazine is granite masonry (Figure 135). The west

magazine is a single barrel-vaulted space built of tabby concrete (Figure 136).

The north magazine is located off a corridor connecting the north rifle pit to the northeast gun emplacement. It is similar to the south and west magazines.

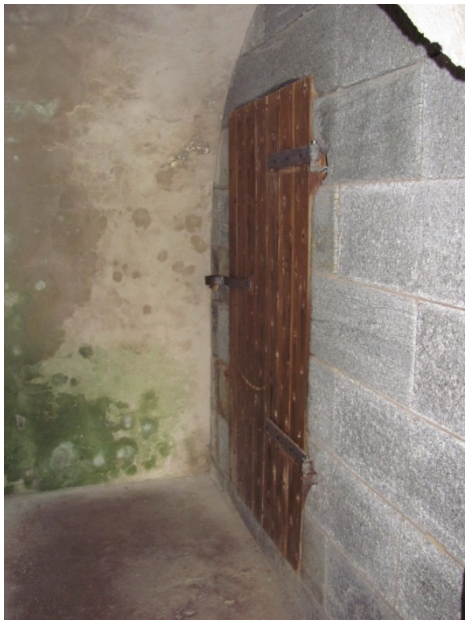


FIGURE 134. Door to the south magazine.



FIGURE 135. Corridor to west magazine.



FIGURE 136. The west magazine.

Outer Walls

Fort Pulaski is a five-sided brick structure with 7-1/2-foot-thick brick masonry walls that rise approximately 30 feet above the moat that surrounds the structure. The brick is laid in an English bond, with alternating courses of headers and stretchers. Bastions are present on the northwest and southwest corners of the fort. A stone watertable is located approximately 7 feet below the top of the fort walls (Figure 138). The five-sided plan of the fort is defined by outer walls facing west, south, southeast, northeast, and north. The west wall is at a 90 degree angle to the north wall and south wall; the intersecting walls at the remaining three corners of the fort form 120 degree angles.

At the west outer wall, paired loop holes extend the length of the wall to the projecting bastions on the northwest and southwest corners of the fort (Figure 139).[198] In all, there are thirteen irregularly spaced pairs of loop holes to each side of the sallyport centered in the west outer wall, not including those immediately adjacent to the opening at the center of the elevation. The loop holes are approximately 5 feet tall and 4 inches wide (Figure 140).

Directly adjacent to the north and south bastions on the west elevation are sets of five small rectangular openings (Figure 141). Placed in a pentagonal pattern, the three lower openings are approximately 8 inches tall and 3 inches wide, while the top two openings are approximately 10 inches tall and 3 inches wide. These openings lead to air shafts that ventilate the powder magazines located inside the fort at these locations.

The bastions at the northwest and southwest corners of the fort each protrude from the main fort structure approximately 18 feet. The west walls of the bastions slope outward approximately 3 feet. The walls begin their outward slope about 25 feet below the top of the fort (Figure 142).

An arched embrasure is present at the center of the west wall of each bastion. The embrasures are framed with red brick, contrasting with the brown colored brick found on the rest of the fort (Figure 143). The arched opening is roughly 7 feet wide and 3 feet tall. Two loop holes are present to either side of the embrasure. The loop hole openings are approximately 2 feet wide and 4 feet tall. Stone lintels and sills are present over the loop holes at the bastions.

An arched embrasure framed in red brick is present where the side return wall of each bastion meets the west outer wall of the fort (Figure 144). The embrasure is similar in size to those seen on the west wall of the bastions. Two loop holes with stone lintels and sills are located west of the embrasure. The embrasure and loop holes are present on the north return wall of the southwest bastion, and the south return wall of the northwest bastion.

198. A loop hole is a narrow vertical windows from which the defenders of a fortification could fire weapons from a sheltered position.

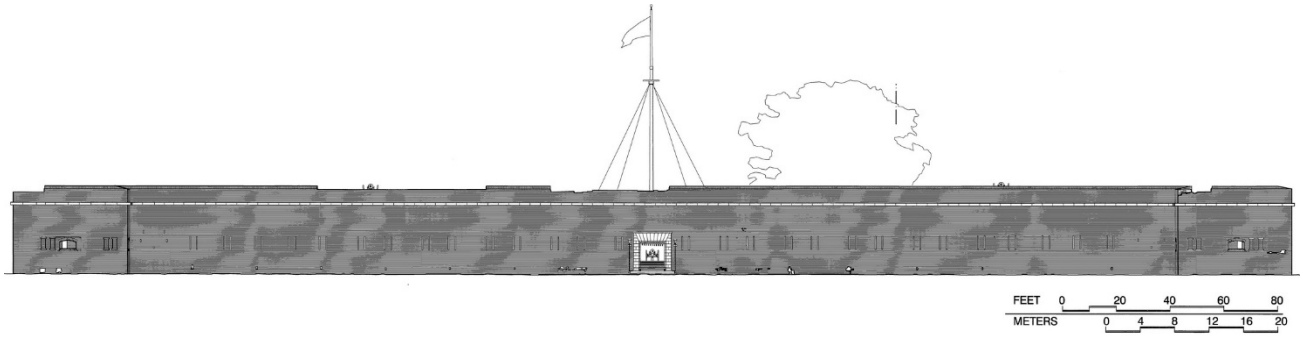


FIGURE 137. The west outer wall. Source: HABS, GA-2158, sheet 18, drawn by Anu Mukherje and Antonio Valdivia, 2002.



FIGURE 138. A view of the west outer wall of the fort. A stone watertable can be seen 7 feet below the top of the fort walls.



FIGURE 139. The outer walls of Fort Pulaski. A projecting bastion is visible on the right.



FIGURE 140. Loop holes along the outer walls of the fort.

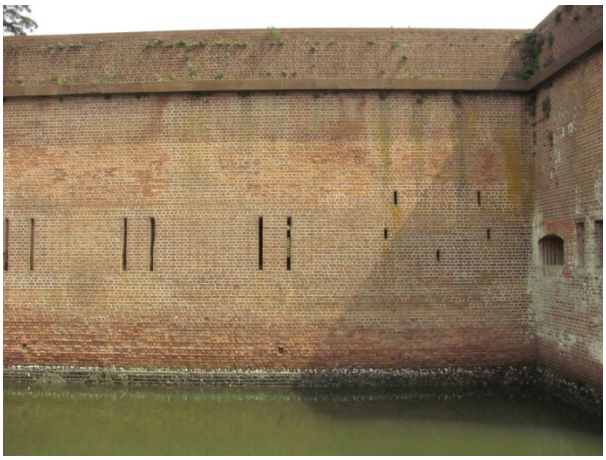


FIGURE 141. Five indentations are present adjacent to the north and south bastions.



FIGURE 142. The west walls of the north and south bastions slope outward at the base of the fort.



FIGURE 144. An arched embrasure is present at the return walls of the bastions.



FIGURE 143. An embrasure on the south bastion. Note the embrasures are typically constructed of red brick.

The south outer wall of Fort Pulaski contains twelve regularly-spaced embrasures (Figure 146). The arched openings are framed with the same red brick seen at the embrasures at the bastions. Damage sustained during the battle of Fort Pulaski during the Civil War is present at the eastern end of the elevation as well as at the adjacent south-southeast angled wall (Figure 147). The southeast corner of the fort was rebuilt following the battle at Fort Pulaski (Figure 148). The brick used to rebuild the walls of the fort at this location is red in color, similar to the brick seen at the embrasures.

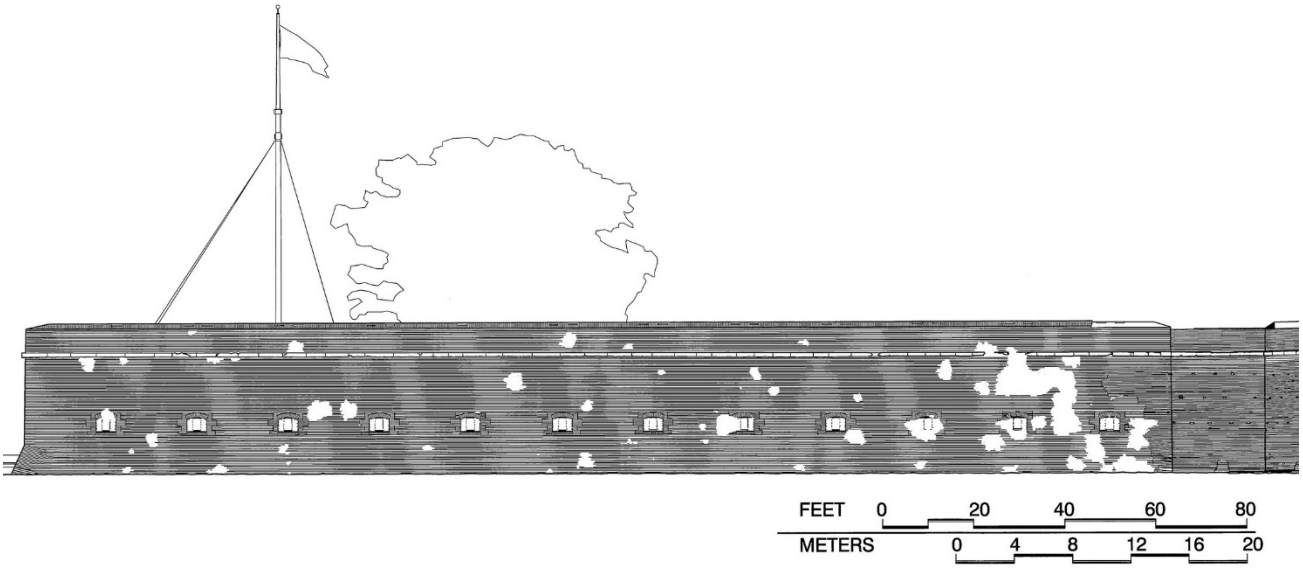


FIGURE 145. The south outer wall. Source: HABS, GA-2158, sheet 16, drawn by Tressa Orsack and Jose de Castillio, 2002.



FIGURE 146. The south outer wall of Fort Pulaski.



FIGURE 147. The southeast corner of the fort was rebuilt following damage sustained during the Civil War.



FIGURE 148. The south and southeast outer walls of Fort Pulaski. Note the rebuilt southeast corner.

Damage from the Union Army's attack on Fort Pulaski during the Civil War is visible along almost the full length of the southeast outer wall of the fort (Figure 150). The far south portion of the elevation has been rebuilt with red colored brick. This corner of the fort was breached during the Civil War (Figure 151). Portions of the parapet wall at the north portion of the elevation are missing as a result of the attack on the fort (Figure 152). There are ten embrasures along the southeast elevation. It is likely that two more embrasures were originally present at the southern end of the wall, where the Civil War breach and subsequent rebuilding occurred (Figure 153).

The east outer wall is a single bay formed where the southeast and northeast elevations meet (Figure 154). Damage from the attack on Fort Pulaski is present. There is a single embrasure centered on the elevation.

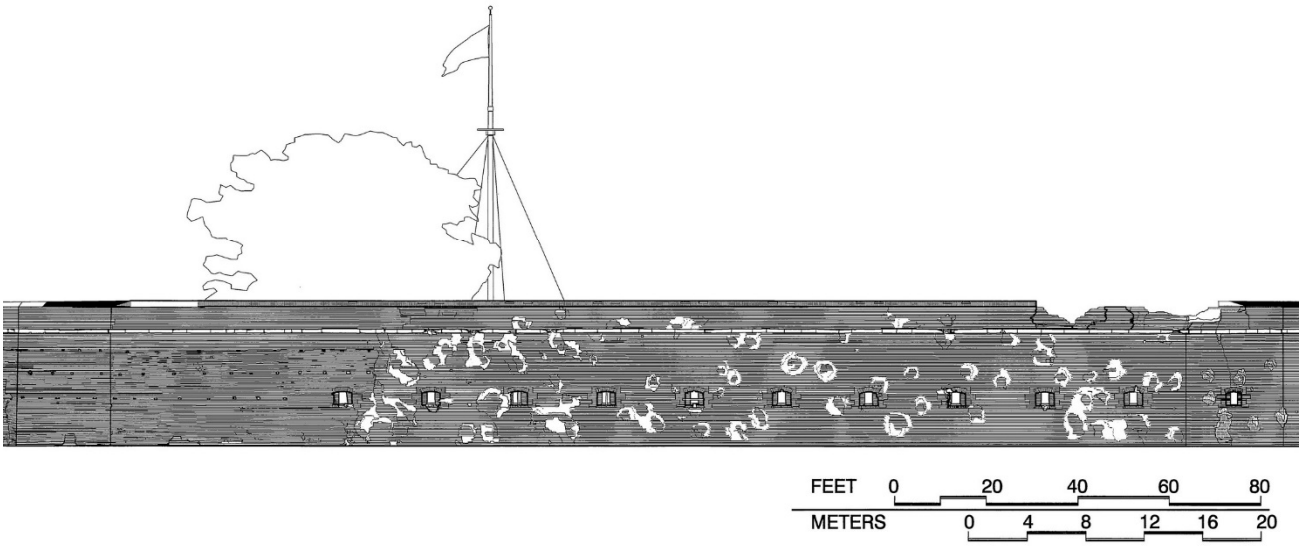


FIGURE 149. The southeast outer wall. Source: HABS, GA-2158, sheet 14, drawn by Laura Massey and Jeffrey Dehaven, 2002.



FIGURE 150. Damage sustained during the Civil War is visible along the southeast wall of the fort.



FIGURE 151. The southeast corner of the fort was breached during the Civil War.



FIGURE 152. Damage at the parapet wall at the north portion of the southeast elevation.



FIGURE 153. Embrasures were not included when the southeast corner of the fort was reconstructed.



FIGURE 154. The east elevation of Fort Pulaski.

The northeast outer wall contains twelve regularly spaced embrasures (Figure 157). The arched openings are framed with red brick, similar to the other embrasures on the fort. There are isolated signs of Civil War-era damage at the far eastern portion of the elevation.

The north-northeast outer wall is a short angled segment with a single embrasure, similar to the east wall.

Twelve, regularly-spaced embrasures extend across the north outer wall (Figure 158). The arched openings are framed with red brick. Below casemate 46, there is an opening through the outer wall located just above the water line (Figure 159). From this location, control wires led out to mines in the north channel of the Savannah River during the 1890s.

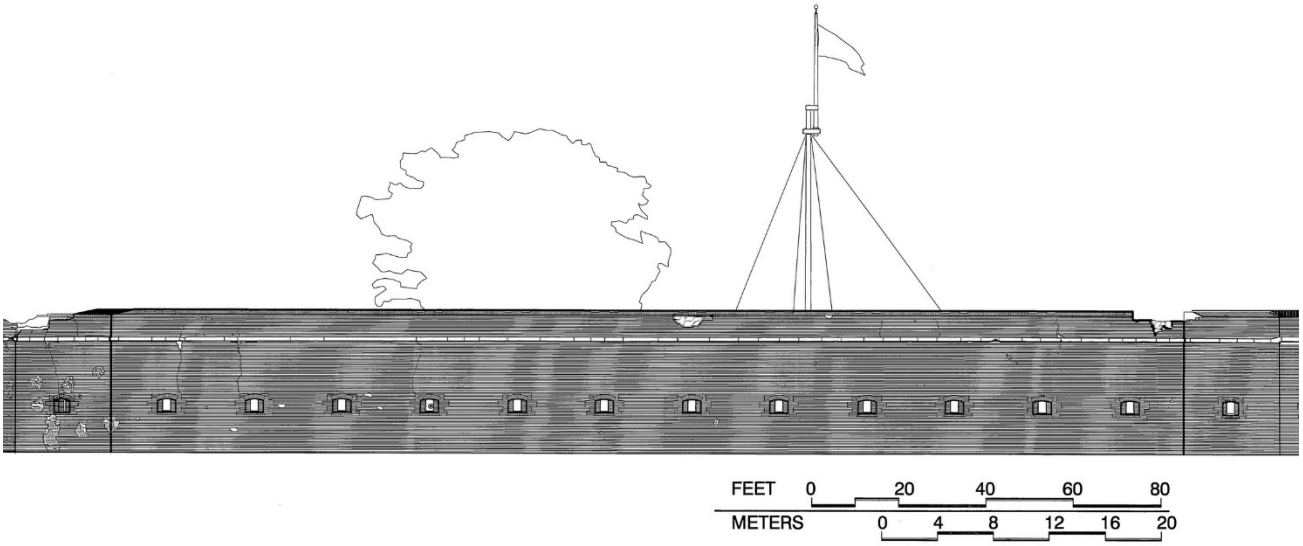


FIGURE 155. The northeast outer wall. Source: HABS, GA-2158, sheet 12, drawn by Bob Brinkman and Jeffrey Dehaven, 2002.

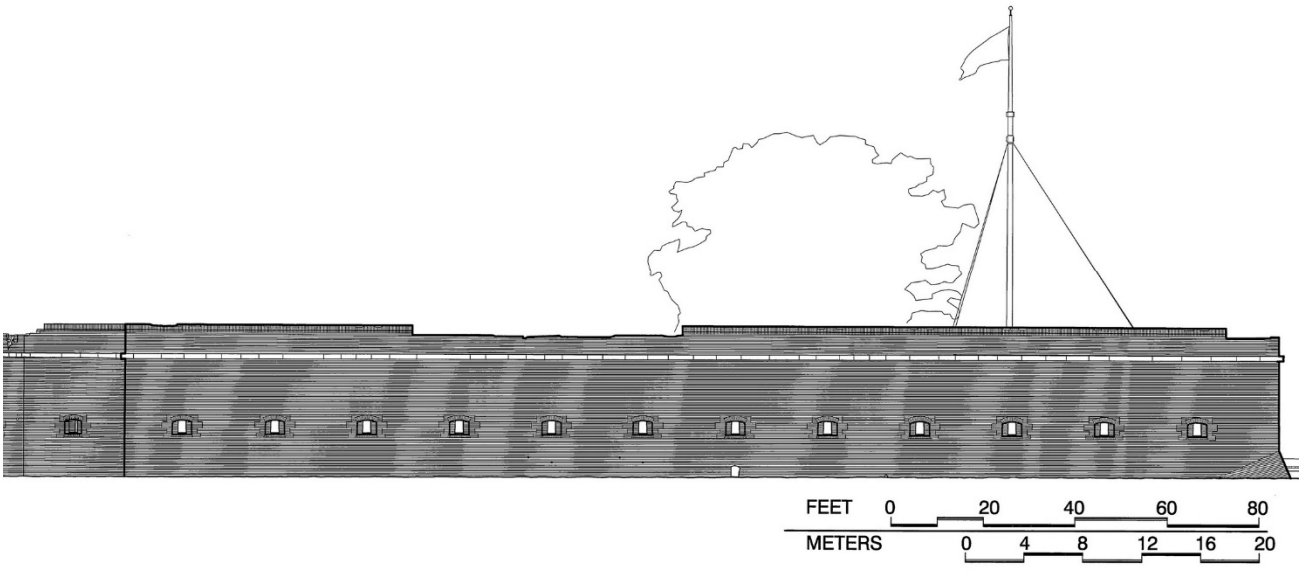


FIGURE 156. The north outer wall. Source: HABS, GA-2158, sheet 10, drawn by Audrea Stahman and Marc Frame, 2002.



FIGURE 157. The northeast wall of Fort Pulaski.



FIGURE 158. The north elevation of Fort Pulaski.



FIGURE 159. Opening at the north elevation below casemate 46.

Drawbridge and Sallyport

A wood drawbridge crosses the moat connecting the demilune to the fort (Figure 160). The drawbridge is supported by two brick piers with sandstone copings located within the moat. The two westernmost spans of the drawbridge, from the demilune to the west pier and between the two piers, are stationary and are constructed of wood joists supporting a wood plank deck. The easternmost third of the structure is the movable drawbridge spanning from the fort walls to the east pier. The drawbridge has a large wood beam connected to iron chains that extend through the outer walls of the fort to the drawbridge mechanism (Figure 161). The drawbridge, which was reconstructed in 2011, is constructed of four layers of wood planks. The bridge can be made operational.



FIGURE 160. A drawbridge extends between the demilune and Fort Pulaski.



FIGURE 161. The entrance to the sallyport on the west elevation of Fort Pulaski.

The fort is entered through the sallyport, which is situated at the center of the west outer wall. The sallyport entrance is framed by a grey granite masonry surround (refer to Figure 161). A pair of loop holes is present to either side of the sallyport.

A pair of wood doors swings into the sallyport. The outer doors are composed of two layers of 2-inch-thick wood planks with iron rivets covering the surface of the door. The outer layer of planks has 12 vertical planks per door, while the inner layer has 23 horizontal planks per door. Each of the outer doors is 62 inches wide by 120 inches high. Each door is hung on iron strap hinges that span the width of the door, and there is a pivoting iron bar to secure the doors on the interior. A small wicket is set into the left-hand (northern) door. One area near the top of the right-hand (southern) door shows evidence of fire damage. These doors are built of quarter-sawn southern yellow pine (probably longleaf pine, *Pinus palustris*) and date to the original construction of the fort, being built and installed in 1840. Remaining paint on the exterior and interior surfaces of the doors likely dates to the nineteenth century.[199]

To the exterior side of these doors is the portcullis. Although it can be made operational, the portcullis is generally maintained in the open position, with only eleven vertical wood members with spiked ends at the base visible. The rest of the latticed wood grille is concealed.

The floor of the sallyport is comprised of large pieces of granite laid in a running bond pattern. The floor slopes up from the entrance to the level of the parade ground and is cut with parallel grooves for traction (Figure 162). The sallyport has red brick walls and an arched red brick ceiling, matching the red brick used for the embrasure frames of the outer walls. The brick on the walls and ceiling is laid in an English bond pattern (Figure 163).

Just behind the outer doors, cross vaults intersect the main vault and extend to the north and south side walls. A set of three loop holes are present on both the north and south walls under this cross vault (Figure 164). Above the middle loophole, a windlass that is used to operate the drawbridge spans the width of the sallyport (Figure 165). The windlass consists of a horizontal cylinder and a crank used to rotate the cylinder. The crank is visible in the guard room. A winch is present at each end of the cylinder, with chains attached to each winch.

East of the first set of cross vaults is a second set of cross vaults connecting to a recessed niche on both the north and south walls. One loop hole is present in each recessed niche.

The inner entrance is framed by grey granite masonry. A set of original wood doors are present at the arched opening at the east end of the sallyport. The tops of the doors are arched to match the opening. The right-hand (southern) door has diagonal lattice at the top and bottom, while the left-hand (northern) door has lattice at the top only. A wicket is positioned in the solid portion of the left-hand door. The doors are built of four layers of wood for a total thickness of 4 inches. Each door is 144 inches tall and 54 inches wide. Iron rivets and iron strap hardware is present on each door, similar to the outer doors. Remnants of nineteenth century paint are present on the doors. Matching the outer doors, these doors are also constructed of southern yellow pine and date to 1840. Damage to the lattice at the left-hand door is thought to date to the 1862 siege.[200]

The main vault of the sallyport transitions from a half-round to a segmental arch profile at the doors, to accommodate the full height of the doors (Figure 166).

199. Alan M. Levitan, "Historic Fort Doors: Condition Assessment, Preservation Recommendations" (Harpers Ferry, West Virginia: National Park Service Harpers Ferry Center, August 2002).
200. Levitan.



FIGURE 162. The stone floor in the sallyport. Note the floor slopes up toward the parade ground.



FIGURE 163. The arched brick celling in the sallyport.



FIGURE 164. Three loop holes are present on the west side of the north and south walls.



FIGURE 165. A windlass used to operate the drawbridge is present east of the entrance to the sallyport.



FIGURE 166. The inner doors of the sallyport swing into the segmental arch portion of the vault.

Parade Ground

At the center of Fort Pulaski is the parade ground (Figure 167). Five sided in plan, the parade ground is defined by casemates on the north, northeast, southeast, and south, and the quarters at the gorge along the west side. The parade ground is a grass-covered area with a continuous brick-paved pathway at its perimeter (Figure 168). The brick in the pathway is laid in a running bond pattern with header course edging along the perimeter. At some casemates, sloped brick paver ramps provide barrier-free access to the interior of the casemates for visitors.

Two pecan trees and one fig shrub are present near the southwest corner of the parade ground. The pecan trees extend north almost to the sallyport (Figure 169).



FIGURE 167. A view of the parade ground, looking north from the terreplein.



FIGURE 168. A brick-paved pathway lines the perimeter of the parade ground.



FIGURE 169. A fig tree (left) and pecan tree (right) are present near the southwest corner of the parade ground.

Four artillery pieces are displayed on the parade ground. An original 12-pounder Field Howitzer (model 1841) on a reproduction metal carriage is positioned facing the sallyport. At the north end of the parade ground are two additional pieces: an original 10-inch Siege Mortar (model 1807) on a reproduction wood platform and a reproduction 30-pounder Parrott Rifle (model 1861) on a reproduction aluminum siege carriage.



FIGURE 170. Artillery pieces are displayed on the parade ground: from left to right, an 1807 siege mortar, an 1861 rifled cannon, and an 1841 cannon, behind an ammunition wagon.

Porch and Quarters

The sallyport is located in the center of the west side of the fort, with seven finished rooms on each side. A colonnade extends along the east face of the west casemates (Figure 171). The colonnade roof is supported by brick columns, approximately 12 inches by 12 inches in plan, spaced at approximately 12 feet on center (Figure 172). Each column is topped with a sandstone capital and has a sandstone base. The pair of columns at the sallyport are larger, about 24 inches wide by 16 inches deep. In total, the colonnade is twenty-nine bays wide, with two bays corresponding to each casement on the west side of the fort and a single wider bay at the sallyport. The columns support a standing-seam metal covered, wood-framed shed roof that slopes down toward the parade ground to the east (Figure 173). An intersecting gable roof is centered at the sallyport entrance (Figure 174), and similar gable roofs are present at the north and south ends of the colonnade, at the entrance to each powder magazine. A brick paved walk extends the length of the colonnade (Figure 175). The brick pavers are arranged in a running bond. There is also a 4-inch-wide granite curb, level with the pavers, along the parade ground edge of the walk.

A brick wall with brick corner pilasters and no openings is present at the north and south ends of the colonnade (Figure 176). The wall extends above the colonnade roof to the eave of the gabled roof at the entrance to the powder magazines beyond.



FIGURE 171. A colonnade extends along the west side of the parade ground.



FIGURE 174. A gable roof at the center of the colonnade marks the location of the sallyport.



FIGURE 172. The colonnade is comprised of brick columns with stone capitals.



FIGURE 175. A brick paved walk constructed by the CCC extends the length of the colonnade.



FIGURE 173. A standing-seam metal roof is present over the colonnade.



FIGURE 176. A brick wall, with corner pilasters north of the colonnade.

Each of the fourteen rooms along the west elevation is accessed through a six-panel stile-and-rail wood door (Figure 177). The doors typically have rim lock hardware. A four-light transom is present over each doorway. Adjacent to each doorway, each casemate on the west side of the fort has two, nine-over-nine double-hung wood windows (Figure 178).

Many of the rooms along the west elevation of the fort have been restored to their historic appearance, while others have been rehabilitated to house NPS offices and visitor services.



FIGURE 177. A typical wood door leading to the quarters along the west side of the fort.



FIGURE 178. Two, nine-over-nine double-hung windows are adjacent to the doorway at each room along the west side of the fort.

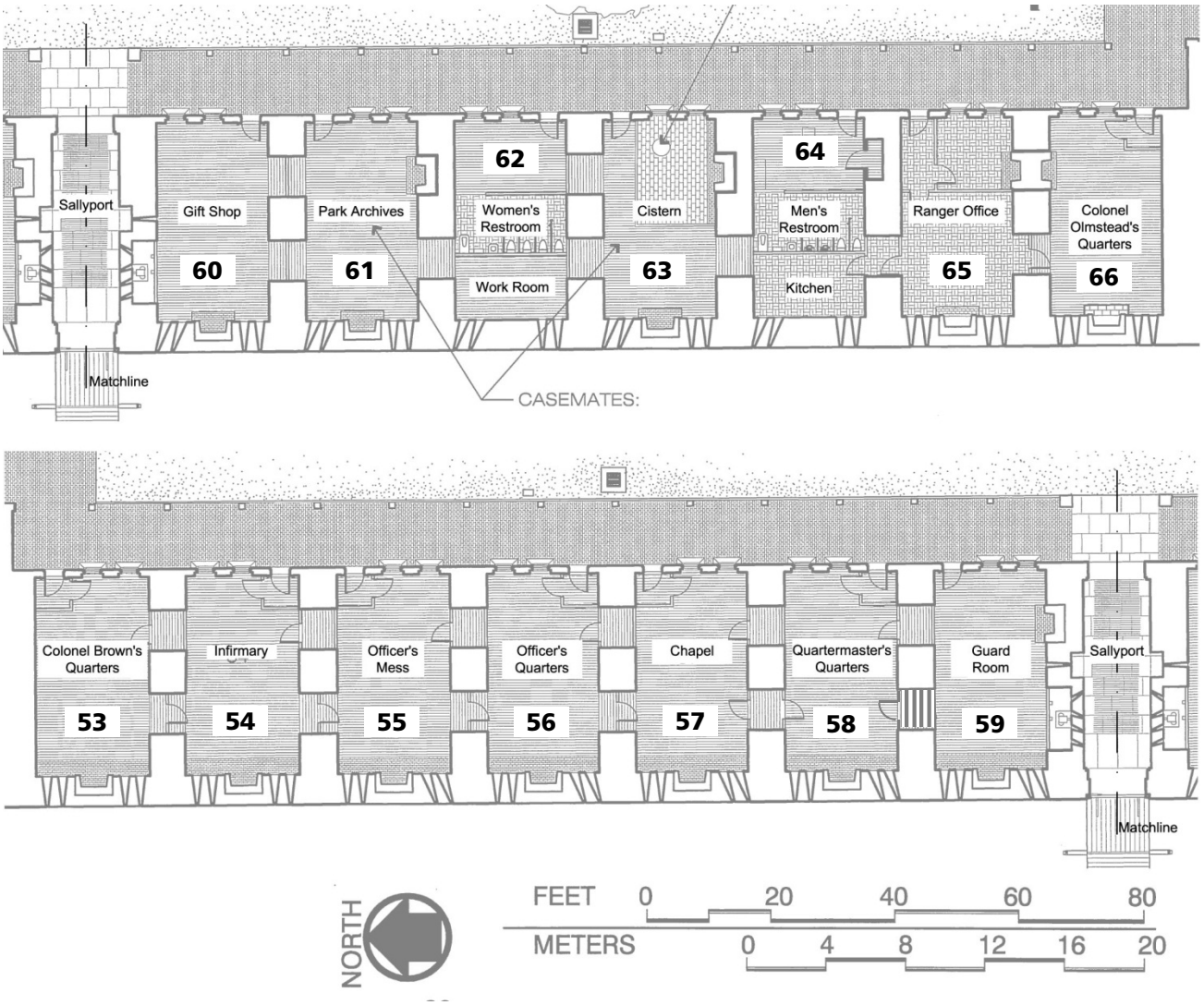


FIGURE 179. Plan of the gorge rooms. Source: HABS drawing annotated by the authors.

Gift Shop

The first room south of the sallyport (casemate 60) houses a gift shop (Figure 180). The room, which is rectilinear in plan, has a flattened barrel-vaulted ceiling. The ceiling and walls are covered in plaster, and the floor is wood. The wood floor is waxed.

The room is entered through a door on the south end of the east wall of the room. The six-panel door has the typical rim lock hardware seen throughout the quarters. Two double-hung windows are present north of the doorway. Opposite the entry is a fireplace, centered on the west wall of the room (Figure 181). The brick fireplace has a wood mantel. Four ten-light wood casement windows are present at the west wall. The windows sit at the interior end of the loop holes visible on the exterior of the fort.

Two arched niches with doors leading to the adjacent room are present on the south side of the gift shop. Retail displays obscure the arched niches and wood partitions adjacent to the loop holes overlooking the sallyport on the north wall of the room. A brass Colonial Revival style chandelier hangs from the ceiling near the east side of the room (Figure 182).

The gift shop is air conditioned.



FIGURE 180. The interior of the gift shop.



FIGURE 181. A fireplace centered on the west wall of the gift shop.



FIGURE 182. A chandelier hangs from the ceiling near the east side of the gift shop.

Park Archives

The casemate directly south of the gift shop (casemate 61) currently houses a modular insulated temperature-controlled archival unit ("Bally building"), which provides a conditioned space housing the park archives and museum collections (Figure 183). The Bally building sits in the center of the room. Unfinished wood floors and exposed brick walls define the room, which is entered through a wood door on the north end of the east wall. Two wood double-hung windows are present south of the doorway. A brick fireplace with no mantel is centered on the west wall of the casemate (Figure 184). There are also four casement windows on the west wall. A second brick fireplace with no mantel is located on the east half of the south wall of the room. At the west half of the south wall, a wood partition wall with a six-panel door is located in an arched niche. The Bally building is cooled using a geothermal loop that extends into the water of the moat.



FIGURE 183. A view of the park archives. The Bally building can be seen on the left.



FIGURE 184. The fireplace on the west wall of the park archives room.

Women's Restroom and Work Room

The women's restroom and a small weapons work room occupy the next casemate to the south (casemate 62). The weapons work room is located in the western portion of the casement. This room is entered from the casemate with the Bally building through a wood six-panel door (Figure 185). The weapons work room has a ceramic tile floor, plaster walls and a plaster flattened barrel-vault ceiling (Figure 186). The tile floor is composed of 1 inch hexagonal tile. Four ten-light wood casement windows are present on the west wall of the room. Ceramic tile wainscot extends from the floor to the height of the window sill throughout the room. A fluorescent light fixture is located on the ceiling of the work room.

A sink is located on the north wall of the work room and appears to drain to the moat. A hot water heater is also present in the room.



FIGURE 185. A wood, six-panel door leads from the park archives room to the weapons work room.



FIGURE 186. The tile floor and tile wainscoting in the weapons work room.

The east portion of the casemate is the women's restroom. The restroom consists of the restroom itself and a vestibule area to the east, separated by a plaster partition wall approximately 7 feet in height (Figure 187). The restroom vestibule is entered through a wood six-panel door located on the south end of the east wall of the casemate. Two wood double-hung windows are present north of the doorway. The glass in the windows is frosted.

The restroom vestibule has wood floors and plaster walls with wood trim. A water fountain is present on the partition wall. A ceiling fan is centered on the ceiling in the restroom.

An unframed opening approximately 4 feet wide is situated at the north end of the partition wall, opening to the restroom. Two wood clerestory windows are present on the west wall of the restroom. Two sinks and four toilets are present in the restroom (Figure 188 and Figure 189). The restroom has a tile floor and tile wainscot that extends approximately 36 inches up the wall (Figure 190).



FIGURE 187. View of the women's restroom vestibule and partition wall.

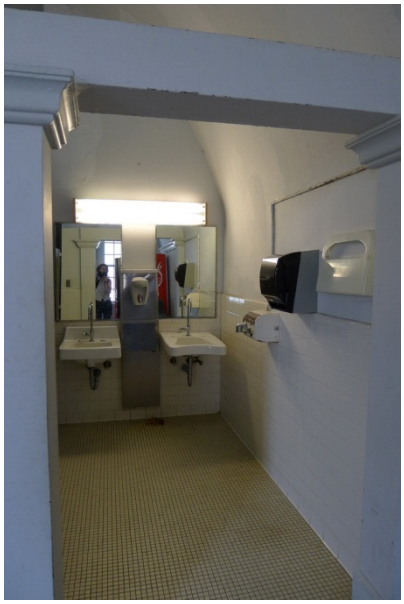


FIGURE 188. Two sinks in the women's restroom.



FIGURE 189. Universally accessible stall in women's restroom.



FIGURE 190. Toilet partitions in women's restroom. Also note ceramic tile floor and wainscot.

Cistern

The casemate south of the women's restroom and weapons work room has been interpreted to focus on the cistern located below the floor level of the casemate (casemate 63, Figure 191). The masonry structure of the fort is exposed. The casemate is entered through a wood, six-paneled door situated on the north end of the east wall of the casemate. The door has typical rim lock hardware with no deadbolt. Two, nine-over-nine wood double-hung windows are present south of door (Figure 192). The original floor was destroyed by fire but was left partially unreconstructed when the south gorge rooms were repaired in the 1930s, exposing the brick masonry cistern for interpretive purposes. A wood-framed deck surrounded by a wood-framed guardrail allows visitors to enter the room (Figure 193). The southwest portion of the casemate has no floor, exposing the cistern below. Two fireplaces remain in the room, one on the south wall, and the other on the west wall of the

casemate (refer to Figure 191). The fireplace on the west wall of the casemate is centered on the wall with two loop holes present on each side (Figure 194); no casement windows are present at these openings. Two arched niches are located along the north wall, and one is located at the west half of the south wall. All three of these niches are closed by wood-framed partition walls.



FIGURE 191. The floor was left unreconstructed to allow for interpretation of the cistern below.



FIGURE 192. Two, nine-over-nine wood double-hung windows in the cistern room.



FIGURE 193. A wood-framed deck allows visitors to walk over the exposed cistern.



FIGURE 194. The fireplace centered on the west wall of the cistern room.

Men's Restroom and Kitchen

The men's restroom (casemate 64) is situated directly south of the casemate with the exposed cistern. The men's restroom occupies the eastern portion of the casemate, while a kitchen for use by NPS employees is housed in the west portion of the casemate.

The men's restroom has a similar layout to the women's restroom to the north. The restroom is divided into vestibule and restroom spaces separated by a plaster partition wall approximately 7 feet in height. The vestibule is accessed through a wood, six-panel door at the south end of the east wall. Two, nine-over-nine wood double-hung windows are situated north of the door. The glass in the windows is frosted. The restroom vestibule has wood floors and plaster walls with wood trim. A water fountain is present on the partition wall. On the north wall of the restroom vestibule, adjacent to the opening, is a brick fireplace with a painted wood mantel (Figure 195). There is no hearth present at the fireplace. A ceiling fan is centered on the ceiling of the restroom.

An unframed opening approximately 4 feet wide is situated at the north end. The opening leads to the main portion of the restroom. Two wood clerestory windows are present on the west wall of the restroom (Figure 196). Two sinks and four toilets are present in the restroom (Figure 197 and Figure 198).The restroom has a tile floor, with tile wainscot that extends approximately 36 inches up the wall. A wood plank door leads to a closet in the niche located near the southeast corner of the room.

Directly west of the men's bathroom and in the same casemate is a kitchen utilized by NPS employees (Figure 199). The kitchen has a painted wood floor and plaster walls with a flattened barrel-vault ceiling. Two sets of two, ten-light wood casement windows are present at the north and south ends of the west wall. Wood picture rail trim lines the top of the room. A laminate counter with a sink extends along the east wall of the room (Figure 200). A stove and refrigerator are located at the north wall of the room. Above the counter and sink, solid wood panels have been installed over the clerestory windows seen in the adjacent men's restroom (Figure 201).



FIGURE 195. A fireplace is present on the north wall of the men's restroom.



FIGURE 196. A set of two clerestory windows are located on the west wall of the bathroom.



FIGURE 197. View of the men's restroom showing the lavatories.



FIGURE 198. Two sinks are present in the men's restroom.



FIGURE 200. A laminate counter extends along the east wall of the kitchen.



FIGURE 199. A view of the kitchen used by NPS employees west of the men's restroom.



FIGURE 201. Wood panels cover the clerestory windows seen in the men's restroom.

Ranger Office

South of the men's restroom is the ranger office (casemate 65). The office is accessed through a six-panel wood door located on the north end of the east wall. The door has typical rim lock hardware. Two, nine-over-nine wood double-hung windows are located to the south (Figure 202). The office has wood floors, plaster walls, and a plaster flattened barrel-vault ceiling. A ceiling fan with lights, as well as a circular vent, are located in the ceiling. A brick fireplace with a wood mantel is centered on the east wall of the room (Figure 203). A set of two, ten-light wood casement windows are situated on either side of the fireplace (Figure 204). A second fireplace is located at the east end of the south wall (Figure 205). Both brick fireplaces have wood mantels. Portable air conditioning units are present at each fireplace,

with exhaust ducts running up the chimney flue. A wood, six-panel door on the north wall of the office leads to the adjacent kitchen (Figure 206). A wood louvered opening is present directly north of the doorway (Figure 207). On the south wall, a connecting door leads to the adjacent casemate interpreted as Colonel Olmstead's Quarters.



FIGURE 202. The wood door and double-hung windows on the east end of the ranger office.



FIGURE 203. A brick fireplace is centered on the west wall of the ranger office.



FIGURE 204. A set of two casement windows are present on either side of the fireplace on the west wall.



FIGURE 205. A second fireplace is located on the south wall of the ranger office.



FIGURE 206. A six-panel wood door leads from the ranger office to the adjacent kitchen.



FIGURE 207. A wood louver vent between the ranger office and kitchen.

Colonel Olmstead's Quarters

The last casemate at the south end of the west side of the fort is interpreted as the quarters of Colonel Olmstead (casemate 66, Figure 208). The room has a wood floor, plaster walls, and a plaster flattened barrel-vault ceiling. The space is accessed through a six-panel wood door at the south end of the east wall. The door has typical rim lock hardware. Two, nine-over-nine wood double-hung windows are located north of the doorway. A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting access (Figure 209).

A brick fireplace with a marble mantel and hearth is centered on the west wall of the room (Figure 210). Two, ten-light wood casement windows are situated on either side of the fireplace. A second brick fireplace, with a marble mantel and hearth, is situated on the west end of the north wall (Figure 211). At these fireplaces, some marble pieces, including the pilaster bases, capitals, and top shelf pieces, are original. A barrel-vaulted niche with a six panel wood door is located west of the fireplace on the north wall (Figure 212). The door leads to the ranger office to the north.



FIGURE 208. Colonel Olmstead's quarters, view from the east.



FIGURE 209. A partition wall is used to restrict public access to the quarters.



FIGURE 210. The west wall of the quarters, showing the central fireplace and adjacent casement windows.



FIGURE 211. A second fireplace is present on the north wall of Olmstead's quarters.



FIGURE 212. A six-panel wood door leads to the ranger office to the north from Olmstead's quarters.

Guard Room

The first casemate north of the sallyport is interpreted as a guard room (casemate 59). The guard room is entered through a six-panel wood door located at the northeast corner of the room. Two, nine-over-nine wood double-hung windows are situated south of the door (Figure 213). The guard room has a wood plank floor, painted brick walls, and a brick barrel-vaulted ceiling.

Situated opposite the entrance into the guard room centered on the west wall is a brick fireplace with no mantle (Figure 214). Two, ten-light wood casement windows are located to either side of the fireplace (Figure 215). These windows have no trim.

A second fireplace, also constructed of brick, is situated on the east half of the south wall of the room (Figure 216). Both fireplaces have iron bar lintels. Directly west of the fireplace, near the center of the south wall, is a wood-framed opening with a wood door, approximately 4 feet in height, and about 2 feet from the floor (Figure 217). The

doorway covers a loop hole, which would have allowed troops stationed in the guard room to defend the fort against intruders in the sallyport (Figure 218).

The mechanisms that are used to operate the drawbridge in the adjacent sallyport are visible behind a wood plank doorway in an arched niche west of the fireplace on the south wall (Figure 219 and Figure 220).

Two arched niches on the north wall are closed by wood-framed partition walls.



FIGURE 213. A multi-panel wood door and two double-hung wood windows line the east wall of the guard room.



FIGURE 214. A fireplace on the west wall of the guard room.



FIGURE 215. The guard room, view from the southeast. Note the casement windows on the west wall.



FIGURE 216. A second fireplace is present on the south wall of the guard room.



FIGURE 217. A wood-framed opening on the south wall of the guard room.



FIGURE 218. The wood-framed opening covers a loop hole.



FIGURE 219. A wood plank door covers the mechanism used to operate the drawbridge.



FIGURE 220. The drawbridge mechanism.

Quartermaster's Quarters

Directly north of the guard room is the former quartermaster's quarters (casemate 58). The room has plaster walls and wood flooring and is accessed through a six-panel wood door at the south end of the east wall. Two, nine-over-nine wood double-hung windows are located north of the doorway (Figure 221). A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting access (Figure 222).

A brick fireplace with a wood mantel is centered on the west wall of the room (Figure 223). Two, ten-light wood casement windows are situated on each side of the fireplace (Figure 224).



FIGURE 221. The east wall of the quartermaster's quarters.



FIGURE 222. An L-shaped partition wall at the entrance to the quartermaster's quarters is used to prevent public access into the room.



FIGURE 223. The brick fireplace at the center of the west wall of the quartermaster's quarters.



FIGURE 224. The quartermaster's quarters, view from the east.

This room has three interior doors built of two layers of wood planks. Two of the doors are situated along the south wall of the room. Each door has a wood louvered vent above (Figure 225).

The southwest door, which leads to a closet containing the domestic water pressure tank and related equipment, is built of thick wood planks of uniform width, with large-headed nails clinched on the back side of the door, matching the sallyport doors (Figure 226 and Figure 227). There is significant wear at the locking bar on this door (Figure 228). The iron hardware has unevenly tapered edges, indicating that it was likely hand-forged (Figure 229). This door has a heavy build-up of paint layers. Based on the observed conditions, it is possible that this door dates to original construction. However, no door is indicated at this location on the 1934 existing condition drawings (refer to Appendix B).

The southeast door, which leads to a closet containing the main electrical transformer for the fort, is also built of thick wood planks of uniform width (Figure 230 and Figure 231). The horizontal planks on the back side are very wide tongue-and-groove boards (Figure 232). The door uses small-headed nails, similar to the northwest bastion door. The hardware is similar to the southwest door, although this door shows less evidence of wear (Figure 233). Based on the observed conditions, it is possible that this door also dates to original construction. However, no door is indicated at this location on the 1934 existing condition drawings (refer to Appendix B).

A wood door on the west side of the north wall of the room leads to the adjacent chapel to the north (Figure 234). The north door is built with smaller nails that are not clinched on the back side. It also lacks locking hardware. The boards are thinner and smaller than the other two doors in this room. The door also has narrow boards at its edges, rather than equally sized boards across the entire width or height of the door. The bolts attaching the hardware are machined rather than hand-forged. Based on these conditions, the north door is assumed to be a twentieth century reproduction.

A small passageway sits between the quartermaster room and the chapel to the north (Figure 235). The passage has plaster walls and a wood floor. Above the wood door leading to the chapel is a four-light wood transom window. Two smoke detectors are present in the room.



FIGURE 225. The doors along the south wall of the quartermaster's quarters.



FIGURE 226. The front face of the southwest door.



FIGURE 228. Detail of locking hardware on southwest door, showing heavy wear of wood.



FIGURE 227. The back side of the southwest door.



FIGURE 229. Detail of hardware on southwest door.



FIGURE 230. The front face of the southeast door.



FIGURE 231. The back side of the southeast door.



FIGURE 232. Detail of southeast door showing tongue-and-groove planks.



FIGURE 233. Detail of hardware on the southeast door.



FIGURE 234. A wood door on the north wall leads to the chapel.



FIGURE 235. The space between the chapel and the quartermaster's quarters.

Chapel

The main entryway into the chapel is situated at the north end of the west wall (casemate 57). A six-panel wood door and two, nine-over-nine wood windows are located at the west wall of the room (Figure 236). A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting their access.

The chapel has plaster walls, a plaster flattened barrel-vaulted ceiling, and wood plank flooring.

A brick fireplace with a wood mantel is centered on the west wall of the room (Figure 237). A set of two, ten-light wood casement windows are situated on each side of the fireplace.

Two wood doorways are present on the south wall of the room (Figure 238). Both doors are topped by four-light wood transom windows. One door leads to a closet, while the other leads to the connecting passageway to the quartermaster's quarters.

An arched niche with a wood door is situated on the west end of the north wall of the room (Figure 239). This door connects the chapel to the officers' quarters to the north.



FIGURE 236. The chapel, view from the north.



FIGURE 237. A brick fireplace is flanked by two pairs of casement windows on the west wall of the chapel.



FIGURE 238. Two multi-panel wood doors are present on the south wall of the chapel.



FIGURE 239. A view of the arched nook on the north wall of the chapel.

Officers' Quarters

The officers' quarters (casemate 56) is accessed through a wood six-panel door located at the south end of the east wall of the room (Figure 240). The door has typical rim lock hardware. Two, nine-over-nine wood windows are located north of the wood door. A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting their access.

The officers' quarters has plaster walls, a plaster flattened barrel-vaulted ceiling, and wood plank flooring. A brick fireplace with a wood mantel is centered on the west wall of the room (Figure 241). Two, ten-light wood casement windows are situated on each side of the fireplace.

Two wood doors are present on the south wall of the room. The western door is situated in an arched niche and leads to the chapel to the south. The door to the east is topped by a four light transom (Figure 242); this door leads to a closet. Another arched niche is present on the north wall. A wood door leads to the officers' mess located to the north (Figure 243).



FIGURE 240. The east wall of the officers' quarters. Note the two double-hung windows, and the wood-framed wall adjacent to the doorway leading to the room.



FIGURE 241. A brick fireplace is centered on the west wall of the officers' quarters. The fireplace is flanked by two casement windows on each side.



FIGURE 242. One of the doors located on the south wall of the officers' quarters.



FIGURE 243. A wood door leads to the officers' mess to the north. The door is situated in a nook.

Officers' Mess

The officers' mess (casemate 55) is accessed through a wood, six-panel door located at the north end of the east wall of the room. The door has typical rim lock hardware. Two, nine-over-nine wood windows are present south of the door (Figure 244). A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting their access.

The officers' mess has plaster walls, a plaster flattened barrel-vaulted ceiling, and wood plank flooring. A brick fireplace with a wood mantel is centered on the west wall of the room (Figure 245). Two, ten-light wood casement windows are situated on each side of the fireplace (Figure 246).

Two wood doors are present on the south wall of the room. The west door is situated in an arched niche and leads to the officers' quarters to the south. The door to the east is topped by a four light transom (Figure 247); this door leads to a closet. Another arched niche is present on the north wall. A wood door in this niche leads to the infirmary located to the north (Figure 248).



FIGURE 244. A multi-panel wood door and two wood double-hung windows line the east wall of the officers' mess.



FIGURE 245. A brick fireplace with wood mantel is centered on the west wall of the officers' mess.



FIGURE 246. A set of two wood casement windows flank the central fireplace on each side.



FIGURE 247. Two doors along the south wall lead to the officers' quarters to the south.



FIGURE 248. A door leading to the infirmary is present in an arched nook on the north wall of the officers' quarters.

Infirmary

The main entryway into the infirmary (casemate 54) is situated at the south end of the west wall. A six-panel wood door and two, nine-over-nine wood windows line the west wall of the room (Figure 249). The door has typical rim lock hardware. A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting their access.

The infirmary has plaster walls, a plaster flattened barrel-vaulted ceiling, and wood plank flooring.

A brick fireplace with a wood mantel is centered on the west wall of the room (Figure 250). Two, ten-light wood casement windows are situated on each side of the fireplace.

Two wood doors are present on the south wall of the room. The western door is situated in an arched niche and leads to the officers' quarters to the south. The door to the east is topped by a four-light transom (Figure 251); this door leads to a closet. Another arched niche is present on the north wall. A wood door leads to Colonel Brown's quarters located to the north (Figure 252).



FIGURE 249. A view of the northeast corner of the infirmary. Note the double-hung wood windows along the east wall.



FIGURE 250. A fireplace is present on the center of the west wall of the infirmary.



FIGURE 251. Two doors line the south wall of the infirmary.



FIGURE 252. A wood door leading to Colonel Brown's quarters is present in an arched nook on the north wall of the infirmary.



FIGURE 253. A multi-panel, wood door and two double-hung wood windows are present along the east wall of Colonel Brown's quarters.

Colonel Brown's Quarters

Colonel Brown's quarters (casemate 53) is accessed through a wood, six-panel door located at the south end of the east wall of the room. The door has typical rim lock hardware. Two, nine-over-nine wood windows are present south of the door (Figure 253). A wood-framed wall, L-shaped in plan and with two fixed window openings and a wood door with a glass insert, allows visitors to view the room, while restricting their access.

Colonel Brown's quarters has plaster walls, a plaster flattened barrel-vaulted ceiling, and wood plank flooring. A brick fireplace with a wood mantel is centered on the west wall of the room (Figure 254). Two, ten-light wood casement windows are situated on each side of the fireplace (Figure 255).

Two wood doors are present on the south wall of the room. The western door is situated in an arched niche and leads to the infirmary to the south (Figure 256). The door to the east is topped by a four-light transom (Figure 257); this door leads to a closet.



FIGURE 254. A brick fireplace is centered on the west wall of Colonel Brown's quarters. The plaster work has since been completed.



FIGURE 255. One of the two sets of casement windows that flank the fireplace along the west wall of the room. The plaster work has since been completed.



FIGURE 256. A view of Colonel Brown's quarters looking southwest. Note the arched nook on the south wall. The plaster work has since been completed.



FIGURE 257. The easternmost door along the south wall of Colonel Brown's quarters.

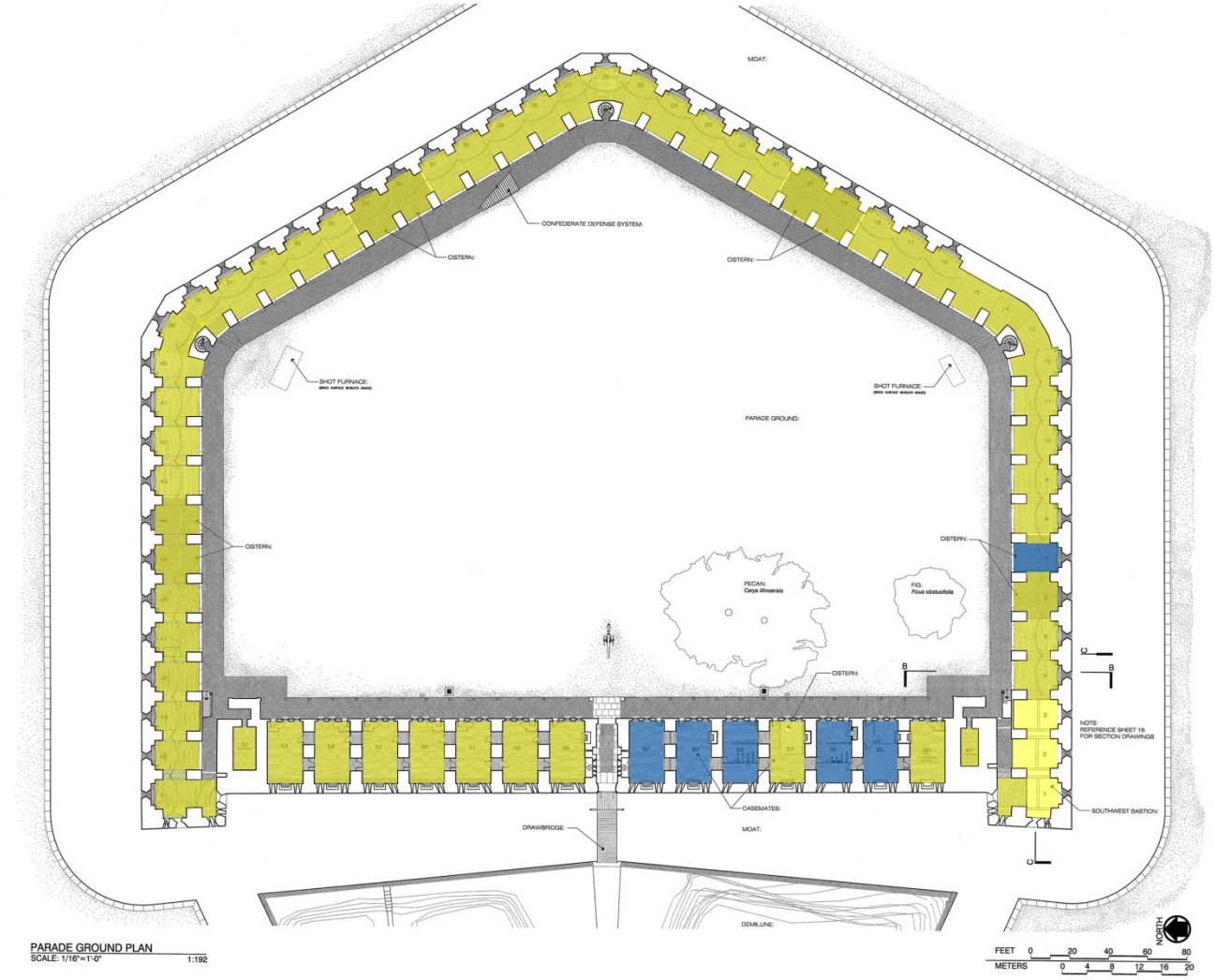


FIGURE 258. Overview plan, showing casemates used for interpretation of the history and construction of the fort (yellow) as compared to contemporary NPS management functions or public services (blue).

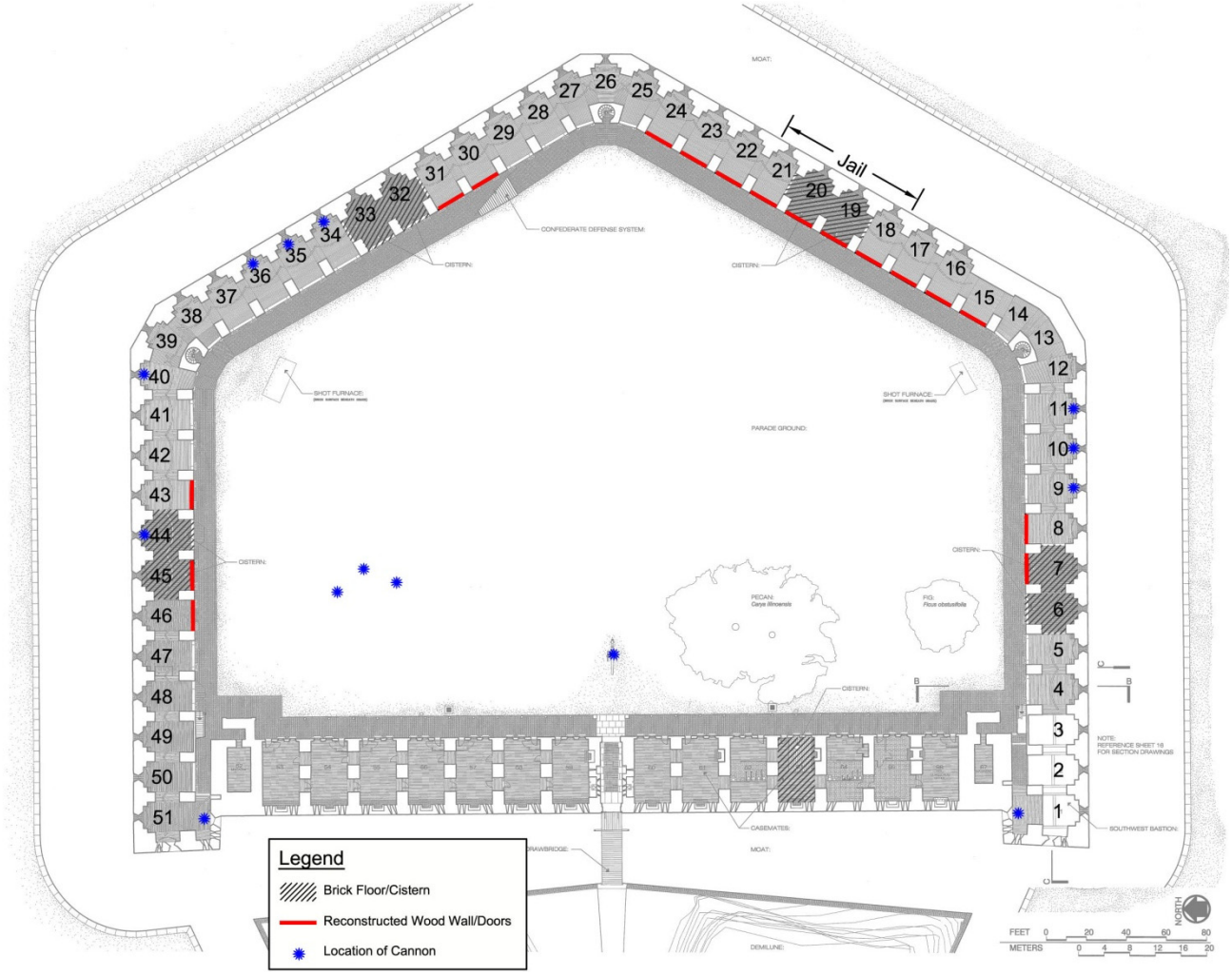


FIGURE 259. Overview plan of the casemates showing existing conditions.



FIGURE 260. Overview plan indicating dates of existing flooring material.

Casemates

Fifty-one casemates line the north, northeast, southwest, and south walls around the parade ground (Figure 259). The casemates are defined by brick masonry arched-openings that span the width of the casemates (Figure 261). The casemates are numbered consecutively starting at the southwest corner of the fort.

A typical casemate has exposed brick masonry walls with a masonry barrel-vault ceiling (Figure 262). Arched openings connecting adjacent casemates are present on the long sides of the casemates. An embrasure is present at the center of the exterior wall of a typical casemate (Figure 263). An open vent is present above the embrasure, allowing smoke from cannon fire to be vented from the space (Figure 264).



FIGURE 261. A typical casemate opening.



FIGURE 262. The interior of a typical casemate.



FIGURE 263. An embrasure is centered in the center of the exterior wall of a typical casemate.



FIGURE 264. A vent opening in the ceiling is present near the outside walls of a typical casemate.

Two flooring types are present in the casemates. The majority of the casemates have wood plank flooring, with the wood running the width of each casemate (Figure 265). Curved cast iron tracks that allow cannon carriages to be easily rotated without wear or damage to the wood floor are embedded in the wood flooring (Figure 266). Typically, three vintages of wood flooring are present in the casemates. The oldest portions are presumed to date to original construction or Civil War-era repairs; other portions are assumed to date to 1930s restoration work; and newer portions are treated wood installed within the last ten years (refer to Figure 260). The park periodically inspects and replaces flooring as necessary. The open space covered by wood flooring allowed for air flow throughout the fort. In the casemates located over the cisterns, the floors are made of brick. The brick is laid in a running bond pattern (Figure 267). Sandstone is inlaid in the brick floors to accommodate cast iron rails (Figure 268).

The floor structure at each typical casemate is supported over an open crawlspace with an earthen floor. The crawlspace is vented by stone-framed openings just outside each casemate within the parade ground walk (Figure 269) as well as through wood-framed open slats in the casemate floor near the embrasure (Figure 270).



FIGURE 265. View of a typical wood casemate floor. The heavily worn portion of the wood floor at the far left is original. The weathered portion at the middle dates to 1934–1935. The brown-colored wood at the right is treated wood installed within the last ten years.



FIGURE 266. Iron tracks are embedded in the casemate floor to avoid wear from the cannon carriage wheels.



FIGURE 267. Casemates at the cistern locations have brick floors.



FIGURE 268. The brick floors have sandstone bands where the iron cannon carriage tracks were located.



FIGURE 269. Stone-framed crawlspace vent opening in the parade ground walk.



FIGURE 270. Wood-framed crawlspace vent in the casemate floor.

The arched openings have been filled in at seventeen casemates with a wood-framed wall similar to what was originally present at the casement openings (Figure 271), as described

further below. Where no wood-framed wall is present, abandoned metal inserts that anchored the wall construction are usually visible at the masonry around the opening to the casemate.

A set of double doors is located at the center of the wall. The doors are wood-framed, with vertical wood planks visible from the exterior of the casemate. A black metal strap hinge is present at the top and base of each door. Two window openings flank the double doorway. The openings are covered by shutters constructed in a similar manner to the adjacent doors. Two strap hinges are present on each shutter. An additional two window openings are located directly above the door head. The small openings are covered by shutters. The casemate number is painted on the wall, between the two small windows.



FIGURE 271. Several casemate openings have been filled in with a wood-framed wall.

Casemates 13, 26, and 39 are situated at the corners of the fort, behind the masonry spiral staircases (Figure 272 and Figure 273), and therefore are not visible from the parade ground. These casemates are pie-shaped in plan, as opposed to rectangular in plan like the majority of the other casemates.



FIGURE 272. The spiral staircase at casemate 26.



FIGURE 273. Detail of the spiral staircase at casemate 26, showing wood door and stone stair treads.

The following list describes features unique to the various casemates in Fort Pulaski.

Casemates 1 through 3

- No wood floor construction exists at these casemates, with the masonry walls below floor level visible to visitors (Figure 274). The floors in these casemates were destroyed by fire and purposefully omitted during restoration in the 1930s to allow for interpretation.
- An original 24-pounder Flank Howitzer (model 1844) on a reproduction wood garrison carriage is present at the embrasure at the north wall of casemate 1.
- Brick flooring is present in the north portion of casemate 2.



FIGURE 274. There is no floor present in casemates 1 through 3.

Casemate 4

- Remnant whitewash is present on the brick walls and ceiling.
- There are iron inserts at the vault.
- Wood flooring is present in casemate 4.

Casemate 5

- Remnant whitewash is present on the brick walls and ceiling.
- There are iron inserts at the vault.
- Wood flooring is present in casemate 5.

Casemate 6

- A brick ramp leads from the adjacent brick walk to the floor of the casemate.
- Remnant whitewash is present.
- The casemate has a brick floor. The brick is laid in a running bond pattern.
- Brick flooring is present in casemate 6.

Casemate 7

- Casemate 7 is enclosed and used for maintenance storage (Figure 275).
- A wood-framed wall separates the casemate from those to the east and west (Figure 276).
- A four-light wood hopper window is present at the embrasure (Figure 277).
- Brick flooring is present in casemate 7.

Casemate 8

- The casemate is enclosed with a wood-framed wall in the arched opening.
- Casemate 8 is interpreted as a store house (Figure 278).
- A wood burning stove sits adjacent to the embrasure with a ventilation pipe extending up toward the ceiling.
- A wood-framed wall separates the casemate from those to the east and west.
- A four-light wood hopper window is present at the embrasure.
- Wood flooring is present in casemate 8.



FIGURE 275. The interior of casemate 7, which is currently used for storage.



FIGURE 277. Four-light wood hopper windows are present in the embrasures in casemates 7 and 8.



FIGURE 276. Wood-framed walls separate casemates 7 and 8 from adjacent casemates to the north and south.



FIGURE 278. Casemate 8 is currently interpreted as a storeroom.

Casemate 9

- Remnant whitewash is present on the brick walls and ceiling.
- An iron rod is installed vertically at the embrasure.
- A wood floor is present, with portions possibly dating to the nineteenth century.
- A reproduction wood field carriage is on display in casemate 9.

Casemate 10

- A brick ramp leads from the adjacent brick walk to the floor of the casemate.
- Remnant whitewash is present.
- The casemate has wood flooring, with portions at the south half and cross vaults dating to 1934–1935.
- A reproduction brass 32-pounder Seacoast Cannon (model 1841) is on display in casemate 10 (Figure 279). This cannon is mounted on a field carriage, rather than a pivoting carriage anchored to the embrasure.



FIGURE 279. Cannon displayed in casemate 10.

Casemate 11

- A brick ramp leads from the adjacent brick walk to the floor of the casemate.
- Remnant whitewash is present at the walls and ceilings.
- Wood flooring is present.
- A reproduction 32-pounder Seacoast Cannon (model 1841) on a wood carriage is present at the embrasure in casemate 11.

Casemate 12

- The arched opening is narrower than what is seen at a typical casemate due to its location near the southeast corner of the fort.
- Wood flooring is present, with portions at the south half of the casemate likely dating to the nineteenth century.

Casemate 13

- The casemate does not open to the parade ground, as one of the spiral stairs is situated in front of the casemate.
- No embrasure is present in casemate 13.
- Wood flooring is present.

Casemate 14

- The arched opening is narrower than what is seen at a typical casemate due to its location near the southeast corner of the fort.
- No embrasure is present in casemate 14.
- Wood flooring is present.

Casemate 15

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- No embrasure is present in casemate 15.
- Wood flooring is present.

Casemate 16

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- Extensive whitewashing is present on the walls and ceilings.
- Wood flooring is present, with the southeast portion likely original.

Casemate 17

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- The majority of the walls and ceiling have been whitewashed.
- Wood flooring is present.

Casemates 18 through 21

- The casemates are enclosed with reconstructed wood-framed walls in the arched openings.
- Casemates 18 through 21 have been interpreted as a jail which was present at the fort during the Civil War (Figure 280).

- Bars are present in the arched openings in these casemates behind the wood-framed walls (Figure 281).
- Metal bars are present on the embrasure openings (Figure 282).
- Bars are installed between casemates 17 and 18 as well as between casemates 20 and 21.
- The walls and ceilings in these casemates are largely whitewashed.
- A brick floor is present in casemates 19 and 20.
- Wood flooring is present in casemates 18, 20, and 21.



FIGURE 280. Casemates 18 through 21 have been interpreted as a jail that was housed in the fort during the Civil War.



FIGURE 281. A view of casemates 18 through 21.



FIGURE 282. Bars are present in the embrasure openings at casemates 18 through 21.

Casemate 22

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- Remnant whitewash is present at the walls and ceilings.
- A wood-framed wall is present between casemates 22 and 23.
- Wood flooring is present.

Casemate 23

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- Remnant whitewash is present at the walls and ceilings.
- Wood flooring is present.

Casemate 24

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- Remnant whitewash is present at the walls and ceilings.
- A wood-framed wall is present between casemates 24 and 25.
- Wood flooring is present.

Casemate 25

- The arched opening is narrower than what is seen at a typical casemate due to its location near the east corner of the fort.
- Wood flooring is present.

Casemate 26

- The casemate does not open to the parade ground, as one of the spiral stairs is situated in front of the casemate.
- Wood flooring is present.

Casemate 27

- The arched opening is narrower than what is seen at a typical casemate due to its location near the east corner of the fort.
- Wood flooring is present, with portions possibly dating to the 1930s at the outer half.
- Remnant whitewash is present at the walls and ceilings.

Casemates 28 through 29

- Wood flooring is present at both casemates.

Casemate 30

- A reconstructed portion of the Confederate defense system is visible at casemate 30, at the northeast portion of the fort (Figure 283). This system, reconstructed in the 1980s, consists of wood timber cribbing leaning against the fort and covering the casemate openings. The Confederate forces occupying the fort constructed the original system in preparation for Union attacks.
- The casemate is partially enclosed with a reconstructed wood-framed wall in the arched opening.
- Wood flooring is present. A replica iron gun carriage has been installed.



FIGURE 283. A reconstructed portion of the confederate defense system at casemate 30.

Casemate 31

- The casemate is enclosed with a reconstructed wood-framed wall in the arched opening.
- Wood flooring is present.

Casemate 32

- A brick floor is present in casemate 32.

Casemate 33

- A brick floor is present in casemate 33.

Casemates 34 through 36

- Wood flooring is present in all three casemates, with portions dating to the 1930s still intact.
- Reproduction 32-pounder Seacoast Cannon (model 1841) on reproduction wood casemate carriages are present in all three casemates.

Casemate 37

- Graffiti dating to 1899 is present at the pier between casemates 36 and 37.
- Wood flooring is present, with portions up to the curved gun track dating to the 1930s.

Casemate 38

- The arched opening is narrower than what is seen at a typical casemate due to its location near the northeast corner of the fort.
- Wood flooring is present, with portions up to the curved gun track dating to the 1930s.

Casemate 39

- The casemate does not open to the parade ground, as one of the spiral stairs is situated in front of the casemate.
- Remnant whitewash is present at the walls and ceilings.
- Wood flooring is present.

Casemate 40

- The arched opening is narrower than what is seen at a typical casemate due to its location near the northeast corner of the fort.
- Wood flooring is present, with portions up to the curved gun track dating to the 1930s.
- An original 42-pounder Seacoast Cannon (model 1831) on a reproduction wood carriage is on display in casemate 40.

Casemates 41 through 43

- Wood flooring is present at all three casemates, with portions up to the curved gun track dating to the 1930s.
- A reproduction Civil War limber with ammunition box, used for the park's Historic Weapon Program, is stored in casemate 43.[201]

Casemate 44

- A brick floor is present in casemate 44.
- Remnant whitewash is present at the walls and ceilings.
- Brick flooring is present in casemate 44.
- A reproduction brass 12-pounder Field Howitzer (model 1841) cannon on a reproduction wood field carriage is on display in casemate 44.

Casemate 45

- A brick floor is present in casemate 45.
- Remnant whitewash is present at the walls and ceilings.
- A wood-framed wall is present between casemates 45 and 46.
- Brick flooring is present in casemate 45.
- Cannon assembly equipment is on display.

Casemates 46 through 48

- Wood flooring is present at all three casemates, with portions up to the curved gun track dating to the 1930s. Cannon assembly equipment is on display in casemate 47 (Figure 284).
- A wood burning stove sits adjacent to the embrasure in casemate 46 with a ventilation pipe extending up toward the ceiling.
- A wood hopper is present at the embrasure opening in casemate 46.



FIGURE 284. Cannon equipment displayed in casemate 47.

Casemate 49

- Casemate 49 is located behind stairs leading to the terreplein.
- Wood flooring is present.

Casemate 50

- A brick floor is present in casemate 50.
- Remnant whitewash is present at the walls and ceilings.

201. The limber, which was pulled by a team of six horses, was often used to transport the artillery piece and ammunition on the battlefield.

Casemate 51

- Casemate 51 is located at the northwest bastion.
- A niche is present at the south wall.
- Wood flooring is present.
- A reproduction 24-pounder Flank Howitzer (model 1844) on a reproduction wood garrison carriage is on display at the south wall embrasure.
- The door from the parade ground to the northwest bastion is a wood plank door constructed of four vertical boards affixed to three horizontal interior boards. The door includes two gun slots and has iron hardware. This door is thought to be original due to its style of construction and the use of southern yellow pine.[202]

Powder Magazines

At the north and south ends of the west wall of the fort, at locations that would be numbered as casemates 52 and 67, are two powder magazines.

Casemate 67, the south magazine, is rectilinear in plan and has a barrel-vaulted ceiling. The walls and ceiling are clad with horizontally laid wood planking (Figure 285).

Casemate 52, the north magazine, is also rectilinear in plan. The room has brick walls and a brick barrel-vaulted ceiling. Wood plank floor is present in the room. A number of replica powder barrels have been placed in the room for interpretive purposes (Figure 286). The timbers within this magazine may be original.

Entries to the casemates in the northwest and southwest bastions are set back from the enclosure protecting the magazine rooms.



FIGURE 285. Interior of the south powder magazine (casemate 67).



FIGURE 286. Interior of the north powder magazine (casemate 52).

202. Levitan.

Terreplein

The terreplein is the elevated area at the perimeter of the fort above the casemates. An intricate drainage system is associated with the casemate ceilings (Figure 287). This system includes a layer of lead over the structure of the casemates. An interior gutter runs between casemates, leading to lead pipes enclosed in the brick piers. Oyster shell was originally placed over the sheet lead prior to earth being added. The earth forms the terreplein surface. The terreplein is largely covered by grass (Figure 288).

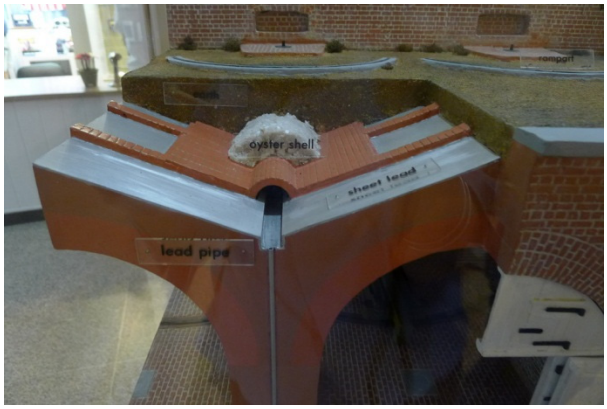


FIGURE 287. Model of the fort showing construction of waterproofing and drainage for casemates and terreplein. At Fort Pulaski National Monument visitor center.



FIGURE 288. The majority of the terreplein is covered by grass.

Stairs to the terreplein are located north and south of the colonnade. The north stair is partially enclosed. An arched opening provides access to the stairways (Figure 289). The bottom half of the staircase is sheltered by a sheet metal-covered shed roof. A circular louvered vent is situated above the opening leading to the stairway. Partway up the stair, a circular opening in the wall provides ventilation into casemate 49. At the top of the stair, a 24-inch-high brick wall edges the north and west sides of the stair opening (Figure 290).

At the south stair, a shorter wall that follows the rise of the stairs is present (Figure 291). Based on the rough parge coating at the top of the wall, it is likely this stair was originally enclosed in a similar manner to the north stair. Partway up the stair, similar to the north stair, a circular opening in the wall provides ventilation into casemate 3.



FIGURE 289. The enclosed stairway leading to the terreplein at the northwest corner of the fort.



FIGURE 290. The northwest stair to the terreplein.



FIGURE 291. The stairway at the southwest corner of the fort is not enclosed.

Spiral staircases are located at the southeast, east, and northeast corners of the parade ground that lead to the terreplein above (Figure 292). The staircases are constructed of stone. Each doorway includes a sandstone surround (Figure 293). Cast iron railings surround the stair openings at the terreplein level (refer to Figure 292).

Wood doors are located at the bottom of each spiral staircase facing the parade ground. These doors are built of two layers of tongue-and-groove planking, with ten vertical planks to the exterior (parade ground) and eight horizontal planks to the interior (stair). The layers are joined by iron nails, and the doors are supported on iron strap hinges. The doors have keyholes but currently lack any lockset. These doors are thought to be original, dating to 1846, due to their style of construction and the use of southern yellow pine.[203]

Brick paved walkways extend onto the terreplein for several yards from each of the five staircases (Figure 294). These walkways are only located adjacent to the staircases, and do not extend around the terreplein.



FIGURE 292. One of the spiral staircases that lead to the terreplein.

203. Levitan.



FIGURE 293. Entrance from the parade ground to one of the spiral staircases.



FIGURE 294. Brick-paved walkways extend from the spiral staircases on the terreplein level.

The exterior wall of the fort extends above the terreplein floor approximately 4 feet in most locations (Figure 295). Where the original exterior wall is intact, the exposed coping consists of brick in a running bond pattern. The outer half of the coping slopes down toward the exterior of the fort. Portions of the wall are damaged, and do not extend the full height of the majority of the wall (Figure 296). At some locations, the irregular bricks at damaged areas are parged with a cementitious coating as a coping. Vent openings from the casemates below and from chimneys at the rooms of the west side of the fort are present at the coping; these vent openings usually have an iron frame (Figure 297).

Coping stones at the same height as the grass surface of the terreplein line its interior edge (Figure 298); no railing or guard is present at most locations. At the coping along the west side only, embedded pipes at regular intervals are present. These pipes are remnants of a railing system that was constructed in the late nineteenth century when the caretaker's house was present on the terreplein. (Figure 299). The railing was removed after it was damaged when the adjacent house burned down in 1925.



FIGURE 295. The exterior walls of the fort extend past the terreplein level approximately four feet.



FIGURE 296. A view of a damaged portion of the parapet wall.



FIGURE 297. Iron frames at casemate vent openings.



FIGURE 298. Coping stones line the interior edge of the terreplein.



FIGURE 299. At the coping along the west side, remnants of embedded pipes at regular intervals suggest that a railing may formerly have been present.

At the west side of the terreplein, granite-framed openings with iron grilles mark the openings to chimneys for fireplaces in the rooms below.

Additionally, low brick vent stacks with stone copings are located at the wall along the colonnade (Figure 300 and Figure 301).

A wood flagpole is present on the terreplein level at the center of the west portion of the fort (Figure 302). Three wood platforms holding cannon are also present along the west side of the fort (Figure 303).



FIGURE 300. West side of the terreplein. Granite-framed openings with iron grilles mark the openings to chimneys for fireplaces in the rooms below.



FIGURE 301. Low brick vent stacks with stone copings are located at the wall along the colonnade.



FIGURE 302. A wood flagpole is present near the center of the west portion of the fort.



FIGURE 303. One of three elevated wood platforms along the west side of the fort.

The terreplein was designed to accommodate fifty-one emplaced guns, but it is not known how many gun mounts were constructed originally. Typically, each terreplein gun mount is centered on the dividing wall between two casemates below, with additional mounts located at the corners of the northwest and southwest bastions. Two types of gun mounts are present today: an original design and an 1855 design. Thirty-two existing gun mounts, dating to original construction circa 1839–1842, include semicircular granite tracks with inlaid iron rails, to allow cannon to be rotated. At the center of each mount is a raised brick pad with iron dowel to secure the gun (Figure 304 and Figure 305). The outer wall is notched at the location of the gun mount. At some gun mounts, brick pavers are present between the granite tracks and the raised brick pad. Four similar quarter-circle gun mounts are located on the west wall and at the northwest and southwest bastions (Figure 306).

Thirteen additional existing gun mounts are located at the northeast and southeast sides of the terreplein, above casemates 22 through 33 (Figure 307). These gun mounts, designed in 1855 and constructed between 1855 and 1860, include raised octagonal granite bases supporting iron circular rails. A granite pad and iron dowel and ring are located at the center of the mount; the space between the granite pad and the perimeter is filled with tabby concrete. The outer wall has a chamfered offset in front of each base, as well as a recessed niche aligned to the center of the mount. Three guns are placed near the east corner of the fort to interpret how these gun mounts were utilized (Figure 308).



FIGURE 304. Original type of terreplein gun mount. Stone track with inlaid iron rails in a semicircular shape along the exterior walls of the terreplein.



FIGURE 305. This gun is mounted to interpret how the masonry and iron gun mounts were utilized.



FIGURE 306. Similar quarter-circle gun mounts at the northwest bastion.



FIGURE 307. Raised gun mounts of the 1855 design along the northeast wall of the fort.



FIGURE 308. Two of three guns installed at the raised mounts.

A number of original cannon are displayed at the terreplein level. The positions described below refer to the location of each gun mount at the dividing wall between the numbered casemates below.

- Position 1/2: original 30-pounder Parrott Rifle (model 1862) on a reproduction wood siege carriage, placed atop a reproduction wood platform over the fixed gun mount.
- Position 13/14: original 8-inch Confederate Columbiad (model 1861) on a reproduction wood center-pintle carriage. This cannon was present in the fort during the Civil War.
- Position 21/22: original 24-pounder Naval Cannon (model 1835) on a reproduction wood center-pintle carriage.
- Position 24/25: original 24-pounder Blakely Rifle (pattern of 1861) on a reproduction wood center-pintle carriage. This cannon was present in the fort during the Civil War.
- Position 25/26: original 6.4-inch Double Branded Brooke Rifle (unknown year) on a reproduction wood center-pintle carriage.
- Position 27/28: original 24-pounder Blakely Rifle (pattern of 1861) on a reproduction wood center-pintle carriage. This cannon was present in the fort during the Civil War.
- Position 43/44: reproduction 8-inch Parrott Rifle (model 1861) on an original front pintle carriage.
- Position 47/48: iron front-pintle carriage (no cannon tube present).
- Position 55/56: wood platform only.
- Position 64/65: original 30-pounder Parrott Rifle (model 1861) on a reproduction wood siege carriage, placed atop a reproduction wood platform over the fixed gun mount.

Condition Assessment

Moat

The following notable conditions were observed at the moat:

- Mortar joints at the brick masonry wall on the outer edge of the moat are cracked and show signs of deterioration (Figure 309).
- Step cracking was observed in the brick masonry at portions of the outer moat wall (Figure 310).
- Individual bricks are loose and at risk of falling into the adjacent moat (Figure 311). In some areas, bricks are already missing from the wall. (Figure 312).
- At the moat outer wall, above the sluice gate portal, areas of brick are missing above and within the vault, and cracking is present at the face of the brick masonry vault. Plant growth is occurring at this area (Figure 313).
- Significant erosion of mortar joints was observed in the underside of the archway over the drainage canal (Figure 314).



FIGURE 309. A view of cracked and deteriorated mortar joints along the moat wall.



FIGURE 310. Step cracking along the outer moat wall.



FIGURE 311. A loose brick in the moat wall.



FIGURE 312. Bricks are missing at portions of the moat wall.



FIGURE 313. Cracking of brick units at the arched opening where the canal meets the moat.



FIGURE 314. Significant deterioration of mortar joints was observed at the underside of the archway over the drainage canal.

Demilune

The following condition issues were observed at the demilune:

- Biological growth was observed in association with the concrete walls throughout the demilune (Figure 315).
- Cracking of the concrete walls was observed (Figure 316).
- The concrete floor of the interior demilune spaces shows signs of deterioration (refer to Figure 129).
- Signs of water infiltration are visible on the ceiling of the interior portions of the demilune (Figure 317). This staining is particularly severe at the south magazine corridor.
- Biological growth is present on the wall and ceiling surfaces of the interior portions of the demilune that are exposed to the exterior (Figure 318).
- Biological growth was observed on the brick masonry retaining walls of the demilune (Figure 319).
- Mortar joints in the brick masonry retaining walls are deteriorated (Figure 320).
- Hard repointing mortar and spalled and loose brick were observed near the northeast corner. Diagonal cracking suggests that this corner may be shifting outward (Figure 321).
- At the south half of the east wall near the southeast magazine, efflorescence is present on the brick masonry (Figure 322).
- At the southeast corner, diagonal cracking on both faces suggests that this corner may be shifting outward (Figure 323 and Figure 324).
- Occasional spalled bricks and eroded joints were observed in the south wall, especially just above the high water line. However, most areas of pointing are intact (Figure 325).
- Some areas where the grass surfaced form of the demilune meets paved surfaces are suffering from scalping of the turf and damage to adjacent tabby and other masonry materials.



FIGURE 315. Biological growth is present on the concrete walls throughout the demilune.



FIGURE 316. Some of the demilune's concrete walls exhibit cracking.



FIGURE 317. Signs of water infiltration is evident in interior portions of the demilune.



FIGURE 318. Biological growth is present over exposed portions of the demilune.



FIGURE 319. Biological growth is evident along the masonry walls of the demilune.



FIGURE 320. The mortar joints of the demilune masonry walls show signs of deterioration.



FIGURE 321. Hard repointing mortar and spalled and loose brick were observed near the northeast corner. Diagonal cracking suggests that this corner may be shifting outward.



FIGURE 322. At the south half of the east wall near the southeast magazine, efflorescence is present on the brick masonry.



FIGURE 323. At the southeast corner, diagonal cracking on the east faces suggests that this corner may be shifting outward.



FIGURE 324. At the southeast corner, diagonal cracking is also present on the south face.



FIGURE 325. Occasional spalled bricks and eroded joints were observed in the south wall, especially just above the high water line.

Outer Walls

The following notable conditions were observed at the outer walls of the fort:

- The face of the brick masonry units is deteriorated in several locations (Figure 326).
- Mortar joints, particularly at the base of the fort walls, are significantly deteriorated (Figure 327). Mortar is missing in several areas (Figure 328).
- An inappropriate mortar mix appears to have been used in several areas of the outer walls. The mortar appears to be harder than the adjacent brick in these areas, as the mortar has remained intact and extends above the eroded, friable surface of the brick unit (Figure 329).
- Organic growth is visible, particularly at higher portions of the outer walls (Figure 330).
- Biological growth was observed in several areas along the outer walls of the structure (Figure 331).
- At all areas, there is a heavy encrustation of oyster shells up to the high water line (Figure 332). There is no obvious indication that the oyster shells are causing accelerated or unusual deterioration of the masonry.
- At most areas, a zone of the wall several feet above the high water line is apparently prone to rising damp; more significant erosion of brick, loss of mortar, and evidence of varying repointing campaigns was observed in this zone as compared to the higher portions of the walls. Minor efflorescence was noted in areas associated with this rising damp. (Efflorescence consists of soluble salts carried through the masonry and deposited on the surface by moving water. The source of the salts may include cement and other masonry constituents, as well as salts carried by the brackish water in the moat. Although not observed here, extensive or severe efflorescence can result in damage to the masonry.)
- Also, evidence of previous, inappropriately hard pointing mortar was commonly observed in this zone (Figure 333).
- At most areas, plant growth is occurring within joints at the parapet wall and at areas just below the sandstone watertable (Figure 334).
- At the west wall of the southwest bastion: eroded brick units were observed just above the escarpment. Both brown and red brick types are eroded. In this area, older, pointing mortar that appears to be overly hard is present (Figure 335). Efflorescence is present around the embrasures, and the sandstone sills and heads are eroded at the exposed face. Near the top of the wall, plants are growing from joints at both the parapet wall and from areas just below the sandstone watertable (Figure 336).
- At the south wall, various hard repointing mortars present on the walls are likely causing accelerated deterioration of the underlying setting mortar. In some areas, a thin crust of twentieth century pointing mortar is present behind loose sand or fully eroded joints (Figure 337).
- At casemate 11, the large areas of Civil War-era damage at the wall above the embrasure

appear to be stable; all joints are pointed at the exposed broken masonry surface (Figure 338).

- At casemate 12, the large area of Civil War-era damage below and west of the embrasure has a few potentially unstable brick units; unfilled mortar joints are present (Figure 339).

- At casemates 13 through 15, the brick used for Civil War-era repairs has more widespread deterioration and spalling of the face than the original portions of the walls (Figure 340). At the area of casemates 13 and 14, newer red bricks are intermixed in the wall; this may represent CCC-era or later repairs (Figure 341). Also in this area, hard repointing mortar is present in the zone above the high water line; spalling and erosion of brick faces is widespread in this area (Figure 342 and Figure 343).

- At casemate 18, at the area of Civil War-era damage below and south of the embrasure, many loose and eroded brick units were observed. The joints in this area are heavily eroded, and remaining setting mortar is sandy and lacks cohesion (Figure 344). However, this area has been relatively stable over time, based upon a comparison of older photographs to present conditions (Figure 345 and Figure 346).

- At casemate 25, at the area of Civil War-era damage below the embrasure, many open and eroded joints were observed. Deteriorated mortar and loose sand are falling from the joints. Some brick units may be loose. Also, efflorescence was observed on the surface of the brick units within the damage above the embrasure (Figure 347).

- At casemate 26, the area of Civil War damage below the embrasure appeared generally stable, with intact joints (Figure 348). There is an open crack in the wall extending above and below the embrasure.

- At casemates 27 and 28, vertical cracks were observed aligned to the embrasures (Figure 349).

- The northeast wall is generally in fair to good condition, except for some erosion of bricks and pointing mortar in the zone just above the high water line. Also, there is an approximately 2 foot high strip of mismatched repointing work, extending across casemates 35 through 38 in the field of the wall above the embrasures (Figure 350). It is not known why this localized area required repair in the past, although the mortar appears stable at this time.

- At casemate 39, white-colored lichen growth is present on the wall surface. There is an open crack in the wall directly below the embrasure.

- At casemate 46, there is a roughly cut opening through the wall; the joints and brick units around this opening appear generally stable (Figure 351).

- The west exterior wall is generally in fair to good condition, although mortar joints in the zone above the high water line are consistently significantly eroded along this wall (Figure 352 through Figure 354).

- At casemate 52, there is an area of eroded mortar joints above the vent openings of the casemate (refer to Figure 352 and Figure 353).

- Along the south face of the northwest bastion, significant plant growth is present on the parapet wall and below the sandstone watertable (Figure 355). Near the corner of the bastion, diagonal cracking suggests that the plant growth may be causing displacement of the adjacent masonry (Figure 356).

- At casemate 61, pipes for the geothermal mechanical system exit the wall just above the high water line at this point.

- At casemate 62, an open drain pipe discharges directly into the moat. This pipe is apparently connected to the weapons work room sink (Figure 357). Water drains down the brick wall surface.

- At casemate 63, several brick units are loose at a vent opening approximately 2 feet above the high water line (Figure 358).
- At casemate 64, pipes for the geothermal mechanical system exit the wall just above the high water line at this point.
- At casemates 66 and 67, there are several areas of eroded mortar joints above the vent and embrasure openings (Figure 359).
- At the north wall of the southwest bastion, significant lichen growth is present on the wall in this area (Figure 360). Also, organic staining and plant growth is widespread on this wall, at the parapet and below the sandstone watertable (Figure 361).



FIGURE 326. The face of the brick units on the outer walls is deteriorated in several locations.



FIGURE 327. Mortar joints show signs of deterioration in several locations along the outer walls.

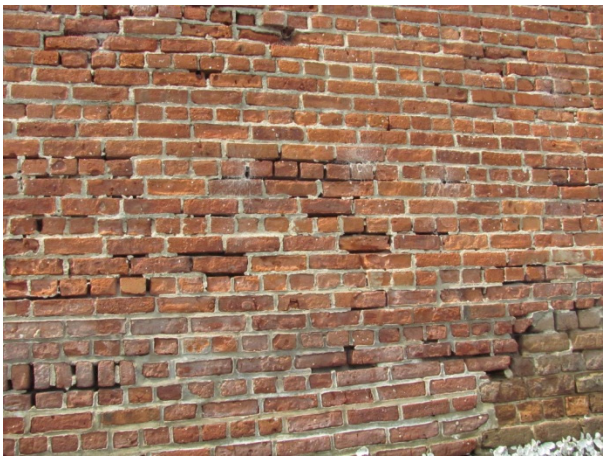


FIGURE 328. Mortar is missing in some locations of the outer wall.



FIGURE 329. An inappropriate mortar mix was used in several locations along the outer walls.



FIGURE 330. Organic growth is visible along portions of the wall, particularly near the top.



FIGURE 331. Biological growth was observed at portions of the outer walls.



FIGURE 332. Heavy encrustation of oyster shells was observed up to the high water line in all areas.



FIGURE 333. Evidence of inappropriately hard pointing mortar was observed.



FIGURE 334. Plant growth was observed at the parapet wall, and at points below the sandstone water table.



FIGURE 335. Eroded brick units at the west wall of the southwest bastion.



FIGURE 336. Plants were observed growing near the top of the wall at the southwest bastion.



FIGURE 337. Hard repointing mortars are likely causing the accelerated deterioration of the underlying setting mortar.



FIGURE 338. The Civil War damage at casemate 11 appears to be stable. Note that all joints at exposed broken masonry are pointed.



FIGURE 339. Unfilled mortar joints and potentially unstable bricks were observed at casemate 12.



FIGURE 340. Widespread deterioration and spalling was observed at areas with brick used for Civil War-era repairs.

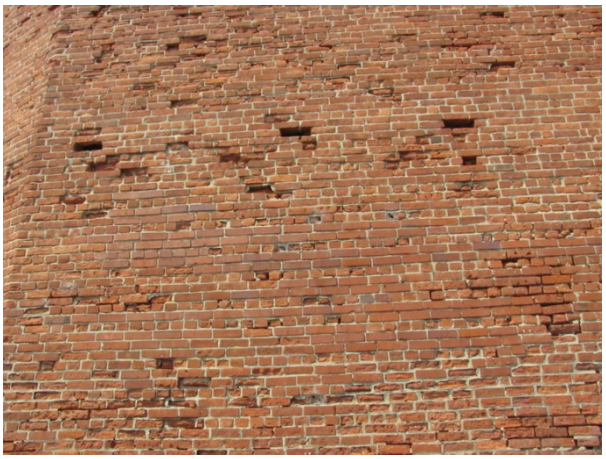


FIGURE 341. Red brick intermixed in the walls outside casemates 13 and 14 may represent CCC-era repairs.

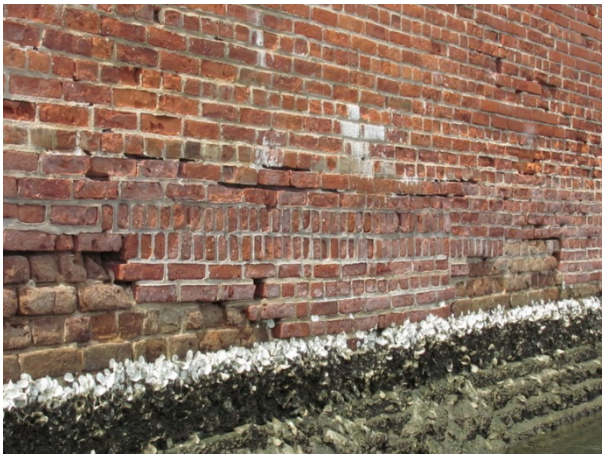


FIGURE 342. Hard repointing mortar was observed above the high water line. Note the spalling and erosion of brick faces.



FIGURE 343. Spalling and erosion of brick faces was observed at the walls outside of casemates 13 through 15.



FIGURE 344. Heavily eroded joints were observed at Civil War damage at casemate 18.



FIGURE 345. Overview of Civil War damage at casemate 18, January 13, 2000. Color transparency by the authors.



FIGURE 346. Present-day view of the same location at casemate 18, September 29, 2012.



FIGURE 347. Many loose and eroded brick units were observed at the area outside of casemate 18.



FIGURE 348. An area of Civil War damage at casemate 26. The bricks appeared to be generally stable.



FIGURE 349. Vertical cracking was observed at casemates 27 and 28. The cracking is aligned with the embrasures.



FIGURE 350. Mismatched repointing work was observed above the embrasures at casemates 35 through 38.



FIGURE 351. A roughly cut opening through the wall at casemate 46. The brick units and joints appeared to be relatively stable.



FIGURE 352. Mortar joints at the west wall above the high water line are significantly eroded.



FIGURE 353. The west wall of the fort. Note the mortar joints above the high water line are significantly eroded.

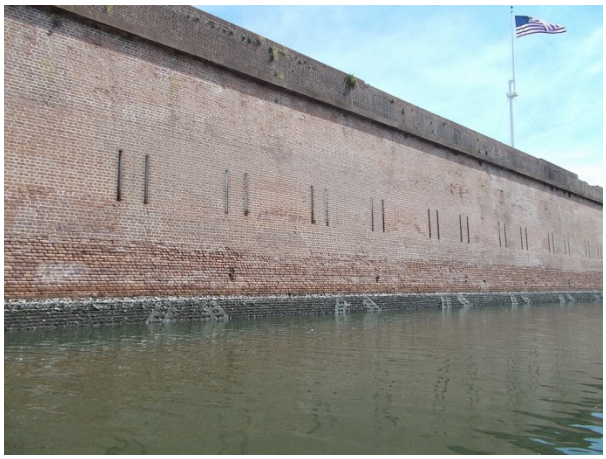


FIGURE 354. Eroded mortar joints above the high water line at the west wall of the fort.



FIGURE 355. Significant plant growth is present on the parapet wall and below the sandstone watertable at the south face of the northwest bastion.



FIGURE 356. Diagonal cracking at the corner of the northwest bastion.



FIGURE 357. An open pipe discharges directly into the moat, with water running down the face of the masonry.



FIGURE 358. Several brick units are loose at casemate 63 (cistern).



FIGURE 359. Several areas of eroded joints were observed above the vent and embrasure openings at Colonel Olmstead's Quarters.



FIGURE 360. Significant lichen growth was observed at the north wall of the southwest bastion.



FIGURE 361. Organic staining and plant growth along the north wall of the southwest bastion.

Drawbridge and Sallyport

The following notable conditions were observed at the drawbridge and sallyport:

- Staining was observed at the base of the stone surround at the sallyport (Figure 362).
- Signs of water infiltration, including moderate efflorescence, are present at the brick masonry ceiling of the sallyport (Figure 363). As noted above, where extensive or severe, efflorescence can result in damage to the masonry.
- Deteriorated mortar was observed at the ceiling and walls of the sallyport (refer to Figure 163).
- As noted in the August 2002 condition assessment, the wood outer doors exhibit paint loss, abrasions and scratches, surface weathering, fungal decay (particularly at the bottom edges of the doors), previous dutchman repairs at hinge anchorages,

damage to the wicket door, and corrosion of the iron hardware. One area at the top of the right-hand door was damaged by fire in the nineteenth century when the quarters in the south half of the gorge burned (Figure 364). As noted in the 2002 condition assessment report, much of this deterioration and damage to the doors as well as the prior repairs are visible in photographs taken in the 1930s, indicating that much of the deterioration occurred while the fort was empty and abandoned. Corrosion of iron fittings and weathering due to sun and rain will continue to affect the doors.[204]

- Staining was observed at the brick and stone at the interior arched opening of the sallyport (Figure 365).

- As noted in the August 2002 condition assessment report, the inner doors exhibit paint loss, abrasions and scratches, insect damage, and corrosion. Much of this damage already existed by the 1930s. There is also physical damage that is thought to date to the 1862 siege. At the time of the 2002 inspection, the doors were fixed in place in an open position due to corrosion of the hinges.[205] One of the doors is partially functional, while the other is frozen in place.



FIGURE 362. Staining was observed at the base of the stone surround at the sallyport entrance.



FIGURE 363. Signs of water infiltration can be seen at the ceiling of the sallyport.

204. Levitan.

205. Ibid.



FIGURE 364. The historic wood doors at the sallyport show signs of deterioration.



FIGURE 365. Moisture related staining was observed at the stone archway at the interior portion of the sallyport.

Parade Ground

The following notable conditions were observed at the parade ground:

- The grass-covered portions of the parade ground have experienced localized settlement or subsidence since the most recent re-grading work in the 1960s.
- Cracking was observed in the brick walkway surrounding the parade ground (Figure 366).
- Brick edging along the brick walkway is separating from the main walk in several areas (Figure 367).
- Differential settlement has resulted in an offset between the brick walkway in the parade ground and the adjacent brick paving at the west porch (Figure 368). Mortar parging has been installed to smooth this offset and mitigate the inherent tripping hazard, but portions of this parging have debonded and been removed.



FIGURE 366. Cracking was observed in several locations along the brick walkway at the edge of the parade ground.



FIGURE 367. Brick along the edge of the walkway is separating from the main portion of the walk.



FIGURE 368. Differential settlement related issues were observed at the brick walk.

Porch and Quarters

The following notable conditions were observed at the porch and quarters:

- Significant staining was observed under the scuppers along the length of the porch (Figure 369).
- Cracking of brick pavers was observed in the brick walkway at the porch (Figure 370 and Figure 371).
- Peeling paint was observed at the vaulted ceiling of the gift shop, as well as at the west walls of the officers' quarters and the officers' mess (refer to Figure 241).
- Deteriorated mortar joints were observed in the vaulted ceiling of the guard room (Figure 372).
- Condensation was observed at the casement windows in the gift shop. The lower rail of the window shows signs of decay (Figure 373). Mortar deterioration attributed by the park to condensation has also been reported on the interior masonry walls of casemate 61, which contains the Bally building.
- A broken piece of glass was observed in a casement window in the weapons work room (Figure 374).
- Spalled and otherwise damaged brick units were observed in the cistern room (Figure 375).
- Standing water was observed adjacent to the cistern (Figure 376).
- Displaced brick units are present in the north fireplace in Colonel Olmstead's quarters (refer to Figure 211).
- Minor surface corrosion was observed at the iron lintel of the fireplace in the gift shop (casemate 60). Although brick masonry joints at this fireplace are eroded and cracked, this distress does not appear to be related to the minor corrosion observed.



FIGURE 369. Water staining was observed under the scuppers along the length of the porch.



FIGURE 371. Cracking in the brick paving at the porch.



FIGURE 370. Cracking at a column on the porch along the west portion of the fort.



FIGURE 372. Deteriorated mortar was observed in the ceiling of the guard room.



FIGURE 373. Condensation at a window in the gift shop. Note the decay present on the lower rail of the window.



FIGURE 374. A broken window pane in one of the windows in the weapons work room.



FIGURE 375. Damaged brick was observed in the cistern room.



FIGURE 376. Standing water is present in the cistern room below floor level.

Casemates

The following notable conditions were observed at the casemates:

- Staining and biological growth are present along the exterior brick masonry walls of the casemates (Figure 378 and Figure 379).

- Organic growth was observed at several piers between casemate openings and at scuppers (Figure 380).
- Spalled bricks were observed at several of the casemate openings (Figure 381).
- Deterioration of brick masonry units was observed (Figure 382).
- Spalling of stone coping units was observed along the exterior casemate walls (Figure 383).
- Historic wood doors located at the spiral staircases show signs of decay (Figure 384). As noted in the 2002 assessment, the parade ground door to the northwest bastion (casemate 51) has areas of paint loss, splitting, chipping, wood decay, and corrosion of hardware.[206]
- Stone units framing the door entries at the spiral staircases have cracked (Figure 385).
- Damaged and spalled bricks were seen in casemates 2, 14, 15, 16, 20, 26, 31, 33, 39, 41, and 47 (Figure 386 and Figure 387).
- Eroded brick masonry was observed in casemates 10, 19, 28, 29, 36, 47 (Figure 388).
- Cracking of brick masonry and mortar joints was observed in casemates 8, 10, 11, 12, 17, 19, 20, 21, 25, 27, 32, 33, 35, 39, 43, 44, 46, 49 and 50 (Figure 389 and Figure 390).
- Eroded mortar joints were observed in casemates 4, 5, 6, 9, 10, 16, 17, 23, 40, and 45 (Figure 391).
- Several of the sandstone sills at the casemate openings are damaged and have been repaired with parge coating (Figure 392). This condition was observed in casemates 4, 28, 32, 34, and 37.
- Water-related staining was observed at the ceiling of several casemates (Figure 393 and Figure 397, and refer to Figure 377). The water leakage is active in several locations. This condition was observed in casemates 1, 7, 15, 18, 22, 24, 25, 26, 27, 37, 38, 40, 44, and 45. During the site visit, a hose was allowed to run at the terreplein above casemate 38. Within a few hours, water was observed at the location of staining in the vault of casemate 38, dripping to the wood floor below (Figure 394 through Figure 396).
- Evidence of rising damp was observed at casemates 12, 13, 30, 31, and 43 (Figure 398).
- Standing water was observed in the crawlspace below the floor of casemates 4, 5, 10, 30, and 31 (Figure 399).
- Displacement and spalling of brick was observed at several casemates related to the corrosion of embedded metal. This condition results from the presence of exposed iron embedments intended to anchor the wood enclosure walls at the casemate openings (Figure 400).
- Birds have been noted to be roosting or nesting within the vents of the embrasures within the casemates.

206. Levitan.

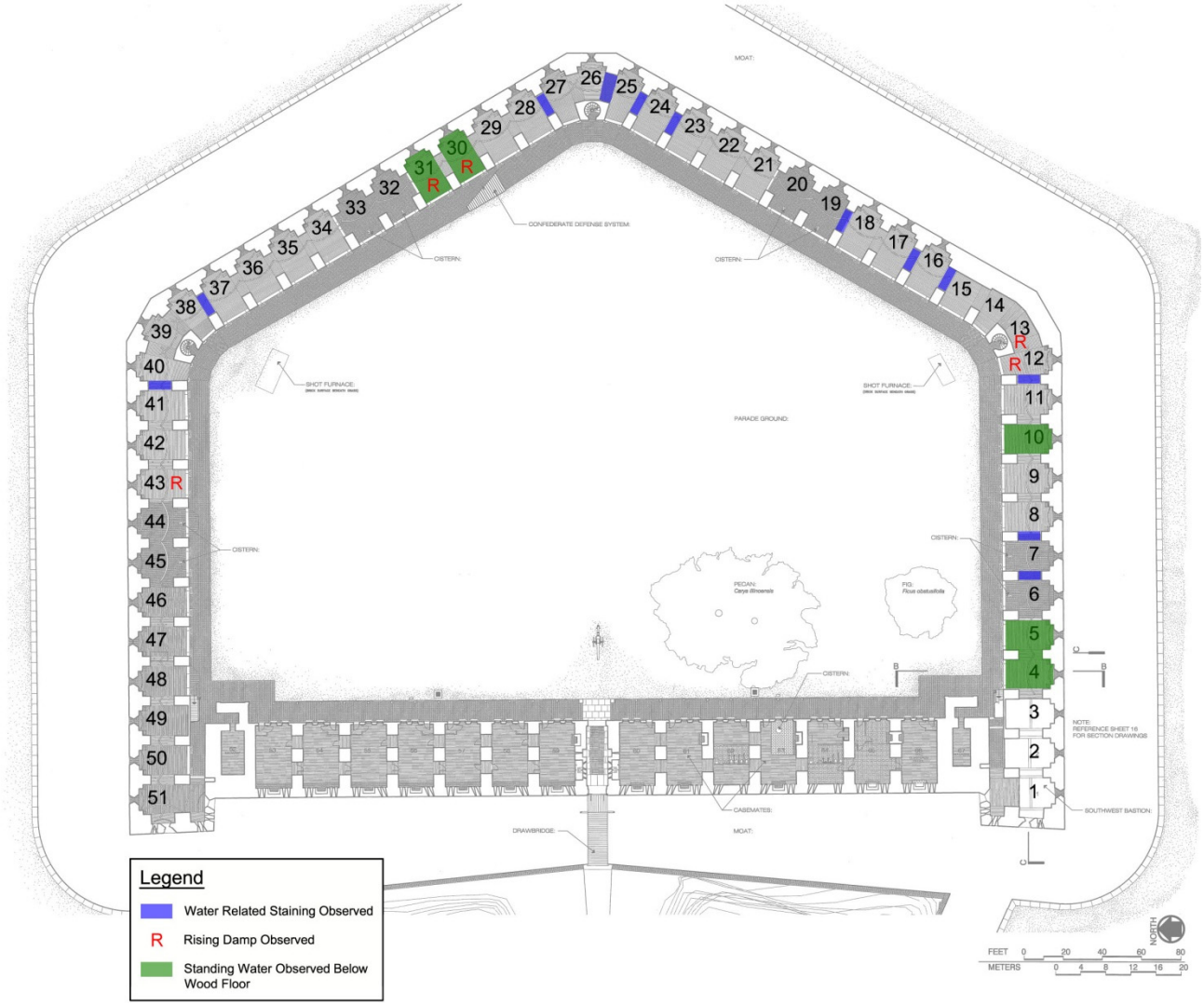


FIGURE 377. Plan annotated to show locations of water leakage and other moisture related distress in the casemates.



FIGURE 378. Staining and biological growth along the exterior walls of the casemates.



FIGURE 380. Organic growth was observed at scuppers between casemate openings.



FIGURE 379. Staining and biological growth adjacent to a casemate opening.



FIGURE 381. An instance of spalled brick at an arched casemate opening.



FIGURE 382. Deterioration of individual brick units was observed.



FIGURE 383. Spalled coping stones were observed along the top of the casemate walls.



FIGURE 384. Deterioration of the wood doors at the spiral staircases was observed.



FIGURE 385. Cracking of the stone units surrounding the doorways to the spiral staircases was observed.



FIGURE 386. An example of damaged brick seen in several casemates.



FIGURE 387. Spalled brick at an arched opening in the interior of a casemate.



FIGURE 388. Eroded masonry was observed in several casemates.



FIGURE 389. Cracking of brick units and mortar joints was observed in casemates throughout the fort.



FIGURE 390. A crack along the arched ceiling of a casemate.



FIGURE 391. Eroded mortar joints were observed in several casemates.



FIGURE 392. A damaged sandstone sill, which was repaired with a parge coating.



FIGURE 393. An example of the water related staining seen at several casemate ceilings.



FIGURE 394. Water test above casemate 38.



FIGURE 395. Active water leakage, including efflorescence and organic growth, at the masonry vault above casemate 38. (The presence of efflorescence is difficult to confirm visually due to the remnant whitewash.)



FIGURE 396. Water leakage resulting in water penetrating to wood floor of casemate.



FIGURE 397. Evidence of water infiltration was observed in several locations.



FIGURE 398. Signs of rising damp were observed.



FIGURE 399. Standing water below the floor of casemate 4. Note evidence of rising damp at the exterior masonry beyond. Despite the presence of moisture in the crawlspace, the wood floor joists at this location appeared intact.



FIGURE 400. An instance of damage related to the corrosion of embedded iron.

Terreplein

The following notable conditions were observed on the terreplein:

- As noted in the 2002 assessment, the wood doors to the terreplein stairs have splitting and dents, paint loss, wood decay, and corrosion of iron fittings.[207]
- Eroded brick was observed along the parapet at the terreplein level (refer to Figure 246).
- Organic growth is present at the parapet along the terreplein level (Figure 401).
- Biological growth was observed at the parapet along the terreplein level (Figure 402).

(Also refer to discussion of fort Outer Walls, above.)



FIGURE 401. Plant growth was observed at the parapet coping, especially at areas of Civil War damage.



FIGURE 402. Biological growth can be seen at coping stones at the edge of the terreplein.

207. Levitan.

Materials Analysis

During the fieldwork conducted in September 2012, select material samples were removed for laboratory review, relative comparison, and limited visual analysis. The purpose of the studies was to attempt to locate and determine the composition of the original mortar as well as to review the mortar relative to the whitewash in an attempt to determine when the whitewash was originally applied. Observations were focused on individual casemates where signage painted on whitewash was present as well as locations where a variety of mortar types were present and accessible for sampling. Samples removed include mortar, brick, stone, concrete, and whitewash. Table 1 in Appendix A includes a summary of the samples removed. Also, refer to the key plan for sample locations in Appendix A.

Mortar

Recent Studies. Two mortar analysis studies were undertaken in 2008. The first study, undertaken by Dr. Jim Carr, a Professor of Chemistry at the University of Nebraska-Lincoln, sought to determine the amount of Rosendale cement in a sample of 1840s mortar from the fort. To accomplish this, the park provided Dr. Carr with a sample of natural Rosendale cement from the 1840s, reportedly from the same areas where natural Rosendale cement was mined.

The sample of 1840s mortar from the fort was found to contain 74.7 percent sand, 2.7 percent "residue," 14.5 percent $CaCO_3$, and 6.1 percent $MgCO_3$, accounting for 98 percent of the material. The sample of natural Rosendale cement contained no sand, 37.7 percent "residue," 28.6 percent $Ca(OH)_2$, and at least 20.9 percent $Mg(OH)_2$, accounting for only 87.5 percent of the sample. The amount of manganese in each sample was also measured. The mortar sample was found to contain 0.010 percent manganese, while the Rosendale cement sample was found to have 0.18 percent manganese. The analysis concluded that the large difference in the amount of manganese between the two samples meant that there was little to no Rosendale cement in the mortar sample. X-ray diffraction measurements of each sample were also taken. These results were inconclusive.[208]

In 2008, Construction Materials Consultants (CMC) performed an analysis of mortar samples taken from Fort Pulaski. Three samples were taken by Fort Pulaski National Monument staff and transported to CMC for analysis.

The first sample was taken from a bed joint in casemate 5. The color and texture of the mortar suggested the sample was original lime mortar and not a modern material. The sample was found underneath the portland cement mortar that was being removed as part of a repointing campaign. The sample was comprised mostly of powder, with only a few intact pieces of mortar present. The sample was found to be comprised of 73.57 percent insoluble residue, 1.1 percent SiO_2, 12.86 percent CaO, 0.16 percent MgO, and 10.67 percent loss on ignition. X-ray diffraction analysis indicated that the mortar was non-hydraulic, high calcium lime. The analysis concluded that the mortar was used in the form of a putty, and most likely mixed by volume at a ratio of 1 part binder to 1.7 part aggregate.

The second sample was taken from brick pointing mortar from casemate 26. The mortar was believed to be a natural cement such as Rosendale cement, due to its color and density. The sample was thought to be original to the fort, as examples of similar mortar were found in various locations at the fort. The sample was found to be comprised of 30.21 percent insoluble residue, 10.34 percent SiO_2, 18.09 percent CaO, 0.42 percent MgO, and 25.65 percent loss on ignition. X-ray diffraction analysis indicated the mortar was a natural cement, similar to Rosendale cement. The inclusion of shale and clay materials in the sample indicated

208. Dr. Jim Carr, University of Nebraska-Lincoln, Chemistry Department, to Larry Murphy, U.S. Department of the Interior. September 5, 2008.

that the product source was potentially not of high quality. The analysis concluded that the natural cement mortar was likely from Guild & Co. or another local Georgia source.

The third sample was taken from casemate 27, directly below the gun embrasure. The sample was believed not to contain portland cement because the adjacent bricks were intact, in contrast to areas where portland cement was used, where the bricks were spalled. The sample was thought to be original to the fort, given its difficult to reach location. The sample was found to be comprised of 64.20 percent insoluble residue, 2.46 percent SiO_2, 15.28 percent CaO, 0.26 percent MgO, and 15.34 percent loss on ignition. X-ray diffraction analysis indicated the mortar to be a gauged lime-sand mix, with the mortar gauged with a natural or early portland cement, rather than a hydraulic lime mortar mix.

Observations. A wide range of mortar types are present in the brick masonry joints within the casemates and throughout the fort, indicating several different repointing campaigns (Figure 403 and Figure 404). The mortar installed within the brick joints ranges from soft and buff in color with flush profiles, to relatively hard, warm and cool toned grey mortars with tooled or smooth flush profiles. In some locations, a thin layer (0.25 to 0.33 inch) of grey mortar was found to have been applied and tooled over buff colored mortar (Figure 405).

The joints contain mortar in a wide range of conditions. Some joints contain apparently newer mortar with flush or tooled profiles and little exposed aggregate. Other joints are deeply eroded or have exposed aggregate. Some mortar is neatly placed within the joints, while other mortar has been applied onto the surface of the adjacent brick, giving the impression of wider joints. It is not uncommon to see a wide range of mortar types, conditions, and installation appearances present within a small area of wall surface where the mortar joints are visible and not covered with whitewash (Figure 406 and Figure 407). Whitewash covers the surface of approximately 50 percent of the mortar joints in casemate 48 and is typically present on the wall surfaces of many casemates (Figure 408). Casemate 48 was selected as a representative casemate due to the variety of mortar types observed and the various pointing campaigns present under the layers of whitewash.

Samples. Limited mortar samples were removed from casemates 42, 43, and 48. Casemates 42 and 43 included painting on the surface of whitewash layers. Limited mortar samples were also removed from the east exterior wall of the gorge and the columns of the colonnade, from the west outer wall at the terreplein, and from other locations throughout the fort. The mortar was removed for visual evaluation, comparison among the samples removed, and potential additional studies as indicated by findings of the limited materials review.

Sample removal locations were selected based on accessibility and the visual appearance of the mortar surface as well as the adjacent coating of whitewash. At casemate 48 the majority of the exposed mortar joints appear to have been repointed with modern grey or buff mortars. The mortar on the north wall of casemate 48, located under the thickest coatings of whitewash, is presumed to date to, or predate, the CCC era during which the whitewash coating was reportedly originally applied (the whitewash coating has reportedly been recoated over time, contributing to its thickness). The majority of the mortar samples were selected in an attempt to represent original setting mortar and CCC era repointing mortar. One sample was removed from joints at the recessed area under the embrasure in the casemate; this location was selected for the increased likelihood of the presence of original bedding mortar (due to the relatively difficult to access location and the depth of the sample location between the brick units) (Figure 409). Dense grey pointing mortar characteristic of the mortar typically observed directly under the thickest applications of whitewash was removed from the north wall of casemate 48 in a location west of the embrasure, as well as from the east wall of casemate 48 near the south entrance, and from the east exterior wall of the gorge (Figure 410).

A total of eleven mortar samples were collected and viewed visually and with a stereomicroscope

to characterize the color of the paste and the shape of the aggregate. This review was conducted to characterize the various samples, as well as to identify two pairs of similar samples potentially representing original mortar and CCC era mortar for additional examination. Based on the visual and microscopic review, two mortar samples (samples 1 and 3) removed from casemate 48 were considered potentially to represent original bedding mortar due to the friability of the sample, the shape of the aggregate, and the buff color of the paste. Two mortar samples, including one removed from casemate 48 (sample 4) and one removed from the east exterior wall of the gorge (sample 7), were considered potentially to represent CCC era repointing mortar due to the color of the paste and the thickness of the whitewash (of the sample from the casemate). The selected samples were subjected to additional petrographic examination. The purpose of the examination was to characterize and compare the two pairs of samples and comment on their similarities and differences in an attempt to determine if they are in fact original and/or CCC era mortars, and to better understand the mortar composition to provide information for future repairs.



FIGURE 403. General view of the north wall of casemate 48. Arrow indicates the location detailed in Figure 404.

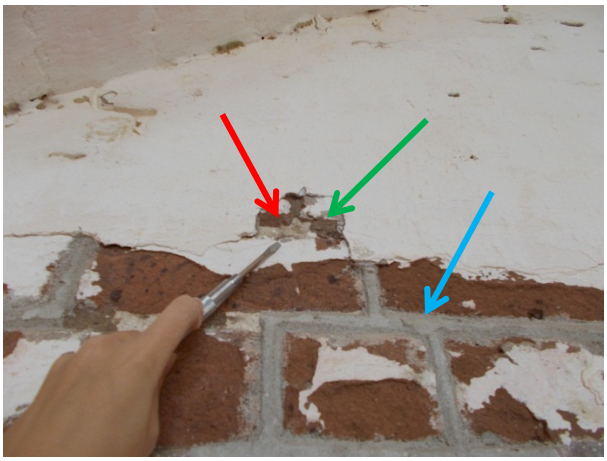


FIGURE 404. Detail of the area west of the embrasure in the north wall of casemate 48. The red arrow indicates buff mortar, the green arrow indicates warm grey colored mortar, and the blue arrow indicates another pointing campaign with grey mortar.



FIGURE 405. A thin layer of mortar (warm grey color) installed over buff mortar.



FIGURE 406. View of casemate 48 wall showing a range of mortar types and conditions.



FIGURE 407. View of casemate 48 wall showing a range of mortar types and conditions.



FIGURE 408. A view of the north and east walls of casemate 48 showing the extent of whitewash.



FIGURE 409. Mortar was sampled from the recess under the embrasure in the north wall of casemate 48.



FIGURE 410. Typical view of mortar joints in the east wall of the gorge.

Petrographic Examination of Representative Mortars. The buff mortar samples selected for additional petrographic examination included sample 1, removed from the recess below the embrasure at the north wall of casemate 48, and sample 3, removed from between bricks at the east side of the north wall of casemate 48 adjacent to the entrance to casemate 47. Refer also to the table and figures in Appendix A.

Based on the results of the petrographic examination, neither sample 1 nor sample 3 originates from the 1830s–1840s construction era of the fort. Sample 1 contains finely ground portland cement in the paste that was not available at the time of the construction of the fort (Figure A-1 through Figure A-4 in Appendix A).

Sample 3 contained mortar fragments representing two different types of mortars distinguished by a slight difference in color and hardness (Figure A-5). The darker material contained within sample 3 has a portland cement and hydrated lime paste (Figure A-6 through Figure A-8). The portland cement particles are coarse, indicating an early portland cement mortar dating from the late nineteenth or early twentieth century. The lighter material contained within sample 3 contains a hydrated lime paste, with evidence of either a natural cement or hydraulic lime. The paste is variable in color and density with abundant lumps of lime (Figure A-9 through Figure A-13). The composition of the lighter portions of sample 3 is not inconsistent with mortar from the earliest

construction era of the fort. The sample 3 portion composed of the relatively darker buff mortar is consistent with late nineteenth and early twentieth century mortars and may have been used in reconstruction efforts.

The two grey mortar samples selected for additional petrographic examination include sample 4 and sample 7. Sample 4 was removed from the north wall of casemate 48, west of the embrasure. Sample 4 also contained attached brown iron-spot brick and whitewash (Figure A-14 through Figure A-18). The grey mortar ranged from approximately 0.25 to 0.33 inch thick and was applied over a buff colored mortar which remained in place when the sample was removed. The mortar surface was tooled with crisp squared edges. The buff mortar that remained within the wall was visually characteristic of the mortar in sample 1 above. Sample 7 was removed from the east exterior wall of the sallyport near column 10. The removal of sample 7 was difficult due to the narrow configuration of the joint and the density of the mortar. There was no visible indication of a different setting mortar existing in the location where sample 7 was removed.

The petrographic examination of sample 4 indicates that it contains subangular fine aggregate including quartz and black carbon-rich particles, brick fragments, plant material, and mica. The brick fragments within the mortar are not similar to the brick adhered with the mortar. The paste system is hydrated lime and hydraulic lime and/or natural cement. All of these components were available during the construction period of the fort, although the use of domestic natural cement in this application is considered early.

The petrographic examination of sample 7 indicates that its binder paste is composed of portland cement particles with no visible hydrated lime (Figure A-19 through Figure A-21). The portland cement particles are coarse, suggesting that they originate from the late nineteenth or early twentieth century. The aggregate present in sample 7 is similar to the aggregate in all of the other samples examined.

Based on the results of the thin-section analysis of sample 4, powder mount specimens of two additional similar mortar samples removed from casemates 42 and 43 were briefly examined (sample 6 and sample 17). The samples removed were approximately 0.25 to 0.33 inch thick and installed over buff setting mortar. The joints were tooled with crisp edges similar to the tooling of sample 4. These samples also contained brick fragments, lime, and natural cement, and are characteristic of sample 4. The presence of these mortars under multiple layers of whitewash supports an early installation date.

Summary of Petrographic Examination of Mortars. None of the four samples examined petrographically were pure lime mortars. Although a pure lime mortar could have been used for the original construction of the fort, considering the date of construction and locally available sources of lime, findings of the 2001 conservation study indicate that the bedding mortar may contain a natural cement from tuff, ground brick, or other hydraulic material.[209] Also, considering the locally abundant sand sources, it is assumed that the sand would have been obtained locally for original construction and early repairs. The aggregate in all four samples appeared similar. Based on the compositions of the mortars, portions of sample 3 (the lighter colored portion) may represent original bedding mortar while the remainder of samples 3, 4, and 7 may represent repair mortars.

Documentation of the materials used for repointing work performed by the CCC, if existing, has not been located. If these materials are confirmed through documentation, a comparative analysis of that mortar with mortar samples 1, 3, 4, and 7 would be informative.

This review of mortar materials is based on site observations performed during the site visit,

209 . Catherine S. Meyers, Myers Conservation, *Conservation Assessment and Treatment Proposal*, 2001.

limited material sampling, and laboratory examination of four representative samples. Due to the scale and importance of the fort and the multitude of mortar types observed in the brick masonry construction, a more extensive study consisting of sufficient samples to establish statistical significance would be appropriate to identify and characterize the original mortar and establish a likely chronological history of repair mortars.

The ongoing current repointing work at the fort includes a mortar composed of natural cement and hydraulic lime. Over the last decade, the park has experimented with repointing joints using sand obtained from a pit on Cockspur Island and lime putty derived from burning oyster shells collected locally. Although these procedures produce mortar materials that are assumed to match the materials available during the early nineteenth century construction of the fort, working with this mortar has proved impractical. In the last several years, the park has instead begun to use mildly hydraulic lime mortars commercially produced by Lafarge. For this recent work, 2.0 natural hydraulic lime mortar has been used at casemate piers, while 3.5 natural hydraulic lime mortar has been used at exposed walls areas and gun mounts at the terreplein (the number indicates the relative hydraulic properties of the lime). Also, test patches of commercially sourced lime putty mortar and Rosendale natural cement mortar have been installed at the northwest bastion, in a location where the masonry is frequently saturated.[210]

Review of Repointing Samples. As part of this study, the park also provided additional samples of mortar from recent repointing work conducted by park personnel for assessment. A WJE conservator and petrographer reviewed the samples, which comprised pairs of mortar taken from five locations. One mortar sample of each pair was considered by park personnel who performed the pointing to be a repointing "success" while the other sample of each pair was considered to be a "failure." Review of the samples indicated the following.

- At gun emplacement 43, a gauged mix of natural hydraulic lime and K-4 natural cement was used for repointing.

  At this location, the sample identified as a "success" had good compaction and soft paste; was normally sanded; and contained 2 percent on air voids. Based on limited visual review, this sample was considered a good example of repointing mortar.

  The sample identified as a "failure" was observed to have split into very thin parallel sheets. The sample may be over-sanded, with the paste much softer than in the successful sample from this pair. The distress observed was similar to what would be expected with cyclic freezing and thawing. A 30 mil separation at cracks was noted within the paste of mortar.

- At casemate 11, a lime mortar was used for repointing.

  The sample identified a "success" was observed to have sizeable lime lumps and very soft paste. It may be slightly oversanded. The mortar in this sample was found to be friable.

  The sample identified as a "failure" appeared similar to the "success" sample but was even more friable.

  Neither sample of this pair is considered to be a successful example of repointing.

- At casemate 50 at the northwest bastion, a gauged mix of natural hydraulic lime and K-4 natural cement was used for repointing.

210 . Information provided by park staff performing masonry pointing work on site during HSR field work, 2012.

The sample identified as a "success" was observed to have a high sand content, with microcracks in the paste.

The sample identified as a "failure" as received was essentially dust. It was observed to be very highly sanded, with many cracks through the paste.

Neither sample of this pair is considered to be a successful example of repointing.

- At casemate 6, a mix of St. Astier natural hydraulic lime was used for repointing.

  The sample identified as a "success" had well distributed sand particles, held together and well coated with paste. The paste was observed to be soft. Based on limited visual review, this sample was considered a good example of repointing mortar.

  The sample identified as a "failure" appeared essentially the same as the "success" sample.

- At casemate 29, natural hydraulic lime from Virginia Limeworks was used for repointing.

  The sample identified as a "success" was very fragile, with very high sand content. The sand grains were observed to be touching. Some odd crystals observed may be an indication of a proprietary ingredient.

  The sample identified as a "failure" appeared similar to the "success" sample from this location, with crowding of sand. Either the sand content is high or the mortar was not well mixed, or both. Many cracks were observed through the paste, which was extremely soft.

Of the paired samples provided by the park, two samples— the "success" sample from Gun Emplacement No. 43, repointing with a gauged mix of natural hydraulic lime and K-4 natural cement, and the "success" sample from casemate 6, repointing with a mix of St. Astier natural hydraulic lime— were judged to be successful examples of repointing mortar. (The "failure" sample of the latter pair appeared to be similar to the "success" sample.) Other samples, including those considered by the park to be successful based upon visual review, are not considered to be appropriate and would not be expected to provide serviceable repointing in situ.

As detailed information was not available for review about mortar components, mixing procedures, wet or dry condition of the sand used in the mortar, installation procedures, weather at the time of installation, conditions during curing, and other factors that contribute to the character and serviceability of the repointing, it not possible to comment specifically on the causes of problems (or failure) of the mortar samples provided. (Further laboratory analysis of these samples could be performed; however, it is recommended that in lieu of additional laboratory studies, new trials samples be conducted with careful documentation, as further discussed under Recommendations, below.)

Brick

The walls inside the casemates are constructed of two different types of brick. The lower portion of the wall is composed of brown brick (from a single source), while red brick (from two different sources) was used at the embrasures and at the arched openings above the brown iron-spot brick (Figure 411). The Conservation Assessment and Treatment Proposal prepared by Catherine S. Meyers of Myers Conservation in 2001 notes that the brown brick is unfired. The bricks are irregularly shaped with textural variation of the exposed surface. Most brick appear to be in good condition; however, in isolated locations, such as the arched entrances at many casemates, the bricks have eroded due to weathering (Figure 412). The brick has eroded preferentially to the adjacent mortar, resulting in a honeycomb-like appearance of the remaining mortar. This weathering pattern typically indicates that the mortar present in locations where the brick has eroded is less porous and denser than the adjacent brick. In a typical brick masonry wall, the mortar is more porous and less dense than the adjacent brick. When the masonry is saturated, use of mortar that is more porous than the brick this promotes the wall to dry by directing water out through the mortar joints.

The less porous and denser mortar observed in this location may cause the wall to dry by directing the water out through the brick instead of the mortar, which would result in an increase of weathering-related deterioration of the brick. (Although rising damp was observed in various locations at the base of the walls, significant efflorescence was not observed in associated with the rising damp. Refer to Figure 398.)

As is typically observed on the casemate brick wall surfaces, evidence of many different colors and installations of mortar are present. Other brick distress includes cracking related to the expansion of ferrous embedments in the walls (Figure 413). The embedments likely remain from the original casemate doors.

The 1954 National Park Service report titled *Fort Pulaski National Monument*, by Ralston Lattimore, indicates that the brown iron-spot brick used to construct the walls were manufactured at the Hermitage Plantation approximately 2 miles west of Savannah. There are two types of red brick used in the embrasures, arches, and parade ground walls, which came from brick manufacturers in Baltimore and Alexandria, Virginia.

Review of Brick Samples. Several brick samples were provided by the park for review as part of this study. Two samples were reportedly taken from the area of fire damage in the southwest bastion: one Savannah grey brick and one Baltimore red brick. This area has been exposed for nearly 90 years, since the major 1925 fire. The Savannah grey brick showed no visual evidence of fire damage. The Baltimore red brick showed some soot impregnation, and very small incipient delamination on front face, but no other visible distress. In addition, mortar removed as part of the sample was found to be well adhered to the brick.

If the brick masonry had been significantly damaged by the 1925 fire, it would be expected that the mortar would exhibit delamination from the brick; this was not apparent in the samples examined. Based on this limited sampling, no issues of concern related to its future performance were noted for the brick at the fire-damaged area.

One brick sample was also provided from casemate 1, from an area characterized as outside the limits of 1925 fire damage. This sample was a Savannah grey brick. It exhibited no soot or cracks, and the mortar was well bonded to the brick.



FIGURE 411. Overall view of brown brick located at the base of the west wall of casemate 43 with red brick above. Yellow line shows the transition between brick types at 23 courses above the floor.

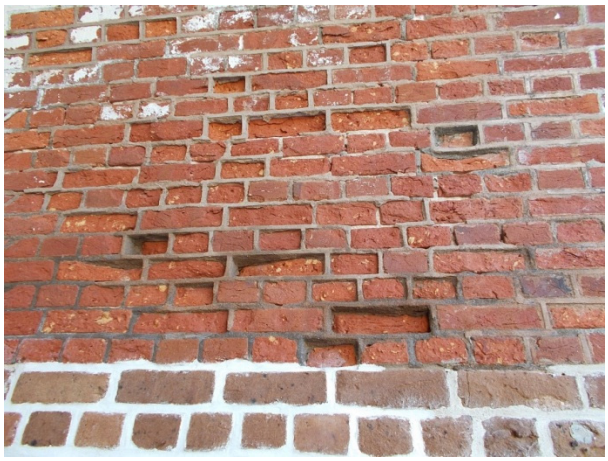


FIGURE 412. Eroded brick on the east side of casemate 43.



FIGURE 413. Typical cracked brick units adjacent to an embedded ferrous element at casemate 48.

Stone

The 1954 National Park Service report titled *Fort Pulaski National Monument,* by Ralston Lattimore, also indicates that the granite used at the casemate thresholds and the brown sandstone located at the casemate thresholds and under the embrasures came from New York and the Connecticut River Valley, respectively (Figure 414).

A full condition assessment of the stone was not performed; however, the granite was observed to be in relatively good condition with minor distress including chipping and small spalls. The brown sandstone exhibits distress parallel to the surface that is apparently related to delamination of the bedding planes. In some locations, the brown sandstone threshold units were covered with a cementitious parge coat to make the surface level with the adjacent brick walkway. The delamination distress is considered relatively minor, given the service life of the units.

The sandstone was briefly reviewed petrographically to characterize the stone and identify the primary minerals present. The stone is granular and includes quartz, feldspar, and mica. The presence of mica that has not degraded into clay indicates that the stone is considered geologically young. The stone has very little matrix and is therefore considered to have a grains-supported framework.

Review of Stone Samples. Small stone samples were provided by the park for review and general characterization. As noted during the field investigation, the sandstone is very susceptible to deterioration in the form of delamination based on its mineralogy. It is a coarse sandstone, weakly bound with a lack of matrix. The beds were observed to contain different grain sizes, with sand grains up to 1/10 inch in the 1/4 inch sample examined.

The sandstone samples provided also contained an adhered parge coat applied in the past as a repair. Based on visual examination, the parge coat is a hard, cementitious patch material. This type of material is much harder than the sandstone and is not considered an appropriate repair material for this application.



FIGURE 414. Brown sandstone and light granite at the threshold of a typical casemate. Note the parge coat on the sandstone.

Whitewash

A small sample of whitewash (or lime wash) was removed in conjunction with a mortar sample at the east side of the north wall of casemate 43 near a location that includes painted decoration. The whitewash coating sample is approximately 0.06 inch thick and 0.5 inch square. This thickness is representative of the typical thickness of whitewash coatings observed adjacent to areas including painted decoration; the areas with painted decoration have significantly thinner whitewash coatings (Figure 415 and Figure 416). The sample removed includes at least four layers of whitewash application, each layer with a

different thickness. Portions of the sample have a pinkish appearance, which is attributed to the potential presence of a bio-film (possibly algae) rather than to an intentional tinting of the whitewash.

To further characterize the base layer, portions of a trace amount of whitewash that remained adhered to the mortar were scraped from the mortar surface and microscopically reviewed as a powder mount sample. The layer of whitewash adhered to the mortar sample (and therefore thought to be the earliest placed layer) is characterized as a very finely grained carbonated lime coating, most likely dispersed in water during the initial application. Gypsum may have been added to the whitewash to increase the setting rate; the use of gypsum in this application predates the construction of the fort. (Additional studies with a scanning electron microscope (SEM) are required to confirm the presence of gypsum.)



FIGURE 415. Whitewashed brick area with painted lettering at casemate 42.



FIGURE 416. Detail showing the built up thickness of whitewash coatings. Lettering appears to have been painted over the base layer of whitewash. Photo taken at an area adjacent to the location of Figure 415 in casemate 42.

Tabby Concrete

A small sample of tabby concrete was removed from the demilune wall at the north side of the northwest pier (Figure 417 through Figure 419). The demilune wall was constructed in 1869–1872. (The tabby concrete from the 1895 southeast magazine was not sampled as part of this study.)

Tabby is a type of concrete made by burning shells (typically oyster shells) to produce lime and combining the lime with water, sand, and broken portions of shell. The concrete at the demilune wall is visually characteristic of tabby. Based on microscopic observation of a sample, the tabby includes an abundant amount of quartz sand. In order to further characterize the sample, a portion including the paste and fine aggregate was ground, sieved, and a powder mount of the paste was reviewed. No portland cement was present in the powder mount sample. Particles that appear to be recrystallized lime, as well as particles that may be natural cement, were present. Based on the fineness of the paste, additional analysis of a thin-section specimen would be required to further characterize the binder system.

It is noteworthy that brick particles such as those present in mortar samples 4, 6, and 17 were not observed in the tabby paste.



FIGURE 417. General view of tabby concrete at the demilune.



FIGURE 418. Close-up view of tabby concrete at the demilune.



FIGURE 419. Close-up view of tabby concrete at the demilune.

Review of 2001 Conservation Assessment and Treatment Proposal

A copy of a *Conservation Assessment and Treatment Proposal* prepared by Myers Conservation in 2001 was received for review as part of this study. The 2001 assessment primarily reviewed the conditions of casemates 42, 43, and 44. The report notes that the whitewash (lime wash) layers visible on the surface of isolated casemate walls are believed to have been applied in certain locations by the CCC and reapplied at later dates.

Isolated locations of the whitewash surfaces include painted symbols and signs. The meaning of the paintings is not fully understood. Ms. Myers compared documentation drawings of casemate 43 dating from 1957 to historic photographs believed to be taken in the 1960s or 1970s. Based on the 1957 drawings, it appears the paintings in casemate 43 were altered and expanded between 1957 and the 1970s.

Additional photographic documentation from years prior to the CCC's presence at Fort Pulaski was compared to photographic documentation immediately after the CCC's work on site. This comparison indicates that walls were extensively whitewashed in the 1930s and whitewashed again at a later date. Based on the photographs, limited deterioration of the whitewash occurred between the post-CCC photographs and the 2001 assessment.

The 2001 assessment indicates that the wall paintings on the whitewash were in poor condition at that time. Factors contributing to the deterioration of the paintings were identified as biological activity (growth and insects), the presence of water, and accelerated wet/dry cycles. It is unknown if undocumented prior physical intervention, such as cleaning, has contributed to the deterioration of the paintings.

The types of mortar present in casemate 42 were briefly reviewed. Ms. Myers notes that the bedding mortar she identifies as original may contain natural cement or another hydraulic material. The

pointing mortar that she identifies as original is similar in hardness to the likely original bedding mortar, but is dark brown instead of tan in color. She observed at least two repointing campaigns, identified by the difference of the mortar color and strength, and notes that observed distress has been exacerbated by replacement mortar that is incompatible with the original brick.

The treatment approach outlined in the 2001 assessment for casemates 42, 43, 44, and 45 are similar for the different casemates. Recommendations include reattachment of spalling brick and loose mortar with acrylic emulsion type adhesive systems. Also recommended is stabilization of loose, flaking whitewash layers with a 10 percent solution of acrylic emulsion (such as Beva D-8 based on small-scale trials). Also, the report recommends stabilizing powdering paint with an acrylic resin (such as Acryloid B-72 or other appropriate consolidant). In very limited locations, the removal of more modern painting touch-ups was recommended in casemate 43.

The 2001 conservation assessment provides a useful baseline of information for comparison to present and future conditions. In general, the findings of the HSR study agree with the condition assessment conducted in 2001. Some slight additional losses of whitewash were noted in comparing photographs from the 2001 study with current conditions.

In response to the treatment recommendations offered in the 2001 conservation assessment, the HSR generally concurs with the conservation study, with the following caveats. First, although the use of adhesives to reattach small fragments of brick or mortar (as recommended in the 2001 study) is considered appropriate in areas of decorative painted finishes as a way to conserve the substrate of the artwork, this approach is not suitable for use in areas of masonry that do not support decorative painted finishes or for the fort walls overall. Second, the materials recommended in the 2001 study are still available at this writing and are appropriate for stabilization of painted finishes; however, when conservation is implemented, specific materials to be used should be confirmed through review of available formulations as well as implementation of trial samples to evaluate the efficacy of the recommended treatments.

Significance and Integrity

Evaluation of Significance

Significance Criteria

The Criteria for Evaluation for listing in the National Register of Historic Places state:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. That are associated with the lives of persons significant in our past; or
>
> C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D. That has yielded, or may be likely to yield, information important in prehistory or history.
>
> **Criteria Considerations**
>
> Ordinarily cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties *will qualify* if they are integral parts of districts that do meet the criteria or if they fall within the following categories:
>
> a. A religious property deriving primary significance from architectural or artistic distinction or historical importance; or
>
> b. A building or structure removed from its original location but which is primarily significant for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
>
> c. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building associated with his or her productive life; or
>
> d. A cemetery that derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
>
> e. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
>
> f. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or

g. A property achieving significance within the past 50 years if it is of exceptional importance.[211]

National Register Significance Evaluation

Fort Pulaski National Monument was administratively listed in the National Register of Historic Places on October 15, 1966, under the National Historic Preservation Act. Documentation of Fort Pulaski was added to the National Register of Historic Places on December 9, 1975. The property is described as a historic district and is noted as significant in the areas of Architecture, Engineering, and Military history.

Although the nomination does not cite the National Register criteria in its assessment of the significance of Fort Pulaski, research conducted for this study indicates that the fort is significant under Criteria A, C, and D.

Under Criterion A, Fort Pulaski is associated with events that have made a significant contribution to the broad patterns of our history, including events of the Civil War and specifically the blockade of Southern seaports. The fort, which is otherwise remarkably intact, preserves damage that occurred during the battle of April 10–11, 1862. It is also significant for its use by Union forces from 1862 until the end of the war, including a period of use as a prison for Confederate officers. The fort is also associated with broad patterns of military history in that its construction, designed to withstand fire from smoothbore cannon, failed rapidly when attacked with rifled artillery in April 1862. This failure led to significant changes in fortification design and construction. The fort was recognized as an important historic structure by the early twentieth century, and was designated a National Monument in 1924. During the 1930s, an extensive restoration of the fort was conducted under the New Deal programs.

Under Criterion C, Fort Pulaski embodies the distinctive characteristics of a type, period, or method of construction—the design of masonry fortifications, as realized in this country during the nineteenth century. The fort is significant for its original design, developed by French military engineer Simon Bernard with U.S. Army engineers, and as an example of the coastal fortifications constructed under the "Third System of Defense." Later modifications to the fort are also of interest. In 1869–1872, a series of earth-sheltered magazines were constructed within the existing demilune, and in the 1890s an additional magazine was constructed to modernize the fort for continued coastal defense.

Fort Pulaski is also significant under Criterion D as a resource that has yielded, or may be likely to yield, information important in prehistory or history. Numerous archeological studies conducted at Cockspur Island have indicated the presence of prehistoric and historic resources. At the fort itself, archeological resources from the nineteenth century were identified during 1930s work by the CCC. For example, 1,000 Civil War-era bottles were retrieved from the moat during restoration work in 1935.[212] Further archeological study at the fort and demilune may yield additional information.

As noted in a summary of archeological studies conducted at Fort Pulaski by the NPS Southeast Archeological Center:

> The changes that occurred at the monument in the last century greatly affected the archeological record. Digging and building by the Civilian Conservation Corps altered the landscape extensively and uncovered numerous 18th and 19th century artifacts. Construction of US Highway 80 and the placement of dredge spoil on the north shores of both McQueens and Cockspur Islands buried the locations of some possible archeological sites under several feet of unrelated fill. These activities all affected the archeological record at Fort Pulaski National

211. *Code of Federal Regulations, Title 36, Part 60,* "The National Register Criteria for Evaluation."

212. Lattimore, 54.

> Monument in negative ways, but they also had a positive role in preserving Fort Pulaski's heritage.[213]

Further research would be required to assess the significance of the fort under Criterion B, association with the lives of persons significant in our past, as related to French military engineer Simon Bernard. Along with U.S. Army engineers, Bernard was responsible for the new coastal defense system known as the "Third System of Defense." Their work resulted in the construction of a permanent system of modern masonry fortifications along the Atlantic and Pacific coasts, including construction or modification of forty-two forts, of which Fort Pulaski is one of the most well preserved. Research would specifically need to address the place of Fort Pulaski within the context of Bernard's overall work and career.

As noted in the National Register of Historic Places nomination:

> Fort Pulaski is the best preserved and most original of a system of eastern coastal forts designed by the French military engineer Simon Bernard, while in the employ of the United States Army Corps of Engineers. Its massive brick walls, backed by heavy piers, and casemated rooms reflected the continuing search for security against increasingly large caliber smoothbore cannon of the period. The best military engineering principles, and finest joinery and masonry techniques of the day were used in its construction. Yet the siege and rapid reduction of Fort Pulaski in 1862 by heavy rifled artillery of the Federal Army, which had no precedent, immediately made obsolete all masonry forts everywhere. Most of the construction features and extensive siege damage are visible, and are interpreted to the public today.
>
> Ancillary structures include: numerous cisterns, workmen's village house foundations and a stone pier, all associated with the fort's construction; Cockspur Island Lighthouse (1840) prominent in local navigational history and architecturally significant; Battery Hambright (1895) which represents the continuing evolution of coastal fortifications; and, the park residence (1896), once headquarters of the U. S. Quarantine Station on the island.
>
> The Fort Pulaski complex is significant in the areas of architecture, engineering and military history of the U.S. Although the fort embodies nothing new since Roman times in the way of architectural principles, the craftsmanship exhibited in its construction is outstanding, and it is one of the best surviving examples of North American fort architecture and engineering. It is far more significant in terms of military history. Built as it was, to withstand the heaviest of smoothbore cannon of the day, the fort quickly fell under the punch of rifled artillery. This successful test siege immediately changed the course of military architecture and history.
>
> All of the above structures and sites represent the long and important role of Cockspur Island in the nation's military, architectural and maritime history. Cockspur Island consists of 260 acres.[214]

Period of Significance

The National Register nomination identifies the period of significance of Fort Pulaski as the nineteenth century (as indicated in the nomination form in use when the documentation was prepared), with specific dates identified as constructed 1829, and garrisoned 1861–1872, briefly 1890s.

The Cultural Landscape Report for Fort Pulaski National Cockspur Island Historic District identifies a period of significance of 1829–1895. The beginning date is the start of the initial construction of Fort Pulaski, while the closing is the date of completion of the southeast magazine at the demilune. This latter construction

213. National Park Service Southeast Archeological Center web site, "SEAC: Echoes from the Past: The Archeology of Fort Pulaski," accessed at: http://www.nps.gov/seac/research/fp/fp00010/0-introduction/index.htm

214. Edward L. Trout, Park Historian, *National Register of Historic Places Nomination Form: Fort Pulaski National Monument*, December 9, 1975.

represents the completion of the physical fortification as it exists today, and the last modification constructed in response to the military use of the fort.

The Cultural Landscape Report also defines a secondary period of significance, 1933–1942, covering the time in which the New Deal era agencies were active at Fort Pulaski and on Cockspur Island. At the fort itself, these activities were primarily related to repair and reconstruction.

Character-Defining Features

The historic nature of significant buildings and structures is defined by their character, which is embodied in their identifying physical features. Character-defining features can include the shape of a building; its materials, craftsmanship, interior spaces, and features; and the different components of its surroundings.[215]

The following table identifies existing exterior and interior elements and features of Fort Pulaski, provides dates of origin where known, and indicates which features contribute to the historic character of the fort. (Refer to the Developmental History chapter for further discussion of changes to the fort over time.) The determination of whether each element is a contributing feature is made with reference to the primary period of significance (1829–1895), and is based on documentation and research materials available at this time. Resources dating to the secondary period of significance (1933–1942) are also noted below. Features noted as non-contributing are not necessarily intrusive to the historic character of the fort.

215. Lee H. Nelson, FAIA, *Preservation Brief 17: Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character* (Washington, D.C.: National Park Service, Technical Preservation Services, 1988).

Summary Table of Features

Feature	Date of Extant Material	Comments
Setting and Moat		
Outer retaining wall	1844–1845	
Feeder canal and lock	1844–1846	Re-excavated and re-filled with water by CCC, 1934–1935.
Outer drawbridge	2011	Original drawbridge built 1846–1847. Missing by 1930s. PWA Project 545-X: Drawbridge II, 1936. Drawbridge III, circa 1975. Drawbridge IV, 2011.
Outer drawbridge mechanism	1846–1847	
Moat	1844–1845	Re-excavated and re-filled with water by CCC, 1934–1935.
Demilune		
Moat walls	1844–1845	
Brick masonry walls, rifle pits, and gun emplacements	1844–1846	
Original earthworks	Missing	Removed as part of post-Civil War modifications
West magazine complex	1869–1872	
Southeast magazine	1895	
Wood doors and hardware	1938	
Turf grass covering	1960	Overgrown in trees and shrubs in 1950s. Cleared and planted in grass in 1960. Remaining large cedar trees removed in 1977.
Brick stairs at gun pits and connecting brick paths	1960	Added during Mission 66 era.
Concrete sidewalks	1972 or later	
Kitchen, dining hall, and other wood-framed outbuildings	Missing	Built by Union forces, 1862. Removed after Civil War.
Shot furnace	Missing	Built 1842. Likely removed as part of west magazine complex construction, 1869–1872.
Outer Walls		
Brick masonry walls	1833–1839	
Impact damage to masonry walls	April 10–11, 1862	
Reconstructed area, south-southeast corner	1862	
Concrete foundation, south-southeast corner	1934	PWA Project 545-H.
Cementitious parging at missing areas of brick coping	1934–1935; 1959–1960	
Drawbridge and Sallyport		
Wood drawbridge with iron hardware	2011	Original drawbridge built 1846–1847. Missing by 1930s. PWA Project 545-X: Drawbridge II, 1936. Drawbridge III, 1951. Drawbridge IV, 1975. Drawbridge V, 2011.
Stone surround at openings	1833–1839	
Wood portcullis	1960	Original portcullis built 1846–1847, heavily deteriorated by 1930s and rebuilt by PWA; rebuilt again in 1960.
Wood outer doors with iron fittings	1840	
Stone paving in sallyport	1833–1839	
Brick walls and vaulting in sallyport	1833–1839	
Drawbridge mechanism	1846	
Wood inner doors with iron fittings	1840	

Feature	Date of Extant Material	Comments
Parade Ground		
Turf grass	1960 and later	Originally a level grade. Trenches dug by Confederates, 1861–1862. Re-graded by Union, 1862. Filling operations by CCC, 1934–1936. Additional filling and re-grading, 1956 and 1960.
Fig tree	1890s–1900s?	Trees were present by 1918.
Pecan tree	1890s–1900s?	Trees were present by 1918.
Shot furnace buildings	Missing	Built in 1842. Visible in 1862–1865 photographs during Union occupation of the fort. Deteriorated by 1930s. Foundations may survive below existing turf grass.
Brick pathway along casemates	1935–1936; 1938; 1990s–2000s?	Similar older brick walkways are shown as existing on 1934 existing conditions drawings. PWA Project 545-I, reconstruction of walkways along casemates. Extensions at northwest and southwest corners, 1938. Accessibility ramps added later.
Drainage and utility access points	?	
Porch and Quarters		
Colonnade columns and roof	1935; 1951	Original 1846 colonnade removed in 1862. PWA Project 545-W, reconstruction. One column rebuilt, 1951.
Colonnade walkway with brick pavers and stone curb	1935 1990s–2000s?	Original 1846 paving later removed. PWA Project 545-W, reconstruction. Accessibility ramps added later.
External downspouts at colonnade	2003	Replacing 1935 downspouts embedded within columns.
Exterior and interior doors, transoms, and double-hung windows	1935	PWA Project 545-M. Surviving fragments of original doors and windows removed in 1930s due to deterioration.
Southeast and southwest doors with iron hardware, casemate 58	1843?	Possibly original, based on similarities to other original doors.
Wood shutters for windows and doors	Missing	Built 1843–1846 and visible in Civil War photographs.
Wood-framed screen doors and window screens	Missing	Added as part of 1935 work but later removed.
West side casement windows	1935	PWA Project 545-M.
Plaster wall and ceiling finishes	1935	PWA Project 545-M. Surviving fragments of original 1843 finishes removed in 1930s due to poor condition. Casemate 65 not finished in 1930s; wood paneling installed circa 1960s; new lath and plaster finishes installed 2005.
Wood floor construction	1935	PWA Project 545-M. A limited amount of original 1842 material was salvaged from the north half and reinstalled at the south half and casemates 56 and 58 as part of the 1930s work.
Circular ceiling vents	1935	PWA Project 545-M.
Brick fireplaces with iron lintels	1842	PWA Project 545-M: major repairs. Fireplaces in casemates 62 and 64 removed in 1934–1935.
Wood fireplace mantels	1935	PWA Project 545-M.
Marble mantels and hearths, casemate 65 (Col. Olmstead)	1846, 1935	PWA Project 545-M: original black marble mantel caps, bases, and shelves salvaged and reinstalled, incorporating new marble.
Visitor interpretation partitions at casemate entrance doors	1972	Casemates 53, 54, 55, 56, 57, 58, and 63.
Gift shop (casemate 60) chandelier	1935	
Utilitarian lighting (e.g., fluorescent)	?	Relatively new.
Bally building for archival storage, casemate 61	1985	
Ceramic tile floor and wainscot, work room, casemate 62	1935	Likely dates to 1930s, when this space was used as a men's restroom.
Sink, work room, casemate 62	?	Relatively new.

Feature	Date of Extant Material	Comments
Partition walls in casemates 62 and 64	1935	
Ceramic tile flooring and wainscot in restrooms, casemate 62 and 64	Early 1980s	
Plumbing fixtures and toilet stall partitions, casemate 62 and 64	1997	
Brick cistern, casemate 63	1839	
Partial wood floor, casemate 63	1935	Left unrestored by CCC, to allow for interpretation of cistern.
Built-in counter and sink, kitchen, casemate 64	?	Relatively new.
Desalinization boiler and flue, casemate 59	Missing	Built by Union forces, 1862. Surviving portions removed 1930s.
Casemates		
Brick masonry walls and vaulted ceiling, embrasure, vent	1833–1839; 1862	Casemates 13 through 15 have no embrasure, due to Civil War damage and reconstruction. Some new brick installed as part of twentieth century repairs.
Wood floors with iron tracks for cannon	1840; 1934–1935; 2000s?	PWA Project 545-A. Intact original material salvaged during PWA work and reinstalled. Some later repairs.
Cisterns and brick floors (casemates 6, 7, 19, 20, 32, 33, 44, 45)	1839	Interior of cisterns finished with plaster, 1843.
Wood-framed enclosure walls	1935; ?; 2000s	▪ Originally built in 1842. ▪ Currently present at casemates 7, 8, 15 through 24, 30, 31, 43, 46, and 47. ▪ PWA Project 545-L, 1934–1936: enclosures built at casemates 15 through 24 on the southeast side. Lead paint abated, 2010–2011. Some original surviving iron hardware was salvaged and reinstalled during the 1934–1936 work. ▪ At some point prior to 2002, casemates 7, 8, 30, 31, and 46 had been enclosed. ▪ Casemate 43 enclosure was built after 2002. ▪ Casemate 47 enclosure was built in 2012. ▪ Future enclosure of casemates 44 and 45 has been proposed.
Door to parade ground, casemate 51 (northwest bastion)	1846	Likely original. PWA Project 545-U included restoration of iron hinges, 1934–1935.
Whitewash and painted decoration and graffiti, some casemates	1840; 1860s ?; 1899	Casemates plastered during original construction, 1840. Casemates 36–37 graffiti, 1899.
Wood windows at outer wall, casemates 7 and 8	?	Likely added when casemates were enclosed, sometime after 1930s.
Iron prison bars, casemates 18 through 21	1864; 1934–1936	Installed in 1864, casemates 14 through 37. During PWA Project 545-L, 1934–1936, it was noted that "one set" of prison bars survived and was painted in place.
Timber defensive cribbing, casemate 30	1980s	Reconstruction of 1862 defensive measure.
Powder magazines	1842	
Wood floors and walls in powder magazines	?	Appear relatively new.
Terreplein		
Northwest and southwest stairs	1841–1842	PWA project 545-J: Enclosing wall at northwest stair rebuilt above level of stair treads, 1934–1935.
Brick masonry enclosure walls and roof at terreplein level, northwest and southwest stairs	Missing	Built 1841–1842, visible in 1862 photographs.
Brick masonry partial height guard walls, north and south stairs	1935–1936	PWA Projects 545-B and C.

Feature	Date of Extant Material	Comments
Southeast, east, and northeast stairs	1841–1842	
Wood plank doors at SE, E, NE stairs	1846	
Iron railings at E and NE stairs	1846–1847; 1934–1935	Original railings installed 1846–1847. PWA Project 545-U: major repairs to E and NE railings.
Iron railing at SE stairs	1934–1935	PWA Project 545-U: entirely new railing built at SE stair.
Roof and drainage system	1842	Repairs, 1934–1935, PWA Projects 545-B and C. Other subsequent repairs in 1960–1961.
Brick paved walkways at top of stairs	1960s?	Perhaps installed after 1960–1961 waterproofing repairs.
Grass covering	1960	Filled, graded, and sodded by CCC in 1936.
Iron frames and grilles at vents and chimneys	1934–1935	Tall chimneys were present during Civil War era.
Flagpole	1974	▪ Original flagpole, 1846–1847, damaged during bombardment. ▪ Flagpole II repaired or built by Union forces, 1862; missing by 1900. ▪ PWA Project 545-X: Flagpole III, 1935. ▪ Flagpole IV, 1947, reversed orientation; partial replacement and modification, 1957; struck by lightning, 1970. ▪ Flagpole V, installed 1974.
Gunmounts	Brick: 1842; granite: 1855–1860	In general, gun mounts were left in place during 1934–1935 and 1960–1961 roof repairs. The gun mount at position 13-14 only was dismantled and rebuilt, 1934–1935.
Union signal station at east angle	Missing	Built 1862, removed after Civil War.
Wood-framed sentry boxes at northeast and southeast angles	Missing	Built 1862, removed after Civil War.
Earthen mounds	Missing	Present during Civil War, removed thereafter.
Caretaker's house	Missing	Built late nineteenth century for Ordnance Sergeant. Occupied by Cockspur Island lighthouse keepers after 1907. Destroyed by fire, 1925.
Water storage tanks	Missing	Installed 1935; removed 2001.

Assessment of Integrity

Assessment of integrity is based on an evaluation of the existence and condition of the physical features which date to a property's period of significance, taking into consideration the degree to which the individual qualities of integrity are present. The seven aspects of integrity as defined in the National Register Criteria for Evaluation are location, design, setting, materials, workmanship, feeling, and association. As noted in the National Register Bulletin, *How to Apply the National Register Criteria for Evaluation*:

> Location is the place where the historic property was constructed or the place where the historic event occurred. . . . Design is the combination of elements that create the form, plan, space, structure, and style of a property. . . . Setting is the physical environment of a historic property. . . . Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. . . . Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. . . . Feeling is a property's expression of the aesthetic or historic sense of a particular period of time. . . . Association is the direct link between an important historic event or person and a historic property.[216]

The property must retain the essential physical features that enable it to convey its historical significance. The essential physical features are those features that define both why a property is significant (National Register criteria) and when it was significant (period of significance). The National Register Bulletin, *How to Apply the National Register Criteria for Evaluation*, defines integrity as "the ability of a property to convey its significance."[217]

Integrity of Location. Fort Pulaski retains a high degree of integrity of location. The location of the fort is unchanged since its original construction.

Integrity of Design. Fort Pulaski retains a high degree of integrity of design. Although some modifications have been made to the fort over the years, both during and after the period of significance, the primary form, components, and features of the fort are unchanged since the fort was completed in 1847.

Integrity of Setting. Fort Pulaski retains a moderate degree of integrity of setting. As noted in the *Cultural Landscape* Report (2011), in 1862 the island setting was devoid of trees and shrubs, providing open views to the river and across the landscape. Currently, the immediate setting of the fort is maintained in mown turf grass, with a few widely spaced trees and markers. Longer distance views are obstructed by mature woodland growth. Other more recent changes to the setting include construction of parking lots and the visitor center.

Integrity of Materials and Workmanship. Fort Pulaski retains a high degree of integrity of materials and workmanship. Although some features from the period of significance have been altered, the majority of the original materials remain. Some non-original materials are present (e.g., casemate doors constructed by the CCC in the 1930s), but are accurate reconstructions of original features.

Integrity of Feeling. Fort Pulaski retains a high degree of integrity of feeling. The fort still strongly conveys its character as a nineteenth-century masonry coastal fortification.

Integrity of Association. Fort Pulaski retains a high degree of integrity of association. Restoration work conducted by the CCC in the 1930s and ongoing repairs today have maintained the association of the fort with the battle of April 10–11, 1862, and other Civil War events.

216. National Register Bulletin, *How to Apply the National Register Criteria for Evaluation* (Washington, D.C.: Government Printing Office, 1997), 44–45.

217. Ibid.





FIGURE 417. A partial view of the Sallyport in 1900 (top) and 2012 (bottom). Note that the damage to the parapet wall above the Sallyport is largely unchanged. Also, no flag pole is present at the center of the elevation in the 1900 photograph.



FIGURE 418. A partial view of the gorge circa 1930s (top) and 2012 (bottom). Note that the porch along the gorge is not present in the historic photograph, and that two windows in the guard room to the right of the sallyport were filled in with masonry. The pecan trees can be seen on the left side of the historic photograph.









FIGURE 419. A partial (cropped) view of the terreplein along the north side of Fort Pulaski in 1863 (top), circa 1930s (center) and 2012 (bottom). Note the presence of the wood-framed doorways at the casemates in 1863.



FIGURE 420. A partial view of the northwest corner of the parade ground in 1863 (top) and 2012 (bottom). Note that the porch along the gorge on the west side of the fort is not present in 1863. Also, shutters are present at the doors and windows at the gorge. Note the earthen mounds present at the terreplein in the 1863 photograph.





FIGURE 421. A view of repairs being made to the lead roof over the casemates at the northeast wall of the fort in the 1930s (top) and a view of the terreplein in 2012 (bottom). Note that the parapet appears to be in similar condition in both photographs.



Treatment and Use

Requirements for Treatment and Use

Laws, Regulations, and Functional Requirements

Key laws, regulations, and functional requirements that apply to the recommended work include the following:

- National Park Service Cultural Resources Management Guideline (Director's Order 28), which requires planning for the protection of cultural resources on park property.
- Section 106 of the National Historic Preservation Act (NHPA), which mandates that federal agencies, including the National Park Service, take into account the effects of their actions on properties listed or eligible for listing in the National Register of Historic Places and give the Advisory Council on Historic Preservation a reasonable opportunity to comment.

Treatment of the building and site are also to be guided by the following:

- *Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*
- Americans with Disabilities Act (ADA)
- International Building Code (IBC), 2012
- International Existing Building Code (IEBC), 2012

The State of Georgia has adopted the 2012 IBC but has not adopted the IEBC.

The National Park Service is self-regulating in terms of enacting and enforcing building code standards. Fort Pulaski National Monument Park is therefore not legally subject to local or state building code requirements. When undertaking repairs to buildings and structures, the National Park Service endeavors to have the work comply with model building code standards. At this time, the 2012 IBC with Appendices (replacing Chapter 34 with the IEBC) is the model building code used by the NPS and is referenced by the NPS Denver Service Center for design and construction. The NPS Denver Service Center also references the 2012 IEBC, with Appendices and Resource A.

The 2012 IEBC includes the following statement in paragraph 408.1, Historic Buildings:

> The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard.

Newly installed electrical systems and components, including any significant alterations to existing electrical systems, should comply with applicable provisions of the National Electrical Code (NEC).

Executive Order 13514 issued in 2009 directs all federal agencies to implement sustainable design

and construction practices. For Fort Pulaski, the relevant guidelines in this executive order require:

> . . . managing existing building systems to reduce the consumption of energy, water, and materials, and identifying alternatives to renovation that reduce existing assets' deferred maintenance costs . . . [and] ensuring that rehabilitation of federally owned historic buildings utilizes best practices and technologies in retrofitting to promote long term viability of the buildings.[218]

With historic structures, attempts to achieve strict conformance with model building code standards that are intended for new buildings can lead to destruction of the historic fabric. Alternative compliance procedures, such as Chapter 12 of the IEBC relating to historic buildings, should be referenced in determining code compliance.

Of particular importance at Fort Pulaski are elements or conditions that may be considered to pose potential threats to visitor safety. Previously identified areas of concern at Fort Pulaski include the inside edges of the terreplein, the three circular stairwells, the two straight staircases, and the two drawbridges. In 2000, an evaluation was conducted by the park to evaluate safety issues at the fort.[219] The Fort Pulaski management team reviewed NPS policy, the accident history at the fort, and public safety awareness programs for coordination with NPS objectives and goals. In the ten years preceding the study, two visitors experienced falls where the lack of railings might have been a factor; both visitors suffered minor injuries, one from a fall on the circular stairs, and the other from stepping off a moat drawbridge. Both visitors had visual impairments that contributed to cause the accidents.

The 2000 study concluded that there are no areas within the fort that are dangerous because of the absence of railings or other barriers, and therefore the decision was made to not install railings or barriers in any areas that did not have such protective devices historically. The report further noted that adding non-historic railings would result in an unacceptable level of destruction of cultural resources, and would visually detract from the historic character of the fort.[220]

Since issuance of the 2000 report, the park has received two letters from visitors expressing concern about the lack of railings at the terreplein level. The response by the NPS National Safety Program Director to one query noted that by the nature of the national parks, inherent risks exist; features of the parks that make them special often also make them dangerous.

In response to safety concerns, the NPS formed a group to review fort safety issues for various fortifications in the national park system. This review is currently in progress. The need to balance preservation of the historic resource with protection of NPS personnel and visitors is a primary consideration in development of recommendations to address safety issues.

Further commentary on code and safety is provided below.

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218. "Executive Order 13514 of October 5, 2009: Federal Leadership in Environmental, Energy, and Economic Performance" (Washington, D.C.: *Federal Register* 74, no. 194, October 8, 2009).
219. Superintendent, Fort Pulaski, *Memorandum on Evaluation of Railings, Fort Pulaski National Monument*, October 4, 2000.
220. Superintendent, Fort Pulaski, *Memorandum on Evaluation of Railings, Fort Pulaski National Monument*, October 4, 2000. The 2000 report references NPS Management Policies, January 14, 2000 draft, and Director's Order 50B, Occupational Safety and Health, effective December 22, 1999

Alternatives for Treatment and Use

The U.S. National Park Service has developed definitions for the four major treatments that may be applied to historic structures: preservation, rehabilitation, restoration, and reconstruction. The four definitions are as follows:

> **Preservation** is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.
>
> **Rehabilitation** is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.
>
> **Restoration** is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.
>
> **Reconstruction** is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.[221]

Of the four treatment approaches, *preservation*, which involves sustaining the building in its existing form, is most appropriate for the fort itself, given the significance and integrity of the fort today. Preservation is to some extent in progress as a result of ongoing repair and cyclical maintenance implemented by the park. Alterations and repairs to the fort since the primary period of significance have in many cases retained historic features and materials, with the primary exceptions of the enclosure walls at some of the casemates, which are currently either missing or reconstructions. A limited number of non-original features have previously been added to the fort to assist public visitation. These features include paved brick and concrete paths at the demilune, parade ground, and terreplein; iron railings and brick knee walls at staircase openings at the terreplein; and visitor restrooms. Overall, these added features are not intrusive and do not detract from the historic character of the fort. The treatment *rehabilitation* is the most appropriate for the landscape associated with Fort Pulaski, given its historic significance and the National Park Service mission to provide interpretation and visitor access.

Within this overarching approach, the historic structure report recommends preservation of the fort structure, including making all of the repairs necessary to stabilize and preserve the fort in its existing state, coupled with modifications (as needed) to protect the fort structure from water infiltration, to accommodate improvements to climate control, electrical, and plumbing systems, as well as to meet code and universal access requirements, for use by the park. The treatment *preservation* permits selective restoration of character-defining elements where missing or altered, if appropriate archival documentation is available. Examples of missing features that could be restored in the future include wood enclosure walls at casemates. (Refer to the Developmental

221. The Secretary of the Interior's Standards for the Treatment of Historic Properties.

History and the Significance and Integrity chapters for further discussion of character-defining features.)

Future use of Fort Pulaski is anticipated to be similar to its current function— a historic monument interpreted for visitors. Any minor changes in this use should be formulated so as to not require significant alterations to the historic exterior or primary interior spaces and features. Where future modifications are considered to provide universal access, incorporate improvements to mechanical, electrical, and plumbing systems, and meet code requirements (e.g., handrails), these modifications should be designed to retain original historic materials, features, and character wherever possible. Where incorporation of new amenities would require significant alterations to the fort that could diminish its integrity as an historic resource, consideration should be given to limiting or avoiding these modifications.

Many of the distinctive materials, features, and spaces of the fort are essentially intact, and in spite of various alterations since 1865 to accommodate ongoing military use and later interpretation, the structure retains its historic integrity. Repair of original materials and character-defining features as part of the overall rehabilitation is practical and appropriate, and can be achieved without implementing an overall treatment of preservation of the building in its current state or restoration to an earlier appearance.

For the historic landscape resources located within the moat walls—the demilune, parade ground, and terreplein—the overarching treatment approach of *rehabilitation* will allow for modification of vegetation to meet maintenance and sustainability goals, and the addition of potential improvements associated with storm water management and erosion control, access, and interpretation. For landscape resources, the goal of treatment is to protect the physical evidence of the earthen fortification structures associated with the demilune, the level open space of the parade ground, and access to the views and artillery emplacements atop the terreplein for the benefit and enjoyment of visitors. Protection of the landform and topography by limiting the potential for erosion is of the highest importance. Also important is maintaining visual accessibility of the attendant landforms and spaces and commanding views of the surrounding landscape that were designed for military purposes. To meet this goal, it will be necessary to maintain vegetation that perpetuates an open character. Turf grasses meet both of these needs by establishing a fibrous root system and top growth that protects against erosion and allows for views and perpetuates the spatial qualities present during the Civil War. The recommendations provided herein identify a strategy for establishing and maintaining turf cover intended to protect the character-defining characteristics of the Fort Pulaski landscape.

Ultimate Treatment and Use

Guidelines for Treatment

The guidelines and requirements for treatment included later in this chapter have been defined based on the preservation objectives and requirements for treatment and use outlined above for the Fort Pulaski National Monument. All treatment guidelines and recommendations provided for the fort were developed in accordance with the *Secretary of Interior's Standards for Preservation.* (The *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* were referenced in development of treatment guidelines and recommendations for landscape features addressed in this study.)

The Secretary of the Interior's Standards for Preservation are as follows:

1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.

2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.

3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.

6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.[222]

The Secretary of the Interior's Standards for Rehabilitation are as follows:

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be

222. Ibid. The guidelines that accompany the Standards also note that new materials should be distinguishable from old.

disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired. [223]

Guidelines for implementing the treatment recommendations provided herein are as follows:

- Undertake all work in compliance with the *Secretary of the Interior's Standards for Preservation*.
- Retain the character of the historic building and environs by protecting the building and significant site features.
- Ensure that proposed new elements or construction are compatible with the historic character of the building and its site.
- Protect adjacent natural resources during construction activities.
- Document through detailed as-built drawings, photographs, and written narrative all changes and treatments to the building and its immediate site. Maintain records of treatments and preserve documentation according to professional archival standards. Maintain a copy of records in NPS archives.
- Retain features and materials at both the exterior and interior of the buildings that survive from the period of significance to the greatest extent possible.
- Incorporate sustainable design principles in all future projects that respect the preservation principles listed above.

Prioritization of Treatment

Based on the condition assessment performed as part of this Historic Structure Report, the following prioritization is recommended for work on Fort Pulaski.

First priority: For the fort, complete repairs related to structural stabilization and safety issues, such as repairs to address loose or partially detached masonry fragments or brick units. For the landscape, protection of historic landform and topography by limiting the potential for erosion is of the highest importance.

Second priority: Complete work related to waterproofing to prevent water infiltration and deterioration of building materials of the fort structure, and to address conditions that may lead to continued deterioration and subsequent loss of historic fabric. Repairs are needed to the waterproofing of the terreplein and at the earth-sheltered magazines of the demilune, masonry joints, and windows and doors.

The next priority is modifications required to permit continued use of the building, such as work required to meet code, for universal access, for egress, to repair or restore interior finishes, to enhance interpretation, to upgrade building systems, or to address mitigation of hazardous materials such as lead-based paint (where present).

Finally, in addition to the specific repairs recommended, cyclical maintenance tasks such as inspection, painting of exterior wood and metal elements, repair or restoration of interior finishes, pointing of mortar joints in brick masonry, and other ongoing maintenance tasks must be continually implemented to avoid damage to the

223. Ibid.

historic building fabric and to reduce the need for large-scale repair projects in the future. (Note that several of the repair and maintenance activities discussed below are currently in progress by the park).

All work performed on the building and site features should be documented through notes, photographs, and measured drawings and/or sketches, or with as-built annotations to construction documents at project completion. These records should be placed in park archives as part of the permanent record of Fort Pulaski, and to provide information for future repairs and ongoing maintenance. The project work orders currently developed using the NPS Facility Management Software System can provide a basis for this documentation.

These records should be permanently archived at NPS or park archives as a part of the permanent record of the building and to provide information for future repairs and ongoing maintenance. In addition, these records will allow future observers to identify which materials are historic.

Recommendations

The following specific recommendations for treatment of Fort Pulaski respond to the overarching treatment approach *preservation*, which involves sustaining the building in its existing form, for the fort itself, and *rehabilitation* for the historic landscape resources located within the moat walls—the demilune, parade ground, and terreplein—to allow for modification of vegetation while protecting physical evidence of the fortification structure, and maintaining important views and viewsheds, as noted above.

Responses to Code Provisions and Safety Issues

For purposes of this study, specific consideration was given to the existing safety concerns, such as presented by the terreplein, stairways, drawbridge, demilune, and moat. These conditions do not meet code-mandated requirements for non-historic or new construction.

Chapter 12–Historic Buildings of the 2012 *International Existing Building Code* provides general guidance on repair, alteration, relocation, and change of occupancy of historic structures. The code generally defers to the code official to determine whether specific conditions are acceptable or are considered to require modification. With respect to guards (paragraph 1203.9), the code notes that "Existing handrails and guards at all stairs shall be permitted to remain, provided they are not structurally dangerous." Paragraph 1203.10.1 references section 605–Accessibility with respect to guard heights. Section 605 states that "Repairs shall be done in a manner that maintains the level of accessibility provided [prior to the work]."

The following approaches are recommended in response to safety concerns noted at Fort Pulaski:

- Conduct an updated safety assessment of the fort overall, including both fortification and landscape features, with emphasis on achieving a balance between preservation of character-defining features and improving visitor and NPS personnel safety. (This assessment will be informed by the findings of the NPS review of fort safety issues for various fortifications in the national park system, currently in progress.)

- Develop and implement a program of pro-active safety briefings, to be delivered to park personnel by a designated park safety officer on a regular basis. Also consider enhancing pro-active safety briefings provided by park to visitors.

- Consider alternative safety approaches to railings at the terreplein and other locations, given that railings could be visually intrusive, and might provide a false sense of security. (Further research would be helpful in determining whether types of railings may be available that would be less intrusive to the historic resource.)

- Ensure that vegetation on the terreplein does not obscure the edge or create tripping hazards.

- Consider limiting access to certain areas, or by certain tour groups (e.g., school children).

- Provide improved lighting in the stairways, using fixtures that are energy-efficient and visually non-intrusive, such as removable LED lights.

General Treatment Recommendations

1. Retain and maintain the character-defining qualities and characteristics of the fort, while applying contemporary effective preservation methods to stabilize and preserve historic features in good condition. Key character-defining features include:

    - Perimeter moat and associated masonry walls

    - Open character of the site

    - Mounded soil parapets edged by masonry and concrete walls

    - Demilune and associated earthen landforms maintained under grass cover

    - Gun emplacements on the demilune

    - Drawbridges and sallyport

    - Walkways linking drawbridges with each other and paths providing access to the interior rooms

    - Fort exterior walls, casemates, spiral stairs, porch and quarters, and associated built features

    - Parade ground and associated grass turf

    - Perimeter walkways

    - Expansive views across the parade

    - Terreplein

    - Gun emplacements on the terreplein

    - Interior casemates and quarters

2. Avoid adding new features or altering existing non-historic features in ways that adversely affect the fort's historic character and historic materials.

3. Protect the setting of the fort from changes that will affect its historic integrity.

4. Sustainability should be considered in the choice of materials and energy use.

5. Consider the fort as a whole in treatment, maintenance, and management strategies, while carefully addressing the inherent structural and material needs of each individual feature.

6. Consider equally both natural and cultural resource values in treatment decisions.

7. Continue to facilitate and provide access to the historic features of Fort Pulaski, including the accommodation of universal accessibility wherever practical and feasible without incurring irreparable change to the historic resources.

8. Continue to provide thoughtful, educational interpretive materials and programs to the visitor. Consider a range of options for conveying interpretive information, including the replacement of visually intrusive wayside exhibits with other media. In addition to the current use of personal interpretation services, options might include printed brochures that visitors can use during their visit and return for additional use at the end of their tour, virtual materials available for smartphones and other devices, and temporary or removable sign features. Utilize interpretive programming and devices to illustrate the military design and engineering aspects of the fort to the public and to indicate the location and character of any missing features. Ensure that interpretive materials feature historic maps and photographs to illustrate the missing historic conditions.

9. Develop a coordinated program of further research and investigation as required to support ongoing repair, maintenance, conservation, protection, and interpretation. Identify technical and historical research needs, including archival research and oral interviews with park personnel, and investigative efforts required to support repair and maintenance efforts (see below).

10. Establish a monitoring program that regularly assesses the health and viability of turf growing on the demilune, parade ground, and terreplein, and need for any repair or replacement. Keep records that may suggest repeat problems associated with specific locations. Use the records to employ an adaptive strategy whereby adjustments can be made to management and maintenance practices as needed that will ensure the perpetuation of turf cover.

11. Document all work performed on the fort with notes, photographs, and measured drawings and/or sketches, or with as-built annotations to construction documents at project completion. The development of comprehensive organized documentation of all work performed on the fort and its landscape is essential to the preservation and maintenance of the historic resources. Records of future research, condition assessments, investigations, testing, trial repairs, and treatment should be permanently archived at the park and copies provided to other relevant NPS archives.

Brick Masonry

In general, ongoing repairs are required to address the effects of weathering on the brick masonry. These types of repair activities will be required on a cyclical basis. It may be desirable to perform a small quantity of work each year, proceeding from location to location in the fort. These typical weathering-related repairs include the following:

1. In support of developing appropriate repairs and for documentation purposes, conduct selected laboratory studies of existing and new mortar to assess current conditions and develop information for replacement mortar mixes.

2. Implement, review, monitor, and document trial repair protocols for repointing and other repairs. Review over an extended period to evaluate seasonal effects of climate conditions. Establish and record best practices to guide ongoing repair and maintenance.

3. Prepare and repoint open or eroded mortar joints in the brick masonry.

   Where present, unsound mortar should be removed to a depth of 2-1/2 times the width of the joint, or to sound mortar, whichever is greater. Work should be performed using handheld, non-power tools. A skilled mason can sometimes accomplish joint preparation without damaging the adjacent substrate by using a small power tool to cut along the center of the joint, followed by use of a hand tool (chisel) to remove mortar adjacent to the center cut. This process, if implemented by a skilled mason, can sometimes result in less potential damage to the masonry adjacent the joint than preparation using hand tools only, particularly for existing very hard mortar adjacent to eroded or spalled brick. A trial sample is always required to evaluate the skill of the mason and effectiveness of the repair.

   Joints should be repointed using appropriate mortars that match existing historic mortars. The use of hard portland cement-based mortars should be avoided. Commercially available masonry mortars should be avoided because they can contain unnecessary, and undisclosed, additives and fillers.

   Based on available historic documentation, it appears that natural cement mortars were used during initial construction of the fort for at least some of the masonry construction and pointing.

   Based on the limited materials studies conducted for this report of repointing samples provided by the park, additional trials

may be conducted using the gauged mix of natural hydraulic lime and K-4 natural cement, and a mix of St. Astier natural hydraulic lime. A detailed written protocol or specification should be prepared prior to implementation of new trial samples, and information recorded to note mortar components, mixing procedures, wet or dry condition of the sand used in the mortar, installation procedures, weather at the time of installation, conditions during curing, and other materials, methods, and conditions related to the repointing process. New trial samples should be reviewed for an extended period and assessed prior to continuing repointing work.

New work should match historic mortar joints in color, texture, joint size, profile, and tooling.

4. Since the repointing work will likely be performed over an extended period of time and at varying locations on the fort each year, establish a detailed protocol for tracking the extent of work and materials installed each year. The protocol should include photographic documentation of the work before, during, and after repointing; marked plan and elevation drawings (using the HABS drawings as baselines) to indicate the extent of work; written records of mortar mixes; and physical mortar cubes prepared at the same time mortar is installed on the fort to be cured, labeled, and stored in the park archive for future comparison.

5. Where individual severely spalled or deeply eroded brick are observed, consideration could be given to removing the brick and resetting it with the previously concealed face oriented to the exterior. If individual brick are too severely damaged to be used, it is recommended to dismantle a small area, harvesting original brick for use on the exposed surfaces, and providing new compatible brick for the concealed back-up construction. In some cases, given the thickness of the wall construction, individual eroded brick units do not require repair.

6. Conduct close-up investigation of selected areas of the fortification with existing (historic) damage, including Civil War-era damage to exterior walls and fire damage at Southwest Bastion, to assess structural stability. Document existing conditions to establish a baseline; review historical documentation and monitor these locations for any changes in deterioration or distress.

7. Where individual displaced or loose brick are observed throughout the masonry walls, reset loose brick and replace missing brick with brick to match original. Many loose brick are at the edges or within the Civil War shell impact locations. At these locations, the loose brick should be re-set in their existing position with new mortar, including partial or broken brick, so that the shell impact locations do not "grow" over time due to deterioration of brick masonry.

8. Where hard mortar is observed adjacent to eroded or spalled brick units, this mortar should be carefully removed and the joints repointed with compatible mortar as described above. Where mismatched non-original brick units or hard cementitious patch materials have been installed to replace damaged brick, the brick or patch material should be removed and replaced with matching brick, and repointed as described above.

9. Where continuous cracks are observed through brick masonry, repair the masonry by rebuilding along the cracks. Consideration should be given to adding horizontal stainless steel reinforcement within masonry bed joints across cracks. Due to the coastal environment, Type 316 stainless steel or coated stainless steel reinforcement should be used. In some locations, cracks that have been present for many years could be monitored and, if found to be stable, repaired by repointing. Records of previous repair work implemented in the 1930s indicate that salt was sometimes placed in cracks to discourage plant growth. Therefore, it may be desirable to test the chloride content at crack locations prior to

rebuilding, to determine if chloride levels are elevated as compared to other masonry areas of the fort.

10. Where existing metal embedments in brick masonry are causing damage to adjacent masonry, repair is required. In some cases, it may be desirable to remove the embedment, particularly if it is not an original feature of the fort. In other cases, particularly the abandoned embedded anchors that formerly supported wood-framed casemate enclosure walls, the embedded metal should be retained as a historic element. Therefore, the embedded metal should be cleaned of corrosion, primed, and painted, and the adjacent brick masonry repaired by localized rebuilding and/or repointing. In severely cracked locations, the brick masonry should be dismantled to completely expose the embedded metal element. The embedded metal should be cleaned of corrosion and primed and painted on all surfaces. The embedment should be wrapped in a compressible fill material, held back from the finished masonry surface. Finally, the brick masonry should be rebuilt around the embedded metal. When rebuilding, the original brick should be salvaged and reinstalled.

11. Mortar deterioration attributed by the park to condensation has been reported on interior brick masonry at casemate 61, which contains the park archives within the Bally building. This area should be monitored to confirm under what conditions condensation is occurring, and to determine appropriate remedial measures. For example, possible approaches could include adjustments to mechanical system set points, insulation of the Bally building, or provision for additional ventilation of the casemate surrounding the Bally building.

12. Clean brick masonry where affected by biological growth such as lichen or algae, including localized areas of brick retaining walls, interior walls of sallyport, and terreplein parapet, outer fort walls, and casemates. Also clean brick masonry where staining is occurring due to storm water passage through the scuppers.

13. Prior to cleaning, conduct trial cleaning studies to address soiling and biological growth on masonry.

    Cleaning treatments fall into three general categories: water-based, chemical, and mechanical methods. Water-based methods include pressurized water spray, heated water or steam treatments, and misting. Chemical methods involve the use of products ranging from non-ionic soaps and detergents to acidic or alkaline cleaners, as well as biocidal treatments, in a variety of gels, liquids, pastes, and poultices. Mechanical cleaning methods include very low pressure (less than 75 psi) micro-abrasive systems and specialized laser-based cleaning equipment; these techniques are likely not appropriate for most of the types of masonry present at Fort Pulaski.

    When cleaning is necessary, it should be performed using the gentlest means possible. Low-pressure water washing can be effective, at no greater than 100 to 200 pounds per square inch (psi), or less as indicated by trial samples. Any cleaning method using water should not occur when the temperature will fall below 50 degrees Fahrenheit for at least 72 hours after cleaning.

    If chemicals are used, test panels should be developed and carefully evaluated to avoid over-cleaning. Chemical cleaners must be chosen by a conservator who understands the type and condition of the masonry material to be cleaned. Cleaners containing strong acids or which are highly alkaline can damage historic materials and should be avoided. Some chemical cleaners may result in further staining of porous masonry in the near term and long term.

    Biological staining can be removed using an approved masonry cleaner containing a quaternary ammonium compound, if shown to be appropriate for the masonry.

Appropriate water pressure, nozzle, distance, and fan tip based on cleaning trials and conservator's microscopic examination. Use only stainless steel nozzles with fan tip spray, typically 40 degrees, held a minimum of 12 to 18 inches from the surface being cleaned. Prewetting and thorough rinsing are necessary in any cleaning process involving water or chemical cleaning. Finally, it should be understood that some soiling may remain and the masonry should not be expected to appear new after cleaning.

Cleaning should be repeated only as needed (typically every five years) to remove heavy soiling or staining. Rinsing with clean water to remove bird drippings and other accretions can occur more frequently.

A treatment record should be maintained of cleaning work, including date of cleaning, materials used, and any change in condition since the previous cleaning.

The following repairs address unique items or issues that, with proper repair, would not be expected to recur due to normal weathering over time.

14. Investigate and address standing water in casemate crawlspaces and rising damp causing damage to masonry at base of wall in some casemates, for example, casemates 12, 13, 30, 31, and 43. It may be appropriate to provide additional drainage and/or gravel fill, so that the crawlspace areas below the wood floors of the casemate do not retain standing water. It is likely that the soils under the casemate floors will be saturated up to the level of water in the moat. Therefore, if rising damp still results in significant distress following initial filling or drainage efforts, consideration could be given to the introduction of waterproofing along the moat side of the brick masonry wall, below the water line in the moat. Further study is required to evaluate this approach.

15. The cementitious parge coat added in the twentieth century at areas of damaged or missing coping can remain, as removal would likely result in significant damage to the substrate. In locations where cracking, debonding, or missing parge coat are observed, either remove the parge coat entirely (if limited to a small area), or consider installing a new cementitious mortar wash to provide drainage at the top of the wall (if at an expansive area and/or an area likely to retain water).

    Consideration could be given to performing absorption and compressive strength testing of the brick, to provide additional information to guide future repointing. These tests are destructive in nature and require removal of representative brick samples from the wall; therefore, it may be reasonable to wait until other brick masonry work involving removing and resetting brick units is undertaken, so that sample brick units can be removed from concealed locations. Additionally, the absorption and compressive strength testing could include samples of brick from the southwest portion of the fort that was damaged by fire in 1925, in order to determine if the fire caused any lasting structural damage. (Although damage was not observed in limited visual materials studies performed of selected brick samples provided by the park, additional testing would permit further assessment of this issue.)

16. Investigate the outward displacement and cracking of brick masonry at the corners of the demilune moat walls. Localized rebuilding may be necessary to ensure the stability of these wall corners.

17. To prevent birds from roosting or nesting in the vents at the casemate embrasures, installation of a bird control system is recommended at the top and bottom of each vent shaft. The system should be non-harmful to birds and should use only materials that are non-destructive to the masonry (i.e., stainless steel or plastic), reversible, and visually non-intrusive.

Stone Masonry

1. Remove deteriorated parge coating previously applied as repair to sandstone sills, for example at casemates 4, 28, 32, 34, and 37. The cementitious parge coat is not an appropriate treatment because it is much harder and less vapor permeable than the underlying sandstone. Inspect the condition of the sills following parge removal. Stone units with smooth spalls or erosion may not require repair, if the existing condition of the stone allows water to drain and the stone does not represent a tripping hazard. For units where the remaining stone is irregular or unstable following parge coating removal, consider repair as discussed below. Also, for units such as door thresholds that may pose a tripping hazard, consider repair as discussed below.

2. Consider repairing sandstone units with large spalls or incipient delamination of the original tooled face. Where stone repair is considered, various options are available. For severely eroded or cracked stone units where much of the original material is already lost, consideration can be given to replacement in kind with an entirely new sandstone unit. Replacement units should be photographically documented before, during, and after the work, and drawings should be annotated to show the location of the units. The new unit should be permanently embossed or engraved on a concealed surface with a notation such as "NPS, 2014." For stones with localized damage, dutchman units can be installed that replace a portion of the original unit with compatible sandstone material, cut square and installed to re-create the original profile. For sandstone units where incipient delamination may result in the loss of the original tooled face, consideration can be given to the use of stone consolidants to prolong the serviceability of the stone and preserve the original exposed face. Prior to widespread use of consolidants, install test patches in discreet locations to study the long-term performance of the consolidant and to monitor for any adverse performance or aesthetic effects.

3. Clean stone where affected by biological growth or soiling. Refer to Brick Masonry, above for a discussion of masonry cleaning issues.

4. In support of developing appropriate repairs and for documentation purposes, conduct selected laboratory studies of existing stone.

Roofing and Waterproofing

1. Investigate and document sources of active water leakage through the terreplein roofing into the casemate interiors, specifically at casemates 1, 7, 15, 18, 22, 24, 25, 26, 27, 37, 38, 40, 44, and 45. At specific locations of active water leakage, carefully excavate the terreplein fill to expose the terreplein roofing. Repair the lead roofing by soldering lead sheet metal patches over any tears or punctures. Repoint any deteriorated masonry exposed during terreplein excavation. Depending upon conditions observed, consider extending the roofing upward on the concealed back side of the masonry walls with a new rubberized asphalt waterproofing membrane. The membrane would be adhered to and extend from the lead roofing up to the highest continuous bed joint that is below grade of the terreplein fill. As part of this work, ensure that drainage outlets from the terreplein are clear of debris. Consider installing filter fabric, strainers, and/or washed gravel fill below the terreplein earthen fill to minimize clogging of drainage pathways.

2. Investigate and document sources of active water leakage related to the porch roof and its drainage system. Perform localized repairs to sheet metal roofing if needed. Perform ongoing maintenance to ensure that the porch roof drainage system remains clear of debris and watertight.

Concrete

1. Investigate and address sources of water infiltration visible on the interior of the demilune structures, especially at south magazine corridor. This investigation may

require excavation of the earth covering. Consider the application of hot rubberized asphalt waterproofing with appropriate detailing and protection layers prior to re-covering the structures with earth.

2. Monitor cracks that are wider than 1/32 inch in concrete demilune walls and floors over time. If cracks are found to be stable, repair using a cementitious crack fill material. Hairline cracks do not require repair.

3. Conduct trial repairs and clean demilune concrete where affected by biological growth such as lichen or algae.

4. In support of developing appropriate repairs and for documentation purposes, conduct laboratory petrographic and material studies of the existing tabby concrete.

Wood (Drawbridge, Floors, Porch, Doors, and Windows)

1. Inspect non-historic or interpretive wood components such as the drawbridge and the terreplein gun platforms on an annual basis. When significant wood decay or warping is observed, replace the wood element with new pressure-treated kiln-dried material matching the existing configuration.

2. Inspect the wood casemate floors on an annual basis. Where flooring material that dates to the 1930s or later has experienced significant decay or displacement, such that a tripping hazard results, replace individual floor boards with new material matching the existing widths and appearance. Where present historically, re-create the grooves for cannon tracks in the new material. The new wood components should be marked on the back side with an annotation such as "NPS–2014." When selected portions of the casemate flooring are removed for replacement, inspect the crawlspace for evidence of standing water and masonry deterioration, and the wood floor joists for evidence of decay and other deterioration. It is preferable to retain the surviving portions of original/nineteenth century wood casemate flooring; if wood decay or other damage results in a safety (e.g., tripping) hazard at these locations, public access to the area should be limited. Also, it may be desirable to add signage or similar elements to interpret the various types and ages of wood flooring that are present. When 1930s wood material is replaced, or where localized severe deterioration necessitates isolated replacement of nineteenth century wood flooring, locations of replacement material should be documented with drawings and photographs, and samples of wood materials should be retained in the park archives. For replacement wood, the use of old-growth material matching the original species is recommended for consideration if available, rather than treated lumber.

3. Inspect historic wood components such as the sallyport doors and staircase doors on an annual basis. Ensure that water is not directed against the doors and that they remain as dry as possible. Perform trials of wood preservative application under the direction of a conservator to minimize future decay. When recommended by a conservator, apply wood consolidants to address localized wood decay.

4. Inspect and repair the windows and doors at the gorge quarters as needed. Specifically, inspect windows in the gift shop and repair to address condensation and deterioration, and replace broken glass panes where present, as in the casement window in the weapons workroom. Maintain the paint coating on the windows and doors in good condition. (See discussion under brick, above.)

5. Review historic documentation and contemporary sources to attempt to identify an appropriate Civil War-era color scheme for the windows and doors. A paint analysis of the windows and doors may be performed to assist in determining historic color schemes if locations are identified where original finishes are thought to exist; however, research performed for this study indicates that nearly all existing doors and windows at the gorge rooms date to the 1930s rehabilitation work. If

no evidence of historic finishes can be found, the existing white color should be maintained and the historic appearance interpreted with photographs.

6. Consider restoring shutters to the windows and doors at one or more gorge rooms for interpretive purposes. The wood shutters should be designed to match the shutters visible in Civil War-era photographs.

7. When repair is required, consider re-orienting the upper portion of the flagpole to match the documented Civil War-era appearance.

Ornamental Metals

1. Continue to regularly prime and paint the ironwork of the fort, including stair railings, door and drawbridge hardware, prison enclosures, casemate hardware, and cannon hardware. Remove deteriorated paint using appropriate methods, including wire-brushing for non-decorative elements exhibiting light rust, or chemical paint removal for heavier built-up paint that obscures details. Clean metal surfaces when appropriate to remove corrosion before repainting. For cast iron, hand scraping and wire brushing with a fine wire brush are appropriate methods for removing finishes and surface corrosion. Low pressure grit blasting may also be used if it does not abrade the surface. Elements with severe corrosion should be removed to a shop for repair. Newly-cleaned metal should be protected immediately with a rust-inhibiting primer. Epoxy and alkyd-based coatings are recommended for field finishing. Zinc-rich primers may be applied in a carefully controlled shop setting. Latex and other water-based paints are not recommended, as they will not be as durable. Appropriate historic colors should be used, as determined from review of archival documentation. If it is not possible to confirm the historic colors through documentation, a conservator should be engaged to conduct finishes analysis to determine the historic colors where fabric from historic periods remains.

Quarters and Casemate Interiors

1. Continue ongoing repair, restoration, and maintenance of wood floors, plaster walls and ceilings, and other interior finishes. Also refer to discussion of brick, above.

2. Maintain the existing mechanical systems in good condition. Consider adjusting system set points so that a higher interior temperature is maintained on warm, humid days so as to minimize condensation on exterior glass and other surfaces. (See also discussion of brick, above.)

3. Inspect the interior of each cistern to determine current condition and any needed masonry repairs. Drains or other pipes that discharge into the cisterns should be re-routed if necessary so that the cisterns are maintained in a generally dry condition. It may not be possible to maintain a fully dry interior at the cisterns, and groundwater may seep into the cistern up to the level of water in the moat. If rising damp or masonry distress related to a low water level in the cistern becomes apparent, consideration should be given to waterproofing of the outside walls of the fort below the water level of the moat, or the installation of a pump to drain the cisterns. Installation of waterproofing would be a complex and costly approach, and limited in reversibility. Installation of a pump to drain selected cisterns could be implemented on a trial basis and monitored over time to evaluate the efficacy of this approach. Ongoing monitoring and repair as needed of the masonry would be required throughout this evaluation period, and in the future if the pumps are left in place long term.

Setting

1. Consider removing non-historic woody vegetation outside the fort to restore key viewsheds and fields of fire that may currently be obscured.

Parade Ground

1. Retain and maintain the character-defining qualities and characteristics of the parade ground that include its open level character and grass surface, edged by the masonry fortification and associated brick walks and colonnade features, flagpole, and emplaced artillery.

2. Conduct a survey of the parade ground to generate a 6 inch interval topographic map. Evaluate grading efforts conducted by the CCC and during Mission 66, and compare these with historic topographic plans of the parade ground. Consider re-grading the parade ground as a relatively level plane that is designed to slope at a sufficient pitch towards drainage structures so that ponding does not occur. (See recommendations below regarding interpretation of missing conditions to address this change to the parade ground character.)

3. Maintain the existing pecan trees and fig shrub until they are no longer viable. The 2011 Cultural Landscape Report determined that the existing trees are not historic resources that contribute to the significance of the historic property. Current recommendations provided in the Cultural Landscape Report suggest not replacing these vegetation features once they succumb to age or disease. (See Recommendations for Further Research, below.) To replace the shade created by the trees, design and install a removable canvas cover over the area used for visitor orientation by personal interpreters.

4. Repair the brick walks to ensure a level and smooth walking surface and reduce trip hazards. Repairs should address problems with cracking, the separation of the brick edging along the walkway, and differential settlement that has created a grade separation between the brick walkway in the parade ground and the adjacent brick paving at the west porch. Where existing cracks in the paving are narrow and adjacent paving is level, the cracks can be left unrepaired. Repairs would likely consist of removal of individual cracked or displaced brick units and adjacent mortar, and installation of new brick or resetting of intact brick. Brick should be set in mortar with joints filled to match existing adjacent paving. Care should be taken to match the size, color, and texture of the original brick material. Note that where cracking in specific areas is extensive, the underlying concrete slab should be examined when brick is removed for replacement or resetting. The concrete should be selectively replaced as needed prior to brick installation.

5. Enhance interpretation of the parade ground and features of the fortification accessed from the interior, taking into consideration a range of approaches. Utilize interpretive programming and devices to illustrate the military design and engineering aspects of the parade ground to the public and to indicate the location and character of any missing features. Incorporate information about changes that have been made to the parade since the Civil War to meet emerging needs. Interpret the Civil War-era character and composition of the parade ground to ensure that visitors understand the design and function of the feature during its primary period of significance. Consider incorporating interpretive material that utilizes available technology, such as smart phone apps, to supplement that available on wayside exhibits.

6. **Turf Management.** Maintenance and management of the historic character and features of the parade ground focuses principally on turf management. Challenges associated with turf maintenance within the parade ground include the relatively level topography, which may lead to ponding during large storm events; the possible presence of salt spray from the nearby brackish Savannah River; the presence of invasive species; and the potential for drought to kill the turf grass. Management strategies are intended to protect against these eventualities.

    - Establish and/or maintain healthy grass cover throughout the parade ground.

- Evaluate the turf species mix of the parade ground. Consider options for replacing the existing mix with a more sustainable one, in terms of drought tolerance, diminished mowing requirements, and a lesser need for soil amendments.

- Establish best management practices for caring for the turf that addresses desirable species composition, watering, fertilizer and pest and weed control applications, and mowing practices. Ensure that all maintenance personnel are trained to follow the protocols. Consider the use of native plant species wherever possible.

- Establish mowing protocols to protect the health of the turf. Ensure that all maintenance personnel are trained to follow the protocols.

- Inspect the parade ground regularly to identify any turf maintenance needs. During inspection document instances of problems requiring repair, including their locations on a map. Identify areas requiring rehabilitation, replacement, or establishment of new grass cover. Regularly monitor the grass stand regularly to ensure that any problems are identified and corrected immediately.

7. Record all procedures and techniques developed in the field as part of the monitoring program recommended in this plan to facilitate long-term management of the parade ground.

8. Address any drainage problems encountered immediately.

9. Undertake vegetation removal and drainage mitigation using specialized techniques that avoid damage to archeological resources.

10. Encourage visitors to refrain from walking on the parade ground.

11. Address the need to accommodate visitors at the edge of the parade ground as they enter from the sallyport. Visitors repeatedly gather in this location and have worn away the grass. Consider rehabilitating the turf in this area by either adding a stabilized turf sod that can handle foot traffic, or paving with a surface application of warm brown colored asphalt that can be removed in the future without altering the landscape.

Terreplein

1. Repair spalling, cracked, and broken concrete associated with walks and gun emplacements.

2. Determine the portion of the terreplein that is appropriate for visitors to access. Grade the walking surface of the terreplein so that it is smooth and does not contain any trip hazards. Pave a 3-foot-wide path with a surficial treatment of warm colored asphalt along sections of the terreplein designated for visitor access.

3. Consider alternatives for establishing safety improvements in the areas designated for visitor access, such as thin steel post and cable systems. Safety improvements should be reversible and removable, and as visually unobtrusive as possible. (Coordinate with findings of the safety study for fortifications currently in progress by the National Park Service.)

4. Evaluate the efficacy of the roof drainage system. Repair any aspects of the system that are not functioning properly.

5. Clean the brick fortification walls where staining is occurring due to storm water passage through the scuppers.

6. Evaluate the turf species mix that covers portions of the terreplein surface that are not paved. Consider options for replacing the existing mix with a more sustainable one, in terms of drought tolerance and diminished mowing and soil amendment needs.

7. Carefully remove volunteer vegetation growing on the terreplein and associated

features. Remove vegetation in such a way as to avoid dislodging soil and masonry.

8. Enhance interpretation of the terreplein, taking into consideration a range of approaches. Ensure that visitors understand the changes that have occurred to this area since the nineteenth century.

9. Consider adding LED removable lights on the interior of the spiral staircases to enhance visitor safety.

Demilune

1. Retain and maintain the character-defining qualities and characteristics of the demilune that include its open character, earthen landform featuring mounded soil parapets edged by masonry and concrete walls, a perimeter moat, drawbridge connections linking the demilune to the fort and to the island, concrete openings leading to interior rooms, gun emplacements, and walkways linking the drawbridge connections, and entrances into the interior spaces.

2. Enhance interpretation of the demilune, moat, and sallyport, taking into consideration a range of approaches. Ensure that visitors understand the changes that have occurred to this area since the nineteenth century, and the original role of the demilune in the military design of the fortification. Incorporate information about changes that have been made to the demilune over time to meet emerging needs. Interpret the Civil War-era character and composition of the demilune to ensure that visitors understand the design and function of the feature during its primary period of significance. Consider incorporating interpretive materials that utilize available technology, such as smart phone apps, to supplement information available on wayside exhibits. Consider creating a bronze three-dimensional model that visitors can touch that can be placed in the landscape to convey the Civil War character and configuration of the fort as a way to convey information about missing conditions.

3. Establish a monitoring program that regularly evaluates the earthwork for evidence of erosion and slumping.

4. Record all procedures and techniques developed as part of the monitoring program, as well as for repair and maintenance of the demilune, to facilitate long-term management of the demilune earthworks and structures.

5. Repair cracked, spalling, and broken concrete and brick pavement associated with the demilune.

6. For repair of historic brick masonry and tabby concrete features of the demilune, refer to discussion of repairs for brick masonry and concrete, above.

7. Protect the historic integrity of the demilune by conducting a digital scan that can be used to create a 3-dimensional record of the feature.

Earthen Fortifications. Earthworks are fragile and irreplaceable authentic remnants of military landscapes. They are cultural resources whose preservation is dependent on careful management of ambient natural systems involving water resources and vegetation. Earthworks are also archeological resources with information potential that merits careful stewardship and a conservative approach to management. Successful earthworks management strategies integrate natural and cultural resource values.

The demilune is the only earthwork structure of the Fort Pulaski military complex. As such, it provides an important counterpart to the adjacent fort for education and interpretation. Although the demilune and other aspects of Fort Pulaski were adaptively reused for military purposes after the Civil War and the form of the resource changed, the structure remains a unique and significant resource with a direct link to a nationally significant Civil War event. The objectives for the treatment of the demilune earthwork include 1) protection and preservation of the structure; 2) sustainable management of associated ecological systems; 3) interpretation that includes

information about the fragile nature of the structure and the need for stewardship; and 4) establishment of best management practices that include a monitoring strategy.

The primary goal of management of the demilune earthworks is to ensure that the earthen forms are protected from erosion by maintaining a comprehensive, healthy cover turf grass or other fibrous-rooted ground cover. Earthworks are highly susceptible to erosion unless carefully protected against storm water and visitor access. Any current evidence of erosion needs to be quickly corrected, and associated causes mitigated to limit future erosion.

The demilune is currently protected under turf cover that is generally healthy and covers most, if not all, areas of the earthworks. Loss of or damage to the turf that protects the demilune against erosion could occur at any time, however, due to visitor trampling, drought, salt spray, and inappropriate mowing techniques or timing. The treatment recommendations that follow are designed to diminish the potential for these problems to occur, and to develop a strategy that allows for a rapid response to any damage or threat.

1. Implement a park-wide policy of requesting visitors to refrain from walking on the earthworks. Initiate the message in the parking area and the visitor center. Include signs at the drawbridge that reinforce the message. Suggest that park personnel regularly remind visitors of the policy.

2. Limit access to the demilune by park maintenance personnel.

3. Repair immediately upon its discovery any evidence of erosion and structural damage to the earthworks.

4. Address any drainage problems encountered immediately. Storm water ponding and channelization can both damage or kill turf and lead to erosion.

5. Repair evidence of soil slumping and erosion associated with the demilune. Consider the use of sod to repair eroded areas. Consider using such techniques as erosion control blankets, hydroseeding, and sod to ensure repair of erosion and dead or dying turf.

6. Ensure that a healthy stand of fibrous-rooted vegetation protects the demilune from erosion.

7. Evaluate the existing turf species mix used to protect the demilune. Evaluate the efficacy of current turf maintenance practices to determine whether they are consistent with sustainability goals. Determine whether the existing turf is suited to the steep slopes, soil composition, moisture conditions, and maintenance regime. Should the park decide to replace the current species mix with a comprehensive planting of a single mix or species, consider whether the species mix might include native warm season grasses that require less frequent mowing, are drought tolerant, and do not require fertilizer and lime amendments to thrive. Consider using sod to replace any existing stands and to repair any problems as they occur. To support this recommendation, consider establishing a sod production area within the park using the desired mixture that can be used on the demilune as needed.

8. Establish best management practices for caring for the turf on the earthworks that address desirable species composition, watering, fertilizer and pest and weed control applications, and mowing practices. Consider the use of native plant species wherever possible.

9. Establish mowing protocols to protect the earthworks from gouging and other deleterious effects that could lead to soil erosion. Ensure that all maintenance personnel are trained to follow the protocols.

10. Ensure that maintenance practices include careful edging of the earthwork soil profile

where it abuts masonry features to avoid damage to either resource type.

11. Consider the impact of mowing and edging techniques on the condition of the demilune earth profile and tabby and adjust to avoid damaging either one.

12. Inspect the earthworks for erosion on a cyclical basis. During inspection, document instances of problems requiring repair, including their locations on a map. Identify areas requiring rehabilitation, replacement, or establishment of grass cover. Regularly monitor the grass stand to ensure that any erosion is identified and corrected immediately.

13. Undertake vegetation removal and erosion mitigation using specialized techniques that avoid damage to the earthen resources.

Recommendations for Further Research

- Conduct additional research on the history and construction of the fort to inform interpretation, including but not limited to subject areas identified below.

- Conduct investigations and implement monitoring to provide updated baseline information for specific features of concern, such as areas of water leakage through the terreplein into the casemates, the condition of the wood-framed casemate floor structure, the condition of decorative paint features, reported condensation associated with the Bally building in casemate 61, and other issues.

- Perform materials studies of historic materials to provide information for documentary and interpretive purposes and to inform future repairs. Of interest would be sampling and analysis of brick, mortar, stone, and tabby from the 1895 southeast magazine, as well as further assessment of whitewash and finishes to augment the 2001 conservation study. Also of interest would be sampling and investigation of wood from the southeast and southwest doors in casemate 58, to determine if either of these doors dates to original construction of the gorge interiors, circa 1843.

- Conduct an evaluation of the effects of cannon reverberation on the historic fort and associated structures.

- Conduct controlled trial repairs of repointing, including preparation of comprehensive documentation. Monitor and document trials over several seasons prior to implementing large-scale pointing repairs.

- Develop a documentation program for all repair and maintenance projects to record in detail materials, methods, and extent of work performed. Also record project team members and sources of information used in determining the materials and methods to be used.

- Develop additional documentation to augment the *Fort Pulaski National Monument Cultural Landscape Report* (CLR), or a separate CLR specific to the fort, to support rehabilitation and maintenance of the landscape features of the fort.

- Conduct further research on the adjacent visitor center and consider including it as part of a future National Register update for Fort Pulaski National Monument.

- Conduct further research to assess the significance of the fort under Criterion B, association with the lives of persons significant in our past, as related to French military engineer Simon Bernard. This research could inform a future National Register update for Fort Pulaski National Monument.

- Conduct additional research on the planting of the fig trees in the parade ground to inform further evaluation of their contribution to the significance of the fort, given that the trees were present during the period of significance.

- Consider the potential effects of future sea rise and other climate change issues on Fort Pulaski and its immediate site, such as increased storm threats and inundation of low-lying areas; changes in mean temperature and rainfall totals that may affect the ability of the park to grow appropriate vegetation for the protection of the demilune, parade ground, and terreplein; increased exposure to salt water and salt spray, which is damaging to built and natural features; erosion due to wind and wave action, leading to changes in landform; and associated loss or degradation of resources. Monitor weather-related deterioration and evaluate needed responses to protect the fort and its immediate site in coordination with overall assessment of climate change effects on Fort Pulaski National Monument overall.

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Appendix A: Laboratory Material Studies

Table A-1. Fort Pulaski Material Analysis Samples

Sample Number	Sample Material	Sample Removal Casemate/Location	Sample Removal Location	Visual Description of Sample
1	Mortar	48	North wall in recess below cannon opening	Thought to be original bedding mortar, very light colored with small apparently rounded sand particles
2	Sandstone	48	North wall at recess below cannon opening	Brown sandstone fragments with whitewash on surface
3	Mortar	48	North wall, east side near entrance to 47	Thought to be original bedding mortar, very light colored with small apparently rounded sand particles
4	Mortar, brick and whitewash	48	North wall, upper west side of cannon opening	Multiple layers of whitewash, fragments of brown brick and dense gray mortar.
5	Brick and mortar	48	Lower east wall right inside entrance	Brown iron spot brick with attached dense gray mortar
6	Mortar with whitewash	43	North wall, east of painted sign	Dense gray mortar with attached layers of whitewash
7	Mortar	West wall	West wall area between two windows west of column 10 (as counted from the south)	Dense gray mortar. Mortar is visually characteristic of the majority of visible pointing mortar present.
8	Mortar	West wall columns	North side of column 10 (as counted from the south)	Small fragments of dense gray mortar, difficult to remove
9	Mortar	Entrance	Northwest (outside) corner of entrance at drawbridge	Dense gray mortar, from the joint between granite stone units.
10	Mortar	31	From area under wood floor	Friable light gray mortar removed by others
11	Concrete	Demilune wall	North side of northwest pier	Brown-gray concrete with oyster shells
12	Granite	43	South opening at threshold	White/gray granite
13	Mortar	Terreplein	West wall near flag pole	Light gray, not friable
14	Brick	Exterior wall	Base of east wall near mid-point	Dark red brick
15	Brick	Exterior wall	Base of east wall near mid-point	Orange iron spot brick
16	Brick and mortar	South side	Unknown (removed by others)	Brown iron spot brick with dense gray mortar
17	Mortar	42	East wall, removed from north of 'this way out' painted sign	Dense gray mortar with layers of attached whitewash
18	Mortar*	11	Wall HL	Tiny fragments of white mortar, labeled “failure”

19	Mortar*	11	Wall GL	Larger fragments of white mortar, labeled “success”
20	Mortar*	Gun Placement 43	Unknown	Flakes of white mortar, labeled “failure”
21	Mortar*	Gun Placement 43	Unknown	Larger fragments of white mortar, labeled “success”
22	Mortar*	50	B-5	Tiny fragments of white mortar, labeled “failure”
23	Mortar*	50	B-5	Larger fragments of white mortar, labeled “relative success”
24	Mortar*	6	Wall HL	Tiny fragments of white mortar, labeled “failure”
25	Mortar*	6	Wall HL	Larger fragments of white mortar, labeled “success”
26	Mortar*	29	Wall GL	Tiny fragments of white mortar, labeled “failure”
27	Mortar*	29	Wall GL	Larger fragments of white mortar, labeled “success”
28	Brick*	61	Burnt area	Savannah Gray brick
29	Brick*	Southwest Bastion	Burnt area	Savannah Gray brick
30	Brick*	Southwest Bastion	Burnt area	Baltimore Red brick
31	Sandstone*	Terreplein	South area	Red sandstone fragments
32	Parge coat*	48	Threshold	Fragments of gray mortar
33	Mortar**	Gun placement #4	Unknown	Larger fragments of white mortar, labeled “success”
34	Mortar**	50	Wall CR	Small fragments of white mortar, labeled “success”
35	Mortar**	57	Burnt area	Larger fragments of white mortar, potentially a modern mortar
36	Mortar**	57	Burnt area	Larger fragments of tan mortar, potentially a historic mortar

37	Sandstone**	22	Exterior wall	Fragment of red sandstone
38	Brick and mortar**	61	Burnt area	Baltimore Red brick and mortar
39	Brick and mortar**	61	Burnt area	Savannah Gray brick and mortar
40	Brick and mortar**	Southwest Bastion	Burnt area	Savannah Gray brick and mortar

* Additional samples provided by park; limited petrographic examination performed.

** Additional samples provided by park; for potential future examination.



FIGURE A-1. Sample 1 mortar.

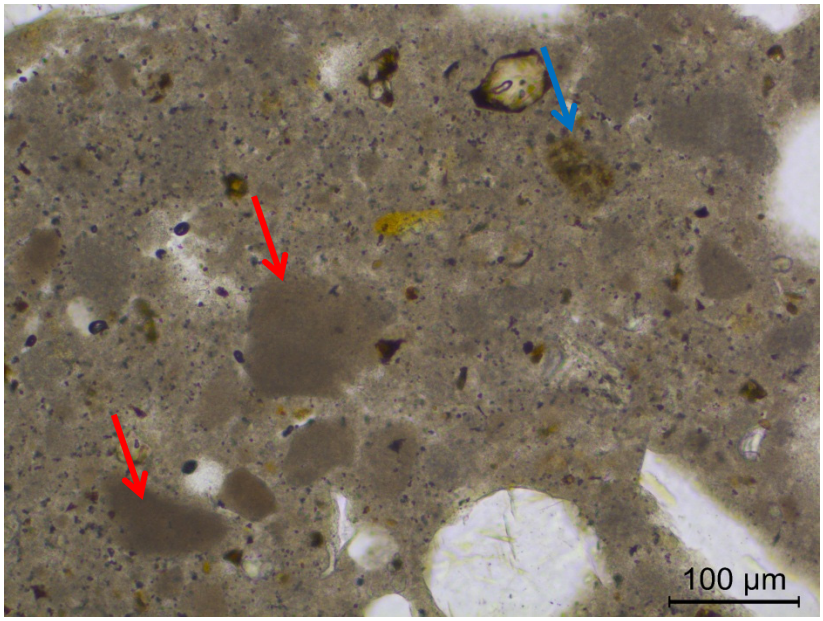


FIGURE A-2. Sample 1, detail of residual nodules of lime (red arrows) and residual cement particles (blue arrow).

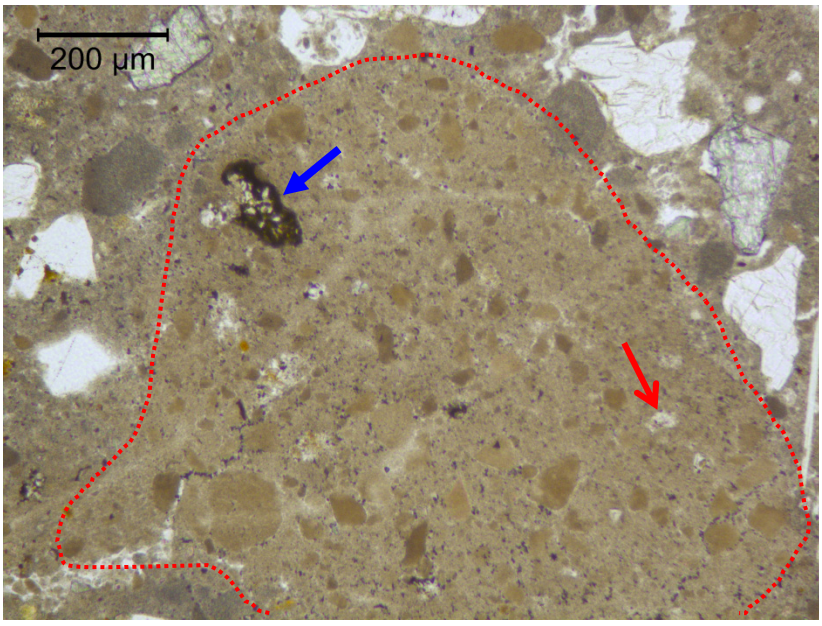


FIGURE A-3. Sample 1, detail of large lime and cement nodule (bounded by red dots). Cement contains many lime lumps (red arrow) and a larger cement clinker particle (blue arrow) plus many smaller cement particles. Plane-polarized light.

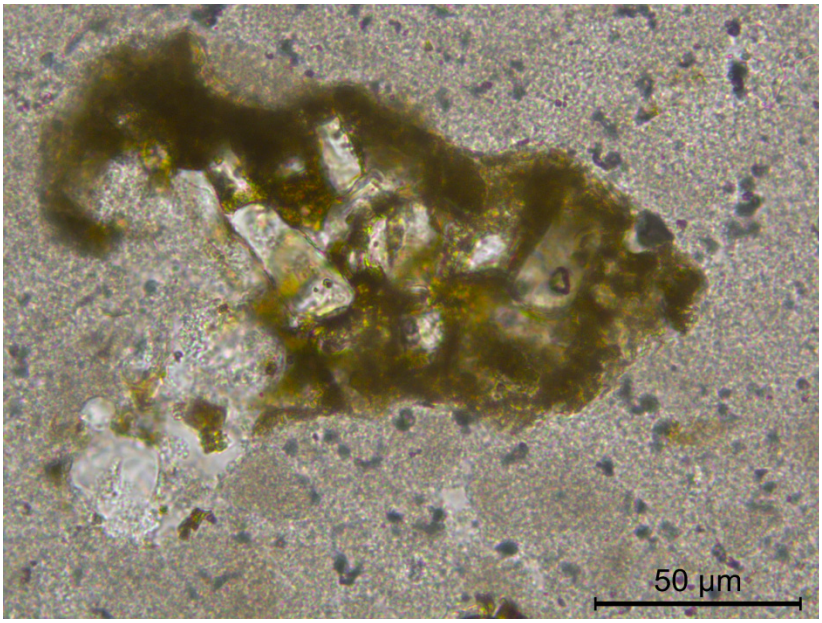


FIGURE A-4. Sample 1, detail of coarse cement clinker particle. Notice the rectangular shape of the clear crystals. Plane-polarized light.



FIGURE A-5. Sample 3, showing -the variable color of the mortar.

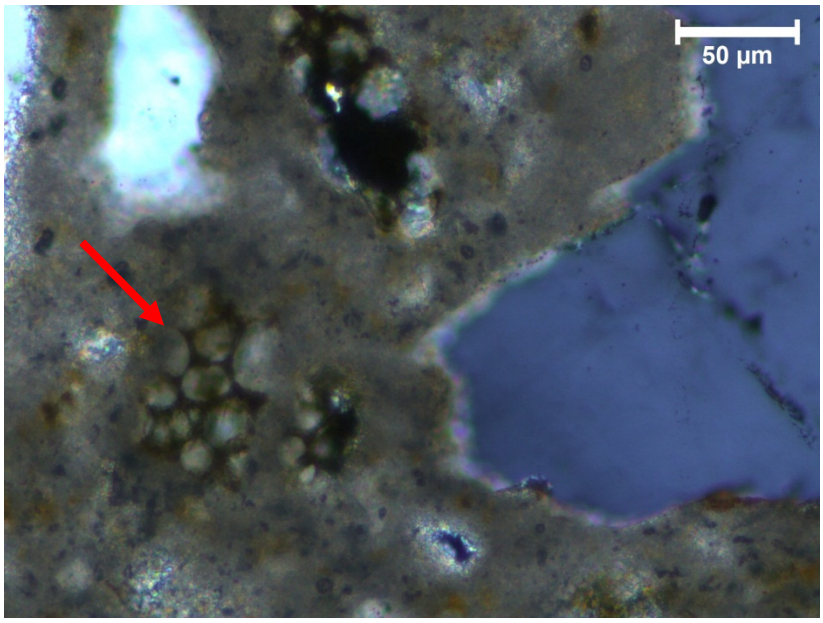


FIGURE A-6. Sample 3, detail of dark mortar. Arrow shows cement particle with "bunch of grapes" morphology.

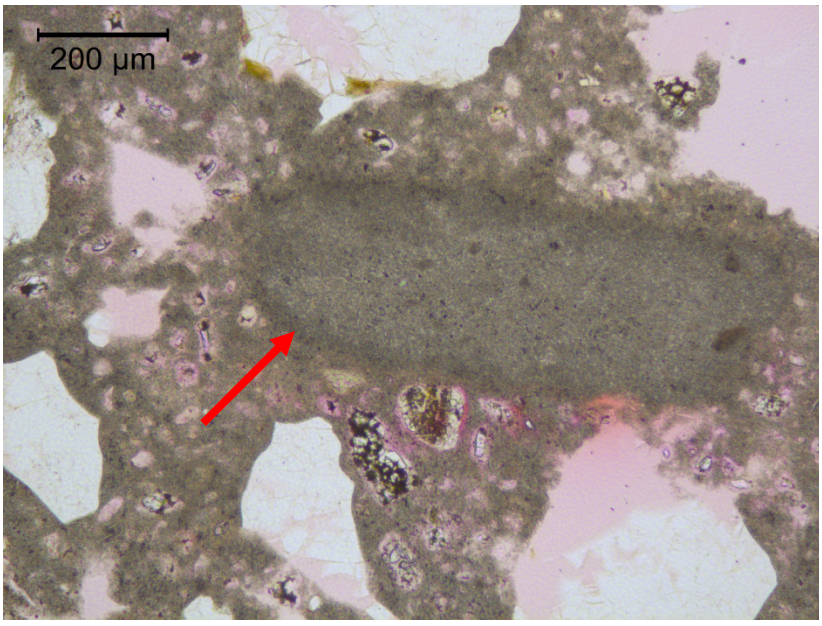


FIGURE A-7. Sample 3: arrow shows a residual lime lump in the dark mortar. Reddish color is due to impregnation with epoxy that contains a red dye.

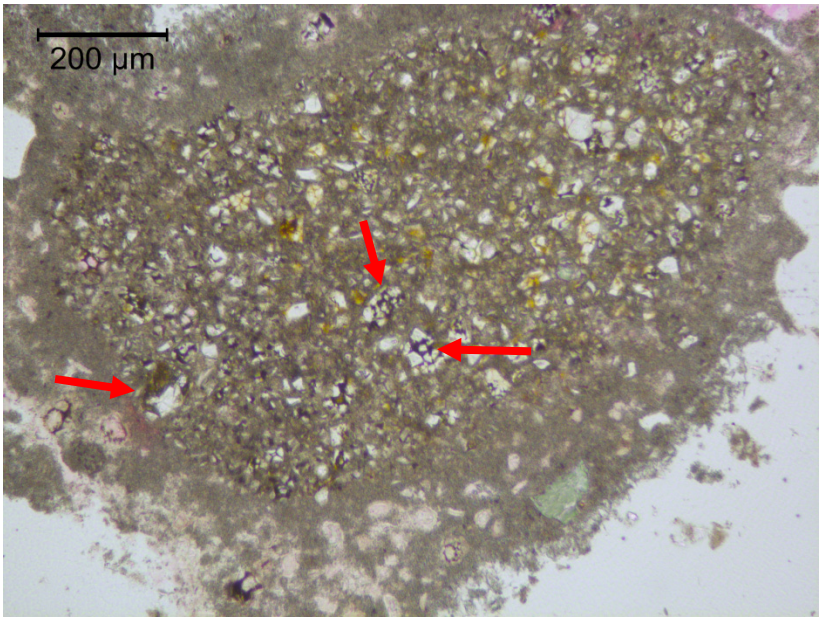


FIGURE A-8. Sample 3, detail of cement nodule in the dark mortar. Examples of some of the larger cement particles are shown with red arrows. Plane-polarized light.

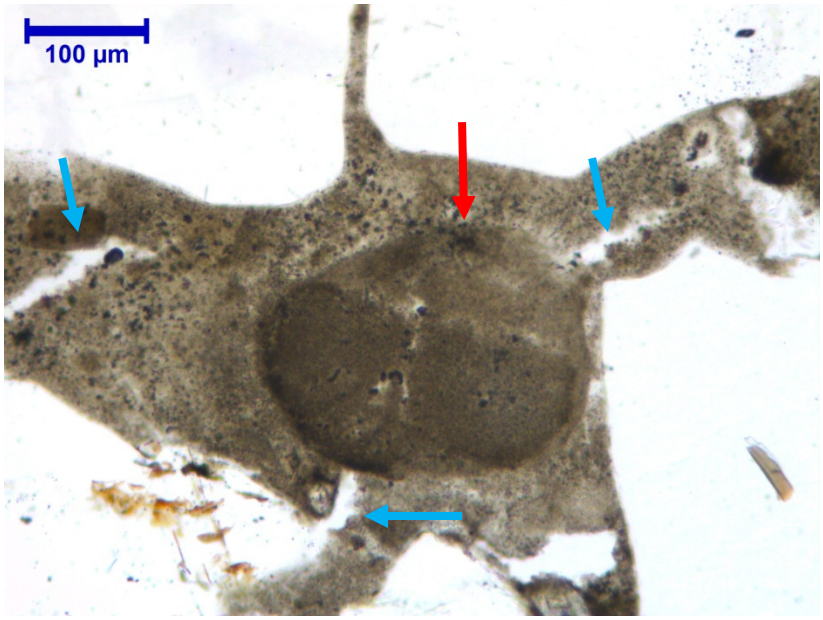


FIGURE A-9. Sample 3: red arrow shows residual lime nodule in the light colored mortar. Blue arrows show shrinkage cracks. Plane-polarized light.

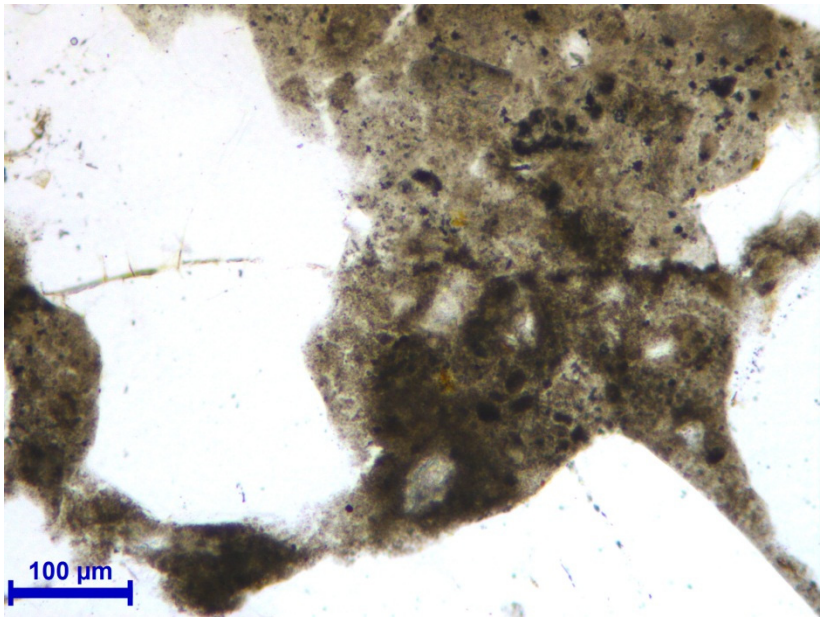


FIGURE A-10. Sample 3, showing variable paste color and density in light mortar. Plane-polarized light.

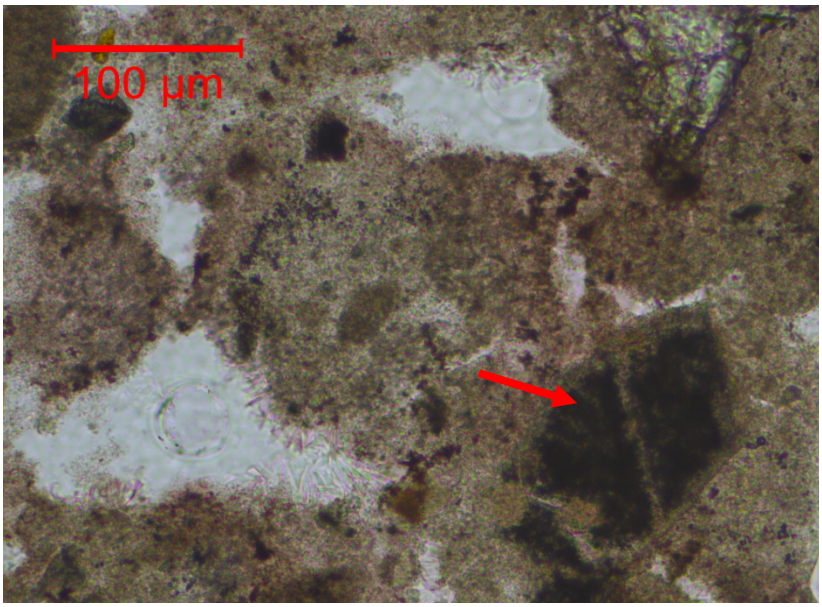


FIGURE A-11. Sample 3, detail of partially burnt lime particle (red arrow) in light colored mortar. Plane-polarized light.

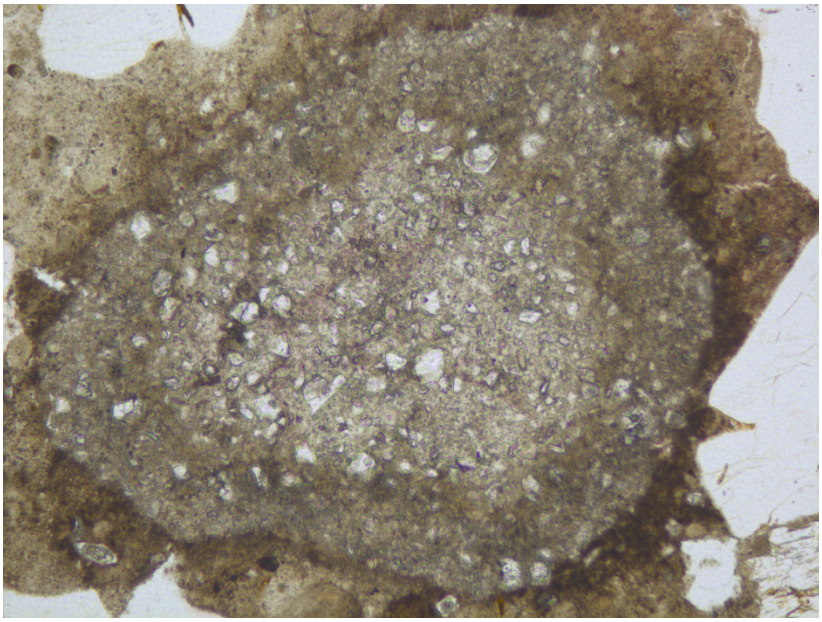


FIGURE A-12. Sample 3, detail of cement nodule in light-colored mortar. Plane-polarized light.

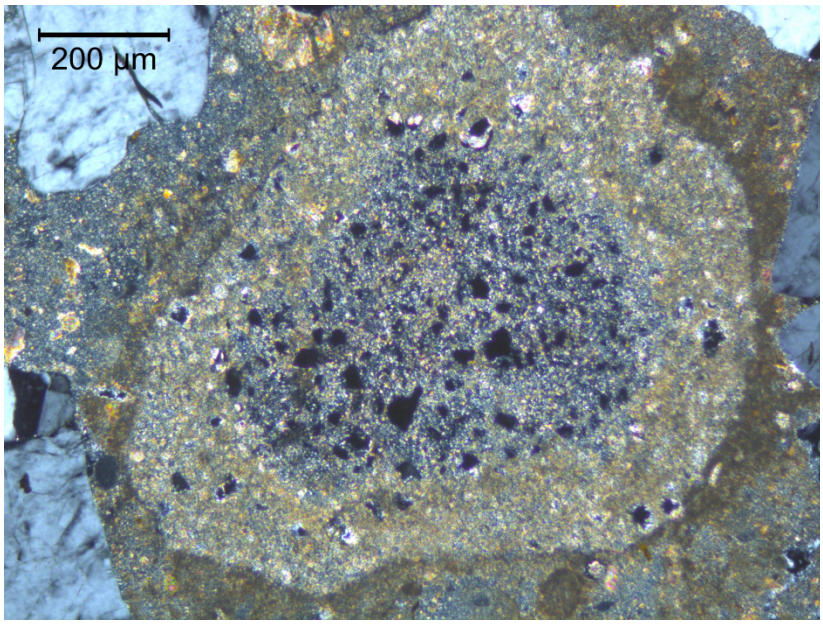


FIGURE A-13. Sample 3, detail of cement nodule in light-colored mortar. Cross-polarized light.



FIGURE A-14. Sample 4: circle indicates area of adhered mortar.

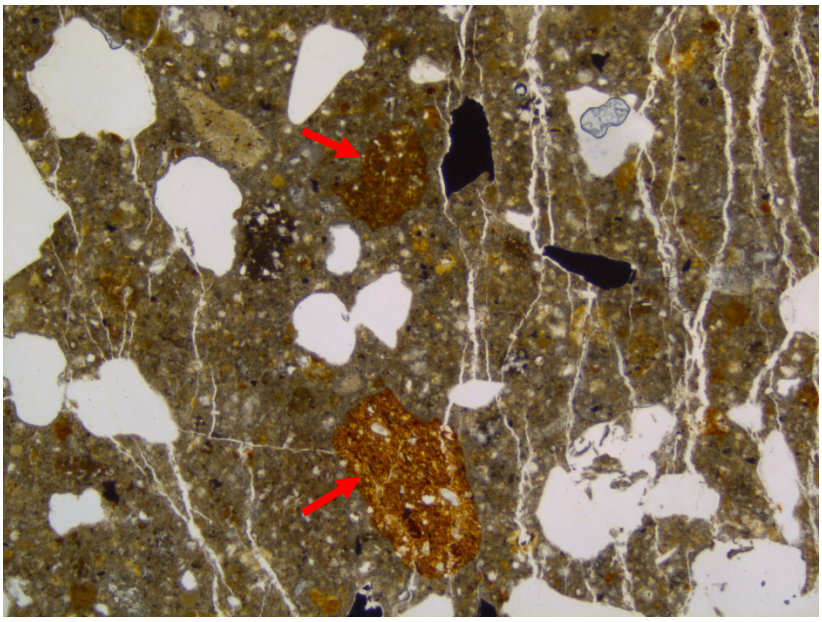


FIGURE A-15. Sample 4: arrows show two brick particles. The mortar contains numerous aligned microcracks. Plane-polarized light.

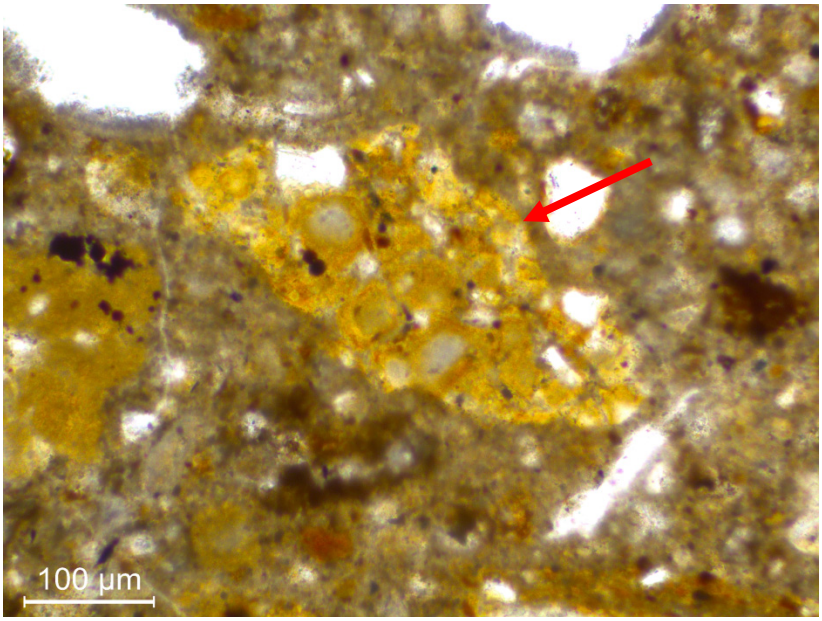


FIGURE A-16. Sample 4: red arrow shows natural cement particle. Plane-polarized light.

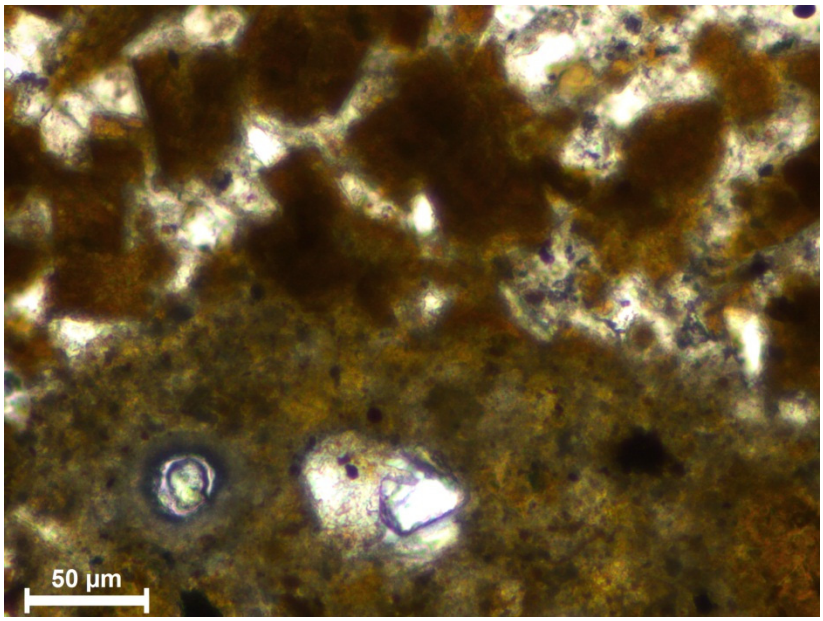


FIGURE A-17. Sample 4: the top of the field is a natural cement particle. Relict texture of the dolomitic limestone is apparent in the rhombohedral features. Plane-polarized light.

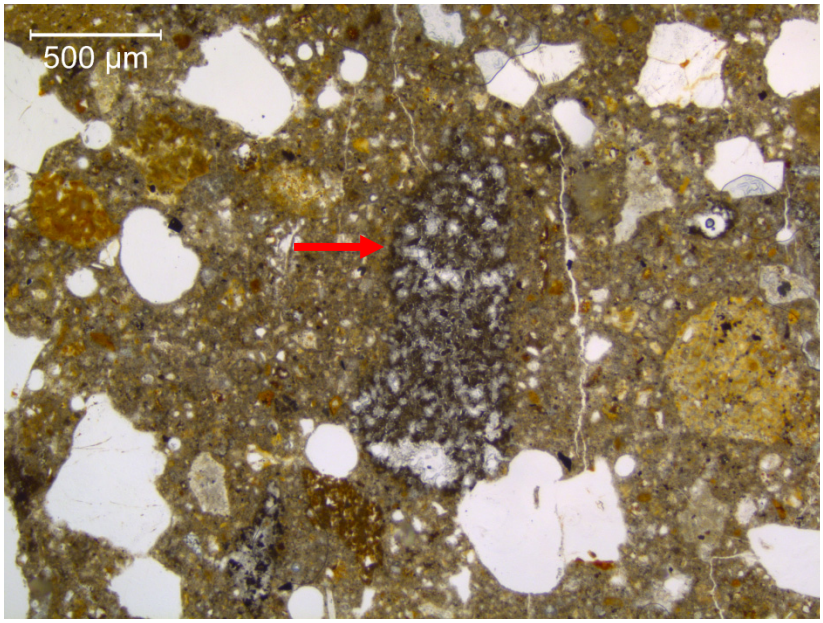


FIGURE A-18. Sample 4, detail of natural cement lump (red arrow). Plane-polarized light.



FIGURE A-19. Sample 7- Red patches on mortar are adhered brick.

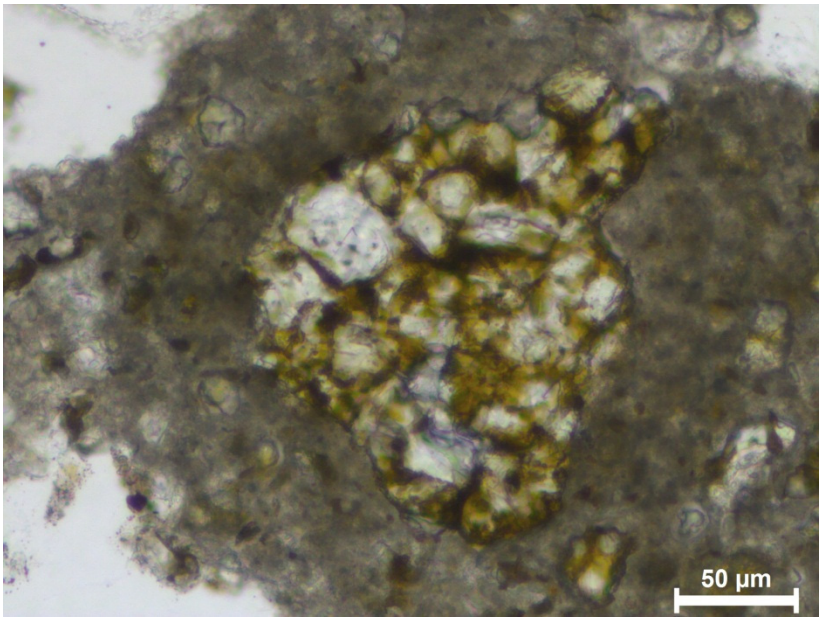


FIGURE A-20. Sample 7, detail of large cement particle. Plane-polarized light.

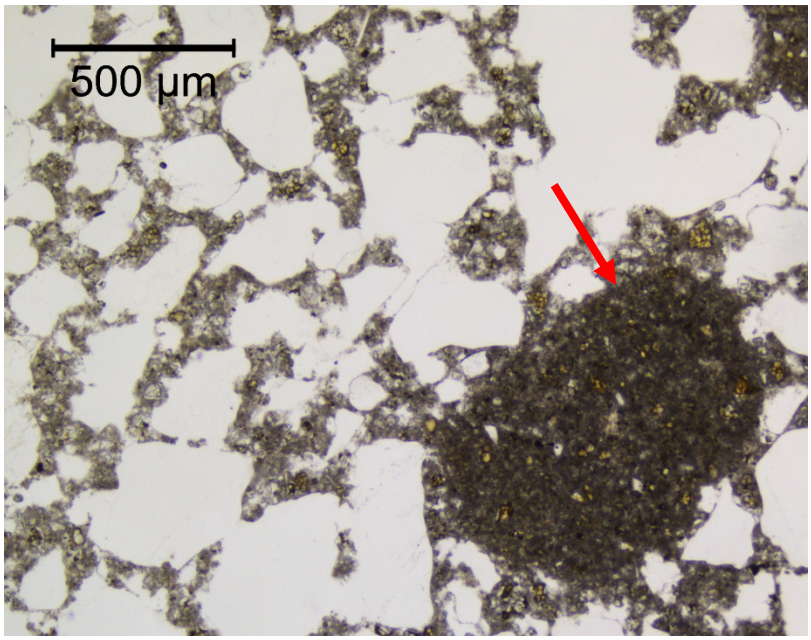


FIGURE A-21. Sample 7, detail of large cement nodule (red arrow). Plane-polarized light.



FIGURE A-22. Sample 18, detail of removal area.



FIGURE A-23. Sample 40, Savannah Gray brick and mortar.



FIGURE A-24. Sample 40, Savannah Gray brick and mortar.



FIGURE A-25. Sample 19, mortar.



FIGURE A-26. Sample 19, mortar.



FIGURE A-27. Sample 20, mortar.



FIGURE A-28. Sample 20, mortar.



FIGURE A-29. Sample 21, mortar.



FIGURE A-30. Sample 21, mortar.



FIGURE A-31. Sample 22, mortar.



FIGURE A-32. Sample 22, mortar.



FIGURE A-33. Sample 23, mortar.



FIGURE A-34. Sample 23, mortar.

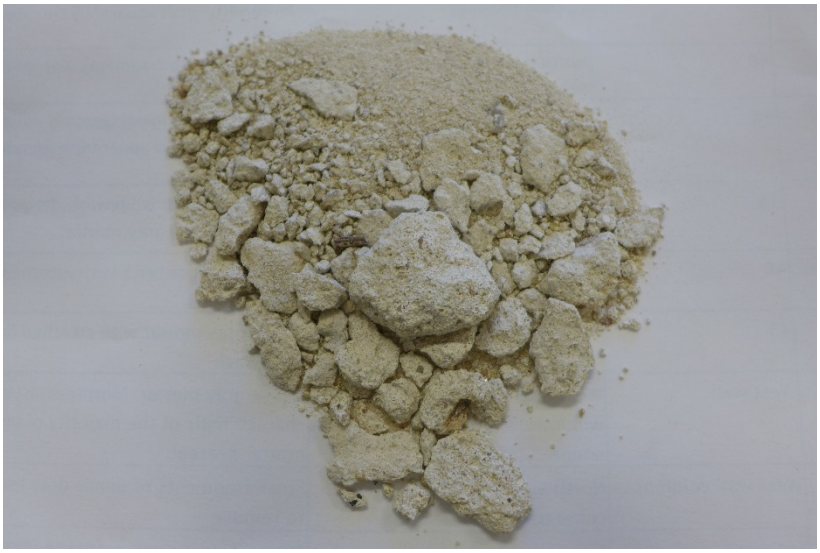


FIGURE A-35. Sample 24, mortar.



FIGURE A-36. Sample 24, mortar.



FIGURE A-37. Sample 25, mortar.



FIGURE A-38. Sample 25, mortar.



FIGURE A-39. Sample 26, mortar.



FIGURE A-40. Sample 26, mortar.



FIGURE A-41. Sample 27, mortar.



FIGURE A-42. Sample 27, mortar.



FIGURE A-43. Sample 29, Savannah Grey brick.



FIGURE A-44. Sample 29, Savannah Grey brick.



FIGURE A-45. Sample 30, Baltimore Red brick.



FIGURE A-46. Sample 30, Baltimore Red brick.



FIGURE A-47. Sample 31, detail of removal area.



FIGURE A-48. Sample 31, Red sandstone fragments.



FIGURE A-49. Sample 31, Red sandstone fragments.



FIGURE A-50. Sample 32, parge coat.



FIGURE A-51. Sample 32, parge coat.



FIGURE A-52. Sample 33, mortar.



FIGURE A-53. Sample 33, mortar.

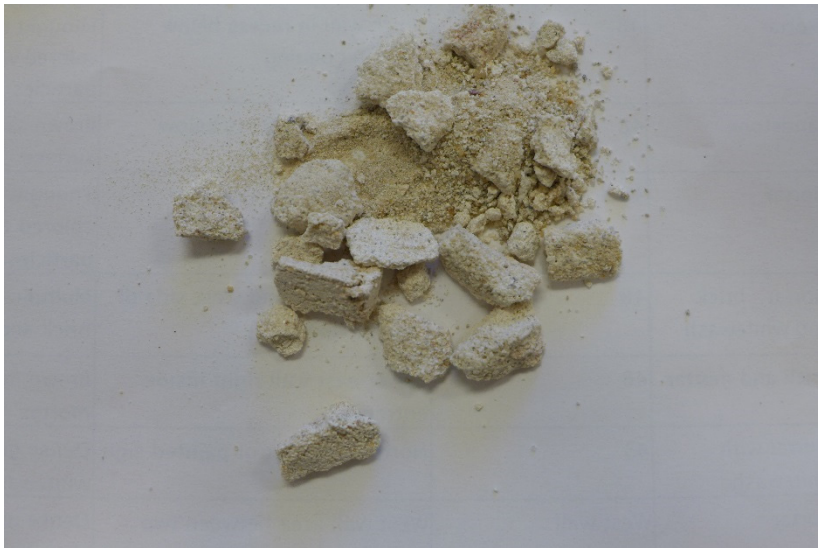


FIGURE A-54. Sample 34, mortar.



FIGURE A-55. Sample 34, mortar.



FIGURE A-56. Sample 35, mortar.



FIGURE A-57. Sample 35, mortar.



FIGURE A-58. Sample 36, mortar.

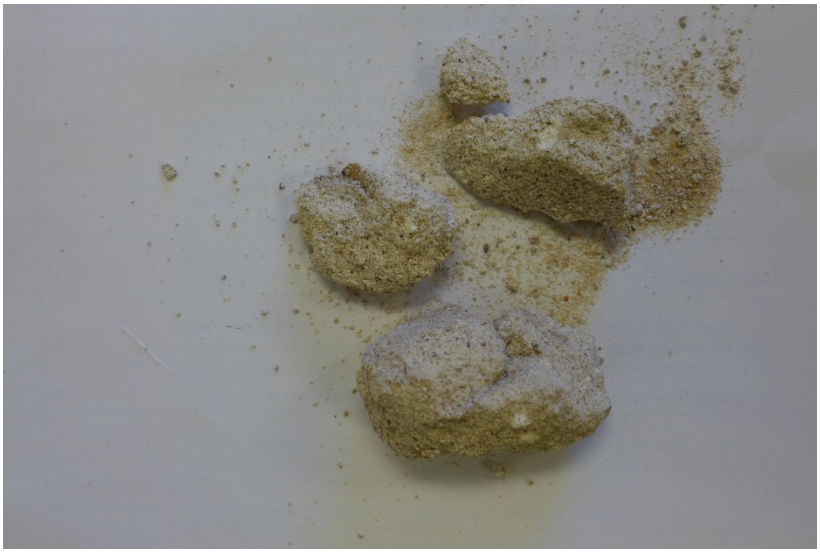


FIGURE A-59. Sample 36, mortar.



FIGURE A-60. Sample 37, detail of sandstone sample removal area.



FIGURE A-61. Sample 37, red sandstone.



FIGURE A-62. Sample 37, red sandstone.

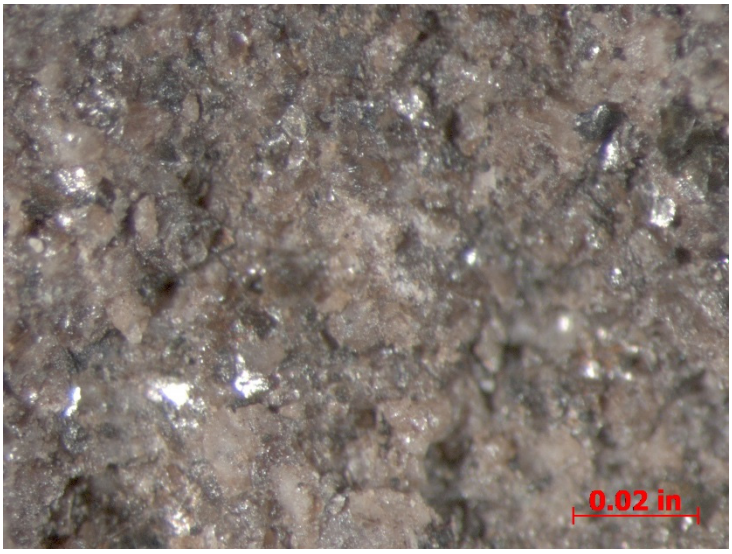


FIGURE A-63. Sample 37, photomicrograph of red sandstone.

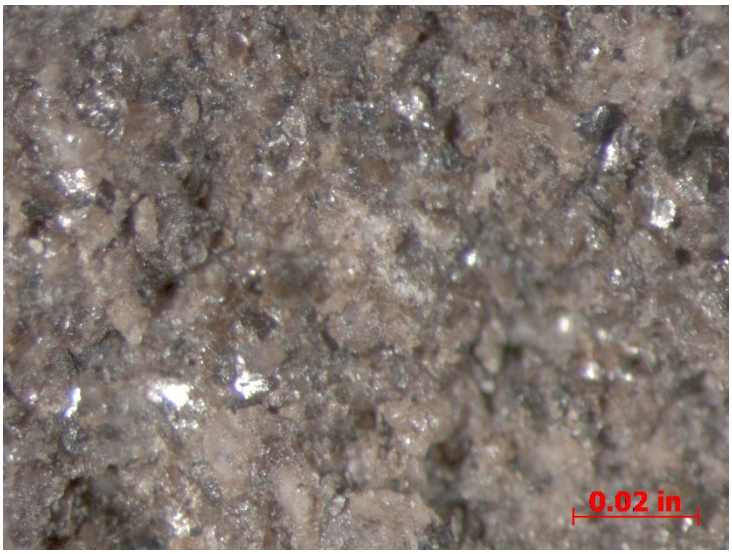


FIGURE A-64. Sample 37, photomicrograph of red sandstone.

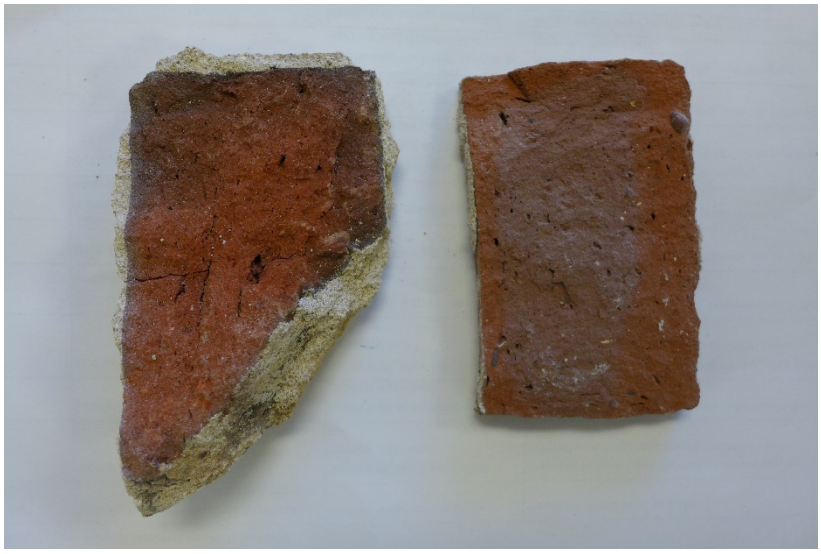


FIGURE A-65. Sample 38, Baltimore Red brick and mortar.

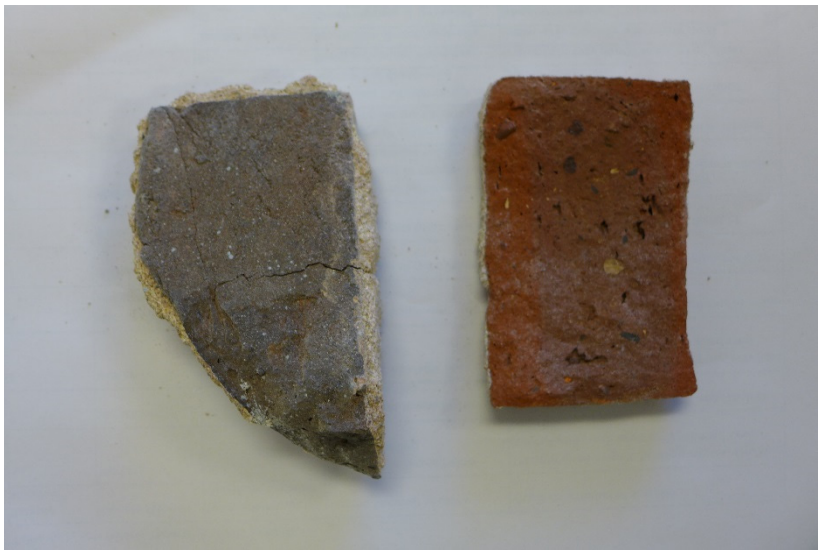


FIGURE A-66. Sample 38, Baltimore Red brick and mortar.



FIGURE A-67. Sample 39, Savannah Gray brick and mortar.



FIGURE A-68. Sample 39, Savannah Gray brick and mortar.



FIGURE A-69. Sample 40, Savannah Gray brick and mortar.



FIGURE A-70. Sample 37, Savannah Gray brick and mortar.



SAMPLE 7 (WEST WALL BEHIND COLUMN)

SAMPLE 8

EAST WALL, CASEMATE 42



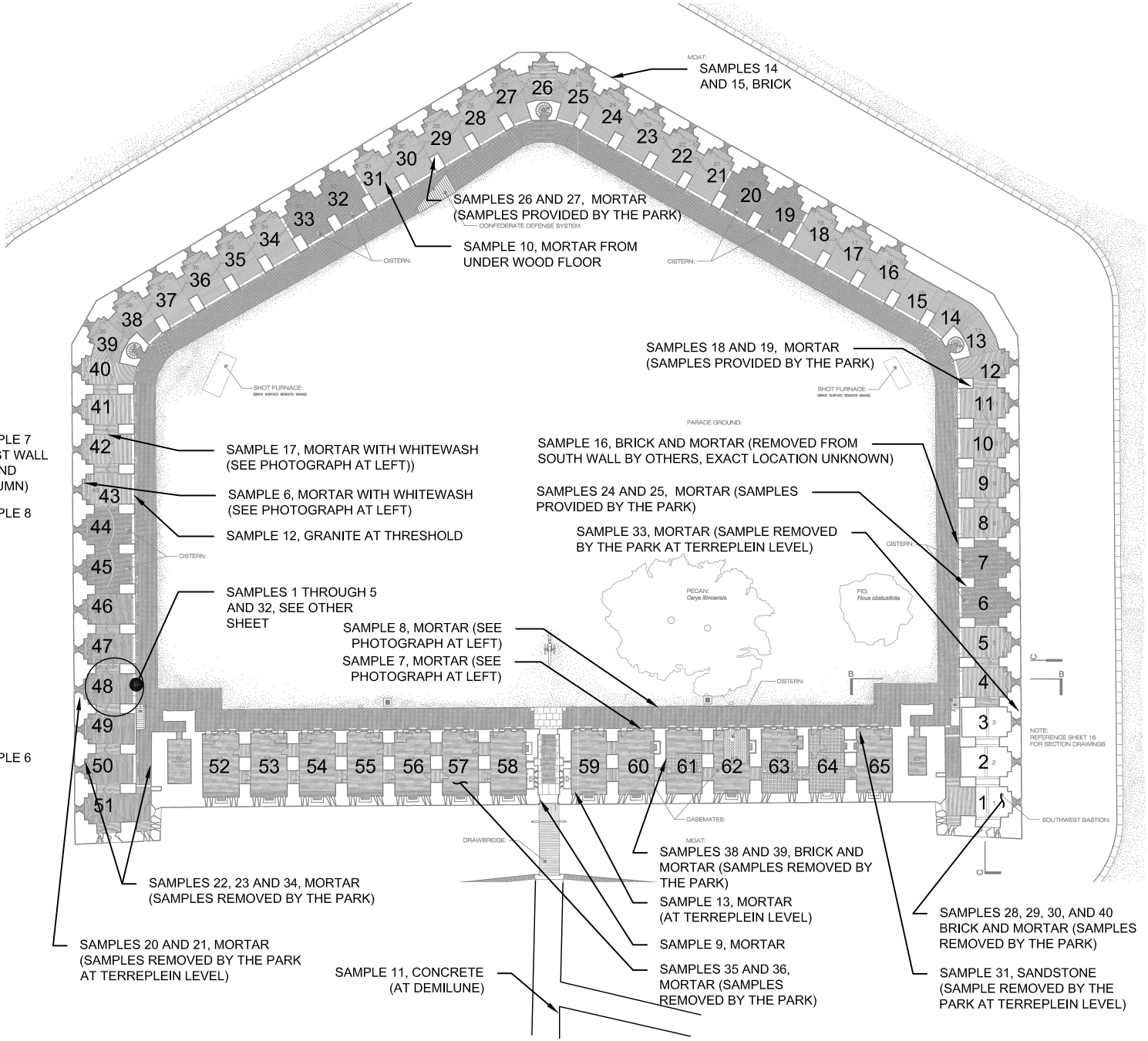
SAMPLE 6

NORTH WALL, CASEMATE 43

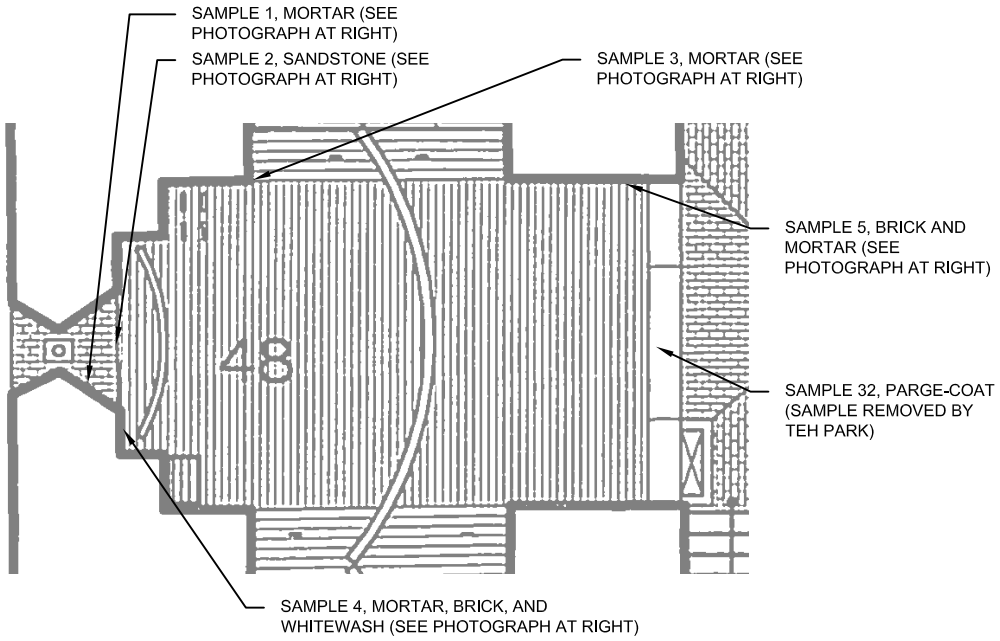


SAMPLE 17

EAST WALL, CASEMATE 42

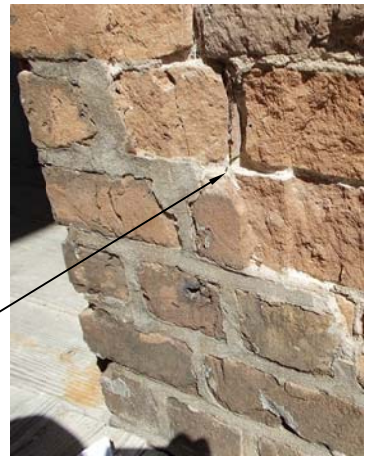


Fort Pulaski Material Analysis
Sample Removal Locations





NORTH WALL, CASEMATE 48



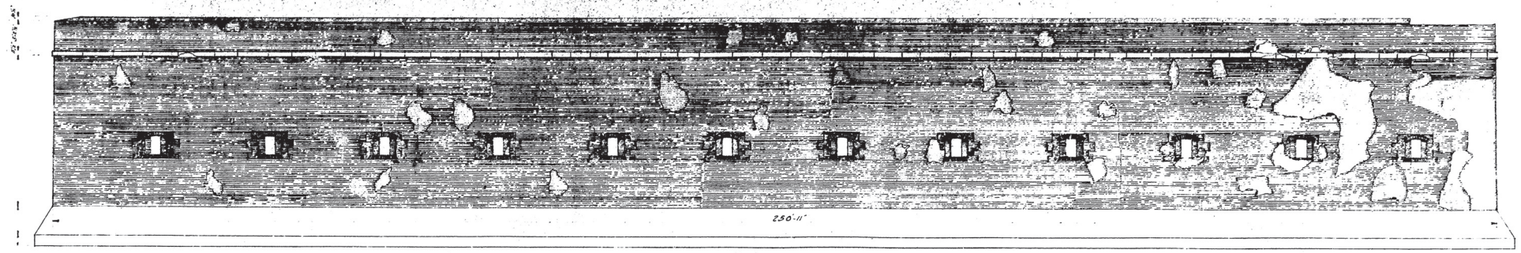
EAST WALL, CASEMATE 48



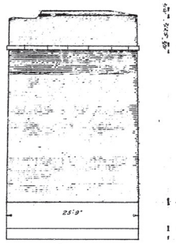
NORTH WALL, CASEMATE 48

Fort Pulaski Material Analysis
Sample Removal Locations

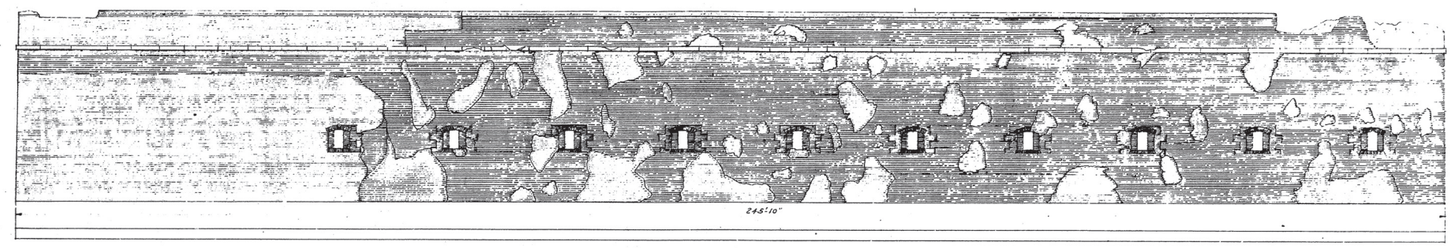
Appendix B: 1934 Existing Condition Drawings



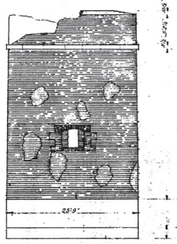
SOUTH GALLERY OF CASEMATES



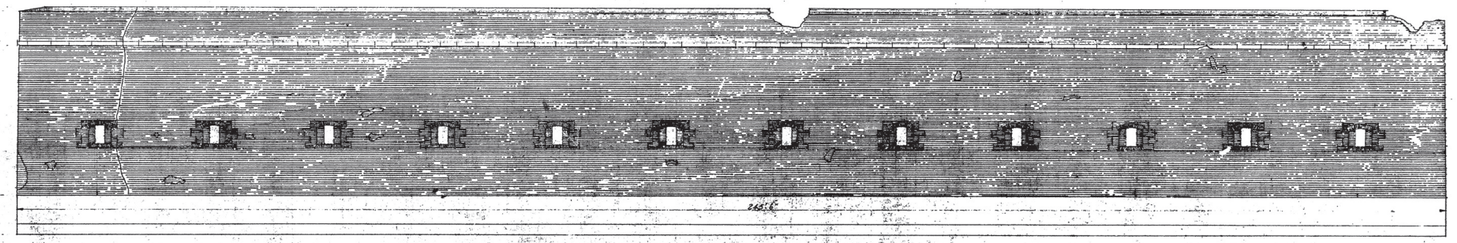
PAN - COUPE



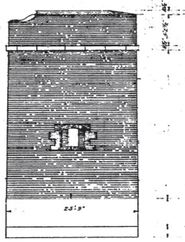
SOUTH-EAST GALLERY OF CASEMATES



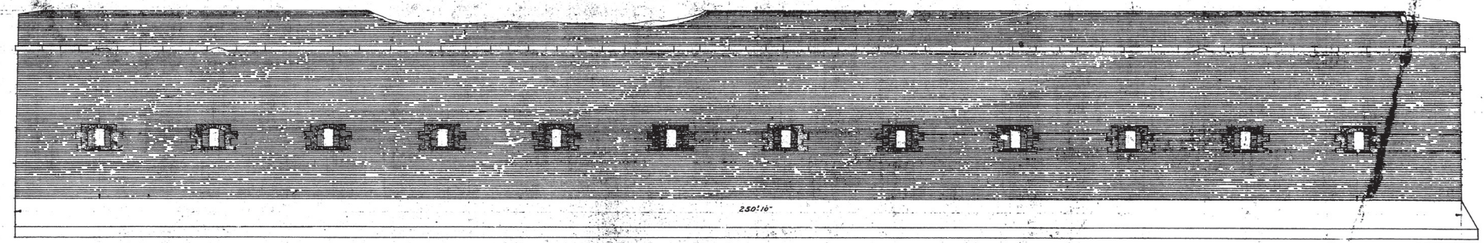
PAN - COUPE



NORTH-EAST GALLERY OF CASEMATES



PAN - COUPE



NORTH GALLERY OF CASEMATES



WEST GALLERY OF GORGE ROOMS

EXTERIOR ELEVATIONS OF FORT

SCALE ONE EIGHTH INCH EQUALS ONE FOOT

Dr. by RAS Tr. by RAS Ck. by Revised		U.S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE FORT PULASKI NATIONAL MONUMENT EXTERIOR ELEVATIONS OF FORT. DRAWN BY EASTERN DIV. BRANCH OF PLANS & DESIGN	Date Sheet 9 of Sheets Dwg. No. 10

Filmed SEPTEMBER 2003 @ 36X

PAN-COUPE

SOUTHEAST GALLERY CASEMATES

NORTHEAST GALLERY CASEMATES

SOUTH GALLERY CASEMATES

NORTH GALLERY CASEMATES

COUNTER SCARP WALL

MOAT

BRICK WALK

48'-0" Radius

PARADE GROUND

GALLERY OF GORGE ROOMS

POSTERN

SALLY PORT

SCARP WALL

DEMI-LUNE

KEY PLAN OF GROUND LEVEL

SCALE 1/16" = 1'-0"

1/2" = 1'-0"

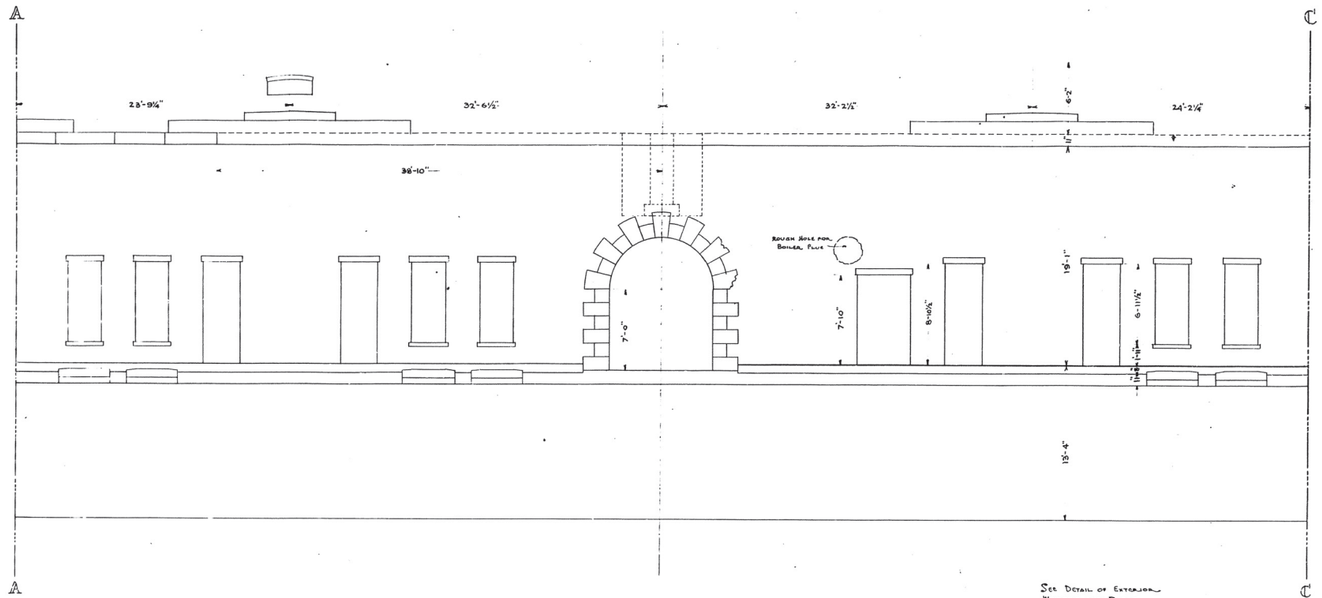
Legend

Brick, Brownstone, Brick, Stone, Earth, Wood, Earth, Red Sand, Water, Granite, Lead, Plaster

1829 Fort Pulaski 1934

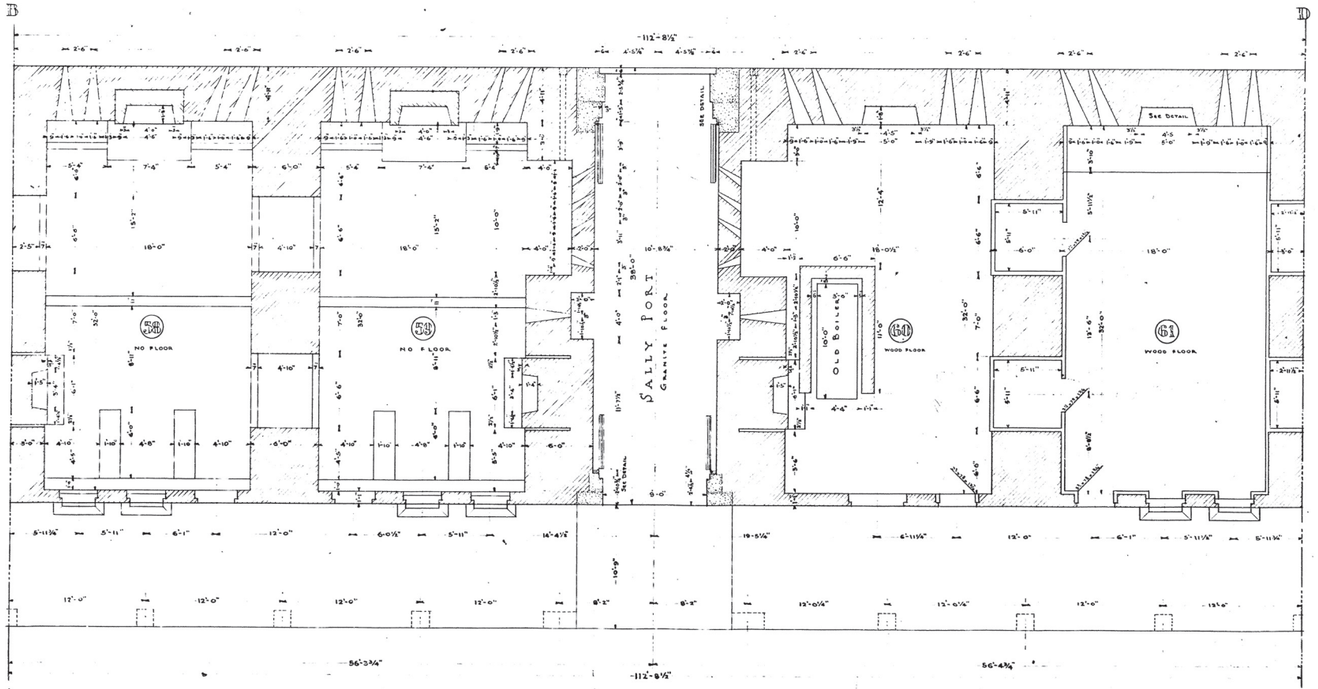
Recommended: Approved: Approved:

U.S. Department of the Interior
National Park Service
Fort Pulaski National Monument
Measured Drawings of Fort
Drawn by Lester Boutwell Fort Pulaski, Ga.



See Detail of Exterior Windows and Doors.

PARADE GROUND ELEVATION A-C



PLAN OF SECTION A-B-C-D

SCALE 1/4" = 1'-0"

Legend

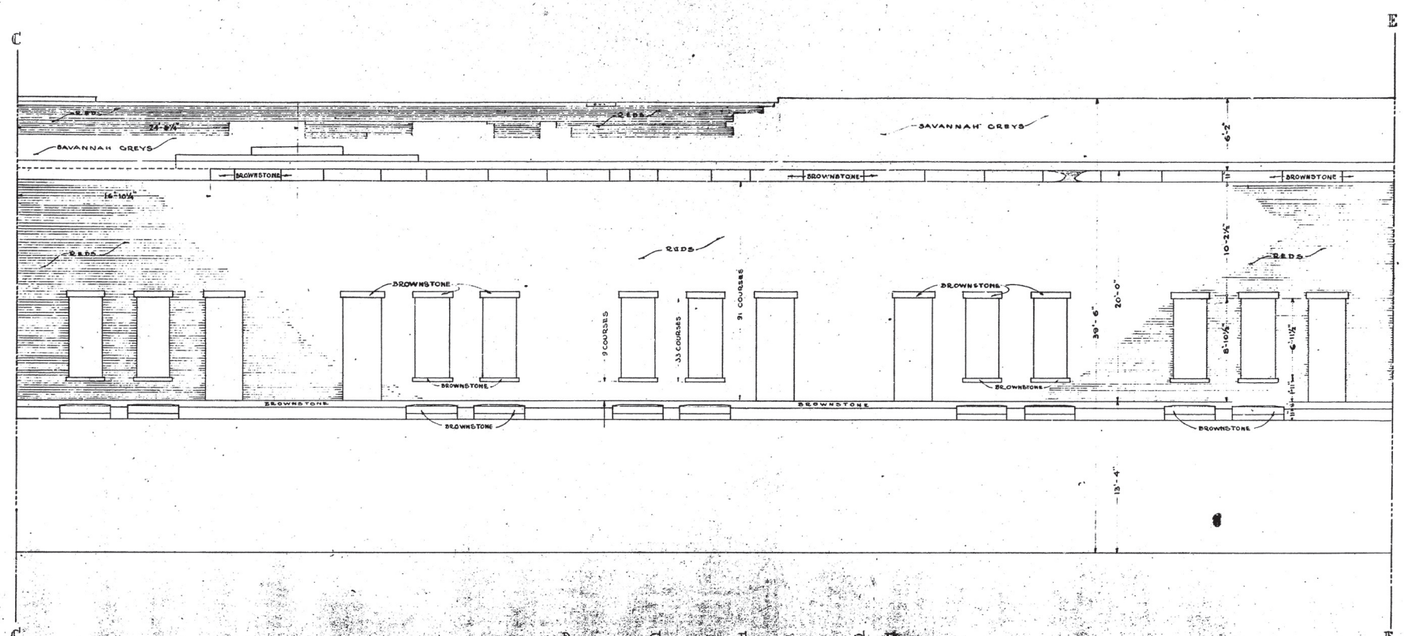
Brick	Cast Iron	Granite	
Brownstone	Wood	Lead	
Concrete	Earth	Plaster	
Tabby	Mud Line		
Cayuina Rock & Oyster Shell			

1829 Fort Pulaski 1934

U.S. Department of the Interior
National Park Service
Fort Pulaski National Monument
Measured Drawings of Fort

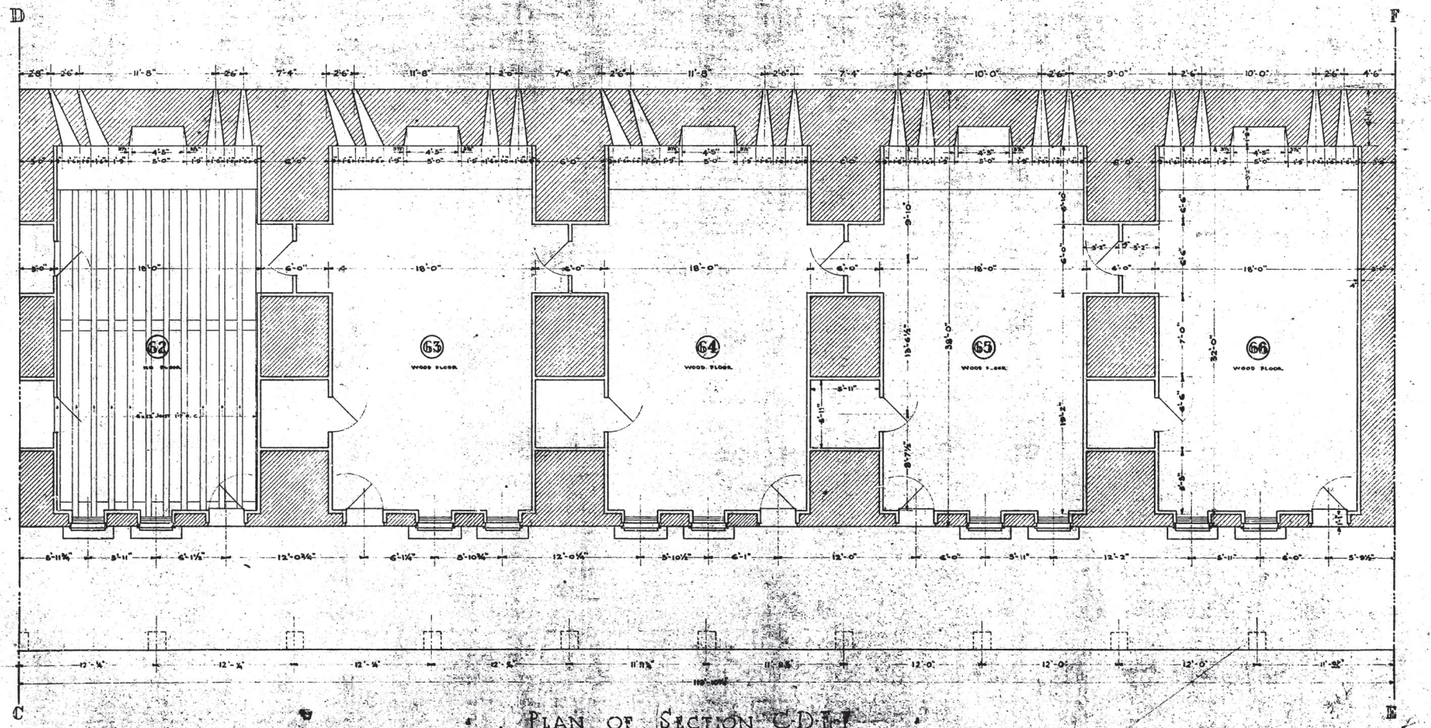
Drawn by Virginia Division of Plans & Design

Date
Sheet No. 17 of Sheets
Dwg. No. 107



PARADE GROUND ELEVATION C-E

SCALE: ¼"=1'-0"



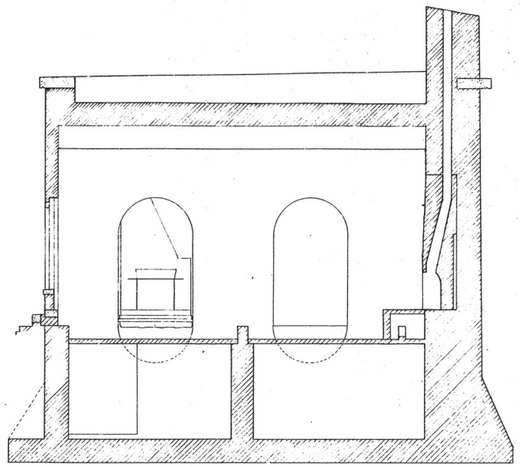
PLAN OF SECTION CDEF

Legend

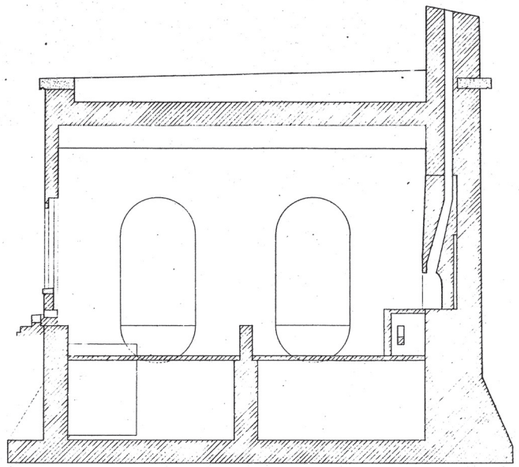
Brick, Brownstone, Concrete, Tile, Cast Iron, Granite, Lead, Plaster

1829 Fort Pulaski 1934

U.S. Department of the Interior
National Park Service
Fort Pulaski National Monument
Measured Drawings of Fort

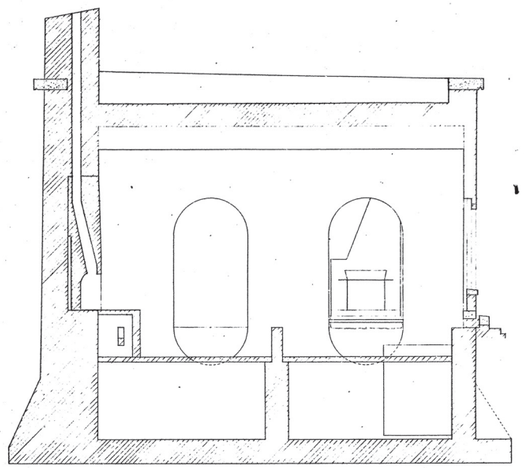


Cross Section Through Room 56

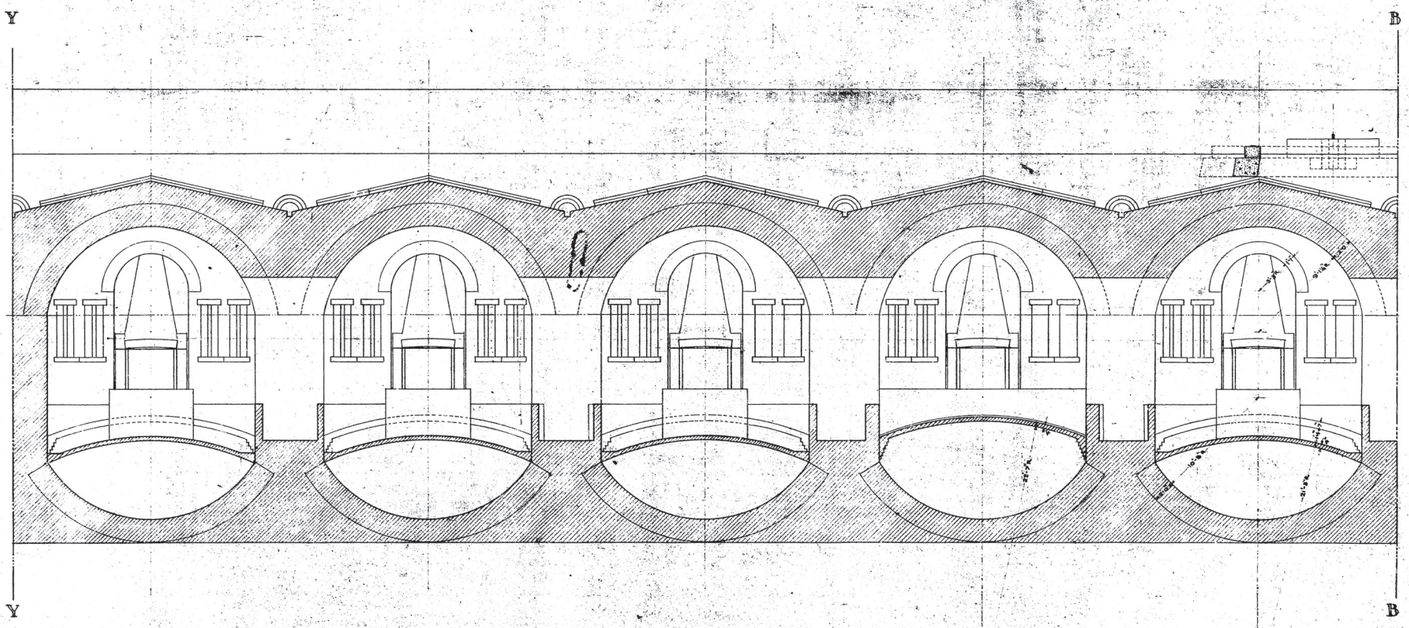


Cross Section Through Room 55

Scale ¼"-1'-0"



Cross Section Through Room 55



Longitudinl Section YY-BB

Scale 1" 1'-0"

Legend

Brick	Cast Iron	Granite	
Brownstone	Wood	Lead	
Concrete	Earth	Plaster	
Tabby	Mud Line		
Coquina Rock of Oyster Shell			

1829 Fort Pulaski 1934

Dr. by
Tr. by
Ck. by
Approved

U.S. Department of the Interior
National Park Service
Fort Pulaski National Monument
Measured Drawings of Fort
Drawn by Eastern Division Branch of Plans & Designs

Dwg. No. 1075

Sheet No. 7 of 7 Sheets

Detail 1=7

NORTHEAST PARAPET WALL

SOUTHEAST PARAPET WALL

NORTH PARAPET WALL

SOUTH PARAPET WALL

GORGE PARAPET WALL

KEY PLAN OF BARBETTE TERREPLEIN.
SCALE:- 1/16" = 1'-0"

Legend

Brick	Cast Iron	Granite	
Brownstone	Wood	Lead	
Concrete	Earth	Plaster	
Tile	Rubble		
Bayuna Rock & Oyster Shell			

1829 Fort Pulaski 1934

Department of the Interior
National Park Service
Fort Pulaski National Monument
Measured Drawings of Fort
Drawn by Eastern Service Project Drawing

Date
Sheet
of Sheets
Dwg. No.

PAN-COUPE

NORTHEAST GALLERY CASEMATES

SOUTHEAST GALLERY CASEMATES

MOAT

COUNTER SCARP WALL

PARADE GROUND

SOUTH GALLERY CASEMATES

GALLERY OF GUN ROOMS

DEMI-LUNE

KEY PLAN OF GROUND LEVEL

SCALE: 1/16" = 1'-0"

Legend

Granite
Brick
Stone
Earth
Mortar
Wood
Masonry Scarp & Counter Scarp Walls

1829 Fort Pulaski 1934

Measured by
Drawn by
Traced by
Checked by
Scanned

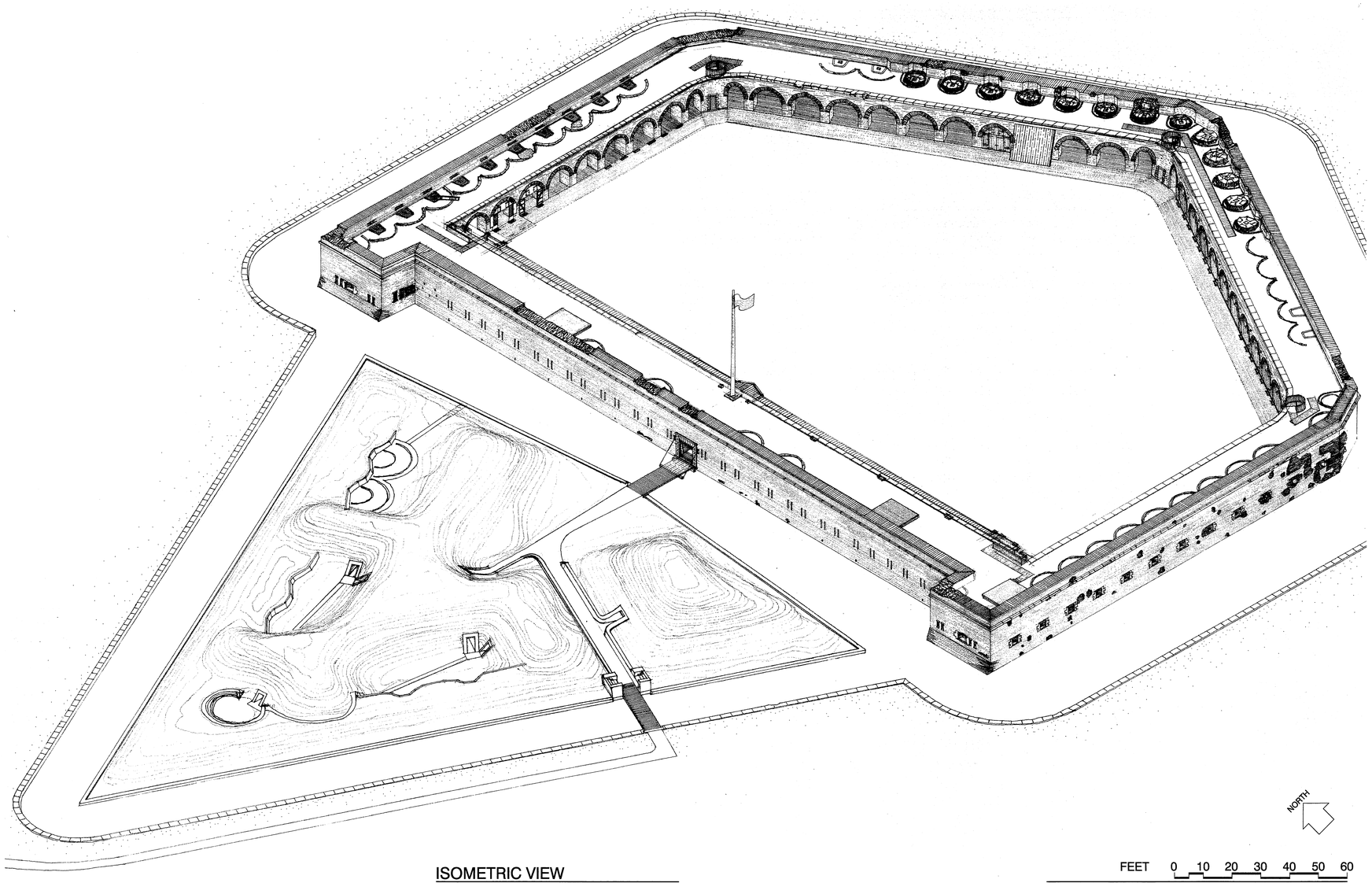
U.S. Department of the Interior
National Park Service
Fort Pulaski National Monument
Measured Drawings of Fort
Drawn by Eastern Division Branch of Plans & Design

Date
Sheet
No. of Sheets
Drawing No.

348/10075 SL 17 9/15

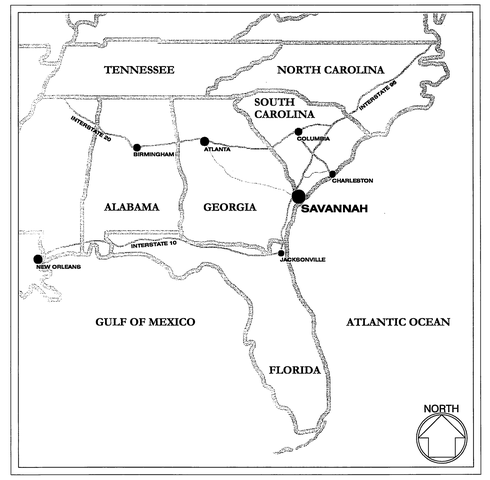
Appendix C: Historic American Buildings Survey Drawings

FORT PULASKI NATIONAL MONUMENT
COCKSPUR ISLAND . SAVANNAH, GEORGIA



ISOMETRIC VIEW
SCALE: 1/16"=1'-0" 1:192

FEET 0 10 20 30 40 50 60
METERS 0 5 10 15



REGION MAP MILES 0 50 100 200 300
KMS 0 100 200 300 400



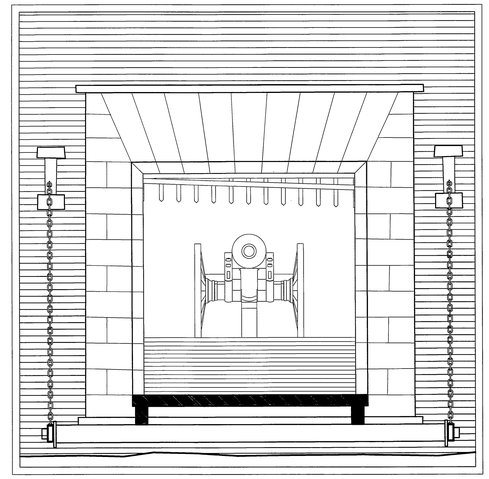
LOCATION MAP MILES 0 1 2 4 6
KMS 0 1 2 3 4

FORT PULASKI WAS CONSTRUCTED IN 1847 AS PART OF THE COASTAL FORTIFICATION SYSTEM ADOPTED BY PRESIDENT JAMES MADISON. MANY CONSIDERED THE FORT'S 7 1/2 FOOT SOLID BRICK WALLS TO BE UNBREACHABLE, HOWEVER THE ADVENT OF THE RIFLED CANNON PROVED THE FALLACY OF THAT ASSUMPTION.

ON APRIL 10-11, 1862, WITH THE USE OF RIFLED ARTILLERY, UNION TROOPS OPENED WIDE GAPS IN THE SOUTHEAST ANGLE, FORCING THE CONFEDERATE GARRISON TO SURRENDER THE FORT. FORT PULASKI, BUILT TO WITHSTAND EARLIER FORMS OF ATTACK, BECAME AN INTERESTING RELIC OF DEFENSIVE ARCHITECTURE.

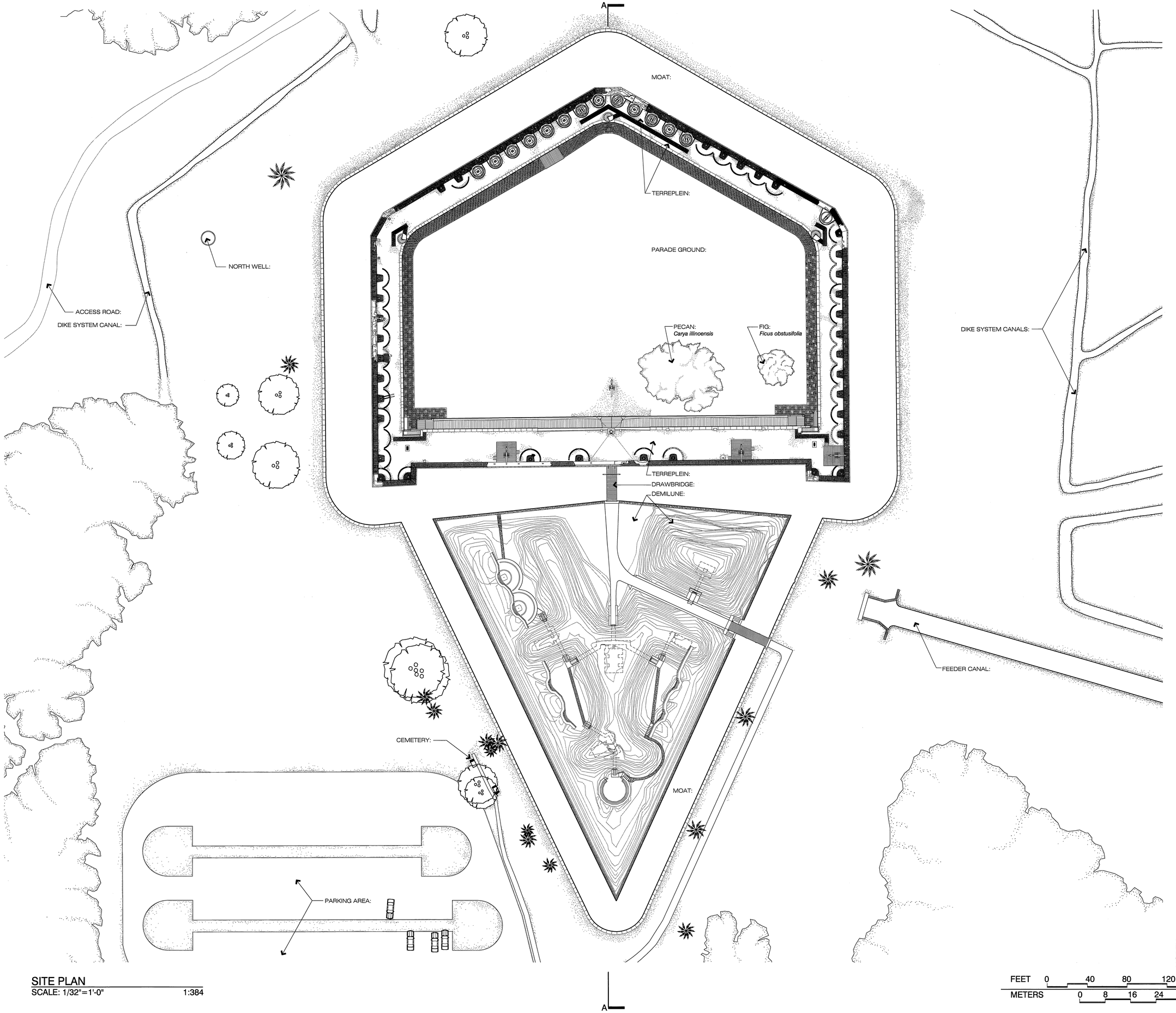
IN 1924, THE ISLAND AND FORT WERE MADE A NATIONAL MONUMENT. RESTORATION OF THE FORT BY THE WORKS PROGRESS ADMINISTRATION (W. P. A.) BEGAN IN 1934. THIS REMARKABLY INTACT EXAMPLE OF 19th CENTURY MILITARY ARCHITECTURE WITH AN ESTIMATED 25 MILLION BRICKS, HAS BEEN PRESERVED FOR FUTURE GENERATIONS BY THE NATIONAL PARK SERVICE AS A REMINDER OF THE ELUSIVENESS OF INVINCIBILITY. THE FORT FURTHER SERVES AS A MEMORIAL TO THOSE CONNECTED WITH THE CONSTRUCTION, BOMBARDAMENT, AND DEFENSE.

THIS PROJECT WAS ADMINISTERED BY THE HISTORIC AMERICAN BUILDINGS SURVEY OFFICE IN WASHINGTON D. C. UNDER THE DIRECTION OF PAUL DOLINSKY. DOCUMENTATION WAS COMPLETED DURING THE SUMMER OF 2000 AND 2001, BY THE HISTORIC RESOURCES IMAGING LABORATORY, COLLEGE OF ARCHITECTURE, TEXAS A&M UNIVERSITY, DAVID G. WOODCOCK, DIRECTOR. DOCUMENTATION WAS COMPLETED BY PROJECT SUPERVISOR ROBERT WARDEN AND THE FOLLOWING ARCHITECTURAL TECHNICIANS:
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(2001) CODY DEIKE, JEFF DINGER, SOYEON KIM, BYRON CHAMBERS, MIKE LYSSY, HARUTAI PRARTNADI.
(2002) JOSE DE CASTILLIO, JEFFREY DEHAVEN, MARC FRAME, ANTONIO VALDIVIA.



SALLYPORT DETAIL FROM WEST EXTERIOR ELEVATION N.T.S.

HISTORIC AMERICAN BUILDINGS SURVEY SHEET 1 OF 16 SHEETS
SURVEY NO. GA-2153
GEORGIA
FORT PULASKI NATIONAL MONUMENT
SAVANNAH
CHATHAM COUNTY
COCKSPUR ISLAND
NAME AND LOCATION OF STRUCTURE
DRAWN BY: ANTONIO VALDIVIA . JEFFREY DEHAVEN, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR



SITE PLAN
SCALE: 1/32"=1'-0" 1:384

NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
SAVANNAH
CHATHAM COUNTY
GEORGIA

SURVEY NO. GA-2153

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 2 OF 16 SHEETS

HABS/HAER/HALS RECORDING PROJECT

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UNITED STATES DEPARTMENT OF THE INTERIOR

COCKSPUR ISLAND

IF REPRODUCED, PLEASE CREDIT THE HISTORIC AMERICAN BUILDINGS SURVEY - NATIONAL PARK SERVICE. NAME OF DELINEATOR, DATE OF DRAWING

MOAT:

CONFEDERATE DEFENSE SYSTEM:

CISTERN:

CISTERN:

SHOT FURNACE:
(BRICK SURFACE BENEATH GRASS)

SHOT FURNACE:
(BRICK SURFACE BENEATH GRASS)

PARADE GROUND:

CISTERN:

CISTERN:

PECAN:
Carya illinoensis

FIG:
Ficus obstusifolia

CISTERN:

B

B

C

C

NOTE:
REFERENCE SHEET 16
FOR SECTION DRAWINGS

CASEMATES:

SOUTHWEST BASTION:

DRAWBRIDGE:

MOAT:

DEMILUNE:

NORTH

FEET 0 20 40 60 80

METERS 0 4 8 12 16 20

PARADE GROUND PLAN

SCALE: 1/16"=1'-0" 1:192

NAME AND LOCATION OF STRUCTURE

FORT PULASKI NATIONAL MONUMENT
SAVANNAH
CHATHAM COUNTY
GEORGIA

SURVEY NO. GA-2153

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 3 OF 16 SHEETS

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COCKSPUR ISLAND

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

(IF REPRODUCED, PLEASE CREDIT THE HISTORIC AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE, NAME OF DELINEATOR, DATE OF DRAWING)

MOAT:

CONFEDERATE DEFENSE SYSTEM:

NORTH EAST ELEVATION

SOUTH EAST ELEVATION

TERRAPLEIN:

PARADE GROUND:

NORTH ELEVATION

SOUTH ELEVATION

PECAN:
Carya illinoensis

FIG:
Ficus obstusifolia

WEST ELEVATION

DRAWBRIDGE:

MOAT:

DEMILUNE:

NORTH

FEET 0 20 40 60 80

METERS 0 4 8 12 16 20

TERRAPLEIN PLAN

SCALE: 1/16"=1'-0" 1:192

NAME AND LOCATION OF STRUCTURE

FORT PULASKI NATIONAL MONUMENT

CHATHAM COUNTY

SAVANNAH

GEORGIA

COCKSPUR ISLAND

HISTORIC AMERICAN BUILDINGS SURVEY

SHEET 4 OF 16 SHEETS

SURVEY NO. GA-2153

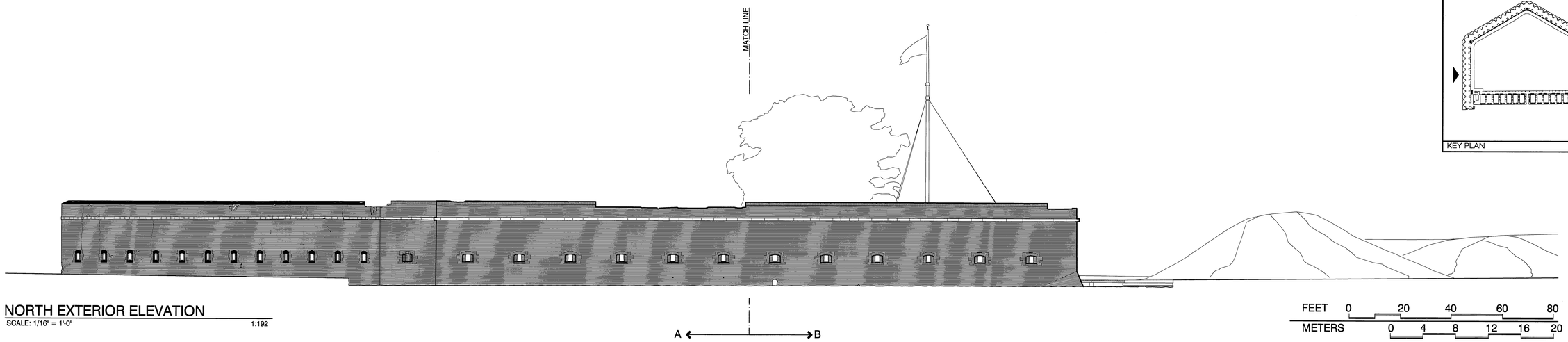
DRAWN BY: JIHYUN HER, 2000, JEFFREY DEHAVEN, 2002

TEXAS A & M UNIVERSITY

NATIONAL PARK SERVICE

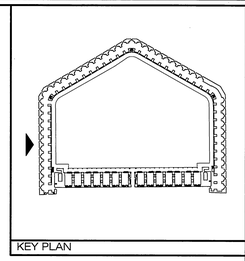
UNITED STATES DEPARTMENT OF THE INTERIOR

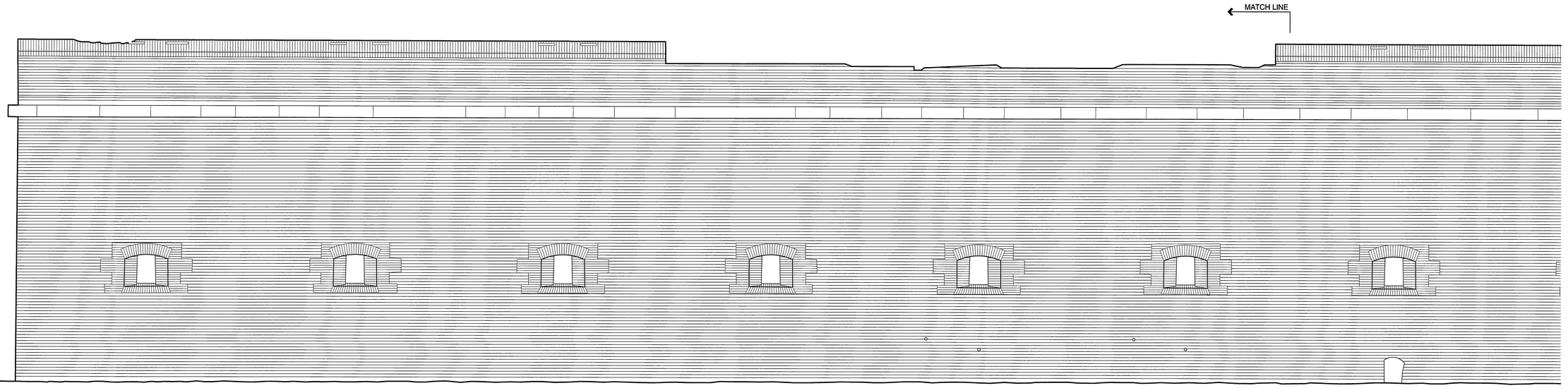
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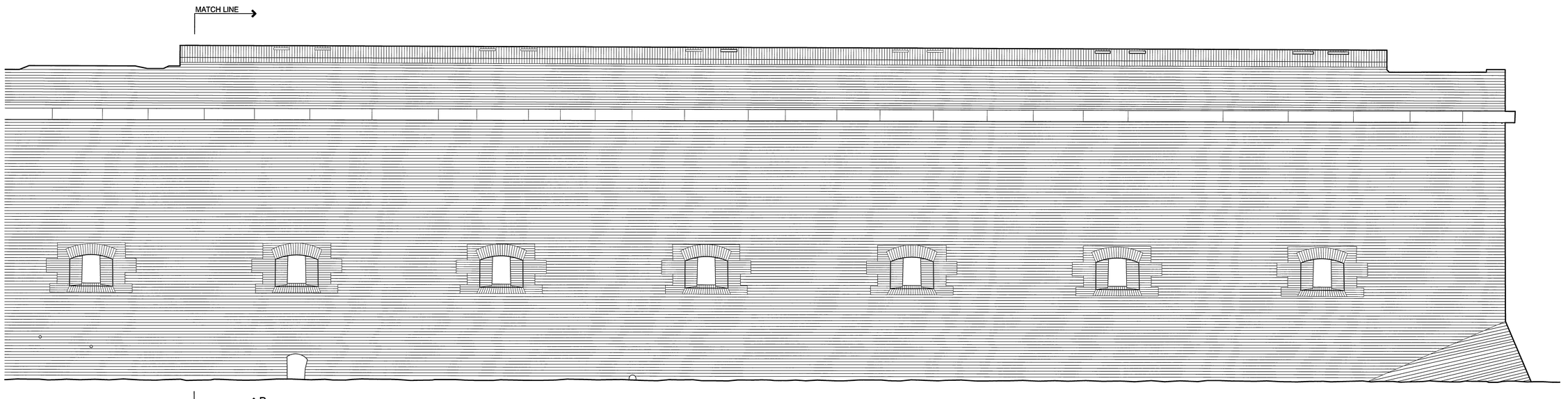
NORTH EXTERIOR ELEVATION
SCALE: 1/16" = 1'-0" 1:192

FEET 0 20 40 60 80
METERS 0 4 8 12 16 20


KEY PLAN



NORTH ENLARGED EXTERIOR - A
SCALE: 1/4" = 1'-0" 1:48



NORTH ENLARGED EXTERIOR - B
SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 5 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

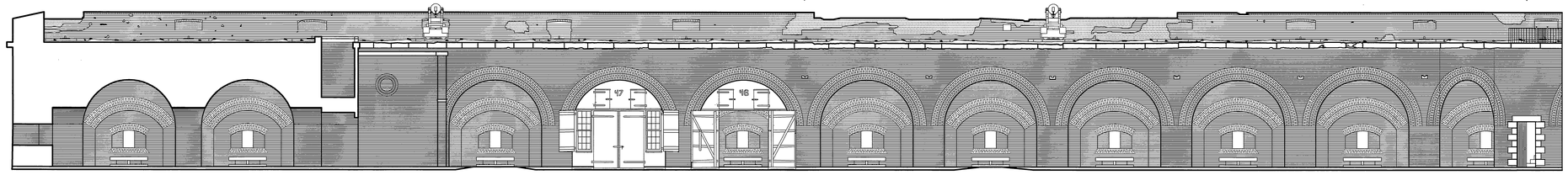
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH

COCKSPUR ISLAND

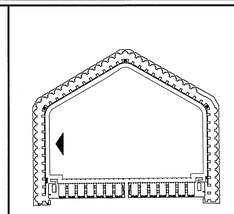
NAME AND LOCATION OF STRUCTURE

DRAWN BY: AUDREA STAHMAN, 2000, MARC FRAME, 2002
TEXAS A & M UNIVERSITY
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UNITED STATES DEPARTMENT OF THE INTERIOR

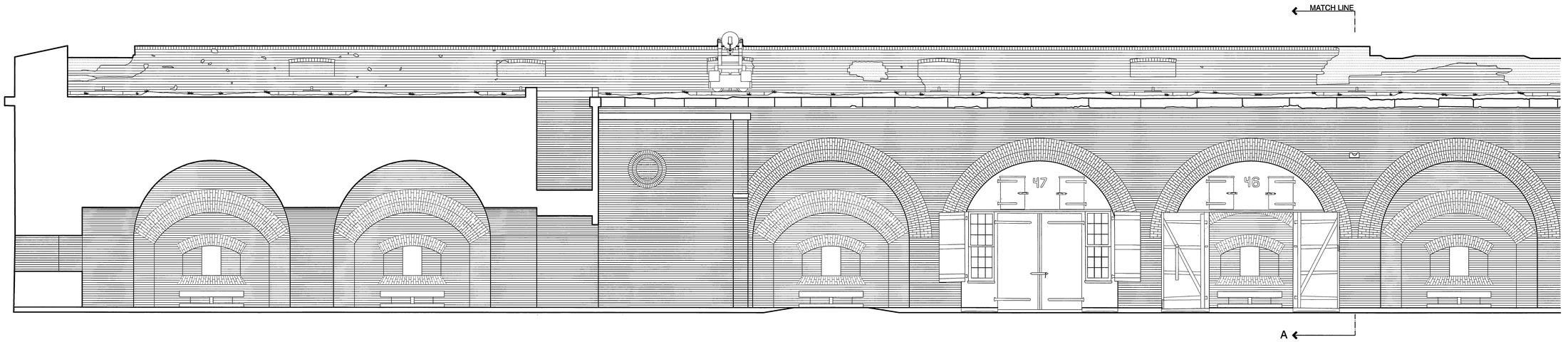
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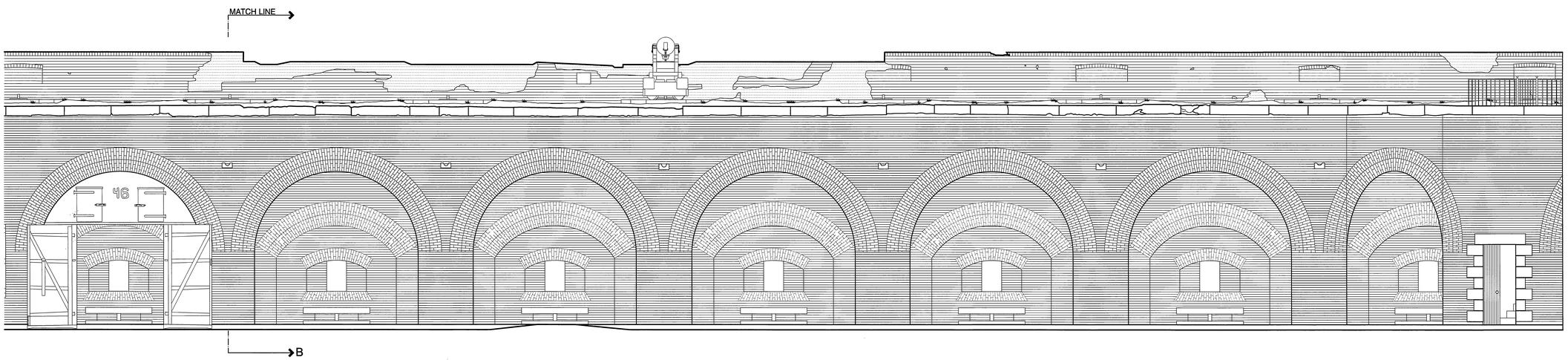
NORTH INTERIOR ELEVATION
SCALE: 1/8" = 1'-0" 1:96



FEET 0 10 20 30 40
METERS 0 2 4 6 8 10



NORTH ENLARGED INTERIOR - A
SCALE: 1/4" = 1'-0" 1:48



NORTH ENLARGED INTERIOR -B
SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

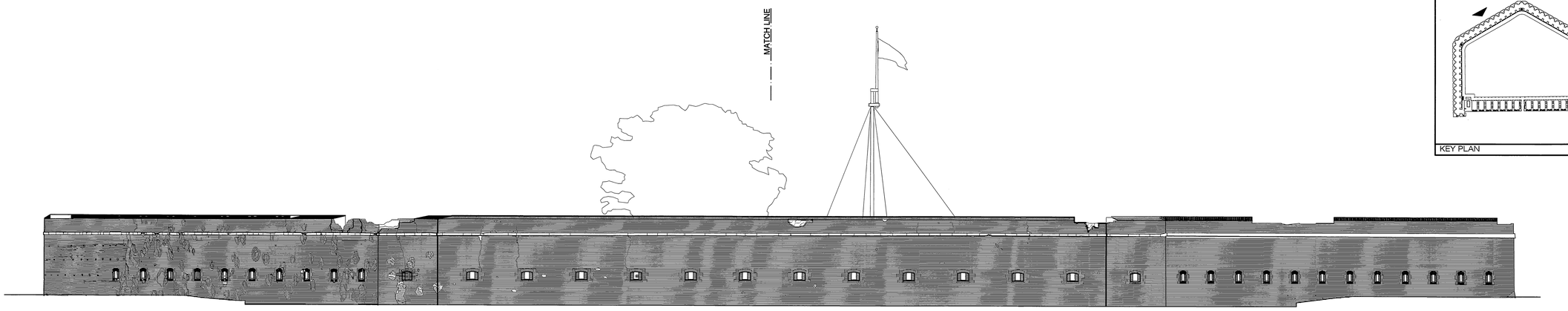
NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH
COCKSPUR ISLAND
GEORGIA

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 6 OF 16 SHEETS

SURVEY NO.
GA-2153

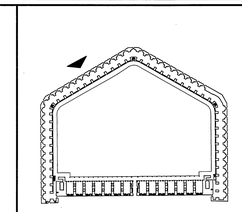
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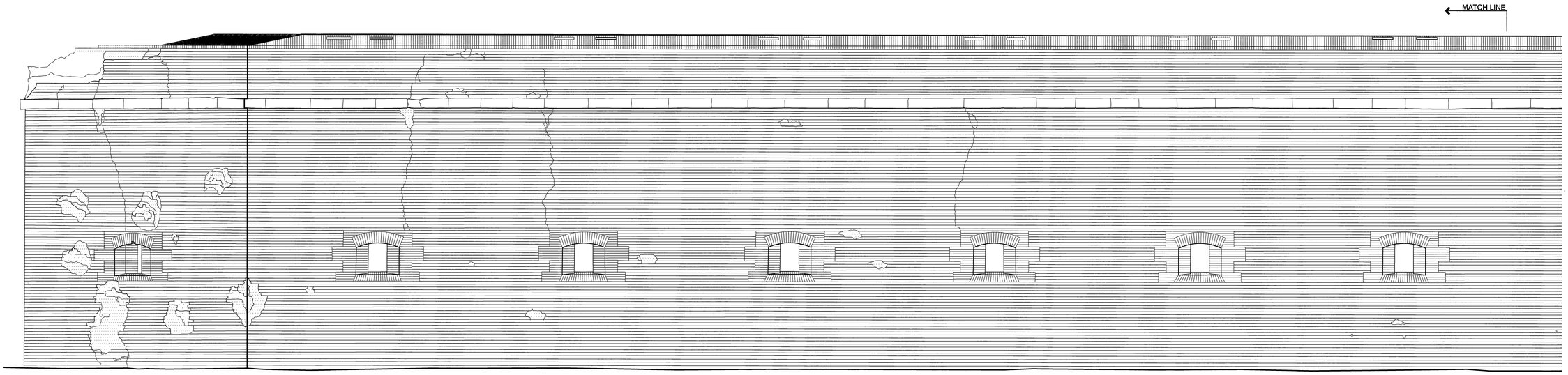
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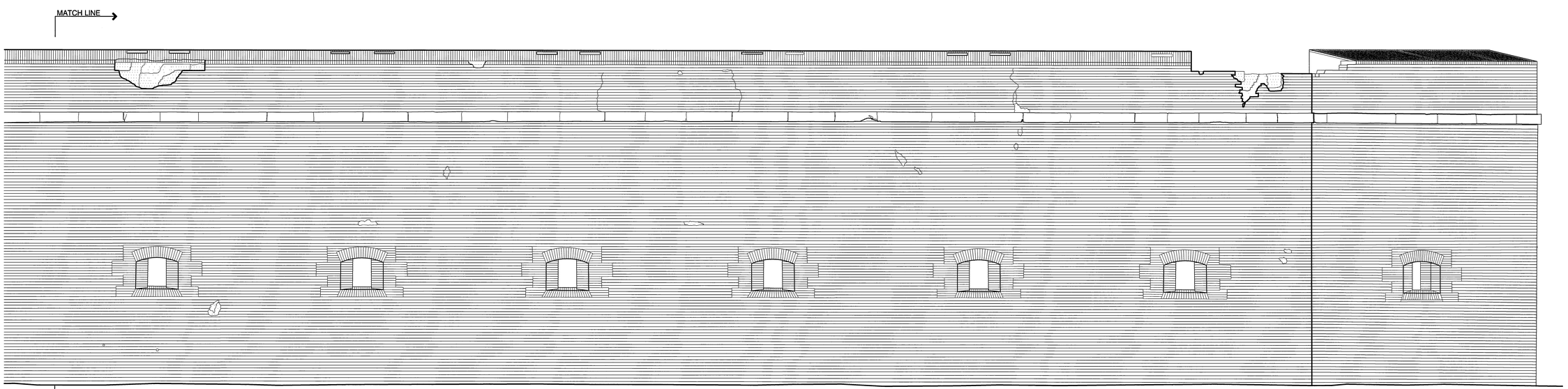
NORTH EAST EXTERIOR ELEVATION
SCALE: 1/16" = 1'-0" 1:192

FEET 0 20 40 60 80
METERS 0 4 8 12 16 20


KEY PLAN



NORTH EAST ENLARGED EXTERIOR - A
SCALE: 1/4" = 1'-0" 1:48



NORTH EAST ENLARGED EXTERIOR - B
SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
SAVANNAH
CHATHAM COUNTY
GEORGIA

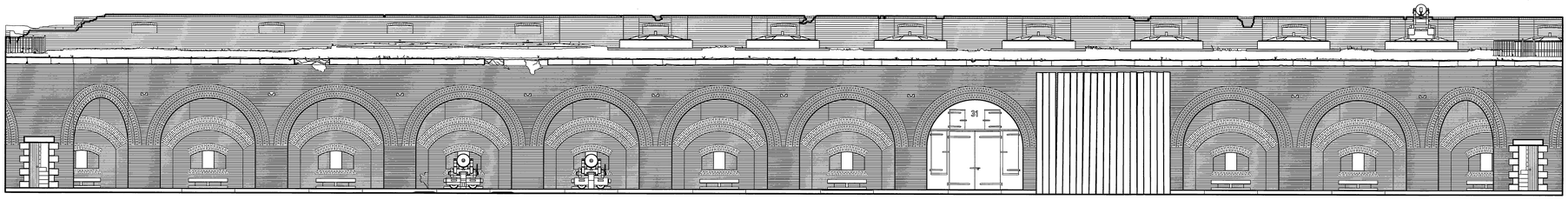
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HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 7 OF 16 SHEETS

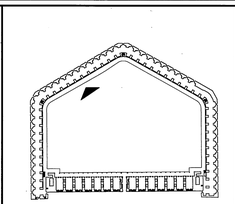
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COCKSPUR ISLAND

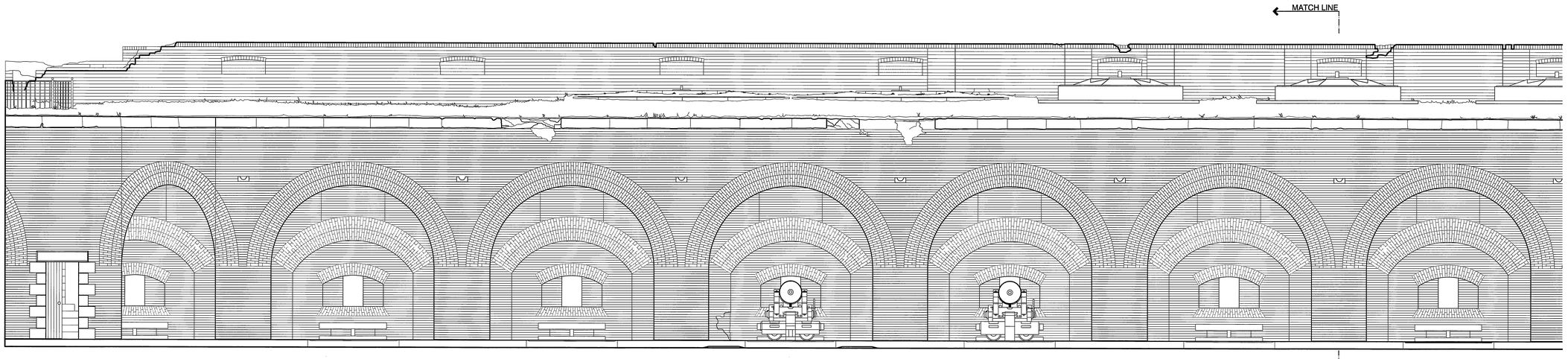
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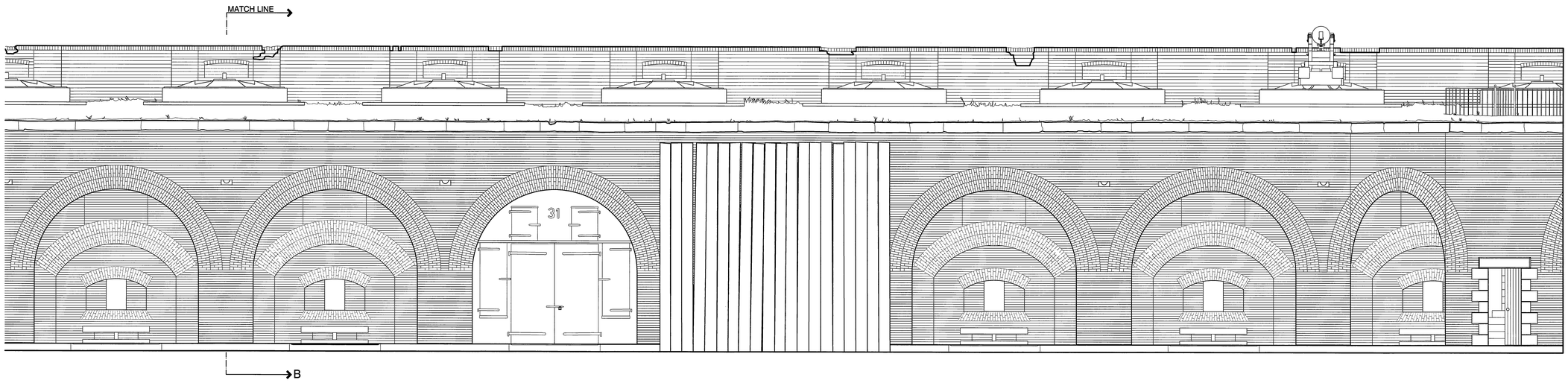
NORTH EAST INTERIOR ELEVATION
SCALE: 1/8" = 1'-0" 1:96



FEET 0 10 20 30 40
METERS 0 2 4 6 8 10



NORTH EAST ENLARGED INTERIOR - A
SCALE: 1/4" = 1'-0" 1:48



NORTH EAST ENLARGED INTERIOR - B
SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 8 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

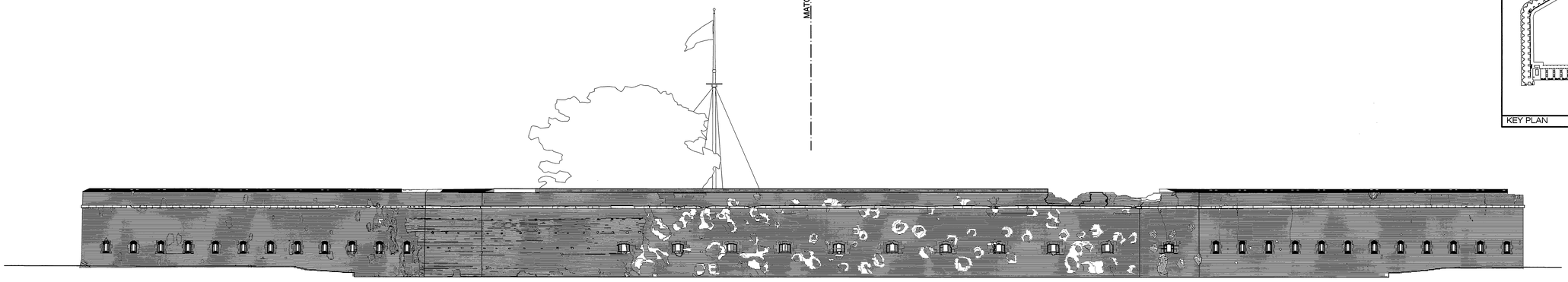
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH

NAME AND LOCATION OF STRUCTURE

COCKSPUR ISLAND

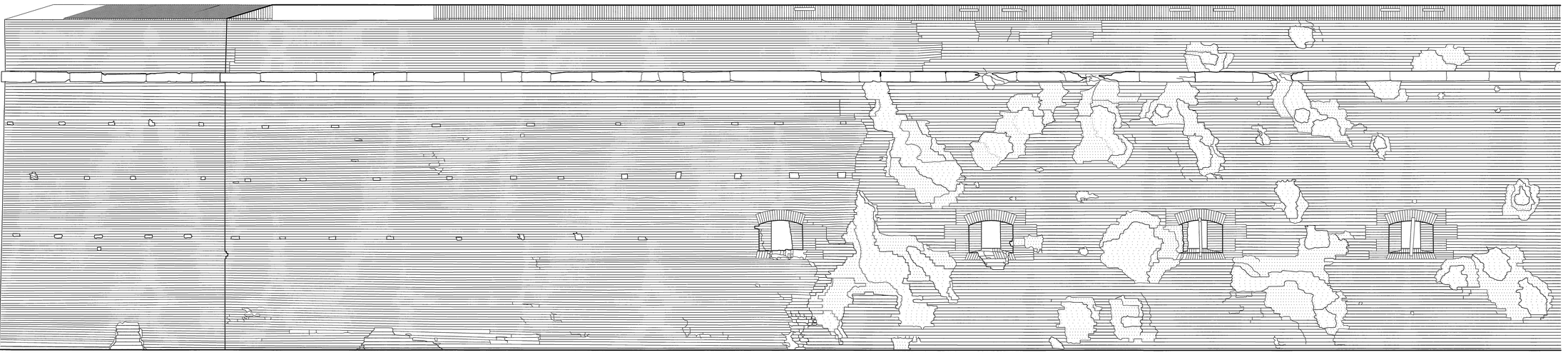
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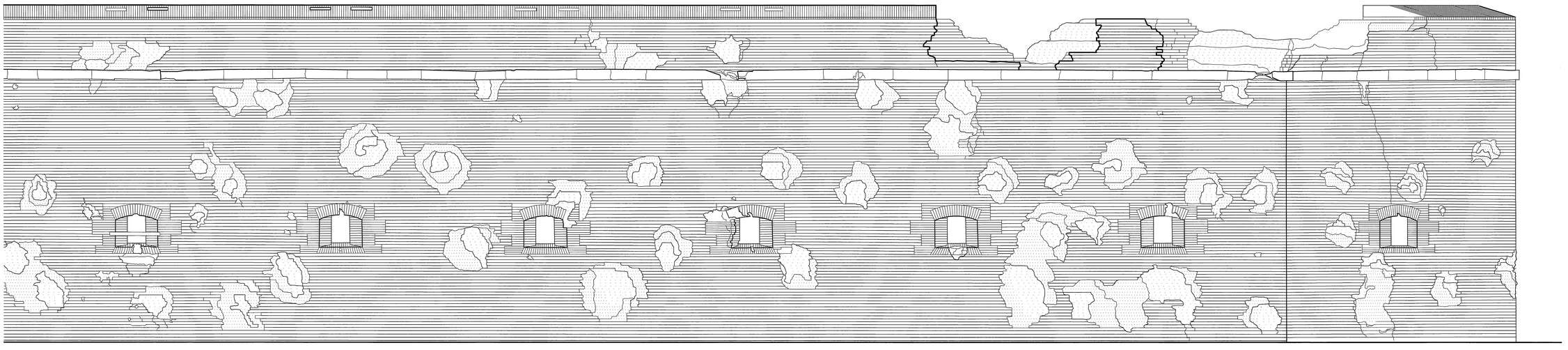


SOUTH EAST EXTERIOR ELEVATION
SCALE: 1/16" = 1'-0" 1:192

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METERS 0 4 8 12 16 20

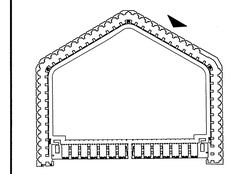


SOUTH EAST ENLARGED EXTERIOR - A
SCALE: 1/4" = 1'-0" 1:48



SOUTH EAST ENLARGED EXTERIOR - B
SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5


KEY PLAN

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 9 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH

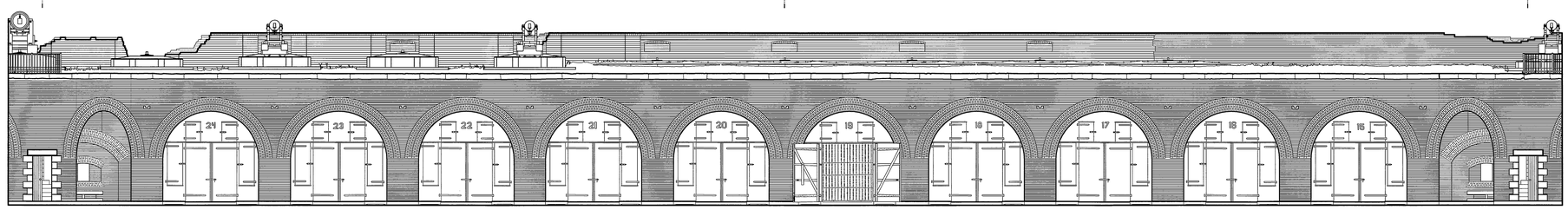
NAME AND LOCATION OF STRUCTURE

COCKSPUR ISLAND

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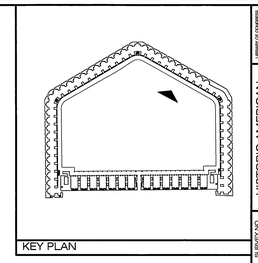
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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SOUTH EAST INTERIOR ELEVATION

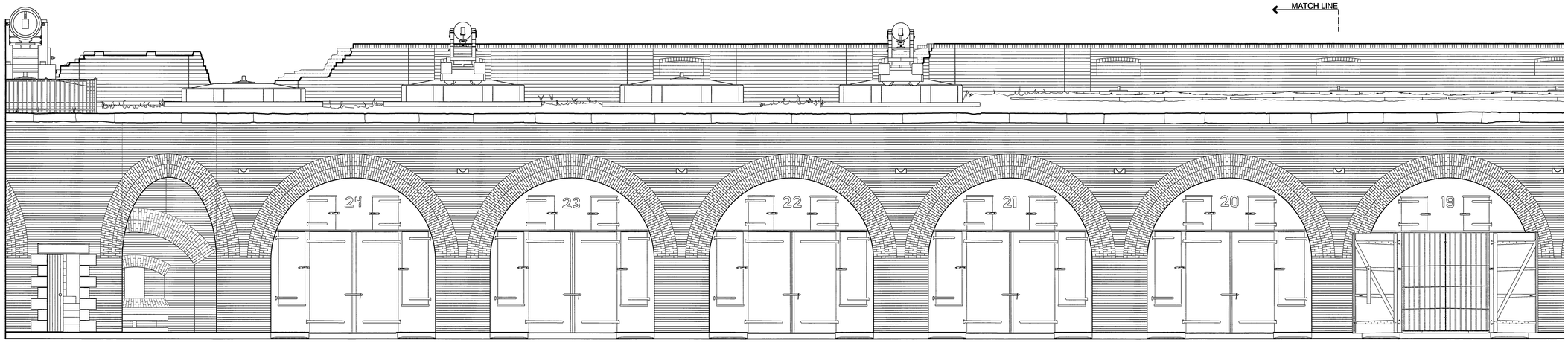
SCALE: 1/8" = 1'-0" 1:96



KEY PLAN

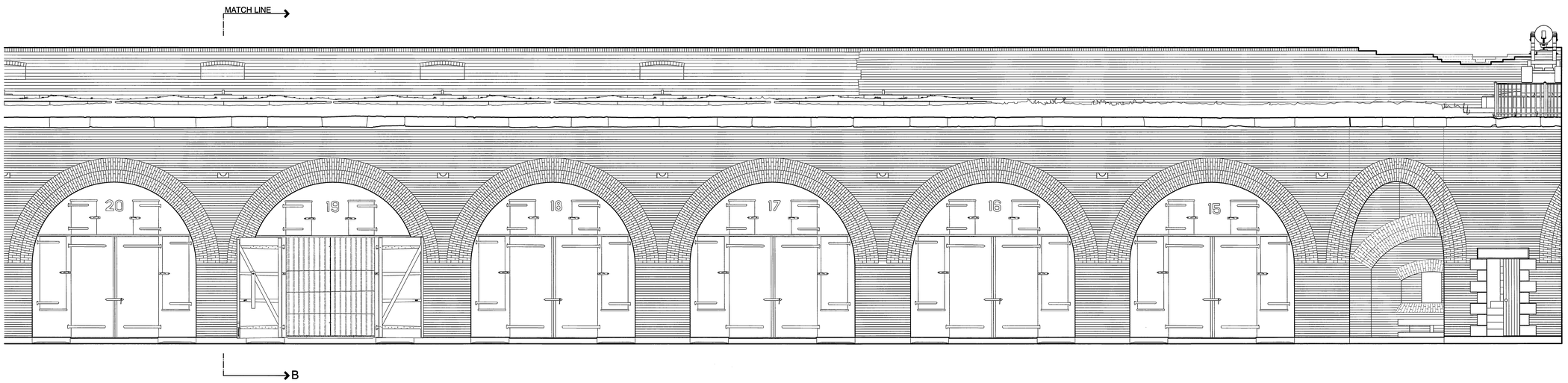
FEET 0 10 20 30 40

METERS 0 2 4 6 8 10



SOUTH EAST ENLARGED INTERIOR - A

SCALE: 1/4" = 1'-0" 1:48



SOUTH EAST ENLARGED INTERIOR - B

SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20

METERS 0 1 2 3 4 5

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 10 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
SAVANNAH
CHATHAM COUNTY

COCKSPUR ISLAND

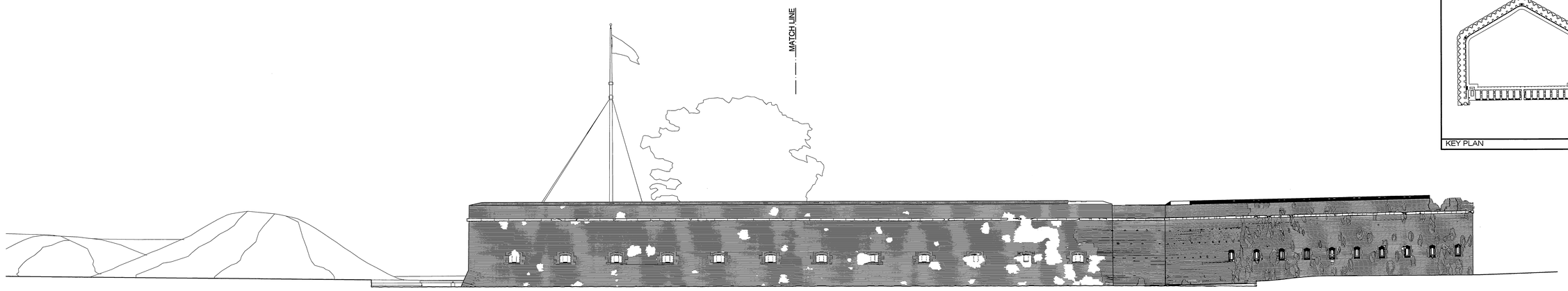
DRAWN BY: JEFF DINGER, 2001, JEFFREY DEHAVEN, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
LIMITED EXTENT OF PHOTO OF THE INTERIOR

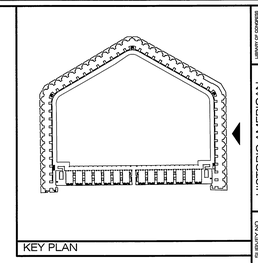
DATE OF DRAWING

NAME OF DELINEATOR

HISTORIC AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE

IF REPRODUCED, PLEASE CREDIT THE HISTORIC AMERICAN BUILDINGS SURVEY





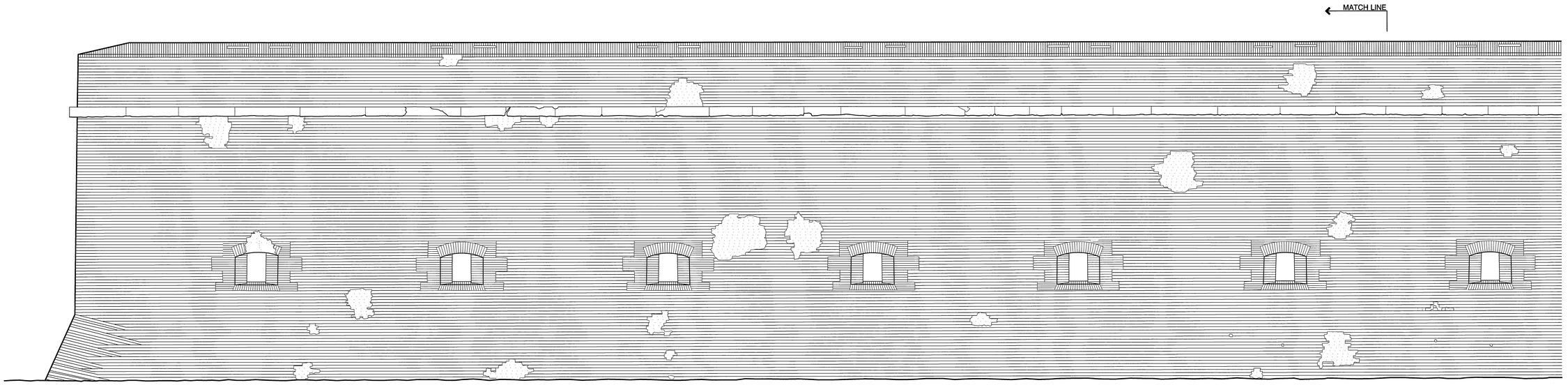
KEY PLAN

SOUTH EXTERIOR ELEVATION

SCALE: 1/16" = 1'-0" 1:192

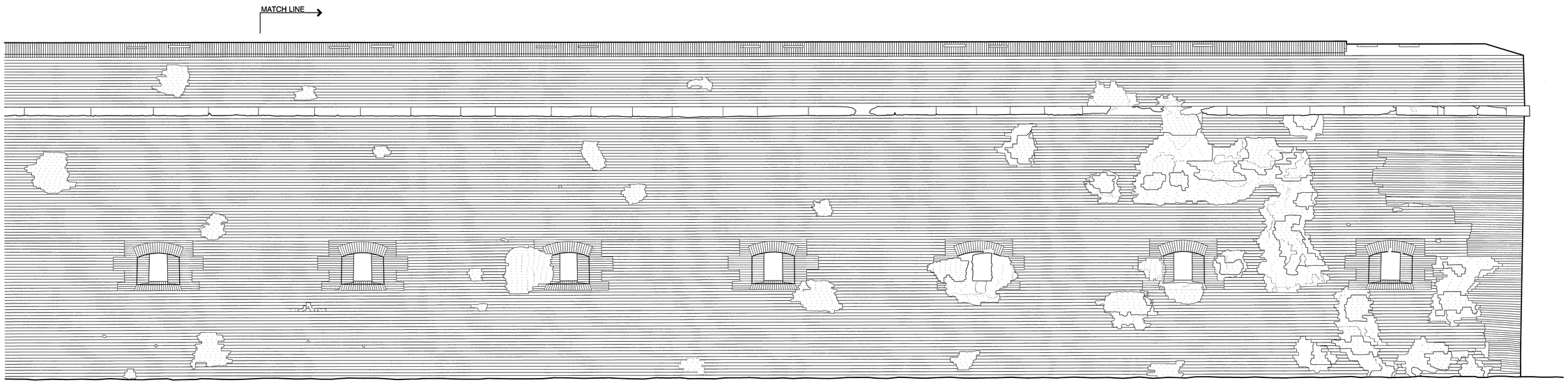
FEET 0 20 40 60 80

METERS 0 4 8 12 16 20



SOUTH ENLARGED EXTERIOR - A

SCALE: 1/4" = 1'-0" 1:48



SOUTH ENLARGED EXTERIOR - B

SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20

METERS 0 1 2 3 4 5

NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH
GEORGIA

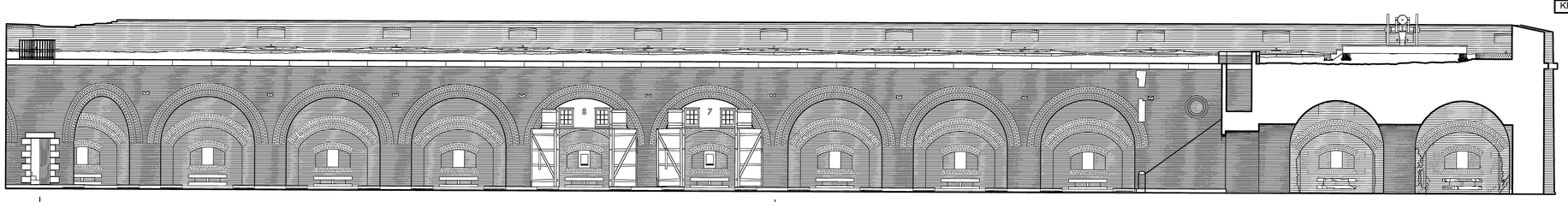
SURVEY NO. GA-2153

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 11 OF 16 SHEETS

COCKSPUR ISLAND

DRAWN BY: TRESSA ORSACK, 2000, JOSE DE CASTILLO, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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

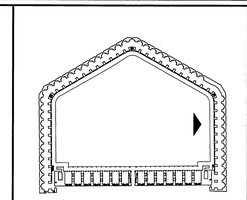


10

A B

SOUTH INTERIOR ELEVATION

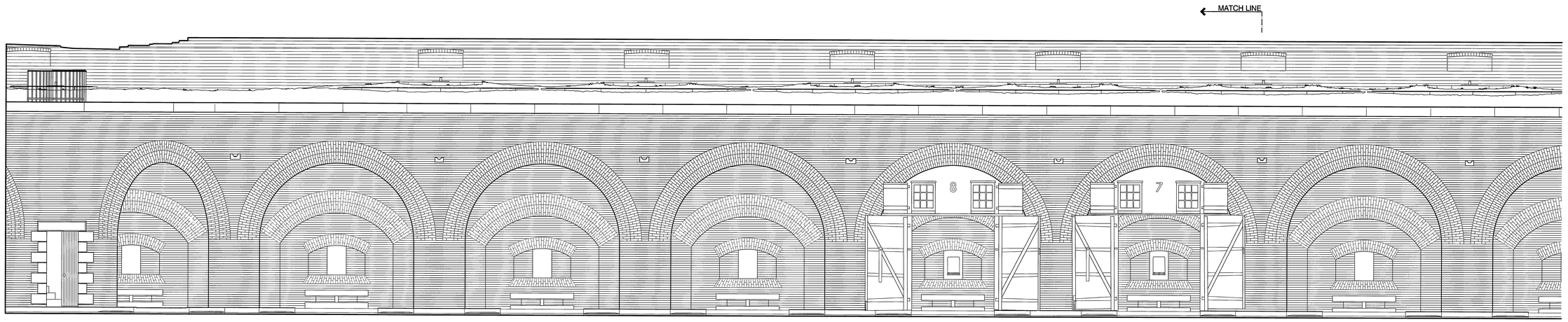
SCALE: 1/8" = 1'-0" 1:96



KEY PLAN

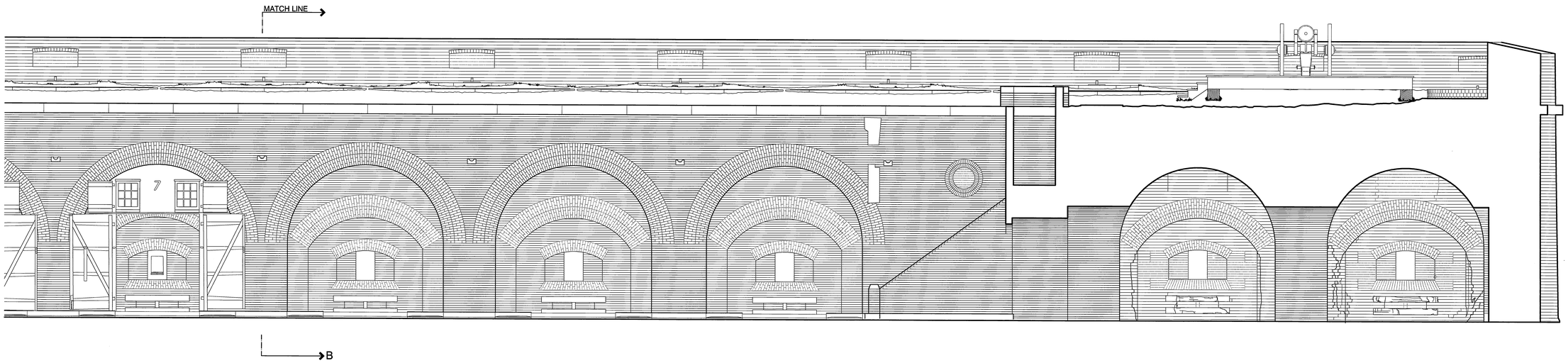
FEET 0 10 20 30 40

METERS 0 2 4 6 8 10



SOUTH ENLARGED INTERIOR - A

SCALE: 1/4" = 1'-0" 1:48



SOUTH ENLARGED INTERIOR - B

SCALE: 1/4" = 1'-0" 1:48

FEET 0 5 10 15 20

METERS 0 1 2 3 4 5

HISTORIC AMERICAN BUILDINGS SURVEY

SHEET 12 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

NAME AND LOCATION OF STRUCTURE

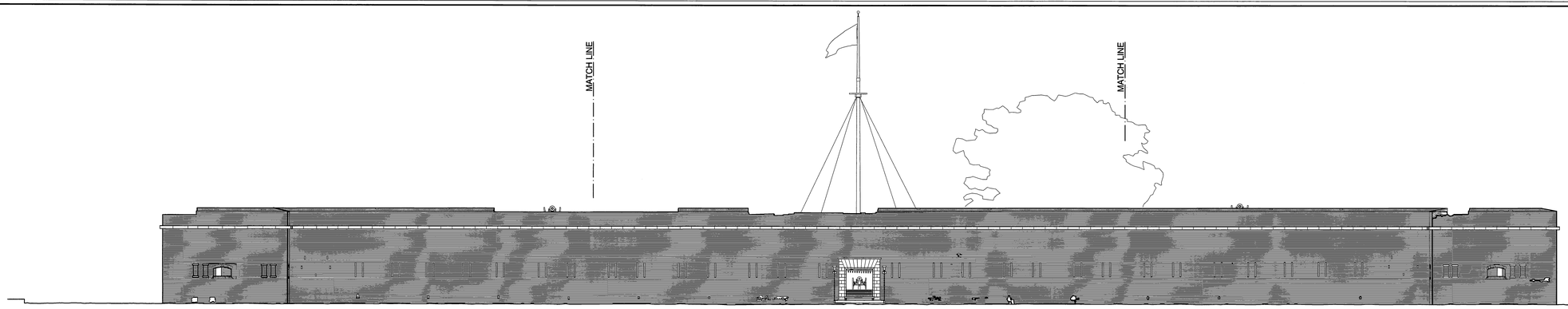
FORT PULASKI NATIONAL MONUMENT
SAVANNAH
CHATHAM COUNTY

COCKSPUR ISLAND

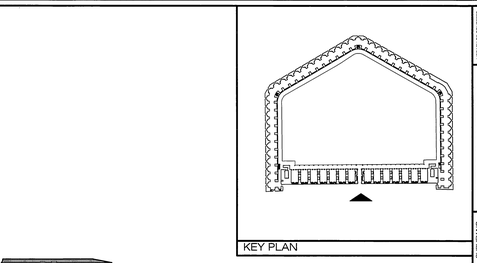
DRAWN BY: MICHAEL LYSSY, 2001, JOSE DE CASTILLO, 2002
TEXAS A & M UNIVERSITY

NATIONAL PARK SERVICE
HISTORIC AMERICAN BUILDINGS SURVEY

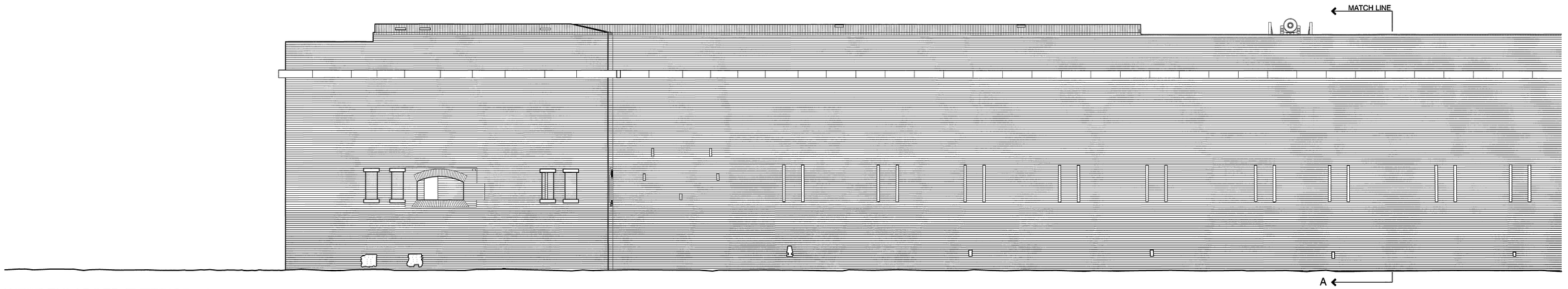
IF REPRODUCED, PLEASE CREDIT THE HISTORIC AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE, NAME OF DELINEATOR, DATE OF DRAWING



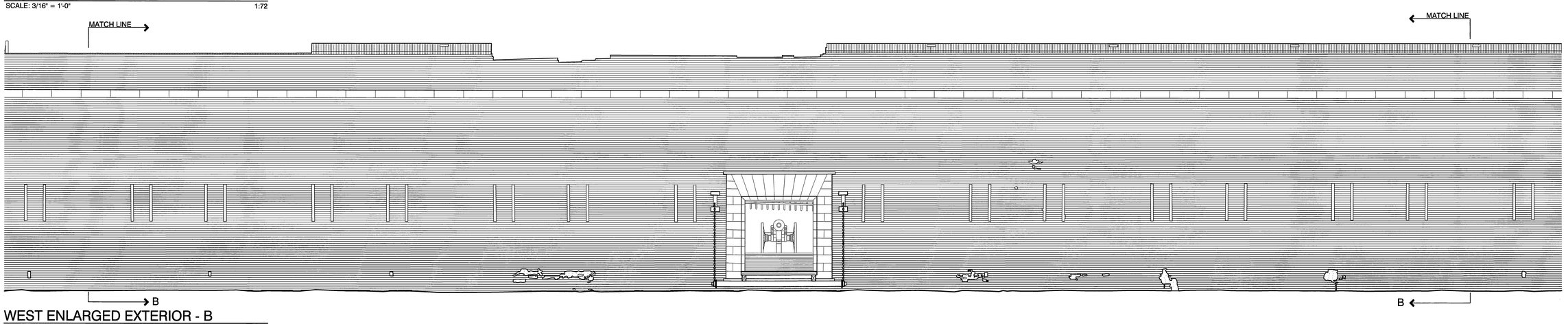
WEST EXTERIOR ELEVATION
SCALE: 1/16" = 1'-0" 1:192


KEY PLAN

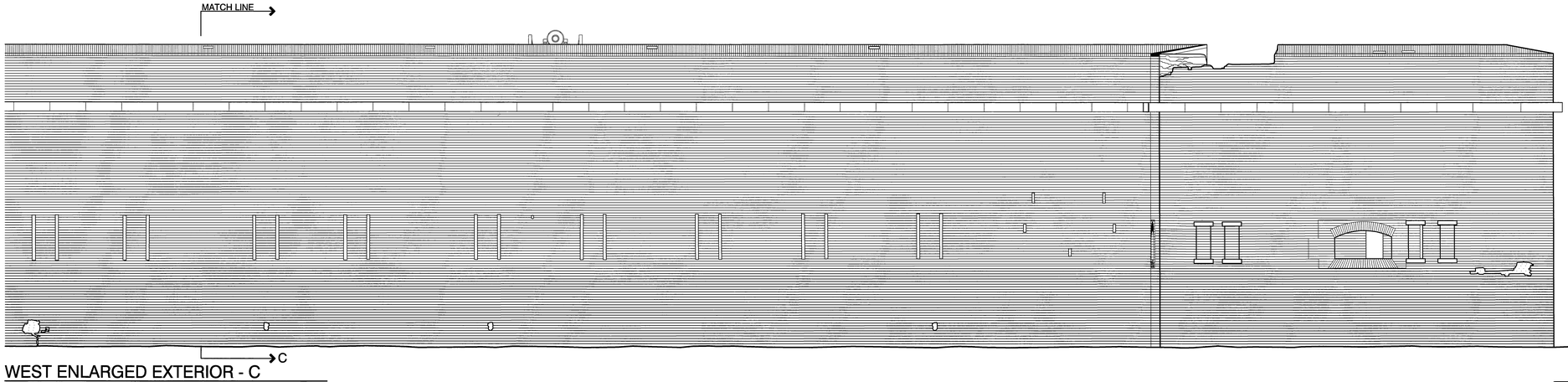
FEET 0 20 40 60 80
METERS 0 4 8 12 16 20



WEST ENLARGED EXTERIOR - A
SCALE: 3/16" = 1'-0" 1:72



WEST ENLARGED EXTERIOR - B
SCALE: 3/16" = 1'-0" 1:72



WEST ENLARGED EXTERIOR - C
SCALE: 3/16" = 1'-0" 1:72

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH
GEORGIA

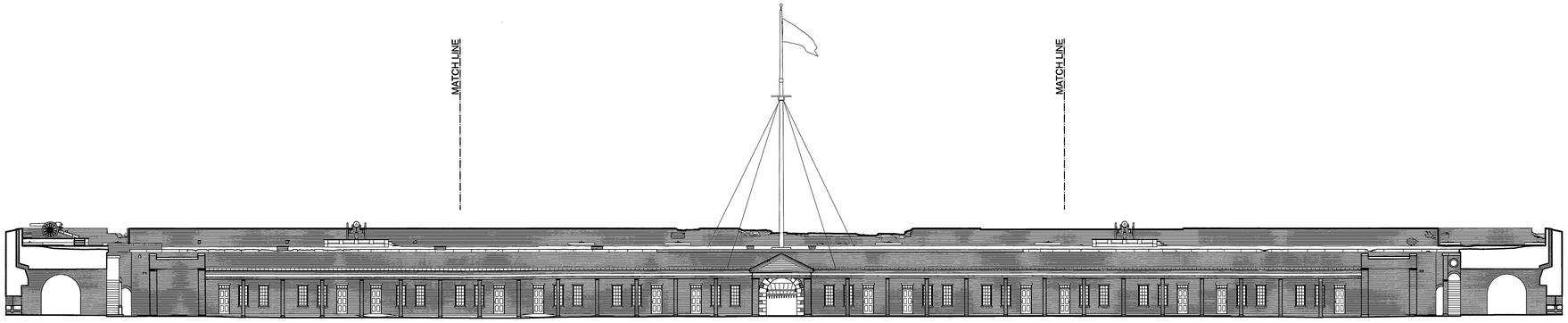
SURVEY NO. GA-2153

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 13 OF 16 SHEETS

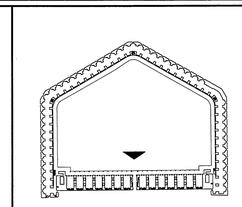
COCKSPUR ISLAND

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

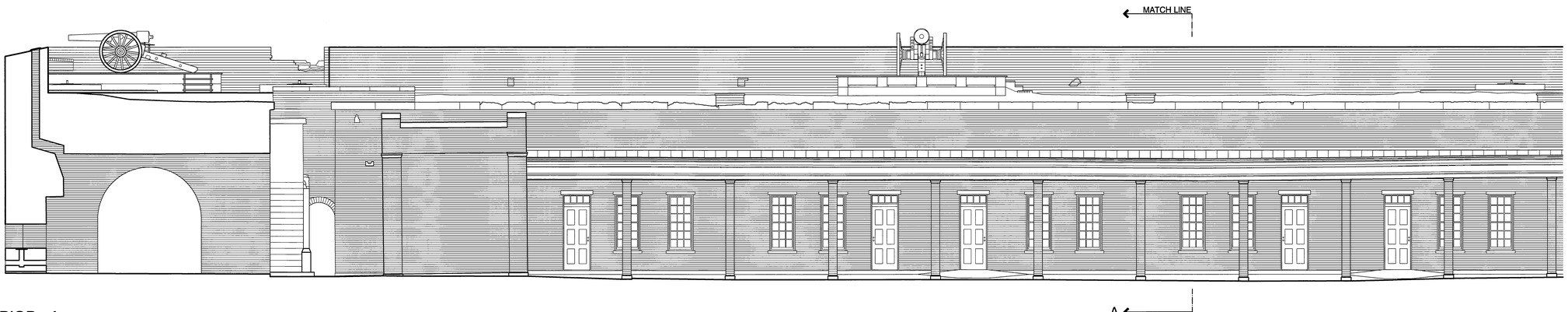
DRAWN BY: ANU MUKHERJEE, 2000, ANTONIO VALDIVIA, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR



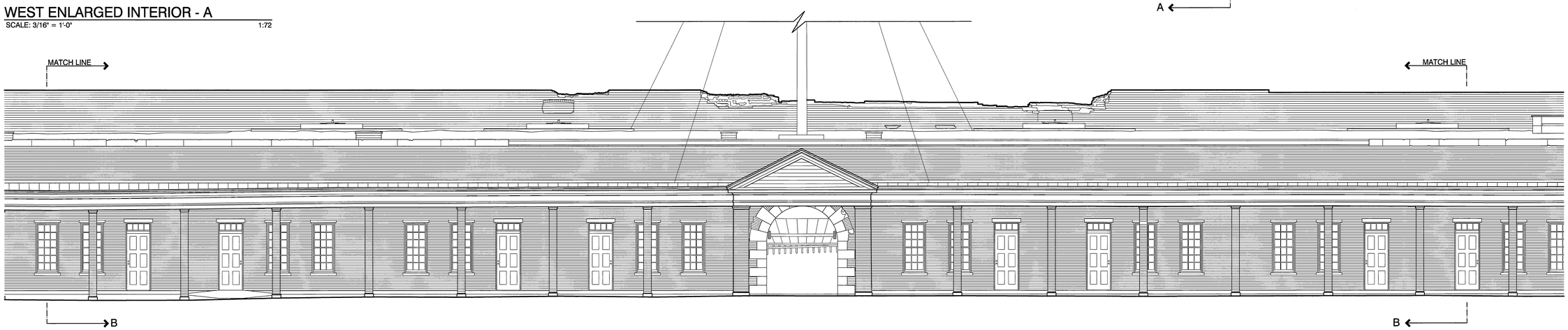
WEST INTERIOR ELEVATION
SCALE: 1/16" = 1'-0" 1:192


KEY PLAN

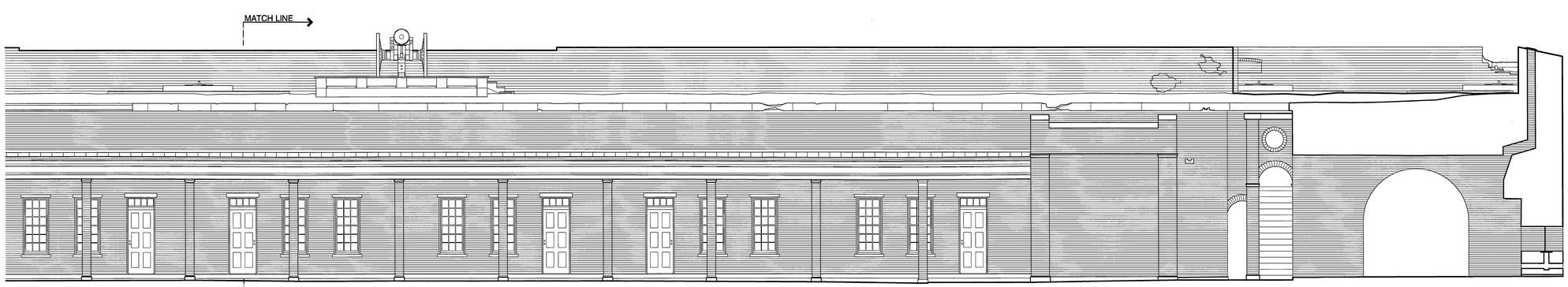
FEET 0 20 40 60 80
METERS 0 4 8 12 16 20



WEST ENLARGED INTERIOR - A
SCALE: 3/16" = 1'-0" 1:72



WEST ENLARGED INTERIOR - B
SCALE: 3/16" = 1'-0" 1:72



WEST ENLARGED INTERIOR - C
SCALE: 3/16" = 1'-0" 1:72

FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

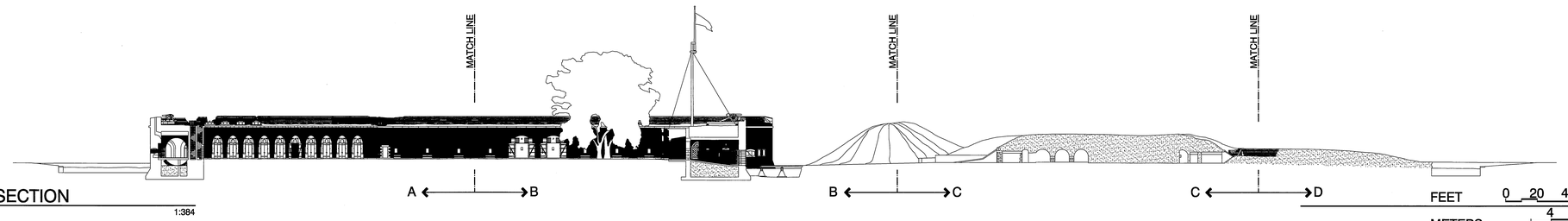
NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH
COCKSPUR ISLAND
GEORGIA

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 14 OF 16 SHEETS

SURVEY NO. GA-2153

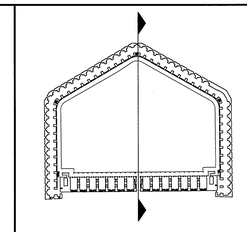
DRAWN BY: HARUTAI PRARTNADI, 2001; ANTONIO VALDIVIA, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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LONGITUDINAL SECTION

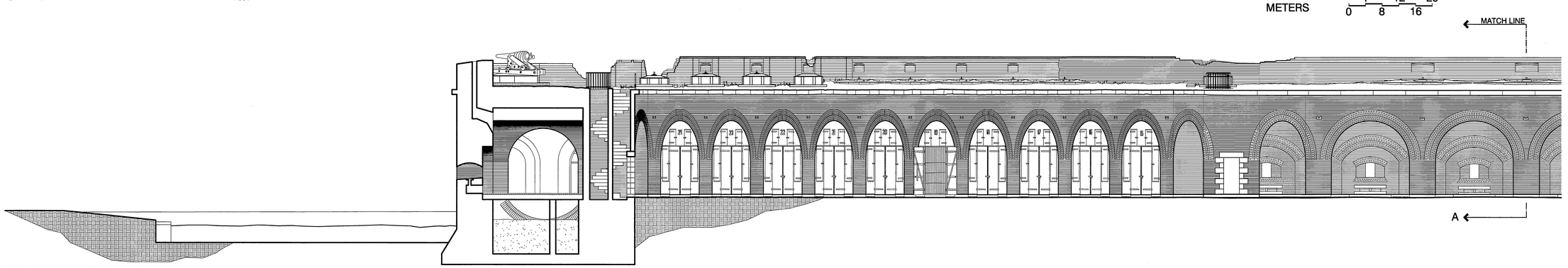
SCALE: 1/32" = 1'-0" 1:384



KEY PLAN

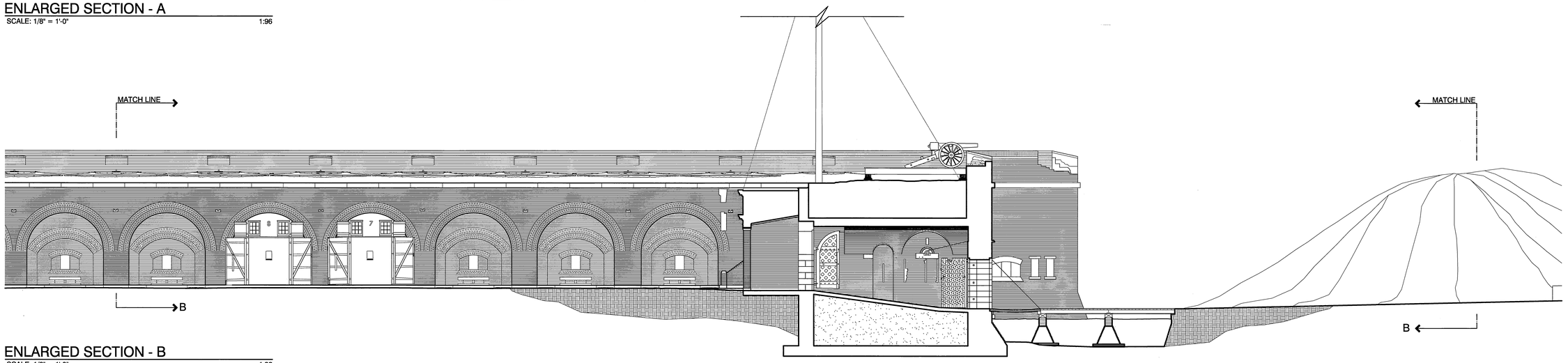
FEET 0 20 40 60 80

METERS 0 4 8 12 16 20



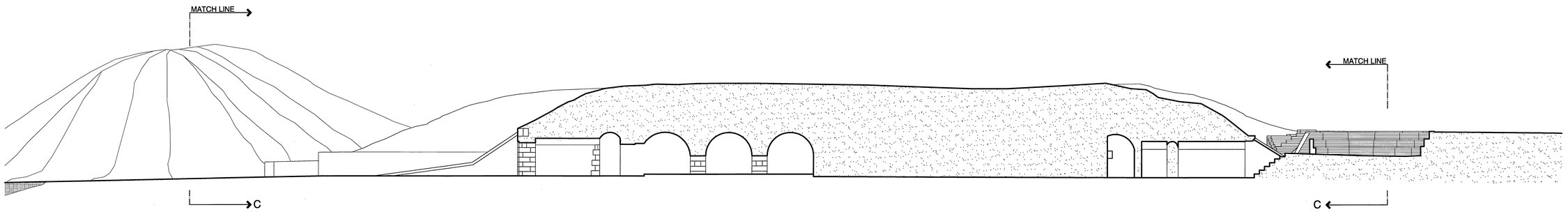
ENLARGED SECTION - A

SCALE: 1/8" = 1'-0" 1:96



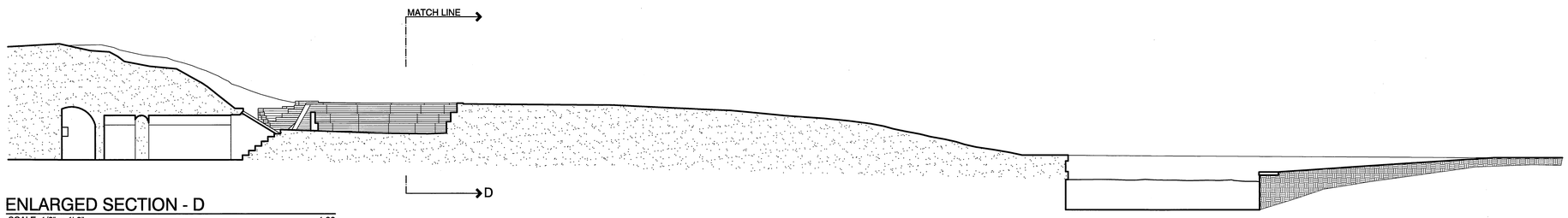
ENLARGED SECTION - B

SCALE: 1/8" = 1'-0" 1:96



ENLARGED SECTION - C

SCALE: 1/8" = 1'-0" 1:96



ENLARGED SECTION - D

SCALE: 1/8" = 1'-0" 1:96

FEET 0 10 20 30 40

METERS 0 2 4 6 8 10

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 15 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

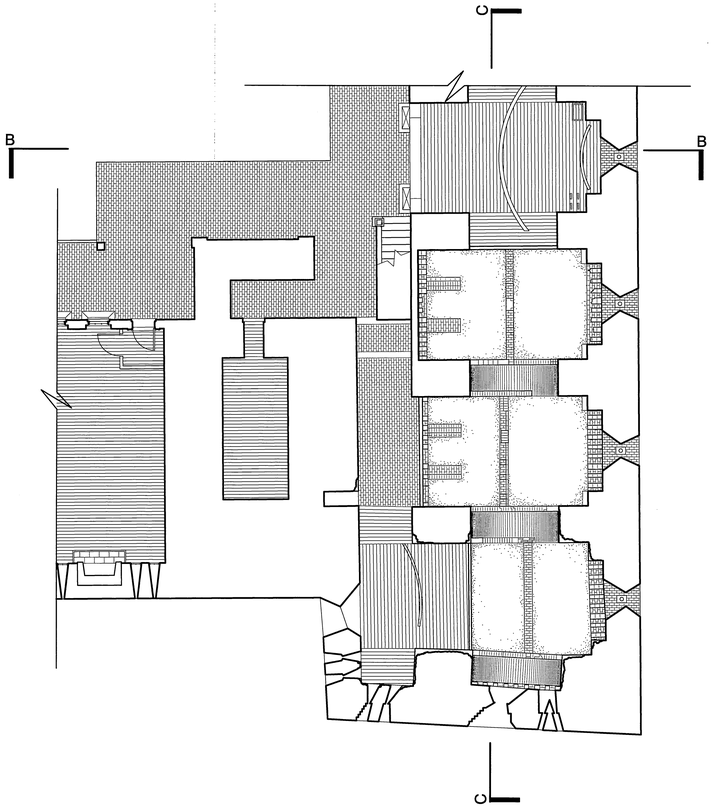
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH

NAME AND LOCATION OF STRUCTURE

COCKSPUR ISLAND

DRAWN BY: SOYEON KIM, 2001, JEFFREY DEHAVEN, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

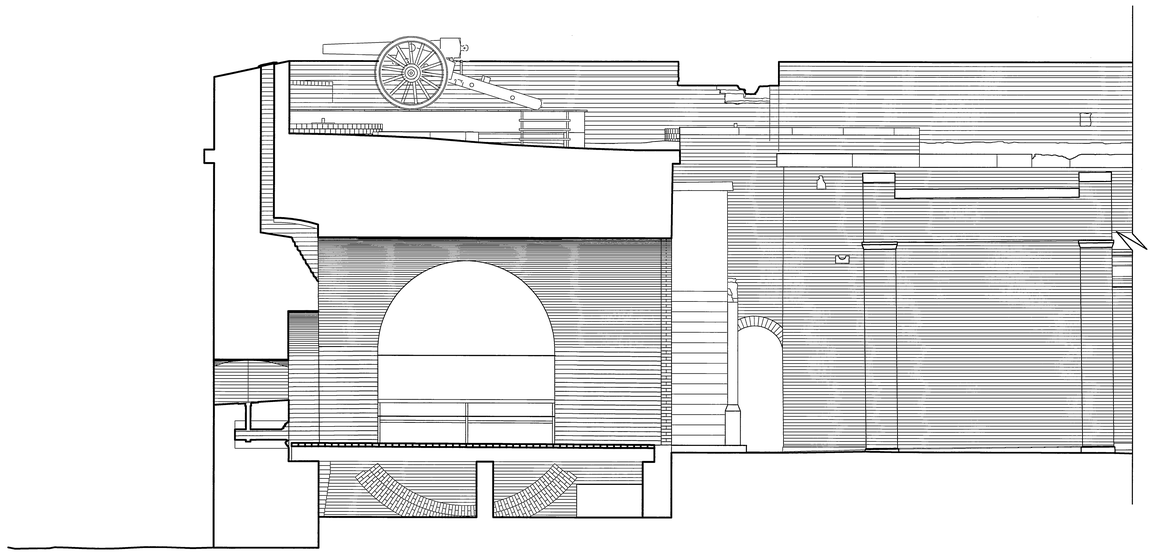
IF REPRODUCED, PLEASE CREDIT THE HISTORIC AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE, NAME OF DELINEATOR, DATE OF DRAWING



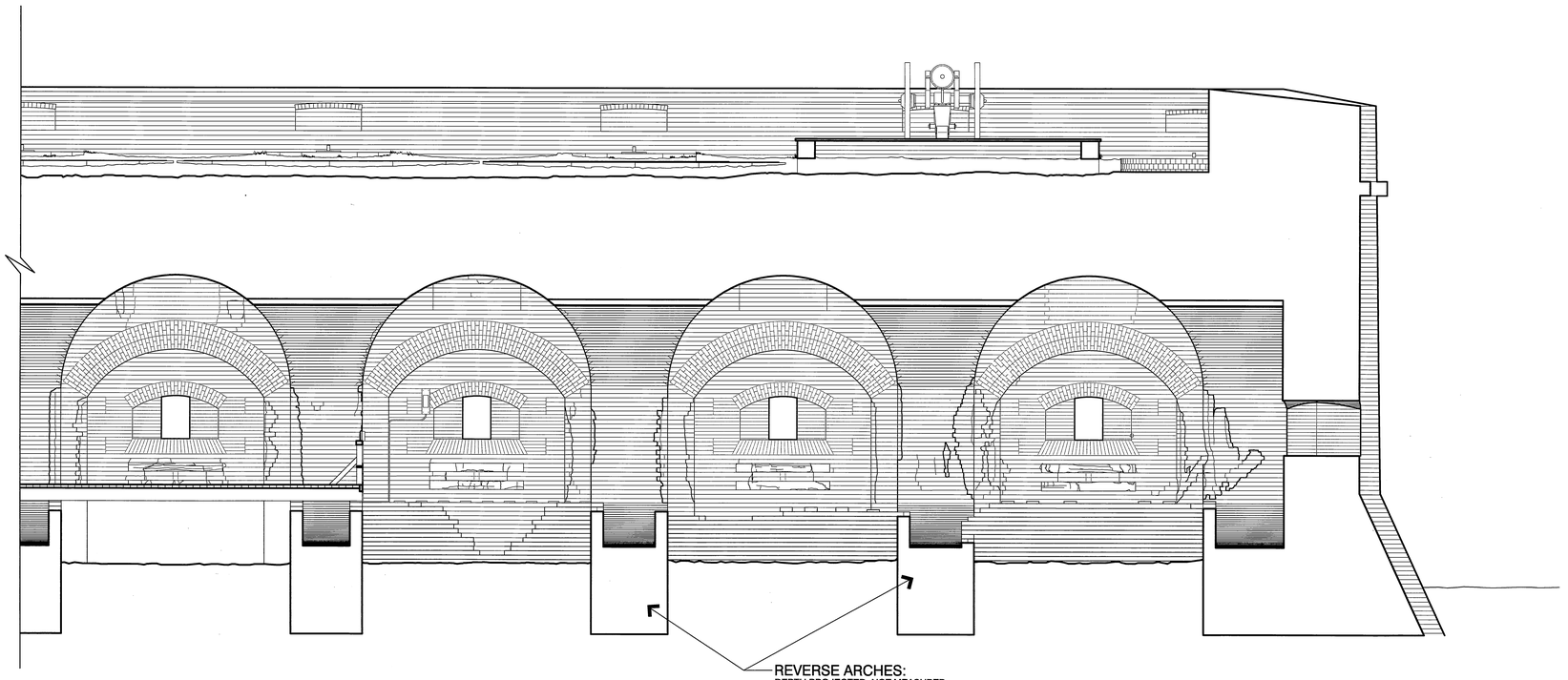
NORTH

FEET 0 10 20 30 40
METERS 0 2 4 6 8 10

ENLARGED PLAN AT SOUTHWEST BASTION
SCALE: 1/8"=1'-0" 1:96

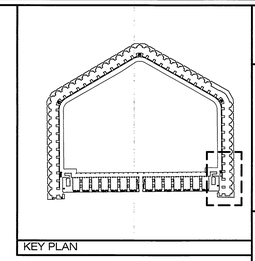


SOUTHWEST BASTION SECTION - B
SCALE: 1/4"=1'-0" 1:48



FEET 0 5 10 15 20
METERS 0 1 2 3 4 5

SOUTHWEST BASTION LONGITUDINAL SECTION - C
SCALE: 1/4"=1'-0" 1:48


KEY PLAN

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 16 OF 16 SHEETS

SURVEY NO. GA-2153

GEORGIA

NAME AND LOCATION OF STRUCTURE
FORT PULASKI NATIONAL MONUMENT
CHATHAM COUNTY
SAVANNAH

COCKSPUR ISLAND

DRAWN BY JEFF DINGER, 2001, JOSE DE CASTILLIO, 2002
TEXAS A & M UNIVERSITY
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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