



# Dry Tortugas National Park Garden Key Cultural Landscape Report



Cultural Resources  
Southeast Region

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Garden Key

Dry Tortugas National Park

# Cultural Landscape Report

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About the cover: Fort Jefferson Parade Ground, 1867 (EVER 7393).

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# Garden Key Cultural Landscape Report

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# Foreword

We are pleased to make available this cultural landscape report, part of our ongoing effort to provide comprehensive documentation for the landscapes and historic structures of National Park Service units in the Southeast Region. A number of individuals and institutions contributed to the successful completion of this work. We would particularly like to thank the staff at Everglades National Park for their assistance throughout the process. We hope this study will be a useful tool for park management in continuing efforts to preserve the cultural landscape and to others interested in the significance of the park's many cultural resources.

Dan Scheidt, Chief  
Cultural Resources Division  
Southeast Regional Office  
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# Introduction

## Management Summary

Dry Tortugas National Park is located sixty-eight miles west of Key West, Florida. It encompasses a striking combination of historic resources in a subtropical marine environment. Garden Key, one of seven sandy keys within park boundaries, is the location of Fort Jefferson, the largest brick masonry fortification in federal ownership.

The area's unique natural values were first officially recognized by Executive Order in 1908 when the Dry Tortugas Keys Reservation was established to protect nesting seabirds. The area continues to protect nationally significant seabird nesting and migratory bird habitats.

On January 4, 1935, President Franklin D. Roosevelt designated the area as the Fort Jefferson National Monument. Dry Tortugas National Park was established on October 26, 1992, to “preserve and protect for the education, inspiration, and enjoyment of present and future generations nationally significant natural, historic, scenic, marine, and scientific values in South Florida.”

Fort Jefferson was listed in the National Register in 1970 under Criterion A (associated with events that have made a significant contribution to the broad patterns of our history) and Criterion C (embodies distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic values). Due to

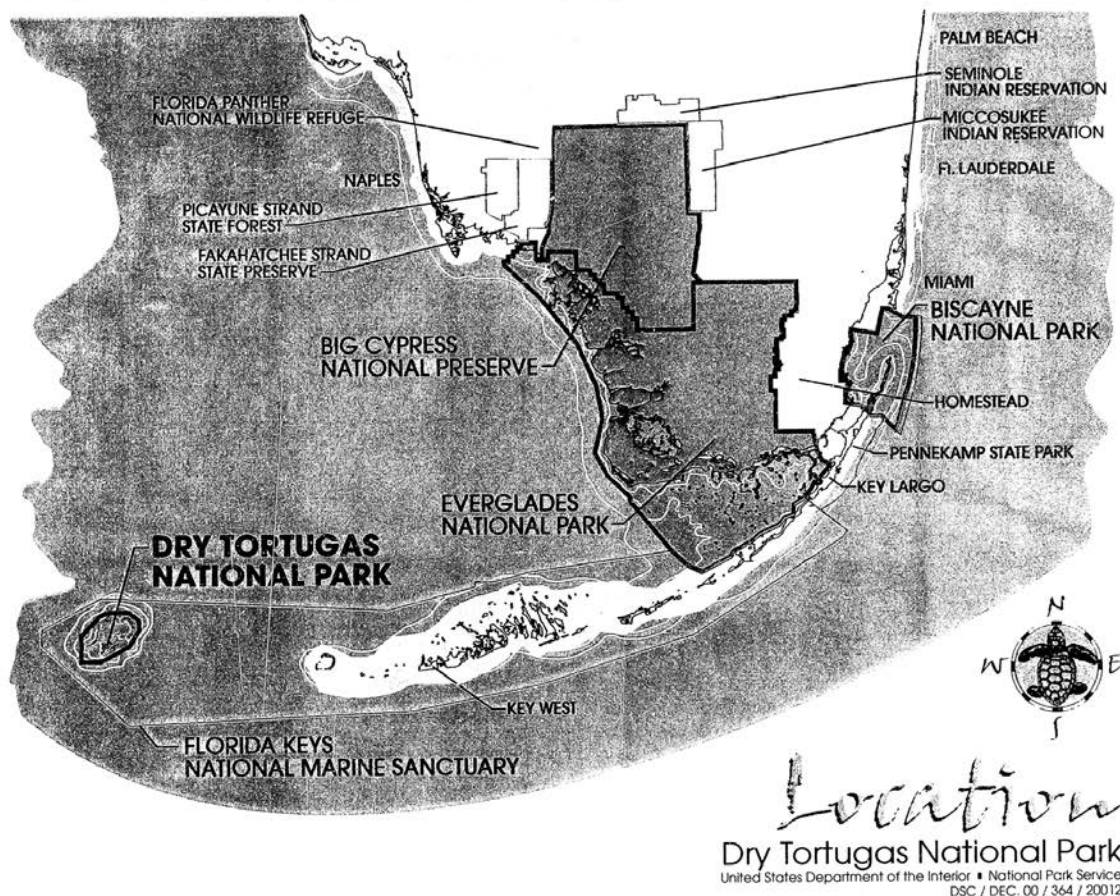


Figure 1. Location map. (Denver Service Center etic 364/20012)

the early date of the nomination, the contributing resources are primarily structural and do not include any landscape features. In addition to the contributing resources listed in 1970, a number of significant landscape resources, primarily vegetation, are managed by the park.

Cultural landscapes are settings man has created in the natural world. They reveal fundamental ties between people and the land because of our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Landscapes are intertwined patterns of things both natural and constructed: plants and fences, waterways and buildings. They range from formal gardens to historic cotton fields, military parade grounds to community settlements. They are special places—expressions of human manipulation and adaptation of the land.

The purpose of this cultural landscape report (CLR) is to document the physical development of Garden Key beginning with the construction of Fort Jefferson in 1846 to the present. A site history is followed by a description of the current condition of the site and an analysis of historical significance and integrity. This includes an evaluation of Garden Key's historic and contemporary landscape characteristics, such as changes in spatial organization, circulation, and vegetation. With an understanding of the historic fabric, character-defining features of the cultural landscape are identified. The report then presents treatment issues and recommendations to direct the active management of the cultural landscape. This study provides the documentation needed to return portions of the Garden Key cultural landscape to a more historically accurate appearance.

## Historical Summary

There are no recorded prehistoric sites in the Dry Tortugas, and aboriginal occupation or use of the islands is not documented in historical records. The scarcity of readily available fresh water would likely have been a limiting factor, impeding extensive or long-term habitation. The possibility, however, that prehistoric or early historic period activity did occur may be borne out through further ethnographic research and, perhaps, controlled archeological surveys, although

previous ground disturbance, from both human activities and natural events, has likely obliterated or obscured land-based prehistoric remains that may have existed.<sup>1</sup>

Site work and the earliest phases of fort construction at Garden Key began in 1846. The fortification was designed and its construction supervised by General Joseph G. Totten, Chief of the U. S. Army Corps of Engineers, who was known for his expertise in the construction of masonry fortifications and specifically his highly refined casemate plan. Totten's casemate design allowed the guns inside them to track to either side and included smaller embrasures in the casemate walls through which the guns fired. To minimize the risk of a penetrating attack while a gun was being reloaded, he designed heavy iron shutters that rebounded to the closed position upon firing.

From the initial phases of construction through the 1870s, construction of Fort Jefferson was hampered by difficulties in procuring labor and materials. Although provided for through the annual Fortifications Bill, funding for construction was inconsistent. Also contributing to the slow pace was the threat of yellow fever, hurricanes, and the debilitating effects of the tropical sun.<sup>2</sup>

During the Civil War, Fort Jefferson served as a base for the Union Navy's blockading forces as well as a place of incarceration for military convicts and political prisoners. In the mid-1860s, with the walls of the fort essentially complete, work was suspended on the second tier casemates due to concern about subsidence. Work then concentrated on completing the parade ground structures and increasing the fort's armament.

The modernization of the fort's weaponry during the 1872-73 construction season included reinforcing the traverse magazines and adding wooden galleries, as well as infilling the terreplein with sand, which allowed six 15-inch Rodmans to be mounted. At the bastions, it was necessary to remove one smaller gun emplacement to each side of the bastion to mount the big guns. On Fronts

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- 1 *General Management Plan Amendment Dry Tortugas National Park* (Atlanta, GA: Southeast Regional Office, 2001), 118.
  - 2 Lord-Aeck-Sargent (LAS), *Historic Structure Report Amendment* (Atlanta, GA: National Park Service, 2006), 13.

5 (historic Front 1), 6 (historic Front 2), and 1 (historic Front 3), four 10-inch Parrotts replaced smaller guns. In 1876, an iron lighthouse at Bastion 6 replaced the original lighthouse on the parade ground, damaged by a series of hurricanes.

After nearly thirty years of construction, Fort Jefferson remained unfinished and never fully garrisoned. Nonetheless, the fort's design discouraged attack, marking its success as a component of the coastal defense network. Lacking the available labor a permanent garrison could provide limited maintenance activities, and those elements of the structure susceptible to decay in the harsh marine conditions began to deteriorate.

Over the years of Fort Jefferson's construction, the Engineer Department drew on three primary sources of labor: slaves from Key West, white contract labor, and military prisoners. As work on the fort progressed, many Key Westers purchased slaves to realize income from their labor. Fort Jefferson's use as a military prison, however, would eventually supply the largest workforce. Fort Jefferson's most famous prisoners were the four Lincoln conspirators, including Dr. Samuel A. Mudd.

In 1888, Garden, Bird, and Loggerhead keys were set aside as the site of a national quarantine station, under the jurisdiction of the Treasury Department. The Navy began construction of a coaling station on Garden Key in August 1898, which included extensive dredging of the harbor. Construction was intermittent between 1898 and 1901 due to the continuing operation of the quarantine station and the fort's occupation during the Spanish-American War. The transfer of the Dry Tortugas military reservation to the Navy occurred on April 7, 1900. The Dry Tortugas Coal Depot was turned over to the Navy for operation on July 11, 1901. They established an early naval wireless radio station in 1904.

Following a devastating hurricane in 1910, the Navy decided not to rehabilitate the coal depot and to transfer what could be salvaged to the Key West Naval Station. Fire struck Fort Jefferson on January 12, 1912, and destroyed the enlisted men's quarters and lightkeeper's dwelling and outbuildings. After the fire, an automatic light at Garden Key replaced the resident lightkeeper.

After the onset of World War I in 1916, the wireless radio station at Fort Jefferson was rehabilitated and a seaplane base established in 1917. The role it played as a seaplane base was very brief, and after 1918, Fort Jefferson was abandoned. Fire struck again in 1927 when the officers' quarters burned.

On January 4, 1935, President Franklin D. Roosevelt proclaimed the Dry Tortugas a National Monument. Funding for work at Fort Jefferson over the next few years came primarily from the Emergency Relief Administration (ERA) and the Works Progress Administration (WPA) programs. The 1938 Master Plan recommended that Fort Jefferson be preserved as a ruin, with no attempt being made at restoration. All visitor accommodations were to be placed so that no modern intrusions would degrade the historic scene. After the United States' entry into World War II in 1941, New Deal funding was shifted to the war effort, and Fort Jefferson had only two employees.

In January 1956, NPS Director Conrad Wirth outlined Mission 66, a ten-year park development program aimed at upgrading the conditions and meeting the demands of the postwar era. Although most Mission 66 projects at other parks focused on new construction, efforts at Fort Jefferson were directed at doing something about the rapid deterioration of the fort and the need for concessionaire planning. A 1957 planning conference concluded that protection of Fort Jefferson was the primary consideration, with any new development in harmony with the fort. Another recommendation was the demolition of the ruins of both quarters buildings to their foundations, which occurred in April 1962.

Over the next few years, resolution of two issues could not be agreed upon—the location of staff quarters within the fort and how to handle overnight visitor accommodations. In 1964, NPS officials finally concluded that there would be no overnight visitor facilities at Fort Jefferson, with the exception of limited camping. A new master plan was approved in 1967. It called for new employee quarters to be located in the casemates (replacing the previously built casemate quarters); a concessionaire-owned and operated vessel to provide overnight accommodations, meal services, etc.; a new dock to serve both visitors and NPS

needs; a seaplane ramp; and limited picnicking and camping sites.

As NPS officials considered how best to accommodate visitors and staff, the condition of the fort continued to deteriorate. The selected and approved treatment of Fort Jefferson, as described in the 1983 General Management Plan (GMP), was stabilization of structurally critical areas throughout the fort (all scarp walls, bastions, outer works, the shot furnace, magazines, etc.) and selective interpretive restoration of certain limited elements.

In 1992, President H. W. Bush signed legislation establishing Dry Tortugas National Park, replacing Fort Jefferson National Monument. In addition to the fort, the legislation recognized the unique marine natural and submerged cultural resources of the park.

In 1998, a condition assessment of the fort revealed a variety of serious problems and the park embarked on a multi-phased, multi-year preservation project. Among the worst of the problems was expanding, corroding iron embrasures that were destroying the masonry structure in which they were embedded, and the decision was made that the iron embrasures had to be completely removed. Because this was an adverse, albeit unavoidable, effect on the historic resource and because of other ongoing concerns about the fort's treatment, the park and the Florida State Historic Preservation Office entered into a Memorandum of Agreement in 2003 to guide the fort's stabilization. After an exhaustive investigation of the fort's physical condition, including documentation of treatment of the fort since 1983, an amendment to the historic structure report was completed in 2006. Phase I of the project was to carefully remove the existing brick surrounding the embrasure openings on the lower level in order to gain access to the original iron elements, with bricks being cleaned and set aside for reuse.

In 2008, the park began Phase II of this project at a cost of \$5.8 million. This phase consists of the repair of the exterior scarp wall in the following areas: the north and east faces of Bastion 3 (historic Bastion F), Front 4 (historic Front 6) and the west and northwest faces of Bastion 4 (historic Bastion A); Bastion 5 (historic Bastion B), Front 6 (historic Front 2); and the northeast and east faces of

Bastion 6 (historic Bastion C). The work includes the selective demolition of masonry to remove all original iron elements, the installation of new non-corrosive glass fiber reinforced concrete armor blocks and lintel facsimiles, and the associated repair and repointing of the masonry on the scarp wall. Additionally, the entire parapet in the area of work described above will be repaired and stabilized with selective brick replacement and repointing. Concrete made with local sand and coral—just as used in the original construction—and historic bricks salvaged during demolition blended with new replacement brick are being used to preserve the historic appearance of the walls.

## Study Boundary

Fort Jefferson is located on Garden Key in Dry Tortugas National Park (DRTO). The Dry Tortugas are recognized for their significant natural resources, including sea-grass beds, fisheries, and sea turtle and bird nesting habitat. In addition, the tropical coral reef of the Tortugas is one of the best developed on the continent and possesses a full range of Caribbean coral species, some of which are rare elsewhere.

The larger setting is the Florida Keys, composed of 1,700 keys, all of which are located in Monroe County, Florida. Dry Tortugas National Park is the westernmost part of the Florida Keys. Its 100-square-mile boundary (64,701 acres) includes seven waterless keys, the largest of which is Loggerhead Key. The Tortugas keys are composed of coral bedrock and sand and the surrounding shoals and water. Totaling 104 acres, the islands in the park are situated on the edge of the main shipping channel between the Gulf of Mexico, the western Caribbean, and the Atlantic Ocean.<sup>3</sup>

Garden Key covers approximately twenty acres and is the second largest key of the isolated islands.<sup>4</sup> Fort Jefferson spans almost the entirety of the key, enclosing the historic core and parade ground within the fort walls. The remainder of the island stretches along the east shore between the north and south ends of the fort. The U.S. Army chose

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3 General Management Plan Amendment, iii.

4 GIS data that includes both coaling docks, the main dock, and finger piers. Personal communication Chris Ziegler.

Garden Key as the site of Fort Jefferson for its strategic location and deep harbor, despite the lack of fresh water on the island. During the nineteenth century, the fort protected the Straits of Florida, a vital shipping lane between the Gulf of Mexico and the Atlantic Ocean.

The Fort Jefferson National Register historic district overlays all of Garden Key and the surrounding coral reef. The boundary points form a large rectangle covering 47,000 acres, referenced by latitude and longitude. Garden Key and the entirety of Dry Tortugas National Park were also included in the UNESCO Biosphere Reserve in 1976, covering south Florida and Everglades National Park.<sup>5</sup> The establishment of a Research Natural Area (RNA) in the Dry Tortugas occurred on January 19, 2007. The RNA is a 46-square-mile, no-take, no-anchor ecological preserve that provides a sanctuary for species affected by fishing and loss of habitat.

This cultural landscape report is limited to a study of Garden Key's cultural landscape, focusing on the historic parade ground and the exterior spaces of Garden Key. (Location maps here)

## Project Methodology

The Southeast Regional Office (SERO) cultural landscapes group completed the study. SERO staff performed archival research, prepared the site history, documented existing conditions, and prepared comparative analyses, integrity evaluations, and treatment recommendations. The site history, existing conditions, and analysis and evaluation sections identify the historical values associated with the landscape, document extant landscape characteristics and features, and define the significance and integrity of the landscape. Treatment recommendations enable the park to better manage its cultural landscape.

Archival research was conducted during two site visits, one in July 2007 and one in December 2008 at the South Florida Collections Management

Center at Everglades National Park. Existing conditions documentation was undertaken during three site visits— one in November 2007, one in December 2008, and one in February 2010—at Garden Key in the Dry Tortugas. During these site visits, SERO staff met with key park staff to discuss management issues and treatment concerns regarding the cultural landscape, ground truthed and annotated base maps, and completed digital photography as part of the existing conditions survey.

SERO staff completed comparative analyses and integrity evaluations by comparing historical information—taken from the written site history and historic maps and photographs—to existing conditions data in order to understand how the landscape changed over time. The landscape characteristics and associated features, values, and associations that make a landscape historically significant were identified. Integrity evaluations used the seven aspects of historic integrity as described in *A Guide to Cultural Landscape Reports* and standards set by the National Register of Historic Places.

Appropriate treatment recommendations were developed from the condition assessments and the results of the comparative analyses and integrity evaluations. Recommendations responded to existing issues and offered suggestions that would preserve and enhance the park's historic landscape character, as well as improve interpretation efforts.

The best documentation and evaluation of the landscape features is the cultural landscape inventory (CLI) completed in 2005. Other valuable resources include the 2008 ground penetrating radar study of the Fort Jefferson parade ground prepared by the Southeast Archeological Center (SEAC) and the 2006 historic structure amendment report (HSR-A) prepared by Lord-Aeck-Sargent (LAS).

Other park planning documents consulted include the historical data section from Ed Bearss' historic structure report; the architectural data section from Louis Anderson's historic structure report; and Albert Manucy's construction history of Fort Jefferson. Several other reports prepared for the stabilization of Fort Jefferson were also consulted. Additional archival research for the CLR was

5 UNESCO is an acronym for the United Nations Educational, Scientific and Cultural Organization. Reserves are set aside as vehicles for knowledge-sharing, research and monitoring, education and training, and participatory decision-making. (UNESCO website <http://www.unesco.org/mab/>)

undertaken at the park's archives at the South Florida Collections Management Center.

In addition to park planning documents, Thomas Reid's *America's Fortress: A History of Fort Jefferson, Dry Tortugas, Florida*, Rodman Bethel's *A Slumbering Giant of the Past: Fort Jefferson, U.S.A. in the Dry Tortugas*, and Albert Manucy's *Pages From the Past: A Pictorial History of Fort Jefferson* provided valuable information about the landscape of Garden Key during the period of significance.

## Summary of Findings

The centerpiece of the historic landscape at Garden Key is Fort Jefferson, part of the nation's Third System of forts, designed and constructed by the United States Army Corps of Engineers. Fort Jefferson represents the high point of nineteenth-century masonry fort design with its two tiers of arched casements on all six seaward fronts, concentrated armament, and separate magazine and hot shot furnaces on the parade ground. The magnitude of its engineering and construction, its lack of Endicott infill, and its remote location set it apart among resources in the National Park system.

The arrangement of buildings within the fort created a central area for parade dress, soldier recreation, and military drills. The parade ground was laid out in accordance with military cultural values and traditions expressed in the landscape as a ranking hierarchy in building placement, landscape treatment, and uniform architectural styles. Hierarchy was expressed through the placement of the structure with the highest ranking officers claiming the most prestigious spot. The permanent buildings within Fort Jefferson lined the perimeter of this space, and historically a small garden, whose soil was amended with fill material, occupied the center. Major buildings were supplemented by specialized outbuildings pushed to the edge of the parade ground to maximize open space. The spatial pattern resulted in a ring of buildings connected by axial walkways and paths. On the exterior of the fort, temporary support buildings were clustered around the wharf.

Coconut palms and buttonwoods were historically significant to the landscape, repeatedly mentioned in early descriptions of the site. The introduction of exotic species increased when the fort was

garrisoned in 1861 and continued throughout the historic period. Most of our understanding of the vegetation during the years the fort was garrisoned comes from photographs and journal accounts. Lush vegetation planted around the buildings provided shade and relived the monotony of the dry, sandy key.

## Period of Significance

The period of significance for Fort Jefferson spans thirty years (1846-1876), beginning with its construction in 1846. Hurricanes and yellow fever, coupled with advances in weaponry that made the fort obsolete as a defensive work long before construction was stopped, led to abandonment by the Army in 1874. Major construction activities ceased, leaving the fort unfinished. In 1876, the last major improvement under the Army's watch occurred when the Lighthouse Board put up the cast-iron lighthouse at Bastion 6.

After 1876, Fort Jefferson was set aside as a quarantine station, briefly reoccupied by the Army during the Spanish-American War, and used as a Navy coaling station, for which the Navy built coal sheds and docks that survive only as foundation ruins. Under National Register guidelines, historic properties must possess integrity for all periods of significance. The resources at Fort Jefferson from the period after 1876 lack integrity and do not contribute to the fort's historical or architectural significance.

## Integrity

The cultural landscape at Garden Key retains integrity of location, feeling, and association, but integrity of setting, design, materials, and workmanship has been compromised.

Fort Jefferson remains the centerpiece of the Garden Key cultural landscape. Its preservation is threatened by the deteriorative effects of time, the harsh marine environment, and specifically the corrosion and expansion of original iron elements embedded within the fort's masonry structure. As a result, there has been significant loss of historic fabric. An ongoing program of stabilization is addressing the problem, but replacement mortars used in post-1983 repairs are not compatible with original mortars and brick selection has not been

consistent, resulting in adverse visual and material compatibility issues.

Although lacking all but the foundations, the ruins of the officers' quarters and the enlisted men's quarters on the parade ground demarcate the spatial order of military buildings around a central, open space. The loss of buttonwoods on either side of the main path and coconut palms that were planted near the officers' quarters and small powder magazine is the most significant change in historic vegetation. It is unclear if any of the oldest buttonwoods that survive on the parade ground date from the period of significance or were planted to replace trees that were damaged in hurricanes or that simply died. A small, enclosed garden area located near the center of the parade has also been lost along with the pathways across the parade.

On the fort's exterior, the only remaining nineteenth-century feature is the location of the wharf. Other construction-era work spaces and temporary frame buildings have been lost and replaced with modern visitor use and service facilities and utilities. The addition of communications equipment and a radio antenna along Front 1 detracts from the viewshed when approaching Fort Jefferson.

A ground-penetrating-radar (GPR) study conducted in 2006 identified the location of walkways throughout the parade, a large rectangular surface that may have been associated with gardens or livestock pens, and foundation remains possibly associated with the storehouse, carpenter's shop, limehouse, blacksmith shop, and original lighthouse. Large areas of the parade ground, however, had degraded subsurface integrity related to modern intrusions. Numerous utility pipes, cables, buried tanks, and leach fields were encountered on the western half of the parade ground facing NPS residential and maintenance areas, making it unlikely that any significant remains of intact archeological features survive in this area. Based on the GPR recommendations, two archeological management zones have been established. Future ground disturbance will be limited to the low archeological intensity zone.

## Treatment

The overarching treatment associated with the historic landscape is preservation. Restoration has been applied to selected features, primarily the restoration of historic vegetation, the central garden space, pathways on the parade ground, and cannon and gun mounts on the terreplein.



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# Site History

## Prehistoric Occupation of the Dry Tortugas

There are no recorded prehistoric sites in the Dry Tortugas, and aboriginal occupation or use of the islands is not documented in historical records. The scarcity of readily available fresh water would likely have been a limiting factor, impeding extensive or long-term habitation. The possibility, however, that prehistoric or early historic period activity did occur may be borne out through further ethnographic research and, perhaps, controlled archeological surveys. However, previous ground disturbances, both from human activities and natural events, have likely obliterated or obscured any land-based prehistoric remains that may have existed.

Despite the lack of terrestrial discoveries, many archeologists consider it reasonable to assume that submerged prehistoric artifacts and sites are present in the area. Paleo-Indian hunters and gatherers, for example, are known to have been in south Florida approximately 10,000 to 12,000 years before the present (B.P.). Sea levels at the beginning of that period were considerably lower (by 60 to 100 meters), and the region encompassing the Tortugas was then connected to the mainland peninsula by dry limestone uplands of the Florida continental shelf. Access to the Tortugas would therefore have been possible for these early nomadic peoples.

At the beginning of the Archaic cultural period (c. 8,500 B.P.) seawaters had risen to within 25 meters of the current coastline. Archaic period people took advantage of the increased biological diversity that accompanied the period's warmer and wetter climate. They relied on an abundance of shellfish and other coastal resources, and supplemented fishing with intensive hunting and plant gathering. Populations increased significantly, and village communities were in existence by 7,000 B.P. in south Florida. They also used watercraft to travel

between regional islands and mainland areas for cultural exchange and subsistence purposes.<sup>1</sup>

Protected bay and cove prehistoric sites have been found at Buck Island Reef National Monument and Salt River Bay National Historical Park and Ecological Preserve in the Virgin Islands. It is likely that prehistoric peoples visited the Dry Tortugas, given the islands' proximity to areas known to have been occupied or utilized, yet it is quite possible that visitors or inhabitants left little or no readily identifiable archeological evidence. It is also possible that traces were left but have long since been obliterated or are simply undetectable by traditional survey approaches.<sup>2</sup>

## Early History of Garden Key, 1513-1825

The Spanish explorer Juan Ponce de León visited the coral keys at the western end of the Florida Reef in 1513 and named them "las Tortugas"—the Turtles—for their abundance of sea turtles. Because there is no fresh water on the islands, the name was later changed to the Dry Tortugas. Ponce de León earlier landed on the east coast of Florida and named it *La Pascua Florida*, or "Flowery Easter." He returned to Florida with equipment and settlers to start a colony in 1521, but they were driven off by repeated attacks from the native population. In 1565, Pedro Menéndez de Avilés founded St. Augustine, beginning the first period of Spanish rule of the colony of Florida.

An early description of the Dry Tortugas comes from Hernando d'Escalante Fontaneda, who was shipwrecked in the Florida Keys around 1545 and lived with keys Indians for seventeen years. In his memoir, he states:

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- 1 *General Management Plan Amendment Dry Tortugas National Park* (Atlanta: Southeast Regional Office, 2001), 118.
  - 2 Larry E. Murphy, ed., *Dry Tortugas National Park Submerged Cultural Resources Assessment* (Santa Fe, NM: Southwest Cultural Resources Center, 1993), 63.

To the west of these islands is a great channel, which no pilot dares go through with a large vessel; because, as I have said, of some islands that are on the opposite side towards the west, which are without trees, and formed of sand. At some time they have been the foundations of cays [keys], and must have been eaten away by the currents of the sea, which have left them thus bare, plain sand.

They are seven leagues in circumference, and are called the Islands of the Tortugas; for turtle are there, and many come at night to lay their eggs in the sand.<sup>3</sup>

In 1565, John Hawkins, chief architect of the Elizabethan navy and widely acknowledged to be a pioneer of the English slave trade, replenished his provisions at the Tortugas. In 1566, Pedro Menéndez de Avilés explored the Tortugas and other keys, but this area was known to be a haven

for pirates. Over the next two hundred years, the Tortugas remained a distant outpost, mainly visited by privateers and other unsavory types.

The Spanish controlled the colony of Florida until 1763. In treaty negotiations concluding the Seven Years War in 1763, Spain ceded the colony of Florida to Britain. The British reorganized this territory into the provinces of East Florida, which consisted of most of the present-day state of Florida, and West Florida, bounded by the Mississippi River and Lake Pontchartrain on the west, by the 31<sup>st</sup> parallel on the north, and the Apalachicola River on the east.<sup>4</sup>

During the Revolutionary War, the Spanish, then allied with the French (who were actively at war with Britain), took advantage of the distraction and recaptured portions of West Florida, including

3 Jerry Wilkinson, "Fontaneda's Memoir," <http://www.keyshistory.org/Fontaneda.html>.

4 Wikipedia contributors, "History of Florida," *Wikipedia, The Free Encyclopedia*, [http://en.wikipedia.org/w/index.php?title=History\\_of\\_Florida&oldid=234626323](http://en.wikipedia.org/w/index.php?title=History_of_Florida&oldid=234626323).

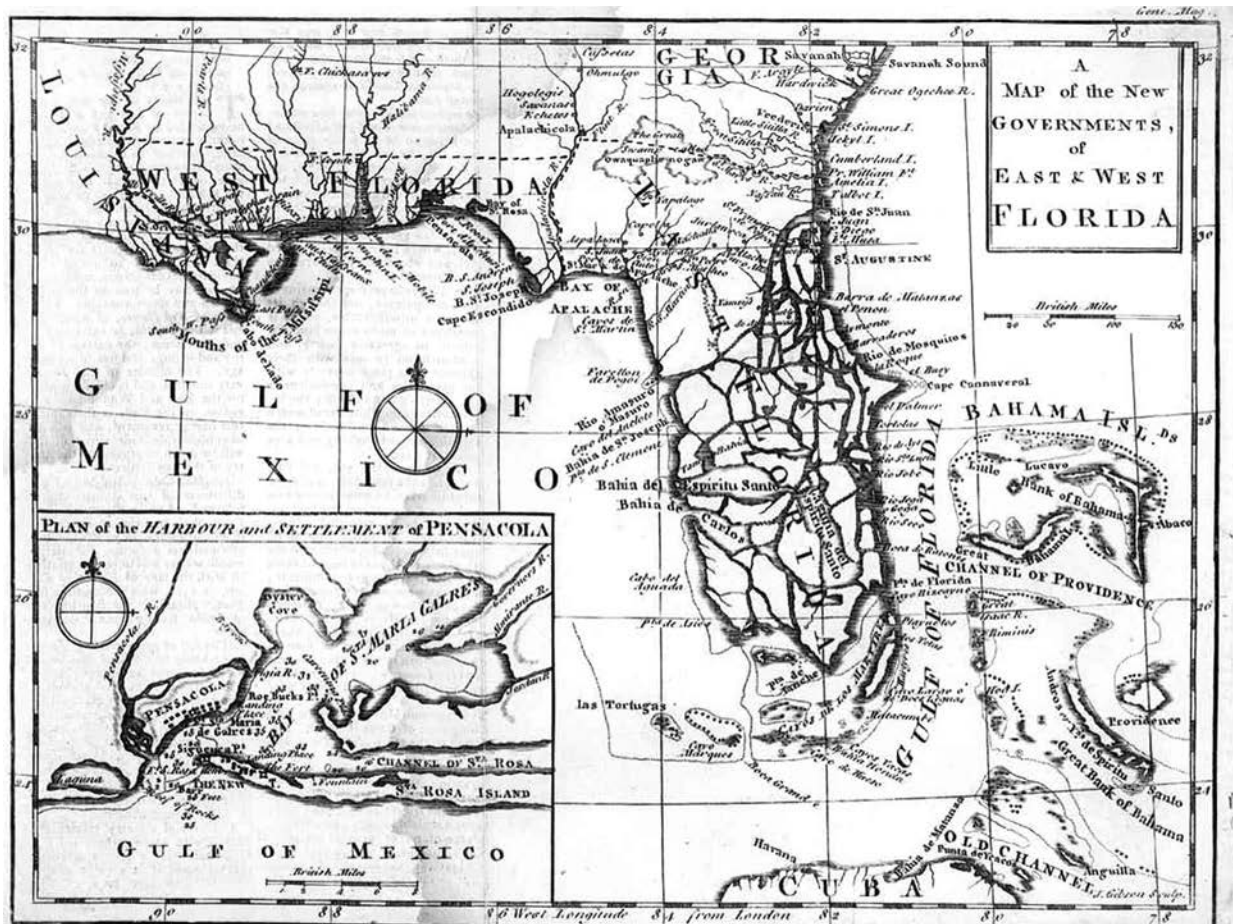


Figure 2. Map of East and West Florida, 1760. (Courtesy Hargrett Rare Book and Manuscript Library/University of Georgia Libraries)

Pensacola. The Treaty of Paris, signed in 1784, ended the Revolutionary War and returned all of Florida to Spanish control. In 1815, the Spanish government awarded Key West to Juan Pablo Salas for meritorious service.

The United States acquired the colony of Florida from Spain under the terms of the Adams-Onís Treaty, signed in 1819. In return, the United States renounced all claims to Texas. The United States took control of Florida in 1821. At this time, John Simonton purchased Key West from Juan Pablo Salas.<sup>5</sup>

Continued problems with pirates in the Caribbean finally forced the United States to take action. In 1822, Commodore David Porter accepted a command to suppress piracy in the West Indies and restore order to American and Caribbean waters. Porter arrived at Key West in 1823 with his “Mosquito Fleet” of small, shallow-drafted vessels that were more easily able to maneuver the shallow reefs of the Florida Keys. Over the next two years, Porter’s fleet virtually eliminated pirates in the Caribbean, the Bahamas, and the Gulf of Mexico.

Commodore Porter explored the Dry Tortugas in December 1824 and January 1825. He was looking for a site for a naval station, but he reported that the Tortugas were unfit for any kind of naval establishment: “they have a good inner harbour for small craft and a tolerable outer one for ships of war; but they have no fresh water, and furnish scarcely enough land to place a fortification and it is doubtful if they have solidity enough to bear one.” With pirates eliminated from the Dry Tortugas, however, the need for a lighthouse to warn ships away from the dangerous shoals and reefs of the most westerly of the Florida Keys resulted in the construction of a lighthouse on Garden Key in 1826.<sup>6</sup>

## Strategic Importance of the Dry Tortugas, 1829-1844

Shoreline defense was fragmented and weak when the British burned the nation’s capital during the War of 1812. At the time, coastal defenses were composed of a haphazard assortment of batteries and outposts, the so-called Second System of fortifications. In response to lessons learned in the War of 1812, a new coastal defense system was designed, meant to provide a comprehensive program of coastal defense with advanced armaments. Called the Third System, it was an attempt to protect critical United States shorelines.

In 1816, Congress appropriated over \$800,000 for the Third System, the most ambitious American fortification construction program to date. Begun under peaceful conditions, the works were built more methodically and were permanent in nature. President James Madison appointed a Board of Engineers for Seacoast Fortifications, which visited potential sites and prepared plans for the new works. Its first report in 1821 suggested a chain of forts from Maine to Texas, and Dry Tortugas was the logical spot for the bottom link in the chain.<sup>7</sup>

The strategic importance of the Dry Tortugas as the key to the Gulf of Mexico was linked to concerns about protecting ships carrying commerce from the growing Mississippi Valley, which sailed the Gulf to reach the Atlantic. Ships had to pass through a narrow channel known as the Straits of Florida, bounded on the south by Cuba. Enemy seizure of the Dry Tortugas would cut off this vital traffic, and naval tactics from this strategic base could also be effective even against a superior force. In addition, Britain was developing her West Indies possessions, there was trouble in Cuba, and the new republic of Texas seemed ready to form an alliance with France or Britain. The United States needed good harbors that would afford a point of refuge for both naval and cargo ships near the entrance to both the Gulf and the Caribbean.

Commodore John Rodgers and a team of engineers visited the Gulf Coast in May 1829. They were sent to examine the Pensacola Navy Yard and select a site for a naval hospital and other facilities. On

5 Wikipedia contributors, “Spanish Florida,” *Wikipedia, The Free Encyclopedia*, [http://en.wikipedia.org/w/index.php?title=Spanish\\_Florida&oldid=233632414](http://en.wikipedia.org/w/index.php?title=Spanish_Florida&oldid=233632414).  
6 Edwin C. Bearss, *Historic Structure Report Historical Data Section Fort Jefferson: 1846-1898* (Denver: Denver Service Center, 1983), 3; Thomas Reid, *America’s Fortress: A History of Fort Jefferson, Dry Tortugas, Florida* (Gainesville, FL.: University Press of Florida, 2006), 12.

7 Coast Defense Study Group, “United States Seacoast Defense Construction 1781-1948: a Brief History,” <http://www.cdsg.org/cdsghis2.htm>.

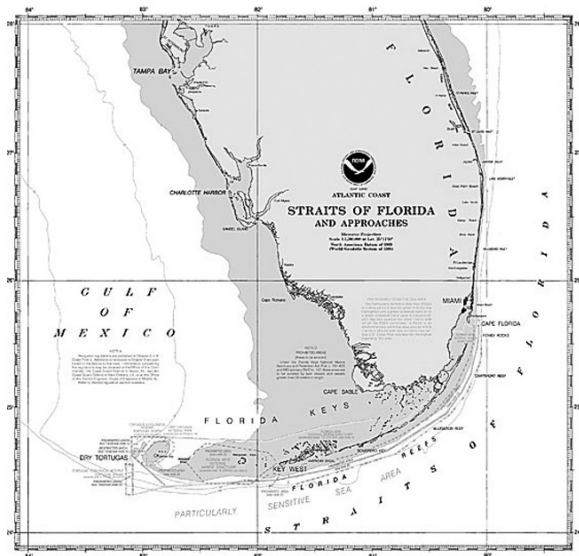


Figure 3. The Straits of Florida, 1908. (Courtesy of NOAA)

his return to Washington, Commodore Rodgers stopped at Dry Tortugas to examine the anchorage, which combined a sufficient depth of water for ships-of-the-line with a narrow entrance of not more than 120 yards. He found the geographic location ideal, stating that no other site presented the “same facilities in communicating” with ports in Cuba and the Mexican Gulf coast. The disadvantages were no fresh water or firewood.<sup>8</sup>

In 1829, Lieutenant Josiah Tattnall completed a detailed survey of the Dry Tortugas. In reporting his findings, he wrote:

A naval force, designed to control the navigation of the Gulf, could desire no better position than Key West or the Tortugas. Upon the very wayside of the only path through the Gulf, it is, at the same time, well situated as to all the great ports therein. It overlooks Havana, Pensacola, Mobile, the mouths of the Mississippi, and both the inlet and the outlet of the Gulf.

The Tortugas harbors afford shelter for vessels of every class, with the greatest facility of ingress and egress. And there can be no doubt that an adversary, in possession of large naval

8 “Fort Jefferson National Monument Site Bulletin” (Washington, D.C.: National Park Service, 1965, photocopy); Antonia Gerli, “Historic Landscape Report,” 1991, 7, South Florida Collections Management Center, Everglades National Park; Bearss, 4-9.

means, would, with great advantage, make these harbors his habitual resort, and his point of general rendezvous and concentration for all operations of this sea. With an enemy thus posted, the navigation of the Gulf by us would be imminently hazardous, if not impossible; and nothing but absolute naval superiority would avail anything against him. Mere military means could approach no nearer than the nearest shore of the continent.

It is believed that there are no harbors in the Gulf at all comparable with these, that an enemy could resort to with his larger vessels. . . . By occupying two (or at most three) small islands, the harbors of the Dry Tortugas may be thoroughly protected.

Nothing was done at this time to establish a naval base at the Dry Tortugas. The focus eventually shifted from the Navy to the War Department in an effort to fortify the Florida Reef.

In 1844, Secretary of War James M. Porter asked Chief Engineer Joseph G. Totten of the Corps of Engineers and Quartermaster General Thomas S. Jesup to submit position papers relative to the protection of the Florida Reef. Both men agreed that such fortifications were needed to command the Straits of Florida entrance into the Gulf of Mexico. After reviewing these documents, Congress appropriated \$50,000 and preparatory surveys were ordered.

Colonel Totten charged Captain John G. Barnard with making a detailed reconnaissance of Key West and the Dry Tortugas. Barnard concluded that the Tortugas and Key West were strategic necessities that must be fortified. He proposed a series of seven batteries on the sand keys. After receiving Barnard’s report, Totten convened a four-man board to prepare a plan for the defense of the Florida Reef. They decided on Garden Key as the location for a “bombproof caserne arranged in bastioned fronts along the water’s edge and embracing in their total length about 2,000 feet with cisterns under them and a parapet and terreplein over them.”<sup>9</sup>

9 Albert Manucy, *A Handbook for Fort Jefferson History* (St. Augustine, FL.: National Park Service, 1942), 23-24; Bearss, 10-22.



Figure 4. General Joseph G. Totten (Courtesy of old-picture.com)

## The Building of Fort Jefferson, 1846-1876

### Horatio G. Wright Command, 1846-1856

Major Hartman Bache and several others from the Corps of Engineers began a topographical survey of Garden and Bird keys in 1845, which they completed early in 1846. They found the lighthouse keeper and his family living there, as well as a group of unsavory salvage crews. The engineers' survey included borings of the coral sand subsoil, which they examined in order to determine the island's load-bearing capacity.<sup>10</sup>

After gaining statehood in 1845, Florida ceded jurisdiction of the Dry Tortugas to the United States. President James K. Polk's executive order of September 17, 1845, made the Dry Tortugas a military reservation. In May 1846, Chief Engineer Totten assigned Captain William D. Fraser as the Superintending Engineer for the construction of the work on Garden Key. Part of the \$200,000 appropriated by Congress in 1846 was being used to construct a fortification at Key West, but the remainder would be "devoted to



Figure 5. Colton's Florida, 1855 (Courtesy Special Collections Department, University of South Florida)

the commencement of a still larger and more important work on Garden Key."

The fortification was designed and its construction supervised by General Joseph G. Totten. Lieutenant Montgomery C. Meigs prepared drawings for the fort, a hexagonal casemated structure with two sides shortened to conform to the shape of Garden Key. The two short walls measured 325 feet and the remaining four walls measured 477 feet. Chief of Engineers Totten's casemate design allowed the guns inside them to track to either side and included smaller embrasures (gun ports) in the casemate walls through which the guns fired. To minimize the risk of a penetrating attack while a gun was being reloaded, he designed heavy iron shutters that rebounded to the closed position after the guns were fired. Two tiers of casemates would be protected using the iron-framed embrasures. Additional guns would be mounted on the terreplein. At each corner of the fort there was a bastion containing gunrooms, magazines, and a circular granite staircase.

The United States declared war on Mexico on May 13, 1846, and Captain Fraser was ultimately assigned to join the invasion force of Brigadier General John Wool in San Antonio, Texas. Lieutenant Horatio G. Wright replaced Fraser and took command of the Garden Key project, arriving at Dry Tortugas in December 1846. One of his first tasks was to determine the effect of an October hurricane on Garden Key. The lighthouse keeper reported that one of the wharves had been wrecked, several small buildings flattened, and all vessels in the harbor damaged. Although parts of

<sup>10</sup> Reid, 13.

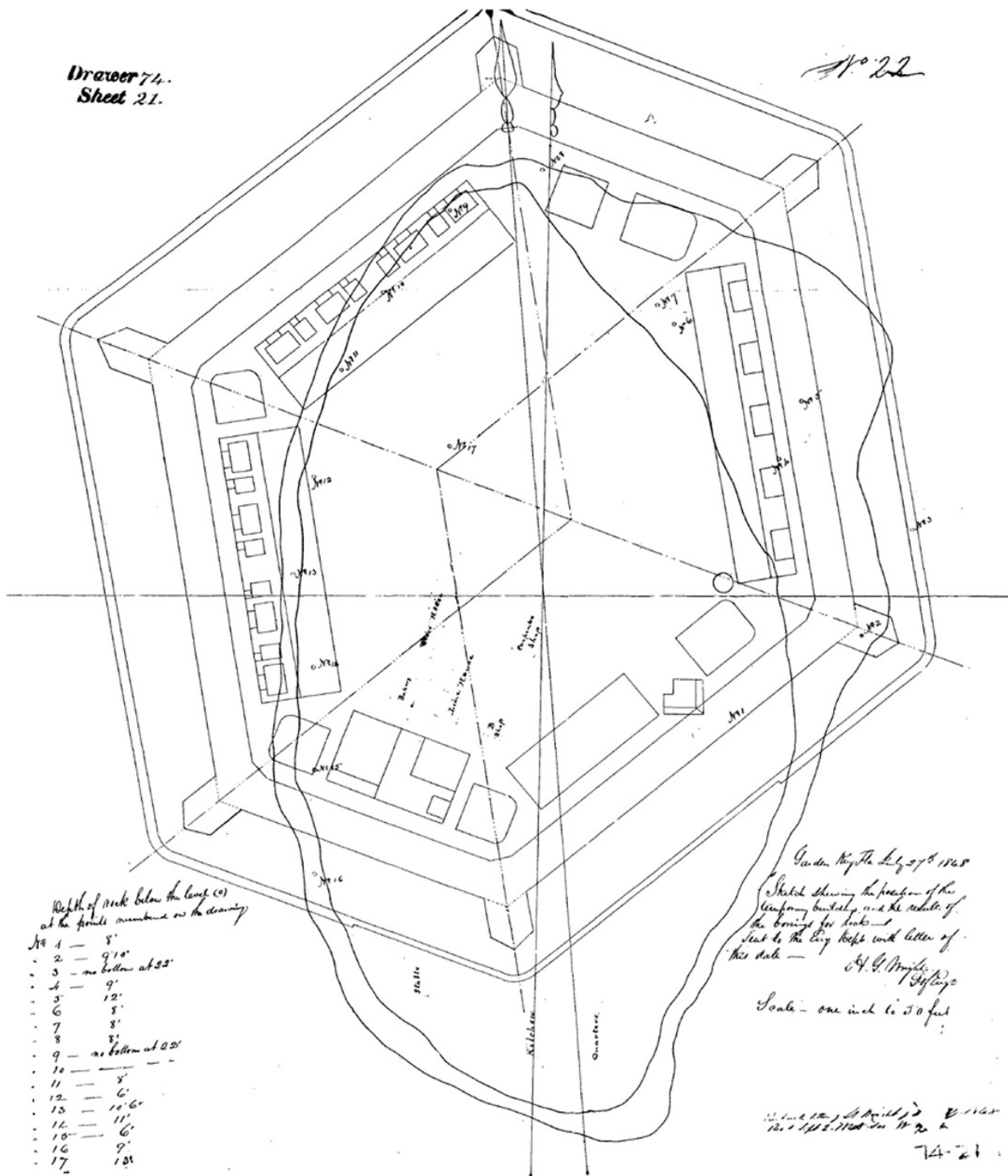


Figure 6. Construction drawing Fort Jefferson, 1848. (National Archives, Record Group 77, Drawer 74, Sheet 21) make all drawings full or half-page

the shore had been altered, Wright did not believe it would make construction of the fort more difficult.

The Engineer Department contracted with the firm of Norton and Parker to erect several temporary buildings that would be needed during the construction process. Since Garden Key was devoid of any kind of building supplies or fresh water, the structures were to be prefabricated and reassembled on site. When Norton and Parker went bankrupt in early 1847, the Army awarded Andrew B. Vennard the contract to complete the buildings by July. Vennard was unable to meet the original schedule due to mismanagement and the primitive working conditions on Garden Key. The eight temporary buildings were finally completed during the fall, after the end of the 1847 fiscal year on September 30.<sup>11</sup>

By October 1847, Lieutenant Wright felt that a sufficient number of mechanics and laborers were on site to start construction of the permanent buildings. A section of the officers' quarters and three detached kitchens were begun. By the spring of 1848, the three kitchens had been completed and the walls of the officers' quarters raised and the building roofed. Congress did not appropriate any additional funds for Fiscal Year 1848, as the war with Mexico was seen as a higher priority.

In February 1848, the Treaty of Guadalupe Hidalgo ended hostilities with Mexico. Congress appropriated \$25,000 for the Garden Key project for Fiscal Year 1849, and Lieutenant Wright proposed using it to complete the officers' quarters and begin construction of the counterscarp. Funding for Fiscal Year 1850 and 1851 was \$50,000, which was used to continue construction of the counterscarp and to begin raising the scarp front. Wright estimated that an additional \$1.2 million would be needed to complete the fort, not including the buildings on the parade.

In 1850, the fort was officially named Fort Jefferson in honor of the third president. Over the next few years, construction at Fort Jefferson was slowed and even suspended due to lack of funds. Congress failed to appropriate any money for Fort Jefferson for Fiscal Year 1852, and the project was closed down for more than a year, beginning in May

1852. Congress finally appropriated \$100,000 for Fiscal Year 1854 and \$50,000 for Fiscal Year 1855. Lieutenant Wright proposed using all available money to raise the remainder of the scarp wall to water level, excepting a small sum for repair of the wharf. By December 30, 1854, masons were on site and materials were finally arriving in a timely manner, enabling Lieutenant Wright to accomplish his goals for the fort. Workers completed two large concrete cisterns, made considerable progress on the casemate cisterns, and began work on the sewer system.

Fiscal Year 1856 brought a large increase in appropriations for Fort Jefferson. A crisis in relations with Spain, brought about by William Walker's filibustering activities in Nicaragua and southern expansionists' interests in Cuba, led to an increase of \$150,000 for Fort Jefferson. General Totten advised his superintending engineers that all forts should be in condition to defend against attack. On May 1, 1855, Lieutenant Wright reported that the portion of Fort Jefferson "below water" was essentially complete and the construction on the first tier had begun. He felt that after serving over eight years at Fort Jefferson, he should be given a new assignment. The Department finally granted Wright, who had been promoted to Captain, a new duty station in December 1855.<sup>12</sup>

### **Daniel P. Woodberry Command, 1856-1861**

On March 22, 1856, Captain Daniel P. Woodberry took command of the construction of Fort Jefferson. Construction reports indicate that by September 30, 1856, all six bastions were at 8 feet high and casemates and walls were between 10 and 11 feet. Once ammunition magazines and the arches over some of the casemates were completed, Fort Jefferson could mount the first tier of guns.

12 Bearss, 47-55, 87-93, 117; Albert Manucy, *A Construction History of Fort Jefferson, 1846-1874* (Richmond, VA: National Park Service, 1961), 37; William Walker (May 8, 1824– September 12, 1860) was an American lawyer, journalist and adventurer, who organized several private military expeditions into Latin America, with the intention of establishing English-speaking colonies under his personal control, an enterprise then known as "filibustering." Walker became president of the Republic of Nicaragua in 1856 and ruled until 1857, when he was defeated by a coalition of Central American armies.

11 Bearss, 27, 40-45; Reid, 14-16.

Appropriations for Fiscal Year 1857 were again \$150,000. Work completed included putting up embrasure irons in the lower tier casemates, raising the bastion magazines and stairway tower walls up to elevations varying from 8 feet to 16 feet, and raising the scarp walls to heights varying from 10 feet 6 inches to 16 feet 8 inches above low water. Also fourteen casemate cisterns had been paved and made watertight.<sup>13</sup>

Woodberry proposed using the \$300,000 appropriation for Fiscal Year 1858 to raise the fort to 20 feet and complete the work below that level. By July 1, 1858, Woodberry advised the Department that, with slight exceptions, the scarp stood at 19 ½ feet above mean low water. By September 23, the first tier had been enclosed, covered, and made defensible. All first tier embrasures, with the exception of four left open for roadways, had been positioned. All first tier guns could be mounted, if on hand. General Totten inspected the fort in February.

For Fiscal Year 1859 congress appropriated \$150,000. Woodberry's proposal was to continue work on the scarp and piers and to turn the arches of the second tier. By June 30, 1859, the masonry stood at 30 feet, the bastion towers had been raised higher, and the magazine arches adjacent to the towers had been formed.<sup>14</sup>

Appropriations for Fiscal Year 1860 were cut to \$95,000, which Woodberry planned to use "to continue the erection of the upper casemate arches as far as the means will go." By June 30, masons raised the scarp to 32 ½ feet. The stairway towers reached the upper landings and all 24 casemate arches had been formed, as well as 86 of the 122 curtain arches.

### The Civil War Years, 1861-1865

By Fiscal Year 1861, Captain Woodberry had finally secured a transfer to another post. Replacing him was Captain Montgomery C. Meigs, who arrived at Garden Key on November 8, 1860. During his trip to the Tortugas, Captain Meigs was alarmed to hear many southerners express hostility and rebellion towards the Union. At Fort Jefferson he found

not a single gun, and I doubt whether among the seventy or eighty persons, white and black, employed or permitted on the island half a dozen fowling pieces could be found. The embrasures of the lower tier are ready for their guns. Magazines exist for ammunition. The walls are thirty feet in height, and the armament of the flanks by a few howitzers and the placing of one or two big guns on each curtain, with a proper supply of ammunition and small-arms, would enable a single company of artillery, with the aid of volunteers . . . to hold this extensive and important work.

After Florida seceded from the Union on January 10, 1861, Meigs ordered the workmen to close up the 200 openings in the scarp wall with brick and timber and put up a drawbridge and gate at the sally port. Priority would next be given to making a number of the second tier arches bombproof to protect the magazines and fort garrison, who arrived on January 18, 1861. Major Lewis G. Arnold took command of the fort, and the troops of Company C, 2<sup>nd</sup> U. S. Artillery were housed in the frame structures on the parade. An annotated 1861 plan of Fort Jefferson shows that casemates were also being used to house the garrison, as well as women's quarters for laundresses.<sup>15</sup>

The mounting of the first armament for the fort, six Columbiads and four field guns, occurred on January 25, 1861. Captain Meigs reminded General Totten that all lower tier casemates were ready for their cannon and large pivot guns could be mounted on the terreplein. Meigs strengthened the fort's armament on February 9 by borrowing several cannon from Fort Taylor in Key West. The Department was ready to send 36 Columbiads, 36 howitzers, their casemate carriages, and 6 additional Columbiads that would be mounted *en barbette* on the bastions.

On April 1, 1861, Lieutenant James St. Clair Morton replaced Captain Meigs as Superintending Engineer at Fort Jefferson. Work accomplished during Fiscal Year 1861 included raising the scarp from 35 to 42 feet, constructing much of the breast-height and parade ground walls, constructing three tower magazines, constructing temporary

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13 Reid, 17-19; Bearss, 94, 129-30, 158.

14 Bearss, 145-59.

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15 Bearss, 181-82; Lord-Aeck-Sargent (LAS), *Historic Structure Report Amendment* (Atlanta.: National Park Service, 2006), 54; Drawer 74, Sheet 59, ???.

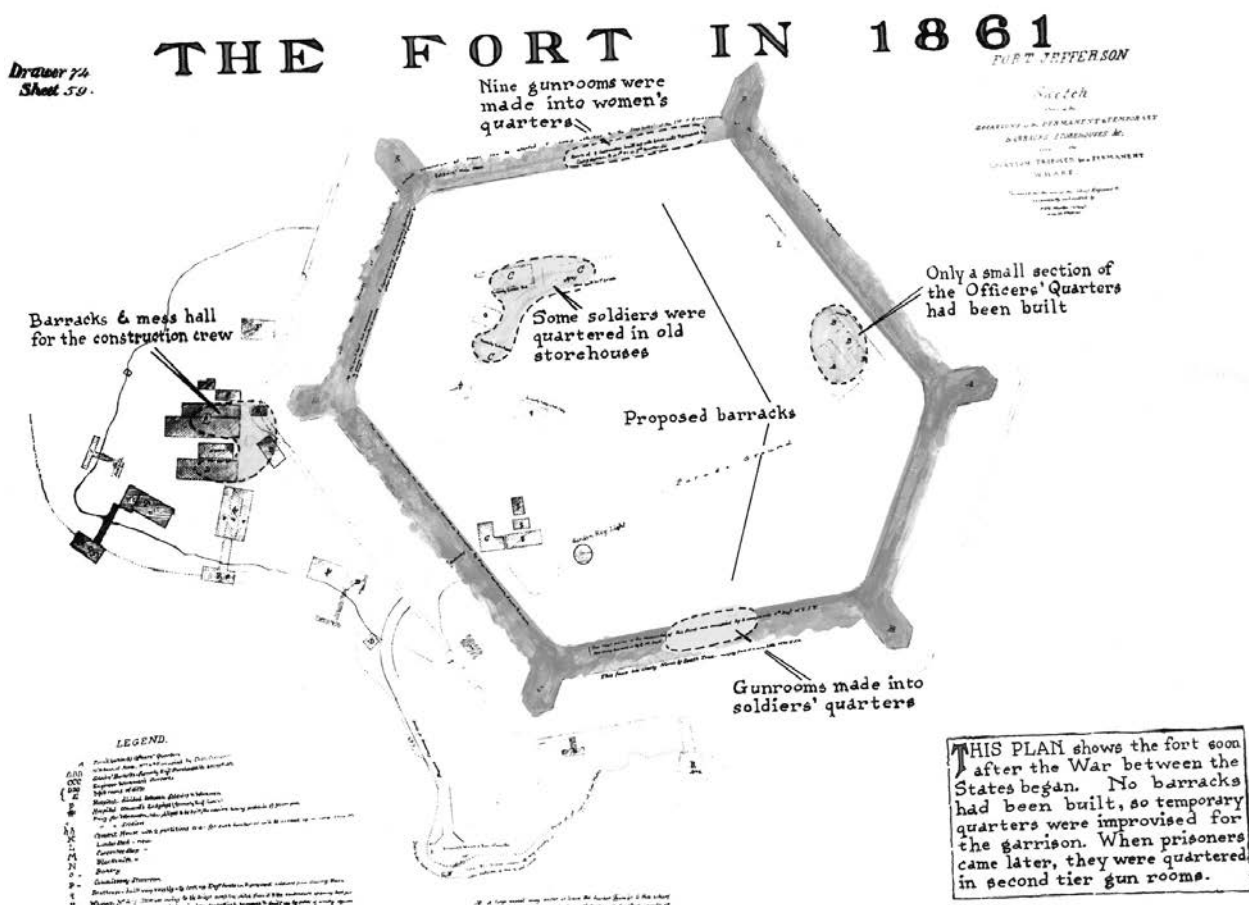


Figure 7. Annotated 1861 plan (*Pages from the Past*)

buildings for storerooms and shops, and outfitting casemates and wooden buildings as barracks and quarters. Fiscal Year 1862's appropriation of \$75,000 would be used on the parapets and terreplein of the fort and to begin construction of the permanent barracks. Construction funds for Fort Jefferson increased by \$100,000 when money was reprogrammed from coastal forts seized by Confederate forces. Captain Morton reported to the Department that he estimated an additional \$1 million would be needed to complete the parapets and terreplein, officers' quarters No. 1 and 2, barracks, second tier casemates and magazines, a Navy storehouse, four parade magazines, and a permanent wharf and horse railway.

Congress appropriated \$100,000 for Fiscal Year 1862 and \$200,000 for Fiscal Year 1863. On March 5, 1862, Lieutenant Walter McFarland was named Superintending Engineer for the Florida Reef. Residing at Key West, McFarland gave responsibility for day-to-day supervision of Fort Jefferson to Chief Clerk Pearsall. In July

1862, McFarland contracted yellow fever and was unable to continue his duties until September. During this outbreak, twenty-six of his men died. Work continued on Fort Jefferson with McFarland managing the project through assistants.

During Fiscal Year 1863, workmen completed roofing the casemates and tower magazines of the second tier, outfitted the curtain magazines of the first tier, and completed the masonry and roofs of the stair towers and various other details. On the parade, construction of the enlisted men's quarters was progressing and one hot shot furnace was completed. In March 1863, Civil Engineer Edward Frost wrote McFarland that "many, indeed almost all, casemates not provided with guns are at present occupied as quarters, or for storehouses and miscellaneous purposes."

Fiscal Year 1864's \$300,000 appropriation funded continuation of work on the enlisted men's quarters and officers' quarters, on the sewer system, on the counterscarp wall, on the barbette

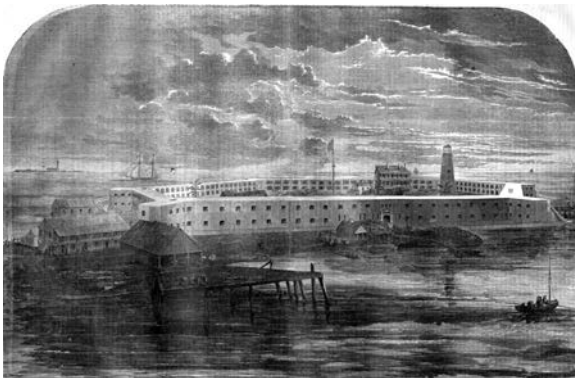


Figure 8. Fort Jefferson, 1861 (DRTO 300837A)

tier and four lower tier casemates, and on moat excavation. Long-time Chief Engineer Totten died in April 1864; his replacement was Richard Delafield. Congress failed to appropriate any funds for Fort Jefferson in Fiscal Year 1865.<sup>16</sup>

A depleted workforce hampered efforts to complete the fort during Fiscal Year 1865, but limited work continued on the casemates, the officers' quarters and enlisted men's quarters, and ditch excavation. The sewers were completed but could not be used because of the unfinished condition of the moat. Four enlisted men's quarters' kitchens and two double kitchens for the officers' quarters were built and foundations laid for four others. Concern over subsidence caused the Engineer Department to suspend work on the second tier.<sup>17</sup>

16 Bearss, 183-213, 251-58, 274-75; Manucy, *Construction History*, 91-98, 155; LAS, 55.

17 Bearss, 256; Manucy, , 133.



Figure 9. Terreplein under construction, 1863. (DRTO 300646)

## Post-Civil War Construction, 1866-1876

Relief came in Fiscal Year 1866, when Congress appropriated \$100,000. Work occurred almost entirely on the permanent buildings on the parade, mainly repairs due to damage from an October 1865 hurricane. The rear third-story wall of the officers' quarters had to be rebuilt, as well as one of the double kitchens. Two single kitchens and a double kitchen were completed and privies attached to the kitchens. Work continued on the enlisted men's quarters, small and large magazines, curtain casemates, and moat excavation. The number of guns mounted in the fort increased significantly to 175.

Fiscal Year 1867's appropriation was \$50,000. McFarland found he needed all of the money to continue work on the enlisted men's quarters and officers' quarters. Yellow fever struck Fort Jefferson in August 1867, resulting in thirty-eight deaths. A Board investigating the causes of the outbreak recommended that the enlisted men's quarters be completed as soon as possible so that troops could be removed from the casemate quarters, which were described as "damp and unhealthy." The Board also recommended that priority be given to completion of the counterscarp and moat so that tidal flows could flush out the sewers.

Colonel James H. Simpson replaced McFarland as superintending engineer of Forts Jefferson and Taylor on January 1, 1868. A reduced appropriation for Fiscal Year 1868 was mainly used for construction of the enlisted men's quarters and officers' quarters, as well as for moat excavation.

During Fiscal Year 1869, Colonel Charles E. Blunt replaced Colonel Simpson as superintending engineer of the Florida Reef. Although Congress failed to appropriate any funds for Fort Jefferson, work continued on the officers' quarters, enlisted men's quarters, and on the moat and counterscarp walls. During Fiscal Year 1870, Blunt concentrated his limited resources on the enlisted men's quarters. The emplacement of twenty-nine additional 10-inch Rodman's occurred during this time. Work was suspended in Fiscal Year 1871. According to an 1870 report, part of the garrison was quartered in casemates, four men to each casemate, as the enlisted men's quarters was not finished and was "but partially occupied. The



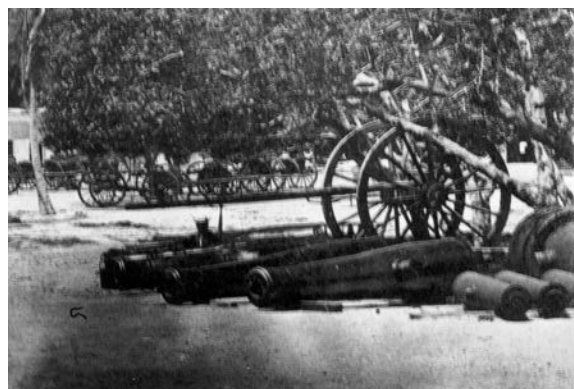
**Figure 10.** Officers' quarters, large magazine, and enlisted men's quarters, 1909. (Monroe County Library)

officers' quarters were described as "well-finished and conveniently arranged."<sup>18</sup>

Funding for Fort Jefferson resumed in Fiscal Year 1872. Attention was focused on the counterscarp with some work accomplished on the enlisted men's quarters. This same work program continued in Fiscal Year 1873, with the addition of adapting the barbette tier for heavier armament. International conflicts with Great Britain and Spain led to a program to quickly modernize the weaponry at Fort Jefferson. This effort, which included reinforcing the traverse magazines and adding wooden galleries, as well as infilling the terreplein with sand to form a parapet, allowed six 15-inch Rodmans to be mounted during the 1872-1873 construction season. At the bastions, it was necessary to remove one smaller gun emplacement to each side of the bastion to mount the big guns. On Fronts 5, 6, and 1, four 10-inch Parrotts replaced smaller guns.

The completion of the counterscarp wall and moat finally occurred in 1873. Another outbreak of yellow fever struck Fort Jefferson in August 1873. As a result of this latest yellow fever outbreak, the fort's garrison was transferred to Fort Barrancas in January 1874, leaving only a few soldiers to look after the armament and ordnance stores. The garrison's commander, Captain Langdon, charged that the outbreak was caused by the "filthy condition of the engineer premises" and that several of the temporary frame buildings should

<sup>18</sup> Bearss, 247-58, 264-75, 293, 305-12; Manucy, *Construction History*, 155; Reports of Assistant Surgeon S. A. Sorrow, United States Army, and Acting Assistant Surgeon W.E. Day, United States Army, "A Report on Barracks and Hospitals with Descriptions of Military Posts" (Washington, D.C.: Surgeon General's Office, 1870), 154.



**Figure 11.** Cannon awaiting mounting, 1870. (DRT0 300890)

be razed. The Engineer Department strongly disagreed, although problems with the sewers had not been resolved. To make matters worse, a hurricane in October 1873 damaged the roofs of the quarters of the enlisted men and officers and swept away a large latrine outside the fort.

During Fiscal Year 1874, Congress approved \$50,000, which was programmed for modifications to the magazines and continuing construction of the unfinished section of the enlisted men's quarters. In response to complaints about the temporary structures, six were razed and several others repaired. On January 1, 1874, Captain Jared A. Smith replaced Colonel Blunt as superintending engineer for the Florida Reef. The Engineer Department asked him to investigate complaints about water in the moat being "foul and offensive." Major Smith sent the following recommendations with his annual report:

In view however of the probability of the work being regarrisoned at some future time it is recommended that the officers and soldiers quarters be completed, as well as magazines and other unfinished work of the barbette tier. It is also desirable to reconstruct the privies, with cisterns or other arrangements for their cleansing. It is recommended that an appropriation of fifty thousand dollars be asked for these purposes.

As the second tier of casemates at this work has remained for some years incomplete, it is suggested that some method of closing the scarp wall for cover of guns or other purposes should be devised.

No construction monies were appropriated for Fort Jefferson for Fiscal Years 1875 and 1876. A September 1875 hurricane battered the 1825 light tower and damaged the lantern. During this time period, a fort keeper was hired to provide for the maintenance and preservation of the property with day laborers hired to assist him.<sup>19</sup>

Beginning in Fiscal Year 1876, Congress stopped making annual appropriations for seacoast defense construction. Fort Jefferson continued to use its contingency money to fund a keeper. In March 1876, an inspection of Fort Jefferson by Colonel Horatio G. Wright, Colonel Zealous B. Tower, and Major Smith occurred. They reported that the fort was essentially complete, except for the second tier embrasures. During this same time, the U. S. Lighthouse Service erected a new wrought-iron lighthouse over the stair tower near Bastion C (present-day 6) and demolished the old tower.<sup>20</sup>

### Fort Jefferson Work Force

Over the years of Fort Jefferson's construction, the Engineer Department drew on three primary sources of labor: slaves from Key West, white contract labor, and military prisoners. As work on the fort progressed, many Key Westers purchased slaves to realize income from their labor, which included quarrying coral aggregate on site. The

Engineer Department also profited from the use of slave labor. Unlike white workers from New York, enslaved workers were mostly immune to tropical disease due to their exposure as children. They could be employed year-round, while most of the white workers left during the summer months when outbreaks of yellow fever were more common. Superintending engineers had to deal with skeleton work crews during the summer months or suspension of work altogether. After the fort was garrisoned in 1861, fatigue parties were also assigned construction duties.

Fort Jefferson discontinued the use of slave labor in 1863 after President Lincoln's Emancipation Proclamation declared slaves in regions "in rebellion" free. Although the Florida Reef was technically exempt from provisions of the Proclamation, since it was occupied by Federal troops, 100 free blacks were recruited from Louisiana for work at Garden Key in December 1863.

Fort Jefferson's use as a military prison, however, would eventually supply the largest workforce. Policy changes by the Lincoln administration in 1864 substituted hard labor in the Tortugas for execution as a punishment in the military system of justice. Most of the prisoners sentenced to Fort Jefferson were convicted by court-martial for desertion, cowardice, mutiny, and other offenses against the laws of war. In 1865, there were more than 800 men imprisoned at Fort Jefferson, a portion of whom were employed at hard labor

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19 Bearss, 314-43; Manucy, *Handbook*, 89; Manucy, *Construction History*, 168-69; Reid, 127.  
20 Bearss, 344-48.



**Figure 12.** Fort Jefferson with wrought-iron lighthouse, C. 1898 (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)

excavating the ditch on the land fronts. Captain McFarland reported that there would be work for 200 prisoners for several years. One soldier commented: “The only use, it would seem to me, that is or can be made of the fort, is that which it really serves at present—as a prison. But whether it was, in the first place, worth while to erect such a structure, for such a purpose, in such a climate, entailing also the necessity of a battalion of soldiers, equally prisoners with those they guard, I leave to wiser heads to determine.”<sup>21</sup>

Fort Jefferson’s most famous prisoners were the four Lincoln conspirators, including Dr. Samuel A. Mudd, who arrived on July 24, 1865. Another state prisoner was Colonel George St. Leger Grenfell, who arrived on October 8, 1865. Grenfell, a British soldier who served with the Confederacy as adjutant to General John Hunt Morgan, was convicted by military tribunal of involvement with the “Chicago Conspiracy” to free Confederate prisoners of war from Camp Douglas, Illinois. He was one of the few prisoners to escape the prison at Fort Jefferson, although he was never heard from again and was presumed to have perished with three other prisoners in a severe storm the night they escaped. By January 1867, the number of prisoners had dropped to fifty-six. The three surviving Lincoln conspirators were pardoned by President Andrew Johnson in 1869.<sup>22</sup>

## Yellow Fever

Constant fear of yellow fever outbreaks during the summer months plagued the workforce during the construction of Fort Jefferson. Although true yellow fever did not strike Garden Key until 1854, a malady that was called “break-bone” fever struck the fort nearly every summer. It was thought at the time to be mild form of yellow fever, as it was rarely fatal, but was later identified as dengue fever.

The first recorded outbreak occurred in 1854, when Lieutenant Wright brought yellow fever from Key West back to Fort Jefferson. It quickly spread through the officers’ quarters. Thirty cases were reported, with one death.

One of the first victims of the 1867 outbreak was Dr. Joseph Sim Smith, the Fifth Artillery’s

surgeon. Two companies of soldiers were moved to Loggerhead Key. Of those that remained at Fort Jefferson, thirty-eight died. Dr. Samuel Mudd volunteered his services and was placed in charge of the post hospital until the arrival of Dr. D. W. Whitehurst from Key West. Dr. Mudd wrote his wife: “I cannot refrain from letting you share the gloom which surrounds this seeming God-forsaken isle. Although three-fourths of the garrison have been removed, the epidemic seems to increase with unabated fury.”<sup>23</sup>

In August 1873, yellow fever returned to Garden Key. Post Commander James E. Bell died on September 11. The healthy soldiers were evacuated to Loggerhead Key. Of the thirty-seven stricken with yellow fever, fourteen died.

## Hurricanes

Hurricanes were not unusual for the Tortugas, given their location in the Florida Reef. In fact, a hurricane struck Garden Key in October 1846, just before the arrival of Lieutenant Wright in December, changing the configuration of the shoreline. When the storm was at its height, the lighthouse keeper reported that the surf swept over most of the key.

A hurricane of August 1856 destroyed the fort’s schooner *Activa* but left the Engineer Department property on Garden Key relatively unscathed. The next major hurricane struck in October 1865. Serious damage occurred to the unfinished officers’ quarters and to some of the frame structures. The rear wall of the officers’ quarters collapsed onto a kitchen building, killing two soldiers. Major Wentworth reported: “At the time the wall fell it was blowing a fearful Hurricane; the oldest residents of the Key say that they had not as severe a gale since 1846.”<sup>24</sup>

Another hurricane struck in October 1870. Most of the damage was to the wharves, but the roof slates were blown off the old section of the officers’ quarters. Much more damaging was the hurricane of October 1873, which carried off part of the barrack’s iron roof, flooding the building. The roof of the officers’ quarters was also damaged, and a

21 Bearss, 57, 177, 231, 281-83; Reid, 29, 68-76, 101.  
22 Reid, 100-121.

23 Manucy, *Construction History*, 74; Reid, 111-13; Bearss, 54, 290-93.  
24 Reid, 94; Bearss, 40-41, 171, 289; Manucy, *Construction History*, 143.

bakery and brick oven on the parade could not be repaired. Numerous livestock were washed away.

A September 1875 hurricane battered the Florida Reef, but the Engineer Department property at Garden Key escaped damage. The U. S. Lighthouse Service property, however, was not so fortunate, as the tower and lantern sustained major damage. An iron light tower, constructed over the stair tower near Bastion C (present-day 6), replaced the original tower in 1876.

### **Maintaining Fort Jefferson, 1877-1888**

On December 16, 1876, Captain William B. Heuer replaced Major Smith. No construction occurred during Fiscal Year 1877. The fort was inspected on April 24, 1877. During Fiscal Year 1878, repairs occurred to the officers' quarters and enlisted men's quarters from a surplus on hand from the 1874 appropriation.

No new work occurred at Fort Jefferson during Fiscal Years 1879, 1880, 1881, 1882, and 1883 beyond its "protection, preservation and repair." In 1883, the fort mounted 132 guns, although the six 15-inch Rodmans were unserviceable because of worm-eaten platforms.

Captain Thomas Turtle replaced Captain Heuer as superintending engineer on February 1, 1884. He reported that the lower tier of casemates were "generally in good condition." In places the scarp wall had not been completed, the parapet not being entirely embanked. He also reported that most of the traverses were incomplete and suffering from deterioration through loss of material.

For Fiscal Year 1885, Captain Turtle requested money to rebuild the principal wharf, in addition to money for the keeper's pay. The Department denied his request for construction funds. Captain William T. Rossell replaced Captain Turtle on August 31, 1884. The Department suggested that the fort's keeper be laid off, since an ordnance sergeant was stationed at the fort.

In March 1885, Captain Rossell notified the Department that hurricanes had damaged the roofs of structures on the parade. Many of the gun carriages and embrasure irons were rusted

and the ninety 10-inch Rodmans emplaced in the casemates and on the barbette tier were in bad condition. Cisterns and sewer outlets needed cleaning. He requested \$5,365 for fort repairs but only received \$350. Repairs completed included minor repairs to the ordnance sergeant's quarters, cleaning out the sewers, construction of a temporary postern at the sally port, and shoring up of the temporary casemate partitions.<sup>25</sup>

For Fiscal Year 1886, Captain Rossell requested funding to hire four laborers to continue repairs at Fort Jefferson. He received \$7,985 for projects at Fort Jefferson and Fort Taylor.

In 1885, the Engineer Department established District Offices. On November 15, 1885, Major William B. Heuer was placed in charge of the New Orleans District, which included Forts Jefferson and Taylor. Congress refused to appropriate any funds for Fiscal Year 1887 for the upkeep and preservation of the seacoast fortifications considered obsolete after the Endicott study in 1885, which recommended construction of modern reinforced concrete fortifications and the installation of large breech-loading artillery and mortar batteries and electrically controlled mine fields.<sup>26</sup>

Consequently, the fort keeper and watchman were discharged, leaving the ordnance sergeant in charge of the department property at Fort Jefferson. Heuer's annual inspection showed cracks in the scarp wall, serious damage to the officers' quarters, and a rotten wharf and bridge.

In 1888, Captain Walter L. Fisk replaced Major Heuer. On his first visit to Garden Key, he found conditions exactly as described by Major Heuer in his 1887 annual report. No money had been spent or allotted at Fort Jefferson for twenty-two

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25 Bearss, 357-67.

26 The fortifications constructed as part of the Endicott program were a radical departure from traditional masonry forts concealing massed batteries of cannon that had dominated harbor defense for most of the 19th century. Instead, smaller batteries of up to four large caliber rifled guns were installed in well-constructed emplacements hidden behind earth covered concrete parapets. Most long-range large-caliber rifles were mounted on disappearing carriages that would allow a gun to be raised to fire, but otherwise remain protected from sight and shot behind a protective parapet. Some large guns and most smaller guns were mounted on less expensive barbettes or pedestals, [http://en.wikipedia.org/wiki/Board\\_of\\_Fortifications](http://en.wikipedia.org/wiki/Board_of_Fortifications).

months. In Fiscal Year 1888, the War Department transferred the Garden Key sand spit west of the Engineer wharf to the U. S. Lighthouse Service, who erected a wharf, buoy, and blacksmith sheds.

The last major hurricane before Garden Key was transferred to the Treasury Department occurred in August 1886. Most of the piazzas fronting the officers' quarters were torn off and the galvanized metal roofs damaged. The wharf was left in very bad condition.<sup>27</sup>

## Quarantine Station at Dry Tortugas, 1888-1900

On August 2, 1888, Garden, Bird, and Loggerhead Keys were set aside as the site of a national quarantine station, the Marine Hospital Service, under the jurisdiction of the Treasury Department. The War Department had no objections to the transfer, providing that the defense works were left unchanged and that the site be returned to the War Department when needed. Captain Fisk was directed to secure all property belonging to the Department within the casemates. Not included in the transfer were the lighthouse tower, the lightkeeper's house, and lighthouse wharf, buoy, and coal shed.

In Fiscal Year 1889, the Treasury Department secured funds for construction of a new wharf at Garden Key. The Marine Hospital Service chose the officers' quarters as the location of the bacteriological laboratory that was being established to investigate the causes of yellow fever. A hospital for non-contagious patients was also located in the officers' quarters. The roof was repaired and painted, but on an inspection trip in November 1890, Dr. Walter Wyman noted that problems with the sewers continued, and the moat was filled with stagnant water. Patients with infectious diseases were placed in floored tents outside the scarp wall, west of the sally port.

The construction of the new wharf occurred in Fiscal Year 1892, with a coal shed added in 1894 and more mooring space in 1895. Repairs were also made to the chapel/office cistern and to the cistern outside the fort. A section of Bird Key was set aside for infectious patients in the summer of

1895. During Fiscal Year 1896 and 1897, repairs continued to the officers' quarters and kitchens.

The Spanish-American War began on April 25, 1898, following the destruction of the U.S.S. *Maine*. Merchant-marine quarantine was suspended at Garden Key, but the station was kept open for treatment of infected warships and troop transports. On May 8, the Army returned to Fort Jefferson, setting up camp on the parade. The fort's armament at this time was six 15-inch Rodmans, ninety 10-inch Rodmans, three 300-pounder Parrotts, eight 200-pounder Parrotts, twenty-six 24-pounder howitzers, two small mortars, and a few cannon without carriages. Hostilities halted in August of that year, and a treaty ended the war in December.

During Fiscal Year 1899, Garden Key continued as a quarantine station. The Navy began construction of a coaling station in August 1898, which included extensive dredging of the harbor. Construction was intermittent between 1898 and 1901 due to the continuing operation of the quarantine station. The transfer of the Dry Tortugas military reservation to the Navy occurred on April 7, 1900. Operation of the Dry Tortugas Coal Depot was turned over to the Navy on July 11, 1901.<sup>28</sup>

## Dry Tortugas Coal Depot, 1901-1916

A marine garrison arrived at Fort Jefferson to guard the coal depot in May 1901. An appropriation of

28 Bearss, 378-93, 409-10.



**Figure 13.** Dock, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)

27 Reid, 125; Bearss, 319, 343, 374-76.



**Figure 14.** Army on the parade of Fort Jefferson, 1898. (EVER 7320)



**Figure 16.** Fort Jefferson used as a quarantine station, 1899. (National Archives 2005-M-90-1-31)



**Figure 15.** Rodmans in casemates, 1899. (National Archives 2005-M-90-1-43)



**Figure 17.** Wireless mast foundation, 1902. (Monroe County Library)

\$5,000 was spent to clean out the moat and address problems with the sewer. A distillery to provide water for the Marine garrison was completed in 1902 and a wireless radio station in 1904. The Commanding Officer of the U. S. Naval Station, Key West, inspected the coal depot on August 23, 1904, and reported:

The general appearance of Fort Jefferson is good, though somewhat dilapidated; but the spacious quarters, still habitable, afford good accommodations for the officers, marines, and employees at Garden Key. If it is contemplated to maintain and increase the present establishment, repairs and alterations to a considerable extent would be required.<sup>29</sup>

On July 1, 1905, only a Sergeant's guard remained at Fort Jefferson. The Navy withdrew all personnel except for two laborers to maintain the coal plants in June 1906. The transfer of the Dry Tortugas to the Department of Agriculture as a designated

breeding ground and sanctuary for native birds occurred in 1908.

A devastating hurricane struck the Dry Tortugas on October 17, 1910, causing massive damage. Navy mate and fort custodian George C. Short reported:

I am sorry to inform that Tortugas is a wreck. Both coal rigs down and in falling smashed sheds and shifting bridge. North breakwater completely destroyed. South breakwater about half destroyed. Officers quarters; a great number of slates and chimneys gone, one at each end. Enlisted men's quarters entirely stripped of tin and some of sheathing; windows missing. Gutters of all buildings nearly gone. Sheds on entrance of wharf from Fort, down. Blacksmith shop broken up. Approach to North dock gone. Weather Bureau tower wrecked and twisted up, lying inside of fort. All water on island ruined. Parade ground flooded. Launch sunk in 18 ft. water.

<sup>29</sup> Bearss, 411-13.



**Figure 18.** Damage to south coal depot, 1911. (USGS Photographic Library vtw00353)

The Navy decided not to rehabilitate the coal depot and to transfer what could be salvaged to the Key West Naval Station.

Fire struck Fort Jefferson on January 12, 1912, and destroyed the enlisted men's quarters and the lightkeeper's dwelling and its outbuildings. Unfortunately, the 1910 hurricane damaged the barrack's galvanized roof, exposing the wooden sheathing beneath. When fire struck in 1912, the sheathing quickly caught fire and spread. After the fire, arrangements were made for a non-attended automatic light at Garden Key.

In the period 1914-1916, only minor repairs were made at Fort Jefferson, such as to the moat bridge. During this time, the Boston Iron and Metal Company removed most of the iron and steel from the coal sheds and enlisted men's quarters. The Commanding Officer of the Key West Naval Station suggested a plan to salvage bricks from Fort Jefferson, but the cost of removing the bricks proved prohibitive.<sup>30</sup>

<sup>30</sup> Bearss, 417-26.

## The Intervening Years, 1917-1934

After the onset of World War I in 1916, the wireless station at Fort Jefferson was rehabilitated and a seaplane base established in 1917. The role it played as a seaplane base was very brief, and after 1918, Fort Jefferson was abandoned. Fire struck again in 1927 when the officers' quarters burned. Very little is known about life on Garden Key at this time. One account by Charles I. Park, the warden on Bird Key, stated:

When I went there in 1929, Bird Key had already started to wash away. The house which the former warden had occupied was considered unsafe so I lived on Garden Key and commuted by boat to the other keys.<sup>31</sup>

<sup>31</sup> "The History of Fort Jefferson, Dry Tortugas," undated, South Florida Collections Management Center, Everglades National Park; William B. Robertson, "The Terns of the Dry Tortugas," *Bulletin of the Florida State Museum Biological Sciences* 8, no. 1 (1964), 8.



Figure 19. Fort Jefferson, 1915. (USGS Photographic Library sew01372)



Figure 20. Parade ground, 1937. (EVER 7119)

## National Park Service Administration, 1935-Present

### Park Development Era, 1935-1941

On January 4, 1935, President Franklin D. Roosevelt proclaimed the Dry Tortugas a National Monument. The Florida Emergency Relief Administration (FERA) provided the funds to maintain Fort Jefferson, with Fred O. Eberhardt in charge of the project.

In September 1935, Hillory O. Tolson, Arthur E. Demaray, and Verne E. Chatelain of the National Park Service (NPS) met with M. E. Gilfond and Julius F. Stone of the Florida Works Progress Administration (WPA) to discuss a project to preserve and restore Fort Jefferson. In July 1936, FERA discontinued its funding for Fort Jefferson, although two workmen were kept at the fort through September to protect the property until adequate funding could be obtained from another source. In November 1936, a WPA project was approved for Fort Jefferson.

The WPA project began in January 1937. Philip C. Puderer was appointed Acting Superintendent, and he submitted a detailed report on existing conditions with recommendations on April 15, 1937 to Thomas C. Vint, Chief Architect, NPS. During the period from February through June, work included an intensive clean-up of Garden Key in order to put the area in a safe, sanitary, and habitable condition. Although a Civilian Conservation Corps (CCC) side camp was approved in June 1937, Fort Jefferson's remote

location made acquisition of a seventy-five-foot boat to transport workers back and forth to the mainland a prerequisite before the project could be approved.

Willard H. Morris replaced Philip Puderer as Acting Superintendent on October 1, 1937. The WPA project was finally approved on February 28, 1938. The Coast Guard transferred a boat to the NPS for use in transporting workers. The program for 1938 was proposed as a general cleanup of the parade ground, construction of quarters for the superintendent in the second tier casemates, work on the water system, and repairs to the engineer officers' quarters.

In October 1938, NPS inspector Carl Vinten and Philip Puderer, now resident landscape architect, visited Fort Jefferson as part of the procedure for getting Public Works Administration (PWA) projects underway. Where to locate the living quarters received a great deal of discussion. Newly appointed Superintendent James Felton disagreed with Mr. Puderer's plan for developing the southwest bastion as quarters. Since arriving at the fort, he and his wife felt that none of the existing structures were suited to rehabilitation as living quarters and preferred the construction of a new residence. The group finally agreed to rehabilitate two of the engineer officers' quarters buildings. It was also agreed to use the chapel/office cistern as the permanent place for water storage and to build a brick structure on the parade ground for public toilets and showers. It was reported that the general clean-up of the old brick and construction

debris was complete except for the enlisted men's quarters, which required a scaffolding.<sup>32</sup>

**1938 Master Plan.** The 1938 Master Plan recommended that Fort Jefferson be preserved as a ruin, with no real attempt being made at restoration. All visitor accommodations were to be placed so that no modern intrusions would degrade the historic scene.

An early point of discussion centered around the disposition of the ruins on the parade ground. In a memo to Arno B. Cammerer, Director, NPS, on February 19, 1938, Hillory A. Tolson stated that the NPS might be severely criticized if the buildings were completely removed and suggested leaving the low corners in place to interpret what was once there. The 1938 Master Plan recommended that none of the buildings on the parade ground be dismantled, since they played an important part in telling the history of the fort construction and life at the fort thereafter.

The location of the superintendent's quarters was changed from the second tier casemates to the former engineer officers' quarters on the parade ground. Other points of the master plan included a septic system, a water collection system, repair of the lighthouse, and development of the south coaling pier as a docking place for the proposed concessionaire's houseboat, which was expected to provide overnight accommodations for visitors.

On December 21, 1939, Director Arno B. Cammerer approved a memorandum regarding recommendations for the future development at Fort Jefferson. This memo followed a conference with Washington office officials about problems at Fort Jefferson, particularly concerns about hazards and safety to employees and visitors. Regional Director M. R. Tillotson pointed out

[T]he hazards of the job are such that the work cannot be continued with even a reasonable guarantee of safety to life and limb of employees. This is especially true in view of the lack of medical and hospital facilities and adequate two way radio communication. Injured employees must be taken by most dependable boat transportation to Key West, a distance of 65 nautical miles over open water, subject at all times to severe storm conditions.

The memo called for temporary repairs only to the south wharf to accommodate potential visitor vessels and running a temporary water line to the dock. The memo suggested securing the assistance of the Navy in reconstructing the main wharf. Other projects under construction included the water system, sewerage system, and superintendent's residence.<sup>33</sup>

On June 10, 1940, NPS inspector Carl R. Vinten wrote a follow-up memo addressing the status of the work at Fort Jefferson. Temporary repairs were completed to the south wharf, which was being used as a supplemental docking space. The park had no definite information regarding visitor boat services. The sewer and water systems were complete except for work on the parade ground water system, which was expected to be finished by the end of June. The first unit of the superintendent's residence was expected to be ready by the end of June. Surveys were being prepared for an electrical supply system. Plans had been received for repairs to the main wharf.

On November 27, 1940, a meeting was held in the Richmond Regional Office to discuss the development program at Fort Jefferson. Among those in attendance were Thomas C. Vint, Chief of Planning, Ronald F. Lee, Supervisor of Historic Sites, and Roy E. Appleman, Regional Supervisor of Historic Sites, as well as Acting Superintendent Felton and Associate Engineer Mikell. A discussion ensued about the location of quarters and visitor accommodations and operating facilities for the concessionaire. An investigation of construction

32 Albert C. Manucy to Herbert E. Kahler, October 2, 1935; R. C. Unkrich to Honorable Arthur Gomez, September 17, 1936; Herbert E. Kahler to Florida Works Progress Administration, November 24, 1936; Herbert E. Kahler, Coordinating Superintendent to The Director, National Park Service, June 22, 1937; Herbert E. Kahler to The Regional Director, February 12, 1938; Philip C. Puderer, "Special Report to the Regional Director and the Regional Landscape Architect Covering Inspection of Fort Jefferson National Monument Dry Tortugas on October 7, 8 & 9, 1938," 1938, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

33 Tolson to Cammerer, February 19, 1938; Master Plan, General Development Sheet, Edition 1939, M. R. Tillotson to Director, December 20, 1939, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park; 364/2062 General Development and Utilities Plan, 1940.

details and a review of the work necessary to accomplish effective waterproofing on the terreplein convinced the group that all living quarters should be removed from the fort. Acting Superintendent Felton pointed out the futility of attempting to maintain dry quarters in the fort even if the terreplein could be effectively waterproofed. It was decided that the Carnegie Institution buildings on Loggerhead Key would be the best choice for concessionaire housing and that the work on Garden Key would proceed in accordance with the current master plan, to include a public comfort station, water treatment plant, electric power plant, store rooms and shops in the southwest face of the fort, and restoration of small parade ground buildings as additional employee quarters.<sup>34</sup>

### World War II, 1941-1945

In October 1941, ERA work was terminated at Fort Jefferson. America's entry into World War II in 1941 meant that NPS funding for major projects was shifted to the war effort. The NPS stationed a superintendent as a custodian on Garden Key, but the fort was closed to the public during the war. From 1942 to 1944, Robert R. Budlong served as Superintendent of Fort Jefferson. His monthly reports of life on Garden Key described weather, wildlife, and the constant struggle to maintain the parade ground and keep up with backlogged projects with only one employee. Numerous military ships visited Fort Jefferson during the war, and Budlong mentioned testing taking place for the Chemical Warfare Service. The typical isolation of Fort Jefferson was further pronounced during this time, although members of the 106<sup>th</sup> Observation Squadron dropped newspapers for Budlong and his family in March 1942. One of his last reports described the scene:

Early June brought cooling breezes, fresh and restful, bearing with them the soft fragrance of the blossoms of the sea-grape and bay cedar;

days were bright and work was pleasant; nights were cool and sleep was restful. Later June brought days of dead calm, days with not a trace of breezes, days and nights both hot and steamy, damp and sticky, most oppressive. . . . And the moisture gathered thickly on the stone walls of the fortress; dank and gloomy lay the fortress, full of rust and mould and mildew, steadily disintegrating, dark and brooding, vast and silent, ghostly in the quiet starlight.

### Post-World War II, 1946-1956

Deterioration of Fort Jefferson continued during this period. No money was appropriated to remedy the situation. Visitors to Fort Jefferson declined from 9,000 in 1946 to 5,000 in 1956. There was no reliable scheduled transportation between the Dry Tortugas and Key West, as prospective operators of boats had abandoned plans as being uneconomical.

### Mission 66, 1956-1966

Mission 66 efforts were seen as the perfect opportunity to do something about the rapid deterioration of Fort Jefferson and the need for concessionaire planning. In March 1957, Everglades landscape architect W. T. Ammerman completed a development analysis of Fort Jefferson. He concluded that complete restoration of the fort was "neither economically practicable nor is it desirable." He suggested relocating utility and employee housing near the south coaling pier. He based this suggestion on the fact that similar development was located here during the fort construction period. He also felt that overnight visitor accommodations could only be located at Loggerhead Key, although fresh water and other services would have to be provided.<sup>35</sup>

In April 1957, a planning conference that included many of the staff from Everglades and the regional office, as well as Thomas C. Vint, Chief of Design and Construction and Edward S. Zimmer, Chief of Eastern Office of Design and Construction,

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34 Carl R. Vinten to Coordinating Superintendent, Fort Marion National Monument, June 10, 1940; Conference on Fort Jefferson National Monument, November 27, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park; in 1904, Loggerhead Key was selected as the site for the Carnegie Institution-sponsored Tortugas Marine Biological Laboratory, the first tropical marine laboratory in the Western Hemisphere.

35 Robert R. Budlong to C. T. Reid, October 30, 1946; Conrad L. Wirth, Director to Hon. George A. Smathers, October 24, 1957; W. T. Ammerman, "Potential Development Analysis Fort Jefferson National Monument," March 1957, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

was held at the park to discuss options for Fort Jefferson. Expanding pressures of Florida development and the need to include Fort Jefferson in Mission 66 programming were the impetus for the meeting. Unlike other planning conferences held in the past, several of the participants represented natural resources. The group agreed that Fort Jefferson's values were 60% natural and 40% cultural, concluding that the top single resource was the coral marine gardens. The group was determined to protect the Dry Tortugas coral reef in view of the depletion of unprotected coral reefs along the Florida Keys.<sup>36</sup>

In terms of cultural resources, the group felt that protection of the fort was the highest priority with an increased emphasis on interpretation second. Any development should be in harmony with the fort. They felt that "the massiveness of the structure as a partial ruin should remain dominant." They did not feel, however, that the entire fort should be kept free from use, particularly given the cramped nature of Garden Key.

Loggerhead Key was the first choice for overnight visitor accommodations, given the limited space on Garden Key. The group finally concluded, however, that logistical problems at Loggerhead could not be overcome. With no fresh water, a roof catchment system would be needed and even then, supplemental fresh water would probably have to be hauled by boat. Also, the lack of a sheltered harbor meant that one would have to be built or a very long pier constructed.

The final recommendation was that overnight accommodations should be at the south coaling wharf. The idea was to build "temporary" housing with minimal capital investment, taking advantage of existing facilities and equipment. Some in the group felt that the Dry Tortugas should not be made too readily available to the general public and should not be exposed to the volume of tourist traffic common to southern Florida. They finally concluded that proper planning needed to be put



Figure 21. Loggerhead Key, 1945. (DRTO 300731)

in place and that it would be several years before the actual work could be programmed.

The group recommended the following projects:

- Repair of the broken section of counterscarp wall. Rather than attempt an accurate restoration, this part of the wall would be replaced with concrete from the nearby coaling wharf, which would be put in as riprap. Bricks from the reduced quarters would be used to hold and repair the wall.
- Demolition of the officers' quarters and enlisted men's quarters buildings' walls, leaving the foundations.
- One wall of the fort to be used as staff quarters and shops, warehouses, utility rooms, etc. The group felt that the superintendent's residence and guest house should be used as park headquarters, given its public exposure.
- Terreplein to be paved as a water catchment area and cisterns to be reactivated.
- Water supply piping, sewer lines, and electric system to be redesigned and replaced.
- Construction of a new wharf.
- Development of biological and historical exhibits.

Over the next few years the final decision on two issues could not be agreed upon—the location of staff quarters within the fort and how to handle overnight visitor accommodations. Carl R. Vinten, who had been the Coordinating Superintendent for Fort Jefferson for many years, weighed in on the side of caution regarding development:

As for development for the fort and Garden Key, let's preserve it for present and future generations and let the fishermen, tourists and

36 Daniel Beard, "The Consensus of a Planning Conference at Fort Jefferson National Monument, April, 8, 9, 10, 1957" (Washington, D.C.: National Park Service, 1957); it is interesting to note that Albert Manucy, an authority on Fort Jefferson and its history, was not at the meeting.

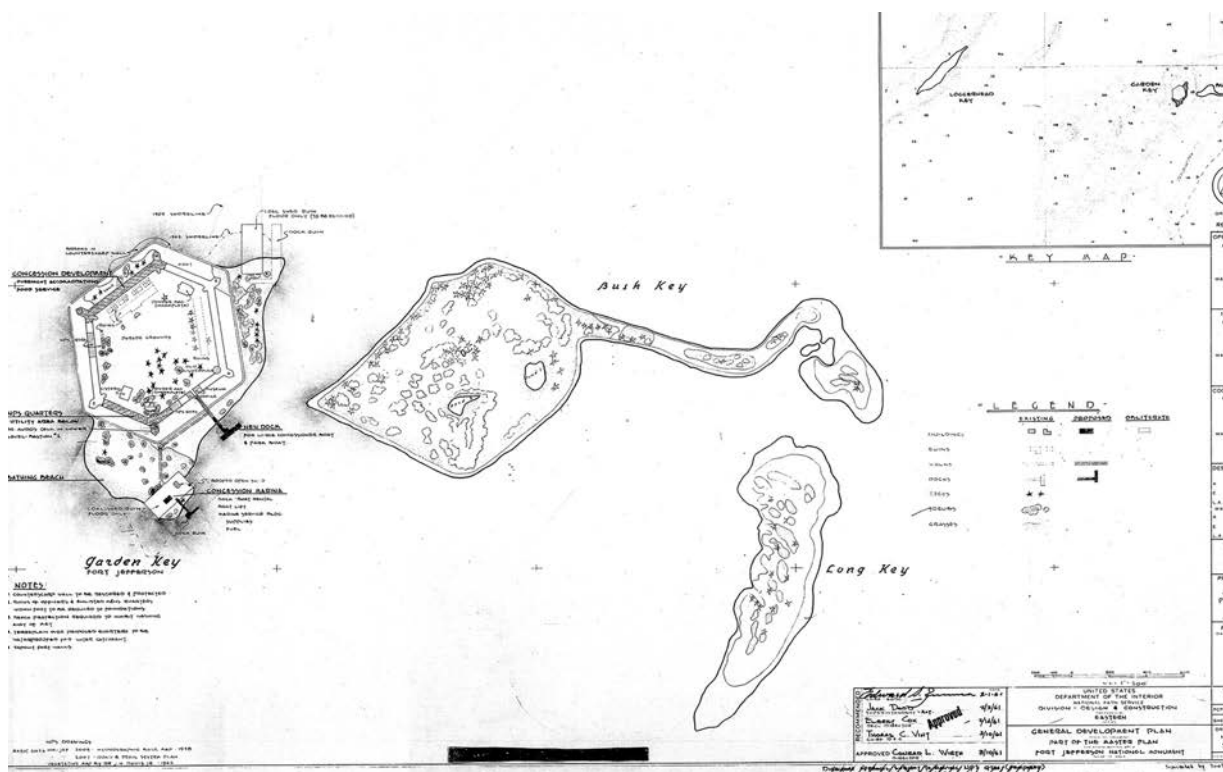


Figure 22. General Development Plan 3005, 1961. (Denver Service Center etc 364/3005)

speed boat enthusiasts, including skin divers and those who flock to Tortugas in future years look to Loggerhead Key for a headquarters for both temporary and permanent facilities. In this way public use of this unique area can be continued under light visitation as at present or under increasing visitation in future years without taking chances with the basic responsibility of the Service which is the preservation of values which are so important but so often intangible.<sup>37</sup>

A prospectus was issued in July 1960 seeking bids from potential concessionaires. In March 1961, General Development Plan 3005 was approved by Director Conrad L. Wirth, who visited Fort Jefferson along with Regional Director Elbert Cox and Superintendent Warren Hamilton in December 1961. The demolition of the ruins of both quarters buildings to the foundations occurred in April 1962.

Director Wirth issued a Record of Decision in June 1962 stating that the government would construct all concessioner facilities necessary for visitor accommodation on Garden Key. He asked for a feasibility study that would include accurate cost estimates. The NPS planned to assign a maximum of two bastions in the fort to the concessioner. The present dock would be used jointly. Additional structures and docks would be determined by the feasibility study. The fort would also be used to house park employees. Maintenance buildings would be provided outside the fort walls.



Figure 23. Enlisted men's quarters during demolition, 1962. (DRTO 300792)

37 C. R. Vinten to Daniel B. Beard, July 24, 1957, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

NPS officials deferred any action on the feasibility study, as well as employee quarters, utilities, and dock facilities during the Cuban Missile Crisis of October 1962. In early 1964, Robert G. Hall, Chief, Eastern Office of Design and Construction, wrote Elbert Cox, Regional Director, Southeast Region, stating that the study should be undertaken. He also suggested that recent advancements in ship and plane construction might make quick trips to Fort Jefferson possible, minimizing the need for overnight visitor accommodations.<sup>38</sup>

Everglades Superintendent Stanley C. Joseph summarized the various opinions in an April 1964 memo. Concessioner-operated accommodations could be located in one of several places:

- On Garden Key outside the fort walls. Proponents pointed out that it had a superb view, it was most convenient to visitor activities, and it would confine concessioner activity to a small area outside the fort walls. Opponents feared that development there would detract from the impressiveness of the fort, and that it would be too exposed to storm and hurricane damage.
- On Garden Key inside the fort walls. The most likely location seemed to be the casemates.
- On Loggerhead Key. The 1957 conference strongly favored this site but regarded it as not feasible because the extremely shallow water would require prohibitively long piers or extensive channel dredging. Because of the exposed situation of the key, a pier or channel would be required on each side of the island to meet shifting weather conditions. It would be difficult to run and maintain a boat service between Loggerhead and Garden Key.
- A concessioner-owned and operated vessel that provided accommodations, meal services, etc. in a self-contained unit.

Superintendent Joseph stated the park's position:

To summarize, we feel that a development program at Fort Jefferson, with special reference to Service facilities, is long overdue. We encourage a feasibility study to determine visitor demand and concessioner potential. We recommend careful consideration of a self-contained vessel as an interim measure and as a possible solution to the concessioner problem.

At a meeting held in August 1964, NPS officials finally concluded that "visitor accommodations at Fort Jefferson are to be provided within the transportation media with no overnight visitor facilities on the Monument itself, with the possible exception of limited camping." All concession facilities would be located in the vicinity of the south coaling dock. A visitor comfort station within the fort casemates or one of the bastions and a seaplane ramp were later added to the planning requirements for Fort Jefferson.

Similar discussions occurred regarding additional employee housing. According to a 1954 Master Plan Development Outline, there was already one residence and one guest quarters in two of the former engineer officers' quarters. Two sets of quarters were located in the second tier casemates on the west side of the fort and one set was located on the southwest side of the fort. Locations for the new quarters discussed included houses on the parade ground, houses outside the fort, and apartments in the casemates. Supporters of apartments in the casemates made the following argument:

We finally arrived at a decision that the quarters should be apartments built on the second floor of the casemates. This was based on the fact that houses in the Parade Ground would be an intrusion in the historical area and that houses outside the Fort would be subject to destruction by hurricanes. We agreed that apartments in the casemates would be better in the end as they would avoid the disadvantages of the houses and have the advantage of being up out of the Parade Ground and at the same time protected by the walls of the Fort as well as having the advantage of being able to see the view outside as well as the activities outside and thereby improve living conditions and the morale of

38 Conrad L. Wirth to Regional Director, Region One, June 21, 1962; Maurice S. Sager, Chief Landscape Architect to Regional Director, Region One, March 13, 1961; Robert G. Hall to Regional Director, Southeast Region, February 26, 1964, Dry Tortugas National Park Resource Management Records Collection, DRT0 4378, South Florida Collections Management Center, Everglades National Park.

the employees and at the same time improve protection of the area.<sup>39</sup>

Edward S. Zimmer, Chief, Eastern Office of Design and Construction, concurred with the idea of placing employee quarters in the casemates but withheld approval of the project for FY 1962 until some of the details could be worked out. Supervisory Park Ranger Roy S. Evenson wrote a memo in July 1960 protesting the decision to locate the quarters in the casemates.

Fort Jefferson is a historical landmark, and much of the scenic beauty has already been depreciated by the National Park Service using many of the lower casemates for offices, storerooms, generator rooms, shops and guest quarters. The second tier casemates have three residences, which detract from the beauty of the fort. To build additional new residences, would only add further depreciation of the scenic beauty.

The major reason why the second tier casemates are wrong for residences is the moisture factor. In cold weather the thick, brick walls become cold and hold the cold for days. When warm weather follows the cold, condensation forms on the walls for days. This condensation may become so bad that walls are wet and floors slippery for days. . . . Methods of painting the walls, plastering, using rubberized bases and moisture absorbing coverings have all failed in stopping the condensation, but PCP B016 does not take these factors into consideration, nor does it offer a solution.

Every residence built in the second tier casemates has a bad history of leakage through the roofs (actually the brick archways). After heavy rains, the bricks act as sponges for the water, until they are saturated, then they release

their moisture. The leaks may vary from drips to streams, and whole rooms may be soaked and water standing over a whole residence. A secondary ceiling might retard the leaks, but usually the volume of water coming through the brick archways is too great to be kept out. PCP-16 does not offer a solution for this problem.<sup>40</sup>

The cost of constructing the six apartments also came into question. Although \$120,000 was originally programmed for the quarters, final estimates came to \$280,000 and would require Congressional clearance. The Cuban Missile Crisis deferred construction projects at Fort Jefferson until 1964, when a Project Construction Proposal was sent forward to restore residence #3 on the parade ground to provide a two-unit apartment at a cost of \$35,900. Regional Director Elbert Cox asked that the proposal be deleted from the Project Construction Program in September 1964, stating that General Development Plan 3005 approved in 1961 called for the structure to be retained as a ruin.<sup>41</sup>

A new master plan was developed in 1965 and approved in 1967. It called for as many as twelve new employee quarters to be located in the casemates (which would replace the previously built casemate quarters), a concessioner-owned and operated vessel that provided overnight accommodations, meal services, etc., a new dock to serve both visitors and NPS needs, a seaplane ramp, and limited picnicking and camping sites. A historic structure report (HSR) would be required before any construction could be undertaken within the fort. An interpretive prospectus would also be required before any plans could be

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39 Stanley C. Joseph to Regional Director, Southeast Region, April 29, 1964; W. E. O'Neil, Jr., August 12, 1964, Development – Fort Jefferson NM; Stanley C. Joseph to Regional Director, Southeast Region, October 23, 1964; Carroll A. Burroughs to Regional Director, Southeast Region, December 10, 1964; Superintendent, Everglades to Chief, Eastern Office, Division of Design and Construction, May 15, 1959, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

40 Edward S. Zimmer, Chief to Regional Director, Region One, May 29, 1959; H. Reese Smith, Acting Regional Director to Superintendent, Everglades, August 14, 1959; Chief, EODC to Superintendent, Everglades National Park, November 19, 1959; Roy S. Evenson, Supervisory Park Ranger, Fort Jefferson National Monument to Superintendent, Everglades National Park, July 6, 1960, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

41 John B. Cabot, Acting Chief of Design and Construction to Chief, Eastern Office, Division of Design and Construction, October 26, 1961; Paul N. Heaton to Regional Director, June 9, 1964; Elbert Cox to Director, September 24, 1964, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

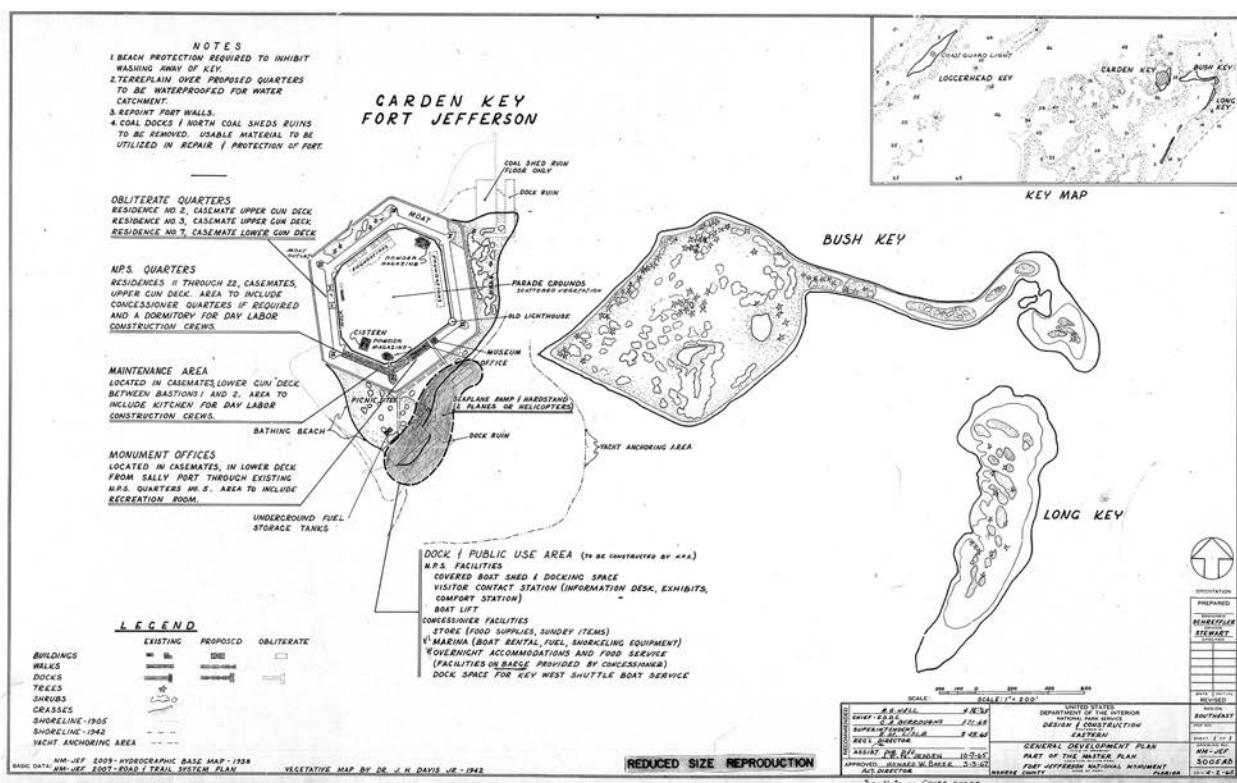


Figure 24. General Development Plan, 1967 (Denver Service Center etic 364/3005AB)

prepared that would involve concessioner facilities and services.<sup>42</sup>

The park rehabilitated the main electrical distribution system in 1965.<sup>43</sup>

### Post-Mission 66, 1967-Present

As NPS officials considered how best to accommodate visitors and staff, the condition of the fort itself continued to decline, as described in a 1970 physical status report:

It is apparent that continued deterioration of the total structure will occur from several causes. The forces of nature, wind, rain, salt environment, hurricanes, storm tides, etc., will continue to take their toll. In addition to these damages, damage will continue from weaknesses within the structure such as the

cracks which permit the leaching out of the mortar.

It might be said that the “point of no return” has been reached for this historic area. Either a strong concentrated effort must be made to stabilize and save this structure or it will surely and eventually crumble into the sea.

The construction of a new reinforced concrete pier and seaplane ramp east of the old timber pier finally occurred in 1968. By this time, a picnic and camping area had been added west of the two docks. The timber pier was replaced in 1980 with a new pier with visitor contact and comfort station. In June 1980, Public Law 96-287 established new boundaries.<sup>44</sup>

The selected and approved treatment of Fort Jefferson, as described in the 1983 General Management Plan (GMP), was stabilization of structurally critical areas throughout the fort

42 The Master Plan, Development Analysis, January 1965; Chief, Division of New Area Studies and Master Planning to Chief, Office of Resource Planning, March 13, 1967, DRTO 4378, South Florida Collections Management Center, Everglades National Park.  
43 William M. Alexander, “Historic Structure – Physical Status Report, Fort Jefferson National Monument, Dry Tortugas, Florida,” 1970, South Florida Collections Management Center, Everglades National Park.

44 Alexander, 8; W. E. O’Neil, Jr., Chief, Design and Construction to Assistant to the Regional Director, Program Coordination, November 8, 1967, DRTO 4378, South Florida Collections Management Center, Everglades National Park.; Denver Service Center etic 364/41000, 1968; 364/41009, 1975.



**Figure 25.** Campground and seaplane before seaplane ramp constructed east of the dock, 1960s. (EVER 300922)

(all scarp walls, bastions, outer works, the shot furnaces, magazines, etc.) and selective interpretive restoration of certain limited elements. The importance of the dockside front to the visitor's impressions and experiences would be recognized but emphasis would be placed on stabilizing the entire structure. The GMP called for a historic structure report that included both a historical data section and an architectural data section, which was completed in 1988.

A 1986 report summed up the problems with any large-scale project at Fort Jefferson:

Fort Jefferson NM is one of the most remote and isolated units in the Park Service. Transportation of personnel and supplies by either float plane or sea going vessels, limited quarters and communications, and the harsh, unpredictable marine climate make accomplishing any task at this site extremely difficult.<sup>45</sup>

The fort utility systems were rehabilitated in 1985. Between 1976 and 1991, additional quarters were added in the casemates. Existing quarters were entirely rebuilt between 1978 and 1992. The installation of a pre-fabricated housing unit in the second tier casemates was completed in 1999.<sup>46</sup>

In 1992, President George H. W. Bush signed legislation establishing Dry Tortugas National Park, replacing Fort Jefferson National Monument and recognizing the unique marine natural resources

45 Thomas V. Baltzell and Paul Hatchett, "Project Analysis Report Preservation of Lower Tier Embrasures at Fort Jefferson National Monument" (Atlanta: Southeast Regional Office, 1986), 5.

46 Denver Service Center etic 364/41001B, 1975.

and submerged cultural resources of the park, in addition to Fort Jefferson and the other cultural resources on Garden and Loggerhead Keys.

A terreplein waterproofing project occurred in 1993. An Australian pine eradication program, concentrated on Loggerhead Key, occurred from 1995 to 1999.<sup>47</sup>

## 2000-2009

The park installed new benches in 2000 and a temporary radio antenna at Bastion 1 in 2003. The reconstruction of the hot shot furnace occurred from 2001 to 2004.

The 2001 GMP Amendment established several long-term goals to protect the resources of Dry Tortugas National Park. They included:

- Stabilization of all historic structures at Dry Tortugas, including Fort Jefferson and the Loggerhead Key Lighthouse.
- Restoration of one example of each type of armament and the hot shot oven.
- Provision of only minimal onsite visitor services and facilities.
- Establishment of a Research Natural Area (RNA) in the west section of the park (46%) and a natural/cultural zone in the east and south sections of the park (50%). A historic preservation/adaptive use zone (3%) would be applied to Garden Key and the waters around Bush and Long Keys. The central portion of Loggerhead Key would also be designated historic preservation/adaptive use.<sup>48</sup>

In FY 2001, the park received funding for stabilization, repair, and reconstruction work on the right side of Front 2 between embrasures 31 and 35 with the goal of reconstructing 3-4 embrasure openings and associated scarp wall brickwork.

47 Louis Anderson, *Historic Structure Report: Architectural Data Section* (Denver: Denver Service Center, 1988), 17; Jerry W. Cheeseman, Lt. Col., USAFR to Alan Scott, Dry Tortugas National Park, February 4, 2007, DRTO 4378, South Florida Collections Management Center, Everglades National Park; LAS, 90, 163; Superintendent's Annual Narrative Report, DRTO, 1999, 2000, Southeast Regional Office (SERO) archives; 364/41011B, 1985.

48 LAS, 73.

Hurricane Charley damaged the counterscarp, floating docks, and finger piers in August 2004. Dozens of downed trees and other plant debris had to be cut up and hauled away. Sand pushed into the campground had to be cleared away.

In December 2004, the park's campground reopened following more than a year's closure. Significant, heavy rains in June 2002 destroyed the septic system, which required the design of a new waste water system. The park completed its installation and the construction of four composting toilets in the campground to replace those on the dock in 2004.

The rehabilitation of the timber boathouse docks, ramps, and moat bridge was completed in 2005. Phase 1 stabilization of the scarp wall reached ninety percent completion.

The park suffered hurricane damage in 2004, but 2005 was a record year. Hurricanes Dennis, Katrina, and Wilma all struck the Dry Tortugas. At Fort Jefferson, damage occurred to the counterscarp wall, docks, employee quarters, the communications tower, and park utilities. After Hurricane Wilma, the park was closed for several weeks to allow staff to repair damages and remove downed vegetation. Finger piers remained partially unusable during 2005.<sup>49</sup>

49 Federal Highway Administration, "Final Construction Report, Dry Tortugas National Park, Monroe County, Florida," May 2005, DRTO 4378, South Florida Collections Management Center, Everglades National Park; LAS, 163; Superintendent's Annual Narrative Report, 2000- 2006, SERO archives.



**Figure 26.** Front 4 wall repair, June 2009. (SERO image)

The park and the Florida State Historic Preservation Office entered into a Memorandum of Agreement in 2003 to guide the fort's stabilization. Phase I stabilization of the fort walls included carefully removing the existing brick surrounding the embrasures on the lower level in order to gain access to the original iron elements and was 90% complete in 2006. In 2007, the park began Phase II of this project to repair the exterior scarp wall in the following areas: the north and east faces of Bastion 3, Front 4, the west and northwest faces of Bastion 4; Bastion 5, Front 6, and the northeast and east faces of Bastion 6, with a projected completion date of June 2011.

The Dry Tortugas Research Natural Area (RNA), a no-take no-anchor marine sanctuary covering 46% of the park, went into effect in January 2007. No consumptive recreational, management, or scientific activities will be permitted in this zone.

The replacement of three employee and two superintendent's quarters within the casemates with pre-fabricated housing units was completed in 2008. Also included was the addition of a modern roof over the units on Front 3.

A multiyear cannon conservation project began in 2007, with the goal of conserving all cannon by 2012.



**Figure 27.** Conserved Rodman cannon mounted on reproduction iron carriage and gun platform, 2011. (NPS image)



# Landscape Characteristics

Landscape characteristics include tangible and intangible aspects of the cultural landscape that individually and collectively give a landscape its historic character. Landscape characteristics range from large-scale patterns to site details and materials. These landscape character-defining features are used throughout the report to focus on the definition and details of the cultural landscape as it has evolved through time to the present.

## Spatial Organization

### Parade Ground

The centerpiece of the historic spatial organization at Fort Jefferson was a large, open parade ground with clusters of trees and buildings along the perimeter. Although their size and layout varied, parade grounds almost always had a consistent relationship with the surrounding buildings, which

were oriented with the front elevation facing inward towards this important central space. Period photographs from the 1860s show a fenced garden area located southwest of the center of the parade as well as enclosures for livestock. A central pathway running northwest to southeast connected the sally port with the officers' quarters, by far the most imposing building on the parade. In front of Bastion C (present-day 6) sat the original lighthouse. Ground penetrating radar conducted in 2006 found an anomaly in the southwest portion of the parade that was interpreted as the garden area and livestock pens based on historic maps.<sup>1</sup>

Engineer Department plans drawn during the construction of Fort Jefferson show the evolution of buildings on the parade ground that incorporated several factors identified in a recent study of historic military landscapes. These include siting and layout directly influenced by the local,

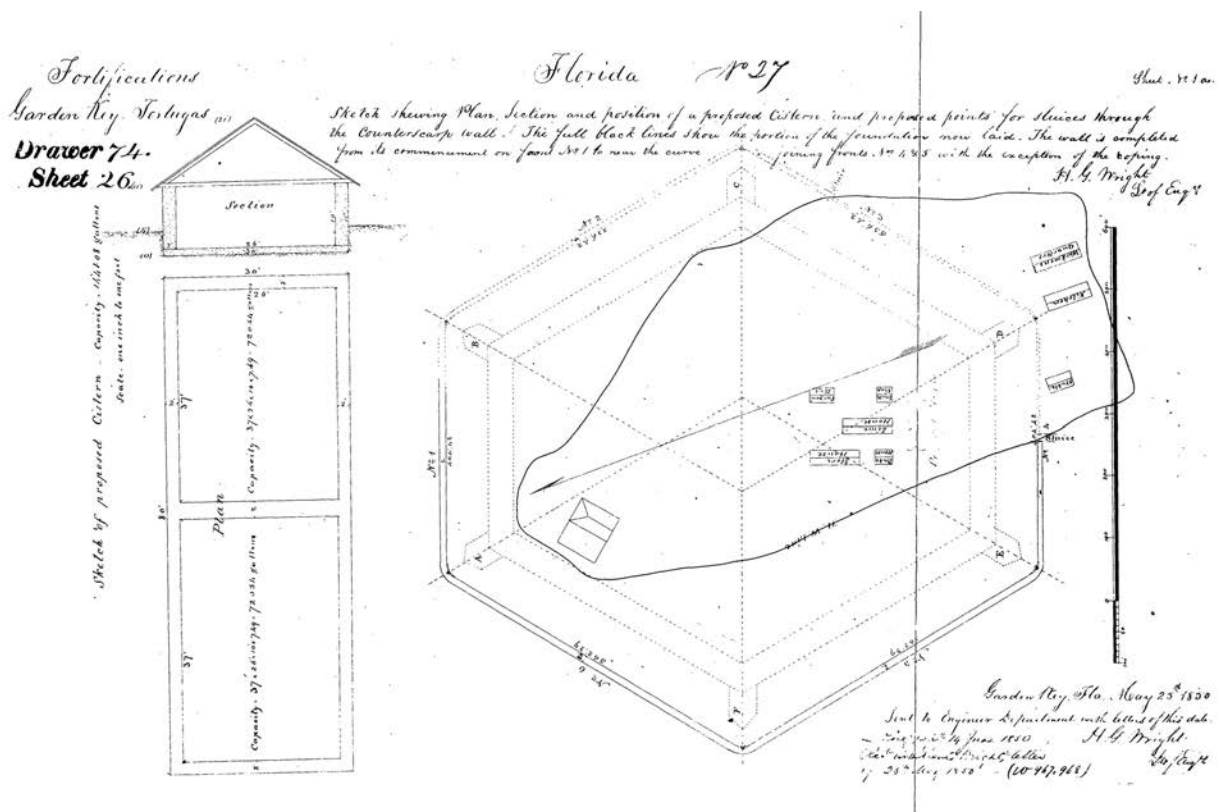


Figure 28. 1850 plan showing temporary structures. (National Archives, Record Group 77, Drawer 74, Sheet 26)



Figure 29. First block of the officers' quarters, 1863. (EVER 7396)

natural environment and military cultural values and traditions expressed in the landscape as a ranking hierarchy in building placement, landscape treatment, and uniform architectural styles. Plans from 1846 called for officers' quarters of identical design flanking Fronts 5 and 6 (present-day 3 and 4), enlisted men's quarters flanking Front 2 (present-day 6), several magazines, a hospital flanking Front 1 (present-day 5), a chapel/office flanking Front 4 (present-day 2), and a Navy store flanking Front 3 (present-day 1). Housing areas exhibited both hierarchy and uniformity through their size, style, and location of the quarters. Hierarchy was expressed through the placement of the structure with the highest ranking officers claiming the most prestigious spot.<sup>2</sup>

By 1854, five temporary frame buildings (storehouse, bakehouse, limehouse, smithery, and carpenter's shop) and a masonry cistern had been assembled at the southwestern end of the parade ground to assist construction of the fort. The first section of the officers' quarters with piazzas and detached kitchens had been completed, and these quarters were given the most commanding position on axis with the sally port. Outside the fort, workmen's quarters, mess house/kitchen, and stables were clustered to the south. In 1855, the stables were converted into workmen's quarters.<sup>3</sup>

2 Suzanne Keith Loechl, Susan I. Enscore, Megan Weaver Tooker, and Samuel A. Batzli, *Guidelines for Identifying and Evaluating Historic Military Landscapes* (Champaign, IL: U.S. Army Engineer Research and Development Center, 2009), 29, 73, 84.  
3 Manucy, *Construction History*, 65.

An 1861 plan shows changes necessitated by troops garrisoned at Fort Jefferson before the fort was completed. The storehouse, which burned in 1857, was replaced by a frame shed for storing lumber. This structure, as well as the original lime house, was turned over to the garrison as barracks. Crews converted the carpenter's shop into a commissary/storeroom. The smithery and bakehouse retained their original functions. Lime house (now called cement house), lumber shed, and carpenter's shop found new locations outside the fort near the engineer workmen's quarters, hospital, and cistern, clustered in an area west of the wharf. An account by post doctor Joseph B. Holder's wife Emily from 1862 described the parade ground being used to set up tents when a full regiment garrisoned the fort:

The parade was quickly converted into an impromptu camp-ground; tents were pitched, guns stacked, and, as if by magic, camp fires appeared with men sitting around eating, their knapsacks serving as tables, or reading the letters they found awaiting them. All were evidently delighted to be on shore even though the island was not larger than one of their fields at home in New Hampshire.<sup>4</sup>

By 1868, only one of the proposed officers' quarters on Front 6 (present-day 4), the enlisted men's quarters, three detached kitchens on Front 5 (present-day 3), two magazines (partially constructed), hot shot furnace, and chapel/office foundation (used as a cistern) had been built. An 1871 plan shows that no further construction progress had occurred.

A work yard in the rear of the officers' quarters and the enlisted men's quarters would have been associated with the detached kitchens built behind both buildings. The yard functioned primarily to accommodate the essential activities of food preparation, washing and laundering, and storage. It was also the location of latrines, privies, and perhaps trash pits. Ground penetrating radar performed behind the enlisted men's quarters found three anomalies that have not been identified pending ground truthing excavations.<sup>5</sup>

4 Emily Holder, "At the Dry Tortugas During the War: A Lady's Journal," *Californian Illustrated Magazine* 1, no. 5 (April 1892), 397; Bearss, 220.  
5 Lawson, 65.

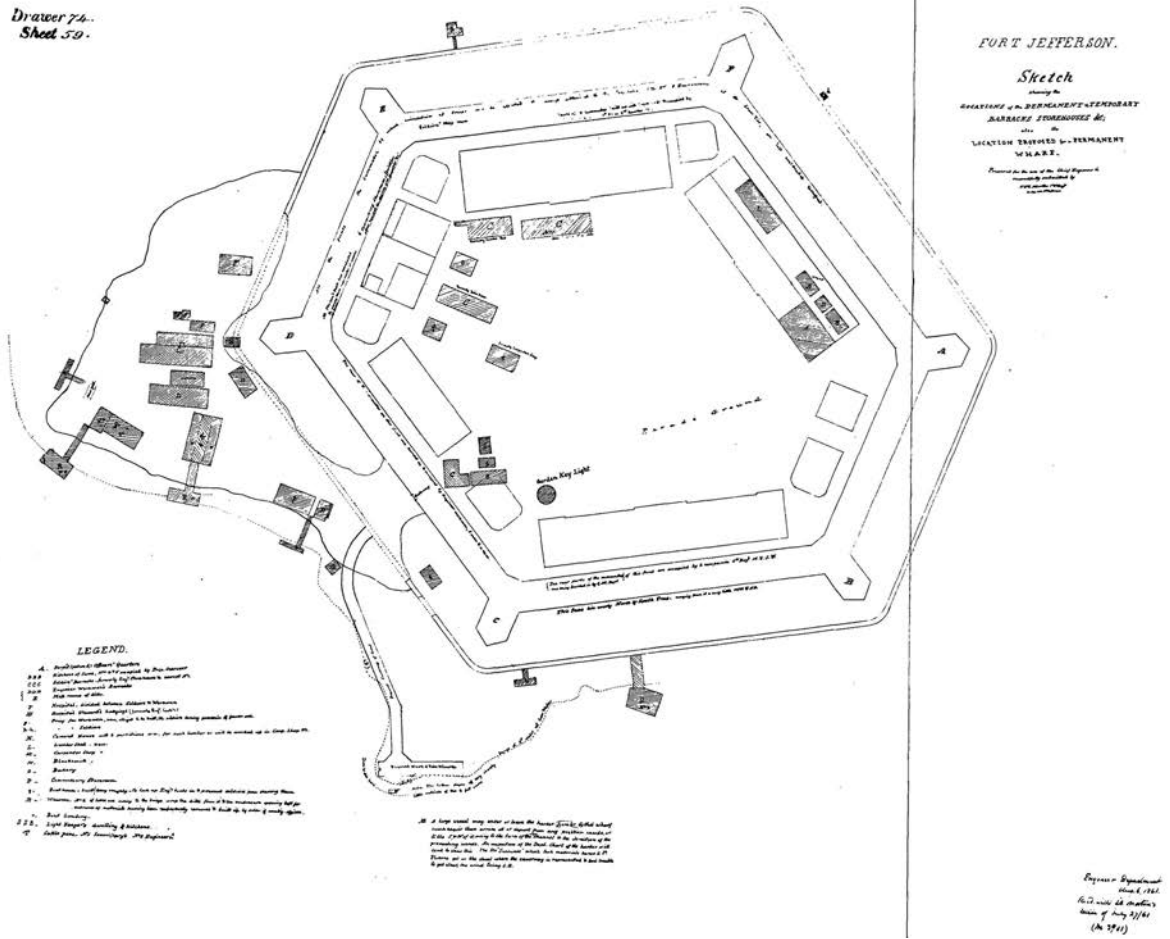


Figure 30. 1861 plan showing changes on parade and exterior. (National Archives, Record Group 77, Drawer 74, Sheet 59)

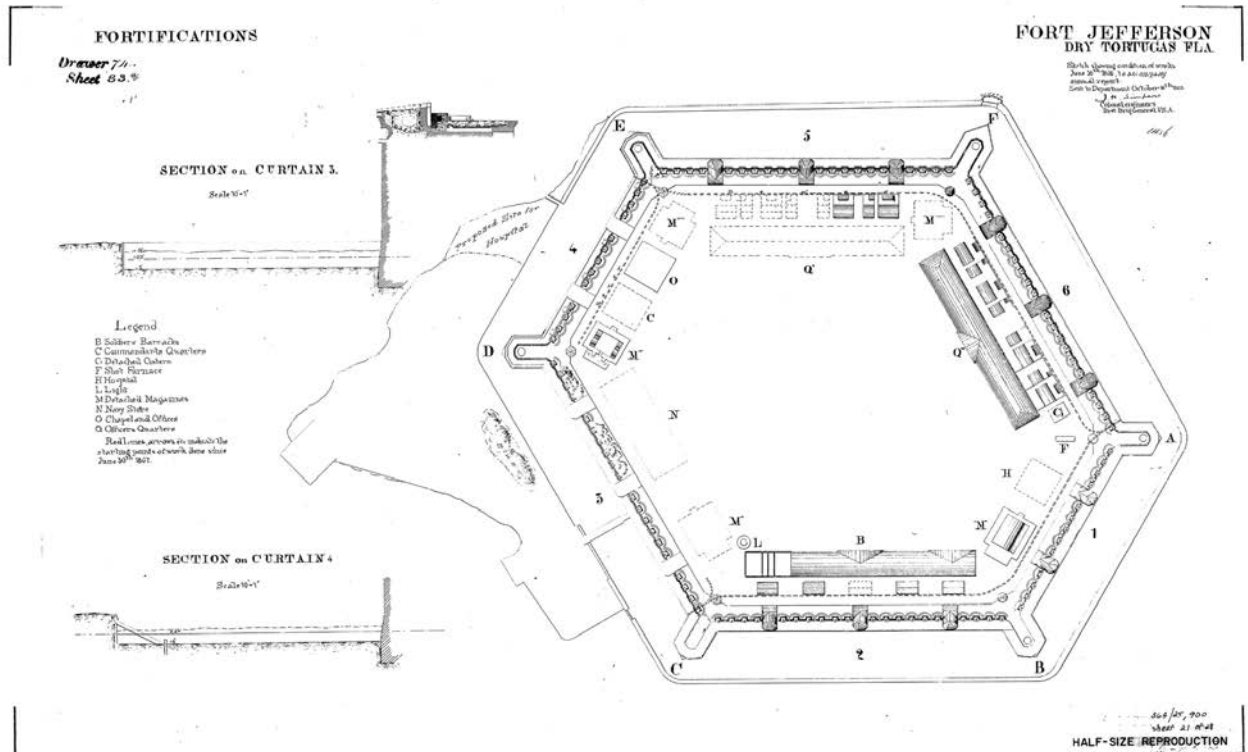


Figure 31. 1868 plan showing existing buildings on parade. (National Archives, Record Group 77, Drawer 74, Sheet 83)



**Figure 32.** Detached kitchens behind enlisted men's quarters, 1870s. (DRTO 300654)

Historic photographs of the parade from the 1860s show a fenced area cultivated as a garden near the center of the parade ground to the west of the main pathway, where livestock was sometimes enclosed. A grove of buttonwoods can be seen on either side of the main pathway. Coconut palms were planted near the sally port and small magazine. Secondary pathways branched off to other structures. Paling fences enclosed three detached kitchens used as engineer officers' quarters (see Figure 61).



**Figure 33.** Enclosed garden with buttonwoods on either side of path, 1867. (EVER 7393)

Two historic images from 1871 show the parade ground and associated buildings as largely unchanged from the description above, with one important exception. A row of coconut palms can be seen in front of the officer's quarters, giving the highest ranking officers the most impressive landscape treatment. Also, the completion of the quarters buildings allowed most of the temporary frame buildings to be removed from the parade ground.

Historic images from 1898-1901 show the same formalized spatial footprint dominated by the permanent brick buildings on the perimeter of



**Figure 34.** Parade ground with line of coconut palms, 1871. (National Archives 87861)



Figure 35. Parade ground with lightkeeper's residence, buttonwood grove, and ordnance-lined central path, 1901. (EVER image)

the parade connected by axial paths. Ordnance lined the primary path between the sally port and the officers' quarters, while secondary paths had stacks of ordnance along their lengths. An expanding grove of buttonwoods and more mature coconut palms in front of the officers' quarters and small parade magazine remained the primary vegetation on the parade ground. In these images, the enclosed garden space is gone, and troops camped on the parade ate under temporary sheds. The new lightkeeper's residence is enclosed by a combination of paling and wire fences, and the iron light tower is visible in the background. As noted above, the Major Smith monument is visible as well.



Figure 36. Parade ground with buttonwood grove, coconut palms, and temporary sheds, 1898. (EVER 7403)

An Existing Conditions map of Garden Key from 1938 shows the spatial footprint of buildings and ruins relatively unchanged. Missing is the fenced garden area and any evidence of the formal pathways that linked buildings. Also missing are the coconut palms in front of the small magazine and the officers' quarters, but some of the buttonwoods remains. A project to rehabilitate the engineer

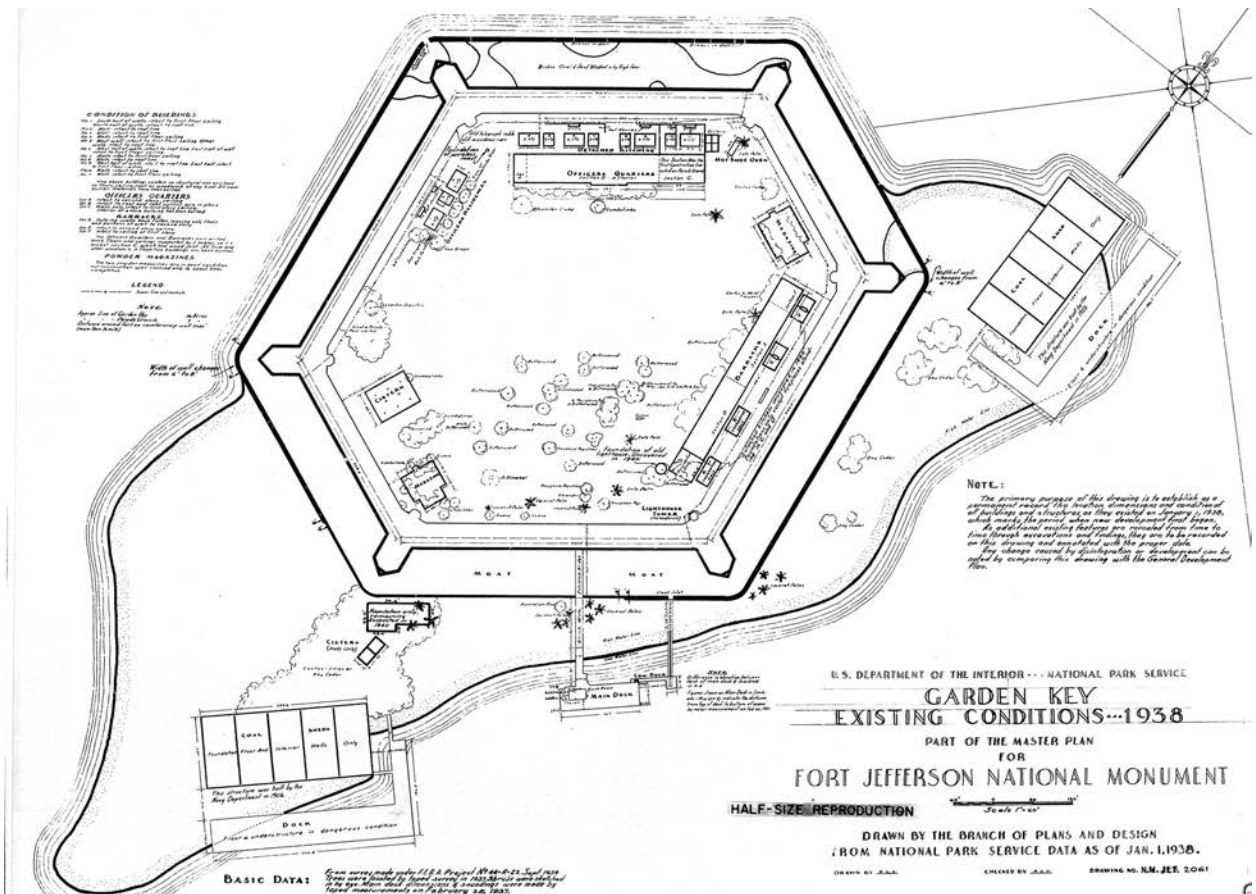


Figure 37. Existing Conditions map, 1938. (Denver Service Center etic 364/2061)



**Figure 38.** View of parade ground and sally port, 1935. (DRTO 301192)



**Figure 39.** View of parade ground from enlisted men's quarters, 1937. (DRTO 300993)



**Figure 40.** Enlisted men's quarters demolition, 1962. (DRTO 300673)

officers' quarters, completed in 1940, left one building still in ruins.

In April 1962, the ruins of both quarters buildings were demolished to the foundations, leaving the footprint of the structures. The plan was to use the rubble from the demolition to rehabilitate the counterscarp wall. A general cleanup of the rubble within the foundation areas had been



**Figure 41.** Original lightkeeper's quarters, 1867. (National Archives 77-F-74-79D)



**Figure 42.** Original lighthouse, 1867. (EVER 7404)

accomplished by March 1965, still leaving large amounts of brick and some steel around the edges of the building foundations.<sup>6</sup>

### Garden Key Lightkeeper's Complex

Images from the 1860s capture elements of the lightkeeper's complex. Just northeast of the sally port sat the original lighthouse, lightkeeper's residence, outbuildings, and other landscape features, enclosed by a paling fence. Images from 1871 show the lighthouse still standing, before damage by a hurricane in 1875 that required its removal and replacement by the iron light tower in the angle of Bastion C (present-day 6) in 1876. The lightkeeper's residence was replaced around that time by a structure with wrapping porches.

<sup>6</sup> Acting Superintendent, Everglades to Regional Director, Region One, June 2, 1961; Superintendent, Everglades to Regional Director, Region One, April 30, 1962; Carl S. Christensen, Acting District Manager, Fort Jefferson to Assistant Superintendent, Everglades, March 23, 1965, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

# TORTUGAS HARBOR

## LIGHT STATION, FLORIDA.

Buildings Surveyed, March 6<sup>th</sup> 1887 by A. C. BELL, L. K. Surveyor.

Scale,  $\frac{1}{400}$

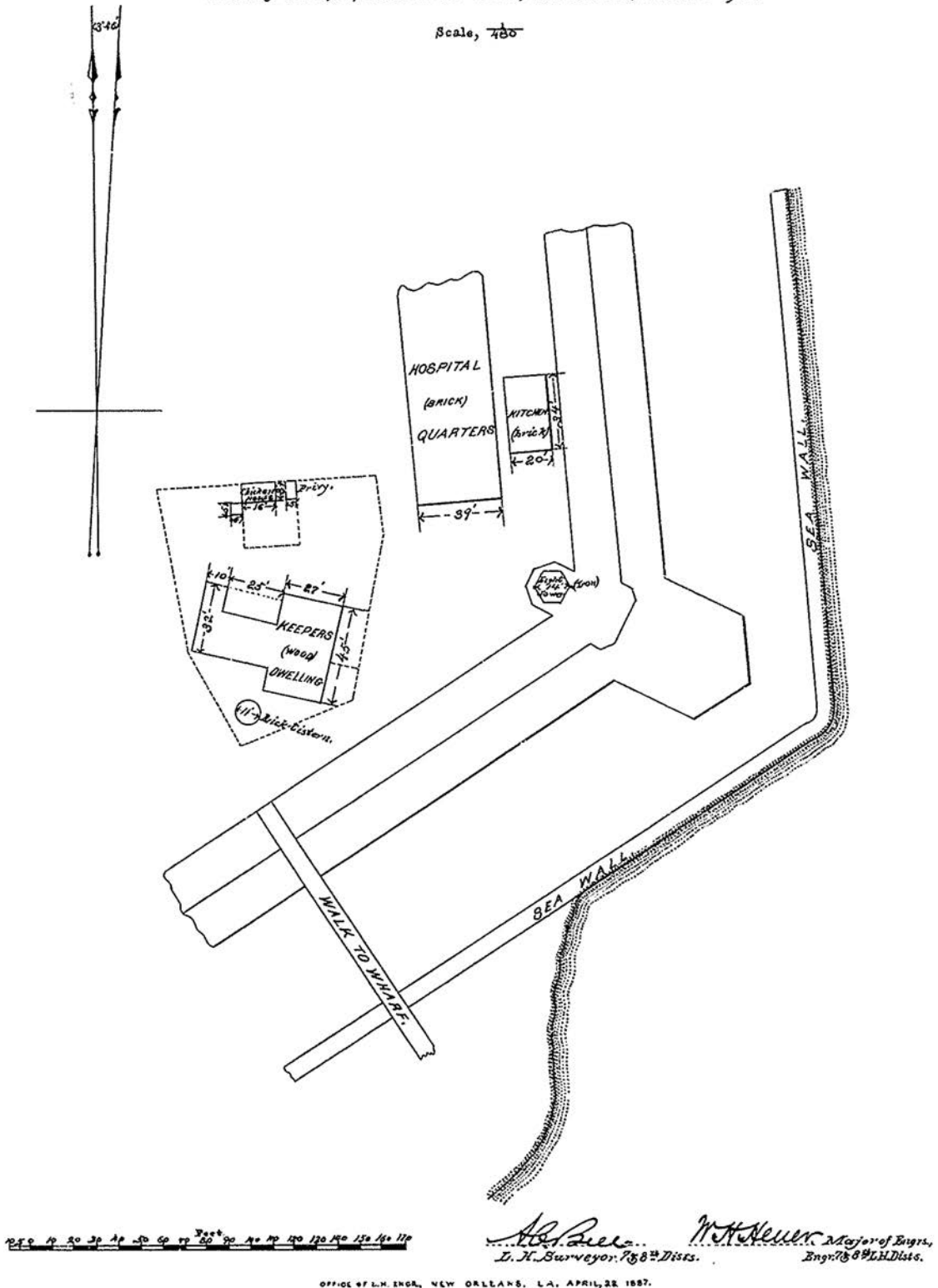


Figure 43. Light keeper complex, 1887. (Denver Service Center etic 364/25901)



**Figure 44.** 1876 iron light tower and complex, 1898. (EVER 7349)



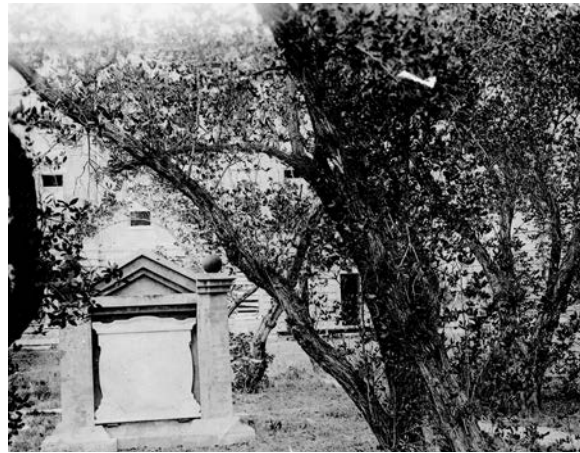
**Figure 45.** Lightkeeper's complex, 1913. (USGS Photographic Library drb00115)

Associated outbuildings included a chicken house, privy, and brick cistern enclosed by paling fences.

A 1903 plan shows the light-keeper's quarters still enclosed by a fence and the major buildings on the parade, which are unchanged (see Figure ???). An image taken in 1913 shows the wire fence that enclosed the complex, the foundation of the structure, a downed palm, and other trees.

### Major Smith Monument

Dr. (Brevet Major) Joseph Sim Smith, the Fifth Artillery's surgeon, died of yellow fever in 1867. A marker was erected to his memory around 1870. Its location on the parade was west of the enlisted men's quarters in a grove of buttonwoods. It can be seen in historic photographs surrounded by a concrete edging that also enclosed nearby buttonwood trees, which were still there in 1928. Images from the 1930s show that some of the buttonwoods had died or been taken out. It was described in 1937 as "the restful and peaceful setting of the monument erected in memory of Brevet Major Joseph Sims Smith." Ground



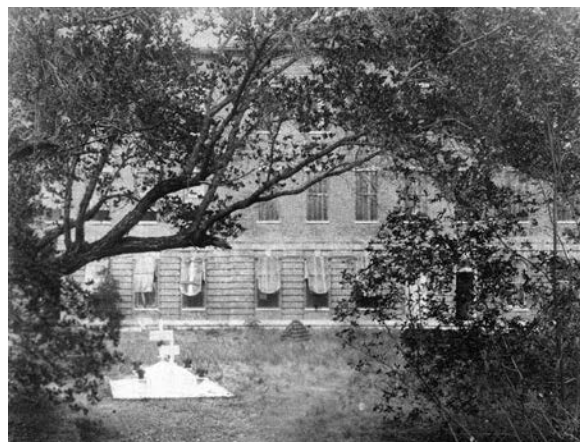
**Figure 46.** Major Smith Monument, c. 1898. (DRTO 301154)

penetrating radar studies found the remains of the edging foundation, some of which can be seen aboveground.<sup>7</sup>

### Italy Grave

Located southeast of the Major Smith monument was the "Italy" grave, believed to be the resting place of the wife of William H. Italy, the last light keeper on Garden Key before the light tower was automated in 1912. In April 1935, Colonel W. H. Noble excavated the site of the grave and "upon reaching a depth of two feet through sand and coral formations, contact was made with a wooden casket." It is documented in 1937 images and maps. The wooden marker present in 1937 had the date 1930, but that date likely refers to the year that Cuban fishermen erected the wooden cross for the unmarked grave, rather than the date of the actual

<sup>7</sup> Lawson, 23, 27, 37; National Park Service, "Cultural Landscape Inventory Fort Jefferson Landscape" (Atlanta: Southeast Regional Office, 2005), 24; Reid, 111.



**Figure 47.** Italy grave, 1900s. (National Archives RG 90)



Figure 48. Major Smith monument and Italy grave, 1937. (EVER 7144)

interment. Ground penetrating radar conducted in 2006 identified the probable near surface reflection of what remains of the grave.<sup>8</sup>

8 Earl L. Glaze, "Fort Jefferson Notes," 1982, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park; Lawson, 19, 76.

## Fort Exterior

The central feature of the fort's exterior was the wharf, where everyone and everything coming to Fort Jefferson landed. The principal wharf was opposite the sally port and a secondary wharf was located near the southern extremity of the key. A third wharf was built opposite Front 2 (present-day 6) to offload building materials during the height of construction. Support structures outside the fort were clustered in an area west of the principal wharf. A wooden tramway of light bar rails was constructed in 1861 to offload supplies from the principal wharf.

In 1883, the U.S. Light-House Board erected a wharf, buoy, and blacksmith sheds on the sand spit west of the principal wharf. The wharf collapsed in 1893, and the 1910 hurricane destroyed the blacksmith shed. In 1892, the U.S. Marine Hospital Service constructed a new wharf fronting the sally port, covered by a shed and two toilets. By

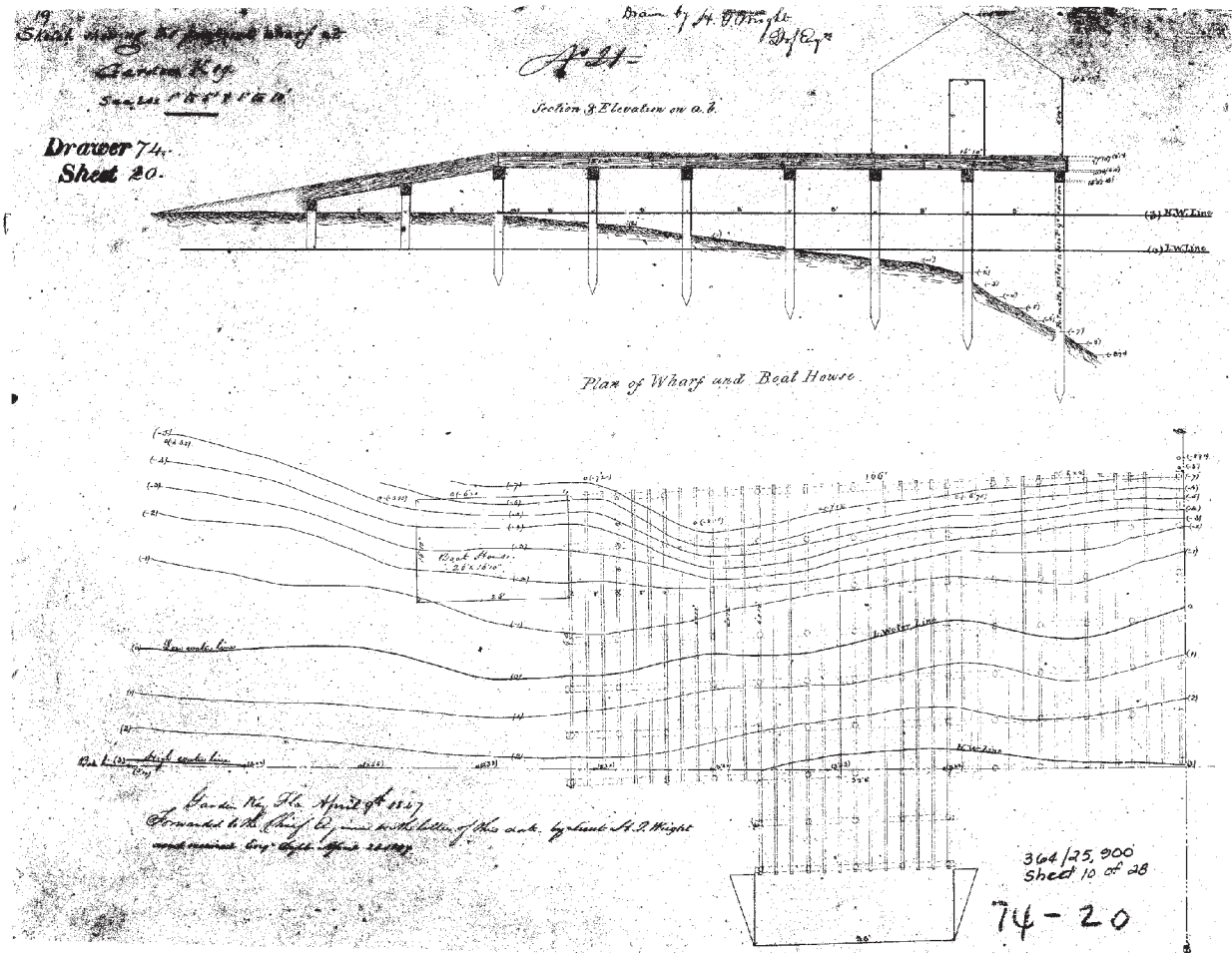


Figure 49. Plan of the principal wharf, 1847. (Denver Service Center etic 364/25900 sheet 10)

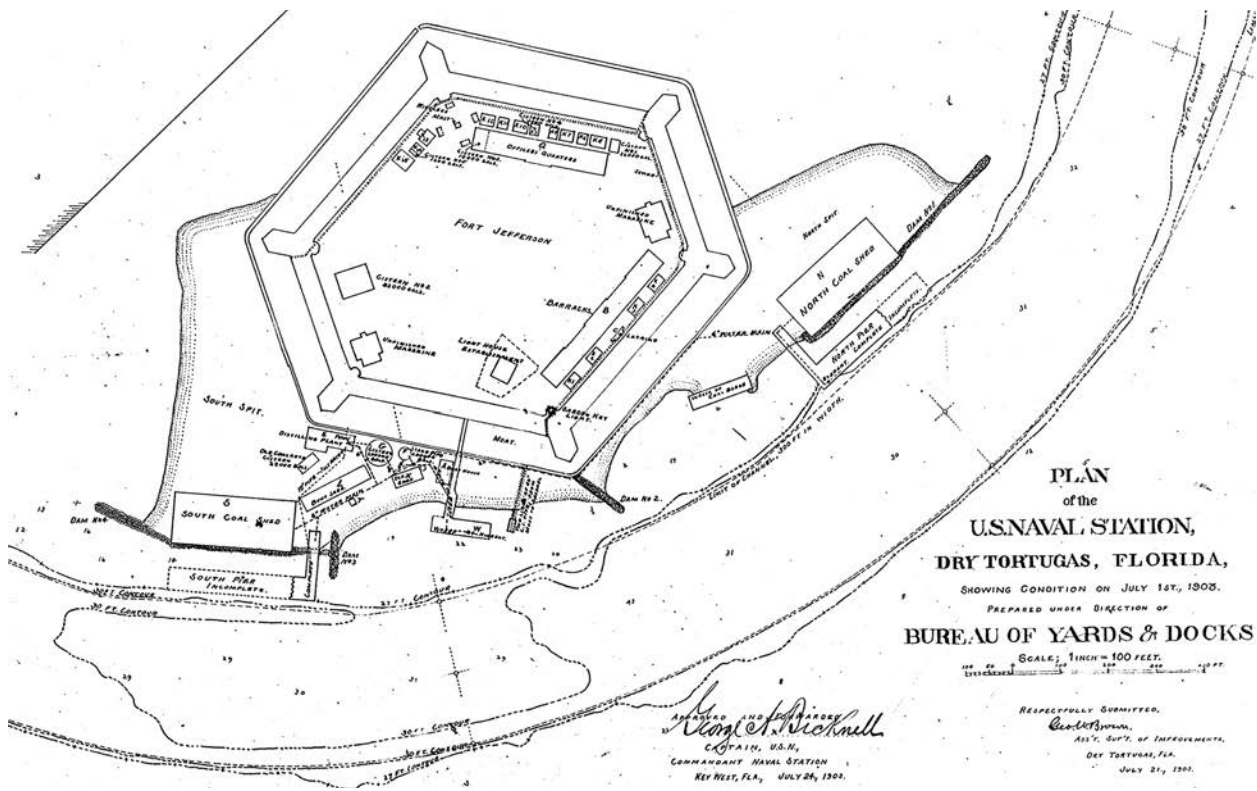


Figure 50. Plan of Naval coaling station, 1903. (364/60904A)



Figure 51. Construction of north coal depot, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



Figure 53. South coal depot, (DRTO 300639)



Figure 52. Construction of south coal depot, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



Figure 54. Damage to south coal shed, 1911. (USGS Photographic Library vtw00352)

1898, the support buildings needed for the fort's construction clustered around the wharf had been demolished.

At that time, the Navy began dredging the harbor channels and constructing a coal depot, which was completed in 1904. Twin coal sheds and piers were built to the north and south of the fort. At the southeastern corner of the fort, a condensing plant converted salt water to fresh water at the rate of 60,000 gallons per day. Plans from 1903 show the layout of the coal depot, including the distilling plant. In 1910, a hurricane wrecked the coal conveyors, and they were never repaired.

No new additions occurred to this area until visitor accommodations were finally agreed upon in the 1960s. By 1967, a picnic and camping area had been added west of the main dock facility. The replacement of the old pier with a new concrete pier with restrooms occurred in 1968 in conjunction with the construction of a seaplane ramp north of the main dock. Rehab/repair

projects occurred in 1975, 2002, and following damage by hurricanes Wilma and Katrina in 2005.

## Counterscarp Walk

Another important feature of the fort's exterior was the counterscarp walk. It provided the fort's inhabitants with a needed escape from the fort's interior spaces and was mentioned by Emily Holder in her account of life on the island (see Circulation).<sup>9</sup>

## Vegetation

### The Building of Fort Jefferson, 1846-1876

During a preliminary visit to the Dry Tortugas in 1829, Commodore John Rogers reported that seven of the keys were covered with mangroves and shrubbery, while the other four had little vegetation. In December 1846, Lieutenant Wright

9 Emily Holder, "At the Dry Tortugas During the War: A Lady's Journal," *Californian Illustrated Magazine* 1, no. 2 (January 1892), 90.

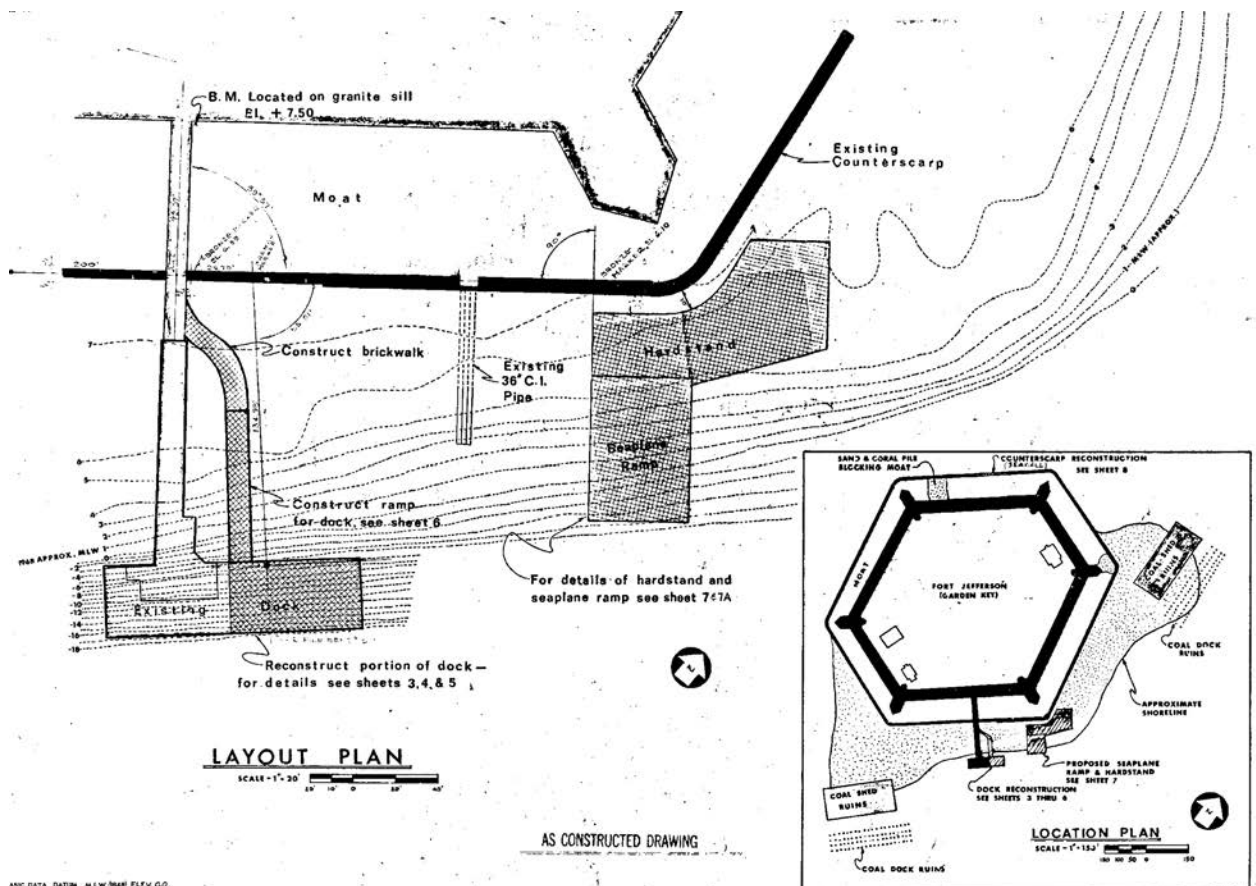


Figure 55. Plan of dock and seaplane ramp, 1968. (364/41000A)

described a barren group of eight islets vegetated with bay cedar (*Suriana maritima*), buttonwoods (*Conocarpus erectus*), and mangroves.<sup>10</sup>

Visitors to Garden Key in the 1850s described the vegetation. Emma Talcott was shipwrecked and came on shore around 1856:

We landed at a good Wharf, walked up to the house under the shade of a grove of mangrove trees, [and] admired some beautiful yellow flowers with which the Island was carpeted, and the Cocoa Nut trees overshadowing the residence of the lighthouse keeper. And [we] were received very kindly by Mrs. Whitehurst.<sup>11</sup>

Emily Holder, wife of post doctor Joseph B. Holder, arrived at Fort Jefferson in 1859. She described her first impressions of Garden Key:

One night took us to Fort Jefferson, that in time became known as the famous Dry Tortugas; and our first view in the early morning as we sailed in through the winding channel was surely suggestive of a prison. Over the top of the fort we caught sight of trees and the roof of a building with a tall, white lighthouse towering over all. The little keys that we had passed, some pure white, others with a few trees and shrubs, took away something of the isolated feeling. . . .

The walk, hard as cement and white as snow, partly shaded by the evergreen trees, led past the lighthouse and cottage of the keeper to the opposite side of the fort, where we were taken into a large, cool and pleasant house, and given a warm welcome by Captain Woodbury and his charming wife and family, who soon made us

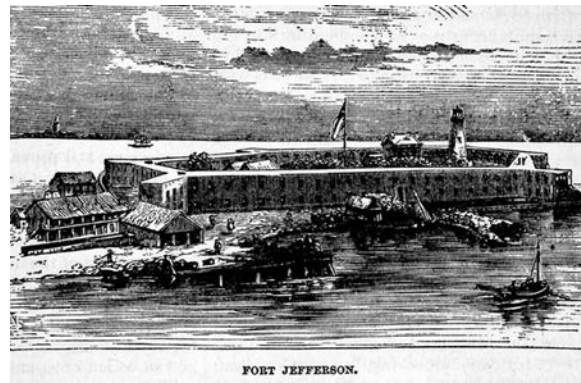


Figure 56. 1861 engraving of Fort Jefferson. (DRTO 300837B)

feel that a home does not depend upon locality, but in the hearts of the people. . . .

The wind coming in through the embrasures kept the shiny leaves of the mangrove constantly quivering; and the rattling among the coconut branches sounded not unlike gentle rain. Outside the deep blue water was covered with whitecaps, which broke into waves wherever the coral approached the surface.<sup>12</sup>

Construction photographs from the 1860s show a clump of buttonwood or gumbo-limbo (*Bursera simaruba*) west of the main path in front of the officers' quarters. Samuel Arnold, one of the Lincoln conspirators, described a group of coconut palms (*Cocos nucifera*), planted in front of the small magazine opposite Bastion D (present-day 1) and near the sally port:

On our arrival the island was entirely destitute of vegetable matter, with exception of some few bushes of small growth, natural to the soil, and about a dozen Cocoa nut trees planted many years back.<sup>13</sup>

A fenced area cultivated as a garden was near the center of the parade ground to the south of the main pathway. A grove of buttonwood trees flanked the circulation paths just north of the sally port and lightkeeper's quarters. Grasses and forbs grew on the terreplein during the Civil War.

- 
- 10 Gerli, 5; Bearss, 3-4, 40, 127; the mangrove ecological community includes four mangrove species: black mangrove (*Avicennia germinans*), buttonwood (*Conocarpus erectus*), red mangrove (*Rhizophora mangle*), and white mangrove (*Laguncularia racemosa*). Buttonwood thrives along the edge of brackish waters, while the other three species prefer a more consistently wet environment. Mangrove forests could have originally grown on Garden Key, and as sand was used to fill the parade ground, it is likely that buttonwoods became the dominant mangrove species.
- 11 Emma Talcott, "Shipwreck and Escape in the Tortugas," nd, South Florida Collections Management Center, Everglades National Park.

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- 12 Holder, "At the Dry Tortugas During the War: a Lady's Journal," *Californian Illustrated Magazine* 1, no. 2 (January 1892), 87-93; *Floripedia: A Florida Encyclopedia* <http://fcit.usf.edu/Florida/docs/t/tortugas.htm>
- 13 Albert Manucy, "An Autobiography of Samuel Arnold, A Lincoln Conspirator," *The Florida Historical Quarterly* 22, no. 2 (October 1943), 95.

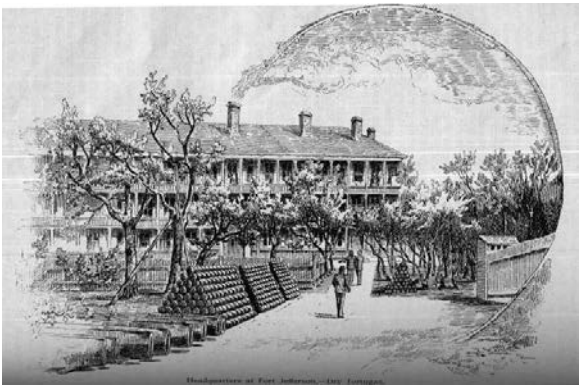


Figure 57. Sketch showing grove of buttonwoods and fenced garden area, 1862. (Courtesy *Californian Illustrated*)



Figure 58. Enclosed garden with clump of trees in the background, 1867. (DRTO 300657)

A number of soldiers' accounts of Fort Jefferson included descriptions of vegetation. Calvin Shedd, a member of the 7<sup>th</sup> New Hampshire Volunteer Regiment, wrote his family on March 6, 1862:

There are Beef Cattle Horses Mules a Cow & Calf goats cocks & hens Parrots a few small Birds &c in the Fort. there is quite a number of trees here Black Mangroves & Red . . . There are also a number of CocoaNut trees with nuts on every tree they are a curious looking thing the nuts are different sizes from an egg to a quart bowl some of the trees have as many as a hundred nuts on them it is said they never get ripe here on account of the soil which is mostly coral land or rather no soil at all. we have Pitched our Tents in a Grove of Mangroves, Co G, are in the Grove of CocoaNuts.<sup>14</sup>

Also a description of the desolate nature of the keys on May 4:

14 Calvin Shedd to Wife and Daughters, March 6, 1862, Calvin Shedd Papers, University of Miami Special Collections Library, <http://scholar.library.miami.edu/shedd/letters/62mar06.html>.

I sent four flowers in my last as you will see if you have got it there are no seeds in the Desert & but few Flowers that I have seen those I sent grow on a running vine on the sand the Lord only knows how for there is no soil.<sup>15</sup>

Emily Holder also described the arrival of the 7<sup>th</sup> New Hampshire Volunteers and the transformation of the parade in 1862:

The scene in the moonlight, looking down from the ramparts upon their white tents among the mangrove trees, was charming, if one could forget that this same picture in another place must later mean a camp-ground with a battle field not far distant, blood, carnage, the whistling of cannon balls and the “zip” of the bullet, and broken hearts and homes.<sup>16</sup>

Dr. Joseph B. Holder was concerned about the lack of vegetables and citrus fruit for the burgeoning prisoner population at Fort Jefferson in 1864. He discovered that the herb purslane (*Portulaca oleracea*) grew on Loggerhead Key, and he had loads of it brought over and used as greens, boiled and served with vinegar and pepper.<sup>17</sup>

A member of the garrison at Fort Jefferson provided a more detailed record of the vegetation:

The entrance to the fort is through a handsome; well-built, and massive sally port, immediately inside which is the garrison guard-house. The view, on entering, is, I imagine, to a stranger, rather pleasant. On the right of the entrance is the light-house and residence of the keeper; on either side are cocoanut trees, furnished with a dozen or two large green nuts that never seem to ripen. Trees, green all the year round, and Spanish grass, planted with great care and watchful tenderness, greet the eye quite refreshingly. Underneath the trees, long ranges of shot piled symmetrically and great guns not mounted yet, remind the visitor, should he for a moment be inclined to forget the fact that he stands within the inclosure [*sic*] of one of the

15 Calvin Shedd to Family, May 4, 1862, Calvin Shedd Papers, University of Miami Special Collections Library, <http://scholar.library.miami.edu/shedd/letters/62may04.html>.

16 Emily Holder, April 1892, 397.

17 Reid, 71.

greatest fortresses in the United States. A well-kept, hard-cemented walk leads in a straight line from the sally port to the officers' quarters. In the centre of the fort is a miniature garden, nicely railed in, in which tropical fruits and vegetables are supposed to grow. What its actual production for the last two years has been I am unable to state. It is, however, well watered and kept in good order, and makes a nice show to strangers, which is something. Our best water is the rain, which we catch and confine in cisterns. We have also steam machinery in full running order, capable of condensing several thousand gallons per day. Part of the troops, owing to the other buildings being unfinished, are quartered in the upper casemates, which are perfectly airy, pleasant, and constantly whitewashed. The greatest want experienced on the island is that of vegetables. Occasionally we get watermelons, bananas, and pineapples from Cuba, which sell at very extravagant prices; a good head of plain vulgar cabbage, so little esteemed in the outside world, would sell readily for a dollar here. The wonder is that some "live Yankee" does not settle somewhere on the coast of Florida and supply this place and Key West with vegetables, fruit, eggs, and butter. One with a moderate capital and energy would shortly realize a fortune. An attempt was made last summer to establish a garden on Loggerhead, two miles distant from the fort. This island contains about twenty-five acres, the soil consisting altogether, of coral sand, covered with cactus; but the idea was abandoned, the labor, expense, and inconvenience attending it being too great a price to pay for any doubtful good to be derived.

I have endeavored to give some idea of this out-of-the-world fortress and its surroundings. Strangers landing here for a few hours, no doubt, may indulge in rhapsodies about its beauty, its few cocoanut trees, just like those in pictures that adorn little missionary tracts, its apocryphal banana trees, its luxuriant grass and evergreen foliage; but perhaps if they were doomed to a three years' residence on this barren, broiling, coral island, their ideas would

be considerably modified, and a good deal of the rosy tinting bleached out of their pictures.<sup>18</sup>

Dr. Samuel Mudd, imprisoned at Fort Jefferson from 1865 to 1870, mentioned the garden in early 1867:

We have a garden in the center of the Fort, the soil or surface of which has been brought from the mainland. It is now luxuriant with all kinds of vegetables that have been planted—beets, peas, tomatoes, beans, radishes, etc. The few trees we have never lose their foliage and the cocoanut, the only tree bearing, always with its peculiar fruit. The flowers that are cultivated are always in bloom.

Colonel George St. Leger Grenfell, a British soldier who served with the Confederacy, tended the garden.<sup>19</sup>

A later letter also records that no bearing fruit trees were present:

Since I have been sick I have had the greatest desire for fruits, apples, peaches, etc. These we barely meet with, except in the very imperfect state of hermetically sealed cans. Although the State abounds in fruits at all seasons, we seldom meet with any. Occasionally a few oranges, bananas, and pineapples come on the boats, but the price is so enormous we can't afford to indulge in a plentiful supply.

In 1868, Mudd again wrote his wife about the vegetables in the garden:

My health continues good. The weather is quite pleasant in the shade. There are a great quantity of ripe tomatoes, peas, beans and "collards" in the garden, now suitable for table use. The corn is in silk, and soon there will be roasting ears. This does not contrast with the season with you. In the interior of the State it must be delightful.<sup>20</sup>

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18 A. O'D., "Thirty Months at the Dry Tortugas," *The Galaxy Miscellany* 7 (February 1869): 282-88; <http://fcit.usf.edu/florida/docs/d/dtthirty.htm>; probably a member of the 5<sup>th</sup> U. S. Artillery, who garrisoned the fort beginning in 1865.

19 Reid, 107; Nettie Mudd, *The Life of Samuel A. Mudd* (New York: Neale Publishing Company, 1906), 220.

20 Mudd, 276, 305.



**Figure 59.** Parade with buttonwood grove, coconut palms, and enclosed garden. (National Archives 87860)

Grenfell was reassigned to more physical duties in March 1868. He and three others escaped days later in the midst of a terrible storm. No trace of the boat or the other prisoners was ever found, and most thought that they could not have survived the intensity of the storm. It is not known what happened to the garden after his escape, but an 1870 report that described the fort stated:

There are no gardens at the post except a small one in the center, which is kept up more as a curiosity than for any practical benefit. . . .

Few or no fresh vegetables are to be had at the post, and for those exorbitant prices are charged.<sup>21</sup>

Historic images from 1870s show the enclosed garden area still present. One image shows a dovecote within the enclosed space and vines growing on the fence. It is unknown when this enclosed garden feature disappeared.

Dr. Joseph B. Holder, the surgeon assigned to the engineers at Fort Jefferson who was also trained as a zoologist, returned to Fort Jefferson after his family left in December 1865. He gave a detailed account of the parade vegetation in 1867:

On entering the fort the stranger is surprised to see a pleasant parade-ground of fine Bermuda grass—the choicest of all lawn grasses—and large groups of evergreen mangroves and buttonwoods. Towering above all are the elegant plumes of the cocoa palm. A neat walk leads to the officers' quarters through an arching group of mangroves, flanked by long rows of ordnance material. And as we approach headquarters a beautiful group of mangroves is seen, furnished with shady seats and lounging places, where the ever acceptable hammock swings invitingly.

Across the parade is a cottage, vine-clad and cozy. . . . Here in the cold month of November or December, or any time in the year, is the same display of rich foliage and flowers. The veranda, hand-rail, pillars, and all festooned and draped with jasmines, Thunbergias, morning glories, and cypress vines.

<sup>21</sup> Reports of Assistant Surgeon S. A. Sorrow, United States Army, and Acting Assistant Surgeon W.E. Day, United States Army, "A Report on Barracks and Hospitals with Descriptions of Military Posts" (Washington, D.C.: Surgeon General's Office, 1870), 155 ; Manucy, 64.

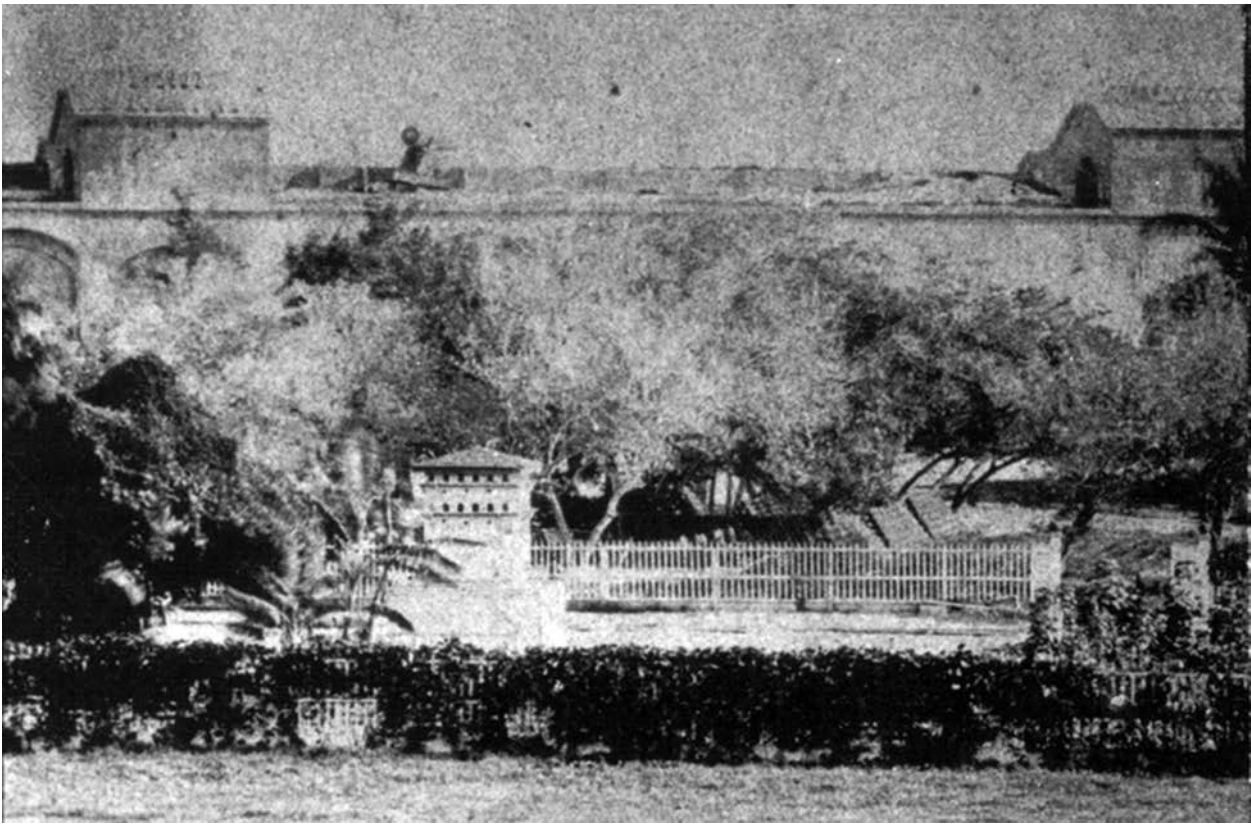


Figure 60. Enclosed garden space, 1870. (DRTO 300658)

Thunbergia has covered itself with glory, and now over a year old, is a perfect galaxy of white stars. The four-o'clocks are quite like shrubs, and no evening sun fails to receive a gentle courtesy from these many colored marvels.

The Dry Tortugas is not a perfect desert; most plants and tropical trees will flourish here. Here, at the end of the veranda, is a group of splendid bananas, and they have borne most delicious fruit; and their leaves are very grand and beautiful. These bananas are nearly ready to bear. When they get to be about fifteen feet high they are ready to fruit; and that takes only one year, for this is only an annual. As soon as one bunch of bananas has ripened the plant dies, and others shoot up from the root to bear the next year.

On the brick wall of the house, climbing nearly to the top, is the night-blooming cereus—long, triangular joints of green, which throw out numerous thread-like feelers that cling closely to the wall. What a glorious show they made last summer! With their great pond-lily-like flowers opening their pure white petals at evening, and

sending forth rich perfume until morn. Here is a banyan or wild fig, much like the banyan of the East Indies, for it throws down great numbers of slender branches to the ground, where they take root and support the horizontal limbs. On the fence grows one of the curious “air plants”—orchids. This specimen we found growing upon the dead limb of a tree at old Fort Dallas, on the Miami River, in Southern Florida, near the Everglades. It is a singularly beautiful object, having long spikes or heads, like wheat, that are richly colored, scarlet and blue with yellow anthers. The plant resembles the pine-apple. Gum-trees, castor-oil plants, date palms, and the curious, palm-like tapioca plant are here.

Those large clumps of maritime lilies are perfectly at home in the salt sand-soil, and give confidence to the tender gladiolus, and crocus, and dyeletras; . . . and some old-fashioned flowering annuals have been cheering us all winter with their bright faces. Marigolds, larkspurs, and hollyhocks are among them. The great vine which covers much of the cottage—an Ipomoea—is a native here, and is surnamed



Figure 61. Engineer officers' quarters with vines, 1867. (EVER 7392)



Figure 62. Small magazine with coconut palms, c. 1870s. (May CD)

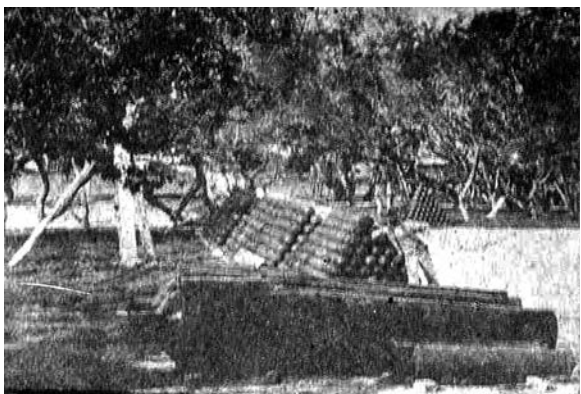


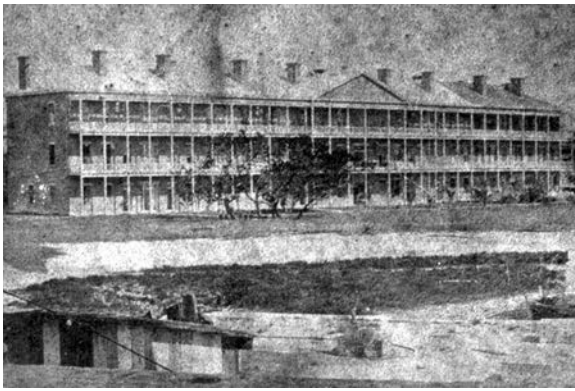
Figure 63. Grove of buttonwoods with ordnance, 1870. (DRTO 301205)

Bona Nox, or good-night, because it blooms about bedtime. This is a wonderful vine; every night during the past year hundreds of large silver-shaped white trumpets bloom out, and remain open until sunrise, reflecting the quaint music of the midnight sphinx in concert with the great ophicheides of the night-blooming cactus.<sup>22</sup>

Major impacts to the parade vegetation were hurricanes and livestock. In July 1865, an unauthorized member of the engineer corps transported hogs from Long Key to Bird Key, the site of scattered graves of Union soldiers who died at Fort Jefferson. Post Commander Major Henry Devendorf was outraged at the thought of hogs uprooting the shallow graves. Civil engineer Frost agreed that the hogs would be returned to their range on Long Key but complained that Devendorf had allowed cattle to be penned on the parade ground, where they damaged valuable shade trees:

I . . . request that so soon as their restoration to Long Key is accomplished - the above named individual be directed to employ the labor

22 Joseph B. Holder, "The Dry Tortugas: The Keys and the Fort", *Harper's New Monthly Magazine* 37, no. 218 (July 1868): 261-62.



**Figure 64.** Officers' quarters with palms, 1871. (DRTO 300895B)



**Figure 66.** Coconut palms in front of officers' quarters, 1898. (EVER 7330)



**Figure 65.** Grove of buttonwoods and palms in front of small magazine, 1898. (DRTO 300891A)



**Figure 67.** Grove of buttonwoods along main path, 1898. (DRTO 301208)

which he had been misapplying to his private emolument in the return of the Cattle Pen from the centre of the Parade to its former locality on Long Key—referring to reasons . . . foremost amongst which I place the rapid destruction now going on of the priceless shade trees within its limits.<sup>23</sup>

Nothing was done about moving the cattle back to Long Key until September, when there was a change in command. The great hurricane of October 1865 uprooted trees and broke open the cattle pen, releasing livestock to wander on the parade. An August 1886 hurricane also damaged palms and other trees on the parade.<sup>24</sup>

Although not evident in Civil War images, a line of coconut palms can be seen in front of the main block of the officers' quarters beginning in images taken in 1871. These palms continue to show

up in photographs through the early 1900s. The placement of these trees in a formal arrangement in front of the officers' quarters conformed to the hierarchy of military cultural traditions and reflected the officers' quarters' importance on the parade ground.

The primary vegetation on the parade ground seen in historic images from the 1890s is an expanding grove of buttonwoods and mature coconut palms in front of the officers' quarters and small parade magazine. Recently planted palms flanked the main path. The palms near the lightkeeper's residence remain but are much taller. There is no evidence of the enclosed garden area. The vegetation was described in an 1898 article:

The inclosure [*sic*] up to the time of the recent activities was a picture of desolation. Bushes had overgrown it, and there were trailing vines that trip the exploring visitor, and buttonwood

23 E. Frost, Asst. Engineer in Charge, J, to Maj. N. Devendorf, 110 N. Y. Vols., Commanding Post, July 18, 1865, South Florida Collections Management Center, Everglades National Park.  
24 Bearss, 258, 289, 374; Manucy 136,143-144; Reid, 88, 94.

trees in clusters. Thirty coconut palms have grown till their feathery tops are far above the walls of the fort.<sup>25</sup>

### Dry Tortugas Coal Depot, 1901-1916

A 1901 plan of the coal depot documented vegetation inside the parade. A grove of buttonwood trees flanking the circulation paths just north of the sally port and lightkeeper's quarters has increased in size. Palms and other trees remain in front of the officers' quarters and the engineer officers' quarters. Looking from the officers' quarters back towards the sally port, a large palm is shown to the left of the walk, probably one of a group of palms seen in other period photographs from the 1890s.

A 1903 image shows a row of gumbo-limbo trees in front of the engineer officers' quarters. Buttonwood or gumbo-limbo trees are seen in

front of the officers' quarters along a secondary path leading to the engineer officers' quarters. Some of these trees may be remnants of trees seen in images from the 1860s and 1871 (see Figures ???). Images from 1907-1913 show a relatively open parade beyond the grove of buttonwoods, coconut palms and other trees remain in front of the officers' quarters, and the allée of gumbo-limbo trees persisting. Several palms in front of the small magazine had their crowns broken off, leaving only three intact palms surviving from the group seen in images from the historic period. By 1913, only two survive intact.

A vegetation survey published in 1907 identified thirty black mangroves (*Avicennia nitida*), tamarind (*Tamarindus indica*), perfumed spider lily (*Hymenocallis latifolia*), and Indian almond (*Terminalia catappa*) growing on the parade ground. The survey probably misidentified the

25 "The Fort at Dry Tortugas," *The New York Times*, April 3, 1898.

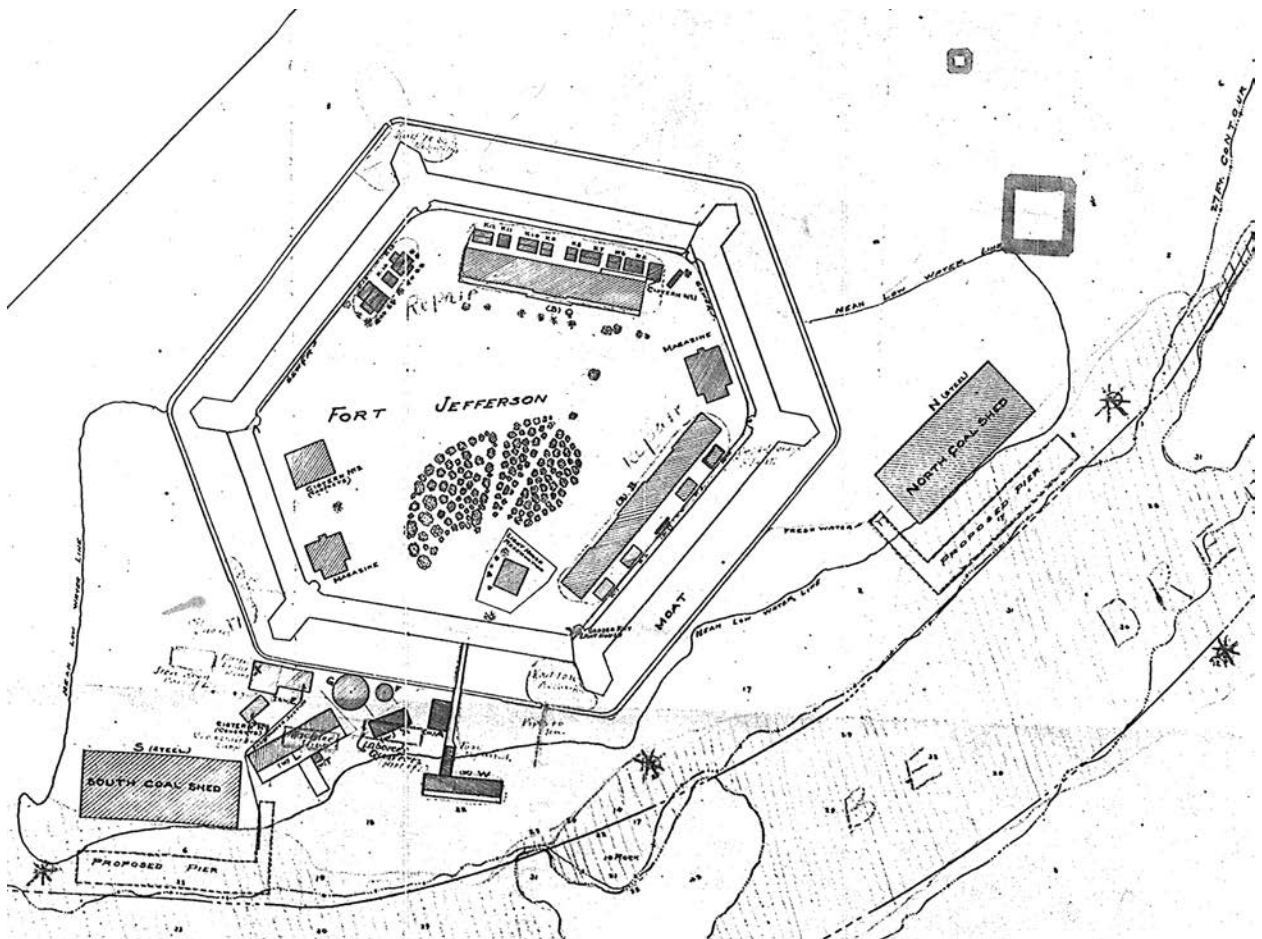


Figure 68. 1901 plan showing parade vegetation. (Denver Service Center etic 364/60904)



Figure 69. View looking to sally port from officers' quarters, 1898. (EVER 7342)



Figure 73. Palms in front of small magazine, 1909. (USGS Photographic Library vtw00302)

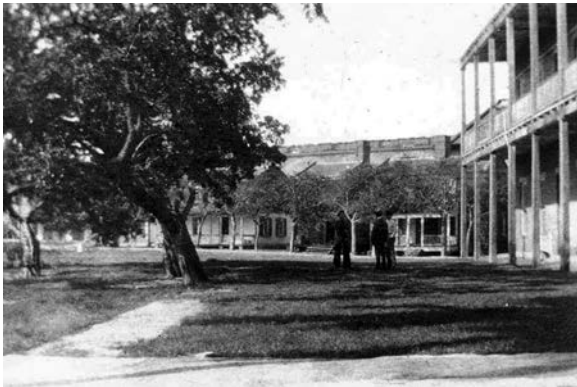


Figure 70. Vegetation looking toward engineer officers' quarters, 1903. (DRTO 301220)

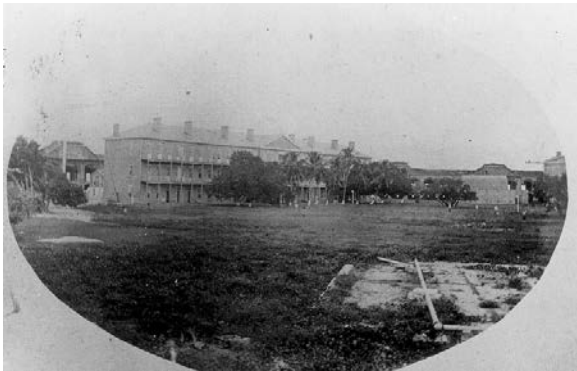


Figure 71. Open character of parade ground, 1907. (DRTO 301204)



Figure 72. Allée of gumbo-limbo trees, 1913. (USGS Photographic Library drb00114)

buttonwoods known to have been growing on the parade as black mangroves.<sup>26</sup>

### Intervening Years, 1917-1934

H. H. M. Bowman's study published in 1918 describes a lush parade ground. Among the plants noted were both natives and introduced species, including buttonwood, tropical almond, date palm (*Phoenix dactylifera*), Canary Island date palm (*Phoenix canariensis*), coconut palm, seagrape (*Coccoloba uvifera*), gumbo-limbo, tamarind, oleander (*Nerium oleander*), seaside mahoe/Portia tree (*Thespesia populnea*), and geiger tree (*Cordia sebestena*). He noted several clumps of false sisal (*Agave decipiens*) on the west side of the parade, and a thicket of gumbo-limbo and a guava (*Psidium uajava*) growing inside one of the powder magazines. It was noted that the caretaker burned the center of the parade ground yearly in an attempt to remove weeds, but to no avail. On the terreplein he noted many of the native strand plants and several gumbo-limbo trees growing in shielded crevices (see images in Appendix B).<sup>27</sup>

HABS photographs from 1934 shows a better-tended parade ground with a scattering of buttonwood trees, a few surviving coconut palms, and the row of gumbo-limbo trees in front of the engineer officers' quarters.

26 Charles F. Millspaugh, *Flora of the Sand Keys of Florida* (Chicago: Field Columbian Museum, 1907), 225-43.

27 Bowman, 127-28.



**Figure 74.** Workers burning the parade ground, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



**Figure 75.** Parade with thick grass and weeds, undated. (June CD)



**Figure 76.** Parade ground, 1934. (HABS 053112)



**Figure 77.** Date palm adjacent to officers' quarters, 1937. (EVER 7135)



**Figure 78.** Enlisted men's quarters and Major Smith monument, 1937. (EVER 7123)

## NPS Administration, 1935-Present

**Park Development Era, 1935-1941.** WPA workers pulled all high weeds in the parade ground in 1937, giving the parade a park-like appearance with Bermuda grass (*Cynodon dactylon*) established over two-thirds to three-fourths of the seven-acre parade. (Puderer, image 6, 48,?? Get park to scan Use in appendix?)

It appears that no coconut palms survived in front of the officers' quarters and that indiscriminate planting on the parade ground had already taken place by 1938. Coordinating Superintendent Kahler wrote that "no planting should be undertaken and the Australian pine should be removed." In 1939, three acres of weeds and cactus were cleared.

In 1940, surveys were made of the area around the superintendent's residence so that a plan could be prepared for walks, grading, and planting. It was suggested that some of the plantings at the south end of the house be thinned to improve air circulation. Also in 1940, "landscape gardening" was reported as part of the maintenance work accomplished during the year.<sup>28</sup>

28 Philip C. Puderer, Acting Superintendent to Herbert Kahler, Coordinating Superintendent, Fort Marion National Monument, May 18, 1937; Willard H. Morris to Herbert Kahler, December 15, 1937; Herbert E. Kahler, Coordinating Superintendent to R. M. Panton, May 21, 1938; ERA Work Accomplished Under Supervision of National Park Service, July 1, 1939 to December 31, 19; C. R. Vinten to Coordinating Superintendent, June 10, 1940; Job Completion Record, June 30, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

**World War II, 1941-1945.** The vegetation documented by John H. Davis Jr. in 1942 describes the parade ground covered with Bermuda grass and several buttonwood trees surviving from the historic period. The survey noted the lack of coconut palms in front of the officers' quarters that had long been present in historic photographs and that more buttonwood trees were present during the historic period. Additional coconut palms were planted after the NPS assumed administration of Fort Jefferson National Monument in 1935. The survey notes the presence of two *Agaves*— the century plant (*Agave americana*) and sisal hemp (*Agave sisalana*)— and Australian pine (*Casuarina euitsetfolia*). Plants documented by Bowman in 1918 were still present, including date and Canary Island date palm, guava, geiger tree, seaside mahoe/Portia tree, oleander, seagrape, gumbo-limbo, and tamarind (See Appendix for complete species listing). Davis reiterates what Bowman said in 1918 about the plants growing on the terreplein—a mix of native strand plants and weeds. Plants documented on the parade ground over long periods of time include buttonwood, coconut palm, date palm, seagrapes, tamarind, bay cedar, gumbo-limbo, geiger tree, guava, oleander, and seaside mahoe.<sup>29</sup>

In March 1942, Superintendent Budlong reported that “unsightly piles of old lumber were removed from the parade ground. The grounds present a clean, well-kept appearance.” Cleanup of grounds and casemates continued, with considerable mowing of the seven-acre parade. He reported that following rain in early June, “weed growths went into all-out production . . . and rapidly grew completely beyond control. It was, however, gratifying to observe that the formerly brown grass turned suddenly green and a few flowers appeared.” In September 1942, Superintendent Budlong reported:

the parade ground may now be recognized as a parade ground for the first time in several months. At one time the weeds covered most of its seven acres, and those weeds grew to heights

of over twelve feet, with stems some two inches in diameter. Our one power-mower being out of commission for months past, and being inadequate anyhow for such as task, it became necessary to grub out the weeds one at a time, roots and all. They are now entirely removed, and what appeared to be a semi-tropical jungle is now rapidly becoming a well-kept area of grass. Attempts to obtain repair parts for our power mower have so far proven unsuccessful, but we hope to manage repairs soon, and if successful expect to keep the grounds up to standard.”

In January 1943, he took down the large Australian pine near the moat bridge over concerns that it might penetrate the counterscarp wall. He also planted a garden:

Being unable to get fresh vegetables very often, and living mostly on seafoods, we hopefully planted a garden. Commander Hoffman of Key West hopefully donated a hundred pounds of fertilizer. Those interesting little creatures, the land crabs and soldier crabs, hopefully watched the beans, carrots, tomatoes, and lettuce push through the sandy soil, patiently waited until they were several inches high, and then dined sumptuously. We're going to grow petunias in window-boxes.<sup>30</sup>

In February, much effort led to a lawn area between the two piers:

During the month we completed making repairs of an emergency nature to the worn-out power mower. Rivets were improvised from old nails, a handmade cutter-bar was assembled and put into service and the superintendent walked some fifty-six miles herding the cutter around our seven-acre parade ground, restoring it to more than presentable condition. We hand-weeded the entire parade ground before cutting it. In front of the fort we cut down many old agaves and removed them and also removed dead or dying cocoanut palms set out some years ago.

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29 John R. Davis, *The Ecology of the Vegetation and Topography of the Sand Keys of Florida* (Washington, DC: Carnegie Institution of Washington, 1942), 186; D. R. Stoddart and F. R. Fosberg, *Topographic and Floristic Change, Dry Tortugas, Florida, 1904-1977* (Washington, DC: The Smithsonian Institution, 1981), 42.

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30 Monthly Narrative Report, Fort Jefferson National Monument, September 1942, January 1943, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park .

In March, more agaves were removed:

The grass has turned green and has started growing vigorously, but the weeds are trying to set some sort of record in production. They seem to spring-up overnight, and to have gone to seed before the dark the same day. . . . The situation was kept under control during the month, however, and in addition much work was done to place the grounds in condition where they present a far better appearance than formerly. We removed many weeds, vines, and old agaves in order to bare traces of old walks in front on the officers' barracks.

In July, he compared the site to the previous summer's condition:

This time last year the entire parade-ground was grown up to weeds that grew about twelve feet high. . . . I don't know what kind of weed it was, but I thought someone had set out young tamarind trees – the leaves were similar. The things shot up overnight like Jack's beanstalk, and then the grasscutter went out of commission and the weeds got completely out of control. This year we hand-weeded all the young plants we could find, and daily we found them by the millions, but we did manage to get them fairly-well eradicated before the really intense heat of July arrived.

In November, he reported the loss of "our one big guava tree" but described an improved condition on the parade:

With the passing of November our maintenance problem grows less serious. The parade ground is now almost completely transformed into a lawn and the grass is going into its rest period, so one huge problem will be taken from our hands for some months. During most of the month the grass continued to grow vigorously, and we took turns cutting at it with the small worn-out hand mower. It seemed a hopeless job, but in this semi-tropical climate vegetation must be kept under control or it soon overruns everything. The area in front of the fort was also



**Figure 79.** Single palm in front of officers' quarters, 1944. (NPS image)

turned into a closely-cut lawn. I think I have never seen the area in better condition.<sup>31</sup>

Most of the reports through June 1944 focus on grass cutting. A couple of references are made to landscaping efforts, but no details were given.

**Mission 66, 1956-1966.** In 1957, Everglades landscape architect W. T. Ammerman suggested removing Australian pines from the outside of the fort, stating that they "detract from the stark and barren masonry mass of the Fort." He recommended keeping the coconut palms growing around the dock and sally port but removing some of the more recently introduced plants on the parade.<sup>32</sup>

A Project Construction Proposal from 1959 stated that "all the planting area inside and outside the

- 31 Monthly Narrative Report, Fort Jefferson National Monument, February, March, July, November 1943, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park .
- 32 Ammerman, 4.



**Figure 80.** Australian pines outside of fort, 1957. (EVER 300777)



Figure 81. Parade ground, 1962. (DRTO 301080)

fort walls is choked with sand spurs.” The proposal called for sowing the existing areas with a seed such as Pensacola, which would choke out the sand spurs and provide good cover. A project to seed and fertilize the parade ground occurred between March 1963 and December 1966.<sup>33</sup>

Considerable planting by the park occurred within the fort in 1965, both along the perimeter walk and on the parade ground. Nine kinds of shrubs totaling approximately “388 units” and ten kinds of trees totaling approximately “39 units” were planted. Some planting and fertilizing of grass on the parade also occurred. This planting corresponded with the completion of most of the cleanup of the demolished quarters buildings.

**Post-Mission 66, 1967-Present.** It should also be noted that throughout the occupation of the fort, residents have added plants to the landscape of the parade in an effort to counter the sense of isolation at Fort Jefferson. A 1977 report described the vegetation on the parade ground:

The only part of the Monument where vegetation is intensely managed is in the historic zone of Garden Key. A wide variety of exotic plants have been introduced since the beginning of the construction of Fort Jefferson in 1846. Only these plants adaptable to local conditions without supplemental water or fertilizer have survived. The most prominent exotic plants include Australian Pine, Coco Plum, Tamarind, Bermuda grass, Date Palm, and Ochrosia. The Australian Pine is the only

33 Project Construction Program Proposal, Seeding and Fertilizing, October 26, 1959, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park ; Alexander, 68.

species that is a problem with spreading and is being controlled. While no existing individual plant is of historical significance, most are common to the Florida Keys and were probably introduced by accident or intent during the historic period. The native vegetation is of historic significance mainly with respect to general density and distribution in and around the Fort. It is possible that a few Buttonwood specimens are historic, but specific confirming reference is not known and dating has not been attempted. These trees are being preserved on the assumption that they do date from the historical period.

This report recommended that routine planting “be limited to replacement, in kind, with existing



Figure 82. Parade looking towards engineer officers’ quarters, 1950. (DRTO 301055)



Figure 83. Parade showing indiscriminate planting of coconut palms with buttonwoods in the background, 1970. (Alexander Physical Status Report 88)

species. The report stated that the grounds were maintained in a manner that permits an open, uncluttered view of the Fort, related structures, and grounds. In 1988, a project involving the removal of agave and prickly pear from the terreplein was underway.<sup>34</sup>

After the establishment of Dry Tortugas as a national park in 1992, resource managers began to assess the alterations to the native plant communities of Loggerhead with the intent of restoring the island back to pre-settlement conditions. In 1995, the NPS began to actively remove the two dominant exotic species, Australian pine and agave, from Loggerhead and Garden Keys. Eradication was accomplished by 2000 using prescribed burns and herbicidal treatment. Disturbed areas were monitored and retreated to facilitate restoration. In 2004, vegetation monitoring transects were sampled and showed the continued recovery of native vegetation communities on Loggerhead Key.

Dozens of downed trees and other plant debris had to be cut up, loaded, and hauled away following hurricane damage in 2004 and 2005. By 2008, over ninety percent of the coconut palms on the parade ground had been removed following additional hurricane damage.<sup>35</sup>

### Garden Key Lightkeeper's Complex

Vegetation within the lightkeeper's complex included coconut palms, some type of small, vase-

- 34 "Draft Historic Resources Management Plan," February 1977, II-13, III-1, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park; Anderson, 54.
- 35 Superintendent's Annual Narrative, 2000, 2004, 2005; personal communication Chief of Maintenance.



Figure 84. Rear of lightkeeper's complex, 1872. (Monroe County Library)



Figure 85. Front of lightkeeper's complex, 1898 (note new keeper's quarters). (DRTO 300834)



Figure 86. Lightkeeper's complex, 1910s. (National Archives RG 90)

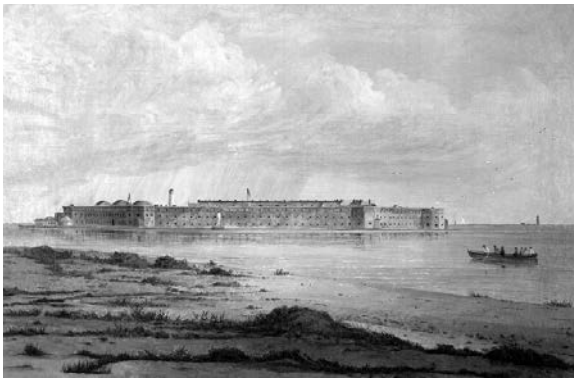
shaped evergreen trees, and possibly some kind of fruit tree. An image taken from the rear of the site in the 1870s sheds some light on the layout, which featured garden and work areas enclosed by paling fences, but exactly what was planted is unknown. The most detailed images of the vegetation are from the 1890s and early 1900s.

## Buildings and Structures

### Fort Jefferson

Fort Jefferson is a hexangular, casemated structure with an angular bastion projecting from each corner. Four sides measure 476 feet each and two sides measure 325 feet each. The fort is encircled by a 70-foot-wide moat and counterscarp wall. Originally, entrance to the fort was over a drawbridge and through the sally port, which features a segmentally arched opening with granite ashlar casing and pediment.

The curtain or scarp wall, constructed with millions of light-colored Pensacola bricks, rises



**Figure 87.** George Eastman painting of Fort Jefferson, 1875. (U.S. Senate Collection)

about 40 feet to a crown of smaller, redder northern bricks. On either side of the sally port are slot-like, off-set openings in the scarp wall, which serve as windows for the two guardrooms. Above the pediment are three narrow loopholes that open into a casemate (gunroom) above the gateway.<sup>36</sup>

The casemates are strongly vaulted galleries behind the scarp. They provide shelter for first and second tier cannon and also support the terreplein (roof). Supporting piers are pierced by two arched openings that provide ventilation, access to the gunnery areas, and contain water system channels or leaders. Segmental arch construction was used to span major openings and the shell-resistant vaults of the casemates. Vault masonry abuts the scarp but is not keyed to it. The pier-and-vault design is such that each vault stands independently, yet gains strong lateral support from the vaults on each side.

First-tier, iron-framed embrasures (gun ports) are evenly spaced along all six fronts. As a result of subsidence, second tier embrasures were never completed. At the beginning of the Civil War, gaping holes between the vaulted piers were closed by masons, who built walls of only a single brick in thickness with embrasure-sized windows to simulate a completed tier of guns. Much of this temporary work did not last past the end of the war. Small rectangular recesses of embrasure dimensions, to give the impression of another row of gun ports, rest on a corbelled band above the second tier embrasure openings. A contiguous

<sup>36</sup> Pensacola is a Gulf Coast brick whose color derives from its manufacture from Escambia clay. Two manufacturers from Baldwin County, Alabama, supplied the Pensacola bricks. The northern bricks came from brickyards in Danvers, Massachusetts, and Brewer, Maine.



**Figure 88.** Typical arch construction, 1934. (HABS 053147)

series of semi-circular, corbelled arches protrudes from the parapet.

At each interior angle of the fort is an octagonal bastion stair tower, five sides and the entrance of which abut the parade. The stair towers originally extended above the terreplein, but most of the turrets were in ruins by the 1930s (see Figure 63). Height from the parade to the terreplein is about forty feet, while the parapet extends some six feet higher. On the terreplein and at right angles to the length of each front are traverse magazines, three on the long and two on the short fronts. Between the magazines, traverse arcs for gun carriages elevated the cannon above the terreplein. Rising some twenty feet from the terreplein of the fort, a light tower constructed in 1876 surmounts the southeastern bastion stair tower.<sup>37</sup>

An effort to modernize the fort's weaponry occurred during the 1872-1873 construction

<sup>37</sup> Albert Manucy, "Draft Historic Structure Report, Part II, Fort Jefferson National Monument" (Richmond, VA: National Park Service Southeast Region, 1966), 3-5; Manucy, *Construction History*, 7-9.



**Figure 89.** Stair tower with turret, wooden galleries, and cannon, 1901. (DRTO 301203)

season. The work included reinforcement of the traverse magazines, addition of wooden galleries, and infilling the terreplein with sand to form a parapet, which allowed six 15-inch Rodmans and four 300-pounder Parrotts to be mounted.

Construction at the fort ended in 1876, with the addition of the iron light tower. By this time, there were considerable cracks in the scarp and the iron embrasures were badly rusted. An 1878 inspection reported structural failure of the scarp and casemates due to unequal settlement. Many of the second tier casemates had been closed up by four-inch brick walls. A number of these temporary walls had been blown out by hurricanes, and the rubble lay in the ditch or near the parade walls.

In 1885, Captain Rossell reported the “rapid deterioration” of all iron and woodwork. The doors to the sally port could not be moved on their hinges due to rust, so a temporary postern door was constructed. An 1887 inspection revealed that the first and second tiers were in generally good condition but that the barbette magazines were deteriorating rapidly. The first tier iron embrasure shutters were badly rusted.

Over the next few years, Fort Jefferson received little more than cursory maintenance. A 1911 inspection described the fort’s condition:

Nothing is being done to the fort or its buildings to prevent deterioration from decay, and weather, save in a few rooms occupied by Mate Short, U. S. N., and those dependent upon his living there, the Light-house keeper, and the employees engaged in the care of the coaling plants, wharves, and buildings. In consequence woodwork generally is decaying and falling away, giving entrance to the weather which in turn is washing down banks and fills, causing plastering to fall and rusting metal work, and the like so that there is now a constant retrogression in the condition of the Fort and everything attached to it.<sup>38</sup>

Fort Jefferson continued to deteriorate until it was declared a national monument on January 4, 1935, at which time the NPS began to prepare plans for the preservation and restoration of Fort Jefferson.

Acting Superintendent Puderer inspected the fort in February 1937 and felt that the entire mass was still sinking. Large cracks in the bastion walls ran through the entire height of the structure from moat to parapet. Many cracks were also apparent on the six faces of the fort between bastions. Only a few of the gun embrasures still had the iron shutters.

New Deal funding allowed many of the proposed projects to be completed. By 1940, seven second tier casemates had been rehabilitated for use as quarters with windows and doors constructed for all openings. Floors were repaired, and in three rooms concrete floors were poured. The rooms were wired for electricity, walls were whitewashed, and new woodwork painted.<sup>39</sup>

Robert R. Budlong served as superintendent during the war years. In 1942, he reported that some of the fort cistern repairs had failed, allowing salt water to enter. The conversion of three casemates formerly used as quarters for workmen into carpenter and machine shops and the west powder magazine into an equipment storage room occurred in 1943. Frames for its three windows and one door were fabricated from scrap materials and installed. Old holes in the masonry were plugged with wood, to which the frames were attached. 1947 plans show the maintenance shops northwest of the sally port were to be moved to Front 2

39 Philip Puderer, “Narrative Report on General Conditions with Recommendations,” 1937, 2; Job Application and Completion Record Quarters, Facilitating Personnel, June 10, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.



Figure 90. Casemate enclosure, 1945. (DRTO 300906)

38 Bearss, 345, 352,374, 419.

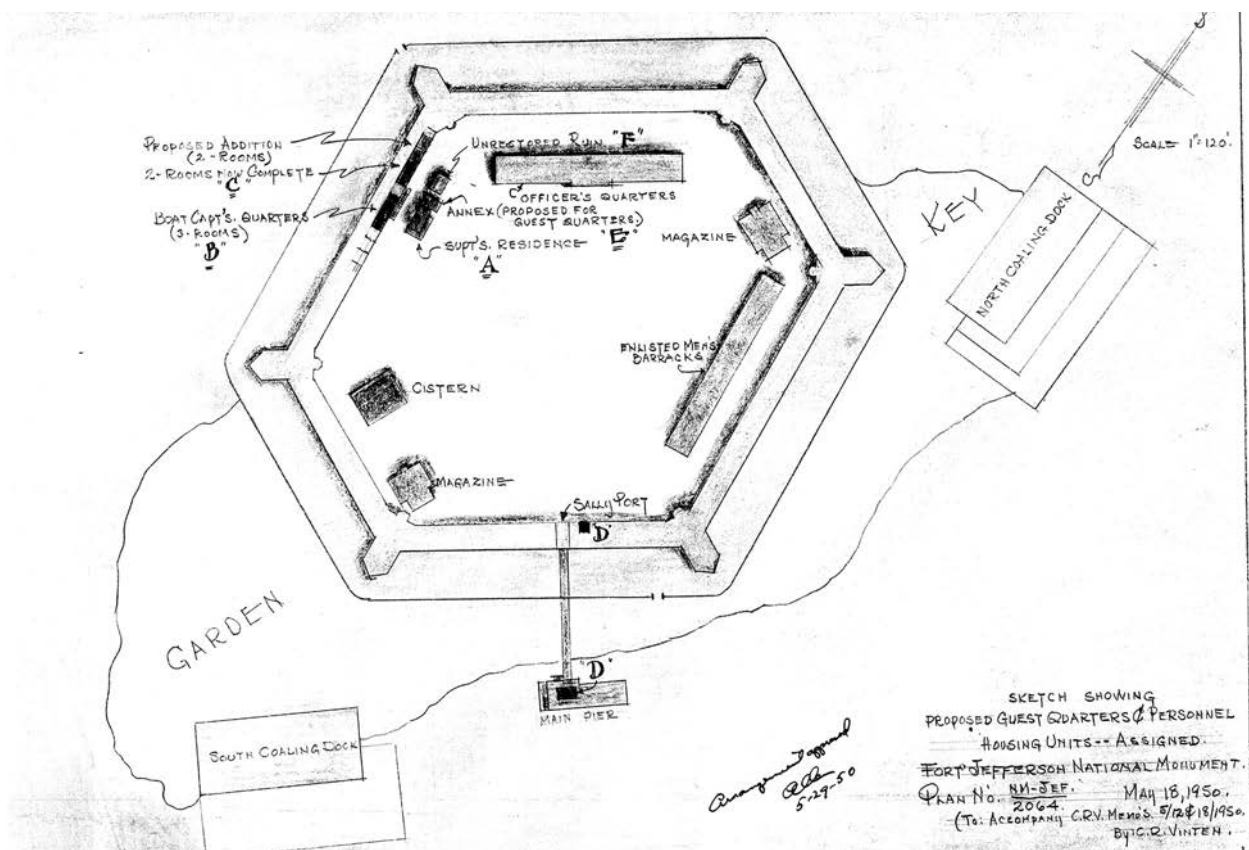


Figure 91. Sketch of proposed housing units, 1950. (Denver Service Center etic 364/2064)

(historic 4) and those southwest of the sally port would be abandoned.<sup>40</sup>

Beginning in the 1950s, a series of plans show existing and proposed quarters in the upper and lower tier casemates along Fronts 1, 2, and 3 (historic 3, 4, and 5). Between 1976 and 1991, crews from the 482<sup>nd</sup> Civil Engineering Squadron constructed additional quarters and rebuilt several of the existing quarters. They installed pre-fabricated quarters in the second tier casemates in 1998.<sup>41</sup>

In 1963, the park got funding for repair and repointing of the casemate walls and general cleanup. The project consisted of repointing the brick work throughout, cleaning and storage of bricks in Bastion 5 (historic B), storage of granite

blocks and wrought-iron ornaments, and disposing of excess rubble in the large voids of the north and south coaling docks, leaving the foundations of the officers' and enlisted men's quarters intact and clean. The Regional Office wanted a historic structure report (HSR) before repointing of the fort could proceed.<sup>42</sup>

A draft historic structure report was completed in 1966. It described some of the problems that must be addressed:

The fort contains a large quantity of wrought iron. The constantly humid salt atmosphere has caused severe exfoliation of the iron, with resultant expansion which the masonry cannot contain. Deterioration is progressive and continuing.

40 LAS, 58; Superintendent's Monthly Narrative, April – May 1943, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

41 Cheeseman to Scott, 2007; LAS, 90; Denver Service Center etic 364/2064; 364/2101A; 364/60004A; 364/41011B.

42 Stanley C. Joseph, Superintendent, Everglades to Regional Director, Southeast Region, September 26, 1963; Carroll A. Burroughs, Acting Superintendent, Everglades to Regional Director, October 17, 1963, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida. Collections Management Center, Everglades National Park.



**Figure 92.** Quarters #3 in upper tier casemates Front 3, maintenance units in bottom, 1970. (Alexander Physical Status Report 80)

Gun embrasures in the lower tier are critical areas. Here exfoliation of the iron frames set into the scarp ... has set up pressures which burst the interior bonding of the masonry and cause the wall around the embrasures to bulge dangerously out of line. ... The condition is a fairly recent development, widespread and serious, and it is worsening. Moreover, it is a public safety hazard and seriously endangers the stability of the scarp.

Loss of mortar is a widespread condition on all brick masonry exposed to water or weather. In many locations, mortar joints are open up to 3" deep and loss of the face course is imminent.



**Figure 93.** Loss of face brick due to iron exfoliation, 1970. (Alexander Physical Status Report 27)

Water leakage through vaults is fairly common, but is serious in relatively few casemates. The second tier vaults were asphalted upon completion in 1861-1863 in order to increase their effectiveness as water catchments. Brick channels at the spandrels collected the water and led it into vertical conduits (in the casemate piers) leading to the cisterns. The present leakage occurs in the spandrel areas and is usually localized at the center of one of the wide arches connecting the casemates. ... Vault fractures or cants, due to foundation settlement, have caused the leakage in most instances. Clogged drainage may also be a factor.<sup>43</sup>

Front 6 (historic 2) was the most seriously affected by the exfoliation of the iron shutters, causing the exterior face of the wall to split away from the scarp. Early in 1977, additional sections collapsed, exposing the core of the wall to weather. In 1983, a team from the Denver Service Center removed the exfoliated iron of one embrasure and reconstructed it.<sup>44</sup>

A 1986 report stated the problem—continued exfoliation of the iron components forced the masonry of the scarp to break apart. As the mortar holding the face brick together weathered away and cracked, the brick, forced out of position by the embedded iron, broke and fell into the moat. In some instances, one brick at a time fell, and at

43 Manucy, "Draft Historic Structure Report, Part II," 13.

44 106 Compliance Statement, Preservation of Fort Jefferson, undated, SERO archives; Baltzell, 1986.



**Figure 94.** Typical lower tier embrasure showing exfoliation, 1970. (Alexander Physical Status Report 20)

other times several cubic feet gave way. In January 1986, an area of approximately 300 square feet dropped into the moat at Bastion 3 (historic F).

A 1988 historic structure report described the ongoing effect of exfoliating embrasure ironwork in tandem with the nature of the scarp wall construction:

The loss or detachment of face brick around the gunports has exposed the core of the scarp wall to weathering. The quality of this core material is decidedly inferior in comparison to the face brick and is thus significantly less weather resistant. The structural integrity of the fort thus is severely threatened as this core material helps to bear the load of the casemate vaults. Should structural failure of the arches occur, the ongoing collapse of the entire fort would be accelerated and extremely difficult to arrest.

Exfoliating embrasure irons also caused severe damage to several of the bastions.<sup>45</sup>

A 1994 report was quite clear and emphatic in its assessment of the scarp wall, stating that the wall was in extremely critical condition. By 1999, the NPS had rebuilt approximately thirteen percent of the embrasure openings. Eighteen percent of the lower tier embrasure openings, however, had shown significant deterioration. A 1999 report described part of the problem:

More significant to the condition of the upper tier openings is the progressive deterioration of the openings below. As the masonry “peels” away from the wall at the lower tier the fracture creeps upward and attacks the upper openings. Repair of the lower tier is most critical to the upper tier openings. However, even if the lower tier openings were rebuilt, and the entire wall repointed, the treatment of the upper tier openings remains problematic from historical and safety perspectives. Originally, the upper tier embrasures were to be fitted with “Totten” shutters and finished in a manner similar to the lower tier embrasures. The shutters were never

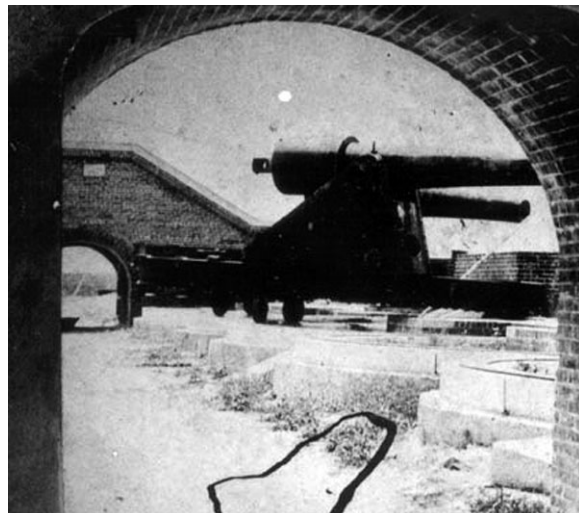
installed, leaving the openings in a “semi-ruin” state of appearance.<sup>46</sup>

Between 1995 and 2001, several projects were carried out to preserve the scarp walls and rehabilitate the embrasures along Front 2. In 2006, a historic structure Amendment report (HSR-Amendment) was completed to develop technically sound treatment approaches responding to the preservation goals of the park, using available resources that can be applied to the entire structure. The HSR-Amendment reported that further deterioration of the scarp wall had taken place, with continued masonry failure at the lower, upper, and blind embrasure levels. A phased approach to stabilization is ongoing, with the development of best practices on site to guide the stabilization and preservation work.<sup>47</sup>

## Terreplein

The terreplein is the upper level of the fort, between the parapet and the parade face, where guns were mounted and ordnance was stored in shot cellars. On the terreplein and at right angles to the length of each front are traverse magazines, three on the long and two on the short fronts. Between the magazines, traverse arcs for gun carriages elevated 10-inch Rodmans, 42-pounder smoothbores, and 200-pounder Parrotts above the

- 46 Grives Worrell Wright & O’Hatnick, Inc., “Preservation and Stabilization of Fort Jefferson,” 1999, 6, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.
- 47 LAS, 19.



**Figure 95.** Parrott rifled cannon on terreplein, 1870. (DRTO 300652)

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45 Baltzell, 4, Anderson, 34, 50.



**Figure 96.** Displaced cannon on the terreplein, 1913. (USGS Photographic Library drb00117)



**Figure 97.** Parrott gun, Front 6, 1970. (Alexander Physical Status Report 72)

terreplein. Ten-inch Columbiads were mounted in the bastions.

Modernization of the fort during the 1872-73 construction season reinforced fourteen of the traverse magazines by increasing their thickness to twelve feet. New doorways were cut on the rear of the magazine (facing the parade), old doorways exposed to hostile bombardment bricked up, and wooden galleries were positioned for entry into the magazines.

Also part of the modernization effort was the mounting of six 15-inch Rodmans and four 10-inch Parrotts. To mount the Rodmans required the construction of six 15-inch salient angle platforms and the adjoining breast-high walls and steps. A large amount of sand was used as fill. The Parrotts used three front-pintle and one center-pintle masonry platforms. For the Rodmans, displacement of the traverse arcs for smaller guns facilitated installation of the big guns. The Parrotts also replaced smaller guns, but existing granite



**Figure 98.** Water collection system on the terreplein, 1863. (DRTO 300685)

platforms were modified to accommodate them, although the pintle blocks had to be replaced.

A major change to the terreplein occurred between 1900 and 1902, when the Ordnance Department sold all the smaller guns and iron carriages. Cannons no longer peeked up over the fort's walls, and except for the ten big guns, the terreplein was empty of armament.

**Water Collection System.** The terreplein also functioned as a water collection system for charging the cisterns. The downward sloping areas between the arches were designed to collect rainwater, which was conducted to the cisterns by six-inch, cast-iron conduits housed within the masonry piers.

Assistant Chief Engineer Preece's inspection of the fort in 1937 revealed that a thin layer of slate, instead of lead sheathing, was used on the terreplein to induce increased percolation to the cisterns below. However, it also offered less protection to the top side of the brick arches. He saw considerable leaching of the lime in the mortar throughout the entire ceiling of the second tier, which he feared might eventually lead to the failure of some of the arches. Water collected through the terreplein catchment system fed down through six-inch iron leader pipes embedded in the pillars on each side of the casemates of the upper and lower tiers. He found the leaders to the cisterns clogged, which if not repaired would cause water caught on the terreplein to escape through the faces of the walls.

During a 1938 inspection, resident landscape architect Puderer reported that sand on the terreplein directly opposite the chapel/office cistern had been removed and that the exposed area was ready to be treated with a waterproofing



Figure 99. Cistern pipe, Bastion 1, 1938. (DRTO 300954)

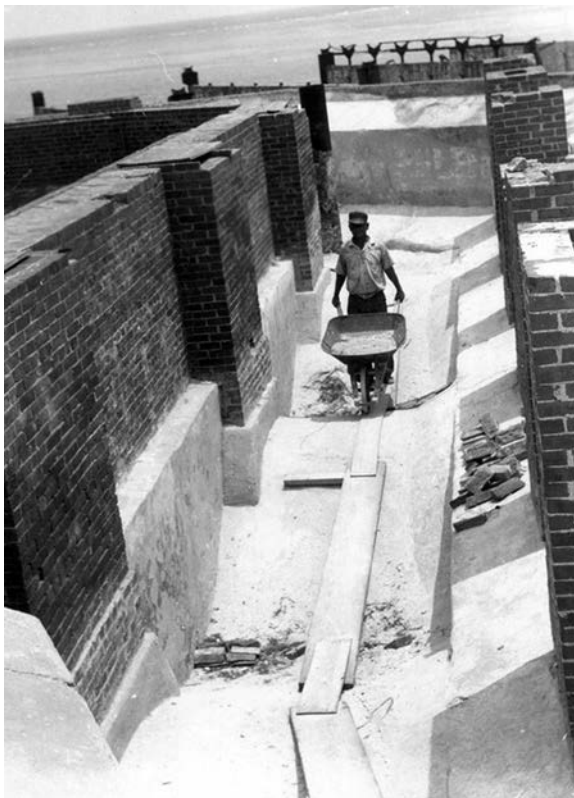


Figure 100. Removing sand, 1938. (DRTO 300950)

compound. Also, all of the cisterns located in the west and south half of the fort were pumped dry and examined. Eight were cleaned and filled with fresh water.

In 1939, officials submitted a different plan to treat the water catchment area of the terreplein, proposing to install a brick surface, waterproofed with membrane, at a higher elevation in order to allow water to reach the leaders more quickly and reduce water loss by evaporation. It was also hoped that the work might prevent seepage of water through the masonry arches between the parapet wall and the outer wall of the fort.

In 1940, the park determined that leaders over the southwest face failed and installed new four-inch vitrified tile pipe between each arch. Holes six feet square were dug to reach the leader pipe openings between arches at the bottom of the parapet wall. The catchment area was refilled, tamped, and graded around the riser pipe. One layer of salvaged brick was laid over this surface, over which a coat of heated asphalt was applied. According to Acting Superintendent James Felton, this was the most extensive ERA job undertaken at Fort Jefferson, which moved, cleaned, and re-laid approximately 100,000 bricks. All materials were handled by hand and hoisted from the parade ground to the terreplein using a hand-powered winch. After completion of the repairs, less than one-quarter-inch of rainfall produced a stream in the leader pipes dropping to the cisterns.<sup>48</sup>

To provide for filtration and chlorination of the water collected in the fort cisterns, a small, portable pump sent water into a galvanized iron collecting line that ran parallel to the inner face of the casemates and directly into a chlorinator. From the chlorinator, the water flowed to the chapel/office cistern, where it was stored.

48 E. F. Preece, "A Report on Engineering and Other Considerations with Regard to the Development of Fort Jefferson National Monument Dry Tortugas," August 1937, 32; Puderer, "Special Report," 4; Improvements of Terreplein, Job Application and Completion Record, January 5, 194; ERA Work Accomplished Under Supervision of National Park Service July 1, 1939 to December 31, 1939; James B. Felton to Regional Director, April 8, 1940; Improvement of Terreplein, Job Application and Job Completion Record, November 5, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

water, pumped to a steel tank located in one of the powder magazines on the terreplein, flowed by gravity to the distribution lines.<sup>49</sup>

A 1970 physical status report stated that the six-inch iron pipes of the terreplein catchment system were badly corroded causing structural failure of the columns within which they were embedded. By this time, the casemate cisterns were no longer being used due to the intrusion of sea water through settlement cracks in some of the cisterns.

A terreplein stabilization project began in 1993. The focus of the work was to provide a concealed water proof membrane on the parapet and terreplein above the V. I. P. quarters on Front 3 (historic 5) where leak problems were frequent and previous attempts to alleviate the situation had failed. Waterproofing methods included capping intervening walls with flashing, repointing face walls, closing hatchways, and resetting traverse stones. The specifications also called for waterproofing the magazine by restoring the sand cover, capping the walls, repointing masonry faces, and applying a new membrane over the existing concrete. The key waterproofing element used was a rubberized asphaltic membrane.<sup>50</sup>

The 2006 HSR-Amendment described the terreplein as having numerous deteriorated areas, including the bastion stair towers, magazines, flues, superior slope, and gun emplacements.<sup>51</sup>

### Counterscarp/Moat

The purpose of the counterscarp or seawall was twofold. One was to form one side of a ditch, in which “a depth of water too great for fording is obtained, and by preventing boats from reaching the scarp, thus strengthening the work against assault.” Secondly, the wall protected the scarp foundation against wave action. By the first week of April 1849, the foundation for 100 feet of counterscarp had been laid, and the wall brickwork



Figure 101. Fort Jefferson, 1898. (EVER 7316)



Figure 102. Counterscarp, 1915. (USGS Photographic Library sew01374)

started. By September 30, 1851, that part of the counterscarp wall “in the water” had been carried up to the coping, with two gaps left for transporting materials and two openings for sluiceways. During a September 1853 inspection, Wright noticed some cracks in the counterscarp, which had increased in number by 1855. Since their width was insignificant, he had no concerns for the structure’s stability and attributed the cracks to the slow slaking of lime from the concrete.<sup>52</sup>

The counterscarp was finally completed in January 1873. Fort Jefferson’s moat was seventy feet wide, with two sluiceways in the counterscarp— one on the southeast and one on the west front— through which the tide ebbed and flowed. By 1876, the seaward face of the counterscarp needed repointing.

Acting Superintendent Puderer found three bad breaks in the northwest counterscarp in 1937, allowing sand and coral to fill the moat. Approximately 250 feet of wall needed to be repaired. When Assistant Chief Engineer Preece

49 W. Mikell, “Public Works Administration Construction at Fort Jefferson National Monument Dry Tortugas Florida,” June 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

50 Grieves Worrall Wright & O’Hatnick, *Stabilization of the Terreplein at Fort Jefferson*, March 1993, 1-5, SERO archives.

51 LAS, 19, 141.

52 Bearss, 97, 104, 106.



Figure 103. Moat filled with sand, Front 4, 1937. (EVER 7175)



Figure 104. Sand removal, 1938. (DRT0 300947)

inspected the fort he reported that a channel forming under the wall caused the collapse of certain sections of the counterscarp. He did not recommend repairing the wall, stating that removal of the sand from the moat would create a constant maintenance problem. As of 1940, no job had been submitted to repair bricks in the counterscarp or to replace the brick coping.<sup>53</sup>

Hurricane Betsy breached the counterscarp at the east end of Front 4 (historic 6) in 1956. A project to rehabilitate the counterscarp wall was finally funded in 1962. The Project Construction Program Proposal described 620 lineal feet of wall that had fallen into the sea, allowing wave action directly against the fort wall. Salvage brick, rubble, masonry, or rock for fill was obtained from the demolition of the officers' and enlisted men's quarters. By June 1963, repairs to 378 lineal feet had been completed to within one brick height of the original wall elevation, leaving areas that

53 Puderer, "Special Report," 4; Preece, 30; James B. Felton to Regional Director, April 8, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

included large voids beneath the water line, holes in the interior of the wall, and in some cases, complete replacement of portions of the wall above the water line.<sup>54</sup>

In 1968, another breach in the counterscarp was scheduled for repair. According to the proposal:

Previous attempts to stabilize this particular section of wall, by building up the original foundation with concrete, have failed to prevent undermining of the footing and subsequent rupture of the wall.

A saving of approximately \$5,750 could be realized by constructing the top of the footing at the same elevation as the existing built-up footing. At this elevation, however, the foundation is visible above water at low tide. We are therefore planning on constructing to the original elevation unless advised to do otherwise.

54 James F. Wolfe, Civil Engineer, Everglades to Assistant Superintendent, Everglades, July 13, 1962; Warren F. Hamilton, Superintendent, Everglades to Regional Director, Southeast Region, June 4, 1963, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.



Figure 105. Counterscarp wall repair opposite Front 4 showing section in back washed out by Hurricane Betsy, 1970. (Alexander Physical Status Report 7)



**Figure 106.** Close-up of section washed out by Hurricane Betsy, 1970. (Alexander Physical Status Report 9)

Henry Judd, Chief, Branch of Restoration, and Acting Superintendent John Raftery agreed that the top of the footing should be at the elevation of the historic footing mean low water (1848).<sup>55</sup>

A 1970 physical status report stated that the “number one priority project as this time is the reconstruction and/or repairing of the counterscarp (moat) wall. The major break areas opposite Fronts 4 and 5 (historic 6 and 1) should come first with second priority work at [the] flood tide gate and along Fronts 2 and 3 (historic 4 and 5).”<sup>56</sup>

A 1979 report described the causes of the wall failure:

The original counterscarp wall allowed for a relief opening (tidal gate) to maintain equal water levels on both the moat and sea sides. Sediment interchange and accumulation on either side of the wall has since disrupted this equilibrium and resulted in differential water levels within the moat and between the moat and sea as indicated by varying tidal levels recorded in these areas. . . . Sand accumulation between the two walls exceeding water levels

in the moat . . . has resulted in piping action beneath the counterscarp wall which when combined with the effects of wave action has produced numerous washouts or undermining of this wall along all its fronts. These washouts in turn are responsible for cracks and settling or collapse . . . of large blocks of the counterscarp wall.<sup>57</sup>

The 1988 HSR recorded the condition of the counterscarp in 1986 as “varying from one of acceptable stability to severe weathering with loss of brick and badly deteriorated mortar. Stable conditions are the result of prior maintenance efforts involving repointing, brick replacement, concrete resurfacing and, in some areas, reconstruction. The most seriously weathered areas owe to their orientation toward the northwest through northeast quadrants, the zone subject to the most pronounced effects of wave action.” A stabilization project began in 1986 and included the reconstruction of the continuous walkway around the fort and sluice gate at Bastion 3.<sup>58</sup>

Various problems of repair were observed in the 2006 HSR-Amendment. Significant deterioration of masonry, weathering, and failed mortar joints were seen in a number of places. Front 4 (historic 6) exhibited severe weathering at Bastion 3 (historic F) with widespread structural cracking along the entire front. The concrete walk was severely deteriorated or missing entirely along the majority of Front 6 (historic 2). Washout under the counterscarp was evident at several locations. Numerous repairs were noted.<sup>59</sup>

### Sally port Gateway/Drawbridge

The Engineer Department transmitted plans for the gateway and drawbridge into the fort on September 22, 1855, which included a two-leaf, in-swinging gate. Granite would be introduced as a facing to the exterior and interior entrance of the gateway passage. The drawbridge gudgeon had to be sustained by granite blocks large enough to be thoroughly embedded in the walls. Composition

55 H. Reese Smith, Chief, Design and Construction to Regional Director, Southeast Region, March 11, 1968, Everglades archives; Charles S. Marshall, Acting Regional Director, Southeast Region to Chief, Design and Construction, March 26, 1968, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

56 Alexander, 2.

57 *Foundation Condition Appraisal and Improvements Recommended for the Counterscarp Rehabilitation* (Atlanta: Southeast Regional Office, 1979), 7.

58 Anderson, 30.

59 LAS, 146-48.

hooks or sockets would be needed to sustain the gate hinges.

It was reported in 1859 that the gateway would be constructed in the near future. In preparation for a garrison arriving at the fort in 1861, Captain Montgomery C. Meigs had the workmen take up several bridges giving easy access to the fort and put up the drawbridge and gate at the sally port. In 1862, the irons for the drawbridge were ready, and blacksmiths were fabricating ironwork for the gateway. The construction of the bridge to the gateway occurred in 1866. In an image from the 1870s, handrails had been constructed along the bridge but do not show up in later images.

In 1878, the annual report noted that the drawbridge had been recently rebuilt, but its condition had deteriorated by 1887. The construction of a temporary postern at the sally port occurred in 1885. An 1898 article reported that “a wooden bridge leads across the fifty-foot-wide moat to the heavy granite portal.” Following the devastating hurricane of 1910, the bridge was reported as being completely down. It is unknown when repairs or replacement of the damaged

bridge occurred or when the original in-swinging gate was taken down.<sup>60</sup>

Historic images from the 1930s show that after the NPS took ownership of the site, repairs occurred to the sally port and drawbridge. Prior to 1935, graffiti covered the granite portions of the sally port and the drawbridge was falling apart. Sometime between 1962 and 1967, the bridge was rebuilt, but historic plans were not followed. Instead of being reconstructed as a drawbridge, a general plan of standard timber bridge construction was used. Steel beams salvaged from the demolished quarters buildings were run in two lines parallel to each other for the full length of the bridge to give longitudinal strength to carry the load of trucks. Timbers were replaced in 1979.<sup>61</sup> (get originals from completion report scanned)

60 Bearss, 138, 182, 250, 263, 353, 375, 418; Manucy, *Construction History*, 80, 91-92, 138; “The Fort at Dry Tortugas,” *New York Times*, April 3, 1898.

61 Alexander, 69; Narrative Report Rebuild Historic Walks and Moat Bridge, Work Order B-24, 1967, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park; Cheeseman to Scott, 2007.

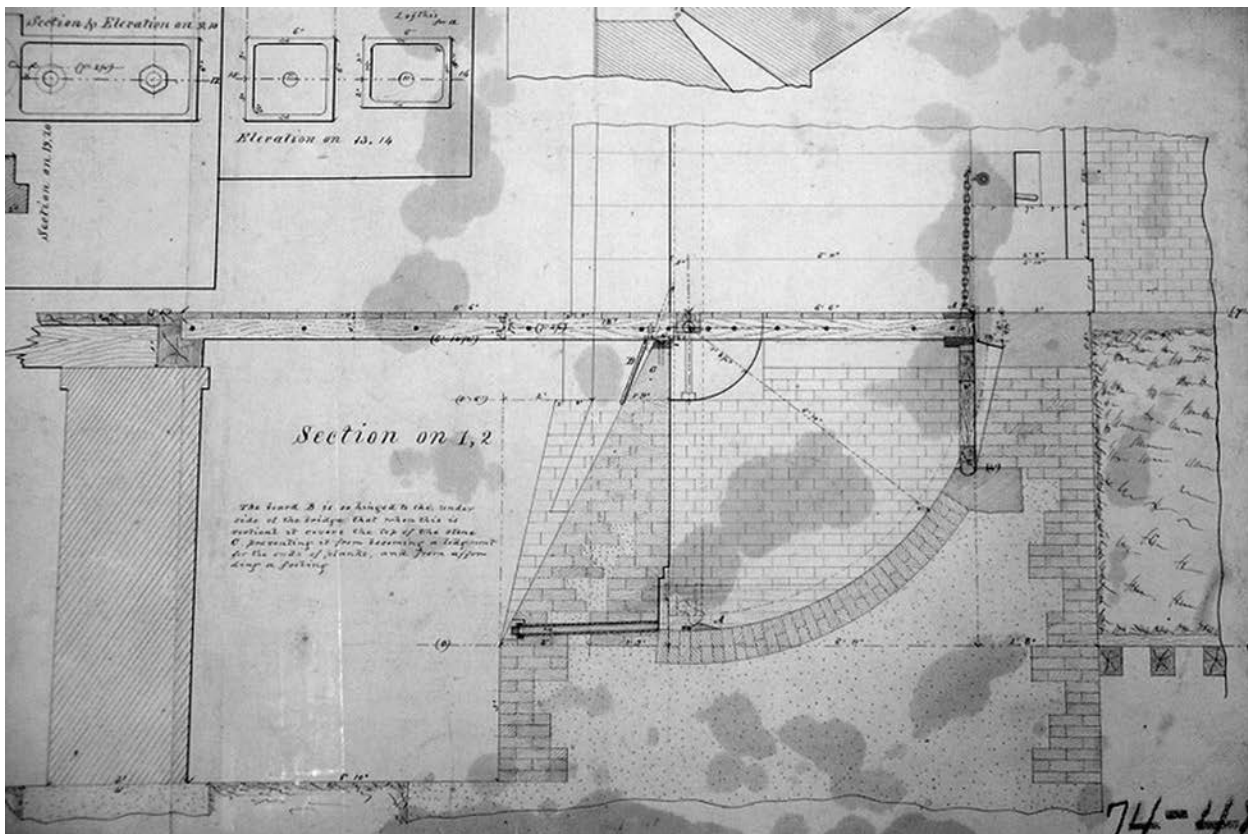


Figure 107. Drawbridge plans. (National Archives, Record Group 77, Drawer 74, Sheet 48)

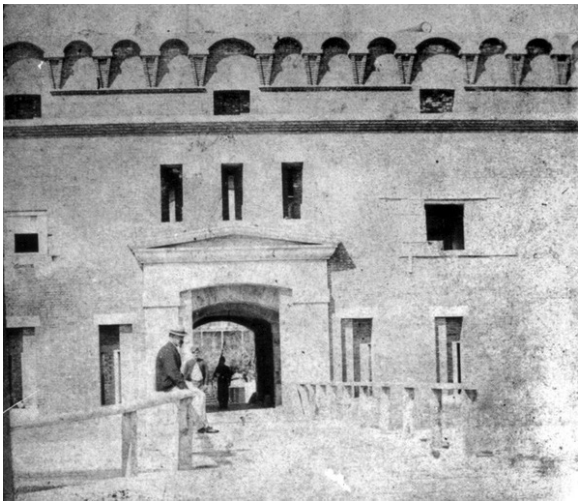


Figure 108. Sally port, 1870s. (DRTO 300692)



Figure 109. Sally port, 1899. (National Archives 2005-N-90-1-28)



Figure 110. Sally port, 1928. (Monroe County Library)



Figure 111. Sally port with graffiti, 1931. (DRTO 300736)

The rehabilitation of the sally port occurred from 1999 to 2000. In 1999, the Architectural Conservation Projects Program of the Intermountain Support Office disassembled the parade ground elevation of the sally port's granite surround and then reassembled the surround without the iron gudgeons, which were causing severe displacement of the upper stones in the surround. In 2000, preservation crewmembers, an exhibit specialist, and a masonry specialist repointed the stones disassembled during the rehabilitation of the sally port during 1999. Repointing replicated historic pointing in appearance, color, profile, and texture as found in the exterior elevation of the sally port surround, and as documented during the removal of the granite stones from the parade ground elevation of the sally port's granite surround. Hinge gudgeons were produced to match in appearance those removed; the original became part of the park's museum collection and are stored at the South Florida Collections Management Center (SFCMC)



Figure 112. Sally port, 1934. (HABS 053108)



Figure 113. Sally port, 1962. (HABS 053131)

at Everglades National Park. The gudgeons were reproduced in cast bronze.<sup>62</sup>

In 2002, the moat bridge was reconstructed with all new seals, stringers, decking, and hardware.

### Officers' Quarters

Workmen completed a 69-foot section of the three-story officers' quarters with piazzas during Fiscal Year 1850 (see Figure 29). Three detached brick kitchens were constructed in the rear yards. By 1854, Lieutenant Wright discovered that the Hudson River bricks used in construction were rapidly deteriorating. During Fiscal Year 1855, workmen repainted the structure and replaced the decayed bricks.<sup>63</sup>

Shipwrecked passenger Emma Talcott provided an early description of the officers' quarters around 1856:

Now for the prettiest little adventure of all – the going on shore business. That little Island a mile in circumference with its three storey brick house in which the Pilot had told us lived some very nice people who would treat us well, looked very tempting and altogether more agreeable than a leaky ship if she was anchored. ...

I was especially fatigued and went to bed as soon as possible, but the boys started on an exploring expedition, pulled off their shoes, rolled up their pants, and walked round the Island, coming back loaded with shells. During the week we spent there, they were out the whole time, examining the fort, or rowing with Captain Woodbury to the adjacent Islands. They were never in want of amusement and never enjoyed themselves more.

The Captain took a fancy to them, as he has some in Carolina about the same age. [He] thought them remarkably good children. Mrs. Whitehurst has two boys under six – the eldest

62 Glenn Simpson, "Completion Report Sally Port Granite Surround Repointing and Gudgeon Replacement Project (Parade Ground Elevation)," September 21, 2000, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

63 Bearss, 46, 95-97.



**Figure 114.** Fort Jefferson, 1861. (University of Miami Library, Calvin Shedd Papers)

a little cripple – he was a pitiable object. Mr. and Mrs. Phillips who occupied the whole of the third story have two little girls. So the boys were well off for company. . . .

The three families have each their own kitchen and keep separate tables. In Mrs. Whitehurst I found a charming companion, and I can assure you the week passed away very agreeably. The Ship got her sails mended and men to pump her and went off to New York.<sup>64</sup>

An expansion of the officers' quarters occurred in the 1860s. By 1865, the entire block with detached kitchens had been completed to its full three-story height and was waiting to be floored and roofed. Difficulties in securing a final plan delayed the roofing of both the officers' quarters and enlisted men's quarters until 1866 when iron beams and the roof were completed to a height of thirty-three feet. The replacement of the rear third story wall damaged in the 1865 hurricane also occurred in 1866, as well as the completion of the detached kitchens. The structure was roofed with galvanized iron in 1867, leaving only the halls and piazzas to be completed. The hurricane of 1873 damaged the roof of the first section, allowing water in, which flooded the rooms below. Repairs were completed in 1874. After the Army withdrew the garrison, the windows were covered with wooden shutters in 1876.

In March 1876, the Board of Engineers inspected Fort Jefferson. They reported that some of the window lights were broken, the piazzas were badly decayed, the iron stairways were badly rusted, and that two chimneys had been damaged by the 1875 hurricane.

<sup>64</sup> Emma Talcott Norman, "Shipwreck and Escape in the Tortugas," nd, [www.themosttraveled.com/.../The%20Florian%20Letters%201801--1856.pdf](http://www.themosttraveled.com/.../The%20Florian%20Letters%201801--1856.pdf).

In February 1878, Captain Heuer reported that a portion of the extension had never been "thoroughly" completed, while three-fourths of the front piazzas were never roofed or ceiled, causing damage to their woodwork. Later that year, the piazzas were painted and roofed. In 1883, Ordnance-Sergeant Carey's report stated that the first and second stories were in good condition, but a number of windows were broken and the structure leaked. There were twelve detached kitchens. By 1886, Captain Heuer found the galvanized roof leaking so badly that the ceiling had failed in some sections. Brick work of the first section had deteriorated. An August 1886 hurricane tore loose most of the piazzas and damaged the metal roof. An 1887 inspection reported the quarters "in bad order" and the detached kitchens dilapidated.<sup>65</sup>

Former employee George Phillips was hired by Captain Fisk to oversee the storage of Engineer Department property before the transfer of Garden Key to the Treasury Department in 1889 as a quarantine station. Phillips described the officers' quarters and enlisted men's quarters as:

now but a little more than a wreck, the windows and doors are broken and lie shattered around but few of them can either be open or shut, many of them are open and can not be shut until repaired, and the water now pouring through them whenever it rains, destroying the fine stucco walls and ceilings by the hundreds of sqs. yds. The roofs of these . . . [structures] are of tin, and so badly rusted through in many places as to allow the water to run through them and destroy whatever property there may be stored within. The piazzas of the Officers

<sup>65</sup> Bearss, 256, 262-64, 301, 345, 353, 363, 372-74; Manucy, *Construction History*, 98, 133, 162, 166.



**Figure 115.** Officers' quarters, 1865. (DRTO 300682)

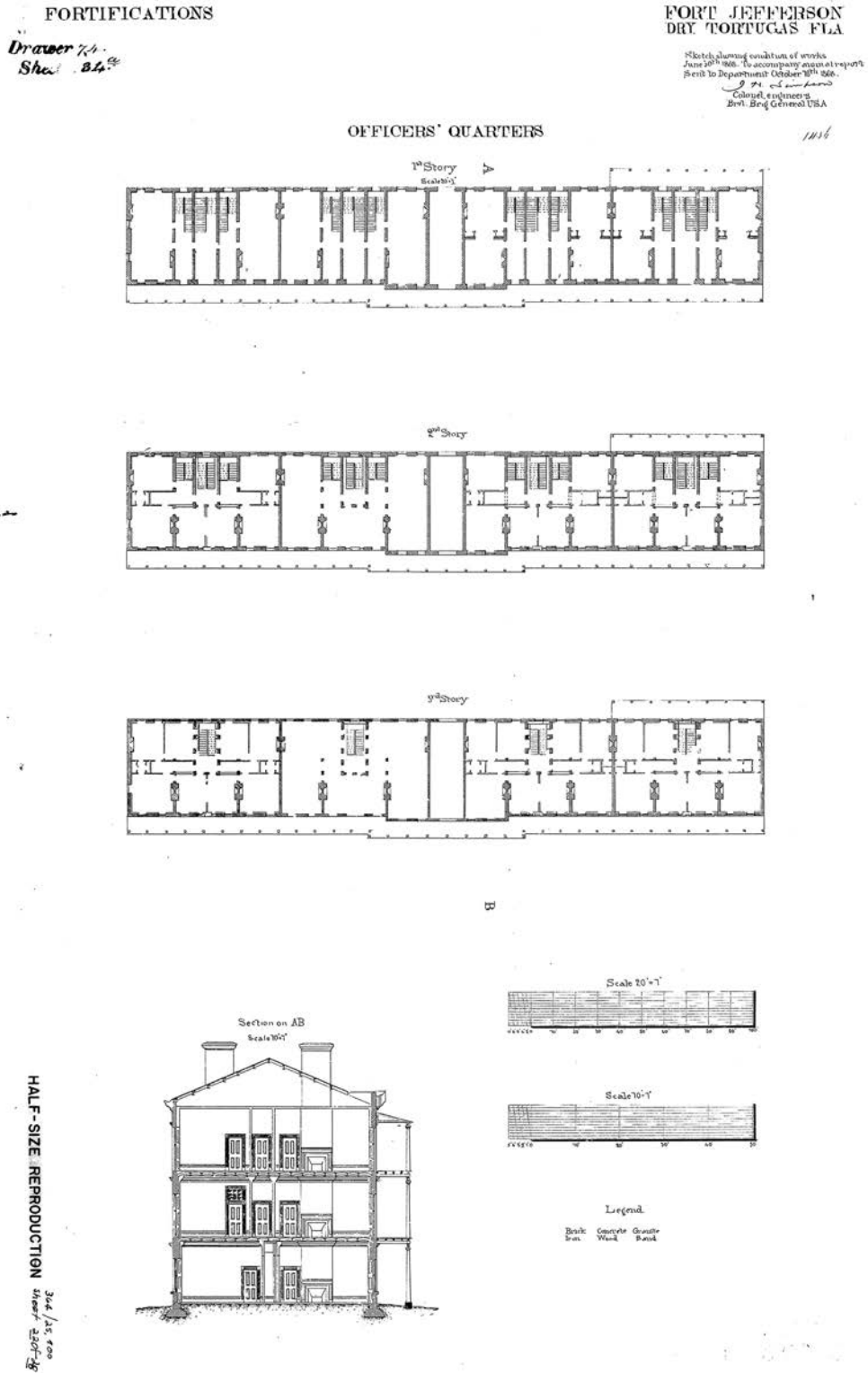


Figure 116. Officers' quarters plan, 1868. (Denver Service Center etic 364/25900 sheet 22)

quarters are in a dangerous condition not being safe to walk over, the roof of them being blown off and lodged upon the roof of the main building.

In 1890, the Marine Hospital Service rehabilitated section four of the officers' quarters for use as the assistant surgeon's office and equipped three second-story rooms as a bacteriological laboratory. The roof covering that section was mended and painted several times between 1890 and 1895, when it was reported that, other than the section that had been repaired, the roof was in bad condition and that the front piazza had collapsed. Repair work occurred on the roof of the quarters and the twelve detached kitchens in 1896. After the closure of the quarantine station in 1900, a marine garrison was stationed at Fort Jefferson from 1901-1906. During this period, the building received little maintenance.

After a devastating hurricane in 1910, a team of inspectors described the building:

The Officers' Quarters are gradually losing their woodwork, all that of front and rear porches being practically decayed. The interiors are badly in need of repairs. Some slate are gone, chimneys down, etc.

In 1916, it was noted that the original section was in a dilapidated condition, although the slate roof generally was in good condition, the balconies were unsafe, and the roofs of the detached kitchens leaked. Following a period of general decline at Fort Jefferson, the officers' quarters burned in 1927.<sup>66</sup>

The 1938 Master Plan called for the building to be left as a ruin. A general cleanup of brick and construction debris occurred in 1938. In 1939, crews removed 977 cubic yards of broken plaster, loose brick, and charred wood. In 1943, a section of one of the inner walls of the original portion of the building blew down.<sup>67</sup>

66 Bearss, 378-425.

67 Puderer, "Special Report," 4; ERA Work Accomplished Under Supervision of National Park Service July 1, 1939 to December 31, 1939; Monthly Narrative Report, March 1943, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.



Figure 117. Officers' quarters, 1934. (HABS 053121)



Figure 118. Officers' quarters showing detached kitchens, 1937. (EVER 7188)



Figure 119. Demolition of officers' quarters, 1962. (DRTO 300765)

The demolition of the building to the foundation occurred in 1962, in spite of the fact that NPS policy called for the approval by the director of a historic structure report (HSR), which had not been prepared, before such an action could proceed. The justification for the demolition was that the walls, roofs, and floors had completely fallen or cracked to the point that the building was considered dangerous. Given that dynamite was necessary to facilitate the demolition, it is unclear exactly how serious or immediate the danger was

or if it was necessary to remove the entire structure to mitigate the danger that did exist.<sup>68</sup>

Ground penetrating radar (GPR) conducted in 2006 found the piazzas of the officers' quarters approximately nine meters from the southern wall of the ruined building. GPR also located a foundation component of the ground floor of the piazza of the original building, which was completed in 1848. The ground-floor feature was found only in association with the original structure, which is indicative of either a variation in the construction technique for the piazza of the original building or of the incomplete removal of the foundation on the east end of the building.<sup>69</sup>

### Enlisted Men's Quarters

Work on the foundation of the enlisted men's quarters began in 1862 after the fort was garrisoned in 1861. By June 30, 1863, the foundation was complete, the water table laid, and three wall sections raised to the level of the lower window sills. Walls were ready for roofing, and four detached kitchens were completed by 1865. Captain McFarland ordered a temporary roof placed over two sections of the enlisted men's quarters in 1864 while waiting on the Engineer Department to make a final decision about the treatment of the roof. He suggested using iron beams and galvanized iron sheathing for the roof covering. Although Chief Engineer Richard Delafield approved McFarland's idea to substitute iron roofs for wooden ones on the parade buildings, the enlisted men's quarters' roof construction was delayed. Between 1866 and 1870, the enlisted men's quarters and officers' quarters neared completion, with the exception of interior finish in some sections. Roofing for part of the officers' quarters and all of the enlisted men's quarters was galvanized iron (see Figure 156).

An October 1873 hurricane took off the iron roof, which was replaced in 1874. An 1876 inspection reported that the enlisted men's quarters were



**Figure 120.** Enlisted men's quarters under construction, 1864. (DRTO 300894)

enclosed but that only about half the rooms had their interior finish and about half the detached kitchens had been erected. Ordnance-Sergeant Carey reported a similar condition in 1883 (twenty-seven rooms finished, twenty-three rooms unfinished, eight detached kitchens). In 1887, the barracks were in better condition than the officers' quarters, but the kitchens were "in very bad order."<sup>70</sup>

By 1889, the condition of the enlisted men's quarters had deteriorated. In 1895, Surgeon R. D. Murray reported that most of the rooms were too damp to be used by the quarantine station. Between 1901 and 1906, \$30,000 was spent on the repair and improvement of both the enlisted men's quarters and officers' quarters. On October 17, 1910, a devastating hurricane tore off the galvanized roof of the enlisted men's quarters, and the building burned in 1912 when a fire spread from the lightkeeper's house. In 1914, 35,000 bricks were salvaged from the detached kitchens and transported to the U. S. Naval Station at Key West, where they were used to erect a boiler.<sup>71</sup>

70 Bearss, 252-59, 302-5, 346, 363, 375; Manucy, *Construction History*, 133, 140, 154.

71 Bearss, 318, 346, 363, 386, 423-26; Manucy, *Construction History*, 166.



**Figure 121.** Enlisted men's quarters, 1898 (EVER 7317)

68 Project Construction Program Proposal, May 22, 1961; J. C. Harrington, Acting Assistant Regional Director to Chief, EODC, April 25, 1962; Warren F. Hamilton, Superintendent, Everglades to Regional Director, Region One, April 30, 1962, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

69 Lawson, 25-26, 37.



Figure 122. Enlisted men's quarters, 1937. (EVER 7175)



Figure 123. Enlisted men's quarters, 1934. (HABS image 053118)

The 1938 Master Plan called for the building to be preserved as a ruin. It appears from historic images that by 1937 not much was left of the four detached kitchens and in 1938, much of the brick rubble was cleaned up, with only a few walls standing. In 1962, the NPS demolished the enlisted men's quarters to the foundation, along with the officers' quarters. The justification for the demolition was that the walls, roofs, and floors had completely fallen or cracked to the point that the building was considered dangerous. In 1965, it was reported that most of the rubble had been removed from the foundation area.<sup>72</sup>

### Engineer Officers' Quarters

In order to alleviate problems that arose when it was necessary to garrison the fort, Superintending

72 Monthly Narrative, March 1943; Project Construction Program Proposal, May 22, 1961; J. C. Harrington, Acting Assistant Regional Director to Chief, EODC, April 25, 1962; Warren F. Hamilton, Superintendent, Everglades to Regional Director, Region One, April 30, 1962; Carl S. Christensen, Acting District Manager to Assistant Superintendent, Everglades, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.



Figure 124. Enlisted men's quarters, 1970. (Alexander Physical Status Report 91)

Engineer Morton had two kitchens constructed as engineer officers' quarters on Front 5 (present-day 3) during his tenure from April 1861 to March 1862. Superintending Engineer McFarland built a third kitchen to serve as quarters for Lieutenant Holgate, then assistant in charge, on Front 5 (present-day 3) during 1864. These are the buildings referred to by Dr. Joseph B. Holder as "vine-clad and cozy." (see Figure 61) Previously, Superintending Engineer Woodbury had a kitchen built on Front 6 (present-day 4) during his tenure from 1856-1860 for the caretaker and his family.

After the fort's garrison left in 1874, an ordnance-sergeant and fort keeper occupied two of these quarters. In 1885, Superintending Engineer Rossell asked for \$250 to repair the ordnance-sergeant's quarters. The piazzas were almost collapsing, and the roof leaked badly. It was reported in 1887 that the two sets of quarters were habitable. One was vacant, since the fort keeper was discharged in 1886. In 1890, the ordnance-sergeant was using three of the kitchens as quarters.

After the 1910 hurricane, buildings inside the fort described as "cottages" were said to be leaking badly. A 1916 inspection reported that one of the quarters was occupied by the custodian and that the roof leaked and the porch was decayed. Two of the quarters were described as being in "very poor condition."<sup>73</sup>

How the structures became brick shells by 1937 with no roofs, windows, doors, porches, or interior

73 Bearss, 256-58, 368, 375, 382, 418, 425; Manucy, *Construction History*, 135; Joseph B. Holder, 261-62.



**Figure 125.** Engineer officers' quarters, c.1898 (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



**Figure 126.** Engineer officers' quarters, 1909. (Monroe County Library)



**Figure 127.** Engineer officers' quarters, 1934. (HABS 053117)



**Figure 128.** Engineer officers' quarters, 1937. (EVER 3136)

floors, with many of the walls toppled, is unknown. Acting Superintendent Puderer reported many cracks in the standing walls and that the interior of one appeared to have been burned. However, in December 1938, plans were approved to rehabilitate two of the structures (8A and 8B) to serve as the superintendent's quarters using a connecting wooden hyphen. The plans placed a laundry and storehouse in one of the former detached outhouses behind the quarters.

20,000 bricks were cleaned, sorted for color, and stacked for reuse. Salvaged slate covered the roof and cypress was used for the outside frame walls and porch trim. The work for the residence ended on October 1, 1940. The intent of the rehabilitation was to maintain the historic exterior appearance of the structures, except for the addition of a hyphen to connect the two buildings and some changes to the fenestration. In some cases, steel "L" plates were added to support the existing granite lintels.<sup>74</sup>

A 1970 physical status report stated that both quarters had cracks in the masonry walls, as well as other areas of leakage that needed immediate repair. The buildings also needed repointing and all wood trim repaired and repainted.<sup>75</sup>

The 1988 HSR stated that "the masonry and mortar integrity of the entire structure is good throughout, with the exception of several doorways where iron lintels have exfoliated and jacked open the mortar joints where installed." The report repeated that the most significant preservation issue was moisture transmission through the masonry walls. Crews from the 482<sup>nd</sup> Civil Engineering Squadron replaced wood trim and porch screening from 1996 to 1997.<sup>76</sup>

74 Puderer, "Narrative Report," 3; Master Plan General Development Sheet, Edition 1939, Superintendent's House Job Application and Job Completion Record, 1941, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park; Glenn Simpson and Kelly Clark, *Exterior Preservation Plan Engineering Officers' Quarters* (Santa Fe, NM: Intermountain Regional Office, 2009), 14-19.

75 Alexander, 60.

76 Anderson, 25; Cheeseman to Scott, 2007; Completion Report Superintending Engineer's Quarters Roof Replacement, December 6, 1999, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.



was to replicate the historic appearance of the window openings based on an analysis of historic photographs. A preservation crew from the Intermountain Region was on site to install the new lintels when the Florida State Historic Preservation Office determined the treatment was “selective restoration” and a long-term restoration plan would need to be prepared before the lintels could be installed. The Division of Facilities Management, Historic Preservation Projects, Intermountain Regional Office completed a draft Exterior Preservation Plan in 2007. After the collapse of the porch on the building in 2009, DRTO Exhibit Specialist Kelly Clark updated the draft to account for the change in condition and adaptive reuse strategy.<sup>78</sup>

### Chapel/Office /Cistern

In May 1850, Superintending Engineer Wright notified General Totten that the wooden cisterns

were in a state of decay. He believed concrete cisterns were needed to meet the need for fresh water. The Engineer Department decided to construct a cistern on the site of a proposed chapel/office, with the cistern also serving as the building’s foundation. The structure was to be 66 ft. x 53 ft., with exterior walls of brick and interior walls of concrete. By May 13, 1852, the cistern was complete and full of water (see Figure 34). It was reported in 1876 that the building had been raised to the level of the first floor, with the part below arranged as a cistern. In 1895, 500 feet of galvanized pipe was removed from the chapel/office cistern and relocated to the cistern associated with the officers’ quarters. The superstructure of the chapel/office was never completed.<sup>79</sup>

The 1938 Master Plan called for the chapel/office cistern to serve as a reservoir for treated water. The

78 Glenn Simpson and Kelly Clark, 1, 44-45.

79 Bearss, 123-25, 346, 375, 387; Manucy, *Construction History*, 32, 119.

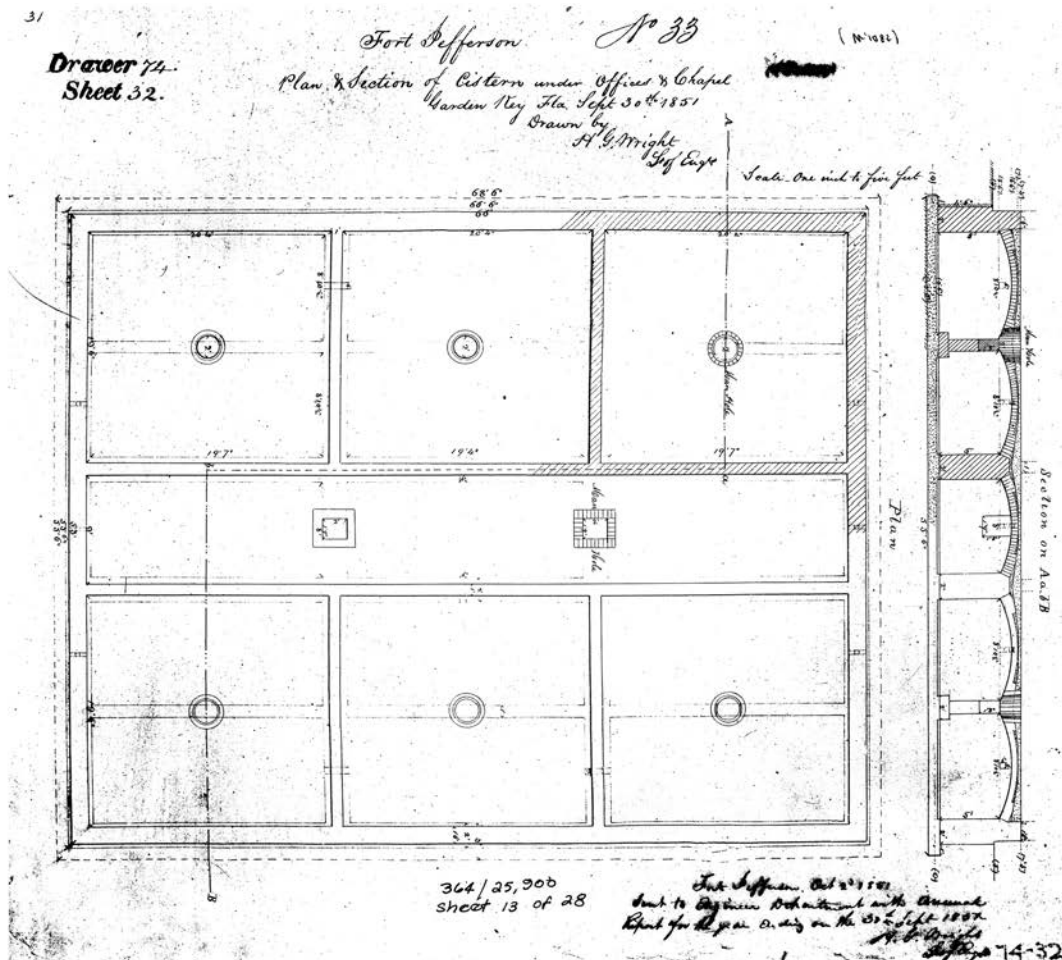


Figure 131. Plan of Chapel/office cistern, 1851. (Denver Service Center etic 364/25900)



Figure 132. Chapel/office cistern, 1898. (EVER 7345)



Figure 133. Chapel/office cistern, 1913. (USGS Photographic Library sew01385)



Figure 134. Chapel/office cistern, 1937. (DRTO 301080)

construction of a concrete deck covering the top of the cistern occurred in 1938. In order to prevent leaks into the cistern, the interior walls, originally covered with a cement plaster, were waterproofed by replastering with Embeco-treated cement plaster. Waterproofing of the floor areas with the same product also occurred but with the addition of aggregate in the mix.

Cracks in the walls were caulked, but due to the poor quality of the original concrete, leakage through cracks was finally stopped only by boxing

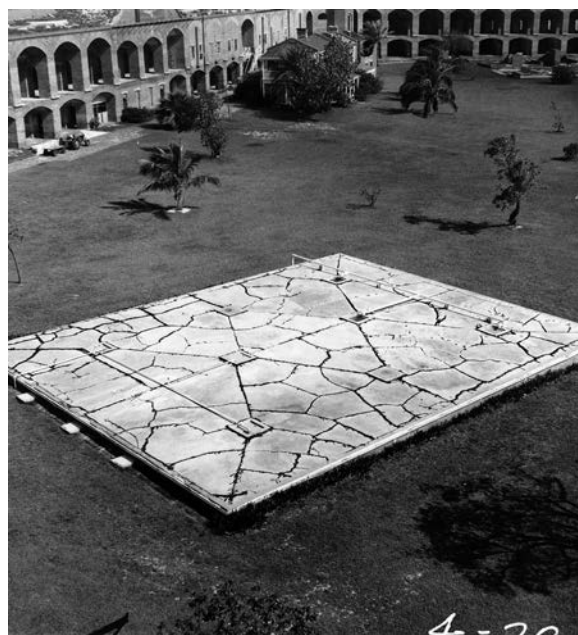


Figure 135. Chapel/office cistern, 1970. (Alexander Physical Status Report 94)

in the cracks with a small form and filling this with concrete. After the desired thickness of Embeco had been applied, a ½-inch coat of cement stucco prevented the stored water from coming in contact with the Embeco. The treatment covered the exterior walls with cement stucco and recovered the top with a three-inch slab of reinforced concrete. Openings, cut through the division walls, allowed water to flow towards the outlet pipes. The project also included new reinforced concrete manhole covers.<sup>80</sup>

A 1970 physical status report stated that the concrete cover was badly cracked and replacement should be considered. Crews from the 482<sup>nd</sup> Civil Engineering Squadron installed a pool liner material in an effort to prevent leaking, but it did not work and was later removed.<sup>81</sup>

A utilities rehabilitation project initiated in 1985 included considerable repairs to the cistern. In 1993, a new dock-to-cistern water-line was installed. A 1999 project cleaned fractures and filled with adhesive sealant. Aboveground wall fractures were cleaned and damaged bricks were replaced and repointed. Also during this project, a

80 Puderer, "Special Report," 4; Mikell, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

81 Alexander, 63; Cheeseman to Scott, 2007.



Figure 136. Officers' quarters, cistern, and hot shot furnace, 1937. (EVER 7183)

pressurized pump station was constructed adjacent to the cistern.<sup>82</sup>

### Concrete Cisterns

The construction of two concrete cisterns occurred in 1854. One was located outside the fort, between the temporary enlisted men's quarters and kitchen. The second cistern was sited at the officers' quarters, adjacent to one of the rear kitchens just west of the shot furnace (see Figure 142). Repairs to the cisterns occurred from 1895 to 1897. The exterior cistern's water is described in 1910 as "sweet," and both are described in 1916.

82 Anderson, xvii; LAS, 163.

The cistern on the fort's exterior was in good condition, except for its roof. The cistern adjacent to the officers' quarters was nearly full. These cisterns supplied water to destroyers and other craft that docked at Fort Jefferson. After this, their fate is unknown but since the officers' quarters cistern was supplied by gutters on the front of the building, it is likely that after the 1927 fire, the cistern was abandoned. It can still be seen in images from the 1930s.<sup>83</sup>

### Large Powder Magazine

In February 1862, Superintending Engineer Morton received plans for a detached magazine on Front 1 (present-day 5). The foundation was to be concrete, walls and piers above the foundation were to be faced with brick, and the roof would be slate.

Workers completed the foundation in 1864. By 1866, the walls had been raised thirteen and one-half feet and the principal arch had been turned. On an 1876 inspection, the magazine remained unfinished. A 1970 physical status report stated that the arch was in good condition but needed

83 Bearss, 125, 375, 386-89, 416-18, 424, 443.

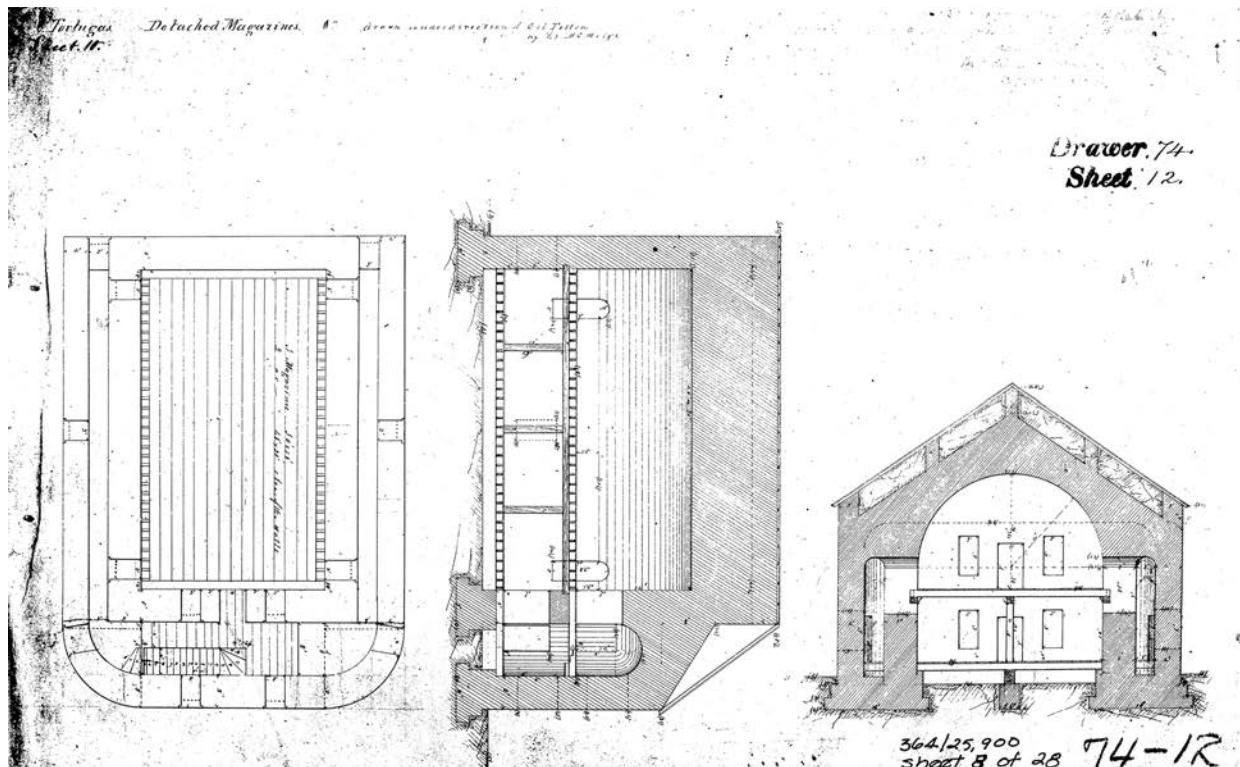


Figure 137. Plan of detached magazines, 1862. (Denver Service Center etic 364/25900)



**Figure 138.** Large powder magazine, 1937. (EVER 7122) repointing and sealing to prevent the mortar from leaching out.<sup>84</sup>

The 1988 HSR described its condition:

The condition of the unfinished large powder magazine is one of relative stability, the structure being situated in the protected confines of the parade ground. The brick are showing signs of weathering in some areas, particularly on the south and west elevations. There is speculation that the cause of the pronounced weathering on the south elevation was its use as a rifle range for target practice during the historic period. Approximately 100 square feet of brick are damaged or missing in this area. Accompanying the brick weathering is a certain amount of mortar deterioration, especially evident on the west elevation.<sup>85</sup>

A 1998 investigation of conditions noted that the structure was in stable condition with little change to the historic fabric since the 1988 HSR. The HSR-Amendment concurred that the magazine appeared to be structurally stable but also noted significant biological growth and efflorescence throughout the structure. These conditions correlated with areas of water infiltration. Interior mortar joints appeared to be in relatively good condition. On the exterior of the building, deteriorated mortar joints were concentrated near the base of the building, a pattern found throughout the fort that can be attributed to rainwater saturating this area of the structure.<sup>86</sup>

84 Bearss, 205, 256, 262, 346, 385; Manucy *Construction History*, 138, 155; Alexander, 61.

85 Anderson, 19.

86 LAS, 157.

## Small Powder Magazine

A smaller magazine was located on Front 4 (present-day 2) in front of Bastion D (present-day 1). By 1866, the walls had been raised seven feet. It also remained unfinished and did not have an enclosure arch like the large magazine. A 1970 physical status report stated that it required minimal stabilization work.<sup>87</sup>

The 1988 HSR described its condition:

The most obvious condition of the small powder magazine needing remedy is the predominance of vegetative intrusion, particularly on the east elevation. Some cracks in the structure can be attributed to this cause. One major crack in the horizontal mortar beds circles the entire magazine at a level coincident with the depth of the root systems of plants growing on the structure.<sup>88</sup>

87 Alexander, 61.

88 Anderson, 19.



**Figure 139.** Small powder magazine, 1867. (HABS 053155/EVER 7390)



**Figure 140.** Small powder magazine, 1898. (DRTO 300891B)

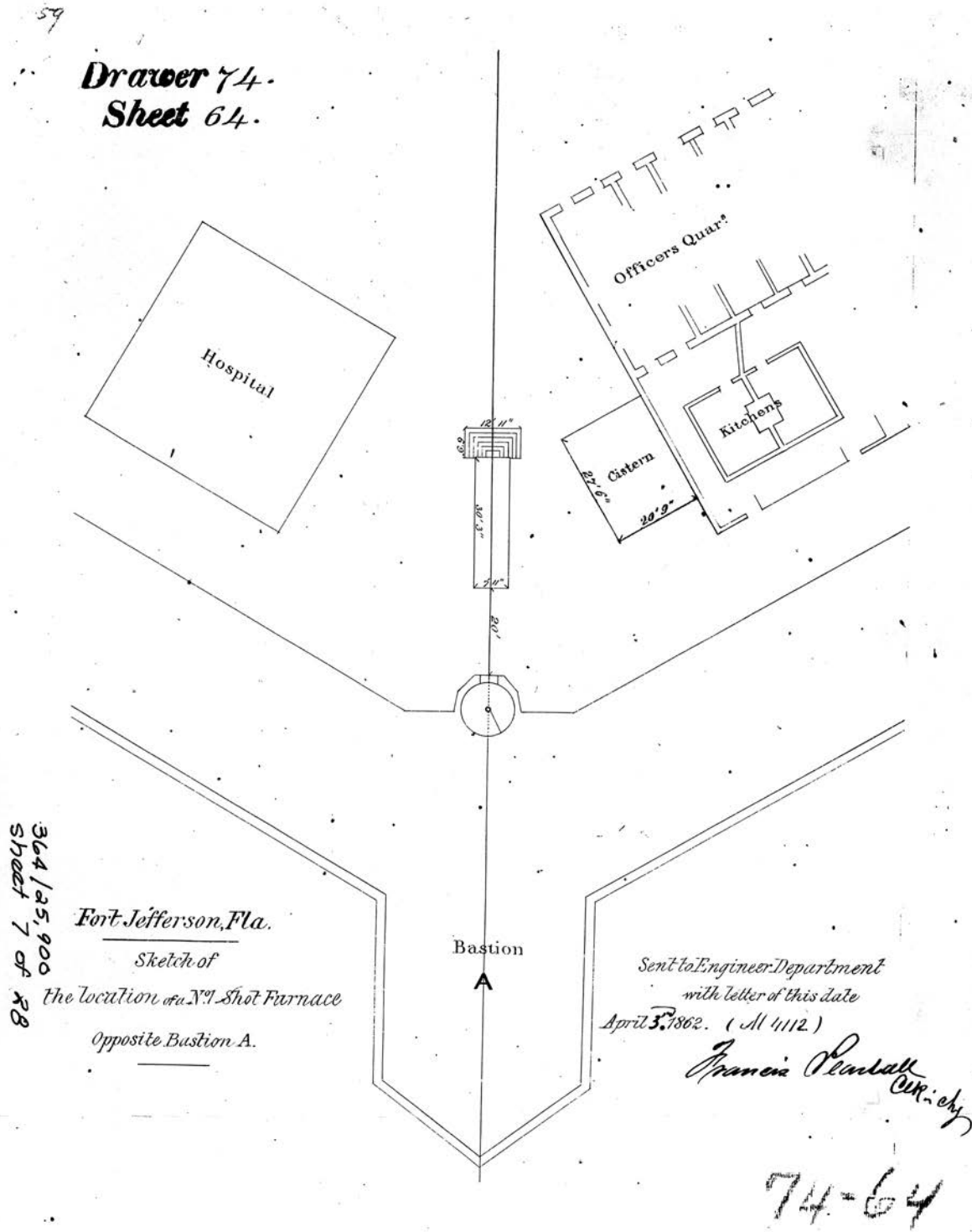


Figure 141. Plan of hot shot location, 1862. (Denver Service Center etic 364/25900 sheet 7)

Invasive vegetation was removed from the small powder magazine in 2000. The HSR-Amendment noted that vegetation had been cleared from the structure, which appeared to be in fair to good condition, but that a horizontal separation was observed in the middle of the perimeter wall. Biological growth and efflorescence was present at the interior arches. A new floor in the entrance area, laid with contemporary brick pavers, was not in keeping with the character of the original masonry.<sup>89</sup>

## Hot Shot Furnace

The construction of the hot shot furnace at the north angle of the parade began in April 1862. Completed in 1863, it consisted of a long wrought-iron grate enclosed by brick masonry. A fire pit was located at one end, and a flue through which combustion gases escaped was located at the other. A 1970 physical status report stated that the structure had numerous cracks from the exfoliation of the iron bolts and tie bars within. The top of the oven had a loose coral-rubble fill that allowed water to penetrate into the structure.<sup>90</sup>

The 1988 HSR described its condition:

The shot furnace shows evidence of accelerating deterioration due to the typical weathering to which all of the fort structures are subjected. Also, considerable quantities of ironwork integral to the furnace assembly are exfoliating, generating severe damage to the masonry. The latter case is particularly seen on the west face where two large cracks

have occurred along the planes defined by the iron tie rods. Prior repointing of these cracks is evident but the problem itself persists essentially unremedied.

At the south face of the shot furnace, most of the granite coping stones of the chimney are missing and the chimney itself is inclining toward the north.

A phased restoration project occurred from 2001-2004. The internal iron pieces that are integral to the design of the hot shot furnace continually expanded as they oxidized and became infiltrated with salts. As the iron pieces expanded, they began to displace the masonry around and above. In order to preserve the furnace, all of the internal iron had to be removed and replaced with non-ferrous material. During Phase I, the dismantling of the upper portions of the furnace and removal of all iron elements occurred. During Phase II, these elements were re-fabricated in siliconized bronze, and during Phase III, the furnace was reconstructed. Samples of the original iron elements are preserved in the park's museum collection and are in storage at the SFCMC.<sup>91</sup>

## Frame Buildings

Eight frame buildings were constructed in 1847. Three buildings—workmen's quarters, kitchen/mess hall, and stables—were located outside the fort. Five buildings—lime house, bake house, storehouse, blacksmith shop, and carpenter's shop—were located on the parade. The storehouse burned in 1857, and a small store near the mess

89 LAS, 158.

90 Bearss, 214, 252; Manucy, *Construction History*, 90, Anderson, 10; Alexander, 61.

91 Anderson, 21; Glenn Simpson, *Record of Treatment – Rehabilitation of the Hot Shot Furnace at Fort Jefferson* (Santa Fe, NM: Intermountain Regional Office, 2004), 1; LAS, 157.



Figure 142. Hot shot furnace, 1934. (HABS 053154)



Figure 143. Hot shot furnace, 1937. (EVER 7138)

hall supplied clothing and other necessities to the workmen. Another structure added to the parade before 1861 was used as a lumber shed (see Figure 30).

In order to house the troops that arrived at Fort Jefferson in 1861, the Quartermaster Department took over the lime and lumber sheds as temporary quarters for the two companies. Another was constructed on the parade east of and parallel to Front 5 (present-day 3). It was completed in August 1861 (see Figure 63). At this time, the stables were being used as a temporary hospital. The removal of three frame buildings from the parade—blacksmith shop, paint shop, and bakehouse—occurred in 1870. )

During an outbreak of yellow fever in 1873, Assistant Surgeon Harvey E. Brown reported that the roofs of the frame buildings outside the fort were decayed and should be replaced with slate. Fungus covered a lumber shed on the parade. In 1874, the Engineer Department responded to these complaints by razing six of the frame structures and repairing the others. By 1876, all

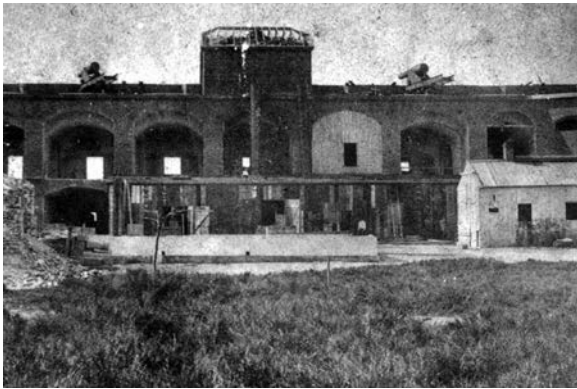


Figure 144. Blacksmith shop, 1870. (DRTO 300658)



Figure 145. Blacksmith shop, undated.



Figure 146. Frame building on wharf, 1908. (USGS Photographic Library vtw00292)

frame structures on the parade associated with the fort construction had been removed, and the frame buildings outside the fort were in a dilapidated condition. Although it was reported in 1887 that only one of the temporary frame structures, a shed, remained outside the fort and was “so dilapidated that it might collapse at any minute,” an 1895 report stated that “the frame structure formerly used by the Engineers as a carpenter’s shop” had been fitted with gutters to supply the cistern on the southeast spit. Included in the destruction of the 1910 hurricane were “sheds on entrance of wharf” and the blacksmith shop.

Ground penetrating radar conducted in 2006 found the possible foundation remains of the storehouse, anomalies possibly associated with the blacksmith shop, carpenter’s shop, and limehouse, and foundation remains outside the fort possibly associated with the workmen’s quarters. It appears that the installation of buried utility systems disturbed the area.<sup>92</sup>

### Major Smith Monument

A 9 ft. x 3 ft. x 8 ft. classical marker was constructed in 1870 of brick and stuccoed white with pilasters on each end and a pedimented central section. The marker can be seen in historic photographs surrounded by a concrete edging that also enclosed nearby buttonwood trees. Concrete coping surrounded the monument and continued out further into the parade ground.

92 Bearss, 45, 172-73, 223, 254, 293, 335-37, 346, 367, 386, 417-18; Reid 22, 63, 127; Lawson, 28, 33.



Figure 147. Major Smith Monument, 1870. (DRTO 301156)



Figure 148. Major Smith Monument, 1940s. (017902 GPR)

## Wharf

The construction of a simple pier head measuring 34 ft. x 28 ft. along Front 3 (present-day 1) occurred in 1849. Extensive wharves were not needed early in the construction process due to the depth of water close to shore. An additional wharf, built in 1855 opposite Front 2 (present-day 6), accommodated the larger quantity of building materials expected on site. Plans show a landing bridge over the moat going into the fort. An 1861 map shows three wharves, with a note that the 1855 wharf was of little use (see Figure 30). The embrasure opening, through which materials had been offloaded directly from the 1855 wharf into the fort, had been filled in as construction



Figure 149. Wharf, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



Figure 150. Wharf, 1909. (USGS Photographic Library vtw00305)

progressed. Repair work to the wharves occurred in 1864 and 1869.<sup>93</sup>

It was reported in 1876 that the wharves were in “tolerable condition.” The principal wharf was opposite the sally port and the other near the southern extremity of the key. An 1877 inspection described the smaller wharf as “somewhat decayed and broken.” By 1883, the principal wharf was also rotten, and by 1886, it was so decayed that it could not be used for landing heavy stores.

U.S. Marine Hospital Service finally constructed a new wharf in 1892. During Fiscal Year 1894, a coal shed was constructed beside the wharf gangway. Modifications were needed to give the new wharf more mooring space, and these occurred in Fiscal Year 1895. Quarantine personnel repaired the wharf bridge in 1898. The Navy spent \$2,000 on wharf repairs between 1898 and 1906. An inspector reported in 1910 that the deck was in good condition but that many of the diagonal ties beneath the deck were broken or corroded.<sup>94</sup>

Temporary repairs made in 1937 used salvaged lumber, but the substructure remained in poor

93 364/25900 sheet 10; Record Group 77, Drawer 74, Sheet 59; Record Group 77, Drawer 74, sheet 37.

94 Bearss, 94, 253, 332, 346-51, 370-75, 383-90, 410, 417; Manucy, 37, 96, 155; Reid, 125.

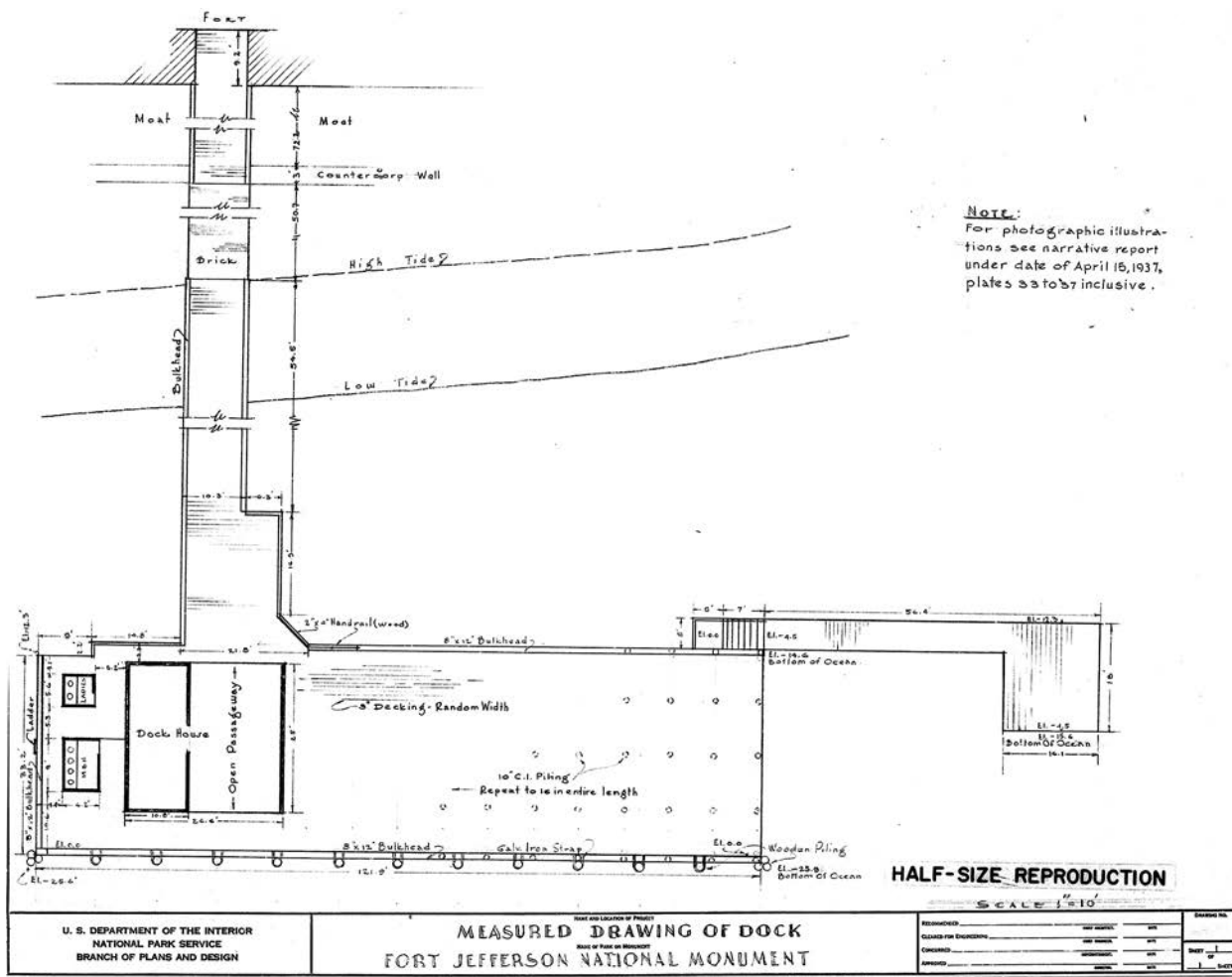


Figure 151. Plan of wharf, 1937. (Denver Service Center etic 364/2050)

condition. The wooden deck was rotting, the iron piling supporting the deck was rusted, and six of the pilings in the front row were broken off at the water line. The only toilets at Fort Jefferson were the two on the main dock. Resident landscape architect Puderer reported in 1938 that a new dock was needed.<sup>95</sup>

In 1940, Coordinating Superintendent Edward D. Freeland advocated for repairs to the wharf and a new comfort station for the public:

During my recent visit to Fort Jefferson, accompanied by Inspector Vinten, we went over the projects to be accomplished by ERA this fiscal year. Two projects that I believe

95 Puderer, "Narrative Report," 1, 4, 6; Puderer, "Special Report," 3; Master Plan General Development Sheet, 1939 Edition, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

should be close to the top of the priority list are repairs to the main wharf and a public comfort station. The present comfort station facilities are a disgrace to the National Park Service. As we have an ERA Project this fiscal year, every effort should be made to replace the existing unsanitary facilities now located on the dock, with a suitable comfort station



Figure 152. Wharf, 1937. (EVER 7157)

in the Court Yard. Another reason why the comfort station facilities will have to be given early consideration is that the structures on the dock will have to be removed when the dock is repaired.

I am still of the opinion that the best location for the proposed comfort station is in the partly completed powder magazine to the left of the Sallyport as one enters the Fort. As you know, the sewer system is complete, and connections have been provided in the septic tank near the above-mentioned powder magazine.

The following year, the Acting Superintendent stated that the comfort station project had not been approved and recommended that the job be cancelled due to lack of suitable labor.<sup>96</sup>

Superintendent Budlong reported in 1942 that one undesirable structure on the pier was demolished. In March 1943, he stated:

Our main pier is rapidly going to pieces and the decking is in unsafe condition in many spots. Slow machinery is still in motion, I believe, to have essential repairs made by another agency of the government, but nothing has been done to date. During the month the old south coaling pier received some rude shocks that made its general condition even more deplorable than before.

Minor repairs to the pier and small boat landing occurred during November 1943. In February 1944, Superintendent Budlong was finally able to report some progress:

We shored-up our sagging small-boat landing stage, and it is now quite a rigid structure. We used only scrap materials, of course. Considerable work remains to be done; we have to drive more pilings and brace things a bit more, but the worst of the work has now been done.

In March 1965, the Acting District Manager stated that the pier “has been a source of grave concern

to Monument personnel since at least 1943, according to our files, yet decisive action has never been taken. Three years ago, the dock was in bad shape; its condition today is near ruin.” It appears from park images that around 1958 the dockhouse was replaced or altered. In 1966, the Everglades Superintendent wrote the Regional Director that “the condition of the pier has now reached the point of being dangerous to the National Park Service personnel and visitors.” The dockhouse contained two visitor restrooms, a visitor contact-registry room, and two small NPS storage-utility rooms.<sup>97</sup>

Plans for a new dock called for a seaplane ramp to be located between the south coaling dock and the south half of the existing wooden dock, but the ramp was moved northeast of the new dock over concerns that aircraft operation would intrude into the picnic and camping areas and would be immediately adjacent to the walkway to the visitor contact station. Demolition of the north half of the old wooden pier and construction of a new reinforced concrete dock, combination concrete and timber approach ramp, and reinforced concrete seaplane ramp and soil cement hardstand finally occurred in 1968. Crews from the 482<sup>nd</sup> Civil Engineering Squadron reversed timbers on the ramp to the dock in 1979 and 1993.

A new boathouse dock with visitor contact and comfort stations replaced the south half of the timber pier in 1978. A project that included the rehabilitation of the timber boathouse docks and ramps concluded in 2002. Nail-laminated stringers, new decking, and stainless steel hardware replaced the original concrete deck of the loading dock, which was also enlarged. The boathouse dock received new stringers, new decking, and stainless steel hardware. All piles were replaced. The loading dock ramp was completely reconstructed with new stringers and decking. The boathouse ramp received new piers, new decking, new stringers, and polymer wood composite handrails. All of the

96 Edward D. Freeland, Coordinating Superintendent to Regional Director, Region 1, July 20, 1940; A. P. Bursley, Acting Assistant Regional Director to Acting Superintendent, February 25, 1941, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

97 Monthly Narrative Report, June 1942, November 1943; Monthly Narrative Report, February 1944; Carl S. Christensen, Acting District Manager to Superintendent, Everglades, March 18, 1965; Roger W. Allen, Superintendent, Everglades National Park to Regional Director, Southeast, March 4, 1966, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park .





Figure 155. Original lighthouse, 1867. (DRTO 300889)

decking and half of the stringers were replaced on the finger piers. Hurricanes Katrina and Wilma damaged the docks and finger piers in 2005.<sup>98</sup>

### Garden Key Lightkeeper's Complex

Garden Key was the location of the Garden Key lighthouse, keeper's residence, and outbuildings, which were constructed in 1826. The original lighthouse was a masonry tower that stood just off the southwest corner of the enlisted men's quarters. The original keeper's residence was a two-story frame structure located just northeast of the sally port. Chief Engineer Totten issued a directive that the lighthouse property should be fenced when the Engineer Department began construction of Fort Jefferson in 1846, as it was not the property of the U. S. Army. With the construction by the Light-House Board of a larger lighthouse tower on Loggerhead Key in 1858, the Garden Key structure was reduced to a harbor light.

Photographs from the 1860s show the original frame lightkeeper's residence enclosed by a picket fence (see Figures 42, 100). Hurricanes in 1873 and 1875 damaged the 1825 lighthouse, rendering the lantern almost useless, and damaged the keeper's quarters. The erection of a new wrought iron light

tower and the demolition of the old lighthouse occurred in 1876. The new tower was constructed over the stair tower near Bastion C (present-day 6), close to the location of the old light tower<sup>99</sup> (plans of light tower)

An image taken after the erection of the new light tower in 1876 shows the old keeper's quarters still in place. A raised keeper's quarters with wrap-around porches was built slightly closer to the original lighthouse at some point shortly thereafter and was associated with a chicken house, privy, and circular brick cistern.<sup>100</sup>

In 1912, a devastating fire started in the outhouse of the keeper's quarters and spread to the house, quickly engulfing it. The automation of the light tower occurred in the same year, with tanks of compressed acetylene replacing the butts of kerosene to fuel the lights. The light tower was decommissioned in 1924.<sup>101</sup> Repairs to the light tower were made between December 1939 and March 1940. Two men chipped rust surfaces on the lighthouse tower. When the lining on the first floor of the tower was removed during cleanup, it was discovered that the ¼-inch plates rising from the terreplein were rusted out in many spots and that generally less than ⅛ inch of sound metal remained. Attempts to gas weld reinforcing plates to the bottom of the rusted sections failed. However, spot welding of the catwalk was successful and all sections damaged by corrosion were replaced. A minimum amount of electrical welding completed the project. Sealed beads welded reinforcing plates to the sheets on the tower.

Half of the metal of the cast-iron crown ball needed replacement. New brass fillister bolting was purchased, and all cast iron beading strips were replaced. After the completion of all chipping, scraping of rust, and welding jobs, the upper parts of the tower were given one coat of red lead and two coats of black enamel. Below the catwalk, the structure received two coats of red lead and two coats of red enamel. Repairs to the floors and replacement of the tongue-and-groove lining in the tower occurred. The cupola received ten tempered glass plates; the tower four windows fabricated on

98 Roger W. Allen, Superintendent, Everglades to Regional Director, Southeast Region, November 7, 1967; W. E. O'Neil, Jr., Assistant to the Regional Director, Program Coordination to Chief, Design and Construction, November 8, 1967; Chief, Design and Construction to Regional Director, Southeast Region, December 27, 1967; Final Construction Report, April 26, 2005, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.; Alexander, I-1; Cheeseman to Scott, 2007; Superintendent's Annual Report 2005.

99 Bearss, 346, 382, 385, 422; Reid, 21.

100 Bearss, 317, 343; Lawson, 19.

101 <http://www.uscg.mil/history/weblighthouses/LHFL.asp>.

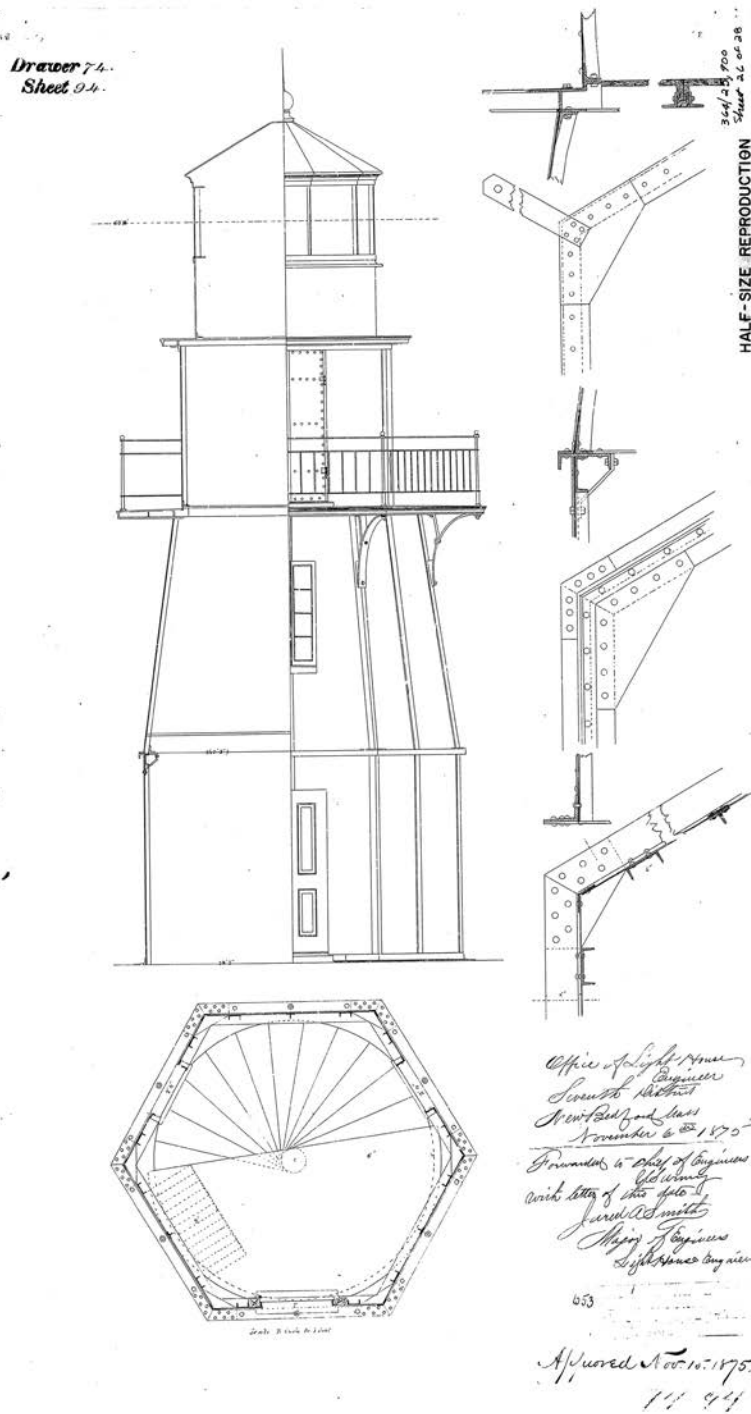
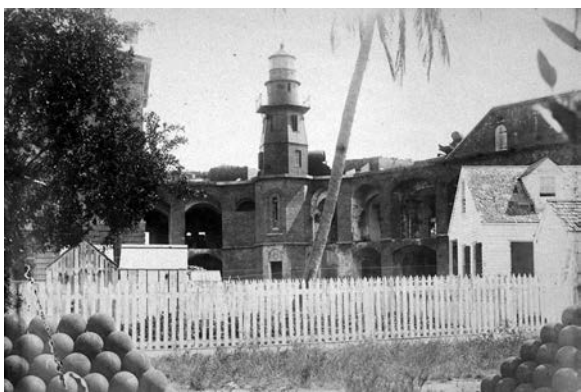


Figure 156. Plan of light tower, 1875. (Denver Service Center etic 364/25900 sheet 26)



**Figure 157.** Light tower with old keeper's quarters, c. 1876 (NARA)



**Figure 158.** New keeper's quarters, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRT0 3805)



**Figure 159.** Light tower, 1937. (Harpers Ferry Center 000626)

site. The Lighthouse Service agreed to furnish a lens for the light when the repairs were complete.<sup>102</sup>

In 1968, a condition assessment reported:

The existing light structure is in no danger of immediate collapse. However, it is in a state of deterioration that requires immediate attention, especially if it is to be opened for visitor use. The view through the windows above elevation 65.17' is most exciting, as one can get a thorough panoramic picture of the entire monument area. It is especially good for taking pictures of the Fort, the surrounding Keys and the lighthouse on Loggerhead Key.

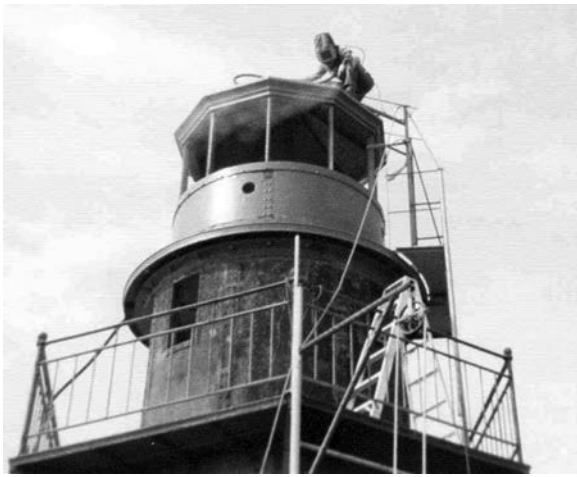
In its current condition and continuing rate of deterioration the structure will continue to be a source of maintenance problems as well as being unsafe and unsightly.

The report outlined three possible treatments for the light tower—minimal repairs, complete reconstruction using modern methods of welding and high strength bolts, or an intermediary level of rehabilitation. The park supported an intermediary level of rehabilitation that would permit some visitor access.<sup>103</sup>

In 1976, crews from the 482<sup>nd</sup> Civil Engineering Squadron replaced deteriorated metal, sandblasted the entire exterior below the upper walkway, and applied a rust inhibitor to the exterior. Additional preservation maintenance occurred in 1983. Work included sandblast cleaning and repainting the exterior, replacing all lantern glass, repainting the lighthouse interior, replacement of door and window hardware and repainting and refinishing lighthouse doors and windows. Windows were replaced in kind in 1991. In 1999, extensive repairs occurred and a new painting system was applied. The HSR-Amendment noted some deterioration

<sup>102</sup> Mikell, 1940; Restoration of Lighthouse Tower Job Application and Completion Record, June 24, 1939, Dry Tortugas National Park Resource Management Records Collection, DRT0 4378, South Florida Collections Management Center, Everglades National Park.

<sup>103</sup> Pat Miller, Acting Superintendent, Everglades to Regional Director, Southeast Region, February 17, 1969, Dry Tortugas National Park Resource Management Records Collection, DRT0 4378, South Florida Collections Management Center, Everglades National Park; 364/94000, The Iron Lighthouse, 1971, Denver Service Center, <http://etic.nps.gov..>



**Figure 160.** Light tower restoration, 1976. (DRTO 301708)

of the wood window sash and many areas of rust on the metal body. Replacement of windows with historically accurate shutters occurred in 2009.<sup>104</sup>

Ground penetrating radar conducted in 2006 in the southeast portion of the parade ground discovered an anomaly roughly the size of the second lightkeeper’s residence and another that may correspond to the fenced area and outbuildings.<sup>105</sup>

### Coal Depot

The construction of the Dry Tortugas Naval Coal Depot began in August 1898. The Union Bridge Company and the Brown Hoisting and Conveyer Machine Company were the prime contractors. Work continued on an intermittent basis until the depot’s completion in July 1901, at which time the Navy Bureau of Equipment took possession of the coals sheds, piers, and hoisting apparatus.

In March 1909, a Board appointed by the Commanding Officer of the U.S. Naval Station in Key West reported that the coal depot could not be maintained by only two laborers and that the sheds were rapidly deteriorating. A hurricane struck on October 17, 1910, and badly damaged the coal depot conveyors. In 1911, the Secretary of the Navy decided not to rehabilitate the coal depot at Dry Tortugas. Materials were to be transferred to the Key West Naval Station.<sup>106</sup>

104 Cheeseman to Scott, 2007; Anderson, 19; LAS, 156, 163; Superintendent’s Annual Report 1999.

105 Lawson, 30.

106 Bearss, 408-20.

Acting Superintendent Puderer reported in 1937 that both coaling docks were in bad condition. On an inspection of the area in December 1937, the Secretary of the Interior ordered that the coaling docks be demolished. A job was approved in 1939 for “Cleanup of the South Coaling Dock.” Included in the job application was a request for the rental of a dragline and barge. Heavy pieces of old machinery, girders, channel markers, and wrecked elevators could not be moved by hand or with any equipment on hand at Fort Jefferson.

A completion report filed in 1942 reported that all rotted decking and scrap iron had been removed the previous year. The dock itself was stripped down to leave only pilings, cross member supports, temporary runway, thirty square feet of planked landing, and pile caps. The park removed debris remaining from the dock demolition, stockpiled valuable building materials at the southern end of the shed foundation, and buried all junk iron in pits well back from the beach. This included thirty tons of structural steel scrap and ten tons of bulky light scrap iron.

The demolition of the north coaling dock shed structure made way for cleanup of the site. However, due to a reduction in workmen, no work was undertaken after June 25, 1941, leaving cleanup unfinished.<sup>107</sup>

107 Puderer, “Narrative Report,” 4; Job Application and Completion Record, Cleanup of South Coaling Dock, October 1939; Completion Report, Job 21, Cleanup of South Coaling Dock, 1942; Job Completion Record, Cleanup North Dock, October 31, 1941, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.



**Figure 161.** North depot, 1902. (National Archives)



Figure 162. South depot, 1902. (National Archives)



Figure 163. North depot hurricane damage, 1911. (USGS Photographic Library vtww00357)

More salvage work occurred on the coaling docks in 1961, but the contractor hired failed to complete the work. By 1963, the outer (westerly) end of the south coaling dock had been damaged by continual scouring by wave action. The loss of material from under the foundation of the end wall caused the settlement of the wall and washing out of interior fill material, which caused portions of the concrete deck slab to collapse into the void. A day-labor crew poured a new foundation “cut off wall” during the period from April 1963 to May 1964. The interior void was filled with sand, shell, and rubble from the demolished quarters buildings. In 1970, the central section of the existing deck slab was being used as a helicopter landing area. Also a section of the deck was being used to support two 3,000-gallon and two 4,000-gallon diesel fuel storage tanks.<sup>108</sup>

The northern end of the north coaling dock suffered a similar type of damage, but no repair

108 Superintendent, Everglades to Regional Director, Southeast Region, January 31, 1963, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park .

work was done in the 1960s. By 1970, the remaining concrete deck surface was not useable due to the remains of old concrete walls that had fallen over on the deck.<sup>109</sup>

In 1991, the park removed a 1,000-gallon underground storage tank adjacent to the south coaling dock and replaced it with two 500-gallon aboveground, gasoline storage tanks. The tanks were enclosed by a 12 ft. x 12 ft. storage shed. In 1994, the park replaced the underground fuel storage tanks.<sup>110</sup>

## Distilling Plant

In 1902, the Navy completed a distilling plant to provide water for the Marine garrison at Fort Jefferson. In 1906, the distilling plant was removed to Guantanamo, Cuba, when the last of the Marine garrison left Fort Jefferson.<sup>111</sup>

## Topography

One of the earliest surveys that identified the individual keys was made by George Gauld for the British Admiralty in 1773-75. Gauld’s chart

109 Alexander, III-3-4.

110 LAS, 163.

111 Bearss, 413-15.

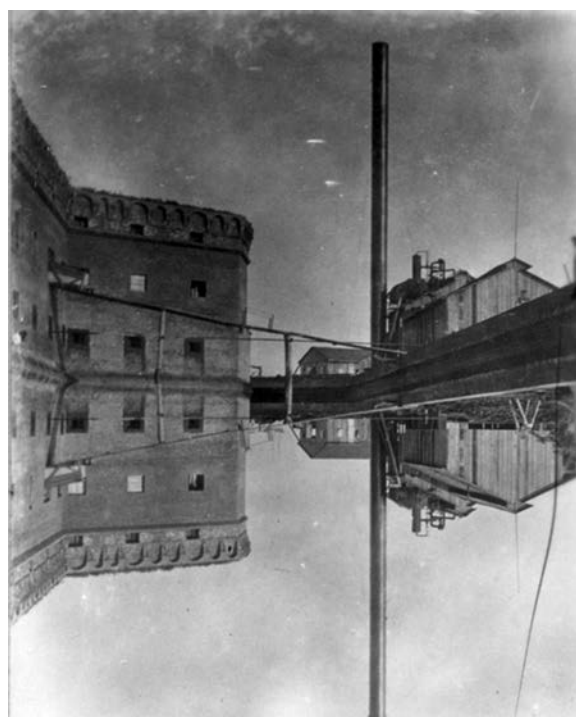


Figure 164. Distillation plant, 1907. (DRTO 300633)

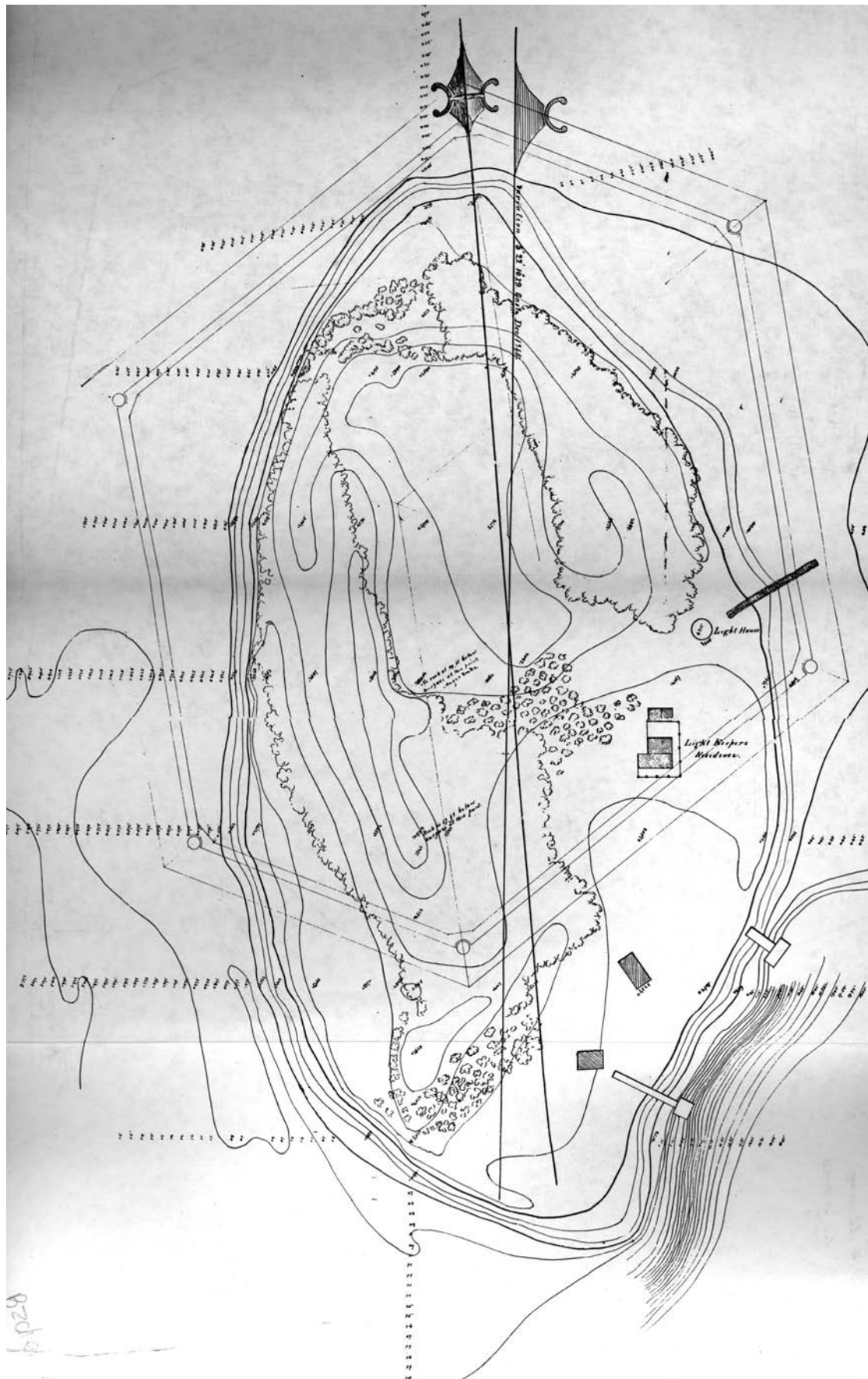


Figure 165. 1845 survey of Garden Key. (National Archives Record Group 77, Drawer 74, sheet 1)

applied the name “Dry Tortugas” to the group as a whole and showed ten keys. Gauld’s chart showed Garden Key with an irregular shoreline.<sup>112</sup>

Reports in conjunction with the construction of the original lighthouse in 1826 described Garden Key as a crude oval about 300 yards long by 200 yards wide barely three feet above sea level with a stagnant salt pond in the center that was later filled in as a result of complaints by the lightkeeper that it bred mosquitoes.

The 1829 Tattnall survey reported Garden Key’s area as about 7½ acres. Bache’s 1845 survey, conducted before the construction of Fort Jefferson began, showed a roughly elliptical shape, with highest land elevations just over 5 feet above mean low water, and the center of the island was shown as low and swampy. Bache’s survey gave the land area as 8.8 acres above high tide line. Engineers shortened two sides of the fort to conform to the shape of Garden Key, but the size of the key was increased by adding fill during construction of the fort. The size was described by Davis in 1942 as 16 acres, of which 5 lay outside the walls of the fort.

An October 1846 hurricane altered the shoreline of Garden Key, sand having migrated from the northern to the southern extremity. Wright reported that the conditions would not increase the difficulty of fort construction but that more fill would be needed for the parade.

Changes to the topography of Garden Key resulting from the 1846 hurricane necessitated constructing an “enrockment” in 1847 to protect the foundations of three detached officers’ quarters kitchens from the surf, but even a strong gale “swept away the sand so readily through the enrockment, as to show the protection to be entirely inadequate to the security of the buildings against the action of the water in a Hurricane.” Solving the problem required the erection of a coral barrier around the kitchens and filling the area between it and the buildings with sand and brushwood. A September 1848 storm tested the barricade, which held and was not breached by the sea.<sup>113</sup>

112 W. B. Robertson, “Terns of the Dry Tortugas,” *Bulletin of the Florida State Museum of Biological Sciences* 8 (1964): 6-14.

113 Reid, 12-14; Bearss, 40, 47.

Constructing the parade required large quantities of fill, excavated from the counterscarp cofferdam. During 1854, the parade was embanked three feet above grade to prevent it from flooding, using sand boated over from Long Key. A depression, formerly a salt pond, was filled to the same level.

Spoil excavated from the adjacent ditch in 1863 was used as fill for the area between the scarp and the breast-high wall of the barbette tier. During 1868, sand removed from the ditch on Front 3 (present-day 1) was used to fill the parapet’s superior slope. Excess sand was placed on the terreplein over the brick arches. Rain water then seeped through the sand to leaders in the valleys between the arches and then to the cisterns below.

In 1869, workmen placed spoil deposits taken from the moat excavation on the parade or outside the counterscarp wall. By 1889, overseer Phillips reported that ordnance on the parade was sinking into the ground “by the thousands.”

During modernization of the fort’s armament from 1871 to 1873, plans called for large amount of sand to be used to infill the bastions on the terreplein. All parapets having a thickness of 25 feet and under were to be constructed of sand, eliminating all masonry construction behind them. By 1872, 9,500 cubic yards had been hoisted as fill for six 15-inch salient angle platforms. Construction of the coaling stations around 1900 provided fill for Garden Key.<sup>114</sup>

114 Bearss, 127, 251, 302-7, 319-26, 378; Manucy, *Construction History*, 171; Robertson, 14; DRTO 364/25900 sheet 14 from September 30, 1854, Denver Service Center, <http://etic.nps.gov>.

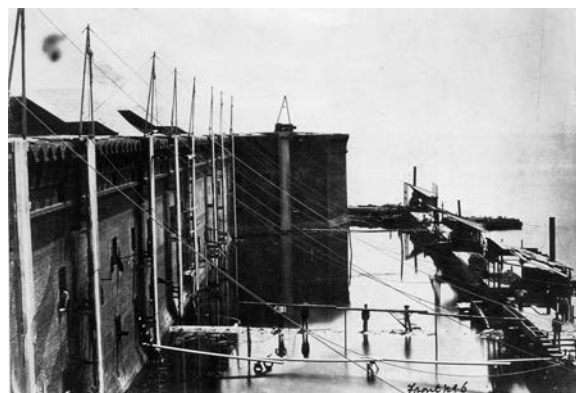


Figure 166. Hoisting sand to the terreplein, c. 1864. (DRTO 300651)

## Subsidence

Ironically, in his initial findings in 1825 on the suitability of the Dry Tortugas for a naval station, Commodore David Porter warned that “they have no fresh water, and furnish scarcely land enough to place a fortification and it is doubtful if they have solidity enough to bear one.” Later surveys disagreed with him, and plans for Fort Jefferson went forward.

In 1848, Superintendent Engineer Wright sent Chief of Engineers Totten the results of recent borings, which indicated that Garden Key was formed on collections of distinct stones of coral formation and not on a regular rock stratum. General Totten was not convinced but acknowledged that the rock stratum was “below our reach.” Consequently, building foundations would have to rest on sand. The shifting nature of the Tortugas sands concerned Wright, who felt that the counterscarp could be used to shield the foundation of the scarp against the battering it would take from the sea.<sup>115</sup>

As work progressed during 1848, Superintendent Engineer Wright concluded that the counterscarp foundation could be best laid by cofferdamming and pumping out the water.<sup>116</sup> In 1853, Wright noted that the 1852 hurricane partially eroded the sand bottom of the counterscarp along Front 5 (present-day 3). Workmen laid an enrockment along the face of the foundation of Front 5 and for a short distance on Front 6 (present-day 4).

The first indication of subsidence occurred in 1851, when Wright observed a slight subsidence in the wall of the officers’ quarters. The Engineer Department was concerned about the heavy weight of the fort’s piers and scarp. Initial subsidence tests in 1851 indicated that settlement would be insignificant, but by 1853, tests showed that the scarp and piers could be expected to settle and that settlement would not be uniform. After reviewing the subsidence tables, Chief of Engineers Totten decided on timber grillages to prevent damage to the masonry by unequal settlement of the foundations. Workmen positioned most of the grillages by September 30, 1855.

Despite these actions, Superintendent Engineer Woodbury noticed settlements in nearly all parts of the fort in 1858. As the fort continued to settle, construction of the second tier embrasures was put on hold. By May 1859, the fort had subsided as much as eleven inches at several points.

Civil Engineer Edward Frost, who assumed supervision of construction at Fort Jefferson in 1863, observed cracks in the scarp wall and casemate arches as his boat approached the fort. The Engineer Department had not received any subsidence reports in months, but Overseer Phillips reported the cracks had just recently gotten much worse. New experiments showed subsidence on all five bastions.

In 1864, subsidence experiments conducted on Bird Key confirmed what Superintendent Engineer Wright suggested so many years before: there was no solid rock within thirty feet of the surface of the island. Work on the second tier was suspended during 1864 because of the foundation’s continued settlement.

An 1878 inspection report noted that unequal settlement had caused three ½-inch cracks, extending from the coping to near the surface of the water in the scarp wall. A few of the first and second tier casemate arches were also cracked. In as many as a dozen of the upper tier casemates, the scarp wall was beginning to separate from the casemate arches.<sup>117</sup>

NPS Assistant Chief Engineer E. F. Preece visited Fort Jefferson in 1937. His report indicated that there had been considerable settlement of the fort, particularly at Bastions 1 and 6 (historic D and C). At the sally port, the top of the counterscarp was approximately two feet above the water, and at the outer end of Bastion 6 it was six inches. Preece believed that complete consolidation under the loads imposed was attained years previously and that no further settlement would take place.<sup>118</sup>

A draft historic structure report written in 1966 disagreed. The report stated:

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115 Bearss, 3-6, 97-99.

116 A cofferdam is a temporary water-tight enclosure built in the water and pumped dry to expose the bottom so that construction can be undertaken.

117 Bearss, 102-13, 170, 277, 352; Manucy, *Construction History*, 118-134.

118 E. F. Preece, 24-29.



**Figure 167.** Vertical cracks at Bastion 1, 1970. (Alexander Physical Status Report 15)

Foundation settlement, which had exceeded 1.5' in some areas by 1862, is a continuing threat to stabilization of the ruin.

The first line of defense in the battle for preservation is the counterscarp. This breakwater is exposed to the battering of heavy seas with consequent undermining, erosion, shock, and complicated hydraulic pressures. The bastions, due to their projection at the fort angles, are especially vulnerable to peripheral settlement except where juncture with the body of the fort gives them adequate support. Settlement is by no means limited to the bastions, however. Serious subsidence is evidenced by these symptoms: (a) simple fracture of vaults, and vertical fracture in piers due to tensions developed from uneven sinking or peripheral foundations. Scarp walls are sometimes thrown out of plumb. (b) Simple to complicated fracture of vaults and arches due to wrenching tensions and pressures caused by severe local settlement (as at a bastion). Scarps may move dangerously out of plumb, weakened by fractures and bond separations.<sup>119</sup>

A 1979 report described the origins of the settlement problems:

As previously mentioned, only parts of the Fort Jefferson walls, those at fronts 1 and 6,

were constructed on Garden Key proper; the other fronts were founded on a log matting placed over generally unconsolidated marine sediments. It was recorded that up to 12 inches of settling occurred in certain areas during the construction of the fort upon these sediments. Large failure cracks in the fort and bastion walls are confirmation of the settlement of the foundation materials. There is, however, no evidence that this subsidence might have resulted from undermining of the walls since no washouts were observed beneath them. Vertical splitting on the fort walls on all fronts, especially front 6, has separated parts of the brick facing from the wall core and given the walls a bowed appearance.

Despite these problems with subsidence, the HSR-Amendment reported that “the scarp wall continues to perform remarkably well. Despite the erosion of the mortar and face brick, and the delamination on the face brick at the embrasure openings, the scarp wall exhibits no real structural failures such as collapse or crushing.” The report pointed out that deliberate structural separation of the scarp from the casemates helped accommodate different rates of subsidence.<sup>120</sup>

### Drainage/ditch

Fort Jefferson’s original drainage system featured three outlets for the principal sewer discharging through the scarp, with a flushing gate at each outlet. Theoretically, flushing of the moat by tidal fluctuation would occur on a regular basis. When the tide rose, water swept into the sewer lines and when the tide fell, the sewer lines were flushed.

The placement of the sluiceways through the counterscarp would be crucial, as they must be protected from the surf, as well as from enemy fire. There would be two sluiceways nearly opposite, and Chief of Engineers Totten felt they should be constructed so that at low water, the sluice would remain aboveground on the outside. The normal position of the gate would allow the tide to flow in and out without interruption.

Due to the occupation of troops at Fort Jefferson in 1861 before the completion of the drainage system and other vital structures, problems arose

119 Manucy, “Draft Historic Structure Report, Part II,” 8.

120 *Foundation Condition Appraisal*, 8; LAS, 47.

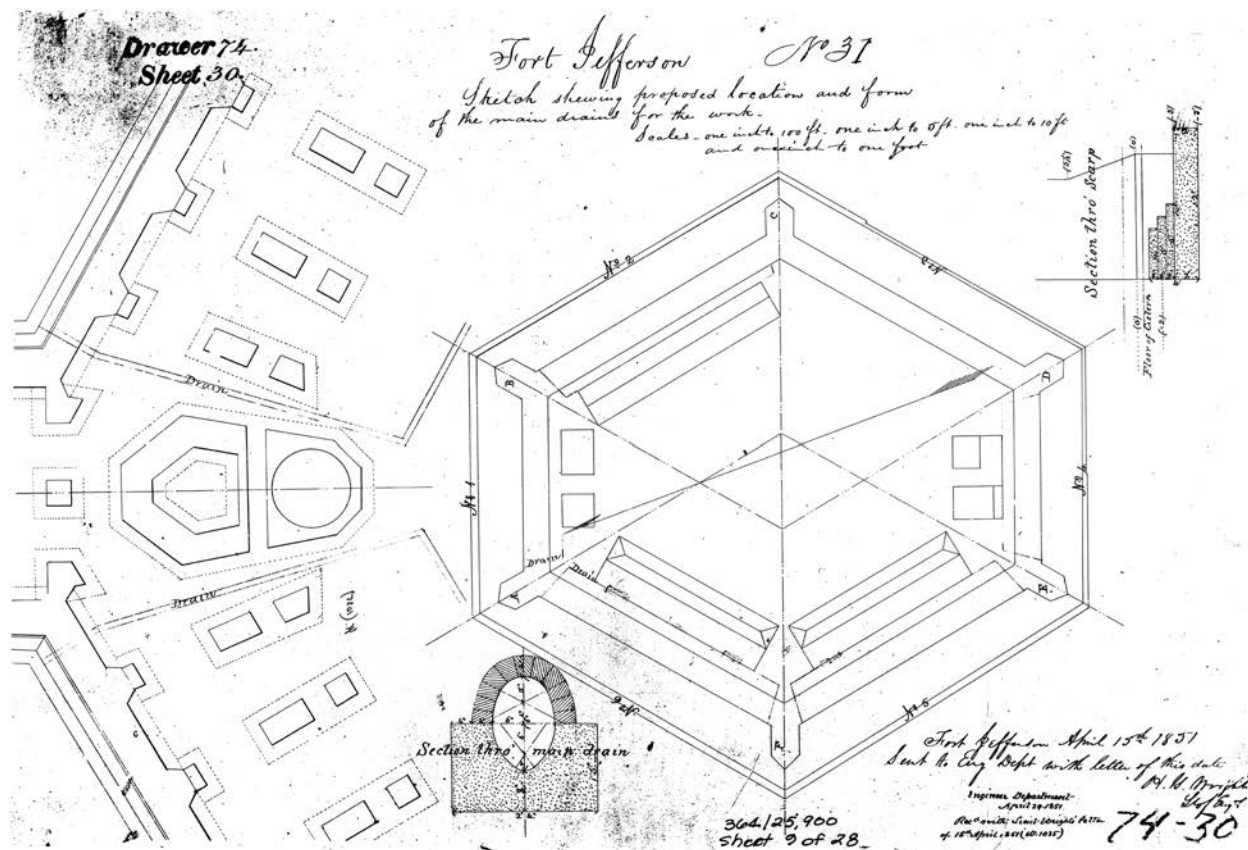


Figure 168. Plan of main drains, 1851. (Denver Service Center etic 364/25900 sheet 9)

with clogged culverts and inadequate flushing of the moat. Stagnant water in the moat in 1863 prompted Post Commander William R. Alexander to order Civil Engineer Edward Frost to pierce the counterscarp at some point on Fronts 1 (present-day 5) and 2 (present-day 6) to help drain the ditch by tidal ebb and flow. Alexander then called for the removal of parts of the cofferdam on Front 6 (present-day 4) that were interfering with tidal fluctuation. He also ordered a floodgate constructed in a 25-foot-wide breach in the counterscarp on Front 1.

In 1864, Frost reported that the sewer was completed and that pumps were removing water from the main ditch on Front 6 (present-day 4). Prisoners were being used to excavate the ditch, but insufficient numbers were on the job, which slowed the work. Nonetheless, the ditch on Front 6 had been completed by November 30, 1864. By June 30, 1866, two-thirds of the moat on Front 3 (present-day 1) had been excavated and the counterscarp constructed for the same distance.

Investigations following an outbreak of yellow fever in 1867 found that the unfinished condition

of the moat on Fronts 3 (present-day 1) and 4 (present-day 2) allowed the bottom to be exposed at ebb tide, preventing the necessary flushing of the moat. Connecting sluices between the privies and sewers, which had been blocked with refuse and filth, further added to the problem. By August 1868, the moat had been excavated, but the counterscarp remained unfinished. Connecting sluices had been flushed and cleaned.

Major General George Meade, the War Department's top commander in Georgia and Florida in 1868, also complained about the problems with the sewers at Fort Jefferson and the effect to the health of the garrison. Dr. Samuel Mudd wrote to his wife: "The atmosphere around the Fort, owing to the filthy condition of the moat outside, is terribly offensive at times and bids fair to breed another pestilence." Chief Engineer Humphreys made several suggestions to Superintending Engineer Simpson, including extending the sewers across the moat to the counterscarp, where outlets would discharge into the sea.<sup>121</sup>

121 Bearss, 105, 251, 263, 292; Reid, 74, 126; Manucy, *Construction History*, 95, 121; Mudd, 305.

The engineers at Fort Jefferson continued to insist that problems with the sewers could be avoided with proper maintenance. They also believed that as soon as the counterscarp was completed and the corresponding section of the ditch excavated, tidal currents would keep the moat flushed. During 1869, some work occurred on the moat and counterscarp on Fronts 3 (present-day 1) and 4 (present-day 2). Sluice gates were positioned on Fronts 3 and 6 (present-day 4). During this time, most of the limited resources available for fort construction were used to complete the officers' quarters and enlisted men's quarters. A report from the Surgeon General's Office in 1870 described the condition of the sewers:

The main sewer follows the internal circumference of the fort, forming the same outline, having exits at the alternate bastions by lateral sewers which open into the moat without, below low-water mark. The depression of the exits below the main sewer is not sufficient to secure a ready transit of debris. The vaults of the privies are of little less depth than the sewer. The opening between is trapped, but this does not prevent the return of offensive gases into the water-closets.

It will be seen at once how imperfect must be the sewerage where the entrance and exit are so nearly on a level.

When a congressional appropriation was finally forthcoming for Fiscal Year 1872, priority was given to completion of the counterscarp. The unfinished portion allowed large amounts of sand into the moat, forming sandbars that blocked the drains and sewers. Finally in 1873, workmen completed the counterscarp encircling the fort. They also completed the excavation of the moat on Front 3, which had become filled with sand, and clean water filled the moat around the fort.

Later that same year, however, similar charges were made against the Engineer Department after a yellow fever outbreak in August 1873. Dr. Harvey E. Brown, Assistant Surgeon in charge of the hospital, found the water did not flow with enough force into the sewers to flush them out through the moat. The Engineer Department felt that the sewers and moat were cleaner than they had been

in years and that the main problem was from a privy erected by order of the post commander. Nonetheless, the engineers renewed their efforts to regularly flush the sewers with the tides.

New Superintending Engineer Jared A. Smith arrived at Fort Jefferson in 1874 with orders to investigate the condition of the drains and ditch. He reported the water in the moat to be "as pure as the clearest sea-water," but he did find problems with sand accumulation in the moat. Moreover, fort subsidence caused the drains on Fronts 1 and 6 to be deeper than when built and also reduced the openings, which prevented a complete flushing by the tides. He found the privy vault trap defective, allowing foul gases to permeate the fort. He recommended removal of the privies and their replacement with water closets that would be flushed by gravity. Due to a lack of funds, Smith's plans were put on hold.

By 1877, a sandbar had formed outside the counterscarp on the northern face of the fort, blocking the sluiceway and preventing flushing through the gate. Superintending Engineer William B. Heuer reported in 1878 that large amounts of refuse, including "old boots, clothing, bottles, tin ware," were being thrown into the privies, clogging the sewers. His men removed fifteen cartloads of garbage from the privies.

He further observed that the low water level was higher than the outlets, resulting from the scarp's subsidence. He concurred with Major Smith's recommendations that flushing water closets be placed in several second tier casemates. Heuer also believed it would be necessary to open a third sluiceway through the counterscarp to free the moat of "offensive matter."<sup>122</sup>

No money was available for repair work at Fort Jefferson until 1885. At this time, \$50 was allotted for clearing out the sewers. Superintending Engineer Rossell reminded Chief of Engineers Newton that the moat was filling up with sand. On an 1890 inspection of the quarantine station, Surgeon Walter Wyman reported that both sluiceways were clogged with sand and that the moat filled with stagnant water. He asked the

122 Bears, 292-98, 307-41, 350-56; Mudd, 310; Reports of Assistant Surgeon S. A. Sorrow, United States Army, and Acting Assistant Surgeon W.E. Day, United States Army, 154.

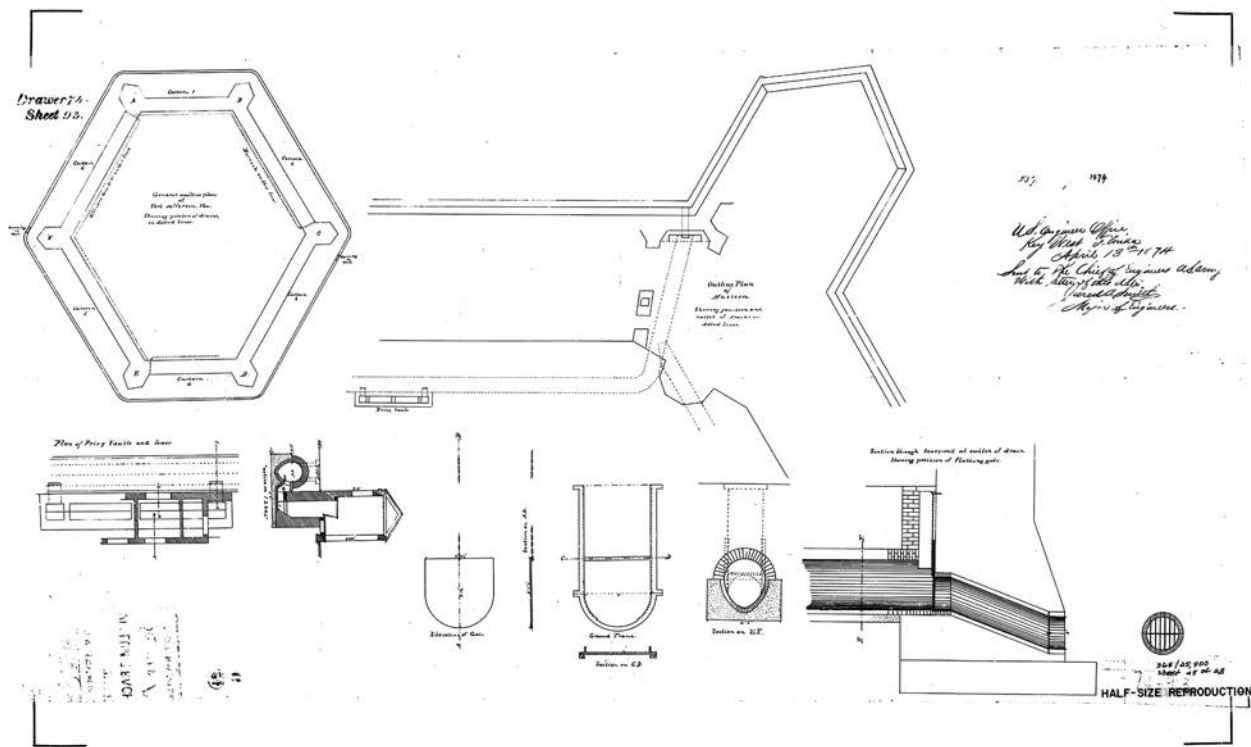


Figure 169. Plan of drains, 1874. (Denver Service Center etic 364/25900 sheet 25)

Engineer Department for assistance, noting that sewer gases would soon be unbearable. In 1898, both sluiceways were narrowed to about half their original width, and each was fitted with a gate that never worked properly. The eastern gate was closed in 1898.

The posting of a Marine guard at Fort Jefferson in 1901 prompted the Navy to approve five thousand dollars to clean out the moat and correct the problems with the flow of water in and out of it. By this time, the filling of the moat by sand at the eastern entrance had become so bad that the north and south sand spits of Garden Key were united across the eastern entrance into the moat, practically closing the moat at low water. The shoal inside the western opening was somewhat higher, cutting off the connection between the sea and the moat completely at the lowest tides. A 1904 inspection recommended using flushing water closets in the enlisted men’s quarters instead of latrines. Following the devastating hurricane of October 1910, sand filled the moat, particularly on the north side of the fort, where it stood above the water.<sup>123</sup>

Assistant Chief Engineer Preece inspected the water flow in the moat in 1937, which was completely cut off in some sections. He recommended that the inlets be eliminated, that a new inlet be constructed just south of Bastion 3 (historic F), and that the fill in front of the sluice then be removed. This would permit circulation from one end to the other of the watered section of the moat. Circulation would be positive if the inlet had a gate swinging inward and the sluice had a gate swinging outward.

In 1938, resident landscape architect Puderer reported that debris from the cleanup of the parade ground, mainly broken bricks, mortar, and pieces of wood, was placed in the north moat as fill. Puderer was distressed that this project had been approved and pointed out the contrast between the white coral sand fill that had washed in over the years and the unsightly debris. He felt that fill material was valuable due to its limited supply and should be used with discretion. In 1939, workers dug a trench opposite Bastion 5 (historic B) to promote tidal circulation near the area where birds were nesting.

After taking over administration of Fort Jefferson, the NPS realized that a septic system would be

123 Bearss, 369, 381, 411-27.



**Figure 170.** Front 4 showing sluice gate, 1910. (USGS Photographic Library vtw00323)

needed to correct problems that had never been resolved. The 1938 Master Plan recommended a sewage system using one septic tank for the superintendent's quarters and one for the public comfort stations, both discharging effluent into a six-inch pipe to run through the old sewer outlet in the southwest bastion, cross the moat, and empty into the sea. The line passed through the counterscarp in a horizontal position and at the end of the line, a "Y" was installed to take advantage of the sweep of the current and to prevent the end of the line from being covered with sand.<sup>124</sup>

By 1970, there were three septic systems at Fort Jefferson. One was on the beach near the main pier, one was located to serve the quarters along Front 1 (historic 3), and one was located to serve the parade ground quarters and the quarters along Front 3 (historic 5). All of the sewage disposal systems used salt water from pumps located in the lower tier casemates. In 1967, a six-inch cast-iron sewer line from the manhole behind the superintendent's quarters (quarters No. 6) to the parade-ground septic tank needed replacement due to clogging and deterioration.<sup>125</sup>

The construction of a new drain field to serve the dock comfort station occurred in 1991. In 2003, the park constructed a wastewater treatment plant in one of the casemates and located the associated effluent disposal mounds on the parade ground near Bastion 3 (historic F). The installation of

124 Preece, 32; Puderer, "Special Report," 4; Master Plan, General Development Sheet, Edition 1939; Mikell, 1940, Fort Jefferson ERA/WPA Project Records, DRTO 3389, South Florida Collections Management Center, Everglades National Park.

125 Alexander, 64.

composting toilets in the campground occurred in 2004.<sup>126</sup>

## Dredging

Dredging of the Dry Tortugas Channel, in conjunction with the establishment of a Naval Coal Depot on Garden Key, began in 1898 and continued, intermittently, until the depot's completion in 1901. Harbors were dredged 30 feet deep and 300 feet wide. Dredging increased and modified Garden Key's area. Additional dredging occurred in 1904. Dredging of the moat has occurred throughout the years as sand needed to be removed.<sup>127</sup>

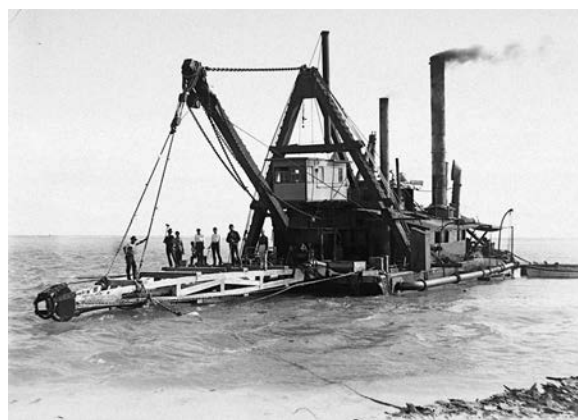
## Circulation

### Parade Ground

The only entry into the fort was across the drawbridge and through the sally port on Front 3

126 LAS, 92, 163; Superintendent's Annual Report, 2003, 2004, 2005.

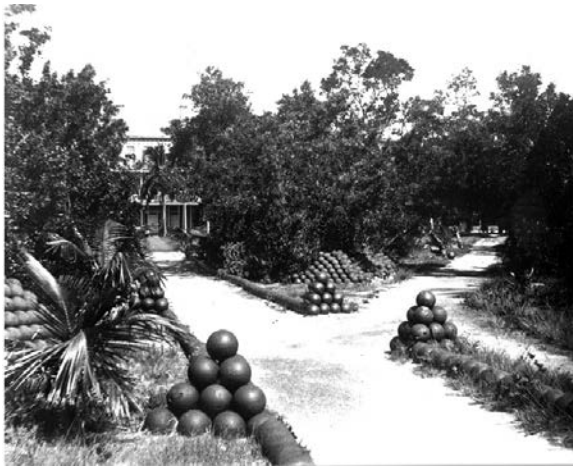
127 Bearss, 393-413.



**Figure 171.** Dredging the harbor, 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



**Figure 172.** Moat dredging, 1965. (DRTO 300923)



**Figure 173.** Parade walkways showing split, c. 1898 (DRTO 300518)



**Figure 174.** Parade walkways showing three paths, c. 1898. (DRTO 300898)

(Present-day 1). A main central pathway running northwest to southeast connected the sally port with the officers' quarters. Secondary pathways branched off the main pathway, which was described as "a well-kept, hard-cemented walk." Ordnance was stacked at intervals along the pathways, in accordance with military protocols and to facilitate counting the inventory of cannonballs. Dr. Joseph B. Holder stated in 1867 that "a neat walk leads to the officers' quarters through an arching group of mangroves, flanked by long rows of ordnance material." Paths within the lightkeeper's complex linked various parts of the landscape.

The construction of a new parade walkway from the sally port to the officers' quarters in 1896 may have been the impetus for adding cannonballs, as historic images from 1898 first show the ordnance-lined path. Cannonballs continue to show up in



**Figure 175.** Secondary parade walkway, c. 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)



**Figure 176.** Parade walkway without ordnance, 1909. (USGS Photographic Library vtW00301)

historic images of the walkway through 1901. After an ordnance sale in 1900, all the ordnance, except for the ten big guns, had been sold or taken to Fort Taylor in Key West. Images after 1901 no longer show ordnance lining the main pathway. In 1943, Superintendent Budlong reported that vegetation had been removed in order to uncover traces of the old walk in front of the officers' quarters.<sup>128</sup>

By 1959, Fort Jefferson needed a circulation system to manage the flow of visitor traffic through the fort. During this period, only a short, narrow brick walk was in place; all other trails were just paths in the grass. In response to a proposal to rebuild the historic walks, Chief Park Ranger Richard M. Ward wrote: "The idea of rebuilding the old historic walks would have trails all over the parade grounds leading nowhere in particular, while the walks and

128 Joseph B. Holder, "The Dry Tortugas: The Keys and the Fort", *Harper's New Monthly Magazine* 37, no. 218 (July 1868): 261-62; Bearss, 387, 412; Monthly Narrative Report, March 1943, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

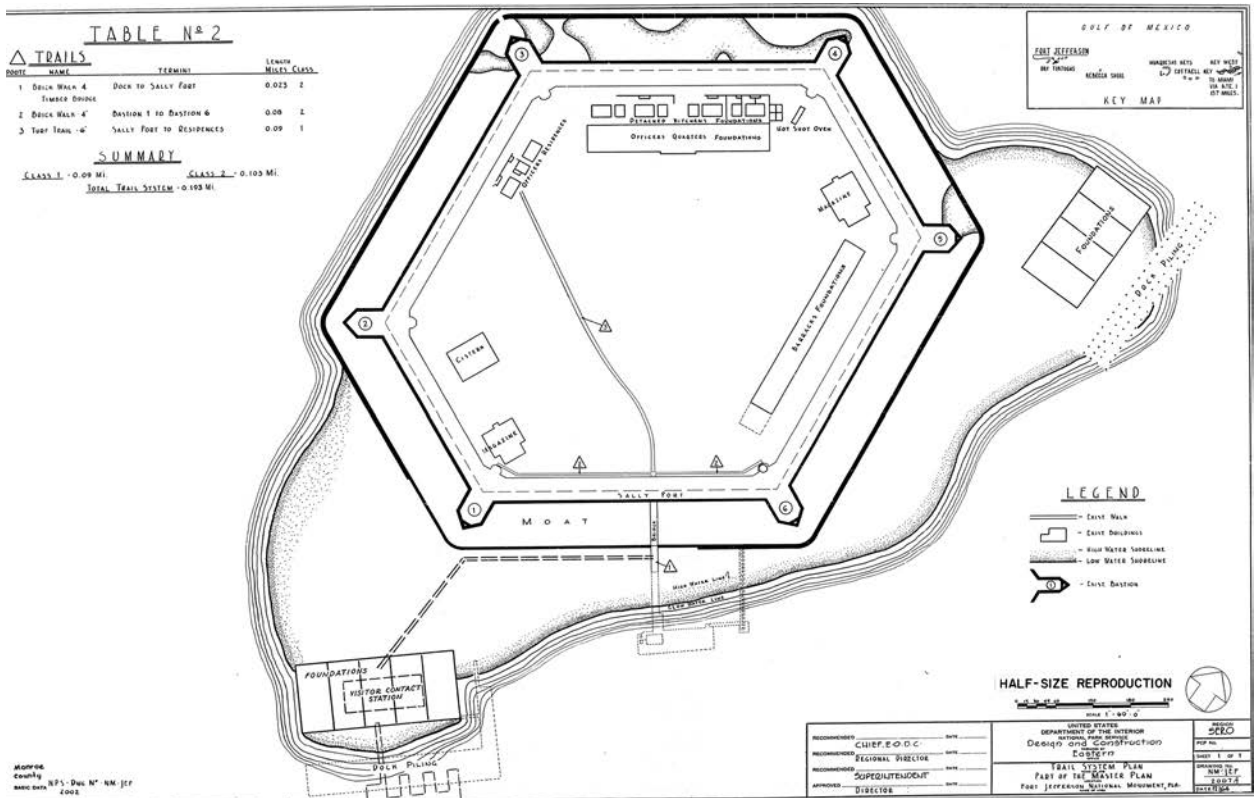


Figure 177. Plan of existing trails, 1964. (Denver Service Center etic 364/2007-A)



Figure 178. Image of walkway from Bastion 1 to 6, 1962. (HABS 053134)

trails placed and constructed as described in the PCP [Project Construction Proposal] would be of use and benefit for the protection, management, and interpretation of Fort Jefferson National Monument.” His proposal called for a 3-foot walk from the sally port across the parade to the residence and a 5-foot walk adjacent to the inner wall from Bastion 6 to Bastion 4 (historic C to A) with turnarounds for a small supply vehicle.

An updated 1961 Project Construction Proposal (PCP) included the replacement of the moat bridge to accommodate proposed construction activity, as well as the walkways as proposed by Ward. A Trail System Plan from 1964 records a path from the sally port to the residence as a turf path and a brick path from Bastion 1 to Bastion 6 (historic D to C) as the only pathways inside the fort, although a Physical Status Report from 1970 indicated that the work was completed in 1962.

The project apparently concluded in 1967. An undated completion report whose accompanying images are dated June 1967 documented the reconstruction of the timber bridge across the moat and the construction of part of a six-foot walkway around the perimeter of the parade, with

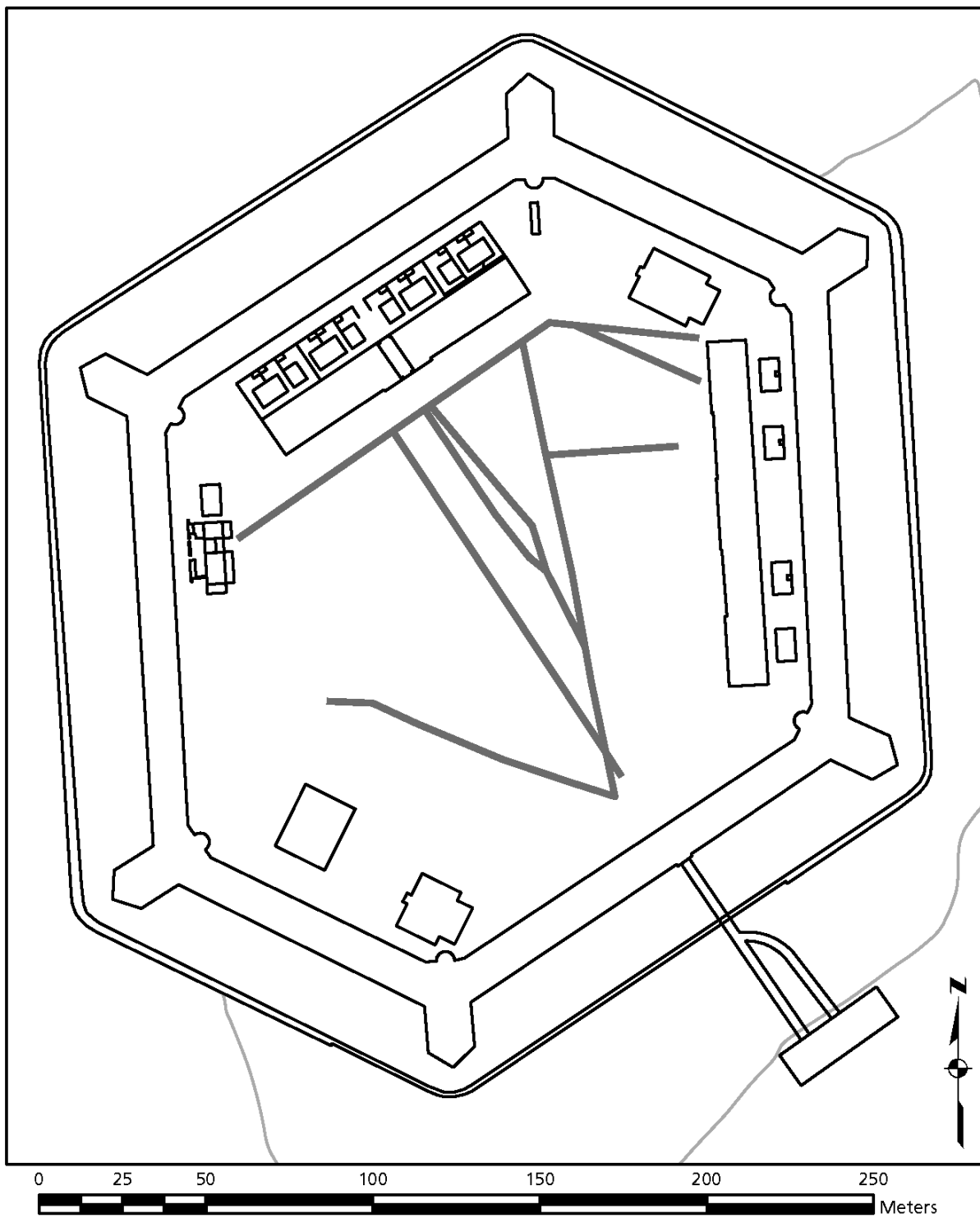


Figure 179. Map of historic pathways as detected by GPR, 2006. (Courtesy GPR survey)

three 10 ft. x 40 ft. turnarounds for maintenance equipment. The walkway, constructed with brick salvaged from the demolition of the officers' and enlisted men's quarters buildings, was laid in a herringbone pattern in a layer of beach sand. The completion report stated that the historic walks between the sally port and the officers' quarters were not reconstructed as planned due to personnel and time problems. The report also stated that due to a difference in elevation of the floor level of the first tier casemates and the parade, a portion of the walk between Bastions 4 and 5 (historic A and B) had to be built up using brick rubble and sand. Crews from the 482<sup>nd</sup> Civil Engineering Squadron replaced the perimeter walkway inside the fort in 1977.<sup>129</sup>

Archeology conducted in 2003 found the surfaces of the parade ground paths paved and the edges lined with bricks. The absence of these bricks in historic photographs of the main pathway, which show ordnance in their place from 1898 to 1901, indicates that the bricks were a later addition used after removal of the cannonballs. The buried brick edging is known to exist along the path leading from the engineer officers' quarters to the officers' quarters (excavated) and along the westernmost path leading from the sally port to the officers' quarters (visible aboveground). Ground penetrating radar conducted in 2006 showed a series of paths consistent with those seen in historic photographs. It is unknown if all the paths identified in the GPR study are lined with brick.<sup>130</sup>

## Terreplein/Parapet

As specified by Chief Engineer Totten, the terreplein surface was to be earth, screened of all lumps of rock or coral to a depth of two feet. Grasses and other strand vegetation would have seeded themselves on the earth surface.

129 Chief Park Ranger, Fort Jefferson National Monument to Superintendent, Everglades National Park, July 20, 1959; PCP Walk System, July 20, 1959; Project Construction Proposal, November 21, 1961; James F. Wolfe, Civil Engineer, Everglades to Assistant Superintendent, Everglades, July 13, 1962; Narrative Report, Rebuild Historic Walks and Moat Bridge, 1967, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park; Alexander, 59; Cheeseman to Scott, 2007.

130 Lawson, 33-44, 74.

Emily Holder spoke of walking there and on the counterscarp walk (see Fort Exterior below). It was reported that the 1886 hurricane wrecked seven of the walkways to the parapet magazines. The surface of these walkways is unknown.<sup>131</sup>

## Fort Exterior

In December 1861, Captain Morton sought construction of a horse railway to facilitate transportation of supplies from the wharf onto the parade. An 1861 map documents the planned distribution routes around the periphery of the parade to get supplies to the large permanent structures. Morton requested rails secured to concrete sleepers. The Engineer Department would only authorize a common wooden tramway of light bar rails. Ground penetrating radar conducted in 2006 discovered the remains of a relict road, presumably a portion of the materials distribution route. Dredging operations in 2009 uncovered remains of the tramway near the boat slips.<sup>132</sup>

Since Fort Jefferson took up most of Garden Key, circulation outside the fort focused on the wharves and temporary buildings west of the sally port. The counterscarp provided a prime circuit walk for those living on Garden Key. Emily Holder described the scene in the 1860s:

The fort on the inside showed long stretches of each curtain of arches, making pleasant places for walking, cool and shady; and in the moonlight the effect was really beautiful. Looking not unlike some grand old ruin with its lights and shadows, one could invest it with all sorts of romance. . . .

The seawall around the moat was our favorite walk, making nearly a mile. The atmosphere was so clear that the space between the sky and the earth seemed interminable. The sun was blazing in its brightness.

She also remarked:

The only variety in our walks was around the seawall or on the ramparts, where the sky for nearly eight months in the year was one

131 Bearss, 201, 374, 422.

132 Lawson, 57; Bearss, 220-21; Manucy, *Construction History*, 90.

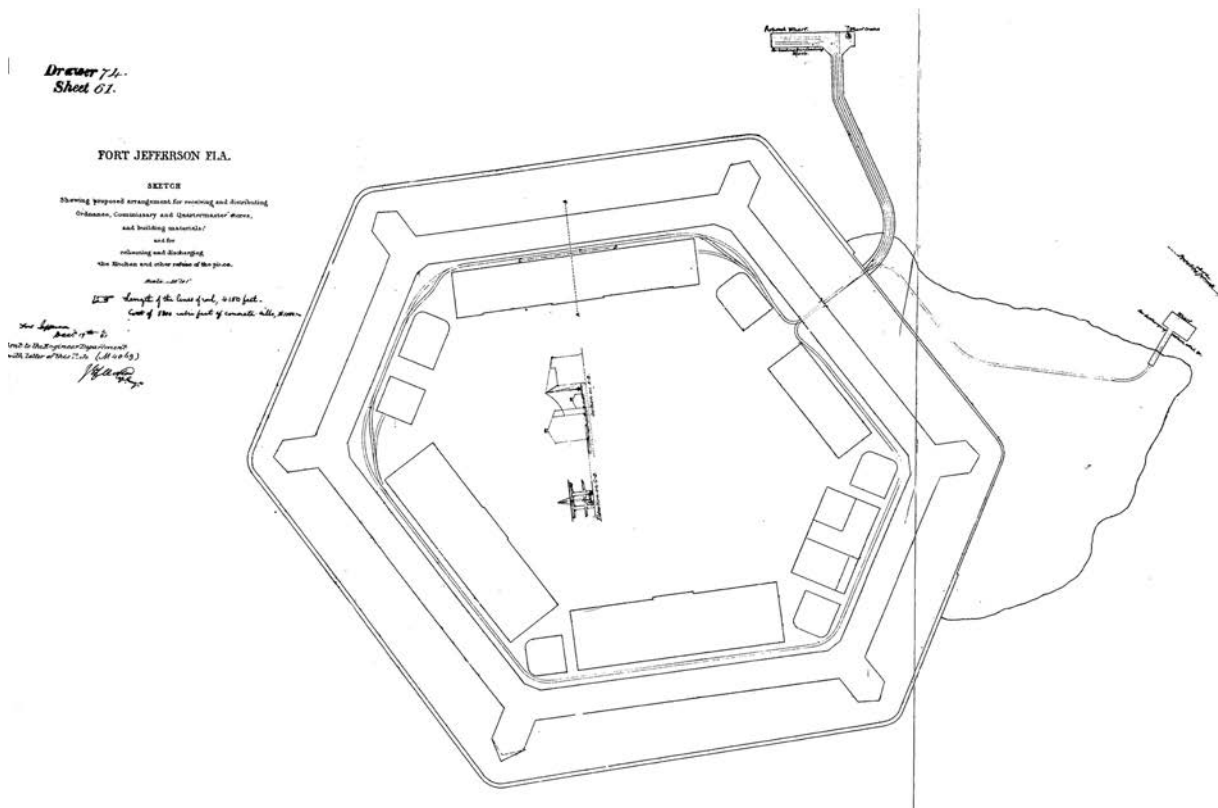


Figure 180. Proposed distribution routes, 1861. (National Archives Sheet 77, Drawer 74, Sheet 61)



Figure 181. Counterscarp walk, c. 1899. (EVER 7386)

grand, burnished dome, that met the seemingly illimitable sea in all directions, reflecting millions of rays of heat that took our strength and courage.

The 1870 hurricane destroyed a walkway 100 feet long leading to one of the wharves.<sup>133</sup>

133 Bearss, 387; Emily Holder, "At the Dry Tortugas During the War: A Lady's Journal," *Californian Illustrated Magazine* 1, no. 2 (January 1892), 90; Emily Holder, "At the Dry Tortugas During the War: A Lady's Journal," *Californian Illustrated Magazine* 2, no. 2 (July 1892), 206; Bearss, 333.

## Views and Vistas

Fort Jefferson commanded unobstructed views in all directions. The importance of these views was primarily defensive in nature. Views approaching the massive, brick fortification invoked a feeling of isolation and remoteness. After its construction in 1858, the Loggerhead Key Lighthouse became a prominent feature of the viewshed from the fort, often captured in photographs from the terreplein. It was described by a member of the Fort Jefferson garrison:

In the distance is Loggerhead Island, with its tall and beautifully symmetrical light-house, the feeble light just struggling into existence, though momentarily increasing in brilliancy as the pall of darkness deepens.<sup>134</sup>

Views inside the parade ground were along straight, axial pathways, with ordnance stacked at intervals along their length. The placement of the permanent buildings along the perimeter of the parade ground ensured the open, spatial

134 A. O'D., 282-88.



**Figure 182.** Loggerhead Lighthouse, 1892.

articulation of the sight lines along the ground plane, as well as views to and from the terreplein.

The interplay of light and shadow on the island was perhaps an unintentional feature of the cultural landscape. Emily Holder reflected:

The exterior of the fort was bare and repulsive, the interior offering a decided contrast.

Here were trees of the deep green belonging to tropical vegetation, so restful to the eye in the glaring sun; and as the walls inclosed [*sic*] about thirteen acres, and water could not be seen, I instinctively lost the feeling of being so far from the mainland.<sup>135</sup>

Beginning in the 1930s, a number of modern intrusions, such as pipes, cables, and conduits, began to affect the views inside the parade ground, as modifications to modernize the infrastructure of the fort were completed. Alterations to casemates for housing and maintenance uses resulted in a different look and feel inside the parade ground.

135 Emily Holder, January 1892, 87-93.



**Figure 183.** View inside the parade ground of ordnance-lined path, c. 1899. (DRT0 301206)

The demolition of the officers' quarters and enlisted men's barracks dramatically changed the interior view of the parade ground.

## Small-scale Features

### Fencing

Fencing was used on the parade ground to enclose the garden area to the south of the main pathway and to enclose work yards in the rear of the quarters buildings. Just northeast of the sally port sat the lightkeeper's residence and outbuildings, enclosed by paling fences. Later photographs show this area enclosed by a combination of paling and wire fences. Three detached kitchens used as engineer officers' quarters were also enclosed with paling fences (see Figures 63 and 126).

Emily Holder described one of the fences:

One day we were watching a company being drilled by a young second lieutenant, who had just joined the service. He marched them straight up to the house as though they were going to storm it. They reached the fence only four feet from the steps and there kept stepping, the young officer in torture, as he could not remember the command that would wheel them about, while we tried to look as though it was part of the discipline for them to stand knocking their toes against our paling.

According to Engineer Department reports, the 1870 hurricane destroyed parade fencing.<sup>136</sup>

136 Emily Holder, April 1892, 403; Bearss, 333.



**Figure 184.** Paling fencing in the work yard of the officers' quarters, c. 1870s.

Civil War-era images also show wooden staircases to the second tier casemates in place on the parade. Many casemates on the second tier were enclosed for housing, which also gave a vastly different appearance to the interior of the fort. Wooden barriers were also used on open casemates on the second tier on the parade side (see Figures 32 and 42).

Clothes lines were common on the parade ground in the 1960s. The Tropical Audubon Society added a brick fountain to a shaded area of the parade ground near the sally port entrance in the 1970s.

## Cannon

As of 1870, several different kind of cannon were mounted on the terreplein, including 10-inch Columbiads, 10-inch Rodmans, 42-pounder smoothbores, and 200-pounder Parrotts. In the casemate curtains, 10-inch Rodmans and 8-inch Columbiads were mounted.<sup>137</sup>

The Rodman cannon were not installed at Fort Jefferson until 1872. Installation was in response to saber rattling from the British over an attempt by the U.S. Government to compel Great Britain to pay a huge sum for prolonging the Civil War by failing to exercise due diligence in enforcement of her neutrality. This increase in international



**Figure 185.** Paling and wire fencing enclosing the lightkeeper's complex, c.1899. (John Meigs Photograph Collection, Dry Tortugas National Park, DRT0 3805)

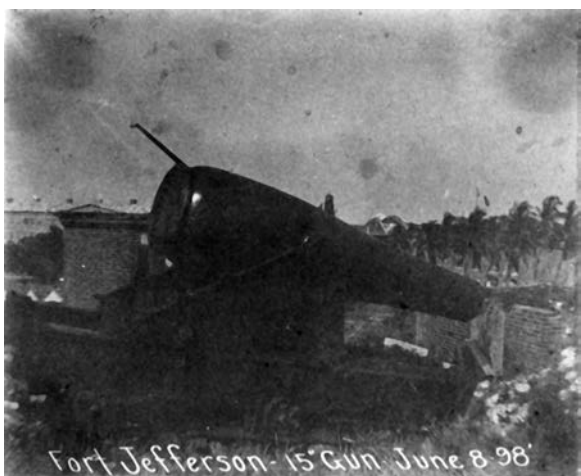
tensions led to a program to quickly modernize the weaponry at Fort Jefferson.

Six 15-inch guns were to be mounted on center-pintle carriages, one at each bastion. The carriages were to be mounted on timber platforms laid on a concrete foundation. Problems with the wooden timbers and with the traverse wheels delayed the mounting of the guns until 1873. The mounting of four 10-inch Parrotts also occurred during the 1872-73 construction season. They arrived at the fort in 1865 but were not mounted until 1872. Three Parrotts were mounted on front-pintle carriages and one was mounted on a center-pintle carriage. Along Fronts 1, 5, and 6, they replaced smaller guns, whose granite platforms were upgraded to accommodate the larger guns.

The harsh marine environment of the Dry Tortugas took a toll, and by 1878, it was noted that the wooden platforms were in "an advanced stage of decay." By 1883, the 15-inch guns were "falling, for they had been mounted hastily on temporary wooden platforms." Despite numerous funding requests for their repair, no work was done on the cannon, and their condition continued to deteriorate. During the Spanish-American War in 1898, the armament was inspected for the first time in a number of years. As the crisis passed, the War Department shelved its plans to remount and make serviceable the big guns at Fort Jefferson.

Beginning in 1900, the Ordnance Department auctioned armament from Fort Jefferson, resulting in the removal of all the smaller guns and all the

137 Bearss, 310-12.



**Figure 186.** Rodman cannon, 1898. (National Archives)



**Figure 187.** Parrotts on Front 1, c. 1900. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)

iron carriages. No longer did cannons peek up over the fort's walls, and the terreplein and casemates were suddenly empty of armament. An ordnance sergeant remained on duty until 1902.

The sale included the six 15-inch Rodman and four 10-inch Parrott guns, but when the NPS took over the site in 1935 the large guns were still located on the terreplein. Park records indicate a concern about the condition of the cannon dating to the late 1950s, without any attempt at professional conservation.

Discussions of lifting the Rodman cannon began in earnest in 1982, utilizing the volunteer services of the 482<sup>nd</sup> Civil Engineering Squadron of the U.S. Air Force Reserves to raise the cannon. Although a long-term project, by 2006, the 482<sup>nd</sup> had raised



**Figure 188.** Parrott on Front 1, 1937. (EVER 7176)



**Figure 189.** Rodman on reproduction carriage, 2011. (NPS image)

all ten Rodmans and Parrotts, ending their direct contact with the sandy terreplein.

A renewed interest in conservation resulted in a collection condition survey in 2004. Phase I of a project to conserve the cannon began in 2007, 134 years after the garrison left Fort Jefferson. The first cannon to be treated was the Rodman at Bastion A (present-day 4). Phase II of this project concluded in February 2009, treating the Rodman guns at Bastions D and E (present-day 1 and 2), and Phase III saw the Rodman on Bastion F (present-day 3) and a Parrott on Front 4 conserved in February 2010. The Rodman on Bastion F (present-day 3) was successfully mounted on a full reproduction carriage in November 2010. It is anticipated that all the cannon will be conserved by late 2012. In addition, in 2009-2010 a contractor was developing an alternative mounting plan for the cannons that will not be mounted on full carriages. The goal of the alternative mounting system will be to ensure the guns preservation, facilitate routine

maintenance, and improve interpretation while being suggestive of the full carriage.<sup>138</sup>

## Natural Systems and Features

### Geology

The entire south Florida region was deposited in Pliocene times during depression, then in Pleistocene times there was an uplift, another depression, and a succeeding uplift. During the Pleistocene period it is thought that some of the coral reefs were as much as eighteen feet above sea level. In recent times there has been a depression, leaving the keys slightly higher than they were before Pleistocene depression.<sup>139</sup>

All of the Tortugas Keys are composed of calcareous detritus, the remains of various calcium carbonate-secreting organisms, mollusks, corals, nullipores, echinoderms, and calcareous algae. The coral fauna of the Tortugas has contributed a great deal to this detritus. The elliptical atoll was formed by marine currents accumulating this loose calcareous detritus in the form of islands on the coral banks. The material above sea level is unconsolidated, but below eight feet, indurated beach rock is found, constituting an older formation for the growth of coral reefs. Coral reefs occur only on the eastern shores of continents where currents of tropical waters are carried towards the poles by the earth's rotation and the direction of winds. The coral "marine gardens" at Dry Tortugas are part of the larger Florida Reef Tract, the most extensive living coral reef system in North American waters and the third largest system in the world. Dr. Joseph Holder described the coral reef in one of his articles:

But how difficult to convey an idea of the wonderful beauty and singularity of the scene beneath the wave. Spread over acres, miles of reef; in shoal water and deep, on hill-side and plain, in forest-like groups and garden-like beds, in choice single clusters, in circles, in hedges, in *chevaux de frise*. Domes like the round-topped mosque of the Orient;

sponge-forms that mock the Turkish minaret; Laplandish huts, and the Gothic minster; cups, vases, and the classic urns; antlers of deer, of moose, of elk; blossoms of rose, of jasmine, of daisy; clusters of pinks, lilacs, coxcombs, and amaranths; dandelions, golden-rods, anemones, and clovers; vines of michella and cypress; ferns, brakes, and mosses. All these forms come before you as you drift slowly with the tide, and look down as from a balloon upon this vast ocean garden. And they look so much like these forms, do the corals and sponges, sea-anemones, and sea-weeds; and this ocean garden looks so much as if he had been laid out in the "landscape style." The large round heads of meandrina look like artificial structures placed, for artistic effect, at certain points; while the more picturesque astreas are like "rock-work," around which grow delicate moss vines and richly-colored algae.<sup>140</sup>

As the name implies, there is no source of fresh water on the Dry Tortugas. There were originally eleven small keys, but by 1874, a mariner's chart listed two of the eleven as "disappeared" and a third "bare at low water." After a series of hurricanes in the early 1900s and 1930s, Bird Key, which supported a large nesting colony of sooty and noddy terns, sank into the sea in 1935. The birds moved to nearby Bush Key. The remaining keys are Garden, Loggerhead, Hospital, Long, East, and Middle Keys. Middle Key is a sandbar that changes configuration during the year.<sup>141</sup>

Sergeant Calvin Shedd described an excursion to East Key in April, 1862:

I have been off the Key last Tuesday but once & I must tell you about it Lieuts House & Williams Sergt Davis & Self got a Sail Boat & started for East Key the wind shifted and we had to boat a long time but at least we arrived the sea was rather rough & we got pretty wet Williams was pretty well frightened but got quieted down after I laughed at him a spell By the way I will

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140 Holder, 266.

141 "The History of Fort Jefferson, Dry Tortugas, undated, photocopy, 1; "Topography of the Dry Tortugas," undated, photocopy, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park; National Park Service, GMP Amendment (Denver: Denver Service Center, June 2000), 6.

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138 Nancy Russell, "History of the Rodman Smoothbore Cannon at Fort Jefferson," February 2009, 1-7, South Florida Collections Management Center, Everglades National Park; Manucy, *Construction History of Fort Jefferson*, 170.

139 Davis, 176; Bowman, 112.

tell what we were after and dont laugh it was Birds Eggs, We had but an hour & a quarter to stay Oh! how we wished we could have had all day & Oh! how I wished you all could have been there & see the Thousands on Thousands of Birds Black & white about the sise [sic] of wild Pigeons they were very pretty & their cries were almost deafning & so tame that I could have caught hundreds with my hands but it was no fun to catch them they were so tame it was eggs we wanted & I never worked much harder than I did hunting them the Island is covered



**Figure 190.** Bird Key with Sooty Tern colony, 1909. (DRTO 301104)

with Bushes from four to eight ft high crooked scraggy things & grow in the coral Sand.<sup>142</sup>

Another member of the 7<sup>th</sup> New Hampshire later wrote about Bird Key:

Bird Key, where our hospital was situated, one of the six Tortugas islands, was simply a sand-bar in the sea, about one hundred rods long and twenty rods wide. A portion of this sand-bar was covered with small bushes about as high as a man's waist, and a few tufts of coarse grass were seen in spots; the rest of the island was a dry, white coral sand. No part of the island was more than three feet above the water level at high tide, while the most of it was not over one foot. This coral sand was very coarse and the water washed through it as easily as it would through sawdust. When the sea was rough the position on that sand-bar was not an enviable one, especially in stormy weather, when it seemed as though the waves would overwhelm it. The island had been used for a burial place

- 142 Shedd, Calvin, Collection of the Civil War Letters of Calvin Shedd, University of Miami Library, April 19, 1862, Calvin Shedd Papers, <http://scholar.library.miami.edu/shedd/letters/62apr19.html>.



**Figure 191.** Long, Bush, Garden, and Loggerhead Keys, 1945. (DRTO 301180)



Figure 192. Calvin Shedd writing to friends at home, 1861. (University of Miami Library, Calvin Shedd Papers)

of such soldiers and sailors as had died at Fort Jefferson hospital previous to the arrival of the Seventh N.H. Volunteers.<sup>143</sup>

Ornithologist John James Audubon visited the Tortugas in 1832 and described the bird life. Louis and Alexander Agassiz, renowned early marine scientists, recognized the importance of the Tortugas and explored the region in the 1850s. In 1886, Johns Hopkins University Professor of Zoology, W. K. Brooks, visited the Tortugas with about seven graduate students.

In 1903, Dr. Alfred G. Mayer, under the auspices of the Carnegie Institution of Washington, recommended that a tropical marine biological research laboratory be established at the Tortugas (as opposed to other Caribbean sites) because of their isolation from continental land masses, lack of commercial fisheries, lush reefs, clear waters and proximity to the Gulf Stream. In 1904, Dr. Mayer selected Loggerhead Key as the site for the Carnegie Institution’s Tortugas Marine Biological Laboratory, the first tropical marine laboratory in the Western Hemisphere. During its subsequent thirty-five years of operation, the Tortugas Marine Biological Laboratory hosted a number of the world’s leading scientists.<sup>144</sup>

### Field Studies

Field reports published in 1907 by Charles F. Millspaugh, in 1918 by H. H. M. Bowman, and in 1942 by John H. Davis, Jr. documented existing vegetation, topography, and climate at Dry Tortugas. Each report contributed to the on-going research of Tortugas’ ecology and captured a detailed snapshot of Garden Key.

Although Millspaugh did not identify any plant communities, he described natural vegetation on the northeast and south shores of Garden Key that is consistent with strand flora—a group confined

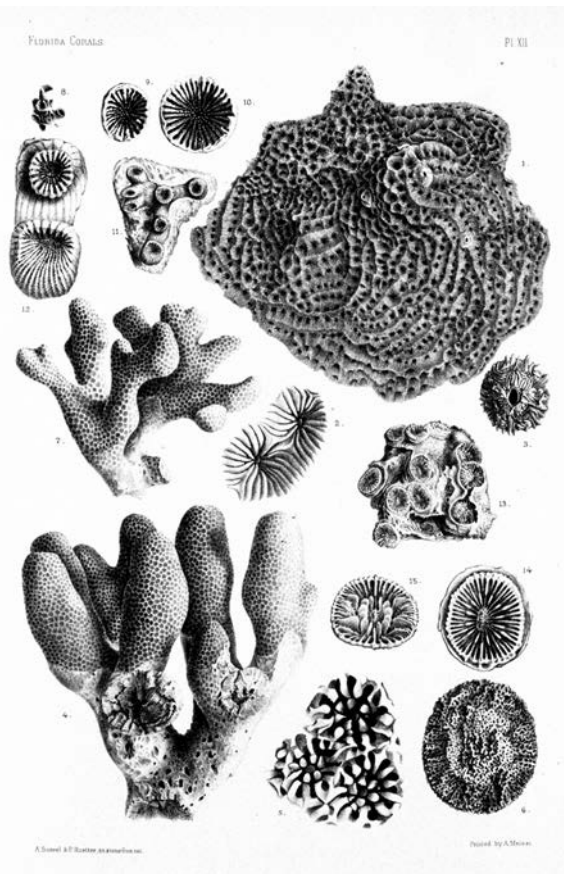


Figure 193. Plate from Louis Agassiz’s 1851 field study (NOAA’s Coral Kingdom Collection 2512)

143 Henry F. W. Little, *The Seventh Regiment New Hampshire Volunteers in the War of the Rebellion* (Concord, NH: Ira C. Evans, 1896), 15.  
 144 1851 Field Studies In: “Report on the Florida Reefs”, 1880, by Louis Agassiz. Mem. of Museum of Comp. Zoo. at Harvard, Vol. VII, No. 1. Plate XII; Thomas W. Schmidt and Linda Pikula, “Scientific Studies on Dry Tortugas National Park: An Annotated Bibliography,” <http://www.aoml.noaa.gov/general/lib/dtint.html>; Dr. Mayer was a pupil of Alexander Agassiz.

to uniformly xerophytic conditions and small areas of land. Plants within this group reported in 1907 included bay cedar (*Suriana maritima*), sea purslane (*Sesuvium portulacastrum*), coastal beach sandmat (*Chamaesyce mesembrianthemifolia*), beach elder (*Iva imbricata*), snow squarestem (*Melanthera nivea*), sea oats (*Uniola paniculata*), sea lavender (*Tournefortia gnaphalodes*), railroad vine (*Ipomoea pes-caprae*), beach bean (*Canavalia rosea*), prickly-pear cactus (*Opuntia stricta*), and different species of sandbur and grasses. Because of constant human activity near the docks, the southern shore of Garden Key had the densest vegetation when surveyed in 1904.<sup>145</sup>

Summer field sessions in 1915 and 1916 mapped the distribution of species on the exterior of Fort Jefferson and identified four plant communities, a *Uniola* grass community (with *Cakile*, *Cenchrus*, *Sesuvium*, *Tournefortia*, *Ipomoea*, and *Scaevola*), a *Suriana* scrub community (with *Canavalia*), an *Opuntia* community (with *Paspalum*, *Ipomoea macrantha*, *Ipomoea pes-caprae*, and *Melanthera aspera*), and a *Euphorbia* community (with *Iva imbricata* and *Cyperus planifolius*) The resulting 1918 report by Bowman specifies the location, maturity, and association of nearly every plant on Garden Key.<sup>146</sup>

Davis' observations built upon the information of earlier surveys. Fieldwork completed between 1937 and 1942 noted plant communities on Garden Key and identified broad categories within the strand ecosystem. The largest of these was the strand-beach associates (*Sesuvium*, *Cakile*, *Ipomoea*, *Sporobolus*, *Uniola*, *Chamaesyce*, *Tournefortia*), which covered about half of the southwestern sand area. He noted the absence of a large *Suriana* scrub community on Garden Key but noted a number of colony groups on the east side of the fort, which were increasing in number.

The report reiterates the distinction between the parade ground, a result of cultivation and care, the terreplein with loose soils and volunteer forbs, and the remainder of the island supporting native vegetation and diverse exotics. The National Park Service operated Fort Jefferson during this time,

placing a heavy emphasis on the use of native plants.<sup>147</sup>

A compilation of historic field reports published in 1981 synthesized the previous studies of the Tortugas Keys, pointing out that only Davis' maps were truly accurate. The report detailed the diversity, size, and coverage of vegetation on Garden Key and compared maps of the island acreage beginning in 1904.<sup>148</sup> (See Appendix A and B for complete species listing)

## Archeological Resources

In 2003, the Southeastern Archeological Center (SEAC) conducted an investigation of a path leading from the engineer officers' quarters to the officers' quarters after it was inadvertently exposed during construction of a leach field. A portion of the path was excavated and found to be lined with parged brick.

In 2006, SEAC conducted a ground penetrating radar (GPR) survey of the parade ground and a limited area outside of the fort in the campground and picnic area. Historic landscape features identified include remnant paths and roads, possible privies and/or cisterns, a probable grave, and foundation remains of the original lighthouse and some of the frame structures associated with the fort's construction. Also found were unidentified anomalies of potentially historic origin.<sup>149</sup>

Of primary interest is the fact that large areas of the parade ground were found to have significant impacts related to modern intrusions related to NPS occupation. Numerous utility pipes, cables, buried tanks, and leach fields were encountered on the western half of the parade ground facing NPS residential and maintenance areas. Utilities were so numerous in Quadrant 4 and the western half of Quadrant 3 that there is little likelihood that any significant remains of intact archeological features remain. Utilities were identified in other areas as well, including a PVC line crossing the northern half of the parade and several lines in Quadrant 7 that probably supply the park headquarters and the

145 Millsbaugh, Charles F. Flora of the Sand Keys of Florida. Botanical Series, Vol. II., No. 8. pp. 225-243.

146 Stoddart and Fosberg, 11. Bowman, p. 125.

147 Davis, 176-187.

148 Stoddart, 3.

149 Lawson, 2; 74.

Audubon Fountain. However, these utilities are less concentrated and represent a minor disturbance to the overall area.

In 1962, the NPS removed the superstructure of the enlisted men's quarters and the officers' quarters, as well as their associated buildings. The aboveground foundations of the two buildings remain, as do the foundations of the officers' quarters kitchens and latrines and one of the original four kitchens of the enlisted men's quarters. The GPR survey indicated that removal of the aboveground material of the other three kitchens was nearly total, with no apparent reflections from buried foundation features. Such a demolition would have resulted in significant ground disturbance, probably obliterating any other archeological features that may have been present in the vicinity of the kitchens.

The removal of historic fabric and degradation of subsurface integrity is also significant in the area tested outside the fort. The three radar grids that were placed in the campground and picnic area identified large utility features including a leach field and septic tank, as well as utility lines crossing the area. Although some concrete foundations were encountered adjacent to the counterscarp, there were no significant reflections indicative of the large number of structures that historically sat at this location. The physical removal of these features, natural erosion and storm action, and modern utility installation have apparently taken their toll on the outside portion of Garden Key. It appears unlikely that significant intact archeological features will ever be identified outside the counterscarp.

In consideration of the probable archeological features identified by the GPR, as well as the identification of buried utilities and negative data areas, the fort grounds were divided into two potential management areas: one with low archeological integrity and one with potentially high archeological integrity. Future

ground disturbance will be limited to the Low Archeological Integrity Zone.<sup>150</sup>

## Submerged Resources

Submerged resources include potentially extant submerged prehistoric archeological resources and a large collection of submerged ship wreck sites. Shipwrecks on the surrounding reefs constitute one of the nation's principal underwater graveyards, dating back to the 1600s.

The Dry Tortugas are located at the confluence of the shipping lanes of the Gulf of Mexico, the Atlantic Ocean, and the Caribbean Sea. The shoals, banks, and coral reefs are internationally known as a serious hazard to navigation. The first documented wreck occurred in 1622, and there are now more than two hundred documented shipwrecks in the park. Many of the shipwrecks are associated with the construction of the fort.<sup>151</sup>

## Land Use

Fort Jefferson was built as a military seacoast fortification and later used as a prison, quarantine station, coaling facility, and seaplane base. Technology rendered Third System forts obsolete before the end of the Civil War, although the parade ground was used briefly during the Spanish-American War as a drill field and campsite.

After the establishment of Fort Jefferson National Monument in 1935, NPS administration, maintenance, interpretation, housing, and recreation took center stage, and commercial/recreation vessels eventually replaced military vessels in the harbor. In recent years, Garden Key and other Dry Tortugas islands have been frequent landing points for Cuban refugees, requiring an increased law enforcement presence on the island.

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150 Lawson, 74-82.

151 National Park Service, *Long Range Interpretive Plan Dry Tortugas National Park* (Harpers Ferry, WV: Harpers Ferry Design Center, 2003), 21.

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# Existing Conditions

Existing conditions are documented to clearly identify and describe the landscape characteristics that compose the cultural landscape.

Contemporary site functions, visitor services, interpretation, park operations, and maintenance are included to the degree they contribute to or influence treatment of the landscape. Also recorded is detailed technical information, such as data on geology, climate, ecology, and vegetation.

## Spatial Organization

### Parade Ground

Garden Key has two distinct areas separated by the fortification walls. The interior of the fort contains the historic parade ground and several buildings,



**Figure 194.** Interior view towards officers' quarters ruin, 2010. (SERO image 1626)



**Figure 195.** Interior view from enlisted men's quarters, 2010. (SERO image 1556)

all bounded by a modern brick path. Many of the structures, landscape features, and vegetation that once articulated spatial patterns within the fort are no longer present. Extant structures include the engineer officers' quarters, hot shot furnace,



**Figure 196.** Interior view towards engineer officers' quarters, 2010. (SERO image 1578)



**Figure 197.** Remnant pathway showing brick edging, 2010. (SERO image 1530)



**Figure 198.** Casemates below used for maintenance, above used for housing, 2010. (SERO image 1535)



**Figure 199.** Major Smith Monument looking towards the Audubon fountain, 2010. (SERO image 1568)

large magazine, small magazine, and cistern. Two of the most prominent buildings historically, the officers' quarters and the enlisted men's quarters, burned and survive only as ruins. Historic paths, described as hard-packed surfaces, are now sandy paths with some of the later brick edging exposed where it was previously covered with sand. The spatial delineation remains visible in some areas, but existing pathways do not necessarily conform to the historic circulation system documented in the ground penetrating radar survey and seen in historic photographs.

Casemates and what were historically the guard rooms adjacent to the sally port are being adaptively used as a small visitor center and park headquarters. Several casemates along Fronts 1, 2, and 3 and the engineer officers' quarters have been adapted to contain staff housing. Maintenance facilities and utilities are located within casemates concentrated along Fronts 2 and 3.



**Figure 200.** Parade ground vegetation, 2010. (SERO image 1485)



**Figure 201.** Screen of vegetation, 2010. (SERO image 1489)

A monument to Dr. Joseph Sim Smith sits west of the foundation of the enlisted men's quarters. A modern brick fountain west of the sally port donated by the Tropical Audubon Society is shaded by buttonwoods and a seaside mahoe, the latter of which is growing into the fountain. In 2010, maintenance staff repointed the masonry to stabilize the fountain.

The parade ground was historically planted with coconut palms and buttonwood trees. Today the parade is open with mature buttonwood trees near the center of the parade. It is unclear if any of these are of the historic period. None of the coconut palms from the historic period survive. A vegetative screen of seagrapes currently separates the public area from staff housing. Bastions 1 and 2 and Fronts 2 and 3 are closed to the public with access restricted by signage and barriers on the second tier and terreplein. The curved screen of trees separates the housing area from the open parade ground, both visually and physically.



**Figure 202.** Seaside mahoe, 2008. (SERO image 0050)

Other vegetation within the fort plays a small role in spatial organization. Besides the vegetative screen, a cluster of buttonwoods and four seaside mahoes are located near the Audubon fountain. While these trees provide shade to visitors, especially bird enthusiasts, seaside mahoe is an invasive exotic species typically controlled by NPS natural resource managers.

## Exterior of Fort/ Campground

The remainder of Garden Key embraces the exterior of Fort Jefferson, a strip of sandy island wrapping along Fronts 1, 2, and 6. The open landscape stretching west and north from the south coaling docks is the location of a picnic area and campground and provides access to the docks and harbor of the key. A sandy road parallels the Front 6 counterscarp and leads to the work area at the north end of the island. Snorkeling beaches are located on the north and west shores. The picnic area, which has approximately nineteen recycled, plastic picnic tables scattered to the south of the main boat dock, transitions into the campground area at the western edge. Each campground site has a picnic table, metal grill, and pole to hang water, food, and trash. The park installed four composting toilets in 2004 at the southern edge of the campground.

The north coaling dock is cordoned off to the public and used as a staging ground for ongoing stabilization efforts. Fuel tanks for the generators are located underground near the south coaling docks. Fuel tanks for the boats and maintenance equipment are located in an aboveground, wood structure on the south coaling dock. A landing pad for helicopters occupies the remainder of the dock. Additional storage, workspace, and a brick and



**Figure 203.** Campground, 2010. (SERO image 1617)



**Figure 204.** North coaling dock, 2010. (SERO image 1589)



**Figure 205.** Brick and rubble debris pile, 2010. (SERO image 1658)



**Figure 206.** Main dock, 2010. (SERO image 1501)



Figure 207. Counterscarp walk, 2010. (SERO image 1512)

rubble pile of debris from the quarters buildings' demolition are on the northeast end of Garden Key.

The main dock has two wooden gangways for ferry arrivals, a dock house with changing rooms, and four finger piers for NPS craft.

### Counterscarp Walk

The counterscarp walk remains an important feature of the fort's exterior. It provides the park staff and visitors with a circuit walk around the fort with views of the surrounding seascape.

### Vegetation

The ecosystem on Garden Key contains Florida strand vegetation typical of maritime and tropical shorelines. Mostly xerophytic strand plants grow within a uniform climate, adapting to environmental factors including porous soils, dry winds, constant sunlight, and tropical storms. In addition to native vegetation, Fort Jefferson has a long history of introduced plants from frequent contact with ships, humans, and animals. The park eradicated the exotic Australian pine (*Casuarina equisetifolia*) through control efforts carried out between 1995 and 2000, although many introduced plants remain on Garden Key. Some of these introduced plants are associated with the historic occupation of the key while others are the result of NPS management and staff.

The 2005 Cultural Landscapes Inventory (CLI) identified two historically important trees-- buttonwood (*Conocarpus erectus*) and coconut palm (*Cocos nucifera*)--that continue to contribute



Figure 208. Buttonwoods on the parade ground, 2010. (SERO image1580)

to the cultural landscape.<sup>1</sup> A cluster of buttonwood trees was the only historic vegetation attributed to the unimproved island prior to fort construction. Buttonwoods remain in the middle of the parade ground and grow near the sally port, Audubon fountain, and enlisted men's quarters. Although only a few coconut palms currently survive on the parade ground, this character-defining tree was prevalent during the military occupation of Fort Jefferson, clustered around the officers' quarters, the small parade magazine, and the lightkeeper's quarters. Although the park removed 90 percent of the extant coconut palms following damage from a series of hurricanes in 2005-2007, the palms from the historic period had been lost by the 1930s. Today the parade ground features six coconut palms and over twenty buttonwoods. The public portion of the parade ground is primarily open space with a few seaside mahoes (*Thespesia populnea*) on either side of the main

1 A site visit for the CLI occurred in 2005 and the inventory unit was certified in FY 2007.



Figure 209. Parade vegetation, 2010. (SERO image 1486)



**Figure 210.** Vegetation around large magazine with officers' quarters in the background, 2010. (SERO image 1564)



**Figure 211.** Seagrapes screening staff portion of parade, 2010. (SERO image 1489)



**Figure 212.** Gumbo limbo overarching brick walkway, 2010. (SERO image 1481)

path near the sally port and buttonwoods scattered across the entire parade. Geiger trees (*Coridia sebestena*) and a gumbo limbo (*Bursera simaruba*) grow along Front 6 behind the enlisted men's quarters. A massive date palm (*Phoenix dactylifera*) dominates the southern façade of the large magazine. Apple cactus (*Cereus hildemannianus*)

framed by spider lily (*Hymenocallis latifolia*) grows on the west end of the same building. In the rear of the officers' quarters ruins, a few geiger trees grow between the brick walkway and the fort. Interpretive signs list names and uses of a few individual trees, although these do not necessarily relate to the historic landscape.

The parade also includes a vegetative screen setting apart the Front 2 and 3 staff area from the main parade. A row of sea grapes (*Coccoloba uvifera*) curves between Bastion 3 and the small magazine, screening the western fronts as well as the engineer officer's quarters, the staff picnic area, and the cistern. The sea grapes are interspersed with buttonwoods. Within the staff portion of the parade ground, the remaining coconut palms and a scattering of Indian almonds (*Terminalia catappa*), geiger trees, and gumbo limbos are present. A cluster of mature gumbo limbos is planted between Bastion 1 and the small magazine, overarching the brick walkway. A mature Indian almond and large date palm grow in front of Bastion 3.

Park staff cultivated small, personal gardens over the years and many of the introduced exotic plants have seeded and spread throughout the parade landscape. Introduced species now grow in the ruins of the officer's quarters, the enlisted men's quarters, and detached kitchens across the parade ground. Aloe (*Aloe vera*), bowstring-hemp (*Sansevieria hyacinthoides*), tropical hibiscus (*Hibiscus rosa-sinensis*), Madagascar periwinkle (*Catharanthus roseus*), and spider lily (native) occupy planting beds along Front 2, between the park housing entrance doors and the brick sidewalk. Other planting beds are located near the small magazine and beside the engineer officers' quarters.

The parade is covered with a mixture of native and exotic grasses, including Bermuda grass (*Cynodon dactylon*) and St. Augustine grass (*Stenotaphrum secundatum*). Maintenance staff at current levels can only mow Fronts 1 and 6 and are presently not mowing inside the ruins. Higher staffing levels in the past permitted mowing of the interior of the ruins with a push mower.

The exterior of Fort Jefferson is open with clusters of vegetation in the campground and near the north coaling dock. An area of mature buttonwoods and several coconut and date palms



Figure 213. Buttonwoods in the campground, 2010. (SERO image 1638)



Figure 214. Rubble pile with strand vegetation, 2008. (SERO image 0006)

separate the west beach from the campground. The buttonwoods provide shade and delineate the two areas. A small roped-off section targeted for a dune restoration project protects coastal grasses. A second roped-off area protects a group of younger buttonwoods. Sea grapes grow in front of the composting toilets adjacent to the south coaling dock. A single coconut palm is located just north of the toilets. The picnic area has three coconut palms and patches of Bermuda grass interspersed between the tables.

A rubble pile, consisting of bricks and ironwork from the demolition of the enlisted men’s quarters and officers’ quarters, is on the eastern shore of Garden Key. It supports buttonwood saplings and mature seagrapes, generates forbs throughout the year, and is scattered among typical coastal strand vegetation. The eastern beach near the north coaling docks has a clump of seagrapes and two buttonwoods growing south of the dock platform.

Several isolated trees grow near the main dock and fort entrance. The gangway from the dock house is framed by two seagrapes and one coconut palm.

**Predominant Vegetation Currently Found on the Parade Ground**

<i>Bursera simaruba</i> *	Gumbo limbo tree
<i>Cereus hildemannianus</i>	Apple cactus
<i>Coccoloba uvifera</i>	Seagrape
<i>Cocos nucifera</i> *	Coconut palm
<i>Conocarpus erectus</i> *	Buttonwood
<i>Coridia sebestena</i>	Geiger tree
<i>Cynodon dactylon</i> *	Bermuda grass
<i>Euphorbia lactea</i>	Candelabra cactus
<i>Hymenocallis latifolia</i> *	Spider lily
<i>Ochorosia elliptica</i>	Ochrosia
<i>Phoenix dactylifera</i> *	Date palm
<i>Portulaca oleracea</i> *	Purslane
<i>Sesuvium portulacastrum</i>	Sea purslane
<i>Stenotaphrum secundatum</i>	St. Augustine grass
<i>Terminalia catappa</i>	Indian almond
<i>Thespesia populnea</i>	Seaside mahoe
<i>Tournefortia gnaphalodes</i>	Sea lavender

\*Mentioned in letters or articles from the historic period

**Buildings and Structures**

Of all the buildings constructed on the Fort Jefferson parade, only two buildings remain intact: the engineer officers’ quarters (currently used as staff quarters) and the hot shot furnace, rehabilitated in 2004. Other structures are in various states of ruin or were never completed.

**Fort Jefferson**

This Third-System brick fort was designed as a hexagonal structure with 2,000 brick arches and vaults, partitioned into 303 casemates, some of which have been converted to staff housing/ administration/maintenance use. The fortification has a bastion at each corner with a staircase to provide access to the open terreplein. Two stories of brick casemates rest on a foundation of vaulted cisterns. The embrasures in the first tier of casemates were originally framed with iron to support the Totten shutters, which were designed to close over the embrasure to protect the fort and soldiers from fire. The second tier embrasures were never completed, due to subsidence, leaving much larger, square openings than those on the first tier.



**Figure 215.** Fort Jefferson, 2010. (SERO image 1508)

A series of small round arches form a cornice that spans the exterior scarp on all six sides, stretching 2,500 feet.

In 1998, a condition assessment of the fort revealed a variety of serious problems, and the park embarked on a multi-phased, multi-year preservation project to stabilize Fort Jefferson. Among the worst of the problems was the expansion of corroding ironwork associated with the Totten shutters that was destroying the masonry structure in which it was embedded. A decision was made that the ironwork had to be entirely removed. Because this was an unavoidable adverse effect on the historic resource, the park and the Florida State Historic Preservation Office (SHPO) entered into a memorandum of agreement in 2003 to guide the fort's stabilization. After a comprehensive investigation of the fort's physical condition, LAS completed an amendment to the historic structure report in 2006. Phase I stabilization of the fort walls included carefully removing the existing brick surrounding the embrasures on the lower level in order to gain access to the original iron elements.

In 2007, the park began Phase II stabilization to repair the exterior scarp wall in the following areas: the north and east faces of Bastion 3, Front 4, the west and northwest faces of Bastion 4; Bastion 5, Front 6, and the northeast and east faces of Bastion 6. The work included the selective demolition of masonry to remove the corroded iron Totten shutters, armor blocks, and lintels; the installation of new non-corrosive glass fiber reinforced concrete armor blocks and lintel facsimiles; and the associated reconstruction and repointing of the masonry on the scarp wall. Additionally, the



**Figure 216.** Phase II stabilization, 2010. (SERO image 1514)



**Figure 217.** Light tower, 2010. (SERO image 1610)

parapet in the area of the work described will be repaired and stabilized with selective brick replacement and repointing. A test example of a replica Totten shutter was installed on Front 5 to ensure that the system functioned before work began. An infusion of American Recovery and Reinvestment Act money completed Phase II stabilization in May 2011. Phase III has yet to be funded.

### Light Tower

The Garden Key light tower is a hexagonal metal structure atop Bastion 6. The light tower tapers to

an observation deck at the second story enclosed by an iron balustrade. The tower is boiler-plate iron painted black with windows facing east and west. The light tower is thirty-seven feet tall. At its top is a lantern room with ten windows, capped by a metal roof with a round roof finial.

### Terreplein/Parapet

The surface of the terreplein consists mainly of vegetated sand over the fort's masonry structure. Gun mounts, made from granite in most cases, are positioned between concrete and brick traverse magazines along each front and at each bastion. The Rodman gun mounts that would originally have been located at each bastion are no longer extant, although remnants are visible on the surface at Bastions 1 and 4. An uneven mix of volunteer cactus, grasses, and forbs grow along the sandy parapet path and cover many of the gun emplacements. On some fronts the vegetation completely obscures the gun emplacements. There are also scattered pieces of granite around the terreplein, some of which are the result of removing small gun emplacements near the bastions to facilitate installation of the Rodman guns during the 1872-73 modernization of the fort's armament.

Today a portion of the self-guided tour includes walks on four fronts of the terreplein (1, 4, 5, and 6). Traverse magazines, placed symmetrically along all six fronts, are a prominent feature. The masonry of many of the magazines shows signs of deterioration such as loose and missing brick and deteriorated mortar joints. One traverse magazine is open to the public along Front 6. Brick steps have been constructed from the parapet to give visitors access to the magazine entrance below.

Six 15-inch Rodmans at each bastion and four 10-inch Parrotts along Fronts 1, 5, and 6 have been raised off the ground, most onto temporary mounts that utilize displaced granite blocks from the gun emplacement. The Rodman at Bastion 6 and Parrots on Fronts 1 and 6 were set into concrete in historically inaccurate positions prior to 1963. Good examples of gun emplacements not obscured by vegetation are found along Fronts 1 and 6, which is also the location of a radio antenna and satellite dishes within full view of the visitor. Along other fronts, vegetation covers some of the gun mounts. The disrupted gun mounts on either



**Figure 218.** Traverse magazine and gun mounts on Front 6, 2010. (SERO image1576)



**Figure 219.** Rodman cannon on temporary mounts, 2010. (SERO image 1551)



**Figure 220.** Walking tour with radio antenna in the background, 2010. (SERO image 1630)

side of each bastion are actually part of the historic setting since their displacement dates to 1872-73. However, there are other places where individual pieces of granite could be replaced. On the parade face, the walkway braces of the galleries are also visible features of the cultural landscape. These are remnants of the galleries



Figure 221. Walkway braces, 2010. (SERO image 1533)



Figure 222. Plywood covers, 2010. (SERO image 1561)

constructed when the traverse magazines were modified in 1873 for entry from the rear.

The original terreplein filtered rainwater into the foundation cisterns through leader pipes, most of which are covered with round iron lids. Plywood covers chimney-smoke holes to keep water out of the fort. A waterproofing material has been used on portions of the terreplein to prevent leaks into the casemates below. The membrane currently installed has not been entirely effective as water infiltration below the treatment is evident, and portions of the membrane can be seen on the terreplein at Bastion 2 and Bastion 3. Along Front 3, a modern roof covers a portion of the housing area.<sup>2</sup>

### Maintenance Area

The maintenance area is located in a series of first-tier casemates along Front 3. Workshops, storage, laundry, waste-water treatment plant,



Figure 223. Waterproofing membrane, 2010. (SERO image 1640)



Figure 224. Maintenance area with modular housing units above, 2010. (SERO image 1537)

water plant, and a recycling facility occupy most of the casemates along Fronts 2 and 3, while other designated casemates provide housing for park residents and temporary staff and contractors working at the site. New modular housing units have been constructed on Front 3 in the second tier casemates.

### Counterscarp/Moat

The counterscarp separates the moat from the open sea. Although it protects the fort from wave action, erosion is a constant concern. The counterscarp is constructed of brick and coral concrete and is topped with a wide walkway constructed of brick and concrete. Recently, portions of the exterior counterscarp brick edging have fallen into the moat along Front 3.

During inspection of the counterscarp in 2006, the following observations were made:

- Along Front 1 at Bastion 6, the coping was in

2 LAS, 167.

poor condition with grass growing over several portions with many missing bricks. From the sally port to Bastion 1, the host masonry had severe deterioration and weathering with missing mortar, deteriorated coping, and grass growing throughout.

- Along the interior face of Front 1, there was a significant amount of host masonry deterioration and failed mortar joints.
- The host masonry along Front 2 showed severe deterioration and weathering.
- Major delamination at the joint between the top surface of the concrete walk and the coping joint along the curve between Fronts 2 and 3 was present. Approximately 7 ft. of coping was missing along the outer face.
- Mortar along the interior face of Front 3 was in fair condition and was debonding with areas of horizontal cracking. The sluice at Bastion 3 had severe cracking and staining and severe structural cracking on either side of the opening.
- Along Front 4, host masonry was in good condition but severe mortar deterioration was observed.
- The host masonry on the interior face of Front 4 as Bastion 3 had severe weathering. The entire front was in fair to poor condition with rampant structural cracking.
- Along Front 5, host masonry was in good condition but had severe mortar deterioration. The interior face was in fair condition.
- The concrete walk was severely deteriorated and/or gone along the majority of Front 6. The host masonry was severely weathered, deteriorated, missing, or damaged with severe loss of mortar. Washout under the counterscarp was evident at several locations.
- The interior of Face 6 at Bastion 5 was in fair condition with host masonry deterioration and mortar joints failing.<sup>3</sup>

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3 LAS, 147-48.



**Figure 225.** Sand covering counterscarp, Front 2, 2010. (SERO image 1506)



**Figure 227.** Officers' quarters, 2010. (SERO image 1660)



**Figure 226.** Counterscarp, Front 6, 2010. (SERO 1516)



**Figure 228.** Officers' quarters detached kitchens, 2010. (SERO image 1474)

In 2008, cracks in the counterscarp along Front 3 became more pronounced after storms early in the year, followed by a major collapse in the spring. In 2010, sand covered the counterscarp walk along a portion of Fronts 1, 2, and 6. Near the end of Front 2, at the transition from brick to concrete, masonry was deteriorated, missing, or damaged with severe loss of mortar. Along Front 3, a collapsed section is marked with an orange cone. Along Front 6, the walkway is deteriorated along its length. Along Front 1, an existing repair near Bastion 6 using wood and concrete stands out in a section that only used brick historically.

Two sluice gates were originally constructed—one on Front 1 and one at Bastion 3. Today, only the gate at Bastion 3 remains.

### Officers' Quarters

The officers' quarters survive as low brick ruins along Front 4 directly across the parade ground opposite the sally port. A central passage divides the building in two with concrete and slate flooring exposed. The east end of this building was one of the first constructed at Fort Jefferson, but there is no visible evidence of the separate construction. The ruins vary in height with granite window sills remaining in a few places. The ruins are overgrown with exotic grasses.

The outhouses and detached kitchens behind the officers' quarters are low ruins similar to those of the adjacent barracks. The kitchens are connected to the main building by the ruins of later brick walls. Some central chimneys are evident in the kitchens.



**Figure 229.** Enlisted men's quarters, 2010. (SERO image 1560)

### Enlisted Men's Quarters

The enlisted men's quarters span the length of Front 6 and remain as a brick and concrete foundation with granite blocks defining the building's perimeter. The foundation is two feet high in places with portions rising to three feet. Exotic grasses grow in the interior of the ruins. By the 1930s, very little remained of the four detached kitchens in the rear of the building, which were demolished in the 1960s, although a few brick piles can be seen in images from this period.

### Engineer Officer's Quarters

The two-story building, which was largely reconstructed in the 1930s, serves as quarters for NPS personnel and contractors. The brick building has a side-gabled slate roof, end parapet walls, and shed-roof front porches on square posts. Two brick sections (8A and 8B) are connected by a wood-frame hyphen, which was added during the 1930s rehabilitation. The addition of metal lintels over window openings also occurred at this time. The south elevation has a two-story, frame porch on chamfered posts.

The kitchen extension of 8B is a non-historic feature with jalousie windows that enclose the space between the brick section and the associated privy/storage structure. The overall privy structure is in fair condition, although the roof is failing.

New windows installed in 2001 are in good condition, but their installation was poorly executed. The installer removed the existing sashes and crudely modified the existing wooden frames to fit the new windows and made up excesses in tolerances with large amounts of caulking that is beginning to fail.

In 2004, the park planned to replace the iron window lintels with new granite lintels. The Florida SHPO determined that the effort to replicate the historic appearance of the granite lintels was selective restoration and that a long-term restoration plan would need to accompany new lintel installation. An exterior preservation plan was completed in 2009.

In July 2009, the single-story porch on the east elevation of 8A sagged in the center and pulled completely away from the brick wall of the east



**Figure 230.** Engineer officers' quarters, 2010. (SERO image 1571)

elevation. The porch was near collapse, but the park was able to temporarily stabilize the structure with a forklift. Further investigation showed that the porch was tied into the brick work with iron thru bolts that had rusted away so that the porch was being supported by two pilasters and six posts set on concrete bases. As this was perceived to be a design flaw, a stabilization effort would not have been productive or cost effective. The forklift was removed and the porch collapsed to the ground. The park salvaged the 1930s copper gutter and the slate shingles.<sup>4</sup>

Low brick walls connect small storage sheds on the west façade and enclose a flagstone patio. Portions of the ruins to the north of the quarters rise above one story with brick and granite sills remaining in place. Herbaceous vegetation currently grows inside the ruins.

<sup>4</sup> Simpson, 1, 55-65.



**Figure 231.** Cistern, 2010. (SERO image 1622)



**Figure 232.** Large magazine, 2010. (SERO image 1625)

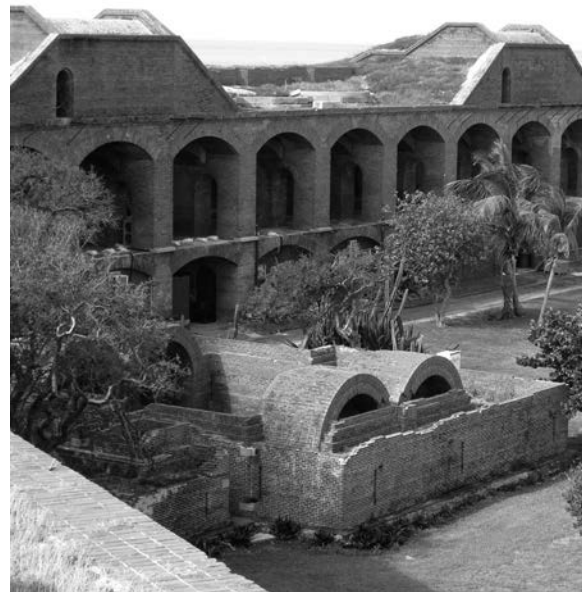
### Chapel/Office/Cistern

A 90,000-gallon concrete cistern, rising two feet from the ground, is located along Front 2 at the southwest end of the parade. A metal and asphalt covering has eight water intake openings and three non-potable wooden water valve boxes. Delamination and cracking appear on the most recent parge coat. The cistern occupies the location designated for the chapel, whose superstructure was never completed. This area is designated “off-limits” to the public.<sup>5</sup>

### Large Magazine

The large magazine is oriented east to west along Front 5. A 30-foot-high, barrel-vaulted magazine is surrounded by a rectangular brick enclosure

<sup>5</sup> LAS, 163.



**Figure 233.** Small magazine, 2010. (SERO image 1623)

with an arched entry door on the north elevation and vertical ventilation slits in the walls. Because construction was never complete, the building is open-ended and exposed to the elements. The impact of “target practice” from the Spanish-American War occupation of the fort is still visible on the south façade, and a date palm grows nearby. No vegetation grows in the interior, except a few weeds and mold, although vegetation grows on the roof. There are three modern, wooden benches with decorative iron located in the entry of the magazine for visitor comfort.

### Small Magazine

The small magazine sits in front of Bastion 1. Two pairs of 10-foot-high barrel vaults are contained within a rectangular brick enclosure. The army did not finish construction of the small brick magazine, and today the one-story building is stabilized with open, arched bays in the main storage area. A new floor in the entrance area was laid with contemporary brick pavers.

### Hot Shot Furnace

The hot shot furnace is a rectangular brick building with a slate roof opposite Bastion 4. A brick chimney rises to 16 ½ feet at the southern end. The west façade has a floor-level opening where coal was inserted. Two sets of reinforcements run horizontally through the furnace for support. Metal runners are visible through the length of the building with an arched opening at the north end to extract the shot. The building was recently rehabilitated and is interpreted by a wayside exhibit.



**Figure 234.** Hot shot furnace, officers' quarters, and large magazine, 2010. (SERO image 1659)



**Figure 235.** Major Smith Monument with concrete coping, 2010. (SERO image 1527)

### Lighthouse Foundation

The original Garden Key lighthouse was located at the southwest corner of the enlisted men's quarters and now exists only as an exposed foundation. A ring of bricks encircles the concrete base. A small brick kick-out protrudes to the east of the circular foundation. The lighthouse was replaced with the present light tower in 1876, and it is likely that the original structure was dismantled at that time. There is no wayside interpretation of the foundation, and the former lighthouse keeper's residence burned in 1912.

### Major Smith Monument

The Major Smith Monument is in fair condition but has spalling and weathering on the corners and foundation. The marble inscription is in good condition. The monument has a broken pediment, and an old buttonwood has grown up around it, blocking the inscription from view. Sections of the poured-concrete foundation surrounding the Major Smith monument are partially exposed on the surface. It is faintly visible with sand and pebbles forming a grid beneath overgrown Bermuda grass. Ground-penetrating radar conducted in 2006 revealed the foundation remains more clearly. In historic photographs from the 1930s, they appear to be an edging or coping around the monument that extended out into the parade, similar to a cemetery plot edging.<sup>6</sup>

### Wharf

The main boat dock is located on the southeastern shore of Garden Key. One section contains a dock

<sup>6</sup> Lawson, 29.



Figure 236. Dock, 2010. (SERO image 1598)



Figure 237. South coaling dock, 2008. (SERO image 0028)



Figure 238. North coaling dock, 2007. (SERO image 114)

house with men’s and women’s changing rooms and a small interpretive room with information on park history, fishing, coral reefs, weather, and park regulations. Another section is a loading dock, used by the ferry concessionaires. A view of the fort from the dock is framed by seagrapes and a coconut palm. NPS vessels are docked in four finger piers adjacent to the main boat dock. 2010 plans call for the extension of the main dock, replacement of wood siding on the dock house with Hardiboard panels with battens, and the addition of two finger piers.

## South Coaling Dock

The south coaling dock is a rectangular concrete foundation on the southwestern shore of Garden Key. A helicopter pad and modern fuel storage tank enclosure occupy a portion of the foundation. A wayside exhibit interprets the later history of Fort Jefferson and the coaling dock. Old bricks have been dumped in the coaling station ruins.

## North Coaling Dock

The concrete foundation on the north end of the island serves as a staging area for the stabilization work ongoing at Fort Jefferson and a workspace for boat maintenance. A storage shed sits on the south end. Old bricks and other rubble have been dumped in the water among the pilings.

## Topography

Dry Tortugas National Park is comprised of an ellipse of seven small, tropical islands. At one time there were eleven islands, but four of these have eroded away. Elevations in the park range from sea level to eighty-two feet below sea level—part of the extension of the Florida shelf.

These islands developed upon the stable Florida Plateau, which existed in Lower Oligocene time and projected as a submarine platform from the southeastern corner of the continental shelf and extended at least to its present southern limit. Depression and uplift occurred in both Pliocene and Pleistocene times. As the area was depressed, the atoll ring formed and was shaped by various currents. The material from which it has formed is largely composed of coral debris. The Dry Tortugas is the westernmost extension of the oolitic facies of the Miami limestone.<sup>7</sup>

Four islands—Garden, Loggerhead, Bush, and Long Keys—have enough elevation to support woody vegetation. Bush Key is the only significant breeding colony in the continental United States for sooty terns and brown noddies. Although Long Key is inundated at high tide, black mangroves are large enough to support a small frigate-bird colony. Both East and Hospital Keys are little more than flat, bare sand piles that change configuration constantly, but Hospital Key is the only important

7 GMP Amendment, 22, 105.



**Figure 239.** Bush Key, 2008. (SERO image 0045)

nesting area for masked boobies in the continental United States. Middle Key is a sandbar that is awash in the summer but emerges intermittently at other times of the year.<sup>8</sup>

The existing topography of Garden Key remains defined by Fort Jefferson. The sand key is low and relatively flat with accessible shoreline along Fronts 1, 2, 5, and 6. Casemates and the parade wall surround the parade ground and provide some protection from the sun, wind, and surf. Storms subtly adjust the exposed shorelines each season and redistribute beach sand dunes.

The parade ground was designed to be flat and even, similar to other Third System fortifications.<sup>9</sup>

8 GMP Amendment, 6; "Topography of the Dry Tortugas," undated, photocopy, Dry Tortugas National Park Resource Management Records Collection, DRTO 4378, South Florida Collections Management Center, Everglades National Park.

9 Emanuel Raymond Lewis, *Seacoast Fortifications of the United States: An Introductory History* (Pictorial Histories Publishing Company: Missoula, MT, 1979), 37-72.



**Figure 240.** Leach fields, 2010. (SERO image 1543)



**Figure 241.** Architectural debris pile, 2010. (SERO image 1652)

Erosion is causing low areas on the parade to fill with water when it rains, harboring mosquitoes.

Two modern oblong leaching fields rise in a north-south angle in front of Bastion 3. These parallel features are part of the water treatment process on Garden Key and protrude as low, linear mounds. Between the sally port and first wayside exhibit, a subtle change in topography elevates a portion of the brick walkway. This area is graded to provide handicapped accessibility to the visitor center, which is located within one of two guard rooms adjacent to the sally port.

The eastern portion of the island (Front 6) contains an overgrown dump site of architectural debris from the demolition of the quarters buildings and random material dislocated after hurricanes. It is overgrown with typical strand vegetation. The sand pile between Bastion 5 and the north coaling dock was removed in 2009 when the moat and boat slips were dredged. The spoil was put by the north coaling dock, as well as along the shoreline east of the brick rubble pile. Since the dredging, the sand has started to fill in the moat again by Bastion 5 and Bastion 1. Aside from these two man-made features, the landscape outside of the fort is flat.

Near the campground, a roped-off beach restoration area creates a slight rise and provides protection to native dune grasses and buttonwoods bordering the sandy campground. Replacement of fuel storage tanks in 1994 required the removal of approximately two additional feet of soil for the new trench line, which altered the topography adjacent to the south coaling dock. Hurricane



Figure 242. Entrance to Fort Jefferson, 2010. (SERO image 1498)



Figure 243. Fort Jefferson sally port, 2010. (SERO image 1524)



Figure 244. Interior brick walkway, 2010. (SERO image 1662)

Wilma removed the land bridge connecting Garden and Bush Keys in October 2005.<sup>10</sup>

## Circulation

Garden Key is accessed on the southeast shore via modern boat docks, a seaplane beach, and a dinghy beach. Most visitors arrive by ferry, exiting the dock via one of two wooden gangplanks. A short brick walkway leads to the wooden sally-port bridge.

Visitors enter the fort through the sally port, the sole access point to the interior of Fort Jefferson. Once inside the sally port, a brick walkway circumscribes the edge of the parade ground. The herringbone walk provides a six-foot-wide trail for portions of an interpretative walk and serves as a thoroughfare for park golf carts and maintenance vehicles. Access is restricted between Bastion 1 and Bastion 3 to park staff only. Although the current brick path is not historic, this same circuitous route was used historically to move supplies around the parade ground.

The interior circulation followed formal walkways with stacked ordnance across the parade ground. Today some of these patterns are visible as sandy paths, several with an interrupted line of brick edging visible aboveground. No cannonballs remain from the military period. In 2003, SEAC excavated a portion of the path from the officers' quarters to the engineer officers' quarters and determined that it was lined with brick and parged.

10 LAS, 92, 162; Superintendent's Annual Narrative, 2005; the land bridge was created by a storm in 2003, so it was not a long-term feature of the landscape.



Figure 245. Interior pathways, 2010. (SERO image 1649)



**Figure 246.** Counterscarp Front 2 and sandy path to campground beach, 2010. (SERO image 1505)



**Figure 247.** Communications equipment at Bastion 1, 2010. (SERO image 1629)



**Figure 248.** Radio antenna at Bastion 1, 2008. (SERO image 0029)

Other sandy paths fork from the main axis nearest the entrance, leading across the open parade to the Audubon fountain and various maintenance casemates and staff quarters. The paths are overgrown with Bermuda grass in places and provide shortcuts across the open parade, not necessarily corresponding to paths from the historic period.

On the exterior of the fort, the remainder of the island is open with sandy paths connecting the beaches and docks. The counterscarp provides a popular walking route around the fort today, just as it did historically. The walking surface changes from brick to concrete along Front 2.

In 2009, dredging of the boat slips uncovered a portion of the wooden tramway that was used to transport building materials into the fort. This iron rail presently rests against the main dock.



**Figure 249.** Views across the parade, 2010. (SERO image 1611)



**Figure 250.** Communications equipment seen from the tour route, 2010. (SERO image 1633)



**Figure 251.** Views up to the terreplein of radio tower, 2010. (SERO image 1487)



**Figure 252.** Views of asphalt roof and satellite dish, 2010. (SERO image 1572)

## Views and Vistas

The essential defensive views from the fort remain intact. All six sides of the fort have unobstructed views in each direction. In the immediate area, Bush Key, Long Key, and Loggerhead Key are all within sight. Signage on Bush Key is clearly visible from Fort Jefferson. The light tower at Garden Key and lighthouse at Loggerhead Key each provide navigational warnings for the nearby shoals.

Views approaching and inside Fort Jefferson are diminished by communications equipment and a radio antenna along Front 1. Plastic chairs outside of staff quarters in the second tier casemates also degrade the viewshed on approach to Fort Jefferson.

From the second tier casemates and terreplein, the loss of all historic coconut palms and most of the buttonwoods has affected interior views across the parade ground. The hard, packed pathways with stacked ordnance are no longer extant, frame structures are gone, and the quarters buildings survive only as ruins. Communications equipment on the terreplein detracts from the



**Figure 253.** AC compressor on tour route, 2010. (SERO image 1493)



**Figure 254.** Vegetative screen in front of maintenance units, 2010. (SERO image 1534)

historic character. Portions of the waterproofing membrane can be seen at Bastion 2.

Views from the parade ground to the terreplein are diminished by the radio tower at Bastion 1 and large black cables on Front 1. There are also many cables and PVC pipes that run up the parade-side scarp walls, especially on Fronts 2 and 3, and these detract from the views inside the fort because they are poorly camouflaged. The asphalt roof over Front 3 also detracts from views to the terreplein.

Views inside the parade ground are diminished by an air-conditioning compressor visible along the self-guided tour route near the sally port and by effluent mounds near Bastion 3. Signage on Bush Key is also visible through an embrasure opening. A vegetative screen, planted in the 1980s, helps to block the view of the housing/maintenance units along Fronts 2 and 3 from visitors on the parade ground, but these units are visible from the second tier and terreplein.

## Small-scale Features

### Parade Ground

**Fountain.** The Tropical Audubon Society fountain is a modern feature added to the parade ground in the 1970s. The square, brick fountain has three tiers with concrete lining and evidence of numerous repairs. The electrical service is exposed on the east face. The fountain is surrounded entirely by buttonwoods, and one seaside mahoe is growing into its base. The fountain does not date to the period of significance and is a modern intrusion on the landscape. However, it may be politically insensitive to remove it in spite of the cultural and natural resource impacts, as birding is a primary activity of visitors. The masonry is repointed as needed, and the Tropical Audubon Society supplies the pump.<sup>11</sup>

- 11 Some birds are encouraged to stay longer by the artificial source of water and end up eating themselves out of a food source and dying on the parade ground (e.g. cattle egrets).



**Figure 255.** Tropical Audubon fountain, 2010. (SERO image 1468)



**Figure 256.** Plastic bench near Audubon fountain, 2010. (SERO image 1469)

**Benches.** Two plastic benches are located near the Audubon fountain under a group of buttonwoods, and a makeshift bench has been constructed from architectural materials (slate and brick). On the far side of the sally port, a grouping of plastic benches is the first stop on the current guided tour offered by the ferry operators. Although this is a non-historic configuration, it does provide a place for visitors to rest in the shade. There are three wooden benches placed along the entry to the large magazine.

**Picnic Tables.** Three picnic tables, two recycled plastic and one wooden, sit opposite the crew quarters #4 near the small magazine in the staff area.

Three wooden, non-potable-water valve boxes sit atop the cistern. Three lift stations, one of which is covered with a six-sided lid, service the waste water treatment plant. A frame weather station is located near the small magazine.



**Figure 257.** Plastic benches on tour stop, 2010. (SERO image 1492)



**Figure 258.** Recycled plastic picnic tables, 2010. (SERO image 1466)



Figure 259. Cannon conservation, 2010. (SERO image 1555)



Figure 260. Cannon aiming in wrong direction, 2010. (SERO image 1595)



Figure 261. Cannon on alternative mount, 2012. (NPS image)

Fort Jefferson is very windy. Sandbags throughout the perimeter parade ground walkway anchor various items. A large dock cleat sits immediately to the left as you enter the fort from the sally port and would not have been there historically.

## Terreplein

**Cannon.** All 10 big guns mounted at Fort Jefferson in 1873 remain on the terreplein. There are six 15-inch Rodman cannon, one at each bastion and four 10-inch Parrotts on Fronts 5, 6, and 1. All will eventually be conserved, with one Rodman mounted on a full reproduction carriage and others mounted on some kind of alternative carriage. Conservation of the cannon is currently ongoing, and over half of the collection has received treatment, including the remounting on a full reproduction carriage of the Rodman on Bastion 3 (see Figure 189) and the mounting on an alternative carriage on Bastion 4. The Rodman on Bastion 6 and two Parrotts on Front 1 are set into concrete. Most of the guns are incorrectly oriented, aiming at the fort's walls; several are mounted upside down or sideways.

Many of the gun mounts without cannon are disrupted, with sections of granite scattered on the ground. The historic displacement of the traverse circles for the smaller guns on either side of each bastion occurred to facilitate installation of the 15-inch Rodmans. In addition, pintle blocks were replaced on the gun platforms when the 10-inch Parrotts were mounted on the fronts. Those replaced pintle blocks are still present on Fronts 1, 6 and 5. On Front 5, the pintle block is used to support the Parrott gun. In addition to the intentional, historic displacement of these elements, there are several gun platforms where single granite block has been moved, and it is still possible to determine where they belong.

Telecommunications equipment, radio antennae, and heavy cables have been installed on Bastion 1. A non-historic flagstaff is located above the sally port on Front 1.

## Fort Exterior

**Picnic Tables.** In the area between the main dock and campground, recycled plastic picnic tables, installed in 2009, serve day-trip visitors. The landscape is sandy with Bermuda grass. The picnic tables are arranged in clusters and scattered throughout the open area. Most lie between the two sandy paths that lead to the south coaling dock and the snorkeling beach. Two picnic tables sit to the right of the entrance sign along Front 1.

An anchor adjacent to the bridge across the moat has no historical significance. A large park sign on a brick base sits just to the left of the anchor. A wooden bench provides seating along Front 6.

Dredging activities in 2009 uncovered the remains of the wooden tramway authorized in 1861 to help move construction materials from the dock into



Figure 262. Disrupted granite pieces, Front 4, 2010. (SERO image 1544)



Figure 263. Telecommunications equipment along Front 1, 2010. (SERO image 1606)



Figure 264. Picnic tables and campground, 2010. (SERO image 1602)

the fort. Since its location was unknown to park staff, the remains were damaged in the dredging operation.

## Natural Systems and Features

The Dry Tortugas are characterized as a mosaic of coral reefs, sedimentary shoals, seagrass meadows, and small sand keys. The elliptical atoll composed of limestone, coral, and coarse sands rises from the nearby reefs and is separated from the primary Florida Keys by a deep channel. The cluster of islands includes East Key, Middle Key, Hospital Key, Long Key, Bush Key, Garden Key, and Loggerhead Key.

## Climate

At the convergence of the Gulf of Mexico, the Caribbean Sea, and the Atlantic Ocean, the location of the Dry Tortugas predisposes the landscape to frequent storms and hurricanes. The subtropical climate has consistent temperatures and infrequent rainfall with no fresh water source on any of the keys. Tides, prevailing easterly winds, and constant sunlight also affect the natural systems, vegetation, and shoreline erosion of the Tortugas keys.

## Terrestrial Habitats

The composition of the keys supports mangrove and strand communities, although the impact of humans at Fort Jefferson greatly altered the topography and vegetation on Garden Key. The white mangrove family (buttonwoods, silver buttonwoods, white mangroves, and Indian almond) has been documented in the Tortugas since 1904. Only a few black mangrove colonies, requiring a wet muddy condition, have been reported.<sup>12</sup>

Before human habitation, the natural environment was likely a strand ecosystem associated with beach, dune, and scrub species.<sup>13</sup> Terrestrial plants within this group included bay cedar (*Suriana maritima*), sea purslane (*Sesuvium*

- 12 Richard G. Reimus and William B. Robertson, Jr., "Plants of the Dry Tortugas National Park: An Annotated List," March 2000, South Florida Collections Management Center, Everglades National Park; Bowman, p. 115. Davis, p.127.
- 13 Davis, pp 120-128. Stoddart and Fosberg, 11

*portulacastrum*), coastal beach sandmat (*Chamaesyce mesembrianthemifolia*), beach elder (*Iva imbricata*), snow squarostem (*Melanthera nivea*), sea oats (*Uniola paniculata*), sea lavender (*Tournefortia gnaphalodes*), railroad vine (*Ipomoea pes-caprae*), beach bean (*Canavalia rosea*), prickly-pear cactus (*Opuntia stricta*), and different species of sandbur and grasses.<sup>14</sup> Today, buttonwoods, seagrapes, and seaside mahoes dominate the central parade ground, with gumbo limbos, geigers, and palms planted along the perimeter and interspersed in the vegetative screen. Typical strand vegetation grows from the pile of architectural debris located on the north shore.

### Marine Habitats

Over 99 percent of the Dry Tortugas National Park is an underwater marine ecosystem.

**The Florida Reef.** Because of its remote location 70 miles west of Key West and more than 140 miles from mainland Florida, the Tortugas region has the best water quality in the Florida Keys archipelago, due in part to the strong influence of the Florida Current, which forms the Gulf Stream off the east coast of Florida. At some point, the waters of the entire Caribbean Sea and Gulf of Mexico pass by the Tortugas in one of the world's strongest currents, delivering a rich array of organisms from the huge area of the Caribbean basin.<sup>15</sup>

**Corals.** The Florida Reef Tract is the most extensive living coral reef system in North American waters and the third largest system in the world. Stony corals are the major reef architects. Polyps, the living portion of the coral, extract calcium from seawater and combine it with carbon dioxide to construct the elaborate limestone skeletons that form the reef backbone. Coral polyps are united into colonies. An individual colony grows one-half to seven inches a year, depending on the species. Corals start life as free-living larvae that later

settle on the sea floor and develop into massive, sedentary limestone formations.<sup>16</sup>

Though reef corals are classified as animals, they are, in fact, a complex of microscopic plants that lives within the animal tissues (a symbiotic relationship). The animals benefit from the energy that the plants provide through photosynthesis. The plants are protected within the coral tissues and gain nutrients from animal wastes. These tiny plants are called zooxanthellae and are responsible for much of the color seen in the reef corals.<sup>17</sup>

The major reef types at Dry Tortugas include bank reefs, patch reefs, and thickets of staghorn corals. The once abundant elkhorn coral (*Acropora palmata*) assemblages (44 hectares by Agassiz's estimate in 1882) have virtually disappeared from the area. Since a study published by Davis in 1982, some of the staghorn (*Acropora cervicornis*, *A. prolifera*) coral populations have declined due to hypothermal stress and a virulent disease.

**Algae.** Davis reported that distribution of the brown algae was on rocks or rubble in areas of high wave energy, such as the reef flats. The conspicuous genera include: *Laurencia*, *Dictyota*, *Sargassum*, *Cladophora*, and *Padina*. In deeper areas, there are often abundant algae that are attached to the hard substrate or sedimentary deposits. Common genera include: *Halimeda*, *Avrainvillea*, *Penicillus*, *Udotea*. Crustose coralline algae (Rhodophyceae) form thin-branched or unbranched crusts typically attached to the limestone. Algae such as *Halimeda* contribute significant amounts of carbonate sediments.

**Sea grasses.** Sea grasses provide links in nutritional cycles and provide cover that animals use to avoid predators. Sea grasses also sustain production of debris that is essential to food web productivity. The Dry Tortugas has a high diversity of sea grass species when compared to waters around the Florida Keys, including: Turtle grass (*Thalassia*

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14 Millspaugh, 225-243.

15 National Oceanic and Atmospheric Administration (<http://floridakeys.noaa.gov/tortugas/whatspecial/welcome.html>)

16 Florida is the only state in the continental United States to have extensive shallow coral reef formations near its coasts. These reefs extend from near Stuart, on the Atlanta coast, to the Dry Tortugas, west of Key West, in the Gulf of Mexico. The most prolific reef development occurs seaward of the Florida Keys. The reefs here are spectacular and rival those of many Caribbean areas. Approximately 6,000 coral reefs are found between Key Biscayne and Dry Tortugas.

17 (<http://www.dep.state.fl.us/coastal/habitats/coral/htm>)

*testudinum*), Manatee grass (*Syringodium filiforme*), Shoal grass (*Halodule wrightii*), Paddle grass (*Halophila decipiens*), and Star grass (*Halophila engelmannii*). Many of these habitats are extremely important to juvenile reef fish.

**Sponges.** Other underwater habitats include immense and relatively diverse hard-bottom communities of sponges and gorgonians, many of which are unique to the Tortugas. Functionally sponges provide space, filter water, are a food source for a wide variety of animals from invertebrates to turtles, and provide other ecological services. In the context of reefs and carbonate rock, sponges can be an important structural buttress in that they hold the reef together. The boring sponges are destructive to the reef because they excavate coral limestone skeletons. Over time the weakened skeletons may break loose from the reef platform.<sup>18</sup>

More than 300 species of reef fish have been identified in Dry Tortugas National Park. The park and surrounding region contain both deep and shallow reef formations that support different fish species as well as different life stages.

The Dry Tortugas play an important role in bird migration and sea-turtle nesting. Sooty terns nest and breed on the Tortugas along with noddy terns, masked boobies, and frigate birds. Sea turtles, protected by the Endangered Species Act, were once abundant on the keys. Although Fort Jefferson altered Garden Key dramatically, the park continues to offer research potential on coral reef ecology, subtropical islands, bird migrations, and fisheries.

## Hurricanes

Following the 2004 hurricane season, staff evaluated hurricane impacts to the vegetation of the Dry Tortugas. The most severe impacts to vegetation were on the western end of Bush Key, where many bay cedar and sea lavender were killed. Mangroves on Bush and Long Keys were damaged but will recover. The area of black mangroves used by frigate birds as a nesting

area on Long Key were topped and significantly thinned, but frigate birds continue to nest there. On Loggerhead Key, inundation by salt water killed small areas of bay cedar and sea lavender and reduced the vines, including railroad, moonflower, and beach bean. Substantial losses to shallow seagrass meadows around East, Bush, and Loggerhead keys occurred following the 2005 hurricanes.<sup>19</sup>

The continued substantial decline in stony corals, especially the protected reef-forming *Acropora* spp., is the most ecologically significant Dry Tortugas resource stewardship issue. The loss of live stony corals is due mostly to disease, hypothermic events (strong cold fronts), bleaching, and hurricanes.<sup>20</sup>

## Climate Change

Climate change presents significant risks to our nation's natural and cultural resources. Although climate change was once thought to be a future problem, there is now scientific evidence that our planet's climate system is warming. Some of the impacts specific to the Dry Tortugas are:

- Over the past century, regional sea surface temperature has increased at a rate of 0.3°C per decade in the Gulf Stream region.
- Mangrove systems and other tidal wetlands are threatened by climate change effects, especially sea level rise. Other climate change components that threaten these ecosystems include high water events, increased storminess, temperature and precipitation, and ocean circulation patterns. Loss of mangroves will result in reduced coastal water quality, reduced biodiversity, loss of fish and crustacean nursery habitat, and loss of ecosystem services for human populations.
- Reefs off the Florida Keys are to varying degrees already in degraded condition due to the effects of overfishing, land-based pollution by nutrients and sediments, and coastal development. Over the past twenty-eight years, the overwhelming threats to coral reefs have been coral diseases and increasing sea surface temperatures, double threats that will continue to challenge the survival of coral reefs as

18 GMP Amendment, 106; Walter C. Jaap, Jennifer L. Wheaton, James Forqurean, "Dry Tortugas Benthic Community Characterization," <http://floridakeys.noaa.gov/tortugas/studyarea/jaap.html>.

19 Superintendent's Annual Narrative Report, 2004.

20 Superintendent's Annual Narrative Report, 2006, 24.

- atmospheric CO<sub>2</sub> concentrations increase.
- Coastal vulnerability assessments for Dry Tortugas National Park, Gulf Islands National Seashore, and Padre Islands National Seashore show significant areas of shoreline classified as having high vulnerability to sea level rise.<sup>21</sup>

## Land Use

Fort Jefferson was built as a seacoast fortification and later used as a prison, quarantine station, and coaling facility. Today the fort and Garden Key serve as a national monument to the military history of the nineteenth century, surrounded by the waters of the Dry Tortugas Research Natural Area.

The parade ground was a drill field and campsite during the Civil War and the Spanish-American War, and today contains open space and ruins for passive recreation. Interpretive talks follow a marked tour, beginning in an area with benches and shade trees just outside of the visitor center. The staff area of the parade ground is divided from the public space by a vegetative screen. The unique dual land use at Fort Jefferson combines park housing, maintenance, and administration within the fort, which is a primary destination for visitors. Balancing the public monument and private staff area on a small, isolated island creates complex management issues and necessary cooperation.

The use of the harbor has changed dramatically from military vessels to commercial/ recreation vessels. There are a limited number of commercial use authorizations issued each year to provide guided fishing trips, dive and/or snorkeling trips, guided wildlife viewing trips, and sailing charters to Dry Tortugas National Park. The main wharf at Fort Jefferson, where commercial ferries and NPS work boats dock, also serves passing fishing boats. Garden Key and other Dry Tortugas islands are frequent landing points for Cuban refugees. Scientific research and conservation also occur in the Research Natural Area.

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21 Rachel Loehman and Greer Anderson, "Understanding the Science of Climate Change Talking Points: Impacts to the Gulf Coast" (Fort Collins, CO: National Park Service, 2010), 1-11.

Land uses of Garden Key include interpretation, recreation, administration, park housing, maintenance, visitor services, and law enforcement. Each of the varied land uses continues to employ existing infrastructure. As outlined in the 2001 GMP Amendment, 50 percent of Dry Tortugas National Park is managed as a Natural/Cultural Zone, 46 percent is managed as a Research Natural Area Zone, and 3 percent is managed as a Historic Preservation/Adaptive Use Zone. Special Protection Zones provide added protection for critical resources. Additionally, two archeological management zones were created in 2009 to guide ground-disturbing efforts on Garden Key.

## Archeological Resources

In December of 2006, SEAC conducted a ground penetrating radar survey that included all open ground in the fort's parade ground and a limited area outside the fort's walls in the campground and picnic area. The survey revealed a variety of historic subsurface features, including relict footpaths and roads, possible privies and/or cisterns, a probable grave, foundation remains of buildings no longer standing, as well as a number of buried anomalies of unknown origin but probably associated with historic refuse dumps. Of particular interest to this report, the survey identified a large rectangular surface comprising the entirety of the center of the parade ground that may be associated with gardens and livestock pens. In addition, numerous historic and modern sewage, electrical, and water distribution utilities were identified during the survey.<sup>22</sup>

The long history of the Dry Tortugas is reflected by the maritime archeological sites within its waters. There are 241 sunken vessels documented in the Dry Tortugas and immediate vicinity. Currently, only one identified shipwreck site, known as the Windjammer, has been documented. Located off Loggerhead Key, the wreck consists of the remains of the *Avanti*, an aging windjammer that sank in 1907 after her crew made a navigational error trying to pass around the Dry Tortugas.<sup>23</sup>

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22 Lawson, 2, 75.

23 Larry E. Murphy, ed., Dry Tortugas National Park Submerged Cultural Resources Assessment (Santa Fe: Southwest Cultural Resources Center, 1993), 143-45.

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# Analysis and Evaluation

## Analysis of Landscape Characteristics

In order to better understand the relationship between the existing Garden Key landscape and its historic character, this chapter includes a comparative analysis of historic and existing conditions. The focus of this section is to identify the broad patterns and specific features associated with the historic periods and to evaluate to what extent they survive today. The integrity of each aspect of the site's character is evaluated within the context of the landscape as a whole. This process is the groundwork for establishing the period of significance and for identifying a framework against which all changes in the landscape can be compared. The analysis is crucial to developing appropriate and relevant treatment strategies.

## Spatial Organization

The spatial organization within Fort Jefferson displays Third System military design, the distinguishing characteristics of which include masonry pier construction, detached magazine and hot shot furnaces on the parade, and added gun positions on the terreplein.

The arrangement of military buildings within the fort created a central area for parade dress, soldier recreation, and military drills. The permanent buildings within Fort Jefferson lined the perimeter of this space, and historically, a small garden occupied the center, amended with imported soils. In Civil War-era photographs, the major buildings were supplemented by temporary structures placed at the edge of the parade ground to maximize open space.

Individual designs of Third System forts depended on such factors as remoteness from a populated area, the nature of the surrounding topography, and the size and importance of the channel it was designed to protect. Fort Jefferson's size left little space on Garden Key for support buildings, gardens, or livestock pens. A lighthouse and keeper's quarters were already located on Garden Key before the fort's construction, and the parade ground had to be built around them.

A 69-foot section of the officers' quarters was the first permanent building completed in 1849 and occupied a dominant location directly across the parade ground from the sally port. The

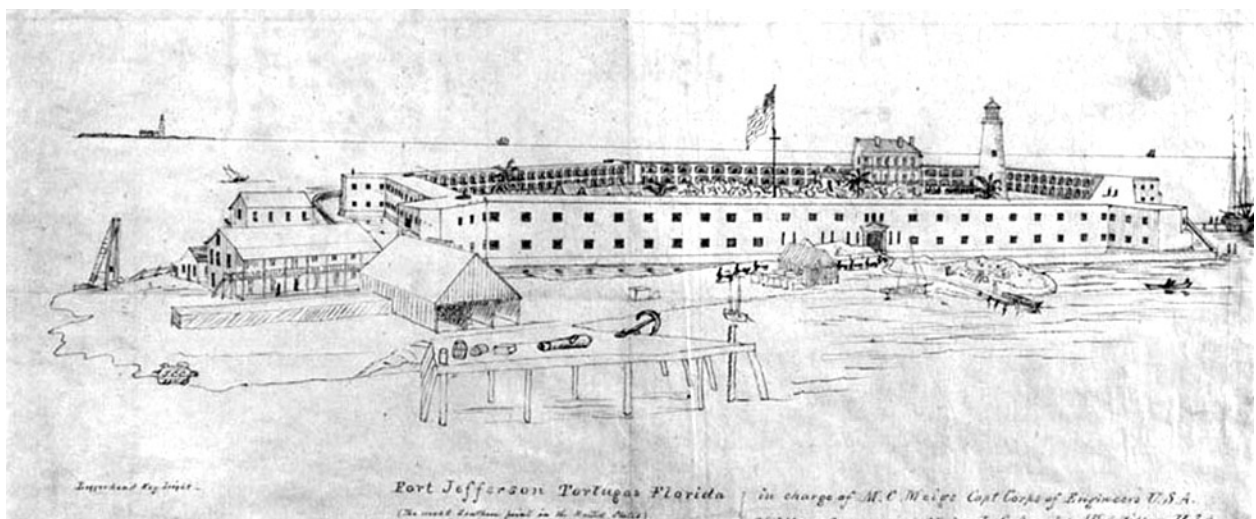


Figure 265. Fort Jefferson, 1849. (Courtesy Museum of Fine Arts)



Figure 266. Officers' quarters, c. 1900 (EVER 7350)

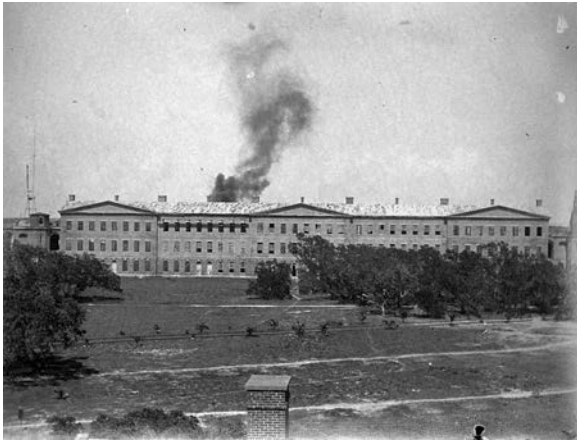


Figure 267. Parade ground, c. 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRT0 3805))



Figure 268. Parade ground, 1928. (Monroe County Library)



Figure 269. Fort Jefferson, Front 2, undated. (U.S. Army Heritage & Education Center)

location of other permanent buildings—enlisted men's quarters, large magazine, small magazine, engineer officers' quarters, and hot shot furnace—followed a Third System arrangement. Magazines were separated for safety, and quarters required continuous fronts for long barracks. Military cultural traditions were expressed in the landscape as a ranking hierarchy in building placement, uniform architectural styles, and landscape treatment. The highest ranking officers claimed the most prestigious spot and the largest, most elegant structure.<sup>1</sup>

Secondary to the military spatial organization would have been a spatial order dedicated to the work yard, which was located in back of the main structures with detached kitchens. Meals would have been prepared in the work yard by slaves and later servants and was also the location of latrines, privies, and possibly debris pits.

The spatial pattern resulted in a ring of permanent buildings connected by straight, direct walkways and paths. In later years, vegetation covered portions of the paths, and buildings deteriorated with little maintenance, battered by frequent storms. After two major fires, both quarters buildings were demolished to the foundations in 1962.

On the fort's exterior, only the location of the wharf and the counterscarp walk remain from the nineteenth century. Other construction-era work spaces and temporary frame buildings have been lost and replaced with modern visitor use and service facilities and utilities. The distinction between the interior and exterior space remains intact. Bright, unshaded spaces on the fort's exterior give rise to areas of welcome shade on the parade ground.

## Vegetation

One consistent characteristic of Garden Key's vegetation is its changing nature. Construction, hurricanes, intermittent gardening, and a variety of landscape maintenance activities altered the parade ground and exterior ecosystems. Prior to Fort Jefferson's construction, buttonwoods, bay cedar, mangroves, and native grasses covered Garden

1   Loechl, 29, 73, 84.



**Figure 270.** Parade ground with grove of buttonwoods, c. 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRT0 3805)

Key. As the parade was leveled and filled and the fort enclosed, a drier habitat resulted. There is little documentation describing the vegetation during the early construction period.

Coconut palms and buttonwoods were historically significant to the landscape, repeatedly mentioned in descriptions of the site. A grove of buttonwoods was located on either side of the main pathway and coconut palms were planted near the sally port, small magazine, and officers' quarters. There was an attempt to grow vegetables in the enclosed garden space, although its success seems short-lived. The introduction of exotic species increased before construction was completed when the fort was garrisoned in 1861 and continued throughout the historic period. Most of our understanding of the vegetation during the years the fort was garrisoned comes from photographs and journal accounts. The Engineer Officers' Quarters was described by Dr. William B. Holder as "vine-clad" and "draped with jasmines, Thunbergias, morning glories, and cypress vines." Historic photographs from 1871 provide the last documentation of the enclosed garden area and the first documentation of the coconut palms planted in front of the officers' quarters. The officers' quarters received the most prominent landscape treatment, reflecting the hierarchy of military cultural traditions.<sup>2</sup>

Beginning in 1904, a series of vegetation surveys of the Tortugas Keys documented detailed information about Garden Key, providing a record of trees found on the parade ground throughout



**Figure 271.** Officers' quarters and large magazine, c. 1900. (National Archives RG 92)

the twentieth century. Recent changes include the staff gardens and planting of seagrapes to screen the staff quarters. The loss of buttonwoods on either side of the main path and coconut palms planted near the officers' quarters and small powder magazine is the most significant change in historic vegetation. It is unclear if any of the oldest buttonwoods that remain on the parade ground date from the period of significance or were planted to replace trees that were damaged in hurricanes or simply died.

## Buildings and Structures

Fort Jefferson's construction program began in 1847, when eight temporary frame buildings were completed. A 69-foot section of the three-story officers' quarters with piazzas was constructed during 1850. A concrete cistern was added to the parade in 1852 on the site of the unfinished office/chapel.

In order to alleviate problems that arose when it was necessary to garrison the fort in 1861 before construction ended, three detached brick kitchens were added to the parade along Front 3. The officers' and the enlisted men's quarters with detached kitchens were nearing completion in 1867, lacking only interior finishes and piazzas.

The army constructed two powder magazines on the parade during the Civil War, although neither was ever finished. The small powder magazine lacks the enclosure arch of the large magazine. The final permanent building on the parade was the hot shot furnace, completed in 1863. The Major Smith monument dates to 1870.

2 Joseph B. Holder, 261-62.

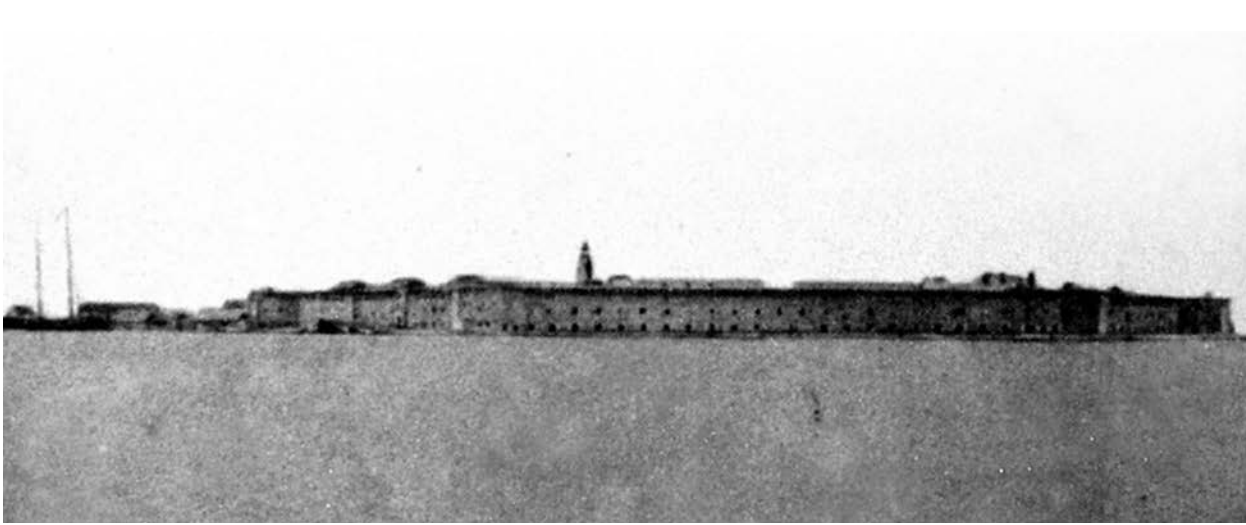


Figure 272. Fort Jefferson from Bush Key, 1864. (U.S. Army Heritage & Education Center)

Although the completion of the counterscarp wall and moat occurred in 1873, Fort Jefferson remained unfinished. Nonetheless, it represented a high point of nineteenth-century masonry fort design with two tiers of arched casements on all six seaward fronts. Bastions enclosed staircases at each corner providing access to the terreplein and traverse magazines. The counterscarp operated to stabilize the foundation from wave action and created additional defenses with a moat. The modernization of the fort's weaponry in 1873 included the addition of the Rodman and Parrott cannon on the terreplein, reinforcement of the traverse magazines and positioning of the wooden galleries at their entrance, and infilling the terreplein with sand. Construction ended in 1876 when an iron light tower was added at Bastion 6.



Figure 273. Parrott cannon on terreplein, c. 1898. (John Meigs Photograph Collection, Dry Tortugas National Park, DRTO 3805)

Outside the fort, a group of frame buildings near the wharf provided support for the fort's construction. By 1876, all frame structures on the parade associated with the fort construction had been removed. The frame buildings outside the fort were dilapidated, and by 1887, it was reported that only a shed remained.

By the 1920s, both the officers' quarters and the enlisted men's quarters had burned. As part of CCC work at the fort, crews reconstructed two of the engineer officers' quarters buildings for use as park housing in 1940.

The fort deteriorated from neglect for most of the twentieth century. Between 1995 and 2001, several projects were carried out to preserve the scarp walls and rehabilitate the embrasures along Front 2. Replacement mortars used in these repairs were not compatible with original mortars and brick selection was not consistent, resulting in adverse visual and material compatibility issues. As a result of these actions, a multi-phased preservation project to stabilize and preserve Fort Jefferson began in 2006.

## Topography

The flat topography of Garden Key has changed only subtly since the construction of the fort. During early site work, the Army raised portions of the parade ground with sand excavated from the foundation to fill a low depression in the center of the island and level out the parade. Once constructed, Fort Jefferson minimized interior

erosion by sheltering the parade ground from wind and waves. Imported soils also contributed to less erosion and more substantial vegetation.

With the completion of the counterscarp, the topography on Garden Key stabilized, although storms continued to batter the exposed shorelines. The weight of the fort on a coral foundation caused settling in the buildings and structural damage to the scarp and cisterns. The southern shoreline was repeatedly manipulated with a series of wharves, piers, and workspaces.

The shoreline of Garden Key continues to shift and does not represent the historic landscape of the nineteenth century. The presence of mature vegetation and existing structures protect the fort interior, although erosion is occurring in some parts of the parade ground. For the most part, the flat, uniform topography of Garden Key persists. Modern improvements, such as the wastewater treatment plant, required effluent disposal mounds that changed the topography of the parade ground near Bastion 3.

## Circulation

The circulation across the parade ground of Fort Jefferson developed during fort construction. In 1854, the fort walls and counterscarp remained incomplete and areas within the walls were filled with excavated sand to create a level parade. The arrangement of temporary frame buildings and accompanying workspace likely kept circulation informal. As buildings were completed, circulation was formalized, and pathways, described as “hard as cement and white as snow,” connected the perimeter buildings. Cannonballs were stacked at



Figure 274. Pathways, 1901. (DRTO 301209)

intervals along the main pathway connecting the sally port and the officers’ quarters, as well as along portions of other secondary pathways. It is not certain when cannonballs were added to line the main pathway, but it may have been in 1896 when the walk was rebuilt. On the fort’s exterior, the counterscarp was a favorite walking route.

By 1902, it appears that all the ordnance except for the large guns had been sold or taken to Fort Taylor in Key West. Historic images from 1903 show the main path without ordnance. Archeological investigations in 2003 found that the surfaces of the paths were parged and the edges lined with bricks. The absence of these bricks in historic photographs showing the ordnance-lined main path indicate that if bricks were added, they were a later addition put in place after the cannonballs were removed.<sup>3</sup>

The present circulation on Garden Key uses patterns reflective of the day-to-day operation of the fort and does not necessarily reflect the historic period. Only portions of the formal, axial paths retain visible brick edging. Other paths across the parade ground are overgrown and informal. The walkway circumscribing the edge of the parade is a brick walk completed in 1967, which follows the distribution routes used during the fort’s construction.

Other important paths used historically were the exterior counterscarp walk and the walk circumscribing the parapet. These survive today in their historic configurations.

## Views and Vistas

The views from Fort Jefferson remain unchanged, except for signage on Bush Key. Although storms repeatedly alter the shoreline of nearby keys, the panoramic view of the surrounding water remains intact. The views are no longer used for sighting approaching enemy ships but now overlook the Research Natural Area. The Loggerhead Key Lighthouse, constructed in 1858, is a prominent feature of the viewshed from the fort.

Views approaching Fort Jefferson have been degraded by a radio antenna and communications equipment on Front 1, as well as by debris on the

3 Lawson, 74.

coaling docks and by non-native palm trees planted in the picnic area.

The interior views from the terreplein and casements across the parade ground have been affected by the addition of effluent disposal mounds near Bastion 3. Views from the parade ground up to the terreplein have also been diminished by the addition of a radio tower and communications equipment at Bastion 1 and large black cables on Front 1. Many infrastructure intrusions, such as pipes and cables, detract from the views inside the fort because they are poorly camouflaged. Vegetation screens first tier housing and maintenance units but does not hide second tier housing units or the modern roof covering them on Front 3.

### Small-scale Features

Ten big guns were mounted on the terreplein during the 1872-73 construction season—six 15-inch Rodmans and four 10-inch Parrotts. The brick fountain on the parade ground donated by the Tropical Audubon Society is a modern addition.

### Natural Systems and Features

The Dry Tortugas region plays a critical role in the function and dynamics of the larger Florida Keys coral reef ecosystem. The Florida Keys encompass many varied interdependent habitats including subtropical embayments and lagoons, mangrove stands, coral islands, sponge and gorgonian and sea grass beds, and coral reefs. The abundance, distribution, and productivity of many natural resources, such as reef fishes, macroinvertebrates, soft and hard corals, algae, sea grasses, etc., are tightly linked to the oceanographic environment and biophysical connections between these habitats.<sup>4</sup>

The park includes one of the most isolated and least disturbed habitats for endangered and threatened sea turtles; the only significant sooty and noddy tern nesting colonies in the United States; the only frigate bird nesting colonies in the continental United States; and serves as an important resting spot for migrating birds.<sup>5</sup>

The vegetative composition on Garden Key has been substantially altered with exotics imported by humans, ships, and birds. The park continues to target invasive plants for removal.

### Land Use

Technology rendered Third System forts obsolete before the end of the Civil War, and the land use of Garden Key shifted from a military garrison to its use as a prison, quarantine station, Navy coal depot, and seaplane base. Land uses today include recreation, maintenance, interpretation, administration/housing, and law enforcement.

The utilitarian use of Garden Key outside of the fort walls remains intact despite the shift from storage and industry to recreation, workspace, and law enforcement. A shift from military to commercial/recreation vessels also occurred in the harbor. Garden Key and the surrounding waters, including those around Bush and Long Keys, and the central area of Loggerhead Key are managed as a Historic Preservation/Adaptive Use Zone.

### Evaluation of Significance

Designated a national monument in 1935, Fort Jefferson was listed in the National Register of Historic Places on November 10, 1970. It is significant in the areas of military history and engineering under Criterion A (associated with events that have made a significant contribution to the broad patterns of our history) and Criterion C (embodies distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic values).

### Period of Significance

The period of significance for Fort Jefferson spans thirty years (1846-1876), beginning with its construction in 1846. Hurricanes and yellow fever, coupled with advances in weaponry that made the fort obsolete as a defensive work long before construction was stopped, led to abandonment by the Army in 1874. Major construction activities ceased, leaving the fort unfinished. In 1876, the last major improvement under the Army's watch occurred when the U.S. Lighthouse Service put up the cast-iron light tower at Bastion 6.

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4 GMP Amendment, 105.

5 GMP Record of Decision, July 27, 2001, 4.

Fort Jefferson is nationally significant as an example of mid-nineteenth-century military engineering. Under the direction of Brigadier General Joseph G. Totten, the United States Army Corps of Engineers supervised the construction of a number of masonry coastal fortifications that brought this form of military architecture to its apogee. Of these, Fort Jefferson was the most extensive and ambitious and was one of the most vital to the nation's security (Criterion C).

In mid-nineteenth-century America, General Totten and his engineers were the nation's preeminent builders of large masonry structures and innovators in the use of concrete construction. They were acknowledged experts in the use and form of the arch. Their monographs on builders' arts were widely distributed, and their practice adopted by many of their civilian counterparts.

Fort Jefferson is also significant as an example of United States territorial expansion during the age of Manifest Destiny, the belief that America should stretch from the Atlantic to the Pacific. Fort Jefferson contributes to the broad historic pattern of increased national influence, westward expansion, and the necessity to protect boundaries in the nineteenth century (Criterion A). It represents the major effort by the United States in the 1840s and after to safeguard shipping lanes and prevent foreign powers from gaining a foothold in the Gulf of Mexico. Its role as a base for blockaders focuses on the Union Navy's vital activities in the Civil War. During and after that conflict, the fort served as a place of incarceration for military convicts and political prisoners. After the emergence of the United States as a world power in 1898, the Navy sought to develop the Tortugas harbor as an important coaling station but withdrew their efforts following a devastating hurricane in 1910. The resources associated with the naval coaling station survive only as foundation ruins.

Under National Register guidelines, historic properties must possess integrity for all periods of significance. The resources at Fort Jefferson that represent post-1876 significance lack integrity, are not contributing, and are not included in the period of significance.

Appendix D shows the features identified in the List of Classified Structures (LCS) for Fort Jefferson, as well as other landscape features.<sup>6</sup>

## Evaluation of Integrity

A landscape possessing integrity has the ability to convey historical significance through extant landscape features and characteristics. The National Register provides seven qualities that, when combined, define integrity. These include location, design, setting, materials, workmanship, feeling, and association. The assessment of integrity addresses the features on Garden Key in an overall context.

**Location: the place where the historic event occurred.** The cultural landscape of Garden Key retains integrity of location. The need for a Third System fort to protect the Straits of Florida from attack and preserve trade in the Gulf of Mexico determined its remote location. The location of buildings and vegetation on the parade ground contributes to the spatial arrangement within the fort and conveys the historic layout of the garrison. All permanent buildings on the parade are preserved in their original locations. The oldest buttonwoods on the parade may not date to the historic period, but their location is approximately the same.

6 Structures listed on the LCS must meet one of the following criteria: either the structure is listed individually or is eligible for the National Register or the structure is a contributing element of an historic site or district that is listed or is eligible for the National Register. In addition, the LCS includes other structures, moved or reconstructed, commemorative structures, and structures which have achieved significance within the last fifty years that are managed as cultural resources.



Figure 275. Aerial image of Fort Jefferson, c. 1929. (National Archives RG90)

**Design: the combination of elements that create the form, plan, space, structure, and style of a property.** Fort Jefferson remains the centerpiece of the Garden Key cultural landscape and retains integrity of design. Fort Jefferson's uniform engineering and spatial arrangement embodies the distinctive characteristics of a Third System fort, while architectural details were adapted to a small, dry key surrounded by the sea. Unlike many others, Fort Jefferson escaped modification during the Endicott and Taft periods.

The placement of structures on the parade reflects the functional purpose of each and the ingenuity required for building in such isolation. Military cultural traditions were expressed in the landscape as a ranking hierarchy in building placement and landscape treatment and uniform architectural styles.

The fort encloses a level, open parade with clustered buttonwoods. Several permanent buildings and ruins on the perimeter were once linked by a series of rectilinear paths. This spatial pattern reflected the building-to-parade ground relationship. More often than not, buildings surrounding the parade ground were oriented with the front elevation facing inward towards this important central space.

A major loss occurred with the demolition of the officers' quarters and the enlisted men's quarters to their foundations. Other permanent buildings on the parade survive, but, with the exception of the hot shot furnace, their designs were never completed when construction at the fort stopped in 1876. The loss of the historic, rectilinear pathways also lowers integrity of design for the parade ground. Nothing remains of the enclosed garden area, the lightkeeper's quarters, or the construction support buildings located on the parade and near the wharf. Of these features, only the lightkeeper's quarters and some of the frame buildings near the wharf are known to have survived after the period of significance.

The open character of the parade with clustered buttonwoods and the cohesive space between buildings is a character-defining feature of the historic landscape, including the relationship between the ruins and their detached kitchens. Outside the fort, the counterscarp walk defines the spatial pattern of the fort's exterior.

Ground penetrating radar conducted in 2006 found the walkways located throughout the parade, a large rectangular surface that may be associated with gardens or livestock pens, and foundation remains possibly associated with the storehouse, carpenter's shop, limehouse, blacksmith shop, and original lighthouse. This area is managed as a High Archeological Integrity Zone. Large areas of the parade ground, however, had degraded subsurface integrity related to modern intrusions. Numerous utility pipes, cables, buried tanks, and leach fields were encountered on the western half of the parade ground facing NPS residential and maintenance areas, making it unlikely that any significant remains of intact archeological features survive in this area, which is managed as a Low Archeological Integrity Zone.

**Setting: the physical environment of a historic property.** Garden Key retains overall integrity of setting. The isolated, tropical island sits amid open waters between Florida and Mexico, overlooking the other Tortugas keys. The strategic location of the historic outpost affords 360-degree views within a remote setting, with the Loggerhead Key Lighthouse a key feature since 1851. Character-defining features include the dry, sandy soils, hot climate, and unobstructed views. Integrity of setting has been lowered by the addition of communications equipment and a radio antenna along Front 1 and debris on the coaling docks, which degrade the vista when approaching the fort.

The loss of the superstructure of Fort Jefferson's two largest permanent buildings lowers integrity of setting, although the spatial relationship of periphery buildings, clustered buttonwoods, and open parade helps convey the setting from the period of significance. Intrusions such as cables, air conditioners, effluent mounds, and modern housing/maintenance units diminish integrity of setting. Although casemates along Front 3 were used as quarters during the Civil War, the construction of a modern roof over a portion of the housing units detracts from the historic appearance of the fort. A screen of seagrapes blocking the residential fronts from view and a natural grass cover on the leeching fields are recent additions that lessen the visual impact of these modern intrusions. Another impact to integrity of setting is the loss of vegetation often described in diaries and other accounts. A 1900 ordnance sale

had a dramatic effect on the setting of the fort. No longer did cannons peek up over the fort's walls, and the terreplein and casemates were suddenly empty of armament.

Outside the fort, none of the temporary frame buildings needed to support the fort's construction survive. The wharf occupies the same location, and visitors are brought into the fort in the same way as they would have historically. The counterscarp retains its historic use as a primary walking circuit. The historic setting of the work area, however, has been replaced with modern visitor services.

Garden Key's remote, isolated setting has been affected by generators needed to run the fort's infrastructure. The noise level is particularly high along the counterscarp at Front 2, which is also near the swim beach. Soundscape studies carried out in 2008 found that exterior noise levels are of concern for speech intelligibility and interpretive activities. The generator levels can be expected to disrupt normal conversation on the moat walkway, as well as any interpretive talks. Even at distances up to 100 meters along the beach, if any part of a group were to move too far from the speaking interpreter, speech from that talk could be difficult for those participants to hear.<sup>7</sup>

**Materials the physical elements that were used to construct the features of the landscape.**

The buildings and vegetation of Fort Jefferson exhibit diminished material integrity. Historic building materials include brick, mortar and concrete, stone, metals, and wood. Past stabilization efforts utilized bricks of the wrong color along Fronts 1, 2, and 6 and associated bastions, creating an adverse effect. While some previous stabilization work utilized a Portland cement/lime mortar mix that was determined to be in accordance with the NPS recommendations at that time, it is possible that some of the work utilized a mortar that is incompatible with the existing historic fabric of the fort. The mortar used on Front 2, in particular, may have been significantly harder than the historic mortar and bricks, and may lead to as yet unknown long-term adverse effects. Also, exposed elements of a

waterproofing membrane on the terreplein detract from the historic scene.

After consultation with the Florida State Historic Preservation Office, it was determined that removing the character-defining Totten embrasures was necessary for the overall preservation of Fort Jefferson. To mitigate adverse effects, the park will install reproduction Totten shutters with appropriate associated hardware where the original embedded iron embrasures must be removed for scarp preservation purposes.<sup>8</sup>

The engineer officers' quarters exhibit cracking due to corrosion and expansion of iron/steel window lintel supports that replaced the original granite lintels. Efforts to restore the granite lintels are on hold until a comprehensive preservation plan has been agreed upon for the entire structure. Replacement of the roofing in 1999 restored the historic slate used in this feature. In 2001, a project to replace the windows compromised material integrity, when the 6-over-6 double-hung divided-lite wooden windows from the 1939-40 rehabilitation were replaced with 9-over-9 double-hung plastic windows with snap-in grid instead of muntins.<sup>9</sup>

The rehabilitation of the hot shot furnace required removal of the internal iron pieces and replacement with a non-reactive metal. Silicon-bronze—a combination of copper, manganese, and silicon—was determined to be the best choice based on a comparison of the longevity of different materials and reproduction costs. The addition of silicon helped strengthen the bronze alloy. The color of the new bronze work, however, does not match the blackish color of the original ironwork, even though each new piece was treated in an acidic bath for sixty seconds to produce a blackish patina resembling the iron.<sup>10</sup>

It is unknown if any of the clustered buttonwoods on the parade ground date from the historic period, but none of the historic coconut palms remain. Introduced exotics, inappropriate plantings, and

7 National Park Service, Natural Resource Program Center, Natural Sounds Program, "Everglades and Dry Tortugas National Parks Noise Source Measurement Summary Report," June 2010, 20.

8 Memorandum of Agreement Between Dry Tortugas National Park and the Florida State Historic Preservation Officer Regarding the Fort Jefferson Stabilization Project, October 20, 2003.

9 Simpson and Clark, Exterior Preservation Plan, 1, 47.

10 Simpson, Record of Treatment, 2.

devastating hurricanes have compromised portions of the landscape.

The historic paved pathways lined with brick are now little more than sandy paths or have been lost altogether.

**Workmanship: the qualities of the ways in which landscape features have been fashioned and constructed for both functional and decorative purposes.**

A high level of craftsmanship occurred during the fort's construction, as evidenced in the mortar joints, arched casemates, and detailed bastions. The fort and military outbuildings survived frequent hurricanes, harsh sunlight, and minimal budgets for repair. Past preservation work created distinct color differences from the historic brick and also included inappropriate repointing work on the upper magazine, as well as other areas of the fort. Brick bands in the scarp wall and below the magistral were also lost. These efforts reduced the fort's integrity of workmanship.

The presence of the kitchen extension of the engineer officers' quarters obscures the historic form and materials of the structure and its association with the adjacent privy/storage building. In addition, the new windows are not consistent with the historic period character and their longevity is suspect.<sup>11</sup>

The counterscarp contains many areas of host masonry deterioration and failed mortar joints with evidence of numerous past repairs. The pointing along the interior face of Front 2 is improved over Front 1; however, poor workmanship is evident along the top courses.<sup>12</sup>

Other rehabilitation efforts have been more successful. The rehabilitation of the sally port (1999-2000) included hinge gudgeons reproduced in cast bronze and repointing that replicated historic pointing in appearance, color, profile, and texture. The loss of the original gateway doors, however, diminished integrity of workmanship.<sup>13</sup>

A carefully phased rehabilitation project (2001-2004) replicated the high level of craftsmanship characteristic of the original construction of the hot shot furnace. Replacement of all internal iron with a non-reactive material required the careful disassembly of the furnace, careful oversight of the ironwork replication, and meticulous reassembly of the furnace by historic preservation specialists. Replacement of windows in the light tower with historically accurate shutters occurred in 2009.<sup>14</sup>

An important component of the historic profile of the fort was restored in November 2010, when the Rodman cannon on Bastion 3 was remounted on a reproduction carriage, which had not been seen at Fort Jefferson in over 100 years.

**Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.**

The impressive construction of a large masonry fort on a small, isolated island captures a sense of remoteness that has stood the test of time. The ruins on the parade ground demonstrate the spatial order of military buildings around a central, open space, although the lushness often described in written accounts of the historic period is missing. A sense of the historic arrangement and use has been compromised by the loss of historic buildings and pathways, although the quiet, ruinous foundations offer visitors reflection on the tough, lonely conditions at the military outpost.

Although the use of the fort to house soldiers and prisoners during the historic period continues today in the staff quarters located in casemates along Fronts 1, 2, and 3, the feeling is not the same due to the modern conversion of the casemates to housing units. The sunbaked counterscarp walk evokes a feeling of the isolation and despair felt by many who lived, worked, or were prisoners on Garden Key. The remoteness and isolation of the fort remain character-defining features.

**Association: the direct link between an important historic event or person and a historic property.** Fort Jefferson retains strong integrity of association. The extant historic structures and spatial organization and the remote setting convey the significant association and use of Garden Key as military outpost, army prison, quarantine

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11 Simpson and Clark, Exterior Preservation Plan, 55-58.

12 LAS, 147.

13 Simpson, "Completion Report," 6.

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14 Simpson, Record of Treatment, 2.

station, and navy coaling depot. Integrity of association and use as a light station could be improved with interpretation of the lightkeeper's complex.

## Summary

The centerpiece of the Garden Key historic landscape is Fort Jefferson. The United States Army Corps of Engineers oversaw the design and construction of Third System forts, and Fort Jefferson represented the high point of nineteenth-century masonry fort design with two tiers of arched casements on all six seaward fronts, concentrated armament, and separate magazine and hot shot furnaces on the parade. The scale of its engineering and construction and its near pristine and remote location set it apart as one of the most unique resources in the National Park system.

Although its design integrity remains intact, the preservation of Fort Jefferson is threatened. The deteriorative effects of time, the harsh marine environment, and the corrosion and expansion of

original iron elements embedded within the fort's masonry structure have resulted in significant loss of historic fabric. An ongoing program of stabilization is addressing the problem, but replacement mortars used in post-1983 repairs are not compatible with original mortars and brick selection has not been consistent, resulting in adverse visual and material compatibility issues.

The loss of the superstructure of Fort Jefferson's two largest permanent buildings lowers the design integrity of the historic parade ground, although the surviving footprint helps convey the spatial pattern of this excellent example of Third System design. The loss of coconut palms and buttonwoods identified in photographs from the historic period compromises the lush setting for which Garden Key was named. A small, enclosed garden area near the center of the parade has also been lost, as well as the pathways across the parade. The only remaining feature of the lightkeeper's complex is the foundation of the original lighthouse.

Integrity of location and association remain high.



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# Treatment Recommendations

Fort Jefferson is a nationally significant example of mid-nineteenth-century military engineering. Its construction was guided by Brigadier General Joseph G. Totten of the United States Army Corps of Engineers. In mid-nineteenth-century America, General Totten and his engineers were the nation's preeminent builders of large masonry structures and innovators in the use of concrete construction. Of these, Fort Jefferson was the most extensive and ambitious and was one of the most vital to the nation's security. The best military engineering principles and the finest joinery and masonry techniques of the time were used in its construction.

The spatial organization within Fort Jefferson displays Third System military design, the distinguishing characteristics of which include masonry pier construction, separate magazine and hot shot furnaces on the parade, and added gun positions on the terreplein. The centerpiece of the historic landscape at Fort Jefferson is a large, open parade ground with clustered buttonwoods and scattered trees and buildings placed along the perimeter. Period photographs show a fenced garden area located near the center of the parade with enclosures for livestock. A main central pathway running northwest to southeast connected the sally port with the officers' quarters, by far the most imposing building on the parade.

Temporary frame buildings supported the fort's construction and were present during the military occupation. Because the imposing footprint of the fort on an island of limited size left little room on the fort's exterior, crews clustered temporary frame structures at the southwestern end of the parade ground and near the wharf.

Historically significant vegetation included coconut palms, planted near the sally port, small magazine, and officers' quarters, and buttonwoods, located on either side of the main pathway.

The overarching treatment associated with the historic landscape is preservation. Restoration is appropriate for a select number of features, primarily historic vegetation and historic circulation patterns on the parade ground and views and vistas both inside and outside the fort.

## Spatial Organization

The spatial relationship between the surviving nineteenth-century buildings and ruins on the parade ground is a character-defining feature.

- Maintain the spatial footprint of the parade ground, including the spatial relationship between the buildings and their detached kitchens.
- Interpret missing features of the historic landscape (officers' quarters, enlisted men's quarters, frame buildings, lightkeeper's complex, enclosed garden area) with period photographs. Although artists' renditions of the historic parade ground can be helpful to convey some of the features and people missing in historic photographs, they should not replace the use of these images, which often contain important clues about the cultural landscape. Care should be taken, however, not to overload the historic parade ground with too many waysides. Interpretation can use other media or be done in a central location.

During the period of significance (1846-76), historic vegetation was limited to a grove of buttonwoods on either side of the main pathway, an enclosed garden area, and clusters of vegetation around permanent buildings. The remainder of the parade ground was open.

- Maintain the open character of the parade ground to the extent possible. Do not plant in areas that were open during the period of significance. Use historic images as guidance.
- Do not plant non-historic vegetation (see Vegetation section for specific planting recommendations).

## Treatment Recommendations

- Restore the fenced garden area to consolidate resident gardens into a historically appropriate area. Ground penetrating radar in 2006 found a large rectangular anomaly in the central portion of the parade that was interpreted as the garden area and livestock pens based on historic maps.
- Do not block sight lines. Use care when placing waysides on the parade ground.

Remove modern intrusions and non-historic debris from the terreplein, coaling docks, and storage yards.

- Remove defunct satellite dish mounts on the terreplein.
- Cover exposed portions of the waterproofing membrane.
- Remove wooden palette holding black cables from communications tower in place on Front 1; replace with something more permanent that does not detract from the terreplein.



**Figure 276.** Wooden palette holding black cables, 2010. (SERO image 1619)



**Figure 277.** Old communication platform, 2010. (SERO image 1637)

- Remove old communication platform along Front 1 if it is no longer being used.
- Keep storage yard of north coaling dock free of debris.
- Remove abandoned Cuban refugee boats. This does not include the buried boats that are considered archeological resources.

Extraneous items along the perimeter of the parade ground detract from the setting of Fort Jefferson. Although portions of the parade ground are off-limits to the visitor, this is still part of the historic landscape and should be maintained as such.

- Move gas grills along the perimeter path to an area out of view when not in use, such as inside the casemates.
- Plastic and aluminum chairs, benches, and picnic tables should be discouraged. Wood is a more historically appropriate material. If recycled plastic must be used, end-accessible tables with metal supports, not plastic, should be specified.
- Remove large dock cleat immediately to the left at the sally port entrance.
- Do not hang signs, laundry, or decorations within the viewshed.
- The present location of the interpretive trail wayside just inside the sally port is a visual intrusion on the parade ground. A new wayside in a slightly different location with a drawing of “historic” parade ground buildings will be installed in the future.

## Infrastructure

- Consider painting PVC pipe and other cabling that runs up the parade face walls being careful to use a color that makes them disappear, not stand out.



**Figure 278.** Laundry seen from the counterscarp walk, 2010. (SERO image 1510)

- Move AC condenser located near the perimeter path to a casemate.
- Conceal utility lines in underground trench using existing utility corridors.
- Use results of soundscape study to reduce the noise, vibration, and visual impact of generators housed in casemates along Front 2.

## Buildings and Structures

### Fort

All recommendations for the fort, terreplein, moat and counterscarp, and gateway structure should defer to the HSR-Amendment completed in 2006.

- Reconstruct historic sally port doors.
- Remove woody vegetation growing on the terreplein, taking care not to damage fort mortar, brick, or coral aggregate.
- A water management system is needed to reinstate the drainage path from the terreplein. A comprehensive treatment plan should include repairs to the water collection gallery and access hatches and address the waterproofing membrane that currently detracts from the setting of the terreplein. Further, repairs should include the treatment of the existing cast iron downspouts to the cisterns below.

### Officers' Quarters

The use of casemates for NPS housing and administrative functions has been a subject of discussion since the first “custodian” arrived in 1936. The continuing expansion of housing and other functions into the casemates adversely affects historic fabric and the historic scene, limits areas for interpretation, and in some cases hinders access to casemate masonry for physical work and inspection.<sup>1</sup>

Reconstructing at least the first block of the Officers' Quarters for NPS administration and housing would restore not only a crucial piece of the historic landscape, but would also return casemates within the fort to their original use, which would greatly enhance interpretation of both the fort and parade ground. Apparently, reconstructing the first block of the officers'

quarters was discussed with the Florida SHPO during the preparation of the HSR-A, but a letter to this effect has not been located. Given the new climate change/DAB review process, a reconstructed officers' quarters seems unlikely, and current plans call for replacing existing sub-par housing in the casemates with pre-fabricated housing units.

- Preserve the ruins of the officers' quarters, which survive as a foundation only.

### Enlisted Men's Quarters

- Preserve the ruins of the enlisted men's quarters, which survive as a foundation only.

### Engineer Officers' Quarters

- Repair and preserve the engineer officers' quarters.
- Refer to the 2010 Exterior Preservation Plan for specific recommendations.
- Low brick walls that connect small storage sheds on the west façade and enclose a flagstone patio were part of the 1930s rehabilitation of the building and should be preserved unless a full-scale restoration of the parade ground buildings occurs. Privies scheduled to be partially demolished down to a safe height to facilitate removal of iron lintels will be reconstructed.

### Frame Buildings

- Interpret temporary frame buildings that were part of the construction village on the parade ground during the military occupation of the fort.
- Since a limited number of waysides should be used on the parade ground, interpretation can occur elsewhere or with other media.
- Carry out further archeological testing through excavation of the two adjacent anomalies potentially associated with the 1847 storehouse and an adjacent unidentified structure.

### Large Parade Magazine

All recommendations for the structure's preservation will defer to the HSR-Amendment.

- Remove woody vegetation growing inside the structure and on the roof as needed.

1 Randall J. Biallas to Superintendent, Everglades and Dry Tortugas National Parks, August 9, 2001.



Figure 279. Vegetation on roof of large parade magazine, 2010. (SERO image 1559)

### Small Parade Magazine

All recommendations for the structure's preservation will defer to the HSR-Amendment.

- Remove woody vegetation growing inside the structure as needed.

### Hotshot Furnace

- Maintain and preserve the hotshot furnace, which was recently restored.

### Lighthouse Complex

- Interpret the location of the lighthouse and lightkeeper's residence.
- Use ground penetrating radar study as a guide for placement of wayside in order to avoid archeological resources. Several excellent historic photographs show the lighthouse, the two residences, and landscape features.

### Cistern

- Preserve the cistern.

### Wharf

- Any changes to the dock and boat house should approximate the look and feel of the current dock and not detract from the viewshed of the fort. The dock and boat house are also the first things that visitors see upon debarkation.

### Coaling Docks

Although the coaling docks are classified as noncontributing because of integrity issues,

they serve an important function and should be stabilized as needed.

### Major Smith Monument

The Major Smith monument dates to 1870 but is described as a non-contributing feature on the List of Classified Structures.

- Preserve Major Smith Monument and consult with Regional List of Classified Structures Coordinator about updating its status to contributing in the List of Classified Structures.

### Vegetation

The following guidelines apply to vegetation management throughout Garden Key:

- Do not replant Australian pine, seaside mahoe, or agave.
- Consult with Everglades exotic plant management staff for approval before planting any introduced plant material.
- Consult with Everglades natural resource management staff before removal of any native vegetation.
- Avoid altering the habitats of rare, threatened, or endangered species or species of special concern. Evaluate the potential impact to wildlife habitat prior to undertaking any construction or vegetation removal project.

### Parade Ground

A hazard tree assessment is needed for trees on the parade ground. Maintenance staff presently have no guidance for maintenance of these trees. It may be necessary to prune or replace some of the buttonwoods, especially those around the Major Smith monument.

- Contact Olmsted Center for Landscape Preservation or other certified arborist to conduct the assessment.
- Replace buttonwoods in kind.

The lush setting for which Garden Key was named was based in part on a grove of buttonwood trees on either side of the main path and clusters of coconut palms planted in front of permanent buildings. This is a character-defining feature of the historic landscape.

The buttonwood grove on either side of the main path has decreased in size since the 1870s.

- Plant additional buttonwoods, after the main path is restored, using historic photographs as a guide. Trees can be planted in stages so that all trees do not mature at the same time.

Coconut palms historically were clustered in front of the small magazine, the officers' quarters, and the lightkeeper's quarters.

- Replant a limited number of coconut palms (at least three) in front of the small magazine. Use historic photographs as a guide.
- If the officers' quarters block is ever reconstructed, replant a limited number (at least five) in front of the building using historic photographs as a guide.

An enclosed garden area was also part of the parade ground during the period of significance.

- Re-establish the garden area on the parade, using vegetables, fruit, and herbaceous materials that were grown here historically (see plant list in Appendix).
- Exotics that were described as growing around the engineer officers' quarters or elsewhere on the parade could be replanted in this enclosed area (see plant list in Appendix), after consultation with Everglades exotic plant management staff.

Four seaside mahoes are growing near the sally port and Audubon fountain. Seaside mahoes are classified by the Florida Exotic Pest Plant Council (FLEPPC) as an invasive exotic plant species.

- Remove four seaside mahoes and replace with native buttonwoods, which were growing on the parade ground during the period of significance.

The date palm growing next to the large magazine is not historic and is a haven for rats at the fort. The area around the large magazine was open during the period of significance.

- Remove date palm

A number of stumps remain where nonhistoric palms were taken down. When removing trees, stumps should be removed as well.

- Grind stumps of nonhistoric palms.
- Consult with SEAC before removing stumps in the High Archeological Integrity Zone.

A line of seagrapes was planted in the late 1980s to deter visitors from encroaching into the staff quarters area of the parade ground. Although this portion of the parade ground had no trees during the period of significance, there is a need to screen the modern intrusions of fort housing, maintenance, and infrastructure.

- As these trees decline or are damaged by storms, their replacements should be planted in a more natural arrangement, not in a straight line.
- New plantings should not be installed anywhere on Garden Key except those described in this cultural landscape report unless approved by regional historical landscape architect.

Maintenance staff at current levels can only mow Fronts 1 and 6 and are presently not mowing inside the ruins. Ruins were mown in the past with a push mower when staffing levels were higher. The first level of bricks and pipes remain inside the ruins, making mowing difficult.

- Increase staffing levels to include mowing of all six fronts and mowing inside the ruins.

## Picnic Area/Campground

More shade trees are needed in the picnic area/campground to provide relief for visitors from the hot sun.

- Plant buttonwoods, seagrapes, or gumbo limbos as shade trees in the picnic area outside the fort. All of these are historically appropriate, grow fast, and are native.
- Replace missing coconut palm framing gangway to main boat dock or take out remaining palm.

## Topography

A dumpsite of architectural debris from the demolition of the quarters buildings and random material dislocated after hurricanes on the northeast shore of Garden Key is presently covered with native vegetation, screening it from view.

- Remove trash from dumpsite.
- Bricks from the pile could be used to line the walkways on the parade ground, if restoration of the walks is undertaken.
- Bricks from the pile could be used as riprap to stabilize the north coaling dock and then be

- covered with sand from the sand stockpile.
- Bricks can be used for moat wall repairs.
- Do not excavate and bury the brick pile. It provides habitat for birds and slows down erosion.

Heavy equipment has caused soil compaction on the parade ground in the past.

- Use perimeter circulation and refrain from driving maintenance vehicles over the center of the parade ground. Restrict cart use to working hours only and use only when needed for work.

No new utilities should be buried in the High Archeological Integrity Zone identified in the ground penetrating radar study.

- New utilities should be limited to the Low Archeological Integrity Zone that has already been subjected to significant disturbance.

## Circulation

The historic circulation system is a character-defining feature of the historic landscape.

- Restore main pathways identified in the ground penetrating radar study.
- Portions of the historic circulation system may not be suitable for restoration in order to restrict visitor access to maintenance area and employee quarters.
- Preserve the counterscarp walk, the only circulation feature on the fort's exterior that survives from the period of significance.

The radio antenna is located on the interpretive trail on Front 1.



Figure 280. Sign on Bush Key, 2010. (SERO image 1653)

- If the radio antenna cannot be moved, rerouting of the interpretive trail will occur when the new wayside plan is implemented.

## Views and Vistas

Unobstructed views on approach to the fort and views out to sea and to other keys from the terreplein are a character-defining feature of the historic landscape.

- Plastic chairs outside of staff quarters in the second tier casemates are currently degrading the viewshed on approach to Fort Jefferson. These should be placed in less obtrusive locations during daylight hours, not within the embrasure openings.
- A radio antenna is an adverse visual impact and diminishes integrity of setting. It should be moved to another location. If it cannot be moved, seek new technologies to decrease the footprint and visual intrusion of the antenna.
- Replace sign on Bush Key. The current sign degrades the viewshed from the fort out to sea and can actually be seen from the parade ground through one of the embrasure openings. It was confirmed in 2010 in consultation with park biologists that the island should not be closed year round.

Communications equipment installed at Bastion 1 is an adverse visual impact and diminishes integrity of setting.

- Investigate moving the equipment to another location. If it cannot be moved, seek new technologies to minimize the footprint and visual intrusion of the tower, dishes, and cabling.
- Ensure that communications equipment is at the lowest level without reducing satellite coverage.



Figure 281. Communications equipment, 2010. (SERO image 1628)

Maintain unobstructed views of the parade ground up to the terreplein.

- Paint cables and PVC pipes/conduits to blend in with the parade face wall.

Reduce visual intrusion created by interpretive wayside just inside the sally port.

- Move to another location that does not interfere with the visitor's first view of the historic parade ground.

### Small-scale Features

- Remove anchor adjacent to the sally port bridge. It was not part of the historic scene.
- 
- The 1970s Audubon fountain does not function and was placed too close to one of the historic buttonwood trees. As a favorite spot for birders, it may remain, but it could be removed when the masonry gives way.
- Construct a historically accurate flagpole. Several historic images show the flagpole.

Plastic and aluminum benches, chairs, and tables are visually intrusive.

- Replace plastic benches on the parade ground with wooden benches similar to the one along Front 6.
- Use wooden picnic tables.

Too many modern, small-scale features disrupt the sense of isolation on Garden Key, a character-defining feature.

- Move breaker box in campground area over to south coaling dock pad.
- Consolidate location of fee box and signage for campground.
- Use consistent, unobtrusive informational and directional signage.
- Use interpretive waysides of an appropriate number, scale, and location. Consider alternatives to waysides that may intrude on the historic landscape of the parade or the counterscarp walk.

Plywood covers chimney-smoke holes, which detracts from the setting of the terreplein.

- If a water management system cannot be identified to re-establish the drainage system, some alternate form of covering should be adopted that is not a visual intrusion.

### Cannon

Conservation of the cannon is currently ongoing, and over half of the collection has received treatment, including the remounting on a full reproduction carriage of the Rodman on Bastion 3 and the mounting on an alternative carriage on Bastion 4.

- Conserve all ten cannon.
- Develop a more appropriate mounting system for the other cannon, so that they do not rest on structural pieces of the fort and are oriented and positioned properly.
- Move communication equipment located near the Rodman cannon on Bastion 1.

Granite cannon platforms on either side of each bastion were disrupted to enable installation of the Rodman cannon in 1873, but, in addition to the intentional, historic displacement of these elements, there are several gun platforms where single granite block have been moved, and it is still possible to determine where they belong.

- A historic mason crew is needed to reassemble the granite pieces that are not part of the historic scene and could be put back in place.
- Intact metal components should be cleaned.

In some areas, vegetation has completely covered the traverse circles. Many of the shot cellars are filled with sand and/or blocked by vegetation.

- Remove vegetation if it is covering the traverse circles.
- Remove spider lilies growing around cannon at Bastion 6. These could be replanted with other spider lilies along the perimeter walk on the parade ground or used to screen a lift station.
- Remove vegetation and/or sand from the shot



**Figure 282.** Vegetation covering traverse circles, 2010. (SERO image 1565)



**Figure 283.** Shot cellar covered with sand and vegetation, 2010. (SERO image 1562)

cellars. Begin with those on the guided tour.

## Archeological Resources

Conduct further archeological testing through excavation of:

- the two adjacent anomalies potentially associated with the 1847 storehouse and an adjacent unidentified structure.
- a large rectangular anomaly in the central portion of the parade that was interpreted as the garden area and livestock pens based on historic maps.
- the possible pit features, including those in

the vicinity of the lightkeeper's residence and the larger ones near the east end of the officers' quarters and the hot shot furnace. These features likely comprise trash dumps near the officers' quarters and possibly cisterns or privies in the area around the lightkeeper's residence. Such features regularly provide vast quantities of information on material culture that may be of interest for the interpretation of life at the fort during the period of significance.

All ground disturbing activities at the fort should be reviewed for archeological impacts. Every effort should be made to avoid impacts in the High Archeological Integrity Zone identified in the ground penetrating radar study.

## Land Use

Garden Key's lack of land mass had dictated the use of Fort Jefferson for housing, staff offices, interpretation, and maintenance. Fort Jefferson needs an integrated master plan that outlines how the fort will be used in the future.

- Develop an integrated master plan that addresses facility management, housing, cultural resource management, natural resource management, and interpretation.



United States Department of the Interior  
NATIONAL PARK SERVICE



Everglades and Dry Tortugas National Parks  
40001 State Road 9336  
Homestead, Florida 33034

In Reply Refer to:

H4217-FY12-038

SEP 04 2012

Mr. Robert F. Bendus  
State Historic Preservation Officer  
Florida Division of Historical Resources  
R.A. Gray Building  
500 S. Bronough Street  
Tallahassee, Florida 32399-0250

Reference: §110 and 106 Compliance: *Garden Key Cultural Landscape Report, Dry Tortugas National Park, Monroe County, Florida*

Dear Mr. Bendus:

In accordance with §110 and 106 of the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation regulations at 36 CFR Part 800, we request your review and consultation in regards to the historic context and proposed preservation plan articulated in the enclosed Cultural Landscape Report recently completed for Garden Key in Dry Tortugas National Park, Monroe County, Florida, previously determined eligible for the *National Register of Historic Places*.

The recognition of the landscape and its features as eligible for the *National Register of Historic Places* was confirmed by your office after a review of the 2007 Cultural Landscape Inventory of Garden Key. While the Inventory document provided baseline data on each landscape feature and their status as contributing or non-contributing to the period of significance, the report goes further in describing the landscape, its historic context, current condition, and proposed treatment recommendations. Your review and concurrence on these aspects of the report are requested.

Please note that we will be undertaking an effort in 2013 to update our *National Register of Historic Places* documentation and identify contributing properties throughout Dry Tortugas National Park. The goal of this effort is to synthesize existing documentation of historic resources park-wide. This report will be among those that will inform this effort. Therefore, if your review could include comments with the knowledge of this intent, this would also be appreciated. Further, if this letter and the draft report with your comments could be shared with Barbara Mattick prior to submittal to the site file, this would also greatly aid our efforts. (We have already initiated a dialogue with her on this effort, but want to make sure that your review and comments on this document, as it is rather comprehensive for Garden Key, are included in our discussions with her moving forward.)

If you have any questions, please contact Chief of Cultural Resources Melissa Memory at (305) 242-7755 or [melissa\\_memory@nps.gov](mailto:melissa_memory@nps.gov).

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As the intent of this effort is to better understand and maintain or improve the condition of the Cultural Landscape of Garden Key, we feel that the treatment recommendations will have *no adverse effect* to historic properties.

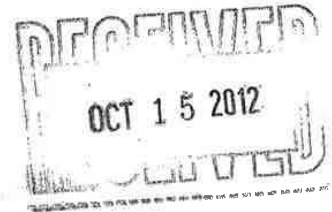
As always, thank you for your assistance with this documentation and preservation planning effort.

Sincerely,

A handwritten signature in black ink that reads "Dan B. Kimball". The signature is written in a cursive style with a large initial "D" and a long, sweeping underline.

Dan B. Kimball  
Superintendent

Enclosure



**FLORIDA DEPARTMENT of STATE**

**RICK SCOTT**  
Governor

**KEN DETZNER**  
Secretary of State

Mr. Dan B. Kimball  
U.S. Department of the Interior - National Park Service  
Everglades and Dry Tortugas National Parks  
40001 State Road 9336  
Homestead, Florida 33034

October 9, 2012

Re: DHR Project File Number: 2012-4386  
National Park Service – H4217-FY12-038  
*Garden Key Cultural Landscape Report, Dry Tortugas National Park, Monroe County, Florida*

Dear Mr. Kimball:

Our office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical, architectural or archaeological value. The review was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended and 36 CFR Part 800: Protection of Historic Properties.

We have reviewed the above referenced report, and we concur that the outlined treatment recommendations will have no adverse effect on historic properties. However, any new construction or excavation on park lands will require review by this office. We look forward to further consultation as individual projects arise.

For any questions concerning our comments, please contact Deena Woodward, Historic Sites Specialist at 850.245.6333, or by electronic mail at [deena.woodward@dos.myflorida.com](mailto:deena.woodward@dos.myflorida.com). We appreciate your continued interest in protecting Florida's historic properties.

Sincerely,

for Robert F. Bendus, Director  
Division of Historical Resources  
and State Historic Preservation Officer



DIVISION OF HISTORICAL RESOURCES  
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# Selective Bibliography

## Published Works

- Anderson, Louis. *Historic Structure Report: Architectural Data Section*. Denver: Denver Service Center, 1988.
- Baltzell, Thomas V. and Paul Hatchett. "Project Analysis Report Preservation of Lower Tier Embrasures at Fort Jefferson National Monument." Atlanta: Southeast Regional Office, 1986.
- Beard, Daniel. "The Consensus of a Planning Conference at Fort Jefferson National Monument, April, 8, 9, 10, 1957." Washington, DC: National Park Service, 1957.
- Bearss, Edwin C. *Historic Structure Report Historical Data Section Fort Jefferson: 1846-1898*. Denver: Denver Service Center, 1983.
- Bethel, Rodman. *A Slumbering Giant of the Past: Fort Jefferson, U.S.A in the Dry Tortugas*. Hialeah, FL: W. L. Litho, Inc., 1989.
- Davis, John R. *The Ecology of the Vegetation and Topography of the Sand Keys of Florida*. Washington, DC: Carnegie Institution of Washington, 1942.
- Holder, Emily. "At the Dry Tortugas During the War: A Lady's Journal." *Californian Illustrated Magazine* 1, no. 2 (January 1892): 87-93; 1, no. 3 (February 1892): 179-89; 1, no. 4 (March 1892): 274-82; 1, no. 5 (April 1892): 397-403; 1, no. 6 (May 1892): 585-89; 2, no. 7 (May 1892): 102-09; 2, no. 2 (July 1892): 206-10; 2, no. 8 (August 1892): 388-95; 2, no. 8 (September 1892): 557-60.
- Holder, Joseph B. "The Dry Tortugas: The Keys and the Fort." *Harper's New Monthly Magazine* 37, no. 218 (July 1868): 260-67.
- Lawson, Charles. *A Geophysical Investigation of the Parade Ground at Fort Jefferson, Dry Tortugas National Park, Florida*. Tallahassee, FL: Southeast Archeological Center, 2008.
- Lewis, Emanuel Raymond. *Seacoast Fortifications of the United States: an Introductory History*. Missoula, MT: Pictorial Histories Publishing Company, 1979.
- Little, Henry F. W. *The Seventh Regiment New Hampshire Volunteers in the War of the Rebellion*. Concord, NH: Ira C. Evans, 1896.
- Loechl, Suzanne Keith, Susan I. Encore, Megan Weaver Tooker, and Samuel A. Batzli. *Guidelines for Identifying and Evaluating Historic Military Landscapes*. Champaign, IL: U. S. Army Engineer Research and Development Center, 2009.
- Lord-Aeck-Sargent (LAS). *Historic Structure Report Amendment*. Atlanta: National Park Service, 2006.
- Manucy, Albert. *A Handbook for Fort Jefferson History*. St. Augustine, FL: National Park Service, 1942.
- Manucy, Albert. *A Construction History of Fort Jefferson, 1846-1874*. Richmond, VA: National Park Service, 1961.
- Manucy, Albert. "Draft Historic Structure Report, Part II, Fort Jefferson National Monument" Richmond, VA: National Park Service Southeast Region, 1966.
- Manucy, Albert. *Pages from the Past: A Pictorial History of Fort Jefferson*. Homestead, FL: Florida National Parks and Monuments Association, Inc., 1999.
- Millspaugh, Charles F. *Flora of the Sand Keys of Florida*. Chicago: Field Columbian Museum, 1907.
- Mudd, Nettie. *The Life of Samuel A. Mudd*. New York: Neale Publishing Company, 1906.
- Murray, Larry E. ed. *Dry Tortugas National Park Submerged Cultural Resources Assessment*. Santa Fe, NM: Southwest Regional Office, 1993.

## Bibliography

---

- Reid, Thomas. *America's Fortress: A History of Fort Jefferson, Dry Tortugas, Florida*. Gainesville: University Press of Florida, 2006.
- Robertson, W. B., Jr. "The Terns of the Dry Tortugas." *Bulletin of the Florida State Museum of Biological Sciences* 8, no. 1:1-95.
- Simpson, Glenn and Kaisa Barthuli. *Record of Treatment – Rehabilitation of the Hot Shot Furnace at Fort Jefferson*. Santa Fe, NM: Intermountain Regional Office, 2004.
- Southeast Regional Office. *Foundation Condition Appraisal and Improvements Recommended for the Counterscarp Rehabilitation*. Atlanta: Southeast Regional Office, 1979.
- Southeast Regional Office. *General Management Plan Amendment Dry Tortugas National Park*. Atlanta: Southeast Regional Office, 2001.
- Stoddart, D. R. and F. R. Fosberg. *Topographic and Floristic Change, Dry Tortugas, Florida, 1904-1977*. Washington, DC: The Smithsonian Institution, 1981.
- Grives Worrell Wright & O'Hatnick, Inc. *Stabilization of the Terreplein at Fort Jefferson for Dry Tortugas National Park, Florida*. Atlanta: Southeast Regional Office, 1993.
- Fisher, L. M. "Report of Inspection at Fort Jefferson National Monument, Dry Tortugas, Florida, December 4 and 5, 1938," February 1939, Fort Jefferson ERA/WPA Project Records (DRTO 3389, Folder 38), South Florida Collections Management Center, Everglades National Park.
- Grives Worrell Wright & O'Hatnick, Inc. "Preservation and Stabilization of Fort Jefferson," 1999, South Florida Collections Management Center, Everglades National Park.
- Mikell, W. "Public Works Administration Construction at Fort Jefferson National Monument Dry Tortugas Florida," Fort Jefferson ERA/WPA Project Records (DRTO 3389, Folder 40), South Florida Collections Management Center, Everglades National Park.
- National Park Service. "Cultural Landscape Inventory Fort Jefferson Landscape." Atlanta: Southeast Regional Office, 2005.
- Preece, E. F. "A Report on Engineering and Other Considerations with Regard to the Development of Fort Jefferson National Monument Dry Tortugas," August 1937, Fort Jefferson ERA/WPA Project Records (DRTO 3389, Folder 37), South Florida Collections Management Center, Everglades National Park.
- Puderer, Philip C. "Narrative Report on General Conditions with Recommendations," 1937, Fort Jefferson ERA/WPA Project Records (DRTO 3389), South Florida Collections Management Center, Everglades National Park.
- Puderer, Philip C. "Special Report to the Regional Director and the Regional Landscape Architect Covering Inspection of Fort Jefferson National Monument Dry Tortugas on October 7, 8 & 9, 1938," 1938, Fort Jefferson ERA/WPA Project Records (DRTO 3389, Folder 39), South Florida Collections Management Center, Everglades National Park.
- Simpson, Glenn D. "Completion Report Sally Port Granite Surround Repointing and Gudgeon Replacement Project (Parade Ground Elevation)," September 21, 2000, Santa Fe, NM: Intermountain Support Office.

---

Simpson, Glenn D. and Kelly J. Clark. "Exterior Preservation Plan – Engineering Officers' Quarters, HS-08," 2009, Santa Fe, NM: Intermountain Regional Office.

## Internet Resources

Calvin Shedd Papers, University of Miami Special Collections Library, <http://scholar.library.miami.edu/shedd/letters/62mar06.html>.

Coast Defense Study Group, "United States Seacoast Defense Construction 1781-1948: a Brief History," <http://www.cdsg.org/cdsghis2.htm>.

Thomas W. Schmidt and Linda Pikula, "Scientific Studies on Dry Tortugas National Park: An Annotated Bibliography," <http://www.aoml.noaa.gov/general/lib/dtint.html>.

Southeast Archeological Center, "Outline of Prehistory and History," <http://www.nps.gov/seac/outline/05-mississippian/index.htm>

Wikipedia contributors, "History of Florida," *Wikipedia, The Free Encyclopedia*, [http://en.wikipedia.org/w/index.php?title=History\\_of\\_Florida&oldid=234626323](http://en.wikipedia.org/w/index.php?title=History_of_Florida&oldid=234626323).

Wikipedia contributors, "Spanish Florida," *Wikipedia, The Free Encyclopedia*, [http://en.wikipedia.org/w/index.php?title=Spanish\\_Florida&oldid=233632414](http://en.wikipedia.org/w/index.php?title=Spanish_Florida&oldid=233632414).



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# Appendix A

## Timeline

1513: Ponce de Leon named them “las Tortugas”—the Turtles.	Florida ceded jurisdiction of Dry Tortugas to United States. Polk’s executive order made the Dry Tortugas a military reservation
1565: John Hawkins makes a stop	1846: Major Hartman Bache completed topographical survey of the Tortugas
1566: Pedro Menendez de Aviles and Adelantado explore the Tortugas	Start of Mexican War
1600-1822: Pirates control the Tortugas	Captain Walter D. Fraser assigned charge of Tortugas fortification (May 19)
1815: Key West awarded to Juan Pablo Salas for meritorious service to the Crown (Spain)	Lieutenant Wright assigned charge of fortification (July 27)
1821: Florida ceded to United States by Spain. Key West purchased from Salas by John W. Simonton.	Wright reached Tortugas in mid-December
Commodore David Porter drives out the pirates	1847: Work begins on the fort
1824: U.S. Marines stationed at Key West	1850: First section of Officer’s Quarters completed
1826: Lighthouse constructed on Garden Key	First concrete of scarp poured
1829: Lieutenant Josiah Tattnall surveyed the Tortugas	Chapel-office foundation started to provide cisterns
1832: Audubon visited the Tortugas	Storm damage
1835: Start of Second Seminole War in Florida	Fort named Fort Jefferson
1836: Texas becomes a republic. Secretary of War listed potential coastal fortification sites, including Key West and the Tortugas.	1851: Shoal water parts of counterscarp completed
1842: End of Seminole War	1852: Work suspended
1844: Captain J. G. Bernard made preliminary reconnaissance of fort sites	1856: Wright transferred to Washington; Woodberry assigned to fort
U. S. Engineer Department ordered survey of sites	The <i>Activa</i> wrecked
1845: Texas and Florida admitted into the Union	Loggerhead lighthouse started
	1857: Schooner <i>Tortugas</i> sent to fort
	Wooden storehouse burned

Settlement of fort became noticeable	Subsoil experiments by Lieutenant Holgate
1858: Garden Key light reduced to harbor light	Woodberry died of yellow fever at Key West
General Joseph Totten and naturalist Louis Agassiz visited the fort	1865: Engineer Department ordered construction of second tier discontinued; Bird Key fortification essentially completed
1860: Woodberry transferred; yellow fever outbreak	End of Civil War
Captain M. C. Meigs arrived at the fort; Fort Jefferson made defensible	Dr. Samuel Mudd arrived at Fort Jefferson
1861: Florida seceded from the Union	Hurricane in October; schooner <i>Tortugas</i> lost at Key West
First garrison of Federal troops arrived at Fort Jefferson	1871: Work suspended
Meigs ordered back to Washington First prisoners of war arrived at Fort Jefferson	1872: Fort modernization begun; 4 curtain magazines strengthened
1862: Fort wall completed to full height, although second tier unfinished	1873: Counterscarp and moat excavation completed; barbette magazines strengthened
Yellow fever and smallpox	August: Beginning of yellow fever epidemic; except for volunteers, entire garrison evacuated to Loggerhead Key (all women, children, and some married men evacuated earlier); Dr. Mudd sent to Loggerhead Key to help
Appropriation for fortification of Bird Key	October: end of epidemic; severe hurricane
1863: Curtain magazines, second tier tower magazines, and hot shot furnace completed.	1874: hurricane damage repaired
Main sewer begun	Quarters and enlisted men's quarters completed
Enlisted Men's Quarters and extension of Officer's Quarters begun	Garrison left fort
Civilian Engineer Edward Frost arrived at the fort.	1875: Barbette modifications completed; end of Army construction at fort
Woodberry placed in command of the District of Key West and Tortugas	1876: Windows to Officer's Quarters and EM Barracks boarded up; fort keeper and ordnance sergeant left in charge
Slave roll discontinued after Emancipation Proclamation	Garden Key Light Tower constructed
1864: Barbette magazines and most of the terreplein completed	1888: Act of Congress set apart Garden, Bird, and Loggerhead Keys as site of a national quarantine station
Main sewer completed	1889: Site transferred from War Department to Treasury Department
Certain kitchens completed	
Large parade magazine started	

- 
- 1891: Gunpowder removed from fort magazine
- 1896: Dissatisfaction in the U.S. with Spanish conduct in Cuba. Revised plans for modernization of fort under consideration
- 1898: During Spanish-American War, the fort was garrisoned by the 5<sup>th</sup> Artillery, some volunteers, and perhaps a few marines
- Dredging of Tortugas channels started; coal depot construction started
- December: Peace treaty signed
- 1900: Condensing plants completed
- Dry Tortugas transferred to Navy Department; quarantine discontinued
- 1902: Marine garrison at Fort Jefferson
- All remaining War Department property transferred to Fort Taylor
- 1903: Wireless station started
- 1904: Wireless station in operation
- Coal depot completed, damaged by hurricane and repaired
- 1905: Marine complement at fort reduced to 12 men
- 1906: Condensing plant and water storage tanks removed to Guantanamo Naval Station, Cuba, and Key West Naval Station
- 1908: Dry Tortugas transferred to Department of Agriculture as a preserve
- 1909: Wireless station discontinued
- 1910: Hurricane wrecked the coal conveyors and damaged the fort buildings
- 1912: Enlisted Men's Barracks and lightkeepers house burned
- 1917: Wireless station rehabilitated and seaplane base established at Dry Tortugas
- 1924: Garden Key light decommissioned
- 1927: Officers' Quarters burned
- 1935: Fort Jefferson declared a national monument
- 1992: Dry Tortugas National Park established



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# Appendix B Vegetation

## Post-1900 Vegetation Surveys

Field reports published in 1907, 1918, and 1942 documented existing vegetation, topography, and climate at Dry Tortugas. Each report contributed to the on-going research of Tortugas' ecology and captured a detailed snapshot of Garden Key. The Carnegie Institute established a Laboratory for Marine Biology on Loggerhead Key in 1905, providing a base for research throughout the early twentieth century.

After the U.S. Navy tenure, Garden Key supported vegetation on the northeast and southern shores of the island. The 1907 survey published by the Columbian Field Museum in Chicago identified bay cedar (*Suriana maritima*), sea purslane (*Sesuvium portulacastrum*), euphorbia, spider lily (*Hymenocallis caribaea*), beach elder (*Iva imbricata*), snow squarestem (*Melanthera nivea*), sea oats (*Uniola paniculata*), sea lavender (*Tournefortia gnaphalodes*), and different species of sandbur and grasses growing in concentrations outside the fort. Because of constant human activity near the docks, the southern shore of Garden Key had the densest vegetation when field surveyed in 1904. Within Fort Jefferson, the survey documented thirty black mangroves (*Avicennia nitida*), a tamarind (*Tamarindus indica*), and several Indian almond trees (*Catappa catappa*) on the parade ground. The survey probably misidentified buttonwoods (*Conocarpus erectus*) present on the parade as black mangroves.<sup>1</sup> (See below for complete species listing)

Summer field sessions in 1915 and 1916 mapped the distribution of species on the exterior of Fort Jefferson and identified four plant communities, a *Uniola* grass community, a *Suriana* scrub community, an *Opuntia* community, and a *Euphorbia* community, together containing the most diverse flora on any of the Tortugas keys.<sup>2</sup>

The resulting 1918 report specifies the location, maturity, and association of nearly every plant on Garden Key.

The 1915-1916 parade ground reveals a history of cultivation and change. The soil variations or “artificial influence” within the fort sustained exotic species, while regular cutting and prescribed burning routinely removed smaller forbs and strengthened older trees.<sup>3</sup> The report noted two red mangroves (*Rhizophora mangle*) producing fruit in 1916 and the presence of Australian pine (*Casuarina euitsetfolia*), buttonwoods, and bay cedar.

The northern portion of Garden Key supported an assemblage of beach elder, sea purslane, morning glory (*Ipomoea*), and fan flower (*Scaevola*).<sup>4</sup> A “tangled mass” of iron girders and rods was noted near the abandoned coaling dock. The southeast section of the island included not only several plants listed in 1907, but also pepper grass (*Lepidium virginicum*), Mexican prickly poppy (*Argemone mexicana*), seashore dropseed (*Sporobolus virginicus*), and other forbs. Further west near Bastion 1, several large patches of prickly pear cactus (*Opuntia stricta*) and a single black mangrove were noted. The 1918 inventory included a guava tree (*Psidium guajava*), date palms (*Phoenix dactylifera*), coconut palms (*Cocos nucifera*), seagrapes (*Coccoloba uvifera*), gumbo-limbo (*Bursera simaruba*), oleander bushes (*Nerium oleander*), hibiscus (*Hibiscus rosa-sinensis*), and other forbs and grasses. (See below for complete species listing)

The observations published in 1942 build upon the information of earlier surveys. Fieldwork completed between 1937 and 1942 noted plant communities on Garden Key and identified broad categories within the strand ecosystem. The report reiterates the distinction between the

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1 Millspaugh, Charles F. Flora of the Sand Keys of Florida. Botanical Series, Vol. II., No. 8. pp. 225-243.  
2 Stoddart and Fosberg, 11. Bowman, p. 125.

3 Bowman, pp. 127-8.  
4 Bowman, p. 126.

parade ground, a result of cultivation and care, the terreplein with loose soils and volunteer forbs, and the remainder of the island supporting native vegetation and diverse exotics.

The vegetation documented in 1942 describes the parade ground covered with Bermuda grass (*Cynodon dactylon*) and several buttonwood trees surviving from the historic period. Additional coconut palms were planted after the NPS assumed administration of Fort Jefferson National Monument in 1935. The survey notes the presence of the century plant (*Agave americana*), date palms, guava, geiger trees, oleander, seagrape, gumbo-limbo, Australian pine, and Canary island

date palm (*Phoenix canariensis*). (See below for complete species listing)

A compilation of historic field reports published in 1981 synthesized the previous studies of the Tortugas Keys. The report detailed the diversity, size, and coverage of vegetation on Garden Key and compared maps of the island acreage beginning in 1904. Reimus and Robertson compiled a comprehensive annotated list of plants in 2000.<sup>5</sup>

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- 5 Richard G. Reimus and William B. Robertson, Jr., "Plants of the Dry Tortugas National Park: An Annotated List," March 2000, South Florida Collections Management Center, Everglades National Park.

## Flora Found on Garden Key

Taken from *Flora of the Sand Keys of Florida* by Charles Frederick Millspaugh  
Field Columbian Museum Publication 118, Botanical series, Vol. II, No.5. Chicago, 1907.

Including information from Table 8 from *Topographic and Floristic Change, Dry Tortugas, Florida, 1904-1977* by D. R. Stoddart and F. R. Fosberg, Atoll Research Bulletin, No. 253, The Smithsonian Institution, Washington, D.C., July 1981.

<i>Amaranthus viridis</i>	Slender amaranth	(native)
<i>Argemone mexicana</i>	Mexican poppy	(introduced)
<i>Atriplex pentandra</i>	Crested saltbrush	(native)
<i>Conocarpus erectus</i>	Buttonwood	(native) reported as black mangrove
<i>Bidens alba</i>	Spanish needles	(native)
<i>Boerhavia coccinea</i>	Red spiderling	(native)
<i>Cakile lanceolata</i>	Coastal searocket	(native)
<i>Canavalia rosea</i>	Beach bean	(native)
<i>Capraria biflora</i>	Goat weed	(native)
<i>Terminalia catappa</i>	Indian almond	(introduced)
<i>Cenchrus echinatus</i>	Southern sandspur	(native)
<i>Cenchrus incertus</i>	Coastal sandspur	(native)
<i>Cyperus planifolius</i>	Flatsedge	(native)
<i>Digitaria sanguinalis</i>	Hairy crabgrass	(introduced)
<i>Euphorbia adenoptera</i>	Florida sandmat	(native)
<i>Euphorbia heterophylla</i>	Mexican fireplant	(native)
<i>Euphorbia mesembrianthemifolia</i>	Coast spurge	(native)
<i>Eustachys petraea</i>	Pinewoods fingergrass	(native)
<i>Heliotropium curassavicum</i>	Salt heliotrope	(native)
<i>Hymenocallis latifolia</i>	Spider lily	(native)
<i>Ipomoea pes-caprae</i>	Railroad vine	(native)
<i>Iva imbricata</i>	Beach elder	(native)
<i>Melanthera nivea</i>	Snow squarestem	(native)
<i>Opuntia dillenii</i>	Prickly pear cactus	(native)
<i>Paspalum distichum</i>	Knotgrass	(native)
<i>Philoxerus vermicularis</i>	Silverhead	(native)
<i>Portulaca oleracea</i>	Common purslane	(native)
<i>Sesbania sericea</i>	Dangle pod	(introduced)
<i>Sesuvium portulacastrum</i>	Sea purslane	(native)
<i>Sida acuta</i>	Common wireweed	(native)
<i>Sida procumbens</i>	Spreading fanpetals	(introduced)
<i>Sonchus oleraceus</i>	Common sowthistle	(introduced)
<i>Sporobolus purpurascens</i>	Purple dropseed	(introduced)
<i>Stachytarpheta jamaicensis</i>	Blue porterweed	(native)
<i>Suriana maritima</i>	Bay cedar	(native)
<i>Tamarindus indica</i>	Tamarind	(introduced)
<i>Tournefortia gnaphalodes</i>	Sea lavender	(native)
<i>Tournefortia hirsutissima</i>	Chiggery grapes	(native)
<i>Uniola paniculata</i>	Sea oats	(native)

(Native refers to native to Florida)

## Flora Found on Garden Key

Taken from *Botanical Ecology of the Dry Tortugas* by H.H.M. Bowman. University of Pennsylvania, 1918.

Including Table 8 from *Topographic and Floristic Change, Dry Tortugas, Florida, 1904-1977* by D. R. Stoddart and F. R. Fosberg, Atoll Research Bulletin, No. 253, The Smithsonian Institution, Washington, D.C., July 1981.

<i>Agave decipiens</i>	False sisal	(introduced)
<i>Alternanthera maritima</i>	Seaside joyweed	(native)
<i>Atriplex pentandra</i>	Crested saltbrush	(native)
<i>Avicennia nitida</i>	Black mangrove	(native)
<i>Bidens alba</i>	Spanish needles	(native)
<i>Boerhavia coccinea</i>	Red spiderling	(native)
<i>Bursera simaruba</i>	Gumbo-limbo	(native)
<i>Caesalpinia bonduc</i>	Gray nicker bean	(native)
<i>Cajanus cajan</i>	Pigeon pea	(introduced)
<i>Cakile lanceolata</i>	Coastal searocket	(native)
<i>Canavalia rosea</i>	Beach bean	(native)
<i>Coccoloba uvifera</i>	Seagrape	(native)
<i>Cocos nucifera</i>	Coconut palm	(introduced)
<i>Conocarpus erectus</i>	Buttonwood	(native)
<i>Conyza canadensis</i>	Dwarf horseweed	(introduced)
<i>Cordia sebestena</i>	Geiger	(introduced)
<i>Cynodon dactylon</i>	Bermuda grass	(introduced)
<i>Cyperus planifolius</i>	Flatsedge	(native)
<i>Digitaria sanguinalis</i>	Hairy crabgrass	(introduced)
<i>Euphorbia glomerifera</i>	Erect spurge	(introduced)
<i>Euphorbia mesembrianthemifolia</i>	Coast spurge	(native)
<i>Glottidium vesicarium</i>	Bladder pod	(introduced)
<i>Hymenocallis latifolia</i>	Spider lily	(native)
<i>Ipomoea macrantha</i>	Beach moonflower	(native)
<i>Ipomoea pes-caprae</i>	Railroad vine	(native)
<i>Iva imbricata</i>	Beach elder	(native)
<i>Lepidium virginicum</i>	Pepper grass	(introduced)
<i>Lippia nodiflora</i>	Turkey tangle fogfruit	(native)
<i>Melanthera nivea</i>	Snow squarestem	(native)
<i>Nerium oleander</i>	Oleander	(introduced)
<i>Opuntia dillenii</i>	Prickly-pear cactus	(native)
<i>Paspalum caespitosum</i>	Blue crowngrass	(native)
<i>Phoenix canariensis</i>	Canary island date palm	(introduced)
<i>Phoenix dactylifera</i>	Date palm	(introduced)
<i>Portulaca oleracea</i>	Common purslane	(native)
<i>Psidium guajava</i>	Guava	(introduced)
<i>Ricinus communis</i>	Castor oil plant	(introduced)
<i>Rhizophora mangle</i>	Red mangrove	(native)
<i>Rhynchosia parvifolia</i>	Small leaf snoutbean	(native)
<i>Scaevola plumieri</i>	Beachberry	(native)
<i>Sesbania</i> spp.	(introduced)	
<i>Sesuvium portulacastrum</i>	Sea purslane	(native)
<i>Sida acuta</i>	Common wireweed	(native)
<i>Sida procumbens</i>	Spreading fanpetals	(introduced)
<i>Sonchus oleraceus</i>	Common sowthistle	(introduced)

<i>Sporobolus virginicus</i>	Seashore dropseed	(native)
<i>Stachytarpheta jamaicensis</i>	Blue porterweed	(native)
<i>Suriana maritima</i>	Bay cedar	(native)
<i>Tamarindus indica</i>	Tamarind	(introduced)
<i>Terminalia catappa</i>	Indian almond	(introduced)
<i>Thespesia populnea</i>	Seaside mahoe/Portia tree	(introduced)
<i>Tournefortia gnaphalodes</i>	Sea lavender	(native)
<i>Uniola paniculata</i>	Sea oats	(native)

## Flora Found on Garden Key

Taken from *The Ecology of the Vegetation and Topography of the Sand Keys of Florida* by John H. Davis, Jr. Papers from Tortugas Laboratory, Volume XXXIII, Southwestern College, Memphis, Tennessee, November 23, 1942.

Including Table 8 from *Topographic and Floristic Change, Dry Tortugas, Florida, 1904-1977* by D. R. Stoddart and F. R. Fosberg, Atoll Research Bulletin, No. 253, The Smithsonian Institution, Washington, D.C., July 1981.

<i>Agave americana</i>	Century plant	(introduced)
<i>Avicennia germinans</i>	Black mangrove	(native)
<i>Boerhavia coccinea</i>	Red spiderling	(native)
<i>Bursera simaruba</i>	Gumbo-limbo	(native)
<i>Canavalia rosea</i>	Beach bean	(native)
<i>Casuarina equisetifolia</i>	Australian pine	(introduced)
<i>Cenchrus echinatus</i>	Southern sandspur	(native)
<i>Coccoloba uvifera</i>	Seagrape	(native)
<i>Cocos nucifera</i>	Coconut palm	(introduced)
<i>Conocarpus erectus</i>	Buttonwood	(native)
<i>Conyza canadensis</i>	Canadian horseweed	(introduced)
<i>Cynodon dactylon</i>	Bermuda grass	(introduced)
<i>Cyperus planifolius</i>	Flatsedge	(native)
<i>Digitaria sanguinalis</i>	Hairy crabgrass	(introduced)
<i>Eragrostis tenella</i>	Japanese lovegrass	(introduced)
<i>Euphorbia heterophylla</i>	Mexican fireplant	(native)
<i>Euphorbia mesembrianthemifolia</i>	Coast spurge	(native)
<i>Eustachys petraea</i>	Pinewoods fingergrass	(native)
<i>Hymenocallis latifolia</i>	Spider lily	(native)
<i>Ipomoea pes-caprae</i>	Railroad vine	(native)
<i>Iva imbricata</i>	Beach elder	(native)
<i>Melanthera nivea</i>	Snow squarestem	(native)
<i>Nerium oleander</i>	Oleander	(introduced)
<i>Opuntia dillenii</i>	Prickly-pear cactus	(native)
<i>Paspalum caespitosum</i>	Blue crowngrass	(native)
<i>Phoenix canariensis</i>	Canary island date palm	(introduced)
<i>Phoenix dactylifera</i>	Date palm	(introduced)
<i>Psidium guajava</i>	Guava	(introduced)
<i>Sesbania</i> spp.		(introduced)
<i>Sesuvium portulacastrum</i>	Sea purslane	(native)
<i>Sporobolus domingensis</i>	Coral dropseed	(native)
<i>Sporobolus virginicus</i>	Seashore dropseed	(native)
<i>Stachytarpheta jamaicensis</i>	Porterweed	(introduced)
<i>Suriana maritima</i>	Bay cedar	(native)

<i>Tamarindus indica</i>	Tamarind	(introduced)
<i>Thespesia populnea</i>	Seaside mahoe/Portia tree	(introduced)
<i>Uniola paniculata</i>	Sea oats	(native)

**Vegetation extracted from the text of the cultural landscape report that could be replanted:**

**Annuals and perennials grown at Fort Jefferson from 1826-1876**

- Jasmine (*Jasminum* spp.)
- Thunbergia (*Thunbergia* spp.)
- Morning glories (*Ipomoea* spp.)
- Cypress vine (*Ipomoea quamoclit*)
- Four o'clocks (*Mirabilis jalapa*)
- Night blooming cereus (*Hylocereus undatus*)
- Gladiolus (*Gladiolus* cvs.)
- Crocus (*Crocus* spp.)
- Marigold (*Tagetes* spp.)
- Larkspur (*Consolida ajacis*)
- Hollyhock (*Alcea rosea*)
- Spider lilies (*Hymenocallis latifolia*)
- Moonvine (*Ipomea bona-nox*)
- Castor bean (*Ricinus communis*)
- Tapioca plant (*Manihot esculenta*)

**Fruit trees grown at Fort Jefferson from 1826-1876**

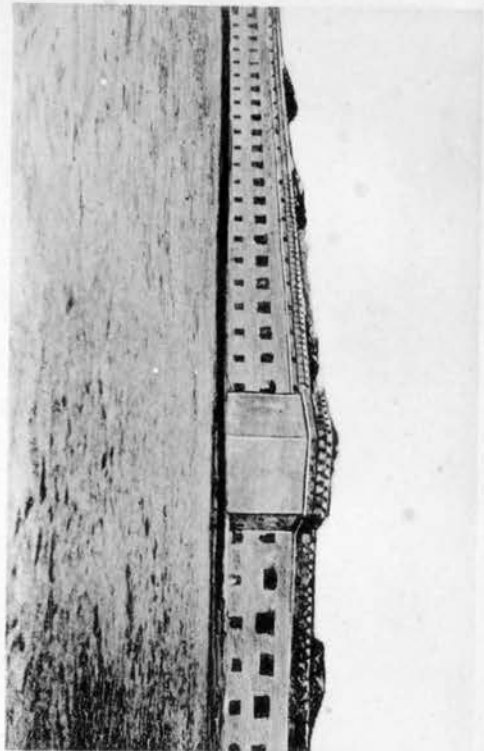
- Banana (*Musa × paradisiaca*)
- Wild banyan tree (*Ficus citrifolia*)

**Vegetables grown at Fort Jefferson from 1826-1876**

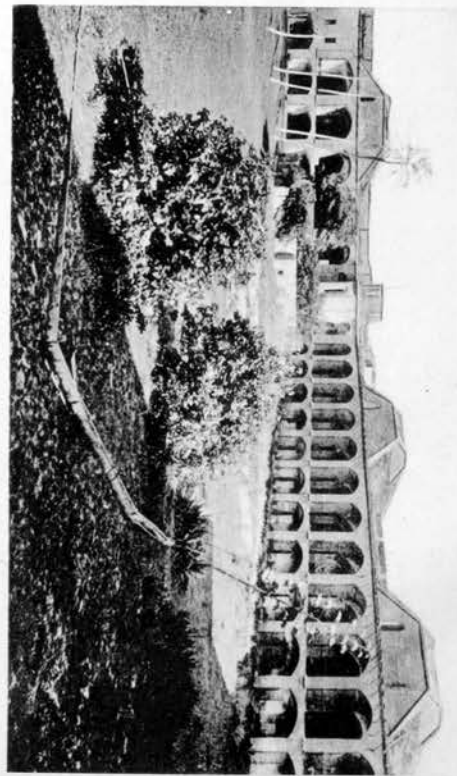
- Beets
- Peas
- Tomatoes
- Beans
- Radishes
- Tomatoes
- Collards
- Corn

**Woody landscape plants grown at Fort Jefferson from 1826-1876**

- Buttonwood (*Conocarpus erectus*)
- Gumbo-limbo (*Bursera simaruba*)
- Date palm (*Phoenix dactylifera*)
- Indian almond (*Terminalia catappa*)
- Coconut palm (*Coconut nucifera*)



7



8



9



10

7. Old Fort Jefferson on Garden Key. Vegetation is shown growing high up on the earth-covered ramparts and bastions.
8. View of Parade Ground in Fort Jefferson showing *Sebesten* bushes in the background.
9. Grove of ancient *Quercus* trees in the Parade Ground at Fort Jefferson, a remnant of the traditional, original, sylvan flora of the Tortugas.
10. Plant of *Hymenocallis cymatocarpa* in bloom.

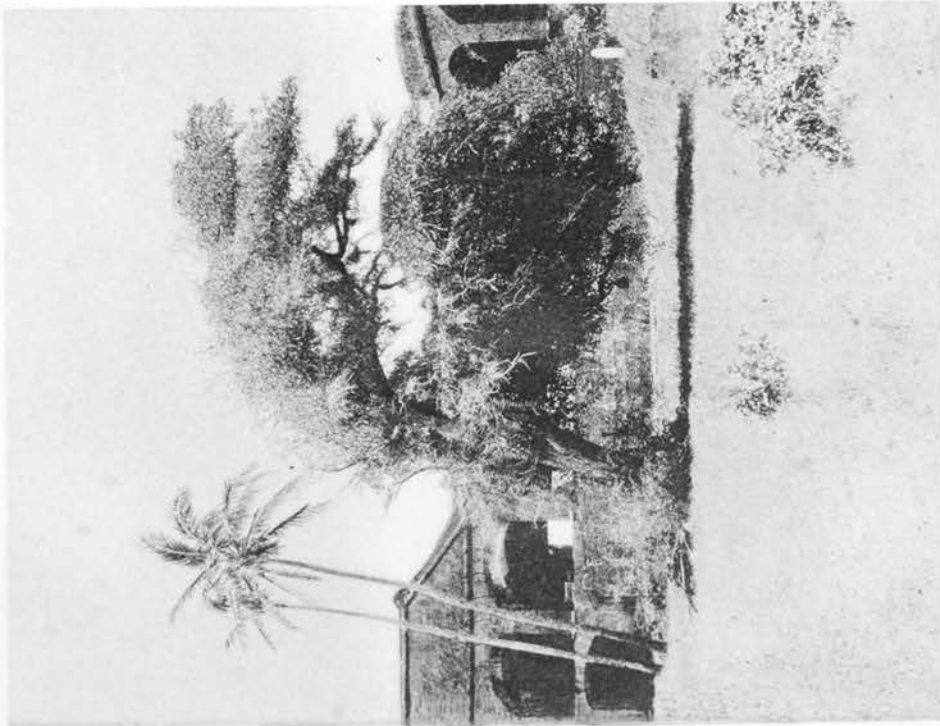
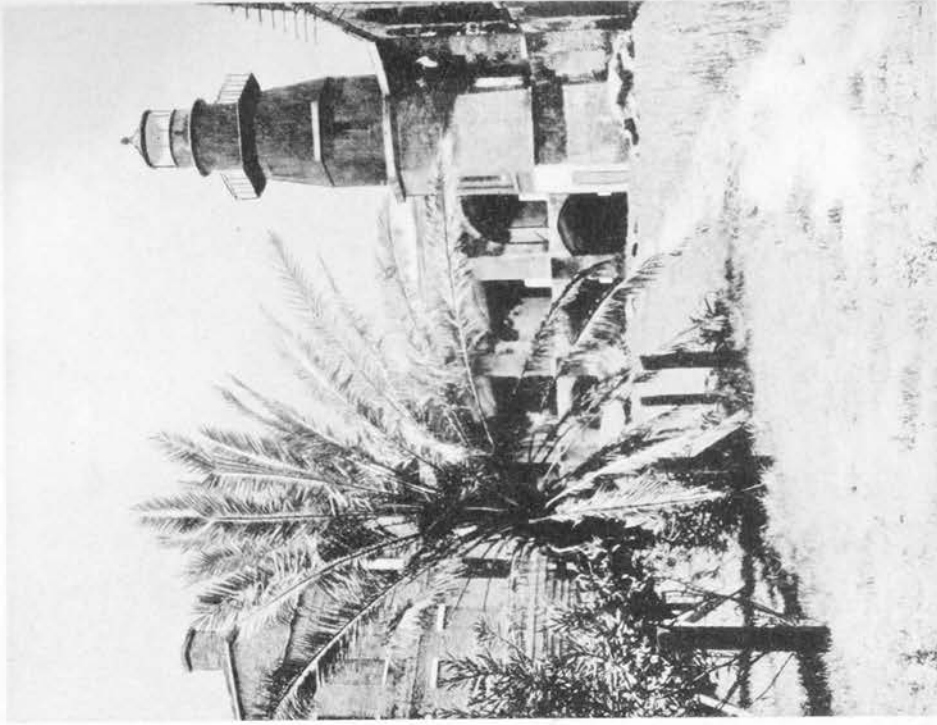
PLATE 4

BOWMAN

BOWMAN

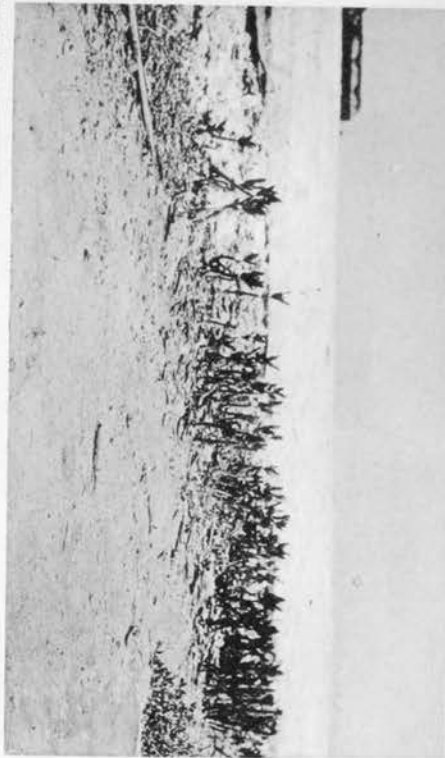
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PLATE 5

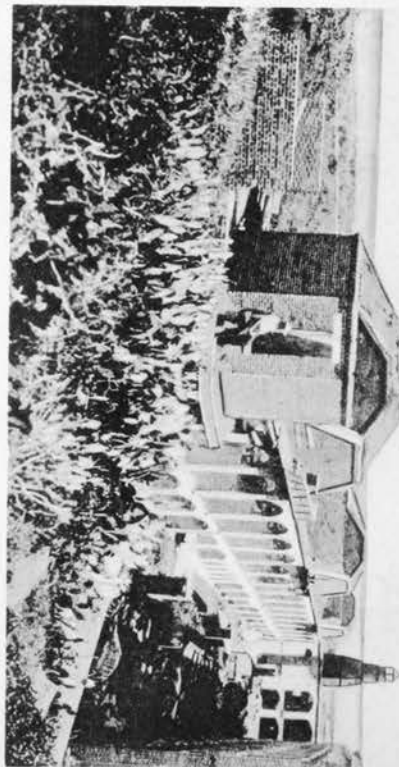


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11. Coconuts and old Tamarind Tree in Parade Ground illustrating the direction of the prevailing wind.  
12. Oleanders and *Phoenix dactylifera* bearing clusters of dates in Parade Ground at Fort Jefferson.

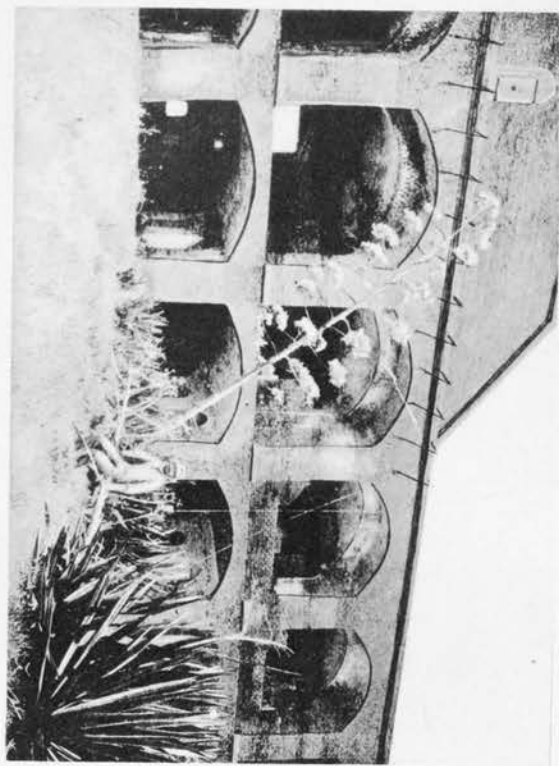


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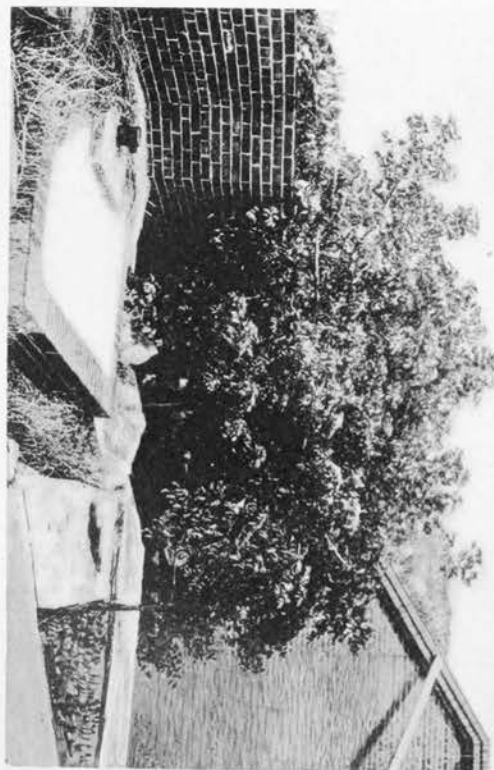


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BOWMAN



15



16

PLATE 6

- 13. Young mangrove seedlings on the beach at Long and Bush Keys.
- 14. *Opuntia alleni* growing high on the ramparts at Fort Jefferson.
- 15. Inflorescence and plants of *Agave decipiens*.
- 16. Gum-Ellemi Tree, *Eliophorum sinaroba*, growing in a crevice of the parapet at Fort Jefferson, Garden Key.



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## Appendix C Glossary

The various sources of the glossary include:

- o Thomas Wilhelm, A Military Dictionary and Gazetteer, Philadelphia, 1881.
- o Colonel H.L. Scott, Military Dictionary, New York, D. Van Nostrand, London, Trubner and Co., 1862.
- o Willard B. Robinson, American Forts: Architectural Form and Function, Urbana, University of Illinois Press, 1977.
- o Albert c. Manucy, "A Constructional History of Fort Jefferson 1846-1874," 1961.

**Barbette:** Platform in fortification on which guns are mounted to fire over parapet.

**Bastion:** Work consisting of two faces and two flanks, all the angles being salient. Two bastions are connected by means of a curtain which is screened by the angle made by the prolongation of the corresponding faces of two bastions, and flanked by the line of defense. Bastions contain, sheltered by their parapets, marksmen, artillery, platform and guards.

**Battery:** Place where cannon or mortars are mounted for attack or defense.

**Blind Embrasure (False Embrasure):** Surface indentation in a walled fortification of such details and dimensions as would simulate the appearance of an actual embrasure or gunport. In the case of Fort Jefferson, the barbette tier armament surmounts the illusory blind embrasures immediately below the parapet.

**Breastwall:** Interior slope of parapet, against which the garrison lean in firing.

**Casemate:** Bombproof chamber in which cannon may be placed to fire through embrasures in its front.

**Coping:** Highest or covering course of masonry in wall, often with sloping edges to carry off water.

**Corbel:** Masonry or brick construction which consists of one of a series of brick courses projecting slightly by steps from the wall surface. Essentially a short cantilever.

**Counterscarp:** Vertical or nearly vertical side of the ditch nearest to the besiegers and opposite to the scarp; exterior slope of ditch or moat opposite the scarp; moat wall.

**Curtain:** That part of the rampart or scarp wall which extends between to bastions or gates.

**Embrasure:** Opening in a fort wall or hole in the mask wall of a casemate through which guns are pointed. The throat of the embrasure is sometimes closed with iron shutters.

**Embrasure Iron:** Massive piece of wrought iron armor which is integrally constructed with the brickwork of an embrasure and is located immediately behind the jambs of a gunport. In the case of Fort Jefferson, these irons measure 8 inches in thickness.

**En Barbette:** Guns are said to be en barbette when they are elevated by raising the earth behind the parapet or by placing them on a high carriage so that instead of firing through embrasures, they can be fired over the crest of the parapet. In this position the guns have a wide range instead of being limited, as in firing through embrasures.

**Enrockment:** Protective layer of loose stone to prevent undermining of counterscarp foundation.

**Exfoliation:** Condition of advanced iron corrosion characterized by swelling and detachment of material in flakes, scales or layers.

**Faces:** Name given to several parts of a fortification, as the face of the bastion which is the two sides reaching from the flanks to the salient angles. Also a particular elevation of a fortified work, as the parade face.

**Front:** At Fort Jefferson, designation of a side of the hexagonal figure; curtain.

**Grillage:** Arrangement of sleepers and crossbeams forming a foundation in loose or marshy soil. At Fort Jefferson, grillage was placed under casemate and bastion piers and extended between those elements to form the understructure for cistern floors.

**Magazine:** Building or room in a fortification for the protected storage of powder or explosives, or more generally for provisions.

**Magistral:** Baseline from which the positions of various units of the fortification are determined.

**Moat:** Deep Ditch around a fort, usually containing water.

**Ordnance:** Artillery.

**Parade:** Courtyard or enclosure in fortification where troops are mustered for assembly or drilled.

**Parapet:** Wall crowning curtain to protect soldiers from enemy fire.

**Parrott:** Early piece of rifled artillery firing an elongated projectile and bearing the name of its designer, Robert P. Parrott.

**Pier:** Mass of detached masonry, distinct from a column, from which an arch springs.

**Pintle:** Pivot about which the chassis of the gun carriage sweeps.

**Rampart:** Broad embankment round a place upon which the parapet is raised.

**Rodman:** Large piece of smoothbore ordnance firing a spherical projectile and named after its designer, Thomas J. Rodman.

**Salient:** Angular work which projects outward from the interior.

**Sally Port:** Gate or passage by which the garrison of a fortress may make a sally against attackers.

**Scarp:** Slope of the protecting ditch or moat which touches the wall or parapet; inner slope of the protecting ditch as the foot of the parapet, nearly perpendicular.

**Short Furnace:** Furnace in which round shot were heated, and subsequently conveyed and loaded into muzzle-loading cannon with a ladle to be then fired as red-hot projectiles.

**Stairtower (Bastion Tower):** Section of the bastion enclosing a spiral stairway.

**Subsidence:** Sinking or settling of the earth.

**Terreplein:** Main upper level of a rampart, between the parapet and the parade face, where guns are mounted; roof of the fort.

**Tier:** Level of fortification.

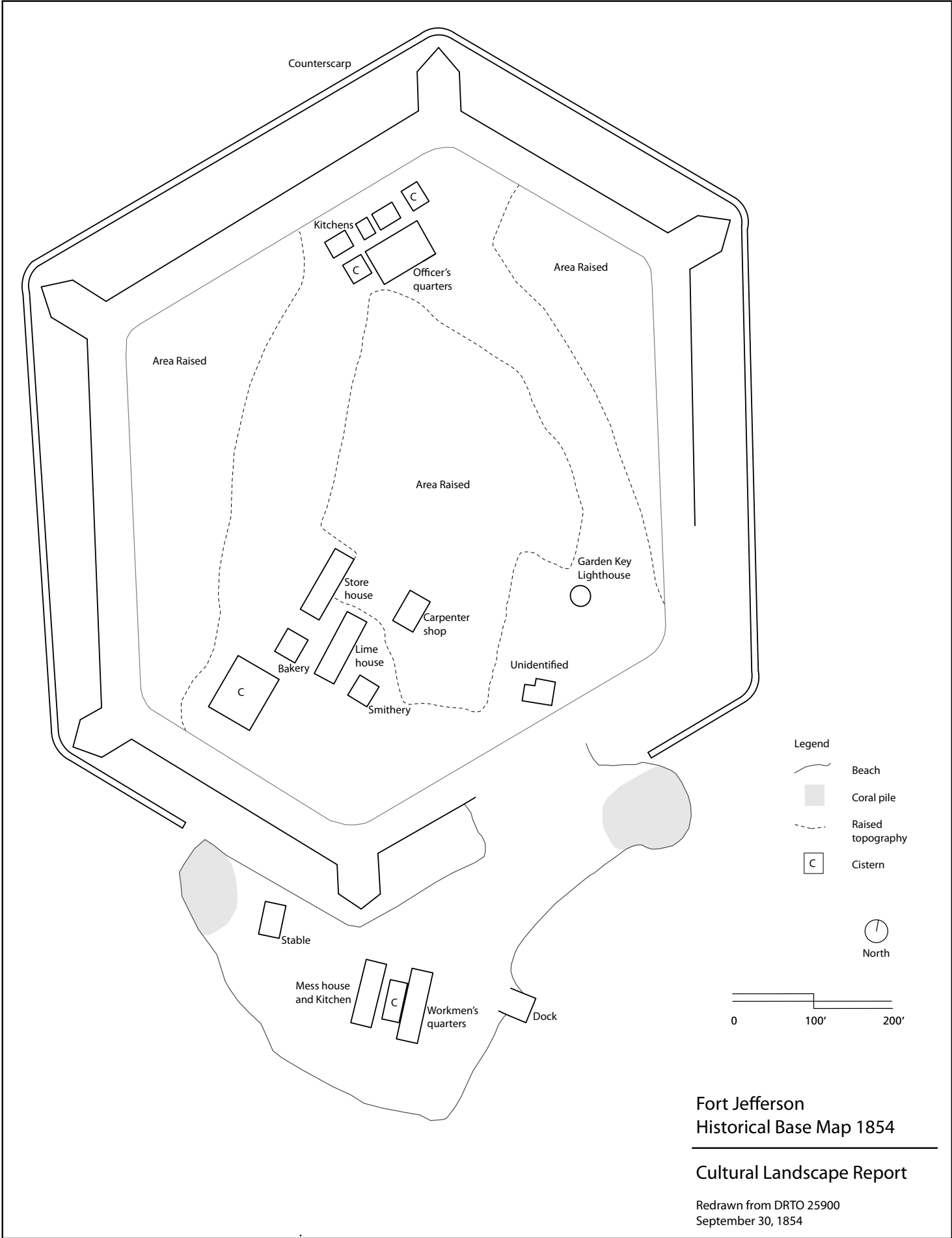
**Totten Shutters:** Iron shutter assembly developed by Engineer Joseph C. Totten. The shutters were part of an entire lining and enclosure for the embrasure and permitted the embrasure to be closed to enemy fire after discharging cannon through the gunport. In the case of Fort Jefferson, the shutters themselves were of wrought iron 2 inches thick.

**Traverse Arc:** Arc of part of a circle described by the movement of a gun carriage about the Pintle or center point; the stone support and iron track upon which the gun carriage rolls to aim the gun right or left.

# Appendix D Matrix

Feature	LCS#	Construction Date	Demolition Date	Contributing	Treatment
Garden Key Lighthouse	HS-01	1876		Yes	Preserve
Fort Jefferson	HS-12/13/14/15	1846-1874		Yes	Preserve
Large Magazine	HS-02	1864-1866		Yes	Preserve
Small Magazine	HS-03	1866?		Yes	Preserve
Hot Shot Furnace	HS-04	1862-1863		Yes	Preserve
Officers' Quarters foundation	HS-06	1850-1866	1962	Yes	Preserve
Enlisted Men's Quarters foundation	HS-07	1862-1866	1962	Yes	Preserve
Engineer Officers' Quarters	HS-08/18/19	1861-1862		Yes	Follow Preservation Plan
Lighthouse foundation	HS-16	1826	1876	Yes	Preserve
Cistern	HS-10	1852		Yes	Preserve
Counterscarp and moat	HS-11	1847-1872		Yes	Preserve
Main Dock		1978		No	
Coaling Docks		1898-1901	1941	No	
Major Smith marker	HS-17	1870		Yes; consult with Region LCS Coordinator	Preserve
Fort Jefferson Brick Walk		1967		No	
Brick Fountain		1970s		No	
Coconut trees		1850s	All historic gone by 1930s		Replant in front of small magazine; officers' quarters block if reconstructed
Buttonwood trees		1850s		Yes	Preserve/replace in kind/replant
Spatial pattern between buildings		1860s		Yes	Preserve
Temporary frame buildings parade		1850s	All by 1876		Archeology, then interpret
Parade ground garden		1860s	Unknown		Restore
Historic paths		1860s			Restore if appropriate
Keeper's quarters		1860s	1912 (burned)		Interpret
Cannon		1860s and 70s		Yes	Conserve and mount



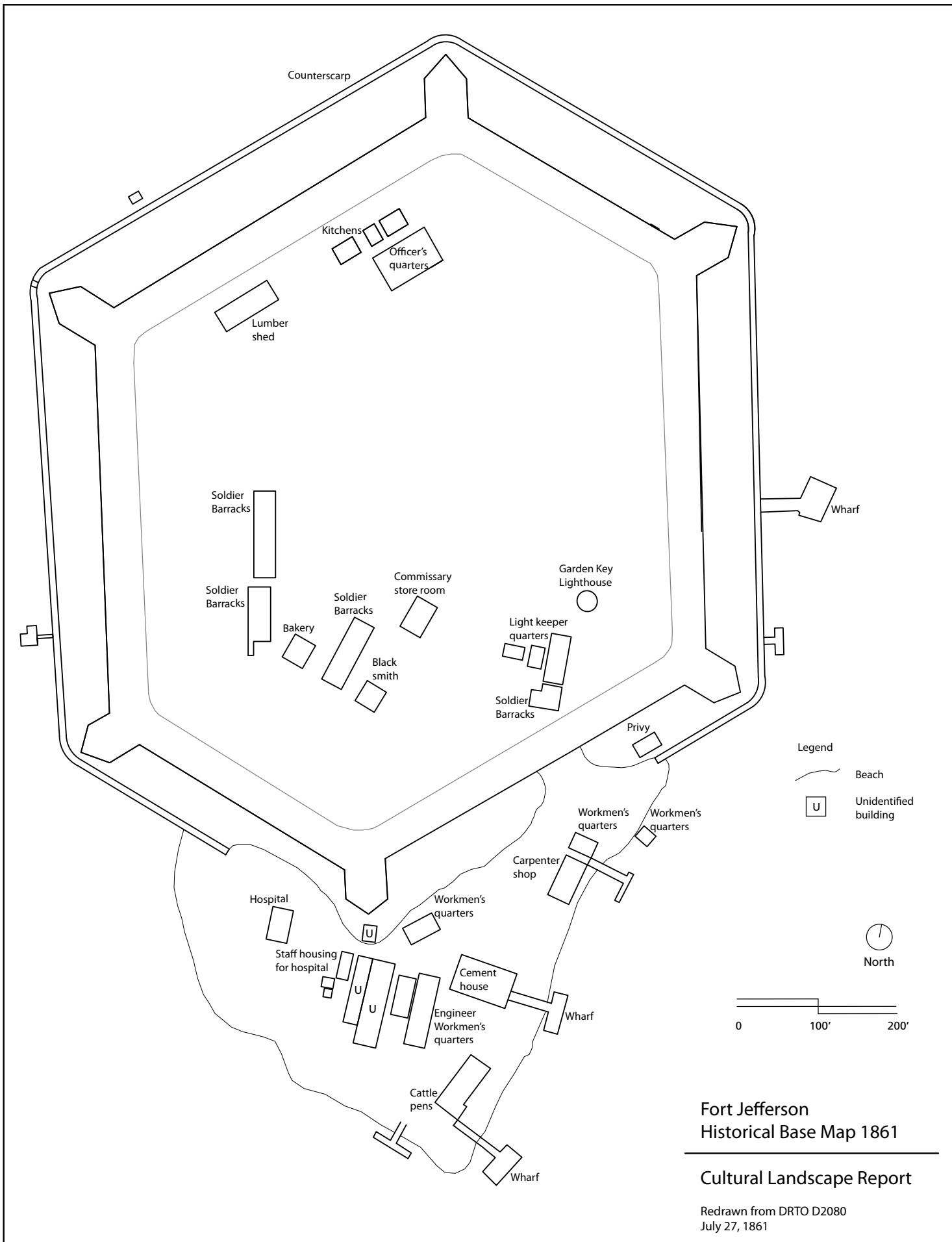


**Fort Jefferson  
Historical Base Map 1854**

**Cultural Landscape Report**

Redrawn from DRTO 25900  
September 30, 1854



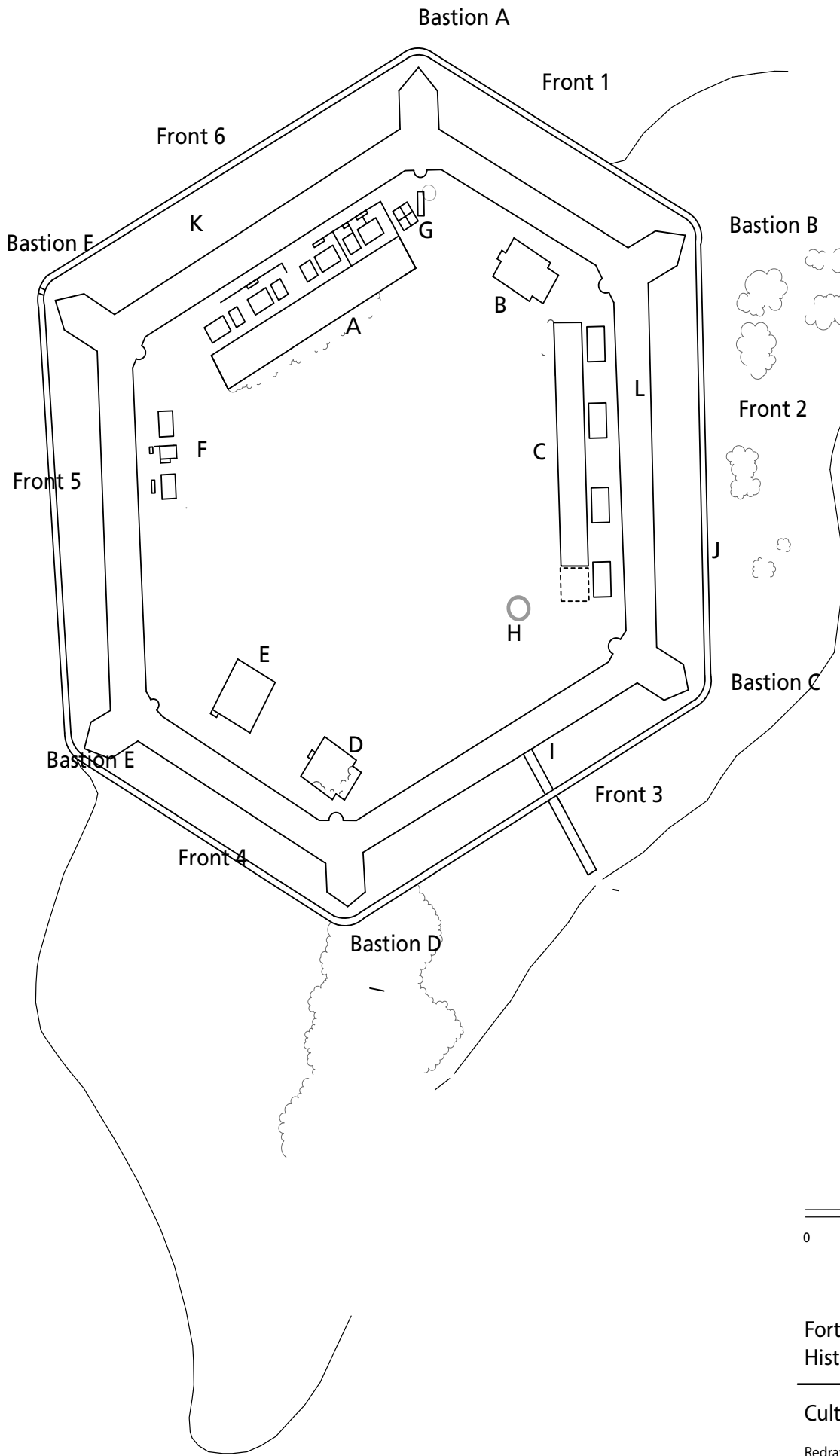


**Fort Jefferson  
Historical Base Map 1861**

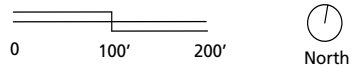
**Cultural Landscape Report**

Redrawn from DRTO D2080  
July 27, 1861





- Legend
- A Officers' quarters
  - B Large magazine
  - C Enlisted men's quarters
  - D Small magazine
  - E Cistern
  - F Engineer officers' quarters
  - G Shot furnace
  - H Light tower
  - I Sally port/Drawbridge
  - J Counterscarp walk
  - K Counterscarp
  - L Terreplein

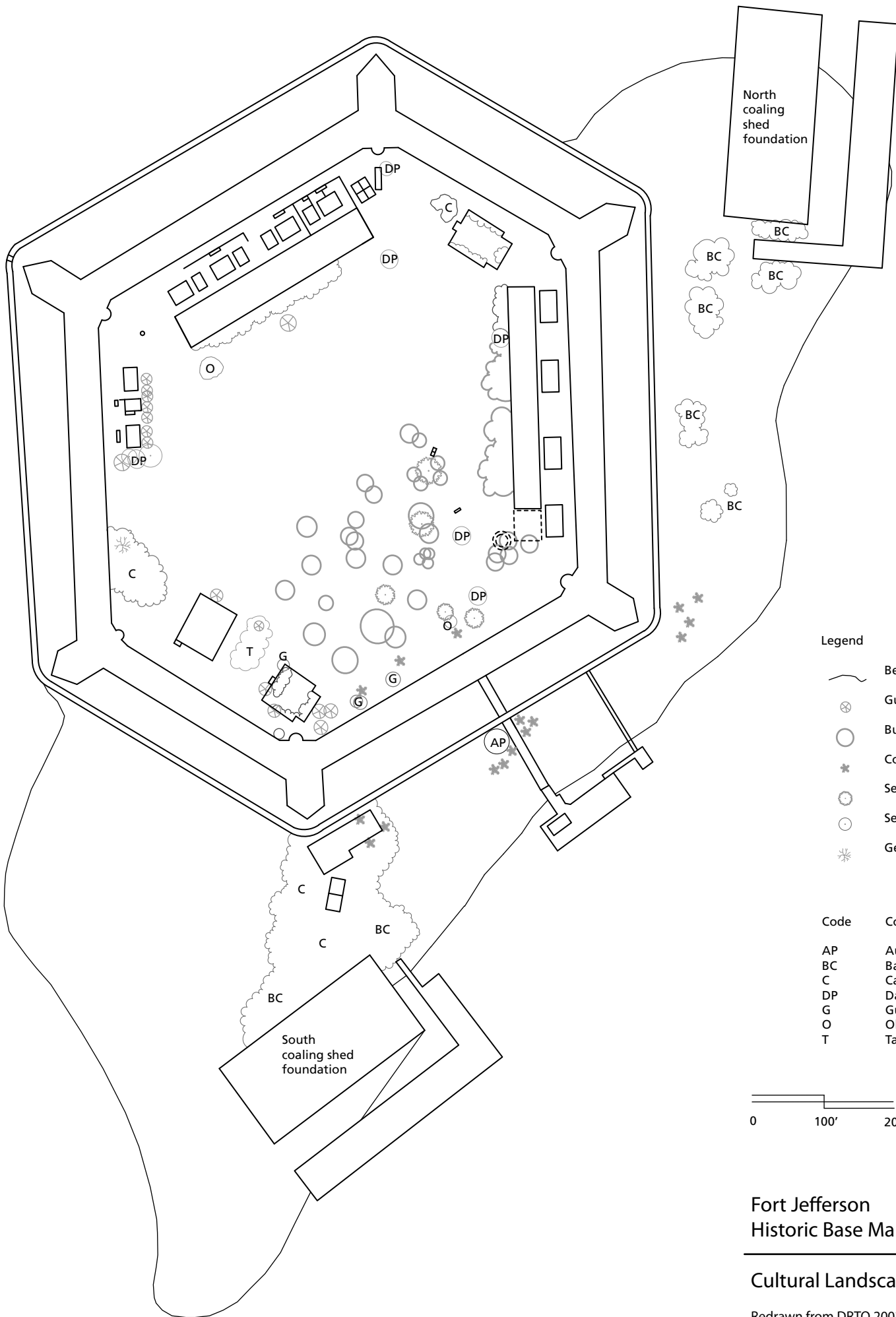


**Fort Jefferson**  
**Historic Base Map 1868**

**Cultural Landscape Report**

Redrawn from DRTO 25900

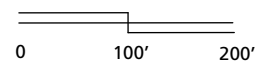




Legend

- Beach
- Gumbo limbo
- Buttonwood
- Coconut palm
- Seaside mahoe
- Seagrape
- Geiger

Code	Common name
AP	Australian pine
BC	Bay cedar
C	Cactus
DP	Date palm
G	Guava
O	Oleander
T	Tamarind

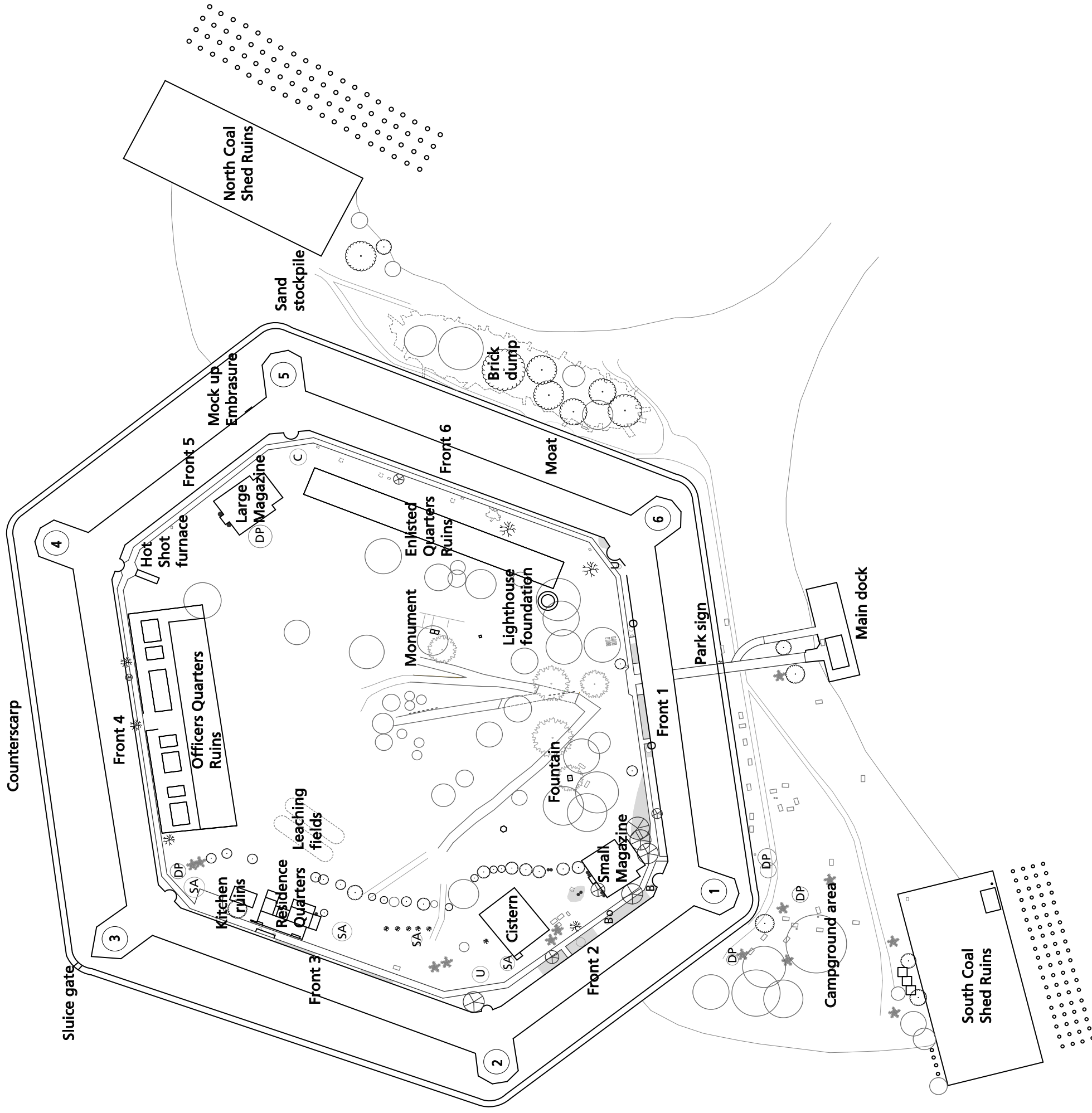


Fort Jefferson  
Historic Base Map 1939

Cultural Landscape Report

Redrawn from DRTO 20021 and 20022





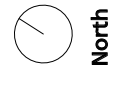
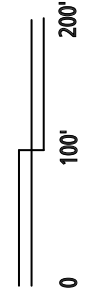
**Legend**

- ▬ Brick walkway
- ▬ Visible sand path
- ⋯ Visible brick edging
- Buried paths (GPR survey)\*
- ⬢ Brick rubble
- ⌋ Beach
- Planted beds\*\*
- ◇ Picnic tables/Benches
- Interpretive signs
- Campground grills

- Buttonwood
- ★ Coconut Palm
- ✱ Geiger
- ⊗ Gumbo Limbo
- Night-blooming Cereus
- ⊗ Seaside Mahoe
- Seagrape

**Code Common name**

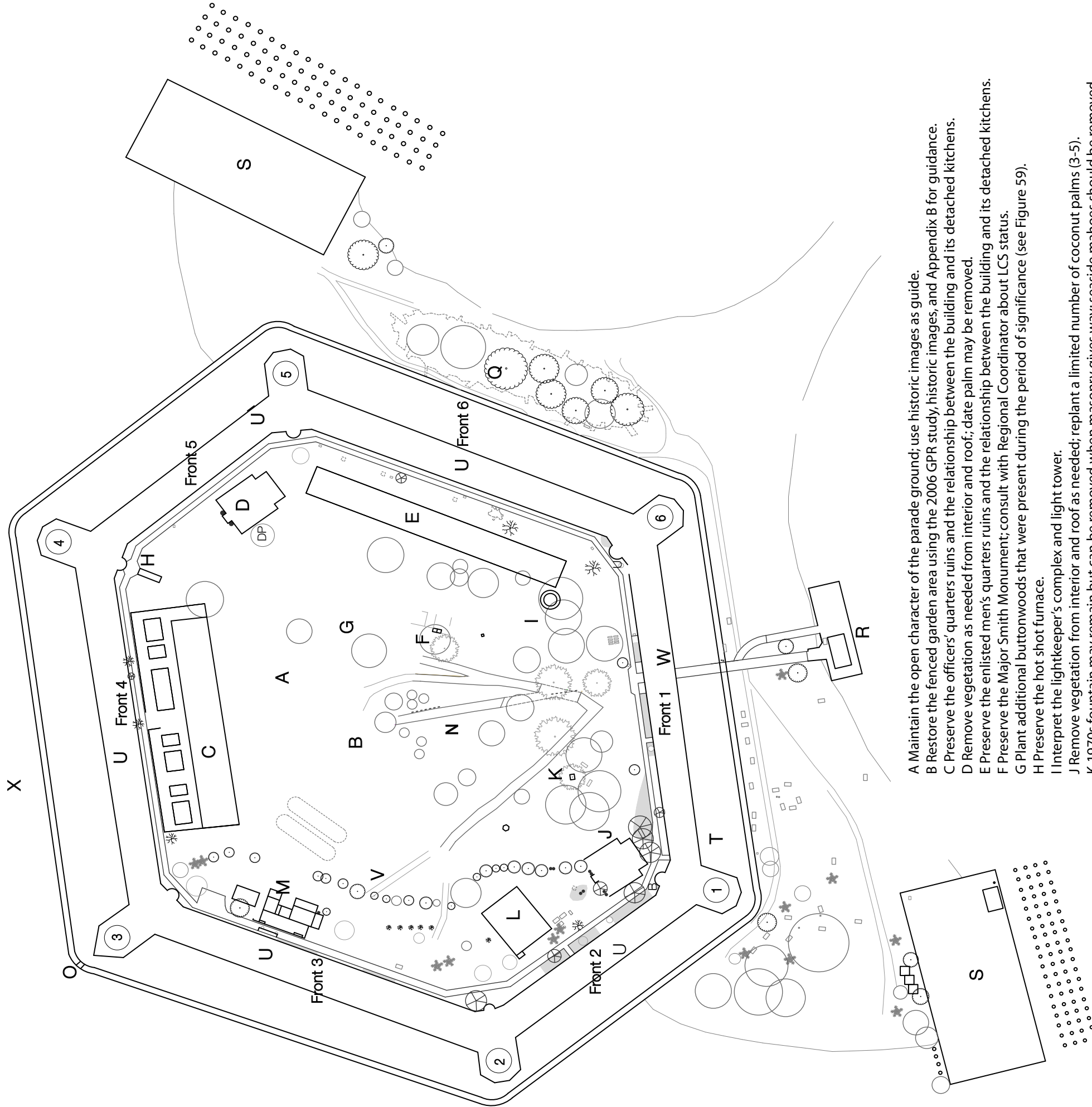
- B Banana
- C Cereus
- DP Date Palm
- O Ochrosia
- SA Indian Almond
- SO Sour Orange
- U Unidentified



**Fort Jefferson**  
**Existing Conditions**  
 Dry Tortugas National Park  
 Cultural Landscape Report  
 March 2009

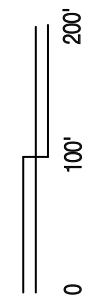
\*GPR survey located buried paths.  
 Dashed lines represent conjecture  
 \*\*Planting beds contain Beach Lily, Aloe Vera, and Mother-in-laws tongue





- A Maintain the open character of the parade ground; use historic images as guide.
- B Restore the fenced garden area using the 2006 GPR study, historic images, and Appendix B for guidance.
- C Preserve the officers' quarters ruins and the relationship between the building and its detached kitchens.
- D Remove vegetation as needed from interior and roof; date palm may be removed.
- E Preserve the enlisted men's quarters ruins and the relationship between the building and its detached kitchens.
- F Preserve the Major Smith Monument; consult with Regional Coordinator about LCS status.
- G Plant additional buttonwoods that were present during the period of significance (see Figure 59).
- H Preserve the hot shot furnace.
- I Interpret the lightkeeper's complex and light tower.
- J Remove vegetation from interior and roof as needed; replant a limited number of coconut palms (3-5).
- K 1970s fountain may remain but can be removed when masonry gives way; seaside mahoes should be removed.
- L Preserve the cistern.
- M Repair and preserve the building using the 2010 Exterior Preservation Plan.
- N Restore main pathways identified in 2006 GPR study.
- O Preserve the counterscarp walk.
- P Plant buttonwoods, seagrapes, or gumbo limbo to provide shade to visitors.
- Q Remove trash from dumpsite; do not excavate or bury the brick pile; use old bricks to line historic pathways.
- R Changes to the dock or boat house should approximate the look and feel of the current dock.
- S Stabilize as needed.
- T Investigate moving communications equipment to another location or decrease visual intrusion with new technology.
- U Clear vegetation from shot cellars and traverse circles as needed; reassemble granite pieces not part of historic scene.
- V As trees decline, replant in a more natural arrangement, not a straight line.
- W Reconstruct historic sally port doors.
- X All recommendations for the fort refer to HSR-Amendment and established best practices.

\*GPR survey located buried paths.  
 Dashed lines represent conjecture







As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS 364/116644, June 2011

Dry Tortugas National Park

Cultural Landscape Report

