National Park Service
Cultural Landscapes Inventory

2020



Sandy Hook Coastal Defense Batteries

Gateway National Recreation Area

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Introduction

The Cultural Landscape Inventory (CLI)

The Cultural Landscape Inventory (CLI) is a comprehensive inventory of all cultural landscapes in the National Park System. Landscapes that are listed, or eligible for listing, on the National Register of Historic Places, or are otherwise managed as cultural resources and in which the National Park Service has, or plans to acquire, legal interest are included in the inventory. The CLI identifies and documents each landscape's location, size, physical development, landscape characteristics, character-defining features, and condition. Cultural landscapes have approved CLIs when concurrence with the findings is obtained from the park superintendent and all required data fields are entered into the Cultural Resources Information System (CRIS-CL) database. In addition, for landscapes not currently listed on the National Register and/or without adequate documentation, concurrence is required from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or the Keeper of the National Register.

Scope of the CLI

The information contained within the CLI is compiled from primary and secondary sources and through on-site surveys of the landscape. The level of investigation is dependent upon scoping the need for information. The baseline information collected provides a comprehensive look at the historical development and significance of the landscape. Documentation and analysis of the existing landscape identifies character-defining characteristics and features and allows for an evaluation of the landscape's integrity and an assessment of the landscape's condition. The CLI also includes historic maps, drawings, and images; photographs of existing conditions; and a site plan that indicates major features. The CLI documents the existing condition of park landscape resources and identifies impacts, threats, and measures to stabilize condition. This information can be used to develop strategies for improved stewardship. Unlike a Cultural Landscape Report (CLR), the CLI does not provide management recommendations or treatment guidelines for the cultural landscape, but it may identify stabilization measures.

The Cultural Resources Information System (CRIS)

CRIS is the National Park Service's database of cultural resources on its lands, consisting of archeological sites, historic structures, ethnographic resources, and cultural landscapes. Cultural Resources Inventory System (CRIS) replaces three legacy inventory systems: ASMIS (archeology), CLI (cultural landscapes), and LCS (historic structures); and it reinstates the former ERI (ethnographic resources). This Cultural Landscape Inventory document reflects the information in a corresponding CRIS Cultural Landscape record.

Statutory and Regulatory Foundation

The legislative, regulatory, and policy directives for conducting and maintaining the CLI within CRIS are:

- National Historic Preservation Act (NHPA) of 1966 (16 USC 470h-2(a)(1)) Sec. 110
- Executive Order 13287: Preserve America, 2003. Sec. 3 (a and c)
- Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs
- Pursuant to the National Historic Preservation Act, 1998. Std. 2
- Cultural Resource Management Guideline, 1997, Release No. 5, page 22; issued pursuant to Director's Order #28 (DO-28)

The NHPA requires the identification, evaluation, and nomination of historic properties to the National Register of Historic Places and the maintenance and expansion of an inventory of cultural resources. DO-28 requires a cyclic assessment of the current condition of cultural landscapes based on an assessment interval, with a default of six years.

Use

Beyond fulfilling legal and policy requirements, park staff can use the Cultural Landscape Inventory in the following ways:

- To learn about park cultural landscapes (all staff)
- To inform management decisions (park managers)
- To inform project planning and development (park managers, facility managers, project managers, compliance specialists)
- To monitor the condition of the cultural landscape and take measures to protect its significance and integrity (cultural resource managers, facility managers)
- To recognize the stabilization and treatment needs of landscape features and plan work within cultural landscapes to address the needs (facility managers, cultural resource managers)
- To understand the cultural value of natural systems in a cultural landscape (natural resource managers)
- To create programming and educational materials based on site history (interpretation and education specialists)
- To recognize impacts within cultural landscapes and enforce protection measures (visitor and resources protection staff)

General Information

Property Level and CLI Numbers

Inventory Unit Name: Sandy Hook Coastal Defense Batteries

Resource Classification: Component Landscape

CLI Identification Number: 975528

Parent Landscape: 650079

Inventory Status: Complete

Park Information

Park Name: Gateway National Recreation Area

Alpha Code: GATE

Park Organization Code: 1775

Park District: GATE

Region: Northeast

Restricted: No

Landscape Description:

The Sandy Hook Coastal Defense Batteries are part of Gateway National Recreation Area, which covers more than 40 square miles in New York and New Jersey. Established on October 27, 1972, the park provides a national park experience in the New York City area, preserving a mosaic of coastal ecosystems and natural areas interwoven with historic coastal defense and maritime sites around New York's Outer Harbor. The park has three administrative units – Jamaica Bay, Staten Island, and Sandy Hook –
that are geographically distinct but linked together by similar types of resources and recreation uses. The Sandy Hook Unit is 4,688 acres of land, bay, and ocean waters in Monmouth County, New Jersey. Part of the Middletown Township, surrounding communities include the boroughs of Atlantic Highlands, Highlands, Monmouth Beach, and Sea Bright along Route 36.

The Sandy Hook Unit lies at the northern end of the New Jersey barrier island system that is characterized by relatively flat topography and undulating dunes shaped by waves and wind. The central portion of the peninsula is dominated by a maritime holly forest, which contrasts with the more developed areas concentrated at the north and south ends. The southern end features recreational facilities for visitors to enjoy the beaches and natural areas associated with the Atlantic Ocean and Sandy Hook Bay. The northern end contains the Fort Hancock and Sandy Hook Proving Ground Historic District and an active U.S. Coast Guard base. Each year, more than two million people visit Sandy Hook's many natural and cultural resources.

Over the course of more than one-hundred years, facilities at Sandy Hook have had major roles in the testing and deployment of weapons systems, including nearly every kind of seacoast artillery, harbor mines, searchlights, and RADAR systems. Fort Hancock was established in 1895 as part of a new nationwide system of coastal fortifications proposed in 1886 by the Endicott Board. Various gun batteries comprised of concrete structures and engineered earthworks were built between 1893 and 1917, and finally disarmed and mothballed by the U.S. Army following the end of World War II. The Army then briefly took Fort Hancock off-line January to June 1950 until the onset of the Korean Conflict, and soon thereafter used the property to locate missile defenses protecting the surrounding metropolitan area against bombardment by high-altitude aircraft. When the missile defense system was deemed obsolete in the early 1970s, the Army's land, which also included a complex infrastructure of roads, railroad rights-of-

way, and utility corridors, was transferred to the National Park Service. Today, elements of this coastal defense system and associated infrastructure survive, though many are in an advanced state of deterioration and hidden by successional vegetation.

This cultural landscape inventory documents eleven extant Endicott-Taft period gun batteries and two separate sites that comprise a NIKE missile battery. However, it does not include two sites that served as important components in Sandy Hook's coastal defenses; the Mine Casemate, which is presently on U.S. Coast Guard property, and Battery Arrowsmith, which is located on Horseshoe Cove Point that protrudes into Sandy Hook Bay and is in a ruinous and unstable condition.

SIGNIFICANCE SUMMARY

The Sandy Hook Coastal Defense Batteries are part of the Fort Hancock and Sandy Hook Proving Ground Historic District that was listed on the National Register of Historic Places on April 24, 1980. The boundary of the National Register district encompasses 459 acres, including the northern portion of the Sandy Hook peninsula that was historically associated with Fort Hancock and the Proving Ground, and thirteen coastal defense areas identified in this inventory. The National Register documentation identified significance under Criterion A in the area of Military for the dates 1859-1950s when Fort Hancock served as chief unit in the defense of New York Harbor from the Spanish-American War through the Cold War, and in the area of Invention for the dates 1874-1919 as the site of the Army Ordnance Board's Proving Ground. In consultation with the New Jersey State Historic Preservation Office (SHPO) in 1996, the National Park Service extended the end date of the period of significance to 1974 to acknowledge later developments of missile defense systems at Sandy Hook and their associated resources.

The Fort Hancock and Sandy Hook Proving Ground Historic District was designated as a National Historic Landmark (NHL) on December 17, 1982. The boundary of the NHL district is 4,584 acres, which encompasses the entire Sandy Hook peninsula, from the Highway 36 bridge to the northernmost point of the peninsula. The NHL documentation identified significance under Criterion 1 in the areas of Military and Social History for the dates 1859-1958 for the development of Sandy Hook defenses, and 1895-1949 for the operation of the Spermaceti Cove No. 2 Life-Saving Service Station (Fort Hancock Life Saving Station). The documentation also identified significance under Criterion 3 for Engineering for the dates 1874-1919 as related to the operation of the Sandy Hook Proving Ground. The overall NHL period of significance is 1857-1958.

For the purposes of this CLI, the Coastal Defense Batteries are significant under National Register criteria A and C in the areas of Military, Social History, and Engineering. The overall period of significance is 1859-1974, beginning when construction commenced on the granite Fort at Sandy Hook and ending when the Army closed the NIKE missile site and Fort Hancock was officially deactivated.

ANALYSIS AND EVALUATION SUMMARY AND CONDITION

Significant landscape characteristics identified for the coastal defense batteries include spatial organization, topography, vegetation, circulation, buildings and structures, views and vistas, and small-scale features. The spatial relationship of an Endicott-Taft period gun battery's firing side and engineered earthwork, concrete structure, and rear elevation for access remains unaltered at the individual sites. At the NIKE missile sites, the distinct three spaces designed for separate functions are retained and identified by arrangements of buildings and structures and circulation routes. The engineered earthworks at all sites are primarily intact with some erosion occurring since the end of the historic period. Large woody vegetation growing on the earthworks creates the potential for the placed earth and sand to be removed by a toppled tree. Vehicular circulation routes provide access throughout Sandy Hook and among the various coastal defense battery sites. Sidewalks and pedestrian circulation systems provide access among the individual structures that comprise the NIKE missile sites. The reinforced concrete structures and engineered earthworks that comprise the building system for the batteries are intact, but there is evidence of spalling, cracks, and separation on the concrete elements. Tactical views from the artillery emplacements, battery commander's stations, and fire control stations to the water are primarily impeded by woody vegetation growing at the interface of the engineered earthwork and concrete battery structure. The coastal defense batteries contain numerous small-scale architectural features associated with buildings and structures. Railings and features utilized for lighting, electronic communication, and weather observation are present on various batteries and in the landscape there are small-scale features such as fencing and exterior lighting.

The coastal defense batteries retain integrity of location, setting, materials, and workmanship. The batteries also

retain integrity of design, feeling, and association, but these aspects are diminished primarily due to the addition of non-historic structures, changes to circulation features, and the growth of large woody vegetation. These aspects have not been permanently lost and can be greatly improved with the removal of the non-historic vegetation. The coastal defense batteries retain their overall physical forms and addressing the condition of historic details will strengthen the association of the batteries as critical installations for defending the southern approach to New York City and the metropolitan area's airspace.

The overall condition of the coastal defense batteries is "fair" due to the unmanaged growth of large woody vegetation, concrete and building material deterioration, and social trails that traverse historic engineered earthworks.

Landscape Hierarchy Description:

The Sandy Hook Coastal Defense Batteries, along with the Fort Hancock Post Grounds, is a component landscape of the larger Fort Hancock Military Reservation landscape at the Sandy Hook Unit of Gateway National Recreation Area. Gateway is comprised of two other units. The Jamaica Bay Unit contains the Breezy Point, Fort Tilden, Jacob Riis Park, and Floyd Bennett Field landscapes. The Staten Island Unit contains the Fort Wadsworth (including the Battery Weed Headlands component landscape), Great Kills, and Miller Field landscapes.

Landscape Type:

Historic Designed Landscape

Other Names:

Other Name:	Battery Urmston	**Other Name Type:**	Both Current And Historic
Other Name:	New Battery Urmston (World War II-era emplacement)	**Other Name Type:**	Historic
Other Name:	Battery No. 6 (World War II-era emplacement)	**Other Name Type:**	Historic
Other Name:	Battery Morris and CFR station	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Engle	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Peck	**Other Name Type:**	Both Current And Historic
Other Name:	Battery No. 8 (Battery Peck)	**Other Name Type:**	Historic
Other Name:	Nine Gun Battery	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Alexander (one of four batteries comprising Nine Gun Battery)	**Other Name Type:**	Both Current And Historic

Other Name:	Battery Halleck (one of four batteries comprising Nine Gun Battery)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Bloomfield (one of four batteries comprising Nine Gun Battery)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Richardson (one of four batteries comprising Nine Gun Battery)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery No. 7 (four World War II era 90mm gun emplacements located south of the present North Beach Center)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Potter	**Other Name Type:**	Both Current And Historic
Other Name:	Gun Lift Battery #1 (Battery Potter)	**Other Name Type:**	Historic
Other Name:	Battery Granger	**Other Name Type:**	Both Current And Historic
Other Name:	Ten-inch Battery #1 (Battery Granger)	**Other Name Type:**	Historic
Other Name:	Mortar Battery	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Reynolds (one of two firing batteries comprising the Mortar Battery)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery McCook (one of two firing batteries comprising the Mortar Battery)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Gunnison	**Other Name Type:**	Both Current And Historic
Other Name:	New Battery Peck (Battery Gunnison)	**Other Name Type:**	Historic
Other Name:	Battery Arrowsmith (ruin, not evaluated in CLI)	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Kingman	**Other Name Type:**	Both Current And Historic
Other Name:	Battery Mills	**Other Name Type:**	Both Current And Historic

Other Name:	NIKE Radar Site (synonymous with NIKE Integrated Fire Control Site)	**Other Name Type:**	Both Current And Historic
Other Name:	NIKE Integrated Fire Control Site (synonymous with NIKE Radar Site)	**Other Name Type:**	Both Current And Historic
Other Name:	NIKE Launch Site	**Other Name Type:**	Both Current And Historic

Site Plan



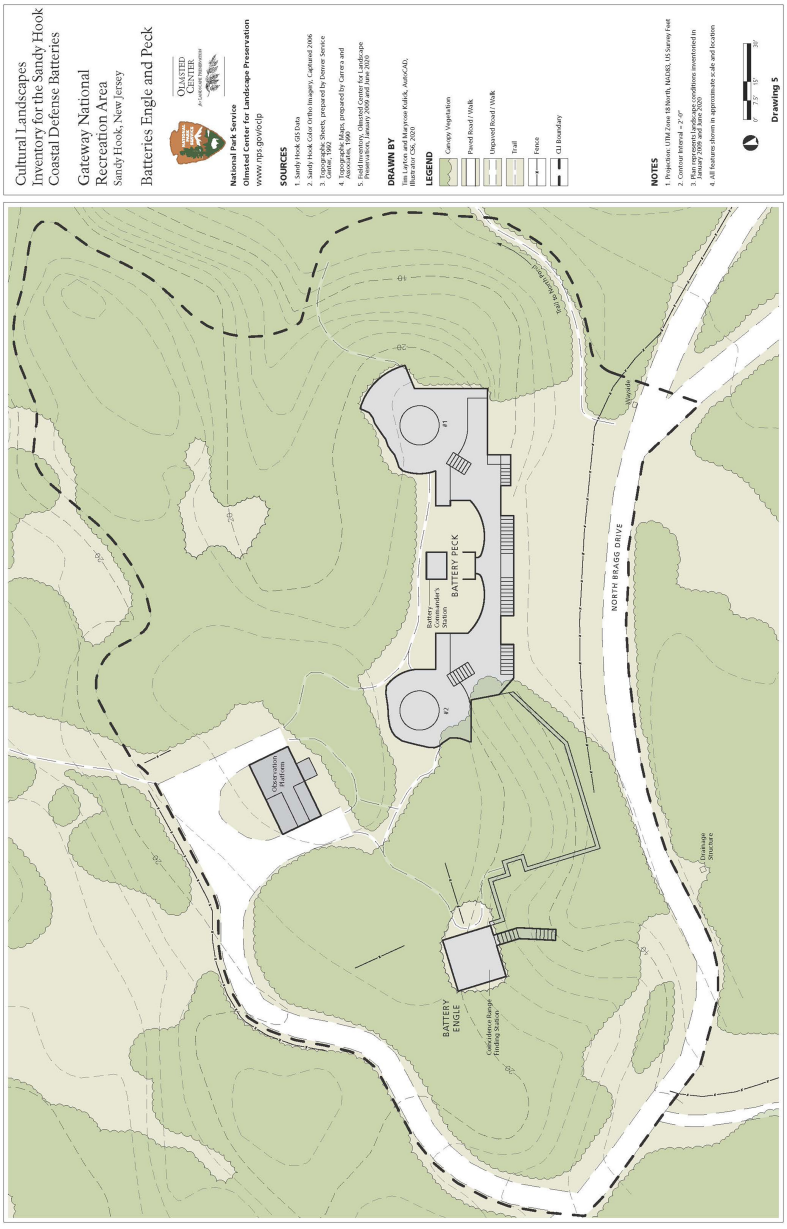
Drawing 2, Coastal Defense Batteries.



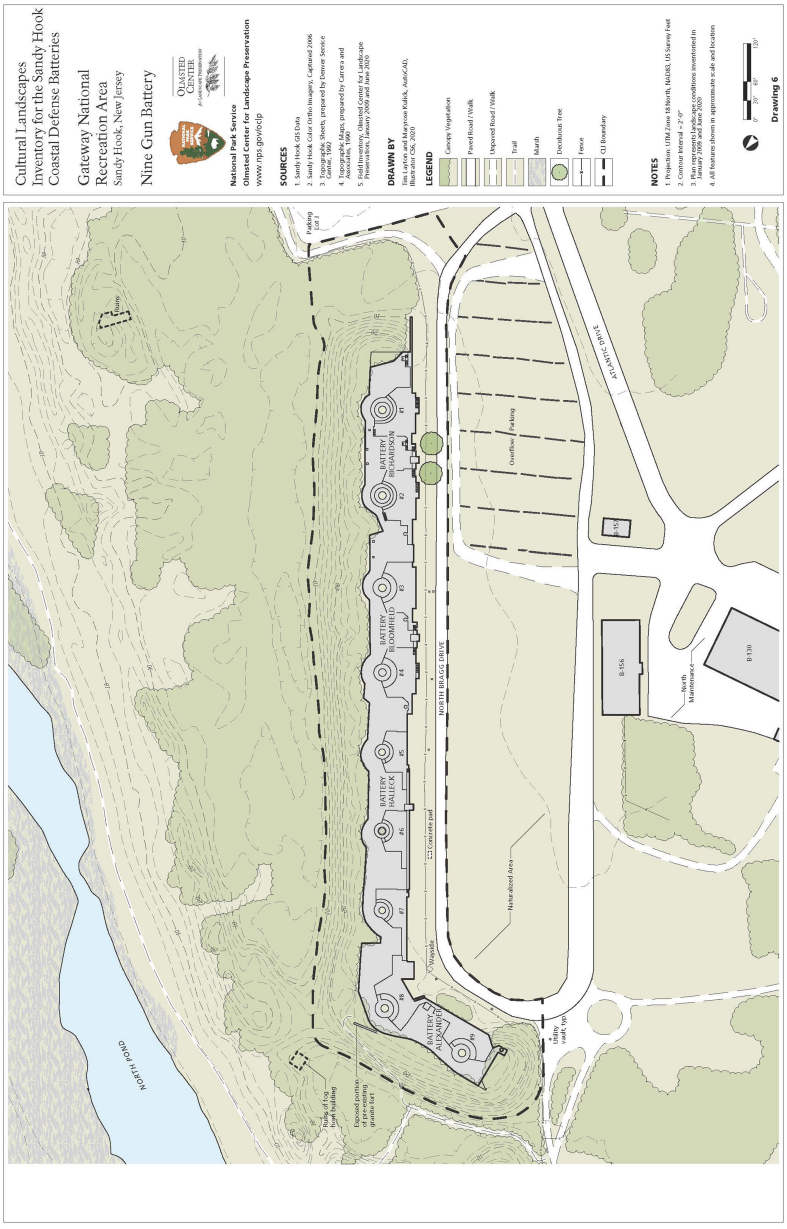
Drawing 3, Battery Urmston.



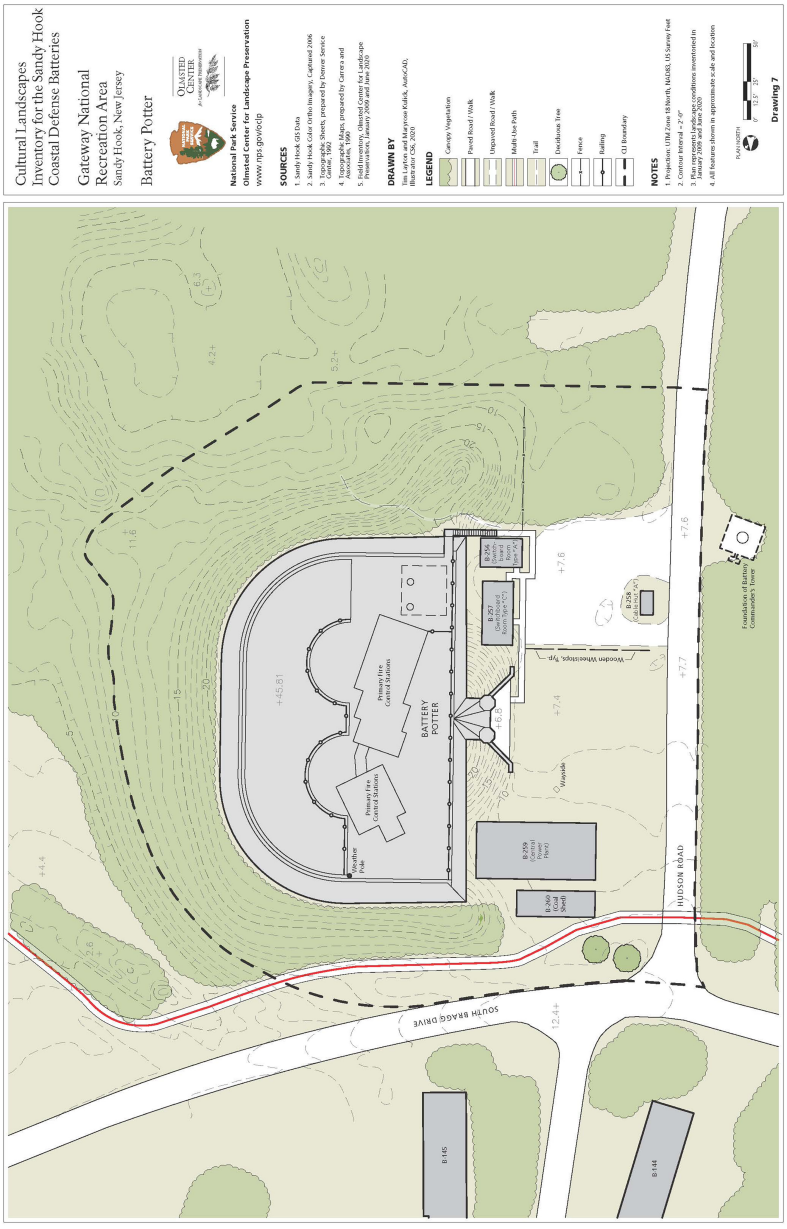
Drawing 4, Battery Morris.



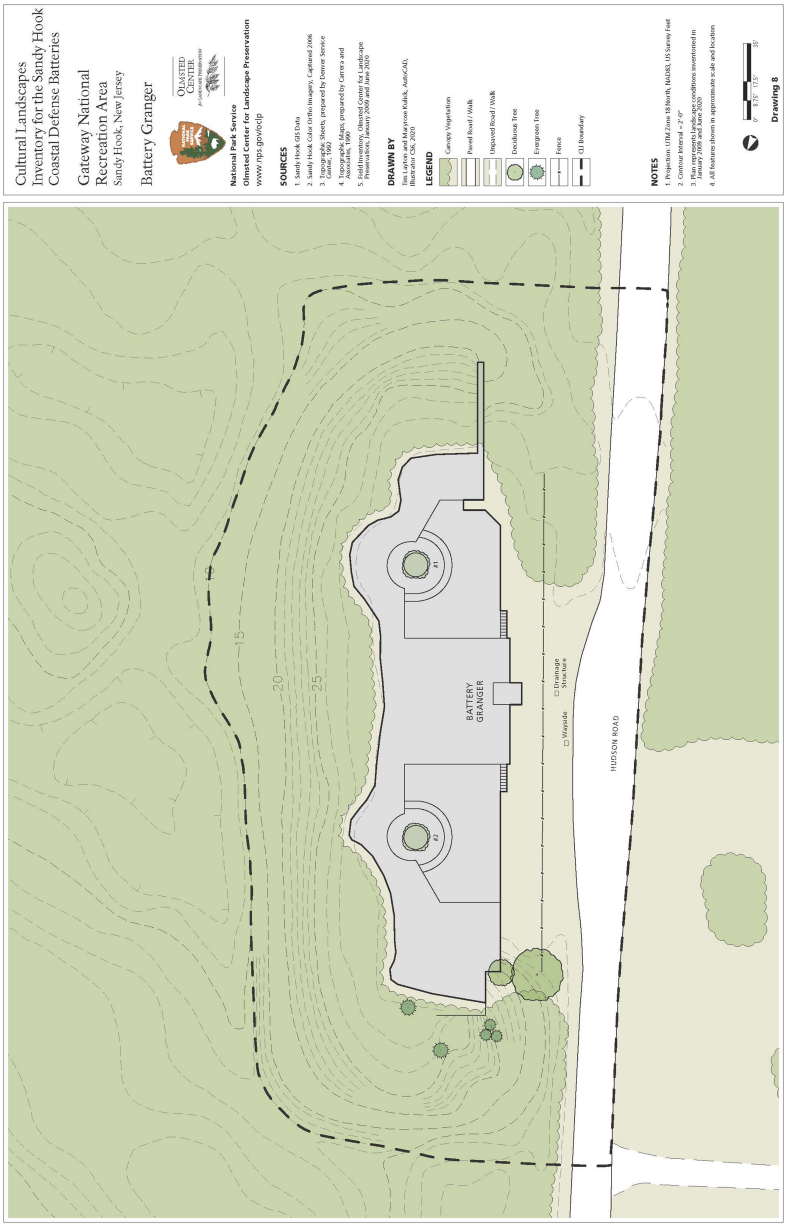
Drawing 5, Batteries Engle and Peck.



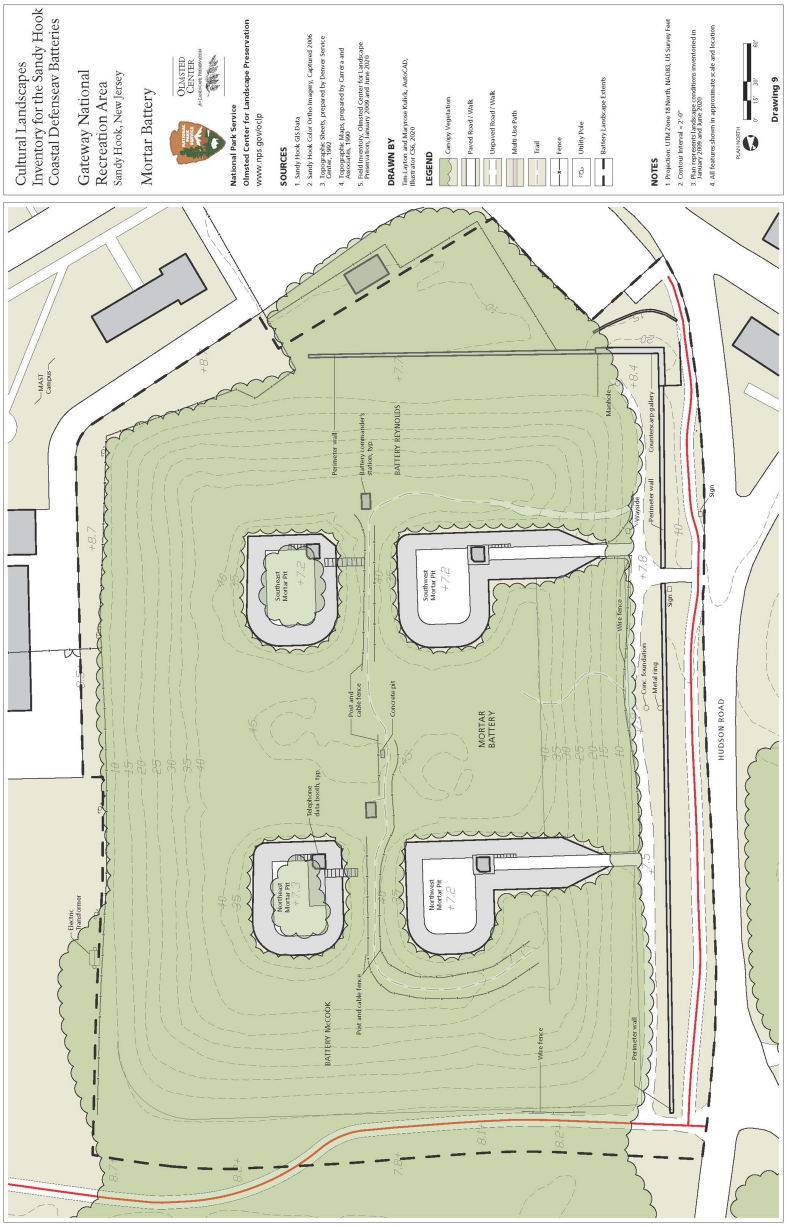
Drawing 6, Nine Gun Battery.



Drawing 7, Battery Potter.



Drawing 8, Battery Granger.



Drawing 9, Mortar Battery.



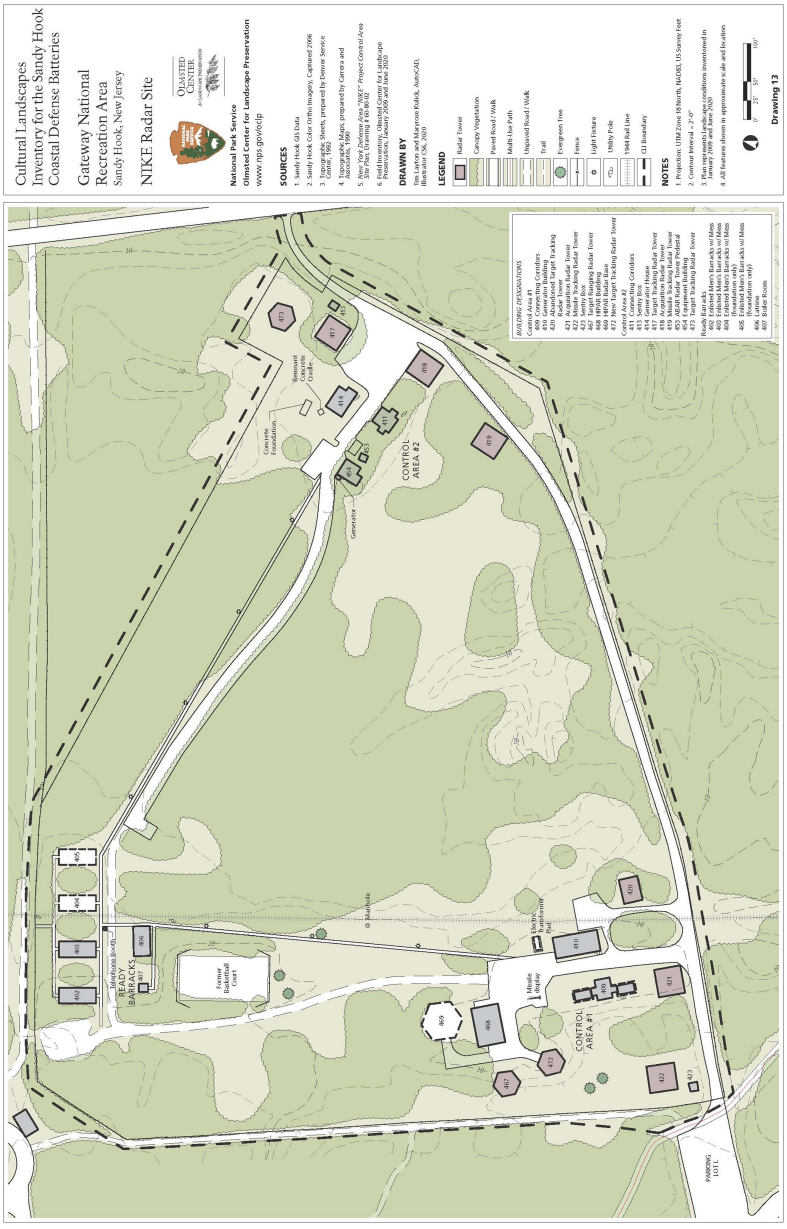
Drawing 10, Battery Gunnison.



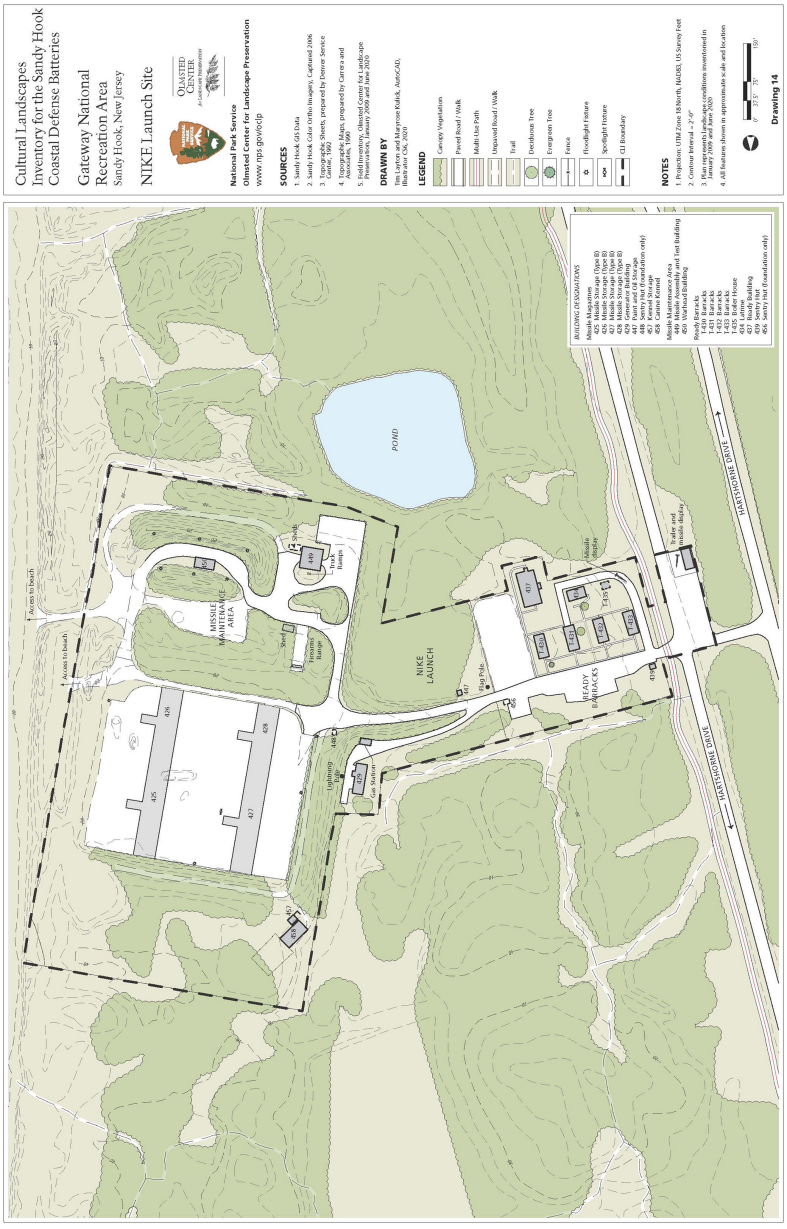
Drawing 11, Battery Kingman.



Drawing 12, Battery Mills.



Drawing 13, NIKE Radar Site.



Drawing 14, NIKE Launch Site.



Drawing 1, Site Map.

Concurrence Information

Concurrence Status:

Park Superintendent Concurrence: Yes

Park Superintendent Date of Concurrence: 09/02/2020

Completion Status Explanatory Narrative:

This CLI is based on the 2010 Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries by Tim Layton and Eliot Foulds, Historical Landscape Architects at the Olmsted Center for Preservation. Site visits were completed in April 2008 and January 2009 for documentation and to verify the findings of the Cultural Landscape Report. The CLI was submitted to the park in 2011 but was not finalized due to pending completion of the park's General Management Plan. In 2020, Jeff Killion, Historical Landscape Architect, edited the CLI and conducted field work in June of that year to document existing conditions. Tim Layton and Maryrose Kulick, Seasonal Cartographer, updated site maps. The park contact for cultural resources is Marilou Ehrler, at 718-354-4561, marilou_ehrler@nps.gov.

Concurrence Graphic Information:

Attachment File Path

Fw: [EXTERNAL] CLI for Sandy Hook Defense Batteries, HPO I 2020-150 PROD, 20-1590-2

Ehrler, Marilou <Marilou_Ehrler@nps.gov>
Wed 9/30/2020 7:36 AM
To: Killion, Jeffrey T <Jeff_Killion@nps.gov>; Page, Robert (Bob) R <Bob_Page@nps.gov>
Cc: Nersesian, Jen T <Jen_Nersesian@nps.gov>

1 attachments (250 KB)
GATE CLI Sandy Hook Coastal Defense Batteries SHPO Letter_7-21-2020(1).pdf;

Your emails may have been incorrect in Kate's original email. Jeff, it looks like you can move this forward and include this in your count. Looking forward to receiving the final document.

Marilou

From: Marcopul, Kate <Kate.Marcopul@dep.nj.gov>
Sent: Tuesday, September 29, 2020 7:35 PM
To: Meade, Jonathan D <Jonathan_Meade@nps.gov>; jeff_Killian@nps.gov <jeff_Killian@nps.gov>
Cc: jennifer_nersesian@nps.gov <jennifer_nersesian@nps.gov>; Ehrler, Marilou <Marilou_Ehrler@nps.gov>; Baratta, Meghan <Meghan.Baratta@dep.nj.gov>; West-Rosenthal, Jesse <Jesse.West-Rosenthal@dep.nj.gov>; Leynes, Jennifer <Jennifer.Leynes@dep.nj.gov>
Subject: [EXTERNAL] CLI for Sandy Hook Defense Batteries, HPO I 2020-150 PROD, 20-1590-2

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

This e-mail serves as the official correspondence of the New Jersey Historic Preservation Office as we switch to a temporary remote work environment in response to the ongoing novel coronavirus (COVID-19) outbreak.

Dear Mr. Meade and Mr. Killian,

Thank you for providing the HPO with the September 2, 2020 draft copy of the CLI for Sandy Hook Defense Batteries. Based on Jeff Killian's September 28, 2020 email addressing the HPO's concerns regarding the potential for archeology in the area of study proposed, **I concur that the CLI meets the NPS's Section 110 requirement of the National Historic Preservation Act for the for Sandy Hook Defense Batteries**. Below are the edits that Mr. Killian will add to the draft CLI to recognize the potential of the area to yield future archeological information :

--Documentation Narrative Description, page 26, end of top paragraph
"The NHL documentation noted that historic district may have significant prehistoric and historic period archeological deposits, but that, "To date (1982) there is little physical or documentary evidence which can be of assistance in precisely locating sites of historic and prehistoric origin on Sandy Hook. In view of the lack of information concerning archeological sites no level of significance can be assigned to known archeological sites at this time." (NR/NHL 1982: Sec.7: 3)

NJ SHPO Concurrence Letter, page 1/2.

--Statement of Significance, page 26, 1st paragraph, after "...period coastal defenses."
"The historic district may be significant in the area of Archeology, but an evaluation of National Register eligibility for these resources is beyond the scope of this CLI. For information regarding potential archeological resources, refer to the 2009 "Sandy Hook Archeological Assessment and Overview" and the 2014 "Gateway National Recreation Area, Final General Management Plan, Environmental Impact Statement."

The AOA has also been added to the report's bibliography.

We look forward to receiving the final draft of the CLI. If possible please send us a hard copy as well as an electronic copy with the above edits. We greatly appreciate your cooperation with this review.

Sincerely,

Katherine J. Marcopul, Ph.D., CPM
Administrator and
Deputy State Historic Preservation Officer
Historic Preservation Office
NJ Department of Environmental Protection
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NJ SHPO Concurrence Letter, page 2/2.

1

United States Department of the Interior

NATIONAL PARK SERVICE
Interior Region 1
North Atlantic-Appalachian
1234 Market Street, 20th Floor
Philadelphia, PA 19107

IN REPLY REFER TO:

A.1.2 (NER-RS&S)

July 21, 2020

Katherine Marcopul
Administrator and Deputy State Historic Preservation Officer
New Jersey Historic Preservation Office
501 Station Plaza
Building 5 — 4th floor
Trenton, New Jersey 08625-0404

Dear Ms. Marcopul:

Enclosed you will find a copy of the Cultural Landscapes Inventory (CLI) for the Sandy Hook Coastal Defense Batteries within Gateway National Recreation Area. We seek to reconfirm our agreement on previously evaluated resources and your concurrence on the status of previously unevaluated resources identified in this CLI for listing in the National Register of Historic Places. This includes reconfirmation of the prioritization treatment band for the coastal defense batteries as identified in the park's General Management Plan. The report has been prepared by a team of historical landscape architects with the National Park Service (NPS) Olmsted Center for Landscape Preservation and Gateway National Recreation Area. The CLI program and the enclosed report continue the NPS efforts to update our cultural resource inventories.

Through the CLI program, the NPS is currently in the midst of a nationwide effort to inventory its cultural landscapes. The CLI is conducted in accordance with Section 110 of the National Historic Preservation Act of 1966 (as amended). It is an inventory of baseline information for all historically significant cultural landscapes within the national park system, and it examines multiple landscape features that contribute to the significance of historic properties. The CLI process includes gathering information from existing secondary sources and conducting on-site reconnaissance of the existing landscape. The information collected provides a comprehensive look at the historical development and significance of the landscape, placing it in context of the property's overall significance. For landscapes found potentially eligible for the National Register of Historic Places, the evaluation describes their character-defining features and assesses the landscape's overall historical integrity. It also raises questions about the landscape that need further study.

NPS Concurrence Letter to NJ SHPO, Page 1/12.

It is important to note that the CLI reports are not intended as comprehensive inventory reports for any one property, although for some properties they provide fuller documentation than for others. For example, the reports do not include a full architectural description of structures, but document structures as elements of the overall landscape, and similarly documents other characteristics such as vegetation, spatial organization, and views and vistas. The CLI is one component of the NPS inventory effort that also includes cultural resource inventories for historic structures, archeological sites, ethnographic resources, and museum objects. For example, the NPS List of Classified Structures inventory includes structural features of cultural landscapes, but the CLI takes a more encompassing approach to the properties, inventorying all above-ground features in each park in which the NPS has a legal or mandated interest.

Previous Historic Property Evaluation:

Gateway National Recreation Area was established by Congress in October 1972 and included most of the Sandy Hook peninsula except the tip area, which is U.S. Coast Guard property. Prior to that time, the Sandy Hook Light was designated a National Historic Landmark on January 29, 1964 and automatically listed on the National Register of Historic Places on October 15, 1966. The Spermaceti Cove No. 2 Life-Saving Service Station (Fort Hancock Life Saving Station) was listed on the National Register on November 30, 1981. Neither resource is within the boundaries of the coastal defense batteries.

On April 24, 1980, the "Fort Hancock and the Sandy Hook Proving Ground Historic District" was listed on the National Register. The National Register documentation identified significance under Criterion A in the areas of Military and Invention for the dates 1874-1919 when the Proving Ground was active as a testing center for new artillery and associated ordnance, and 1859-1950s beginning with the construction of the Fort at Sandy Hook and ending with modernization of Fort Hancock's facilities with the defensive NIKE missile system. The boundary of the district encompassed a total of 459 acres. This area included 380 acres in the northern portion of the Sandy Hook peninsula that was historically associated with Fort Hancock and the Proving Ground, including nine of the thirteen coastal defense areas identified in this inventory: Battery Urmston, Battery Morris, Battery Engle, Battery Peck, Nine Gun Battery, Battery Potter, Battery Granger, Mortar Battery, and Battery Gunnison. The remaining 79 acres of the area encompassed the other four coastal defense areas to the south: Battery Kingman, Battery Mills, the NIKE Radar Site, and the NIKE Launch Site. The documentation described in detail each battery and associated buildings and structures, but was limited in its discussion of associated earthworks, slopes, and vegetation. (Note: Battery Arrowsmith was also described in the National Register documentation, but it is now a ruin and is not evaluated in this CLI.)

On December 17, 1982 the "Fort Hancock and the Sandy Hook Proving Ground Historic District" was designated a National Historic Landmark (NHL). The NHL documentation identified significance under Criterion 1 in the areas of Military and Social History for the dates 1859-1958 (per July 19, 2011 email from National Historic Landmarks Program) relating to the

NPS Concurrence Letter to NJ SHPO, Page 2/12.

development of Sandy Hook defenses, and 1895-1949 for the operation of the Spermaceti Cove No. 2 Life-Saving Service Station (Fort Hancock Life Saving Station). The documentation also identified significance under Criterion 3 for Engineering for the dates 1874-1919 as related to the operation of the Sandy Hook Proving Ground. The boundary of the district was expanded to 4,584 acres to encompass the entire Sandy Hook peninsula, from the Highway 36 bridge to the northernmost point of the peninsula. As such, all thirteen coastal defense areas identified in this inventory are included in the NHL district. The NHL documentation described in detail each battery and associated buildings and structures, but was limited in its discussion of associated earthworks, slopes, and vegetation.

In conjunction with an update to the park's List of Classified Structures in 1996-1997, your office and the NPS agreed to revise the end date of the district's National Register period of significance to include later developments of missile defense systems at Sandy Hook. Correspondence from the NPS to your office on November 5, 1996 explained that "…because the NIKE missile era identified in the NHL documentation continued almost to the date of transfer between the military and the NPS, December 31, 1974, the deactivation date for Fort Hancock, is used as the end date of the period of significance." Concurrence on this matter from your office on January 2, 1997 thus established 1974 as the end date of the National Register period of significance. This date has not been confirmed by the NHL program. In addition to the new end date, numerous buildings, structures, walks, and lights associated with the batteries, NIKE Radar Site, and NIKE Launch Site were identified as contributing resources at this time.

Current Findings:

The enclosed CLI for the Sandy Hook Coastal Defense Batteries fully evaluates the cultural landscape, particularly the associated landscape characteristics and features, and finds that the site's landscape retains integrity to the areas of Military, Social History, and Engineering. As noted previously, many of the property's features compiled on the attached list have already been listed, or have determined to be eligible for listing, on the National Register. The CLI identifies 174 resources and features related to spatial organization, topography, vegetation, circulation, buildings and structures, views and vistas, and small-scale features that contribute to the significance and historic character of the coastal defense batteries. Fifty-seven features have been evaluated as noncontributing because they are not historically significant, and eleven features have been evaluated as undetermined because additional research is needed.

We call your particular attention to the Landscape Description, Boundary Description, National Register Information and the Statement of Significance, and Analysis and Evaluation Summary in the enclosed CLI.

Based on the CLI, we seek to reconfirm our agreement on previously evaluated resources and your concurrence on the status of resources and features identified in this CLI:

- The Sandy Hook Coastal Defense Batteries are significant at the national level under National Historic Landmark Criterion 1 (National Register Criterion A) in the areas of

NPS Concurrence Letter to NJ SHPO, Page 3/12.

Military and Social History for the dates 1859-1958 relating to the development of Sandy Hook defenses and 1895-1949 for the operation of the Spermaceti Cove Life-Saving Station.

- The Sandy Hook Coastal Defense Batteries are significant at the national level under National Historic Landmark Criterion 3 (National Register Criterion C) in the area of Engineering for the dates 1874-1919 as related to the operation of the Sandy Hook Proving Ground and the distinctive characteristics of the Endicott-Taft period coastal defenses.
- The overall National Register period of significance for Sandy Hook's coastal defenses is 1859 to 1974. The period begins in 1859 when construction commenced on the granite fort at Sandy Hook. The period ends in 1974, as per consultation between the NPS and your office, when the Army closed the NIKE missile site and Fort Hancock was officially deactivated.
- The categorization of contributing and non-contributing landscape characteristics and features (see attached list).

If you concur with these findings, we ask that you please sign on the space provided and return this letter to Jeff Killion, CLI Coordinator (Address: National Park Service, Olmsted Center for Landscape Preservation, 15 State Street, 6th Floor, Boston, MA 02109). We would appreciate your response in **45 days**, if possible. Thank you for your attention to this inventory. Should you have any questions, please feel free to contact Mr. Killion at 617-223-5053. Upon your concurrence, a copy of this letter will be sent to the National Historic Landmark Program.

Sincerely,

Jonathan Meade

Jonathan Meade
Associate Regional Director,
Resource Stewardship and Science

Enclosure

cc:
Superintendent, Gateway National Recreation Area

I concur with the National Park Service categorizations of the landscape resources and features for the Sandy Hook Coastal Defense Batteries, as contributing, non-contributing, and undetermined.

_____ _____
New Jersey State Historic Preservation Officer Date

NPS Concurrence Letter to NJ SHPO, Page 4/12.

NPS Cultural Landscapes Inventory – Sandy Hook Coastal Defense Batteries
Gateway National Recreation Area
List of Contributing, Non-Contributing, and Undetermined Landscape Features
August 2020

Contributing Landscape Characteristics & Associated Features

The following landscape characteristics and associated features contribute to the property's historic character, though not all are considered countable resources according to the National Register of Historic Places. Those marked with an (*) are described in the National Historic Landmark documentation accepted on December 17, 1982. Those marked with a (+) were identified as contributing resources by the New Jersey State Historic Preservation Office on January 2, 1997.

Spatial Organization

Battery Urmston: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Morris: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Engle: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Peck: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Nine Gun Battery: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Potter: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Granger: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Mortar Battery: Arrangement of battery's mortar pits and engineered earthwork, counterscarp galleries, and perimeter wall
Battery Gunnison: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Kingman: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
Battery Mills: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access
NIKE Radar: Control Area #1
NIKE Radar: Control Area #2
NIKE Radar: Ready Barracks
NIKE Launch: Missile Magazines
NIKE Launch: Missile Maintenance Area
NIKE Launch: Ready Barracks

NPS Concurrence Letter to NJ SHPO, Page 5/12.

Topography

Battery Urmston: Engineered earthwork
Battery Urmston: High point over central storeroom
Battery Urmston: High point between Battery Urmston and Battery Morris
Battery Morris: Engineered earthwork
Battery Morris: High point over magazines
Batteries Engle and Peck: Engineered earthwork
Nine Gun Battery: Engineered earthwork
Battery Potter: Engineered earthwork
Battery Potter: Engineered slope along west facade
Battery Potter: High point at southwest corner of Battery Potter
Battery Granger: Engineered earthwork
Mortar Battery: Engineered earthwork
Battery Gunnison: Engineered earthwork
Battery Gunnison: High point over central structure
Battery Kingman: Engineered earthwork
Battery Kingman: High point over each gun emplacement
Battery Mills: Engineered earthwork
Battery Mills: High point over each gun emplacement
NIKE Launch Site: Engineered plateau for Missile Magazines
NIKE Launch Site: Engineered earthwork north of Warhead Building
NIKE Launch Site: Engineered earthwork south of Warhead Building

Vegetation

Battery Urmston: Mixed native and non-native vegetative ground cover on engineered earthwork
Battery Morris: Mixed native and non-native vegetative ground cover on engineered earthwork
Batteries Engle and Peck: Mixed native and non-native vegetative ground cover on engineered earthwork
Nine Gun Battery: Mixed native and non-native vegetative ground cover on engineered earthwork
Battery Potter: Mixed native and non-native vegetative ground cover on engineered earthwork
Battery Granger: Mixed native and non-native vegetative ground cover on engineered earthwork
Mortar Battery: Mixed native and non-native vegetative ground cover on engineered earthwork
Battery Gunnison: Mixed native and non-native vegetative ground cover on engineered earthwork
Battery Kingman: Mixed native and non-native vegetative ground cover on engineered earthwork

NPS Concurrence Letter to NJ SHPO, Page 6/12.

Battery Mills: Mixed native and non-native vegetative ground cover on engineered earthwork
NIKE Radar Site: Maintained vegetation among radar towers, support buildings, and barracks
NIKE Radar Site: Fire breaks along perimeter fence
NIKE Radar Site: Undisturbed area in the center of site
NIKE Launch Site: Maintained vegetation at the Missile Magazines, Missile Maintenance Area, and Ready Barracks
NIKE Launch Site: Firebreaks along perimeter fence
NIKE Launch Site: Low-growing groundcover on engineered earthworks

Circulation

Battery Urmston: Paved road south of battery
Battery Morris: North Bragg Drive
Batteries Engle and Peck: North Bragg Drive
Nine Gun Battery: North Bragg Drive
Battery Potter: South Bragg Drive and Hudson Road
Battery Potter: Paved landing at main entry
Battery Potter: Sidewalks to switchboard rooms
Battery Granger: Hudson Road
Mortar Battery: Pedestrian entrance through west perimeter wall
Mortar Battery: Pedestrian access at northwest corner
Mortar Battery: Trail paralleling the inside west perimeter wall
Mortar Battery: Trail north of battery
Battery Gunnison: Atlantic Drive
Batteries Kingman and Mills: Access road from Hartshorne Drive NIKE
Radar Site: Paved vehicular route between Control Area #1 and #2
NIKE Radar Site: Vehicular routes between control areas and Ready Barracks
NIKE Radar Site: Parking area west of Ready Barracks
+ NIKE Radar Site: Walkway network, SH-P
NIKE Launch Site: Hartshorne Drive
NIKE Launch Site: Parking area
NIKE Launch Site: Paved central access road
NIKE Launch Site: Paved road spur to Generator Building (SH-429)
NIKE Launch Site: Paved vehicular routes and dolly route at Missile Maintenance Area
+ NIKE Launch Site: Walkway network at Ready Barracks, SH-P NIKE
Launch Site: Unpaved route around inner security fence

Buildings and Structures

* + Battery Urmston, SH-540
Battery Urmston: Coincidence range finder station between emplacements #4 and #5
* + Battery Morris, SH-539
* + Battery Morris: Coincidence range finder station, SH-K
* + Battery Peck, SH-180

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* + Battery Peck [Engle]: Coincidence range finder station, SH-189A
* + Nine Gun Battery, SH-181
Nine Gun Battery: Remnant of granite fort
* + Battery Potter, SH-264
* + Battery Potter: Central Power Plant, SH-259
* + Battery Potter: Coal Shed, SH-260
* + Battery Potter: Switchboard Room, SH-256
* + Battery Potter: Switchboard, SH-257
* + Battery Potter: Conduit Hut "A" Building, SH-258
Battery Potter: Primary Fire Control Stations
* + Battery Granger, SH-266
* + Mortar Battery (Batteries McCook and Reynolds), SH-349
Mortar Battery: Telephone data booths
Mortar Battery: Battery commander's stations
Mortar Battery: Perimeter wall
Mortar Battery: Counterscarp gallery
* + Battery Gunnison, SH-337
* + Battery Arrowsmith, SH-348
* + Battery Kingman, SH-441
Battery Kingman: Concrete box south of emplacement #2
Battery Kingman: Concrete pipe southwest of emplacement #2
+ Battery Kingman: Horseshoe Cove Wood Bulkhead, SH-G
* + Battery Mills, SH-440
Battery Mills: Concrete box and metal pipe near center top of the engineered earthwork
Battery Mills: Concrete pipe southwest of emplacement #1
* Battery Mills: TNT Igloo (SH-444)
* Battery Mills: TNT Igloo (SH-445)
* + NIKE Radar Site: Connecting Corridors, SH-411
* + NIKE Radar Site: Sentry Box, SH-413
* + NIKE Radar Site: Generator House, SH-414
* + NIKE Radar Site: Target Tracking Radar Tower, SH-417
* + NIKE Radar Site: Acquisition Radar Tower, SH-418
* + NIKE Radar Site: Missile Tracking Radar Tower, SH-419
* + NIKE Radar Site: ABAR Radar Tower Pedestal, SH-453
* + NIKE Radar Site: Equipment and Ops. Building, SH-454
* + NIKE Radar Site: Target Tracking Radar Tower (HIPAR Tower), SH-473
* + NIKE Radar Site: Connecting Corridors, SH-409
* + NIKE Radar Site: Generator House, SH-410
* + NIKE Radar Site: Abandoned Target Tracking Radar Tower, SH-420
* + NIKE Radar Site: Acquisition Radar Tower, SH-421
* + NIKE Radar Site: Missile Tracking Radar Tower, SH-422
+ NIKE Radar Site: Sentry Box, SH-423
* + NIKE Radar Site: Target Ranging Radar Tower, SH-467

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* + NIKE Radar Site: HIPAR Building, SH-468
* + NIKE Radar Site: HIPAR Radar Base, SH-469
* + NIKE Radar Site: New Target Tracking Radar Tower (HIPAR Tower), SH-472
* + NIKE Radar Site: Enlisted Men's Barracks with Mess, SH-402
* + NIKE Radar Site: Enlisted Men's Barracks with Mess, SH-403
NIKE Radar Site: Enlisted Men's Barracks with Mess concrete slab, SH-404
NIKE Radar Site: Enlisted Men's Barracks with Mess concrete slab, SH-405
* + NIKE Radar Site: Latrine, SH-406
* + NIKE Radar Site: Boiler Room, SH-407
* + NIKE Launch Site: Missile Storage (Type B) (NIKE Silo), SH-425
* + NIKE Launch Site: Missile Storage (Type B) (NIKE Silo), SH-426
* + NIKE Launch Site: Missile Storage (Type B) (NIKE Silo), SH-427
* + NIKE Launch Site: Missile Storage (Type B) (NIKE Silo), SH-428
+ NIKE Launch Site: Generator Building, SH-429
+ NIKE Launch Site: Paint and Oil Storage (Sentry Box), SH-447
NIKE Launch Site: Sentry Hut foundation, SH-448
+ NIKE Launch Site: Kennel Storage (Storage Shed), SH-457
+ NIKE Launch Site: Dog Kennels, SH-458
+ NIKE Launch Site: Missile Assembly and Test Building, SH-449
+ NIKE Launch Site: Warhead Building, SH-450
+ NIKE Launch Site: Ready Barracks, SH-430
+ NIKE Launch Site: Ready Barracks, SH-431
+ NIKE Launch Site: Ready Barracks, SH-432
+ NIKE Launch Site: Ready Barracks, SH-433
+ NIKE Launch Site: Boiler House, SH-435
+ NIKE Launch Site: Latrine, SH-434
+ NIKE Launch Site: Ready Building, SH-437
+ NIKE Launch Site: Sentry Box, SH-439
NIKE Launch Site: Sentry Hut foundation, SH-456

Views and Vistas

Battery Urmston: Downrange views from the emplacements and coincidence range finder station

Battery Morris: Downrange views from the emplacements and coincidence range finder station

Batteries Engle and Peck: Downrange views from the emplacements, commander's station, and coincidence range finder station

Nine Gun Battery: Downrange views from the gun carriage and battery commander's stations

Battery Potter: Downrange views from the emplacements and Primary Fire Control Stations

Battery Granger: Downrange views from the gun carriage and battery commander's stations

Mortar Battery: View from battery commander's stations to water

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Battery Gunnison: Downrange views from the emplacements and battery commander's station

Small-scale Features

Battery Potter: Metal weather pole
Mortar Battery: Concrete footing and metal ring
* + NIKE Radar Site: Perimeter fence, SH-S
NIKE Radar Site: Basketball court
+ NIKE Radar Site: Pedestrian lighting, SH-R
* + NIKE Launch Site: Inner security fence, SH-S
* + NIKE Launch Site: Outer security fence, SH-S
+ NIKE Launch Site: Floodlights along inner security fence, SH-Q
+ NIKE Launch Site: Floodlights at the Missile Maintenance Area, SH-Q NIKE Launch Site: Spotlights in the Missile Magazine area

Non-Contributing Landscape Characteristics & Associated Features

Vegetation

Battery Urmston: Large woody vegetation south of battery
Battery Morris: Large woody vegetation south of battery
Nine Gun Battery: Large woody vegetation north and east of battery
Nine Gun Battery: Phragmites growing in gun wells
Battery Granger: Large woody vegetation north and east of battery
Battery Granger: Phragmites growing in gun wells
Mortar Battery: Large woody vegetation atop battery
Mortar Battery: Large woody vegetation east of battery
Mortar Battery: Vegetation in Northeast and Southeast Mortar Pits
Battery Gunnison: Deciduous trees in open lawn west of battery

Circulation

Batteries Engle and Peck: Unpaved vehicular access to observation platform
Batteries Engle and Peck: Social trails among batteries and observation platform
Nine Gun Battery: Social trail from emplacement #8
Battery Potter: Unpaved parking area
Battery Potter: Multi-use Path (MUP)
Battery Potter: Trail at southwest corner of Battery Potter
Battery Granger: Vehicular pull-off east of Hudson Road
Mortar Battery: Trail up engineered earthwork south of southwest emplacement
Mortar Battery: Multi-use Path (MUP)
Battery Gunnison: Concrete walk from beach facility to battery
Battery Gunnison: Social trail between emplacements and on top of central structure
Battery Kingman: Vehicular route circumscribing battery
Battery Mills: Vehicular route circumscribing battery

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Battery Mills: Trail on top of engineered earthwork
NIKE Radar Site: Multi-use Path (MUP)
NIKE Launch Site: Multi-use Path (MUP)
NIKE Launch Site: Unpaved area north of Warhead Building (450) and access to beach
NIKE Launch Site: Path to Dog Kennels (458)

Building and Structures

Battery Peck: Observation platform
NIKE Launch Site: Shed at Firearm Range

Views and Vistas

Mortar Battery: View from gun emplacements to water
Battery Kingman: View from gun emplacements to water
Battery Mills: View from gun emplacements to water

Small-scale Features

Battery Urmston: U.S. Coast Guard perimeter fence
Battery Morris: U.S. Coast Guard perimeter fence
Batteries Engle and Peck: Chain-link fence south of Battery Peck
Batteries Engle and Peck: Wooden split-rail fence east of Battery Engle
Batteries Engle and Peck: Barbed wire fence section west of communications trailer
Batteries Engle and Peck: Wayside east of Battery Peck
Nine Gun Battery: Chain-link fence west of Nine Gun Battery
Nine Gun Battery: Wayside west of emplacement #8
Battery Potter: Wooden wheelstops
Battery Potter: Wayside west of structure
Battery Granger: Chain-link fence west of battery
Battery Granger: Wayside west of battery
Mortar Battery: Chain-link fence east of battery
Mortar Battery: Woven-wire fence along west side of engineered earthwork
Mortar Battery: Wood post and wire cable fence at top of engineered earthwork
Mortar Battery: Two signs outside perimeter wall
Battery Gunnison: Wood post and rope bollards
Battery Gunnison: Waysides west of battery
Battery Kingman: Chain-link fence above concrete canopy for each emplacement
Battery Kingman: Wood post and wire cable fence at top of engineered earthwork
Battery Kingman: Wood guardrails east of vehicular route
Battery Mills: Chain-link fence above concrete canopy for each emplacement
Battery Mills: Wood guardrails east of vehicular route
NIKE Launch Site: Missile display southwest of Ready Barracks

NPS Concurrence Letter to NJ SHPO, Page 11/12.

Undetermined Landscape Characteristics & Associated Features

Topography

Battery Morris: Swale north of engineered slope

Vegetation

Batter Potter: Large woody vegetation north, east, and south of battery
Battery Kingman: Scrub pine (Pinus virginiana) on engineered earthwork
Battery Mills: Scrub pine (Pinus virginiana) on engineered earthwork
Battery Mills: Planetrees (Platanus × acerifolia) on engineered earthwork

Circulation

Battery Gunnison: Remnant curbs west of battery

Buildings and Structures

Battery Kingman: Unknown structure on west side
NIKE Launch Site: Sheds at Missile Assembly and Test Building

Views and Vistas

NIKE Radar Site: View between each Missile Tracking Radar and the control vans and individual missiles at the launch site
NIKE Launch Site: View from the control vans and individual missiles to the Missile Tracking Radars at the radar site

Small-scale Features

NIKE Radar Site: Telephone Booth

bcc:
Susan Hollister, Region 1 Historic Architecture Program
Dennis Montagna, Region 1 History Program
Robert Page, Director, Olmsted Center for Landscape Preservation

NPS Concurrence Letter to NJ SHPO, Page 12/12.

CULTURAL LANDSCAPES INVENTORY
CONCURRENCE FORM

Sandy Hook Coastal Defense Batteries
Gateway National Recreation Area

Gateway National Recreation Area concurs with the findings of the Cultural Landscape Inventory (CLI) for the Sandy Hook Coastal Defense Batteries, including the following specific components:

MANAGEMENT CATEGORY: May Be Preserved and Maintained

CONDITION ASSESSMENT: Fair

Good: indicates the inventory unit shows no clear evidence of major negative disturbance and deterioration by natural and/or human forces. The inventory unit's cultural and natural values are as well preserved as can be expected under the given environmental conditions. No immediate corrective action is required to maintain its current condition.

Fair: indicates the inventory unit shows clear evidence of minor disturbances and deterioration by natural and/or human forces, and some degree of corrective action is needed within 3-5 years to prevent further harm to its cultural and/or natural values. If left to continue without the appropriate corrective action, the cumulative effect of the deterioration of many of the character defining elements will cause the inventory unit to degrade to a poor condition.

Poor: indicates the inventory unit shows clear evidence of major disturbance and rapid deterioration by natural and/or human forces. Immediate corrective action is required to protect and preserve the remaining historical and natural values.

The Cultural Landscape Inventory for the Sandy Hook Coastal Defense Batteries is hereby approved and accepted.

JENNIFER NERSESIAN Digitally signed by JENNIFER NERSESIAN
Date: 2020.09.02 09:19:54 -04'00'

Superintendent, Gateway National Recreation Area Date

Park Concurrence Form.

Geographic Information

State and County:

State	County
New Jersey	Monmouth County

Size (Acres): 98.25

Land Tract Number(s)

Boundary Description:

The Sandy Hook Coastal Defense Batteries consists of eleven extant gun batteries and two sites that comprise the NIKE missile battery. The thirteen batteries are discontiguous, but all are located within the Fort Hancock and Sandy Hook Proving Ground Historic District, which was designated a National Historic Landmark (NHL) in 1982. Descriptions of the batteries are presented below in geographical order from north to south starting with gun batteries Urmston and Morris and ending with Battery Mills. The descriptions conclude with the NIKE radar site and the NIKE launch site. The boundary descriptions expand from the historic structures to include the toe, or bottom, of engineered slopes, circulation routes that historically provided service to the batteries, and secured perimeters defined by fencing. A clear separation between adjacent batteries could not be identified and therefore, a single boundary is described for batteries Urmston and Morris and batteries Engle and Peck. The battery site boundaries defined in this CLI are both minimal and reasonable boundaries sufficient to protect and preserve these cultural resources for the enjoyment of future generations.

Note: Since completion of the 2010 Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries, the boundaries have increased slightly for most batteries to include portions of adjacent roads that historically provided access. The most substantial increase is at Batteries Mills and Kingman, which now includes the access road from Hartshorne Drive, two TNT igloo structures, and remnants of a wood bulkhead in the water.

Batteries Urmston and Morris (see Drawings 3 and 4).
Beginning at the intersection of two U.S. Coast Guard perimeter fences located southwest of Battery Urmston on the souths side of the road, proceed north 165 feet along the east side of the perimeter fence to the toe of Battery Urmston's engineered slope. Then proceed east 570 feet across the toe of the engineered slope for both batteries and continuing another 20 feet east past the Battery Morris CRF station. Then proceed south 70 feet across the remnants of North Bragg Drive to the north side of a U.S. Coast Guard perimeter fence. Continue west along the perimeter fence, cross the road and continue on the south side of the road, returning to the point of origin. Acreage of Batteries Urmston and Morris is just over 1.55.

Batteries Engle and Peck (see Drawing 5).
Beginning at the Battery Peck wayside located on the north side of North Bragg Drive, proceed south 25 feet to the south side of North Bragg Drive, then west 265 feet along the south side of North Bragg Drive. Then proceed northwest 120 feet along the west side of the unpaved access road to the observation platform. Then proceed northeast 250 feet along the north side of the unpaved access road to the observation platform. Continue east 260 feet beyond the observation platform and then proceed south following the toe of Battery Peck's engineered slope. Cross a trail leading to North Pond and proceed southwest along the south side of the trail returning to the point of origin. Acreage of Batteries Engle and Peck is slightly over 1.53. Note: When Battery Peck was converted into Battery No. 8, it consisted of four

90mm guns, two mounted on the concrete gun platform Battery Peck and two mounted on an east-west line from the above two guns. The latter two guns are no longer visible: one was located just northwest of the former Battery Engle range finding station hut and one was located just west of the Fisherman's trail. (Review comments, Hoffman and Cox, 20 August 2020)

Nine Gun Battery (see Drawing 6).
Beginning 10 feet north of a concrete utility vault located south of Battery Alexander, proceed northwest 70 feet along the northern edge of North Bragg Drive. Turn north and then east for 420 feet following the toe of the engineered slope for Battery Alexander. Proceed southeast for 1,110 feet following the toe of the engineered slope for Batteries Halleck, Bloomfield, and Richardson. Continue southeast for 170 feet and arrive at the western edge of Parking Lot J. Proceed south for 200 feet following the western edge of Parking Lot J. Then proceed west for 90 feet and arrive at the western edge of North Bragg Drive. Proceed northwest along the western edge of North Bragg Drive, paralleling the rear facade of the batteries, returning to the point of origin. Acreage of Nine Gun Battery is slightly over 6.47.

Battery Potter (see Drawing 7).
Beginning at the intersection of Hudson Road and South Bragg Drive, proceed 150 feet along the northwest side of North Bragg Drive. Then proceed east and then southeast for 480 feet following the toe of Battery Potter's engineered slope. Then proceed south for 155 feet followed by southwest for 245 feet arriving at the northeast side of Hudson Road. Continue to follow the northeast side of Hudson Road returning to the point of origin. Acreage of Battery Potter is just over 3.08.

Battery Granger (see Drawing 8).
Beginning on the northwest side of Hudson Road across from the Battery Granger wayside located on the northeast side of Hudson Road, proceed northwest 190 feet along the west side of Hudson Road. Then proceed northeast 160 feet along the toe of Battery Granger's engineered slope. Turn southeast and continue for 390 feet following the toe of the engineered slope. Then proceed southwest for 160 feet arriving at the northwest side of Hudson Road. Continue to follow the northwest side of Hudson Road returning to the point of origin. Acreage of Battery Granger is slightly over 1.42.

Mortar Battery (see Drawing 9).
Beginning at the Mortar Battery sign located on the southeast side of Hudson Road, proceed northeast 470 feet along Hudson Road. Then proceed southeast for 480 feet. Next, proceed southwest for 570 feet paralleling the chain-link fence at the toe of the Mortar Battery's engineered slope and then the edge of a paved driveway. Proceed west for 195 feet continuing to parallel the driveway edge to the fence, then north 30 feet, then west again for 105 feet to the edge of the parking lot. Then proceed north for 105 feet along the edge of the parking lot and then west 75 feet along the edge of the parking lot to Hudson Road. Turn north following a wood retaining wall outside the Mortar Battery's counterscarp galley and proceed northeast along the southeast side of Hudson Road, returning to the point of origin. Acreage of the Mortar Battery is just over 6.99.

Battery Gunnison (see Drawing 10).
Beginning at a point on the southwest edge of Atlantic Drive, 75 feet southwest of a concrete drainage structure, proceed northwest for 160 feet following the northwest edge of Atlantic Drive. Then proceed northeast for 250 feet following the southeast edge of the Gunnison Beach Facilities. Continue northeast of 75 feet following the southeast edge of the path to Gunnison Beach. Proceed southeast for 125 feet following the toe of Battery Gunnison's engineered slope. Then proceed south for 185 feet continuing to follow the toe of the engineered slope. Next, proceed southwest for 50 feet continuing to follow the toe of the engineered slope. Proceed southwest at a tangent to the toe of the engineered slope, returning to the point of origin. Acreage of Battery Gunnison is slightly over 1.06.

Batteries Kingman and Mills (see Drawings 11 and 12).
Beginning at a point 100 feet north of the intersection of Hartshorne Drive and the road that leads to these batteries, proceed 600 feet west to the road that encircles Battery Kingman. Follow this road east and then north edge of this road 1200 feet to the junction with a road trace that continues north. Follow the road trace north for 400 feet, then turn west and extend 100 feet into the water. Follow the shoreline in a southwesterly direction for 4,000 feet and then turn east for 200 feet. Proceed northeast along a road trace for 1,800 feet to the junction with a road that encircles Battery Mills. Follow this road 600 feet southeast,

northeast, and north until within 100 feet of the road that leads to these batteries. Then proceed east for 600 feet to Hartshorne Drive and then turn north for 220 feet, returning to the point of origin. The acreage of Batteries Kingman and Mills, including the road, is around 31.30 acres.

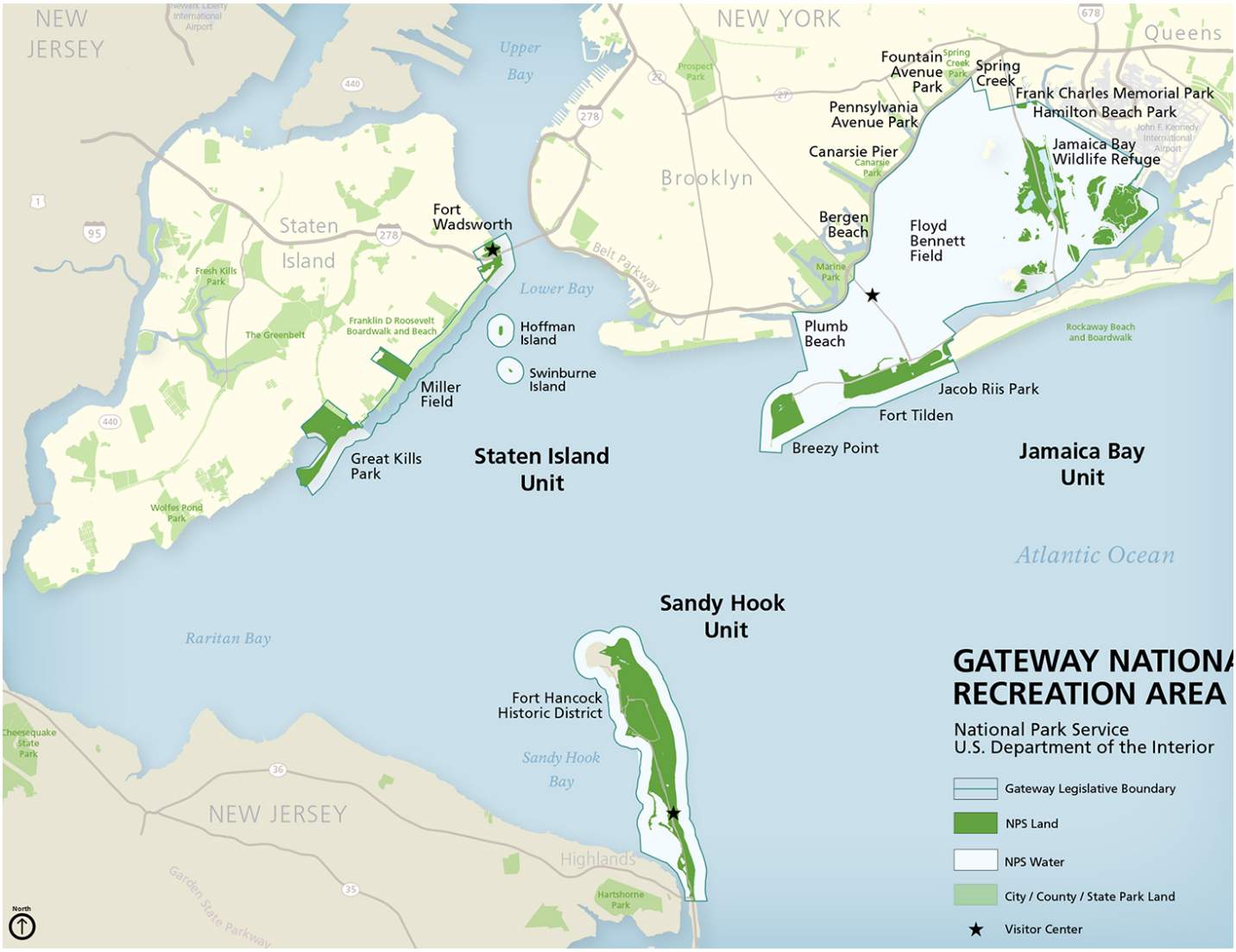
NIKE Radar Site (see Drawing 13).
Beginning at the southern intersection of the Multi-Use Path (MUP) and Parking Lot L, proceed northwest 95 feet following the eastern edge of the MUP. Then proceed north 700 feet at a 6-foot offset west from the radar site perimeter fence. Maintain the same offset and continue to follow the perimeter fence. Proceed northeast for 150 feet. Then proceed east for 375 feet. Next, proceed southeast for 650 feet. Continue to follow the fence around the northeast section of Control Area #2. Proceed east for 40 feet paralleling the access drive to Atlantic Drive. Then proceed south for 35 feet following the western edge of Atlantic Drive. Next, proceed southwest for 75 feet paralleling the access drive from Atlantic Drive. Proceed south 330 feet at a 6-foot offset east from the radar site perimeter fence. Maintain the same offset and continue to follow the perimeter fence, returning to the point of origin. Acreage of the NIKE Radar Site is 17.56.

NIKE Launch Site (see Drawing 14).
Beginning at a point at the northwest end of the vehicular entry gate to the launch site, proceed northwest for 75 feet at a 20-foot offset west from the perimeter fence. Maintain the same offset and continue to follow the perimeter fence. Proceed northeast for 590 feet. Then proceed north for 80 feet. Next, proceed east for 85 feet. Proceed north for 395 feet. Then proceed east for 560 feet. Next, proceed south for 995 feet. Proceed west for 580 feet. Then proceed north for 195 feet. Next, proceed southwest for 260 feet. Proceed southeast for 50 feet. Then proceed southwest for 85 feet. Next, proceed northwest for 50 feet. Proceed southwest for 180 feet. Then proceed northwest for 100 feet. Next, proceed southwest 35 feet and cross the Multi-Use Path (MUP). Proceed southeast 100 feet following eastern edge of Hartshorne Drive. Then proceed southwest 75 feet following the southern edge of the launch site parking area. Next, proceed 200 feet northwest following the western edge of the parking area. Proceed northeast 110 feet crossing Hartshorne Drive and the Multi-Use Path (MUP) and arriving at a point 20 feet off of perimeter fence. Maintain the same offset from the fence and continue to follow the fence northwest returning to the point of origin. Acreage of the NIKE Launch Site is 17.45.

Boundary Coordinates

Source	Type of Point	Latitude	Longitude	Narrative
Aerial Photograph	Point	40.470995	-74.008697	
Aerial Photograph	Point	40.471197	-74.007451	
Aerial Photograph	Point	40.471508	-74.006276	
Aerial Photograph	Point	40.471366	-74.005762	
Aerial Photograph	Point	40.470153	-74.003222	
Aerial Photograph	Point	40.466845	-74.001938	
Aerial Photograph	Point	40.464376	-74.000588	
Aerial Photograph	Point	40.459957	-73.995083	
Aerial Photograph	Point	40.437774	-73.992028	
Aerial Photograph	Point	40.434626	-73.992103	
Aerial Photograph	Point	40.448947	-73.992687	
Aerial Photograph	Point	40.433862	-73.985496	

Location Map:



Map depicting the units of the Gateway National Recreation Area. Sandy Hook is in the bottom center of the map. The Fo Hancock and Sandy Hook Proving Ground National Historic Landmark District encompasses the Sandy Hook peninsula. (National Park Service, A New Vision for a Great Urban National Park, Gateway National Recreation Area, Final General Management Plan, Environmental Impact Statement, 2014: 5)


AL
ort

Regional Landscape Contexts:

Type of Context: Physiographic

Description:

Located in the northeast corner of Monmouth County, New Jersey, Sandy Hook extends six and a half miles from the town of Highlands into southern (lower) New York Harbor. The landform parallels the primary deep water channel into New York Harbor and is nineteen miles south of the southern tip of Manhattan. The Sandy Hook peninsula is bounded by the mouth of the Navesink River that opens into Sandy Hook Bay on the west and the Atlantic Ocean on the north and east. The landform is a recurved sand spit that formed over thousands of years by a south to north littoral drift in the Atlantic Ocean. The currents continue to shape the elongated landform by removing material from the southern, narrower end and depositing new material at the wider, northern end of the peninsula.

Coastal forces such as tides, storm surges, salt spray, and strong winds influence and affect the landscape characteristics on the peninsula. The topography of Sandy Hook is relatively flat with undulating dunes shaped by waves and wind. Protected from wind and salt spray, the central portion of the peninsula features over 200 acres of a maritime forest with American holly (Ilex opaca), wild black cherry (Prunus serotina), and Eastern red cedar (Juniperus virginiana) as the dominant plant species. In contrast to this undisturbed central area, developed areas are primarily concentrated at the north and south ends of the peninsula.

Type of Context: Cultural

Description:

The Endicott-Taft period gun batteries at Sandy Hook were intended to provide defense-in-depth—a redundant system that provided continued resistance against a potential enemy advancing north toward New York City. From the late nineteenth century until the end of World War II, battery designs at Sandy Hook incorporated changes in artillery, new locations relative to targets, and a variety of concealment strategies in response to new offensive weaponry. In response to the threats posed by long-range aerial bombers, the Army added the NIKE missile battery at Sandy Hook in 1954-1955. The NIKE missile battery was also part of a redundant system of defenses that incorporated geographically separate radar sites and command centers for coordinating nineteen missile batteries in the New York Defense Area. With the introduction of intercontinental ballistic missiles (ICBMs), defense philosophy shifted from the NIKE batteries to the doctrine of mutually-assured destruction. Military experts espoused that the only defensive position was to deter a nuclear-armed ICBM launch by matching an opponent's nuclear missile capabilities.
No longer vital to America's defenses, the Army deactivated Fort Hancock in 1974 and the area became part of the Sandy Hook Unit of Gateway National Recreation Area. Since that time, the entire peninsula, minus the active Coast Guard base at the northern tip of the peninsula, has functioned as a recreational park and is open to the public.

Type of Context: Political

Description:

The coastal defense batteries are a component of the Sandy Hook Unit of Gateway National Recreation Area. Prior to 1975, the peninsula was controlled by the Army who operated a base on site beginning in 1896. The Army had a presence on site prior to that when they began, but did not finish, a masonry fortification in the late 1850s. The Army deactivated Fort Hancock in 1974 and the peninsula, minus the active Coast Guard base at the northern end, was incorporated into Gateway National Recreation Area, which was established in 1972.

Management Information

General Management Information

Management Category: May Be Preserved Or Maintained

Management Category Date: 09/02/2020

Management Category Explanatory Narrative:

The Sandy Hook Coastal Defense Batteries are contributing resources within the “Fort Hancock and the Sandy Hook Proving Ground Historic District,” designated a National Historic Landmark (NHL) on December 17, 1982. The 1982 NHL documentation describes in detail each battery structure and associated buildings and structures, and limited documentation of associated landscape characteristics and features. In 2014 the park completed a General Management Plan/Environmental Impact Statement (GMP/EIS) that prioritized park resources to inform future preservation efforts, funding, and maintenance, identifying resources for restoration and rehabilitation, and resources that would be allowed to deteriorate over time. Through this effort, the individual battery structures and their associated landscapes are managed according to their place on a spectrum of actions, ranging from “preserve” to “stabilize” to “ruin.” The management categories for individual battery structures are reported in the park’s List of Classified Structures (LCS):

--Must Be Preserved and Maintained (Preserve Band): Mortar Battery (LCS #008587), Battery Gunnison (008578), Battery Potter (008547)
--May be Preserved and Maintained (Stabilize Band): Nine Gun Battery (008535), Battery Kingman (008629), Battery Mills (008628)
--May Be Released, Altered, or Destroyed (Ruin Band): Battery Morris (008655), Battery Peck (008534), Battery Engle (041302), Battery Urmston (008656), Battery Granger (008548)
--All Management Categories and Bands (varies by structure): NIKE Launch Site, NIKE Radar Site

A management category for a CLI is based on its significance, use, condition, and location, and represents a compilation of legislative mandates, policy considerations, and planning. The thirteen sites that comprise the Sandy Hook Coastal Defense Batteries CLI collectively represent a system of coastal defenses, and include historic structures and their associated designed landscapes of earthworks, engineered slopes, circulation patterns, fields of fire, and vegetation. These historic landscapes are integral to the design, form, function, and character of the defense structures. As only one management category can be selected for a CLI, the “May be Preserved and Maintained” category has been selected for the Sandy Hook Coastal Defense Batteries. This management category best aligns with the prioritization of park resources outlined in the 2014 GMP/EIS.

Management Agreements:

Type of Agreement: Cooperative Agreement

Management Agreement Expiration Date:

Management Agreement Explanatory Narrative:

AGFA manages new Peck/Gunnison under an I&E agreement.

Legal Interests:

Type of Interest: Fee Simple

Narrative:

Located in managed wilderness?: Unknown

Adjacent Lands Information

Do Adjacent Lands Contribute? Yes

Adjacent Lands Narrative:

Adjacent lands are lands outside the cultural landscape boundary, including lands inside or outside the park. The Atlantic Ocean, the Sandy Hook Bay, the Sandy Hook Light, and the “Fort Hancock and the Sandy Hook Proving Ground Historic District” contribute to the setting and historic character of the coastal defense batteries. Historic landscape characteristics and features dating to the period of significance are extant in these areas.

National Register Information

National Register of Historic Places

Documentation Status: Entered Inadequately Documented

Documentation Narrative Description:

Gateway National Recreation Area was established by Congress in October 1972 and included most of the Sandy Hook peninsula except the tip area, which is U.S. Coast Guard property. Prior to that time, the Sandy Hook Light was designated a National Historic Landmark on January 29, 1964 and automatically listed on the National Register of Historic Places on October 15, 1966. The Spermaceti Cove No. 2 Life-Saving Service Station (Fort Hancock Life Saving Station) was listed on the National Register on November 30, 1981. Neither resource is within the boundaries of the coastal defense batteries.

On April 24, 1980, the "Fort Hancock and the Sandy Hook Proving Ground Historic District" was listed on the National Register. The National Register documentation identified significance under Criterion A in the areas of Military and Invention for the dates 1874-1919 when the Proving Ground was active as a testing center for new artillery and associated ordnance, and 1859-1950s beginning with the construction of the Fort at Sandy Hook and ending with modernization of Fort Hancock's facilities with the defensive NIKE missile system. The boundary of the district encompassed a total of 459 acres. This area included 380 acres in the northern portion of the Sandy Hook peninsula that was historically associated with Fort Hancock and the Proving Ground, including nine of the thirteen coastal defense areas identified in this inventory: Battery Urmston, Battery Morris, Battery Engle, Battery Peck, Nine Gun Battery, Battery Potter, Battery Granger, Mortar Battery, and Battery Gunnison. The remaining 79 acres of the area encompassed the other four coastal defense areas to the south: Battery Kingman, Battery Mills, the NIKE Radar Site, and the NIKE Launch Site. The documentation described in detail each battery and associated buildings and structures, but was limited in its discussion of associated earthworks, slopes, and vegetation. (Note: Battery Arrowsmith was also described in the National Register documentation, but it is now a ruin and is not evaluated in this CLI.)

On December 17, 1982 the "Fort Hancock and the Sandy Hook Proving Ground Historic District" was designated a National Historic Landmark (NHL). The NHL documentation identified significance under Criterion 1 in the areas of Military and Social History for the dates 1859-1958 (per July 19, 2011 email from National Historic Landmarks Program) relating to the development of Sandy Hook defenses, and 1895-1949 for the operation of the Spermaceti Cove No. 2 Life-Saving Service Station (Fort Hancock Life Saving Station). The documentation also identified significance under Criterion 3 for Engineering for the dates 1874-1919 as related to the operation of the Sandy Hook Proving Ground. The boundary of the district was expanded to 4,584 acres to encompass the entire Sandy Hook peninsula, from the Highway 36 bridge to the northernmost point of the peninsula. As such, all thirteen coastal defense areas identified in this inventory are included in the NHL district. The NHL documentation described in detail each battery and associated buildings and structures, but was limited in its discussion of associated earthworks, slopes, and vegetation. The NHL documentation noted that historic district may have significant prehistoric and historic period archeological deposits, but that "To date (1982) there is little physical or documentary evidence which can be of assistance in precisely locating sites of historic and prehistoric origin on Sandy Hook. In view of the lack of information concerning archeological sites no level of significance can be assigned to known archeological sites at this time." (NR/NHL 1982: Sec.7: 3)

In conjunction with an update to the park's List of Classified Structures in 1996-1997, the New Jersey State Historic Preservation Office (SHPO) and the National Park Service (NPS) agreed to revise the end date of the district's National Register period of significance to include later developments of missile defense systems at Sandy Hook. Correspondence from the NPS to the New Jersey SHPO on November 5, 1996 explained that "…because the NIKE missile era identified in the NHL documentation continued almost to the date of transfer between the military and the NPS, December 31, 1974, the deactivation date for Fort Hancock, is used as the end date of the period of significance." Concurrence on this matter from the New

Jersey SHPO on January 2, 1997 thus established 1974 as the end date of the National Register period of significance. This date has not been confirmed by the NHL program. In addition to the new end date, numerous buildings, structures, walks, and lights associated with the batteries, NIKE Radar Site, and NIKE Launch Site were identified as contributing resources at this time.

According to research conducted for this CLI and the categories of National Register documentation outlined in the "CLI Professional Procedures Guide," the areas and periods of significance for the Sandy Hook Coastal Defense Batteries are adequately documented in existing 1980 National Register documentation and 1982 National Historic Landmark documentation, as well as through correspondence with the New Jersey SHPO in 1996. Most historic buildings and structures have been documented. However, there are resources related to spatial organization, topography, vegetation, views and vistas, and small-scale features that contribute to the significance of the coastal defense sites that have not been documented. Therefore, for purposes of the CLI, the Sandy Hook Coastal Defense Batteries are considered "Entered-Inadequately Documented."

Eligibility: Eligible -- SHPO Consensus Determination

Concurrence Eligibility Date: 09/29/2020

Concurrence Narrative:

The New Jersey SHPO concurred with the findings of this CLI on September, 29, 2020. SHPO comments regarding the potential of the area to yield future archeological information were addressed in the CLI.

Significance Level: National

Contributing: Contributing

Classification: District

Statement of Significance for National Register of Historic Places:

The following statement of significance for the Sandy Hook coastal defense batteries is based on, and consistent with, the 1982 National Historic Landmark documentation for the Fort Hancock and Sandy Hook Proving Ground Historic District. The district derives national significance under NHL Criterion 1 (National Register Criterion A) in the areas of Military and Social History for the dates 1859-1958 relating to the development of Sandy Hook defenses and 1895-1949 for the operation of the Spermaceti Cove No. 2 Life-Saving Service Station (Fort Hancock Life Saving Station). The district is also significant under NHL Criterion 3 (National Register Criterion C) in the area of Engineering for the dates 1874-1919 as related to the operation of the Sandy Hook Proving Ground and the distinctive characteristics of the Endicott-Taft period coastal defenses. The historic district may be significant in the area of Archeology, but an evaluation of National Register eligibility for these resources is beyond the scope of this CLI. For information regarding potential archeological resources, refer to the 2009 "Sandy Hook Archeological Assessment and Overview" and the 2014 "Gateway National Recreation Area, Final General Management Plan, Environmental Impact Statement."

The overall National Register period of significance for Sandy Hook's coastal defenses is 1859 to 1974. The period begins in 1859 when construction commenced on the granite fort at Sandy Hook. The period ends in 1974, as per consultation between the National Park Service and the New Jersey State Historic Preservation Office, when the Army closed the NIKE missile site and Fort Hancock was officially deactivated.

The Sandy Hook coastal defenses are significant in American history as the defensive infrastructure within the larger federal military reservation that has played dual roles in United States military history. The Sandy Hook peninsula was home to both the Sandy Hook Proving Ground and Fort Hancock. Between 1874 and 1919, the Proving Ground served as the nation's testing center for major artillery. During this critical time period, the Army developed, tested, and transitioned to rifled artillery that was utilized to protect harbors around the country and in foreign territories. From the 1890s to the Army's divestment of the property in 1974, Fort Hancock and Sandy Hook's coastal defenses were a critical element in a system of fortifications guarding the southern approach to New York City—America's most important harbor and largest metropolis. It was during these years that the United States defeated Spain and emerged as a world power, tipped the geopolitical balance of power against the Central Powers in World War I, retreated into the isolation of the 1920s and 1930s, and emerged from World War II as a super power.

Sandy Hook's collection of Endicott-Taft batteries includes the first completed, partially armed, and tested coastal defense battery in the United States following the Endicott Board's recommendations and the first concrete mortar battery in the United States. Sandy Hook also contains the Nine Gun Battery, the largest continuous grouping of artillery built according to the Endicott and Taft recommendations. The scale of the Nine Gun Battery demonstrates the strategic importance of defending the southern approach to New York City. Additionally, Sandy Hook features Batteries Kingman and Mills that are representative of designs the Army implemented during World War II in response to new threats posed by aerial reconnaissance and bombing. World War II also witnessed the Army retrofit obsolete batteries at Sandy Hook to serve as command and communication centers for coastal defenses spanning from the eastern end of Long Island to Atlantic City, New Jersey. Collectively, the eleven battery sites at Sandy Hook demonstrate the perpetuating contest of improved coastal defense capabilities responding to new offensive weaponry that emerged from the mid-nineteenth century to the end of World War II.

The Sandy Hook Coastal Defense Batteries also consist of the NIKE radar and launch sites for missile defenses constructed during the Cold War era. The Army installed the radar and launch sites to utilize the Ajax missile, the first missile designed for the NIKE program. The Army upgraded both sites for a second generation missile design known as Hercules. Additionally, the radar site received more sophisticated radar during 1962-1963, known as the "Improved Hercules" system, to counter electronic interference from enemy aircraft. The launch site contained two firing batteries, a configuration seldom installed during the Cold War era, and both sites possess representative features such as perimeter fences, protective earthworks, recreational amenities, light fixtures, and a kennel for guard dogs that were prescribed for NIKE installations across the country.

National Register Significance Criteria:

A - Associated with events significant to broad patterns of our history

C - Embodies distinctive construction, work of master, or high artistic values

Area of Significance:

Area of Significance Category: Military

Area of Significance Subcategory:

Explanatory Narrative:

Area of Significance Category: Social History

Area of Significance Subcategory:

Explanatory Narrative:

Area of Significance Category: Engineering

Area of Significance Subcategory:

Explanatory Narrative:

National Register Criteria Consideration:

National Register Periods of Significance (with Historic Context Themes):

Time Period: CE 1859 - CE 1974

Historic Context Theme	Subtheme	Facet	Other Facet
Shaping the Political Landscape	Political and Military Affairs 1865-1939	America Becomes A World Power, 1865-1914	
Shaping the Political Landscape	Political and Military Affairs 1865-1939	World War I, 1914-1919	
Shaping the Political Landscape	World War II	The Home Front	
Shaping the Political Landscape	Political and Military Affairs After 1945	The "Cold War" With The Soviet Union	

NRIS Information:

NRIS Name:	Fort Hancock and the Sandy Hook Proving Ground Historic District
NRIS ID:	80002505
Primary Certification Date:	04/24/1980

State Register Documentation:

Identification Number:	2024
Name:	Fort Hancock and Sandy Hook Proving Ground Historic District
Listed Date:	12/16/1977

National Historic Landmarks:

National Historic Landmark?	Yes
Theme:	Shaping the Political Landscape
Contributing:	Contributing
NHL ID:	80002505
NHL URL:	
Date:	12/17/1982

Statement of Significance for National Historic Landmark:

World Heritage Site:

Is Resource within a designated National Natural Landscape: No

Chronology and Physical History

Chronology:

Year	Event	Major Event Narrative
CE 1859	Built	Army begins construction on a five-bastioned granite fort, known as the Fort at Sandy Hook, near the northern end of the peninsula.
CE 1868	Abandoned	Army stops construction on the partially completed Fort at Sandy Hook due to Civil War-era artillery improvements.
CE 1890 - 1893	Built	In 1890-1893 the Army constructs the Mortar Battery.
CE 1891 - 1893	Built	In 1891-1893, the Army constructs the steam-powered Gun Lift Battery #1 (Battery Potter).
CE 1892	Built	Army emplaces the first 12-inch caliber gun at the Gun Lift Battery #1 (Battery Potter).
CE 1894	Built	Army emplaces four 12-inch mortars in each of the four firing pits at the Mortar Battery.
CE 1895	Built	Army emplaces the second 12-inch caliber gun at the Gun Lift Battery #1 (Battery Potter).
CE 1895 - 1898	Established	The War Department establishes Fort Hancock on October 30th, but a garrison of Corps of Artillery soldiers did not arrive until 1898.
CE 1896	Built	Army completes construction on the 10-inch Battery #1 (Battery Granger).
CE 1897	Built	Army emplaces two 10-inch caliber guns on counterweight carriages at the Ten-inch Battery #1 (Battery Granger).
CE 1897 - 1898	Built	Army completes construction and installs a single 5-inch caliber gun at Battery Engle.
CE 1897 - 1898	Built	Army completes construction and installs three 10-inch caliber guns on the first phase of the Nine Gun Battery, called the Ten-inch Battery #2. The battery is constructed over the east facade of Sandy Hook's Civil War-era granite fort.
CE 1899	Built	Army completes construction on the second phase of the Nine Gun Battery with the Twelve-inch Battery #2 and #3 erected directly to the north and south of the Ten-inch Battery #2.
CE 1899	Built	Army constructs a 60-foot tall range-finder tower west of Battery Potter.
CE 1899 - 1900	Built	Army constructs four-gun emplacements at Battery Urmston.
CE 1900	Built	Army installs 12-inch caliber guns at the Nine Gun Battery's Twelve-inch Battery #2 and #3.
CE 1900	Established	Army designates the first seven batteries at the Nine Gun Battery as Battery Halleck in honor of Civil War veteran Major-General Henry W. Halleck.
CE 1900	Established	Army designates the Ten-inch Battery #1 as Battery Granger in honor of Civil War veteran Major General Gordon Granger.

Year	Event	Major Event Narrative
CE 1900	Graded	Army regrades slopes above the four firing pits at the Mortar Battery.
CE 1901	Built	Army constructs battery commander's station for the Mortar Battery atop a steel tower inside the battery's western perimeter wall.
CE 1901 - 1902	Built	Army constructs Central Power Plant (259) near northwest corner of Battery Potter.
CE 1901 - 1903	Built	Army constructs Battery Peck.
CE 1902	Built	Army completes construction on the third phase of the Nine Gun Battery (Battery Richardson) with two 12-inch caliber gun emplacements at the south end of Battery Halleck.
CE 1903	Built	Army completes construction of Battery Morris.
CE 1903 - 1904	Built	Army builds Battery Gunnison.
CE 1903	Established	Army designates Battery Engle in honor of Captain Archibald H. Engle who was killed in the Civil War Battle of Resaca.
CE 1903	Built	Army installs two 6-inch caliber barbette-mounted guns at Battery Peck.
CE 1903	Established	Army designates Battery Peck in honor of Lieutenant Freemont P. Peck who was accidentally killed at the Sandy Hook Proving Ground.
CE 1903	Established	Army designates the Gun Lift Battery #1 as Battery Potter in honor of Civil War veteran Brigadier General Joseph H. Potter.
CE 1903	Built	Army constructs Coal Shed (260) near northwest corner of Battery Potter.
CE 1903	Established	Army designates the Mortar Battery as Battery Reynolds in honor of Major-General John F. Reynolds who died during the first day of fighting at Gettysburg.
CE 1903 - 1904	Built	Army constructs two additional gun emplacements at Battery Urmston.
CE 1904	Established	Army designates Battery Urmston in honor of Thomas D. Urmston who was killed during the Civil War.
CE 1904	Established	Army designates Battery Morris in honor of Colonel Lewis Morris who was killed during the Civil War Battle of Cold Harbor.
CE 1904	Built	Army installs two 12-inch caliber guns at the Nine Gun Battery's southern emplacements (Battery Richardson).
CE 1904	Established	Army designates the Nine Gun Battery's original three 10-inch guns Battery Halleck. The northern most guns, built in the second phase, are designated Battery Alexander in honor of Revolutionary War General William Alexander. The other second phase guns south of Battery Halleck are designated Battery Bloomfield in honor of New Jersey governor and Revolutionary War General Joseph Bloomfield. The southernmost guns are designated Battery Richardson in honor of Major General Israel B. Richardson who was mortally wounded during the Civil War at the Battle of Antietam.

Year	Event	Major Event Narrative
CE 1904	Established	Army designates Battery Gunnison in honor of Captain John W. Gunnison who was killed in the Utah Territory.
CE 1905	Built	Army constructs two fire control stations on Battery Potter's terreplein.
CE 1905	Built	Army constructs telephone data booths at the southwest corner above each firing pit at the Mortar Battery.
CE 1905	Built	Army emplaces two 6-inch caliber guns on counterweight carriages at Battery Gunnison.
CE 1906	Altered	Army disarms Battery Potter's 12-inch caliber guns and sells the steam-powered gun-lift mechanism for scrap.
CE 1906	Established	Army splits the designation of the Mortar Battery into Battery Reynolds for the southern two firing pits and Battery McCook for the northern two firing pits. Battery McCook was designated in honor of Major-General Alexander McCook, a Civil War veteran.
CE 1906 - 1907	Built	Army constructs two battery commander's stations on top of the Mortar Battery's earthwork.
CE 1907	Altered	With the commander's stations and data booths completed at the Mortar Battery by 1907, the Army converts the tower to a weather station to provide information on atmospheric conditions affecting the trajectory of projectiles.
CE 1907	Built	Army constructs seven fire control stations on Battery Potter's terreplein.
CE 1907	Built	Army constructs two switchboard rooms (256 and 257) near southwest corner of Battery Potter.
CE 1907	Built	Army extends the platforms behind the guns and adds an enclosed, concrete battery commander's station at Battery Granger.
CE 1907 - 1908	Built	Army completes construction of Battery Arrowsmith.
CE 1908	Established	Army designates Battery Arrowsmith in honor of Lieutenant Colonel George W. Arrowsmith who was killed at Gettysburg during the Civil War.
CE 1909	Built	Army installs four pedestal-mounted, 3-inch caliber guns at Battery Morris.
CE 1909	Built	Army emplaces three 8-inch caliber guns on counterweight carriages at Battery Arrowsmith.
CE 1911	Built	Army constructs exterior stairway at southwest corner of Battery Potter. (Review comments, Hoffman and Cox, 20 August 2020)
CE 1917	Moved	Army transfers four 12-inch mortars from the Mortar Battery to a new battery in the Navesink Highlands.
CE 1917	Built	Army completes construction of Battery Kingman.
CE 1917	Built	Army completes construction of Battery Mills.
CE 1918	Removed	Army removes the 5-inch caliber gun at Battery Engle.
CE 1919	Built	Army constructs open style coincidence range finder station between emplacements #4 and #5 at Battery Urmston.
CE 1919	Built	Army emplaces two 12-inch caliber guns at Battery Kingman.

Year	Event	Major Event Narrative
CE 1919	Altered	Army adds steam heat to the plotting room, quarters, and latrine at Battery Kingman.
CE 1919	Established	Army designates Battery Kingman in honor of Brigadier General Dan C. Kingman who served as Chief of Engineers for the Army Corps.
CE 1919	Built	Army emplaces two 12-inch caliber guns at Battery Mills.
CE 1919	Altered	Army adds steam heat to the plotting room, quarters, and latrine at Battery Mills.
CE 1919	Established	Army designates Battery Mills in honor of Brigadier General Albert L. Mills, a Medal of Honor recipient from the Spanish-American War.
CE 1919 - 1920	Removed	Army removes the remaining twelve mortars at the Mortar Battery.
CE 1920	Removed	Army removes guns at Battery Urmston's emplacements #1, #2, #5, and #6.
CE 1920	Built	Army constructs coincidence range finder (CRF) station east of Battery Morris.
CE 1920	Built	Army constructs a coincidence range finding (CRF) station for Battery Peck over Battery Engle's empty concrete gun well.
CE 1920	Built	Army adds fully-enclosed, concrete, battery commander's station to Battery Peck.
CE 1927 - 1929	Removed	The Army removes Battery Arrowsmith's three 8-inch disappearing guns circa 1927-1929. (Review comments, Hoffman and Cox, 20 August 2020)
CE 1922	Altered	Army installs a switchboard room in the Mortar Battery's longitudinal gallery that connects the northern mortar pits with the magazines in the center of the battery.
CE 1922 - 1923	Built	Army mounts two 3-inch caliber anti-aircraft guns on top of the Mortar Battery's earthwork.
CE 1922	Built	Army erects two 40-foot tall towers for fire control at Batteries Kingman and Mills about a half mile south of Battery Gunnison along Atlantic Drive.
CE 1928	Altered	Army removes concrete to increase the angle and range of the guns at Battery Peck.
CE 1937	Built	Army mounts a third 3-inch caliber anti-aircraft gun on top of the Mortar Battery's earthwork.
CE 1938	Demolished	Army demolishes the north, the east, and a portion of the south perimeter wall at the Mortar Battery.
CE 1938	Altered	Army cuts an entry into the west perimeter wall at the Mortar Battery.
CE 1940 - 1941	Altered	Army converts the interior rooms of the Mortar Battery into the New York Harbor Defense Command Post (HDCP).
CE 1941	Built	Army adds machine gun platform with four .50-caliber guns on top of the Mortar Battery's earthwork, c.1941.
CE 1941	Built	Army casemates the open gun platforms at Battery Kingman.

Year	Event	Major Event Narrative
CE 1941 - 1943	Altered	Army converts the northernmost fire control station on Battery Potter's terreplein into a meteorological station, c.1941-c.1943.
CE 1941 - 1943	Built	Army erects a metal tether near the north end of Battery Potter's terreplein to attach weather balloons for recording wind speeds and direction, c. 1941-c.1943.
CE 1941 - 1943	Altered	Army converts the central fire control station on Battery Potter's terreplein to serve as a Command and Observation Post, c.1941-c.1943.
CE 1942	Built	Army casemates the open gun platforms at Battery Mills.
CE 1942	Removed	Army relocates guns at Battery Urmston's emplacements #3 and #4 to the dunes north of Battery Gunnison.
CE 1942	Military Operation	Army deactivates Battery Urmston.
CE 1942	Moved	Army approves the disposal of artillery at the Nine Gun Battery's Battery Halleck.
CE 1942	Removed	Army removes the two 6-inch caliber guns on counterweight carriages at Battery Gunnison.
CE 1942	Altered	Army shifts railroad tracks supplying ammunition to west of the casemated Battery Kingman.
CE 1942	Altered	Army shifts railroad tracks supplying ammunition to west of the casemated Battery Mills.
CE 1942 - 1944	Altered	Army adds air lock rooms, gas-proof doors, ventilation systems, soundproofing, and dehumidifying systems to the interior rooms of the Mortar Battery.
CE 1943	Moved	Army relocates Battery Peck's 6-inch caliber guns to Battery Gunnison.
CE 1943	Built	Army installs two 90mm anti-aircraft guns at Battery Peck.
CE 1943	Moved	Army approves the salvage of artillery at the Nine Gun Battery's Batteries Richardson and Bloomfield.
CE 1943	Military Operation	Army deactivates the Nine Gun Battery.
CE 1943	Altered	Army converts the southernmost fire control station on Battery Potter's terreplein to serve as the Harbor Entrance Control Post.
CE 1943	Military Operation	Army deactivates Battery Granger.
CE 1943	Altered	Army adds camouflage netting over the Mortar Battery's open gallery and southwest mortar pit.
CE 1943	Altered	Army improves electrical power, sanitary sewer, and the dehumidifying system at Battery Kingman.
CE 1943	Altered	Army improves electrical power, sanitary sewer, and the dehumidifying system at Battery Mills.
CE 1943	Altered	Army adds obscurement grading and netting at Battery Kingman.
CE 1943	Altered	Army adds obscurement grading and netting at Battery Mills.

Year	Event	Major Event Narrative
CE 1943	Planted	Army completes ninety percent of obscurement planting on the casemated Battery Kingman.
CE 1943	Planted	Army completes thirty percent of obscurement planting on the casemated Battery Mills.
CE 1944	Military Operation	Army deactivates the Command and Observation Post located on Battery Potter's terreplein.
CE 1944	Altered	Army adds heat to the power room and three dehumidifying units at Battery Kingman.
CE 1944	Altered	Army adds heat to the power room and three dehumidifying units at Battery Mills.
CE 1945	Military Operation	Army deactivates the Harbor Entrance Control Post located on Battery Potter's terreplein.
CE 1946	Military Operation	Army deactivates Battery Morris.
CE 1946	Military Operation	Army deactivates Battery Peck.
CE 1947	Military Operation	Army deactivates Battery Gunnison.
CE 1948	Military Operation	Army deactivates Battery Kingman.
CE 1948	Military Operation	Army deactivates Battery Mills.
CE 1948 - 1949	Military Operation	Army deactivates the New York Harbor Defense Command Post housed in the Mortar Battery. (Review comments, Hoffman and Cox, 20 August 2020)
CE 1950	Military Operation	Fort Hancock is deactivated on June 25, 1950.
CE 1951	Military Operation	On April 10, 1951, Fort Hancock is reactivated.
CE 1954	Built	Army constructs the NIKE integrated fire control (IFC) or radar site comprised of buildings, circulation routes, and vegetation that form three distinct areas—Control Area #1, Control Area #2, and the Ready Barracks.
CE 1954 - 1955	Built	Army constructs the NIKE launch site comprised of engineered earthworks, buildings, and circulation routes form three distinct areas—the Missile Magazines, the Missile Maintenance Area, and the Ready Barracks.
CE 1955 - 1960	Built	Army constructs concrete walks from Control Area #1 and Control Area #2 to the Ready Barracks at NIKE radar site. Electrical conduit and twelve pedestrian-scale light fixtures are installed along the walks and a basketball court is added near the Ready Barracks.
CE 1958 - 1959	Altered	Army updates the missile storage racks, launcher rails, and elevators to accommodate the larger Hercules missile at the NIKE launch site.
CE 1958 - 1959	Built	Army constructs an inner security fence and installs perimeter lights to improve security for Hercules missiles at the NIKE launch site.
CE 1958 - 1960	Built	Army constructs a canine kennel near the northwest corner of the missile magazine area at the NIKE launch site.

Year	Event	Major Event Narrative
CE 1960 - 1962	Built	Army constructs High-Power Acquisition Radar (HIPAR) tower and building in Control Area #1 at NIKE radar site.
CE 1960 - 1962	Built	Army constructs new target tracking and target ranging radars for the “Improved Hercules” program in Control Area #1 at NIKE radar site.
CE 1960 - 1962	Built	Army constructs new target tracking radar for the “Improved Hercules” program in Control Area #2 at NIKE radar site.
CE 1960 - 1962	Built	Army adds the interconnecting corridor building between the battery control and radar control trailers at Control Area #1 and #2 in NIKE radar site. These buildings replace the maintenance and spare parts trailer.
CE 1970 - 1974	Built	A wood-slat fence is installed east of Battery Urmston, c.1970-c.1974.
CE 1970 - 1974	Built	A wood-slat fence is installed north and east of Battery Morris, c.1970-c.1974.
CE 1970 - 1974	Built	Wood two-by-four guard panels are erected at Battery Morris emplacement #2, c.1970-c.1974.
CE 1970 - 1974	Built	Army builds a wood-slat fence around all four sides of gun emplacement No. 1 at Battery Morris, c.1970-1974. (Review comments, Hoffman and Cox, 20 August 2020)
CE 1972	Established	President Richard Nixon signs enabling legislation creating the Gateway National Recreation Area.
CE 1974	Destroyed	In December, a violent winter storm removes several vertical pilings from the bayside bulkhead west of Batteries Kingman and Mills.
CE 1974	Military Operation	Army deactivates Fort Hancock.
CE 1975	Land Transfer	On January 1, Fort Hancock is transferred to the National Park Service and incorporated into the Gateway National Recreation Area.
CE 1975 - 1976	Built	NPS installs chain-link fence above the concrete gun canopies at Batteries Kingman and Mills.
CE 1975 - 1979	Destroyed	Storms destroy the majority of the bayside bulkhead west of Batteries Kingman and Mills and begin eroding the shoreline, 1975-c.1979.
CE 1976 - 1990	Built	NPS erects chain-link fencing and signage between pedestrian routes and the structures at Nine Gun Battery, Battery Peck, and Battery Granger.
CE 1978	Eroded	February storm washes away natural dune formations east of the NIKE launch site.
CE 1979 - 1981	Built	NPS installs post and cable fencing along trails on top of the Mortar Battery, 1979-1981. (Review comments, Hoffman and Cox, 20 August 2020)
CE 1984	Rehabilitated	NPS removes original deteriorating concrete second floor inside the granite main entrance of Battery Potter and replaces it. (Review comments, Hoffman and Cox, 20 August 2020)
CE 1990 - 1994	Abandoned	NPS closes access to trails on top of the Mortar Battery, c.1990-c.1994.

Year	Event	Major Event Narrative
CE 2001	Removed	NPS removes a concrete bridge at Battery Gunnison, between the traverse and gun emplacement No. 1, to eliminate hazards created by the deteriorating concrete.
CE 2003 - 2004	Removed	NPS removes select vegetation at Battery Potter. (PMIS 59698, PMIS 24668)
CE 2003 - 2011	Rehabilitated	NPS rehabilitates exterior metal stairway on the south side of the Battery Potter, and adds new pipe railing along the top of the west facade and also the top of the gun parapet walls. (PMIS 24668; PMIS 147492; Review comments, Hoffman and Cox, 20 August 2020))
CE 2004	Removed	NPS removes select vegetation at Battery Gunnison. (PMIS 24661)
CE 2004	Rehabilitated	NPS adds new metal pipe railing to the stairs and around perimeter of gun platforms, and repairs falling concrete walkway and concrete gun emplacements at Battery Gunnison. (PMIS 24661)
CE 2004	Removed	NPS removes select vegetation at Batteries Kingman and Mills. (PMIS 24668)
CE 2004	Removed	NPS removes select vegetation at the Mortar Battery, (PMIS 246680)
CE 2004	Rehabilitated	NPS repairs and secures gates at Batteries Kingman and Mills. (PMIS 24668)
CE 2004	Built	NPS completes the first phase of the Multi-Use Path (MUP) at Sandy Hook, extending 5.5 miles from Sandy Hook's entrance to the Fort Hancock ferry landing.
CE 2004	Removed	NPS removes select vegetation at Battery Granger. (PMIS 24668)
CE 2008 - 2009	Built	NPS extends the MUP, adding 3.1 miles with a loop between the North Beach Plaza, the Gunnison Beach Plaza, and the Mortar Battery.
CE 2009	Rehabilitated	NPS rehabilitates original wooden and iron doors, iron gates and stairways, three elevated concrete walkways, and iron railings around two gun pits to allow for safe visitor access along the length of the Nine Gun Battery. (PMIS 123084)
CE 2010 - 2011	Removed	NPS removes rusting metal and select vegetation at Battery Gunnison and the Mortar Battery. (PMIS 147492)
CE 2010 - 2011	Rehabilitated	NPS rehabilitates walkways and platforms to provide visitor access, repairs deteriorated concrete walkways and drainage systems, and restores missing concrete and metal walkways to provide full visitor access at Battery Gunnison. (PMIS 147492)
CE 2010 - 2011	Rehabilitated	NPS rehabilitates walkways and platforms to provide visitor access, and rehabilitates metal railings to allow for both security and safe visitor access at the Mortar Battery. (PMIS 147492)
CE 2010	Removed	NPS removes select vegetation around Battery Potter. (PMIS 147492)

Year	Event	Major Event Narrative
CE 2012	Destroyed	In October 2012 Hurricane Sandy damages resources and infrastructure at Sandy Hook. Beaches are hit particularly hard, dunes sustain major damage, and large quantities of sand are blown onto portions of the road system.
CE 2013	Built	NPS extends the MUP, adding 1.5 miles of new trail at the Nine Gun Battery and between Magruder Road and Gunnison Beach. (PEPC 40954)
CE 2015	Reconstructed	NPS reconstructs the wooden Observation Platform north of Batteries Engle and Peck. (PEPC 57923)
CE 2015	Removed	NPS removes an Army-era wooden building and a storage trailer near the Observation Platform north of Batteries Engle and Peck. (PEPC 57923; Review comments, Hoffman and Cox, 20 August 2020)
CE 2017	Reconstructed	NPS rebuilds two concrete bridges and two outer steel stairways at Battery Gunnison. (PMIS 176616)
CE 2018 - 2019	Reconstructed	At Battery Gunnison, the Army Ground Forces reinstalls the Range Operator Platform. (PEPC 82305)
CE 2018	Rehabilitated	Repairs to Buildings 409 and 410 at the NIKE Radar Site. (PMIS 206188A-B)
CE 2020	Rehabilitated	Documentation to rehabilitate Barracks 402 and 40 at the NIKE Radar Site for group camping. (PMIS 243945)
CE 2018 - 2020	Rehabilitated	Repair to HIPAR 468 at the NIKE Radar Site. (PMIS 206188C)

Physical History:

INTRODUCTION

This section provides information on the physical development and evolution of the site, organized by time periods. The history coastal defense resources at Sandy Hook is detailed in the "Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries" (2010) by Timothy W. Layton and H. Eliot Foulds. The following narrative is extracted from the Cultural Landscape Report, where additional information regarding the historical development of the batteries and their adjacent landscapes can be found.

EARLY HISTORY AND EUROPEAN CONTACT, TO 1859

Located in the northeast corner of Monmouth County, New Jersey, Sandy Hook extends six and a half miles from the town of Highlands into lower (southern) New York Harbor. The landform parallels the primary deep water channel into New York Harbor and is nineteen miles south of the southern tip of Manhattan. Approximately 10,000 years ago glaciers covered northern New Jersey and Long Island, but did not extend south to Sandy Hook. Sea levels rose as the glaciers melted and a south to north littoral drift began depositing sand and forming a spit between the Navesink River and Atlantic Ocean. The currents continued to shape an elongated landform with major deposits accumulating at the northern end of the peninsula creating a recurved or hook-shaped formation. (Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries, hereafter CLR 2010: 7)

Based on archeological data, the earliest American Indians arrived in New Jersey from 12,000 to 10,000 years ago. Settlements were located along major rivers and competing theories assert that either these base camps were occupied for long periods throughout the year or seasonally, when food resources were available. Archeological surveys at Sandy Hook have identified American Indian artifacts and possible sites on the southern portion of the peninsula away from recent littoral deposits at the northern end of the peninsula and inland from the dynamically changing shoreline. The first European encounters with the Sandy Hook landscape occurred in the sixteenth century as countries vied for western trade routes to Asia. Italian explorer Giovanni da Verrazano sailed past Sandy Hook in 1524 and was followed the next year by Estevan Gomez. Although born in Portugal, Gomez sailed for Spain and by 1529 a Spanish map recorded the peninsula as “Cabo de Arenas” or Cape of Sands. (CLR 2010: 7)

Sailing on behalf of the Dutch United East India Company, English explorer Henry Hudson sailed along the Atlantic coast and anchored in the Sandy Hook Bay in 1609. Given its proximity to the shipping channel, the Dutch and English disputed claims over Sandy Hook through the mid-seventeenth century until Dutch governor Peter Stuyvesant surrendered all Dutch New World lands to the English in 1663. In the early 1600s, the Unami branch of the Lenni Lenape occupied central New Jersey. The Lenape were part of the Algonquian language group and were dispersed throughout New Jersey in autonomous bands. European contact brought warfare, disease, and alcoholism that decimated the Lenape population. By 1759, estimates placed the Lenape population at 300 for all of New Jersey with few remaining in the state by the start of the nineteenth century. (CLR 2010: 8)

Early Developments and Fortifications:
From the colonial era to the mid-nineteenth century, there were not yet any permanent coastal defenses on Sandy Hook as early developments focused on maritime safety, transportation, and temporary fortifications. One of the first permanent structures on Sandy Hook provided navigational assistance to ships in the narrow channel to New York Harbor. After several shipwrecks in 1761, merchants pressured the New York Assembly to purchase a four-acre site on Sandy Hook in order to construct a lighthouse. For the next three years, Isaac Contro led the building effort to erect an octagonal, masonry structure that rose to 105 feet in height. The beacon was lit on June 11, 1764 and became the fifth operational lighthouse in the thirteen original colonies. (CLR 2010: 8)

During the Revolutionary War, the lighthouse aided friend and foe alike including British troops navigating the waters off of Sandy Hook. Recognizing the importance of the lighthouse, the British occupied the peninsula during the war and constructed a stockade around the structure to deter an attack. In addition, the British Army used Sandy Hook as a secure staging ground to disembark from after the Battle of Monmouth in 1778. During the War of 1812, American troops were stationed on the peninsula to prevent British reoccupation and to secure naval access to New York City. A half mile north of the lighthouse, a wooden stockade called Fort Gates was constructed and armed with cannon. After the war, American troops were withdrawn from Sandy Hook and the stockade and other temporary structures deteriorated. Playing a role in the young nation’s first wars, the strategic importance of Sandy Hook was well established and the United States purchased two large parcels of land comprising most of the peninsula in 1817. (CLR 2010: 8)

After the War of 1812, the government continued development on Sandy Hook in support of maritime

activities. Although the lighthouse aided navigation, violent storms punished mariners along Sandy Hook and the New Jersey coast, prompting Congress to pass a bill in 1848 for a series of lifeboat stations between Sandy Hook and Little Egg Harbor. By May 1849, the U.S. Treasury Department's Revenue Marine Board completed eight stations, set at ten-mile intervals, from Spermaceti Cove on Sandy Hook south to Long Beach Island near Little Egg Harbor. The Spermaceti Cove station was located three miles south of the Sandy Hook Lighthouse. (CLR 2010: 8)

In 1855 the Revenue Marine Board constructed a second station on Sandy Hook northeast of the lighthouse. New stations were constructed in 1872 at both Sandy Hook locations and the northern station was designated Station No. 1 while the Spermaceti Cove station was designated Station No. 2. In subsequent decades, conflicts arose between the Sandy Hook Proving Ground and the location of both stations. In 1891, a new station was completed northwest of the Sandy Hook Lighthouse along the bay and in 1894, a new station was completed 232 yards west of the 1872 station at Spermaceti Cove. (CLR 2010: 8-9)

As early as 1759, commercial ferry service operated between New York City and Sandy Hook. The Raritan and Delaware Bay Railroad Company, a predecessor of the New Jersey Southern Railroad, created a ferry and railroad service between New York City and Long Branch, New Jersey in 1860. New York passengers first traveled on a ferry to Port Monmouth, New Jersey and then transferred to a train for the remainder of the trip to Long Branch. Five years later, the company established a shorter route from Sandy Hook to Long Branch. Ferries arrived at a wharf on Spermaceti Cove and proceeded south along the coast making stops at towns growing with recreational amenities. The wharf was relocated to Horseshoe Cove in 1870 and rail service did not extend north of the cove until the Army Ordnance Department established a line in 1889. (CLR 2010: 9)

THE FORT AT SANDY HOOK, 1859–1895

By the early 1800s, permanent stone fortifications such as Fort Wadsworth on Staten Island and Castle Clinton at the southern end of Manhattan guarded upper New York Harbor and the city. Mindful of Sandy Hook's role in the Revolutionary War and War of 1812, the Army Corps of Engineers prepared plans in 1857 for a fort to protect the lower harbor shipping channel and prevent an enemy force from anchoring and staging an attack from the peninsula. Work began the same year with the construction of a dock near the northwest tip of Sandy Hook. With a facility established to receive material and laborers, construction began on a large, five-bastioned granite fort in 1859. (CLR 2010: 9)

Known as the Fort at Sandy Hook, the pentagonal structure stood at the north end of the peninsula and enclosed approximately eighteen and a half acres. The north and east facade of the fort paralleled the shipping channel along Sandy Hook's Atlantic coastline where it turned northwest into the lower harbor. Construction accelerated with the start of the Civil War in 1861 but halted in 1868 before the entire fort was completed. The defenses offered by the fort, and other stone and masonry fortifications, were surpassed by Civil War-era artillery improvements. With construction stopped on the fort, a cycle began at Sandy Hook that would last throughout the Cold War of new defensive structures and technologies being implemented just as offensive capabilities advanced that rendered the prior generation of defenses obsolete. (CLR 2010: 9)

Civil War-Era Artillery Advancements:
The Civil War allowed emerging artillery technologies to be battle tested, and conclusions about the effectiveness of rifled bores and pointed projectiles changed the design of coastal defense batteries at Sandy Hook and across the country. Prior to the Civil War, major artillery on land, at sea, and at coastal fortifications consisted of cast iron, smooth bore guns with spherical projectiles. Coastal fortifications, like the Fort at Sandy Hook, were not immune to damage from this type of artillery. However, the projectiles were being fired from a ship, moving under sail power, making it difficult to obtain repeated direct hits necessary to destroy a stone and masonry wall. (CLR 2010: 10)

The first Civil War-era innovation in artillery was the successful implementation of pointed projectiles. Spherical projectiles, or cannonballs, could do more damage if they were increased in size and had a corresponding larger barreled gun. A pointed projectile could be designed with the same diameter as a sphere, but with more mass and less drag as it traveled through the air. Fired from the same caliber gun, pointed projectiles were heavier and faster moving, resulting in more damage upon impact. (CLR 2010: 10)

The superior pointed projectiles were coupled with an innovation in producing rifled bores. Rifling is a term describing the spiral grooves on the inside of a gun's bore that spin the projectile. As the projectile travels, the spin stabilizes its trajectory and results in faster speeds, longer range, and improved accuracy. Artillery with rifled bores and pointed projectiles could have more destructive power at a greater distance than earlier ordnance. A single direct hit from this new weaponry could obliterate a rigid stone and masonry wall. Coastal defense batteries were also made more vulnerable by steam-powered ships that had better maneuverability and could be equipped with defensive metal plating. (CLR 2010: 10)

In response to the powerful impacts of this new artillery, Civil War troops discovered that earthen embankments, often reinforced by wood pilings, provided better protection and the promise of easier repairs compared to stone and masonry construction. Unlike shattering stone, the earth could absorb the projectile's force and the resulting crater could be readily filled with nearby earth and sand. Observation and experience with defensive earthen structures in the Civil War would influence the design of coastal defense batteries during the second half of the nineteenth century. (CLR 2010: 10)

Sandy Hook Proving Ground:
Civil War artillery advancements harkened the beginning of a new generation of armaments, but did not address what the United States should do with over a thousand existing smooth bore guns. Congress concurred with the need to test the conversion of smooth bore to rifled artillery and

appropriations were signed into law in 1872 to facilitate the tests. Various locations along the eastern seaboard of the United States were considered for establishing a new proving ground with a seven to eight mile uninhabited range. While potential locations and their acquisition were debated, the military reservation at Sandy Hook was selected as a temporary facility in 1874. The Army hastily constructed wood platforms and carriages and the first test fire of a converted smooth bore gun occurred in October 1874. The temporary facility became more permanent in 1881 with the construction of a Proof Battery and concrete platforms for mounting and testing guns. The Sandy Hook Proving Ground, with a proof battery and supporting, auxiliary structures, was the first development on the peninsula that responded to artillery advancements from the Civil War era. A new generation of coastal defenses would join the granite fort and Proving Ground within the next decade. (CLR 2010: 10-11)

The Endicott Board:
As experts debated the location for a permanent proving ground site, an economic crisis started with the Panic of 1873 and lasted until 1878. As a result, Congress reduced coastal defense spending and ultimately stopped its funding in 1875. Pressure for a new generation of coastal defenses came from the public, officers in the Army and Navy, and members of Congress who were concerned about the advancement of foreign navies and the lack of maintenance on existing defenses. (CLR 2010: 11)

During President Grover Cleveland's first term, in 1885 to 1889, Secretary of War William C. Endicott convened a board comprised of Army and Navy personnel and knowledgeable civilians to study locations, fortification types, armament, and protective materials for coastal defenses. The Endicott Board met in 1885 and early the following year released findings that called for defensive structures at twenty-six coastal locations, including Sandy Hook, and three additional sites along the Great Lakes. Prior to the Endicott Board, coastal defenses placed canons within parapet openings and on top of stone and masonry forts. In contrast to this approach and to address the threat posed by improved artillery, the Endicott Board recommended that new coastal defenses utilize rifled artillery emplaced in concrete platforms. The platforms would be shielded by a concrete wall and from the top of the wall, additional concrete would slope away and then be covered with earth for impact absorption and concealment into the surrounding landscape. As a result of the Endicott Board's recommendations, the first steam-powered, gun-lift battery and the first concrete mortar battery in the nation would be constructed at Sandy Hook. (CLR 2010: 11)

In advance of constructing two new batteries, the Army upgraded transportation and housing facilities. The wharf near the northwest point of the peninsula, primarily used by the Ordnance Department to receive artillery for the Proving Ground, was extended in 1891 to receive cement, broken stone, and lumber for the battery projects. Narrow gauge railroad lines were installed on the wharf and laid out to the proposed battery sites for delivering materials. The Army also constructed temporary buildings to house a civilian workforce needed on Sandy Hook for the new battery projects. Excavations began for the Mortar Battery in November 1890 and were followed three months later by the groundbreaking for Battery Potter. Construction on both batteries occurred simultaneously throughout the early 1890s. Battery Potter has the distinction of being the first completed, partially armed, and tested battery following the Endicott Board's recommendations and therefore, the discussion will now focus on Battery Potter and be followed by the Mortar Battery. (CLR 2010: 12)

Battery Potter:
Prior to its designation as Battery Potter, Sandy Hook's first coastal defense battery utilizing concrete construction and rifled guns was referred to as the Gun Lift Battery #1. In addition to incorporating new materials and artillery, the battery's innovative design featured a steam-powered hydraulic lift that raised the guns up into firing position after they had been loaded within a protective structure. Viewed from above, the Gun Lift Battery was D-shaped with the straight segment of the "D" facing west and a curving facade facing the Atlantic to the east. The terreplein stood approximately forty feet above surrounding grades and contained two openings for raising and lowering the 12-inch caliber guns. East of the guns, a concrete superior slope gently descended to a sentry route known as a "chemin de ronde" that was fronted by a parapet wall. A concrete slope angled away from the parapet and met an engineered earthwork that continued to slope down to surrounding grades and blended the massive concrete structure with the surrounding dune landforms (Figure 1). (CLR 2010: 12)

Before excavating for the Gun Lift Battery [Battery Potter], the Army constructed temporary storage facilities and installed mixing equipment to the west of the battery site for concrete production. Rail cars transported cement and broken stone from the wharf to the construction site, which were mixed with water and sand to produce concrete in close proximity to the building site. Sand was excavated and brought to the production site from nearby pits. (CLR 2010: 12)

In April 1891, two months after excavation work began, workers started placing concrete for the Gun Lift Battery. Construction continued until winter weather slowed concrete production. By June 1892, a majority of the battery's northern section was complete and the boiler, gun lift mechanism, and carriage were installed at the north emplacement. Two months later, the first 12-inch gun was raised to the terreplein and mounted at the north emplacement. Two rounds were test fired in September 1892 inaugurating a new era of coastal defense for metropolitan New York. (CLR 2010: 12-13)

As winter approached, colder weather again slowed concrete production and work crews focused on creating the engineered earthwork around the exterior walls of the battery. From December until June 1893, over 5,000 cubic yards of sand were added around the structure to a height of twenty feet above the surrounding grades. The Army placed sand at a 2:3 slope resulting in a steep finished surface that was susceptible to erosion. In order to limit erosion and camouflage the earthwork with the surrounding dunes, the north, south, and east facing slopes were planted with cedar trees and small shrubs. The plant material was likely obtained from other locations on the peninsula and transplanted to the engineered earthwork. (CLR 2010: 13)

The west facing slope was also planted, however, this earthwork was part of a defensible entrance for the Gun Lift Battery and received low growing sod instead of small cedars and shrubs. Concerned about a land-based assault on the battery, the Army Corps of Engineers designed a castellated entry that extended west from the main concrete structure. The entry was constructed with granite blocks salvaged from the Fort at Sandy Hook. Two octagonal towers flanked either side of a main door. The door and first and second stories of the towers contained gun loop slots so machine guns could fire on potential attackers. As part of the defensive scheme, vegetation on the west slope needed to be low growing in order to permit an unobstructed field of fire. (CLR 2010: 13)

By the end of 1893, the Gun Lift Battery [Battery Potter] was essentially complete with masonry construction finished, the engineered earthwork installed, and plant material added to the steep, sandy slopes. However at this time, the battery only had one 12-inch gun emplaced. The gun lift mechanism for the south emplacement was installed in February 1894 and then delays in manufacturing the gun carriage hindered the full operational start of the battery. Over a year later, the carriage was delivered and installed and the second 12-inch gun emplaced. After successfully test firing ten alternating shots from the two guns, the unique new battery was cleared for service in August 1895. (CLR 2010: 13)

Mortar Battery:
Complementing the capabilities of the artillery at the Gun Lift Battery [Battery Potter] was a battery of sixteen mortars, recessed in a massive earthen landform, just south of the Sandy Hook lighthouse. Compared to the long-barreled guns at the Gun Lift Battery, mortars were stubby and set at steep angles to fire their projectiles in a high, arcing trajectory. A group of eight or sixteen mortars was planned to fire together and their respective 700-pound projectiles would collectively descend on the decks of ships like oversized pellets from a shotgun blast. To achieve high arcing trajectories that struck ships in the channel, Sandy Hook's Mortar Battery had to be located further away from the shoreline than the Gun Lift Battery. (CLR 2010: 13-14)

Construction began in 1890 on the Mortar Battery. The battery contained four concrete platforms that were recessed in a protective mound of earth and sand that rose to almost thirty-five feet. A rectangular concrete outer wall bounded the earthen mound, the longer sides of which were oriented in a southwest to northeast direction. At the wall's southwest and northeast corners, the Army constructed counterscarp galleries to defend against a land-based attack. If enemy forces ever penetrated the Mortar Battery's perimeter wall, machine gunners stationed in the counterscarp galleries had unobstructed lines of fire along the faces of the wall. Given the orientation of the

battery, recessed platforms were located in the southwest, southeast, northwest, and northeast portions of the structure. Vertical retaining walls rose up from each platform and met a concrete blast slope that tapered to a wider opening and held back the mounded earth. The southwest and northwest platforms were entered through a concrete gallery featuring high, concrete retaining walls. Passageways to access the southeast and northeast platforms, as well as ammunition magazines, were located under the protective cover of the built up earthwork (Figure 2). (CLR 2010: 14)

The first step in constructing Mortar Battery was excavating a stable base for each mortar platform, then pouring a concrete slab for the base. Like the work undertaken at the Gun Lift Battery, concrete was produced on site with dedicated storage space for broken stone and cement. Ships transported both products to Sandy Hook and then rail cars brought stone and cement to a site southwest of the Mortar Battery. The Army excavated sand from nearby pits and mixed with the other two components in close proximity to where the final concrete was placed. In addition to the concrete facility, rail lines were installed to three sand pits near the Mortar Battery in order to transport sand for the battery's mounded, protective covering. When temperatures were too cold to mix and place concrete, laborers began filling rail cars by hand with sand. When the cars arrived at Mortar Battery, derricks hoisted a removable container and dumped the sand around the finished concrete work. The sand filling progressed slowly and during the winter months of 1892 and 1893, steam-powered shovels were brought to the site to improve the quantity and speed of the excavation and placing work. (CLR 2010: 14)

Over 150,000 cubic yards of sand were placed at Mortar Battery, but settling and high winds displaced some of the material. To better secure the fill material and protect their tremendous construction expenditures, site engineer Lt. James G. Warren directed the planting of sod, cut from a marsh south of the battery, on the slopes rising from the concrete blast slopes to the top of the mound. The remainder of the mound was covered in native heather and cedar boughs that were tolerant of dry and sunny conditions. Additionally, records show that oats were sown on the slopes to help deter erosion. Masonry construction was completed at Mortar Battery in 1893 and a year later, each of the four platforms was armed with four 12-inch guns. The guns were test fired in June 1894 and Sandy Hook's Mortar Battery became the first completed and operational concrete mortar battery in the United States. (CLR 2010: 14-15)

The Establishment of Fort Hancock:
The creation of the Sandy Hook Proving Ground and the construction of new coastal defense batteries brought personnel from the Army Ordnance Department and the Army Corps of Engineers respectively to the peninsula. In addition to Battery Potter and the Mortar Battery, the Army constructed an experimental Dynamite Gun Battery in 1891. Located at the northern end of the peninsula, the battery utilized compressed air to fire projectiles instead of gunpowder. With three batteries completed, additional personnel from the Army Corps of Artillery were needed for fulltime operation and maintenance of the new structures. (CLR 2010: 15; Review comments, Hoffman and Cox, 20 August 2020)

In order to provide housing and support facilities for the Army Corps of Artillery, the Secretary of War issued a general order establishing Fort Hancock on October 30, 1895. The Army designated the fort in honor of Major General Winfield Scott Hancock, a veteran of the Mexican and Civil Wars, who rose to national recognition for his heroics during the Civil War. The Army Corps of Engineers, based out of New York City, would be on Sandy Hook as needed for battery construction and shoreline stabilization projects. The Ordnance Department and Corps of Artillery would have permanent facilities but each would retain separate and distinct identities under the supervision of their own commanding officers. (CLR 2010: 15)

At the time Fort Hancock was established, the Army Ordnance Department, Army Corps of Engineers, and Army Corps of Artillery shared the peninsula with federal personnel for the U.S. Weather Bureau and the Western Union and Postal Telegraph Companies. All of these organizations shaped and modified the landscape in performing their duties. (CLR 2010: 15; Review comments, Hoffman and Cox, 20 August 2020)

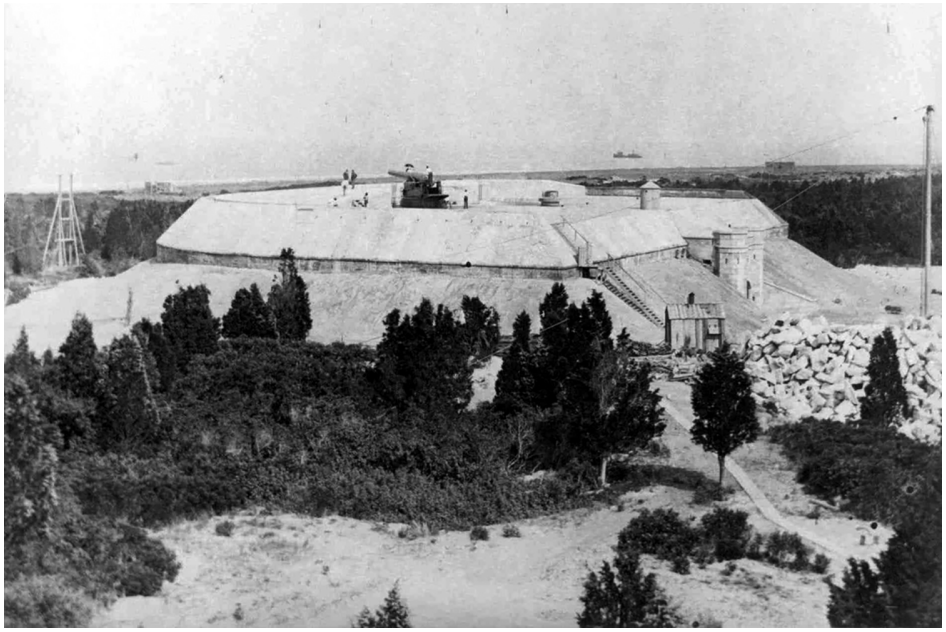


Figure 1. View looking southeast at Battery Potter, 1893 (Gateway National Recreation Area Museum Collection -- hereafter GATE -- 7811)

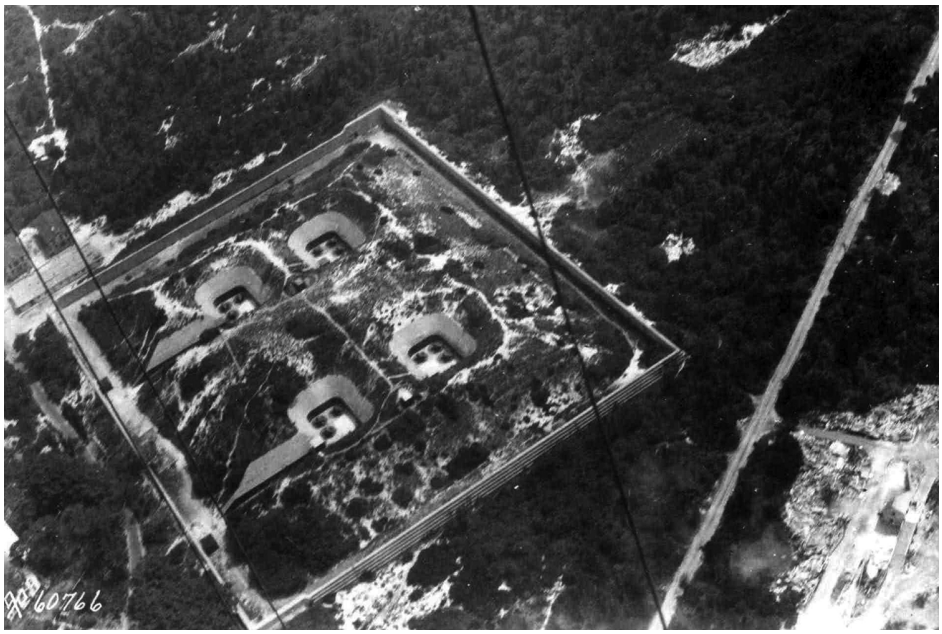


Figure 2. Oblique aerial photograph of the Mortar Battery, June 1919. (GATE 7870)

EXPANSION OF COASTAL DEFENSES, 1895–1919

Following the establishment of Fort Hancock in 1895, the Army constructed additional coastal defense batteries recommended by the Endicott Board at Sandy Hook during the early twentieth century. When the United States entered World War I on April 6, 1917, eight coastal defense structures had been completed in addition to Battery Potter and the Mortar Battery and two more were under construction. The Endicott Board outlined an ambitious coastal defense program that if fully implemented, required funding amounting to roughly half the entire federal budget. The pace of construction at Sandy Hook and throughout the country fluctuated with varying appropriations but finally peaked with the start of the Spanish-American War in 1898. Public fears rose about an inadequately defended coastline and in response, robust military budgets were approved and construction accelerated on coastal defense batteries. (CLR 2010: 35)

The defensive system recommended by the Endicott Board consisted of three categories: large caliber gun batteries, rapid fire gun batteries, and underwater controlled mines. The battery types and mines were designed to engage specific threats and to work together as part of a defensive system. For example, strategically placed controlled mines (detonated via electrical cables from shore) would force an enemy battleship to travel slowly through a shipping channel allowing large caliber gun batteries more time to fire and disable or eliminate the ship. Rapid fire gun batteries would defend against minesweepers and shallow-draft boats that could travel outside the shipping channel. Lacking a component of this system made a coastal site vulnerable to a specific attack. Given the commercial and military importance of New York City, Sandy Hook required both battery categories and controlled mine facilities to defend the southern approach to the harbor. (CLR 2010: 35; Review comments, Hoffman and Cox, 20 August 2020)

Although an important component in the history of Sandy Hook's coastal defenses, the Mine Casemate is presently on U.S. Coast Guard property and is outside the study area for this Cultural Landscape Inventory. The review of the coastal defense batteries is divided according to category and first covers the large caliber gun batteries and then the rapid fire gun batteries. Within each category the batteries are presented chronologically according to the dates of artillery emplacement. (CLR 2010: 35)

Naval Arms Race and the Taft Board:
At the start of the twentieth century, naval artillery consisted of a mixture of caliber sizes with none approaching the size and range of the 12-inch guns emplaced at Sandy Hook's coastal defense batteries. Engineers in Italy, Japan, and Great Britain all proposed battleships with large caliber armament schemes and the British completed the first such vessel with the successful launching of the HMS Dreadnought in 1906. The Dreadnought's launch and early trials were closely observed as the ship combined large caliber armament, electronic range finding system, and faster steam-powered propulsion. The ship's design was groundbreaking and a number of nations including the United States raced to build comparable battleships of their own that were generally categorized as dreadnoughts while all earlier ships were disparagingly referred to as pre-dreadnoughts. (CLR 2010: 35-36; Review comments, Hoffman and Cox, 20 August 2020)

As the Navy's role changed to engaging an enemy force hundreds of miles away from the United States, coastal defense systems required reevaluation yet again. In similar fashion to the Endicott Board, President Theodore Roosevelt convened military and civilian experts headed by Secretary of War William Howard Taft to review the nation's coastal defenses in 1905. In addition to reviewing Endicott Board recommendations, the Taft Board sought to incorporate technological changes made during the twenty-year period. (CLR 2010: 36)

The Taft Board did not alter the armament and defensive recommendations made by the Endicott Board. Instead, the Taft Board reinforced and accelerated the implementation of new technology including searchlights to illuminate channels and harbors at nighttime and the general electrification of coastal defenses. In 1913, an approved project called for thirteen 60-inch searchlights and two 36-inch searchlights at several locations guarding the southern entrance to New York Harbor. Five of the 60-inch searchlights were designated to go to Sandy Hook, and by November 1916, the peninsula's first searchlight was operational at a location 1,000 feet south of Battery Gunnison. By March 1918, the Army installed the remaining four searchlights with one located at the northwest point of the peninsula, one directly east of the Mine Casemate, and two approximately a mile south of

Battery Gunnison. The Taft Board also addressed coastal defenses for American territories acquired from Spain at the conclusion of the Spanish-American War. Except for six batteries at Fort MacArthur near Los Angeles, new coastal defenses built after the Taft Board report were outside the continental United States in Hawaii, the Philippines, and at the Panama Canal. (CLR 2010: 36-37)

Part of the Taft Board's recommendations addressed improving fire control—the process of acquiring and firing on enemy ships. Available land to construct multiple observation points as well as advances in optical instruments and electronic communications among the observation points, plotting rooms, and batteries resulted in the continued superiority of land artillery over naval artillery through the early part of the twentieth century. Target systems were established that used both single and two observation points equipped with precise optical instruments. With two observations points, called base end stations, a ship and its distance from each station would be identified simultaneously. The readings would be communicated to a plotting room and triangulated to find the ship's position and projected course. After calculating this information, instructions would be relayed for aiming and firing the artillery. The communications between observation, plotting, and firing were increasingly handled by telephone. In addition to using two observation points, single observation points were installed in elevated structures and towers. Using this system, the distance to a ship was calculated based on the known height of an optical instrument and the angle it was depressed to sight the target. The Army used both systems for the coastal defense batteries at Sandy Hook and the systems, "…represented the most significant advance to be made in harbor defense fire control until the introduction of radar during World War II." (CLR 2010: 37, citing Lewis 1993: 93)

The accuracy of triangulation improved with greater distance between two observation points. The Army's ability to locate stations at greater distances on land than between ships at sea gave coastal defense artillery an advantage over naval artillery. The coastal defense batteries at Sandy Hook were one component of a system that guarded the southern approach to New York Harbor. Batteries were also constructed at Fort Tilden on the Rockaway peninsula and at Fort Wadsworth and Fort Hamilton guarding the Narrows between the lower and upper harbor. In order to improve triangulation accuracy, the Army constructed an observation tower for Fort Tilden at Sandy Hook. For the high-angle gun carriage batteries (Mills and Kingman) built on Sandy Hook's western shoreline, a pair of observation stations stood a mile north of these batteries along the west side of Atlantic Drive, and another pair stood south of the peninsula in the Navesink Highlands. Electronic communication among the stations, batteries, and forts permitted targeting and firing information to be shared across greater distances. (CLR 2010: 37; Review comments, Hoffman and Cox, 20 August 2020)

Controlling new territories, specifically Hawaii and the Philippines, allowed American military personnel to observe former coastal defense batteries constructed and maintained by the British and Japanese. An April 1910 memorandum notes a difference in the design of earthworks and the use of vegetation and camouflage to conceal these batteries. Specifically, the author cites:
"…the great care that had evidently been taken by each of these governments to conceal the gun batteries and positions [sic] finder stations by means of screens of trees and shrubbery, and also, in case of English barbette batteries, by painting both guns and carriages in splotched or splashed colors of the varied hues of the surrounding landscape. In contrast with this I was equally impressed with the lack of concealment of our own coast defenses on the Pacific Coast and the way the batteries and position finder stations on that coast are exposed. The smooth geometrical slopes of our batteries, differing entirely from the rough natural slopes of the English and Japanese batteries, showed their locations at once, – making them stand out in bold relief against the natural background." (NARA, RG 177, box 69, Records of the Chiefs of Arms)

Plantings intended to conceal or obscure coastal defense batteries at Sandy Hook and other American locations were not an innovation of the Taft Board. Before the Taft Board convened, the Army completed Battery Potter and the Mortar Battery and added vegetation in order to limit erosion and blend the batteries into the adjacent landscape. Following the increase in naval power around the world and the Taft Board report, the Army was more formal in articulating the need for vegetation to conceal coastal defense batteries from detection at sea. Three weeks after highlighting the differences between American and foreign coastal defense batteries, the Army's Office of the Chief of Coast Artillery issued a memorandum instructing that new batteries should be constructed while

minimizing the number of existing trees removed and with engineered slopes that “conform in appearance” to the surrounding landscape and avoid “geometric contours.” The instructions also call for a general planting scheme composed of, “tall trees as a rule, should be planted in rear or and between adjacent batteries and in rear and on the sides of stations; low trees at the foot of batteries, bushes and shrubs on the superior slopes of batteries and low shrubs in irregular splotches between guns.” The memorandum acknowledges that effective concealment cannot be achieved in a single planting effort and that one week every spring and fall should be devoted to planting on and around the batteries. The instructions also cite the need for future replacement plantings and routine watering. Using vegetation to conceal batteries from ships was deemed so important that in 1914, the Army assigned a forester to examine batteries and recommend tree planting. (CLR 2010: 38, citing NARA, RG 177, box 49, folder 5352, Records of the Chiefs of Arms)

Large Caliber Gun Batteries:
Sandy Hook’s coastal defense batteries were constructed, armed, and modified in response to the needs identified by the Endicott and Taft boards. As part of the strategy articulated by the boards, coastal defenses were comprised of large caliber gun batteries, rapid fire gun batteries, and underwater mines. Sandy Hook’s first batteries, Battery Potter and the Mortar Battery, were both large caliber gun batteries. From their initial construction to the World War I armistice, these two would be joined by other large caliber gun batteries designed to engage enemy ships in the narrow channel north and east of the peninsula. (CLR 2010: 38-39)

The additional large caliber batteries at Sandy Hook were developed in response to technological improvements in artillery design, particularly the gun carriages, but also to provide a more effective defensive system. Test firing of Battery Potter’s two guns in 1895 demonstrated an average firing rate of three and a half minutes per shot. Improvements in steam-powered propulsion meant enemy ships would spend less time in a battery’s field of fire. The Army countered increased ship speed by placing controlled mines along the channel and also by constructing successive large caliber batteries. Located from south to north along Sandy Hook, constructing additional large caliber gun batteries provided a greater field of fire against faster ships. (CLR 2010: 39; Review comments, Hoffman and Cox, 20 August 2020)

Improvements in artillery design also resulted in a cycle of construction and disarmament for Sandy Hook’s large caliber gun batteries during the first two decades of the twentieth century. In addition to the main shipping channel, defenses at Sandy Hook could fire on a ship on the western or bay side of the peninsula with the Mortar Battery and Battery Potter’s 360-degree field of fire. When new counterweight carriage mounted guns made Battery Potter’s steam-powered gun lifts obsolete and the guns were disarmed, the Army constructed Battery Arrowsmith on the western shoreline. The cycle repeated when longer-range guns at Batteries Kingman and Mills lead to the disarmament of Battery Arrowsmith. (CLR 2010: 39; Review comments, Hoffman and Cox, 20 August 2020)

Battery Potter.
In 1896, one year after emplacing the second gun at Battery Potter, the Army successfully tested the Buffington-Croizer counterweight gun carriage at the Sandy Hook Proving Ground. After loading a gun mounted on this new carriage design, a counterweight raised the gun barrel into firing position above a protective concrete parapet wall. The recoil from firing the gun brought the barrel back down behind the concrete parapet wall to conceal it and provided cover to the artillerymen reloading the gun. A trained crew could fire two rounds per minute with a counterweight carriage gun compared to a single round every three and a half minutes with the steam-powered gun lift at Battery Potter. Just as advances in artillery during the Civil War eclipsed the defensive capabilities of the Fort at Sandy Hook, the new carriage produced in the closing years of the nineteenth century made Battery Potter’s steam-powered gun lifts obsolete. (CLR 2010: 39; Review comments, Hoffman and Cox, 20 August 2020)

Although its steam lift mechanism was inferior to the new Buffington-Croizer carriages, Battery Potter continued to contribute to New York Harbor’s coastal defenses for another fifty years. Early modifications at Battery Potter focused on improved target identification and new utilities for the entire fort. In 1899, the Army built a sixty-foot tall range-finder tower west of Battery Potter. The steel tower supported a wood observation shelter sheathed with galvanized iron. Between 1901 and 1902, the

Army constructed a central powerhouse (259) for Fort Hancock's lighting system near the northwest corner of Battery Potter. The one-story brick building with a slate roof housed the lighting system's boilers and transformers. In addition, the Army constructed a coal shed (260) to store fuel for the boilers north of the powerhouse in 1903. That same year, the Army officially designated Gun Lift Battery #1 as Battery Potter in honor of Civil War veteran Brigadier General Joseph H. Potter. (CLR 2010: 39-40)

In 1906 Army disarmed Battery Potter's 12-inch caliber guns and sold the steam-powered gun-lift mechanism for scrap. With the guns gone, fire control stations were constructed on Potter's terreplein (roof) in 1905 and 1907. As part of support operations, the Army also constructed in 1907 two telephone switchboard rooms (256, 257) at the southwest corner of Battery Potter to relay range information from the fie control stations to the fort's gun batteries. (CLR 2010: 39-40; Review comments, Hoffman and Cox, 20 August 2020)

Mortar Battery.
Test firings at the Mortar Battery during 1894 impacted the protective earth and sand slopes. The steep grade above each firing pit's concrete blast slope proved difficult to stabilize. In 1900, post commander Major Burbank recorded the "dislodgement of a quantity of turf revetment of the slope in front of the mortar used." In order to improve the slope's stability, the Army re-graded these slopes at a 2:1 ratio. In 1901, the Army constructed a steel tower inside Mortar Battery's western perimeter wall. At the top, the structure supported a wood-frame building approximately fifteen feet square with a surrounding three-foot-wide catwalk. The tower served as a battery commander's station that identified targets for crews in the four pits. To facilitate better communication between the acquisition of targets and aiming of artillery, construction began on telephone data booths in 1905. The Army installed the booths above the southwest corner of each pit and supported each by arched, concrete spans. (CLR 2010: 41, citing NARA Northeast Region, RG 77, Press Copies of Letters Sent Relating to Fort Hancock; Review comments, Hoffman and Cox, 20 August 2020)

Following the construction of the data booths, the designation of the Mortar Battery was split to identify separate batteries for the north and south firing pits. A 1906 general order designated the north pits in honor of Major-General Alexander McCook, another Civil War veteran. The south pits retained the earlier Battery Reynolds, which had been named in 1903 in honor of Major-General John F. Reynolds who died during the first day of fighting at Gettysburg. Between 1906 and 1907, the Army added two battery commander's stations on top of the earth and sand cover to correspond with the separate batteries. From these concrete commander's stations, aiming and firing instructions were relayed to the telephone data booths and then down to the firing pits. With the commander's stations and data booths completed, the Army converted the steel tower to a weather station to provide information on atmospheric conditions affecting the trajectory of projectiles. (CLR 2010: 42)

The World War I efforts to mobilize troops and expand coastal defenses abruptly ended following the armistice on November 11, 1918. At Sandy Hook and across the country, personnel were drastically reduced during the early months of 1919. Coupled with the reduction in personnel and spending, advances in naval artillery during World War I eclipsed the range of the Mortar Battery's mortars. The mortars were subsequently disarmed and sold to civilians between the winter of 1919 and spring of 1920. (CLR 2010: 42-43; Review comments, Hoffman and Cox, 20 August 2020)

Battery Granger.
In the mid-1890s, as trials were underway at the Proving Ground to test the new counterweight gun carriage for service, construction began on a new concrete battery that would incorporate this new system. Completed in 1896, the Ten-inch Battery #1 was the first large caliber gun battery at Sandy Hook to use the new counterweight carriage. Located between Battery Potter to the north and Mortar Battery to the south, the battery's two gun emplacements were armed with 10-inch guns in 1897 and 1898. The Army built two concrete gun emplacements fourteen feet above the surrounding grade to meet a parapet wall that rose an additional ten feet higher. In each gun emplacement From the platforms, a series of concentric steps proceeded down three feet to the counterweight wells over which the carriages and guns were mounted. One hundred twenty-four feet separated the center lines of the two guns with the south emplacement labeled #1 and the north emplacement #2. From the top of the parapet wall, a concrete superior slope continued away from the structure for twenty

feet followed by an additional thirty feet of earth and sand. The concrete and engineered earthwork descended away from the wall at a ten percent slope. The slope of the earthwork then increased to a 2:3 ratio and met the surrounding, unaltered grades. (CLR 2010: 43; Review comments, Hoffman and Cox, 20 August 2020)

Prior to receiving an official designation, typically in honor of a military hero, new coastal defense batteries were named according to their projectile diameter followed by a sequential number for the order in which they were constructed. Plans for defending the southern approach to New York City called for other batteries on Sandy Hook and an 1898 map identifies the Ten-inch Battery #1 and several other batteries with this descriptive naming convention. Replacing the descriptive name, the Army designated the Ten-inch Battery #1 as Battery Granger in 1900 in honor of Civil War veteran Major General Gordon Granger. (CLR 2010: 43)

A decade after the guns were emplaced, the Army updated Battery Granger to reflect the current practices on the efficient operation of a counterweight carriage gun. They extended the platforms behind the guns in order to allow for more convenient loading of munitions. In addition, they added an enclosed, concrete battery commander's station between the two gun emplacements providing a central location and greater protection for the commanding officer (Figure 3). (CLR 2010: 43)

Nine Gun Battery.
Having successfully tested the counterweight carriage at the Proving Ground and installed it at Battery Granger, the Army built additional batteries for the faster firing carriage with a greater range. To compliment the two 10-inch guns at Battery Granger, construction began on a three-gun emplacement—the Ten-inch Battery #2—in 1897. The battery was located north of batteries Granger and Potter and was built over the east oceanside wall of the former granite fort (Figure 4). This location paralleled the main shipping channel along Sandy Hook's eastern shoreline. The Army completed construction and emplaced the three guns in 1898. That same year, the United States declared war on Spain following the explosion of the USS Maine in Havana Harbor and a public outcry for military action. Funding increased for additional coastal defenses, including two batteries to the north and south of the Ten-inch Battery #2. (CLR 2010: 44; Review comments, Hoffman and Cox, 20 August 2020)

To supplement the 12-inch guns at Battery Potter, the Army equipped the two new batteries with 12-inch guns on counterweight carriages. They constructed a Twelve-inch Battery #2 north of the Ten-inch Battery #2, which followed the angle between the east and north facades of the former granite fort. The new 12-inch guns provided fire on the shipping channel as it turned northwest and headed around the tip of Sandy Hook toward lower New York Harbor. South of the Ten-inch Battery #2, the Twelve-inch Battery #3 was designed to emplace two more counterweight mounted guns along the peninsula's eastern shoreline. The new batteries were completed in 1899 and armed in 1900. With seven guns emplaced, the structure was commonly referred to as the Seven Gun Battery. The Army dedicated the battery in honor of Civil War veteran Major-General Henry W. Halleck in 1900. (CLR 2010: 44; Review comments, Hoffman and Cox, 20 August 2020)

At the southern end of the seven-gun Battery Halleck, the Army completed an additional battery in 1902 and armed the battery in 1904 with two 12-inch guns. The combined nine guns mounted across a continuous concrete structure was the largest grouping of artillery built following the Endicott and Taft recommendations. With nine guns emplaced, the Army determined that one battery commander could not efficiently coordinate firing all the guns. To address this problem, they designated the Nine Gun Battery as four separate batteries. From north to south the designations were Battery Alexander, Battery Halleck, Battery Bloomfield, and Battery Richardson (Figure 5). (CLR 2010: 44-45)

Battery Arrowsmith.
Battery Arrowsmith represented a unique and first-of-its-kind coastal defense construction at Sandy Hook. When Battery Potter's guns were removed in 1906, the peninsula no longer had large caliber artillery with a 360-degree field of fire. Fearing that Fort Hancock was susceptible to an attack from Sandy Hook Bay and its western shore, planning began for a battery at Horseshoe Cove Point. Crews completed masonry construction in 1908 and that same year, the battery was named in honor

of Lieutenant Colonel George W. Arrowsmith who was killed at Gettysburg during the Civil War. A year later, the Army emplaced three 8-inch guns at Battery Arrowsmith to defend against any attack on Sandy Hook's western shore. (CLR 2010: 45)

The guns were spaced 128-feet apart and a separate magazine was located east of each gun platform. The magazines were concealed with earth and sand cover that rose slightly over twenty feet above the surrounding grades. Just as Battery Potter's steam gun lifts were quickly eclipsed by the new counterweighted carriages, Battery Arrowsmith's protection of the bay side was not needed after the installation of new coastal artillery at Batteries Kingman and Mills in 1919. The new artillery, mounted on a different carriage design, provided a 360-degree field of fire that could defend Sandy Hook Bay. (CLR 2010: 45; Review comments, Hoffman and Cox, 20 August 2020)

Batteries Kingman and Mills.
The British introduced improved artillery based on its Dreadnought class battleships and as World War I approached, foreign navies developed similar artillery that threatened the relatively small counterweight carriage guns at Sandy Hook. Battleships were equipped with new turrets new turrets that fired artillery shells at higher angles. With this modification that utilized the same guns and projectiles, ships could now be positioned further offshore and out of the range of coastal defense batteries. In addition, the counterweight carriages that lowered a battery's guns behind protective concrete and earth for loading were now susceptible to incoming fire from a ship's higher trajectory projectiles. (CLR 2010: 46; Review comments, Hoffman and Cox, 20 August 2020)

In response to this new threat, construction began on two large caliber gun batteries utilizing a high-angle gun carriage with a greater range. In comparison to the seven to eight mile range of counterweight carriage guns, the new artillery had a range of over twenty miles. The Army mounted the high-angle carriages on rotating platforms that resulted in a 360-degree field of fire. Instead of relying on concrete and mounds of earth and sand to protect the artillery, the new batteries were located on the bay side of the peninsula to be as far away as possible from potential enemy fire and sight lines. (CLR 2010: 46)

The Army completed masonry construction of both batteries in late 1917. Each battery included two open, circular platforms that were 100 feet in diameter. Mounted in the center of the circle, the 12-inch guns, emplaced in 1919, were 420 feet apart with the south gun identified as #1 and the north as #2. In the area between each pair of gun platforms was a large earth covered concrete traverse that housed artillery shells, gunpowder, plotting rooms, a storeroom, and two latrines for the soldiers stationed at either battery. Located approximately two miles from the quarters at Fort Hancock, the engineered earthwork covered traverse also served to protect the neighboring gun platform from a misfire and rose approximately twenty-eight feet above the surrounding grades (Figure 6). In 1919, the Army officially designated Battery Kingman in honor of Brigadier General Dan C. Kingman who served as Chief of Engineers for the Army Corps, and Battery Mills in honor of Brigadier General Albert L. Mills, a Medal of Honor recipient from the Spanish-American War. (CLR 2010: 46; Review comments, Hoffman and Cox, 20 August 2020)

Rapid Fire Gun Batteries:
As a complement to the large caliber gun batteries that guarded the approach to New York Harbor, rapid-fire gun batteries protected areas outside the main shipping channel that were susceptible to attack by shallow-draft warships like destroyers, torpedo boats, and landing craft. In addition, the rapid-fire gun batteries protected the minefields laid outside the channel from enemy minesweepers. At Sandy Hook, the Army located the majority of rapid fire gun batteries at the northern tip of the peninsula. This location allowed these batteries to protect electronically controlled underwater minefields laid adjacent to the shipping channel north of the peninsula. (CLR 2010: 47; Review comments, Hoffman and Cox, 20 August 2020)

Battery Engle.
Construction started on Sandy Hook's first rapid fire gun battery in 1897. The battery was located near the northern end of the peninsula and designed to mount a single 5-inch gun. As tension grew between the United States and Spain over control of the Caribbean and the approach to the Panama Canal, construction on the battery was completed and it was armed on April 21, 1898. Four days

later, Congress declared war on Spain and public pressure and funding increased for coastal defenses. The Army constructed the battery with a twenty-one foot diameter concrete gun emplacement set approximately eight feet above surrounding grades. The gun emplacement contained a deep, cylindrical opening to hold a balanced pillar mounted gun. To the east of the gun emplacement, a magazine included six feet of concrete cover. (CLR 2010: 47; Review comments, Hoffman and Cox, 20 August 2020)

Battery Urmston.
Beginning in 1899, the Army constructed a six gun, rapid-fire battery west of Battery Engle along Sandy Hook's northern shoreline. Construction occurred in three phases and spanned five years beginning with building gun emplacements #1 and #2 at the eastern end of the battery. Following this first phase, construction started on the western end for gun emplacements #5 and #6. These emplacements were completed in November 1900 and all four were armed with balanced pillar mounted guns. When not in use, the pillar mounted guns could be mechanically lowered below the concrete parapet. As they were lowered, the gun barrels rotated ninety degrees and were placed in a notch in the parapet. Battery Urmston's initial four emplacements shared a similar design with steps leading to a rear platform approximately five feet above surrounding grade. From the rear platform, another set of steps led to the gun platforms approximately four feet higher in elevation. A separate magazine stood to the east of each platform, and like Battery Engle, included six feet of concrete cover. The top of the magazine protruded approximately three and a half feet above the gun platform. (CLR 2010: 48)

In 1903-1904, the final phase of construction at Battery Urmston added gun emplacements #3 and #4 between the two previous sections (Figure 7). Unlike the earlier rapid-fire guns, the artillery at emplacements #3 and #4 were two Model 1902 3-inch guns mounted on fixed pedestal mounts that could not be lowered. With all six emplacements completed, the battery was named in honor of Lieutenant Thomas D. Urmston who was killed during the Civil War. (CLR 2010: 48; Review comments, Hoffman and Cox, 20 August 2020)

Battery Morris.
To provide a complete field of fire along Sandy Hook's northern tip, the Army constructed a third rapid fire gun battery between Battery Engle and Battery Urmston. Masonry construction was completed in 1903 on the four gun emplacement battery and it was designated in 1904 in honor of Colonel Lewis Morris who was killed during the Civil War Battle of Cold Harbor. The four 3-inch guns at Battery Morris were intended to be mounted on pedestal carriages. Due to development and production delays of the carriages, the guns were not emplaced until 1909. (CLR 2010: 48-49; Review comments, Hoffman and Cox, 20 August 2020)

The four platforms were constructed approximately nine feet above surrounding grades and were accessed by steps that led to two intermediate levels. Between the four emplacements were three magazines that featured a combination of concrete and earth cover. The top of the earth cover on the magazines rose seven feet above the gun platforms. (CLR 2010: 49)

Battery Peck.
A final rapid fire battery joined Urmston, Morris, and Engle on the northern end of Sandy Hook. Located immediately east of Battery Engle, construction began in 1901 on a battery that mounted two 6-inch rapid fire guns. This new battery had a greater range and worked in conjunction with the remotely detonated minefields to stop fast shallow-draft warships that ventured out of the main shipping channel. (CLR, 2010:49; Review comments, Hoffman and Cox, 20 August 2020)

The Army emplaced the 6-inch guns in 1903 on barbette mounts that did not lower the guns behind a protective parapet. A semi-circular, armor plate that wrapped around either side of the gun barrel provided minimal protection (Figure 8). That same year, the Army designated the battery in honor of Lieutenant Freemont P. Peck who was accidentally killed at the Sandy Hook Proving Ground in 1895. (CLR 2010: 49)

Battery Gunnison.
In 1898, the Army planned to build a rapid fire battery southeast of Nine Gun Battery's southern end.

However, this proposed location conflicted with the ongoing operation of the Sandy Hook Proving Ground and construction was delayed. In 1903, the Army selected an alternative location further south on the peninsula than any battery previously built. Initial work included an extension of the rail lines and clearing for the new battery. Construction was completed a year later and the battery was designated in honor of Captain John W. Gunnison who was killed in the Utah Territory in 1853. In 1905, two six-inch guns were mounted on disappearing counterweight carriages. These six-inch rapid-fire guns worked in the same manner as their larger caliber siblings. A counterweight raised the gun barrel into position and the recoil from firing the gun lowered the barrel back behind a concrete parapet wall (Figure 9). (CLR 2010: 49-50; Review comments, Hoffman and Cox, 20 August 2020)

Two gun emplacements, aligned on a north-south line, faced the Atlantic Ocean to the east and were spaced 125 feet apart on center. The gun emplacements were constructed approximately five and a half feet above surrounding grades. In each gun emplacement, steps led down two feet to gun wells where the carriages and guns were mounted. A parapet wall rose eight feet above each gun emplacement and transitioned to a concrete superior slope that pitched away from the structure. In between the two gun emplacements a protected concrete traverse contained rooms for ammunition, plotting target ranges, and equipment storage that was covered with sand that rose three and a half feet higher than the top of the parapet wall. The earth and sand slope on the east side of the battery helped to blend the structure into the surrounding landscape and camouflage it from ships at sea. Grasses and low-growing shrubs on the engineered earthwork contributed to the concealment. The west facade was not camouflaged and the concrete and metal framework of the structure was clearly visible when approaching from the west. (CLR 2010: 50; Review comments, Hoffman and Cox, 20 August 2020)

Closure of the Sandy Hook Proving Ground:
In order to support the expanded coastal defenses at Sandy Hook, Fort Hancock grew to provide housing, administration, and facilities to cover all facets of military life. With the United States entering World War I in April 1917, personnel at the fort swelled to over 4,000 and the Army constructed many temporary wooden structures for officers and enlisted men arranged in groups called cantonments. The expansion created a danger to personnel and property as testing continued at the Proving Ground. Additionally, the Proving Ground needed greater distances to test longer-range artillery being developed to counter improved naval armament. Given the conflict between the Proving Ground and coastal defenses, Sandy Hook seemed less than ideal for testing new artillery. In March 1918, the Army established the Aberdeen Proving Ground on the western shore of the Chesapeake Bay in Harford County, Maryland. As facilities became operational at Aberdeen, testing at Sandy Hook transitioned to the new site and the use of the Sandy Hook Proving Ground was phased out during 1919. (CLR 2010: 51; Review comments, Hoffman and Cox, 20 August 2020)

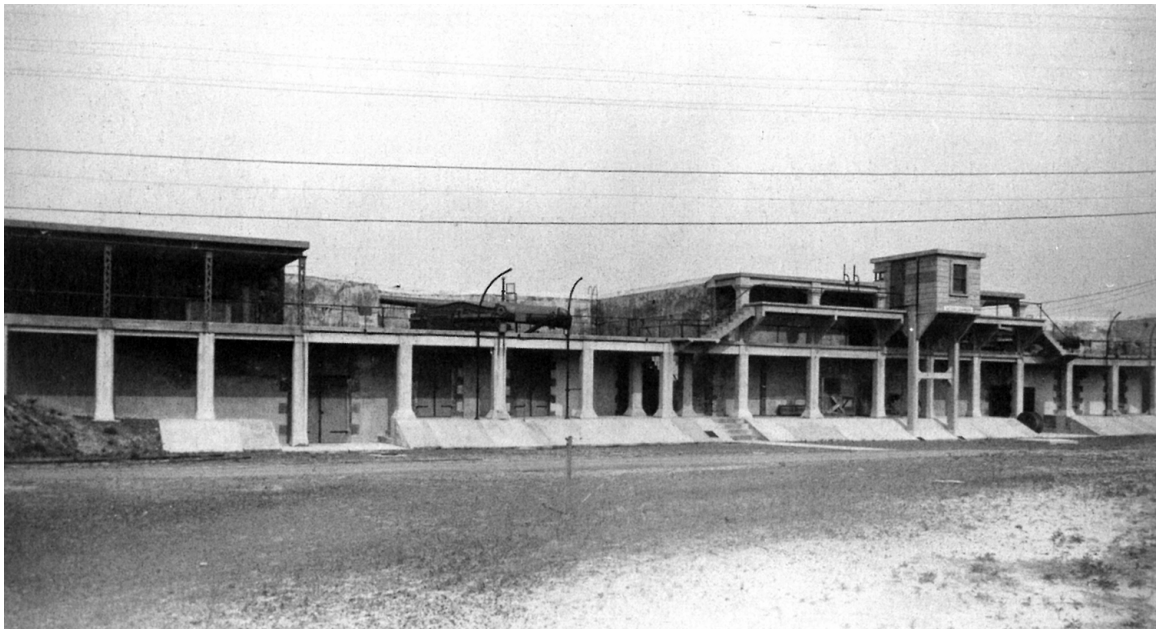


Figure 3. View looking southeast at Battery Granger, circa 1907. (GATE 7844)



Figure 4. View looking northwest at construction of Nine Gun Battery over the east oceanside wall of the Civil War-era granite fort, 1897. (GATE 7880)



Figure 5. Oblique aerial view of the Nine Gun Battery, 1942. (NARA, RG 661 S, Phillip S. Gage Collection, Fort Hancock Folder)



Figure 6. View looking north at Battery Mills' emplacement #2, circa 1940–41. (GATE 4944)



Figure 7. View looking northwest at Battery Urmston, circa 1906. (GATE 7777)



Figure 8. View looking northwest at Battery Peck, circa 1905–10. (Thomas Hoffman, Fort Hancock, Charleston, SC: Arcadia Publishing, 2007)



Figure 9. View looking northeast at Battery Gunnison's emplacement #2, circa 1936-1939. The Army replaced the pictured counterweight carriage guns with barbette-mounted guns in 1943. (GATE 7834)

CARETAKER STATUS AND WORLD WAR II, 1919–1945

The World War I efforts to mobilize troops and expand coastal defenses abruptly ended following the armistice on November 11, 1918. At Sandy Hook and across the country, personnel were drastically reduced and the coastal defense batteries were assigned to a minimal level of upkeep referred to as caretaker status. Between December 1918 and June 1919, Sandy Hook's batteries saw their personnel reduced from twenty-four officers and 1,535 enlisted men to fifteen officers and 386 enlisted men. From the armistice to the conclusion of World War II, personnel levels fluctuated at Sandy Hook, alternating between minimal staffing when in caretaker status, increased personell during periods of activation of National Guard units, and training and coastal defense functions during the war. The Army reduced the number of operational batteries at Sandy Hook and other sites defending New York Harbor because the range of new large caliber 12- and 16-inch guns provided a greater field of fire and could cover the same field of fire as numerous batteries of smaller caliber. At Sandy Hook, Batteries Kingman and Mills held their positions on the western side of the entry to Lower New York Harbor. On Long Island, New York, the Rockaway peninsula marked the eastern side and in this location, 16-inch guns were emplaced at Fort Tilden's Battery Harris. Collectively, these three batteries covered any possible approach of a major battleship and during World War II, were joined by Battery Lewis in the Navesink Highlands. Similar to Battery Harris, Battery Lewis had 16-inch guns that extended the field of fire further south and east into the Atlantic Ocean. (CLR 2010: 81)

Advances in aviation technology during the inter-war period further redefined coastal defense strategies. The potential to use airplanes in reconnaissance and bombing campaigns required the redesign of large caliber batteries, including Kingman and Mills. The expanded role of aviation also resulted in new detection technologies, which were tested and installed at Sandy Hook. In the mid-1930s, the Army Signal Corps Laboratories at nearby Fort Monmouth developed detection systems that transmitted radio waves and determined aircraft location, range, and azimuth based on the reflected waves. The system became known as radar—an acronym for Radio Detecting and Ranging. Due to its secure location and the opportunity to test radio waves on passing ships and planes, the Army Signal Corps established radar facilities at Sandy Hook. Working with the Western Electric corporation, the U.S. Army Signal Corps built a group of eight wooden warehouses approximately a half mile east of Batteries Kingman and Mills near the Atlantic coastline. Each warehouse contained a SCR-268 radar unit, the Army's first operational radar, and allowed tests on

the systems in relative secrecy without exposure to weather. (CLR, 2010: 81)

By August 1943, the Army installed eleven radar sites in New Jersey, Staten Island, and the Rockaway peninsula to help guard the southern approach to New York Harbor. Two of the radar sites stood on the Sandy Hook peninsula to detect ships and low-flying planes and transmit range and azimuth data to specific batteries. The first site at Sandy Hook for a SCR-682 radar unit was the top of an existing fire control tower. The tower was constructed in the late 1920s for Battery Harris and was located approximately 700 feet west of Battery Gunnison. For the second site, the Army constructed a new tower approximately a quarter mile south of the Signal Corps' wooden radar shelters. This tower housed a SCR-296 radar unit that sent target information to the rapid fire guns at Battery Gunnison. (CLR 2010: 81-82)

During peacetime, the primary goal for caretaker status personnel was to prevent the serious deterioration of the batteries' armament, fire control, and communication systems. The Army maintained these components so they could be immediately placed into active service when required. Caretaker duties involved monthly inspections and emphasized the cleaning and maintenance of the guns and carriages. In addition, caretakers were to inspect the emplacement, slopes, and interior rooms during their monthly inspections. If deemed by the inspection, gutters and drainage sumps had to be cleaned out and problems with vegetation addressed, including watering during hot summer months. Following instructions found on battery construction drawings, such as the 1905 drainage plan for Battery Gunnison, damp interiors were improved by opening doors on warm, sunny days and promoting better ventilation. Performing all of these tasks and successfully maintaining a battery depended on the number of caretaker personnel assigned and whether they had to divide their time and energies among numerous duties. (CLR, 2010: 82)

Personnel reductions immediately after World War I were followed by new national policy and an international treaty that kept the caretaker system active until the mid-1930s. With the defeat of Germany and the exhaustion of other European powers, future conflicts seemed unlikely at that time and public support for military spending waned. In this political environment, Congress passed the National Defense Act of 1920 that provided a new organizational model and regulations for the Army. The Act significantly cut active Army personnel and restructured the service to be comprised of the Regular Army, the National Guard, and the Organized Reserves. The National Guard and Reserves would provide the necessary manpower if conflict erupted and the focus of the Regular Army became training these non-permanent forces. Reduced active personnel were coupled with decreased funding and Sandy Hook's coastal defenses remained minimally staffed in caretaker status. (CLR 2010: 82)

Furthermore, emphasis on coastal defenses was diminished by the Washington Naval Treaty, ratified in 1922. Under the terms of the treaty, the United States, Great Britain, Italy, France, and Japan all agreed to limit new naval construction and armament. With the strength of international navies a known and fixed quantity, there was little support beyond rudimentary maintenance for coastal defenses. By 1930, thirty-five coastal defense groups that were developed and active between 1890 and 1917 were reduced to only ten in active status. Sandy Hook, part of the Southern New York Harbor Defenses, and the Eastern New York Harbor Defenses at the confluence of the East River and Long Island Sound, joined an additional thirteen defense groups in caretaker status. Ten defense groups were abandoned and of the ten active groups, half were located in the foreign territories of Hawaii, Panama, and the Philippines. In the northeast United States, only the Long Island Sound Harbor Defenses that guarded the eastern entry to the Sound remained on active status. (CLR 2010: 83)

Mobile Artillery:
Changes in the overall military strategy following World War I and the reduction in personnel and funding created an emphasis on mobile artillery. In the 1919 annual report to the Secretary of War, the Chief of Coast Artillery stated:
"In the past our seacoast guns were mounted on fixed carriages because we had no others on which guns of requisite power could he mounted. But now we have mobile mounts for long range, powerful guns, and economy of force would seem to demand that we take advantage of this strategical and tactical mobility to effect artillery concentration at threatened points and thus use to the fullest

possible extent our available artillery resources." (CLR 2010: 83, citing Annual Report of the Chief of Coast Artillery, 1919: 4044)

The flexibility afforded by tractor-drawn artillery had been proven during World War I. Additionally, a stock of large caliber guns manufactured for use in Europe had never been shipped and being available, could be readily converted into new mobile artillery. Mobile artillery was comprised of large caliber guns and mortars mounted on either tractor-drawn flatbed trailers or railway cars. At Sandy Hook, a railroad line branched off the main line and proceeded in a north-south direction closer to the Atlantic coast line. From this branch, the Army constructed three spurs that extended into a dune area near the middle of the peninsula. On these spurs, the Army positioned two 8-inch railway guns and two 12-inch railway mortars between the dunes facing the shipping channel. By July 1944, a map prepared by the Army Corps of Engineers indicates the original spurs were removed and reconstructed with an orientation to the east. The total number of spurs was also increased from three to five. To support the mobile artillery, the Army also mounted two collapsible searchlights on railway cars to illuminate and identify enemy ships and appeared in service at Sandy Hook by March 1918. (CLR 2010: 83-84; Review comments, Hoffman and Cox, 20 August 2020)

Threats from the Air and Changes in Concealment Strategies:
The focus of coastal defense batteries countering naval strength shifted following World War I. During the war, aircraft—including lighter than air blimps and balloons—were used primarily for reconnaissance but also engaged in strategic bombing and aerial combat. Less than a year after the armistice, defenses to counter an aerial attack were approved for Sandy Hook and 3-inch anti-aircraft guns were planned for installation at the former Dynamite Gun Battery, the Mortar Battery, Battery Arrowsmith, and near the Coast Guard Station at Spermaceti Cove. (CLR 2010: 84; Review comments, Hoffman and Cox, 20 August 2020)

Billy Mitchell, a brigadier general in the Army's Air Service during World War I, recognized the offensive capabilities of aircraft and their potential to revolutionize warfare. In 1921, the Navy conducted bombing tests on seized German ships with Mitchell coordinating the Army's bombers. The ships were stationary targets lacking crews and sank after successive attacks with larger bombs. Navy officials argued that a maneuvering ship and responsive crew could have escaped the attack, however for Mitchell and the press covering the event, the test well demonstrated the effectiveness of airpower over surface-based defenses. (CLR 2010: 84)

In addition to bombing tests, the 1920s witnessed advances in aviation design. Pilots competed to finish longer-distance flights and in 1927, Charles Lindbergh completed the first solo non-stop transatlantic flight to continental Europe. Taking less than a day and a half, Lindbergh's journey demonstrated that the vast oceans that had kept America separated from European and Asian conflicts were increasingly easy to cross. As plane engines became more powerful, more sophisticated weaponry could be added and aerial bombing campaigns would become a standard component of warfare. Aerial bombing represented a major threat to coastal defenses. The existing concealment strategy relied on earth and sand cover to blend the battery into the surrounding dune landscape. This engineered earthwork was then planted with a combination of trees and shrubs at various heights to conceal the battery when viewed from a ship at sea. A 1910 memorandum from the Army's Office of the Chief of Coast Artillery outlined concealment procedures and clearly instructed that, "Before the actual planting begins the post and company commanders should observe the defenses carefully from the water to see where the screening effect is most needed and to decide as to how it can best be effected." However, the efforts made to conceal a battery and its seaward-facing slope could not protect the concrete structure from overhead identification. (CLR 2010: 84, citing NARA, RG 177, box 49, folder 5352, Records of the Office of the Chief of Coast Artillery)

In order to protect coastal defense batteries when viewed from the air, the concealment strategy expanded to include increased plant cover, netting, and camouflage painting. In May 1943, the Chief of Coast Artillery at Fort Hancock provided a status on the batteries, reporting:
"Obscurement grading and netting installed at Kingman and Mills. Planting 90% complete at Kingman and 30% complete at Battery Mills. Obscurement planting and painting at Battery Gunnison completed. Obscurement planting and painting completed at Urmston, Morris, Peck, Alexander,

Halleck, Bloomfield, and Richardson. Camouflage painting of Potter and Granger completed." (CLR 2010: 85, citing NARA, RG 177, box 49, folder 5352, Records of the Office of the Chief of Coast Artillery)

Apart from Battery Arrowsmith, disarmed after Kingman and Mills became operational in 1919, all of Sandy Hook's batteries were soon thereafter listed as having new concealment or "obscurement" strategies implemented. This is noteworthy because by July 1944, an Army Corps of Engineers map listed Battery Granger and the Nine Gun Battery comprised of Alexander, Halleck, Bloomfield, and Richardson as disarmed. Even as the structures were nearing the end of their service, the Army deemed it necessary to upgrade their protection from overhead identification. (CLR 2010: 85)

Preparation for World War II:
Growing conflict in Europe and Asia during the 1930s forced the United States to prepare for war and to reevaluate the nation's coastal defense system. In 1936, Japan withdrew from the Washington Naval Treaty and two years later, Germany annexed Austria and continued with invasions into Czechoslovakia and Poland, beginning a second worldwide war. In response, during 1940 the U.S. War Department convened a board, similar to the Endicott and Taft boards, to prepare a new coastal defense plan. The board standardized new battery designs and artillery. Large-caliber artillery constructed during World War II was comprised of either 16- or 12-inch guns. Utilizing only two gun sizes and consistent battery design resulted in simplified tactics, training, maintenance, and ammunition manufacturing. (CLR 2010: 85)

Recognizing that more personnel would be needed to prepare for an imminent conflict, Congress amended the Selective Service Act in September 1940 and decreased the minimum age requirement to register from 21 to 18 years old. That same month, President Franklin Roosevelt federalized the 245th New York National Guard Regiment making them the 245th Coastal Artillery Regiment stationed at Fort Hancock and Fort Tilden. To accommodate the personnel increase at Fort Hancock, the Army established a regimental-sized tent city west of Battery Gunnison, as well as large wooden cantonments west of Nine Gun Battery, north of the former Mortar Battery, and at Camp Low east of the north end of Horseshoe Cove. (CLR 2010: 85-86; Review comments, Hoffman and Cox, 20 August 2020)

No longer constrained by a minimal workforce that defined caretaker status, Sandy Hook and the nation's other coastal defense sites returned to active status. The number of military and civilian personnel on Sandy Hook grew tremendously to between 7,000 and 12,000 from 1942 to 1943. The large number of personnel was partially due to training exercises conducted at Fort Hancock for troops before deployment overseas. Congress authorized new coastal defense projects and renovation of two batteries at Sandy Hook with the latest defensive strategies. (CLR 2010: 86)

To maintain consistency with the presentation in earlier sections, the coastal defense batteries will be divided into either large caliber gun batteries or rapid fire gun batteries. Within each category, the individual batteries will be presented chronologically according to the dates that artillery was emplaced.

Large Caliber Gun Batteries:
Battery Potter.
During World War II, the fire control stations on top of Battery Potter were no longer required due to longer-range guns, new range finding towers, and the disarming of older counterweight carriage artillery. The old fire control stations and the sweeping views from the top of Potter were assigned new roles to support defensive efforts during the war. In 1941-1943, the Army converted the central fire control station on Battery Potter's terreplein (roof) to serve as a Command and Observation Post. During the same period, the northernmost station on top of Potter's terreplein was converted into a meteorological station to observe and track wind direction and weather phenomenon affecting artillery firing. To support the meteorological station, the Army installed a metal tether to the north of the building to attach weather balloons for recording wind speeds and direction. (CLR 2010: 86; Review comments, Hoffman and Cox, 20 August 2020)

On May 1, 1943, the Army established the Harbor Entrance Control Post (HECP) in the southernmost

fire control station on top of Potter's terreplein. From this vantage, personnel monitored the main shipping channel and controlled all ship traffic coming into and out of New York Harbor. In 1944 the Command and Observation Post was deactivated, as was the HECP in June 1945, approximately six weeks after Germany's surrender to the Allies. (CLR 2010: 86-87)

Mortar Battery.
Advances in naval artillery demonstrated during World War I that the 12-inch mortars at Mortar Battery would be ineffective in future conflicts. The Mortar Battery was disarmed in 1920, however, the engineered earthwork and protected interior spaces were utilized in the decades that followed until the deactivation of the New York Harbor Defense Program in 1950. In 1922, for example, the Army installed a switchboard room in the Mortar Battery's longitudinal gallery that connected the northern mortar pits with the magazines in the center of the battery. (CLR 2010: 87)

In addition to exhibiting the power of naval artillery, World War I introduced new threats posed by aircraft flying reconnaissance missions and bombing campaigns. Responding to this new offensive capability, the Army mounted two 3-inch anti-aircraft guns on top of Mortar Battery's engineered earthwork between 1922 and 1923. The top of the earthwork, about thirty-five feet higher than the surrounding grade, offered a strategic elevation for the guns and the battery's interior rooms were utilized for ammunition storage and defensive shelter. (CLR 2010: 87)

In 1937, an additional anti-aircraft gun was added to the top of the engineered earthwork and the three guns were designated A.A. Gun Battery No. 2. The three gun positions were identified on a 1944 Army Corps of Engineers map of Sandy Hook. With the start of World War II, the 3-inch anti-aircraft guns were supplemented by a machine gun platform consisting of four .50-caliber machine guns. Although not designated on the 1944 map, the smaller machine guns can be seen in a World War II-era photograph. Between 1941 and 1942, the Army converted the Mortar Battery's remaining interior spaces into the New York Harbor Defense Command Post (HDCP), and by 1944 improved the spaces with air lock rooms, gas-proof doors, ventilation systems, soundproofing, and dehumidifying systems. In 1943 the Army added concealing camouflage netting over the former Mortar Battery's two open gallery alleyways and four firing pits. (CLR 2010: 87; Review comments, Hoffman and Cox, 20 August 2020)

Other physical changes made at the Mortar Battery by the Army during this period included removal of the north, east, and a portion of the south perimeter wall in 1938. That same year, an opening was cut into the west wall, opposite the Southwest Mortar Pit, to provide interior access from Hudson Road. (CLR 2010: 87)

Batteries Kingman and Mills.
The 12-inch guns emplaced at Batteries Kingman and Mills in 1919 had significantly greater range than the counterweight guns at Nine Gun Battery and Battery Granger. Capable of firing at targets over twenty miles away, the guns at Kingman and Mills needed new range finding stations to identify targets at greater distances. In response, the Army built steel towers with range finding stations located in booths at the top. In March 1922, two towers—one dedicated for the fire control of Kingman and the other for Mills—were completed about a half mile south of Battery Gunnison along Atlantic Drive. Both towers were approximately forty feet tall and each contained a depression-type range finder. Five years later, a one hundred-foot tall tower was installed approximately 700 feet west of Battery Gunnison to provide fire control for Battery Harris at Fort Tilden (CLR, 2010: 88).

Although batteries Kingman and Mills were innovative coastal defenses when installed, their design provided no protection against aerial detection and bombing, a flaw which had to be addressed as the United States entered World War II. The War Department's 1940 coastal defense plan utilized only 16- or 12-inch large-caliber guns, such as those at Batteries Kingman and Mills. When viewed from above, the existing batteries' open concrete gun platforms looked like bulls-eye targets. A new casemated battery design, retrofitted to Kingman and Mills, protected guns, magazines, and operation centers with a complete covering of concrete and earth (Figure 10). Much of the obscurement grading, netting, and planting was completed in 1943. (CLR 2010: 88-89; Review comments, Hoffman and Cox, 20 August 2020)

Between 1941 and 1942, the Army casemated the open gun platforms at Batteries Kingman and Mills. In order to deliver ammunition and gunpowder, the Army moved the railroad tracks that had previously gone inside both of the batteries traverses to the west of the casemated gun batteries. Heat was installed in the new power rooms in 1944 and that same year, each battery had three individual dehumidifying units added to the existing system to remove moisture from their main corridors. The introduction of long range, high-altitude bombers, rockets, and the atomic bomb demonstrated offensive capability that eclipsed Batteries Kingman and Mills, and both were disarmed in 1948. (CLR 2010: 88-90; Review comments, Hoffman and Cox, 20 August 2020)

Rapid Fire Gun Batteries:
Batteries Engle and Peck.
Disarmed in 1918 as a result of simplifying rapid fire artillery, Battery Engle was not abandoned, but modified before major military reductions were implemented following World War I. Alterations to Battery Engle occurred in 1920 to improve the fire control of nearby Battery Peck. The Army converted Battery Engle's magazine, shielded by seven feet of concrete cover, into a plotting room and constructed a coincidence range finding station over the concrete gun emplacement. The station was nineteen feet square and its floor was set approximately four and a half feet higher than the gun well. (CLR, 2010: 91; Review comments, Hoffman and Cox, 20 August 2020)

In concert with the alterations made at Battery Engle, the Army also improved Battery Peck in 1920. Prior to the modifications, the officer commanding Battery Peck stood on an open, concrete platform centered between the two emplacements. The new construction created a fully-enclosed, concrete, battery commander's station (Figure 11). To improve the range of Battery Peck's 6-inch guns, concrete was cut out of the emplacements in August 1928. Removing some of the concrete permitted the guns to rise to a twenty degree elevation. Increasing the angle of the gun from a horizontal position—zero degrees—to twenty degrees allowed Battery Peck's guns to strike targets further from the coastline. (CLR 2010: 91; Review comments, Hoffman and Cox, 20 August 2020)

The improvements to Battery Peck, including the fire control modifications made to Battery Engle, allowed Peck to remain in service until 1943. At that time, the Army relocated Battery Peck's guns to Battery Gunnison. Peck's 6-inch guns could fire quicker than the 6-inch guns they replaced at Gunnison and as a result, Battery Gunnison was designated New Battery Peck. The Army did not mothball the former Battery Peck, but instead installed two 90mm anti-aircraft guns and designated the structure Battery Number 8. The battery remained armed until its final deactivation in 1946. (CLR 2010: 91)

Batteries Urmston and Morris.
Although a new coincidence ranger finder station was completed at Battery Urmston in early 1919, four of the battery's guns were removed in 1920, and during World War II the remaining two guns were transferred to a new location north of Battery Gunnison along the peninsula's eastern coastline. In March 1920, the Army approved removal of the guns at emplacements #1, #2, #5 and #6. These four guns used balanced pillar mounts, which proved to be inferior to the pedestal mounted system used for other rapid fire guns. Battery Urmston's pedestal mounted guns at emplacements #3 and #4 remained active until the start of World War II. In 1942, the Army removed the two pedestal mounted guns and relocated them to the dunes north of Battery Gunnison. The dune emplacement was operational in July 1943 and designated Battery Number 6. The battery was also referred to as "New Battery Urmston" and worked with the Harbor Entrance Control Post at Battery Potter to observe and potentially engage ships approaching New York Harbor via the channel. To protect New Battery Urmston from aerial detection the Report of Completed Works, updated in September 1943, records that the guns were "concealed with camouflage fabric on a sliding frame." (CLR 2010: 91-92; Review comments, Hoffman and Cox, 20 August 2020)

Unlike Battery Urmston, the four pedestal mounted guns at Battery Morris remained in service throughout World War II. As part of the Army's efforts to improve fire control, a coincidence range finder station was added east of Battery Morris in 1920. The concrete structure, thirteen feet by thirteen feet, was constructed approximately ten feet above the ground. A nine foot-long coincidence range finder was installed inside the station at a height approximately twenty-seven feet above mean low water. The instrument's height and the area north of the station free of large, woody vegetation

combined to provide unimpeded views of the water and improved fire control for Battery Morris (Figure 12). The Army deactivated Battery Morris in 1946. (CLR 2010: 92)

Battery Gunnison.
Battery Gunnison, the last rapid fire gun battery completed, was also the only rapid fire emplacement along the eastern shore of Sandy Hook. In addition to protecting Gunnison's concrete structure, a sand embankment planted with native grasses and shrubs was constructed on the battery's east side to blend the gun battery in with the surrounding landscape. Similar to engineered earthworks at other batteries, erosion was an ongoing issue to contend with at Battery Gunnison. A January 1929 letter to the Army Corps Chief of Engineers indicated Gunnison's east embankment had eroded and additional sand would be required to repair the earthwork. (CLR 2010: 92)

As war loomed again in 1940, the War Department convened a board to prepare a new coastal defense plan. The board concluded that the rapid fire guns on counterweight carriages were deficient compared to the pedestal mounted versions. The counterweight carriage models were slower to load, had a shorter firing range, and had a limited field of fire. As a result of the board's findings, Battery Gunnison's guns and counterweight carriages were disarmed in 1943. Not wanting to leave the southern approach to New York Harbor without rapid fire guns, plans were approved in February 1943 to relocate the pedestal mounted guns from Battery Peck to Battery Gunnison. In order to mount Battery Peck's guns, a redesign of Gunnison's platform areas was needed to emplace the pedestal mounts. The current platforms, at the base of a parapet wall, had concrete added in the pits in order to create a level surface for mounting the guns. Once the new guns were installed, Battery Gunnison was designated New Battery Peck. (CLR 2010: 92; Review comments, Hoffman and Cox, 20 August 2020)

From 1943 to the end of World War II, Gunnison/New Battery Peck operated as directed by the Harbor Entrance Control Post stationed atop Battery Potter. Gunnison served as an examination battery that was intended to track targets and fire upon them when ordered. Orders for firing included "bring-to" shots designed to warn a commercial ship to stop until it received proper clearance, and destructive fire intended for enemy vessels. (CLR 2010: 93; Review comments, Hoffman and Cox, 20 August 2020)

Disarmed Gun Batteries:
By 1919, three large caliber gun batteries were disarmed as new artillery, carriages, and improvements in battleship armaments made them obsolete. Guns were first removed at Battery Potter and then at Mortar Battery. Both of these disarmed structures were repurposed during World War II as command posts for coastal defense coordination. The third large caliber gun battery, Battery Arrowsmith, was disarmed circa 1927-1929 after Batteries Kingman and Mills became operational in 1919; Kingman and Mills featured 360-degree fields of fire that could both fire at ships as sea, as well as defend Sandy Hook's western shoreline. (CLR 2010: 93; Review comments, Hoffman and Cox, 20 August 2020)

During World War II, two additional large caliber gun batteries were disarmed. The 10- and 12-inch artillery atop Nine Gun Battery and Battery Granger was removed because these guns did not have the range to strike better armed enemy battleships. Additionally, the batteries were susceptible to aerial bombing and not protected like the recently casemated Kingman and Mills. The "Report of Completed Works," a detailed account of equipment at each battery maintained by the Army Corps of Engineers, notes in a handwritten comment that the "salvage of armament" at Battery Granger was approved on January 22, 1943. Similar handwritten comments note that the artillery at Battery Halleck, the first three emplacements of Nine Gun Battery, were "listed for disposal" on November 4, 1942. A year later, the Army Service Forces directed the "salvage of armament and accessory equipment" at Batteries Richardson and Bloomfield. Supporting the information in the "Report of Completed Works," Nine Gun Battery, Battery Granger, and Battery Arrowsmith are all labeled "dismantled" on a July 1944 map of Sandy Hook prepared by the Army Corps of Engineers. (CLR 2010: 93)

The geographic separation that afforded the United States a measure of protection against previous global conflicts proved inadequate against technological improvements during World War II. Entry

into the war began with the long-range Japanese aerial attack on Pearl Harbor, and by the war's conclusion the introduction of long-range bombers, rockets, and atomic weapons far surpassed any defensive capability offered by large caliber, casemated guns like Batteries Kingman and Mills. In addition, long-range bombers could fly at a high altitude that positioned them substantially outside the range of rapid fire gun batteries. With both categories of batteries eclipsed by offensive weaponry, the remainder of Sandy Hook's coastal defense batteries were deactivated and disarmed by 1948. Although deactivated in 1947, the 6-inch rapid fire guns at Battery Gunnison remained emplaced and survived a thorough effort at Sandy Hook and across the country to collect coastal artillery for scrap metal. (CLR 2010: 93-94)



Figure 10. View looking northwest at Battery Kingman's north emplacement, September 1945. (GATE 8085)



Figure 11. Covered battery commander's station at Battery Peck, foreground, and coincidence range finding station built over former Battery Engle's gun emplacement, right background, 1921. (GATE 7892)



Figure 12. View looking northwest at coincidence range finding station east of Battery Morris, circa 1921. (GATE 7893)

NIKE MISSILE SYSTEMS AND THE COLD WAR, 1945–1974

During World War II, advances in aviation made it possible to fly beyond the range of 3-inch anti-aircraft guns, similar to those emplaced at the top of Mortar Battery. Providing a greater range, the 90mm anti-aircraft gun became the new Army standard during the war and could strike a target flying at 30,000 feet. This improved anti-aircraft artillery was installed at Sandy Hook on Battery Peck in 1943. (CLR 2010: 121)

However, in the closing years of the war the Army realized that the 90mm guns, even with the assistance of radar technology, lacked the range, accuracy, and destructive power to defend against an aerial attack. On August 17, 1944, Army Ordnance officer Jacob W. Schaefer submitted a memorandum proposing the design of an anti-aircraft rocket which could be radar-guided from the ground. (CLR 2010: 121)

Six months later, the Army's Chief of Ordnance issued a contract to Western Electric and Bell Telephone Laboratories to determine the feasibility of a defensive missile system. The project was given the code name NIKE after the Greek goddess of victory and on November 27, 1951, a NIKE missile successfully destroyed a drone plane during tests at the White Sands Proving Ground in New Mexico. (CLR 2010: 121)

Military Reorganization and the Origins of the Cold War:
Similar to responses following World War I, the years immediately after World War II witnessed reductions in military personnel and spending. A logistical support unit, the 1225th Army Service Unit, remained stationed at Fort Hancock until the end of 1949. The reduction of combat and support personnel, along with new offensive weaponry that surpassed Sandy Hook's existing coastal defense batteries, resulted in Fort Hancock's deactivation on June 25, 1950. The Army's departure from Sandy Hook did not last long as armed conflict erupted on the Korean peninsula. On April 10, 1951, Fort Hancock was reactivated for defense of the metropolitan New York area. Anti-aircraft gun batteries deployed during World War II were reestablished and the fort served as a staging center for training and equipping other anti-aircraft units. (CLR 2010: 121)

NIKE Ajax:
Although conceived during World War II, development of the NIKE system was delayed due to

reduced funding immediately after the war. Renewed attention to the NIKE program corresponded with increased tensions between the United States and Soviet Union, advances in Soviet weaponry, and finally, the start of the Korean Conflict in June 1950. Hostilities between North and South Korea threatened to draw the United States and the allied Chinese and Soviets into another world war. Even though a global conflict did not spread from the Korean peninsula, United States military policy began to focus on defensive preparations. (CLR 2010: 123)

In 1950, the Army reorganized defensive artillery units into the Army Anti-Aircraft Command (ARAACOM). That same year, improvements were made in the NIKE booster rocket and guidance systems leading to the successful test firing in November 1951. This first generation of NIKE missiles, known as Ajax, were twelve inches in diameter, twenty-one feet long, weighed over 2,455 pounds, and operated remarkably similar to the system outlined by Jacob Schaefer's 1944 memorandum. (CLR 2010: 123)

NIKE Hercules:
Four months after the successful test of NIKE Ajax at White Sands Proving Ground, the Bureau of Ordnance recommended studying the feasibility of equipping the missile with a nuclear warhead. In their study of Army and Air Force missile defense programs, John C. Lonnquest and David F. Winkler cite that a major limitation of the Ajax system was, "…the inability to discern individual bombers within a densely-packed flying formation." For example, if two planes were flying close together, the radar would detect them as one object and guide the missile to hit the center of that object. At best, the missile would not score a direct hit and at worst, miss both targets completely. One way to correct this potential shortcoming would be to arm the missile with a nuclear warhead. Upon detonation, the nuclear warhead would create a larger and more powerful explosion that could destroy planes without a direct hit. (CLR, 2010: 123-124, citing Lonnquest and Winkler 1996: 179)

Ajax designers recommended two options for adding a nuclear warhead to the missile. First, a smaller warhead could be reconfigured and adapted for use on the Ajax. The second option involved using a larger warhead with more destructive power and incorporating it into a newly designed, larger missile. The Army selected the second option on condition that the new missile system would use the same facilities already being designed and constructed for the Ajax. In July 1953, the Army authorized the development of the second generation NIKE missile called Hercules. In addition to the larger warhead capacity, Hercules would feature a longer range and more stable fuel mixture than its predecessor. (CLR, 2010: 124)

Three years after authorization, a Hercules missile successfully destroyed a drone aircraft at White Sands Proving Ground. Tests continued into 1957 using a solid fuel mixture that would replace the volatile liquid mixture of jet fuel and nitric acid used in Ajax. Forty-one feet long and thirty one and half inches in diameter, Hercules' increased size accommodated not only a larger warhead, but four booster rockets compared to a single rocket on Ajax. The added thrust increased the range of Hercules up to three times greater than Ajax and obtained altitudes up to 150,000 feet. (CLR 2010: 124)

NIKE Sites at Sandy Hook:
The NIKE installation at Sandy Hook was one of nineteen missile sites that comprised the New York Defense Area. The defense area included the five boroughs of New York City and two counties to the north, the western half of Long Island, and the northeastern section of New Jersey. Regardless of a New York or New Jersey location, all of the NIKE sites were designated "NY" followed by a number to indicate their association with the defense area. (CLR 2010: 124)

The Department of Defense announced plans to construct the NIKE site at Sandy Hook, designated NY-56, in December 1953. With coastal defenses redirected away from naval threats to instead intercepting aircraft, proximity and range-finding views to important waterways were no longer important factors in selecting locations for NIKE sites. The selecting factor changed to adequate distance and a lack of obstructions between proposed NIKE radar and missile locations so radar and launch equipment could properly operate in tandem. (CLR 2010: 125)

At Sandy Hook and across the country, NIKE installations were comprised of an Integrated Fire

Control (IFC) or radar site and a launch site. The IFC contained the acquisition and tracking radar and was separated from the launch site by a minimum of 3,000 feet. More commonly, sites were separated by over a mile as was the case at Sandy Hook. Regardless of the exact distance, the two locations had to be within visual sight of each other so radar could lock onto a firing missile. Buildings, tall vegetation, and utility poles are examples of objects that could interfere with radar transmissions. (CLR 2010: 125)

The IFC and launch sites at Sandy Hook were located south of Fort Hancock and the temporary, World War II-expansion area that was needed to accommodate increased personnel. The IFC was located roughly in the middle of the peninsula, in the largely undeveloped area southeast of the Camp Low barracks built during World War II. The launch site was located east of Batteries Kingman and Mills, across Hartshorne Drive, and immediately north of a small, existing pond. A 1944 Army Corps of Engineers map of Sandy Hook recorded a group of eight warehouses, labeled T-10 through T-17, that were in the general vicinity of the proposed launch site. The warehouses were constructed by Western Electric to shelter radar antenna during tests by the Army Signal Corps. (CLR 2010: 125)

Sandy Hook's NIKE launch site represents one of the few dual battery installations constructed during the Cold War era. The Sandy Hook launch site contained four underground magazines that delivered missiles by an elevator to a row of launchers on the surface. The two magazines on the east side of the launch area formed one firing battery and the two on the west side formed the other. The IFC site to the north contained two control areas with separate radar systems for each firing battery. The western control area, designated #1, provided radar the western firing battery, while the eastern control area, designated #2, was assigned to the eastern firing battery. (CLR 2010: 125; Review comments, Ehler, 20 August 2020)

Integrated Fire Control (IFC) or Radar Site:
During the previous generations of coastal defenses at Sandy Hook, the NIKE IFC site remained largely undeveloped. The Army's central railroad line bisected the future IFC location and during World War II, several temporary structures associated with Camp Low bordered either side of the tracks. A site plan for the IFC, issued March 22, 1954, recorded six concrete foundations in the northern portion of the proposed site. None of the foundations were labeled with building designations and the majority appear small enough to be outbuildings or auxiliary structures. In addition, the site plan showed vegetation cover occupying more than half of the proposed area and contained the labels "brush and trees up to 35' high." (CLR 2010: 125-126)

The proposed IFC site was roughly triangular in shape with its longest perimeter running from west to east. The western point, accessible from Hartshorne Drive, contained Control Area #1. The eastern point contained Control Area #2 and was accessible from Atlantic Drive. The boundaries of the site converged at a northern point that contained the Ready Barracks and were accessible from Sheldon Road (Figure 13). For both control areas, the three types of radar shared the same relative position with the Acquisition Radar in the center flanked by the Missile Tracking Radar (MTR) to the west and Target Tracking Radar (TTR) to the east. Each area also featured a long, rectangular, concrete pad located north of the Acquisition Radar. The pad was constructed for three trailers, stacked front to back, that held equipment and personnel for battery control, radar control, and spare computer and electronics parts. The wheels and undercarriage of each trailer were removed and the trailers set on wooden blocks on top of the concrete pad. (CLR 2010: 126)

In addition to the operational facilities, the Army added infrastructure between 1955-1960, which included concrete walks from Control Area #1 and Control Area #2 to the Ready Barracks, electrical conduit and twelve pedestrian-scale light fixtures along the walks, and a basketball court near the Ready Barracks. In 1960-1962, the army constructed a High-Power Acquisition Radar (HIPAR) tower and building in Control Area #1. At both Control Areas, the army added new target tracking and target ranging radars for the "Improved Hercules" program, and the interconnecting corridor buildings between the battery control and radar control trailers. These buildings replace the maintenance and spare parts trailer.

Launch Site:
The Army originally intended for NIKE missiles to be stored above ground and estimated 119 acres

were needed for a combined IFC and launch site. Since NIKE sites were going to defend populated urban, military, and industrial areas, available space was a constraining factor. To reduce the footprint of the launch site, designs for underground magazines were prepared that resulted in an approximate forty acre-requirement for the IFC and launch sites. On October 28, 1953, ARAACOM directed that the underground magazine design would be used in most instances. (CLR 2010: 128)

The launch site at Sandy Hook was roughly T-shaped in plan. The long leg of the "T" began at Hartshorne Drive and proceeded east toward the Atlantic Ocean where it divided into shorter northern and southern sections. The western portion of the "T" contained the Ready Barracks and the southern section contained the Missile Maintenance Area. The northern section contained the underground missile magazines and launching racks and all three areas were surrounding by a perimeter fence (Figure 14). (CLR 2010: 128)

Due to groundwater being very close to the surface throughout the peninsula, the magazines and launching racks were located in an area with existing grades between elevations of sixteen and twenty feet. Generally higher than other areas on the peninsula, this location, with the addition of fill material, would permit the underground magazine design. The proposed elevation for the launchers was twenty-feet and they were contained within a 460 by 490-foot engineered plateau at a similar elevation. (CLR 2010: 128)

In 1958-1959, the Army updated the missile storage racks, launcher rails, and elevators to accommodate the larger Hercules missiles. To improve security, an inner security fence and perimeter lights were installed, as well as a canine kennel near the northwest corner of the missile magazine area.

ICBMs, NIKE Zeus, and a New Defense Philosophy:
During the 1950s, the United States and Soviet Union escalated their arms race and began developing missiles that would travel beyond the Earth's atmosphere and be able to strike targets half-way around the world. Known as intercontinental ballistic missiles or ICBMs, this new offensive technology shifted the threat away from the long range bombers that the NIKE system was intended to stop. The Soviet Union announced they had an operational ICBM in 1957 and following the launch of Sputnik that same year, the United States accelerated their program and had the Atlas ICBM operational in 1959. (CLR 2010: 130)

In response to this new offensive weaponry, the Secretary of Defense assigned the Army with development of an anti-missile, missile system called Zeus that utilized existing NIKE infrastructure in 1958. For the next three years funds were allocated for research and development, but not for implementation at existing NIKE sites. Opposition mounted against the Zeus system as the scientific community argued existing radar systems lacked the sophistication to discern between an ICBM and debris jettisoned from its booster rockets. Furthermore, arguments against the concept of an anti-missile, missile system contended it could be defeated by overwhelming the system with a massive convoy of decoy missiles with only one missile being armed with a nuclear warhead. Funding for Zeus was cancelled in 1963, however, debate, research, and development on an anti-ballistic missile system continued throughout the 1960s. (CLR 2010: 130)

Personnel cuts began at NIKE sites in 1967 as a result of the Zeus system's cancellation and Hercules being tactically ineffective against ICBMs. The cuts were hastened by escalating war efforts in Vietnam and in 1968, the first NIKE sites were deactivated. The perpetuating contest of new offensive weaponry followed by improved defensive capabilities that resulted in over a century of coastal defense innovations at Sandy Hook, ended with the doctrine of mutually-assured destruction. Defense philosophy shifted from costly artillery and infrastructure to guaranteeing that the United States and the Soviet Union had the same apocalyptic nuclear capabilities. This mutual assurance prevailed as the only way to prevent nuclear war. On February 4, 1974, Secretary of Defense James Schlesinger announced plans to close forty-eight NIKE installations across the country including the Sandy Hook site. In the following months, the Army removed missiles and equipment from Sandy Hook and formally deactivated the site in a ceremony held on August 15, 1974. (CLR 2010: 131)

Base Consolidation and Transfer to the National Park Service:

With the NIKE system's defenses eclipsed by the threat of ICBMs and an expanding war in Vietnam, priorities were adjusted for federal defense spending. In January 1967, the Department of Defense announced plans for thirty-three military base closings and consolidations including Fort Hancock. Prior to this announcement, new stakeholders emerged on the Sandy Hook peninsula and began the transformation of a strategic military installation into a premier recreation destination. (CLR 2010: 131)

Beginning in 1962, New Jersey State Parks purchased twelve acres at the southern end of the peninsula for developing beach access and fishing. Between the highway bridge that entered Sandy Hook and Spermaceti Cove, the State established a parking area and a comfort station for recreational fishing. North of this narrow strip, the State leased 460 acres from the Department of Defense that extended to the southern boundary of the NIKE launch site. In this area, New Jersey State Parks developed two beach sites with bathhouses and parking facilities. The two beach sites and fishing areas to the south combined to provide parking for approximately 3,500 vehicles. Two years later, the State leased an additional 285 acres that extended west from Hartshorne Drive—the main north-south vehicular route—to include land along Horseshoe Cove and Skeleton Hill Island. (CLR 2010: 131)

Already established as a popular recreation site, the Fort Hancock closure announcement brought together Monmouth County and New Jersey state officials and representatives from the Departments of Defense and the Interior to develop and analyze alternatives for Sandy Hook. Chief among their concerns was maintaining the peninsula for public recreation, however, other competing proposals included a new Coast Guard airbase, Army and Coast Guard housing, and recreational facilities for military personnel. One of the main alternatives generated by this group was to designate Sandy Hook as a National Seashore under the management of the National Park Service. Beginning in 1961, a lack of public access to undeveloped seashore areas had led to the creation of parks at Cape Cod, Fire Island, and Assateague Island. In proposing a National Seashore at Sandy Hook, the group proposed that "the peninsula could provide a significant and much needed recreational unit within the heart of the nation's most densely populated region." (Sandy Hook 1967: 33)

With Fort Hancock slated to close, the alternatives studied for Sandy Hook did not lead to an individual park unit, but incorporated Sandy Hook with sections of Brooklyn, Queens, and Staten Island into a new park. On October 27, 1972, President Richard Nixon signed legislation enabling the creation of the Gateway National Recreation Area, which recognized the cultural and natural resources and recreation opportunities along lower New York Harbor. On August 15, 1974, the Army held a ceremony to deactivate Fort Hancock's NIKE site and recognize the service of the Army Air Defense personnel. The ceremony dedicated Guardian Park located south of the Fort Hancock Parade Ground. The park's design featured a cruciform concrete walkway oriented in a north-south and east-west direction. Four commemorative items were placed at the end of each walkway and the intersection was marked by the second stage of a NIKE Hercules missile. A flagpole was erected at the north and a NIKE Ajax missile at the south walkway. A granite monument commemorating soldiers killed during a NIKE explosion in Middletown, New Jersey was placed on the west. Opposite the monument, a 75mm park howitzer was sited to commemorate traditional coastal artillery. Four months later, on December 31, 1974, Fort Hancock was officially deactivated and the next day, transferred to the National Park Service. (CLR 2010: 132)

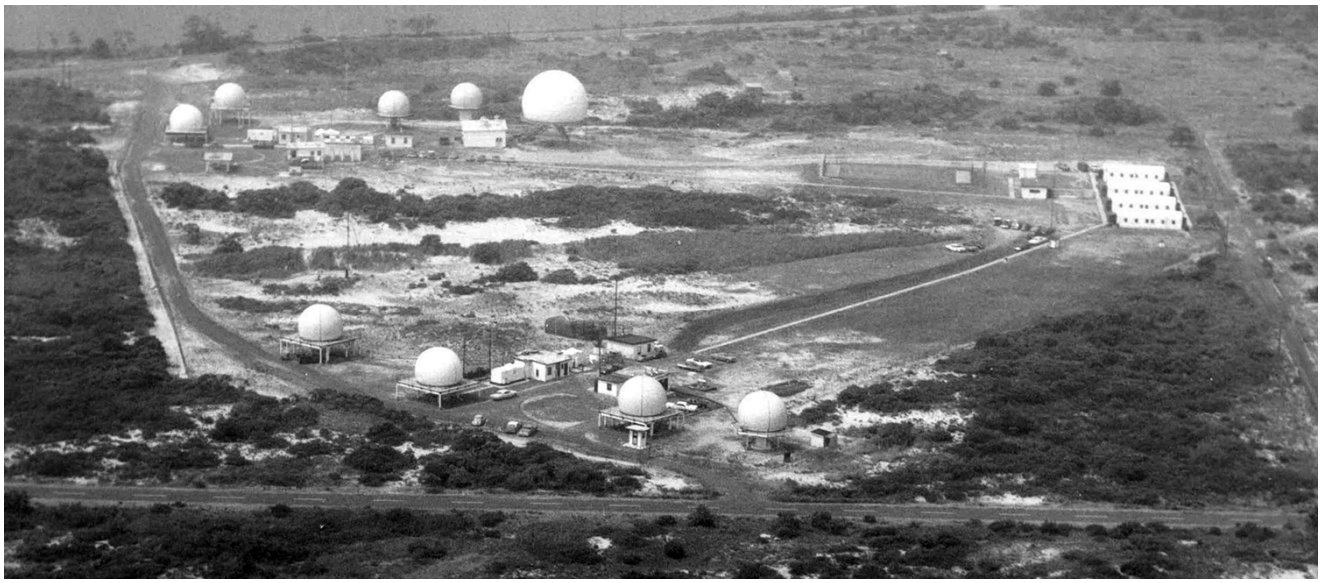


Figure 13. Oblique aerial view, NIKE radar site, circa 1965. Control Area #2 appears in the foreground with Control Area #1 in the background and the Ready Barracks to the right. (GATE 20818)

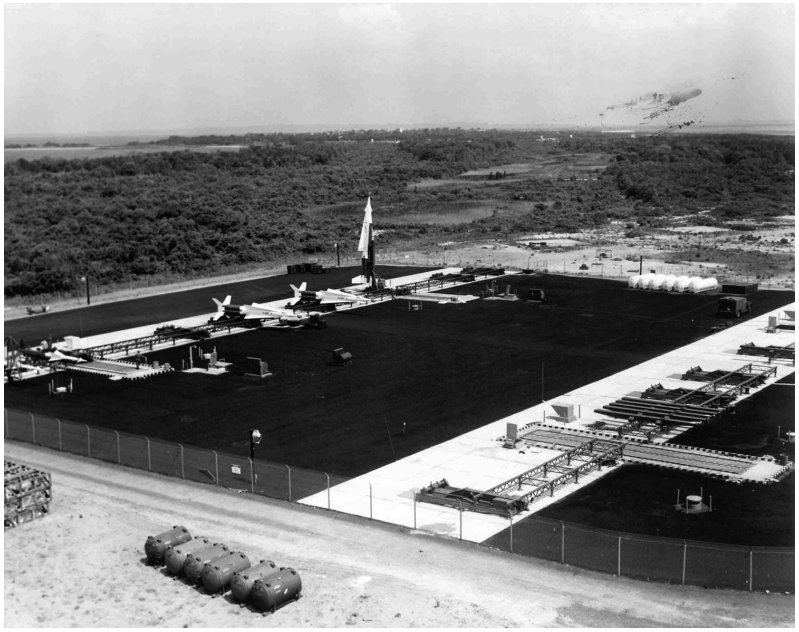


Figure 14. View looking northwest at the missile magazines, NIKE launch site, 1959. (GATE 8067)

NATIONAL PARK SERVICE ADMINISTRATION, 1975–2020

Following the transfer from the Army to the National Park Service, planning efforts began for Sandy Hook and the entire Gateway National Recreation Area, culminating in the publication of Gateway's General Management Plan (GMP) in 1979. The GMP was prepared to identify pertinent issues and guide decision-making processes for the next two decades. (CLR 2010: 161)

At Sandy Hook, strategic coastal defense locations and supporting military infrastructure had shaped development on the peninsula since the Revolutionary War. With the completion of the GMP, priorities shifted to balancing recreational opportunities with natural and cultural resource protection. Specifically, with development focused around historic Fort Hancock at the northern end of the peninsula and the former New Jersey State Park facilities at the southern end, the interior section was recognized for its "spacious coastal landscapes and natural features [that] are an important part of the Sandy Hook resource and are deserving of protective management and uses that will allow their perpetuation." Located within the largest metropolitan area in the nation, Sandy Hook and its miles of undeveloped oceanfront stood apart in stark contrast, offering unique recreational opportunities for residents in the immediately surrounding urban and suburban areas. Access for up to two million visitors annually was almost exclusively by automobile and accordingly, planning efforts focused on road configurations, parking, and alternative transportation development. (CLR 2010: 161, citing GMP 1979: 12)

The National Park Service sought to distribute parking and visitor concentrations more evenly by decreasing parking on the southern portion of the peninsula and creating new parking and beach facilities near Battery Gunnison and Nine Gun Battery. The GMP proposed a 350-car parking area at the former NIKE launch site for visitation and access to a proposed, small beach center located off the site's northeast corner. Neither the beach center nor the parking area was developed in this area, but in subsequent years the NPS did construct parking lots near Nine Gun Battery (Lots J, K, M), North Beach (Lot I), Gunnison Beach (Lot G), Horseshoe Cove (Lots H, L), and Fishing Beach (Lot F). The Gunnison and North Beach areas included beach facilities. (CLR 2010: 161)

Multi-Use Path:
In the 1990s and early 2000s, the park experienced an increasing demand for nonmotorized recreation and nonmotorized access to its resources. In particular, more visitors were seeking opportunities for healthy, outdoor recreation at the park such as bicycling, jogging, and walking. As a result of increased pedestrian and bicycle use, the park also experienced an increase in conflicts and accidents between motorized and nonmotorized visitors. To promote nonmotorized use of the park and create a safer environment for visitors, the NPS began developing the initial segments of the 12-foot wide Sandy Hook Multi-Use Path (MUP). The first phase of the MUP, completed in 2004, was approximately 5.5 miles in length and provided nonmotorized access from Sandy Hook's entrance to the Fort Hancock ferry landing. The second phase was completed in 2008 and 2009 and added approximately 3.1 miles, creating a loop between North Beach, Gunnison Beach, and the Mortar Battery. The third phase, finished in 2013, extended the system 1.5 miles to the Nine Gun Battery and between Magruder Road and Gunnison Beach. (MUP EA 2013: 1; PEPC 40954)

Safety, Stabilization, and Storms:
Initial NPS projects at the coastal batteries in the 1970s included the installation of chain-link fence above the concrete gun canopies at Batteries Kingman and Mills; post and cable fencing along trails on top of the Mortar Battery; and chain-link fencing and signage between pedestrian routes and the structures at Nine Gun Battery, Battery Peck, and Battery Granger. However, both visitor impacts and vegetation growth have damaged these fences over time. At the Mortar Battery, the park closed access to the top around 1990 due to increased erosion and the creation of social trails across the historic earthworks. (CLR 2010: 163)

The physical condition of the coastal defense structures and visitor access have not been the park's only concerns. The tides and currents that began shaping Sandy Hook over 8,000 years ago continue to affect the peninsula and at times, seriously threaten historic resources. A violent winter storm in December 1974 removed several vertical pilings from the bayside bulkhead west of Batteries Kingman and Mills. With a portion of the structure breached, subsequent storms in the 1970s destroyed the majority of the bulkhead and began eroding the shoreline. (CLR 2010: 163)

An especially destructive storm affecting Sandy Hook and the northeastern United States struck in February 1978. In addition to erosion near Batteries Kingman and Mills, hurricane-force wind gusts and storm surges washed away the natural dune formations east of the NIKE launch site and carved away at the narrow, southern portion of the peninsula where beach parking and bathhouses had been established. In the early 1980s, the park pumped sand to reinforce the depleted recreational beaches. As part of this process, sand was initially added in between Batteries Kingman and Mills to set up a construction staging area for remainder of project. To better respond to future beach erosion, the park has installed and tested a sand-slurry pipeline system that can more efficiently replenish eroded areas. (CLR 2010: 163)

In October 2012 Hurricane Sandy struck the East Coast and inflicted tens of billions of dollars of damage. At Sandy Hook, many buildings sustained roof damage from wind and interior damage from flooding, and the storm destroyed the entire utility system: electric, telephone/data, water, and wastewater treatment. Beaches were hit particularly hard and dunes sustained major damage. The storm moved large quantities of sand from the beaches and dunes onto portions of the road system, and damaged the Multi-Use Path at several points. Using federal funds appropriated by the Sandy Recovery Improvement Act, staff and specialists from the park, Northeast Regional Office, and Denver Service Center, as well as several volunteer groups, began the rebuilding effort. (Review comments, Hoffman and Cox, 20 August 2020)

Recent Management of the Batteries:
In the last twenty years, projects at the batteries have addressed critical health and safety, resource preservation, and visitor access needs, primarily at batteries interpreted to the public (Battery Potter, Mortar Battery, Battery Gunnison, and Nine Gun Battery). Many projects have focused on repairs and stabilization of metal features (walls, steps, stairs, doors, gates), repair of drainage systems, and removal of destructive vegetation. Some of the completed and planned projects at the batteries are as follows:

Battery Granger.
-- 2004, gates repaired and secured and select vegetation removed (PMIS 24668).

Battery Gunnison.
-- 2001, concrete bridge is demolished from the south gun platform to the shell hoist to eliminate hazards created by the deteriorating concrete (CLR 2010: 162).
-- 2004, select vegetation is removed, new metal pipe railing is added to the stairs and around perimeter of gun platforms, falling concrete walkway and concrete gun emplacements are repaired (PMIS 24661).
-- 2010-2011, rusting metal and select vegetation is removed, walkways and platforms to provide visitor access are rehabilitated, deteriorated concrete walkways and drainage systems are repaired, and missing concrete and metal walkways are restored to provide full visitor access (PMIS 147492).
-- 2017, two concrete bridges and two outer steel stairways are rebuilt (PMIS 176616).
-- 2018-2019, the Army Ground Forces reinstalls the Range Operator Platform (PEPC 82305).
-- Proposed, reinstall shell hoist #2 (PEPC 81094).
-- Proposed, prune trees west of the battery to reestablish gunsight view to the Sandy Hook Lighthouse (PEPC 62689).

Batteries Kingman and Mills.
-- 2004, select vegetation is removed, and gates are repaired and secured (PMIS 24668).

Battery Potter.
-- 2003, 2004, 2010, select vegetation is removed around the battery (PMIS 59698, PMIS 24668, PMIS 147492).
-- 2003-2011, exterior metal stairway is rehabilitated on the south side of the battery, and new pipe railing is added along the top of the west facade and the top of the gun parapet walls (PMIS 24668; PMIS 147492; Review comments, Hoffman and Cox, 20 August 2020).
-- Proposed, clear invasive vegetation with goats (PEPC 58839).

Mortar Battery.

-- 2004, select vegetation is removed (PMIS 246680).
-- 2010-2011, walkways and platforms to provide visitor access are rehabilitated, destructive vegetation removed from the pits and their surrounding concrete walls, metal railings are stabilized, and portions are rehabilitated to allow for both security and safe visitor access (PMIS 147492).
-- Proposed, removal of additional trees, the use of goats to remove invasive and damaging vegetation and clearing vegetation from the eastern mortar pits (PEPC 67874, PEPC 47572, PMIS 236778).

Nine Gun Battery.
-- 2009, original wooden and iron doors, iron gates and stairways, three elevated concrete walkways, and iron railings around two gun pits are rehabilitated to allow for safe visitor access along the length of the battery (PMIS 123084).
-- Proposed, initiate a 3-acre prescribed burn north of Lot K to perpetuate native plant species and improve wildlife habitat (PEPC 58652).

NIKE Radar Site.
-- 2018, HSR for all Nike Resources (PMIS 201658).
-- 2018, Repair to Buildings 409 and 410 (PMIS 206188A-B).
-- 2020, Repair to HIPAR 468 is underway (PMIS 206188C) and documentation to rehabilitate Barracks 402 and 40 for group camping is in process (PMIS 243945).

In 2015, the NPS reconstructed the non-historic Observation Platform north of Batteries Engle and Morris, and at the same time removed an adjacent storage trailer. (PEPC 57923)

GMP Update:
The 1979 GMP called for rehabilitation and interpretation of the coastal batteries, and improving public access to them. In 2014 the park completed a new General Management Plan/Environmental Impact Statement, which prioritized management of park structures, identifying those for restoration and rehabilitation, as well as those that would be allowed to deteriorate over time. Numerical points were assigned to evaluation criterion, and depending on that score, each resource was placed in one of three bands: preserve, stabilize, or ruin.
-- Preserve: Actions will be taken to maintain and preserve these structures. Efforts will be made to maintain these structures in their current condition or move these structures into good condition through preservation or rehabilitation by NPS or partners. These structures will be utilized for operations, visitor services, and interpretation.
-- Stabilize: Structures where actions will be taken to render an unsafe, damaged, or deteriorated property stable while retaining its present form. Minimal efforts will be made to maintain the structure in its current condition. Unless a use and/or funding is found, the structure may fall into disrepair.
-- Ruin: Structures in poor condition where one or more of the basic structural elements has been lost and due to this condition are without viable reuse options. Resources may be removed or fenced off to keep from being a safety hazard; no work will be done to better the condition of the resource.

The Mortar Battery, Battery Gunnison, and Battery Potter were placed in the Preserve band; Nine Gun Battery, Battery Kingman, Battery Mills in the Stabilize band; and Battery Granger, Battery Morris, Batteries Engle and Peck, and Battery Urmston in the Ruin band. The NIKE Radar and Launch Sites had resources in all three bands. (GMP/EIS 2014: 611-617)

The 2014 GMP/EIS also identified historic districts and structures that would be prioritized for restoration and rehabilitation and identified non-prioritized structures and districts that would be allowed to deteriorate over time as part of a designated Ruin band. The GMP/EIS acknowledged that the loss of individual historic structures in the Ruin band would be substantial, adverse, and permanent, but would not be significant, as many historic structures in the Ruin band shared physical and historical commonalities with other associated historic structures which would be maintained, stabilized, and preserved, thus retaining the park's ability to impart important themes. (GMP/EIS 2014: xxi)

U.S. Coast Guard and Other Uses:
The U.S. Coast Guard, which has maintained a presence on Sandy Hook since the establishment of

a lifesaving station in 1848, continues to operate a facility at the northern end of Sandy Hook. In addition to the Coast Guard, several other institutions have partnered with the park, leasing buildings in the Fort Hancock Historic District. The National Oceanic and Atmospheric Administration's (NOAA) Marine Fisheries Service constructed a new research facility the early 1990s following a fire that destroyed previous laboratories staffed by the Department of the Interior's Bureau of Sport Fisheries and Wildlife Service. NOAA's research efforts were joined by the New Jersey Audubon Society that established the Sandy Hook Observatory in 2001 to provide educational programs and events that address the peninsula as a resource for migratory birds. However, the Audubon Society no longer has a physical presence at Sandy Hook. (CLR 2010: 162; Review comments, McCarthy, 20 August 2020)

Complementing these research and educational endeavors, Monmouth County established two educational facilities in the Fort Hancock Historic District. Brookdale Community College created a field classroom for environmental and marine studies in Fort Hancock's Building 53, the Post Exchange Building, but they no longer occupy this building. South of the Mortar Battery along Gunnison Road, the Marine Academy of Science and Technology (MAST) was founded in 1981 to provide high school instruction in marine science and engineering. The American Littoral Society, which provides programming and marine research, resides in Building 18, while the New Jersey Sea Grant, a cooperative education extension, resides in Building 22 to provide marine research and environmental education programs to school groups. These organizations may be joined by others as the park contemplates lease options involving future partners in rehabilitating historic buildings in the Fort Hancock Historic District. (CLR 2010: 162; Review comments, McCarthy, 20 August 2020)

Uses

Functions and Uses:

Major Category	Category	Use/Function	Historic	Current	Primary
Defense	Fortification	Battery (Defense)	Yes	No	Yes
Recreation/Culture	Outdoor Recreation	Outdoor Recreation	No	Yes	Yes
Vacant (Not In Use)	Abandoned/Unmaintained	Vacant (Not In Use)-Other	No	Yes	No

Public Access:

Public Access: Other Restrictions

Public Access Narrative:

There is limited access into most of the coastal defense battery sites due to potential public safety issues. The exceptions are the Mortar Battery and Battery Gunnison, which are partially open to the public. Battery Potter is open on occasion for limited tours.

Associated Ethnographic Group

Ethnographic Study Status: No Survey Conducted

Ethnographic Narrative:

Analysis & Evaluation of Integrity

Analysis and Evaluation of Integrity Narrative Summary:

Significant landscape characteristics identified for the Sandy Hook Coastal Defense Batteries include spatial organization, topography, vegetation, circulation, buildings and structures, views and vistas, and small-scale features. Many landscape features associated with these characteristics contribute to the overall historic significance and identity, while others do not.

INTEGRITY

The National Register of Historic Places defines integrity as the ability of a property to convey its significance through physical resources. This is evaluated through seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Retention of these qualities is necessary for a property to convey its significance, however, not all seven aspects must be present for a property to retain integrity.

The coastal defense batteries at Sandy Hook retain integrity of location, setting, materials, and workmanship. The batteries also retain integrity of design, feeling, and association, but these aspects are diminished primarily due to the growth of large woody vegetation, addition of non-historic structures, and changes to circulation features. These aspects have not been permanently lost and can be greatly improved with the removal of the non-historic vegetation. The coastal defense batteries retain their overall physical form and addressing the condition of historic details will strengthen the association of the batteries as critical installations for defending the southern approach to New York City and the metropolitan area's airspace.

Location:
Location is the place where the cultural landscape was constructed. The coastal defense batteries continue to occupy the locations where they defended the southern approach to New York Harbor and the skies over the New York-New Jersey metropolitan area. The coastal defense batteries thus retain integrity of location.

Design:
Design is the combination of elements that create the form, plan, space, structure and style of the cultural landscape. Extant design elements include structural features such as gun platforms and pits, battery commander's stations, auxiliary support buildings, and barracks and vehicular and pedestrian circulation. The primary change to the original design of the coastal defense batteries is the growth of large woody vegetation on the structures, their engineered earthworks, and in immediately adjacent areas that would interfere with historic operations. However, the presence of the non-historic plant material can be reversed. With the exception of Battery Gunnison, the gun batteries are missing the artillery and carriages that were part of an earth-covered, concrete defensive structure. Similarly, the NIKE radar site lacks some of the radar units that were mounted on top of the towers for target acquisition and tracking and missile guidance. Nonetheless, the facilities on which this equipment was mounted remain. North of Battery Peck, an observation platform has been constructed. At most locations, the railroad tracks that supported the construction and provided the projectiles and gunpowder for the batteries are gone, although a few traces remain. Near Nine Gun Battery, Battery Gunnison, and the NIKE radar site, surface parking areas have been added. The coastal defense batteries retain integrity of design, but it is diminished.

Setting:
Setting is the physical environment of the cultural landscape. The setting of the coastal defense batteries is defined by topography and vegetation communities that inhabit large, contiguous areas and transitional zones. Contrary to the height of the battery structures and their engineered earthworks, adjacent topography is relatively flat or slightly undulates to form coastal dunes. These topography features are largely intact. Masses of undisturbed vegetation, such as the holly forest east of Batteries Kingman and Mills and the low-growing shrubs and beach grasses on coastal dunes, have also been retained but exist as dynamic features shaped by natural forces. Although Sandy Hook's function has changed from a strategic military installation to a recreation destination serving a densely-populated region, the coastal defense batteries retain integrity of setting.

Materials:
Materials are the physical elements that were combined or deposited during the period of significance in a

particular pattern or configuration to form the cultural landscape. The coastal defense batteries retain historic built materials of granite, concrete, steel, and sand and earth. The condition of these materials is negatively affected by water infiltration, rust, erosion, and large woody vegetation, however, the materials have not been replaced with non-historic substitutes. Changes have occurred with plant materials on the engineered earthworks and adjacent to the batteries due to succession and the growth of non-native invasive species such as ailanthus. The presence of non-historic plant material can be reversed. The coastal defense batteries retain integrity of materials.

Workmanship:
Workmanship is the physical evidence of the crafts of a particular culture or people during the period of significance. The coastal defense batteries demonstrate workmanship of the Army's changing technology in coastal defenses from the late nineteenth to the mid-twentieth century. Masons set granite blocks to form a defensible entrance for Battery Potter. When a land-based attack was no longer a threat and the counterweight gun carriage successfully tested, large caliber gun batteries featured open rear elevations and recessed concrete wells to emplace the guns. Finally, when aerial bombing replaced naval gun fire, Batteries Kingman and Mills were completely casemated in earth-covered concrete to protect artillery and crew. The coastal defense batteries retain integrity of workmanship.

Feeling:
Feeling is the cultural landscape's expression of the aesthetic or historic sense of the historic period. Due to their scale, materials, and integration in the landscape with engineered earthworks, the coastal defense batteries are distinct from other buildings and structures at Sandy Hook and retain their historic feeling. Although sections are missing, the perimeter fences at the NIKE missile sites convey the security established when the radar and launch sites were operational. Large woody vegetation growing on the batteries, their engineered earthworks, and in surrounding areas diminishes the feeling of a maintained military landscape. Similarly, vegetation along the NIKE fence lines and the poor condition of some sections of fences lessens the integrity of feeling. The coastal defense batteries retain integrity of feeling, but it is diminished.

Association:
Association is the direct link between the important historic event or person and the cultural landscape. The coastal defense batteries have a diminished integrity of association. It is challenging to link the structures with their role in coastal defense due to several factors. Changes in circulation systems and unchecked growth of vegetation make access and therefore recognition of batteries such as Urmston and Morris difficult. Large woody vegetation is the primarily culprit obstructing downrange views from the batteries and impeding an understanding between the battery's location and the water. Finally, vegetation growing on the batteries conveys abandonment and lessens the association of the batteries as vital resources for coastal defense. However, the presence of overgrown vegetation is reversible and has not permanently diminished the integrity of these properties.

The next section presents an analysis of landscape characteristics and their associated features and corresponding List of Classified Structures names and numbers, if applicable. It also includes an evaluation of whether the feature contributes to the property's National Register eligibility for the historic period (1859-1974); is noncontributing "compatible" (visually congruent with the historic character of the landscape) or "incompatible" (visually incongruent with the historic character of the landscape); is undetermined; or is managed as a cultural resource. The following analysis is extracted from the "Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries" (2010) by Timothy W. Layton and H. Eliot Foulds.

Landscape Characteristic: Spatial Organization

Historic Condition (to 1974):
Spatial organization is the three-dimensional organization of physical forms and visual associations in a landscape, including the articulation of ground, vertical, and overhead planes that define and create spaces. The spatial organization of the coastal defense batteries is defined in their role as part of a larger system of coastal defenses. The gun batteries at Sandy Hook were not isolated, defensive fixtures but components in a system that utilized multiple locations, varying land-based artillery, and underwater controlled mines to defend the south approach to New York. In addition to batteries at Sandy Hook, the Army constructed coastal defenses to the south at Navesink, to the north at Fort Hamilton, Fort Wadsworth, and Fort Lafayette along the Narrows, and to the east at Fort Tilden on the Rockaway peninsula. All of the battery sites were intended to provide defense-in-depth—a redundant system that provided continued resistance against a potential enemy advancing north toward New York City. The NIKE missile battery at Sandy Hook was also part of a redundant system of defenses that incorporated geographically separate radar sites and command centers for coordinating nineteen missile batteries in the New York Defense Area. In addition to Sandy Hook, nearby missile sites included Leonardo and South Plainfield, New Jersey, and Fort Tilden on the Rockaway peninsula. Fort Wadsworth, located on the west side of the Narrows, served as a command center.

The individual gun batteries at Sandy Hook were oriented to engage a potential enemy on the water. Consequently, a majority of the batteries faced artillery north or east toward the major shipping channel that followed the Atlantic shoreline of the peninsula. The firing side of each battery was protected by an engineered earthwork that transitioned to a reinforced concrete structure. The structure emplaced the guns, stored ammunition, and housed dedicated spaces for calculating a target's range. The rear elevation of the concrete structure provided personnel access and delivery of ammunition and supplies. If an enemy fired on the battery, the safest place for personnel was under the protective cover of reinforced concrete and engineered earthworks. Recognizing this advantage, the Army converted the covered galleries of the Mortar Battery to house central communications and to serve as a command post during World War II.

Post-Historic and Existing Conditions:
The coastal defense batteries at Sandy Hook have not moved since the end of the period of significance and continue to occupy the locations where they guarded the southern approach to New York Harbor and the skies over the New York-New Jersey metropolitan area. The arrangement of a battery's firing side and engineered earthwork, concrete structure, and rear elevation for access remains unaltered (Figure 15).

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197166	Contributing					No
Battery Morris: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197168	Contributing					No

Battery Engle: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197170	Contributing					No
Battery Peck: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197172	Contributing					No
Nine Gun Battery: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197174	Contributing					No
Battery Potter: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197176	Contributing					No
Battery Granger: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197180	Contributing					No
Mortar Battery: Arrangement of battery's mortar pits and engineered earthwork, counterscarp galleries, and perimeter wall	197182	Contributing					No
Battery Gunnison: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197206	Contributing					No
Battery Kingman: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197220	Contributing					No
Battery Mills: Arrangement of battery's firing side and engineered earthwork, concrete structure, and rear elevation for access	197224	Contributing					No
NIKE Radar: Control Area #1	197256	Contributing					No

NIKE Radar: Control Area #2	197276	Contributing					No
NIKE Radar: Ready Barracks	197280	Contributing					No
NIKE Launch: Missile Magazines	197284	Contributing					No
NIKE Launch: Missile Maintenance Area	197286	Contributing					No
NIKE Launch: Ready Barracks	197295	Contributing					No

Landscape Characteristic Graphics:



Figure 15. View looking northwest at the rear elevation of Battery Peck. (OCLP 2020, IMG-082853)

Landscape Characteristic: Topography

Historic Condition (to 1974):
Topography is the three-dimensional configuration of the landscape surface characterized by features (such as slope and articulation) and orientation (such as elevation and solar aspect). Mid-nineteenth century improvements to artillery and projectiles coupled with combat experience during the Civil War convinced military engineers that a new generation of coastal defense batteries should rely on constructed earthworks for protection. Batteries shielded with engineered earthworks were built at Sandy Hook in the 1890s and continued to be a feature of batteries until the conclusion of World War II. Compared to masonry and concrete construction, the engineered earthworks were easy and inexpensive to replace if damaged. In addition to protecting a battery, the earthworks offered an added benefit of concealing the concrete structure by blending it into the surrounding coastal topography. Hundreds of thousands of cubic yards of earth and sand were excavated and meticulously placed to complete the coastal defense batteries at Sandy Hook. Engineered earthworks were also constructed at the NIKE launch site to cover the Missile Magazines and to protect adjacent areas from an accidental explosion at the Missile Maintenance Area.

Post-Historic and Existing Conditions:
The engineered earthworks are primarily intact with some erosion occurring since the end of the historic period. At the NIKE launch site, storms have severely eroded the slope of the engineered plateau on the east (ocean) side, destroying an unpaved road and most of the fencing and lights (Figure 16). The edge of the bluff is creeping westward and has begun to destroy the east edge of the asphalt tarmac. At all battery sites, social trails across the earthworks advance erosion and threaten these features. Large woody vegetation growing on the earthworks creates the potential for the placed earth and sand to be dislodged by a toppled tree.

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston: Engineered earthwork	197305	Contributing					No
Battery Urmston: High point over central storeroom	197327	Contributing					No
Battery Urmston: High point between Battery Urmston and Battery Morris	197334	Contributing					No
Battery Morris: Engineered earthwork	197342	Contributing					No
Battery Morris: High point over magazines	197345	Contributing					No
Battery Morris: Swale north of engineered slope	197351	Undetermined					No
Batteries Engle and Peck: Engineered earthwork	197354	Contributing					No
Nine Gun Battery: Engineered earthwork	197361	Contributing					No
Battery Potter: Engineered earthwork	197365	Contributing					No
Battery Potter: Engineered slope along west facade	197370	Contributing					No

Battery Potter: High point at southwest corner of Battery Potter	197373	Contributing					No
Battery Granger: Engineered earthwork	197378	Contributing					No
Mortar Battery: Engineered earthwork	197382	Contributing					No
Battery Gunnison: Engineered earthwork	197385	Contributing					No
Battery Gunnison: High point over central structure	197387	Contributing					No
Battery Kingman: Engineered earthwork	197394	Contributing					No
Battery Kingman: High point over each gun emplacement	197396	Contributing					No
Battery Mills: Engineered earthwork	197399	Contributing					No
Battery Mills: High point over each gun emplacement	197400	Contributing					No
NIKE Launch Site: Engineered plateau for Missile Magazines	197404	Contributing					No
NIKE Launch Site: Engineered earthwork north of Warhead Building	197409	Contributing					No
NIKE Launch Site: Engineered earthwork south of Warhead Building	197414	Contributing					No

Landscape Characteristic Graphics:



Figure 16. View looking north at fencing and a floodlight at the southeast corner of the NIKE Launch Site. Severe erosion of the engineered slope on the east, ocean beach side of the site has impacted both features. (OCLP 2020, P1010018)

Landscape Characteristic: Vegetation

Historic Condition (to 1974):
Vegetation includes deciduous and evergreen trees, shrubs, vines, groundcovers, and herbaceous plants and plant communities, whether indigenous or introduced in the landscape. In order to reduce erosion and obscure the gun batteries from enemy identification, small tree, shrub, and grass species were planted on the engineered earthworks. Instructions from the Army detailed acquiring local plant materials from nearby sites, performing infill plantings from season to season to ensure adequate coverage, and watering when conditions were necessary to support the plant growth. Vegetation on the engineered earthworks did not interfere with the operation of the artillery or views to potential targets on the water.

Post-Historic and Existing Conditions:
A mixture of vegetation presently grows on the engineered earthworks and includes native and non-native vines and groundcovers, grasses, shrubs, small trees, and large trees. The vegetative cover continues to protect the earthworks from erosion and discourages park visitors from walking on and damaging the earthworks. Vines, groundcovers, grasses, shrubs, and small trees that do not obstruct or interfere with the field of fire for the artillery or view from a battery commander station are contributing features. Large woody vegetation growing on an engineered slope or grade that is larger than six inches in diameter breast height, or otherwise greater than six feet tall, or otherwise growing within six feet of a constructed structural feature or assembly, is non contributing since this vegetation type interferes with the operation of the artillery or views. Vegetation has also encroached on many of the concrete battery structures themselves, having been abandoned for well over half a century (Figure 17). At some batteries, the vegetation is causing deterioration of the structures.

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston: Mixed native and non-native vegetative ground cover on engineered earthwork	197440	Contributing					No
Battery Urmston: Large woody vegetation south of battery	197459	Noncontributing – Incompatible					No
Battery Morris: Mixed native and non-native vegetative ground cover on engineered earthwork	197461	Contributing					No
Battery Morris: Large woody vegetation south of battery	197467	Noncontributing – Incompatible					No
Batteries Engle and Peck: Mixed native and non-native vegetative ground cover on engineered earthwork	197473	Contributing					No
Nine Gun Battery: Mixed native and non-native vegetative ground cover on engineered earthwork	197474	Contributing					No

Nine Gun Battery: Large woody vegetation north and east of battery	197480	Noncontributing – Incompatible					No
Nine Gun Battery: Phragmites growing in gun wells	197483	Noncontributing – Incompatible					No
Battery Potter: Mixed native and non-native vegetative ground cover on engineered earthwork	197485	Contributing					No
Batter Potter: Large woody vegetation north, east, and south of battery	197493	Undetermined					No
Battery Granger: Mixed native and non-native vegetative ground cover on engineered earthwork	197499	Contributing					No
Battery Granger: Large woody vegetation east of battery	197506	Noncontributing – Incompatible					No
Battery Granger: Phragmites growing in gun wells	197513	Noncontributing – Incompatible					No
Mortar Battery: Mixed native and non-native vegetative ground cover on engineered earthwork	197522	Contributing					No
Mortar Battery: Large woody vegetation atop battery	197530	Noncontributing – Incompatible					No
Mortar Battery: Large woody vegetation east of battery	197535	Noncontributing – Incompatible					No
Mortar Battery: Vegetation in Northeast and Southeast Mortar Pits	197543	Noncontributing – Incompatible					No
Battery Gunnison: Mixed native and non-native vegetative ground cover on engineered earthwork	197547	Contributing					No
Battery Gunnison: Deciduous trees in open lawn west of battery	197551	Noncontributing – Incompatible					No
Battery Kingman: Mixed native and non-native vegetative ground cover on engineered earthwork	197561	Contributing					No
Battery Kingman: Scrub pine (Pinus virginiana) on engineered earthwork	197562	Undetermined					No

Battery Mills: Mixed native and non-native vegetative ground cover on engineered earthwork	197563	Contributing					No
Battery Mills: Scrub pine (Pinus virginiana) on engineered earthwork	197566	Undetermined					No
Battery Mills: Planetrees (Platanus × acerifolia) on engineered earthwork	197568	Undetermined					No
NIKE Radar Site: Maintained vegetation among radar towers, support buildings, and barracks	197569	Contributing					No
NIKE Radar Site: Fire breaks along perimeter fence	197572	Contributing					No
NIKE Radar Site: Undisturbed area in the center of site	197575	Contributing					No
NIKE Launch Site: Maintained vegetation at the Missile Magazines, Missile Maintenance Area, and Ready Barracks	197580	Contributing					No
NIKE Launch Site: Firebreaks along perimeter fence	197584	Contributing					No
NIKE Launch Site: Low-growing groundcover on engineered earthworks	197589	Contributing					No

Landscape Characteristic Graphics:



Figure 17. View looking east at vegetation growing in the gun pit and atop the parapet wall of Emplacement No. 1, at Battery Granger. (OCLP 2020, P1010011)

Landscape Characteristic: Circulation

Historic Condition (to 1974):
Circulation refers to the spaces, features, and applied material finishes that constitute systems of movement in a landscape. Multiple circulation systems and infrastructure developed on Sandy Hook to support various modes of transportation during the historic period. The bay side of the peninsula provided more sheltered waters for anchoring and docking ships, and for wharves to transport military supplies and to receive recreation seekers. In the mid-nineteenth century, a railroad line met recreational travelers at a Horseshoe Cove ferry landing and continued south through the peninsula to Long Branch, Sea Bright, and other towns along the Atlantic coast. Recognizing the potential for railroads to transport artillery and ammunition, the Army purchased the existing railroad line and extended it north to the Sandy Hook Proving Ground in 1889. Railroads were utilized throughout the Proving Ground's operation and also installed to move materials for the construction of the coastal defense batteries. After construction was completed, railroad lines served to transport artillery and ammunition to the batteries. Railroads also contributed to the coastal defense system by providing the means for positioning artillery and searchlights mounted on flat rail cars. Following World War II, the gun batteries were deactivated and the railroad lines that supported the batteries' construction and operation were allowed to deteriorate.

In addition to the railroads, vehicular routes were established with compacted soil and wood planks. As Fort Hancock was developed to support the coastal defense batteries, compacted gravel roads were designed and installed to connect the north and south ends of the peninsula and to provide access around the Fort's semi-circular configuration of officers' quarters, enlisted men's quarters, and auxiliary buildings. In many instances, roads paralleled railroad lines along the rear of the batteries and provided access for personnel. The network of the roads expanded with the increase in personnel during the World Wars and designated parking areas appear on historic maps from 1944. Circulation features also include paved and unpaved pedestrian routes associated with the Proving Ground, Fort Hancock, and the individual batteries. The most formal pedestrian circulation systems were designed and installed at the sprawling NIKE missile sites to facilitate access among the barracks, radar towers, magazines, warehouses, and support structures.

Post-Historic and Existing Conditions:
The multiple modes of transportation and their corresponding circulation systems are presently extant at Sandy Hook. A seasonal ferry service operates from Manhattan and brings visitors to the northern end of the peninsula. Vehicular circulation routes provide access throughout Sandy Hook with Hartshorne Drive serving as the major north-south route, Atlantic Drive serving as a secondary north-south route, and Gunnison Road serving as a connecting east-west route between the two. Sidewalks and pedestrian circulation systems connect Fort Hancock's quarters and buildings and provide access among the individual structures that comprise the NIKE missile sites.

Several sections of rail lines and occasional piles of wooden ties are the only extant remnants of Sandy Hook's railroad system. Unmaintained vegetation blocks and obscures some vehicular circulation routes and at other locations, coastal erosion is removing circulation features (Figure 18). New parking lots are present to receive an increasing number of visitors and a multi-use path stretches from the park entrance to the ferry landing to provide dedicated use for jogging, walking, bicycle riding, and roller blading. Circulation features present from the historic period are contributing. Circulation features added during the National Park Service administration of Sandy Hook, such as the parking lots and the multi-use path, are not contributing.

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston: Paved road south of battery	197758	Contributing					No
Battery Morris: North Bragg Drive	197763	Contributing					No

Batteries Engle and Peck: North Bragg Drive	197767	Contributing					No
Batteries Engle and Peck: Unpaved vehicular access to observation platform	197770	Noncontributing – Compatible					No
Batteries Engle and Peck: Social trails among batteries and observation platform	197782	Noncontributing – Incompatible					No
Nine Gun Battery: North Bragg Drive	197784	Contributing					No
Nine Gun Battery: Social trail from emplacement #8	197790	Noncontributing – Incompatible					No
Battery Potter: South Bragg Drive and Hudson Road	197805	Contributing					No
Battery Potter: Unpaved parking area	197823	Noncontributing – Compatible					No
Battery Potter: Multi-use Path (MUP)	197830	Noncontributing – Compatible					No
Battery Potter: Paved landing at main entry	197837	Contributing					No
Battery Potter: Sidewalks to switchboard rooms	197847	Contributing					No
Battery Potter: Trail at southwest corner of Battery Potter	197863	Noncontributing – Incompatible					No
Battery Granger: Hudson Road	197866	Contributing					No
Battery Granger: Vehicular pull-off east of Hudson Road	197869	Noncontributing – Compatible					No
Mortar Battery: Pedestrian entrance through west perimeter wall	197905	Contributing					No
Mortar Battery: Pedestrian access at northwest corner	197914	Contributing					No
Mortar Battery: Trail paralleling the inside west perimeter wall	197918	Contributing					No
Mortar Battery: Trail up engineered earthwork south of southwest emplacement	197926	Noncontributing – Incompatible					No
Mortar Battery: Multi-use Path (MUP)	197932	Noncontributing – Compatible					No
Mortar Battery: Trail north of battery	197944	Contributing					No
Battery Gunnison: Atlantic Drive	197946	Contributing					No

Battery Gunnison: Concrete walk from beach facility to battery	197948	Noncontributing – Compatible					No
Battery Gunnison: Social trail between emplacements and on top of central structure	197951	Noncontributing – Incompatible					No
Battery Gunnison: Remnant curbs west of battery	197954	Undetermined					No
Batteries Kingman and Mills: Access road from Hartshorne Drive	197958	Contributing					No
Battery Kingman: Vehicular route circumscribing battery	197963	Noncontributing – Compatible					No
Battery Mills: Vehicular route circumscribing battery	197968	Noncontributing – Compatible					No
Battery Mills: Trail on top of engineered earthwork	197972	Noncontributing – Compatible					No
NIKE Radar Site: Multi-use Path (MUP)	197975	Noncontributing – Compatible					No
NIKE Radar Site: Paved vehicular route between Control Area #1 and #2	197997	Contributing					No
NIKE Radar Site: Vehicular routes between control areas and Ready Barracks	198002	Contributing					No
NIKE Radar Site: Parking area west of Ready Barracks	198125	Contributing					No
NIKE Radar Site: Walkway network (SH-P)	198132	Contributing	041292				No
NIKE Launch Site: Hartshorne Drive	198134	Contributing					No
NIKE Launch Site: Parking area	198136	Contributing					No
NIKE Launch Site: Multi-use Path (MUP)	198137	Noncontributing – Compatible					No
NIKE Launch Site: Paved central access road	198139	Contributing					No
NIKE Launch Site: Paved road spur to Generator Building (429)	198148	Contributing					No
NIKE Launch Site: Paved vehicular routes and dolly route at Missile Maintenance Area	198150	Contributing					No

NIKE Launch Site: Walkway network at Ready Barracks (portions) (SH-P)	198153	Contributing	041292				No
NIKE Launch Site: Unpaved route around inner security fence (portion)	198155	Contributing					No
NIKE Launch Site: Unpaved area north of Warhead Building (450) and access to beach	198156	Noncontributing – Compatible					No
NIKE Launch Site: Path to Dog Kennels (458)	198157	Noncontributing – Compatible					No

Landscape Characteristic Graphics:



Figure 18. View looking west at Battery Morris. Remnants of a road and the U.S. Coast Guard perimeter fence are visible at left. (OCLP 2020, IMG-091502)

Landscape Characteristic: Buildings and Structures

Historic Condition (to 1974):
Buildings are elements constructed primarily for sheltering any form of human activity in a landscape, while structures are elements constructed for functional purposes other than sheltering human activity. The coastal defense batteries represent successive generations of buildings and structures constructed in response to advances in offensive weaponry and armament. At Sandy Hook, the Army designed and constructed rapid fire and large caliber batteries to defend the southern entrance to New York Harbor. In addition the Army completed experimental battery designs, such as the Dynamite Gun Battery and Battery Potter, which used different means to fire projectiles and raise large caliber guns. Both rapid fire and large caliber gun batteries were a building system comprised of reinforced concrete structures and protective, engineered earthworks.

The first gun batteries at Sandy Hook incorporated defenses against a land-based attack. At Battery Potter, the main entry resembled a castle and featured gun loops in a pair of flanking towers so soldiers could fire on an advancing enemy. At the Mortar Battery, the structure was surrounded by a perimeter wall and had machine guns set in galleries at opposite corners to fire on intruders inside the wall. With a system of gun batteries and controlled mines defending against a land-based attack, later gun batteries had open, rear elevations that provided personnel access and delivery of ammunition and supplies via platforms, steps, stairs, and bridges. Responding to the threat of aerial reconnaissance and bombing, the large caliber gun batteries updated during World War II featured massive concrete canopies over each gun emplacement to protect the artillery and crews.

During the historic period, the gun batteries experienced periods of intensive maintenance and use and also years of minimal care intended to keep the defenses operational ready. Historic photographs document the addition of water-repelling coatings and camouflage paints to the exposed concrete surfaces of Fort Hancock's gun batteries to protect the batteries from natural forces and human detection, a common practice throughout the nation’s system of coastal defenses. Architectural features, many of them metal, were important components in security, safety, and communications. (Review comments, Ehrler, 20 August 2020)

The Army disarmed and deactivated the gun batteries when artillery was no longer effective and when new coastal defenses were operational. The abandoned batteries were not maintained and following World War II, all of the gun batteries were deactivated due to the new threat of high-altitude bombers. In response, the Army constructed a NIKE missile battery at Sandy Hook that could launch surface-to-air missiles. The NIKE missile battery remained operational until new offensive weaponry, the intercontinental ballistic missile (ICBM), eclipsed the NIKE system and defense philosophy shifted to the doctrine of mutually-assured destruction. The buildings and structures at the NIKE sites, similar to the gun batteries before them, were abandoned and not maintained.

Post-Historic and Existing Conditions:
The coastal defense batteries are extant and primarily in a stable condition despite decades of little or no maintenance. The reinforced concrete structures and engineered earthworks that comprise the building system are intact. There are instances of erosion on the earthworks and evidence of spalling, cracks, and separation on concrete elements (Figure 19). In addition, efflorescence can be seen on many of the vertical concrete surfaces indicating water has penetrated the concrete and is drawing out salts and other impurities to the surface. Architectural features, particularly metal components such as stairways and ramps, are in a deteriorating condition and missing at some batteries (Figure 20). The two concrete TNT igloos south of Battery Mills have been undermined by wave action and erosion as the bulkheading behind them has fallen apart. The concrete block buildings at the NIKE missile sites also show symptoms of water penetration along with corrosion on corrugated metal roofs and metal siding (Figure 21).

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston (SH-540)	198167	Contributing	008656		Asset	21625	Yes
Battery Urmston: Coincidence range finder station between emplacements #4 and #5	198192	Contributing					No
Battery Morris (SH-539)	198195	Contributing	008655		Asset	21623	Yes
Battery Morris: Coincidence range finder station (SH-K)	198197	Contributing	041284				No
Battery Peck (SH-180)	198200	Contributing	008534		Asset	21607	Yes
Battery Peck [Engle]: Coincidence range finder station (SH-189A)	198202	Contributing	041302				No
Battery Peck: Observation platform	198203	Noncontributing – Compatible					No
Nine Gun Battery (SH-181)	198205	Contributing	008535		Asset	21608	Yes
Nine Gun Battery: Remnant of granite fort	198206	Contributing					No
Battery Potter (SH-264)	198208	Contributing	008547		Asset	21612	Yes
Battery Potter: Central Power Plant (SH-259)	198212	Contributing	008545		Asset	28164	Yes
Battery Potter: Coal Shed (SH-260)	198215	Contributing	008546		Asset	28165	Yes
Battery Potter: Switchboard Room (“A”) (SH-256)	198217	Contributing	008542		Asset	21609	Yes
Battery Potter: Switchboard (“C”) (SH-257)	198224	Contributing	008543		Asset	21610	Yes
Battery Potter: Conduit Hut “A” Building (SH-258)	198227	Contributing	008544				No
Battery Potter: Primary Fire Control Stations	198228	Contributing					No
Battery Granger (SH-266)	198230	Contributing	008548		Asset	21824	Yes
Mortar Battery (Batteries McCook and Reynolds) (SH-349)	198233	Contributing	008587		Asset	21614	Yes
Mortar Battery: Telephone data booths	198235	Contributing					No
Mortar Battery: Battery commander’s stations	198236	Contributing					No
Mortar Battery: Perimeter wall	198256	Contributing					No
Mortar Battery: Counterscarp gallery	198257	Contributing					No
Battery Gunnison (SH-337)	198262	Contributing	008578		Asset	21615	Yes

Battery Kingman (SH-441)	198264	Contributing	008629		Asset	19434	Yes
Battery Kingman: Concrete box atop emplacement #2	198267	Contributing					No
Battery Kingman: Concrete pipe atop emplacement #2	198269	Contributing					No
Battery Kingman: Unknown structure on west side	198271	Undetermined					No
Battery Kingman: Horseshoe Cove Wood Bulkhead (SH-G)	198275	Contributing	041281		Asset	21000	Yes
Battery Mills (SH-440)	198279	Contributing	008628		Asset	19435	Yes
Battery Mills: Concrete box and metal pipe near center top of the engineered earthwork	198281	Contributing					No
Battery Mills: Concrete pipe southwest of emplacement #1	198290	Contributing					No
Battery Mills: TNT Igloo (SH-444)	198291	Contributing	008632				No
Battery Mills: TNT Igloo (SH-445)	198293	Contributing	008633				No
NIKE Radar Site: Connecting Corridors (SH-411)	198294	Contributing	008601		Asset	81777	Yes
NIKE Radar Site: Sentry Box (SH-413)	198296	Contributing	008603		Asset	81778	Yes
NIKE Radar Site: Generator House (SH-414)	198300	Contributing	008605		Asset	81779	Yes
NIKE Radar Site: Target Tracking Radar Tower (SH-417)	198303	Contributing	008606		Asset	20230	Yes
NIKE Radar Site: Acquisition Radar Tower (SH-418)	198312	Contributing	008607		Asset	20231	Yes
NIKE Radar Site: Missile Tracking Radar Tower (SH-419)	198314	Contributing	008608		Asset	20232	Yes
NIKE Radar Site: ABAR Radar Tower Pedestal (SH-453)	198317	Contributing	008637				No
NIKE Radar Site: Equipment and Ops. Building (SH-454)	198329	Contributing	008639		Asset	21024	Yes
NIKE Radar Site: Target Tracking Radar Tower (HIPAR Tower) (SH-473)	198331	Contributing	008652				No
NIKE Radar Site: Connecting Corridors (SH-409)	198333	Contributing	008600				No

NIKE Radar Site: Generator House (SH-410)	198336	Contributing	008602		Asset	81775	Yes
NIKE Radar Site: Abandoned Target Tracking Radar Tower (SH-420)	198340	Contributing	008611		Asset	20233	Yes
NIKE Radar Site: Acquisition Radar Tower (SH-421)	198345	Contributing	008609		Asset	20235	Yes
NIKE Radar Site: Missile Tracking Radar Tower (SH-422)	198348	Contributing	008610		Asset	20236	Yes
NIKE Radar Site: Sentry Box (SH-423)	198352	Contributing	008604		Asset	81780	Yes
NIKE Radar Site: Target Ranging Radar Tower (SH-467)	198356	Contributing	008646				No
NIKE Radar Site: HIPAR Building (SH-468)	198361	Contributing	008647		Asset	81990	Yes
NIKE Radar Site: HIPAR Radar Base (SH-469)	198373	Contributing	008648				No
NIKE Radar Site: New Target Tracking Radar Tower (HIPAR Tower) (SH-472)	198383	Contributing	008651				No
NIKE Radar Site: Enlisted Men’s Barracks with Mess (402)	198386	Contributing	008597		Asset	81769	Yes
NIKE Radar Site: Enlisted Men’s Barracks with Mess (SH-403)	198387	Contributing	008598		Asset	81771	Yes
NIKE Radar Site: Enlisted Men’s Barracks with Mess concrete slab (SH-404)	198389	Contributing					No
NIKE Radar Site: Enlisted Men’s Barracks with Mess concrete slab (SH-405)	198390	Contributing					No
NIKE Radar Site: Latrine (SH-406)	198393	Contributing	041311		Asset	81773	Yes
NIKE Radar Site: Boiler Room (SH-407)	198394	Contributing	008599		Asset	81774	Yes
NIKE Launch Site: Missile Storage (Type B) (NIKE Silo) (SH-425)	198397	Contributing	008613				No
60 NIKE Launch Site: Missile Storage (Type B) (NIKE Silo) (SH-426)	198399	Contributing	008614				No
NIKE Launch Site: Missile Storage (Type B) (NIKE Silo) (SH-427)	198414	Contributing	008615				No

NIKE Launch Site: Missile Storage (Type B) (NIKE Silo) (SH-428)	198416	Contributing	008616				No
NIKE Launch Site: Generator Building (SH-429)	198422	Contributing	008617		Asset	20143	Yes
NIKE Launch Site: Paint and Oil Storage (Sentry Box) (SH-447)	198425	Contributing	008634		Asset	81785	Yes
NIKE Launch Site: Sentry Hut foundation (SH-448)	198427	Contributing					No
NIKE Launch Site: Kennel Storage (Storage Shed) (SH-457)	198429	Contributing	008642				No
NIKE Launch Site: Dog Kennels (SH-458)	198433	Contributing	008643				No
NIKE Launch Site: Missile Assembly and Test Building (SH-449)	198437	Contributing	008635		Asset	20996	Yes
NIKE Launch Site: Warhead Building (SH-450)	198440	Contributing	008636		Asset	20997	Yes
NIKE Launch Site: Ready Barracks (SH-430)	198446	Contributing	008618		Asset	81782	Yes
NIKE Launch Site: Ready Barracks (SH-431)	198458	Contributing	008619		Asset	20240	Yes
NIKE Launch Site: Ready Barracks (SH-432)	198463	Contributing	008620		Asset	20242	Yes
NIKE Launch Site: Ready Barracks (SH-433)	198467	Contributing	008621		Asset	20244	Yes
NIKE Launch Site: Boiler House (SH-435)	198470	Contributing	008623		Asset	20995	Yes
NIKE Launch Site: Latrine (SH-434)	198471	Contributing	008622		Asset	81784	Yes
NIKE Launch Site: Ready Building (SH-437)	198473	Contributing	008625		Asset	20149	Yes
NIKE Launch Site: Sentry Box (SH-439)	198475	Contributing	008627		Asset	81786	Yes
NIKE Launch Site: Sentry Hut foundation (SH-456)	198477	Contributing					No
NIKE Launch Site: Shed at Firearm Range	198478	Noncontributing – Compatible					No
NIKE Launch Site: Sheds at Missile Assembly and Test Building	198479	Undetermined					No

Landscape Characteristic Graphics:



Figure 19. View looking west at Emplacement No. 1 at Battery Mills. (OCLP 2020, IMG-153044)



Figure 20. View looking east at overgrown steps, missing catwalk (center right), and damaged railings at Battery Urmston. (OCLP 2020, IMG-093812)



Figure 21. View looking southeast at the Generator Building (414), Control Area #2, at the NIKE Radar Site. (OCLP 2020, IMG-173852)

Landscape Characteristic: Views and Vistas

Historic Condition (to 1974):
A view is the expansive and/or panoramic prospect of a broad range of vision that may be naturally occurring or deliberately contrived. A vista is a controlled prospect of a discrete, linear range of vision, which is deliberately contrived. The concrete gun batteries relied on unobstructed views to the water to sight potential targets and allow unimpeded firing of projectiles. The importance of a clear field of fire is demonstrated by the Army Corps of Engineers' "Report of Completed Works" that recorded information on interference and obstacles for each battery such as adjacent batteries, buildings, and vegetation. In addition to a clear field of fire from an emplacement, unobstructed views were necessary from battery commander's stations and fire control stations. Constructed on top of existing batteries or as independent buildings, these stations became dedicated structures for locating and acquiring the range of potential targets.

Tactical views of high-altitude, enemy aircraft were not possible and to counter this strategic advantage, the NIKE missile battery utilized radar to acquire targets and guide missiles to a computed intercept point. Radar and missiles had to be separated by a minimum distance of 3,000 feet for guidance communication to work. Therefore, a tactical view existed between the radar site and launch site so the radar signals could be transmitted without obstruction. At Sandy Hook, the area between the two sites was not stripped of all features, but vertical objects that could interfere with the radar signals had to be removed, relocated, or managed.

Post-Historic and Existing Conditions:
Tactical views from the emplacements, battery commander's stations, and fire control stations to the water are primarily impeded by woody vegetation growing at the interface of the engineered earthwork and concrete battery structure (Figure 22). Beyond the toe or bottom of the engineered earthwork there may be vegetation that impacts views, however, the impact is difficult to evaluate with obstructing vegetation in close proximity to the start of the view (Figure 23). The park has recently cleared woody vegetation at Battery Gunnison, reopening the tactical view from the two replica guns to the water (Figure 24). With the exception of the observation platform at Batteries Engle and Peck, there appears to be no additional buildings or structures that impact views from the emplacements, battery commander's stations, and fire control stations. From the NIKE radar site, signals traveled over a mile to control vans and individual missiles at the launch site. With these vertical elements absent from the launch site, it is difficult to determine if the tactical view is intact or obstructed.

Views are contributing at the gun batteries that directly sighted their targets, and undetermined at the NIKE missile battery. The Mortar Battery, Battery Kingman, and Battery Mills, relied on tactical views from observation points constructed separately from the artillery emplacements. Views from these emplacements to the ocean did not exist historically and if currently present are non contributing.

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston: Downrange views from the emplacements and coincidence range finder station	198489	Contributing					No
Battery Morris: Downrange views from the emplacements and coincidence range finder station	198490	Contributing					No

Batteries Engle and Peck: Downrange views from the emplacements, commander's station, and coincidence range finder station	198493	Contributing					No
Nine Gun Battery: Downrange views from the gun carriage and battery commander's stations	198494	Contributing					No
Battery Potter: Downrange views from the emplacements and Primary Fire Control Stations	198495	Contributing					No
Battery Granger: Downrange views from the gun carriage and battery commander's stations	198497	Contributing					No
Mortar Battery: View from gun emplacements to water	198499	Noncontributing – Compatible					No
Mortar Battery: View from battery commander's stations to water	198501	Contributing					No
Battery Gunnison: Downrange views from the emplacements and battery commander's station	198502	Contributing					No
Battery Kingman: View from gun emplacements to water	198504	Noncontributing – Compatible					No
Battery Mills: View from gun emplacements to water	198505	Noncontributing – Compatible					No
NIKE Radar Site: View between each Missile Tracking Radar and the control vans and individual missiles at the launch site	198506	Undetermined					No
NIKE Launch Site: View from the control vans and individual missiles to the Missile Tracking Radars at the radar site	198507	Undetermined					No

Landscape Characteristic Graphics:



Figure 22. View looking north at the current view from Emplacement 4, Battery Urmston. (OCLP 2020, IMG-095656)



Figure 23. Blocked view looking east from the battery commander's station at Battery Granger.(OCLP 2020, P1010015)



Figure 24. Open view looking north from the 6-inch gun emplacement No. 1 (foreground) and the gun in emplacement No. 2 (background) at Battery Gunnison. (OCLP 2020, P1010053)

Landscape Characteristic: Small Scale Features

Historic Condition (to 1974):
Small-scale features are elements that provide detail and diversity for both functional needs and aesthetic concerns in the landscape. The coastal defense batteries contained numerous small-scale architectural features associated with buildings and structures. Railings and features utilized for lighting, electronic communication, and weather observation were installed on various batteries to improve the operational efficiency of the defenses. In the landscape, small-scale features included fencing and exterior lighting. At the NIKE missile sites, fencing provided security against unauthorized access and served to define the outer boundaries of the radar and launch facilities. The Army added an additional security fence to the launch site as part of upgrades to use Hercules missiles fitted with nuclear warheads. Included in the Hercules upgrades was the installation of floodlights along the newly installed security fence and at the Missile Maintenance Area. Exterior lighting was also a feature at the NIKE radar site. Pedestrian-scale fixtures were installed to illuminate the walkway network between the control areas and Ready Barracks as well as the routes among the barrack buildings.

Post-Historic and Existing Conditions:
Small-scale architectural features associated with the coastal defense batteries and small-scale features in the landscape are presently extant. At all sites, the remaining fencing is in fair to poor condition. Corrosion appears on many components of the fencing and some sections have missing or deteriorated chain-link and barbed wire strands (Figure 25). Vegetation crowds or covers sections of the fencing and makes inspection and routine maintenance difficult. Vegetation also crowds several floodlights at the NIKE launch site and the pedestrian-scale lights at the NIKE radar site (Figure 26). Small-scale features also include remnants of buildings and structures that are no longer extant. At certain locations, concrete footings and collapsed metal pipes are the only items present from observation towers and other structures of the coastal defense system. A telephone booth in the Ready Barracks are of the NIKE Radar Site may be historic but additional research is needed.

Many small-scale features in the landscape are present to support the National Park Service's management of Sandy Hook as a national recreation area. Waysides and signage are located in close proximity to many of the gun batteries to aid interpreting the structures. Additional signage and fencing are installed near some batteries to warn visitors of potentially hazardous conditions and block access to fragile building components and engineered earthworks. Existing small-scale features also include contemporary traffic control devices such as guardrails and bollards. Small-scale features present from the historic period are contributing. Small-scale features added during the National Park Service administration of Sandy Hook do not contribute.

Landscape Features:

Feature Name	CLI Feature ID	Feature Contribution	CRIS-HS Resource ID	Associated CRIS-AR ID	FMSS Record Type	FMSS Record Number	FMSS Exact Match
Battery Urmston: U.S. Coast Guard perimeter fence	198514	Noncontributing – Compatible					No
Battery Morris: U.S. Coast Guard perimeter fence	198515	Noncontributing – Compatible					No
Batteries Engle and Peck: Chain-link fence south of Battery Peck	198518	Noncontributing – Compatible					No
Batteries Engle and Peck: Wooden split-rail fence east of Battery Engle	198519	Noncontributing – Compatible					No

Batteries Engle and Peck: Barbed wire fence section west of communications trailer	198522	Noncontributing – Compatible					No
Batteries Engle and Peck: Wayside east of Battery Peck	198524	Noncontributing – Compatible					No
Nine Gun Battery: Chain-link fence west of Nine Gun Battery	198525	Noncontributing – Compatible					No
Nine Gun Battery: Wayside west of emplacement #8	198526	Noncontributing – Compatible					No
Battery Potter: Metal weather pole	198527	Contributing					No
Battery Potter: Wooden wheelstops	198529	Noncontributing – Compatible					No
Battery Potter: Wayside west of structure	198530	Noncontributing – Compatible					No
Battery Granger: Chain-link fence west of battery	198531	Noncontributing – Compatible					No
Battery Granger: Wayside west of battery	198532	Noncontributing – Compatible					No
Mortar Battery: Chain-link fence east of battery	198534	Noncontributing – Compatible					No
Mortar Battery: Woven-wire fence along west side of engineered earthwork	198535	Noncontributing – Compatible					No
Mortar Battery: Wood post and wire cable fence at top of engineered earthwork	198537	Noncontributing – Incompatible					No
Mortar Battery: Concrete footing and metal ring	198538	Contributing					No
Mortar Battery: Two signs outside perimeter wall	198541	Noncontributing – Compatible					No
Battery Gunnison: Wood post and rope bollards	198543	Noncontributing – Compatible					No
Battery Gunnison: Waysides west of battery	198544	Noncontributing – Compatible					No
Battery Kingman: Chain-link fence above concrete canopy for each emplacement	198546	Noncontributing – Compatible					No
Battery Kingman: Wood post and wire cable fence at top of engineered earthwork	198548	Noncontributing – Compatible					No
Battery Kingman: Wood guardrails east of vehicular route	198549	Noncontributing – Compatible					No

Battery Mills: Chain-link fence above concrete canopy for each emplacement	198551	Noncontributing – Compatible					No
Battery Mills: Wood guardrails east of vehicular route	198552	Noncontributing – Compatible					No
NIKE Radar Site: Perimeter fence (SH-S)	198555	Contributing	041295				No
NIKE Radar Site: Basketball court	198556	Contributing					No
NIKE Radar Site: Pedestrian lighting (SH-R	198558	Contributing	041294				No
NIKE Radar Site: Telephone Booth	198561	Undetermined					No
NIKE Launch Site: Inner security fence (SH-S)	198564	Contributing	041295				No
NIKE Launch Site: Outer security fence (SH-S)	198568	Contributing	041295				No
NIKE Launch Site: Floodlights along inner security fence (SH-Q)	198570	Contributing	041293				No
NIKE Launch Site: Floodlights at the Missile Maintenance Area (SH-Q)	198571	Contributing	041293				No
NIKE Launch Site: Spotlights in the Missile Magazine area	198572	Contributing					No
NIKE Launch Site: Missile display southwest of Ready Barracks	198573	Noncontributing – Compatible					No

Landscape Characteristic Graphics:



Figure 25. Section of inner fence in poor condition at the missile magazine area, NIKE Launch Site. (OCLP 2020, P1010019)



Figure 26. One of the pedestrian lampposts along the overgrown path between Control Area #2 and Ready Barracks Area, NIKE Radar Site. (OCLP 2020, IMG-175419)

Condition

Assessment Interval (Years): 7

Next Assessment Due Date: 09/02/2027

Condition Assessment and Impacts

Condition Assessment: Fair

Assessment Date: 09/02/2020

Condition Assessment Explanatory Narrative:

The Sandy Hook Coastal Defense Batteries are in fair condition due to the unmanaged growth of large woody vegetation, concrete and building material deterioration, and social trails that traverse historic engineered earthworks. Large woody vegetation threatens the batteries' historic earthworks due to the potential for uprooting in a storm event. In addition, vegetation growing near and on concrete structures accelerates deterioration of the concrete. Large woody vegetation on the structures, the earthworks, and within tactical views to the water obscures the visual connection between the defense and potential targets. Water infiltration has resulted in concrete spalling and cracks at the batteries and deterioration of other building materials at separate, free-standing structures. Metal components at the batteries, such as handrails and guardrails, are corroding. The corrosion weakens the metal and contributes to concrete deterioration. Social trails that lead up or across an engineered earthwork promote soil erosion that removes material from these historic structures.

An evaluation of "fair" indicates the property shows clear evidence of minor disturbances and deterioration by natural and/or human forces, and some degree of corrective action is needed within 3-5 years to prevent further harm to its cultural and/or natural values. If left to continue without the appropriate corrective action, the cumulative effect of the deterioration of many of the landscape characteristics will cause the property to degrade to a poor condition.

Impacts

Type of Impact: Deferred Maintenance

Other Impact:

External or Internal: Internal

Impact Narrative: Large woody vegetation has been permitted to grow on historic engineered earthworks and in close proximity to battery structures. The vegetation accelerates damage to the structures and can potentially uproot in a storm event and damage the earthworks.

Date Identified: 09/15/2020

Type of Impact: Erosion

Other Impact:

External or Internal: Internal

Impact Narrative: Beach erosion threatens Battery Kingman, Battery Mills, and the NIKE launch site. At Battery Kingman, storm events and bayside erosion have advanced toward the western edge of the battery and have removed portions of a historic railroad bed and road. At Battery Mills, erosion has removed a portion of the vehicular route that circumscribes the battery. At the NIKE launch site, the Atlantic shoreline has advanced beyond the eastern perimeter of the missile facility, destroying the perimeter fence and circulation features. A future storm event could threaten the two eastern launch sites. Social trails that traverse engineered earthworks also contribute to erosion of these historic structures.

Date Identified: 09/15/2020

Type of Impact: Inundation (Flooding)

Other Impact:

External or Internal: External

Impact Narrative: Flooding associated with major storms continues to affect Sandy Hook and its resources.

Date Identified: 09/15/2020

Type of Impact: Inundation/Sea Level Rise

Other Impact:

External or Internal: External

Impact Narrative: Sea level rise will likely shift the shoreline closer Battery Mills, Battery Kingman, and the NIKE Launch Site.

Date Identified: 09/15/2020

Type of Impact: Other

Other Impact: Structural Deterioration

External or Internal: Internal

Impact Narrative: Spalling and cracked concrete at the coastal defense batteries permits increased water infiltration that further accelerates concrete deterioration. Corrosion weakens metal components at the batteries and results in additional concrete loss.

Date Identified: 09/15/2020

Type of Impact: Other

Other Impact: Ground Water Rise

External or Internal: Both Internal and External

Impact Narrative: The ground water level is rising. All but one of the Nike silos has water in it most of the time.

Date Identified: 09/15/2020

Type of Impact: Vandalism/Theft/Arson

Other Impact:

External or Internal: Internal

Impact Narrative: Unauthorized visitor access into the batteries has resulted in damage to extant features.

Date Identified: 09/15/2020

Treatment

Stabilization Measures

Stabilization Measure Narrative:

"Repair Mortar Battery Features for Safe Access for Park Visitors," (PMIS 236778). This project will increase safe accessibility for visitors to understand and view the entire fortification. The Mortar Battery consists of four separate pit areas. The project will install a new replacement electrical system which includes the installation of a new power feed service line, installation of exposed conduit and the installation of new historically appropriate lighting on the interior and the exterior at the two western entrances. The historic ventilation system will be repaired. The existing drainage system will be cleaned and cleared of debris; returned to working order. The exterior steel doors will be repaired or replaced in-kind; hardware including the rail systems are included in the project. Two eastern mortar pits will be cleared of sand, trees and debris to allow for these spaces to be opened to the public. The two western telephone pit buildings will be restored; the rust jacked concrete on the underside will be repaired and the severely deteriorate concrete stairs leading to the buildings will be replaced; the handrails repaired or replaced in-kind. Inappropriate vegetation growing along the sloping walls of the mortar pits (4) will be removed. The walkway along the top leading to the commander's stations will be cleared; railings repaired or replaced in-kind and the two stations will be restored. The surviving concrete base of the mortar battery tower (along the west counterscarp wall) will be stabilized and an interpretive sign added; new interpretive signage will also be added on the interior. Four exterior windows at the southeastern end of the counterscarp will be repaired. Funding requested for FY 2020 and 2021.

Stabilization Cost: $727,219.23

Stabilization Cost Date:

Estimate Level: C - Similar Facilities

Cost Estimator: Park/FMSS

Cost Narrative:

Treatment Documents

Treatment Type: Rehabilitation

Treatment Completed: No

Document Type: General Management Plan

Document Date: 2014-01-01

Title:

IRMA Link:

Narrative:

Signed into law on October 27, 1972, the enabling legislation for the Gateway National Recreation Area guides the framework for treatment for the coastal defense batteries at Sandy Hook. For the Sandy Hook and Staten Island Units, the act specifically directs that the Secretary of the Interior "…shall inventory and evaluate all sites and structures having present and potential historical, cultural, or architectural significance and shall provide for appropriate programs for the preservation, restoration, interpretation, and utilization of them." (GMP 1979: 163-65)

The park's first General Management Plan, completed in 1979, recommended that the surviving coastal defense batteries be rehabilitated. The park's 1990 General Management Plan Amendment recommended that the batteries be interpreted to the public with a focus on their historic functions, and the technological changes in coastal defenses during Fort Hancock's history. (CLR 2010: 314, citing GMP Amendment, 1990: 13)

Landscape treatment is detailed in the Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries (2010) by Timothy W. Layton and H. Eliot Foulds. The report included a chapter addressing landscape treatment and presents recommendations common to all coastal defense battery sites as well as a site-by-site presentation of specific recommendations. The following narrative is derived from the Cultural Landscape Report:
"Rehabilitation of the Sandy Hook gun and missile batteries would entail the removal of non-historic, large woody vegetation growing on historic engineered earthworks and in close proximity to historic buildings and structures. Vegetation management will also reestablish historic downrange views to the water that are critical to understanding the historic purpose and function of these sites. Following vegetation management tasks, repairs and maintenance of concrete surfaces, including repairing voids and cracks, and sealing the porous concrete surfaces against water infiltration will extend the number of years that the structures can be made safely accessible to the public. In conjunction with limiting water infiltration on the concrete structures, exposed, corroding, metal components at the batteries should be stabilized to preserve the metal and minimize deterioration to the concrete caused by metal corrosion. Providing safe and informative visitor access will involve repairing, retrofitting, and replacing deteriorated stairways, walkways, and accompanying safety railings. Providing safe access also will involve repairing doors and erecting fences and other barriers to prevent visitors from accessing unsafe locations within these sites." (CLR 2010: 323)

In 2014, the park completed a new General Management Plan/Environmental Impact Statement to address issues that the 1979 GMP did not address because they were not anticipated when the plan was prepared. Regarding management of resources at the Sandy Hook Unit, the GMP/EIS stated:
"The cultural landscape within the Fort Hancock area would be maintained. Areas within the cultural landscape would be rehabilitated to function as flexible open space areas for relaxation, gatherings, picnics, and community events. The Nike Missile Launch and Radar Site would be stabilized and interpreted. New opportunities for guided and self-guided exploration of the area would be created. Batteries Potter, Gunnison, McCook and Reynolds (Mortar) would be preserved and interpreted through guided tours and/or interpretive media. Additional batteries within the Fort Hancock area would be stabilized, opened to visitor access and interpreted, including off site through digital media and/or exhibits." (GMP/EIS 2014: x)

In order to guide GMP/EIS decisions, the park determined that a prioritized list of resources was necessary to

inform future preservation efforts, funding, and maintenance. A process was created to evaluate structures and associated landscapes that are contributing resources to the park's nine National Register Districts. Numerical points were assigned to evaluation criterion (fundamental resource, National Register status, level of significance, potential use, uniqueness, visibility, climate change vulnerability, pre-Sandy condition) and totaled for a score, and depending on that score, each resource was placed in one of three bands: preserve, stabilize, or ruin, as follows:
--Preserve: Mortar Battery, Battery Gunnison, Battery Potter
--Stabilize: Nine Gun Battery, Battery Kingman, Battery Mills
--Ruin: Battery Granger, Battery Morris, Battery Engle, Battery Peck, Battery Urmston
(Note: the NIKE Radar Site and NIKE Launch Site possess resources in all three bands) (GMP/EIS 2014: 611-617)

As stated in the Programmatic Agreement between the NPS and the State Historic Preservation Offices of New York and New Jersey, regarding the treatment of historic properties identified as ruins:
"Within the designated Ruin [Band] and through the priority banding, the GATE GMP/EIS identifies certain resources as 'ruins.' Within the GMP/EIS, properties designated as ruins are defined as 'Structures in poor condition ... that may be removed or fenced off to keep from being a safety hazard; no work will be done to better the condition of the resources.' These structures, and in some cases their associated landscapes, will be allowed to decay naturally, be stabilized for safety, fenced off to limit public access, or demolished. Cumulatively, and in most cases individually, these actions will have an adverse effect upon historic properties." (ROD 2014, Attachment C: 2; Review comment, Erhler, 20 October 2020)

Approved Treatment Costs

Cost Narrative:

Treatment Type:	Bulk Import TBD
Treatment Completed:	No
Document Type:	Cultural Landscape Report
Document Date:	2010-01-01
Title:	Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries, Gateway National Recreation Area, Fort Handcock, New Jersey
IRMA Link:	https://irma.nps.gov/DataStore/Reference/Profile/2193192
Narrative:	

Approved Treatment Costs

Cost Narrative:

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