

United States Department of the Interior  
National Park Service

## National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form*. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional certification comments, entries, and narrative items on continuation sheets if needed (NPS Form 10-900a).

### 1. Name of Property

historic name Navesink Military Reservation Historic District

other names/site number Hartshorne Woods Park

### 2. Location

street & number Grand Tour Road and Portland Road, Hartshorne Woods Park

city or town Middletown Township

state New Jersey code NJ county Monmouth code 025 zip code 07748

### 3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this X nomination request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property X meets does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

national X statewide local

Signature of certifying official Rob Boory

Date 8/28/15

State or Federal agency/bureau or Tribal Government NJ DEP

In my opinion, the property meets does not meet the National Register criteria.

Signature of commenting official

Date

Title

State or Federal agency/bureau or Tribal Government

### 4. National Park Service Certification

I hereby certify that this property is:

entered in the National Register

determined eligible for the National Register

determined not eligible for the National Register

removed from the National Register

other (explain:)

Signature of the Keeper

Date of Action

**Navesink Military Reservation**

Name of Property

**Monmouth County, New Jersey**

County and State

**5. Classification****Ownership of Property**

(Check as many boxes as apply.)

<input type="checkbox"/>	Private
<input checked="" type="checkbox"/>	public – Local
<input type="checkbox"/>	public – State
<input type="checkbox"/>	public - Federal

**Category of Property**(Check only **one** box.)

<input type="checkbox"/>	building(s)
<input checked="" type="checkbox"/>	district
<input type="checkbox"/>	site
<input type="checkbox"/>	structure
<input type="checkbox"/>	object

**Number of Resources within Property**

(Do not include previously listed resources in the count.)

Contributing	Noncontributing
	buildings
1	sites
5	structures
	objects
6	<b>Total</b>

**Name of related multiple property listing**

(Enter "N/A" if property is not part of a multiple property listing)

N/A

**Number of contributing resources previously listed in the National Register**

None

**6. Function or Use****Historic Functions**

(Enter categories from instructions.)

DEFENSE/military facility

**Current Functions**

(Enter categories from instructions.)

RECREATION &amp; CULTURE/outdoor recreation

**7. Description****Architectural Classification**

(Enter categories from instructions.)

Mid-20<sup>th</sup> Century**Materials**

(Enter categories from instructions.)

foundation: Concrete

walls: Earth, concrete

roof: Earth, concrete

other: Steel

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**Narrative Description**

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(Describe the historic and current physical appearance of the property. Begin with a **summary paragraph**.)

**Summary Paragraph**

The Navesink Military Reservation contains 224 acres in the southeast corner of Hartshorne Woods Park, a 787-acre passive recreation area in Middletown Township in Monmouth County. The Reservation occupies the southeast corner of the Navesink Highlands with frontage on Grand Tour and Portland Roads on the north, the Shrewsbury River on the east, the Navesink River on the south, and private properties on the west. The land is mostly wooded with steep slopes and some open areas on the high elevations and at two former Hartshorne family house sites on the riverbanks. The Reservation contains five tactical military structures erected by the U.S. Army Corps of Engineers as part of the Harbor Defense of New York during World War II. The structures are of reinforced concrete covered with earth for concealment and protection from aerial bombardment. The 16-inch gun Battery Lewis on the central plateau is the largest coastal fortification built in New Jersey during the War. The 6-inch gun Battery 219 on Rocky Point is on the site of a former mid-19<sup>th</sup> Century Hartshorne family house. The Plotting-Switchboard Room for Battery Lewis is located in a ravine west of the Battery. Two dug-in Fire Control Stations in the woods northeast of Battery 219 served the batteries on the Reservation and others on Fort Hancock on Sandy Hook to the northeast. The Reservation contains a parking area at the entrance northeast of Battery Lewis and loop roads that date both to the military use and the Hartshorne Family use of the property.

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**Narrative Description**

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**INTRODUCTION**

Hartshorne Woods Park lies at the southeast end of the Navesink Highlands peninsula, which is bounded by Sandy Hook Bay on the north, the Shrewsbury River on the east, and the Navesink River on the south (See Locator Images L1-L2). The U.S. Army established the 224-acre Navesink Military Reservation in 1942 as an extension of Fort Hancock on Sandy Hook, about six miles to the north, as part of its Modernization Program for the Harbor Defenses of the Continental U.S. The military continued using the Reservation site during the Cold War until 1974, when the U.S. General Services Administration conveyed 161 undeveloped acres of the Reservation to Monmouth County for park use. The GSA conveyed the 63-acre core of the Reservation to the County for park use in 1984. The Reservation contains roads and five tactical military features from its period of significance during World War II.

**L1: Hartshorne Woods Park locator map, 2012, MCPS.**

**L2: Hartshorne Woods Park Master Plan Map with Navesink Military Reservation, 2012, MCPS.**

The Navesink Highlands are the northeastern end of a cuesta ridge (See L3) that extends to Salem County in southwest New Jersey and marks the transition from the State's Outer Coastal Plain to its Inner Coastal Plain. The ridge is a sedimentary formation consisting of seaward-sloping marine mudrock capped by harder ironstone. The underlying mudrock is made up of fine particles deposited during the Cretaceous period while the upper caprock is a sand and gravel conglomerate deposited during the Tertiary period.

**L3: Hartshorne Woods Park with Sandy Hook, view north, 2010, MCPS.**

With an elevation of 266 feet, Mount Mitchill on the north side of the Highlands is the highest elevation on the continental east coast between Maine and the Yucatan. The Highlands has long been a landmark for navigation to New York Harbor past Sandy Hook to the northeast. The Navesink Twin Lights, built by the U.S. Government in 1862 at a base elevation of around 200 feet, are located in Highlands, N.J., about 1,800 feet north of the Reservation.

The eastern boundary of the Reservation is along the Shrewsbury River and the southern boundary is along the Navesink River. The western boundary is a straight north-south property line bordering single-family residential properties to the west. The northern boundary is irregular, with the western portion along Grand Tour Road, the center along Portland Road, and the eastern portion abutting an apartment complex on the Shrewsbury River (See L4). Portland Road and the eastern portion of the northern boundary is also the municipal border between Middletown and Highlands.

**L4: Navesink Military Reservation, site map, 2014, MCPS.**

The Reservation has steep slopes around two high areas - a small hill in the northwest with an elevation around 250 feet, and a central plateau with an elevation around 215 feet on its west end (See L5). The plateau has an open ridge extending southeast to Rocky Point, and a shorter ridge extending southwest to the Navesink Overlook. Approximately 80

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percent of the Reservation is forested with remnant older chestnut-oak and mixed oak forest with tulip polar, especially on the slopes

SEE CONTINUATION SHEETS

**8. Statement of Significance****Applicable National Register Criteria**

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ B Property is associated with the lives of persons significant in our past.
- ☒ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ D Property has yielded, or is likely to yield, information important in prehistory or history.

**Areas of Significance** (Categories from instructions.)

Military

Engineering

**Period of Significance**

1942-1946

**Significant Dates****Significant Person** (Only if Criterion B is marked above.)**Cultural Affiliation**

N/A

**Architect/Builder****Criteria Considerations**

(Mark "x" in all the boxes that apply.)

Property is:

- ☐ A Owned by a religious institution or used for religious purposes.
- ☐ B removed from its original location.
- ☐ C a birthplace or grave.
- ☐ D a cemetery.
- ☐ E a reconstructed building, object, or structure.
- ☐ F a commemorative property.
- ☐ G less than 50 years old or achieving significance within the past 50 years.



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U.S. Army Corps of Engineers

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Unknown (builder)

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**Period of Significance (justification)**

World War II (1942-1948) – Design, construction, and use as primary fortification for the Harbor Defense of New York.

**Statement of Significance Summary Paragraph** (Provide a summary paragraph that includes level of significance and applicable criteria.)

The Navesink Military Reservation meets Criterion A because it was the primary fortification in the Harbor Defense of New York, the nation's largest and most important city. The War Department established the Reservation on the southeast corner of the Navesink Highlands because of the site's strategic elevation and position near the entrance to Sandy Hook Bay, which leads to New York Harbor. Its construction was a major event locally and in the New York metropolitan region. The Corps of Engineers built the 16-inch gun Battery Lewis as the Number 1 Primary Armament and Battery 219 as the Number 1 Secondary Armament for the Harbor Defense of New York. The Reservation meets Criterion C for the design and construction of its five tactical military structures that exemplify the culmination of more than 200 years of American coastal fortifications, which were rendered obsolete by the post-war development of bombers and missiles. While deteriorated and largely stripped of equipment, the integrity of the structure's massive design and construction remains intact. The Reservation property also retains the integrity of its military road system, which integrated previously existing roads with new access roads.

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**Narrative Statement of Significance** (Provide at least **one** paragraph for each area of significance.)

SEE CONTINUATION SHEETS

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**9. Major Bibliographical References**

**Bibliography** (Cite the books, articles, and other sources used in preparing this form.)

SEE CONTINUATION SHEETS

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**SEE CONTINUATION SHEETS****Previous documentation on file (NPS):**

☐ preliminary determination of individual listing (36 CFR 67 has been requested)  
☐ previously listed in the National Register  
☐ previously determined eligible by the National Register  
☐ designated a National Historic Landmark  
☐ recorded by Historic American Buildings Survey # \_\_\_\_\_  
☐ recorded by Historic American Engineering Record # NJ 46  
☐ recorded by Historic American Landscape Survey # \_\_\_\_\_

**Primary location of additional data:**

☐ State Historic Preservation Office  
☐ Other State agency  
☒ Federal agency National Archives & Records Administration  
☒ Local government Monmouth County Park System  
☐ University  
☒ Other  
Name of repository: Monmouth County Historical Association

☒ noted in Fort Hancock & Sandy Hook Proving Ground Historic District Nomination (1984) as "outside the boundaries"

Historic Resources Survey Number (if assigned):

**10. Geographical Data**

Acreage of Property 224.73

(Do not include previously listed resource acreage.)

**UTM References**

See L4: Navesink Military Reservation, scaled site map, 2014, MCPS.

1	Zone	Easting	Northing	3	Zone	Easting	Northing
2	Zone	Easting	Northing	4	Zone	Easting	Northing

**Verbal Boundary Description** (Describe the boundaries of the property.)

The boundary of is lined in red on Fig. L4: Navesink Military Reservation, scaled site map prepared by the Monmouth County Park System in 2014 from aerial photography and GIS data. The boundaries are described in public records consisting of: MCPS Parcel 417005, 161 acres, Deed Book 3879 Page 150, Recorded 4/17/1974, Current Block 782/Lot 17 & Block 783/Lot 9; and MCPS Parcel 417018 & 18A, 63.73 acres, Deed Book 4508 Page 376, Recorded 9/3/1984, Current Block 782/Lot 17 & Block 783/9 (See Fig. H86). On the northern boundary the west portion is along Grand Tour and Portland Roads, and the east portion is along private property. The east boundary is the Shrewsbury River, and the south boundary is the Navesink River. The west boundary is a straight north-south line along private property.

**Boundary Justification** (Explain why the boundaries were selected.)

1941 U.S. Army Corps of Engineers survey for acquisition of three parcels for the Navesink Military Reservation (See Fig. H45), and Monmouth County acquisitions of Parcel 417005 in 1974 and Parcel 417018 & 18A in 1984 (see Fig. H86).

**11. Form Prepared By**

name/title Clifford W. Zink  
organization \_\_\_\_\_ date August 14, 2014  
street & number 54 Aiken Avenue telephone 609.439.7700  
city or town Princeton state NJ zip code 08540  
e-mail cwzink@gmail.com  
additional research & development Gail Hunton, Monmouth County Park System

**Additional Documentation**

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Submit the following items with the completed form:

- **Maps:** A **USGS map** (7.5 or 15 minute series) indicating the property's location.  
See L4. Navesink Military Reservation, site map, 2014, MCPS.
- A **Sketch map** for historic districts and properties having large acreage or numerous resources.  
See NJ\_Monmouth County\_Navesink Military Reservation\_0000\_Photographs Sketch Maps 1-4, 2014, CW Zink

**Property Owner:**

(Complete this item at the request of the SHPO or FPO.)

name	Monmouth County Park System		
street & number	805 Newman Springs Road	telephone	732-842-4000
city or town	Lincroft	state	NJ zip code 07738

**Photographs:**

Submit clear and descriptive photographs. Each image must be 1600x1200 pixels at 300 ppi or larger.

**Images**

Name of Property:	Navesink Military Reservation
City or Vicinity:	Middletown
County:	Monmouth County
State:	NJ
Name of Photographer:	Clifford W. Zink & Monmouth County Park System
Date of Photographs:	2013-2014 primarily
Location of Original Digital Files:	54 Aiken Ave., Princeton, NJ 08540
Number of Photographs:	0001-0059

**Image Sources:**

Bolling Smith – Private Collection  
CDJ – Coast Defense Journal  
CECOM – U.S. Army Communications-Electronics Command  
COE – U.S. Army Corps of Engineers  
CW Zink – Clifford Zink  
GATE – National Park Service Archives, Gateway National Recreation Area.  
GOGA – National Park Service Archives, Golden Gate National Recreation Area.  
NARA – National Archives and Records Administration  
NJ – State of New Jersey  
MCHA – Monmouth County Historical Association.  
MCPS – Monmouth County Park System  
WD – War Department

**LOCATOR IMAGES**

L3: Hartshorne Woods Park locator map, 2012, MCPS.  
L4: Hartshorne Woods Park Master Plan Map with Navesink Military Reservation, 2012, MCPS  
L3: Hartshorne Woods Park with Sandy Hook, view north, 2010, MCPS.  
L4: Navesink Military Reservation, site map, 2014, MCPS.  
L5: Navesink Military Reservation, contour aerial, 2014, MCPS.

**PHOTOGRAPHS**

NJ\_Monmouth County\_Navesink Military Reservation\_0000 Photographs Sketch Map 1, 2014, CW Zink

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NJ\_Monmouth County\_Navesink Military Reservation\_0000 Photographs Sketch Map 2, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0000 Photographs Sketch Map 3, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0000 Photographs Sketch Map 4, 2014, CW Zink

NJ\_Monmouth County\_Navesink Military Reservation\_0001. Battery Lewis, view east, 2014, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_0002. Battery Lewis, view north, 2012, Bing  
NJ\_Monmouth County\_Navesink Military Reservation\_0003. Battery Lewis, view northeast, 2012, Bing  
NJ\_Monmouth County\_Navesink Military Reservation\_0004. Battery Lewis, Exterior, 2014, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_0005. Battery Lewis, Casemate 2 rear, view SE, 2014, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_0006. Battery Lewis, Casemate 2 front, view NW, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0007. Battery Lewis, Casemate 2, view north, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0008. Battery Lewis Gun Block No. 1, view north, 2014, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_0009. Battery Lewis Casemate 1 Rear Entrance, 2014, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_0010. Battery Lewis, Traverse Corridor, view south, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0011. Battery Lewis, Traverse Corridor, view SE, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0012. Battery Lewis, Powder Room Doors, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0013. Battery Lewis, Powder Room, view south, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0014. Battery Lewis, Shell Room view south, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0015. Battery Lewis, Air Lock Latrine Door, view W, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0016. Battery Lewis, Enlisted Men's Latrine, view N, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0017. Battery Lewis, Passageway, view west, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0018. Battery Lewis, Power Room, view south, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0019. Battery Lewis, Rear Corridor, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0020. Battery Lewis, Rear Corridor, view west, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0021. Battery Lewis, Muffler Room Doors, view S, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0022. Battery Lewis, rear entrance, view east, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0023. Battery 219, view north, 2012, Bing  
NJ\_Monmouth County\_Navesink Military Reservation\_0024. Battery 219, south end, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0025. Battery 219, Firing Platform 1, view north, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0026. Battery 219, south entrance, view north, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0027. Battery 219, South Corridor, view south, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0028. Battery 219, Passageway, view west, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0029. Battery 219, north Corridor, view north, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0030. Battery 219, north Powder Room, view SE, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0031. Battery 219, south Shell Rooms, view west, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0032. Battery 219, Center Corridor, view west, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0033. Battery 219, Plotting Room, view south, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0034. Battery 219, Switchboard Room, view east, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0035. Battery 219, rear Passageway, view east, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0036. Battery 219, Latrine view east, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0037. Battery 219, Power Room view east, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0038. Battery 219, Center Corridor, view west, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0039. Battery 219, west side, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0040. Fire Control Station 1, east side, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0041. Fire Control Station No. 1, view north, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0042. Fire Control Station 2, south side, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0043. Fire Control Station 2, view north, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0044. Plotting-Switchboard Room, view W, 2013 CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0045. Plotting-Switchboard Room, view East, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0046. Plotting-Switchboard Room entrance, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0047. Plotting-Switchboard Room, Corridor, view E, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0048. Plotting-Switchboard Room, Corridor, view S, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0049. Plotting-Switchboard Room, Heater-Power Room, view N, 2014, Zink

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NJ\_Monmouth County\_Navesink Military Reservation\_0050. Plotting-Switchboard Room, CVS-Vent Room, view N, 2014, Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0051. Plotting-Switchboard Room, Latrine, view N, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0052. Plotting-Switchboard Room, Plotting Room, view N, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0053. Plotting-Switchboard Room, Switchboard Room, view N, 2014, Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0054. Plotting-Switchboard Room, Escape Hatch, view S, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0055. Grand Tour Road with Hill 250 Road, view W, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0056. Hill 250, view north, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0057. Lower Rocky Point, view south, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0058. Black Fish Cove, view south, 2013, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_0059. Black Fish Cove, view south, 2013, CW Zink

**HISTORIC IMAGES**

NJ\_Monmouth County\_Navesink Military Reservation\_H1. Battery Murphy, Phantom View, CDJ, Feb 2001  
NJ\_Monmouth County\_Navesink Military Reservation\_H2. Battery Lewis, Sheet 1 of 63 Location Map & Index 1942, 1944, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H3. Battery Lewis, Sheet 2 of 63, General Plan 1942, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H4. Battery Lewis, Structural Steel Details, Sheet 35 of 63 1942, 1944, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H5. Battery Townsley Casemate No 1, Placing Truss 1938, GOGA 18017-116  
NJ\_Monmouth County\_Navesink Military Reservation\_H6. Battery Davis, Construction 1938, CDJ Feb 2001  
NJ\_Monmouth County\_Navesink Military Reservation\_H7. Battery Davis Casemate 2, Walls Ready for Truss, 1938, GOGA  
NJ\_Monmouth County\_Navesink Military Reservation\_H8. Battery Townsley Casemate 2, Roof Details, 1938, GOGA  
NJ\_Monmouth County\_Navesink Military Reservation\_H9. Battery Townsley Casemate No 1 Steel Beams & Truss, 1938, GOGA 18017-118  
NJ\_Monmouth County\_Navesink Military Reservation\_H10. Battery Lewis Ammunition Service No 1 Sheet 36, 1942, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H11. Battery Davis Casemate, 1938, Bolling Smith  
NJ\_Monmouth County\_Navesink Military Reservation\_H12. Battery Townsley, Gun Shield for Casemates, 1942, GOGA  
NJ\_Monmouth County\_Navesink Military Reservation\_H13. Battery Davis, Seacoast Fortifications, page 117  
NJ\_Monmouth County\_Navesink Military Reservation\_H14. Battery Townsley, Preparing 16-in Gun Breech, c1939, GOGA  
NJ\_Monmouth County\_Navesink Military Reservation\_H15. Battery 109, Fort Greene, Section, fortwiki  
NJ\_Monmouth County\_Navesink Military Reservation\_H16. Battery Davis, Construction of Gun Block, 1938, CDJ Feb 2001  
NJ\_Monmouth County\_Navesink Military Reservation\_H17. Battery 519, Fort Miles, Door Details No. 3, 1942, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H18. Battery Lewis, Power Plant, Report of Completed Works, 1944, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H19. Power Plant Equipment Layout, Diesel Electric Plants, Bulletin, 1945, WD  
NJ\_Monmouth County\_Navesink Military Reservation\_H20. 16-inch Gun Powre Plant SNL E-61 008, Bolling Smith  
NJ\_Monmouth County\_Navesink Military Reservation\_H21. Battery 219, site plan, Report of Completed Works, 1944, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H22. Battery 206, Layout, 1995, Butler, Annals of Nahant  
NJ\_Monmouth County\_Navesink Military Reservation\_H23. Battery 206, Phantom, 1995, Butler, Annals of Nahant  
NJ\_Monmouth County\_Navesink Military Reservation\_H24. Battery 223, Cape May Military Reservation, 2010, fortwiki  
NJ\_Monmouth County\_Navesink Military Reservation\_H25. Battery 219, General Plan & Sections, Sheet 1 of 1942, COE  
NJ\_Monmouth County\_Navesink Military Reservation\_H26. Power Plant M4 6-inch Gun, Diesel Electric Plants, Bulletin, 1945, WD  
NJ\_Monmouth County\_Navesink Military Reservation\_H27. Fire Control Stations, Single & Double Dug-in, Report of Completed Works, 1944, COE



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NJ\_Monmouth County\_Navesink Military Reservation\_H28. Plotting-Switchboard Room, site plan, Report of Completed Works, 1944, COE

NJ\_Monmouth County\_Navesink Military Reservation\_H29. Battery Ashburn, San Diego, PSR Plan, fortwiki

NJ\_Monmouth County\_Navesink Military Reservation\_H30. Plotting-Switchboard Room, Plan & Sections Sheet 2 of 29, 1944 COE

NJ\_Monmouth County\_Navesink Military Reservation\_H31. Hill 250, site plan, Report of Completed Works, 1944, COE

NJ\_Monmouth County\_Navesink Military Reservation\_H32. Black Fish Cove, former house, c1979, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H33. William Hartshorne Survey, 1720, MCHA

NJ\_Monmouth County\_Navesink Military Reservation\_H34. Richard Lawrence, Survey May 1761 for Robert and Esek Hartshorne, MCHA

NJ\_Monmouth County\_Navesink Military Reservation\_H35. Survey of Richard Hartshorne Property, 1815, MCHA

NJ\_Monmouth County\_Navesink Military Reservation\_H36. Rounding the Point, Minturn House, Highlands N.J., Buttersworth c1885 MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H37. Minturn House at Rocky Point, c1900, Dan Seitz

NJ\_Monmouth County\_Navesink Military Reservation\_H38. Rocky Point, View of Sea Bright, c1900, Dan Seitz

NJ\_Monmouth County\_Navesink Military Reservation\_H39. Neptune Club, burned 1910, nd, Dorns, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H40. House at Pear Tree Point, c1880, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H41. Map of Robert Hartshorne Estate, 1875, MCHA

NJ\_Monmouth County\_Navesink Military Reservation\_H42. Map of Property of Robert Hartshorne, c1910, MCHA

NJ\_Monmouth County\_Navesink Military Reservation\_H43. Robert Trask House, later Officers Quarters, 1979, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H44. Navesink Highlands Aerial, 1933, NJ

NJ\_Monmouth County\_Navesink Military Reservation\_H43. Robert Trask House, later Officers Quarters, 1979, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H44. Navesink Highlands Aerial, 1933, NJ

NJ\_Monmouth County\_Navesink Military Reservation\_H45. Navesink Site Highlands NJ Survey, 1941, COE

NJ\_Monmouth County\_Navesink Military Reservation\_H46. Navesink Highlands 12-inch Mortar Battery, 1918, 2014 notes, GATE

NJ\_Monmouth County\_Navesink Military Reservation\_H47. Battery Harris, Type A dispersed layout, CDJ Feb 2001

NJ\_Monmouth County\_Navesink Military Reservation\_H48. Type B layout for Narragansett Bay 1933, CDJ Feb 2001

NJ\_Monmouth County\_Navesink Military Reservation\_H49. Proposed Type C 16-inch gun battery, CDJ Feb 2001

NJ\_Monmouth County\_Navesink Military Reservation\_H50. Battery Davis, Fort Cronkhite, San Francisco, 1940, COE

NJ\_Monmouth County\_Navesink Military Reservation\_H51. Battery Townsley, Fort Cronkhite, San Francisco, 2013, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H52. Battery Hamilton, Fort Green, CDJ Feb 2001

NJ\_Monmouth County\_Navesink Military Reservation\_H53. Julia Hartshorne Trask on front lawn of Rocky Point House, c1890, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H54. HDNY Highlands, Boundary Fencing & Sentry Boxes, c1942, COE

NJ\_Monmouth County\_Navesink Military Reservation\_H55. Highlands, N.J., Battery Lewis 16-inch Guns Fields of Fire, 1943, HDNY Annex

NJ\_Monmouth County\_Navesink Military Reservation\_H56. Fields of Fire of All Major Caliber Guns, 1943, HDNY Annex

NJ\_Monmouth County\_Navesink Military Reservation\_H57. Highland, N.J., Const. 219 2-6" Guns Fields of Fire, 1943 HDNY Annex

NJ\_Monmouth County\_Navesink Military Reservation\_H58. Fields of Fire of All Medium Caliber Guns, 1943, HDNY Annex

NJ\_Monmouth County\_Navesink Military Reservation\_H59. Highlands, N.J., Hill 250 SCR Installation, Sheet 2 of 3, c1942, COE

NJ\_Monmouth County\_Navesink Military Reservation\_H60. Portland House with SCR-296 Tower, 1947-48, MCPS

NJ\_Monmouth County\_Navesink Military Reservation\_H61. Utilities Record Drawings 1-8, 1944, combined 2014, CW Zink

NJ\_Monmouth County\_Navesink Military Reservation\_H62. Eastern Cantonment Barracks T-804 for 42 men, view south, c1944, GATE

NJ\_Monmouth County\_Navesink Military Reservation\_H63. Access Road E, Sentry Box and Gates, view south, c1944, GATE

NJ\_Monmouth County\_Navesink Military Reservation\_H64. Access Road A, Retaining Wall, view east, c1944, GATE

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NJ\_Monmouth County\_Navesink Military Reservation\_H65. Colonel Isaac Newton Lewis, c1905, USMA Library  
NJ\_Monmouth County\_Navesink Military Reservation\_H66. Battery 219 Gun Emplacement 1, Fort Hancock Archives, c1944, GATE  
NJ\_Monmouth County\_Navesink Military Reservation\_H67. 6-inch Gun M1903A2 TM 9-428, 1943, WD  
NJ\_Monmouth County\_Navesink Military Reservation\_H68. Main Cable Routings Loc. 1 - Loc. 12, 1943, HDNY Annex  
NJ\_Monmouth County\_Navesink Military Reservation\_H69. Fire Control Installation Location 7, 1943, HDNY Annex  
NJ\_Monmouth County\_Navesink Military Reservation\_H70. Fort Story, Virginia, Plotting Room, 1942, LOC  
NJ\_Monmouth County\_Navesink Military Reservation\_H71. 16-inch Gun MK11 M1 on M4 Barbette Carriage, TM 9-471, 1943, WD  
NJ\_Monmouth County\_Navesink Military Reservation\_H72. Battery Lewis Battalion, Fort Hancock Archives, c1944, GATE  
NJ\_Monmouth County\_Navesink Military Reservation\_H73. General Philip Gage at Battery Lewis, Fort Hancock Archives, c1944, GATE  
NJ\_Monmouth County\_Navesink Military Reservation\_H74. General Map, 1945, NARA  
NJ\_Monmouth County\_Navesink Military Reservation\_H75. Twin Lights SCR-270 & SCR-271 Installations, c1950, CECOM  
NJ\_Monmouth County\_Navesink Military Reservation\_H76. 646th Aircraft Control and Warning Squadron, c1955, Corbett, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H77. Highlands Air Force Station Barracks c1955, Henry Oehlsen, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H78. Highlands Air Force Station, Family Housing Cover Sheet, 1955, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H79. Highlands Air Force Station, Aerial 778-177, 1954, Monmouth County  
NJ\_Monmouth County\_Navesink Military Reservation\_H80. Highlands Air Force Station, AN FPS-7 Radar Tower, c1958, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H81. Highlands Air Force Station, Operations Area, c1962, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H82. Highlands Air Force Station, c1962, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H83. Nike Sage Brush, Highlands Army Air Defense Site, 1966, MCHA  
NJ\_Monmouth County\_Navesink Military Reservation\_H84. Highlands Army Air Defense Site, M-02, 1967, Monmouth County  
NJ\_Monmouth County\_Navesink Military Reservation\_H85. Highlands Army Air Defense Site, 1979, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H86. Hartshorne Woods Park GSA Transfers 1974 & 1984, 2001, MCPS, 2014, CW Zink  
NJ\_Monmouth County\_Navesink Military Reservation\_H87. Highlands Army Air Defense Site, Aerial, 1985, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H88. Highlands Army Air Defense Site, Radar Tower, 1983, MCPS  
NJ\_Monmouth County\_Navesink Military Reservation\_H89. Battery Lewis vegetation removal, 1996, MCPS

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and ridges, and more recent growth on previously open areas and adjacent slopes. The narrow herbaceous tidal shoreline is predominantly coastal bluffs with slopes greater than 25 percent. (See Locator Image 5: Navesink Military Reservation, contour aerial, 2014, MCPS.)

Most of the 787-acres in Hartshorne Woods Park including the Reservation land was previously owned by members of the Hartshorne family, whose ancestor Richard Hartshorne (1) settled on the Navesink River in the 1680s. Hartshorne acquired about 2,300 acres in Middletown and the Hartshorne lands now in the park remained largely undeveloped except for a few house sites. Within the 224 acres that the Army acquired for the Reservation in 1942, there were four Hartshorne house sites and a boating club site. The chronology of Hartshorne ownership is detailed in Section 8.

The Army established the Reservation as part of its Modernization Program for Harbor Defenses in the Continental U.S., which Congress approved in September 1940 following the fall of France to the Nazis.<sup>1</sup> The Program specified 16-inch gun emplacements as Primary Armament and 6-inch gun emplacements as Secondary Armament for 20 harbors, including New York. Fort Hancock's 16-inch and 6-inch guns were to be located in the "vicinity of Sandy Hook" to increase the protection of New York Harbor in conjunction with Fort Tilden on the Rockaway Peninsula in Queens, about 12 miles to the northeast.<sup>2</sup>

During WWI the Army had installed a 12-inch mortar battery on the Highlands south of Twin Lights, and in March 1941 the Site Board for the Harbor Defenses of New York recommended the "Highlands of Navesink" as a "natural fortress" for Fort Hancock's new armament. The elevation of the Highlands would enable the use of a Depression Position Finder for vertical triangulation of targets and Case II firing over the water. The location would enable the guns to cover the entrance to New York Harbor and the New Jersey landing beaches and water area up to the Shark River Inlet, about 15 miles to the south. The elevated site would also be easier to defend against an enemy land assault than a site located on the shore.

The U.S. Government acquired three parcels of land from three Hartshorne family owners to establish the Reservation in 1942. The Corps of Engineers completed Battery Lewis, Battery 219, and related facilities on the Reservation in 1943. The Army deactivated the batteries in 1948, and the Air Force converted the Reservation starting in 1950 to a radar facility known as the Highlands Air Force Station. In 1958 the Army resumed control of the Reservation and established the Highlands Army Air Defense Site (HAADS) there as a missile control facility to defend New York from aerial attack. The Army deactivated HAADS in 1974.

After the County acquired the final Reservation parcel in 1984, four tactical military features from WWII were retained at the request of the Monmouth County Park System (MCPS). The Corps of Engineers demolished all other military buildings and structures on the Reservation to a depth of three feet. Some military remnants remain, including asphalt paving, drainage ditches, retaining walls, junction boxes, telephone poles, and fencing.

In addition to the four extant military features, the Reservation contains one site associated with its

<sup>1</sup> Historical sources are footnoted in Section 8.

<sup>2</sup> Names from U.S. Army documents such as Primary Armament are capitalized herein.

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tactical military use, and two sites that formerly contained Hartshorne houses used by the military:

1. BATTERY LEWIS
2. BATTERY 219
3. FIRE CONTROL STATIONS
4. BATTERY LEWIS PLOTTING-SWITCHBOARD ROOM
5. HILL 250
6. LOWER ROCKY POINT
7. BLACK FISH COVE

Access roads lead to all the sites except the Fire Control Stations, which are accessed by a footpath. About 40 percent of the access roads date to the Hartshorne era and the Army installed the remainder around 1942. The MCPS repaved the access roads in the 1990s, and some of the roads retain concrete drainage ditches dating to WWII.

The primary entrance to the Reservation is in the center of its northern boundary at the intersection of Portland Road and Grand Tour Road (See Locator Image 4). The entrance leads to the Reservation's central plateau, which contains Battery Lewis at the west end and Battery 219 at the east end. The Army partially reshaped the topography of this area for the construction of the batteries and adjacent cantonment facilities that began in 1942, but the extent of the reshaping is unknown. Southwest of the entrance there is a Y-shaped paved parking lot installed by the MCPS in the 1990s in the vicinity of a former septic field for Battery Lewis.

The MCPS Battery Loop Road extends south and southeast from the entrance and includes portions of a pre-WWII residential lane in the northeast and southeast. The south and west portions of the Battery Loop Road were built by the Army in 1942. The Battery Loop Road provides access to two short roads that predate WWII: one to Lower Rocky Point on the southeast corner of the Reservation at the confluence of the Navesink and Shrewsbury Rivers, and a second to Black Fish Cove on the Navesink River.

The central plateau gently slopes from an elevation of approximately 215 feet at the base of Battery Lewis on the west to an elevation of approximately 120 feet at the base of Battery 219 on the east. The west access road (built by the Army in 1942 and designated Access Road "A") runs entrance past the west side of Battery Lewis and continues around the former west cantonment site, which is largely overgrown except for some paving fragments. Between the batteries the central plateau formerly contained eastern cantonment buildings and now contains trees and shrubs along the sides and grassy fields with a footpath in the middle (See Photograph 0001). A repaved loop road from the eastern cantonment connects the front entrances of the Battery Lewis Casemates and continues around the south end of the Battery to the west access road.

(0001. Navesink Military Reservation central plateau, view east from the top of Battery Lewis across the former east cantonment area to Battery 219, 2014, MCPS.)

(Note: Proper names below from military documents begin with capitals.)

1. BATTERY LEWIS

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Also known as Battery Construction Number (BCN) 116, Battery Lewis is a massive concrete, steel and earth-camouflaged gun fortification measuring approximately 614-feet long, 158-feet wide, and 35-feet high (See Photographs 0002-0005). The sloped earth that forms the sides and top of the Battery gives the appearance of a long mound bulging in the center and at the ends. Small shrubs, grasses, and other low plants cover the mound, along with a few trees on the southwest side. A pathway extends from the northeast side of the Battery across the top with a loop to the north end, and the tops of ventilation shafts are visible along the pathway. The elevations of Battery Lewis are approximately 215 feet at the base and 240 feet at the top.

(0002. Battery Lewis, view north, Bing, 2012.)

(0003. Battery Lewis, view northeast, Bing, 2012.)

(0004. Battery Lewis, east side, Casemate No. 1, left, Casemate No. 2, right, 2014, MCPS.)

(0005. Battery Lewis, Casemate No. 2 rear entrance, view northwest, 2014, MCPS.)

Like the twenty other 16-inch gun batteries built between 1942-1945 (see Section 8, Table 1), Battery Lewis is a Type E 16-inch gun fortification consisting of two Casemates, for MK11 M1 Navy guns, connected by a Central Traverse Magazine with rooms for shells, powder charges, latrines, and a power plant. The Corps of Engineers developed the Type E design, based on the construction of Battery Townsley and Battery Davis in San Francisco in the late 1930s, to withstand bombardment of up to 2,000 lb. shells. A phantom view of Battery Murphy, Nahant, Massachusetts, built at the same time as Battery Lewis, as part of the Harbor Defense of Boston, shows the earth and concrete construction of the Type E Casemates and Central Traverse Magazine (See Historic Image H1).<sup>3</sup> (H1. Battery Murphy, Nahant, Mass., Phantom View by Gerald Butler, *Military Annals of Nahant*, 1996.)

The Corps of Engineers sited Battery Lewis facing the Atlantic Ocean on a slight northeast to southwest axis with an azimuth of 293 degrees so its 145-degree Maximum Field of Fire would complement that of Battery Harris on Fort Tilden. The plan of Battery Lewis is largely symmetrical, with Casemate No. 1 on the south end 500 feet on center from Casemate No. 2 on the north (See Historic Image 2). The connecting 484-foot long Front Corridor has Powder, Shell and service rooms in the center of the west side. To the west of these rooms is the Battery's asymmetrical power plant. The Casemates have wide openings on the front or east side, and narrower openings on the rear or west side. An opening near the center of the Battery's west side provides access to the power plant.

(H2. Battery Lewis, Central Traverse Magazine, Location Map & Index, Sheet 1 of 63, 1942, 1944, COE.)

The 6-feet thick concrete fronts of the Casemates are approximately 134-feet long by 19-feet high, with the upper corners of the wing walls angled at 45 degrees (See Historic Image 3). MCPS recently restored the Battery's exterior concrete and protected it with an elastomeric coating to minimize water penetration (See Photograph 0006). The 13-feet high by 44-feet wide openings have jambs angled inward at the top. The chamfered lintels are supported by pairs of steel trusses embedded 2-feet on center in the concrete. The trusses are 9-feet 2-inches tall and 67-feet long, and are made up of 14-inch wide I-beams (See Historic Image 4). A photograph of the construction of Battery Townsley shows the massiveness of the truss construction with wide gusset plates (See Historic Image 5). The tops of the Casemate front walls have steel rings spaced approximately 6-feet on center for hanging

<sup>3</sup> Gerald Butler, *Military Annals of Nahant*, Nahant, Massachusetts: Nahant Historical Society, 1996.

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camouflage nets.

(H3. Battery Lewis, General Plan, Sheet 2 of 63, 1942, 1944, COE.)

(0006. Battery Lewis Casemate No. 2, view north, 2014, CW Zink.)

(H4. Battery Lewis, Structural Steel Details, Sheet 35 of 63, 1942, COE, GATE)

(H5. Battery Townsley, Casemate No 1, Placing Truss, 1938, GOGA, 18017-116.)

The Casemate openings are protected by semi-circular Canopies that project about 15 feet from the front walls. The bottoms of the Canopies are 18 feet above the floor of the Casemates, and have 6-foot high vertical edges. The tops of the Canopies are low-angled semi-cones that terminate at the top of the walls. Impressions of the formboards typically used in constructing Casemates, as shown in a photograph of Battery Davis (See Historic Image 6), are visible in the Battery Lewis concrete.

(H6. Battery Davis Casemate 2, Placing Concrete – Roof & Finishing Canopy, 1938, GOGA.)

The Casemate interior (See Photograph 0007) measures approximately 52-feet wide by 32-feet deep by 14-feet high. The 8-feet thick sidewalls are “haunched” or angled inwards at mid-height, as shown in a construction photograph of Battery Davis (See H7). The haunched walls support a 16.5 feet high roof with 16 3-feet high by 1-foot 2-inch wide steel I-beams at the base. The 60-feet long I-Beams weigh 8.4 tons each, and are set 2-feet on center with their bottom flanges visible and the spaces between them filled with concrete. A section drawing of Battery Townsley in San Francisco shows the ceiling I-Beams, the lintel trusses over the opening, and the extensive reinforcing rods in the ceiling and the canopy (See Historic Image 8). A Battery Townsley construction photograph illustrates the massiveness of the ceiling support with the long and closely-spaced I-Beams (See Historic Image 9). There is approximately 3.5 feet of earth above the Battery Lewis concrete roof.

(0007. Battery Lewis Casemate No. 2, 2013, CW Zink.)

(H7. Battery Davis Casemate 2, Walls Ready for Truss, 1938, GOGA)

(H8. Battery Townsley Casemate 2, Roof Details, 1938, GOGA.)

(H9. Battery Townsley No. 1 Casemate, Steel Beams & Truss in Place, 1938, GOGA.)

The rear walls of the Casemate interior are 4-feet thick. The side and rear walls of the Casemate interiors have 2-inch thick Maneuvering Rings for positioning the armament. The Rings are set in recesses in the concrete with angled sides, and extend 2.5 feet into the wall. Steel sections of the former Ammunition Service remain welded in place on the bottoms of some of the ceiling I-beams (See Photograph 0007). Soldiers used the Ammunition Service to convey projectiles from the Shell Rooms in the Central Traverse Magazine to the Casemates (See Historic Image 10). A photograph of Battery Davis shows Ammunition Service tracks leading from the Magazine to the Casemate (See Historic Image 11). A plan of a Firing Platform at Battery Townsley shows the Ammunition Service layout to supply projectiles across the rear arc of the 16-inch gun's Field of Fire (See Historic Image 12). A section through the Casemate of Battery Davis shows projectiles on the Ammunition Service being delivered to the 16-inch gun (See Historic Image 13), and a photograph of Battery Townsley shows soldiers loading a projectile into a 16-inch gun with the Ammunition Service overhead (See Historic Image 14).

(H10. Battery Lewis, Ammunition Service No 1, Sheet 36, 1942, COE.)

(H11. Battery Davis, Fort Funston, California, No. 319-A., Installing Ammunition Service Conveyor System, 1938, Bolling Smith.)

(H12. Battery Townsley, Gun Shield for Casemates, 1942, GOGA.)

(H13. Battery Davis, Seacoast Fortifications, page 117.)



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(H14. Battery Townsley, Preparing 16-in Gun Breech, c1939, GOGA.)

The Battery Lewis Casemates' former 38-foot diameter steel Firing Platforms were set slightly off center from the opening lintel, as seen in a section through a similar Casemate at Battery 109 in Fort Greene in Narragansett (See Historic Image 15). The Firing Platforms, set on top of 42-foot diameter by 17-foot deep Gun Blocks, originally held the Barbette Carriages for the 68-foot long, 154-ton, 16-inch guns, as seen in a construction photograph of Gun Block No. 1 at Battery Davis (See Historic Image 16). The Battery Lewis Firing Blocks were filled in with gravel and earth by the Corps of Engineers after the guns were removed, but MCPS partially excavated one in 2014 (See Photograph 0008). In the front of the Gun Blocks and Casemates, Burster Courses of 6-foot thick concrete with angled outside corners extend approximately 120-feet across and 38-feet outward (See Historic Image 3), but these are mostly covered today.

(H15. Battery 109, Fort Greene, Narragansett, R.I., Casemate cross-section showing the 16-inch gun in place, 1944, COE.)

(H16. Battery Davis, Placing Concrete – Under-Step Ring at Gun Block No. 1, 1938, GOGA.)  
(0008. Battery Lewis Gun Block No. 1, 2014, MCPS.)

From the rear of the Casemates, corridors measuring 16-feet wide by approximately 36-feet long and 13-feet high lead to rear entrances with original wrought-iron picket Gates (See Photograph 0009). Angled wing walls 3-feet thick and 20-feet apart extend 49 feet from the Gates. Above the entrances the inscription "BATTERY LEWIS 1942" is incised in the concrete. The outer walls of the Casemate corridors have 6-feet wide by 7-feet high door openings to Utility Rooms measuring approximately 15-feet wide by 20-feet deep. Beyond the Utility Rooms there are concrete Protective Roofs 12-feet thick on the tops and 6-feet thick on the angled sides, all set on top of Compacted Fill (See Historic Image 3). The inner walls of the Casemate corridors have openings to the Magazine's 15-feet wide by 10.5-feet high Front Corridor.

(0009. Battery Lewis, Casemate No. 1 Rear Entrance, 2014, MCPS.)

The Front Corridor (See Photograph 0010) has a concrete floor sloping upwards to the center of the Battery to an elevation of 217 feet, two feet above the level of the Casemate floors. On the Front Corridor ceiling there are numerous steel sections of the Ammunition Service (See Historic Image 10) leading from the Shell Rooms to the Casemates. The Front Corridor front or east walls are 8-feet thick and the rear or west walls are 3-feet thick. The ceiling of the Front Corridor and adjacent rooms consists of a 4.5-feet high Structural Roof topped by an 8-feet high Protective Roof, for a total of 12.5-feet of concrete protection (See Photograph 0003). There is approximately 8 feet of earth above the concrete. Protective Roofs of concrete on Compacted Fill, similar to those on the ends of the Battery, extend across the eastern side of the Front Corridor and between the Casemates and Magazine rooms on the western side.

(0010. Battery Lewis, Front Corridor, 2014, CW Zink.)

Along the east or front wall of the Front Corridor there is an approximately 2-feet 4-inch high by 10-inch deep Cable Chase approximately 2 feet above the floor. The Chase has Pressteel Cable Racks 4-feet on center that supported electrical cables from the Power Plant to the Casemates. The Chase terminates 10 feet from the ends of the Front Corridor in recesses that extend down to Power Manholes that project slightly from the wall. In the center of the Front Corridor the Cable Chase has a recess to an east-west Corridor Trench that extends to the Power Plant. Between the ends of the Cable Chase and

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the ends of the Front Corridor are Signal Corps Recesses that contained wiring for the Battery's communications. The Cable Chase and Signal Core Recesses originally had 3/16-inch steel cover plates, as indicated in a detail drawing of Battery 519 at Fort Miles in Delaware.

The west or rear wall of the Front Corridor is nearly symmetrical with 13 door openings to eight rooms - four on each side of a 4-feet wide Passageway leading to the Power Plant (See Photograph 0011). The first two rooms on either side of the Passageway are Powder Rooms with three 6-feet wide by 7-feet high openings with double steel doors (See Photograph 0012). Door Details from Battery 519 at Fort Miles show the design of similar doors made of 1/8-inch steel plates mounted on steel channel frames with diagonal braces (See Historic Image 17). The doors are hung with 3-inch by 11-inch steel strap hinges on 3-inch wall gudgeons. Each door has two 14-inch diameter circular Louvers near the upper and lower outside corners. The Powder Rooms are 50-feet long by 25-feet wide with 4-feet thick side and rear walls, and small ventilation openings in the rear walls (See Photograph 0013).

(0011. Battery Lewis, Traverse Corridor with north Shell Room, view southwest, 2014, CW Zink.)

(0012. Battery Lewis, north Powder Room, steel doors, 2013, CW Zink.)

(H17. Battery 519, Fort Miles, Delaware, Door Details No. 3, 1942, COE.)

(0011. Battery Lewis, North Powder Room, view south, 2013, CW Zink.)

On the north and south sides of the Powder Rooms are Shell Rooms, each with two 6-feet wide openings that are full height (See Photograph 0011) to accommodate the Ammunition Service track. Door Details from Battery 519 at Fort Miles show the design of similar doors with the track I-beam opening at the top. The Shell Rooms are 30-feet long by 18-feet wide with 4-feet thick side and rear sidewalls, and some Ammunition Service brackets remain in place on the ceilings (See Photograph 0014).

(0014. Battery Lewis, North Shell Room, view south, 2013, CW Zink).

On the north side of the north Shell Room, an Air Lock doorway to the Latrines has a steel frame with rubber stripping, and a steel plate and channel door with extra bolts, a bronze Door Fastener, a bronze Door Closer, Door Retarders, and bronze strap hinges (See Photograph 0015). Door Details from Battery 519 at Fort Miles show a similar Air Lock door. On either side of the Battery Lewis Air Lock door are Air Lock window openings to the Latrines with steel frames, grills, and plate and angle-frame doors hung on pintles, and angled jambs on the interior. The Air Lock Door opens to an Air Lock Room with a plate and angle-frame door to a vestibule leading to the Officers' Latrine on the south and the Enlisted Men's Latrine on the north. A 1944 Supplement to the Harbor Defenses of New York listed the Latrine as gasproof "against chemical attack" with a capacity of 2,200 cubic feet and room for up to 20 men.<sup>4</sup>

(0015. Battery Lewis, Air Lock Latrine Door, view west, 2013, CW Zink).

The Enlisted Men's Latrine on the north side of the hall has three porcelain urinals with foot pedals on the south end of the west wall, six enameled cast iron toilets in the north portion of the room (See Photograph 0016), and three enameled cast iron sinks with foot pedals on the south end of the east wall. The toilets are "Vogel Flush" frost-proof toilets manufactured by the "J.A. Vogel Co., Wilmington, Del." The wooden seats are missing but the seat brackets, flushing devices, and galvanized pillbox tanks remain. Instead of interior traps, the frost-proof toilets have spring-loaded seats that fill the water

<sup>4</sup> Supplement to Harbor Defense Project, Harbor Defenses of New York, Annex F, Gas Defenses, 2.

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tank above when the user sits down, and release the water to flush the toilets when the user gets up. The foot-pedal operated sinks and urinals are also frost-proof without traps. The piping is below the floors in a Plumbing Basement crawl space. The mounting devices for former wooden stalls remain in place around the toilets. In the northwest corner of the ceiling there is a 1-foot diameter Ventilator Shaft to the top of the Battery, with a steel-operating wheel below the ceiling. The Officers' Latrine has similar fixtures and apparatus, but with one sink and urinal on the north end of the west wall, two toilets with tanks and stall brackets on the west end of the south wall, and a Ventilator Shaft in the southwest corner of the ceiling. The fixtures and apparatus in the Latrines appear to date to the construction of the Battery.

(0016. Battery Lewis, Enlisted Men's Latrine, toilets, view north, 2013, CW Zink.)

In the Front Corridor on the south side of the south Shell Room there are two 3-feet wide by 7-feet high doorways leading to two 15-feet wide by 10-feet deep Store Rooms. The doorways have steel plate and angle frame doors with circular louvers. In contrast to the diagonal frame bracing of the larger Shell Room and Powder Room doors, the smaller Store Room doors have X-shaped bracing. In the center of the Front Corridor's west wall, a 4.5-feet wide east-west Passageway (See Photograph 0017) leads between the Powder Rooms to the Power Plant. A steel grill hangs on pintles on the south side of the Passageway entrance. The Passageway walls are 4-feet thick. The floor of the Passageway consists partly of removable concrete slabs on top of the Corridor Trench. Some missing slabs have been replaced by 2-inch by 10-inch planks.

(0017. Battery Lewis, Passageway, view west, 2013, CW Zink.)

Steps at the west end of the Passageway lead to the Power Plant, which contains a Power Room (See Photograph 0018 & Historic Image 18) and smaller rooms for the former equipment that powered the Battery for "battle conditions." The Battery was also wired for 100 kW of "Commercial" power for "non-battle conditions." The Army's Training Bulletin for Diesel Electric Plants specified the typical layout for double backup power for Type E casemated batteries with three 6-cylinder, 450-horsepower, 375-kW diesel generators (See Historic Image 19). Each generator could power more than 100 of today's homes at the current average residential use of about 3 kW per hour. A photograph of a completed Power Room shows the diesel generators on the right, the Switchboard and Passageway on the left, and the crane rail and traveling crane along the walls for installing and servicing the diesel generators and related equipment (See Historic Image 20). The approximately 25-feet long by 60-feet wide by 12-feet high Power Room at Battery Lewis retains the crane rails supported by concrete corbels along the walls, and concrete bases and recesses on the floor for the former generators and switchboard. The south wall has supports for the former Air Compressors and tanks for the 16-inch guns breach-purging systems.

(0018. Battery Lewis, Power Room, view south, 2013, CW Zink.)

(H18. Battery Lewis, Power Plant, Report of Completed Works, 1944, COE.)

(H19. Equipment layout, power plant for M1 16 inch gun emplacement, "Diesel Electric Plants for 6, 12, and 16 inch Gun Emplacements," *Coast Artillery Training Bulletin*, 1945.)

(H20. 16-inch Gun Power Plant, Engine and switchboard room, SNL E-61, M1, Bolling Smith.)

In the southeast corner of the Power Room, a doorway on the south wall leads to a 10-feet by 10-feet Work Room with a doorway on its east wall to a 10-feet by 13-feet south Air Conditioning Room. Through an opening on the east wall, a 3-ton air conditioning unit in this Room provided chilled air to regulate the temperature and humidity in the adjacent south Powder Room. The west wall of the Power

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Room has a doorway to a 10-feet by 10-feet Auxiliary Generator Room, an approximately 4-feet square opening to the adjacent Muffler Gallery, and three small openings for the former muffler pipes.

An approximately 12-feet wide opening on the north wall of the Power Room leads to the Magazine's Entrance Corridor, which is 13-feet wide by approximately 45-feet long (See Photograph 0019 & Historic Image 18). On the south end of the east wall, an approximately 3-feet wide doorway with a steel frame leads to a 5-feet wide by 7.5-feet long Latrine, which has some remnant piping. On the north end, an approximately 4-feet wide doorway with an X-braced, steel plate and angle-frame door hung on pintles leads to the 12-feet wide by 7.5-feet deep north Air Conditioning Room. Through an opening on the east wall a 3-ton air conditioning unit in this Room supplied chilled air to the north Powder Room. Next to the opening a red and yellow sign painted on the concrete reads "WARNING, OPEN THIS SLIDE BEFORE GUNS ARE FIRED". Across from the Power Room a recessed section of the north wall of the Entrance Corridor has a 4-feet wide doorway and an approximately 5-feet square opening to a 15-feet by 25-feet Water Cooler Room (See Historic Image 18), which contained three fan-driven Evaporative Coolers with 40-gallons per minute pumps for cooling the three diesel generators in the Power Room.

(0019. Battery Lewis, Entrance Corridor, view east, 2013, CW Zink).

On the west end of the Entrance Corridor's south wall, a double doorway with steel plate doors similar to those on the Shell Rooms (See Photographs 0020-0021) leads to the Muffler Gallery. Pintles on the inside of the doorway indicate the former presence of a second set of double doors. The Muffler Gallery (See Historic Image 18) is L-shaped with a 32-feet by 10-feet north-south section with an opening to the Power Room, and an approximately 20-feet by 8-feet east-west section with a steel grill on the top half of the west wall. The north-south section formerly contained three mufflers for the diesel generators, and the east-west section contained pipes venting the mufflers through the grill to the exterior.

(0020. Battery Lewis, Entrance Corridor, view west, 2013, CW Zink.)

(0021. Battery Lewis, Muffler Gallery Doors, view south, 2013, CW Zink.)

The Magazine's rear or west entrance has 17-feet long by 2-feet thick angled wing walls spaced approximately 30-feet apart (See Photograph 0022). The entrance has a 13-feet wide opening that has chain link fencing but originally had a removable steel partition with a "wire work swing door." A smaller opening to the north had an Air Exhaust Grill for the Water Cooler Room, and a similar opening to the south had a Muffler Room Air Grill.

(0022. Battery Lewis, Traverse Magazine, west entrance, 2013, CW Zink.)

The concrete throughout the Battery was carefully constructed with level and plumb openings and corners, and with chamfers on outside corners. The majority of the concrete is in remarkably good condition considering the Battery's age. The majority of the steel doors, gates and grills on the interior are heavily rusted. Remnant sections of the Ammunition Service are randomly extant on the ceilings of the Casemates, Front Corridor, and the Shell Rooms (See Photographs 0007, 0011, 0014). Remnants of electrical wiring, boxes, and fixtures, some of which are labeled "Crouse-Hinds," are extant in several areas.

## 2. BATTERY 219

The northern portion of the Battery Loop Road leads southwest from main Reservation entrance to Battery 219 (See Locator Image 4-Locator Image 5). This paved road dates to the Hartshorne era and

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was labeled Access Road "F" by the Army. From an intersection northwest of Battery 219, the Army's Access Road "B" extends past the rear or west side of Battery 219 to the intersection of Access Road "C", which leads to the Black Fish Cove Area, and Access Road "A," which loops around the rear of Battery Lewis. From the intersection north of Battery 219, an Army road loops around the front of Battery 219 and connects to Access Road "B."

The COE sited Battery 219 on Rocky Point at the east end of the Reservation's northwest-southeast ridge on a slight northeast-southwest axis with an azimuth of 284 degrees (See Photograph 0023). Rocky Point previously contained a Hartshorne family house and several outbuildings that the Army demolished to build Battery 219 and adjacent eastern cantonment buildings. The precise location of the house and the extent of regrading for Battery 219 are both unknown. (0023. Battery 219, view north, Bing 2012.)

Battery 219 is a concrete, steel and earth-camouflaged gun fortification measuring approximately 170-feet long, 125-feet wide, and 20-feet high (See Historic Image 21 & Photograph 0024). In contrast to Battery Lewis' casemated gun emplacements, Battery 219 had unprotected gun emplacements with 22.5-foot diameter Firing Platforms that extend 20-feet north and south from the eastern corners of the mound (See Photograph 0025). There are entrances on the north and south sides of the mound adjacent to the Firing Platforms, and an entrance and two ventilation openings on the rear or west side. The mound is partially covered by small shrubs, grasses, and other low plants. A wide pathway extends from the northwest corner of the Battery across the top to the southwest corner, and the top of a Ventilator Shaft is visible along the pathway. The elevations of Battery 219 are 150 feet at the base, which is about 70 feet below the base of Battery Lewis, and approximately 170 feet at the top. (0024. Battery 219, south end, view northeast, 2014, CW Zink.)

(H21. Battery 219, Site Plan, Report of Completed Works, 1944, COE.)

(0025. Battery 219, Firing Platform No. 1, view north, 2014, CW Zink.)

The 1940 Modernization Program for Harbor Defenses projected the construction of about 50 6-inch gun emplacements in the continental U.S. Most of them including Battery 219 served as Secondary Armament emplacements in conjunction with Primary Armament 16-inch gun emplacements. Battery 224, built in Fort Story, Virginia, from 1940 to 1941, served as a prototype 6-inch gun battery, and design improvements resulted in a "Standard Plan" in 1941 for "200 Series" 6-inch gun batteries. A plan and a phantom view of Battery 206, built in 1942-1943 in Nahant, Mass., for the Harbor Defenses of Boston, illustrate the layout of the Standard Plan and the uses of the various rooms and spaces (See Historic Image 22-Historic Image 23).

(H22. Battery 206, Nahant, Mass., Plan and room uses, 1995, Gerald Butler, *Military Annals of Nahant*.)

(H23. Battery 206, Nahant, Mass., Phantom view, 1995. Gerald Butler, *Military Annals of Nahant*.)

In both the prototype and Standard Plan, the unprotected gun emplacements are 210 feet apart on center and placed diagonally off the front corners of the Central Traverse Magazine. The typical 6-inch, 25-feet long M1903A2 guns were set on M1 Barbette Carriages. The plan of the 200-Series Central Traverse Magazine is T-shaped, with a long, symmetrical front section containing a Front Corridor with the angles entrances near each Firing Platform and ammunition and firing support rooms along the west side. The narrower, asymmetrical rear section contains the Battery's Power Plant, Fire Control

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rooms, and rear entrance. Battery 223, built on the Cape May Military Reservation from September 1942 to June 1943 for the Harbor Defenses of Delaware, is a typical 200-Series Battery with some slight variations. The erosion of Battery 223's site and earth covering within a few decades of its construction has revealed the exterior concrete appearance of a typical 200-Series Battery (See Historic Image 24). Battery 223 was entered onto the New Jersey and National Registers in 2008. (H24. Battery 223, Cape May Military Reservation, [www.fortwiki.com/Battery\\_223](http://www.fortwiki.com/Battery_223), 2010.)

Battery 219 was begun in July 1942 and completed in April 1943 following the Standard 200-Series design (See Historic Image 25). The former 22.5-foot diameter steel Firing Platforms for the M1 Barbette Carriages and 6-inch Guns were supported by 21-foot diameter by 10-foot deep concrete Gun Blocks with steel supports and Base Recesses approximately 7-feet wide by 6-feet deep. The Gun Blocks have been filled in but most of their 1-foot wide concrete Base Rings and 12-foot wide concrete aprons remain visible (See Photograph 0025).

(H25. Battery 219, Central Traverse Magazine, Report of Completed Works, 1944, COE.)

The approximately 12-foot wide north and south Magazine entrances adjacent to the gun emplacements have double-door openings recessed within angled wing walls (See Photograph 0026). The original steel entrance doors have been replaced with steel security grills. On the outsides of the wing walls are Alert Storage Recesses (aka Ammunition Recesses) for storing shells and powder charges for battle.

(0026. Battery 219, South Entrance, view north, 2014, CW Zink.)

From the entrance doorways the 7-foot wide Front Corridor angles 45 degrees immediately inside the entrance doors for around 15 feet and then angles 45 degrees again to an approximately 110-foot straight run (See Photograph 0027). The angles were designed to diminish the effects of a blast at the entrances passing directly through the Front Corridor. The east walls of the Front Corridor are 6-feet thick. An east-west Passageway at the center of the Front Corridor extends to the Battery's rear, western section (See Photograph 0028). On each side of the Passageway, the Front Corridor has two openings with sliding metal-clad wood doors (See Photograph 0029) leading to 34-foot wide by 22-foot deep Powder Rooms (See Photograph 0030), and three door openings leading to three Shell Rooms - a central 21-foot by 9-foot T-shaped Room in between two 7-foot by 9-foot Shell Rooms (See Photograph 0031). The six Shell Rooms had racks for storing up to 600 rounds of AP and 400 rounds of HE Projectiles. Two doorways at the ends of the straight portion of the Front Corridor lead to 12-foot wide by 10-foot deep Air Compressor Rooms that have angled front corners following the Front Corridor angle. Former Compressors and Reservoir Tanks in these rooms provided air for purging powder gases from the 6-inch guns after firing. Doorways at the ends of the angled portions of the Front Corridor lead to 7-foot wide by 9-foot deep Store Rooms with angled front walls.

(0027. Battery 219, south Traverse Corridor, view south, 2014, CW Zink.)

(0028. Battery 219, Traverse Corridor, west Passageway, view west, 2014, CW Zink.)

(0029. Battery 219, Store Room, Traverse Corridor north, Powder Room & Shell Room Openings, view north, 2014, CW Zink.)

(0030. Battery 219, Store Room, north Powder Room, view southeast, 2014, CW Zink.)

(0031. Battery 219, Store Room, Traverse Corridor, north Shell Room door openings, view west, 2014, CW Zink.)

The approximately 4.5-foot wide central Passageway leads to a wider Center Corridor in the



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Magazine's rear section (See Photograph 0032), where most of the exterior walls are 6-feet thick. A double doorway on the south side of the Center Corridor leads to the 16-feet wide by 19-feet deep Plotting Room (See Photograph 0033), which contained the Battery's Plotting Board and a Range Scale Storage Box. A doorway on the south wall of the Plotting Room leads to the approximately 20-feet wide by 13-feet deep Spotting, Switchboard and Radio Room (See Photograph 0034), which contained a Data Transmission and Junction Box, Vertical Panel and Power Boards, and a Signal Corps Junction Cabinet. The second opening along the south wall of the Center Corridor is an Air Lock Door (See Photograph 0035) to a corridor with three doors - a west door to the Chemical Warfare Service (C.W.S.) Room that contained C.W.S. Canisters, a south door to the Latrine (See Photograph 0036) that contains a sink, three urinals and three toilets, and an east door to the Plotting Room. A 1944 Supplement to the Harbor Defenses of New York listed the Plotting Room and Latrine as gasproof "against chemical attack" with a capacity of 42,400 cubic feet and room for up to 20 men.<sup>5</sup>

(0032. Battery 219, Center Corridor, view west, 2014, CW Zink.)

(0033. Battery 219, Plotting Room, view south, 2014, CW Zink.)

(0034. Battery 219, Switchboard and Radio Room, view east, 2014, CW Zink.)

(0035. Battery 219, Center Corridor, Air Lock Door, view east, 2014, CW Zink.)

(0036. Battery 219, Latrine, view east, 2014, CW Zink.)

From observation points in Fire Control Stations on the Reservation and along the coast, observers telephoned data on the position of targets to soldiers in the Spotting, Switchboard and Radio Room, who relayed it the plotter and other soldiers in the Plotting Room. Plotting methods used by the soldiers are summarized in Section 8.

On the north side of the Center Corridor a double doorway leads to the 34-feet wide by 22-feet deep Power Room, which has three concrete pads on the floor for the former 125 kW Diesel Generators, and a remnant of the power Switchboard Assembly near the east wall (See Photograph 0037). The three Generators and related equipment (See Historic Image 26) provided double backup power for "battle conditions." Battery 219 required 25 kW for "non-battle conditions," which was supplied by commercial power with a capacity of up to 45 kW. A doorway on the west wall of the Power Room leads to the 22-feet wide by 11-feet deep Water Cooler Room (See Historic Image 25), which contained three Evaporative Coolers for cooling the three Generators. The Evaporative Coolers were vented through a chase to the Air Exhaust opening on the north end of the Battery's west wall. Exhaust pipes for the Generators passed through openings in the north wall of the Power Room to the 6-feet wide by 44-feet long Muffler Gallery (See Historic Image 25), which contained a Steam Boiler at the west end for heating the Plotting Room and the Spotting, Switchboard and Radio Room. Exhaust pipes for the mufflers and the boiler extended through a chase adjacent to the Evaporative Coolers' chase to the Muffler Exhaust. The Air Exhaust and Muffler Exhaust openings share a central wall with angled wing walls on either side. The west end of the Center Corridor (See Photograph 0038) has a Blast Trap extension, offset approximately 6 feet to the south, to the Battery's Rear Entrance, which also has angled wing walls (See Photograph 0039). Remnants of electrical wiring, boxes, and fixtures, some of which are labeled "Crouse-Hinds," are extant in several areas in Battery 219.

(0037. Battery 219, Power Room, view east, 2014, CW Zink.)

(H26. Equipment layout, power plant for M4 6 inch gun emplacement, "Diesel Electric Plants for 6, 12, and 16 inch Gun Emplacements," *Coast Artillery Training Bulletin*, 1945.)

<sup>5</sup> Supplement to Harbor Defense Project, Harbor Defenses of New York, Annex F, Gas Defenses, 2.

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(0038. Battery 219, Center Corridor, view west, 2014, CW Zink.)

(0039. Battery 219, west side with rear entrance and exhaust openings, 2013, CW Zink.)

Battery 219 has a 3.5-feet thick Structural Roof covered by a 3.5-feet thick Protective Roof with 5 feet of earth on top (See Historic Image 23 & Historic Image 25). A Ventilator Shaft from the Latrine extends through the earth covering in the southwest section of the Battery. A 7-feet thick concrete Burster Slab extends from the Structural Roof over Compacted Fill along the front wall and along the rear sidewalls of the Battery. Battery 219 has deteriorated interior remnants but appears to be structurally solid.

### 3. FIRE CONTROL STATIONS

From the intersection northeast of Battery 219, a paved road that predates the Reservation leads east and then southeast to the Lower Rocky Point Area. The Army designated this road as Access Road "D." About 250-feet northeast of Battery 219 and about 150-feet off of the east side of this road there are two "pillbox" Fire Control Stations. The FC Stations were part of the Army's Fire Control and Position Finding System for Battery Lewis and Battery 219 on the Reservation, for Battery Peck at Fort Hancock on Sandy Hook, and for Battery Harris at Fort Tilden on Rockaway Point. The FC Stations, aka base end stations, served as one of two or more bases in the Horizontal Base System for plotting the direction or azimuth of targets and their range by spotting and triangulation. (During WWII the Army built two additional FC Stations outside the Reservation on a leased site about 1,500 feet north of Battery 219. These provided Position Finding data for the 12-inch gun Batteries Kingman and Mills on Fort Hancock.)

FC Station No. 1 and No. 2 on the Reservation are low profile, "splinterproof concrete" structures partially embanked into the slope (See Historic Image 27). They have 1-foot thick walls and roofs, and 6-inch floor slabs. The camouflage for the FC Stations was "earthfill and vegetation." The rear walls are completely embedded in the slope, and the front walls are embedded approximately halfway. The roofs originally had 6- to 12-inch layers of earth and vegetation, but are now clear. The site is partially overgrown but the FC Stations are in fair condition.

(H27. Fire Control Station, Single and Double Dug-In Type, Report of Completed Works, 1944, COE.)

FC Station No. 1 is a Single Dug-In Type measuring 14-feet square and 11.5-feet high with a single Instrument Room (See Photograph 0040). A 3-feet square steel Entrance Manhole in the northwest corner of the roof provides access to the interior, where steel Ladder Rungs are embedded into the concrete wall below (See Photograph 0041). The 6-inch thick concrete floor is at two levels, with the rear 7.5-feet measuring 7-feet from floor to ceiling and the front 4.5-feet measuring 8-feet from floor to ceiling. FC Station No. 1 served as the 3<sup>rd</sup> spotting station (S<sup>3</sup>) and the 3<sup>rd</sup> base station (B<sup>3</sup>) for Battery Harris, and the 1<sup>st</sup> spotting station (S<sup>1</sup>) and 1<sup>st</sup> base station (B<sup>1</sup>) for Battery Peck. The steel pedestals remain in place on the north side of the interior for Battery Harris' spotting telescope (for firing elevation), and its azimuth telescope (for firing direction), and on the south side for Battery Pack's azimuth telescope. Two steel-framed, 4-inch high vision slits extend across the façade and halfway back on the sidewalls. The concrete roof overhangs the vision slits approximately 8-inches with a quarter round profile on the outside corners.

(0040. Fire Control Station No. 1, east side, 2013, CW Zink.)

(0041. Fire Control Station No. 1, interior, view north, 2013, CW Zink.)

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FC Station No. 2 is approximately 50 feet northeast of FC Station No. 1, and is a Double Dug-In Type with a two-story rear section and one-story front section, with offset floors (See Photograph 0042). It has an additional flat roof rear section that may have been added after the initial construction. The Double Dug-In portion measures approximately 14-feet wide by 27-feet long, and has front and rear Instruments Rooms with similar interior and exterior details to those of FC Station No. 1. In FC Station No. 2, however, the rear Instrument Room has a manhole with a pipe railing in the middle of the rear floor that leads to the room below (See Photograph 0043). The north side of the upper Instrument Room, the upper story of the rear two-story section, served as the 4<sup>th</sup> spotting station (S<sup>4</sup>) and the 4<sup>th</sup> base station (B<sup>4</sup>) for Battery 219, and the south side served as the 5<sup>th</sup> spotting station (S<sup>5</sup>) and 5<sup>th</sup> base station (B<sup>5</sup>) for Battery Lewis. The steel pedestal for Battery 219's azimuth telescope remains in place in the northeast corner. The lower Instrument Room had Battery Commander Observation Points (BC-OP) for Battery 219 in the northeast corner and for Battery Lewis in the southeast corner. Using the spotting and azimuth instruments, Fire Control observers sighted and followed targets assigned by the Battery Commander, and readers recorded and telephoned the data to soldiers in the batteries' Switchboard Rooms.

(0042: Fire Control Station No. 2, south side, 2013, CW Zink.)

(0043: Fire Control Station No. 2, interior, view north, 2013, CW Zink.)

#### 4. BATTERY LEWIS PLOTTING-SWITCHBOARD ROOM

From the northwest corner of the parking lot near the main Reservation entrance, the Park's Bunker Loop Road extends southwest into a ravine with the Battery Lewis Plotting-Switchboard Room (PSR) (See Locator Image 4-5). The Army built this road in 1942 and designated it as Access Road "G." A short connecting road was subsequently built from Grand Tour Road to the top of Access Road "G." The MCPS designated Access Road "G" as the Bunker Loop Road. An 1875 Hartshorne family map outlines a "Cranberry" area in the vicinity of the Plotting-Switchboard Room, possibly suggesting a former cranberry bog in this location.

While plotting and switchboard operations for the 200-Series Batteries were located internally, the Army determined that for the 16-inch gun batteries, it was necessary to isolate plotting and switchboard operations from the noise and shock of the guns, including the potential damage to the operations' air lock or gas proof doors. Locating the Battery Lewis PSR in the ravine approximately 600-feet west of Battery Lewis provided additional isolation from the firing impact of its guns. The elevation at the west entrance of the PSR is about 110-feet, which is 105 feet below the base of Battery Lewis. The elevation of the top of the PSR is approximately 138 feet. The site has higher ground on the north, east, and west sides, and the ravine continues downward on the southwest. The Army most likely regraded the site to build the Access Road and the P-S Room, but the extent of the regrading is unknown.

The PSR is a concrete, steel and earth camouflaged structure in the shape of a rectangular mound set on a slightly northeast to southwest axis and measuring about 100-feet wide by 160-feet long at the base (See Historic Image 28, Photographs 0044-0045). The PSR is covered with vegetation including many trees. On the top near the southwest corner there is a concrete Escape Hatch with a steel door, and in the northern part there is Flue and Shaft Hood with a steel Manhole door. The PSR was served by a septic tank and two cesspools off the southwest corner of the mound.

(H28. Battery Lewis Plotting-Switchboard Room, site plan, Report of Completed Works, 1944, COE.)

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(0044. Battery Lewis Plotting-Switchboard Room, view west, 2013, CW Zink.)

(0045. Battery Lewis Plotting-Switchboard Room, view east, 2013, CW Zink.)

In the 1944 Report of Completed Works, the Army categorized the PSR as “bombproof” with “gasproofing.” The Corps of Engineers used a standardized design for Plotting–Switchboard Rooms at several fortifications, including Battery Ashburn (BCN 126) in San Diego (See Historic Image 29). The Battery Lewis PSR concrete structure is 50-feet wide by 103.5-feet long with angled corners on all sides except the southwest (See Historic Image 30). The floor of the PSR is about 7-feet thick and the ceiling concrete is 16-feet thick. Service Trenches in the floor and conduits through the foundation in various places conveyed Signal Corps cables to Battery Lewis and the Fire Control Stations. The PSR’s south, east, and north walls are 14-feet thick and the west wall is 12-feet thick.<sup>6</sup>

(H29. Battery Ashburn San Diego PSR Plan,  
[www.fortwiki.com/File:Battery\\_Ashburn\\_PSR\\_Plan.jpg](http://www.fortwiki.com/File:Battery_Ashburn_PSR_Plan.jpg).)

(H30. Battery Lewis Plotting-Switchboard Room, General Plan and Sections, 1944, COE.)

The entrance to the Battery Lewis PSR has 1.5-feet thick angled wing walls that are 9-feet apart and extend 22.75-feet from the entrance (See Photograph 0046). The entrance originally had steel doors but now has a security grill. From the entrance doors, a 7-feet wide by 32-feet long entrance corridor (See Photograph 0047) with a Service Trench in the floor leads to the interior, which is divided into three 24-feet deep sections separated by 1-foot thick walls. The 25-feet wide north section has a continuation of the entrance corridor on the southwest (See Photograph 0048), a Heater and Power Room on the northwest with deteriorated heating and electrical equipment (See Photograph 0049), a Chemical Warfare Service and Vent Room on the northeast with deteriorated heating and electrical equipment (See Photograph 0050), and a Latrine on the southeast with pairs of toilets, urinals, and sinks (See Photograph 0051). Between the entrance room and Latrine there is an Air Lock Room with an Air Lock Door on the west side that opens to a small corridor. On the north side of the Air Lock Room there are flues and a shaft that lead to a Flue and Shaft Hood on the roof. The Latrine and C.W.S. and Vent Room partitions are made of plastered terra cotta blocks.

(0046. Battery Lewis Plotting-Switchboard Room, Entrance, view east, 2013, CW Zink.)

(0047. Battery Lewis Plotting-Switchboard Room, entrance corridor, view east, 2013, CW Zink.)

(0048. Battery Lewis Plotting-Switchboard Room, entrance corridor, view south, 2013, CW Zink.)

(0049. Battery Lewis Plotting-Switchboard Room, Heater/Power Room view north, 2013, CW Zink.)

(0050. Battery Lewis Plotting-Switchboard Room, CVS/Vent Room view north, 2013, CW Zink.)

(0051. Battery Lewis Plotting-Switchboard Room, Latrine, view north, 2013, CW Zink.)

The 32-feet wide center section of the PSR is the Plotting and Spotting Room, which retains sound insulation and portions of the original light fixtures on the ceiling (See Photograph 0052). The 18-feet wide south section is the Switchboard Room (See Photograph 0053). From the southwest corner of the Switchboard Room an Escape Hatch passage (See Photograph 0054) leads to a shaft with a steel

<sup>6</sup> [http://www.fortwiki.com/File:Battery\\_Ashburn\\_PSR\\_Plan.jpg](http://www.fortwiki.com/File:Battery_Ashburn_PSR_Plan.jpg); The Battery Townsley Plotting-Switchboard Room was completed in 1940 with an earlier layout.

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ladder to the Escape Hatch on the roof. A 1944 Supplement to the Harbor Defenses of New York listed the "Plotting Room and Fire Control Switchboard Room, Battery Lewis" as gasproof "against chemical attack" with a capacity of 12,400 cubic feet and room for up to 40 men. The PSR is overgrown and has deteriorated interior features, but it appears to be structurally sound.<sup>7</sup>

(0052. Battery Lewis Plotting Switchboard Room, Plotting and Spotting Room, view north, 2014, CW Zink.)

(0053. Battery Lewis Plotting Switchboard Room, Switchboard Room, view north, 2014, CW Zink.)

(0054. Battery Lewis Plotting Switchboard Room, Escape Hatch, view south, 2014, CW Zink.)

## 5. HILL 250

In the northwest corner of the Reservation, a paved road leads southwest from Grand Tour Road (See Locator Image 4 & Photograph 0055). The road may incorporate portions of an old lane that led to "Skunk Hill," as indicated on an 1875 Hartshorne family map (see Section 8). The Army designated the road as Access Road "J," and today it is a secondary entrance to the Reservation land within Park. The road rises to an open area of approximately 2 acres (See Photograph 0056). At an elevation of approximately 250 feet, this is the highest part of the Reservation, and the Army designated it as Hill 250. The Corps of Engineer most likely regraded the road and the hilltop to provide access and a level area for the facilities, but the extent of the re-grading is unknown. Military use of the site during the Cold War probably expanded the level area and added a short extension to the access road on the east side. The hilltop is currently a grassy field surrounded by young trees. All military structures have been removed, but telephone poles, fencing, sections of paving, and the access road extension on the southeast remain visible.

(0055. Grand Tour Road, Hill 250 Road left, view west, 2014, CW Zink.)

(0056. Hill 250, view north, 2014, CW Zink.)

The Army established Hill 250 as a Fire Control Station and Signal Corps Radio SCR-296 Installation (See Historic Image 31) in conjunction with the two Fire Control Stations northeast of Battery 219, and the two outside the Reservation on the north side of Portland Road. The facilities at Hill 250 included a 107-foot tall Fire Control Station Tower that the Army relocated from Short Beach on Long Island, a 20.5-foot square Transmitter Building, and two small Power Buildings. During the Cold War, the Hill 250 site was converted into a Missile Master installation that controlled missiles for the defense of the New York area. (See Section 8 for a summary of Hill 250's WWII and Cold War facilities). No buildings or structures are extant on Hill 250.

(H31. Report of Completed Works, Hill 250, site plan, 1944, COE.)

## 6. LOWER ROCKY POINT

From the Battery Loop Road intersection northeast of Battery 219 a paved road extends east and then south to the Lower Rocky Point area in the Reservation's southeast corner (See Locator Image 4). This area has a low slope rising from the banks of the Navesink and Shrewsbury Rivers (See Locator Image 5). The road dates to the Hartshorne Estate, when Hartshorne family owners erected one or more buildings at the end of the road and had cleared land on the low slopes to the northwest and north for

<sup>7</sup> Supplement to Harbor Defense Project, Harbor Defenses of New York, Annex F, Gas Defenses, 2.

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gardens, lawns, and fields (see Section 8).

The Army designated the road to Lower Rocky Point as Access Road "G." The Army utilized a former Hartshorne residence and garage at the end of the road for officer's quarters. The Corps of Engineers demolished the buildings in the early 1990s. An open grassy field of about 2 acres with a picnic area lies east of the access road (See Photograph 0057). Young trees line the riverbanks and extend up the formerly-open slopes.

(0057. Lower Rocky Point, view south, 2013, CW Zink.)

#### 7. BLACK FISH COVE

From the Battery Loop Road southwest of Battery 219, a paved road leads southwest downhill to the Reservation's Black Fish Cove area (See Locator Image 4 & Photograph 0058), which was historically known as Black Fish Hole. All or a portion of this short road was built by Robert Hartshorne Trask, Sr., as part of his construction of a house and garage at the end of the road in 1932 (See Historic Image 32). Part of the road may have been built in the 19<sup>th</sup> Century or possibly earlier by Hartshorne family members to reach the "House at Black Fish Hole" on this site or nearby that was noted on an 1815 Hartshorne survey (See Historic Image 35). The road loops around an open area of approximately one acre of trees and grass with a small park structure north of the former house site. An extension of the road continues down to a small open area on the Navesink River bank, where there is a turnaround and a small modern dock (See Photograph 0059).

(0058. Black Fish Cove area, view south, 2013, CW Zink.)

(H32. Black Fish Cove, former house, c1979, MCPS.)

(0059. Black Fish Cove, view south, 2013, CW Zink.)

The Army designated the road to Black Fish Cove as Access Road "B," and used the house and garage for officer's quarters. In the Cold War era, the military built a boathouse on the Navesink River. The Corps of Engineers demolished the buildings in the early 1990s.



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**ELIGIBILITY**

The Navesink Military Reservation, established in 1942 as a sub-installation of Fort Hancock on Sandy Hook, is eligible for the National Register under Criterion A for its primary role in the Harbor Defenses of New York, the nation's largest and most important city, during World War II, the largest military conflict in the history of the United States. In a ranking of Armaments in Order of Tactical Importance for the protection of New York Harbor, the U.S. Army in 1944 identified the Reservation's 16-inch gun Battery Lewis as No. 1 and its 6-inch gun Battery 219 as No. 5. In addition to Battery Lewis being the most important Primary Armament or long-range battery protecting New York Harbor, Battery 219 was the most important Secondary Armament or medium-range battery.<sup>8</sup>

Battery Lewis and Battery 219 are identified in the 1984 Fort Hancock and the Sandy Hook Proving Ground Historic District National Landmark Nomination as "additional gun emplacements...outside the boundaries of the National Historic Landmark District."<sup>9</sup>

The Navesink Military Reservation is also eligible under Criterion C because its extant WWII structures embody the distinctive characteristics of coastal fortifications developed under the U.S. War Department's 1940 Modernization Program for Harbor Defenses in the Continental U.S. Battery Lewis (aka BCN 116) is one of 19 extant (out of 21) 100-Series Type E Casemated 16-inch gun batteries constructed in the continental U.S. between 1942-1945 (See Table 1). Two Type E 16-inch Gun Emplacements are listed on the National Register: Battery 109 in Point Judith, Rhode Island, was listed in 1983 as part of the Fort Greene Historic District, and Battery Steele (BCN 102) on Peaks Island, Maine, was individually listed in 2005.

Battery 219 is one of about 68 200-Series 6-inch gun batteries built in the continental U.S. and one of two built in New Jersey. The 6-inch gun Battery 223 in Cape May Point State Park was completed on the former Cape May Military Reservation in 1942 as part of the Harbor Defenses of the Delaware, and it was individually listed on the National Register in 2008. Fire Control Tower 23 in Lower Township Cape May Point was erected on the Cape May Military Reservation in 1942, and it was individually listed on the National Register in 2003.

Although guns and other military equipment were removed after WWII, the Navesink Military Reservation's four WWII features - Battery Lewis, Battery 219, Fire Control Stations, and the Battery Lewis Plotting-Switchboard Room - retain the integrity of their original sites, designs, and constructions.

The 100-Series Casemated 16-inch gun batteries, the 200 Series 6-inch gun batteries, and a few 500-Series Casemated 12-inch gun batteries represent the apex of U.S. Coast Artillery Defense that developed from the nation's founding through WWII. Advancements in aerial warfare including missiles after WWII rendered coastal artillery obsolete.

The entire land area of the Navesink Military Reservation is intact and has been preserved, along with its WWII road system and its primary WWII structures, and is being interpreted by the Monmouth County Park System (MCPS) within the present-day boundaries of Hartshorne Woods Park.

<sup>8</sup> "Supplement to the Harbor Defense Project of New York," HDNY-AN-44, 1 September 1944, Annex A, page 2.

<sup>9</sup>, "Fort Hancock and the Sandy Hook Proving Ground Historic District National Landmark Nomination," 1984, page 21.

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Table 1 - U.S. Continental Casemated 16" Gun Batteries						
BCN	Name	Harbor Defense	Base	Built	Type	Status
<b>1930s</b>						
-	Harris	New York	Ft. Tilden	1923+1942	*	NPS NR
-	Long	Boston	Ft. Duvall	1927+1942	*	Built on
-	Davis	San Francisco	Ft. Funston	1936-1940	**	NPS
-	Townsley	San Francisco	Ft. Cronkhite	1938-1940	**	NPS
<b>1940s</b>						
102	Steele	Portland	Peaks Island MR	1942-1945	E	Land Preserve NR
103	Seaman	Portsmouth	Ft. Dearborn	4/42-8/43	Em	State Park
104	Murphy	Boston	East Point MR	1/42-12/43	E	NE Univ Sci Ctr
105	NA	Boston	Fort Dawes	11/42-8/44	E	Destroyed
107	Gray	Narragansett	Ft. Church	9/43-5/42	A	Sakonnet Golf Crse
108	Hamilton	Narragansett	Ft. Greene	9/40-11/42	A	Private/City Land
109	NA	Narragansett	Ft. Greene	8/42-10/43	Em	State Park NR*
111	NA	Long Island Sound	Ft. H.G. Wright	2/43-5/44	E	Private
112	-	Long Island Sound	Camp Hero	3/42-6/43	E	State Park
113	Dunn	Long Island Sound	Camp Hero	3/42-6/43	E	State Park
116	Lewis	New York	Navesink MR	6/42-6/43	E	County Park
118	Smith	Delaware	Fort Miles	3/41-10/42	A	NR State Park
120	Ketcham	Chesapeake	Ft. Story	4/41-11/43	A	Army storage
121	-	Chesapeake	Ft. Story	1/42-1/43	E	Army
122	Winslow	Chesapeake	Ft. John Custis	8/41-6/43	E	Estrn Shore NWR
126	Ashburn	San Diego	Ft. Rosecrans	6/42-3/44	E	Navy in use
127	Bunker	Los Angeles	White Point MR	4/42-12/43	Em	LA Nature Presrv
128	NA	Los Angeles	Bolsa Chica MR	4/43-11/43	E	Destroyed
129	NA	San Francisco	Ft. Barry	9/42-3/44	**	NPS
131	-	Puget Sound	Camp Hayden	10/42-5/45	Em	County Park
134	NC	San Diego	Ft. Emory	3/43-2/44	E	Navy

BCN – Battery Construction Number      NR – National Register      Em – Type E modified  
NA - Not Armed      NC – Not Completed      \* Ft. Greene Historic District 1983      \*\* Unique design  
Source: Mark Berhow, *American Seacoast Defenses*.

#### HISTORICAL BACKGROUND – HARTSHORNE ERA

The Navesink Military Reservation was established by the War Department in 1942 with the acquisition of three parcels of land that had remained mostly in the Hartshorne family since the beginning of European settlement in the late 17<sup>th</sup> Century.

By that time the Nave Sincks, a sub-tribe of the Lenape Native Americans, had occupied the southeastern Raritan Bayshore and the Highlands during the Eastern Woodlands period (approximately 1000 BC to 1600 AD), and they and other Native Americans may have occupied it earlier. The Nave Sincks fished and harvested shellfish along the shore, hunted game and gathered food in the lower and

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upper woods, and grew maize, beans, sunflowers and other plants in the fertile soils along creeks.<sup>10</sup>

The prominence of the Navesink Highlands at the confluence of three rivers caught the attention of the early European explorers. Giovanni Verrazano in 1524 noted the "little mountain by the sea" before sailing into the Hudson River narrows that now bear his name. Robert Juet, Henry Hudson's first mate on the *Half Moon* in 1609, noted that "the Land is very pleasant and high, and bold to fall." When shipmates landed on the Raritan Bay's "Souther shoare," Juet reported that they "saw great store of Men, Women, and Children, who gave them Tobacco at their coming on land. So they went up into the Woods, and saw a great store of goodly Oakes, and some Currants."<sup>11</sup>

Several months after the English took over New Amsterdam in 1664, Richard Nicolls, the Governor of New York, issued the Monmouth Patent, or Navesink Patent. Richard Hartshorne (1) (1641-1722), an English Quaker born in Leicestershire, bought land on Sandy Hook Bay in 1669-1670 and afterwards acquired much of the eastern Highlands, including the land area that is now Hartshorne Woods Park, and Sandy Hook. In 1674 he executed a deed with the Nave Sincks to confirm his ownership. The Navesink Highlands area became known to Hartshorne and other settlers as Portland Point, later simplified as Portland.

Richard Hartshorne (1) deeded in several transactions his Highlands and Sandy Hook properties starting in 1703 to his son William Hartshorne (1678/9-1748/9). A 1710-1720 Hartshorne Survey shows parcels totaling 2,410 acres, with the northeast parcel noted as "Sandy Hook Contains in Lands and Cedar Swamp about 800 Acres," and two Highlands parcels noted as lying between "The Edge of the Bay Along under The High Land" and the "Neversinks River" (See Historic Image 33). (H33. William Lawrence, 1710-1720 Hartshorne Survey Map, Hartshorne Family Papers, MCHA.)

The 1710-1720 Hartshorne Survey notes the eastern Highlands parcel, which included the land that became the Navesink Military Reservation, as "William Hartshorne's Land Within Fence Contains 812 8/10 acres." A sketch in the southwest corner of this parcel shows the "William Hartshorne House," which became known as Portland. On "The High Land" in the northeast area of this parcel, a conical structure noted as "The Beacon" suggests that by at least 1720 colonists were using the elevation of the Highlands as a site for a navigation marker or signal. In the 1740s during the War of Austrian Succession, colonists devised a signaling system on the Highlands with an oil fire at night and a raised ball during the day to signal the approach of enemy French ships.<sup>12</sup>

The 1710-1720 Hartshorne Survey notes the western Highlands parcel, which includes land within Hartshorne Woods Park but not in the Reservation, as "William Hartshorne's Land and Hills without Fence Contains 797 8/10 acres English Measure." The south boundary of this parcel abuts the 105-acre property of Samuel Culver (1644-?), a Massachusetts settler who acquired his land from the East Jersey Proprietors in 1685. Culver is identified as "Collsen" on the Survey, which shows his house in

<sup>10</sup> The "Nave Sincks" tribe was identified in *The Origin of New Jersey Place Names*, Trenton, N.J.: New Jersey Public Library Commission, 1945.

<sup>11</sup> King, John, *Highlands, New Jersey*, Charleston, S.C.: Arcadia Publishing, 2001, 8; "Juet's Journal of Hudson's 1609 Voyage, from the 1625 Edition of *Purchas His Pilgrimes*," [www.halfmoon.mus.ny.us/Juets-journal.pdf](http://www.halfmoon.mus.ny.us/Juets-journal.pdf), 591-592.

<sup>12</sup> See Navesink Twin Lights website: [www.lighthousefriends.com/light.asp?ID=376](http://www.lighthousefriends.com/light.asp?ID=376).

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the southeast corner of his parcel on the Navesink River. William Hartshorne acquired the Culver parcel before 1738 and he devised it in his will to his oldest son, Thomas. In the 19<sup>th</sup> Century this property became known as Portland Place, a National Register historic site now part of Hartshorne Woods Park.<sup>13</sup>

After William Hartshorne's death in 1748/9, his sons Robert Hartshorne (1) (1721 – 1805) and Esek Hartshorne (1728-1795) tried to sell their father's approximately 800-acre Sandy Hook land and his 1,529-acre Highlands properties. Instead, they divided the Portland tract in 1761 into two equal estates of 764.5 acres with shared interests in Sandy Hook, as noted on a 1761 survey (See Historic Image 34). In 1762 they sold four acres of the northern tip of Sandy Hook to a group of New York merchants, who in 1764 erected the Sandy Hook Lighthouse, now the oldest lighthouse in the U.S. The brothers retained joint ownership of the rest of Sandy Hook, and divided the Highlands between them, with Robert taking the southern, Navesink River portion, which included the land that became the Reservation, along with the Hartshorne house known as Portland, and Esek taking the northern Bayshore portion. During the War of 1812, the U.S. Army built wooden fortifications on Sandy Hook to guard against the British Navy.

(H34. Richard Lawrence, Survey May 1761 for Robert and Esek Hartshorne, Hartshorne Family Papers, MCHA.)

Robert Hartshorne (1) sold Portland and his interests in Sandy Hook to his son Richard Hartshorne (2) (1752-1831) on 31 December 1799 for \$15,000. He died in New York City in 1805. Richard's lands included the eastern portion that became the Reservation. An annotated 1815 Survey (See Historic Image 35), which was part of an attempt to sell Portland to Nicholas I. Roosevelt of steamboat fame, shows "Upper Rocky Point" near the southwestern corner of the future Reservation land, and "Lower Rocky Point" at the southeastern corner. In between the "Points" the survey notes a "House By the Black Fish Hole" on the River.

(H35. Survey of Richard Hartshorne Property, 1815, Hartshorne Family Papers, MCHA.)

In 1821, Richard Hartshorne (2) conveyed 229 acres of the working farm portion of the Portland tract to his son Robert Hartshorne (2) (1798-1872). The remaining 535 acres were shared equally by the son and his three unmarried sisters after Richard's death in 1831. Robert obtained sole ownership of Portland in 1835 when he bought out his sisters' interests. By the 1850s, he had sold a number of narrow lots on the Shrewsbury River to various owners. In 1852 he sold a large lot, which became part of the Reservation, on the southeastern corner including Lower Rocky Point to Edward Minturn (1806-1879), the brother of his wife Mary Ann Minturn Hartshorne (1802-1861). Minturn, a New York merchant involved in shipping and investments, engaged Thomas R. Jackson to design "an Italian Villa" with a tower for a site overlooking Lower Rocky Point in 1854. Jackson, who was born in England and worked for the noted New York architect Richard Upjohn, designed several prominent buildings in New York, including a five-story building for *The New York Times*. Mary Ann Minturn Hartshorne wrote to her son Benjamin Minturn Hartshorne that his uncle, her brother, was "setting out an abundance of trees and beautifying the lovely site he has chosen," and that his house "will make a fine appearance from the sea and the river." "The situation is unrivaled," she later wrote. "I am advocating a rise in price for

<sup>13</sup> Unless otherwise cited, the sources for Hartshorne family history, property holdings and land transactions herein are from: Portland Place, Middletown, N.J., National Register Nomination, 2012; and Joseph W. Hammond, Consulting Historian/Archivist, Hartshorne Family Papers Project, Monmouth County Historical Association.

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every acre to be sold hereafter." A c1885 painting by James E. Buttersworth depicts the Minturn House overlooking Lower Rocky Point with lawns and gardens extending almost down to the river, and two c1900 photographs show the house and the view (See Historic Image 36-Historic Image 38).<sup>14</sup>

(H36. "Rounding the Point," Minturn House, Highlands NJ, J. E. Buttersworth, c1885, Portland Place Collection, MCPS.)

(H37. Minturn House, Rocky Point, C1900, Portland Place Collection, MCPS.)

(H38. View from Minturn House, c1900, Portland Place Collection, MCPS.)

A group of New York sportsmen chartered the Neptune Club in 1858 and built a Club House on a Navesink River site that Robert Hartshorne (2) provided for them west of Black Fish Hole (See Historic Image 39) within the future Reservation land. By 1885 the Club was reported to have 40 members. After a 1910 fire destroyed the building, the *Red Bank Register* noted that "the clubhouse was the scene of many large sporting events among boat owners for years."<sup>15</sup>

(H39. Neptune Club, Navesink River, 1890, Portland Place Collection, MCPS.)

Robert Hartshorne (2) died in 1872, leaving the Portland estate in equal shares to his three surviving children. The easternmost parcel of land was held in trust for the youngest son Edward Minturn Hartshorne (1837-1886). It included the house at Black Fish Hole within the future Reservation land. Robert's daughter Mary Minturn Hartshorne (1839-1890) inherited a large parcel west of Black Fish Hole, and with her husband Edward O'Rourke built a house on a site, also within the future Reservation land, overlooking the Navesink River on Pear Tree Point (See Historic Image 40), which may have been accessed from the Coonrod Hill Road. Benjamin Minturn Hartshorne (1826-1900), the oldest son of Robert Hartshorne (2), inherited the remaining Portland property including the Mansion and about 300 acres that included nearly all of the working farm.

(H40. House at Pear Tree Point, late 19th century, Hartshorne Family Papers, MCHA.)

In 1875, Benjamin M. Hartshorne began to transform Portland into an estate worthy of a country gentleman of great net worth. He hired Ezra A. Osborn, a civil engineer from Middletown, to serve as his agent for substantial improvements to the Portland mansion and grounds in 1875 and 1876. Osborn laid out picturesque carriage roads on the 700-acre property, including those portions inherited by Edward and Mary. Osborn's 1875 survey of the estate (See Historic Image 41) shows what became known as Grand Tour Road from the Mansion to the hilltop, Minturn Road to the Minturn House above Rocky Point, a road to Coonrod Hill in the southwest, and roads south of Grand Tour Road to Skunk Hill and a Cranberry bog. The Coonrod Hill road no longer exists but the others border or are part of the Reservation. The 1875 survey also shows the house at Black Fish Hole, the Neptune Club House, an open area named Jacob's Field near Upper Rocky Point, all within the future Reservation land, and the Portland Mansion to the west.

(H41. Ezra Osborn, Surveyor, "Map of the Robert Hartshorne Estate Situated on the Highlands of Navesink, Monmouth County, N.J.," 1875, Hartshorne Family Papers, MCHA.)

After Edward Minturn died in 1879, Benjamin acquired his uncle's property, which later became part of

<sup>14</sup> Mary Ann Hartshorne to Benjamin Minturn Hartshorne, Portland, 17 November 1853, 2 February 1854, and 5 May 1955 Hartshorne Family Papers, Monmouth County Historical Association; Monmouth County Building Contracts, July 1, 1854, Monmouth County Archives.

<sup>15</sup> Ellis, Franklin, *History of Monmouth County*, Philadelphia: R. T. Peck & Company, 1885, pg. 535. "Neptune Clubhouse Gone," *Red Bank Register*, February 23, 1910.

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the Reservation, and gave it to his daughter Julia Hartshorne Trask (1863-1955). Julia subsequently acquired the acreage to the west and north, including Black Fish Hole and other land within the future Reservation, from the heirs of her uncle, Edward Minturn Hartshorne. Benjamin Minturn Hartshorne also acquired the Portland Place property west of Portland and gave it to his daughter, Mary Minturn Hartshorne Ward (1867-1960). After Mary's death, her grandson Daniel Seitz eventually acquired sole ownership of Portland Place. In 2008 he donated the 4.5-acre property to the Park System as an addition to Hartshorne Woods Park. Portland Place was listed on the National Register in 2012.

Upon Benjamin Minturn Hartshorne's death in 1900, his son Robert Hartshorne (3) (1866-1927) inherited the Portland property and subsequently acquired the adjacent property to the east with the house at Pear Tree Point formerly owned by his aunt Mary Minturn Hartshorne O'Rourke. This tract had been lost out of the family to the creditors of the O'Rourke's following Felix's death in 1891 in spite of court action brought by Benjamin to prevent it. A c1910 Map of Robert Hartshorne's land (See Historic Image 42) shows that the Hartshorne homestead Portland property was back up to about 527.25 acres. Robert Hartshorne (3) then owned the western portion of the land that became the Reservation and Julia Hartshorne Trask owned the eastern portion.

(H42. Frank Osborne, Surveyor, Map Showing Property of Robert Hartshorne, Adjoining Properties, Highlands of Navesink, N.J., c1910 Hartshorne Family Papers, MCHA.)

Robert Hartshorne (3) bequeathed Portland with the Mansion upon his death in 1927 to his wife Margaret Willis Hartshorne (1868-1942). She conveyed 54.5 acres west of the Mansion in 1928 to their daughter Mary Minturn Hartshorne Noonan (1897-1978) that included a secondary residence that became known as the "Portland Farmhouse." Margaret conveyed the remainder of the estate in 1931 to their son Richard Hartshorne (3) (1900-1958).

In 1931 Julia Hartshorne Trask's son Robert Hartshorne Trask (1892-1956) built a house and garage by Black Fish Hole in the southwest corner of her land. According to his son Robert Trask, Jr., the Black Fish Hole site formerly had a house occupied by the Garret Van Kirk family, who worked for Julia Trask.<sup>16</sup> When Robert Trask contracted to build his home there, the *Red Bank Register* reported that, "The site of the new house commands an excellent view of the river. The view faces the south, while the northern side is protected by hills and woods...A winding road had to be built to reach the site of the new house." The *Register* noted that the four bedroom Colonial house would have three stone fireplaces, and that "The stones for the fireplaces will be taken from the ruins of a house near by." The ruin was probably the "The House by the Black Fish Hole" noted on the 1815 Survey of Portland (See Historic Image 35). A c1979 photograph shows the Robert Trask, Sr., House and site (See Historic Image 43).<sup>17</sup>

(H43. Robert Trask House at Black Fish Hole, c1979, MCPS.)

An aerial photograph of the southern Navesink Highlands from 1933 shows the Hartshorne lands that became the Reservation prior to the outbreak of WWII (See Historic Image 44). From the intersection of Grand Tour and Portland Roads, Minturn Road leads southeast to the Julia Hartshorne Trask House known as Rocky Point. From there a road loops north and then southeast to a house at Lower Rocky Point, and another road leads southwest to the Robert Trask, Sr. House. Lawns, gardens and

<sup>16</sup> Interview, Robert (Bob) Trask, Jr., Londonderry, Vermont, by Gail L. Hunton, Monmouth County Park System, July 6, 2012.

<sup>17</sup> "To Build \$30,000 House on Shore," *Red Bank Register*, October 21, 1931.

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specimen trees cover the area between Rocky Point and Lower Rocky Point. A second road leads south and then southeast from the intersection of Grand Tour and Portland Roads to the Pear Tree Point house site overlooking the Navesink River. Between Pear Tree Point and Upper Rocky Point in the southwest corner there is an open field.

(H44. Navesink Highlands Aerial, 1933, Historic Aerials.)

A November 1941 Survey prepared by the Army Corps of Engineers (See Historic Image 45) shows the Hartshorne and Trask properties and three tracts identified for acquisition by the War Department to establish the Navesink Military Reservation. The Portland property owned by Richard Hartshorne (3) contained 469.3 acres including the Hartshorne homestead consisting of the 3-story frame Mansion, a 1½-story frame Dwelling and Garage, and a large Brick Barn. In the southeast portion of this property the 1941 Survey identified Tract No. 1, consisting of 142.3 acres between the Navesink River on the south and Grand Tour Road on the north, and bordered by Trask properties on the east and by a new 2,930 ft. north-south property line on the west. The survey identified three northeast-southwest roads on the 142.3 acre parcel that were also noted on the 1910 Map of the Property of Robert Hartshorne (3) (See Historic Image 41) and are visible on the 1933 aerial photograph (See Historic Image 44): Wigwam Creek Road from the northwest corner to the Navesink River near Portland; Rebecca Avenue from the northwest corner to the parcel's southwest ridge; and Black Fish Hole Road from the main Trask parcel on the east to the site of the former house at Pear Tree Point (See Historic Image 40). (H45. Navesink Site, Highlands, N.J., Property Survey, War Department, Corps of Engineers, U.S. Army, November 15, 1941, MCPS.)

Julia Hartshorne Trask's 109-acre property contained parcels north and south of Portland Road, and the 1941 Survey identified all of her south parcel as Tract No. 2. This 79.5-acre Tract 2 bordered the Shrewsbury River on the southeast, the Navesink River on the south, and Tract No. 1 on the west. The 1941 Survey of Tract No. 2 noted roads that appear on the c1910 Map of the Property of Robert Hartshorne (3) (See Historic Image 42) and are visible on the 1933 aerial (See Historic Image 44): Point Hollow Road, which extended eastward from Grand Tour Road near its intersection with Portland Road to a midpoint on the eastern boundary and then turned southward; Minturn Road, which extended southeast from Grand Tour Road near Portland Road to an intersection that connected Point Hollow Road to the north, the Black Fish Hole Road leading to Tract 1, and a southeast road to the 2½-story frame Minturn House and a 1-story Frame Dwelling nearby; the road from the Minturn House that looped east past a Frame Garage and then turned southeast to Lower Rocky Point, which contained a 2½-Story Brick Dwelling House and a Brick Garage; and a second road from the Minturn House that extended southeast to the Robert Hartshorne Trask property. The Brick Dwelling House, which was the home of Benjamin Hartshorne Trask (1889-1979), and its Brick Garage at Lower Rocky Point are visible on the 1933 aerial photograph.

In 1941 Julia Hartshorne Trask conveyed an 8.1-acres parcel to Robert Hartshorne Trask that included his residence and Black Fish Hole. This parcel was identified as Tract No. 3 on the 1941 Survey, and it bordered the Navesink River on the south, Tract No. 1 on the west, and Tract No. 2 on the north and east. The Survey shows the road from the Minturn House on Tract No. 2 terminating in a loop near the western boundary of Tract No. 3, with a 2-story Frame Dwelling at the bottom of the loop, a Frame Garage to the west, and a Frame Boat House on the Navesink River. The Robert Hartshorne Trask House, Garage, and Boat House are all visible on the 1933 aerial photograph.

SANDY HOOK AND THE NAVESINK HIGHLANDS

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With their strategic location at the entrance of the Harbor, Sandy Hook and the Navesink Highlands have long been important to the defense of New York. The British used the Sandy Hook Lighthouse for navigation during the American Revolution, and they built a stockade around it to help resist efforts by American soldiers to capture it. The U.S. Government acquired the northern end of Sandy Hook above the Lighthouse from Richard Hartshorne (2) in 1806 “for military purposes,” and built Fort Gates, a temporary wooden stockade, there in 1813 during the War of 1812. Recognizing the importance of Sandy Hook, the Government acquired the land between the Lighthouse and Young’s Creek near the bottom of Sandy Hook from Hartshorne in 1817 also for military purposes.<sup>18</sup>

In 1828 the U.S. Government built the Navesink Light Station on the Highlands with two towers, and it rebuilt the Station with the current Twin Lights in 1862.

In 1859 the Corps of Engineers (COE) started building a granite “Fort at Sandy Hook” and after the Civil War broke out the Army stationed troops there to guard the construction. Improvements in rifled artillery during the Civil War made masonry forts obsolete, and the COE halted construction in 1868. To test ongoing improvements in ordnance, the Army established the Sandy Hook Proving Ground in 1874, and from then until it closed in 1919, “all of the experiments for artillery for seacoast defenses” were conducted there.<sup>19</sup> Armament improvements led to the first large-scale modernization of coastal defenses with open reinforced-concrete gun emplacements during the Endicott Period from 1890-1910.

The Army completed Battery Potter on Sandy Hook in 1894 with a masonry entrance and concrete emplacements for two 12-inch guns on gun-lift carriages. The Army established Fort Hancock on Sandy Hook in 1895 with “permanent barracks, officers’ quarters, storehouses, a hospital, a guardhouse, an administration building, sewage and water systems and other support facilities.”<sup>20</sup>

During the Endicott period the Army built 14 other batteries at Fort Hancock, with most of the guns mounted on disappearing carriages. By World War I, improvements in naval guns on battleships enabled their shells to surpass the firing range of U.S. coastal guns, and “the new naval guns could be fired at higher angles effectively negating the protective advantage of the disappearing carriage on which most of the heavy American harbor defense weapons were mounted.” In 1915, the War Department “called for the development of a new large caliber 16-inch gun to be mounted on a carriage that would have a greater range than those guns in the existing seacoast defenses.”<sup>21</sup>

With the U.S. entry into WWI in April 1917, the War Department urgently expanded the defenses of New York harbor with additional cantonment and other facilities for wartime operation of the batteries and personnel training. At Fort Hancock, the Army built two new 12-inch gun batteries – Kingman and

<sup>18</sup> Parke, John G. *Extracts from the Opinions of the Attorneys General of the United States*, Washington: Government Printing Office, 1882, g. 254.

<sup>19</sup> Lee, James J. III, and Lauren Laham, “Battery Potter, Battery Gunnison, Mortar Battery Historic Structure Report,” Sandy Hook Unit, Gateway National Recreation Area, Historic Architecture Program, Northeast Region, Lowell, Massachusetts, 2007, pg. 26.

<sup>20</sup> Bearss, Edwin C., “Historic Resource Study, Sandy Hook Proving Ground, 1874-1919,” Gateway National Recreation Area, New York/New Jersey, Denver, Colorado: National Park Service, 1983, pg. 1.

<sup>21</sup> For details of Fort Hancock’s batteries see: [www.fortwiki.com/Fort\\_Hancock\\_\(2\)](http://www.fortwiki.com/Fort_Hancock_(2)); Berhow, Mark, “America’s Last Seacoast Defenses: The World War II-Era Construction Program,” *Coast Defense Study Group Journal*, Volume 8, Number 3, 32.



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Mills – with the guns mounted on barbette carriages. The Army also relocated four 12-inch mortars from existing Fort Hancock batteries to a new temporary battery on the Navesink Highlands. This “Mortar Battery at Highlands, N.J.,” also called the Navesink Mortar Battery, was located on the east side east of Portland Road northeast of its intersection with Grand Tour Road, approximately 1,500 feet south of Twin Lights (See Historic Image 46), and it was the first recorded use of armament on the Navesink Highlands. It was also just a few yards north of the future Navesink Military Reservation.<sup>22</sup> (H46. “Navesink Highlands N.J., 12” Mortar Battery” Plan, June 17, 1918, COE.)

The War Department leased the land for the Navesink Mortar Battery from Susanna and Charles Bennett, but it was owned by her first cousin Julia Hartshorne Trask and her husband Dr. James D. Trask.<sup>23</sup> North of the Navesink Mortar Battery, the Army built a “typical one-company cantonment” at the approximate location of the current Highlands High School on the south side of Grand Tour Road. The Navesink cantonment included “two 66-man barracks, a latrine, a mess hall, a type G and a type H officers’ quarters, and an incinerator.” It also included a water tank, pump, electric generator, and a “macadam roadway” connecting it to Portland Road. A wooden magazine was built against the hill behind the battery.<sup>24</sup>

The mortars were moved to the Navesink Mortar Battery in February 1918. In early June Susanna Bennett wrote to Colonel Henry L. Harris, the Fort Hancock commanding officer, requesting that the new battery be named for her brother, Captain Benjamin M. Hartshorne, Jr., an 1896 graduate of West Point who died in the Philippines in 1902 during the Spanish American War. Two weeks later the War Department responded that Captain Hartshorne “already had a battery named for him at Fort Smallwood in Maryland, and that ‘at the present time the Mortar Battery at Navesink highlands is considered a temporary installation. If at a later date it should be decided to permanently install a battery at this site, it is recommended that the name of Battery Hartshorne at Smallwood, Md., be changed and the battery at Navesink Highlands named in honor of Captain Hartshorne.’”<sup>25</sup>

The Navesink Mortar Battery emplacement was completed by July 1918, but the commanding officer of the Sandy Hook Proving Ground noted that, “Proof firing of this battery is awaiting opinion from the office of the 2<sup>nd</sup> district Engineers of New York City as to the probable effect on Navesink Light. As both the light and the battery were built by the Engineers it is believed advisable to get an opinion before firing.’ It is unknown if the Navesink Mortar Battery was ever fired” before the war ended in November 1918. The Navesink cantonment was salvaged in 1919, and the mortars were scrapped in January 1920. Part of the battery’s concrete foundation remains in place today. The Army deactivated the two mortar batteries at Sandy Hook and scrapped their 12-inch mortars, and it also deactivated a gun battery, leaving nine batteries in service at Sandy Hook. Requiring a larger firing range, the Army relocated its Proving Ground to Aberdeen, Maryland in 1920.<sup>26</sup>

<sup>22</sup> Newman, Cory, “Draft History of the Navesink Military Reservation,” October 2013, 41. The battery does not appear to have had an official name but has been called the Navesink Mortar Battery.

<sup>23</sup> Newman, 43, and “Descent of Hartshorne Landholdings.”

<sup>24</sup> Bearss, Edwin C., “Historic Resource Study, Sandy Hook Proving Ground, 1874-1919,” Gateway Rational Recreation Area, New York/New Jersey, Denver, Colorado: National Park Service, 1983, 362.

<sup>25</sup> Newman, 46 (Record Group 392, Entry 311, Box 13, File 4146).

<sup>26</sup> Newman, 47-48; For information on the Navesink mortar battery also see: [www.oocities.org/fort\\_tilden/highlands.html](http://www.oocities.org/fort_tilden/highlands.html).

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Proceeding with its plan for new 16-inch coastal guns, the Army produced nine M1919 guns, one was mounted on a disappearing carriage and eight M1919 MII and MIII guns were mounted on M1919 barbette carriages in open gun pits. Narrow-gauge tracks provided ammunition service from external magazines to the gun pits. The Army emplaced six of these guns, including two at a new Battery Harris at Fort Tilden in Queens for the defense of New York Harbor. Battery Harris was started in 1921 and completed in 1923. Its M1919 MII guns were placed 850-feet apart with no protection, but its Switchboard and Plotting Rooms were protected with bombproof reinforced concrete construction.

The Army's 16-inch guns were made with wire-wound construction, in which "tubes were tightly wound for part or the full length with layers of steel wire, and the wire was covered by a (steel) jacket." The guns weighed 385,847 pounds and fired shells weighing approximately 2,100 to pounds up to a range of approximately 49,000 yards, and they were expensive to produce.<sup>27</sup>

#### EVOLUTION OF THE 16-INCH CASEMATED BATTERY

With the U.S. adoption of the Washington Naval Treaty in 1922, the Navy cancelled plans developed during the War for "6 new battleships and 6 new cruisers. The Navy had already built seventy 50 caliber MkIIIM1 16-inch guns for these ships and it was subsequently decided to release some of these weapons to the Army." The Navy guns weighed 307,000 pounds and fired 2,100-pound shells up to a range of 45,000 yards with more accuracy than the Army guns. The Army modified the Model 1919 barbette carriage design for the 16-inch Navy guns and emplaced six of them in Panama and Hawaii between 1924 and 1934.<sup>28</sup>

In 1923 the Army identified 18 major harbors in the continental U.S. for 16-inch MkIIIM1 Navy gun emplacements. Due to the high cost of bombproof construction, the "new batteries were to be protected by duplication, dispersal, and concealment." Two 16-inch batteries were planned for San Francisco, the highest priority, but debate about the locations of the batteries and the lack of funding for military construction delayed these.<sup>29</sup>

By 1930, new developments in aircraft carriers and warplanes led the Army to reevaluate harbor protection with the establishment of a new Harbor Defense Board. With funding tight during the early depression years, the debate continued amongst the COE and various Army sections about the design and cost of the priority batteries to be located at Fort Funston in San Francisco and at Tennessee Point in Marin County. The COE initially favored a dispersed battery design with open gun emplacements separated by more than 300 yards, and splinter-proof magazines. The Army's War Plans Division and its ordnance and coast artillery sections all had various concerns about the efficiency of different battery designs and their vulnerability to aerial bombardment and its potential impact on battery crews.

The 1920s dispersed 16-inch gun emplacements like Battery Harris at Fort Tilden were designated Type A layouts (See Historic Image 47). A proposed Type B concentrated battery layout had a central bombproof battle magazine and dispersed splinter-proof reserve magazines (See Historic Image 48).

<sup>27</sup> [en.wikipedia.org/wiki/List\\_of\\_British\\_ordnance\\_terms#Wire-wound](http://en.wikipedia.org/wiki/List_of_British_ordnance_terms#Wire-wound)

<sup>28</sup> Berhow, 33;

<sup>29</sup> Smith, Bolling, "The 16-inch Batteries at San Francisco and the Evolution of the Casemated 16-inch Battery," *The Coast Defense Journal*, Volume 15, Issue 1, February 2001, 20. This article thoroughly chronicles the development of battery design in San Francisco and its influence nationally.

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Types A and B were passed over because of the high cost of the land required, the lack of protection for the guns, and the potential service problems from dispersed magazines.

(H47. Battery Harris at Fort Tilden, a Type A layout with dispersed 16-inch gun emplacements and magazines, CDJ, February 2001.)

(H48. Proposed Type B 16-inch gun battery for Narragansett Bay, 1933, CDJ, February 2001.)

A proposed Type C layout for the 16-inch gun battery at Fort Funston with open emplacements 200-yards apart and a central bombproof magazine (See Historic Image 49) was approved by the Army in early 1935 but soon ran into opposition. The Chief of Coast Artillery expressed "serious doubt" about the layout "in view of modern developments in warfare" because of the vulnerability of the guns to aerial bombardment. He recommended that the guns be protected with steel turrets, but their high cost and the time required to develop them proved to be unacceptable, and he withdrew his recommendation in January 1936. A new acting Chief of Coast Artillery then proposed "a new alternative, a modified casemate form of emplacement. This casemate, however, would have to protect a carriage not designed to be casemated. The casemate would therefore have to be massive, far larger than any casemate envisioned before. This major shift in casemate design was forced by the size of the gun and the need to use the existing center-pintle barbette carriages."<sup>30</sup>

(H49. Proposed Type C 16-inch gun battery layout, 1934, CDJ, February 2001.)

The casemate proposal generated more debate within the Army and the COE because the casemates would reduce the field of fire of the 16-inch guns to 145 degrees and the maximum elevation to 46 degrees. Japanese activity in the Pacific increased the urgency of west coast defense, and the War Plans Division (WPD) in February 1937 approved the casemate emplacement of the 16-inch guns at Fort Funston and Tennessee Point. In 1937 the Fort Funston emplacement was named Battery Townsley, and the Tennessee Point reservation was named Fort Cronkhite and the emplacement there was named Battery Davis. While the decision to build casemates at Battery Townsley and Battery Davis was not considered a new policy, "the factors that resulted in the adoption of casemates at San Francisco also proved decisive in the design of all future 16-inch batteries. Never again would the U.S. construct major-caliber open barbette emplacements."<sup>31</sup>

Battery Townsley and Battery Davis were both unique layouts because of the topography of their locations. The plan of Battery Davis has the gun emplacements 600 feet apart with a central traverse magazine in the shape of a flat v with powder and shell rooms along the corridor and the power plant at the rear (See Historic Image 50). After considering a few different casemate designs, the COE and other Army sections settled on a design with a ceiling of 13 feet of concrete over the gun emplacement and a "burst course" of narrow concrete in the soil above the ceiling to protect against 600-pound bombs. The façades of Battery Townsley and Battery Davis have high concrete walls with semi-circular canopies extending to the outer end of the gun blocks (See Historic Image 51). The Plotting Switchboard Rooms at Battery Townsley and Battery Davis were built of bombproof construction and located away from the gun emplacements and magazines so that their Fire Control functions would not be affected by the blast, smoke, noise, or the ammunition service of the 16-inch guns, or by the noise, vibrations and smoke of the power plant.

(H50. Battery Davis, Fort Funston, San Francisco, 1940, COE.)

(H51. Battery Townsley, Fort Cronkhite, San Francisco, 2013, MCPS.)

<sup>30</sup> Smith, 41.

<sup>31</sup> Smith, 53.

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The success of Battery Davis and Battery Townsley was widely recognized in the Army's coastal defense sections. "The casemated batteries, as built in San Francisco, were considered excellent, protecting against both naval gunfire and aerial bombardment. The only drawback was the limited fields of fire, and this could be solved with 3 or 4-gun batteries." While turret protection of large guns was still contemplated, the extended time required to design and test the turrets and the general satisfaction with Battery Davis and Battery Townsley ultimately led to the adoption of casemates for the two existing dispersed 16-inch gun batteries (Battery Harris at Fort Tilden in New York and Battery Long at Fort Duvall in Boston), and for all future 16-inch gun emplacements in the continental U.S.<sup>32</sup>

While San Francisco received new coastal defense facilities, the condition of coastal defenses elsewhere was woefully deficient. "Before 1940," as noted in the Coast Defense Study Group Journal in 1994, "most of the Army's existing harbor defenses were on caretaker status." In early April of 1940, the chief of coast artillery, Major General Joseph A. Green, recommended the construction of six additional 16-inch gun batteries for the harbor defenses of the Chesapeake Bay (one at Fort Story on Cape Henry, Virginia and a second at Fort Custis in Cape Charles, Virginia), Philadelphia (Fort Miles in Cape Henlopen, Delaware), Eastern New York (Camp Hero in Montauk, Long Island), and Narragansett Bay (one at Fort Church in Sakonnet Point, Rhode Island, and one at Fort Greene in Point Judith, Rhode Island). The Army approved this recommendation in early May.<sup>33</sup>

In June 1940, the fall of France raised alarms about possible naval attacks on America's major coastal cities. In an "Immediate Action" letter to the Army's Adjutant General on July 27, the president of the Harbor Defense Board, Major General Walter C. Baker, recommended "major modifications of Harbor Defense Projects" with an estimated cost of an \$82 million. Citing "the major deficiencies of the project armament of the harbor defenses and the measures essential in order to modernize the defenses," Major General Baker noted,

Those fixed batteries of heavy seacoast armament which have served their purpose for the past 20 to 40 years are now outranged to a marked degree, caliber for caliber, by the guns of modern navies... These batteries, having been designed prior to the development of combat aviation, were constructed to resist naval gunfire of their period but not aerial attack. It is impracticable to furnish the heavy outmoded gun and mortar batteries suitable overhead protection. These old batteries should be replaced. In view of the current trend to much heavier naval armament and the proven capabilities of modern combat aviation it is unsound to continue to rely on this outmoded fixed seacoast armament to protect strategically important harbors, harbor facilities, naval bases and elements of the fleets when using, entering or leaving such harbors.<sup>34</sup>

In a section on "Armament and types of emplacements," Major General Baker wrote,

The Board considers it urgent that the modernization of the harbor defenses be accomplished at the

<sup>32</sup> Smith, 64, 66.

<sup>33</sup> Berhow, 36; Smith, 67; Letter, Lieutenant Colonel K.T. Blood to President, Coast Artillery Board, Information for Board of Review, Harbor Defense Projects, June 6, 1940.

<sup>34</sup> Letter, Major General Walter C. Baker, President, Harbor Defense Board, To: The Adjutant General, Subject: Abandonment of Harbor Defense Posts No Longer Required for Seacoast Defense, War Department, Office of the Chief of Coast Artillery, July 27, 1940.

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earliest practicable date. In view of the present disturbed international situation the plans for modernization should seek primarily to meet the present situation rather than to attempt a slower program to meet the indefinite requirements of the distant future. To this end it appears imperative that, for new batteries, use be made of the most suitable guns and types of mounts now available, or readily procurable, rather than to sacrifice valuable time developing new armament and types of installations such as a modern 12-inch gun or turret mounts for 12-inch and 16-inch guns. The board considers the following cannon and types of mounts to be the most suitable and readily procurable.

1) Primary Armament. 16-inch Navy guns Mark II mounted on barbette carriages in casemate emplacements. This gun has a range of 44,680 yards with a 2,100 lb. navy projectile. There are available to meet Army requirements a total of 51 completed and 61 partially completed guns. There are no unused carriages on hand.

2) Secondary Armament. 6-inch M1903 and M1905 guns range approximately 26,000 yards. There are 72 of these on hand and 13 additional guns now mounted on disappearing carriages which may be used in a replacement program. The Navy 6-inch projectile can be used in this gun. It has been estimated that a suitable carriage for this weapon can be manufactured commercially within eight months from the time that funds are made available.

Major General Baker called for the casemating of 10 existing major-caliber gun batteries, the construction of 27 new 16-inch gun casemated batteries (for a total of 37) and 50 new "shielded" 6-inch gun batteries, and the abandonment of 128 existing batteries when the new work was completed. The Secretary of War approved the "Modernization Program of Harbor Defenses, Continental U.S." in September 1940.<sup>35</sup>

As a history of the Eastern Defense Command noted in 1945, "the new harbor defenses which were for the most part sited as far seaward as possible, were based on two basic weapons, the 16" gun for use against heavy units and the long range new 6" gun for use against the smaller and faster targets. These two weapons together could take care of almost any naval unit against them with the exception of motor torpedo boats."<sup>36</sup>

Battery Townsley was proof fired in 1940, and the Army started building Battery Hamilton on Fort Greene at Narragansett Bay with a Type A casemated battery design based in part on the casemated designs of Batteries Townsley and Davis.<sup>37</sup> Battery Hamilton's barbell-type plan has the gun emplacements 500 feet apart and projecting forward from the axis of the central traverse magazine, which has angled corridor ends connecting to the casemates (See Historic Image 52). The straight section of the magazine has large powder rooms on either side of a central transverse passageway, then medium size shell rooms, and then small store rooms on one end and a similar size double latrine on the opposite end. The passageway leads to a largely symmetrical power plant. The profile of the casemate mound was peaked and the burster course was extended across the entire top. (H52. Battery Hamilton, Fort Greene, Narragansett Bay, Report of Completed Works, 1944,

<sup>35</sup> Smith, 68.

<sup>36</sup> Bronk, William M., "A History of the Eastern Defense Command and of the Defense of the Atlantic Coast of the United States in the Second World War," New York, 1945, 22.

<sup>37</sup> The Army's typology for Battery designs does not appear to have been fully standardized or sequential. For a discussion of casemated battery types see Smith, 71.

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The urgency of the Modernization Program precluded major modifications to the approved 16-inch gun battery layout, with casemated emplacements 500 feet apart connected by a central traverse magazine. In early 1941, the chief of coast artillery issued "Notes on Type Harbor Defense Installations," specifying that,<sup>38</sup>

Prior to the existence of an air threat, it was common practice to give to a battery of given caliber protection against cannon of equal caliber. This practice is still considered sound insofar as protection from hostile gunfire is concerned. The hostile air threat requires that protection be provided against possible hits (or, in some cases, near hits) by demolition bombs, fragmentation bombs, incendiary bombs, small arms, small caliber cannon and gas. It is impracticable to provide all seacoast defense elements with complete protection against all of the air weapons. The degree of protection required varies with the importance of the element to be protected and the facility with which protection can be provided...

Bombproof construction for a major caliber casemated battery will, where practicable, be provided to give protection to the vital elements against one hit by a 2,000-pound demolition bomb of current design. Weakest portions of the structure are designed to protect against one hit by a 600-pound demolition bombs of current design...

Bombproof protection for minor caliber batteries is to be provided for the magazines and those rooms normally in the same structure. The guns will be given protection by steel shields. The degree of bombproof protection contemplated for the structures is not as great as that for major caliber batteries.

Important fire control elements such as switchboard and plotting rooms are given bombproof protection comparable with that provided the batteries they serve.

The chief of coast artillery also specified that 16-inch casemated batteries "would have a maximum field of fire of 140 degrees per gun, with a maximum of 200 degrees for the battery. The magazines were to hold 100 rounds per gun. Plotting, switchboard, and radio rooms, as well as the battery commander's station and the primary base end station, were to be located away from the casemate structure."<sup>39</sup>

The COE determined that 16-feet of concrete was necessary to protect major-caliber guns from 2,000-pound demolition bombs. This resulted in a Type E casemated battery modification with 16 feet of solid concrete that included a top burster layer above the gun emplacement (See Historic Image 1). The casemates were also pulled back to align with a straight traverse magazine corridor to simplify the construction and diminish the barbell appearance from the air. Four batteries already under construction with the Type A design for Narragansett, Delaware, and Chesapeake defenses were continued, while all other 16-inch batteries were built with the Type E design, except for a battery at Fort Barry in San Francisco that had a unique design but was never armed. Three of the 15 completed Type E batteries had a modified power plant and magazine layout. Of the 37 authorized 16-inch gun batteries for the continental U.S., 21 were built but six of these were never armed (see Table 1).

The Army assigned a Battery Construction Number (BCN) for each of the projected new gun emplacements - 100-series BCNs for 16-inch gun emplacements and 200-series BCNs for 6-inch gun

<sup>38</sup> Notes on Type Harbor Defense Installations, Office of Chief of Coast Artillery, early 1941.

<sup>39</sup> Smith, 68.

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emplacements. In most locations Primary Armament 16-inch emplacements were paired with Secondary Armament 6-inch gun emplacements to protect the vicinity from vessels at sea within long-range firing capability, close to shore, and from landings. Because new guns would take a long time to produce, "The Army decided to use the existing stocks of some eighty-five M1903 and M1905 6-inch gun tubes, many removed from 6-inch disappearing batteries during World War I, on new M1 and M2 long range barbette carriage designed as the medium range weapon. The gun tubes were modified and redesignated M1903A2 and M1905A2, respectively."<sup>40</sup>

For the Harbor Defenses of Southern New York the Modernization Program specified a new 16-inch gun emplacement (BCN 115) and a new 6-inch gun emplacement (BCN 218) at Fort Wadsworth on Staten Island.

#### FORT HANCOCK AND WORLD WAR II

The Harbor Defense of Sandy Hook included Fort Tilden on Rockaway Point in Queens and Fort Hancock on Sandy Hook. Since the 1920 deactivation of three 12-inch mortar batteries (including the Navesink Mortar Battery) and one 8-inch gun battery, the only notable armament change at Fort Hancock before WWII was the 1930 relocation there from Fort Eustis in Virginia of a railway artillery regiment with four 12-inch railway mortars and four 8-inch guns. On the eve of WWII, Fort Hancock had nine active batteries dating from the pre-WWI Endicott Period with guns ranging from 3-inch to 12-inch calibers. The guns on five of these Endicott Period batteries were mounted on disappearing carriages, which had been considered obsolete by the start of WWI. Fort Hancock had one 6-inch gun mounted on a barbette carriage and two 1917 batteries, Battery Mills and Battery Kingman, with 12-inch guns mounted on barbette carriages.<sup>41</sup>

For the Harbor Defense of Sandy Hook, the Modernization Program included for Fort Hancock:<sup>42</sup>

- casemating the existing 12-inch gun batteries Mills and Kingman
- a new 16-inch gun casemated battery (BCN 116) "in the vicinity of Sandy Hook"
- a new 6-inch gun battery (BCN 219) "in the vicinity of Sandy Hook."

And for Fort Tilden:

- casemating the existing 16-inch gun Battery Harris
- a new 16-inch gun casemated battery (BCN 117) "in the vicinity of Fort Tilden"
- a new 6-inch gun battery (BCN 220) to replace Battery Ferguson.

The "vicinity" identifications were listed as "General Location-Subject to Site Board Approval." Fort Hancock and COE personnel reportedly "scouted the hills and bluffs of Rocky Point" on the Navesink Highlands in June 1940 for the possible location of new Fort Hancock batteries. The temporary 12-inch Navesink Mortar Battery of WWI provided a precedent for locating Fort Hancock artillery on the Navesink Highlands.<sup>43</sup>

In December 1940, Colonel Philip S. Gage assumed command of Fort Hancock and Sandy Hook, and

<sup>40</sup> Berhow, 34.

<sup>41</sup> [www.fortwiki.com/Fort\\_Hancock\\_\(2\)](http://www.fortwiki.com/Fort_Hancock_(2))

<sup>42</sup> Harbor Defense Modernization Program, Harbor Defenses of Sandy Hook, Sept. 6, 1940.

<sup>43</sup> Harbor Defense Modernization Program, Harbor Defenses of Sandy Hook, Sept. 6, 1940; Newman, 54, referencing the June 1940 scouting of Rocky Point as "Discussions with Historian of Fort Hancock Tom Hoffman, May-June 2011."

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he was well prepared to make the post combat-ready. He graduated in 1909 from West Point, where he roomed for two years with George S. Patten, and the two soldiers maintained a close friendship afterwards. Gage specialized in harbor defenses and his first assignment was Portland, Maine. After attending the Coast Artillery School he served in France during WWI. Gage was promoted to Brigadier General in April 1941 and eventually assumed command of the Harbor Defense of New York (re-named in 1942), with his headquarters at Fort Hancock. As *The New York Times* noted, Gage "emphasized the fort's strategic importance by saying, 'We are the gatekeepers of America's front door.'"<sup>44</sup>

In late February 1941, a Board of Officers including Fort Hancock commander Colonel Philip S. Gage convened "for the purpose of selecting sites for fortifications, and making such recommendations as to changes if any, in sites already selected" for the Harbor Defenses of Sandy Hook and the Harbor Defenses of Southern New York. On March 10, this "Site Board" recommended three 16-inch gun and three 6-inch gun batteries: on Staten Island at Fort Wadsworth (BCN or Const. No. 115 and No. 218), in Queens at Nigger Point where JFK Airport is now located (Const. No. 117) and at Fort Tilden (Const. No. 220), and on the Navesink Highlands near Fort Hancock on Sandy Hook (Const. No. 116 and Const. No. 219). Regarding the Navesink location, the Site Board noted,

This site constitutes a natural fortress. It is of sufficient area to accommodate all necessary installations. Its acquisition would have to be accomplished by condemnation proceedings as the owner has stated that although she is perfectly willing to lease the property she will not agree to a transfer of title. The site will permit Case II fire for Const. No. 116. The elevation will permit the efficient utilization of the Depression Position Finder as a means of position finding. The local defense of the site would be greatly facilitated by the nature of the topography. The site for Const. No. 219 would permit Case II fire over the water areas.<sup>45</sup>

The Site Board also recommended casemating the existing 12-inch gun batteries Mills and Kingman on Fort Hancock and the existing 16-inch gun Battery Harris on Fort Tilden with azimuths to optimize their field of fire in conjunction with the new batteries for the Harbor Defenses of Sandy Hook. In a supplement, the Site Board noted "concerning the recommended site for Const. No. 116 and Const. No. 219, the tract to be acquired should comprise approximately 100 acres. The estimated cost of the land, right of way, access road, survey and transfer is \$225,000."<sup>46</sup>

The Army established the Eastern Defense Command in March 1941, with headquarters at Fort Jay on Governor's Island, to defend the major harbors from Portland, Maine, to Key West. As a history of the Eastern Defense Command noted, "Because of its high strategic importance and because of the land and water formations a rather complex problem was offered by the region adjacent to New York City." The structure of three separate Harbor Defenses - "Eastern New York on the North Shore of Long Island at Fort Totten, Southern New York, at the Narrows between Brooklyn and Staten Island, and Sandy Hook, protecting Ambrose Channel between Sandy Hook, New Jersey, and Rockaway Point on Long Island" - was cumbersome at best.<sup>47</sup>

<sup>44</sup> "Brigadier Philip S. Gage, 96; Specialist in Harbor Defenses," *The New York Times*, January 16, 1982.

<sup>45</sup> Proceedings of a Board of Officers, Headquarters Second Coast Artillery District, Office of the District Commander, Fort Hamilton, New York, March 10, 1941.

<sup>46</sup> Supplementary Proceedings of the Board of Officers, March?, 1941.

<sup>47</sup> Bronk, 20.



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On April 5, 1941, the Commanding General of the First Army at Governor's Island recommended that the new 16-inch gun battery (Const. No. 115) proposed for Fort Wadsworth be "disapproved," and to site the new 16-inch gun battery (Const. No. 117) at Fort Tilden instead of at Nigger Point. The recommendation also included siting the new 16-inch gun battery (Const. No. 116) and new 6-inch gun battery (Const. No. 219) at Fort Hancock instead of on the Navesink Highlands.<sup>48</sup>

In an April 29, 1941 letter to the Adjutant General, the Chief of Coast Artillery agreed with the Site Board's original recommendations, noting that because Battery Harris on Fort Tilden and Batteries Kingman and Mills on Fort Hancock are located "on low ground and so near the shore line, which has excellent landing beaches, as to be subject to the action of raiding parties...it is considered highly important that the three new 16-inch gun batteries (No. 115, Harbor Defenses of Southern New York, and Nos. 116 and 117, Harbor Defenses of Sandy Hook) should be dispersed both in depth and laterally." Such an arrangement, the Chief of Coast Artillery noted, "would provide not only for the necessary defense in depth but for sufficient lateral dispersion to permit cross-fire against naval warships. Primary batteries so dispersed would present a more difficult objective for bombardment aviation and could be protected by anti-aircraft artillery far more effectively than coast-line batteries."<sup>49</sup>

Regarding the "Navesink Highlands vicinity of Sandy Hook" for "16-inch Battery Construction No. 116," the Chief of Coast Artillery noted,

This site is approximately 200-feet above mean sea level and will permit efficient utilization of a Depression Position Finder as an auxiliary means of position finding...

The Chief of Coast Artillery believes that the Navesink site is a better location than Fort Hancock as it affords: More adequate fire coverage in the water areas to the south; Lateral Dispersion of heavy batteries; Sufficient height of site to permit Case II fire.<sup>50</sup>

Regarding "6-inch Battery Construction No. 219," the Chief of Coast Artillery noted,

The sighting of this battery at Navesink Highlands will permit Case II firing over the water area and will enable this battery to cover the landing beaches and water area well to the south along the New Jersey Coast to Shark River Inlet. If this battery is sited at Fort Hancock approximately 6,000 yards range to the south will be sacrificed. The existing secondary armament at Sandy Hook ranges only as far south as Monmouth Beach.

In view of the definite advantage of the Navesink Highlands site over the Fort Hancock site the Chief of Coast Artillery believes the site recommended by the Site Board is the better location.<sup>51</sup>

The Chief of Coast Artillery also endorsed the Site Board's recommendation to site 16-inch gun Const. No. 117 at Nigger Point instead of at Fort Tilden as recommended by the Commanding General of the First Army.

President Franklin D. Roosevelt issued a proclamation on May 27, 1941, that "an unlimited national

<sup>48</sup> Headquarters First Army, Governor's Island, NY, Tab "A," April 29, 1941, 1.

<sup>49</sup> Headquarters First Army, Governor's Island, NY, Tab "A," April 29, 1941, 3.

<sup>50</sup> Headquarters First Army, Governor's Island, NY, Tab "A," April 29, 1941, 4.

<sup>51</sup> Headquarters First Army, Governor's Island, NY, Tab "A," April 29, 1941, 4-5.

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emergency confronts this country, which requires that its military, navel, air and civilian defenses be put on a basis of readiness to repel any and all acts or threats of aggression directed toward any part of the Western Hemisphere... I call upon all loyal citizens to place the nation's needs first in mind and action to the end that we may mobilize and have ready for instant defensive use all of the physical powers, all of the moral strength and all of the material resources of this nation."<sup>52</sup>

On June 7 the 2<sup>nd</sup> Coast Artillery District placed harbor defenses on Readiness Condition 3: "Minimum readiness. Within the fort, a minimum of one secondary artillery battery and supporting searchlights manned." A joint Harbor Entrance Command Post for New York Harbor was established at Fort Wadsworth and placed on training status, but the coordination of the separate commands of the Harbor Defenses of Southern New York (Fort Wadsworth and Fort Hamilton) and the Harbor Defenses of Sandy Hook (Fort Hancock and Fort Tilden) was seen as problematic.<sup>53</sup>

#### NAVESINK MILITARY RESERVATION

The War Department executed a "Grant for the Use of Land" with Julia H. Trask on June 18 for a .124-acre site on the north side of Portland Road "for the purpose of constructing, maintaining and operating a dug-in fire control station so long as the use is required for military purposes by the United States of America, during the period of emergency declared by the President of United States in Proclamation dated May 27, 1941, or during a period of war declared by the Congress of the United States prior to termination of said emergency." The Corps of Engineers built Single and Double Dug-in Fire Control Stations on this site for the existing 12-inch gun batteries Mills and Kingman on Fort Hancock, and these stations are extant north of the Reservation. The COE began casemating Battery Kingman in August 1941, but kept Battery Mills in service so that at least one of the 12-inch gun batteries was ready for action. In October, the COE began casemating the 16-inch gun Battery Harris on Fort Tilden.<sup>54</sup>

The War Department also planned the acquisition of the "Navesink Site" owned by Hartshorne family members for the 16-inch gun battery Const. No. 116 and 6-inch gun battery Const. No. 219. In a 1977 interview, Brigadier General Philip S. Gage related a story about part of this acquisition,

That property up there was owned by a widow, Mrs. James Trask (See Historic Image 53). A beautiful piece of property and she had a perfectly lovely home up there. Her husband I think had been quite a prominent attorney in New York...He was dead and she was a widow. When I found out they (the War Department) were contemplating taking over her property, and running her out and putting a battery of 16-inch rifles up there in back of her house I was very much distressed about it because I was very fond of Mrs. Trask. I used to go over there and drop in once in a while and visit her a little bit. She was quite along in years. And when the news broke to me I decided I

<sup>52</sup> Presidential Proclamation 2487 of May 27, 1941, by President Franklin D. Roosevelt declaring a state of National Emergency.

<sup>53</sup> Bearss, 522; For Coast Artillery Defense and Readiness Categories, see Gaines, William C., "Categories of Defense for Coast Artillery Operations in WWII," *American Seacoast Defenses: A Reference Guide*, CDGS Press, McLean, Va., 2004, 499-501.

<sup>54</sup> War Department, Grant for the Use of Land, Julia H. Trask, Grantor, June 18, 1941.

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had better go up and tell her to expect it...I never forget what she said. She was a patriotic, spunky little thing. I told her, "Mrs. Trask, I've got bad news for you I have to tell you." And I told her and she said, "Well, we've lived in this house, my husband and I ever since we were married. But," she said, "if now we are at war and if the government wants me to give it up I will give it up." Just like that and she snapped her hands. Which I thought was a very, very patriotic thing. Not a dissenting word at all.<sup>55</sup>

(H53. Julia Hartshorne Trask at Rocky Point, n.d., MCPS.)

In October and November 1941, the Corp of Engineers surveyed three Hartshorne family tracts totaling 226.2 acres for the "Navesink Site, Highlands N.J." (See Historic Image 45), as discussed above. The Corps that October also began casemating the existing 16-inch gun batteries Long in Boston and Harris on Fort Tilden. In November, the Corps drafted alternate locations for Battery Const. 116 on a topographic map of the proposed Highlands site. Plan "A" located Const. 116 at the southeast corner of the southwest ridge and would require 152 acres of land. Plan "B" located it on the high point of the central ridge and would require about 138 acres. The map sited Battery Const. 219 into the slope northeast of Julia Trask's house. Another map noted the same site for Const. 219 as "Location No. 1," and also noted an alternate "Location No. 2" on the site of Julia Trask's House.<sup>56</sup>

On December 11, 1941, just four days after the Japanese attack on Pearl Harbor, the 2<sup>nd</sup> Coast Artillery District raised the Readiness Condition to 2, "A state of readiness...maintained indefinitely. A selected number of batteries and guns within those batteries and their combat support manned and ready. Observation towers, communications and command posts...continuously manned." The District also raised the Defense Category from A, "Probably free from attack," to B, "May be subject to minor attacks." On December 15, the Northeastern Defense Command raised the Defense Category to C, "In all probability, subject to minor attacks...with preparedness to go quickly to Readiness Condition 1," which was "Maximum unit readiness for combat action." The Eastern Defense Command changed the 2<sup>nd</sup> Coast Artillery District designation to the New York-Philadelphia Frontier Defense Sector, with headquarters at Fort Hamilton.<sup>57</sup>

General Gage recalled that Mrs. Trask had Japanese servants, but that after Pearl Harbor she told him, "We are at war with the Japanese now...I decided that they had better not be around."<sup>58</sup>

In January 1942, the Site Board chose the COE's "Plan B" for Battery Const. 116 and "Location No. 2 for Battery Const. 219," noting that in both cases the alternate sites would "require a great deal of excavation" that would significantly increase construction cost and time.<sup>59</sup> The COE estimated the cost of the Navesink acquisitions at \$225,000, the same total that the Site Board had placed on them.<sup>60</sup> Mrs. Trask was willing to cooperate with the War Department, but she and her son, Benjamin Hartshorne

<sup>55</sup> Hoffman, Tom, "An Oral History Interview with Brigadier General Philip S. Gage, Commanding General, New York Harbor Defenses 1942-1944," Sandy Hook, Gateway National Recreation Area, April 8, 1977, 37-38.

<sup>56</sup> "Local Board Proceedings, Harbor Defenses of Sandy Hook, January 29, 1942," War Department, Exhibit A and Exhibit B.

<sup>57</sup> New York-Philadelphia Sector World War II, War Department, 1944, 28, 34; Gaines, William C., "Fort Tilden, NY," *Coast Defense Journal*, Volume 26, Issue 2, May 2012, 58-90. Gaines, 500.

<sup>58</sup> Hoffman, 36

<sup>59</sup> "Local Board Proceedings, Harbor Defenses of Sandy Hook, January 29, 1942," War Department, 3.

<sup>60</sup> Corps of Engineers, Land Acquisition 16-inch and 6-inch Battery Sites, January 15, 1942.

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Trask, who was apparently occupying the brick house at Lower Rocky Point in the summers, tried to retain ownership of the land as they had in granting the use of the .124-acre parcel north of Portland Road for the fire control stations. That January, Mrs. Trask's attorney wrote to the Under-Secretary of War,

The property in question consists of about 80 acres comprising a part of the Hartshorne estate which Ben's Mother's family has held since one of their early ancestors received it from the Indians. Mrs. Trask was a Miss Hartshorne. This property has never been out of the Hartshorne family. Ben's mother lives the year round on the property in a house of considerable size and value situated near the highest point of land in that vicinity.

Ben, himself, lives on this property about five months in every year but in a separate house.

He and his family are not actuated at all by selfish motives and they are willing and eager to do all they can to aid the government. He would like to work out a plan whereby the government could take the part of the property most necessary for defense, say about 50 acres, for temporary war use at a nominal rental of \$1.00 a year, provided the balance of the property, namely the 30 acres on which Mrs. Trask's house is located, should remain undisturbed. Ben assumes that Army operations on the 50-acre section will not necessarily make Mrs. Trask's occupancy of her home impractical. Mrs. Trask, for reasons that can be readily understood, is reluctant to move from her ancestral home but at the same time she wants to do whatever is necessary to aid the government in setting up adequate defenses at this strategic point.<sup>61</sup>

Neither General Gage nor others involved in the government's acquisition had apparently shared with the Trasks the extent of the Army's plans for the fortifications on their property. After the War Department rejected Mrs. Trask's request to keep her house, she signed an option on May 11, 1942, to sell 75.9 acres, identified as Tract 1 on the 1941 Survey, to the government for \$95,000. On May 19 her attorney again wrote to the Under-Secretary of War,

Because this property is her permanent home both in Summer and in Winter and because of her sentimental attachment to historic home Mrs. Trask naturally was reluctant to sell it, but from a sense of patriotic duty she has consented to accept the Government's offer even though it is less than she thinks it is worth. If you remember the property you will recall that it included a part of a very high hill that was covered with large trees and which had a magnificent view of the ocean. On two sides the base of the hill borders on the Shrewsbury River.

Ben has suggested to the agents with whom he has been negotiating... that he would like that the contract of sale and the deed embody a provision that Mrs. Trask shall have the right within a reasonable time after the end of the war to buy back the property at the price at which the government is paying for it. Ben is generous enough not to require that his mother shall be reimbursed for the value of the improvements on the property including the two houses to be demolished, nor for the cost of demolishing the fortifications and restoring the land to its former condition.

I think that Ben is too generous and that some provision ought to be made in the contract and deed for an allowance for restoring the property, at least in part, to the condition it was in when the Government took it over. However, if the government is unwilling to give to Mrs. Trask upon her reacquiring the property a credit by way of reparation for damages suffered by the property she will be content to buy back the property at the price at which it was sold without any deduction

<sup>61</sup> Letter, Catesby L. Jones to Robert P. Patterson, January 7, 1942.

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whatsoever.<sup>62</sup>

The Trasks inserted a Rider in the option agreement providing their ability to reacquire the property after the Secretary of War determined that the "United States no longer needs said lands, facilities and improvements," or "if fortifications are not completed on these premises prior to the cessation of the present hostilities."<sup>63</sup> The War Department rejected the provision, noting, "it is illegal to provide in a contract for the acquisition of land that the vendor shall have option to repurchase. We are thus not at liberty to grant your request."<sup>64</sup>

On May 19, 1942, Richard Hartshorne signed an option to sell 142.3 acres, identified as Tract 2 on the 1941 Survey, of his 469.3-acre Portland property west of the Trask property to the War Department for \$96,000.<sup>65</sup>

The War Department, according to a newspaper account, originally offered Robert H. Trask, Sr., Julia Trask's son and Benjamin Trask's brother, \$21,500 for his 8-acre parcel on the Navesink River identified as Tract 3 on the 1941 Survey. Robert worked in the insurance business in New York and had spent \$30,000 to build a house and garage on the site where he lived with his wife, Rebecca Minturn Bird Trask, and their two children. Robert acquired title to the 8-acres from Julia Hartshorne Trask on January 23, 1941. The U.S. acquired Tract 3 by condemnation on June 26, 1942, for a judgment of \$33,400. Robert appealed the judgment, and a jury at the U.S. District Court in Trenton later awarded him \$42,500 for the property.<sup>66</sup>

The U.S. acquired Tract 1 from Julia Hartshorne Trask and Tract 2 from Richard Hartshorne and his wife by eminent domain on November 20, 1942, for the amounts specified in the option agreements they signed in May. The government may have acquired the Navesink tracts through eminent domain to provide tax advantages to the sellers. The U.S. paid \$233,500 for the three tracts, just slightly more than the COE had estimated.<sup>67</sup>

In his 1977 interview, General Gage recalled that he tried to save Mrs. Trask's house by siting the proposed guns away from it, but he was overruled. When the Army "tore that beautiful house down," General Gage salvaged several mantles and put four of them in his residence on Fort Hancock.<sup>68</sup>

<sup>62</sup> Letter, Catesby L. Jones to Robert P. Patterson, May 19, 1942.

<sup>63</sup> War Department, Option for Purchase of Land, Navesink Site, Highlands, N.J., Property of Julia H. Trask, May 11, 1942. This Option copy (from the Portland Place Collection, MCPS) was signed by Julia H. Trask and witnessed by Benjamin H. Trask but not signed by the government.

<sup>64</sup> Letter, Howard C. Peterson to Catesby Jones, June 5, 1942.

<sup>65</sup> War Department, Option for Purchase of Land, Navesink Site, Highlands, N.J., Property of Richard Hartshorne, May 19, 1942.

<sup>66</sup> Judgment On Declaration of Taking, United States of America vs. Robert Trask and Rebecca Trask, 8 acres, June 26, 1942, Monmouth County Deed Book 1895, pages 93-95; Interview, Robert (Bob) Trask, Jr., Londonderry, Vermont, by Gail L. Hunton, Monmouth County Park System, July 6, 2012; and "\$42,500 Value Put on Trask Property," *Red Bank Register*, n.d.

<sup>67</sup> Judgment On Declaration of Taking, United States of America vs. Richard Hartshorne, Josephine Hartshorne, and Julia Hartshorne Trask, 218.2 acres, November 20, 1942, Monmouth County Deed Book 1907, pages 204-207.

<sup>68</sup> Hoffman, 38-39.

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In May 1942, the Eastern Defense Command merged the Harbor Defenses of Southern New York, Eastern New York, and Sandy Hook into the Harbor Defenses of New York (HDNY) as a subsector of the New York-Philadelphia Sector:

Fort Hancock became the nerve center of the new command. To administer it, Headquarters and Headquarters Battery, HDNY, was activated at Fort Hancock. This consolidation had its origins in Army Regulations 90-40, October 2, 1937, which designated a harbor defense as "an administrative and tactical command provided for defense of a harbor or other water area." Zeroing in on this, sector people had successfully argued that upon completion of the modernization program, the "interlocking of the three harbor defenses will be achieved to a much greater degree with overlapping fields of fire of seacoast batteries, fire control facilities used in common and joint action with the inshore patrol." Better teamwork was secured by placing the three defenses under one commander.<sup>69</sup>

The earliest Corps of Engineers construction drawings for the Highlands site that have been found to date were completed in May 1942. Along with later COE drawings that are extant, there are nearly 100 drawings documenting the design and construction of the site's WWII facilities, although there were originally many additional drawings. The COE's 1942 drawings identify the site as "Harbor Defenses of New York, Highlands, New Jersey." While the site plans were specific to the Highlands location, the drawings of the batteries, Fire Control Stations, the Plotting Switchboard Room, cantonment buildings, and many utility details were based on standardized designs the COE developed for various fortifications in the 1940 Modernization Program.

The urgency of the program for the Highlands site is evidenced by the start of construction on the 16-inch gun Const. No. 116 on June 1, 1942, shortly after the completion of the earliest drawings, three weeks before the U.S. obtained title to Tract 3, and more than five months before it obtained title to Tracts 1 and 2.

The COE utilized the Navesink topography advantageously by siting Const. No. 116 at an elevation of about 215 feet on the upper, northwestern end of the northwest-southeast ridge on the land, and by siting the 6-inch gun Const. No. 219 at an elevation of approximately 150 feet, about 70-feet below the elevation of Const. No. 116, at the southeast end of the ridge near (Historic Image 54) the location of the demolished Minturn-Trask House.

(H54. HDNY, Highlands New Jersey, Boundary Fencing & Sentry Boxes, c1942, COE.)

The COE sited Const. No. 116 with its east-west axis on an Azimuth of 293 degrees, clockwise from south, and a Field of Fire of its two 16-inch guns with a Left Limit of 220.5 degrees and a Right Limit of 55 degrees (See Historic Image 55). This position complemented the Field of Fire of the two 16-inch guns on Battery Harris on Fort Tilden that had Azimuths of 334 and 337 degrees (See Historic Image 56). Together, Const. 116 and Battery Harris covered the approach to New York Harbor, except for a narrow area along the Jersey Coast, to a range of about 44,680 yards or 25.3 miles. The 12-inch guns at Batteries Kingman and Mills on Fort Hancock provided additional coverage up to a range of 29,000 yards or 16.5 miles.

(H55. HDNY Highlands New Jersey, Battery Lewis 2-16" Guns Fields of Fire, August 1943, HDNY Annex.)

(H56. HDNY Fields of Fire of All Major Caliber Guns, August 1943, HDNY Annex.)

<sup>69</sup> Bearss, 538.

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The Corps of Engineers sited Const. 219 on the Highlands with its east-west axis on an Azimuth of 285 degrees so that its two 6-inch gun would have a Field of Fire of 316 degrees and would therefore cover the approach to New York Harbor plus Lower New York Bay and the North Jersey Coast to a range of 26,000 yards or 14.8 miles (See Historic Image 57). This position complemented the positions of medium range guns on Forts Tilden, Hamilton, and Wadsworth to provide extensive and overlapping medium range artillery defense (See Historic Image 58).

(H57. HDNY Highlands New Jersey, Const. 219 2-6" Guns Fields of Fire, August 1943. HDNY Annex.)

(H58. HDNY Fields of Fire of All Medium Caliber Guns, August 1943, HDNY Annex.)

The COE also took advantage of the Navesink topography by siting Const. 116's Plotting Switchboard Room in a ravine to the west of the battery, and by siting a Fire Control Station on a hill with an elevation of 250 feet in the northwest corner of the government's land (See Locator Images 4-5). The COE labeled this strategic location Hill 250, and the western boundary line of the Tract 2 parcel acquired by the War Department from Richard Hartshorne must have been set to include this hill as part of the land for the Navesink fortification. By erecting a relocated 100-foot tall steel Tower on Hill 250 (See Locator Image 4 & Historic Image 59), the COE enabled the installation of a Fire Control Instrument Room at 83 feet above the ground and 333 feet above sea level.

(H59. HDNY Highlands New Jersey Hill 250 SCR Installation & F.C. Station, Sheet 2 of 3, c1942, COE.)

The Tower's Instrument Room was a Fire Control Station containing two Azimuth Instruments for Battery 219 and for Battery Kingman on Fort Hancock, and two Depression Position Finders (DPF) for Battery Lewis and for Battery Harris on Fort Tilden. The Azimuth Instruments provided data on the azimuth of a target that was used in conjunction with data from a second station to determine the target's position by the Horizontal Base System. Soldiers phoned the azimuth readings to the Switchboard Room, and soldiers there phoned it to the Plotting Room, where the plotter and other soldiers set arms representing the location of the stations and the reported azimuths on the Plotting Board. The Board represented a large water area within the range of the guns, and the intersection of the two arms represented the location of the target.

The DPF instruments utilized the height of the Tower for the Vertical Base System. Observers used the complex DPFs to identify a target's azimuth and distance based on the angle of depression of the instrument telescope - hence the name. Readers read the data on the instrument and phoned it to the Plotting Room, where the plotter and other soldiers utilized it on the Plotting Board in a similar manner to the Horizontal Base System. In both cases, they used the Gun Arm, which pivoted on a point representing the battery's directing point, to read the azimuth and range from the battery. The soldiers corrected the azimuth and range to account for "non-standard conditions," such as air and powder temperature, wind, air density, and earth rotation. They phoned the final data to the gunners, who set the gun and fired at the dinging of the Time-Interval Bell so that the projectile would meet the moving ship.<sup>70</sup>

<sup>70</sup> Correspondence with Bolling Smith, May 28, 2014; For detailed information about fire control see: *Coast Artillery Field Manual, Seacoast Artillery Fire Control and Position Finding, FM 4-15*, Washington, DC: War Department, 5 November 1943.

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At 93-feet above the ground and 343-feet above sea level, the Tower had an Antenna House with an antenna for a Signal Corps Radar known as SCR-296 (See Historic Image 60). These early radar antennas generally required elevations above 80 feet and the higher the elevation the greater the range. With an elevation like the Tower's, observers could identify both the range and the azimuth of a large target up to a range of more than 40,000 yards, well beyond the reach of the standard Fire Control instruments and nearly to the full range of the 16-inch guns (See Historic Image 55). (H60. Portland House with SCR-296 Tower in background, 1947-48, MCPS.)

The COE also sited two more Fire Control Stations northeast of Const. 219 that provided Fire Control for both Navesink batteries and also for Battery Harris on Fort Tilden (See Historic Images 57-58). Fire Control and SCR 296 radar on the Navesink worked in conjunction with Fire Control and radar at multiple locations for all the batteries that were part of the Harbor Defense of New York.

For the artillery battalions manning the Highlands fortifications, the COE built a western cantonment on the ridge extending southwest of Const. 116 and an eastern cantonment to the west of Const. 219 (See Historic Image 61). The western cantonment had six Barracks (1 for 22 men, 2 for 34 men, and 3 for 42 men (See Historic Image 62), two Lavatories (for 100 men each), a Battalion Administration and Store House, a Company Administration and Storehouse, a Mess Hall for 100 men, a Field Office, a Day Room, and a Fire House. The site included roads, pathways, a Parking Area, a 50,000-gallon Reservoir, and utilities including two septic fields with multiple Septic Tanks and Cesspools. The eastern cantonment contained five Barracks (1 for 22 men, 2 for 30 men, and 2 for 42 men), a Lavatory (for 150 men), a Mess Hall for 120 men, an Officer's Quarters, a Battalion Administration and Store House, a Day Room, and a Garage. This site included roads, pathways, two Parking Areas, a septic field with Septic Tanks and Cesspools and another with Tile Drain Fields. Battalions of the 245<sup>th</sup> Coast Artillery Regiment were stationed at the Reservation, and while the cantonments could house a total of 382 men plus officers, the number of men stationed there probably never reached that level and diminished as readiness conditions decreased.

(H61. Navesink Military Reservation, Utilities Record Drawings 1-8, 1944, combined 2014, CW Zink.)

(H62. Navesink Military Reservation, eastern cantonment Barracks T-804 for 42 men, view south, c1944, GATE.)

To access all the facilities on the Highlands site the COE utilized and upgraded several existing roads and built additional roads (Historic Image 61). The COE installed Boundary Fencing around the site and at the entrance to Access Roads E, F, and G it erected Sentry Boxes and Gates (See H63). The COE regraded portions of the ridge and other areas on the Highlands for buildings and roads (See Historic Image 64), but the extent of the regrading is unknown.

(H63. Navesink Military Reservation, Access Road E sentry box and gates, view south, c1944, GATE.)

(H64. Navesink Military Reservation, Access Road A retaining wall, view east, c1944, GATE.)

The Corps of Engineers' Highlands contract drawings illustrate the massiveness of battery construction during the 1940 Modernization Program. As noted in Section 7, the Battery Lewis walls range from 3-



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feet to 8-feet in thickness, and are all extensively reinforced with vertical and horizontal steel rods (See Historic Image 3). The 16-foot high Casemate ceilings are supported by massive steel beams and trusses, all designed to withstand 2,000-pound projectiles (See Historic Images 8-9, Historic Image 13). The Battery Lewis Plotting Switchboard Room has walls 12-feet and 14-feet thick, a 6-feet thick floor, and a 16-feet thick ceiling (See Historic Image 30). The massiveness of this construction represents the Army's best efforts during WWII to protect its largest coast artillery from both naval and aerial bombardment.

The COE completed the casemating of Battery Kingman on Fort Hancock in April 1942, which enabled it to start the casemating of Battery Mills. The timing was scheduled so that at least one of the 12-inch batteries would remain operational. On Fort Tilden, the COE completed the casemating of Battery Harris in June 1942. On the Highlands, the COE started work on Const. 219 on July 8, 1942, a little over five weeks after starting Const. 116. By the summer of 1942, the urgency for the 1940 Modernization Program's new coastal fortifications started to wane.<sup>71</sup>

The battle of Midway in June 1942, the pivotal event of the war in the Pacific, had great impact on the construction of fortifications on the West Coast. In addition, by this time it was also clear that the British Navy would continue to be more than a match for the German and Italian surface fleets...in September 1942 the army, with Navy concurrence, eliminated 10 batteries that had been deferred, and subsequently canceled even more.<sup>72</sup>

That month, the Eastern Defense Command advised its sectors that "as a result of the study of enemy capabilities by the War Department an attack by a major Axis fleet was deemed a remote probability and actions of the 'commando type' were deemed improbable and the only probability was that of isolated raids by submarines and light vessels." The Command reduced the Harbor Defense category of batteries with larger than 6-inch guns from C to B: "May be subjected to minor attacks."<sup>73</sup>

For the Harbor Defenses of New York, the Army cancelled the 16-inch gun batteries Const. 115 planned for Fort Wadsworth on Staten Island and Const. 117 planned for Nigger Point in Queens. The Army continued with building the planned 6-inch gun batteries Const. 218 on Fort Wadsworth and Const. 220 on Fort Tilden. For the Harbor Defenses of the Delaware, the Army cancelled the 16-inch gun battery Const. 119 planned for Fort Miles, but continued building three 6-inch gun batteries, Const. 221 and 222 on Fort Miles, and Const. 223 on the Cape May Military Reservation at Cape May Point.

On Fort Hancock, the COE completed the casemating of Battery Mills that October and the Army began deactivating the Forts Endicott-era guns on disappearing-gun carriages. The deactivations freed up personnel to man the batteries under construction when they were finished. To release coast defense personnel to general service in the European and Asian theatres, where fighting was intensifying, the Command in November designated certain coast artillery regiments as "Limited Service Units."<sup>74</sup>

The Coast Artillery Corps had a tradition dating to the Endicott Era of naming batteries after distinguished officers. In October 1942, the Army named Battery Const. 116 "In honor of Colonel Isaac

<sup>71</sup> For Harbor Defenses of New York Battery start and completion dates see New York-Philadelphia Sector World War II, 164.

<sup>72</sup> Smith, 76.

<sup>73</sup> New York-Philadelphia Sector World War II, 62.

<sup>74</sup> New York-Philadelphia Sector World War II, 62-63.

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N. Lewis, Coast Artillery Corps, who served with distinction in the U.S. Army from June 1884 to September 1913." A soldier and inventor, Isaac Newton Lewis (See Historic Image 65) was born in New Salem, in Fayette County, Pennsylvania in 1858. After graduating from West Point in 1884, he was commissioned a 2<sup>nd</sup> lieutenant in the Second Artillery, and he graduated from the Torpedo School in 1886. He invented and patented the Lewis depression position finder in 1891.<sup>75</sup>  
(H65. Isaac Newton Lewis, n.d., USMA Library, West Point.)

Lewis developed an expertise in ordnance, and in 1900, "under special instructions of the Secretary of War, he visited several European countries and made a study of their methods of manufacturing and supplying ordnance material." He also invented "a plotting and relocating system for seacoast batteries, a time-interval clock cock and bell system of signals for artillery fire control, a quick firing field gun and mount, quick reading mechanical verniers, an electric car lighting system (patented), a windmill electric lighting system, and a gas-propelled torpedo (patented)."<sup>76</sup>

Lewis served on the coast artillery board for New York Harbor, 1894-1898. He developed "the modern corps organization of artillery" that the Army adopted in 1902, and served as acting commandant for the Coast Artillery School in Fort Monroe in Hampton, Virginia, and as commander of Fort Monroe and the Artillery District of the Chesapeake, 1904-1911. He invented the Lewis Gun, an air-cooled machine gun, and patented it in 1911. Lewis rose to the rank of Colonel and retired in 1913.<sup>77</sup>

After retiring, Lewis drew upon his European connections and expertise to set up manufacturing of the Lewis Gun in Liege, Belgium, where he established Armes Automatique Lewis. He also established the Société des Armes Lewis in Paris, the Lewis Machine Gun Company in London, and the Lewis Machine Gun Company in Cleveland, Ohio. After the U.S. entered the War and adopted the Lewis Gun, Lewis declined royalties for guns manufactured for the U.S. Army. Britain and France bought about 100,000 Lewis Guns, and the U.S. bought about 9,000. As the Dictionary of American Biography noted in 1933, "Professing a profound knowledge of mechanical and electrical engineering and thoroughly conversant with all phases of coast artillery construction and equipment, (Lewis) earned an enviable reputation in his profession." Lewis retired to Montclair, New Jersey, and died of a heart attack in the Hoboken Railroad Station in 1931.<sup>78</sup>

On April 18, 1943, the Eastern Defense Command declared a "state of non-invasion" for the New York-Philadelphia sector including the Harbor Defenses of New York. On April 23, the COE completed the construction of Battery 219, and its two 6-inch M1903A2 Guns, serial numbers 53 and 54, were mounted on M1 Barbette Carriages, serial numbers 17 and 18, on May 9 (See Historic Image 66). The guns and the carriages were manufactured at the War Department's Watervliet Arsenal in Watervliet, New York. The Barbette Carriages enabled the guns to be rotated with a Maximum Field of Fire of 285 degrees, and to be adjusted vertically with elevation angles from -5 degrees to 47 degrees (See Historic Image 67). The 25-foot long guns fired 105 pound Army AP (armor piercing) projectiles with a maximum range of 27,150 yards, 108 lb. Navy AP projectiles with a maximum range of 17,000 yards, or 90 pound HE (high explosive) projectiles with a maximum range of 20,995 yards. Soldiers loaded the

<sup>75</sup> (2a) General History, Fort Hancock Record Book, NARA NYC; in its original use, the word torpedo denoted a mine anchored in the water. Later on it came to denote an underwater projectile.

<sup>76</sup> *Dictionary of American Biography*, Isaac Newton Lewis, New York: C. Scribner's Sons, Volume 6, 1933, 215.

<sup>77</sup> *Dictionary of American Biography*, 216.

<sup>78</sup> *Dictionary of American Biography*, 216.

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projectiles and 33-37 lb. powder charge bags by hand from a wheeled loading cart, and could fire the projectiles at a rate of up to 5 rounds per minute. The guns were protected by a steel shield and were reused from a prior battery emplacement on disappearing carriages, but the Barbette Carriages were new. The Army proof fired the 6-inch guns on August 28, 1943, and in 1944 the eastern Defense Command reported that Battery 219 had 400 rounds of 105 pound AP Projectiles, 300 of them "At Battery" and 100 in "General Storage," and 300 rounds of 90 pound HE (high explosive) Projectiles, 200 of them "At Battery" and 100 in "General Storage." The War Department spent \$198,858 (approximately \$2,622,728 in 2014) to build and arm Battery 219.<sup>79</sup>  
(H66. Battery 219 Gun Emplacement 1, Fort Hancock Archives, c1944, GATE.)  
(H67. 6-inch Gun M1903A2 on Barbette Carriage, 1943, TM 9-428.)

The Eastern Defense Command listed Fire Control Stations for Battery 219 in Shark River, Elberon, North Long Branch, Navesink (2), and Hancock. Army maps from August 1943 show these locations along the north Jersey coast (See Historic Image 68) and on the Highlands (See Historic Image 69). From the Fire Control Stations, observing and spotting information was sent to the Switchboard Room in Battery 219, and patched to soldiers in the Plotting Room for position finding of targets. A WWII photograph of a Plotting Room at Fort Story in Virginia shows soldiers at the Plotting Board (See Historic Image 70). San Diego Military History Association members recently rehabilitated a Fire Control Station at Fort Rosecranz with a telescope instrument, telephones, ship identification chart, and other period features.<sup>80</sup>

(H68. Main Cable Routings Loc. 1 - Loc. 12, August 1943, HDNY Annex 143.)  
(H69. Fire Control Installation Location 7 August 1943, HDNY Annex 158.)  
(H70. Fort Story, Virginia, Plotting Room, 1942, LOC.)

The COE completed construction of Battery Lewis on June 26, 1943, and mounted the first MK11 M1 Navy 16-inch gun serial number 70, manufactured by Bethlehem Steel, on a M4 Barbette Carriage serial number 29, manufactured by Wellman Engineering Company, in Casemate 1 on May 14. The COE mounted the second MK11 M1 Navy 16-inch gun serial number 46, manufactured by Midvale Steel and Ordnance Company, on a M4 Barbette Carriage serial number 44, manufactured by Mesta Machine Company, in Casemate 2 on May 14. The 68-foot long guns weighed 307,105 pounds and the Barbette Carriages weighed 665,315 pounds (See Historic Image 71). The Carriages could rotate the 16-inch guns to a Maximum Field of Fire of 145 degrees, and raise them up to a 46-degree elevation to fire shells weighing 2,240 lbs. at the guns' Effective Firing Range of about 44,680 yards, or about 25.4 miles.

(H71. 16-inch Gun MK11 M1 on M4 Barbette Carriage, 1943, TM 9-471.)

The danger of attack by enemy forces on American shores had become so remote by the end of

<sup>79</sup> New York-Philadelphia Sector World War II, 62, 166; Report of Completed Works, Seacoast Defenses, Harbor Defenses of New York, Highlands, New Jersey, Battery No. 219, May 4, 1945; Supplement to Harbor Defense Project, Harbor Defenses of New York, Annex A, General, 10.

<sup>80</sup> Supplement to Harbor Defense Project, Harbor Defenses of New York, Annex B, Fire Control, 9-15; Built in 1905, Battery Gunnison was modified and renamed Battery New Peck in 1943 with 6-inch guns moved from Battery Peck and remounted on Barbette Carriages. Today it is primarily known as Battery Gunnison and is one of the few coastal defense batteries that retains its guns. Members of the Army Ground Forces Association have worked in partnership with the National Park Service for several years on maintenance and interpretation of the guns, position finding, and the manning of the Battery.

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October that another change in the category of defense for the New York-Philadelphia Sector was effected by Change No. 1 to Field Order No. 2. The change, dated 3 November 1943, placed the Sector in Category of Defense "A," which was declared for this Operating Area on 29 October 1943.<sup>81</sup>

In a November 1943 letter to Major General J. A. Green, the head of the Army's Antiaircraft Command, on the status of the Seacoast Modernization Program, Colonel L. A. Whittaker reported "the seacoast program has been under constant fire, since it is of a defensive category. We have had intimations that various procurement review agencies have been interested in curtailing the major caliber portions of the program. This interest has ranged from suggested cutbacks to the elimination of the entire program. We have been fortunate to save as much as we have in the circumstances."<sup>82</sup>

The Army proof fired the Battery Lewis Gun #1 on December 30, 1943, and Gun #2 on January 7, 1944, in both cases firing four rounds ranging from "75% of full charge" to "115% of full charge." Some slight damage was noted to ducts in the Power Plant's dehumidifying equipment rooms. The Eastern Defense Command reported in 1944 that Battery Lewis had 300 rounds of 2240 AP (armor piercing) Projectiles, 200 of them "At Battery" and 100 in "General Storage." The Command listed Fire Control Stations for Battery Lewis in Manasquan, Shark River, Elberon, North Long Branch, Navesink (2), Hancock, Atlantic beach, and Long Beach. The War Department spent \$1,552,492 (approximately \$20,475,743 in 2014 dollars) building and arming Battery Lewis. Battalions of the 245<sup>th</sup> Coast Artillery Regiment manned Battery Lewis (See Historic Image 72) and Battery 219, along with other batteries on Fort Hancock. General Gage visited Battery Lewis sometime after the guns were mounted (See Historic Image 73).<sup>83</sup>

(H72. Battery Lewis Battalion, Fort Hancock Archives, c1944, GATE.)

(H73. General Philip Gage at Battery Lewis, Fort Hancock Archives, c1944, GATE.)

With little possibility of coastal attack and large personnel needs in Europe and in the Pacific, the Army in March 1944 reduced harbor defense troops by approximately 60 percent to release personnel to ground forces. With these reductions, "the only batteries actively manned after this time were 6" and 90mm."<sup>84</sup>

The Corps of Engineers on 8 June 1944 completed eight sheets of Utilities Record Drawings for the "Harbor Defenses of New York, Navesink Military Reservation, Highlands, New Jersey" (Historic Image 61). These are the earliest documents found to date that referred to the site as the Navesink Military Reservation. Most earlier documents referred to the site as "Highlands, New Jersey." Report of Completed Works (RCW) documents from January 1944 on Access Roads and Boundary Fencing referred to the site as "Highlands Reservation." On other RCW documents from 1944 the typed name "Highlands" was crossed out and "Navesink," "Navesink Highlands," or "Navesink Ft Hancock" was handwritten in its place. General documents from the Harbor Defense of Sandy Hook and the Harbor

<sup>81</sup> New York-Philadelphia Sector World War II, 72.

<sup>82</sup> Letter, Colonel L.A. Whittaker to Major General J. A. Green, 4 November 1943.

<sup>83</sup> "Proof Firing of Battery Lewis, Highlands, New Jersey, January 15, 1944," War Department, United States Engineer Office, New York District; New York-Philadelphia Sector World War II, 164; Report of Completed Works, Seacoast Defenses, Harbor Defenses of New York, Highlands, New Jersey, Battery Lewis (116), September 9, 1944; Supplement to Harbor Defense Project, Harbor Defenses of New York, Annex A, General, 10; Annex B, Fire Control, 9-15.

<sup>84</sup> Bronk, 28, 29.

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Defense of New York referred to the site as "Highlands" or "Navesink." Documents of the completed site referred to it as the Navesink Military Reservation (See Historic Image 74).  
(H74. Navesink Military Reservation, General Map, 1945, NARA.)

In August 1944, the Eastern Defense Command issued a Supplement to Harbor Defense Project, Harbor Defenses of New York,<sup>85</sup>

Purpose of Supplement

This supplement amplifies the Basic Project and is intended to furnish a concise record of the status both of existing harbor defense fortification construction and equipment, and of similar items which have been approved by the Secretary of War for future accomplishment. One of the principal purposes is to provide the basis for advanced procurements of funds and materials necessary to complete approved items. A second important purpose is to make available, to those concerned, information of a technical and tactical nature which is not otherwise available in usable form.

Mission of Harbor Defenses

- a. To insure to our Navy and friendly shipping the use of New York Bay and harbor secure from naval gunfire and to prevent bombardment of harbor facilities of New York Harbor.
- b. To cover the debouchment of our naval vessels from New York Harbor.
- c. To deny access to Ambrose Channel or Lower New York bay by enemy vessels.
- d. To support the defense against landing attack within range of the armament.
- e. To meet the attack of submarine or other small vessels which might succeed in getting past the harbor defenses of Long Island Sound.

Tactical Organization

1. The defense of the seaward approaches to the harbor entrance by long and medium range artillery sited on the seacoast and organized into two battalions responsible directly to the harbor commander.
2. The defense of the lower bay and its immediate approaches by secondary armament and submarine mines organized into a group.
3. The defense of the eastern approach to the harbor by secondary armament organized into a battalion responsible directly to the harbor defense commander.

List of Armament in Order of Tactical Importance

1	Lewis (Navesink)	2-16"	BC (Barbette Carriage)
2	Harris (Tilden)	2-16"	BC
3	Kingman (Hancock)	2-12"	BC
4	Mills (Hancock)	2-12"	BC
5	Const. No. 219 (Navesink)	2-6"	BC
6	Const. No. 220 (Tilden)	2-6"	BC
7	Peck (Hancock)	2-6"	BC
8	Kessler (Tilden)	2-6"	BC
9	Const. No. 220 (Wadsworth)	2-6"	BC
	(plus 18 smaller guns)		

Thus among all the armament defending the Harbor of New York, the nation's largest and most important city, the Eastern Defense Command identified the Navesink Military Reservation's Battery

<sup>85</sup> Supplement to Harbor Defense Project, Harbor Defenses of New York, 1 September 1944, 1-2.

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Lewis as the most important of the Primary Armament medium and long-range 12 and 16-inch guns, and its Battery Const. 219 as the most important of the Secondary Armament medium-range 6-inch guns.

With the end of the War in sight, the Joint Chiefs of Staff established a Joint Post-War Committee in 1944 and that fall the Committee began to study "the necessity for permanent seacoast defense fortifications for post-war military bases." Among its conclusions in its February 1945 report, the Committee noted,<sup>86</sup>

The development of guided missiles and other new weapons to date and in progress shows that within the next few years they may be usefully employed as seacoast armament.

At the present time a decision cannot justifiably be made as to whether guided missiles may supplement, or entirely replace conventional seacoast artillery.

As to both major caliber and minor caliber fixed seacoast artillery, all that we now have, emplaced in continental and overseas harbor defenses, should be retained in place and maintained in serviceable condition, with the recognition that subsequent development may demonstrate the desirability of substituting some type of new weapon therefore.

On March 18, 1945, the Army placed Batteries Lewis and 219 on the Highlands and Batteries Kingman and Mills on Fort Hancock on a "Classification of Material" maintenance status of Class C, also called a caretaker status, for "material...not assigned to an organization for regular and frequent training, and...no longer considered vital to the performance of the mission of the harbor defenses, but...still capable of furnishing some fire support." The SCR-296 Installation on Hill 250 on the Highlands was continued in Class A status for "Material...assigned to an organization in a primary capacity for the purposes of regular and frequent training,...maintained at all times in such conditions as to permit it's preparation for service by a full strength manning party and not more than 24 hours." Because of its vast superiority to visual surveillance, radar was considered one of "the most significant developments in seacoast armament during the war," and "the most likely possibility to become the primary means of surveillance, fire control and position finding." The Hill 250 radar thus remained active longer than the other WWII components of the Reservation.<sup>87</sup>

The War Department's chief of logistics reported in October 1945 that the 1940 Modernization Program of Harbor Defenses had cost \$220,451,043 to date (approximately \$2,907,518,000 in 2014 dollars). In March 1946, the Army disbanded the Eastern Defense Command and passed control of its facilities and remaining personnel to Army Ground Forces. As noted in an Army history of the Command written eight months later, "the Eastern Defense Command who zealously protected and guarded the eastern and southern shores of the continental United States during the war years passed into history, leaving a heritage of an important mission well done."<sup>88</sup>

In March 1947, the War Department issued a report on "Trends of Seacoast Defense" that concluded "there was no major naval threat to the U.S. in the 1947-1957 timeframe, submarine attacks were the

<sup>86</sup> Adams, Matthew, "The End of Seacoast Artillery: Joint Chiefs of Staff Memorandum of Policy No. 15," *Coast Defense Journal*, Volume 15, Issue 2, May 2001, 75-76.

<sup>87</sup> Gaines, 501.

<sup>88</sup> Schreier, Konrad F., Jr., "The Termination of U.S. Army Coast Defenses, 1945-1948," *Coast Defense Study Group News*, Volume 6, Issue 1, February 1992, 23; Supplemental History of the Eastern Defense Command (From 15 December 1945 to 15 March 1946), 4.

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most likely form of attack in the near future and could be met by mobile artillery until guided missile systems were developed, and the U.S. would have guided missiles that could act in a coast artillery capacity by 1957.”<sup>89</sup>

In a major postwar reorganization based on WWII experience and projected future needs, President Harry S. Truman signed the National Security Act of 1947 in July to create the National Military Establishment incorporating the Department of the Army (formerly the Department of War), the Department of the Navy, and a new Department of the Air Force. The Act established the Joint Chiefs of Staff of the services reporting to a Secretary of Defense. The National Military Establishment was later renamed the Department of Defense.

In light of post-war cuts in military funding and the development of new weapons, the Army chief of staff concluded in March 1948 that,

Cost of maintenance has become a vital issue in the interest of economy. The need for consolidation and retrenchment require the Army to abandon all marginal functions.

The critical state of manpower in the Army clearly indicates a pressing need for drastic economy in the use of troops.

The concept of seacoast defense has changed. The present concept envisages the employment of mobile weapons for seacoast defense. Until fixed seacoast defense weapons are eliminated, the units now assigned to them cannot be properly trained in the use of mobile weapons.

With no coastal threat anticipated within the next ten years, the projected advancements in missiles and the obsolescence of the existing coastal armament by then, and the need for economy, the Secretary of the Army ordered in May 1948 that, “The permanently emplaced seacoast artillery batteries including appurtenances and seacoast artillery material listed...hereto...are placed in category of surplus and will be disposed of in accordance with applicable laws and regulations,” and that “The disposal of metal scrap resulting from (this) action be expedited.”<sup>90</sup>

The Secretary’s “List of Surplus Seacoast Batteries and Seacoast Artillery Materiel, (Including Spare Guns Stored at the Emplacements)” itemized all the existing 16-inch gun emplacements in the continental U.S. including Battery Lewis on the Navesink Military Reservation and Battery Harris on Fort Tilden in the Harbor Defenses of New York. The List itemized six 6-inch gun emplacements including Battery 220 on Fort Tilden. Battery 219 on the Reservation was spared in the 1948 cuts but was deactivated and declared surplus in 1949. As Mark Berhow noted in 1994, “the day of the big gun defense was over in America.”<sup>91</sup>

Of the 27 16-inch gun casemated batteries authorized by the 1940 Modernization Program of Harbor Defenses, 21 were built but one was not completed and only 14 were armed with guns. As Bolling Smith noted in 2001, “American military planners had seen the threat from the air, and the last generation of American seacoast defenses, with casemated 16-inch batteries, was primarily an effective response to this aerial threat.” Of the 50 6-inch gun batteries authorized by the Program, 49 were built but only 34 were armed. A few of the 16-inch gun batteries have been destroyed and three have been converted to new uses (see Table 1), but most remain in ruinous condition. In New Jersey,

<sup>89</sup> Adams, 77.

<sup>90</sup> Schreier, 27.

<sup>91</sup> Schreier, 29; Berhow, “America’s Last Seacoast Defenses,” 39.

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besides Battery Lewis and Battery 219, the 6-inch gun Battery 223 survives at the former Cape May Military Reservation, but it is rapidly deteriorating from seacoast erosion. The 12-inch gun casemates built for Batteries Kingman and Mills are also extant and but deteriorating on Fort Hancock. Besides the current exterior interpretive signage at Battery Lewis, the only other 16-inch gun battery that is currently interpreted in the U.S. is Battery Townsley, which predates the 1940 Modernization Program, in San Francisco, where the National Park Service opens part of the interior to the public one-day per month.

#### HIGHLANDS AIR FORCE STATION

The Highlands Air Force Station had its roots in radio transmissions at Twin Lights dating back to 1899 when Guglielmo Marconi famously demonstrated the capability of wireless radio by setting up an antenna at the Twin Lights to transmit messages on the America's Cup sailboat races off of Sandy Hook that year. Marconi subsequently ran the first commercial wireless operation at the Twin Lights and set up the first transatlantic wireless there in 1907. Five years later he set up the Marconi Wireless Telegraph Company of America on a site 20 miles south in Belmar that later became Camp Evans, which is now a National Historic Landmark.

In 1917 the Army's Signal Corps set up a training facility at Camp Little Silver near Eatontown, and established the Signal Corps Radio Laboratories (SCRL) there. The site was soon renamed Camp Vail in recognition of Alfred Vail's collaboration with Samuel Morse in the development of telegraphy at the Speedwell Iron Works, owned by Vail's father, Stephen Vail, in Morristown. The Signal Corps School moved to Camp Vail in 1919, and the site was renamed Fort Monmouth in 1925. Major William Blair became head of the SCRL in 1930 with a strong interest in high-frequency radio transmissions and the possibilities of detection with radio waves "bouncing back like an echo." In 1931 Blair initiated Project 88 for "Position Finding by Means of Light" with infrared and short-length radio waves. Harold Zahl, a physicist, joined the SCRL staff in 1931 and set up radio range experiments at Twin Lights in 1934. The SCRL set up infrared detection experiments at Battery Halleck on Fort Hancock in 1934, and tested a thermal-detection searchlight tracking system at Twin Lights in 1935.<sup>92</sup>

In 1936 SCRL started a pulse-echo project called Radio Position Finding headed by Chief Engineer Paul Watson. The project's team demonstrated a prototype SCR-268 radar system at Fort Monmouth in 1937, and the Army established the Aircraft Warning Service that year. Watson, Zahl and other SCRL staff developed an improved pulse-echo mobile system named SCR-270 and a fixed version SCR-271, and they set up prototypes for testing at Twin Lights in 1938 (See Historic Image 75). In November 1939 they demonstrated the systems' ability to track B-17 bombers flying out of Mitchel Air Base, 138 miles away on Long Island to a group of Army brass that included Secretary of War Harry Woodring and Generals George C. Marshall and Henry H. Arnold. The Army awarded a contract in 1940 to Westinghouse for quantity production of pulse-echo units, and systems were installed in Panama and in Hawaii in 1941. The Army established the first Signal Aircraft Warning Company in Panama in 1940 and began Aircraft Warning Service training at Fort Monmouth in June 1941. That year the Navy coined the term RADAR, for radio detection and ranging, and the Army accepted the term in 1940.<sup>93</sup>

<sup>92</sup> Newman, 79; [http://en.wikipedia.org/wiki/Signal\\_Corps\\_Laboratories](http://en.wikipedia.org/wiki/Signal_Corps_Laboratories).

<sup>93</sup> Background on the history and development of wireless telegraphy, radar, and the Signal Corps is from *A Concise History of Fort Monmouth, New Jersey and the U.S. Army CECOM Life Cycle Management Command*, Fort Monmouth, N.J.: U.S. Army CECOM Life Cycle Management Command, 2009; Camp Evans NHL Nomination, 2012; Howard Zahl, *Radar Spelled Backwards*, 1972; and draft history of radar by Howard Zahl



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(H75. Twin Lights SCR-270 & SCR-271 Installations c1950, CECOM.)

On December 6, 1941, one day before the attack on Pearl Harbor, the Army began operating an SCR-271 fixed-radar set at Twin Lights. Other radar sets were operating on Mount Cadillac on Mount Desert Island in Maine and at Montauk on Long Island, and within two weeks the Secretary of War approved these plus 11 new ones for operating 24 hours per day. The Twin Lights Radar Platoon of two officers and 45 men was assigned to the site in early 1942 and billeted at the Twin Lights Hotel. In February 1943 the War Department acquired 4.4 acres next to Twin Lights from Julia Hartshorne Trask for \$1,680. The Army soon erected barracks, officers' quarters, a mess hall, latrine, day room and other buildings on the site. With the likelihood of attack significantly diminished in the spring of 1944, the Twin Lights radar site ceased operations. Today the Henry Hudson Regional High School occupies the Twin Lights Radar Platoon's cantonment site.

In light of Soviet expansion in Eastern Europe, the Air Force in November 1947 approved an initial Air Defense Radar Network using existing Air Control and Warning sites at Roslyn Air Force Station and Camp Hero at Montauk in New York and at Twin Lights and Palermo Air Force Station in New Jersey. The Air Force established the 646<sup>th</sup> Aircraft Control and Warning Squadron (AC&W) with the mission to "to provide early warning of approaching aircraft and GCI (Ground Control Intercept) information for friendly aircraft." In July 1948, the Air Force accepted the "Twin Lights Air Warning Site," with the call sign "Grasp," as part of its interim Lashup I radar network. Because of overcrowding with new equipment, including "the first commercially made AN/CPS-6 Radar," and training at Twin Lights, part of the 646<sup>th</sup> AC&W was being quartered at Fort Hancock, but the Fort was scheduled for deactivation in June 1950.

After the first Soviet atomic bomb detonation in August 1949, funding became available for a Permanent Radar System and the Air Force authorized the Corps of Engineers "to start construction on the high priority Permanent System of radars in February 1950 with the first 24 radar sites to be constructed by the end of 1950." The Air Force approved the relocation of the Twin Lights radar station to the Navesink Military Reservation, where Battery 219 was deactivated in 1949. The 646<sup>th</sup> AC&W moved to the Reservation in April 1950 (See Historic Image 76), but continued operating at Twin Lights while the COE completed construction on the Reservation. The start of the Korean War in June 1950 brought new impetus and funding for air defense, and by the December, the unit strength of the 646<sup>th</sup> AC&W at the Reservation was "21 officers and 399 enlisted airmen." The Squadron reported improved morale thanks in part to the "new and very modern barracks" (See Historic Image 77), an Airman's Club, and a "base movie theater in Battery Lewis which was attended by approximately 75 personnel of the squadron" when it opened. The Squadron held Christmas parties that December "for officers and their children" and for "enlisted men and their families."<sup>94</sup>

(H76. 646th Aircraft Control and Warning Squadron, c1955, Corbett, MCPS.)

(H77. Highlands Air Force Station Barracks, c1955, Henry Oehlsen, MCPS.)

The Air Defense Control Center (ADCC) for New York was located at the Roslyn Air Force Station, and the Air Force designated the Reservation as an alternate ADCC in case of "the disruption of communications service that might be caused by the loss of the Roslyn ADCC through fire or enemy

found at <http://cecom.army.mil/historian/docdisp.php?fname=vieweger-scr-270.pdf&dirname=Equipment+and+Systems%2FSCR+270>.

<sup>94</sup> [http://en.wikipedia.org/wiki/Permanent\\_System\\_radar\\_stations](http://en.wikipedia.org/wiki/Permanent_System_radar_stations); Newman, 156, 187, 179.

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action, or by disruption of commercial telephone facilities in some bombed city through which these lines were routed." The alternative ADCC at the Reservation was the "bombproof" Battery Lewis Plotting-Switchboard Room. With a AN/CPS-6b radar installation in new buildings in the "Operations Area" on Hill 250, the "Navesink" facility on the Reservation "was accepted into the Permanent Radar System being designated P-9 in late July 1951" (See Historic Image 78), and at the same time the earlier Lashup radar installation at the Twin Lights was deactivated. In light of its use by the Air Force, the Reservation was "designated as the Highlands Air Force Station on December 1, 1953."<sup>95</sup> (H78. Highlands Air Force Station Family Housing Cover Sheet, 1955, MCPS.)

Nine units of single-family housing were erected on the site of the former eastern cantonment west of battery 219 in 1955. By this time, there were more than fifty buildings on the Station, but most of them were new (See Historic Image 79). Besides the WWII tactical structures – Battery Lewis, Battery 219, the Plotting-Switchboard Room, and the two Fire Control Stations – there were only four WWII non-tactical buildings remaining - an Infirmary northwest of Battery Lewis, and a Lavatory, Mess Hall and Day Room in the former southwest cantonment. Five structures remained from the Hartshorne era – the Garage near the former Minturn-Trask House, the Robert Trask House and Garage at Black Fish Hole (See Historic Image 43), which was the Commanding Officer's Quarters, and the Benjamin Trask House and Garage at Lower Rocky Point, which was also being used as Officer's Quarters. (H79. Highlands Air Force Station, Aerial 778-177, 1954, MCPS.)

In February 1955, the *Red Bank Register* featured a story on the Station that noted,

Unknown to many in the area, the Highlands Air Force Station plays a vitally important role in the air defense of this community...As a unit of the 26th Air Division (Defense), Highlands is a vital link in an operation for the air defense of some 44,000,000 Americans in nine eastern states including metropolitan New York. Highlands Air Force Station is a radar site or Air Defense Direction Center. The men stationed here maintain a continuous 24-hour radar watch for unknown aircraft penetrating our air defense system.

When an unknown unidentified aircraft is detected, fighter-interceptor bases in the vicinity are contacted, and all weather jet fighters are 'scrambled' within a matter of minutes to make an identification. A controller at Highlands guides the jets to the unknown by means of radar. Usually the interception is completed far out to sea. Fortunately, none of the aircraft intercepted so far have been hostile. However, if an unknown aircraft were to be declared 'hostile,' the jets are equipped to shoot it down. The men at Highlands are assisted in their vigil by radar's civilian counterpart, the Ground Observer Corps. The G.O.C. civilian volunteers stand alert in the shadow areas behind mountains and other areas where radar cannot reach. Their reports complete the radar picture of the aerial situation. Along with fighter interceptor squadrons, the army's anti-aircraft artillery also stands 24-hour alert awaiting word from the radar site.

They have guns and guided missiles at their disposal. The people of this community can rest assured that because of the efficient, untiring efforts of the men at Highlands and similar organizations, their homes stand well protected from an enemy air attack.<sup>96</sup>

In 1955, the Air Force began implementing a SAGE (Semi-Automatic Ground Environment) surveillance and control system "of large computers and associated networking equipment that coordinated data from many radar sites and processed it to produce a single unified image of the airspace over a wide area." SAGE was part of the NORAD (North American Air Defense) coordinated air defense organization that was set up by the U.S. and Canada in 1957 and remains in place today.

<sup>95</sup> Newman, 180-181, 113.

<sup>96</sup> "Highlands in Vital Role," *Red Bank Register*, February 17, 1955.

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The SAGE Direction Center for the New York Sector was set up at McGuire Air Force Base in New Jersey. As part of the SAGE network, the Air Force installed an AN/FPS-7 radar set on Hill 250 at the Highlands Air Force Station in 1958 (See Historic Image 80). This radar had a vertical range of 100,000 and a horizontal range of 270 miles, and it served both air defense and air traffic control. The height of the tower made it visible from the southeast to the southwest of the site.<sup>97</sup>

(H80. Highlands AFS, AN/FPS-7 Radar Tower, c1958, MCPS.)

While the Army's 1940 Modernization Program was developed to protect major harbors against naval attack, in the early 1950s the Army's Air Defense Command (ARADCOM) developed the surface-to-air Nike Missile program to protect major cities from attack by bombers. As part of its circular defense of New York, the Army opened eight Nike Missile batteries in New Jersey in 1955, including batteries in Middletown, Holmdel and Fort Hancock, and added a ninth one in 1957. The Nike Missiles had a horizontal range of 25 miles and a vertical range of 69,000 feet. To coordinate the Nikes in each area, the Army developed the computerized Missile Master control system and in 1958 began building a Missile Master Station on Hill 250 at the Highlands Air Force Station adjacent to the Air Force's radar installation. The Highlands Missile Master was designed for fire control of six of the Nike batteries in central and northern New Jersey. The Missile Master cost about \$2.5 million (about \$20 million in 2014 dollars) and included a "fallout-proof and blast resistant" two-story "Nuclear Bunker" to house an AN/FSG-1 computer installation, plus four radar towers (See Historic Image 81). In a second phase of construction, the Army added a helicopter pad and a Brigade Headquarters. The Missile Master opened in 1960, and the Army's and the Air Force's domed radar towers were visible from the southeast to the southwest (See Historic Image 82).<sup>98</sup>

(H81. Highlands AFS, Operations Area, c1962, MCPS.)

(H82. Highlands AFS, aerial c1962, MCPS.)

The Missile Master added the 52<sup>nd</sup> Artillery Brigade of Army personnel to the Highlands Air Force Station. Jack Eberhardt, an airman who served at the Station in the 1960s recalled his duty there,<sup>99</sup>

I quickly settled in and found the site like a small town. The lower site portion set beside a shore view. It contained the administrative offices, barracks, a PX store and work sheds. A block west of the lower area contained a block-long bunker with two drivable openings. The bunker had been built in W.W. II to house two long-range guns for protection of the sea coast...Inside the bunker, which stood two stories high, were a collection of storage rooms.

The road wound out of the lower area and lead to a higher plain. This is what we called the hill. It contained a work site with a complete radar site. The site had multiple towers and its coverage extended beyond New York City. We had the usual days of maintaining the equipment on the "hill." Most of us had been trained as electronic types. That meant a lot of work, study and some play. We were a combined Army and Air Force group. The "blues" and "greens" were usually in military work clothes, or in civvies off duty... A lot of us simply kept busy with hobbies and the local NCO club visits.<sup>100</sup>

In the 1960s, as the threat from enemy attack shifted from bombers to Inter-Continental Ballistic Missiles (ICBMs), many 1950s defense systems gradually became obsolete. In 1963, the Air Defense Command (ADC) ordered the phase out by 1966 of four SAGE Direction Centers, because of their

<sup>97</sup> [http://en.wikipedia.org/wiki/Semi-Automatic\\_Ground\\_Environment](http://en.wikipedia.org/wiki/Semi-Automatic_Ground_Environment).

<sup>98</sup> [http://en.wikipedia.org/wiki/Missile\\_Master](http://en.wikipedia.org/wiki/Missile_Master).

<sup>99</sup> Newman 338.

<sup>100</sup> "Remembrance of the Highlands Air Force Station," *Atlantic Highlands Herald*, July 25, 2002.

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vulnerability to ICBMs, including the Highlands installation. That same year the Army decided to phase out several Missile Master installations, including the Highlands Missile Master, partly because of their high operating cost. In 1964, Secretary of Defense Robert McNamara announced the closing of 95 military bases, including the Highlands Air Force Station. The Air Defense Command that year declared the "Highlands family housing annex" portion of the site as "excess" property, approximately 161 acres, to be turned over to the General Services Administration. In 1965, the Army authorized the installation in the New York area of a new solid-state Missile Mentor control system, which cost one-tenth as much to operate as a Missile Master.<sup>101</sup>

#### HIGHLANDS ARMY AIR DEFENSE SITE

On June 30, 1966, the Air Force held a "retreat ceremony" marking its departure from the Highlands Air Force Station and its turnover to the Army (See Historic Image 83.). The Army's 19<sup>th</sup> Artillery Group assumed control of the Operations Area on Hill 250 and renamed it the Highlands Army Air Defense Site (HAADS). The Army "hardened and reinforced" the Missile Master bunker at the site and opened its first Missile Mentor system there in 1966 for control of several of Nike missile batteries still protecting New York. A 1967 aerial photograph shows the Highlands site just after its most extensive use by the military (See Historic Image 84). In 1974, Secretary of Defense James Schlesinger announced the decommissioning of the Army Air Defense Command (ARADCOM), which meant the deactivation of the Nike Missile program. As part of its Project Concise U.S. Army Base Realignment and Closure Program, which followed the winding down of the Vietnam War, the Army announced the closing of Fort Hancock, Fort Tilden, and HAADS. The Army deactivated and removed its radar installation at HAADS in 1974, and the U.S. military left the Highlands after 32 years of use for the defense of New York.<sup>102</sup>  
(H83. Nike Sage Brush, Highlands Army Air Defense Site, 1966, MCHA.)  
(H84. Highlands Army Air Defense Site, 1967, M-02 MC.)

#### HARTSHORNE WOODS PARK

The Monmouth County Park System (MCPS) was established in 1960, and by 1963 it had identified the Hartshorne Woods as an area for preservation as a County Park. After Secretary of Defense Robert McNamara announced the closing of the Highlands Air Force Station in 1964, MCPS Secretary Walter Schoellner wrote to the General Services Administration expressing the MCPS's interest in obtaining the site. In a letter to Senator Clifford P. Case, Schoellner noted, "As this land is bordered on two sides by the Navesink and Shrewsbury Rivers, it will afford great possibilities for recreation."<sup>103</sup> Because of its topography and its long-term ownership by members of the Hartshorne family since the late 17<sup>th</sup> century, much of the "Hartshorne Woods" north and west of the Highlands Air Force Station remained in its natural state. In 1973 and 1974, MCPS acquired nine private parcels totaling 436 acres, with grants from Green Acres (N.J. Department of Environmental Protection) and the Federal Open

<sup>101</sup> Newman, 396, 297, 305.

<sup>102</sup> Newman, 400, 406, 404; "Army Takes Over Friday: Highlands Role to be Unchanged," *Red Bank Register*, June 29, 1966; "Army Will De-activate Nike-Hercules Bases at Highlands and Ft. Hancock," *Red Bank Register*, Feb. 5, 1974; see also Bearss, Edwin C., "Historic Resource Study, Fort Hancock 1948 – 1974," Sandy Hook Unit, Gateway National Recreation Area, National Park Service, 1982.

<sup>103</sup> Zink, Clifford W., *The First Fifty Years: The Monmouth County Park System*, Lincroft, N.J.: The Friends of the Monmouth County Park System, 2010, 11.

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Space Program, to create Hartshorne Woods Park.<sup>104</sup>

By this time, the 161-acre "Highlands family housing annex" portion of the Highlands Air Force Station that the Air Force had declared as "excess" property in 1964 had been turned over to the U.S. Bureau of Outdoor Recreation as part of President Richard Nixon's "Legacy of Parks" program. Nixon established the program in 1972, noting "It is essential that our system of parks satisfy both the casual tourist and the avid outdoorsman, that we have places where families can meet other families and places where people can be alone." The program provided matching grants for state and local governments to acquire parklands, and it also provided transfers of surplus U.S. Government property for parks. The Nixon administration assigned military sites to the program that had become surplus through the Army's Project Concise and other base closings. In 1972, Congress established the Gateway National Recreation Area to include Forts Hancock, Tilden, Wadsworth and Totten, which had all been part of the Harbor Defenses of New York. In August 1973 the Monmouth County Park System filed an application with the Department of the Interior for transfer of the 161-acre former Highlands Air Force Station surplus parcel for park and recreation purposes, and in 1974, the U.S. Bureau of Recreation transferred the property to MCPS for Hartshorne Woods Park. The Bureau also transferred two other surplus parcels to the MCPS: a 5-acre parcel in Middletown formerly known as the U.S. Army's Middletown Radio Propagation Site to MCPS for addition to Tatum Park, and an 18-acre former Nike Battery site in Holmdel for addition to Holmdel Park.<sup>105</sup>

When the Army deactivated the remaining 63-acre HAADS portion of the original Navesink Military Reservation in 1974, MCPS officials conveyed the County's interest in adding the site to Hartshorne Woods Park. The site contained the Missile Master/Missile Mentor installation on Hill 250 plus most of the administration and housing buildings on the east side of Battery Lewis (See Historic Image 85). The National Park Service recommended that the HAADS parcel be transferred to MCPS in 1978. However, under the Reagan Administration's program to sell surplus lands to help reduce the deficit, the U.S. Army transferred the parcel to the U.S. Government Services Administration (GSA), which included it on a list of parcels to be offered for sale at full market value. MCPS requested a 100-percent discount, no-cost transfer of the parcel as allowable by Federal law, but the GSA rejected the request in 1982.<sup>106</sup> (H85. HAADS Aerial, 1979, MCPS.)

MCPS Secretary-Director James Truncer and other County officials enlisted the help of Governor Thomas H. Kean, Senator William Bradley, and Congressman James Howard in support of the 100-percent discount transfer. Middletown Township included the HAADS parcel in a parks and recreation zone to indicate its opposition to any other commercial or governmental use of the land. In 1983, Secretary of the Interior James Watts finally approved the 100-discount transfer, noting that the MCPS proposal to add the 63-acre parcel to Hartshorne Woods Park was "of exceptional merit." In expressing his approval of Secretary Watts' decision, Congressman Howard noted, "Common sense says the site should be used to provide additional parkland to Monmouth County residents and protect this land from inappropriate development." The GSA transferred the 63-acre HAADS parcel to MCPS in July 1984 (See Historic Image 86).<sup>107</sup>

<sup>104</sup> Land Acquisition Records, Hartshorne Woods Park, MCPS.

<sup>105</sup> <http://blog.nixonfoundation.org/2010/06/legacy-of-parks/>; Land Acquisition Records, MCPS.

<sup>106</sup> Land Acquisition Records, Hartshorne Woods Park, MCPS.

<sup>107</sup> Newman, 414-415; Land Acquisition Records, Hartshorne Woods Park, MCPS; "GSA Sets Price on Former Defense Site," *Red Bank Register*, May 4, 1983; "Watt Backs Transfer of Land to County," *Red Bank Register*,

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(H86. Hartshorne Woods Park, GSA Transfers 1974 & 1984, from MCPS Composite Map 2001, 2014, CW Zink.)

At the time of the transfer the site still contained numerous Army and Air Force buildings and structures. With the assistance of Senators Bradley and Frank Lautenberg and Congressman Howard, MCPS requested that GSA utilize funds from the Environmental Restoration Defense Account established in 1983 to cleanup existing and former Department of Defense sites. Congressman Howard noted that, "The property contains approximately 60 structures composed of wooden, block and concrete buildings both above and below ground as well as two large steel radar towers" (See Historic Images 87-88). Over the years the structures have become heavily vandalized. As they stand, they present safety hazards and are repugnant to the adoption of this land as a park. I strongly urge your favorable consideration of HAADS for inclusion in work done through ERDA."<sup>108</sup>

(H87. HAADS Facilities Aerial, 1985, MCPS)

(H88. HAADS Radar Tower, 1983, MCPS.)

After studying the existing conditions of the HAADS site, the Corps of Engineers completed remediation of hazardous materials and demolition of all aboveground buildings and structures, including foundations to a depth of three feet, in 1995. At the request of MCPS, the WWII concrete and earth structures left in place were Battery Lewis, Battery 219, the Plotting-Switchboard Room, and the two Fire Control Stations northeast of Battery 219. In 1995 MCPS removed trees and other vegetation that had completely covered the two batteries since their construction during WWII (See Historic Image 89).<sup>109</sup>

(H89. HAADS Battery Lewis vegetation removal, 1996, MCPS)

In 2006 and 2011, MCPS installed a series of outdoor interpretive waysides at Battery Lewis and at Battery 219 (See Photograph 0005). In 2013 MCPS completed concrete restoration of the casemates to preserve the exterior, and began planning for repairs and improvements to the interior to prepare the battery for interpretation and public visitation. This second phase of construction has been funded in 2014. The objective is to open Battery Lewis to the public within two years; visitors will be able to walk from one end of the battery corridor to the other, explore various rooms, and learn through exhibits and guided tours about Battery Lewis and the historic coastal defenses of the United States. A key interpretive element will be the display of a 16-inch gun barrel from the USS New Jersey in the location of the original 16-inch Navy gun barrel.

While the military site in Hartshorne Woods Park had various names during its active use, the Navesink Military Reservation is the appropriate historic name because of its WWII period of significance and because U.S. Army documents of the completed facility referred to it by that name.

May 15, 1983.

<sup>108</sup> Newman, 420, citing correspondence of Senators Bill Bradley, Frank Lautenberg, and James Howard to COE.

<sup>109</sup> Land Acquisition Records, Hartshorne Woods Park, MCPS.

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"Shore Folds Warned to Beware of Heavy Firing," *Red Bank Register*, December 23, 1944.

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**United States Department of the Interior**  
National Park Service

**National Register of Historic Places**  
**Continuation Sheet**

Navesink Military Reservation

Name of Property

Monmouth County New Jersey

County and State

Name of multiple listing (if applicable)

Section number 9 Page 5

U. S. Army

Bronk, William M., "A History of the Eastern Defense Command and of the Defense of the Atlantic Coast of the United States in the Second World War," New York, 1945.

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**United States Department of the Interior**  
National Park Service

**National Register of Historic Places**  
**Continuation Sheet**

Navesink Military Reservation

Name of Property

Monmouth County New Jersey

County and State

Name of multiple listing (if applicable)

Section number 9 Page 6

Reservation, Battery Lewis, Battery 219, Boundary Fencing, Cable Huts, Fire Control Stations, Harbor Defense Fields of Fire, Hill 250, Plotting Switchboard Room, Power Distribution System, SCR-582 Installation, Utilities Record Drawings, Water Supply System, Corps of Engineers, 1944.

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*Service of the Piece: 16-Inch Guns, M1903A2 or M1905A2, on Barbette Carriage M1, Vol. 2, No. 11, Coast Artillery Training Bulletin, Vol. 4, No. 7*, Fort Monroe, Virginia: The Coast Artillery School, July 1943.

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*Technical Manual, 16-Inch Seacoast Gun Material, Gun MK.II M1, Barbette Carriage M4, TM 9-471*, Washington DC: War Department, November 2, 1942.

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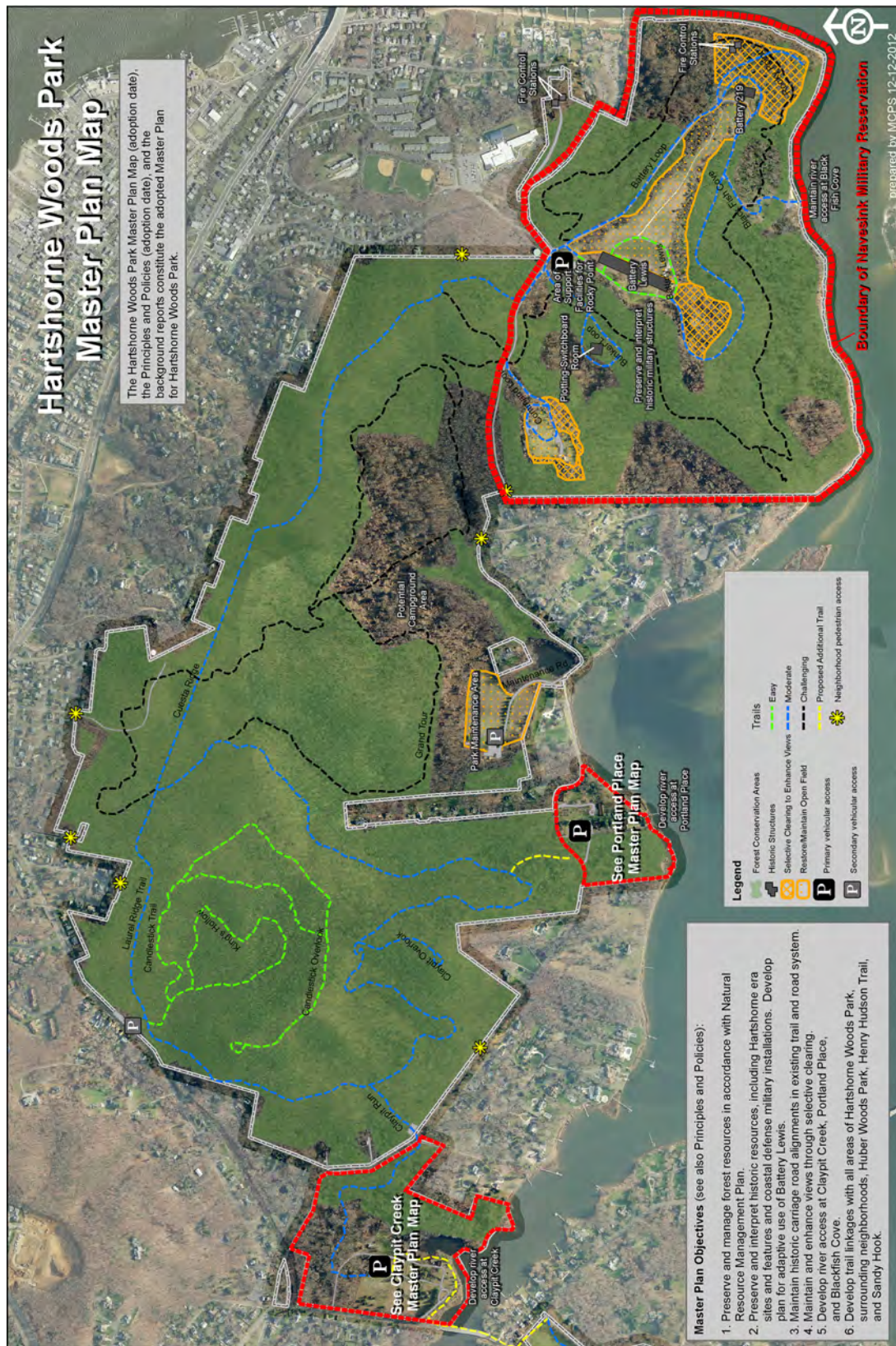
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War Department, Option for Purchase of Land, Navesink Site, Highlands, N.J., Property of Julia H. Trask, May 19, 1942.

War Department, Option for Purchase of Land, Navesink Site, Highlands, N.J., Property of Richard Hartshorne, May 19, 1942.









## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_LOCATOR IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_Locator 3. Hartshorne Woods Park with Sandy Hook, view north, 2010, MCPS



**Navesink Military Reservation**  
**Hartshorne Woods Park**  
**Middletown Township, Monmouth County NJ**

**Boundary of Navesink Military Reservation**

**Coordinates:**  
 A: 40.392286, -73.996218  
 B: 40.392712, -73.994004  
 C: 40.391844, -73.986786  
 D: 40.389087, -73.981218  
 E: 40.386663, -73.981343  
 F: 40.384714, -73.982360  
 G: 40.383844, -73.994843  
 H: 40.384960, -73.996199

**Scale:**  
 0 200 400 600 800 1,000 Feet  
 0 25 50 100 150 200 Meters

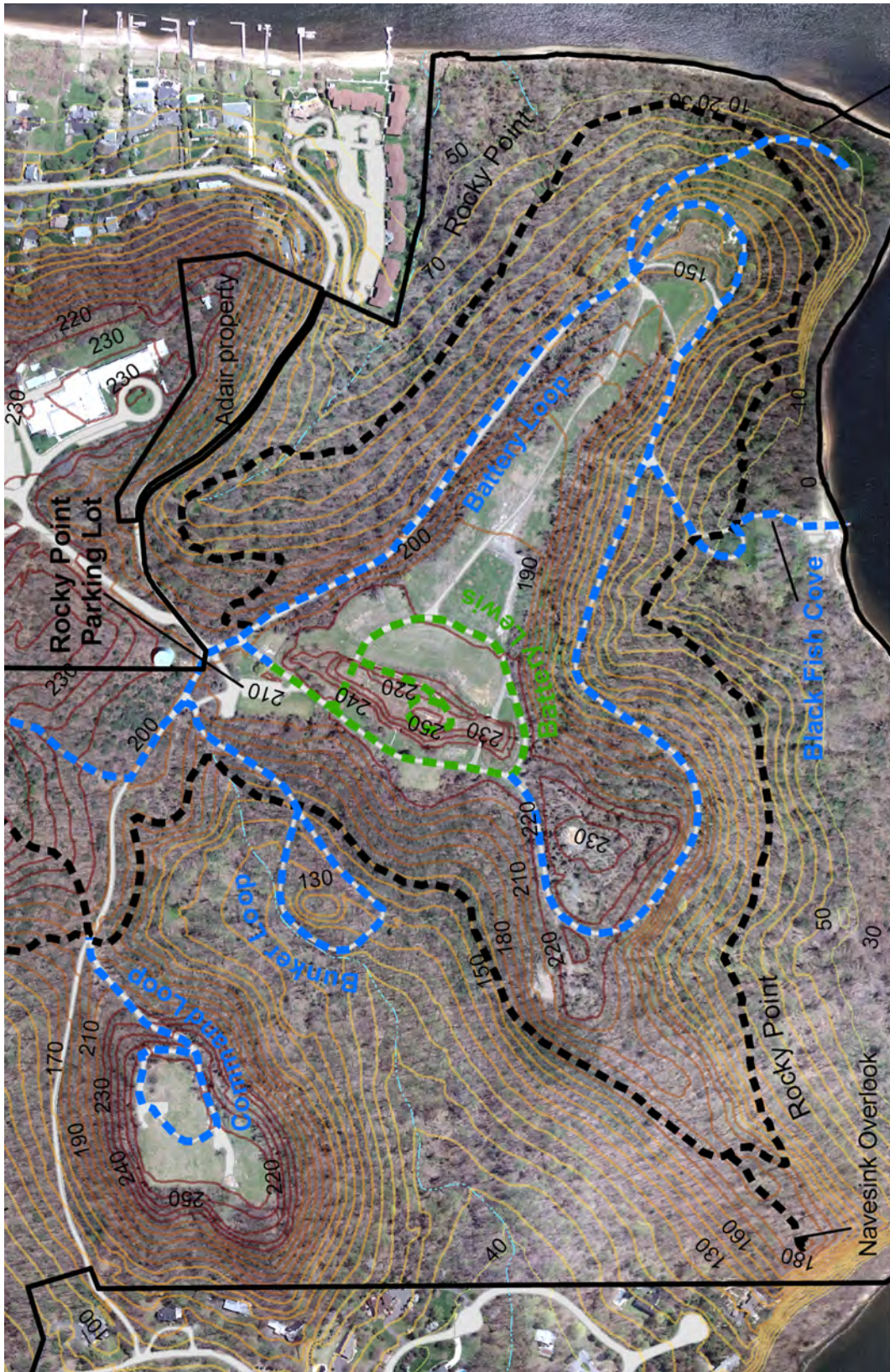
**North Arrow:**  
 N

**Map Labels:**  
 Navesink River  
 Black Fish Hole  
 Upper Rocky Point  
 Lower Rocky Point  
 Fire Control Stations  
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 Military 218  
 Military 217  
 Military 216  
 Military 215  
 Military 214  
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NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_LOCATOR IMAGES



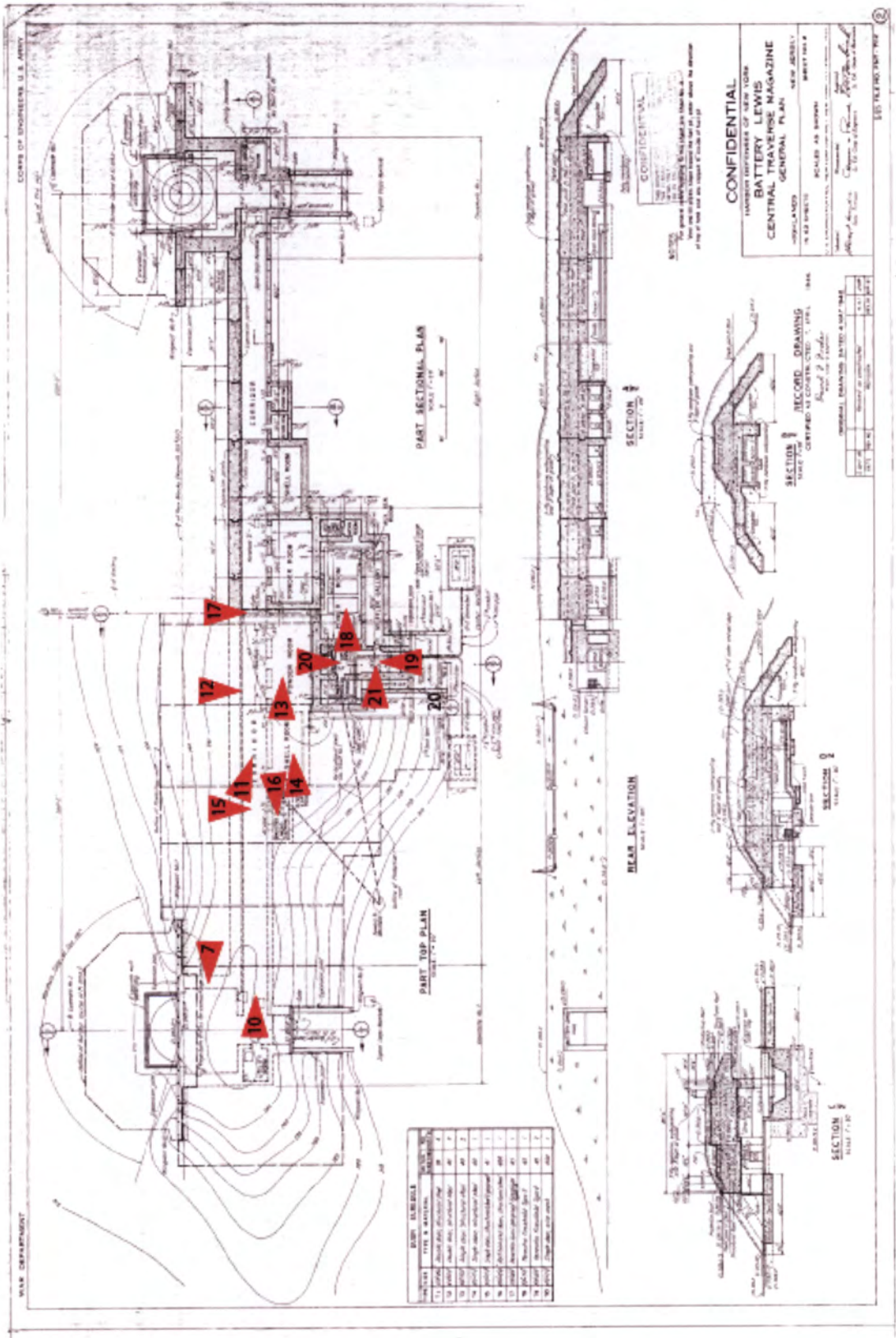
NJ\_Monmouth County\_Navesink Military Reservation\_Locator 5. Navesink Military Reservation, contour aerial, 2008, MCPS





NJ\_Monmouth County\_Navesink Military Reservation\_Photos Sketch Map 1, 2014, CW Zink

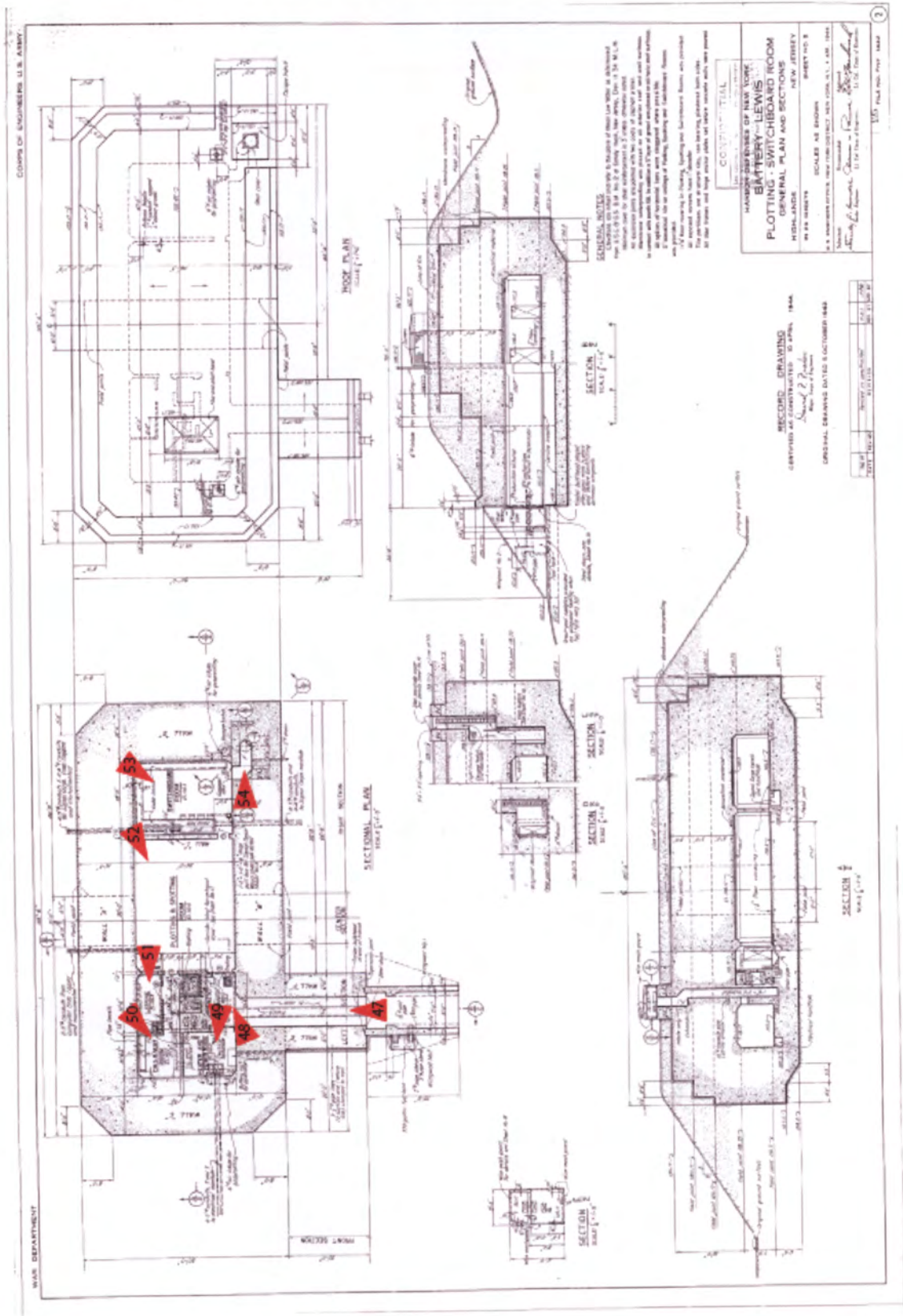




NJ\_Monmouth County\_Navesink Military Reservation\_Photosketch Map 2, 2014, CW Zink



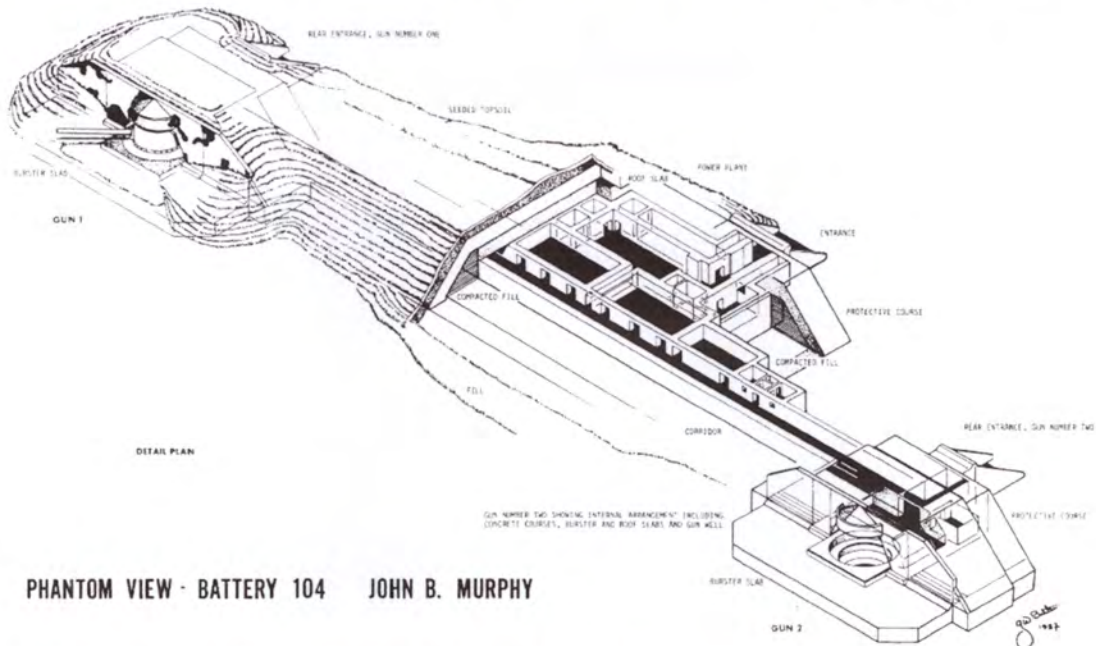
3



NJ\_Monmouth County\_Navesink Military Reservation\_Photosketch Map 4, 2014, CW Zink



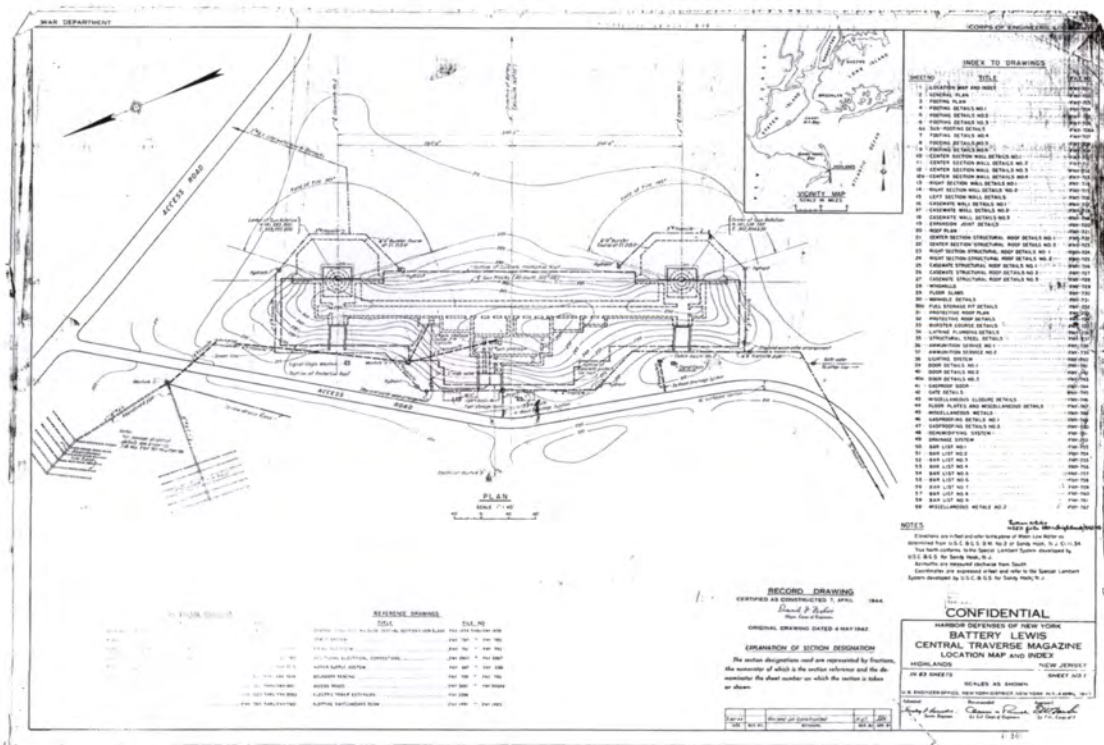
# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



PHANTOM VIEW - BATTERY 104 JOHN B. MURPHY

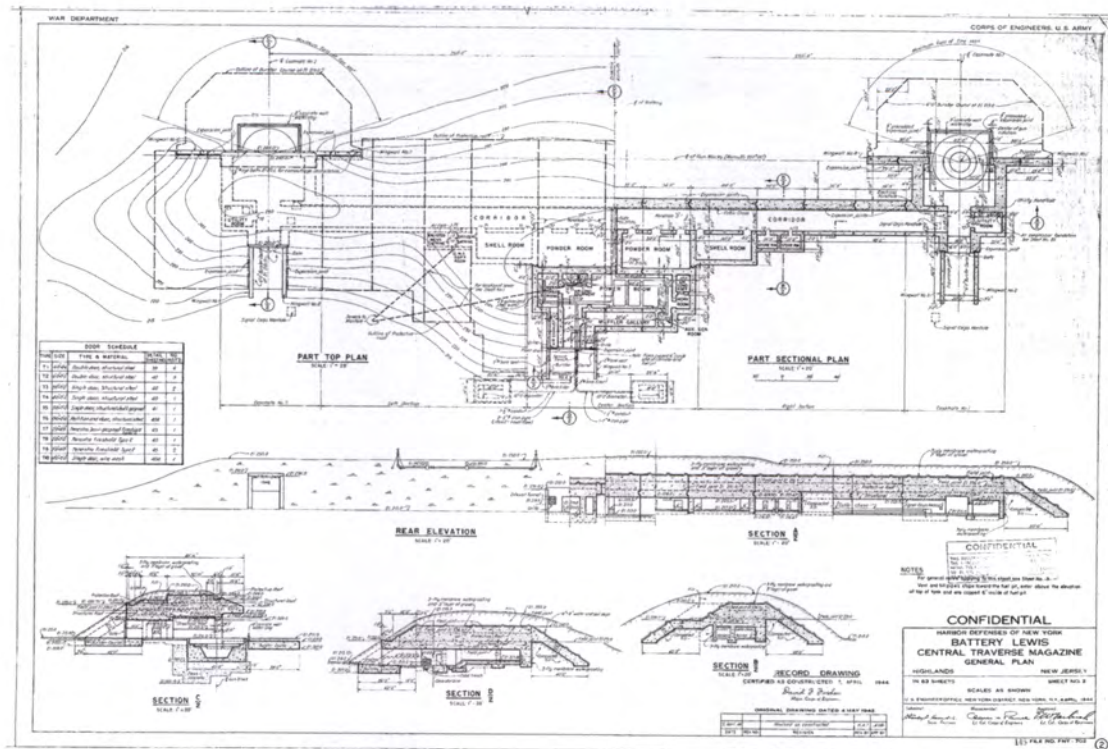
30. Battery John B. Murphy, BCN 104, a Type E 16-inch battery, was begun in 1942 at East Point M.R., Nahant, HD of Boston. Gerald W. Butler, Military Annals of Nahant, Massachusetts

NJ\_Monmouth County\_Navesink Military Reservation\_H1. Battery Murphy, Phantom View, Coastal Defense Journal, Feb 2001

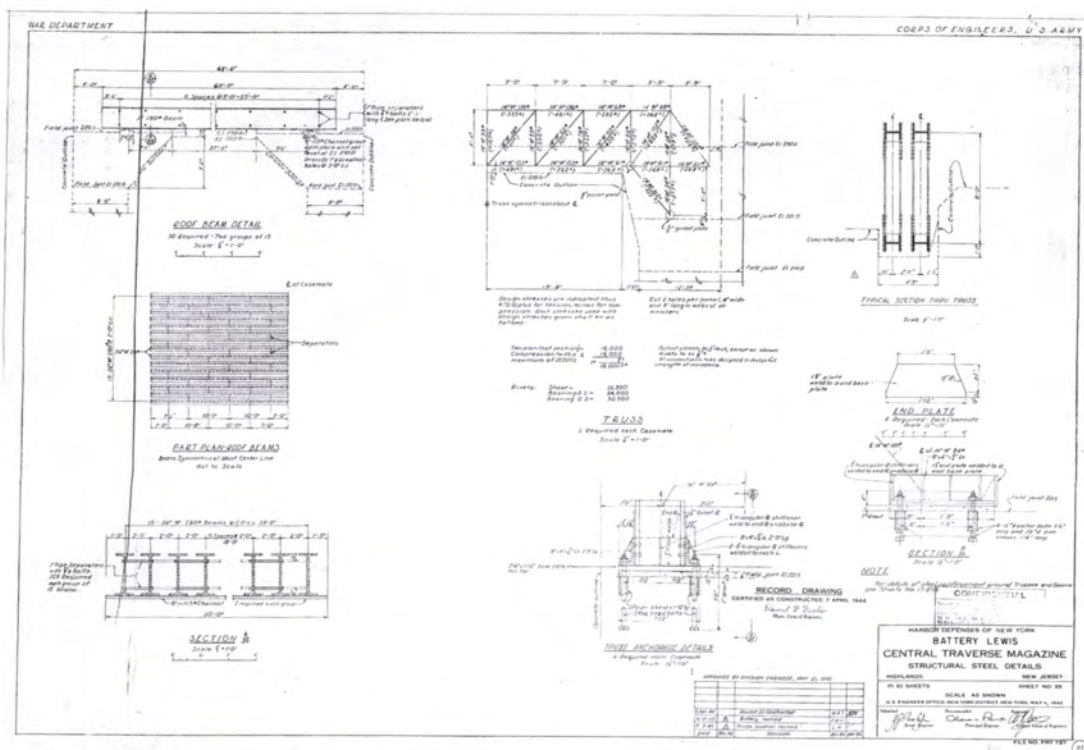


NJ\_Monmouth County\_Navesink Military Reservation\_H2. Battery Lewis, Sheet 1 of 63 Location Map & Index 1942, 1944, COE

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



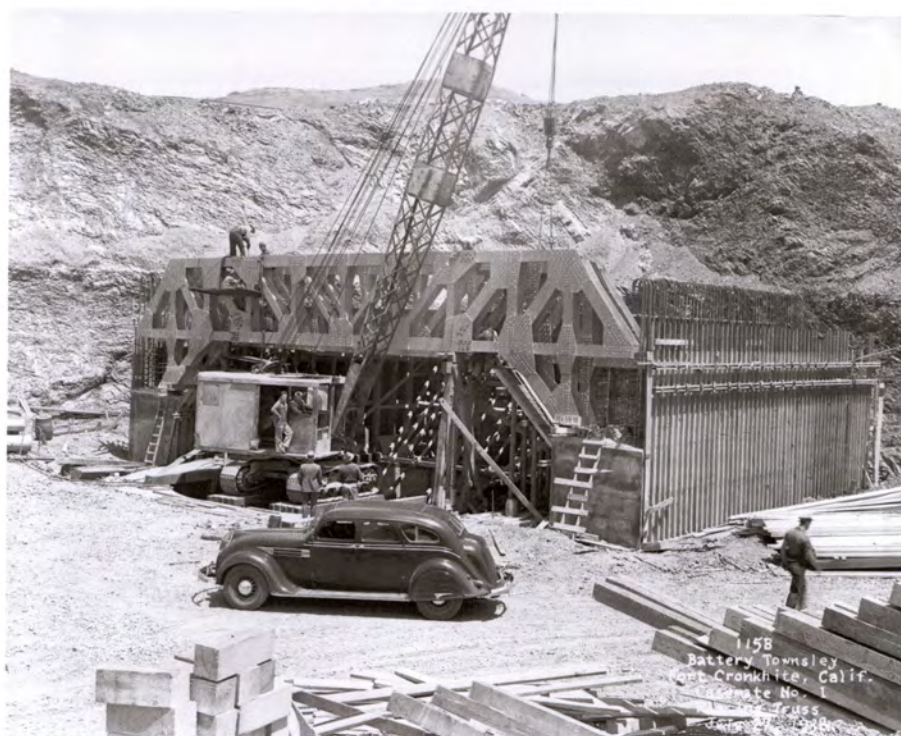
NJ\_Monmouth County\_Navesink Military Reservation\_H3. Battery Lewis, Sheet 2 of 63, General Plan 1942, COE



NJ\_Monmouth County\_Navesink Military Reservation\_H4. Battery Lewis, Structural Steel Details, Sheet 35 of 63 1942, 1944, COE

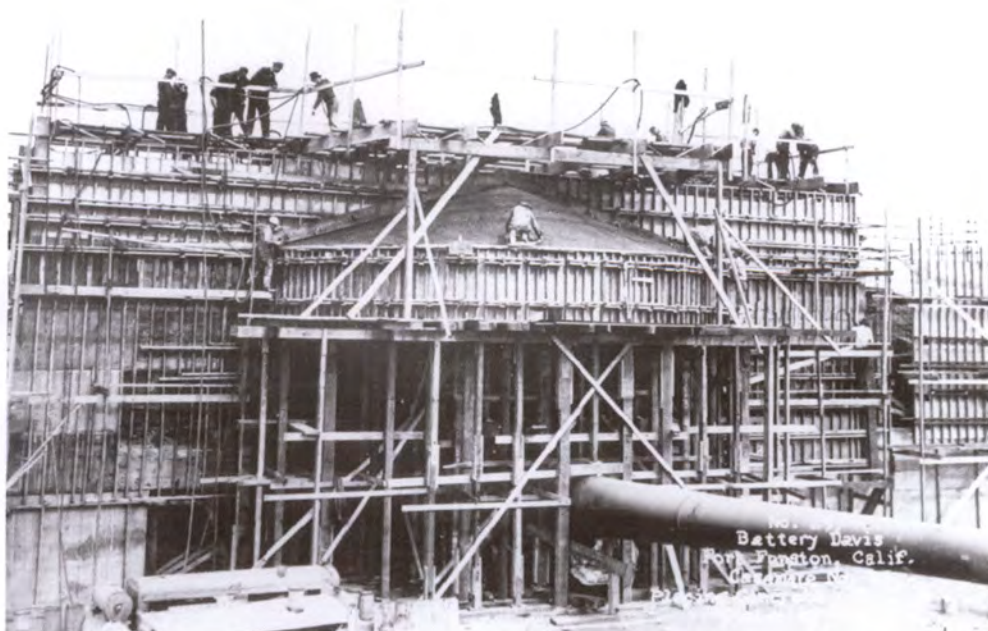


# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



Golden Gate NRA, Park Archives, U.S. Army Corps of Engineers Photograph Collection, 1936-1939, GOGA 18017

NJ\_Monmouth County\_Navesink Military Reservation\_H5. Battery Townsley Casemate No 1, Placing Truss 1938, GOGA 18017-116



21. Construction of casemate at Battery Richmond P. Davis. Atypically, Battery Davis' casemates were built after the guns were mounted. NARA Photo

NJ\_Monmouth County\_Navesink Military Reservation\_H6. Battery Davis, Construction 1938, CDJ Feb 2001

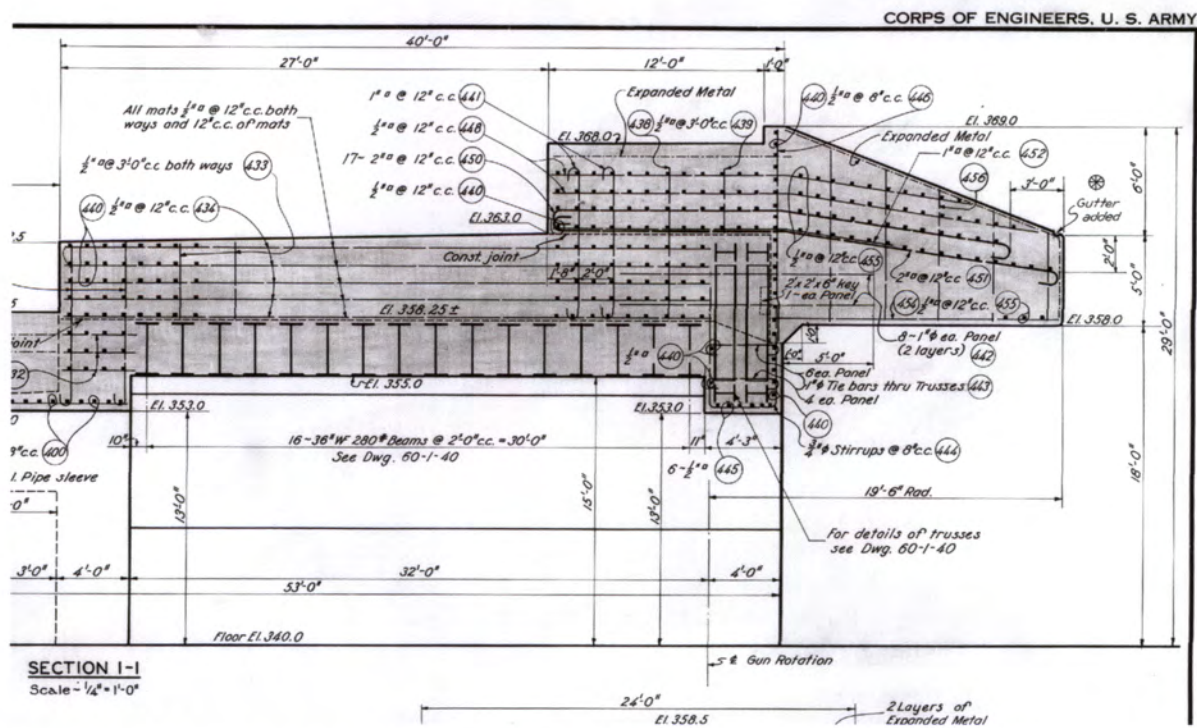


## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



20. Construction of central traverse magazine in 1938, at Battery Richmond P. Davis. NARA Photo

NJ\_Monmouth County\_Navesink Military Reservation\_H7. Battery Davis Casemate 2, Walls Ready for Truss, 1938, GOGA



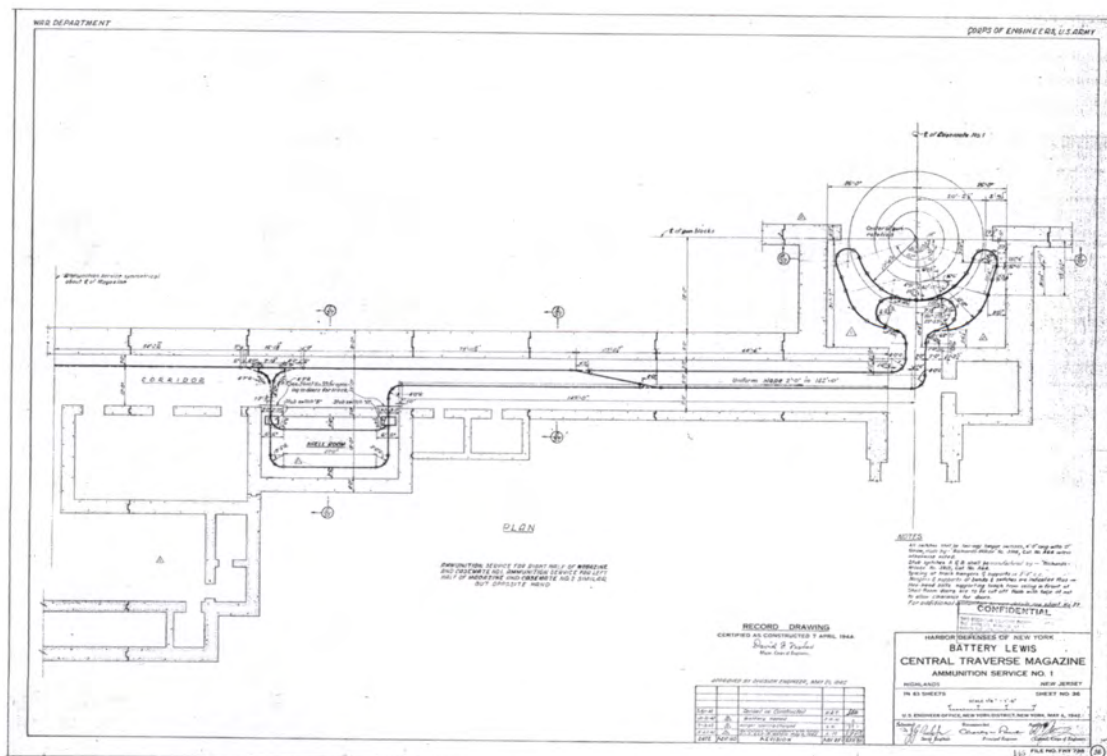
NJ\_Monmouth County\_Navesink Military Reservation\_H8. Battery Townsley Casemate 2, Roof Details, 1938, GOGA

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



Golden Gate NRA, Park Archives, U.S. Army Corps of Engineers Photograph Collection, 1936-1939, GOGA 18017

NJ\_Monmouth County\_Navesink Military Reservation\_H9. Battery Townsley Casemate No 1 Steel Beams & Truss, 1938, GOGA 18017-118



NJ\_Monmouth County\_Navesink Military Reservation\_H10. Battery Lewis Ammunition Service No 1 Sheet 36, 1942, COE

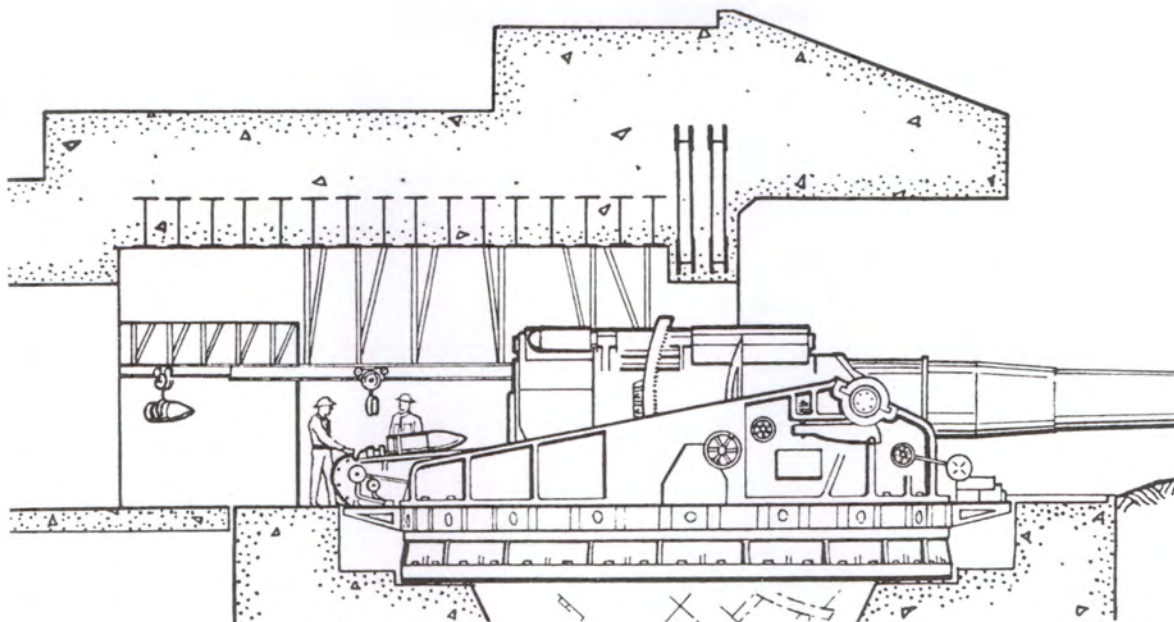


No. 319-A  
Battery Davis  
Fort Funston, Calif.  
Casemates  
Installing Ammunition  
Service Conveyer System  
July 1945

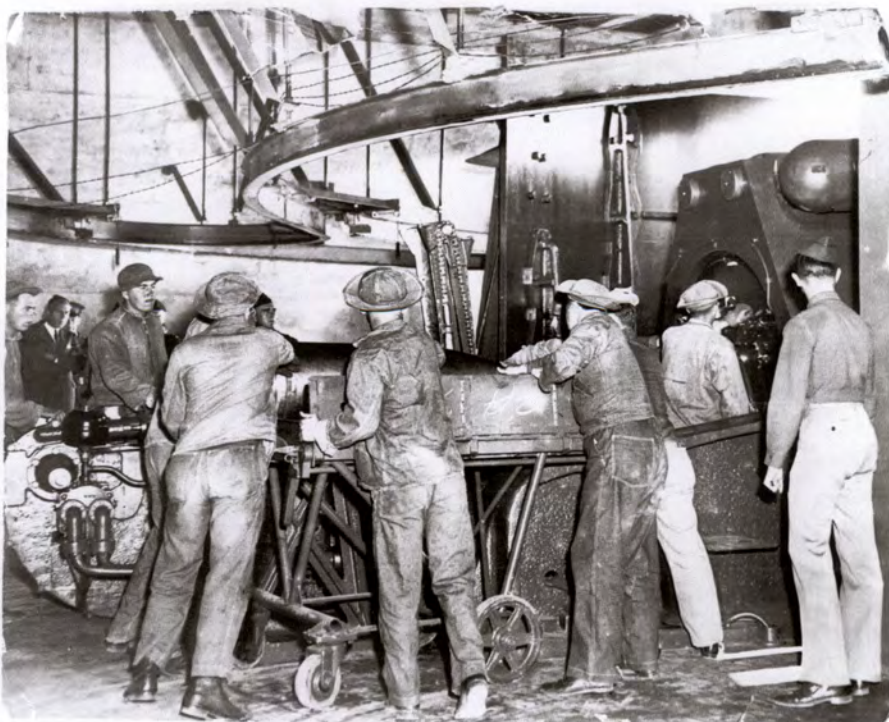
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NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H13. Battery Davis, Seacoast Fortifications, page 117

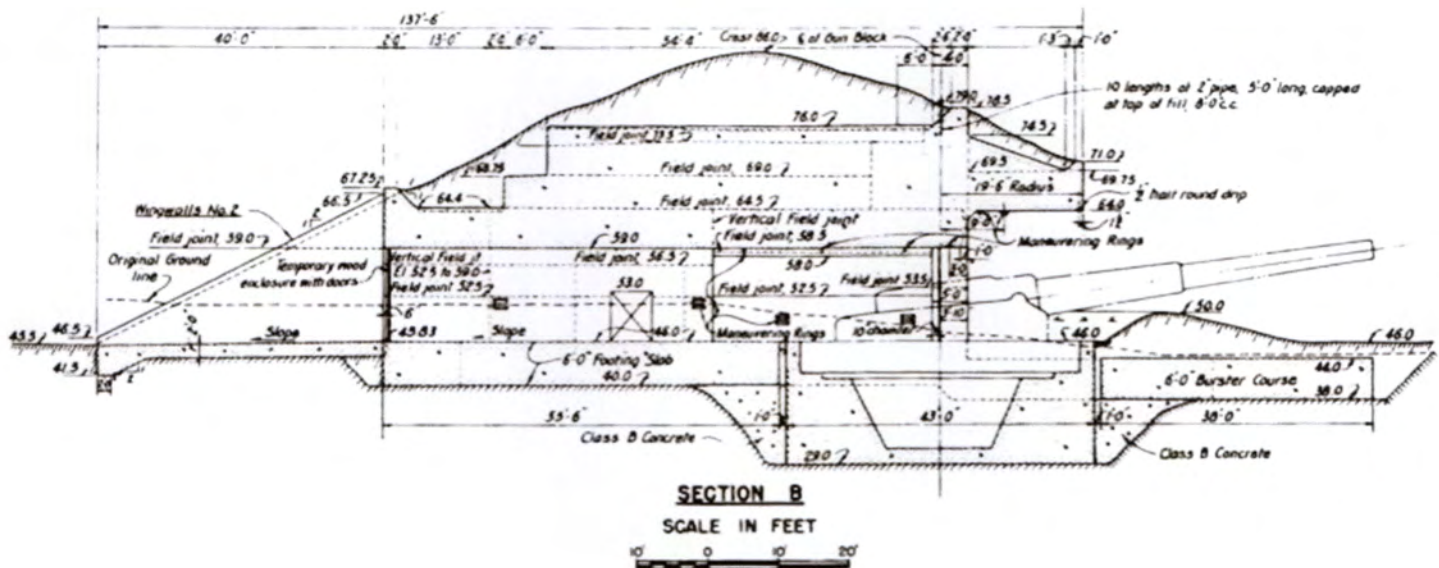


Golden Gate NRA, Park Archives, TASC Negative Collection, GOGA 35301.2130

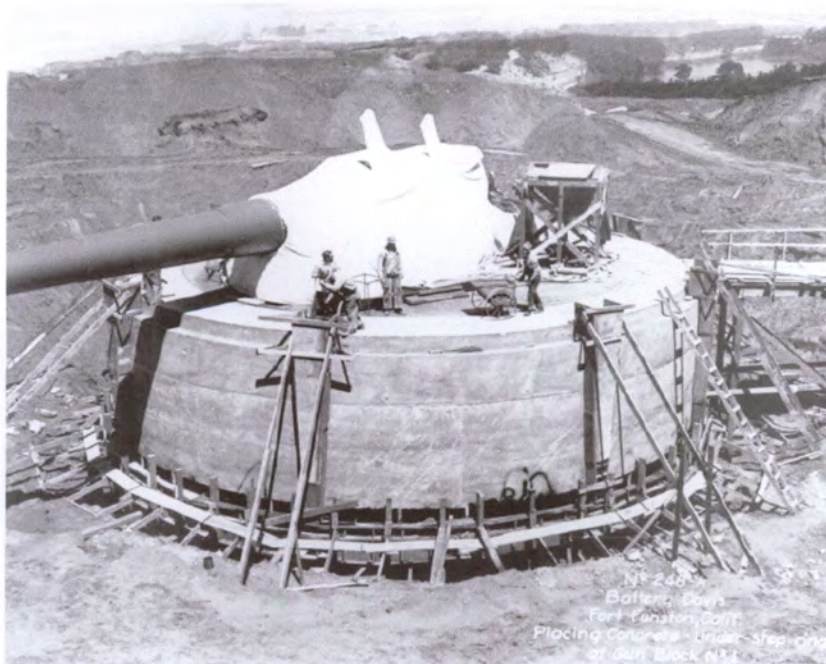
NJ\_Monmouth County\_Navesink Military Reservation\_H14. Battery Townsley, Preparing 16-in Gun Breech, c1939, GOGA



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

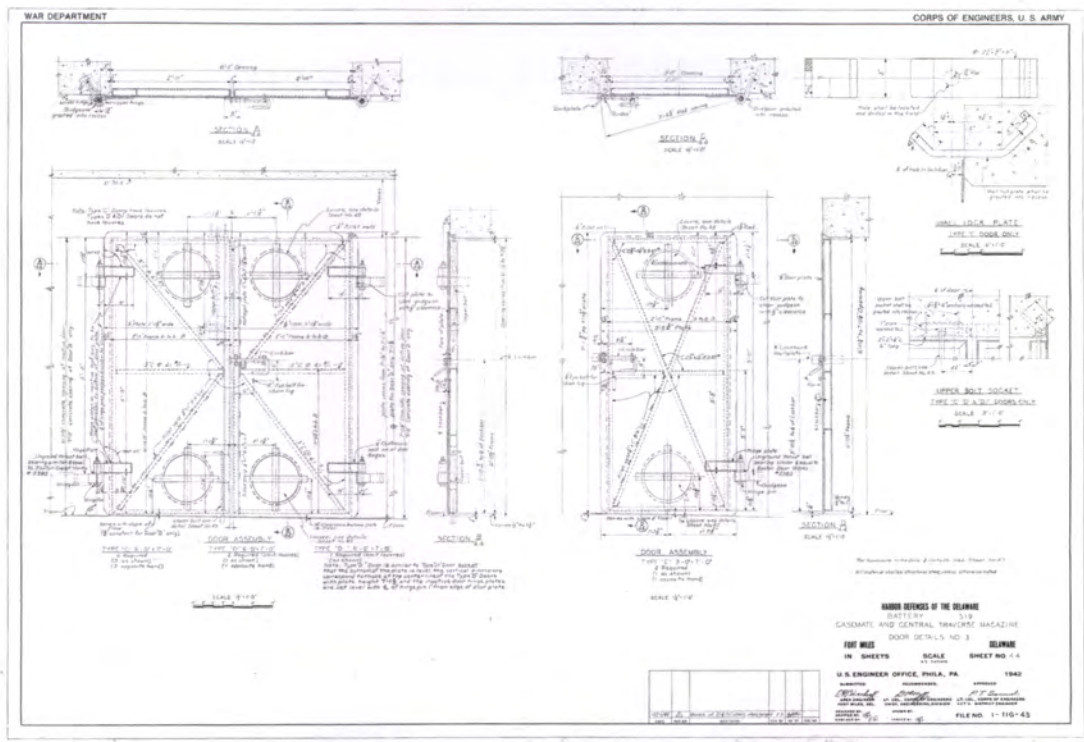


NJ\_Monmouth County\_Navesink Military Reservation\_H15. Fort Greene Battery 109 Section, fortwiki

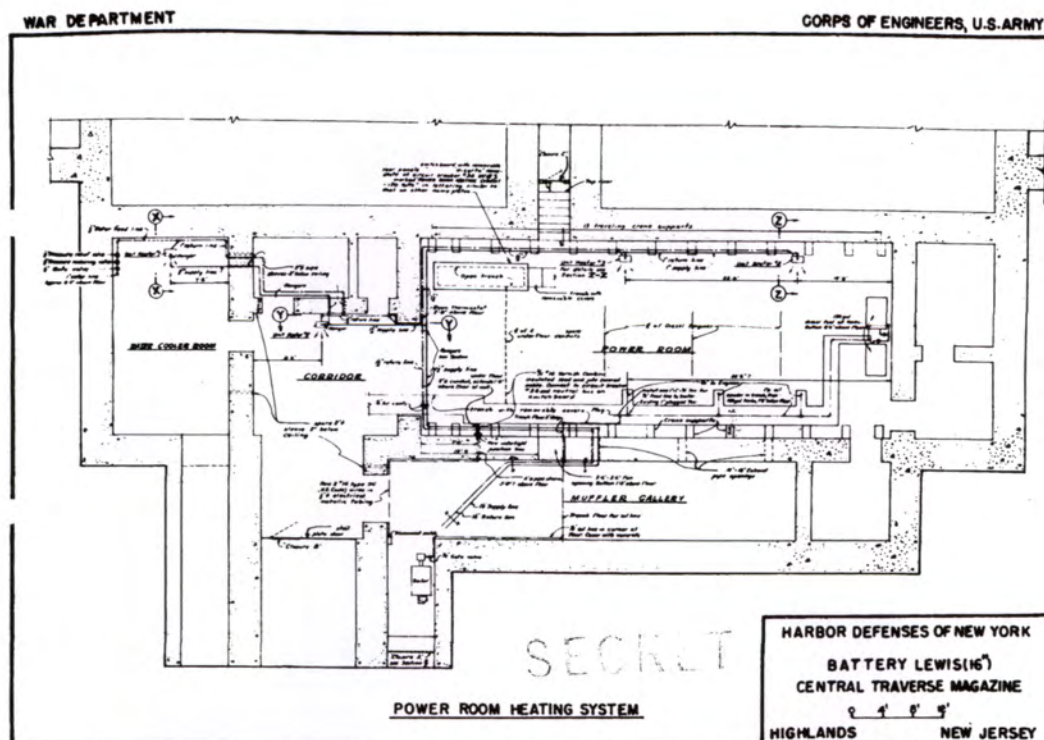


NJ\_Monmouth County\_Navesink Military Reservation\_H16. Battery Davis, Construction of Gun Block, 1938, CDJ Feb 2001

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H17. Battery 519, Fort Miles, Door Details No. 3, 1942, COE



NJ\_Monmouth County\_Navesink Military Reservation\_H18. Battery Lewis, Power Plant, Report of Completed Works, 1944, COE



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

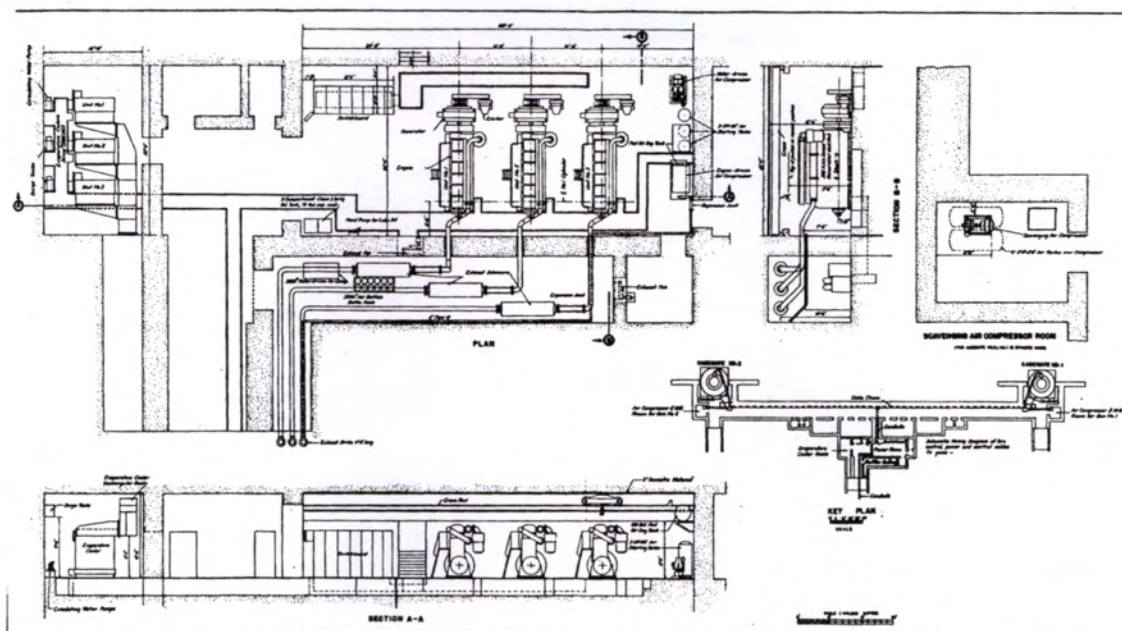


FIGURE 31. Equipment lay-out, power plant M1 for a 16-inch gun emplacement.

NJ\_Monmouth County\_Navesink Military Reservation\_H19. Power Plant Equipment Layout, Diesel Electric Plants, Bulletin, 1945, WD

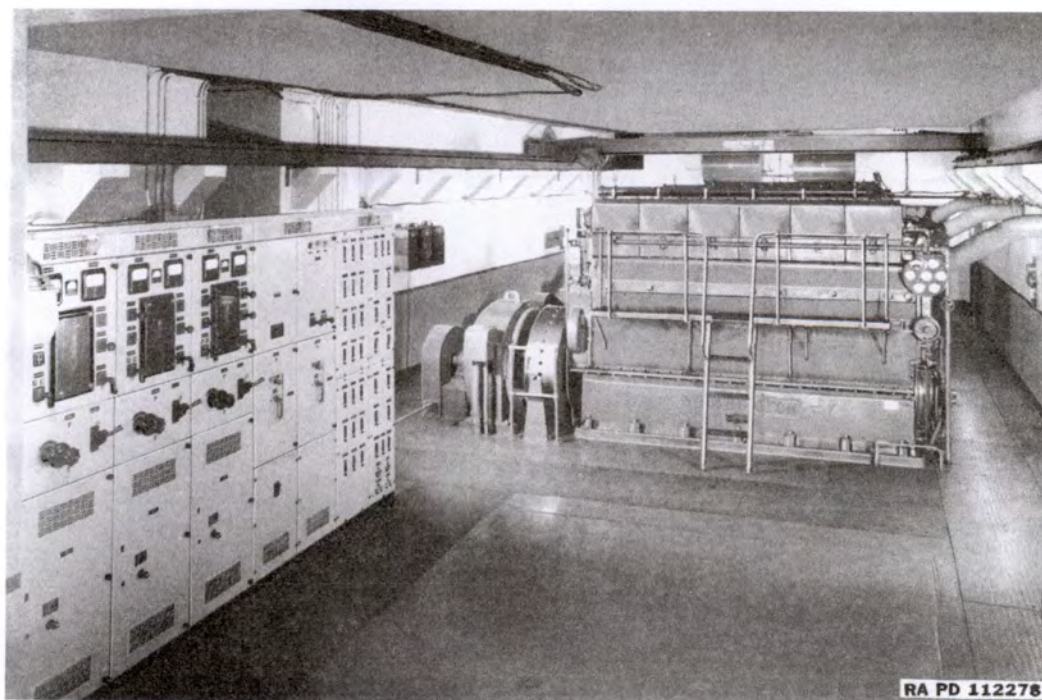
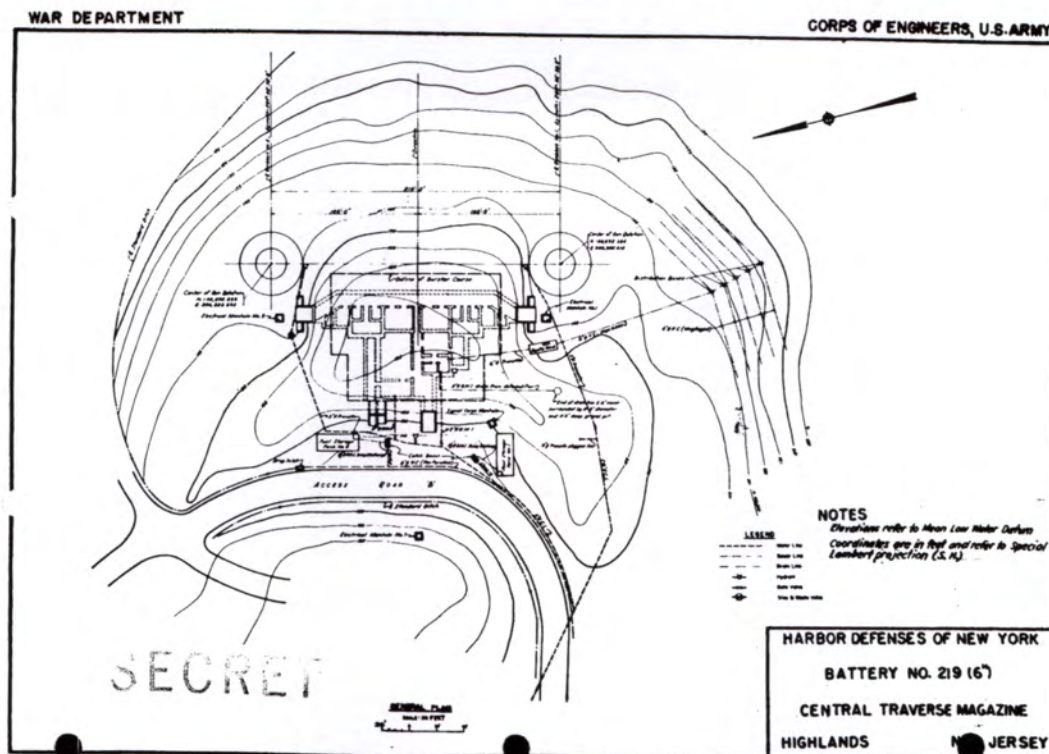
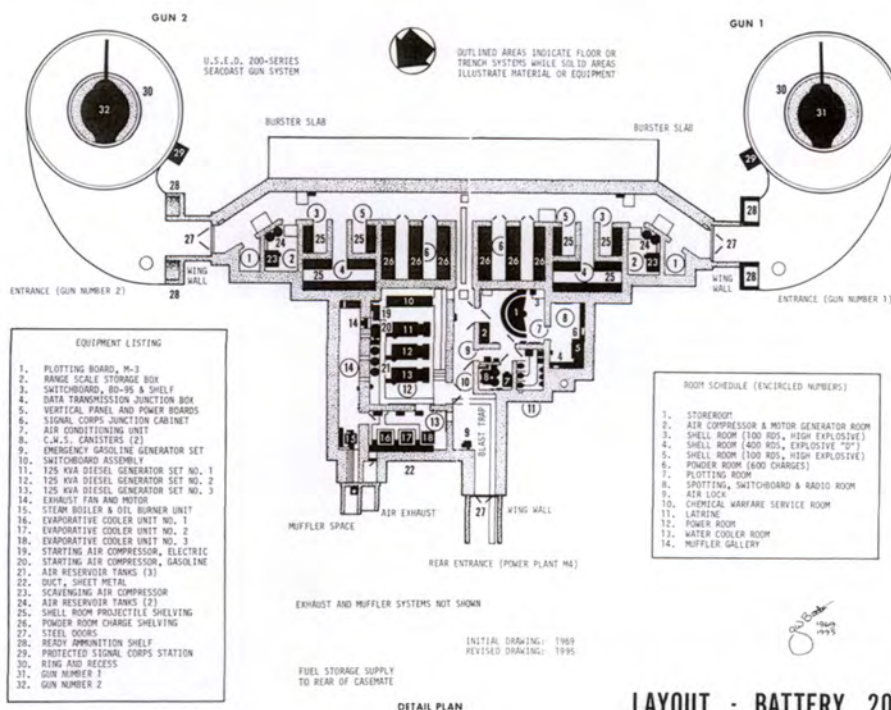


Figure 1. Engine and switchboard room of power plant, M1.

NJ\_Monmouth County\_Navesink Military Reservation\_H20. 16-inch Gun Powre Plant SNL E-61 008, Bolling Smith



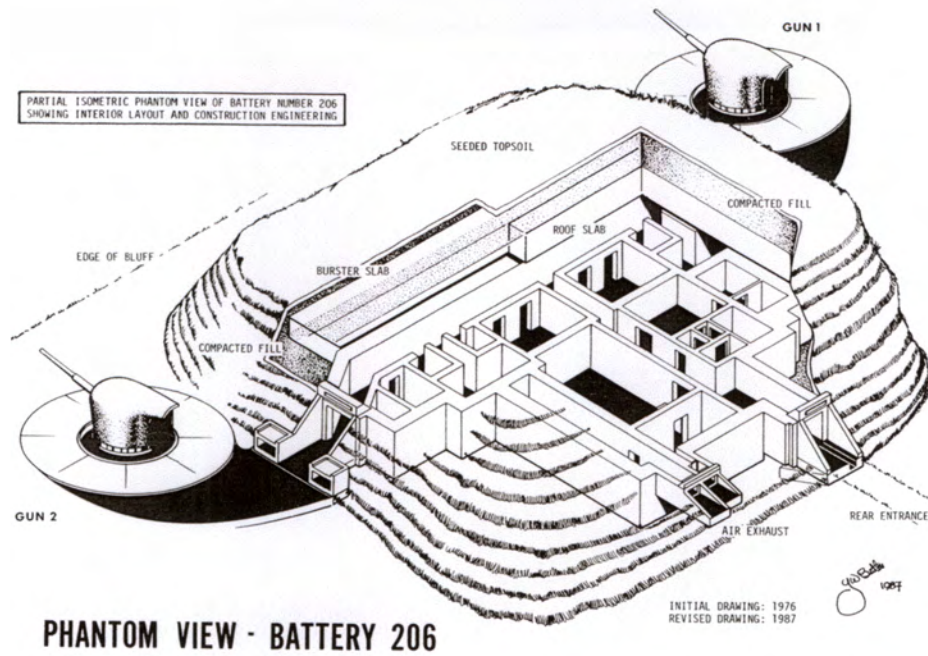
NJ\_Monmouth County\_Navesink Military Reservation\_H21. Battery 219, site plan, Report of Completed Works, 1944, COE



NJ\_Monmouth County\_Navesink Military Reservation\_H22. Battery 206, Layout, 1995, Butler, Annals of Nahant



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

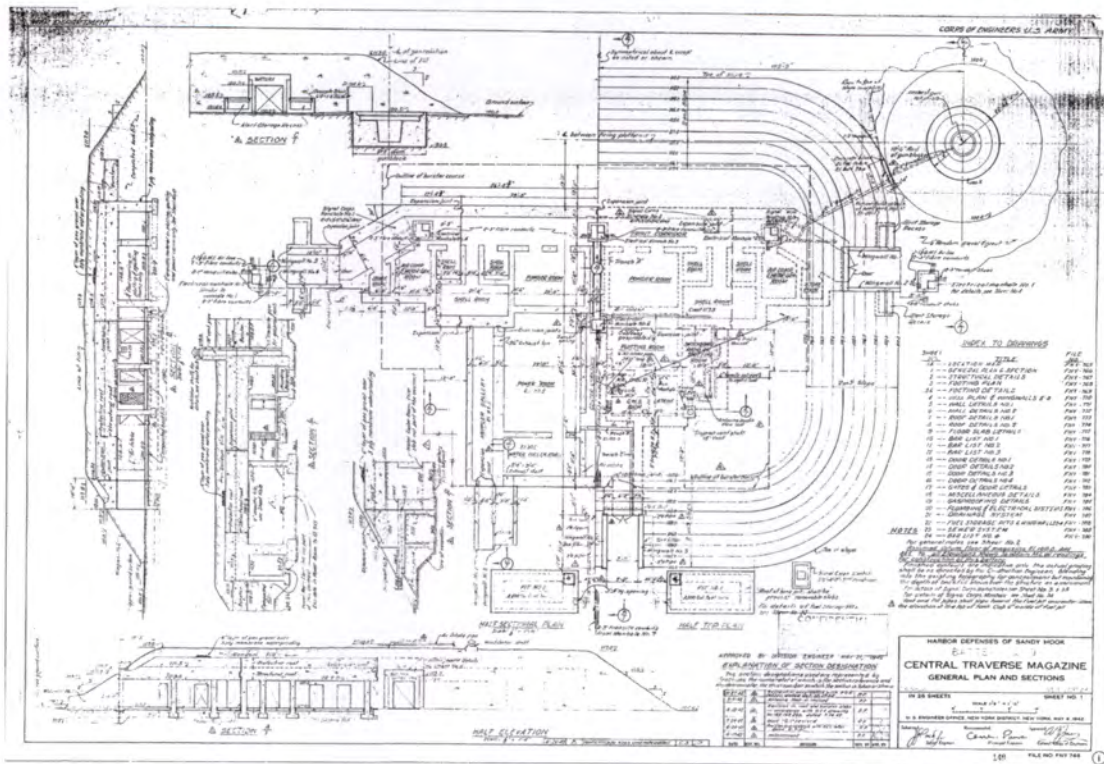


NJ\_Monmouth County\_Navesink Military Reservation\_H23. Battery 206, Phantom, 1995, Butler, Annals of Nahant



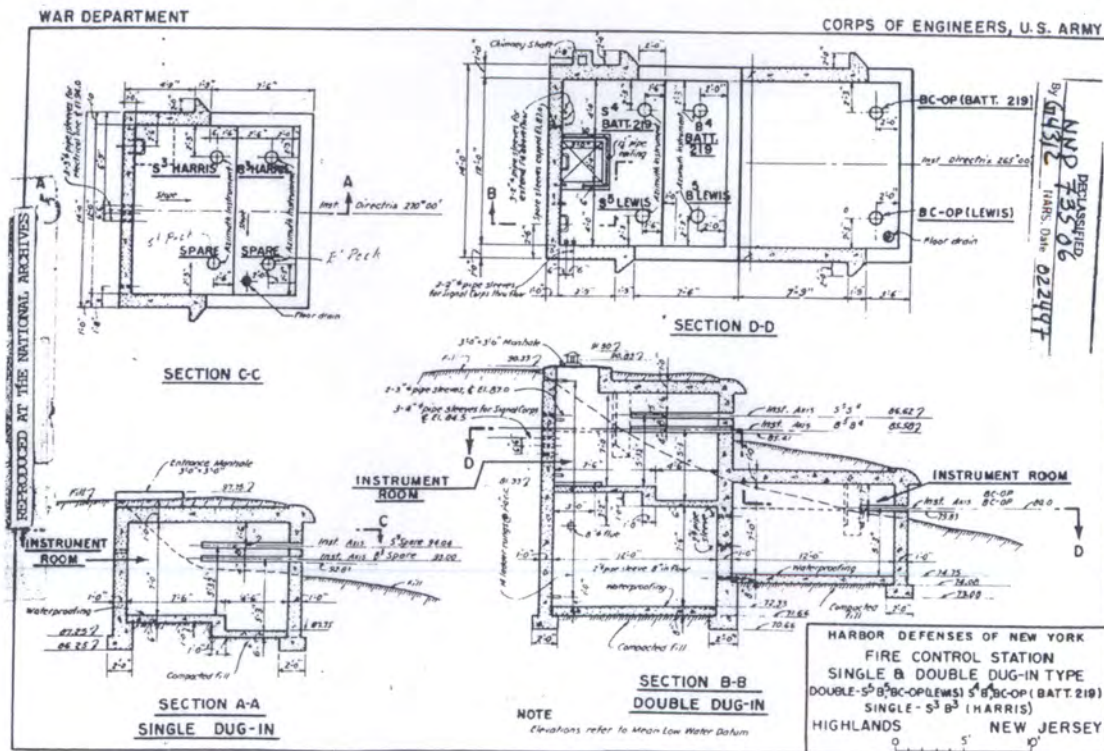
NJ\_Monmouth County\_Navesink Military Reservation\_H24. Battery 223, Cape May Military Reservation, 2010, fortwiki

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

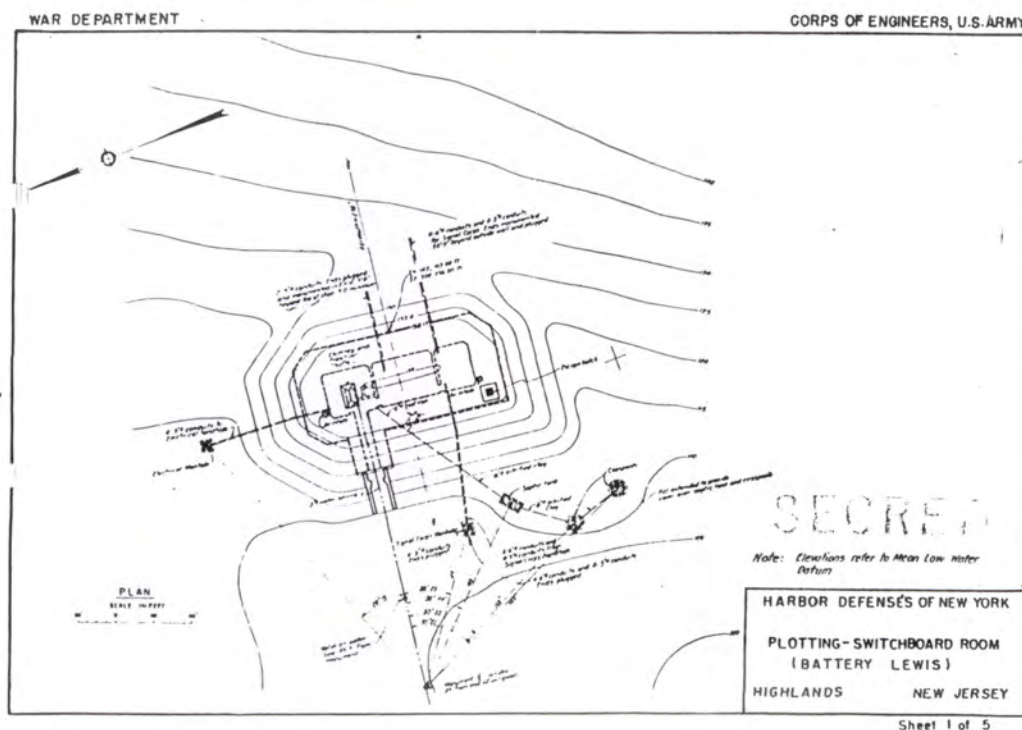




# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

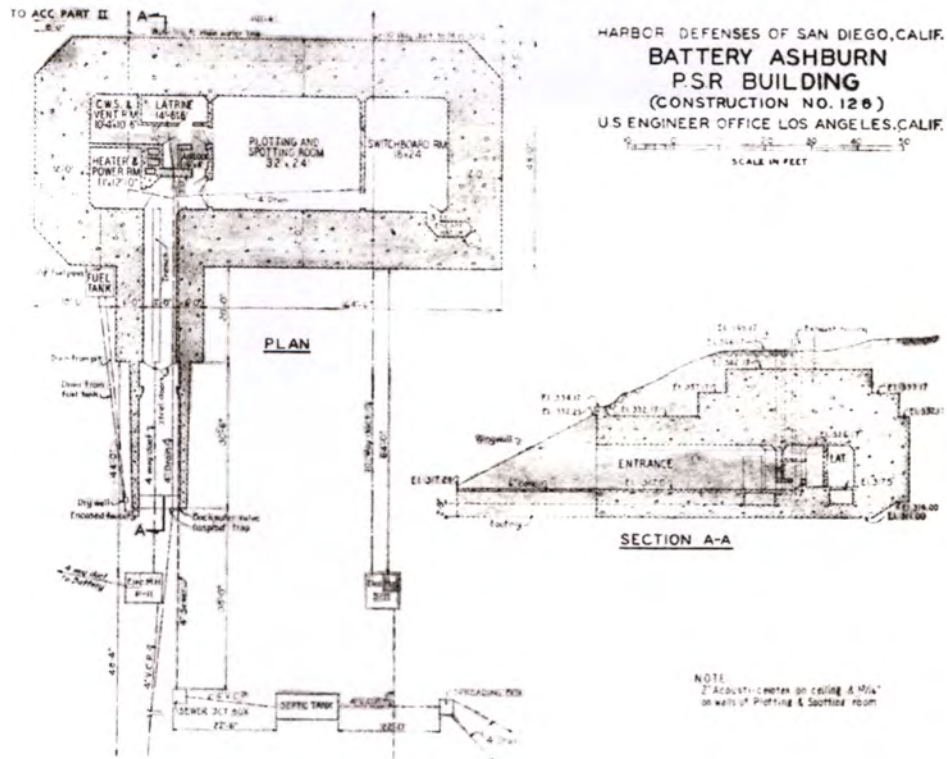


NJ\_Monmouth County\_Navesink Military Reservation\_H27. Fire Control Stations, Single & Double Dug-in, Report of Completed Works, 1944, ...

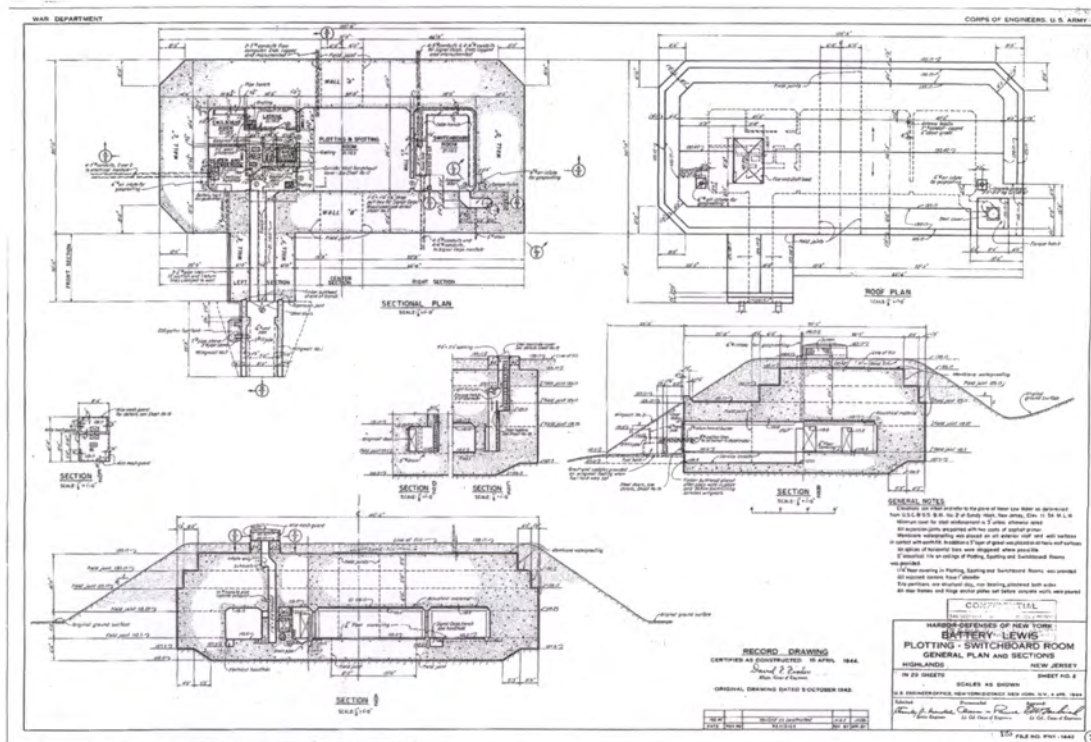


NJ\_Monmouth County\_Navesink Military Reservation\_H28. Plotting-Switchboard Room, site plan, Report of Completed Works, 1944, COE

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



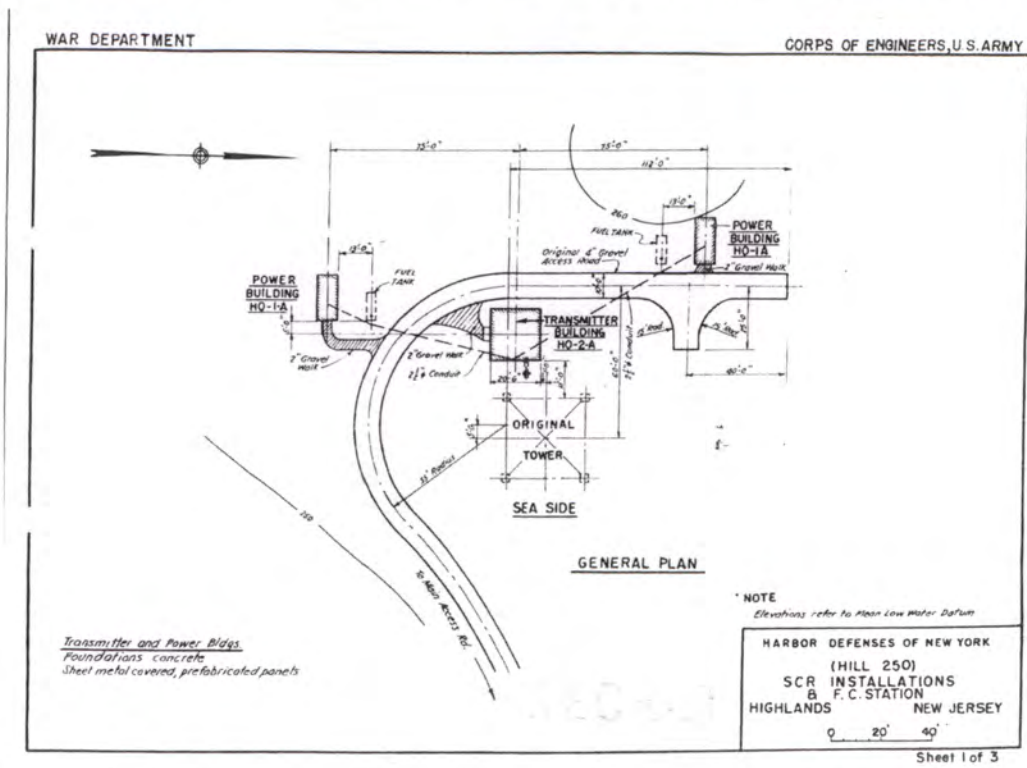
NJ\_Monmouth County\_Navesink Military Reservation\_H29. Battery Ashburn San Diego PSR Plan wik



NJ\_Monmouth County\_Navesink Military Reservation\_H30. Plotting-Switchboard Room, Plan & Sections Sheet 2 of 29, 1944 COE



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H31. Hill 250, site plan, Report of Completed Works, 1944, COE



NJ\_Monmouth County\_Navesink Military Reservation\_H32. Black Fish Cove, former house, c1979, MCPS

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



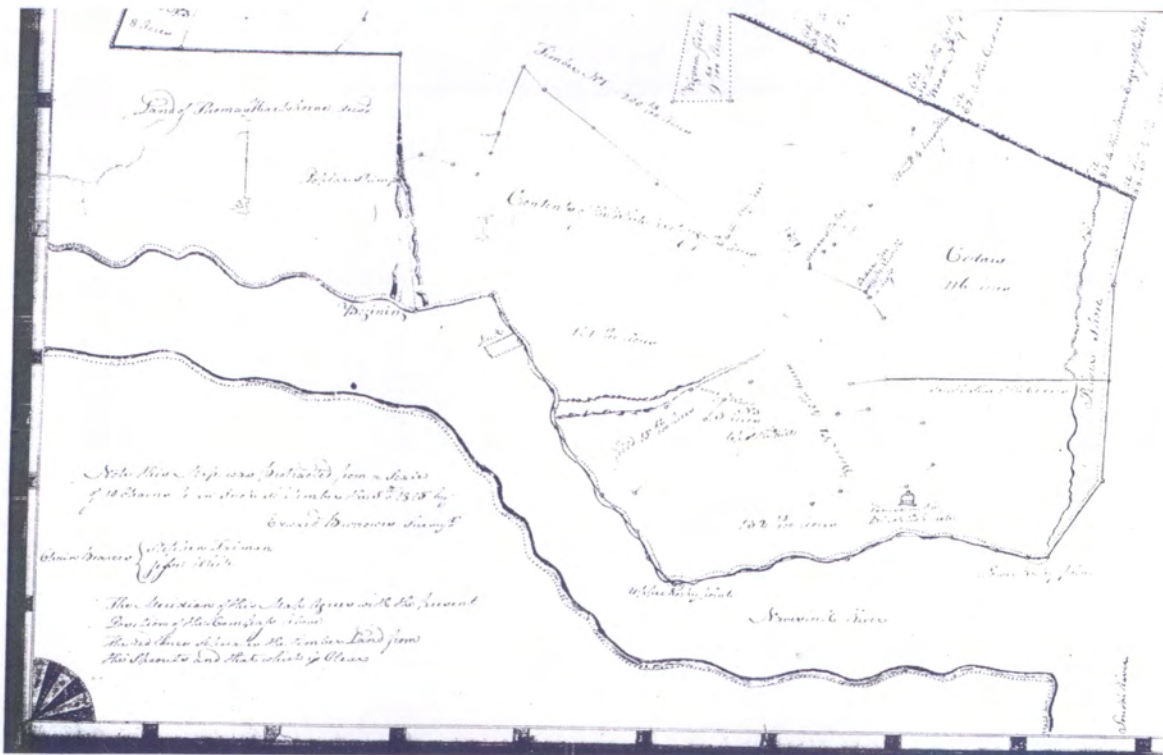
NJ\_Monmouth County\_Navesink Military Reservation\_H33. William Hartshorne Survey, 1720, MCHA



NJ\_Monmouth County\_Navesink Military Reservation\_H34. Richard Lawrence, Survey May 1761 for Robert and Esek Hartshorne, MCHA



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H35. Survey of Richard Hartshorne Property, 1815, MCHA



NJ\_Monmouth County\_Navesink Military Reservation\_H36. Rounding the Point, Minturn House, Highlands N.J., Buttersworth c1885 MCPS



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H37. Minturn House at Rocky Point, c1900, Dan Seitz



NJ\_Monmouth County\_Navesink Military Reservation\_H38. Rocky Point, View of Sea Bright, c1900, Dan Seitz



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



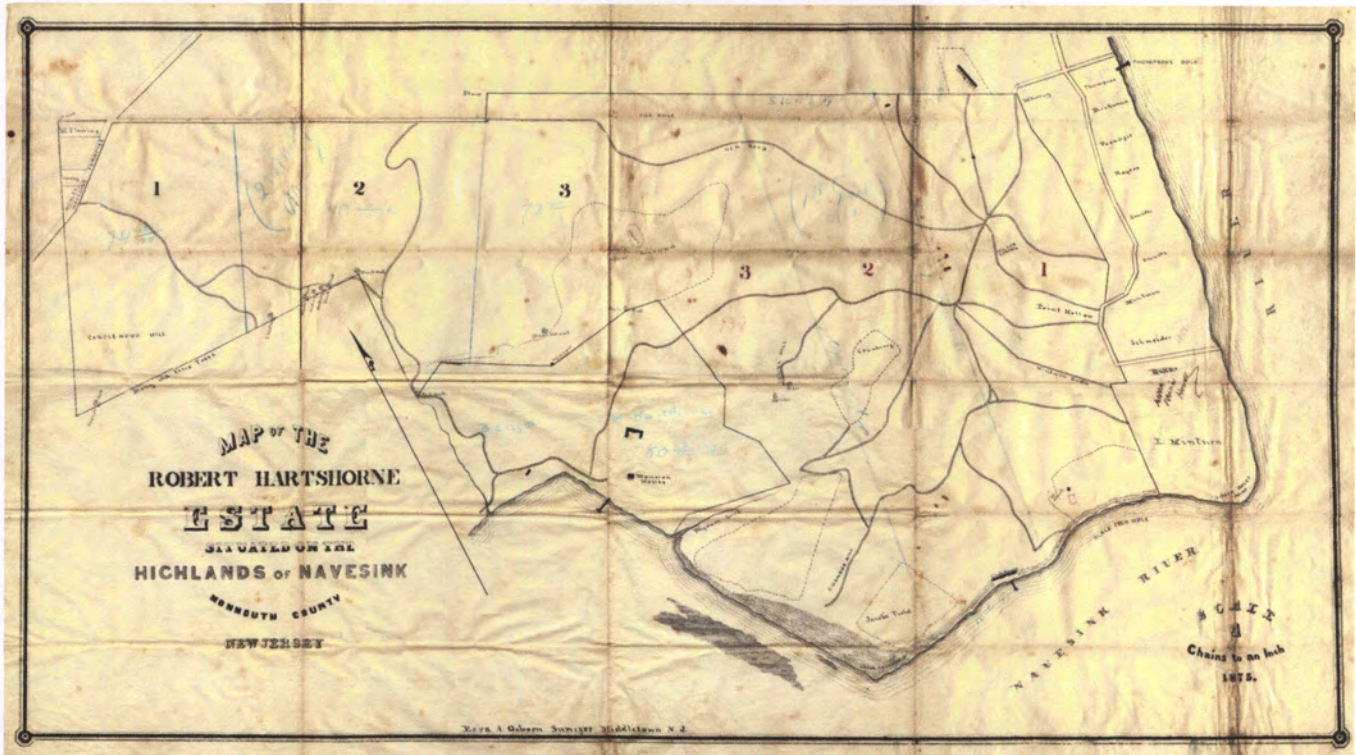
NJ\_Monmouth County\_Navesink Military Reservation\_H39. Neptune Club, burned 1910, nd, Dorns, MCPS



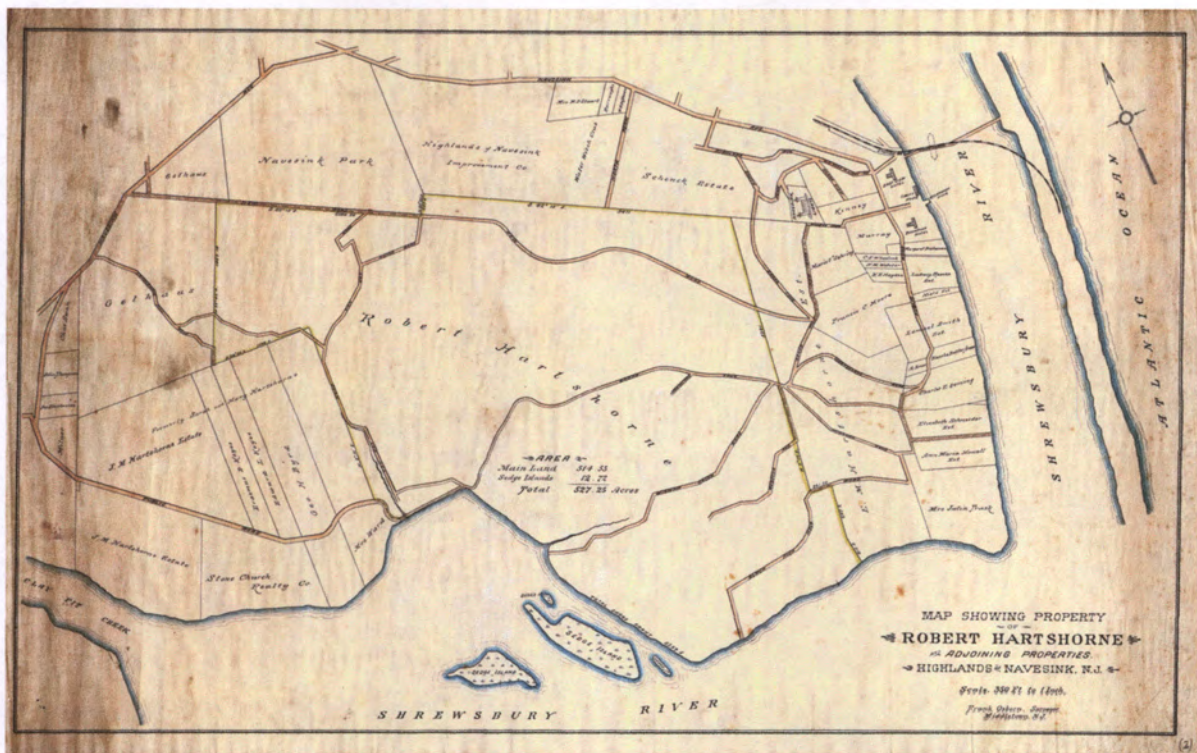
NJ\_Monmouth County\_Navesink Military Reservation\_H40. House at Pear Tree Point, c1880, MCPS



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H41. Map of Robert Hartshorne Estate, 1875, MCHA



NJ\_Monmouth County\_Navesink Military Reservation\_H42. Map of Property of Robert Hartshorne, c1910, MCHA



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



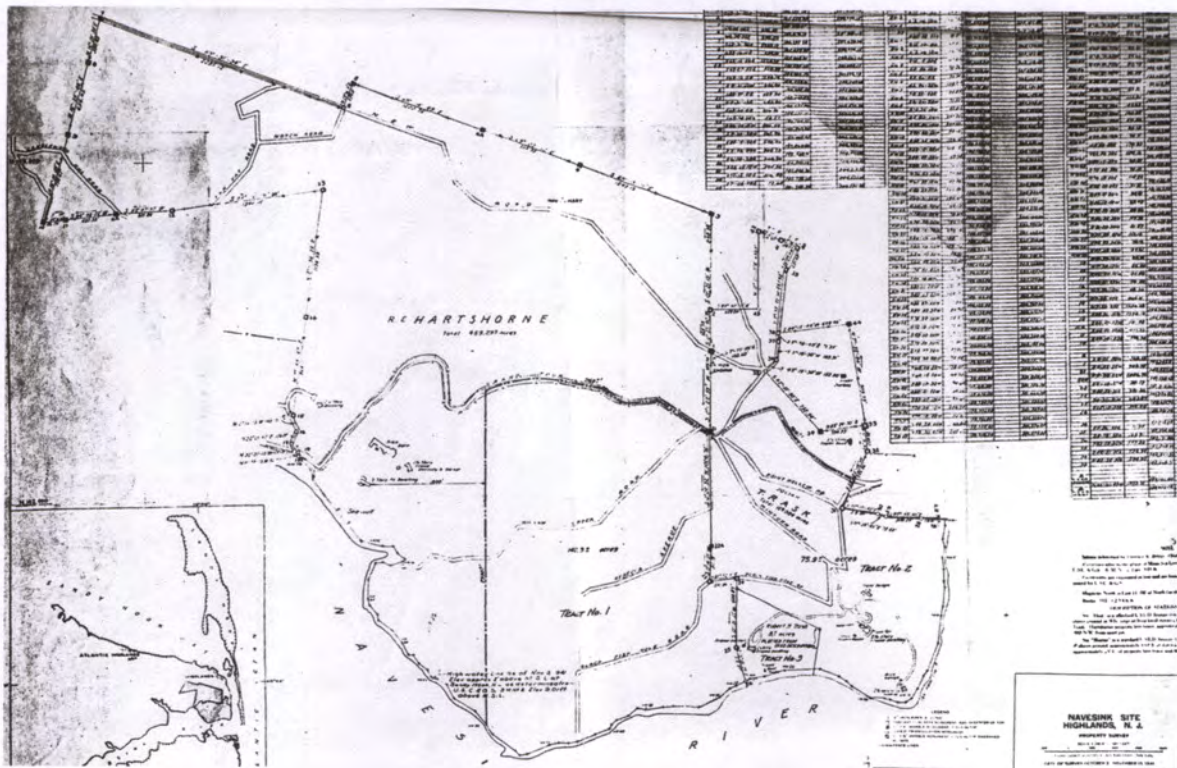
NJ\_Monmouth County\_Navesink Military Reservation\_H43. Robert Trask House, later Officers Quarters, 1979, MCPS



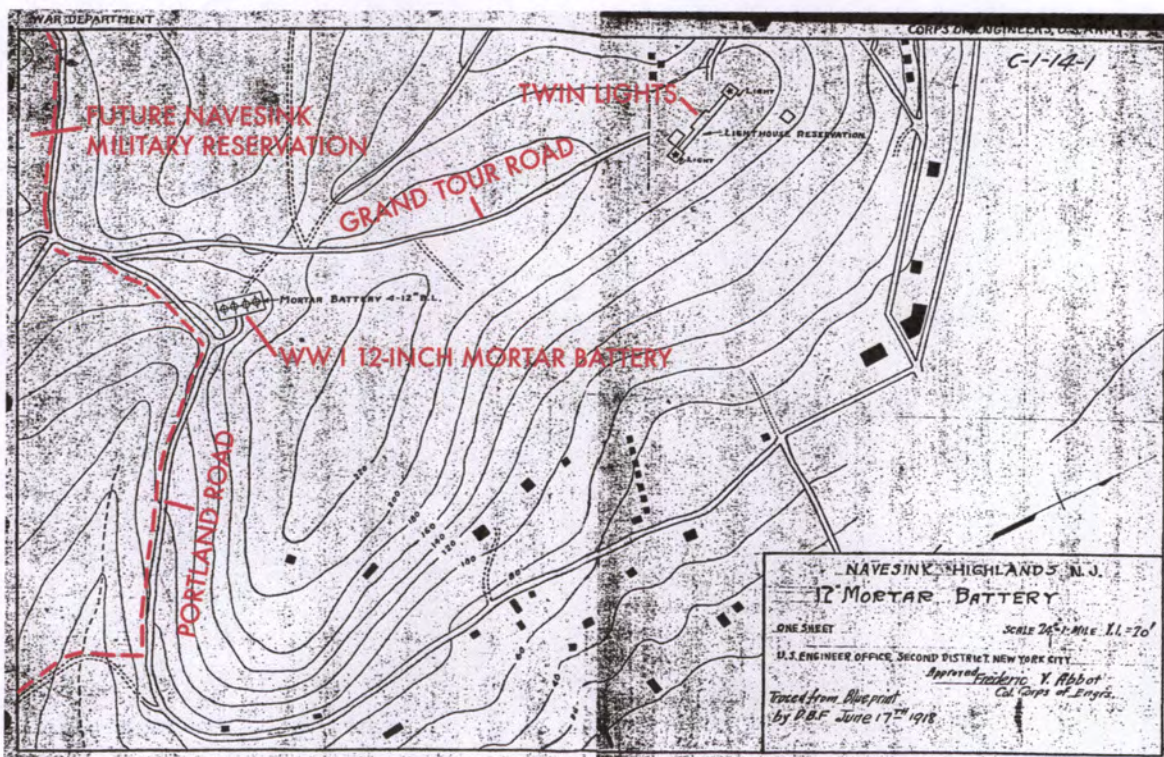
NJ\_Monmouth County\_Navesink Military Reservation\_H44. Navesink Highlands Aerial, 1933, NJ



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H45. Navesink Site Highlands NJ Survey, 1941, COE



NJ\_Monmouth County\_Navesink Military Reservation\_H46. Navesink Highlands 12-inch Mortar Battery, 1918, 2014 notes, GATE



REPORT OF COMPLETED WORKS - SEACOAST FORTIFICATIONS.

COAST DEFENSES OF SANDY HOOK, N.J.  
FORT TILDEN.  
BATTERY HARRIS.  
No. of guns 2. Calibre 16". Carriage Barbette.

FORM 7

Corrected to Jan 2, 1930

GENERAL PLAN - Scale 1 Inch = 300 Ft.

REAR ELEVATION.

PLAN OF EMPLACEMENT.  
Scale 1 Inch = 50 Ft.

CROSS SECTION THRU GUN WELL AT 12 AND MAGAZINE AT 3 A.

Adapted to site at Sakonnet Point, R.I. shown on Exhibit II  
Report of Harbor Defense Board, 1st Corps Area - Nor-  
folk-Suffolk Bay Sub-Area, AG 660.2 (1-30-33) Misc. E.  
C. of E. 381 (Coast Defense) GS.

325 Yds.

Shell Magazine 125 Rds.

Powder Magazine 125 Rds.

Plotting-Switchboard Room

Caretaker's Quarters

Optical Switchboard Room

Larrine

Narrow Gauge Track

AREA 100 ACRES

Emplacement

Magazine--125 Rds./Gun  
g Power Room  
(Type B)

100 Yds.

100 Yds.

125 Rds. per Gun in Protected Storage.  
125 " " " " " Non-Protected Storage.

Shell Magazine 125 Rds.

150 Yds.

100 Yds.

LAYOUT FOR  
SAFE PEACE-TIME STORAGE  
OF 250 RDS. PER GUN  
ON 100 ACRE TRACT

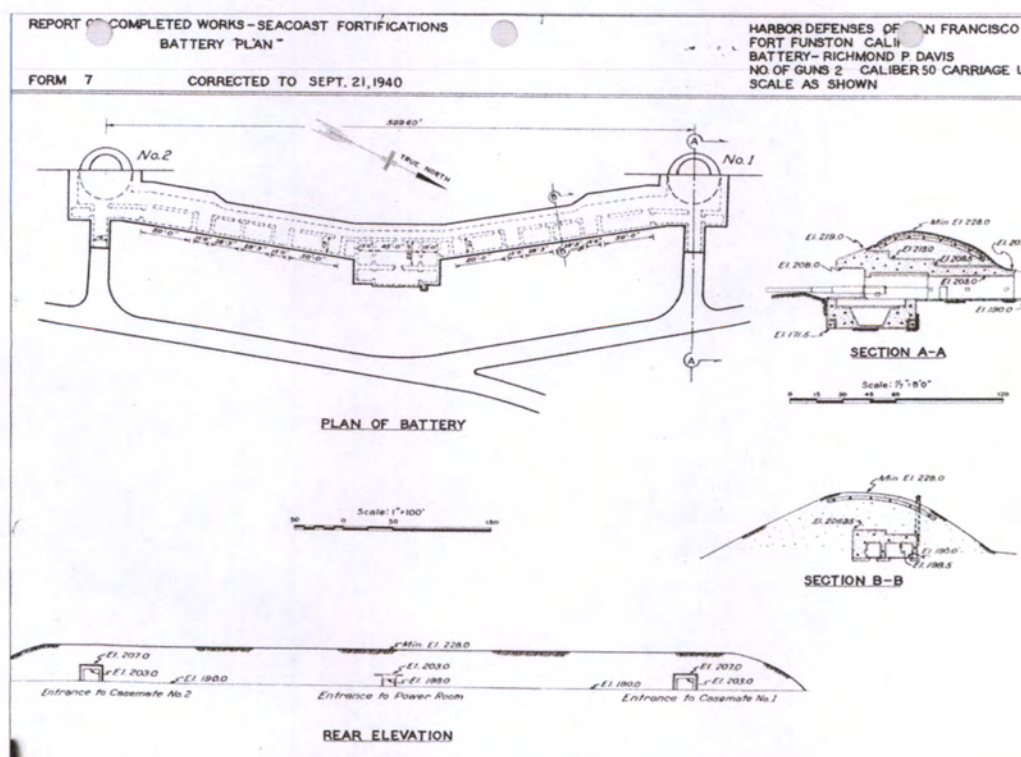
DECLASSIFIED per authorities in NWS  
Project 70-3, dated 24 May 1992, NARS

**SECRET**

To Accompany letter dated Aug 21, 1933.  
Cof A 381 (Coast Defense) GS.

[illegible]

NJ\_Monmouth County\_Navesink Military Reservation\_H49. Proposed Type C 16-inch gun battery, CDJ Feb 2001

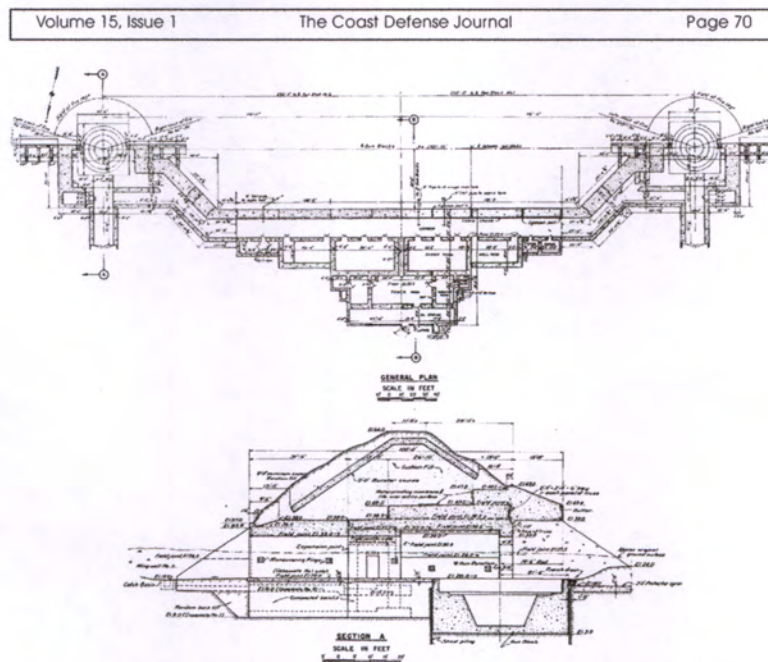




## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H51. Battery Townsley, Fort Cronkhite, San Francisco, 2013, MCPS



28. Battery Hamilton, BCN 108, a Type A 16-inch battery, was begun in 1940 at Fort Greene, HD of Narragansett Bay.

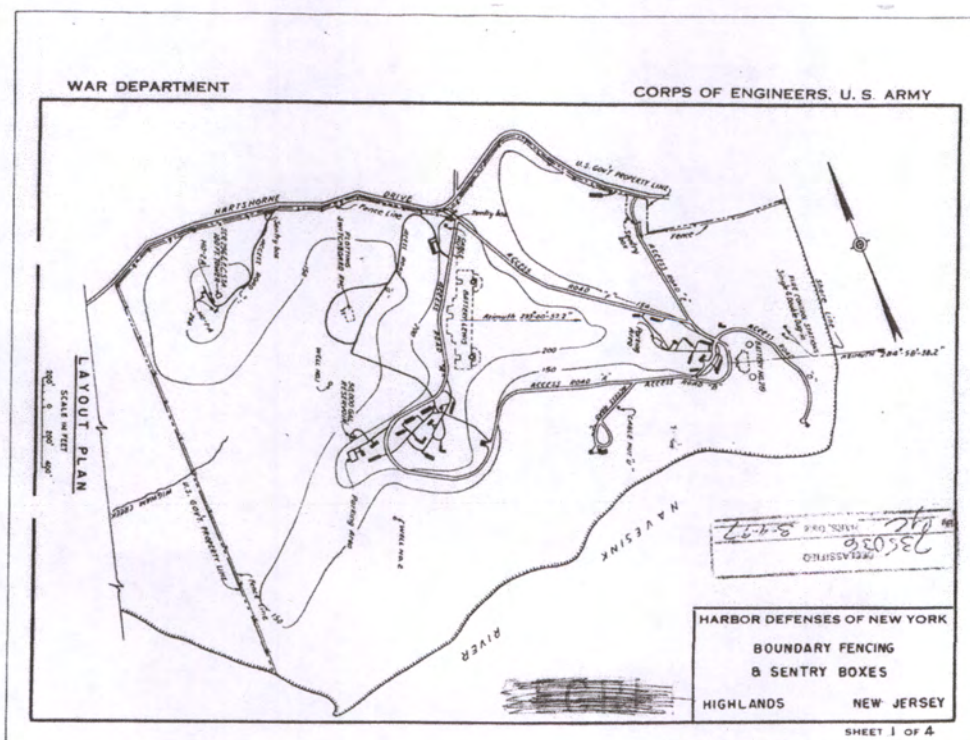
NJ\_Monmouth County\_Navesink Military Reservation\_H52. Battery Hamilton, Fort Green, CDJ Feb 2001



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



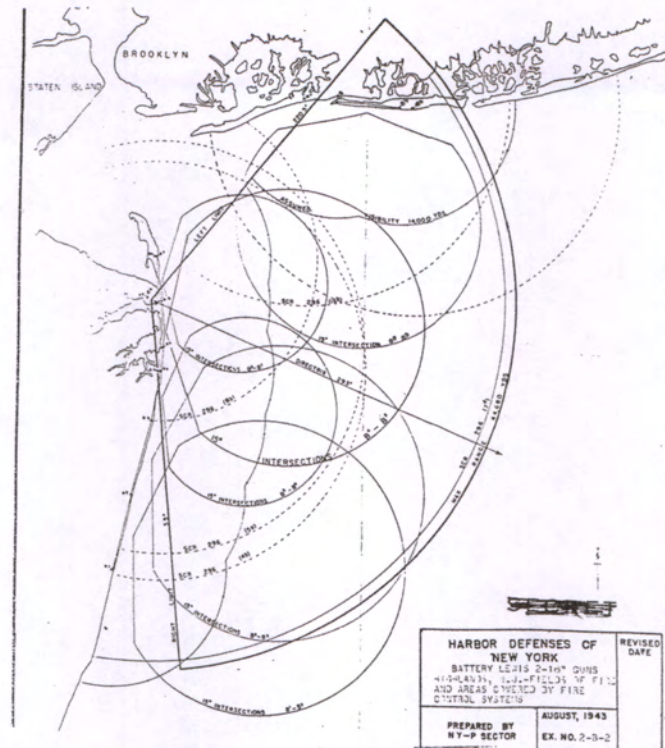
NJ\_Monmouth County\_Navesink Military Reservation\_H53. Julia Hartshorne Trask on front lawn of Rocky Point House, c1890, MCPS



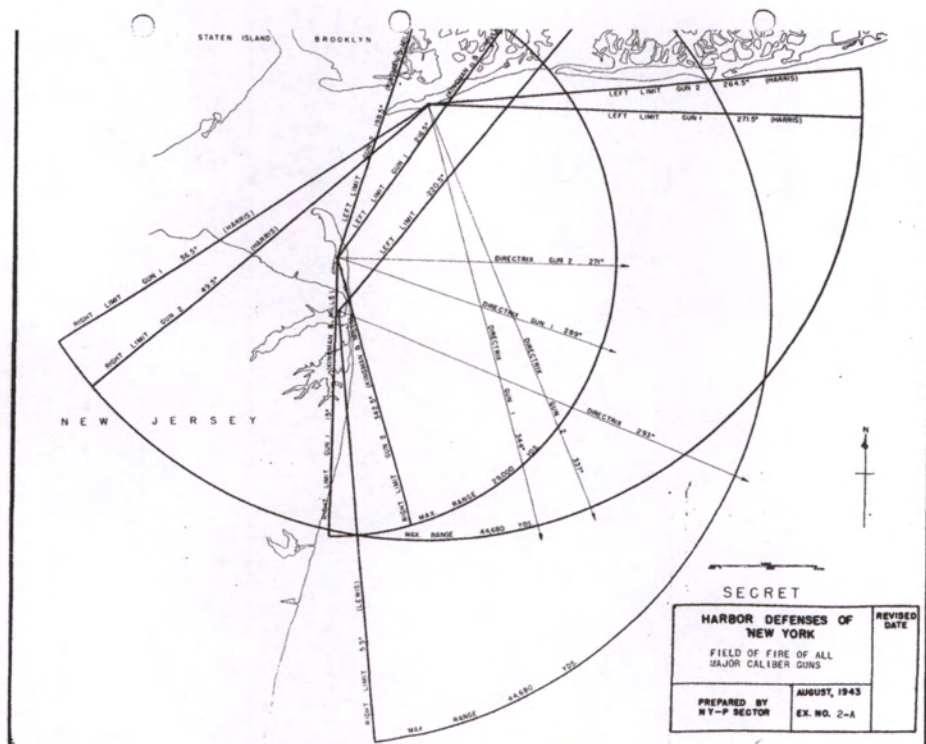
NJ\_Monmouth County\_Navesink Military Reservation\_H54. HDNY Highlands, Boundary Fencing & Sentry Boxes, c1942, COE



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

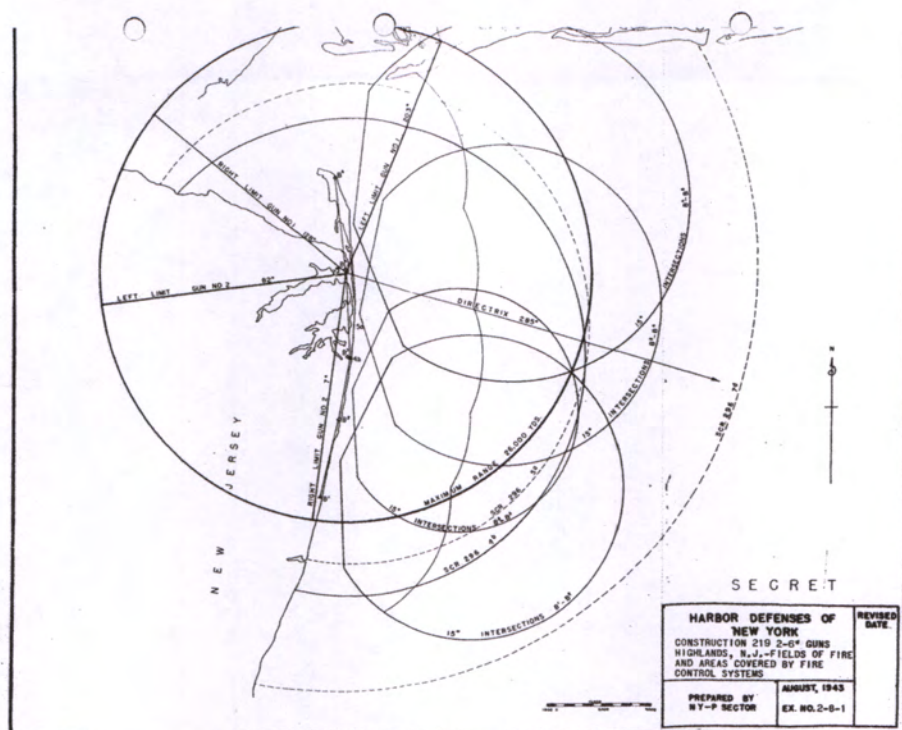


NJ\_Monmouth County\_Navesink Military Reservation\_H55. Highlands, N.J., Battery Lewis 16-inch Guns Fields of Fire, 1943, HDNY Annex

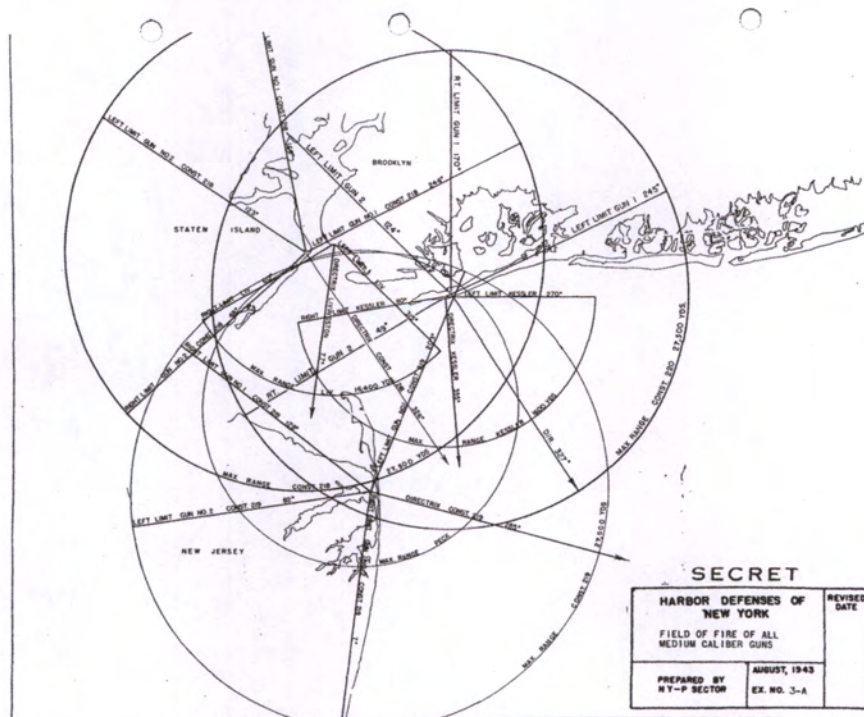


NJ\_Monmouth County\_Navesink Military Reservation\_H56. Fields of Fire of All Major Caliber Guns, 1943, HDNY Annex

# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



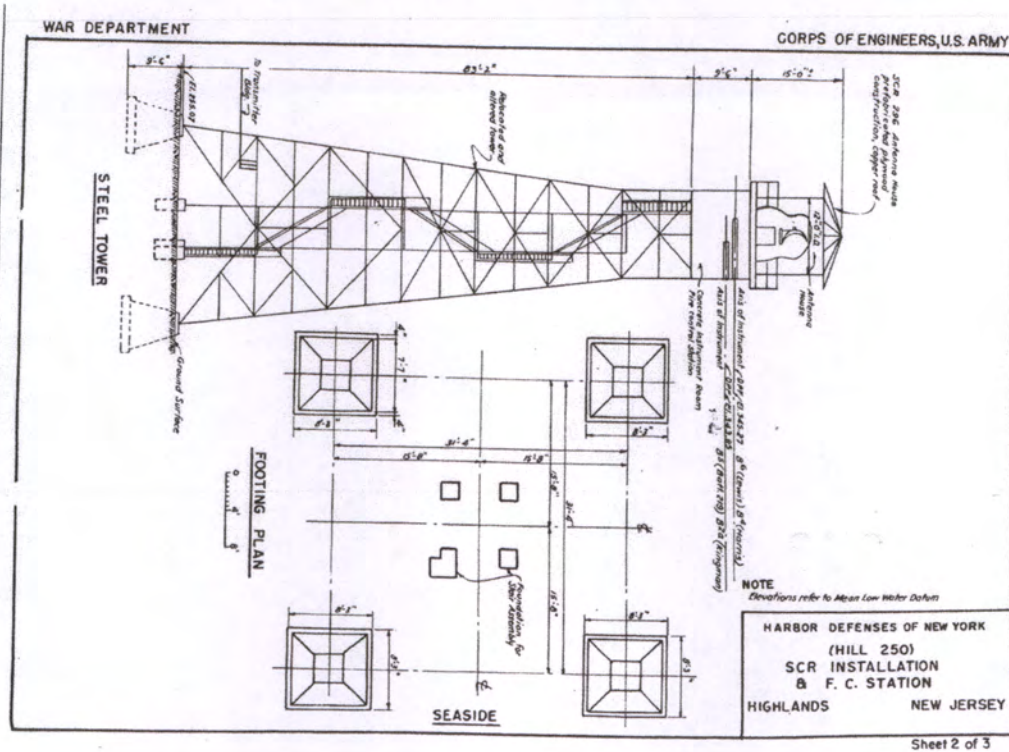
NJ\_Monmouth County\_Navesink Military Reservation\_H57. Highland, N.J., Const. 219 2-6" Guns Fields of Fire, 1943 HDNY Annex



NJ\_Monmouth County\_Navesink Military Reservation\_H58. Fields of Fire of All Medium Caliber Guns, 1943, HDNY Annex



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



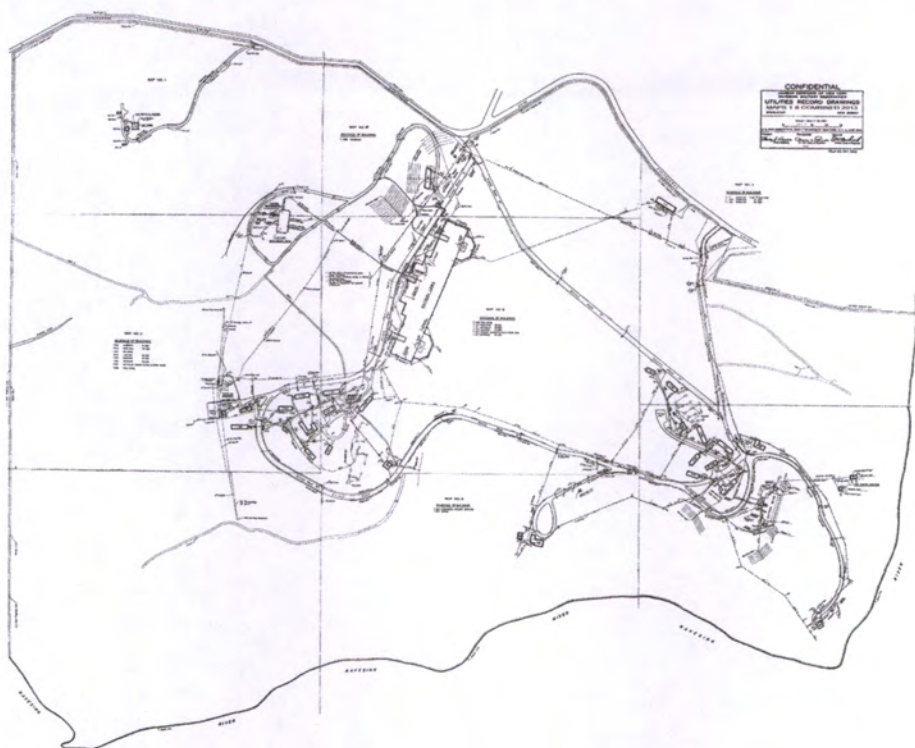
NJ\_Monmouth County\_Navesink Military Reservation\_H59. Highlands, N.J., Hill 250 SCR Installation, Sheet 2 of 3, c1942, COE



NJ\_Monmouth County\_Navesink Military Reservation\_H60. Portland House with SCR-296 Tower, 1947-48, MCPS



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H61. Utilities Record Drawings 1-8, 1944, combined 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_H62. Eastern Cantonment Barracks T-804 for 42 men, view south, c1944, GATE



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H63. Access Road E, Sentry Box and Gates, view south, c1944, GATE



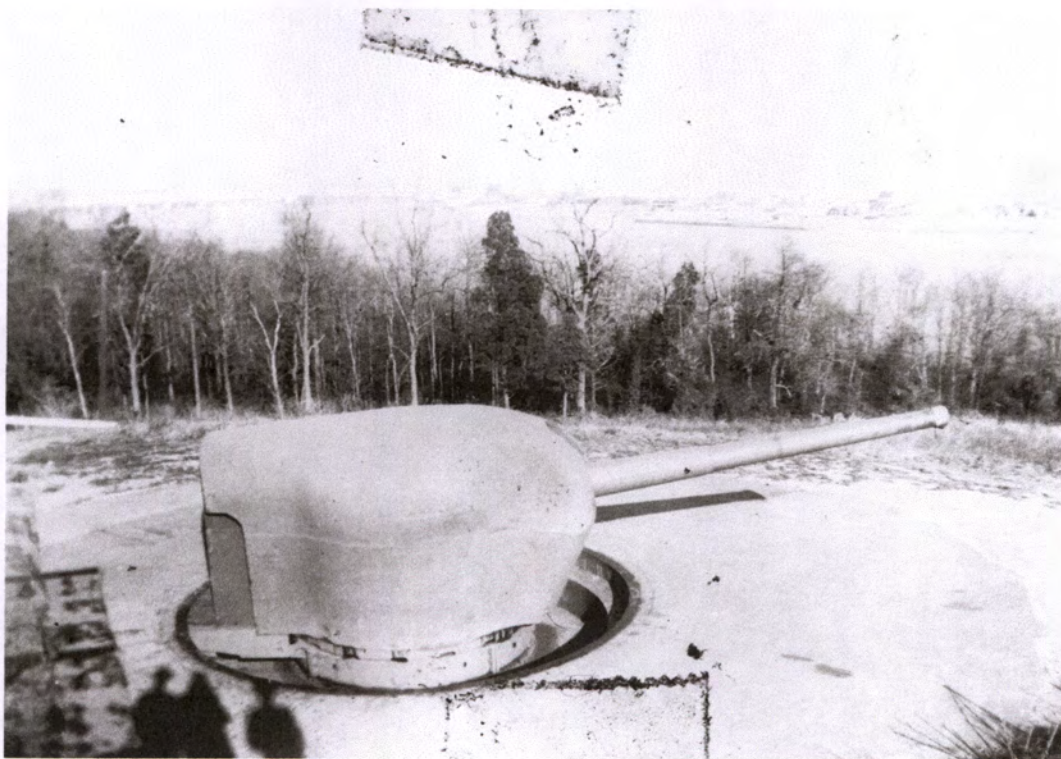
NJ\_Monmouth County\_Navesink Military Reservation\_H64. Access Road A, Retaining Wall, view east, c1944, GATE



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

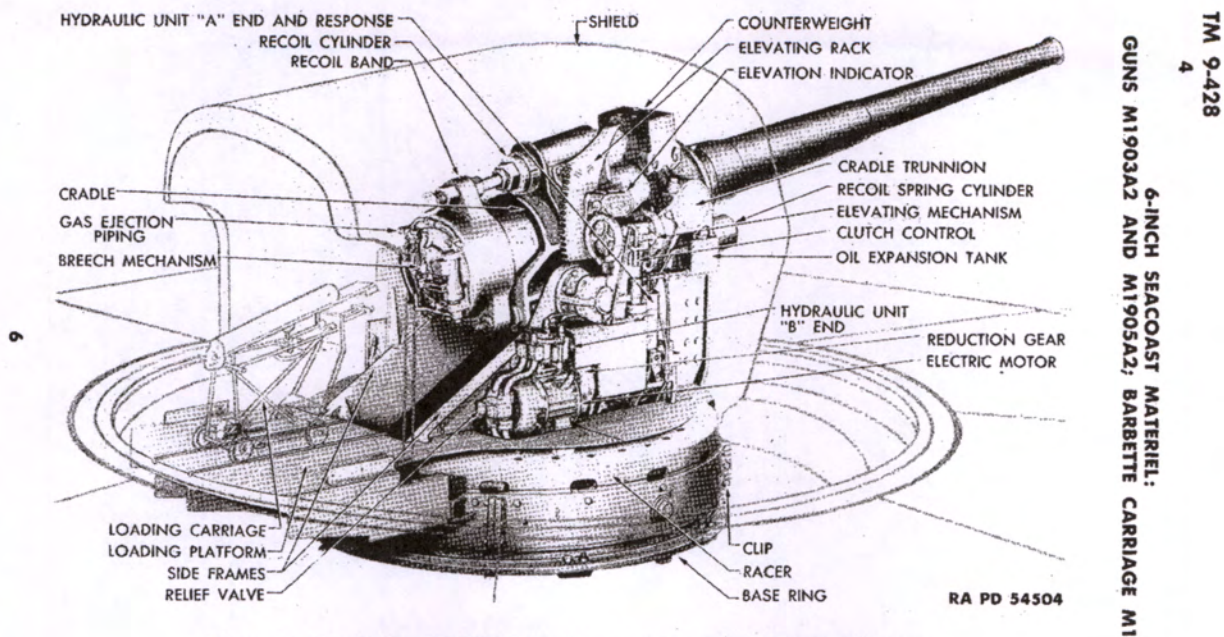


NJ\_Monmouth County\_Navesink Military Reservation\_H65. Colonel Isaac Newton Lewis, c1905, USMA Library

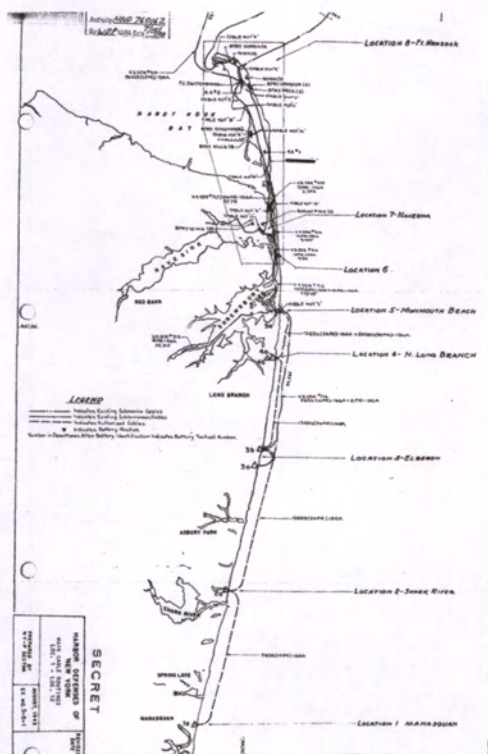


NJ\_Monmouth County\_Navesink Military Reservation\_H66. Battery 219 Gun Emplacement 1, Fort Hancock Archives, c1944, GATE



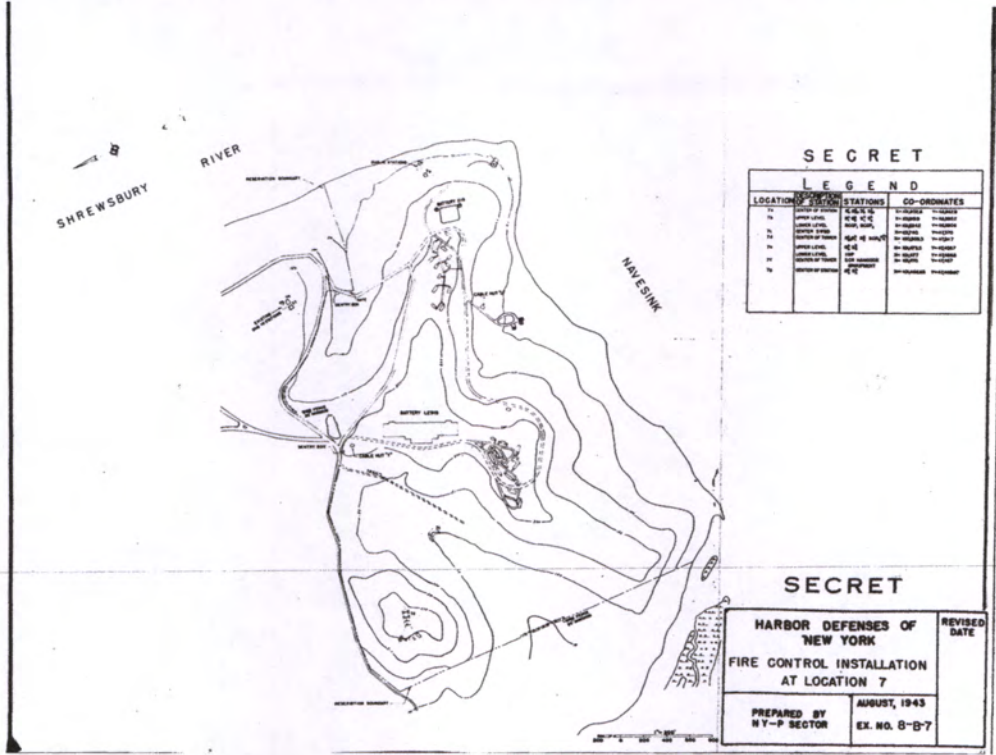


NJ\_Monmouth County\_Navesink Military Reservation\_H67. 6-inch Gun M1903A2 TM 9-428, 1943, WD



NJ\_Monmouth County\_Navesink Military Reservation\_H68. Main Cable Routings Loc. 1 - Loc. 12, 1943, HDNY Annex

NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

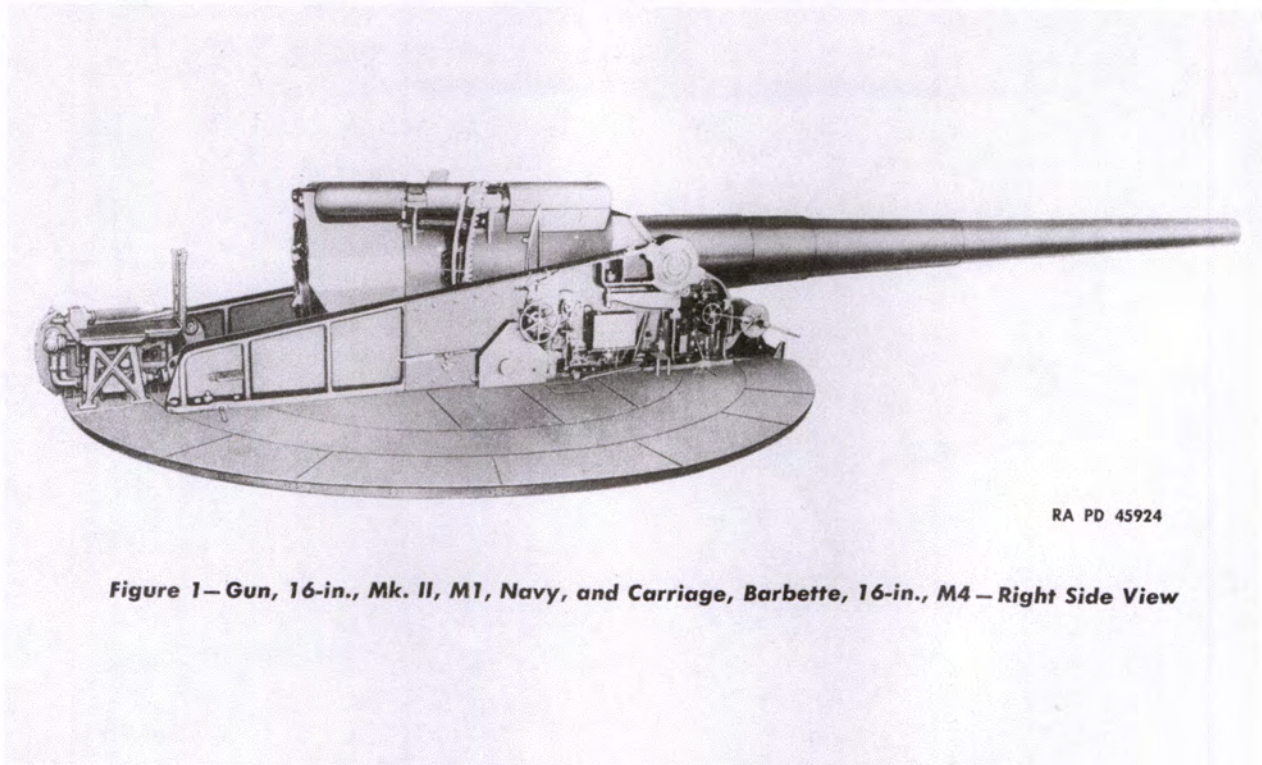


NJ\_Monmouth County\_Navesink Military Reservation\_H69. Fire Control Installation Location 7, 1943, HDNY Annex



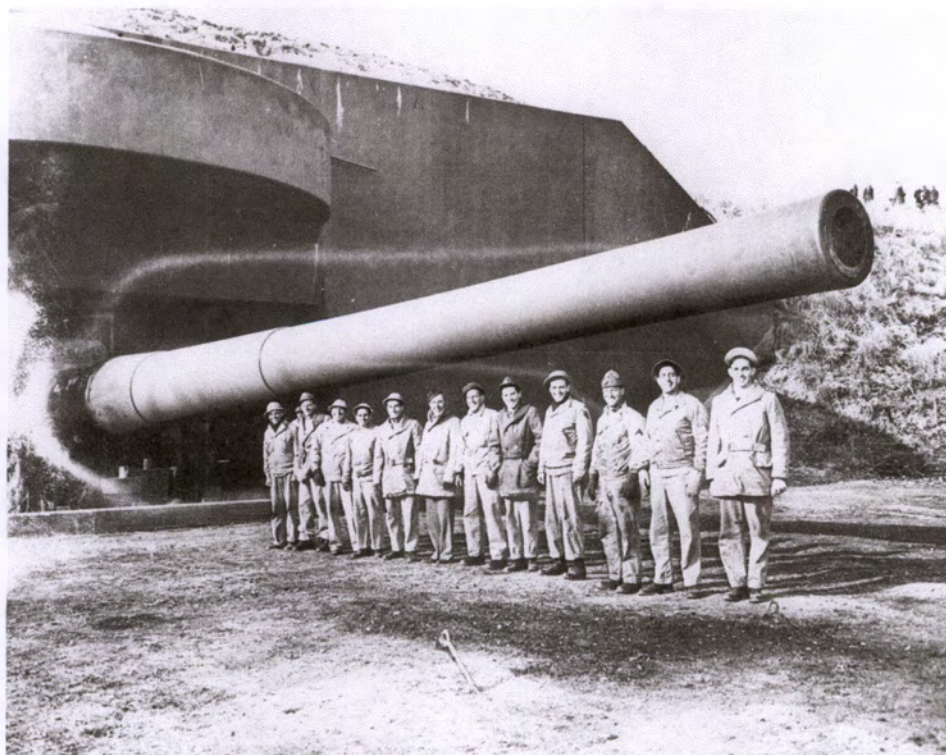
NJ\_Monmouth County\_Navesink Military Reservation\_H70. Fort Story, Virginia, Plotting Room, 1942, LOC





*Figure 1—Gun, 16-in., Mk. II, M1, Navy, and Carriage, Barbette, 16-in., M4 — Right Side View*

NJ\_Monmouth County\_Navesink Military Reservation\_H71. 16-inch Gun MK11 M1 on M4 Barbette Carriage, TM 9-471, 1943, WD



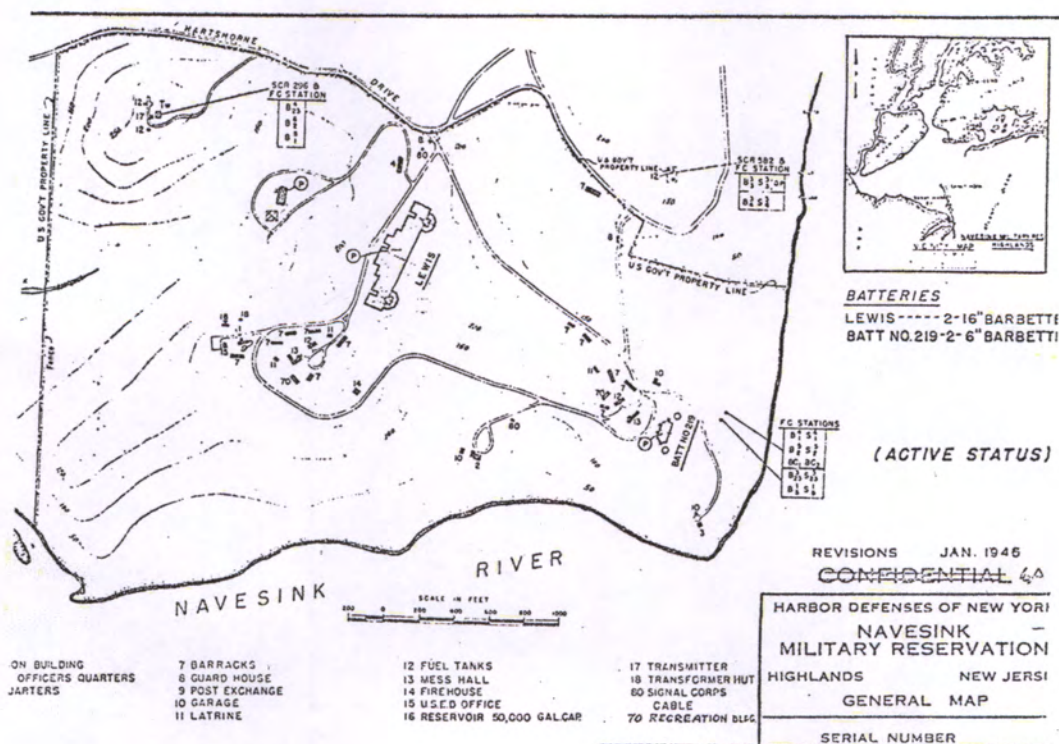
NJ\_Monmouth County\_Navesink Military Reservation\_H72. Battery Lewis Battalion, Fort Hancock Archives, c1944, GATE



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



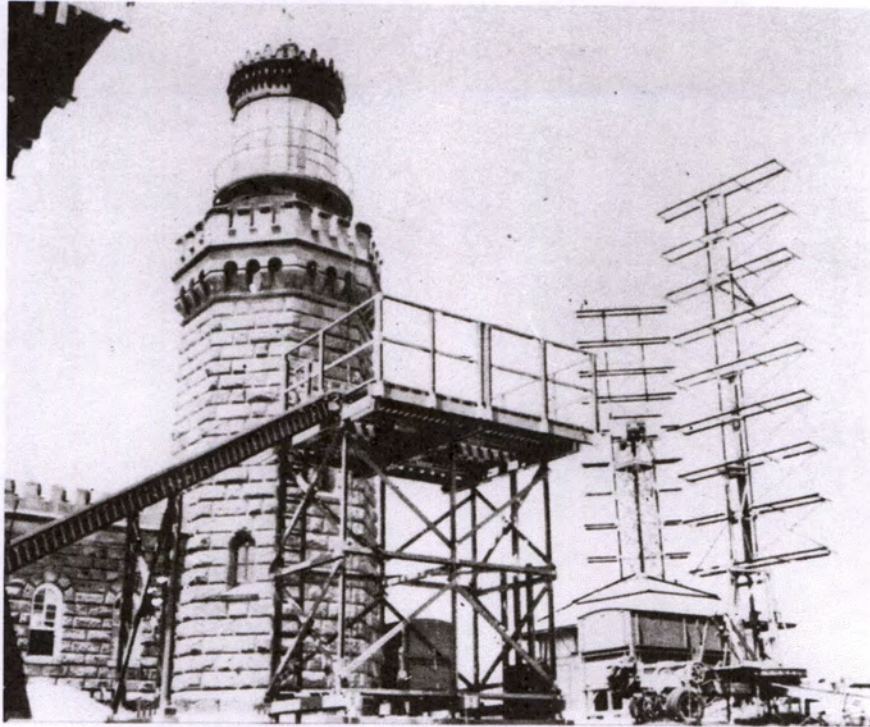
NJ\_Monmouth County\_Navesink Military Reservation\_H73. General Philip Gage at Battery Lewis, Fort Hancock Archives, c1944, GATE



NJ\_Monmouth County\_Navesink Military Reservation\_H74. General Map, 1945, NARA

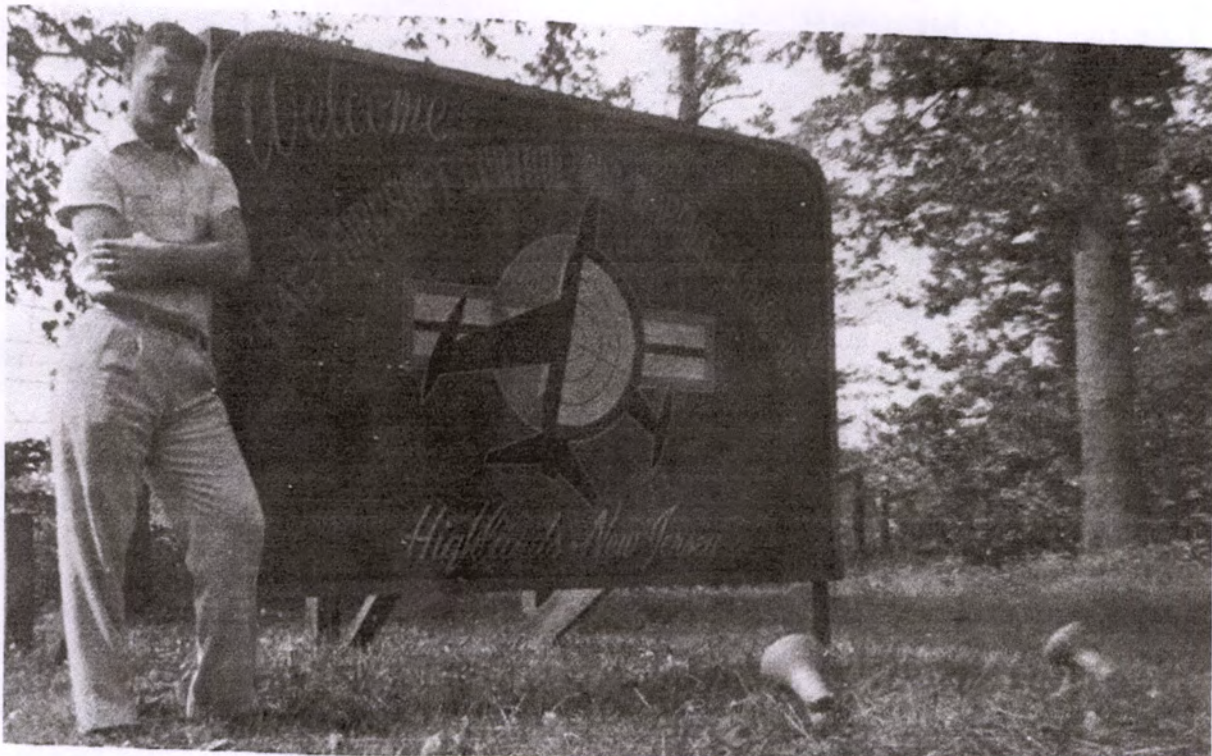


NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



Early models of both the SCR-270 and SCR-271 installed at Twin Lights, N.J.

NJ\_Monmouth County\_Navesink Military Reservation\_H75. Twin Lights SCR-270 & SCR-271 Installations, c1950, CECOM



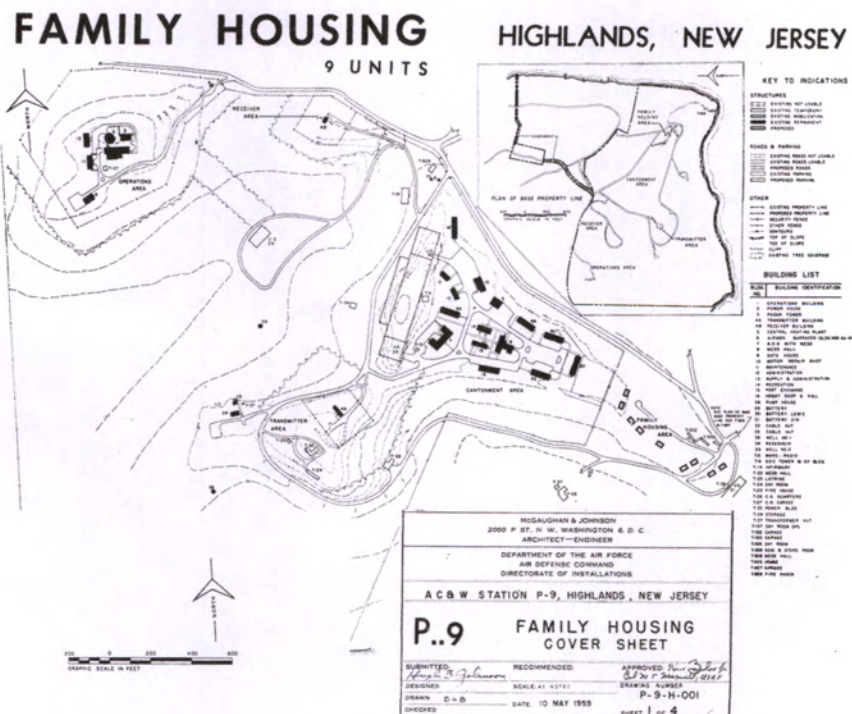
NJ\_Monmouth County\_Navesink Military Reservation\_H76. 646th Aircraft Control and Warning Squadron, c1955, Corbett, MCPS



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H77. Highlands Air Force Station Barracks c1955, Henry Oehlsen, MCPS



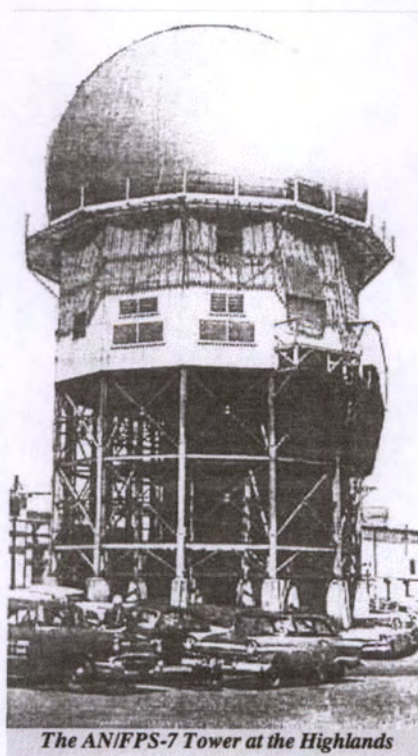
NJ\_Monmouth County\_Navesink Military Reservation\_H78. Highlands Air Force Station, Family Housing Cover Sheet, 1955, MCPS



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H79. Highlands Air Force Station, Aerial 778-177, 1954, Monmouth County



*The AN/FPS-7 Tower at the Highlands*

NJ\_Monmouth County\_Navesink Military Reservation\_H80. Highlands Air Force Station, AN FPS-7 Radar Tower, c1958, MCPS



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES

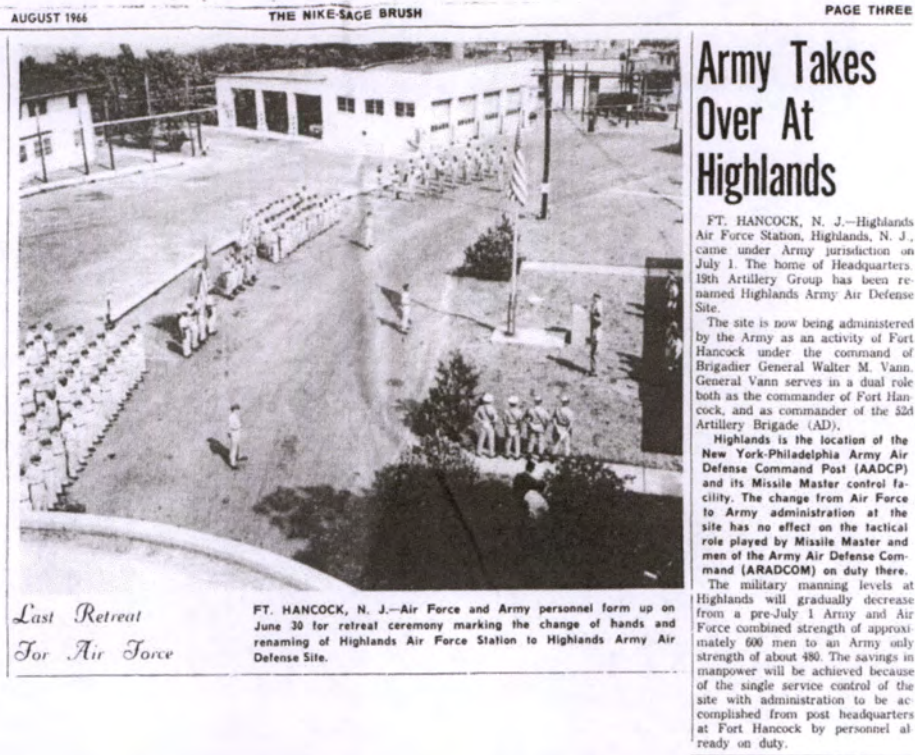


NJ\_Monmouth County\_Navesink Military Reservation\_H81. Highlands Air Force Station, Operations Area, c1962, MCPS



NJ\_Monmouth County\_Navesink Military Reservation\_H82. Highlands Air Force Station, c1962, MCPS





NJ\_Monmouth County\_Navesink Military Reservation\_H83. Nike Sage Brush, Highlands Army Air Defense Site, 1966, MCHA



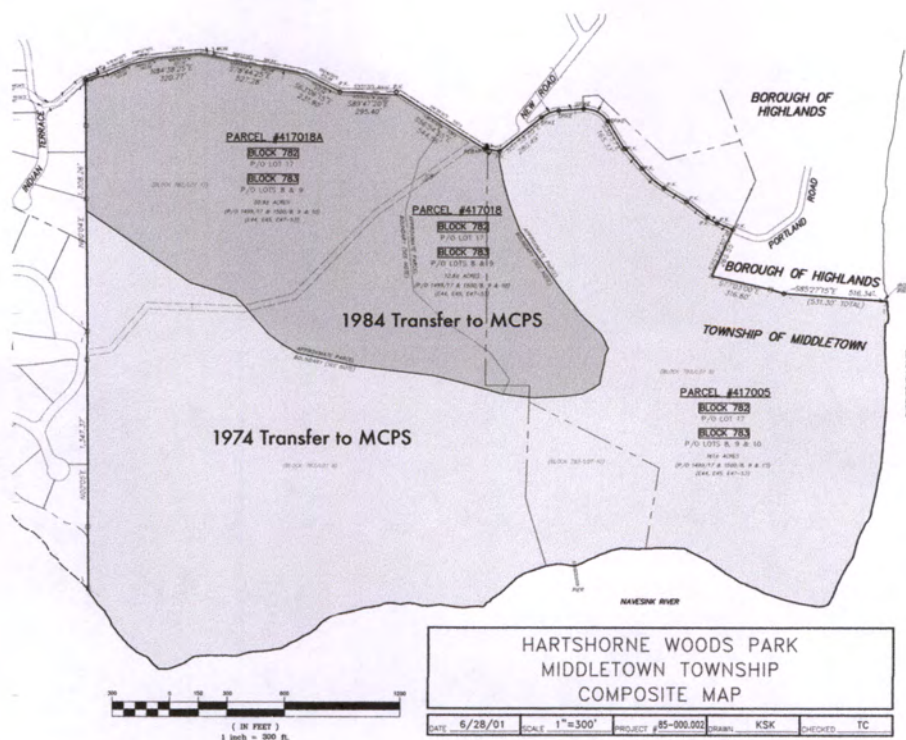
NJ\_Monmouth County\_Navesink Military Reservation\_H84. Highlands Army Air Defense Site, M-02, 1967, Monmouth County



# NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H85. Highlands Army Air Defense Site, 1979, MCPS



NJ\_Monmouth County\_Navesink Military Reservation\_H86. Hartshorne Woods Park GSA Transfers 1974 & 1984, 2001, MCPS, 2014, Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H87. Highlands Army Air Defense Site, Aerial, 1985, MCPS



NJ\_Monmouth County\_Navesink Military Reservation\_H88. Highlands Army Air Defense Site, Radar Tower, 1983, MCPS



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_HISTORIC IMAGES



NJ\_Monmouth County\_Navesink Military Reservation\_H89. Battery Lewis vegetation removal, 1996, MCPS



## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0001. Battery Lewis, view east, 2014, MCPS



NJ\_Monmouth County\_Navesink Military Reservation\_0002. Battery Lewis, view north, 2012, Bing

## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0003. Battery Lewis, view northeast, 2012, Bing



NJ\_Monmouth County\_Navesink Military Reservation\_0004. Battery Lewis, Exterior, 2014, MCPS



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0005. Battery Lewis, Casemate 2 rear, view SE, 2014, MCPS



NJ\_Monmouth County\_Navesink Military Reservation\_0006. Battery Lewis, Casemate 2 front, view NW, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0007. Battery Lewis, Casemate 2, view north, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0008. Battery Lewis Gun Block No. 1, view north, 2014, MCPS

NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0009. Battery Lewis Casemate 1 Rear Entrance, 2014, MCPS



NJ\_Monmouth County\_Navesink Military Reservation\_0010. Battery Lewis, Traverse Corridor, view south, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0011. Battery Lewis, Traverse Corridor, view SE, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0012. Battery Lewis, north Powder Room, steel doors, 2013, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0013. Battery Lewis, Powder Room, view south, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0014. Battery Lewis, Shell Room view south, 2013, CW Zink

NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



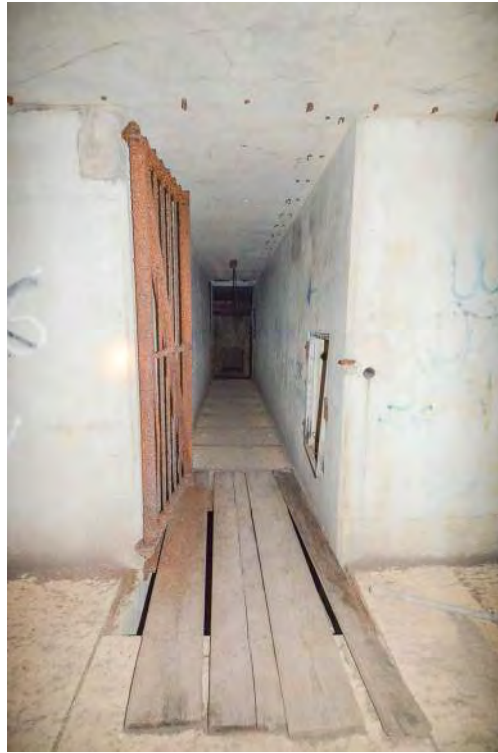
NJ\_Monmouth County\_Navesink Military Reservation\_0015. Battery Lewis, Air Lock Latrine Door, view west, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0016. Battery Lewis, Enlisted Men's Latrine, view north, 2014, CW Zink



## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0017. Battery Lewis, Passageway, view west, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0018. Battery Lewis, Power Room, view south, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0019. Battery Lewis, Rear Corridor, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0020. Battery Lewis, Rear Corridor, view west, 2013, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0021. Battery Lewis, Muffler Room Doors, view S, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0022. Battery Lewis, rear entrance, view east, 2014, CW Zink



## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0023. Battery 219, view north, 2012, Bing



NJ\_Monmouth County\_Navesink Military Reservation\_0024. Battery 219, south end, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0025. Battery 219, Firing Platform 1, view north, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0026. Battery 219, south entrance, view north, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0027. Battery 219, South Corridor, view south, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0028. Battery 219, Passageway, view west, 2014, CW Zink

NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0029. Battery 219, north Corridor, view north, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0030. Battery 219, north Powder Room, view SE, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0031. Battery 219, south Shell Rooms, view west, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0032. Battery 219, Center Corridor, view west, 2014, CW Zink

NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0033. Battery 219, Plotting Room, view south, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0034. Battery 219, Switchboard Room, view east, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0035. Battery 219, rear Passageway, view east, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0036. Battery 219, Latrine view east, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0037. Battery 219, Power Room view east, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0038. Battery 219, Center Corridor, view west, 2014, CW Zink



## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0039. Battery 219, west side, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0040. Fire Control Station 1, east side, 2013, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0041. Fire Control Station No. 1, view north, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0042. Fire Control Station 2, south side, 2013, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0043. Fire Control Station 2, view north, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0044. Plotting-Switchboard Room, view W, 2013 CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0045. Plotting-Switchboard Room, view East, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0046. Plotting-Switchboard Room entrance, 2014, CW Zink



## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0047. Plotting-Switchboard Room, Corridor, view E, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0048. Plotting-Switchboard Room, Corridor, view S, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0049. Plotting-Switchboard Room, Heater-Power Room, view N, 2014, Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0050. Plotting-Switchboard Room, CVS-Vent Room, view N, 2014, Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0051. Plotting-Switchboard Room, Latrine, view N, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0052. Plotting-Switchboard Room, Plotting Room, view N, 2014, CW Zink



## NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0053. Plotting-Switchboard Room, Switchboard Room, view N, 2014, Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0054. Plotting-Switchboard Room, Escape Hatch, view S, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0055. Grand Tour Road with Hill 250 Road, view W, 2014, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0056. Hill 250, view north, 2014, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0057. Lower Rocky Point, view south, 2013, CW Zink



NJ\_Monmouth County\_Navesink Military Reservation\_0058. Black Fish Cove, view south, 2013, CW Zink



NJ\_MONMOUTH COUNTY\_NAVESINK MILITARY RESERVATION\_PHOTOGRAPHS



NJ\_Monmouth County\_Navesink Military Reservation\_0059. Black Fish Cove, view south, 2013, CW Zink