Delaware's Aids to Navigation:
A Survey and National Register Eligibility Evaluation

by

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PREFACE

In 1989, a historic context for navigational aids in Delaware was prepared by the firm of Michael Johannes Paul and William S. Lynch for the Bureau of Archaeology and Historic Preservation (BAHP), Delaware Division of Historical and Cultural Affairs, under a grant from the Bicentennial Lighthouse Fund. The grant was administered by the National Park Service, United States Department of the Interior. The historic context was developed in accordance with the planning process described in the Delaware Comprehensive Historic Preservation Plan (Delaware Plan) and its companion volume, the Historic Context Master Reference and Summary, as well as the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation. One of the products of the historic context was an inventory of 81 historic aids to navigation in the Delaware River and Bay, along with their locations and, for some, their date of construction.

Under the second year of funding provided by the Bicentennial Lighthouse Fund, the Center for Historic Architecture and Engineering received an matching funds grant to conduct a survey and evaluation of all the navigational aids identified by the historic context, except those located in the Chesapeake and Delaware Canal. Each resource was to be evaluated for the potential significance of its inclusion in the context and for its potential eligibility for nomination to the National Register.

Methodology

The survey and National Register of Historic Places eligibility evaluation of Delaware's aids to navigation has been carried out in accordance with the definitions of historic contexts and property types established by the Delaware Comprehensive Historic Preservation Plan and with the specific historic context developed by Paul and Lynch for Delaware's aids to navigation. All sites that could be located on the nautical charts or USGS quadrangle maps were individually reviewed and considered for individual and thematic listing. Those buildings, structures, and sites deemed eligible for nomination to the National Register of Historic Places were grouped by functional type and fully cross-referenced to the Bureau of Archaeology and Historic Preservation (BAHP) Cultural Resource Survey.

The survey and eligibility evaluation was composed of two discrete steps that were carried out in consultation with the BAHP staff and in accordance with the requirements of that office and the Secretary's Standards.

1. Field Survey of All Known Resources Related to Aids to Navigation. The historic context for Delaware's aids to navigation had identified 81 resources to be examined. These sites were located on either navigational charts or USGS quadrangle maps and individual site visits were conducted, either on land or from the water. A list of the sites and their disposition is included as Appendix A.
Modified survey forms were completed for each site and black-and-white photographs were taken. (The completed survey forms are included as Appendix B.) Each structure or site was evaluated for significance and integrity as defined in National Register Bulletin 16: Guidelines for Completing National Register of Historic Places Forms, National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation, and subsequent memoranda and published guidelines. Each historic site was assigned a Cultural Resource Survey Inventory number.

2. Application of the Historic Context for Aids to Navigation. The survey and evaluation data were reviewed in light of the historic context developed by Gredell and Paul. Each individual resource was assigned to its primary property type designation. A series of engineering and architectural themes were developed and each eligible resource was considered individually within the thematic framework. Additional background research was carried out in order to broaden the definitions of property types and themes before the evaluation report was constructed. The final report includes fully-developed property types, engineering and architectural themes, and an expanded historic context narrative. The context written by Gredell and Paul was used as a starting point and portions of it have been incorporated into this report either verbatim or by adaptation.

Results of the Survey

The original historic context identified 85 sites that potentially contained historic aids to navigation--20 channel lights, 17 harbor lights, 6 lightships, 4 buoy depots, 4 day beacons, and 34 range lights. Four of the channel lights were located in the Chesapeake and Delaware Canal and were not included in this survey. Dates of construction on the lights ranged from the Cape Henlopen Light, built in 1725, to the Christiana Front and Rear Range Lights, erected in 1934. Twelve of the sites are already listed on the National Register--copies of the nominations are included as Appendix C.

The field survey conducted from October 1990 through February 1991 found that of the 69 remaining sites, 35 were completely gone and 24 had been replaced with modern structures. Survey forms were completed and submitted for 10 properties that contain original structures. Of the 10 resources, 7 are intact aids-to-navigation, 2 are archaeological sites, and 1 is an original keeper's dwelling (the light on the property has been replaced).

These ten resources were determined eligible for nomination to the National Register of Historic Places under themes based on the historic context for aids to navigation and the Delaware Plan as follows:

Water-Based Aids to Navigation
Manufacturing
Transportation & Communication
Settlement Patterns & Demographic Changes
Architecture, Engineering, & Decorative Arts

1730-1770+/-: Intensified and Durable Occupation
1770-1830+/-: Early Industrialization
1830-1880+/-: Industrialization and Early Urbanization
1880-1940+/-: Urbanization and Early Suburbanization
Land-Based Aids to Navigation
Manufacturing
Transportation & Communication
Settlement Patterns & Demographic Changes
Architecture, Engineering, & Decorative Arts

1730-1770+/-: Intensified and Durable Occupation
1770-1830+/-: Early Industrialization
1830-1880+/-: Industrialization and Early Urbanization
1880-1940+/-: Urbanization and Early Suburbanization

Keeper's Houses
Manufacturing
Transportation & Communication
Settlement Patterns & Demographic Changes
Architecture, Engineering, & Decorative Arts

1730-1770+/-: Intensified and Durable Occupation
1770-1830+/-: Early Industrialization
1830-1880+/-: Industrialization and Early Urbanization
1880-1940+/-: Urbanization and Early Suburbanization
I. HISTORIC CONTEXT FOR MARITIME TRANSPORTATION AND AIDS TO NAVIGATION IN THE DELAWARE RIVER AND BAY

Within the boundaries of the state of Delaware lies one of the major maritime resources of the United States—the Delaware estuary, the region where the waters from the Delaware River and the Atlantic Ocean are mixed by tidal currents to form a continuum of fresh to brackish to salt waters. The Delaware Estuary extends 75 miles northwest to Chester, Pennsylvania. Above Chester, the Delaware River runs north another 200 miles into its northern drainage basin that includes portions of Pennsylvania, New Jersey, and New York. The Delaware Bay spans 12 miles, at its mouth, from Cape May, New Jersey to Cape Henlopen, Delaware. The total length of the Delaware River and Bay is about 275 miles, and it drains an area estimated to be between 11,440 and 13,500 square miles. Delaware itself is only 1,982 square miles, 15% of the land area drained by the Delaware Bay.

The Delaware River and Bay is just as impressive as a route for maritime commerce and transportation. In the United States in 1988, the river was second only to the Mississippi in terms of the amount of commerce it carried annually. In its 60-mile industrialized stretch from Trenton, New Jersey, through Philadelphia, Pennsylvania, to Wilmington, Delaware, the Delaware River transported more than 75% as much tonnage as the Mississippi carries in over 2,000 miles from Minneapolis, Minnesota, to the Gulf of Mexico.1

From 1821 through 1860, Philadelphia, New York, Boston, and Baltimore, were defined as "chief general ports" by the United States government in its Annual Reports on Commerce and Navigation. Other important ports in the nation were classified as "cotton ports" (New Orleans, Charleston, Savannah, and Mobile) and "other ports" (Quoddy, Portland, Salem, Norfolk, Richmond and San Francisco). The Delaware Estuary provided water access to Philadelphia from the Atlantic Ocean; after 1829, when the Chesapeake and Delaware Canal opened, the Delaware Bay became a major route to Baltimore also.

Between 1825 and 1860, the maritime tonnage landing at Philadelphia docks more than doubled, rising from 88,000 tons to 185,000. The tonnage exported from Philadelphia grew also, increasing from 84,000 tons in 1825 to 135,000 tons by 1860. Thus by 1860, the total tonnage being shipped on the Delaware Estuary from Philadelphia alone amounted to 320,000 tons. Among the chief general ports during this period, in total tonnage imported, Philadelphia maintained a solid but somewhat distant third place to Boston and New York. In

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1825, when Philadelphia was landing 88,000 tons of goods on its wharfs, Boston was landing 177,000 tons and New York 294,000 tons. By 1860, when Philadelphia's import tonnage stood at 185,000, New York's had risen to 1,973,000 tons and Boston's to 718,000 tons. Of the total tonnage landed in the three ports, Philadelphia's share was 14.6 percent in 1825 and 6.4 percent in 1860. In total exports, Philadelphia vied with Baltimore for third place until after 1840 when it was fourth among the chief general ports.

Some of the 360,000 tons of goods moving through the Baltimore docks came to the Chesapeake Bay via the Delaware Bay and the Chesapeake and Delaware Canal. Wilmington, Delaware, was also an important port, initially for wheat and flour and later for a variety of manufactured goods.

Thus, the Delaware River and Bay provided the access for initial settlement of Pennsylvania and Delaware and continued as the region's major means of transportation and, through the late nineteenth century, its major means of communication with the rest of the world.

But the bay and river were more than a major shipping lane serving Philadelphia and the larger Middle Atlantic region and fueling westward expansion. For the state of Delaware, the estuary, along with its tributary streams, was an elemental part of life. It linked communities together, providing transportation and communication within the state. Indeed, prior to 1850, the settlement pattern and economic geography of the state reflected its coastal location. Its major settlements--Wilmington, New Castle, Port Penn, Smyrna, Lewes--were all port towns along the Delaware River and Bay providing access, south of Wilmington, to agricultural hinterlands that supplied major cities to the north.

In the 1840s, the steamboat became the primary means of transportation in Delaware for people and goods. Wilmington was the center of steamboat construction where "shipyards fabricated the long slender hulls and beautifully crafted wooden superstructures that glided gracefully and seemingly effortlessly from landing to landing, faithfully maintaining their published schedules." Moreover, "each of the major streams, the Appoquinimink Creek, the Smyrna River, the Leipsic River, the Saint Jones, the Murderkill, and the Indian River had its own steamboat." Steamboat traffic grew throughout the nineteenth century in Delaware, reaching its peak in the early 1900s.

The Delaware estuary and its tributaries were part of an international maritime

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3 Ibid.

4 Ibid.
transportation network that included a farmer’s landing along an inland creek. And all of this waterborne movement took place on a waterway that was very shallow, contained dangerous shoals, and possessed a reputation for extremely rough water during storms. The roughness of the estuary in storms made channel markers especially important to keep ships on course, and in the shallow Bay, to reduce the risk of grounding. The same weather with strong lateral wave action created engineering challenges in developing secure foundations for the navigation aids in the estuary itself.

The navigational aids on the Delaware Estuary guided this traffic to its various destinations. The surviving resources represent the historic significance of maritime transportation but are also a significant historic engineering achievement.

"Aid to navigation" is a technical term that is defined by both national and international governing agencies. The technical definition may be stated as: a recognizable object used in conjunction with nautical charts to guide the movement of a ship. This definition draws on the sense of navigation that emphasizes the guidance, control, or plotting of a ship instead of its simple act of passage. The most well known aids are lighthouses; lightships, buoys, towers, and range lights. Aids to navigation also include natural landmarks and seamarks such as promontories, trees, protruding reefs, and shipwrecks. Aids to navigation do not include waterways (i.e., channels, canals) or waterway or harbor improvements (i.e., dredging, piers, jetties, breakwaters, docks).

Natural and simple, manmade aids to navigate were probably used in the earliest commercial arrivals of settlers to North America. The first aids to navigation likely were distinctive natural features such as hills, cliffs, and distinctive natural trees that would mark safe harbor, and protruding rocks that would warn of hazardous shoals or reefs. Later, crude towers would have been made from coastal timbers or stones to mark a landing during the day; lanterns would be hung to do the same at night. These early aids were temporary and insubstantial; nothing is likely to remain of them today except archaeological evidence.

Definition of Historic Context Elements

Historic preservation planning in Delaware is carried out through the development of historic contexts related to significant themes in Delaware’s history. A historic context

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Historic Context for Maritime Transportation

consists of a historic theme with an associated geographic limit and chronological period. Each historic context has associated with it a set of property types—a grouping of individual resources based on shared associative or physical characteristics. The Delaware Comprehensive Historic Preservation Plan defines 18 historic themes representing important economic and cultural trends in the history of Delaware. Through a historic context framework these themes are related to 5 chronological periods:

A. 1630-1730+/-: Exploration and Frontier Settlement
B. 1730-1770+/-: Intensified and Durable Occupation
C. 1770-1830+/-: Early Industrialization
D. 1830-1880+/-: Industrialization and Early Urbanization
E. 1880-1940+/-: Urbanization and Early Suburbanization (see Figure 1)

The plan also divides Delaware into five geographic zones (see Figure 2):

I. Piedmont
II. Upper Peninsula
III. Lower Peninsula/Cypress Swamp
IV. Coastal
V. Urban (Wilmington)

Historic Themes

The major themes for this context are Transportation and Communication (specifically the subtheme of maritime transportation) and Architecture, Engineering, and Decorative Arts. Secondary historic themes including Fishing and Oystering, Manufacturing, and Settlement Patterns and Demographic Change. Given Delaware’s location along the Delaware Bay and River, maritime transportation has been a critical part of the settlement and economic development of the state.

Aids to navigation and shipping are interdependent. As the size of ships and the volume of tonnage expanded, so does the need for more sophisticated aids to navigation. As the industrialization of the Delaware Valley progressed and the size of ships grew facilitating the movement of greater tonnage, so too did the need for more sophisticated aids to navigation. At the same time, as railroads and later trucks became more competitive land transportation, the smaller ports and waterways became less important, and their associated navigational aids abandoned.

To a lesser but no less certain extent, aids to navigation are tied to the subtheme of land transportation. As overland hauling began to compete for cargo, the nature and extent of shipping changed, as did the deployment of aids to navigation. The development of Delaware’s north-south railroads in the 1850s presaged the decline of ports in the lower part of New Castle County, with the abandonment or change in use of such lights as Mispillion and Bombay Hook.

Because the purpose of aids to navigation is to facilitate guidance, control, and plotting of a ship’s course, aids to navigation were often positioned in relation to points of
**FIGURE 1: FRAMEWORK OF HISTORIC CONTEXT ELEMENTS**

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<td>A. 1630-1730+/-</td>
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<td>01. AGRICULTURE</td>
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<td>18. MAJOR FAMILIES, INDIVIDUALS, AND EVENTS</td>
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Source: Delaware Comprehensive Historic Preservation Plan

Historic Context for Maritime Transportation
FIGURE 2: GEOGRAPHIC ZONES

I  PIEDMONT
II  UPPER PENINSULA
III  LOWER PENINSULA/CYPRESS SWAMP
IV  COASTAL
V  URBAN

Source: Delaware Comprehensive Historic Preservation Plan
intermediate or final destination—landings, ports, and harbors as well as canals and confluent waterways. The earliest known aid to navigation in Delaware, Cape Henlopen Light, was a wooden light erected in 1725 to mark the entrance to Delaware Bay, waterway to the port of Philadelphia. Similarly, Mispillion Lighthouse was first constructed in 1831 to show the entrance to the Mispillion River, the inland port of Milford, and intermediate, downstream landings. Range lights, such as those for Marcus Hook Range (built in 1919 and 1925) and, earlier, those for Port Penn Range, (as well as numerous buoys) were constructed to mark a path of safe passage in a natural or dredged channel.

Aids to navigation also were positioned to warn ships away from hazardous conditions—shoals, reefs, and shipwrecks. Lighthouses such as Fourteen Foot Bank Light, lightships such as Overfalls, and numerous buoys performed this function.

As public facilities, lighthouses were often built according to prevailing architectural styles. The present Mispillion Lighthouse was constructed in the 1870s in a carpenter gothic style that was representative of residential architecture at that time. Other aids to navigation were constructed or equipped in ways that exemplified state of the art engineering, either in structure, optics, or fog signals. Fourteen Foot Bank Light, for example, is exemplary in several respects: founded on a pneumatic caisson, constructed of cast iron plates in a Classical Revival style, equipped with a fourth order fresnel lens.

Aids to navigation are also related to several other themes, including Fishing and Oystering, Manufacturing, and Settlement Patterns and Demographic Change.

**Fishing and Oystering.** These have historically been principal economic activities on the Delaware Bay and River and, along with agriculture, a mainstay in the Delaware economy. Although aids to navigation were seldom established at the behest of watermen, whose travels were relatively local and whose ships were relatively small, buoys and lights certainly guided the passage of fishing and oystering schooners. Also, such watermen most certainly maintained systems of poles and buoys (much as they still do) to mark populated shoals and beds.

**Manufacturing: Ship and Boat Building and Repairing.** Until after World War I, the Delaware River was the leading ship building area in the United States and was known as the "American Clyde" in reference to the great British shipbuilding yards along the Clyde River. Wilmington had nationally significant yards in Harlan & Hollingsworth and Pusey & Jones—these yards produced the first steel hulled ship in the United States, and were the primary

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producers of river boats and ferries, not only for the United States but for South America and Mexico as well.

**Settlement Patterns and Demographic Change.** Delaware is a maritime state. Its settlement patterns and economic significance were heavily influenced by its coastal location. The Delaware Bay and River provided the state with access to Philadelphia, Baltimore, and New York. Although railroads integrated the north-south land route in Delaware by 1860, as late as 1910 more people traveled weekly from Milford to Philadelphia on the packet boat than by train. Aids to navigation are affected by, and, to a lesser degree, affect settlement patterns and demographic changes because aids are tied so tightly to land and water transportation, which, in turn are completely intertwined with such patterns and changes. Early lighthouses, including Cape Henlopen, were located in early settlements that had ports. Conversely, the establishment of such lighthouses facilitated shipping, the use of such ports, and the growth of the same settlements.

**Geographic Zone**

The geographical area of the maritime transportation historic context is the Coastal Zone (Figure 2). By definition, that zone encompasses the coastline of Delaware and extends out to the three-mile limit or the state line on the water side; on the inland side, it reaches to the head of navigation. The zone boundary is not a line running parallel to the coastline, but also includes the land in the immediate vicinity of a river or stream up to the head of navigation.10

Because the boundary line between Delaware and New Jersey coincides with the low tide line on the New Jersey coast for the Delaware River, and the middle of the channel for the Bay, the area covered by this context includes almost all of the Delaware Bay. The zone also includes navigable portions of manmade waterways, such as the Chesapeake and Delaware Canal.

Because of environmental, technological, economic, and political changes, the boundaries of the Coastal Zone have shifted over time and the zone has expanded, contracted, and moved. Environmental changes have had the greatest impact in littoral and offshore parts of the zone. The coastline is a fragile physical and ecological transition that shows constant change. Submarine erosion, sedimentation, and dredging have altered the navigability of waterways, with attendant changes in aids to navigation. For example, the second Mispillion Lighthouse was abandoned in 1859 when the depth of the Mispillion River at its mouth was too shallow to allow passage except to the smallest of boats.11

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10 Delaware Plan, p. 35.

11 A new light was established in 1873, after the river again became navigable.
Dredging of shipping channels in the Delaware River by the Army Corps of Engineers\textsuperscript{12} in the nineteenth and twentieth centuries resulted in continual rearrangement or replacement of range lights along the Delaware coastline. Thus the Port Penn Lights were replaced by the Liston Range Lights in 1904 when the dredging of a new channel was completed. Similarly, slower changes in reefs and especially shoals caused the deployment of new buoys or the repositioning of existing buoys.

On the inland side of the zone, the navigability of Delaware's many rivers and creeks were also affected by erosion, sedimentation, and dredging. Sedimentation in the waterway was tied to farming in the nearby watershed and the development of land immediately adjacent to the waterway. The history of shoreline aids to navigation, will correlate to some degree with agricultural development in the region surrounding the marked inlet.

Navigability of waterways and aids to navigation were both affected by technological changes in ship building and dredging.\textsuperscript{13} In the former case, the reach and extent of shipping continually changed as the size, weight, draft, width, construction, and motive power of ships changed. In the latter case, advances in dredging techniques and equipment improved the safety of shipping and promoted its growth. In both cases, aids to navigation were established, repositioned, improved, or abandoned in response to the demands of maritime shipping.

### Chronological Period

The Delaware Plan identifies the following chronological periods:

- **1630-1730+/-:** Exploration and Early Settlement
- **1730-1770+/-:** Intensified and Durable Occupation
- **1770-1830+/-:** Early Industrialization
- **1830-1880+/-:** Industrialization and Early Urbanization
- **1880-1940+/-:** Urbanization and Early Suburbanization

The earliest period is excluded from this historic context on the grounds that the first known aid to navigation in Delaware, Cape Henlopen Lighthouse, was not completed until 1725, the end of the first period. Aids to navigation have continued to be in service in Delaware since that time. Thus, the second through fifth chronological periods, from 1730 to 1940, effectively do include the beginning and development of this property type in Delaware.


\textsuperscript{13} For a description of the effect of ship technology on shipping in the Delaware and a history of dredging technology, see Snyder and Guss.
The administrative history of United States aids to navigation may be summarized as follows:

**Before 1789:** Colonial administration responsive to local business and maritime interests.

**1789-1852:** Early federal administration overseen by the president with regular, ordinary administration handled through the department of the treasury. After 1820, federal administration overseen by the Fifth Auditor of the Treasury through local collectors of customs in each of eight districts.

**1852-1910:** Developed federal, quasi-military administration of the Lighthouse Board with inspectors in each of twelve districts.

**1910-1939:** Federal lighthouse administration of the Bureau of Lighthouses overseen by a commissioner with civilian inspectors (and military superintendents) for each of 12 to 19 districts.

**1939 to present:** Federal administration by the U. S. Coast Guard.

**Colonial Administration Prior to 1789.** The first lighthouse in what later became the continental United States was Boston Light, a stone tower first erected on Little Brewster Island in 1716. During colonial times other lighthouses were built at significant ports of trade along the Atlantic coast: Brant Point (Nantucket Harbor, Massachusetts, 1746), Tybee Island (Savannah, Georgia, 1748), Beavertail (Newport, Rhode Island, 1749), New London (New London Harbor, Connecticut, 1760), Sandy Hook (New York, 1764), Morris Island (Charleston Harbor, South Carolina, 1767), Plymouth (Plymouth Bay, Massachusetts, 1769), Portsmouth (Portsmouth Harbor, New Hampshire, 1771), Cape Ann (Massachusetts Bay, 1771). At about the same time that Sandy Hook Light was built, business interests from Pennsylvania funded the construction of the first lighthouse on Cape Henlopen, Delaware, at the entrance to the Delaware Bay and, hence, the port of Philadelphia. Cape Henlopen Lighthouse was completed and lit in 1767.

Most colonial lighthouses (and the buoys that were used near them) were requested, funded, and operated by local interests— the merchants, shippers, and other townspeople who used and depended upon the economy of the harbor. For this reason, the colonial aids to navigation were located in or very near populated areas. Few colonists were willing to pay for, build, or maintain aids to navigation in remote, unpopulated areas, even though the needs of and value to navigation may have been great.

**Early Federal Administration, 1789-1852.** On August 7, 1789 the newly formed United States Congress passed an act that gave the federal government responsibility for lighthouses (and other types of aids to navigation), including those then in existence and

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under construction. This action curtailed the localism that had been inherent in the colonial development of aids to navigation, and replaced it with a concern for overall effectiveness and efficiency. Aids to navigation in the United States have remained a federal charge to the present day. In 1789, at the time of transfer, there were approximately 12 lighthouses, existing or under construction, and an unknown number of buoys.

Federal responsibility in the earliest years of the United States involved the personal attention of presidents in the larger affairs of aids to navigation, with most routine matters being increasingly handled by the secretary of the treasury. In 1820 responsibility was shifted to the fifth auditor of the treasury, Stephen Pleasonton, whose tenure lasted some thirty years. During this period, the concern for efficiency was warped into a parsimony that left U. S. aids to navigation in a wretched state of marginal utility. Although the number of lighthouses increased from 55 in 1820 to 331 in 1852, the quality of the nation's aids to navigation deteriorated. Proven European developments in optics and construction were ignored in favor of outmoded, inferior methods and materials that had become replaced by private, commercial efforts such as Blunt's American Coast Pilot. Although Delaware's aids to navigation were assigned to a customs district under the early federal administration, their functional organization prevailed and they were "listed" on a state basis.

**Developed Federal Administration, 1852-1910.** In 1852, following a comprehensive and critical investigation, Congress created the Lighthouse Board, within the Department of Commerce, to supervise and direct the nation's aids to navigation. The nine member board, with strong military and scientific representation, effected a rapid resurgence in quality, quantity, and effectiveness, in part through administrative reforms, in part by incorporating technological advances. Under the Board's stewardship the number of aids to navigation of all types (including buoys) grew to over 11,700 by 1910. The Board effectively promoted caisson construction of lighthouse foundations, iron lighthouse superstructures, gas lighting of buoys and lighthouses, and fresnel lenses.

During most of the developed federal administration, Delaware's aids were included in the Fourth District, which extended from Squan Inlet, New Jersey to Metomkin Inlet, Virginia.

**Federal Lighthouse Administration, 1910-1939.** In 1910, responding to the increasing complexities of administration and operation of the nation's aids to navigation, Congress replaced the Lighthouse Board with the Bureau of Lighthouses, headed by a single commissioner, still within the Department of Commerce. Under the twenty-five year leadership of Commissioner George R. Putnam and a cadre of capable district inspectors, the Bureau initiated growth and technological advancements that made the United States system of aids to navigation the finest in the world. By 1924, the American lighthouse service, with over 16,800 aids to navigation, was the largest such organization worldwide. During its
existence, the Bureau of Lighthouses introduced electric lighting, electric fog signals, electric buoys, radio beacons, and, most importantly, automation of aids to navigation.

During the modern federal administration, Delaware's aids remained in the Fourth District, which was modified to extend from Cape May, New Jersey to Fenwick Island, Delaware, including the entire Delaware River and Bay.

**Coast Guard Administration, 1939-Present.** In 1939, the Bureau of Lighthouses was abolished and responsibility for aids to navigation was transferred to the United States Coast Guard, which was then within the Treasury Department. The Coast Guard continued the progressive management and operations of its predecessor, and the nation's system of aids to navigation has continued to grow and improve to the present day.\(^{15}\) Improvements under the Coast Guard included introduction of Loran and Shoran (radio) navigation signals, the significant addition of ice-resistant lights, and the near completion of automation.

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\(^{15}\) Some critics would claim that the Coast Guard has not shown sufficient concern for its heritage. Loss of maintenance with automation has led to rapid deterioration of many lighthouses, associated outbuildings, and sites. As always, technological advancement shows many effects.
II. ENGINEERING AND ARCHITECTURAL TRENDS

The navigational aids on the Delaware River and Bay are the physical manifestations of historical trends and events in maritime transportation as well as the economic history and industrialization of Delaware, Philadelphia, the middle Atlantic States, and the United States as a whole in the nineteenth century. Industrialization and technological advancements went hand in hand. The Delaware Valley was a seat of technical and industrial innovation, producing inventions such as the steam engine, railroad equipment, and the first iron-hulled steam boats.

This chapter will identify the specific property types related to navigational aids and the historic trends that produced them on the Delaware Estuary, particularly maritime transportation.

Property Types for Aids to Navigation

Property types are groupings of individual resources based on shared physical and associative characteristics that link themes identified in the historic context with actual historic properties. In the historic context for Delaware's aids to navigation, Gredell and Paul suggest that aids to navigation may be classified according to many criteria, including: location (land or water); creation (natural or manmade); information imparted (channel alignment, hazard warning, fixing location of vessel); time of operation (day, night; clear, obscure); type of signal (sight [powered/unpowered], sound, radio); fixity (rigid or tethered); construction (materials and structure); and duration (permanent or temporary).

Michael Paul also suggests that a simple but useful classification using a combination of criteria could list traditional aids to navigation as follows:

- harbor lights (primarily lighthouses)
- range lights (lighthouses and light towers)
- channel lights (lighthouses and light towers)
- lightships
- buoys
- natural marks

Based on the recommendations of Michael Paul and the results of the field survey, this report divides resources related to navigational aids into three property types--water-based navigational aids, land-based navigational aids, and keeper's housing. Buoys and natural markers have been excluded, and keeper's houses, oil houses or outbuildings are mentioned if they exist. Each broad property type contains subtypes based on other physical characteristics, as follows:
Water-based Navigational Aids

1. Lightships
   Traditionally used to temporarily mark a hazard such as a shipwreck, to replace a fixed light that had been damaged or destroyed, or to indefinitely mark a hazard where a fixed light could not be built.

2. Channel lights
   Used to mark the edge of bend in a channel (or area of safe passage) or mark a specific hazard. Structure can be a lighthouse, light tower, or pole light. Channel lights can be identified by type of foundation.
   A. Screwpile
   B. Caisson

Land-based Navigational Aids

1. Harbor lights
   Used to mark safe harbors, for general navigation purposes, and sometimes as rear range lights.

2. Range lights
   Used in pairs to indicate the course of safe passage. Some Front Range lights can be found in water, but Rear Range lights are typically found on land, therefore Range lights are associated with Land-based Navigational Aids.

Keeper’s Housing and Related Outbuildings

Figures 3 and 4 show the results of the survey and the location of the surviving examples of the different property types. A distinction has also been made between the major components of a navigational aid as 1) the foundation or supporting structure, 2) the tower or shaft, and 3) the light or signal, by type and function. The field survey suggests that these elements are modular and somewhat independent components that can be combined in different ways at different times depending upon the type of navigational aid needed, the available technology, and the time period.

The primary reason for choosing to base the property type classification on water versus land-based is that one of the major engineering problems faced in the Delaware Bay was that of finding a way to fix a light house on the bay’s soft floor. Once a method for building an adequate support structure was found and built, different kinds of structures could be built on top of it and different lights placed in the structure itself. The evolution of engineering technologies for foundations and tower construction was influenced by innovations in bridge construction (such as the Eades Bridge in St Louis in the 1860s) and was separate from the design of optical systems.
AIDS TO NAVIGATION MAP REFERENCE
(Lower Delaware Portion)

1. Mispillion Lighthouse
2. Fourteen Foot Bank Lighthouse
3. Brandywine Shoal Lighthouse
4. Miah Mauil Shoal Lighthouse
5. Elbow of Cross Ledge
6. Cross Ledge Light
7. Ship John Shoal Light
8. Leipsic River Front Range
9. Port Mahon Light
10. Little River Front Range
11. Murderkill River Rear Range
12. Murderkill River Front Range
13. Overfalls Lightship
14. Harbor of Refuge North End
15. Harbor of Refuge Light
16. Delaware Breakwater West End
17. Delaware Breakwater East End
18. Delaware Breakwater Front Range
Figure 3:

AIDS TO NAVIGATION IN THE DELAWARE BAY AND RIVER (LOWER DELAWARE PORTION)

LEGEND
- CHANNEL LIGHT
- HARBOR LIGHT
- FRONT RANGE LIGHT
- REAR RANGE LIGHT
- FORMER LIGHTSHIP LOCATION
- KEEPER’S DWELLING

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JUNE, 1971 L. E. BASHMAN
AIDS TO NAVIGATION MAP REFERENCE
(Upper Delaware Portion)

19. Reedy Island Rear Range
20. Reedy Island Front Range
21. Appoquinimink Front Range
22. Liston Front Range
23. Reedy Island Light (Old)
24. Baker Front Range
25. Liston Rear Range
26. Baker Rear Range
27. Delaware City Beacon
28. Fort Delaware Light
29. Pea Patch Island Dike Gap
30. Pea Patch Island Dike Middle
31. New Castle Front Range
32. Pea Patch Island Dike Upper
33. New Castle Rear Range
34. Bulkhead Bar Front Range
35. Bulkhead Bar Rear Range
36. Christiana Rear Range
37. Christiana Front Range
38. Bellevue Rear Range
39. Bellevue Front Range
40. Cherry Island Front Range
41. Marcus Hook Front Range
42. Cherry Island Rear Range
43. Marcus Hook Front Range
Figure 4:
AIDS TO NAVIGATION IN THE DELAWARE RIVER (UPPER DELAWARE PORTION)
The System of Navigational Aids on the Delaware Estuary

The navigational aids on the Delaware Estuary form a nautical guidance system with each aid, from the most visible lighthouse to the humblest buoy, playing a role in assisting ships to successfully navigate their route. The aids mark an invisible network of water routes with the main channel to Philadelphia, some 600 feet wide and 30 feet deep, forming the spine from which tributary channels flow into Wilmington and other smaller ports. The configuration of the system at any time and the types of navigational aids and their placement reflect the interplay between four major elements—the physical nature of the estuary itself as a navigable body of water, the volume of tonnage traveling on the water, the character of the ships carrying it, and the state of technology of aids to navigation.

The Delaware Estuary presents a number of limitations to navigation that became more restrictive as the number and size of ships using the route increased. These limitations dictated the types of navigational aids required as well as aspects of their construction design. Although large in area, the estuary is very shallow, offering many opportunities for running aground. It also has shoals at its mouth with no naturally protected anchorages. It is, in simple terms, a flooded depression in the larger Atlantic coastal plain. As part of the coastal plain, the floor of the Bay is made of soft sedimentary material with a poor weight-bearing capacity to support heavy structures such as light houses, especially tall structures that would be buffeted by waves, high winds, and occasional ice flows.

Because of its shallowness, the estuary is vulnerable to sedimentation from soils contributed by Delaware and New Jersey farms. Many of the streams in Delaware that were navigable in the eighteenth and nineteenth centuries have been lost to sedimentation. In addition, the rocky ledge of the fall line crosses the Delaware River near Chester, Pennsylvania, forming a limit on the depth to which the channel can be dredged.

Thus from a navigational point of view, the Delaware Bay is not a bay at all but a relatively narrow channel some 30 feet deep running from the mouth of the Bay beyond Philadelphia and Trenton. One of the primary goals of the navigational aids system on the Delaware Estuary, especially in the later part of the nineteenth century, was to move a high volume of ships through that narrow passage. This is the reason for the large number of range lights on the Delaware Estuary that allow navigators to determine their precise location in the channel.

Because of the shallowness of the estuary and its susceptibility to sedimentation, both the main and secondary channels were constantly dredged to keep them open. After 1885 the main channel was actually a work of engineering. The Corps of Engineers has undertaken

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major dredging and channel improvement projects some of which resulted in moving the main channel. When the channel was moved, range lights had to be relocated; several were designed with a light tubular tower that could be disassembled and moved.

Influences on the Construction of Navigational Aids on the Delaware Estuary

The system of navigation aids on the Delaware Estuary evolved from a single light placed at Cape Henlopen in 1767 to over 80 sites. Prior to 1850, nearly all of the aids marked either harbors or hazards to navigation. In addition to the Cape Henlopen light, a lightship was placed in 1823 at the Upper Middle Shoal. From 1825 to 1839, a series of six harbor lights were built at Bombay Hook, Port Mahon, Mispillion, Christiana, and Reedy Point. From 1850 until 1934, 68 additional navigational aids were constructed, including the large concentration of range lights that guided ships through the main channel.

While the system of navigational aids on the Delaware Estuary grew in response to the need to handle greater volumes of shipping, it was also influenced by the national administration of lighthouses. Between 1820 and 1852, when the Fifth Auditor of the Treasury Department was responsible for lighthouses, there was great fiscal restraint in both construction and maintenance, and the construction of new navigation aids lagged behind the need. The introduction of new materials and technology into the design and construction of navigational aids was also slow in this period, although wrought-iron and cast-iron foundations began to be used. Most of the innovation in lighthouse design took place in Great Britain.

A great expansion in the number and type of lighthouses on the Delaware Bay occurred after 1852, when the Lighthouse Service was reorganized and the United States Lighthouse Board was created. During this period a great expansion of international shipping coincided with the availability of new materials and engineering skills that revolutionized the technology of navigational aids. Innovative technology provided new methods for illuminating the lights and adding greater height to the towers, allowing the aids to be seen from further away. Wood piling and cribbage systems were replaced with sunken cast-iron caissons, brick towers could exceed 160 feet in height, pre-fabricated cast-iron units made towers more cost effective, and skeletal iron and steel towers were manufactured. These new forms quickly replaced much of the older technology. Thus the development of lighthouse construction in the United States was closely related to the creation of new building technology. In the tapered shape typical of the load-bearing masonry towers, the elegant skeletal frames of iron towers, and the solid, reinforced, seismically-designed concrete towers lie a rich history of engineering and functional design.
III. WATER-BASED AIDS TO NAVIGATION

In the Delaware Bay, with its floor of soft sediments several thousand feet thick, a major engineering imperative for navigational aids in the nineteenth century was to find ways to build foundations and supports for lighthouses that would both support their weight vertically and hold them up against the lateral pressures of water actions, storm winds, and the occasional impacts of ice floes and other floating objects. A number of channel lights were needed because of the shallowness of the Bay and navigational hazards presented by the numerous shoals in the lower Bay. Indeed, the Cape Henlopen light house was built in 1725 not only to mark the entry to the Bay but to "warn ships of the treacherous merging of the bay and ocean."\(^{17}\)

In other areas, the old technology of wooden pilings had been used to support channel lights. These were generally unsatisfactory and did not work in the Delaware Bay because it was difficult to drive and secure piling in the open bay. Once installed, they rotted rather quickly and were very vulnerable to storms and floating objects.

Thus the engineering trends that produced a successful foundation for the Delaware Bay evolved from the lightship (an alternative in the absence of a suitable technology), to the screwpile foundation, to the caisson.

Lightships

As early as 1731 in England, lightships were placed temporarily as markers of sudden hazards such as shipwrecks or as replacements for damaged or destroyed fixed lights; they were placed indefinitely to mark a hazard where permanent lights could not be used. Although originally called lightboats or light vessels, within a few years after the Lighthouse Board took charge of the Lighthouse Service they were uniformly referred to as lightships.

Lightships were placed in the Delaware Bay to mark rocky shoals or to indicate a turn in the river: at the Upper Middle Shoal in 1823, and in 1839, at the Brandywine Shoal and Five Fathom Bank. Since other technology was not yet available, lightships were the sole aid used to guide ships into the Delaware Bay and up the river to their destination. However, it is testimony to the difficulty of building lighthouses in the Bay, especially near the mouth where the bay and ocean meet, that new lightships were positioned in 1898 (*Fenwick Island #52* and *Overfalls #46*). Lightships were used in the Delaware Estuary until 1972. Due to ice floes, however, they could not be kept on station in the winter in the Delaware Bay and

\(^{17}\) The Delaware Estuary
Lightships proved inadequate in the Delaware Bay because ice floes and storms tended to force the lightships from their moorings. In addition, lightships were required to remain on station during even the most severe storms, suffering damage and loss of life. Although they were useful in many situations, lightships were replaced as soon as possible. Technological advances, such as the development of the screwpile lighthouse, allowed the replacement of many of them as early as 1850. Lightships are rarely used today as navigational aids anywhere because permanent structures can be placed in virtually any location. Several decommissioned lightships have been put on display or made into museums such as the Overfalls, now docked at Lewes. The lightship displayed in Lewes, although it is called the Overfalls, was never used in the Delaware Estuary.

For many years lightships were made of wood and had a life expectancy of five to ten years. By 1881, there began to be metal-hull construction with the building of composite--part metal, part wood--hulls. The hull is the part of the boat that constantly sits in the water. Since lightships had been constructed of wood up until this point, it was thought that metal-hull construction would not last as long in the sea. Lightships typically had one or two lanterns that varied in size. A crew was required to operate and maintain the boat. Compasses and sometimes fog signals were part of the standard equipment.

The Lighthouse Board made many improvements to the design of the lightship and the technology used onboard. Lamps and reflectors were improved, as were the living conditions on the ships. Naval architects experimented with the overall design and motive powers. Originally lightships were single-decked, and the crew lived on the lower deck below the water line. The first steps to improve quarters involved building up the sides of the forward portion of the ship and decking it over so that quarters could be placed there. In the 1890s the Lighthouse Board began using electricity to illuminate lanterns on the lightships.

There were 26 lightships in use in the country in 1837; by 1852 there were 42. In 1889 the country's lightships numbered only 24, all on the east coast or in the Great Lakes. The reason for this reduction was that many of the "inside" lightships (those located in bays and sounds) had been replaced by lighthouses. There are no lightships surviving in place in Delaware that are eligible for nomination to the National Register of Historic Places.

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Middle Shoal Lightship</td>
<td>1823-1875</td>
</tr>
<tr>
<td>Brandywine Shoal Lightship</td>
<td>1823-1850</td>
</tr>
<tr>
<td>Five Fathom Bank Lightship</td>
<td>1837-1972</td>
</tr>
<tr>
<td>Fourteen-Foot Bank Lightship</td>
<td>1876-1886 (Ocean Station)</td>
</tr>
<tr>
<td>Fenwick Island Lightship</td>
<td>1888-1933 (Ocean Station)</td>
</tr>
<tr>
<td>Overfalls Lightship</td>
<td>1898-1960</td>
</tr>
</tbody>
</table>
Channel Lights

Channel lights are used to mark the edge of a bend in a channel (or the area of safe passage); in this classification of property types, channel lights also include those that mark a specific hazard (usually a shoal, ledge, or bank on the edge of a channel). A channel light is a functional property type whose physical features vary from one location to another, depending primarily on the period of construction and the engineering problem that needed to be solved. When there was no technology available to build fixed lighthouses in the Delaware Bay, lightships functioned as channel lights. Before 1850, channel lights were needed primarily to mark hazards to navigation, particularly the shoals. Later in the century, as the shipping grew heavier with larger and deeper drafts, lights were needed to mark the channel itself. The screwpile lighthouse was the first attempt to solve the problem of fixing structures to the floor of the bay. When they proved less than successful, the caisson followed.

Screwpile Lighthouses. Technological innovation allowed the lightship to be replaced by other structures that were thought to be more permanent. The screwpile lighthouse was the first structure that could be totally water based. It contained both the mechanical aid to navigation and accommodations for a keeper.

Invented by an Englishman named Alexander Mitchell, the first screwpile lighthouse was built on Maplin Sound at the mouth of the Thames River in England, in 1838. In the mid 1840s, the United States Congressional Committee on Commerce announced that it believed the screwpile lighthouse would replace the lightship.

The first screwpile lighthouse in the United States was erected on Brandywine Shoal in the Delaware Bay in 1850, replacing the lightship that had been stationed there since 1823. Major Hartman Bache was responsible for designing and building the Brandywine Shoal screwpile lighthouse. Pilings were manufactured from corrosion-resistant wrought-iron instead of wood and could be made to any specified length. The most important element of the screwpile, however, was the attachment of a broad-bladed, 3-foot long, cast-iron screw to the end of each piling. The screw attachment was used to force the iron stilt legs deep into the soft ground of protected waters, such as bays and sounds. This technology permitted the construction of lighthouses on sites previously too soft to support the weight of a heavy tower. Not only was the screw a means for getting the pile into the ocean bottom, but the three-foot blade provided additional bearing surface.

A screwpile structure was a functional lighthouse at Brandywine Shoal from 1850-1914. In the 1873 Annual Report of the Lighthouse Board it was reported that a diver from the Engineering Department of the Army had examined the screwpile structure underwater to look for signs of deterioration. As the current and eddies were strong, it was a difficult task for the diver, but of the 77 total piles used to support the structure, he did manage to
examine 7 of the lighthouse piles and 3 of the ice fender piles. It was found that many of the horizontal braces were gone or twisted, but that was not a decisive factor since the engineers had decided already in 1855 not to depend on them. Otherwise, despite some eating away of the iron piles and a few pilings found to be leaning to some degree, the structural support was found in good condition.18

The screwpile lighthouse at Brandywine Shoal served well for 60 years. Improving technology permitted the Lighthouse Board to replace screwpile lighthouses with a caisson lighthouse that required less maintenance than the screwpile, and was less vulnerable to storms, ice, and other floating hazards.

The success of the Brandywine Shoal lighthouse encouraged the board to attempt another screwpile lighthouse in the Delaware Bay. In 1855, the board began erecting one at Cross Ledge, just north of the Brandywine Shoal lighthouse.

Screwpile structures were particularly suited to slow moving, shallow water. Under strong lateral pressure (steady pressure provided by a strong current or sudden collision with an ice floe) the screwpile could be pushed out of alignment. This was dramatically demonstrated when an ice floe in 1856 destroyed the foundation at Cross Ledge. At this point the board began to have second thoughts about the efficacy of a screwpile lighthouse in that location. The board had also planned to put up a screwpile structure at Ship John Shoal, but after the disaster at Cross Ledge, construction work at Ship John Shoal was also stopped. There are no screwpile lighthouses surviving in the Delaware Estuary today.

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates of Service</th>
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<tbody>
<tr>
<td>Brandywine Shoal</td>
<td>1850-1914</td>
</tr>
<tr>
<td>Cross Ledge</td>
<td>tried unsuccessfully 1855</td>
</tr>
</tbody>
</table>

Caisson lighthouses. During the mid-nineteenth century, there was a great deal of experimentation with submergible caissons both for tunnel and bridge construction as well as for navigational aids. Caissons were huge cast-iron cylinders that were made on shore and floated out to a specific site, rather than being constructed on location. Early caissons were simply lowered into the seabed and filled with concrete. Sites where the seabed was uneven, unusually soft, or exposed to strong currents and waves, required special preparation in order for the caisson to stay in place under water. Pneumatic caissons, invented in the early 1880s, were used for the very first time to support the Fourteen Foot Bank Lighthouse in 1886. Known as submarine site lighthouses, pneumatic caissons contained a double bottom that was sunk into position. Once it was upright, air was pumped into the caisson, forcing the sea water out through the bottom. Workmen then entered the top of the caisson through an anti-lock system and prepared the foundation. The bottom rim of the caisson acted as a cutting

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18 Gowdy, p. 59.
edge that settled into the seabed as workmen excavated sand and mud from inside the caisson. Air pressure kept water from seeping under the edge and into the work chamber. The excavated soil was hauled or sucked out through an airtight shaft. The workmen might sink the cast-iron caisson as much as 33 feet below the seabed.

The caisson lighthouse was characterized by a sparkplug shape with circular steel platforms rising up from a submerged foundation, and typically contained a steel light tower and keeper's quarters (see Figure 5). The cast-iron bottom was filled with concrete and heavy rocks to weight it down on the bottom of the river. The advantages of cast-iron were that it was light (compared to stone and brick), inexpensive, strong, water tight, and deteriorated at a slow rate.

As mentioned above, screwpile lighthouses, the popular method of construction for water-based aids to navigation before caissons, were susceptible to ice damage and proved better suited to warmer waters than the Delaware Bay. As soon as the caisson proved successful at Fourteen-Foot Bank, many other lighthouses were also built by this method. Major F. P. Heap's pneumatic caisson method, sunk on a shoal, provided a more stable base foundation than any previous efforts.

In addition to providing much more secure foundations on soft sea and bay floors, caissons required less maintenance than screwpiles and were better suited for the cold waters. Eight caisson-style lighthouses were constructed in the Delaware Bay and River from 1874 to 1926; six are still functional today. Two of the caisson lights, the Delaware Breakwater and the Harbor of Refuge, are already listed on the National Register of Historic Places.

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates of Service</th>
</tr>
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<tbody>
<tr>
<td>Ship John Shoal</td>
<td>1874-present</td>
</tr>
<tr>
<td>Cross-Ledge [foundation remains]</td>
<td>1876-1907</td>
</tr>
<tr>
<td>Fourteen-Foot Bank</td>
<td>1886-present</td>
</tr>
<tr>
<td>Harbor of Refuge</td>
<td>1902-present</td>
</tr>
<tr>
<td>Elbow of Cross Ledge</td>
<td>1907-1951 (modern light)</td>
</tr>
<tr>
<td>Miah Maul Shoal</td>
<td>1909-present</td>
</tr>
<tr>
<td>Brandywine Shoal</td>
<td>1914-present</td>
</tr>
<tr>
<td>Delaware Breakwater</td>
<td>1926-present</td>
</tr>
</tbody>
</table>
Figure 5: Delaware Breakwater Lighthouse
IV. LAND-BASED AIDS TO NAVIGATION

Land-based lighthouses also underwent structural evolution. In 1852, the Lighthouse Board began to develop and utilize new techniques, equipment, and methods for building land-based lighthouses, including harbor lights, seacoast, and range lights. The Board needed to improve the quality of lighthouses in a manner that was economical while at the same time meeting the increased demand for additional navigational aids. From this effort, the metal skeleton tower was developed. Constructed initially of cast and wrought iron and later of steel, it applied new structural engineering techniques, and came into use about the time of the Civil War.\textsuperscript{19} The first generation of these land-based skeleton lighthouses had a central stair tower leading to the lantern with outside bracing or legs consisting of girders rivetted together at the joints and reenforced with steel rods. They were inexpensive and nearly indestructible.

The skeleton towers were continually redesigned to make them more flexible. Later versions of this first generation of skeleton towers were made more versatile—the cast-iron pipe segments that formed the legs of the tower had flanged ends and special joint sockets allowing the tower to be built to different heights, making it easy to erect, and allowing it to be dismantled and moved if necessary.

By the 1890s the design of the skeleton towers had been simplified to the point that they were held together almost by gravity alone. At Reedy Island Light, constructed in 1902, the pipe segments of the tower were fitted into junctions held together by the tension of the tie rods. This simplified design was intended to facilitate disassembly and reassembly at a new site as much as the initial construction.

The design of lighthouses that could be easily moved resulted from the increased need for range lights. As the volume of shipping on the shallow Delaware Bay increased in support of the industrialization of Philadelphia, Wilmington, and the larger Delaware Valley, greater demands were made on the precision of navigation aids as well as on the ability of the Bay to handle larger and larger ships. The greater volume of shipping in the channel required a specific set of navigational aids that would allow navigators to precisely determine their position in the channel. Paired range lights were constructed to provide that information—when their lights were aligned, a ship in the bay knew that it was on course in the channel. At the same time, the larger ships required a deeper channel that could only be created

\textsuperscript{19} F. Ross Holland, "American Lighthouses" Quarterly of the National Archives, Vol 22, No. 2, p. 192.
through dredging. This transformed the channel from a natural feature to one man-made through engineering. Indeed, on at least two occasions, adjustments to the route of the main channel necessitated the construction of new range lights and the relocation of others.

Not all range lights, however, needed to be moved and the Lighthouse Board experimented with materials other than steel. Marcus Hook Rear Range Light (1919) is an example of the early use of reinforced concrete. Reinforced concrete was first used for lighthouses on the Pacific Coast in 1908. The Lighthouse Service's experiments with concrete continued in 1916, when the 100-foot tower for the Marcus Hook Rear Range Light was designed. Standard practice at the time was to use iron or steel skeleton towers for rear range lights, so the use of concrete for the construction of the Marcus Hook Rear Range was truly out of the ordinary.

The advantages of reinforced concrete were its great structural strength and nearly maintenance-free surface. Even though the material itself was cheaper, the building of forms, placement of reinforcing rods, and pouring of cement on the upper levels must have been much more complicated than the erection of a largely pre-fabricated tower.

**Harbor Lights**

Of the 17 harbor lights that have been erected in the Delaware portion of the Delaware Estuary, 5 still retain original fabric. Others have been replaced with small metal latticework towers with automated signals. All of the harbor lights that marked the entrances to rivers and local harbors have been replaced or removed.

The harbor lights are the most diverse property type structurally. They include the 85' 5" brick conical tower of the Fenwick Island Lighthouse, built in 1858 (Figures 6 and 7); the steel tower of the Delaware City Beacon (Figure 8); the small conical cast iron tower of the lighthouse on National Harbor of Refuge Breakwater, built in 1885 (Figure 9); and Mispillion Lighthouse, the only surviving wood frame lighthouse in Delaware. Fenwick Island, Harbor of Refuge, and the Mispillion lights are all listed on the National Register of Historic Places.

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skeleton Towers</strong></td>
<td></td>
</tr>
<tr>
<td>Port Mahon [archaeological]</td>
<td>1903-1955</td>
</tr>
<tr>
<td>Delaware City Beacon</td>
<td>1916-present (modern light)</td>
</tr>
<tr>
<td><strong>Conical Towers</strong></td>
<td></td>
</tr>
<tr>
<td>Fenwick Island (brick)</td>
<td>1859-present</td>
</tr>
<tr>
<td>Harbor of Refuge (cast iron)</td>
<td>1885-present</td>
</tr>
<tr>
<td>Mispillion (wood)</td>
<td>1831-present</td>
</tr>
</tbody>
</table>
Figure 7: Fenwick Island Lighthouse
Figure 8: Delaware City Beacon
Range Lights

The Delaware Estuary has a very extensive systems of range lights. Range lights are most often found along major waterways that have constricted, changing, or heavily traveled channels. Range lights also are found at inlets. Because they often mark dredged channels, the lights are repositioned or replaced when the alignment of the channel is altered through dredging. Through 1910 range lights were constructed as the skeletal pipe towers, the plans for which had been standardized by the 1890s.

First placed along the Delaware Estuary in the 1870s, range lights consist of two lights, a front light and a rear light. The front light is located in the water or at the water's edge, while the rear light is located inland, sometimes as much as 1.5 miles. The rear light is taller than the front light, so that when viewed from mid-channel the rear range light can be seen above the front one. Together a pair of range lights marks the center of the shipping channel and the deepest water for ships, so that when they were correctly lined up, a ship's pilot knew that his vessel was in the proper channel.

Range lights were needed along the Delaware to guide increasingly larger amounts of shipping in the narrow main channel, which needed to be dredged to maintain and enlarge it from the 1870s on. As improvements were made in the shipping channel, range lights were added, moved, or abandoned. The New Castle Front and Rear Range Lights, built in 1876, were the first range lights constructed along the Delaware River. The Marcus Hook Rear Range Light, built in 1919, was the last manned lighthouse to be built along the Delaware River; it completed the chain of high powered range lights guiding ships from the Delaware Bay to Philadelphia and Trenton.

Range lights, like other aids to navigation, required maintenance from a keeper on site or in close proximity. There is little information available on the range lights that were placed at the entrance to the tributary rivers and creeks in Delaware that once led ships to inland ports. It is likely that the range lights at Little River, Little Creek, Saint Jones Creek, Smyrna River, Leipsic River, Appoquinimink River, and Murderkill River all had someone tending them when they were first built. Today, reduced traffic on these waterways has caused the abandonment or replacement of the original lights with automated steel skeletal structures.

Sixteen sets of range lights were built in Delaware. The first three sets were built between 1876 and 1880—New Castle (1876), Port Penn (1877) and Cherry Island (1880). A second generation of ten sets was added between 1895 and 1913. This was part of a major improvement program in the Delaware Estuary designed to implement federal legislation that had been passed in 1885 authorizing the permanent improvement of the Delaware River and Bay. "Construction and maintenance of anchorages, dikes, revetments, and harbors became
Figure 10: Reedy Island Rear Range Light
V. KEEPER’S HOUSES

Before automation, every aid to navigation needed a keeper to maintain the light. Keepers were responsible for insuring that there was enough fuel for a light to burn for a given amount of time; they also tended the lenses and generally kept the lighthouse in good working order. Since each aid needed constant supervision, a keeper’s house was generally located at or close to the site.

Water-based aids to navigation had to have a keeper’s dwelling located at the site in order for them to be properly maintained. In this case the dwelling was incorporated into the construction of the light itself. On land, keeper’s housing could be part of the main light structure or could be a separate dwelling. Fourteen-Foot Bank, Miah Maull Shoal, Ship John Shoal, Brandywine Shoal, Cross Ledge, Harbor of Refuge, and Delaware Breakwater all were constructed on the water as keeper’s quarters and lighthouse in one. This was necessary since these aids to navigation were placed in the middle of the channel, some distance from shore.

Mispillion Lighthouse is the only surviving land-based example in Delaware of a keeper’s house and light structure in one. This type of lighthouse accommodated the keeper and the light all in one structure, which was thought to be very efficient. The Mispillion Lighthouse helped guide vessels into the Mispillion River. It is a surviving example of lights placed at the mouth of secondary rivers to facilitate ship traffic into inland ports. The timing and placement of these lights was critical. Most of them were constructed during an increase in shipping in and out of Wilmington and Philadelphia. The Mispillion Lighthouse was placed on the Mispillion River in 1831 to aid boat traffic into Milford. The placement of some of these lights is indicative of the development of communities and local transportation.

Many of the lighthouses, as well as keeper’s houses, on the Delaware River were affected by the navigability of the shipping channel. The reach and extent of shipping continually changed as the size, weight, draft, width, construction and motive power of ships changed. Advances in dredging techniques improved the safety of shipping and promoted its growth. As more and larger ships navigated the Delaware River a deeper and wider channel was needed. Many times aids to navigation had to be moved so a bigger channel could be dredged. Often an aid to navigation was demolished instead of moving it to a new site. At the new site a technologically advanced aid to navigation of the skeletal variety could be built.

Advances in technology eventually rendered the lighthouse keeper obsolete. Keeper’s houses such as the ones at Fenwick Island, New Castle Front Range, and Marcus Hook Rear...
Range are examples of original keeper’s dwellings now occupied by people who do not have to maintain the light. In the late nineteenth and early twentieth century, lighthouses could be automated. New technology also provided the means by which lighthouses could be constructed as tall, steel skeletal towers that were basically mobile. These technological advances became much more attractive than moving lighthouses and keeper’s houses every time the channel was to be widened. With time, many keeper’s houses became derelict or were demolished. Only a handful of original keeper’s houses still remain today. Both of the dwellings at Fenwick Island (Figure 12), the Mispillion Light, Marcus Hook Rear Range Keeper’ House, and the Reedy Island Rear Range Keeper’s Dwelling are already listed on the National Register of Historic Places.

<table>
<thead>
<tr>
<th>Name</th>
<th>Property Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighthouse and Keeper’s Dwelling in One</td>
<td></td>
</tr>
<tr>
<td>Mispillion Lighthouse (1831–present)</td>
<td>Harbor Light</td>
</tr>
<tr>
<td>Christiana Lighthouse (1831–1909) demolished</td>
<td>Harbor Light</td>
</tr>
<tr>
<td>Bombay Hook Lighthouse (1831–1921) demolished</td>
<td>Harbor Light</td>
</tr>
<tr>
<td>Reedy Island Lighthouse (1839–1950) demolished</td>
<td>Harbor Light</td>
</tr>
<tr>
<td>Port Penn Front Range (1877–1905) demolished</td>
<td>Range Light</td>
</tr>
<tr>
<td>Cherry Island Front (1880–1949) demolished</td>
<td>Range Light</td>
</tr>
<tr>
<td>Cherry Island Rear (1880–1971) demolished</td>
<td>Range Light</td>
</tr>
<tr>
<td>Liston Front Range (1904–1953)</td>
<td>Range Light</td>
</tr>
<tr>
<td>Fort Delaware Beacon (1925–?)</td>
<td>Channel Light</td>
</tr>
</tbody>
</table>

| Keeper’s Dwellings Separate from Lights         |               |
| Fenwick Island–First Dwelling                   | 1857–present  |
| Fenwick Island–Second Dwelling                  | 1882–present  |
| New Castle Front                                | 1876–present  |
| New Castle Rear (demolished)                    | 1876–1953     |
| Delaware Breakwater Range (demolished)         | 1881–1903     |
| Reedy Island Front                              | 1904–?        |
| Marcus Hook Rear                                | 1918–present  |
Figure 12: Fenwick Island Keeper's House
VI. EVALUATION OF DELAWARE’S AIDS TO NAVIGATION

The final step in the creation of a fully developed historic context is the evaluation of potentially eligible resources against specific criteria for inclusion in the context and property types. These criteria must be in accordance with the Secretary of the Interior’s Standards and Guidelines for the nomination of historic resources to the National Register of Historic Places. This chapter will describe the criteria used to determine whether an aid to navigation is eligible for inclusion in the historic context for Aids to Navigation in Delaware as well as those used to determine whether it should be included in a given property type. Each of the resources that was surveyed during the course of this project and was determined eligible for nomination under the aids to navigation historic context is fully described and evaluated.

Criteria for Significance

To qualify for nomination to the National Register of Historic Places, a historic resource must be significant in American history, architecture, engineering, or culture, and must also meet one or more of the four National Register of Historic Places criteria of significance:

A. Be associated with events that have made a significant contribution to the broad patterns of our history

B. Be associated with the lives of persons significant in our past

C. Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose component may lack individual distinction

D. Yield, or be likely to yield, information important in history or prehistory

Specific guidelines for the evaluation of aids to navigation against these criteria of significance within the historic context for Aids to Navigation in Delaware are detailed below.

Taken as a whole, the navigational aids on the Delaware Estuary constitute a guidance system for mariners—a system in which each type of aid and each individual aid perform a specific function to create a marked and navigable sealeane from the mouth of the estuary to the upstream ports. Hence, although they are located in the waters and along the shores of Delaware, New Jersey, and Pennsylvania, each individual aid to navigation should be evaluated in the context of the larger system of navigational aids on the Delaware Bay and River. Since the Delaware Estuary formed one of the three most important commercial maritime systems in the nineteenth century United States, the system itself and each
individual aid must be considered to be of national significance. The system of navigational aids in the Delaware Estuary may have been the most sophisticated among the four major eastern ports (Boston, New York, Philadelphia, and Baltimore). Only Philadelphia and Baltimore are located at the head of a bay; both Boston and New York are ports that have easy access to the Atlantic Ocean. The system of navigational aids on the Delaware Estuary developed in response to the industrialization of Philadelphia and the Delaware Valley and the increased demand for goods. New technology for materials, construction, and lighting aided the invention of more advanced navigational aids, that then facilitated larger ships and greater volumes of shipping on the estuary. In broad terms, navigational aids in Delaware possess significance at a national level and are eligible for nomination to the National Register of Historic Places under Criterion A because of their association with a major center of nineteenth century industrialization in the United States, and under Criterion C as part of an extensive and complex system of navigational aids that incorporated significant engineering innovations. The specific considerations for evaluation under each of the National Register criteria of significance are as follows.

Criterion A

To be eligible under Criterion A, a navigational aid must have made a significant contribution to at least one of the following historic themes from the Delaware Comprehensive Historic Preservation Plan: 1) Transportation and Communication (Maritime Transportation), 2) Architecture, Engineering and Decorative Arts, 3) Fishing and Oystering, 4) Manufacturing, 5) Settlement Patterns and Demographic Change, or 6) Government.

Criterion B

To be eligible under Criterion B, an aid to navigation will possess significance if the historic prominence of a person is directly tied to the aid. None of the aids to navigation surveyed in Delaware was discovered to be associated with a prominent individual.

Criterion C

Under Criterion C, an aid to navigation must possess significance for its embodiment of the distinctive characteristics of a type, period, or method of construction, or its representation of the work of a master, or its possession of high artistic values, or its representation of a significant and distinguishable entity whose components may lack individual distinction. An aid must possess certain features to be a good representative of its type, period, or method of construction.

Aids to navigation are usually found to be eligible for listing on the National Register of Historic Places under Criterion C and are significant in the areas of Architecture and Engineering. Under Architecture, an aid to navigation may be significant if it is 1) a good representative of a specific style of architecture; 2) a good representative of a specific type of
Evaluation of Delaware's Aids to Navigation

construction (such as screwpile, caisson, or octagonal stone tower); or 3) a good example of the work of a master. To be eligible under Engineering, an aid may be significant because of the engineering required for its construction or for its optics and sound signals.

Criterion D

Under Criterion D, an aid to navigation is significant if archaeological research at the site has yielded or is likely to yield information important to history. These data might include design information, methods of construction, or reveal something about the operations and daily life of a lighthouse and its keeper.

In Delaware, Criterion D is important because as local shipping declined in the early twentieth century due to the rise of railroads and highways, harbor lights and channel markers in the small rivers fell into disuse, deteriorated, and disappeared. Port Mahon Light is one example of this phenomenon. Consequently some of the earlier navigational aids related to local ports could have significance under Criterion D.

Criteria for Integrity

To be eligible for nomination to the National Register of Historic Places, a historic resource must also demonstrate a high degree of physical integrity in seven respects: location, design, setting, materials, workmanship, feeling, and association.

Location. Integrity of location refers to whether or not a property has been moved. In most cases, a historic resource loses integrity when it has been moved from its original location. There are two exceptions to this rule when evaluating navigational aids. First, range lights were intentionally designed to be moved when channels were realigned. Second, lightships, of course, were intended to be mobile. Most other forms of lighthouses were not intended to be moved from their original location.

Design. Design is the composition of elements that constitute the form, plan, space, structure, and style of a historic resource. Structurally, lighthouses and lighttowers consist of a foundation, a shaft, and a light. To maintain integrity of design, all three of these elements should be present with little change since their original construction. Any changes that have been made should be related to continuing the functional operation of the navigational aid. The survey of navigational aids in Delaware suggested three exceptions to this criteria.

First, although ideally a navigational aid should have retained its original light or optic in order to be eligible, in the case of lights that are still operational, most optical systems have been updated and/or automated. This evaluation does not consider integrity of design for the optical system to be crucial to the eligibility of an aid to navigation, particularly if the light is still in operation. There are two justifications for this position: 1) it was not possible to determine the technical nature of the lights during the survey; and 2) the lamps have been
systematically upgraded by the United States Coast Guard.

The second exception involves caisson foundations. Important engineering features in their own right, caisson foundations have occasionally proved to have a durability beyond the life of the lighthouses they support. It is recommended that, under certain circumstances where the original lighthouse has been destroyed or replaced, these caissons be considered for nomination to the National Register of Historic Places.

Third, with the automation of water-based lighthouses, keepers' quarters are no longer used or are used for storage and may have suffered a loss of integrity.

**Setting.** Setting, a quality primarily related to land-based navigational aids, is the physical environment of a historic property that illustrates the character of the place. Although the integrity of the setting of some lighthouses, such as Fenwick Island and Bellevue Rear Range Light, have been severely compromised by development, setting has not been considered a critical aspect of integrity in this evaluation. This is because the only factors considered when placing a lighthouse on the landscape were its position relative to the waterway and the type of foundation that would be needed for that location. The physical environment had little effect on that decision.

**Materials.** The integrity of materials is based on the physical elements combined in a particular pattern or configuration to form a historic resource during a period in the past. It is, after design, the most critical aspect of integrity for navigational aids because it determines whether an authentic historic resource still exists. It is also important because new materials such as cast iron and steel contributed to the engineering advancements.

**Workmanship.** Workmanship is the physical evidence of the crafts and technology of a particular culture or historic period. The Ship John Shoal Light, a conical tower of bolted cast-iron plates constructed in the Second Empire architectural style, is an example of the combination of style and technology.

**Feeling.** Feeling is the quality that a historic property has in evoking the historic or aesthetic sense of a past period of time. In Delaware, where the extensive wetlands lining the coast prevent most navigational aids from being viewed from land, the range lights on their nineteenth century pipetowers are especially evocative of the maritime culture of Delaware.

**Association.** This is the direct link between a property and the event or person that makes the property significant. It has little bearing on the significance or integrity of aids to navigation in Delaware since none of them appear to be connected with a particular person. The only exception to this would be a case where a light was the first of its type to be built in the nation, thus associating it with a particular event.

**Evaluation of Property Types for Water-Based Aids to Navigation**

Of the water-based navigational aids, four were found to be eligible for consideration
Evaluation of Delaware's Aids to Navigation

for the National Register of Historic Places. Three have caisson foundations and one has a masonry foundation.

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Foundation</th>
<th>Property Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cross Ledge</td>
<td>1875</td>
<td>Masonry</td>
<td>Channel Light</td>
</tr>
<tr>
<td>2. Ship John Shoal</td>
<td>1877</td>
<td>Caisson</td>
<td>Channel Light</td>
</tr>
<tr>
<td>3. Miah Maull</td>
<td>1909</td>
<td>Caisson</td>
<td>Channel Light</td>
</tr>
<tr>
<td>4. Brandywine</td>
<td>1914</td>
<td>Caisson</td>
<td>Channel Light</td>
</tr>
</tbody>
</table>

Criteria of Significance

Criterion A. All four of these water-based navigational aids mark the main shipping channel in the estuary. They are associated with the historic themes of Transportation and Communication, Manufacturing, Settlement Patterns and Demographic Change, and Architecture, Engineering, and Decorative Arts, reflecting the impact of industrialization on the region and the enlarged capacity of the Delaware Estuary for handling both larger ships and a greater volume of shipping. The significant chronological periods are 1830-1880+/: Industrialization and Early Urbanization, and 1880-1940+/: Urbanization and Early Suburbanization.

Criterion C. The Brandywine Shoal, Ship John Shoal, and Miah Maull lighthouses are significant representatives of a type and method of lighthouse construction that successfully engineered a foundation appropriate to the soft, shallow floor of the Delaware Bay. As a construction technology, caissons, as well as the cast-iron towers and original lanterns, manifest the application of innovative engineering techniques of the second half of the nineteenth century to the requirements of a sophisticated system of navigational aids. Channel lights, as a property type, reflect the unique nature of the Delaware Estuary, providing protection against its shallow water and numerous shoals.

The octagonal granite foundation of the Cross Ledge Light, built in 1877, is the only example of a masonry foundation in the Delaware Estuary and is therefore significant. Given the engineering problems with building in the estuary, archaeological research on the construction of this lighthouse may yield important historic information.

Criteria of Integrity

Brandywine Shoal (1914), Ship John Shoal (1877) and Miah Maull (1909) lighthouses all exhibit a high degree of integrity in the key aspects of design, materials, and workmanship. All three retain the original configuration of the caisson foundation, the conical cast-iron or steel towers, and the external lantern appearance. A detailed description of each lighthouse follows. As a group, they provide information on the evolution of this type of lighthouse.

The evaluation of integrity here for Cross Ledge Light must be based on the foundation
Description:

Cross Ledge Light (Figure 13) was built in 1875, replacing the Upper Middle Shoal Lightship. It survives today only as an archaeological site—the octagonal, granite foundation is still visible above the water. Originally the lighthouse was a two-story, octagonal frame structure, with a heavy cornice between the first and second floor, surmounted by a circular gallery at the third floor level which supported the light. The building had lead colored trimmings, green shutters, and a mansard roof. This was the second attempt to build a lighthouse at Cross Ledge. After a screwpile lighthouse was erected at Brandywine Shoal in 1850, an attempt was made to put a screwpile lighthouse at this site in 1855. It was destroyed by ice floes in 1856.

The Cross Ledge Light was decommissioned sometime between 1907 and 1910 and was replaced by the lighthouse at Elbow of Cross Ledge. In 1901 the octagonal granite foundation of Cross Ledge lighthouse was in bad condition. The new light at Elbow of Cross Ledge was proposed as a way to improve the lighting of the Delaware Bay and eventually led to Cross Ledge’s decommissioning. After 1910 the lighthouse stood abandoned for many years and continued to deteriorate. It has been reported that the vacant structure is used for target practice by military air units stationed in Millville, New Jersey.

The Cross Ledge Light is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Manufacturing, Fishing and Oystering, Settlement Patterns and Demographic Change, and Government. It is eligible under Criterion C for its association with the historic theme of Architecture, Engineering, and Decorative Arts as one of the few lighthouses in the
Figure 13: Cross Ledge Shoal Lighthouse Foundation
Evaluation of Delaware's Aids to Navigation

Delaware Estuary built on a granite foundations. Since only the foundation remains, Cross Ledge is also eligible under Criterion D. The Cross Ledge Light is related to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1830-1880+/-(Industrialization and Urbanization) and 1880-1940+- (Urbanization and Early Suburbanization) periods.

Ship John Shoal Light

CRS #: K-6499
Property Type: Channel Light/Caisson Foundation
Owner: United States Coast Guard
Quad: Bombay Hook
SPO Map #: Navigational Chart # 12304
Hundred:
UTM: E 467499 N 4350513
Boundary: The limit of man-made material found under water.
Location: Center of the Delaware River channel, east of Bombay Hook

Description:
Built in 1877, the Ship John Shoal Light (Figure 14) is situated on a shoal that was named for the ship John, wrecked near the site on December 24, 1797. In 1855 there was a plan to construct a screwpile lighthouse at this site, but after a screwpile failed at Cross Ledge the plan was abandoned. Ship John Shoal Light is a caisson-style lighthouse, 50 feet in height above the water. It has a black lantern surmounting a one-story, brown, octagonal dwelling with a high mansard roof, and sits on a brown, cast-iron, cylindrical foundation filled with concrete. The iron superstructure was built in the Second Empire style with an octagonal main floor with pilasters flanking the window openings. The structure has a mansard roof with four dormered windows. A bracketed cornice separates the main floor with the roof, and a cupola style lantern sits on top. There are walkways around the main floor and around the lantern.

In 1884, 300 tons of riprap rock were dumped near the foundation to replace that carried away by ice, and in 1888 another 200 tons of riprap were deposited around the foundation to protect it from scour.

The optics of the Ship John Shoal Light consist of occulting red and white sectors, with a 6 second cycle--on for 4 seconds and eclipsed for 2 seconds. The white light is 7,500 candlepower and the red sector, which covers the shoals on the east side of the channel, is 2,300 candlepower. They can be seen up to 13 miles away. The lighthouse also has a horn which blasts once every 15 seconds for 2 seconds.

Automated in 1973, the lighthouse underwent repairs in 1989-1990. Although there is some question as to whether the Ship John Shoal Light is a Delaware or New Jersey resource, it is an important aid to navigation in the Delaware River.
Figure 14: Ship John Shoal Lighthouse
The Ship John Shoal Light is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Manufacturing, Fishing and Oystering, Settlement Patterns and Demographic Change, and Government. It is eligible under Criterion C for its association with the historic theme of Architecture, Engineering, and Decorative Arts as a fine example of an early caisson lighthouse with a high degree of integrity in the caisson, the tower, and the lantern. The Ship John Shoal Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1880-1940+/- (Urbanization and Early Suburbanization).

Miah Maull Shoal Light

<table>
<thead>
<tr>
<th>CRS #:</th>
<th>K-6501</th>
</tr>
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<tbody>
<tr>
<td>Property Type:</td>
<td>Channel Light/Caisson Foundation</td>
</tr>
<tr>
<td>Owner:</td>
<td>United States Coast Guard</td>
</tr>
<tr>
<td>NPO Map #:</td>
<td>Navigational Chart # 12304</td>
</tr>
<tr>
<td>Hundred:</td>
<td>E 481895 N 4330614</td>
</tr>
<tr>
<td>Boundary:</td>
<td>The limit of man-made material found under water.</td>
</tr>
<tr>
<td>Location:</td>
<td>In the middle of the shipping channel in the Delaware Bay off of Kitts Hummock, Delaware. It is located in 19 feet of water on the north end of the Miah Maull Shoal.</td>
</tr>
</tbody>
</table>

Description:

Built in 1909, the Miah Maull Light (Figure 15) has a red conical tower on a grey cylindrical pier, with a red cylindrical watchroom and black lantern. The light is located 59 feet above the water. The optic is an occulting white and red sector light for 5 seconds—on for 2.5 seconds and eclipsed 2.5 seconds. The white sector is 7,200 candlepower while the red sector, which covers Brandywine Shoal and Cross Ledge, is 2,200 candlepower. The Miah Maull Light also has a horn which blasts every 10 seconds for 1 second.

The Miah Maull Light is a surviving example of an original caisson-style light. As late as 1970, this station still had resident personnel. The shoal on which the lighthouse was erected was named for Nehemiah Maull, a man who drowned near that site in an eighteenth century shipwreck.

Although there is some question as to whether the lighthouse is a Delaware or New Jersey resource, it is important for one state or the other to claim it, so that it may be protected. The Office of New Jersey Heritage has indicated that the lighthouse has been nominated to the State’s Register of Historic Places.

The Miah Maull Shoal Light is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of...
Figure 15: Miah Maull Shoal Lighthouse
Evaluation of Delaware's Aids to Navigation

Transportation and Communication, Manufacturing, Fishing and Oystering, Settlement Patterns and Demographic Change, and Government. It is eligible under Criterion C for its association with the historic theme of Architecture, Engineering, and Decorative Arts as an example of a mature caisson lighthouse with a high degree of integrity in all elements of the structure. The Miah Maull Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1880-1940+/- (Urbanization and Early Suburbanization) period.

Brandywine Shoal Light

<table>
<thead>
<tr>
<th>CRS #:</th>
<th>K-6502</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Type:</td>
<td>Channel Light/Caisson Foundation</td>
</tr>
<tr>
<td>Owner:</td>
<td>United States Coast Guard</td>
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<td>Quad:</td>
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<tr>
<td>SPO Map #:</td>
<td>Navigational Chart # 12304</td>
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<tr>
<td>Hundred:</td>
<td></td>
</tr>
<tr>
<td>UTM:</td>
<td>E 490160 N 4315033</td>
</tr>
<tr>
<td>Boundary:</td>
<td>The limit of man-made material found under water.</td>
</tr>
<tr>
<td>Location:</td>
<td>On the Brandywine Shoal, 0.9 miles from the south end and directly east of Big Stone Beach, Delaware</td>
</tr>
</tbody>
</table>

Description:

In 1823, a lightship was placed on the site of Brandywine Shoal. It was very difficult to keep the ship on station during the winter months, due to moving ice on the Delaware River. In 1827, an ordinary wooden pile structure was placed on Brandywine Shoal, using the most advanced construction technology of the time. The lighthouse remained intact for one year, until it was destroyed by the action of the river.

The first screwpile lighthouse erected in the United States was constructed at Brandywine Shoal in 1850, by Major Hartman Bache. The light was a red iron screwpile structure with green shutters and was equipped with a third order fresnel lens, made by Henry Le Paute of Paris. The light also had iron pile fenders surrounding it, to protect it from moving ice. The Brandywine Shoal screwpile lighthouse served for over 60 years despite the fact that ice damage weakened the structure over time.

Improved technology allowed the screwpile lighthouse at Brandywine Shoal to be replaced by a more modern lighthouse requiring less maintenance in 1914 (Figure 16). That lighthouse stands today, adjacent to the spot where the original screwpile was constructed. Built on a caisson of reinforced concrete, it stands 60 feet above the water. The entire lighthouse is white, except for the lantern, which is painted red. There are three outside walkways, at the lantern room, watch room, and main floor levels.
Figure 16: Brandywine Shoal Lighthouse
The Brandywine Shoal Light had an occulting light of 30 seconds (on for 27 seconds and eclipsed for 3 seconds) with a white and red sector, that could be seen from 13 miles away. The red sector covered the Overfalls Lightship and the Elbow of Cross Ledge Lighthouse. The optic in the Brandywine Shoal Light today is an occulting white light for 12 seconds, with a red sector. The white light can be seen from 17 miles, while the red light can only be seen from 13 miles. The lighthouse also has a horn which blasts every 15 seconds for 2 seconds. The Brandywine Shoal Light was the last light in the Delaware Bay to have a resident keeper; it was automated in 1974.

Although there is some discrepancy about whether the Brandywine Shoal is a Delaware or New Jersey resource, there is no doubt that this aid to navigation is important for illustrating the technological advances in aids to navigation and should be protected.

Brandywine Shoal Light is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Manufacturing, Fishing and Oystering, Settlement Patterns and Demographic Change, and Government. It is eligible under Criterion C for its association with the historic theme of Architecture, Engineering, and Decorative Arts as an example of a mature caisson lighthouse with a high degree of integrity in all elements of the structure. The Brandywine Shoal Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1830-1880+/-(Industrialization and Early Urbanization) and the 1880-1940+/-(Urbanization and Early Suburbanization) periods.

**Evaluation of Property Types for Land-Based Navigational Aids**

Of the land-based navigational aids, six resources were determined to be eligible for nomination to the National Register of Historic Places.

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Property Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baker Rear</td>
<td>1902/1905</td>
<td>Range Light</td>
</tr>
<tr>
<td>2. Bellevue Rear</td>
<td>1909</td>
<td>Range Light</td>
</tr>
<tr>
<td>3. Marcus Hook Front</td>
<td>1925</td>
<td>Range Light</td>
</tr>
<tr>
<td>4. Bulkhead Bar Front</td>
<td>1929</td>
<td>Range Light</td>
</tr>
<tr>
<td>5. New Castle Front</td>
<td>1876</td>
<td>Keeper’s House</td>
</tr>
<tr>
<td>6. Port Mahon</td>
<td>1831</td>
<td>Harbor Light</td>
</tr>
</tbody>
</table>

**Criteria of Significance**

**Criterion A.** All six land-based aids to navigation are associated with the historic themes of Transportation and Communication, Manufacturing, Settlement Patterns and Demographic Change, and Architecture, Engineering, and Decorative Arts, reflecting the impact of industrialization on the region and the enlarged capacity of the Delaware Estuary.
for handling both larger ships and a greater volume of shipping. The significant chronological periods are 1830–1880+/-: Industrialization and Early Urbanization, and 1880–1940+/-: Urbanization and Early Suburbanization.

The range lights are also associated with the historic theme of Government and, with the exception of the New Castle Front Range Light, were built in response to federal legislation in 1888 that authorized and funded major improvements in the Delaware Bay channel and navigational aids.

**Criterion C.** As range lights, Bellevue Rear, Baker Rear, Marcus Hook Front, and Bulkhead Bar Front are significant representatives of a type and method of construction that allowed pilots to determine their position in the heavily traveled main channel of the Delaware Estuary; they were the most critical element in the overall system of navigational aids on the estuary. Viewed in order of construction, these lights reflect an evolution of construction types with Bellevue Rear, a pipe tower around a central cylinder, representing something close to the final form of the standardized movable range light. Baker Rear is another variation on the modular pipe tower. Marcus Hook Front and the Bulkhead Bar Front mark a transition to the steel skeleton towers designed for untended lights.

Built in 1876, the New Castle Front Range Light originally contained its light in a square, wood-framed tower that was part of the keeper’s house. It is eligible as a range light.

**Criteria for Integrity**

All four range lights have maintained a high degree of integrity in design, materials, and workmanship, exhibiting little if any alteration since their construction. None have been moved. The setting of Bellevue Rear has deteriorated as the Wilmington landfill has encroached on its north side.

The New Castle Front Range Light was one of the few lighthouses with the light tower and keeper’s house combined. Additional research should be undertaken to determine if the house has retained a high degree of integrity as a keeper’s house and its eligibility then determined. It should not be determined ineligible at this point.

**Descriptions of Land-Based Aids to Navigation**

**Baker Rear Range Light**

**CRS #:** N-12698  
**Property Type:** Range Light  
**Owner:** United States Coast Guard  
**Quad:** Delaware City  
**SPO Map #:** 10-11-30  
**Hundred:** St. Georges  
**UTM:** E 451019 N 4376803
Evaluation of Delaware's Aids to Navigation

Boundary: New Castle County Tax Parcel 12-028.00-011
Location: On the bank of the Delaware River, just south of entrance to the Chesapeake and Delaware Canal

Description:

The Baker Rear Range Light (Figure 17) was built in 1902 and rebuilt in 1905. Standing 89 feet above water, the light is a black, pyramidal, skeleton, iron structure. The upper part of the light that faces the channel is slatted. The Baker Rear Range has a 10,000 candlepower white light which occults every 2 seconds--on for 1 second and eclipsed for 1 second. It is likely that this light was erected to help guide ships past Reedy Island.

The Baker Rear Range Light is eligible for nomination to the National Register of Historic Places under Criterion A, for its association with the historic themes of Transportation and Communication, Manufacturing, Fishing and Oystering, Settlement Patterns and Demographic Change, and Government. It is eligible under Criterion C for its association with the historic theme of Architecture, Engineering, and Decorative Arts as an early unmanned range light that used an electric lantern and was of a structural type designed to be movable with changing channel alignments. The Baker Rear Range Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1880-1940+/- period (Urbanization and Early Suburbanization).

Bellevue Rear Range Light

CRS #: N-12700
Property Type: Range Light
Owner: United States Coast Guard
Quad: Wilmington South
SPO Map #: 10-11-33
Hundred: City of Wilmington
UTM: E 455597 N 4396630
Boundary: The limit of man made material found under water.
Location: In the Christiana River, on a bulkhead on the west side of the channel.

Description:

The Bellevue Range was established in 1909 to aid in the movement of shipping on the Delaware River between Edgemoor and Grubbs Landing. The Bellevue Rear Range Light (Figure 18) rests on a concrete foundation, is 100 feet above water, and extends 104 feet from the ground to the top of the lantern. The light is a black, pyramidal, skeletal, iron structure similar to the Reedy Island Rear Range Light. The light is only visible on rangeline and is lighted throughout 24 hours. The current optic is a fixed green light. The 1932 Light List describes the optic as a fixed white light of 240,000 candlepower.
Figure 17: Baker Rear Range Light
When the light was first established, it stood in the Delaware River about 100 yards off shore and about midway along the north jetty which ran out to the Christiana Beacon. At that time a keeper lived on shore near the Christiana Lighthouse and used the walkway on the jetty to get back and forth. The Christiana Lighthouse was later demolished. Over the years the shoreline was extended out to the Bellevue Rear Range Light by dredging and filling. The area behind the lighthouse has become the Wilmington landfill. Due to the changes in the shoreline brought about by the dredging and filling, the lighthouse now stands in the Christiana River rather than in the Delaware.

The Bellevue Rear Range Light is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Settlement Patterns and Demographic Change, Manufacturing, Fishing and Oystering, and Government. Under Criterion C it is eligible for its association with the historic theme of Architecture, Engineering, and Decorative Arts and is significant as one of the last prefabricated movable range lights built using designs developed by the Lighthouse Board in the 1890s. The Bellevue Rear Range Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1880-1940+/- period (Urbanization and Early Suburbanization).

Marcus Hook Front Range Light

<table>
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<tr>
<th>CRS #</th>
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<tbody>
<tr>
<td>Property Type</td>
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<tr>
<td>Owner</td>
<td>United States Coast Guard</td>
</tr>
<tr>
<td>Quad</td>
<td>Marcus Hook</td>
</tr>
<tr>
<td>SPO Map #</td>
<td>12-13-36</td>
</tr>
<tr>
<td>Hundred</td>
<td>Brandywine</td>
</tr>
<tr>
<td>UTM</td>
<td>E 459249 N 4402837</td>
</tr>
<tr>
<td>Boundary</td>
<td>The limit of man-made material found under water.</td>
</tr>
<tr>
<td>Location</td>
<td>100 yards from the west bank of the Delaware River, on the axis of the Marcus Hook Channel</td>
</tr>
</tbody>
</table>

The Marcus Hook Front Range Light (Figure 19) was erected in 1915 and re-built in 1918, both times as a steel skeleton tower with an automated light. Standing 81 feet above the water, the light is a white slatted daymark on a square skeleton tower. This light is visible on rangeline only, and is lighted throughout 24 hours. Originally, the Marcus Hook Front Range Light had a flashing white light (3 seconds) of 240,000 candlepower; today it has a fixed red light.

The Marcus Hook Front Range Light is eligible for nomination to the National Register
Figure 19: Marcus Hook Rear Range Light
Evaluation of Delaware's Aids to Navigation

of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Settlement Patterns and Demographic Change, Manufacturing, Fishing and Oystering, and Government. Under Criterion C it is eligible for its association with the historic theme of Architecture, Engineering, and Decorative Arts and is significant as an unmanned structural steel tower that replaced the earlier pipe tower design as well as for its use of a remote-controlled electrical lantern. Marcus Hook Front Range Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1880-1940+/- period (Urbanization and Early Suburbanization).

Bulkhead Bar Front Range Light

<table>
<thead>
<tr>
<th>CRS #:</th>
<th>N-4245</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Type:</td>
<td>Range Light</td>
</tr>
<tr>
<td>Owner:</td>
<td>United States Coast Guard</td>
</tr>
<tr>
<td>Quad:</td>
<td>Wilmington South</td>
</tr>
<tr>
<td>SPO Map #:</td>
<td>10-11-33</td>
</tr>
<tr>
<td>Hundred:</td>
<td>New Castle</td>
</tr>
<tr>
<td>UTM:</td>
<td>E 450960 N 4390091</td>
</tr>
<tr>
<td>Boundary:</td>
<td>New Castle County Tax Parcel 21-017.00-125</td>
</tr>
<tr>
<td>Location:</td>
<td>The Bulkhead Bar Front Range Light is located 2,660 yards and 53.5 degrees from the New Castle Front Range Light, on the bank of the Delaware River, just south of the center of the City of New Castle.</td>
</tr>
</tbody>
</table>

Description:

The Bulkhead Bar Front Range Light (Figure 20) was built in 1929, and still functions in the Bulkhead Bar Range. The light is a brown square tower, with a white slatted daymark on the side facing the river. The light stands 42 feet above water. The optic on the Bulkhead Bar Front Range Light is 110,000 candlepower and is an occulting green light, every 6 seconds--on for 3 seconds and then eclipsed for 3 seconds. The light operates 24 hours a day.

The Bulkhead Bar Front Range Light is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Settlement Patterns and Demographic Change, Manufacturing, Fishing and Oystering, and Government. Under Criterion C it is eligible for its association with the historic theme of Architecture, Engineering, and Decorative Arts and is significant as a representative of a third generation of range light tower construction. Bulkhead Bar Front Range Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1880-1940+/- period (Urbanization and Early Suburbanization).
Figure 20: Bulkhead Bar Front Range Light
New Castle Front Range Light

CRS #: N-12701
Property Type: Keeper's House
Owner: William E. Cross
Quad: Wilmington South
SPO Map #: 08-09-33
Hundred: New Castle
Boundary: New Castle County Tax Parcel 10-035.00-039
Location: The New Castle Front Range Light and original keeper's dwelling is located on shore, 1.7 miles below the City of New Castle.

Description:

The New Castle Range was established in 1876 to help mark the channel from Pea Patch Island to Bulkhead Shoal. This part of the river was previously thought to be one of the most difficult parts to navigate. Both the front and rear range lights were erected in 1876; the front range light was re-built in 1886. The 1901 Light List describes the New Castle Front Range Keeper's House (Figure 21) as a two story house with gingerbread trim on the eaves. About 30 feet to the west of the dwelling was the 2½ story, white, square, wood framed tower with ornamental trim. Also at the station were a brick oil shed, wooden barn, and small wooden outhouse.

The current owner of the keeper's house was the caretaker of the light for a short time. When Mr. Cross purchased the keeper's house the light tower was in good shape, and it is believed that the fresnel lens was still being used. The tower was demolished in 1964 and replaced by the present day white, steel, skeleton tower with an automated beacon light.

Although the current range light is a replacement, the New Castle Front Range Light Keeper's House maintains its integrity and is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Settlement Patterns and Demographic Change, Manufacturing, Fishing and Oystering, and Government. Under Criterion C it is eligible for its association with the historic theme of Architecture, Engineering, and Decorative Arts and is significant as a representative of a separate keeper's dwelling. New Castle Front Range Light Keeper's House relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1830-1880+- period (Industrialization and Early Urbanization) and the 1880-1940+- period (Urbanization and Early Suburbanization).

Port Mahon Light

CRS#:
Property Type: Harbor Light
The Port Mahon Lighthouse was established in 1831. In 1903 a lighthouse described as a white, square house on iron columns was placed at the site. Today, only the iron columns secured in the ground underwater remain at the site (Figure 22). This site should be considered archaeological.

The Port Mahon Lighthouse is eligible for nomination to the National Register of Historic Places under Criterion A for its association with the historic themes of Transportation and Communication, Settlement Patterns and Demographic Change, Manufacturing, Fishing and Oystering, and Government. Under Criterion C it is eligible for its association with the historic theme of Architecture, Engineering, and Decorative Arts and is significant as a representative of early experimentation with cast-iron piles and tension rods that predated the invention of the screwpile and of a transition in engineering from wooden piles to the screwpile. Since only the cast-iron pilings remain, it is also significant under Criterion D. The Port Mahon Light relates to the Coastal Zone of the Delaware Comprehensive Historic Preservation Plan in the 1830-1880+/− (Industrialization and Early Urbanization) and 1880-1940+/− (Urbanization and Early Suburbanization) periods.
Figure 22: Port Mahon Lighthouse Foundation
Selected Bibliography


_U.S. Coast Guard. Light List, Atlantic Coast._ U.S. Department of Commerce, Lighthouse
APPENDIX A:
LIST OF SURVEYED SITES AND RESULTS
APPENDIX A:
LIST OF SURVEYED SITES AND RESULTS
<table>
<thead>
<tr>
<th>Name</th>
<th>CRS #</th>
<th>Status</th>
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<tbody>
<tr>
<td>Baker Rear Range</td>
<td>N-12698</td>
<td>Eligible</td>
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<tr>
<td>Bulkhead Bar Front Range</td>
<td>N-4245</td>
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</tr>
<tr>
<td>Bellevue Rear Range</td>
<td>N-12700</td>
<td>Eligible</td>
</tr>
<tr>
<td>New Castle Front Range</td>
<td>N-12701</td>
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</tr>
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<td>Marcus Hook Front</td>
<td>N-12702</td>
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<td>Ship John Shoal</td>
<td>K-6499</td>
<td>Eligible</td>
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<td>Brandywine Shoal Lighthouse</td>
<td>K-6502</td>
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<td>Miah Maull Shoal</td>
<td>K-6501</td>
<td>NJ Register</td>
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<tr>
<td>Port Mahon Lighthouse(foundation)</td>
<td>K-6498</td>
<td>Eligible (Archeo)</td>
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<tr>
<td>Cross Ledge (foundation)</td>
<td></td>
<td>Eligible (Archeo)</td>
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<td>Reedy Island Rear</td>
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<td>Liston Front Range</td>
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<td>S-187</td>
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<td>Mispillion Lighthouse</td>
<td>S-441</td>
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<tr>
<td>Harbor of Refuge Lighthouse (1908)</td>
<td>S-186</td>
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<td>Fourteen Foot Bank Lighthouse</td>
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<td>Delaware Breakwater Rear Light</td>
<td>S-186</td>
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<td>Delaware Breakwater East End</td>
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<td>Cape Henlopen Light</td>
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New Castle Front/Rear Range
Christiana Front/Rear Range
Cherry Island Front/Rear Range
Murderkill River Front/Rear Range
St. Jones River Front/Rear Range
Fort Delaware Beacon
Delaware City Beacon
Bulkhead Bar Rear Range
Smyrna River Front/Rear Range
Leipsic River Front Range
Little River Front Range
Mispillion South Jetty Beacon
Pea Patch Island Dike Middle
Pea Patch Island Dike Gap
Pea Patch Island Dike Upper
Appoquinimink Front Range
Bellevue Front Range
Grubb Landing Beacon
Elbow of Cross Ledge
Port Mahon Lighthouse (current)
Reedy Island Front Range
Elbow of Cross Ledge (original base)
Delaware East Day Beacon
Delaware West Day Beacon
Edgemoor Beacon
Baker Front Range
Christiana South Jetty Beacon
Lewes Depot
Rehoboth Canal Jetty
Broadkill Beacon
Leipsic River Rear Range
Little River Rear Range
Broadkill River Day Marker
Cape Henlopen Day Marker
Port Penn Front/Rear Range
Christiana Beacon
Delaware Breakwater Beacon
Delaware Breakwater Light  Not Found
Liston Rear Range  Not Found
Mispillion South Jetty  Not Found
Reedy Island Jetty  Not Found
APPENDIX B:
AIDS TO NAVIGATION COMPLETED SURVEY FORMS
**CULTURAL RESOURCE SURVEY**  
**CONSTRUCTION DATA FORM**  
**FORM CRS-1**

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<thead>
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<tr>
<td>Hundred</td>
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</tr>
<tr>
<td>Quad</td>
<td>Wilmington South</td>
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<tr>
<td>Zone</td>
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1. **ADDRESS OF PROPERTY:** New Castle Front Range Light

2. **DATE OF INITIAL CONSTRUCTION:** 1876

3. **STYLE/FLOOR PLAN:**

4. **ARCHITECT/BUILDER:**

5. **INTERGRITY:** a) original site [x] b) moved ______
   c) if moved, when and from where ________
   d) list major alterations and dates (if known) ________

6. **CONDITION:**
   a) good [x] modern structure deteriorated ________
   
   **remarKs:** Original keeper's dwelling remains at site

7. **DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:**
   a) Overall shape
   stories
   bays
   wings
   
   b) Structural system
   
   c) Foundation
   materials
   basement
   
   d) Exterior walls (modern over original)
   materials
   color(s)
   
   e) Roof
   shape: materials
cornice
dormers
chimney location(s)

**USE BLACK INK ONLY**
f) Windows
   spacing
   type
   trim
   shutters

g) Door
   spacing
   type
   trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

--- Diagram with markings and labels ---

Newcastle Front Range

3. Surveyor: ___________________________ Date of Form ___________

USE BLACK IN ONLY
NPS National Maritime Initiative Inventory of Maritime Resources

AIDS TO NAVIGATION Survey Form

Completed by: Center for Historic Architecture and Engineering
Resource Name: New Castle Front Range

LOCATION
State: Delaware Location: Near edge of Delaware River about 1,75 miles southwest of New Castle.
City Vicinity: New Castle County: New Castle

OWNERSHIP
Owner/Manager/Federal Agency with Jurisdiction:
Mr. William E. Cross owns house and land
Owner Address: United States Coast Guard
Philadelphia, Pa
Owner Phone: 315-241-4847

STATUS
Active Light: TRUE FALSE UNKNOWN Year Inactive:
Automated Light: TRUE FALSE UNKNOWN Year Automated: 1964
Daymarker:
Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER
Site Date: 1876 Current Tower Constructed: 1964 White steel, skeleton tower with automated light.
Foundation (circle one):
Natural Embased Dressed Stone Timber Screw Piling Piling Caisson Crib Concrete Rubble Stone Dressed Stone Brick Wood Cast Iron Reinforced Concrete Steel
Other:
Tower Shape (circle one):
Square Cylindrical Conical Skeletal Pyramidal Hexagonal Octagonal
Relationship to Other Structures (circle one):
Separate Attached Integral
CURRENT SOUND SIGNAL

Signal Type:_________________________

Signal Characteristics:_________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other:_________________________

Building Style:_________________________

Year Constructed:_________________________

ASSOCIATED STRUCTURES (Indicate # of each):

- Sound Signal Buildings: ______
- Off Houses: X ______
- Cisterns: ______
- Garages: ______
- Barns: X ______
- Bridges/Tunnels/Catwalks: ______
- Docks/Cranes/Marine Railroads: ______
- Storage Buildings: ______
- Outhouse X ______
- Brick walkway X ______

SITE SIGNIFICANCE

On a State Inventory? TRUE FALSE UNKNOWN Date Listed:_________________________

National Register Status (circle one):

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park:_________________________

Tower Height: ______ feet, ______ inches

Height of Focal Plane: ______ feet, ______ inches

Markings/Pattems:_________________________

LENS

Current Optic:_________________________

Year Installed:_________________________

Original Optic:_________________________

Year Installed:_________________________

Optic Characteristics:_________________________

PRIMARY KEEPERS QUARTERS

Number of Stories: 2

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick first story
- Wood
- Cast Iron
- Steel frame 2nd story

Other:_________________________

Building Style:_________________________

(Cape Cod, Duplex, Victorian, etc.)

Year Constructed:_________________________

Total # of Keepers Quarters:_________________________

(OVER)
Name of Aid to Navigation: New Castle Front Range
Location: On Bank of the River 1.75 miles SW of New Castle
Year: 1876 Site 1904 Current Structure
CRS no.: ____________________
SFO Maps: ____________________
Hundred: New Castle
Quad: Wilmington South
Zone: ____________________
UTM E 448897 N 4388039

Describe the Resource As Completely As Possible:

- Fixed Light Beacons - Harbor Light ___ Range Light ___/✓ Front ___ Rear ___
  River or Channel Light ___

- Non-Fixed Aids - Lightship ___ Temporary ___ Permanent ___
  Bouy ___
  Natural Marker ___
  Other ___

Is the Aid to Navigation - Manned ___ Unmanned ___

Elements Found in the Interior:

Are there any threats or hazards at the site?
CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM
FORM CRS-3

1. NAME OF PROPERTY: New Castle Front Range

2. STREET LOCATION: 1.75 miles southwest from New Castle on shore of Delaware.

3. OWNER'S NAME: United States Coast Guard/ William E. TEL: # 215-271-4647
   Cross
   ADDRESS: Philadelphia, Pa

4. TYPE OF LOCUS: a) building ______ b) structure X_____ c) site ______
   d) object ______ e) district _____ f) other ______________________

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field _____ b) cultivated field _____ c) woodland ______
   d) scattered buildings _____ e) densely built up _____ f) other ______

6. FUNCTION: original __________ present __________

7. LIST ADDITIONAL SHEETS USED


8. YOUR NAME: Leslie Bashman, Center for Historic Architecture
   and Engineering
   YOUR ADDRESS: University of Delaware, Newark, DE 19717  # 302-451-8097
   ORGANIZATION (if any) Center for Historic Architecture
   January 15, 1991
   and Engineering

USE BLACK INK ONLY
Please indicate position of locus in relation to geographical landmarks such as streams and roads.

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
    a. Time Period(s)
    b. Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title ____________________________ Date ____________
    BAHP: Name/Title ____________________________ Date ____________
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM

FORM CRS-1

1. ADDRESS OF PROPERTY: ___Bellevue Rear Range Light____

2. DATE OF INITIAL CONSTRUCTION: ___1909____

3. STYLE/FLOOR PLAN: ________________________________

4. ARCHITECT/Builder: ________________________________

5. INTEGRITY: a) original site ___X___ b) moved ______

c) if moved, when and from where _______________________

d) list major alterations and dates (if known) _____________

6. CONDITION: good ___X___ deteriorated ________

remarks: ____________________________________________

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:

a) Overall shape
   stories
   bays
   wings

b) Structural system

c) Foundation
   materials
   basement

d) Exterior walls (modern over original)
   materials
   color(s)

e) Roof
   shape; materials
   cornice
   dormers
   chimney location(s)
f) Windows
   spacing
type
trim
shutters

g) Door
   spacing
type
trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

 Delaware River

Christina River

3. Surveyor: ___________________________ Date of Form ____________

USE BLACK IN ONLY
AIDS TO NAVIGATION Survey Form
Completed by (Name/Org/Phone): Center for Historic Architecture and Engineering 302-451-8097

Resource Name: Bellevue Rear Range Light

LOCATION
State: Delaware; Location: Northern shoal of the Christina River (body of water, point of land, etc.)
City Vicinity: Wilmington; County: New Castle

OWNERSHIP
Owner/Manager/Federal Agency with Jurisdiction: United States Coast Guard
Owner Address: Philadelphia

Owner Phone: 302-271-4847

STATUS
Active Light: TRUE FALSE UNKNOWN Year Inactive:
Automated Light: TRUE FALSE UNKNOWN Year Automated:
Daymarker: TRUE FALSE UNKNOWN
Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER
Site Date: 1909; Current Tower Constructed: 1909

Foundation (circle one):
- Natural/Emplaced
- Dressed Stone/Timber
- Screw Piling
- Piling
- Caisson
- Crib
- concrete

Construction Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast iron
- Reinforced Concrete
- Steel

Tall, black pyramid skeleton iron tower on concrete foundation

Other:

Tower Shape (circle one):
- Square
- Cylindrical
- Conical
- Skeletal
- Pyramidal
- Hexagonal
- Octagonal

Relationship to Other Structures (circle one):
- Separate
- Attached
- Integral
CURRENT SOUND SIGNAL
Signal Type: ____________________________

Signal Characteristics: ____________________________
Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel
Other: ____________________________

Building Style: ____________________________
Year Constructed: ____________________________

ASSOCIATED STRUCTURES (indicate # of each):
Bridges/Tunnels/Catwalks: ___ Docks/Cranes/Marine Railroads: ___ Storage Buildings: ___

SITE SIGNIFICANCE
On a State Inventory? TRUE FALSE UNKNOWN Date Listed: __________

National Register Status (circle one):
- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined ineligible by the SHPO
- No Status
- Unknown

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park:

Tower Height: 104 feet, ___ inches
Height of Focal Plane: _____ feet, _____ inches
Markings/Patterns: ____________________________

LENS
Current Optic: ____________________________
Year Installed: ____________________________
Original Optic: ____________________________
Year Installed: ____________________________
Optic Characteristics: ____________________________

PRIMARY KEEPERS QUARTERS
Number of Stories: ____________________________
Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel
Other: ____________________________

Building Style: ____________________________
(Cape Cod, Duplex, Victorian, etc.)
Year Constructed: ____________________________
Total # of Keepers Quarters: ___

Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN
Recorded by the Historic American Engineering Record (HAER): TRUE FALSE UNKNOWN
Designated National Historic Landmark (NHL): TRUE FALSE UNKNOWN

(Over)
Name of Aid to Navigation: Bellvue Rear Range
Location: Christina River, North Sound
Year: 1909
CRS no.: 
SFO Maps: 
Hundred: Wilmington
Quad: Wilmington South
Zone: 18
UTM: E455507 N2396630

Describe the resource as completely as possible:

Fixed Light Beacons - Harbor Light
  Range Light: ✔ Front: __ Rear: ✔
  River or Channel Light: __

Non-Fixed Aids: Lightship: __ Temporary: ___ Permanent: __
  Bouy: __
  Natural Marker: __
  Other: ________________________________

Is the Aid to Navigation: Manned: __ Unmanned: ✔

Elements found in the interior:

Are there any threats or hazards at the site?
1. NAME OF PROPERTY: Bellevue Rear Range Light

2. STREET LOCATION: Christina River- North shoal

3. OWNER'S NAME: United States Coast Guard
   ADDRESS: Philadelphia

4. TYPE OF LOCUS: a) building  b) structure  c) site
   d) object  e) district  f) other

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field  b) cultivated field  c) woodland
   d) scattered buildings  e) densely built up  f) other

6. FUNCTION: original  present

7. LIST ADDITIONAL SHEETS USED

8. YOUR NAME: Leslie Bashman
   YOUR ADDRESS: University of Delaware, Newark, DE 19717
   ORGANIZATION (if any) Center for Historic Architecture
   and Engineering

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
a. Time Period(s)
b. Cultural Concept

11. Evaluation and Eligibility
List area(s) of significance and criteria

12. Certification
Survey: Name/Title ___________________________ Date ________
BAHP: Name/Title ___________________________ Date ________

INDICATE NORTH ON SKETCH
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM
FORM CRS-1

1. ADDRESS OF PROPERTY: Marcus Hook Front Range

2. DATE OF INITIAL CONSTRUCTION: 1925

3. STYLE/FLOOR PLAN:

4. ARCHITECT/BUILDER:

5. INTEGRITY: a) original site X b) moved c) if moved, when and from where d) list major alterations and dates (if known)

6. CONDITION: good X deteriorated

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:
   a) Overall shape
   stories
   bays
   wings
   b) Structural system
   c) Foundation
   materials
   basement
   d) Exterior walls (modern over original)
   materials
   color(s)
   e) Roof
   shape
   materials
   cornice
dormers
   chimney location(s)

USE BLACK INK ONLY
f) Windows
   spacing
type
trim
shutters

  g) Door
     spacing
type
trim

  h) Porches
     location(s)
     materials
     supports
     trim

  i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

3. Surveyor: ___________________________ Date of Form __________
### NPS National Maritime Initiative Inventory of Maritime Resources

**AIDS TO NAVIGATION Survey Form**

**Completed by (Name/Org/Phone):** Center for Historic Architecture and Engineering 302-451-8097

**Resource Name:** Marcus Hook Front Range

**LOCATION**

- **State:** Delaware  
- **Location:** On Delaware River about 100 yds from the west bank along the axis of the shipping channel  
- **City Vicinity:** Edgemoor  
- **County:** New Castle

**OWNERSHIP**

**Owner/Manager/Federal Agency with Jurisdiction:** United States Coast Guard

**Owner Address:** Philadelphia, PA

**Owner Phone:** 615-271-4847

**STATUS**

- **Active Light:** TRUE  
- **Automated Light:** TRUE  
- **Daymarker:** TRUE  
- **Site Only (no buildings remaining):** TRUE  
- **Year Inactive:**  
- **Year Automated:** 1925 (same year built)

**CURRENT TOWER**

- **Site Date:** 1925  
- **Current Tower Constructed:** 1925

**Foundation (circle one):**

- Natural Embankment
- Dressed Stone/Timber
- Screw Piling
- Quay
- Caisson
- Crib

**Construction Materials (circle primary):**

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Reinforced Concrete
- Steel

**Other:**

**Tower Shape (circle one):**

- Square
- Cylindrical
- Conical
- Skeletal
- Pyramidal
- Hexagonal
- Octagonal

**Relationship to Other Structures (circle one):**

- Separate
- Attached
- Integral
CURRENT SOUND SIGNAL

Signal Type: __________________________

Signal Characteristics: __________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel
- Other: __________________________

Building Style: __________________________

Year Constructed: __________________________

ASSOCIATED STRUCTURES (indicate # of each):

- Sound Signal Buildings: ___
- Oil Houses: ___
- Cisterns: ___
- Garages: ___
- Barns: ___
- Bridges/Tunnels/Catwalks: ___
- Docks/Cranes/Marine Railroads: ___
- Storage Buildings: ___

SITE SIGNIFICANCE

On a State Inventory: TRUE FALSE UNKNOWN Date Listed: __________________________

National Register Status (circle one):

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park: __________________________

Tower Height: _____ feet, _____ inches

Height of Focal Plane: _____ feet, _____ inches

Markings/Patters:

____________________________________________________________________

LENS

Current Optic: __________________________

Year Installed: __________________________

Original Optic: __________________________

Year Installed: __________________________

Optic Characteristics: __________________________

PRIMARY KEEPERS QUARTERS

Number of Stories: __________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel
- Other: __________________________

Building Style: __________________________

(Cape Cod, Greek Revival, Victorian, etc.)

Year Constructed: __________________________

Total # of Keepers Quarters: __________________________

Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN

Recorded by the Historic American Engineering Record (HAER): TRUE FALSE UNKNOWN

Designated National Historic Landmark (NHL): TRUE FALSE UNKNOWN

(Over)
Name of Aid to Navigation: Marcus Hook Front Range Light
Location: On Delaware River, on edge near 100 yds from West Bank
Year: 1925 built & Automated
CRS no.
SFO Maps
Hundred: Brandywine
Quad: Marcus Hook
Zone: 18
UTM E: 45249 N: 4402837

Describe the resource as completely as possible:

Fixed Light Beacons - Harbor Light
Range Light ✓ Front ✓ Rear ___
River or Channel Light ___

Non-Fixed Aids - Lightship ___ Temporary ___ Permanent ___
Bouy ___
Natural Marker ___
Other ___

Is the Aid to Navigation - Manned ___ Unmanned ✓

Elements found in the interior:

Are there any threats or hazards at the site?
CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

FORM CRS-3

1. NAME OF PROPERTY: Marcus Hook Front Range

2. STREET LOCATION: on Delaware River near Edgemoor

3. OWNER'S NAME: United States Coast Guard
ADDRESS: Philadelphia

4. TYPE OF LOCUS: a) building _____ b) structure X _____ c) site _____
d) object _____ e) district _____ f) other _____

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
a) fallow field _____ b) cultivated field _____ c) woodland _____
d) scattered buildings _____ e) densely built up _____ f) other X

6. FUNCTION: original _____ X present _____

7. LIST ADDITIONAL SHEETS USED

8. YOUR NAME: Leslie Bashman
YOUR ADDRESS: University of Delaware # 302-451-8097

9. ORGANIZATION (if any) Center for Historic Architecture DATZ January 15, 1990
and Engineering

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

[Sketch of a map with a north arrow and the Delaware River indicated.]

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:

a. Time Period(s)
b. Cultural Concept

11. Evaluation and Eligibility

List area(s) of significance and criteria

12. Certification

Survey: Name/Title ____________________ Date ______
BAHP: Name/Title ____________________ Date ______
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM

FORM CRS-1

1. ADDRESS OF PROPERTY: Port Mahon Lighthouse

2. DATE OF INITIAL CONSTRUCTION: 1831

3. STYLE/FLOOR PLAN:

4. ARCHITECT/BUILDER:

5. INTEGRITY:
   a) original site
   b) moved
   c) if moved, when and from where
   d) list major alterations and dates (if known)

Rebuilt four times

6. CONDITION: good X deteriorated

   remarks: Base of old lighthouse is visible - destroyed by fire in 1984, concrete filled iron foundation columns remain.

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:
   a) Overall shape
      stories
      bays
      wings
   b) Structural system
   c) Foundation
      materials
      basement
   d) Exterior walls (modern over original)
      materials
      color(s)
   e) Roof
      shape; materials
      cornice
      dormers
      chimney location(s)

USE BLACK INK ONLY
f) Windows
   spacing
type
trim
shutters


g) Door
   spacing
type
trim


h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

3. Surveyor: __________________________ Date of Form ___________

USE BLACK IN ONLY
NPS National Maritime Initiative Inventory of Maritime Resources

AIDS TO NAVIGATION Survey Form

Completed by (Name/Organ/Phone):

Resource Name: Fort Mahon Lighthouse

LOCATION

State: Delaware; Location: Delaware River near Little Creek (body of water, point of land, etc.)
City Vicinity: Little Creek; County

OWNERSHIP

Owner/Manager/Federal Agency with Jurisdiction:
United States Coast Guard


Owner Phone: 215-271-4847

STATUS

Active Light: TRUE FALSE UNKNOWN Year Inactive:
Automated Light: TRUE FALSE UNKNOWN Year Automated: 1955
Daymarker: TRUE FALSE UNKNOWN
Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER

Site Date: 1831; Current Tower Constructed:

Foundation (circle one):

Construction Materials (circle primary):

Natural Emplaced
Dressed Stone/Timber
Screw Piling
Caisson
Crib

Rubble Stone
Dressed Stone
Brick
Wood
Cast Iron
Reinforced Concrete
Steel

Other:

Other:

Tower Shape (circle one):

Square  Cylindrical  Conical  Skeletal  Pyramidal  Hexagonal  Octagonal

Relationship to Other Structures (circle one):

Separate  Attached  Integral
CURRENT SOUND SIGNAL

Signal Type: None

Signal Characteristics:

Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other:

Building Style:

Year Constructed:

ASSOCIATED STRUCTURES (Indicate # of each):


SITE SIGNIFICANCE

On a State Inventory? TRUE FALSE UNKNOWN Date Listed:

National Register Status (circle one):
- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN

Recorded by the Historic American Engineering Record (HAER): TRUE FALSE UNKNOWN

Designated National Historic Landmark (NHL): TRUE FALSE UNKNOWN

Owned or managed by the NPS: TRUE FALSE UNKNOWN
Name of Aid to Navigation: Port Mahon Lighthouse
Location: Delaware River near Little Creek
Year: 1931

CRS no.
SFO Maps
Hundred: Little Creek
Quad: Little Creek
Zone: 18
UTM: E465473 N4336372

Describe The Resource As Completely As Possible:

Fixed Light Beacons - Harbor Light ______ Range Light ______ Front ______ Rear ______
River or Channel Light __

Non-Fixed Aids - Lightship ______ Temporary ______ Permanent ______
Bouy ______
Natural Marker ______
Other ______________________

Is the Aid to Navigation - Manned _ Unmanned X

Elements Found in the Interior:

Are there any threats or hazards at the site?
1. NAME OF PROPERTY: Port Mahon Lighthouse


3. OWNER'S NAME: United States Coast Guard

4. TYPE OF LOCUS: a) building _______ b) structure _______ c) site _______

   d) object _______ e) district _______ f) other _______

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)

   a) fallow field _______ b) cultivated field _______ c) woodland _______

   d) scattered buildings _______ e) densely built up _______ f) other _______

6. FUNCTION: original ____ present ______

7. LIST ADDITIONAL SHEETS USED

8. YOUR NAME: Leslie Bashman

   YOUR ADDRESS: University of Delaware

   ORGANIZATION (if any) Center for Historic Architecture

   DATE: January 15, 1991

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
   a. Time Period(s)
   b. Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title __________________________ Date ______
    BAHP: Name/Title __________________________ Date ______
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM
FORM CRS-1

DELAWARE STATE HISTORIC PRESERVATION OFFICE
BUREAU OF ARCHAEOLOGY AND HISTORIC PRESERVATION
15 THE GREEN, DOVER, DE 19901

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</table>

1. ADDRESS OF PROPERTY: Miah Maull Shoal Lighthouse
2. DATE OF INITIAL CONSTRUCTION: 1913 (State of NJ Register)
3. STYLE/FLOOR PLAN: ____________________________
4. ARCHITECT/BUILDER: ____________________________

5. INTEGRITY: a) original site X b) moved ______
   c) if moved, when and from where __________________
   d) list major alterations and dates (if known) __________________

6. CONDITION: good X deteriorated ______
   remarks: __________________

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:
   a) Overall shape
      stories
      bays
      wings
   b) Structural system
   c) Foundation
      materials
      basement
   d) Exterior walls (modern over original)
      materials
      color(s)
   e) Roof
      shape; materials
      cornice
      dormers
      chimney location(s)
f) Windows
   spacing
type
trim
shutters

g) Door
   spacing
type
trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

---

3. Surveyor: ___________________________ Date of Form __________

USZ BLACK IN ONLY
NPS National Maritime Initiative Inventory of Maritime Resources

AIDS TO NAVIGATION Survey Form

Center for Historic Architecture and Engineering
302-365-8097

Completed by (Name/Organ/Phone): 

Resource Name: Miah MauU Shoal Lighthouse

LOCATION

State: Delaware; Location: Middle of channel in Delaware River
(Body of water, point of land, etc.)

City Vicinity: ; County

OWNERSHIP

Owner/Manager/Federal Agency with Jurisdiction:
United States Coast Guard

Owner Address: Cape May, New Jersey

Owner Phone: 609-884-6987

STATUS

Active Light: \[ \text{TRUE} \, \text{FALSE} \, \text{UNKNOWN} \]

Automated Light: \[ \text{TRUE} \, \text{FALSE} \, \text{UNKNOWN} \]

Daymarker: \[ \text{TRUE} \, \text{FALSE} \, \text{UNKNOWN} \]

Site Only (no buildings remaining): \[ \text{TRUE} \, \text{FALSE} \, \text{UNKNOWN} \]

CURRENT TOWER

Site Data: ; Current Tower Constructed:

Foundation (circle one):

- Natural Emplaced
- Dressed Stone/Timber
- Screw Piling
- Piling
- Caisson
- Crib

Construction Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Reinforced Concrete
- Steel

Other: 

Tower Shape (circle one):

- Square
- Cylindrical
- Conical
- Skeletal
- Pyramidal
- Hexagonal
- Octagonal

Relationship to Other Structures (circle one):

- Separate
- Attached
- Integral
CURRENT SOUND SIGNAL

Signal Type: [ ] Yes, horns are visible
[ ] No, horns are not visible

Signal Characteristics: ____________________________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other: __________________________________________________________

Building Style: _________________________________________________

Year Constructed: ____________________________

ASSOCIATED STRUCTURES (Indicate # of each): None


Bridges/Tunnels/Conduits: ____ Docks/Cranes/Marine Railroads: ____ Storage Buildings: ____

SITE SIGNIFICANCE

On a State Inventory? [ ] TRUE [ ] FALSE [ ] UNKNOWN Date Listed: New Jersey

National Register Status (circle one):

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status [ ] Unknown

Owned or managed by the NPS: [ ] TRUE [ ] FALSE [ ] UNKNOWN Park: ____________________________

RECORDS:

Tower Height: _____ feet, _____ inches
Height of Focal Plane: _____ feet, _____ inches

Markings/Patterns: Red cylindrical watchroom, black lantern, red conical tower, grey cylindrical pier

LENS

Current Optic: _________________________________________________
Year Installed: ____________________________

Original Optic: _______________________________________________
Year Installed: ____________________________

Optic Characteristics: _________________________________________

PRIMARY KEEPERS QUARTERS

Number of Stories: ____________________________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other: _________________________________________________________

Building Style: _______________________________________________
(Cape Cod, Duplex, Victorian, etc.)

Year Constructed: ____________________________

Total # of Keepers Quarters: ____________________________

RECORDS:

On a State Inventory? [ ] TRUE [ ] FALSE [ ] UNKNOWN Date Listed: New Jersey

National Register Status (circle one):

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status [ ] Unknown

Owned or managed by the NPS: [ ] TRUE [ ] FALSE [ ] UNKNOWN Park: ____________________________

RECORDS:

Tower Height: _____ feet, _____ inches
Height of Focal Plane: _____ feet, _____ inches

Markings/Patterns: Red cylindrical watchroom, black lantern, red conical tower, grey cylindrical pier

LENS

Current Optic: _________________________________________________
Year Installed: ____________________________

Original Optic: _______________________________________________
Year Installed: ____________________________

Optic Characteristics: _________________________________________

PRIMARY KEEPERS QUARTERS

Number of Stories: ____________________________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other: _________________________________________________________

Building Style: _______________________________________________
(Cape Cod, Duplex, Victorian, etc.)

Year Constructed: ____________________________

Total # of Keepers Quarters: ____________________________

RECORDS:

On a State Inventory? [ ] TRUE [ ] FALSE [ ] UNKNOWN Date Listed: New Jersey

National Register Status (circle one):

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status [ ] Unknown

Owned or managed by the NPS: [ ] TRUE [ ] FALSE [ ] UNKNOWN Park: ____________________________

(over)
Name of Aid to Navigation: Miah Maul Shoal Lighthouse
Location: Middle of channel in Delaware River
Year: 1913

CRS no.: 
SPO Maps: 
Hundred: 
Quad: 
Zone: 18
UTM: E481895 N4330614

Describe the resource as completely as possible:

Fixed Light Beacons - Harbor Light ___ Range Light ___ Front ___ Rear ___
River or Channel Light X

Non-Fixed Aids - Lightship ___ Temporary ___ Permanent ___
Bouy ___ Natural Marker ___
Other ___

Is the Aid to Navigation - Manned ___ Unmanned X

Elements Found in the Interior:

Are there any threats or hazards at the site?
1. NAME OF PROPERTY: Miah Mauill Shoal Lighthouse

2. STREET LOCATION: Middle of channel in Delaware River

3. OWNER'S NAME: United States Coast Guard

   ADDRESS: Cape May, New Jersey

4. TYPE OF LOCUS: a) building b) structure X c) site d) object e) district f) other

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field b) cultivated field c) woodland d) scattered buildings e) densely built up f) other X

6. FUNCTION: original X present

7. LIST ADDITIONAL SHEETS USED

8. YOUR NAME: Leslie Bashman

   YOUR ADDRESS: University of Delaware # 302-451-8097

   ORGANIZATION (if any) Center for Historic Architecture and Engineering

   DATE: February 9, 1991

USE BLACK INK ONLY
1. Description:

2. Location:

3. Feature:

4. Cultural Context:

5. Time Period:

12. Certification:

11. Evaluation and Eligibility:

- Cultural Value
- Noteworthy Feature
- Associated Traditions or Stories
- Relationships to Setting

Consider the following:

- Area
- Other Areas

Place the location of your area in relation to geographic landmarks and each other. Include a sketch and notes.
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM
FORM CRS-1

1. ADDRESS OF PROPERTY: Ship John Shoal

2. DATE OF INITIAL CONSTRUCTION: 1874

3. STYLE/FLOOR PLAN:

4. ARCHITECT/BUILDER:

5. INTERGRITY: a) original site x b) moved
   c) if moved, when and from where
   d) list major alterations and dates (if known)

5. INTERGRITY: Repairs to structure 1989-1990

6. CONDITION: good x deteriorated

6. CONDITION: remarks:

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:
   a) Overall shape
      stories
      bays
      wings
   b) Structural system
   c) Foundation
      materials
      basement
   d) Exterior walls (modern over original)
      materials
      color(s)
   e) Roof
      shape; materials
      cornice
dormers
      chimney location(s)

USE BLACK INK ONLY
f) Windows
   spacing
type
trim
shutters

g) Door
   spacing
type
trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

8. Surveyor: ___________________________ Date of Form __________

USE BLACK IN ONLY
AIDS TO NAVIGATION Survey Form

Completed by (Name/Organ/Phone):

Resource Name: Ship John Shoal

LOCATION

State: DE/NJ Location: In channel of Delaware River (body of water, point of land, etc.)

City Vicinity: None; County

OWNERSHIP

Owner/Manager/Federal Agency with Jurisdiction:

United States Coast Guard

Owner Address: Cape May, New Jersey

Owner Phone: 609-884-6987

STATUS

Active Light: TRUE FALSE UNKNOWN Year Inactive:

Automated Light: TRUE FALSE UNKNOWN Year Automated: 1973

Daymarker: TRUE FALSE UNKNOWN

Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER

Site Date: 1874; Current Tower Constructed:

Foundation (circle one): Natural Emplaced Dressed Stone/Timber Screw Pilling Piling Caisson Crib

Construction Materials (circle primary):

Rubble Stone Dressed Stone Brick Wood Cast Iron Reinforced Concrete Steel

Other:

Other:

Tower Shape (circle one):

Square Cylindrical Conical Skeletal Pyramidal Hexagonal Octagonal

Relationship to Other Structures (circle one):

Separate Attached Integral
Tow# HWM: -4 -
HdgM of Foal Plme: 53 ft, inches
MarkingdPattma:

CURRENT SOUND SIGNAL
Signal Type: None
Signal Characteristics:
Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast iron
- Steel
Other:
Building Style:
Year Constructed:

ASSOCIATED STRUCTURES (indicate # of each):
Sound Signal Buildings: Oil Houses: Claterns: Garages: Barns:
Bridges/Tunnels/Catwalks: Docks/Cranes/Marine Railroads: Storage Buildings:

SITE SIGNIFICANCE
On a State Inventory? TRUE FALSE UNKNOWN Date Listed:
National Register Status (circle one):
Listed
Part of Larger Listing
Determined Eligible by the Keeper
Determined ineligible by the Keeper
Determined Eligible by the SHPO
Determined ineligible by the SHPO
No Status
Unknown
Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN
Recorded by the Historic American Engineering Record (HAER): TRUE FALSE UNKNOWN
Designated National Historic Landmark (NHL): TRUE FALSE UNKNOWN
Owned or managed by the NPS: TRUE FALSE UNKNOWN Park:

LENS
Current Optic: Fourth order lens
Year Installed:
Original Optic:
Year Installed:
Optic Characteristics:

PRIMARY KEEPERs QUARTERS
Number of Stories: 1
Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast iron
- Steel
Other:
Building Style: Victorian
(Cape Cod, Duplex, Victorian, etc.)
Year Constructed:
Total # of Keepers Quarters:
1 story brown octagonal dwelling with high mansard roof, cylindrical foundation filled with concrete.

(OVER)
Name of Aid to Navigation: Ship John Shoal

Location: In middle of channel of Delaware River

Year: 1874

CRS no.: 

SPO Maps: 

Hundred: 

Quad: Bombay Hook

Zone: 18

UTM: E467499 N4350513

Describe the Resource As Completely As Possible:

Fixed Light Beacons - Harbor Light
   Range Light
   Front
   Rear
   River or Channel Light X

Non-Fixed Aids - Lightship
   Temporary
   Permanent
   Bouy
   Natural Marker
   Other

Is the Aid to Navigation - Manned
   Unmanned X

Elements Found in the Interior:

Are there any threats or hazards at the site?
1. NAME OF PROPERTY: Ship John Shoal

2. STREET LOCATION: Middle of the channel of the Delaware River

3. OWNER'S NAME: United States Coast Guard TEL. # 609-884-6987
   ADDRESS: Cape May, New Jersey

4. TYPE OF LOCUS: a) building  b) structure X c) site  
   d) object  e) district  f) other  

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field  b) cultivated field  c) woodland  
   d) scattered buildings  e) densely built up  f) other X  

6. FUNCTION: original X present

7. LIST ADDITIONAL SHEETS USED

8. YOUR NAME: Leslie Bashman
   YOUR ADDRESS: University of Delaware # 302-451-8097
   CENTER FOR HISTORIC ARCHITECTURE AND ENGINEERING DATE February 09, 1991

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

---

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

---

10. Comprehensive Planning:
   a) Time Period(s)
   b) Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title ___________________________ Date ______
    BAHP: Name/Title ___________________________ Date ______
1. ADDRESS OF PROPERTY: Brandywine Shoal Lighthouse

2. DATE OF INITIAL CONSTRUCTION: 1850- Screwpile 1914- Current Structure

3. STYLE/FLOOR PLAN: 

4. ARCHITECT/BUILDER: 

5. INTEGRITY: a) original site ______ b) moved X 50 feet from first screwpile
c) if moved, when and from where ______
d) list major alterations and dates (if known) ______

6. CONDITION: good ______ deteriorated ______

remarks: ______

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:

a) Overall shape
   stories
   bays
   wings

b) Structural system

c) Foundation
   materials
   basement

d) Exterior walls (modern over original)
   materials
   color(s)

e) Roof
   shape; materials
   cornice
   dormers
   chimney location(s)
f) Windows
   spacing
   type
   trim
   shutters

g) Door
   spacing
   type
   trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

---

Surreyor: ___________________________ Date of Form __________________
AIDS TO NAVIGATION Survey Form

Completed by (Name/Organ/Phone): Center for Historic Architecture and Engineering
302-431-6787

Resource Name: Brandywine Shoal Lighthouse

LOCATION

State: Delaware; Location: Delaware Bay (body of water, point of land, etc.)
City Vicinity: Lewes, Delaware; County

OWNERSHIP

Owner/Manager/Federal Agency with Jurisdiction:
United States Coast Guard

Owner Address: Cape May, New Jersey

Owner Phone: 609-884-6987

STATUS

Active Light: TRUE FALSE UNKNOWN Year inactive:_______
Automated Light: TRUE FALSE UNKNOWN Year Automated: 1974
Daymarker: TRUE FALSE UNKNOWN
Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER

Site Date: 1850; Current Tower Constructed: 1914
Conical structure completed in 1914 is built on caisson
Foundation (circle one):
Natlral Emplaced Rubble Stone
Dressed Stone Timber Dressed Stone
Screw Piling Brick
Piling Wood
Caisson Cast Iron
Crib Reinforced Concrete

Other: ___________________________

Construction Materials (circle primary):
Steel

Other: ___________________________

Tower Shape (circle one):
Square Cylindrical Conical
Skeletal Pyramidal Hexagonal Octagonal

Relationship to Other Structures (circle one):
Separate Attached Integral
CURRENT SOUND SIGNAL

Signal Type: intermittent fog horn

Signal Characteristics: ____________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast iron
- Steel

Other: ____________________________

Building Style: ____________________________

Year Constructed: ____________________________

ASSOCIATED STRUCTURES (indicate # of each):

Sound Signal Buildings: ___

Oil Houses: ___

Cisterns: ___

Garages: ___

Barns: ___

Bridges/Tunnels/Catwalks: ___

Docks/Cranes/Marine Railroads: ___

Storage Buildings: ___

three outside walkways (galleries) at lantern room, watchroom and main floor level.

SITE SIGNIFICANCE

On a State inventory? TRUE FALSE UNKNOWN Date Listed: ____________________________

National Register Status (circle one):

Listed

Part of Larger Listing

 Determined Eligible by the Keeper

 Determined Ineligible by the Keeper

 Determined Eligible by the SHPO

 Determined Ineligible by the SHPO

No Status

Unknown

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park: ____________________________

LENS

Current Optic: ____________________________

Year Installed: ____________________________

Original Optic: third order fresnel lens

Year Installed: ____________________________

Optic Characteristics: ____________________________

PRIMARY KEEPERS QUARTERS

Number of Stories: ____________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast iron
- Steel

Other: ____________________________

Building Style: ____________________________

(Cape Cod, Duplex, Victorian, etc.)

Year Constructed: ____________________________

Total # of Keepers Quarters: ____________________________
Name of Aid to Navigation: Brandwine Shoal Lighthouse
Location: Delaware River
Year: 1914
 CRS no. __________________
 SPO Maps ________________
 Hundred ________________
 Quad ________________
 Zone: 18
 UTM: E490160 N4315033

Describe the Resource As Completely As Possible:

Fixed Light Beacons - Harbor Light ______ Range Light ______ Front ______ Rear ______ River or Channel Light ______

Non-Fixed Aids - Lightship ______ Temporary ______ Permanent ______
Bouy ______
Natural Marker ______
Other ______

Is the Aid to Navigation - Manned ______ Unmanned __________

Elements Found in the Interior:

Are there any threats or hazards at the site?
1. NAME OF PROPERTY: Brandywine Shoal Lighthouse

2. STREET LOCATION: situated about a mile from the lower end of Brandywine Shoal, easterly side of main shipping channel in the lower Delaware Bay.

3. OWNER'S NAME: United States Coast Guard

   ADDRESS: Cape May, New Jersey

4. TYPE OF LOCUS: a) building b) structure c) site d) object e) district f) other

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field b) cultivated field c) woodland d) scattered buildings e) densely built up f) other

6. FUNCTION: original x present

7. LIST ADDITIONAL SHEETS USED

3. YOUR NAME: Leslie Bashman

   YOUR ADDRESS: University of Delaware, Newark, DE 19717 #302-451-8097

   ORGANIZATION (if any) Center for Historic Architecture DATE January 15, 1990 and Engineering

USE BLACK INK ONLY
Please indicate position of locus in relation to geographical landmarks such as streams and roads.

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
   a. Time Period(s)
   b. Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title ___________________________ Date ___________
    BAMP: Name/Title ___________________________ Date ___________
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM
FORM CRS-1

1. ADDRESS OF PROPERTY: Baker Rear Range

2. DATE OF INITIAL CONSTRUCTION: 1902, 1906

3. STYLE/FLOOR PLAN:

4. ARCHITECT/BUILDER:

5. INTEGRITY: a) original site X b) moved 
   c) if moved, when and from where 
   d) list major alterations and dates (if known)

6. CONDITION: good X deteriorated
   remarks:

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:
   a) Overall shape
      stories
      bays
      wings
   b) Structural system
   c) Foundation
      materials
      basement
   d) Exterior walls (modern over original)
      materials
      color(s)
   e) Roof
      shape: materials
      cornice
      dormers
      chimney location(s)
f) Windows  
   spacing  
   type  
   trim  
   shutters  

g) Door  
   spacing  
   type  
   trim  

h) Porches  
   location(s)  
   materials  
   supports  
   trim  

i) Interiors details (if accessible)  

SKETCH MAP (provide north arrow)  

3. Surveyor: _____________________________ Date of Form __________
NPS National Maritime Initiative Inventory of Maritime Resources

AIDS TO NAVIGATION Survey Form

Completed by (Name/Organ/Phone): Center for Historic Architecture and Engineering 302-451-8097

Resource Name: Baker Rear Range

LOCATION

State: Delaware Location: Delaware River just south of C & D Canal (body of water, point of land, etc.)

City Vicinity: Delaware City County: New Castle

OWNERSHIP

Owner/Manager/Federal Agency with Jurisdiction:
United States Coast Guard

Owner Address: Philadelphia, Pa

Owner Phone: 215-271-4847

STATUS

Active Light: TRUE FALSE UNKNOWN Year Inactive:

Automated Light: TRUE FALSE UNKNOWN Year Automated:

Daymarker: TRUE FALSE UNKNOWN

Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER

Site Date: 1902 Current Tower Constructed: 1906

Foundation (circle one): Construction Materials (circle primary):

Natural Embplaced Rubble Stone
Dressed Stone Timber Cored Stone
Screw Piling Brick
Piling Wood
Caisson Cast Iron
Crib Reinforced Concrete

Other: Steel

Tower Shape (circle one):

Square Cylindrical Conical Skeletal Pyramidal Hexagonal Octagonal

Relationship to Other Structures (circle one):

Separate Attached Integral
CURRENT SOUND SIGNAL

Signal Type: ____________________________

Signal Characteristics: ____________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other: ____________________________

Building Style: ____________________________

Year Constructed: ____________________________

ASSOCIATED STRUCTURES (Indicate # of each):

- Sound Signal Buildings: ____
- Off Houses: ____
- Cisterns: ____
- Garages: ____
- Barns: ____
- Bridges/Tunnels/Catwalks: ____
- Docks/Cranes/Marine Railroads: ____
- Storage Buildings: ____

SITE SIGNIFICANCE

On a State Inventory? TRUE FALSE UNKNOWN Date Listed: __________

National Register Status (circle one): 

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park: __________

Tower Height: _____ feet, _____ inches

Height of Focal Plane: _____ feet, _____ inches

Markings/Patterns: ____________________________

LENS

Current Optic: ____________________________

Year Installed: ____________________________

Original Optic: ____________________________

Year Installed: ____________________________

Optic Characteristics: ____________________________

PRIMARY KEEPERS QUARTERS

Number of Stories: ____________________________

Building Materials (circle primary):

- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other: ____________________________

Building Style: ____________________________

(Cape Cod, Duplex, Victorian, etc.)

Year Constructed: ____________________________

Total # of Keepers Quarters: ____________________________

National Register Status (circle one): Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN

- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Designated National Historic Landmark (NHL):

TRUE FALSE UNKNOWN

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park: __________
Name of Aid to Navigation: Baker Rear Range
Location: South of Delaware City on tank
Year: 1902, 1904 current tower
CRS no.
SPO Maps
Hundred: St. George's
Quad: Delaware City
Zone: 18
UTM: E 451019 N 4376803

Describe the Resource as Completely As Possible:

Fixed Light Beacons - Harbor Light
  Range Light [ ] Front [ ] Rear [ √ ]
  River or Channel Light [ ]

Non-Fixed Aids - Lightship [ ] Temporary [ ] Permanent [ ]
  Bouy [ ]
  Natural Marker [ ]
  Other [ ]

Is the Aid to Navigation - Manned [ ] Unmanned [ √ ]

Elements Found in the Interior:

Are there any threats or hazards at the site?
CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM
FORM CRS-3

1. NAME OF PROPERTY: Baker Rear Range

2. STREET LOCATION: Delaware River just south of C & D Canal

3. OWNER'S NAME: United States Coast Guard


4. TYPE OF LOCUS: a) building _____ b) structure X c) site _____
   d) object _____ e) district _____ f) other _______________________

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field _____ b) cultivated field _____ c) woodland _____
   d) scattered buildings _____ e) densely built up _____ f) other X

6. FUNCTION: original X present ____________________________

7. LIST ADDITIONAL SHEETS USED

8. YOUR NAME: Leslie Bashman

YOUR ADDRESS: University of Delaware

Center for Historic Architecture and Engineering

ORGANIZATION (if any) ____________________________

DATE January 15, 1990

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
   a. Time Period(s)
   b. Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title __________________________ Date ______
    BAHP: Name/Title __________________________ Date ______

INDICATE NORTH ON SKETCH
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM
FORM CRS-1

1. ADDRESS OF PROPERTY: Bulkhead Bar Front Range

2. DATE OF INITIAL CONSTRUCTION: 1929

3. STYLE/FLOOR PLAN:

4. ARCHITECT/BUILDER:

5. INTEGRITY: a) original site X b) moved ______
c) if moved, when and from where ______
d) list major alterations and dates (if known) ______

6. CONDITION: good X deteriorated ______

7. DESCRIBE THE RESOURCE AS COMpletely AS POSSIBLE:
   a) Overall shape
      stories
      bays
      wings
   b) Structural system
   c) Foundation
      materials
      basement
   d) Exterior walls (modern over original)
      materials
      color(s)
   e) Roof
      shape; materials
      cornice
      dormers
      chimney location(s)

USE BLACK INK ONLY
f) Windows
   spacing
type
trim
shutters

g) Door
   spacing
type
trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

3. Surveyor: __________________________ Date of Form ________
NPS National Maritime Initiative Inventory of Maritime Resources

AIDS TO NAVIGATION Survey Form

Completed by (Name/Org/Phone):

Resource Name: Bulkhead Bar Front Range

LOCATION

State: Delaware Location: On bank of Delaware River just south of New Castle (body of water, point of land, etc.)

City Vicinity: New Castle County: New Castle

OWNERSHIP

Owner/Manager/Federal Agency with Jurisdiction: United States Coast Guard


Owner Phone: 215-271-4847

STATUS

Active Light: TRUE FALSE UNKNOWN Year Inactive:

Automated Light: TRUE FALSE UNKNOWN Year Automated:

Daymarker: TRUE FALSE UNKNOWN

Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER

Site Date: 1929 Current Tower Constructed:

Foundation (circle one):

Natural Emplaced Rubble Stone
Dressed Stone/ Timber Dressed Stone
Screw Piling Brick
Piling Wood
Caisson Cast Iron
Crib Reinforced Concrete
Crib

Other: Other:

Construction Materials (circle primary):

Steel

Tower Shape (circle one):

Square
Cylindrical
Conical
Skeletal
Pyramidal
Hexagonal
Octagonal

Relationship to Other Structures (circle one):

Separate
Attached
Integral
CURRENT SOUND SIGNAL

Signal Type: ___________________________

Signal Characteristics: __________________

Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel

Other: ___________________________

Building Style: ___________________________

Year Constructed: ________

ASSOCIATED STRUCTURES (Indicate # of each):

Sound Signal Buildings: ______
Oil Houses: ______
Clammers: ______
Garages: ______
Barns: ______

Bridges/Tunnels/Catwalks: ______
Docks/Cranes/Marine Railroads: ______
Storage Buildings: ______

SITE SIGNIFICANCE

On a State Inventory? TRUE FALSE UNKNOWN Date Listed: _____________

National Register Status (circle one):

Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN

Recorded by the Historic American Engineering Record (HAER): TRUE FALSE UNKNOWN

Designated National Historic Landmark (NHL): TRUE FALSE UNKNOWN

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park: _____________
Name of Aid to Navigation: Bulkhead Bar Front Range
Location: Bank of Delaware River just south of New Castle
Year: 1929
CRS no.
SPO Maps
Hundred: New Castle
Quad: Wilmington South
Zone: 18
UTM
Describe the Resource as Completely as Possible:
Fixed Light Beacons - Harbor Light
   Range Light X Front X Rear
   River or Channel Light
Non-Fixed Aids - Lightship ___ Temporary ___ Permanent ___
   Bouy ___
   Natural Marker ___
   Other
Is the Aid to Navigation - Manned ___ Unmanned X
Elements Found in the Interior:

Are there any threats or hazards at the site?
CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

FORM CRS-3

1. NAME OF PROPERTY: Bulkhead Bar Front Range

2. STREET LOCATION: On bank of Delaware River just south of New Castle

3. OWNER'S NAME: United States Coast Guard TEL. # 215-271-4847


4. TYPE OF LOCUS: a) building ___ b) structure X ___ c) site ___

   d) object ___ e) district ___ f) other ____________________________

5. SURROUNDINGS OF LOCUS: (check more than one if necessary)

   a) fallow field ___ b) cultivated field ___ c) woodland ___

   d) scattered buildings ___ e) densely built up ___ f) other X

6. FUNCTION: original X present __________

7. LIST ADDITIONAL SHEETS USED


8. YOUR NAME: Leslie Bashman

   YOUR ADDRESS: University of Delaware # 302-451-8097

   CENTER FOR HISTORIC ARCHITECTURE

   ORGANIZATION (if any) ___________________________ DATE January 15, 1991

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

INDICATE NORTH ON SKETCH

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
   a. Time Period(s)
   b. Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title _____________________________ Date ______
    BAMP: Name/Title _____________________________ Date ______
CULTURAL RESOURCE SURVEY
CONSTRUCTION DATA FORM

FORM CRS-1

1. ADDRESS OF PROPERTY: Cross Ledge

2. DATE OF INITIAL CONSTRUCTION: 1875

3. STYLE/FLOOR PLAN:

4. ARCHITECT/BUILDER:

5. INTEGRITY: a) original site X b) moved ______
c) if moved, when and from where ________________
d) list major alterations and dates (if known) __________

6. CONDITION: good ______ deteriorated ______
remarks: original base - light missing from top

7. DESCRIBE THE RESOURCE AS COMPLETELY AS POSSIBLE:

a) Overall shape
   stories
   bays
   wings

b) Structural system

c) Foundation stone
   materials
   basement

d) Exterior walls (modern over original)
   materials
   color(s)

e) Roof
   shape; materials
   cornice
   dormers
   chimney location(s)

USE BLACK INK ONLY
f) Windows
   spacing
type
trim
shutters

g) Door
   spacing
type
trim

h) Porches
   location(s)
   materials
   supports
   trim

i) Interiors details (if accessible)

SKETCH MAP (provide north arrow)

8. Surveyor: ____________________________ Date of Form __________

USE BLACK IN ONLY
AIDS TO NAVIGATION Survey Form
Completed by (Name/Org/Phone): Center for Historic Architecture and Engineering
Resource Name: Cross ledge 302-451-8097

LOCATION
State: DE/NT; Location: Middle Channel to Delaware River (body of water, point of land, etc.)
City Vicinity: ; County

OWNERSHIP
Owner/Manager/Federal Agency with Jurisdiction:
United States Coast Guard
Owner Address: Cape May, NJ
Owner Phone: 609-884-6987

STATUS
Active Light: TRUE FALSE UNKNOWN Year Inactive:
Automated Light: TRUE FALSE UNKNOWN Year Automated:
Daymarker: TRUE FALSE UNKNOWN
Site Only (no buildings remaining): TRUE FALSE UNKNOWN

CURRENT TOWER
Site Date: ; Current Tower Constructed:
Foundation (circle one):
Natural Emplaced Capped Stone Timber Screw Piling Piling Caisson Crib
Construction Materials (circle primary):
Rubble Stone Capped Stone Brick Wood Cast Iron Reinforced Concrete Steel
Other:
Other:

Tower Shape (circle one):
Square Cylindrical Conical Skeletal Pyramidal Hexagonal Octagonal
Relationship to Other Structures (circle one):
Separate Attached Integral
CURRENT SOUND SIGNAL
Signal Type: None
Signal Characteristics: ____________________________
Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel
Other: ____________________________
Building Style: ____________________________
Year Constructed: __________

ASSOCIATED STRUCTURES (Indicate # of each):
Bridges/Tunnels/Catwalks: ___ Docks/Cranes/Marine Railroads: ___ Storage Buildings: ___

SITE SIGNIFICANCE
On a State Inventory? TRUE FALSE UNKNOWN Date Listed: __________
National Register Status (circle one):
- Listed
- Part of Larger Listing
- Determined Eligible by the Keeper
- Determined Ineligible by the Keeper
- Determined Eligible by the SHPO
- Determined Ineligible by the SHPO
- No Status
- Unknown

Owned or managed by the NPS: TRUE FALSE UNKNOWN Park: __________
Recorded by the Historic American Buildings Survey (HABS): TRUE FALSE UNKNOWN
Recorded by the Historic American Engineering Record (HAER): TRUE FALSE UNKNOWN
Designated National Historic Landmark (NHL): TRUE FALSE UNKNOWN
Tower Height: _____ feet, _____ inches
Height of Focal Plane: _____ feet, _____ inches
Markings/Patterns: original stone foundation

LENS
Current Optic: ____________________________
Year Installed: __________
Original Optic: ____________________________
Year Installed: __________
Optic Characteristics: ____________________________

PRIMARY KEEPERS QUARTERS
Number of Stories: None
Building Materials (circle primary):
- Rubble Stone
- Dressed Stone
- Brick
- Wood
- Cast Iron
- Steel
Other: ____________________________
Building Style: (Cape Cod, Duplex, Victorian, etc.)
Year Constructed: __________
Total # of Keepers Quarters: __________

(OVER)
Name of Aid to Navigation: Cross Ledge
Location: Middle Channel of Delaware River
Year: 
CRS no.: K
SPO Maps: Navigational Chart 12304
Hundred: 
Quad: 
Zone: 18
UTM: E 479529 N 334689

Describe the Resource As Completely As Possible:

Fixed Light Beacons - Harbor Light ___
Range Light ___ Front ___ Rear ___
River or Channel Light ___

Non-Fixed Aids - Lightship ___ Temporary ___ Permanent ___
Bouy ___
Natural Marker ___
Other ___

Is the Aid to Navigation - Manned ___ Unmanned ___

Elements Found in the Interior:

Are there any threats or hazards at the site?
CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM
FORM CRS-3

1. NAME OF PROPERTY: Cross Ledge

2. STREET LOCATION:

3. OWNER'S NAME: United States Coast Guard TEL. # 609-884-6987

4. ADDRESS: Cape May, NJ

5. TYPE OF LOCUS: a) building b) structure c) site d) object e) district f) other

6. SURROUNDINGS OF LOCUS: (check more than one if necessary)
   a) fallow field b) cultivated field c) woodland d) scattered buildings e) densely built up f) other

7. FUNCTION: original present

8. LIST ADDITIONAL SHEETS USED

3. YOUR NAME: Leslie Bashman

4. YOUR ADDRESS: University of Delaware Center for Historic Architecture # 302-451-8097

5. ORGANIZATION (if any) and Engineering DATE February 10, 1991

USE BLACK INK ONLY
8. SKETCH MAP

Please indicate position of locus in relation to geographical landmarks such as streams and roads.

INDICATE NORTH ON SKETCH

9. CONTEXT

Consider the following:

a) relationship to setting
b) associated traditions or stories
c) noteworthy features
d) comparison with others in area
e) threats

10. Comprehensive Planning:
   a. Time Period(s)
   b. Cultural Concept

11. Evaluation and Eligibility
    List area(s) of significance and criteria

12. Certification
    Survey: Name/Title _______________________ Date _____
    BAHP: Name/Title _______________________ Date _____
APPENDIX C:
NATIONAL REGISTER NOMINATIONS FOR PREVIOUSLY LISTED AIDS TO NAVIGATION
Fenwick Island Lighthouse Station

LOCATION

STREET & NUMBER
Delaware/Maryland Border Line
CITY OR TOWN
Fenwick Island
STATE
Delaware
COUNTY
Sussex
ZIP
19940
COUNTY
Sussex
ZIP
099

CLASSIFICATION

CATEGORY
DISTRICT
X BUILDING
X STRUCTURE
X SITE
OBJECT
X IN PRINT
X BEING CONSUMED
(Prehistoric only)

OWNERSHIP
X PUBLIC
X PRIVATE
X BOTH

PUBLIC ACQUISITION

CURRENT

STATUS
X OCCUPIED
X UNOCCUPIED
X WORK IN PROGRESS
X IN PROCESS

PRESENT USE

X AGRICULTURE
X COMMERCE
X EDUCATIONAL
X ENTERTAINMENT
X RELIGIOUS
X GOVERNMENT
X SCIENTIFIC
X INDUSTRIAL
X TRANSPORTATION
X MILITARY
X OTHER Navigation

OWNER OF PROPERTY

NAME
Multiple

LOCATION OF LEGAL DESCRIPTION

COURT HOUSE
REGISTRY OF DEEDS
MULTIPLE

REPRESENTATION IN EXISTING SURVEYS

TITLE
Delaware Cultural Resource Survey

DATE
1977

FEDERAL
STATE
COUNTY
LOCAL

FEDERAL
STATE
COUNTY
LOCAL

FEDERAL
STATE
COUNTY
LOCAL

Name

DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM
SEE INSTRUCTIONS IN HOW TO COMPLETE NATIONAL REGISTER FORMS TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

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X WORK IN PROGRESS
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X TRANSPORTATION
X MILITARY
X OTHER Navigation

OWNER OF PROPERTY

NAME
Multiple
The Fenwick Island Lighthouse Station is a group of five structures located about one-third mile west of the Atlantic Ocean, immediately north of the Delaware-Maryland state line at Fenwick Island, Delaware. The group includes the white-painted brick Fenwick Island Lighthouse, a small steel shed at its base, two lighthouse keeper's houses, and a frame barn. All were originally situated on a ten-acre light station tract, which has been gradually reduced in size through transfers of land to the State of Delaware and sale to private property owners. At the present time only the lighthouse itself and the small shed at its base are federally-owned, on a lot 40 feet by 60 feet enclosed by a chain-link fence. Both houses and the barn are now privately owned. Most of the parks used by the large number of summer tourists who visit the area. The area included within this nomination to the National Register of Historic Places runs for 240 feet along the state line, by 70 feet north and south. (An attached diagram shows the layout of the five buildings in question).

There is a wealth of material relating to the station on file in Record Group 26 in the National Archives in Washington, D.C. Among the most valuable sources in describing the station is a "Description of Light-House Tower, Buildings, and Premises at Fenwick Island Light Station, Delaware", prepared for the Lighthouse Establishment of the old Department of Commerce and Labor in 1907. In addition, a full set of original construction drawings of the tower and buildings is on file in the cartographic section of the Archives. Also in Record Group 26 are a partially-damaged correspondence file pertaining to the station, records of employment and payment of station personnel, and other records. Thus, it is possible to obtain details of the original construction of the station, as well as of the changes in equipment and construction of the structures over the years.

**DESCRIPTION OF BUILDINGS**

**The Lighthouse (S-187)**

The Fenwick Island Lighthouse is a brick, conical-type tower 84 feet, 5 inches in height from the base of the tower to the ventilator ball atop the lantern assembly. The brick portion of the structure rests on a rubble stone masonry base on grillage which extends about 12 feet, 6 inches below the surface of the ground and about 3 feet above the ground, forming a watertight base for the brick tower. The brick portion is about 74 feet tall. It consists of an outer brick wall about 27 inches thick at the base and about 24 inches thick at the top of the tower. An inner cylindrical wall is about 9 inches thick from top to bottom. It is also constructed of brick. The lighthouse is about 12 feet, 7 inches in diameter at the ground and about 10 feet, 5 inches in diameter at the top of the water table. The stone and brick portions of the tower were originally white-painted and are now painted white. The outside gallery around the watchroom at the top of the brick tower and the lantern assembly are painted black. The bricks of the outer wall are laid in American bond with fifteen stretcher courses divided by a header course. The entrance to the tower is through a door in the south wall at the level of the top of the water table. The tower contains five windows at various levels. One window is located on the first floor and one on the watchroom level, both facing east.
Those at other levels face south, north, and west. All are six-over-six double sash type with black-painted trim.

The first floor interior of the tower is round with arched alcoves set into the east and west walls. A cast-iron spiral stairway extends from the first floor to the watch room with four landings spaced at intervals.

A galvanized iron tube of about 3 inches in diameter extends up through the center of the tower. It is believed that this device was used to transport containers of mineral oil up to the lantern.

The watchroom originally contained a small table and a small heater ventilated by a stovepipe, which extended up through the lantern and out through the roof of the tower. It was probably removed in 1940 when the lighting mechanism was automated.

A doorway is set in the west wall of the watchroom and leads out to a cast-iron gallery, polygonal in plan and 10-sided, running around the outside of the tower at the watchroom level. The outside of the doorway is boxed in with a wooden windbreak. The gallery is surrounded at waist height by an iron railing with iron mesh guards attached. An outside ladder extends from the watchroom gallery to the rim around the lantern, giving outside access to the lantern through a glass door on the south side of the lantern.

An interior iron stairway leads from the watchroom to the interior of the lantern. The lantern is polygonal in plan with 10 sides. Each side contains two 5-inch-thick glass plates, each of which is 2 feet, 5 inches wide by 2 feet, 7 inches tall. The height of the glass in each of the 10 sides of the lantern housing is 5 feet, 2-3/8 inches. The side corresponding to the outside ladder from the watchroom gallery is a single storm pane hinged on the side. The floor of the lantern is cast-iron. The roof is constructed with cast-iron plates held by wrought-iron strips and covered with tin. A cylindrical ventilator with a hemispherical top extends above the roof of the lantern assembly.

The lens and prism assembly and lighting mechanism were mounted on a cast-iron pedestal of about 7½ feet in diameter which, in turn, was mounted on a shaft 7½ inches in diameter. The lens and electrical lighting mechanism were removed from the lighthouse by the U. S. Coast Guard on November 13, 1979. The pedestal and shaft are still in place.
station barn, the line turns north 90 degrees and runs northerly a distance of 70 feet, then east 90 degrees and easterly for 217 feet to the eastern property line of the livery property and then south along that line to the point of beginning.
### GEOGRAPHICAL DATA

**Acreage of Nominated Property:** Less than 2 acres

**Quadrangle Name:** Assawoman Bay

<table>
<thead>
<tr>
<th>Quadrangle</th>
<th>Scale: 1:24,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>A [1,1]</td>
<td>B [1,1]</td>
</tr>
<tr>
<td>C [1,1]</td>
<td>D [1,1]</td>
</tr>
<tr>
<td>E [1,1]</td>
<td>F [1,1]</td>
</tr>
</tbody>
</table>

**Verbal Boundary Description:**

The property being nominated begins at the point where the eastern property line of Frederick Fryer intersects the Delaware-Maryland State Line. It extends westward along the state line for a distance of 200 feet. At a point immediately west of the western end of the light for a distance of 200 feet. At a point immediately west of the western end of the light.

**State/County Boundaries:**

<table>
<thead>
<tr>
<th>State</th>
<th>Code</th>
<th>County</th>
</tr>
</thead>
</table>

### FORM PREPARED BY

**Date:** January 1979

**Mr. Dick Carter, Historic Preservation Planner**

**Address:**

Sussex County Courthouse, The Circle

Georgetown, Delaware

### STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

The evaluated significance of this property within the state is:

**National:**

**State:**

**Local:**

As the State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Title 16, U.S.C. 1401-1491) hereby name this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and standards established by the National Park Service.

[Signature]

**Date:** 1/26/77

**FEMA (Federal Emergency Management Agency) Use Only:**

I hereby certify that this property is included in the National Register.

[Signature]

**Date:**

**Chief of Registration:**

[Signature]

**Date:** 1/26/77

---

2. Records pertaining to the light station housed in Frank Group 24, The National Archives, Washington, D.C.

3. Francis Ross Holland, Jr.: AMERICA'S LIGHTHOUSES - THEIR ILLUSTRATED HISTORY SINCE 1822

Beattieboro, Vermont: The Stephen Greene Press 1972
of French manufacture was installed. The light was turned on for the first time on August 1, 1859, and it continued in operation without interruption for nearly 120 years until December 11, 1970, when it was turned off by the U.S. Coast Guard.

During the course of its existence, the Fenwick Island Lighthouse Station has undergone numerous changes in its method of operation as new technological innovations were made in lighting equipment. A Second lighthouse keeper's house was erected in 1881. A bridge to the mainland was built in 1892 which, though designed to improve access to the station, also served to open up the Fenwick Island area to early recreational development. In 1940, the lighthouse was automated and much of the original 10-acre light station property was sold. The keeper's houses and other station structures, with the exception of the lighthouse itself and one small generator house, are now privately owned.

The light station site is of further historical significance to the state because of the location on the southern property line of the first boundary stone of the 1751 Transpeninsular Line which served as the basis for the later Mason-Dixon line. The boundary stone, bearing the arms of the Lords Baltimore of Maryland on its southern face and those of the Penn Family of Pennsylvania and "the Three Lower Counties Upon Delaware" on its northern face, is already listed in the National Register of Historic Places as a part of the Delaware Boundary Line (D-101).
The Fenwick Island Lighthouse Station, situated 1,500 feet west of the Atlantic Ocean immediately north of the Delaware-Maryland State Line at Fenwick Island, Delaware, is the last remaining lighthouse on the Delaware-Maryland ocean coast. As such, it is of significance to the history of navigation in Delaware coastal waters. The conical, white-painted brick lighthouse and the group of frame structures at its base, which make up the station complex, are also of architectural significance to the state since they are the only structures of their respective types in Delaware.

Delaware has had a part in the history of lighthouses in the U.S. for more than 200 years. Because of its location on the Atlantic Ocean and the Delaware River and Bay, it was the site of some of the earliest aids to navigation in what is now the U.S. In 1767 America's seventh lighthouse was built at Cape Henlopen, the entrance to the Delaware Bay, 20 miles north of Fenwick Island. That cylindrical stone structure collapsed in 1807 due to beach erosion. During the nineteenth century, a series of wooden and iron lighthouses were erected along the Delaware River and Bay, including several iron screw-pile and caisson-type lighthouses located in the shipping channel of the bay.

The Fenwick Island Light, the only brick, conical-type lighthouse built in the state, was erected in 1858 and early 1859 during a period of rapid expansion and improvement in the nation's system of aids to navigation. The newly-created (1852) U.S. Lighthouse Board reported to Congress in 1855 that "a light-house in the vicinity of Fenwick's Island will serve to guide vessels from the southern ports, bound into the Delaware, and also the great coasting trade with the same or a more northern destination. Fenwick's Island Shoal is a very dangerous one for those, and also in some degree for the European trade of Philadelphia. It is very common for ships coming from the eastward to fall in with the coast considerably to the southward of Cape Henlopen, and in thick weather a light on Fenwick's Island would serve to ascertain their position when the Henlopen light was invisible ..."

The report also noted that the nearest light to the south, that at the southern tip of Assateague Island on Virginia's Eastern Shore, sixty miles south of Cape Henlopen, was so far from the mouth of the Delaware Bay that vessels sailing northward were in danger of piling up on the Fenwick Shoal before they were able to sight the Henlopen Light.

As a result, Congress authorized construction of a lighthouse at Fenwick Island on August 10, 1856, at a cost not to exceed $25,000. A site was selected, which amounted to about 10 acres, and construction of the lighthouse, a lighthouse keeper's house, a boathouse and other structures began early in 1856. When the work was completed early the following year at a cost of $23,740, a Fresnel-type lens of the third order
section is horizontal weatherboarding. The present owner of the property uses a portion of the first floor of the barn as an office. The original barn doors have been removed and a conventional door installed. A door has also been installed into the second floor loft area. It has access to an outside stairway running down the front of the building. Two windows have been installed in the north wall of the structure. Although substantially altered, the original lines of the structure are visible. It is the only one of the buildings which retains a wood-shingled roof.
The house consists of a two-story main section and two one-story wings with a third modern one-story wing. The largest of the original one-story wing is laid out on an east-west line, connecting to the center of the east side of the main section (which runs north and south). The smaller one-story wing is also on a north-side line running from the north side of the larger wing. It is also connected to the east wall and north wall of the main section.

All gable ends in the original section as well as in the modern wing have vertical board-and-batten siding. They are decorated with king posts, collar braces, collar beams, sawn decorations on rafter ends, sawn decoration on purlin ends and brackets supporting the purlins, each of which has crossed diagonal collar braces. While the modern wing gable end does not have the elaborate gable decoration, it does have decorated rafter ends and bracketed purlins supporting the roof overhang.

The main house and original wings, as well as the modern wing, have cut shingle siding below the gable ends and corner boards. Wind and door trim is extremely simple and consists of simple board siding with vertical board heads. No pintles survive on the window surrounds of the newer keeper's house and it is uncertain whether the structure ever had shutters. The main section and each of the three wings have chimneys in the gable ends. Those on the wings are exposed and chimneys running up through the overhanging roof. The chimney in the main section is interior and off center and runs up through the roof near the southwest corner. All chimneys are brick and all appear to have been either rebuilt or repointed in recent years. The roofs of the house are of horizontal boards covered with modern asphalt shingles, which probably replace original wooden shingles.

The one-story wing extending out to the northern end of the house is unusual in that the northwest slope of the roof extends down in a saltbox effect across a portion of the north gable end of the main section of the house. Just to the west of the point where it ends, is a small gable-roofed basement entrance.

While access to the interior of the house was not possible, the present owner said that he extensively remodelled the interior when he purchased the property several years ago. As previously noted, the changes to the exterior of the house do not severely alter the appearance or quality of the structure.

The Barn (4-197.5)

The light station barn is a two-story, gable-roofed structure which appears to be of about the same vintage as the second keeper's house and may have replaced an earlier barn. It has been altered considerably and possesses less of its original integrity than the other four structures. A one-story lean-to garage has been added to its south side. The board-and-batten gable end has been replaced in the barn in a less skillful manner than in the house. The board-and-batten work extends along the one remaining visible side (north) about 1½ ft. below the eaves. Below the board-and-batten...
the chimneys are in the same location and since their bases are of identical size, type, and material, it is possible that the western chimney also had a brick hood originally and that it was removed and the wind deflector installed in the relatively recent past.

The house is also distinguished by a decorative ovolo-moulded cornice on the east and west sides and by simple mouldings on the door and window surrounds. The brick foundation and shingle side walls are painted white. The main and porch roofs are covered with modern red asphalt shingles.

Although it was not possible to gain access to the interior of the house, which is only occupied in the summer months, an 1879 description notes that it possesses three rooms with an entry and stairway on the first floor, three rooms with an attic stairway on the second floor, and an attic. The report also mentions a summer kitchen, but it is uncertain whether the term refers to a separate wing now gone or to the enclosed portion of the porch. Early descriptions also mention that in addition to a regular well, rain gutters on the house fed into a 2,800-gallon brick cistern. It is uncertain whether this cistern remains.

Second Lighthouse Keeper's House (S-187.4)

The second keeper's house, located just under 20 feet west of the lighthouse, was not previously built in 1882 to relieve overcrowding in the original house. It is also of frame and shingle construction and, according to the present owner, possesses the same interior weatherboarding under the shingles. The shingles of the later house, however, are conventional late nineteenth century cut or sawn shingles and not of the unusually-thick bevelled type evident in the older house. The gable ends of the house are of board-and-batten construction. The boards are pointed at the bottoms for decorative effect.

The house is of the Victorian Gothic style with gable end decoration and rafter end decoration, typical of such coastal area government construction in the last quarter of the nineteenth century. It is extremely similar in style to the Indian River Life-Saving station (S-453) which was built 15 miles north in 1881 and now listed in the National Register of Historic Places. It has been altered in recent years with the addition of two enclosed porches, a small greenhouse area around the foundation of the south gable end of the main section of the house, and a wing on the west end of the house. The present owner of the house and barn is extremely conscious of the historical nature of the property, however, and has attempted with a fair degree of success to make the additions blend in with the original character of the structure. In the case of the west wing addition, especially, it is difficult to tell that the wing is not original. The only incongruous feature is a block foundation instead of a brick foundation. Even this difference is minimized by the fact that the foundations of both wing and main house are painted red.
The interior of the house has undergone frequent alterations, both during the time it served as a part of the station complex and since it has been privately owned, but the basic exterior appearance of the structure is largely unchanged from its nineteenth-century appearance.

The house is unusual in its structure in that it is frame-covered with one layer of weatherboarding, with the weatherboard covered, in turn, by extremely thick (at least 5-inch and possibly 3/4-inch) cut cypress shingles with a beveled edge at the bottom. The inside walls are plaster and lath.

All window and door surrounds have their original trim, although the original shutters have been removed from the windows. The driven iron pintles for the shutters are still in place.

The double-pile, three-bay house has three windows on east and west sides on the second floor. The east side first floor is covered by an 8-foot-deep porch running the full width of the house. A doorway with four-light transom is at the north end of the east wall. The wood frame porch is supported by white-painted brick piers. The ends of the porch roof are shingled in the same heavy cypress shingles as the house.

A porch also extends around the middle and northern two bays of the west front facing the lighthouse and around the first bay of the northern gable end of the house. The porch covering the north end of the house and the northern bay of the west side is enclosed with sawn shake shingles and appears to have been altered in the late-nineteenth or early-twentieth centuries.

A doorway with four-light transom is located in the center of the west side first floor. An entrance to the basement is located underneath the window at the southern end of the west side.

On the north side of the house a window is situated in the center of the second floor wall, with an attic window overhead in the gable end. On the south end of the house, first and second floor windows are situated at the southwest corner. A smaller window is located in the south gable end. All windows in the house, including those in the gable ends are double-paned six-over-six windows.

Brick chimneys of the interior end types are located on either side of the roof beam at the southern end of the house. The chimneys are stuccoed up to about 16 inches above the roof line. The eastern chimney has a brick arched hood, while the western one has a flat top and is covered with a modern sheet metal wind deflector. Since
The Fenwick Island Lighthouse is believed by local historians to have first used whale oil for its lamps, followed by a conversion to mineral oil about 20 years after the lighthouse began operation in 1859.

The flashing cycle of Fenwick Island Lighthouse utilized a fixed white light with a white flash of about 20 seconds duration every two minutes. The flash was accomplished by means of three solid panels affixed to a revolving framework which were mounted outside the lens and prism mechanism. The revolving action was governed by a weight-activated clock, manufactured in 1878 by George M. Stevens Company of Boston, which was connected to the revolving apparatus of the "chariot" type which revolved around a track 17 inches in diameter through the use of six bronze guide wheels and twelve smaller wheels.

The clock, in turn, connected vertically down through the watchroom floor and then horizontally by an iron cable to a weight tube of wrought-iron mounted in the wall of the tower. The tube was about 17½ feet deep, long enough to allow the mechanism to revolve for about five hours on one winding. The clock and revolving machinery was protected by six bronze-framed glass doors and was mounted on a four-post, cast-iron table. The lamps themselves were standard fourth order oil lamps. They were replaced in 1899 by fourth order electric lamps. It is uncertain how much of this equipment was still in the lighthouse at the time it was shut down by the Coast Guard.

Generator Shed (S-187.3)

The small shed at the base of the lighthouse, the only other structure on property still owned by the federal government, is made of steel and is about 8 feet square. It is painted white with a red-painted flat roof and a black-painted smokestack.

The steel shed replaces an earlier 8 x 10-foot frame oil shed which was built 14 feet south of the lighthouse in 1831 for the storage of mineral oil. The steel structure, which sits just to the southwest of the tower, was probably installed in 1930 or shortly before. The generators once housed in it have been removed.

First Lighthouse Keeper's House (S-187.2)

The first of the two lighthouse keeper's houses at the light station is a two-story frame structure built on a brick foundation over a brick basement. It was built in 1857 at $1000 and served the families of both lighthouse keepers, with one family on each floor, until overcrowded conditions brought about construction of the second and larger house in 1892.
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 of eligibility for individual properties or districts. See instructions in Guidelines for Completing National Register Forms (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "NIA" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property
   historic name Marcus Hook Range Rear Light
   other names/site number U.S. Coast Guard Light List #2255 CRS #N-12087

2. Location
   street & number Light House Road not for publication
   city, town Wilmington
   state Delaware code DE county New Castle code 003 zip code

3. Classification
   Ownership of Property
   □ private □ public-local □ public-State □ public-Federal
   Category of Property
   □ building(s) □ district □ site □ structure □ object
   Number of Resources within Property
   Contributing 2 □ buildings 0 □ sites 0 □ structures 0 □ objects □
   □ noncontributing □ buildings □ sites □ structures □ objects
   Name of related multiple property listing: NA
   Number of contributing resources previously listed in the National Register

4. State/Federal Agency Certification
   As the designated authority under the National Historic Preservation Act of 1966, 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. [ ] See continuation sheet.

   Signature of certifying official
   SHPO - Acting Director, Division of Historical & Cultural Affairs
   State or Federal agency and bureau
   Date

   In my opinion, the property [ ] meets [ ] does not meet the National Register criteria. [ ] See continuation sheet.

   Signature of commenting or other official
   State or Federal agency and bureau
   Date

5. National Park Service Certification
   I hereby certify that this property is:
   [ ] entered in the National Register. [ ] See continuation sheet.
   [ ] determined eligible for the National Register. [ ] See continuation sheet.
   [ ] determined not eligible for the National Register.
   [ ] removed from the National Register
   other, (explain:)

   Signature of the Keeper Date of Action
7. Description

Architectural Classification
(enter categories from instructions)

Other: Lighthouse
Colonial Revival

Materials (enter categories from instructions)

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Describe present and historic physical appearance.

Marcus Hook Range Rear Light (U.S. Coast Guard Light List Number 2255) is located in a quiet residential neighborhood in Bellefonte, Delaware. The facility was built in the years 1918 - 1920 and includes a tall reinforced-concrete tower, a separate keeper's dwelling, and an outbuilding which served as a garage, storage area, and oil shed. The tower is near the crest of a high ridge and serves as the rear light marking the line of the channel in the Delaware River. The front light is located in the water some 1.5 miles to the northeast and is a flashing white light mounted on a square skeleton tower. It is not included as part of the nominated property.

The tower, keeper's dwelling and outbuilding are all contributing elements of the nomination. The tower, situated well back from the street, is square in plan and rises from a three-step base to a height of 100'. The corners are buttressed up to the level of the gallery which surrounds the cube-shaped lantern at the top. The entrance to the tower faces Lighthouse Road; it is fitted with a modern steel-plate door, a replacement for the wood-and-glass double doors shown in early photographs. The tower below the gallery was poured in nine sections. Each section, other than the topmost, has one window so that there are two openings on each side of the tower, with the spacing varying from side to side. Windows have concrete sills covered with flashing and molded wood frames and are fitted with four-over-four sash. The windows have recently been repaired by the use of casement windows with a glass and muntin arrangement that duplicates the original windows. Decorative effects are limited. There are simple bed moldings beneath the gallery and the roof of the lantern, and the gallery's balustrade is formed of a solid concrete rail with rectangular sunken panels.

See continuation sheet.
Marcus Hook Range Rear Light is significant as an early use of reinforced concrete in lighthouse construction (Criterion C) and as a major Delaware River range light, an integral component of early 20th century improvements to the shipping channel below Philadelphia (Criterion A). One of a half-dozen historic range lights on the Delaware, it is the only one constructed of concrete. Its significance as a historic resource is heightened by the presence of the related dwelling and oil shed.

Marcus Hook Range Rear Light reflects the modernization by the federal government of the Delaware River Channel in the early 20th century. The Army Corps of Engineers in 1910 approved the deepening of the channel below Philadelphia from 30' to 35' in depth. Because part of the deepened channel had to be relocated two new ranges, Marcus Hook and Chester, were laid out to take the place of Schooner Ledge Range. Together with the front range light, Marcus Hook Range Rear Light defines the center line of the channel, for this portion of the river. The Marcus Hook Range is used by ships coming down river from Philadelphia and other upriver ports. It is 7,000 yards long. It is just over 200 yards wide. The range lights are at the southern end of the channel. A river pilot or ship's captain keeps both the rear light and the front light aligned on top of each other in coming down river. In this way he knows that the ship is in the proper channel.

Re-inforced concrete was first used for lighthouses on the Pacific coast in 1908, when the tower at Point Arena, California, was rebuilt after its destruction in the earthquake of 1906. Other
concrete lighthouses off California, Oregon, Washington, and Alaska were built in subsequent years. On the Atlantic coast, the material had primarily been used for minor structures such as the small 1912 oil shed at Delaware Breakwater Light, but in 1913 the lighthouse at Brandywine Shoal was re-built with not only a large reinforced concrete superstructure but a caisson-shell of the same material. The Lighthouse Service's experiments with concrete continued in 1916, when the 100' tower for the Marcus Hook Range was designed. The usual practice at the time was the use of iron or steel skeleton towers for rear range lights, and in fact, Marcus Hook's companion, the 1917 Chester Rear Range Light, was such a tower. Other than providing an extremely strong structure, reinforced concrete would appear to have only minor advantages over steel. Even though the material itself was cheaper, the building of forms, placement of reinforcing rods, and pouring of cement on the upper levels must have been much more complicated than the erection of a largely pre-fabricated tower, something the U.S. Lighthouse Service had been doing since the 1870s. In addition to its structural strength, however, concrete provides a nearly maintenance-free surface, both interior and exterior.

At the time the Marcus Hook Range Rear Light was constructed, all of this nation's lighthouses were under the control of the Bureau of Lighthouses, an agency of the Department of Commerce. The Bureau had been part of the Commerce Department since 1903. Prior to that it had been a branch of the Treasury Department. The Bureau itself was created in 1910 to replace the lighthouse Board. That Board had been established in 1852 as a nine-member group that supervised the construction and maintenance of the lighthouse system. In 1939, the Bureau of Lighthouses was abolished and its duties transferred to the U.S. Coast Guard, a branch of the Treasury Department.

One of the hallmarks of all of the various agencies that have had control over lighthouses has been their desire to provide a safe and reliable system of aids to navigation. The adoption of improved lighting and focusing systems is one example. The use of new materials such as concrete or cast iron is another example. The agencies have also been very willing to work with other agencies such as the Army Corps of Engineers to insure the safe flow of shipping along the courts and inland to major ports.
The interior of the lighthouse features steel stairs running along the outside wall. Other than the stepped flat moldings which surround the windows, there is no interior finish. The concrete of walls, floors, and ceilings is exposed. The electric light shines through a large plate-glass window on the lantern's east face. The original light was focused by a dish-shaped fourthorder Fresnel range lens. The lens rested upon an iron pedestal and consisted of eight rings of cut glass held in place by brass retainers for a total diameter of about 36". It is marked "BARRIER PAVARD 7 TURENNE, constructeurs, Paris." That lens has been donated to the Philadelphia Maritime Museum, Philadelphia, PA. The tower is now illuminated by a powerful fixed searchlight with a red lens. The original light source was a acetylene gas lamp.

The keeper's house is a two and one-half story brick dwelling, Colonial Revival in style, with the ridge of its gable roof parallel to the road. The walls are of textured brick laid up in Flemish bond, with splayed brick lintels over the windows, which are fitted with six-over-one sash. A flat-roofed porch runs across the front of the house, sheltering the entry centered in the three-bay facade. Decorative effects include a full return of the cornice across the gable ends and quarter-circle attic lights on either side of the exterior chimney on the northeast end. The one-story brick outbuilding is similarly detailed. Although the original sliding door has been replaced with a modern roll-up garage door, the outbuilding retains its original asbestos-shingled roof similar to that initially installed on the dwelling.

The facility is in fair condition. The dwelling and outbuilding appear to be in good repair and retain their historical appearance substantially intact. The tower itself has not fared as well. The concrete has undergone natural weathering, exposing the river-gravel aggregate beneath the surface. There are a few places where gouges have exposed small sections of reinforcing rod. More importantly, large pieces of concrete along the lower edge of balustrade are spalling and coming off; repairs have not been successful. However, the structural integrity of the tower, the condition of the lantern roof, and the inherently long-lasting exterior material all appear basically sound.
9. Major Bibliographical References

SEE ATTACHED SHEET

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 #

Primary location of additional data:
☐ State historic preservation office
☐ Other State agency
☐ Federal agency
☐ Local government
☐ University
☐ Other

Specify repository:

10. Geographical Data

Acreage of property .75

UTM References
A 1.8 45.6 4.6 4.4 0.1 2.8 0
Zone Easting Northing
C _ _ _ _ _ _ _ _

B Zone Easting Northing
D _ _ _ _ _ _ _ _

See continuation sheet

Verbal Boundary Description

The nominated parcel is that lot described in the deed, the parcel dated February 20, 1977 and recorded in deed book L27 P281 in the New Castle Recorder of Deeds Office in Wilmington, DE.

Boundary Justification

The bounds are the original tax parcel that made up the Coast Guard/Light Service property.

See continuation sheet

11. Form Prepared By

name/title See attached sheet
organization Bureau of Archaeology & Historic Preservation
date October 1988
street & number 15 The Green
city or town Dover
state DE
telephone (302) 736-5685
zip code 19901
Marcus Hook Range Rear Light
New Castle County, DE.
Top is north
not to scale - dimensions as marked
Site Plan of

Marcus Hook Range Rear Light

Approximate Scale

0 16 32 64 12 feet
United States Department of the Interior
National Park Service

National Register of Historic Places
Registration Form

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2. Location

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3. Classification

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| Name of related multiple property listing: |
| N/A |

| Number of contributing resources previously listed in the National Register |
| 0 |

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this 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 meets does not meet the National Register criteria. See continuation sheet.

<table>
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| State or Federal agency and bureau |

5. National Park Service Certification

I hereby certify that this property is:

| entered in the National Register. |
| See continuation sheet. |
| determined eligible for the National Register. See continuation sheet. |
| determined not eligible for the National Register. |
| removed from the National Register. |
| other, (explain): |

<table>
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was under the supervision of the Civil Engineering Command of the third U.S. Coast Guard District. Since then, the regular source of electricity has been commercial power via 5KV submarine cable connected to the main source at Cross Ledge.

In case of commercial power failure, the back-up system in the basement takes over. The system in substance consists of 12.5 KVA generator, automatic transfer, distribution panel, and 2300V primary and 120/208V secondary transformer. In an emergency, the power generating system provides A.C. electricity to the 1,000 watt lamps in the Fresnel lantern, flasher and lamp changer, double fog signal, boiler, fresh and sanitary water pumps, kitchen range, refrigerator and hot water heater, tower lighting and radio transmitter.

Modernization Program

Under the July 1983 Modernization Program - with a December 1985 supplement - the same Command placed a contract with Maida Engineering Inc. for electrical, mechanical and structural work (structural work essentially called for welding of steel plate in connection with the electrical and mechanical details). The work included the removal of outmoded equipment, accessories and conduit; and the installation, connection and purchases/government furnished of up-to-date replacements. Modernization had been underway, weather permitting, for at least three years when the program was completed in the fall of 1988.

A systems approach, including on-shore supervisory control, covered shore power and on site emergency energy, emergency light flashing, fire protection, fluorescent lighting, fog and halon signal and environmental conditions. The emergency energy system and almost all of the new equipment were installed and connected in the first floor. The high voltage cable, power cut-outs, fuel tanks, ground connections, surge arrestors went to the vault in the basement. Marine plywood covering was put over windows and sashes, steel plates welded to port openings and hatch covers and all other openings filled in with materials matching the contiguous materials for environmental control.

During the modernization program - but not specified in it - the roof gallery was removed due to deterioration with serious hazards and to excessively high cost to repair or replace. A steel security door was installed over the original wooden double door entrance to the tower. Although covered, the one-over-one sashes were not disturbed.

Historic Resource Consultants' supplement to the firm's December 1, 1982 Site Visit Report brings out that the walls of the living quarters as well as the walls of the staircases and watch deck are panelled with wood-fiber. No drawing nor bill of materials has come to light to provide clear-cut details on the panelled
walls. Instead, one of the 1983 modernization drawings shows an existing bulkhead detail for the first floor with an interior T.
& G. wood wall. A reasonable inference from the 3rd District
Civil Engineering Command's 1948 drawings indicates the likelihood
of panelled wood walls. The drawings were for the rehabilitation
of the living quarters, but no mention of walls was made in them.
The lighthouse keepers occupied the living quarters until 1975.

Sources:

1. Office of Superintendent of Lighthouses Prints of
   Improvements to Machinery for Fog Signal Drawings
dated August 1938.

2. U.S. Coast Guard 3rd District Civil Engineering
   prints of A.C. Electrification drawings dated
   May 13, 1958.

3. U.S. Coast Guard 3rd District Civil Engineering Prints
   of Modernization Drawings and Bills of Materials dated
   July 28, 1983.

4. Historic Resource Consultants supplement to the firm's
   December 1, 1982 Site Visit Report.

All four sources carry "Miah Maull Shoal Light-
house" in their captions. All prints of drawing and
bill of materials provided by the Shore Maintenance
Detachment, Ninth U.S. Coast Guard District. Site
Visit Report provided by Bruce Clouette, Partner.
Historical Physical Appearance

Foundation

The foundation, painted gray, is 40 feet in diameter at the bottom, tapers inward to a neck of 30 feet in diameter. Above the neck, it flares out to create a trumpet shape. The foundation is 43 feet in height. A caisson (foundation shell) was erected on shore near Wilmington, Delaware. It consisted of seven courses (levels) of cast iron plates connected to each other with bolts through internal flanges. The shell, partially filled with concrete, was towed to the site where it was placed upon a steel cylinder footing and set in concrete on 187 white oak piles previously driven 22 feet into the shoal bottom.

Then a 40'-wide band of riprap (broken rock loosely thrown together) was placed around the footing to prevent scouring. Concrete was poured into the unfilled space in the shell, leaving some 16' at the top unfilled to serve as a basement area. Six round portholes ventilated the basement.

Basement

Space existed in the basement and in the foundation courses for an air tank, a boiler, a cistern, a coal room, and oil room, a vault and a water tank. The 4.0' x 9'2" vault with an entrance from the basement floor is placed largely in Course $5$. These utilities are essential for the comfort of the keepers and for the operation of the lighthouse.

Several of the other cast iron plates in Courses $4$ and $6$ are modified for run-off of cistern overflow, sink waste and water closet waste. Course $5$ takes care of the mooring rings on the boat landing platform. The cornice of the tower is connected to plates in Course $7$.

A chimney which provides for two 8" x 8" flue openings for furnace gases and smoke is otherwise embedded in reinforced concrete for five feet below the first floor. An oblong chimney with a 16" diameter extends to the roof along the brick lined wall plates to the roof of the third floor. A flue opening is on each of the three dwelling floors. From the third floor roof, the chimney is held in place by a chimney stay fixed to the edge of the lantern floor balcony. The chimney is then in place beyond the lantern floor levels with the base of the ventilator ball.

A ladder 17-3/4" wide and 16'1" tall stands from below and above mean low water and mean high water and is attached to the landing platform. The railed landing platform measures 3'9-1/2" x 2'1-3/4". Another ladder with the same width as the platform stands 11'7" and is fixed to the first deck under a 2'0" x 2'0" landing hatch.
There are two boat landings and ladders, one on the west side and another on the east side of the tower.

**Tower**

The tower, 59 feet above mean high water, also is cast iron (brick lined) with plates bolted together with internal flanges. It accommodates in ascending order, a three-story dwelling area, a one-story watch deck and a lantern deck. A roofed veranda features a cast iron piped rail encircling the deck of the first story. Smaller railings are around the watch and lantern decks.

A center column is the interior structural element of the tower extending from the basement floor to the top of the watch deck (fourth floor). It is cast iron 3/4 inch thick with an 11 inch inside diameter. There are a total of four 3-1/2 x 10 inch column circular openings covered with sheet iron doors: two such openings in the basement and one each on the third and fourth floors. The center column stands in 2 feet 6 inch square cast iron floor plate on the basement floor.

The associated structural strength of the center column comes from the cast iron plates of the tower wall interconnected between the three dwelling floors and the watch deck. In the case of the dwelling area, the individual wall plates are uniform in size, are classified as either inside or outside elevations and are slightly different in numbers, in keeping with the varying radii. In comparison, the wall plates of the watch deck are smaller in size, are fewer in number, but are likewise either inside or outside elevation and for the same reason.

All wall plates reflect a similar design, form the contours of the tower, have raised edges and are bolted together. Windows and doors for the dwelling and watch tower are cut out of the exterior plates. Holes are drilled into the wall and floor plates for downspouts and pipes leading to the basement facilities.

A 3" I beam is placed across the top of the watch tower, beneath the lantern floor.

Cast iron floor plates connect the dwelling tower wall plates to the center column. In a similar vein as the wall plates, the floor plates are uniform in size and are in different numbers depending upon the respective radii of the dwelling and watch tower. The vertical section of the first floor is fitted with T-iron supports, both the vertical and horizontal sections of the second floor are fitted with similar supports, and the horizontal section above of the third is likewise supported.

A staircase is cut out of the floor plates on the south side of the tower for each of the three dwelling floors. Another cut-out on the first floor provides for a trap door covering the coal chute to the coal room in the basement.
NIAH MAULL SHOAL LIGHTHOUSE
New Jersey  Cumberland County

Two 5" I-beams are in place on the first floor, another on the second floor and still another on the third floor. Three of the beams extend from the wall plates to the center column. The second I-beam on the first floor is at right angle to the other I-beam.

Wood floor 2" thick overlays the cast iron floor.

In sum, the circumference wall plates and the central column, all cast iron, are the structural elements of the tower. Collateral support flows from the interconnected cast iron floor plates and the steel beams.

Dwelling Area

The three-story dwelling area, each floor 9 feet in height, tapers from a base diameter of about 26 feet to a top diameter of some 23-1/2 feet. Seven windows on the first floor and eight each on the second and third floors have wooden one-over-one sashes in cast iron surrounds with molded lintels. A wooden double door in a cast iron frame, also with a molded lintel and with rectangular lights over recessed panels provides access to the dwelling area on the south side of the tower.

The dwelling area approximates a conventional home style with a kitchen and dining room on the first floor, with two bedrooms and a bathroom on the second floor and with two more bedrooms on the third floor. A pantry, storage room and four closets are appropriately located. Rooms are separated for privacy and for functional use by horizontal and vertical partitions essentially of channel and plate iron.

Dresser - 3'6" side, 8'0" high and 15" deep - with two-way doors, drawers and shelves and rimmed in iron plate is fixed to the first floor and the ceiling.

A roofed veranda encircles the first deck. The 5/32" sheet steel roof plates with 32 rafters are secured by flanges to the tower wall plates below the second floor windows. It has an approximate one foot slope from the tower wall plates to the 5" x 7" gutter, with three downspouts bolted to 7'8" columns. The twelve columns slip over 3-3/4" floor plate tenons. Sixteen 3'11-1/8" posts and the twelve columns are linked together by three levels of 1-1/4" pipe to form the cast iron Truscon railing around the first deck.

Watch Deck and Lantern Tower

In contrast, the diameter of the fourth floor (watch deck) and the lantern floor are considerably smaller than the 26' and 23-1/2' diameter of the three dwelling floors. The diameter of the watch deck is 15' and slightly more than 9' high. The diameter
of the lantern floor is 8' in diameter and has a focal point of a little more than 5'.

The framing plan of both the fourth floor and the lantern floor provides for further structural support by the strategic placement of steel I-beams. Each floor has an I-beam across its diameter which is connected to the central column and to the wall plates. Other I-beams on each floor are either directly or indirectly attached to the central column and the wall plates.

A semi-circular iron staircase with separate up and down ways between the fourth floor and lantern floor is completely affixed to the central tower via cast iron floor plates. There are eleven newel posts which support the handrail between the fourth floor and the lantern floor. The stairs in between are treaded.

Four round-arched windows with plain cast iron surrounds are set in a like number of outside wall plates of the fourth floor (watch deck). A pane of glass 20" x 20" is in place on each one over one 1-3/4" sash. Metal weather stripping is put in the crevices between the sash and the window frame.

A 1-3/4" thick metal arched door is the balcony entrance to the fourth floor. It has three separate panes of glass, the largest is arched and measures 16" x 28". A projecting molding is across the door near the threshold.

Pipe railings with orb-shaped finials (terminals pointed upward) encircle the galleries at the watch deck and the lantern deck. The watch deck railing consists of eight sections, each one with four posts standing 3' high bolted through a 3" steel I-beam below deck and with twenty-four 3/4" vertical pipes and three 1/2" horizontal pipes. In comparison, the lantern deck is comprised of six sections, each one with three posts also standing 3' high bolted through a 3" steel I-beam below deck and with ten 3/4" vertical pipes and three horizontal pipes.

In short, the railings are cast iron, shouldered and riveted. Excluding the finials, a watch deck section is 3' x 6' and the lantern deck section 3' x 4'.
first-order was the largest and gave the most powerful light. The smallest was a sixth order lens. (there was a three-and-a-half order lens).

The Fifth Auditor dragged his feet on accepting the superiority of the Fresnel lenses so that by 1851, only three light stations in the United States were equipped with the lenses. And they came about by the special acts of Congress. Congress also stipulated that Fresnel lenses were to be placed in all new lighthouses and in lighthouses that needed new lighting apparatuses.

Congressional action brought about a change in the administration of lighthouses from the Fifth Auditor (1820-1852) to the Lighthouse Board (1852-1910).

In the 1870's the Lighthouse Board once again undertook experiments seeking a better fuel. In 1878, the board began introducing kerosene, or mineral oil, into lighthouses. The slowness in introducing mineral oil was due to the fact that the lens lamp had to be converted to use the new fuel.

The Fresnel Lense and the kerosene fuel were still in general use when the initial Congressional appropriation was made for the Miah Maull Shoal Lighthouse on June 30, 1906 and when the lighthouse was in the 1907-08 planning stage. Both found their way into the structure of the lighthouse during the 1909-1913 construction stage.

Whatever its design and construction the top deck (tower) has one primary mission: to support the light the mariner needs to see. The lighthouse is, principally a nighttime aid and as a consequence, the most important aspect of the lighthouse is the light.

The top deck of the Miah Maull Shoal Lighthouse is fitted with a Fresnel lantern (1-1/2' x 3') which encloses a fourth order lens, a hydraulic lamp and a rotating or clockwork mechanism. Kerosene is inventoried and kept in the basement as fuel for the lamp. The lantern, under the lighthouse keeper's surveillance, creates the light characteristics for protecting nearby navigation.

The lantern occultates white at 4 seconds with a nominal range of 15 nautical miles for the white sector and 12 nautical miles for the red sector. The arc of the red sector extends approximately from northwest to southwest and covers the Brown and Joe Flogger shoals along the main shipping channel.

A series of prisms held in brass retainers form a vertical cylinder and the lens concentrates the light from the lamp into a narrow intense beam. Red plastic affixed inside the lantern's glazing causes the beam.
The source of the light is the incandescent oil vapor lamp. Kerosene is forced into a vaporized chamber where it strikes the hot walls and is instantly changed into a vapor. The gas goes through a series of small holes to a mantle (fabric net).

This lamp was the final step in the refinement of the flame. Subsequent improvements in lighting went beyond fire: electricity, now solar.

Source:

Prints of 22 drawings with Miah Maull Shoal Lighthouse in caption provided by Shore Maintenance Detachment, Ninth U.S. Coast Guard.
8. Statement of Significance
Certifying official has considered the significance of this property in relation to other properties:
☐ nationally     ☐ statewide     ☐ locally

Applicable National Register Criteria
☐ A ☐ B ☒ C ☐ D

Criteria Considerations (Exceptions)
☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

Areas of Significance (enter categories from instructions)
Engineering
Maritime History
Transportation

Period of Significance
1908-1913

Significant Dates
Dec. 1913

Cultural Affiliation
N/A

Architect/Builder
Lynchburg Foundry Co., Lynchburg, Va.

Tarnall-Brown Co., Wilmington, Del.

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

The Miah Maull Shoal Lighthouse is a well-preserved embodiment of the cast-iron and concrete caisson foundation technology which was used from 1876 to 1913 in lighthouses that occupied waterbound sites in the northeastern United States. At least 50 such lighthouses were built. Miah Maull Shoal, designed in 1907 and completed in 1913, was the last example of this type built before reinforced concrete technology was introduced; it was also one of the last major navigational aids built in the Delaware Bay. As part of a string of lighthouses in the bay and the lower Delaware River that were in place before World War One, Miah Maull Shoal helped foster the improved navigation of the Delaware that was crucial to the success of the Hog Island Shipyard (now the site of the Philadelphia International Airport), which was established in 1917. By the end of the conflict, Hog Island had become the largest shipyard in the world. Miah Maull Shoal lighthouse meets Criterion A under the category of Transportation and Criterion C under the category of Engineering, as an embodiment of an important engineering technology.

The Miah Maull Shoal itself, which was named for an eighteenth-century Delaware mariner, was 800 yards wide and 3,000 yards long at a depth of 13 feet—a significant hazard to large modern ships, which required a much greater draft. The need for a deep channel, both for commercial and for military purposes, was foreseen during the early years of this century. Now known as the Philadelphia Ship Channel, it was called for by Congress in the River and Harbor Act of 1909 to be a 35-foot deep channel at least 800 feet wide from the Philadelphia and Camden wharves and shipyards to the mouth of Delaware Bay, to replace an existing 600-foot wide, 26-foot deep channel begun in 1885. Subsequent improvements have deepened the channel to 40 feet.
Miah Maull Shoal lighthouse was designed as one of the major navigational aids required for this channel. Appropriations to build it were approved by Congress in acts of June 30, 1906, March 4, 1907, and March 4, 1911. The lighthouse was designed during 1907-8 to employ a pre-fabricated conical cast-iron shell resting on a foundation of pilings surrounded by rip-rap. In this method of construction, the shell was pre-fabricated, towed to the site, and sunk by filling it with concrete. The contract for the shell was awarded in May 1908 to the Lynchburg Foundry Company, of Lynchburg, Virginia, even before site work began. The plates were delivered to Wilmington, Delaware, where they were subsequently assembled and the shell floated. Work at the site was started on July 24, 1908. The Coast Guard towed the shell to the site in August 1909, and the sinking and filling was completed by November. In June 1910, with the building’s superstructure under construction, Engineering News described the emerging edifice.

The foundation shell is 40 ft. in diameter at the base and 42 ft. 8 ins. in height. It is composed of 224 1+1/4-in. cast-iron plates in seven courses, the top course being bell shaped.... The superstructure will consist of a three-story iron dwelling....

The superstructure of Miah Maull Shoal lighthouse was completed on February 20, 1913 and its permanent fog signal was placed in operation on December 5, 1913.

Less than one year later, the Great War erupted in Europe. As part of the American response, the United States commissioned a great number of new military vessels. In September 1917, after the American entry into the war, the American International Shipbuilding Corporation was awarded a contract to build fifty large cargo ships, and in the following month a subsequent contract added seventy more, all to be completed before the end of July 1919. To meet this extraordinary demand, the company secured Hog Island, a large island along the west shore of the Delaware River just south of the confluence of the Schuylkill River. In a crash construction program from September through December 1917, the company built the Hog Island Shipyard in order to fulfill its contract, which could not be handled by existing shipyards in the Delaware Valley. The ships produced by the Delaware River shipyards for World War One proved the need for the Philadelphia
deep channel and its value for national security. Of the navigational aids in the Delaware, the Miah Maull Shoal lighthouse most clearly represents the improvements of this period.
United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section number 9  Page 1

MIAH MAULL SHOAL LIGHTHOUSE
New Jersey  Cumberland County


Survey of Coast Guard, First through Seventeenth Districts. Lewis C. Maull.


Drawings


Ninth U.S. Coast Guard Shore Maintenance Division. Prints of original construction drawings. 1907-1908.
MIAH MAULL SHOAL LIGHT

Light List Number: 37980 (Volume I)

Geodetic Position: 39-07.6 North, 75-12.6 West

✓ Lamp: 1000 Watt

✓ Lantern: 4th Order Classical Fresnel

✓ Characteristic: Occulting White at 4 second interval

✓ Nominal Range: 15 nautical miles (white sector); 12 nautical miles (red sector); red from 137.5 degrees true to 333 degrees true

✓ Power Type: Commercial power via submarine cable

✓ Horn: 1 blast every 10 seconds (1 second blast)

Emergency Light: Of lower intensity with same characteristic as main light if main light is extinguished.

Located on north end of shoal

Shoal dimensions: 800 yards X 3000 yards - 13 foot depth
PLAN OF
MIAH MAULL SHOAL LIGHTHOUSE

FOUNDATION
TOWER (BASE)
TOWER (TOP)
WATCH DECK
LANTERN
ENTRY

1/8" = 1'
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 of eligibility for individual properties or districts. See instructions in Guidelines for Completing National Register Forms (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property
   historic name: Fourteen Foot Bank Light
   other names/site number: United States Coast Guard Light List #1355

2. Location
   street & number: Fourteen Foot Bank
   city, town: Bowers Beach
   state: Delaware
   code: DE
   county: Kent
   code: NA
   zip code: NA

3. Classification
   Ownership of Property
   x public-Federal
   building(s)
   district
   site
   x structure
   object

   Category of Property
   x building(s)
   x district
   x site
   x structure
   object

   Number of Resources within Property
   Contributing
   Noncontributing
   0 buildings
   0 sites
   1 structures
   0 objects
   Total

   Name of related multiple property listing:
   NA
   Number of contributing resources previously listed in the National Register: NA

4. State/Federal Agency Certification
   As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this 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 x does not meet the National Register criteria. x See continuation sheet.

   Signature of certifying official
   SHPO, Acting Director, Division of Historical & Cultural Affairs
   Date: 2/10/59

   In my opinion, the property x meets x does not meet the National Register criteria. x See continuation sheet.

   Signature of commenting or other official
   Date

   State or Federal agency and bureau

5. National Park Service Certification
   I, hereby, certify that this property is:
   x entered in the National Register.
   x See continuation sheet.
   x determined eligible for the National Register. x See continuation sheet.
   x determined not eligible for the National Register.

   x removed from the National Register.
   x other, (explain:)

   Signature of the Keeper
   Date of Action
### 6. Function or Use

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<th>Current Functions (enter categories from instructions)</th>
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### 7. Description

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<tr>
<td></td>
<td>roof              cast iron</td>
</tr>
<tr>
<td></td>
<td>other             stone</td>
</tr>
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Describe present and historic physical appearance.

Fourteen-Foot Bank Lighthouse (Light List Number 1355) rises abruptly up out of the water almost in the middle of Delaware Bay, some twelve miles east of Bowers, Delaware. The lighthouse consists of a white two-and-half story gable-roofed dwelling, cruciform in shape, with an integral square tower. The superstructure rests upon a bell-shaped caisson, 35' in diameter, 24' high, formed of 12 courses of cast-iron plates and filled with cement. The foundation shell is sunk more than 33' into the surrounding shoal; when it was completed in 1886, it was the first light in the United States built by the pneumatic caisson method.

The dwelling is Classical Revival in style, with full returns of the cornice on each of its three principle gables. The main roof extends westward from the square tower which is built into the front or east end of the lighthouse. Gable-roofed wings extending to either side are somewhat lower in height, and the angles between wings are occupied by one-story infills, giving the lighthouse an octagonal plan. The eight-sided lantern located atop the three-story tower has vertical muntins between its glass panes, a pyramidal roof, and an orb-shaped ventilator-lightning rod. The entire structure - walls, roof, and cornice - is constructed of iron plates bolted together through interior flanges. The lighthouse is further protected by a heavy standing-seam metal roof.

A pipe railing with ornamental turned stanchions surrounds the deck on top of the foundation, and another simple rail of pipe and flat stock forms a gallery at the top of the tower. Cast-iron window frames are finely detailed with consoles below the sills and a full classical entablature - architrave, frieze, and molded cornice - across the top. The windows have all been blocked up but formerly contained two-over-two sash. Other parts of the structure include ladders on the caisson which permit boarding from several directions; a small crane (not original) near the northeast corner; two brick chimneys in the north- and southwest angles and a modern stack running up the west.

[See continuation sheet]
Fourteen-Foot Bank Lighthouse is a landmark in the history of lighthouse engineering, the first American use of the pneumatic caisson method of foundation construction (Criterion C). This technique, while difficult, represented a great advance in dealing with the problem of locating lighthouses on unstable sandy bottoms. Using a pressurized wooden chamber open at the bottom, the shoal at Fourteen-Foot Bank was excavated to a depth of more than 33'. As the digging progressed, more tiers of iron plates were added so as to keep the top of the foundation shell above water, and the cavity (except the air shaft) filled with concrete. Following the pioneering effort at Fourteen-Foot Bank, ten other lights in similar circumstances were built by this method, at which time more precise ways of pile-driving superceded the use of pneumatic caissons. Although the dwelling and tower are less revolutionary than the substructure, they constitute a good example of the use of cast-iron plates for superstructures, a construction technique characteristic of the period. One of the Bay's more stylish lights, Fourteen-Foot Bank's Classical Revival form and details reflect the federal government's penchant for classical architecture in public buildings. Finally Fourteen-Foot Bank Lighthouse is also significant because it reflects the great increase in shipping, and consequent need for an improved system of navigational aids, which occurred in the late 19th century (Criterion A).

Fourteen-Foot Bank is a critical turning point for ships navigating the Delaware Bay and had been marked by a lightship as early as 1876. As in the case of other lightships in the Bay, however, this arrangement proved inadequate; ice floes and storms tended to force the lightship from its mooring when it was most needed.
9. Major Bibliographical References


National Archives, Still Picture Branch, photographs c. 1900

Snow, Edward Bowe Famous Lighthouses of America (New York: Dodd, Mead & Co., 1955)

U.S. Lighthouse Board, Annual Report 1877 - 1886

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

Primary location of additional data:

☐ State historic preservation office
☐ Other State agency
☐ Federal agency
☐ Local government
☐ University
☐ Other

Specify repository:

10. Geographical Data

Acreage of property: .07

Coordinates: 39° 02.9' 75° 11.0'

UTM References:

Zone
Easting
Northing

A 1 18 4 3 2 1 9 5 0
B
C
D

See continuation sheet

Verbal Boundary Description

The bounds of this nomination are the lighthouse and the riprap foundation surrounding the lighthouse. This extends for approximately 20 feet from the base of the caisson.

See continuation sheet

Boundary Justification

The boundary includes the lighthouse and the foundation material associated with the lighthouse.

See continuation sheet

11. Form Prepared By

name/title: SEE ATTACHED SHEET
organization: Bureau of Archaeology & Historic Preservation
date: January 1989
street & number: 15 The Green
city or town: Dover
state: DE
zip code: 19901
elevation; and a mast with emergency beacon attached to the west side of the lantern. Interrupting the rail on the northwest rim of the caisson deck is a small hip-roof iron-plate privy, complete with its own lightning rod.

The interior of the lighthouse continues the classical motif, with window and door surrounds of the fluted board and corner block type. Walls are finished with a wainscot of narrow vertical boards, and the four-panel interior doors appear original. The hallway inside the double iron-plate entrance doors contains the stairway to the upper levels. The natural dark maple rail is carried on simple square balusters. Where they take their first turn, the stringers are shaped in a long, graceful S-curve. The railings within the stairwells are narrow round sections of wood. They are covered with twine in a variety of wrapping patterns and knots. There were installed by the lighthouse keepers in their spare time.

The first floor of the lighthouse contains the diesel generators for electric power. The lights and the foghorn are powered by this equipment which is of modern design. The horn is turned off when a crew is on board for inspection duties as it is too loud and intense for the human ear.

The lens is old but not original to this lighthouse and is a drum-shaped Fresnel lens mounted on a four-cornered brass pedestal. Marked "HENRY LEPEAUTE Paris," it is about 18" in diameter and 2' high. The focal plane is 59' above sea level. Plastic insets form a red sector covering the shoal to the southwest. The red sector provides a warning to mariners for the Brown and Joe Flogger shoals. The white main beam can be seen for 15 miles. The red insert reduces the light's visibility to 12 miles.

The lighthouse is in fair condition. Both railings have large sections missing and some of the interior trim has been removed. Overall, however, the light retains its historical appearance, the chief alteration being the blocking off of the windows.
Moreover, traffic on the channel had greatly increased in the 1870s; imports into Philadelphia almost doubled in that decade. Ships carrying goods and passengers to Philadelphia not only had to avoid Fourteen-Foot Bank, but nearby Brown and Joe Flogger shoals as well. The Lighthouse Board began planning in 1882 for a permanent light to better mark these hazards.

After considering several options, the board adopted the suggestion of its engineer, Major D.P. Heap, that an iron-plate foundation be sunk into the shoal with the pneumatic-caisson method. First used in lighthouse construction (with mixed results) in building the Rothersand, Germany, light in 1881-82, the pneumatic caisson used compressed air to create an underwater chamber in which excavation crews could work. When the Fourteen-Foot Bank Light was designed, it was still an extremely advanced technique.

A lighthouse constructed in this manner offered several advantages over alternative methods. The screw-pile lighthouses which were the previous state-of-the-art were susceptible to ice damage and proved better suited to warmer waters than Delaware Bay. Iron caissons attached to wooden piles driven into the sand had been used at Ship John Shoal light and Great Beds in New York Harbor. Precise pile driving was difficult, however, and involved underwater leveling of the piling by diving crews. Moreover, the foundation had to be accurately and securely set onto the piling. With the pneumatic method, however, the foundation itself could be sunk into the shoal, providing a more stable base.

The wooden caisson, as well as the first three courses of iron plates was assembled on shore at Lewes, Delaware, and towed to the site, where it was submerged and work was begun. A ship's tender, "Moro Castle" was used as a construction platform, warehouse, and worker's barrack. On site, workmen entered the caisson and worked within the air-shaft working chamber to excavate the shoal. When the iron plate walls broke the surface of the water, the caisson was filled with concrete to the water level.
Thirty-eight men spent the summer of 1885 working on the excavation and filling the caisson. According to one author the following incident occurred as the construction crew was preparing to leave the work site:

"In a heavy southerly sea, the Moro Castle parted her moorings and began to drift down toward the lighthouse cylinder. which at the time was only eight feet above the water and filled with concrete to water level. The steamer was about to hit the obstruction a glancing blow, but several of the men sitting on the upper flanges of the cylinder dropped fenders to ward off the vessel. Thus the Moro Castle struck relatively gently. Nevertheless that light bump was enough to prevent the men from leaving their seated positions, for it momentarily opened the joints between the cylinder sheets a tiny fragment of an inch—just enough to catch their trouser seats when the joints closed again. As their floating home was rapidly leaving them, the workmen, with a single shout, discarded the garments in which they were trapped and leaped aboard the Moro Castle with only their pride injured." (Snow, p.144)

After the caisson was complete, 1,000 tons of riprap were placed around the caisson. A mast with a light was left to mark the site of the caisson. The lighthouse was completed during the summer of 1886 and occupied that fall. After weathering several storms, the lighthouse trembled during storms, consequently 2,000 additional tons of riprap were added to the base of the lighthouse.

The superstructure is also characteristic of the improved lighthouse technology of the 1880s. Unlike the stone, brick, and frame structures common earlier, the iron-plate dwelling and tower at Fourteen-Foot Bank was pre-fabricated and bolted together on the site, an important economy in the construction stage. Moreover, when properly painted, the iron was as maintainable any substance until reinforced concrete became available.
In its stylishness, the light at Fourteen-Foot Bank is more akin to the lighthouses of the 1870s than the prosaic conical towers which prevailed in the 1880s and 1890s. The Classical cornice moldings, the gables treated as pediments, and the molded door surrounds in the interior are all elements derived from the architecture of ancient Greece. Fourteen-Foot Bank was recognized in its time as a major engineering accomplishment, and this may explain why a more elaborate superstructure was chosen.

Classical architecture had passed from fashion in private construction, but governmental projects continued to favor the style for its connotations of elegance and permanence. Although it is not the original lens in the lighthouse, the present lens at Fourteen-Foot Bank dates from 1918 and is one of a dwindling number of in-place Fresnel lenses. The Fresnel lens was the major innovation in lighthouse illumination of the 19th century.
COMPREHENSIVE PLANNING

The Fourteen-Foot Bank as a federal constructed aid to navigation is important to the historic theme of transportation and communication. As an example of a specific solution to an engineering problem, i.e. the permanent display of a fixed point of light, the light and its related buildings is significant to the theme of architecture, engineering and decorative arts.

Geographically, the Fourteen-Foot Bank Light falls within the Coastal Zone by virtue of its location in the Delaware Bay.

Constructed in 1885-1886, the light represents the intensification of the rate of Urbanization and Suburbanization in Delaware. Increasing traffic to all the ports along the Delaware Bay caused the federal government to significantly upgrade the aids to navigation in the Bay or River and to improve the depths of the various channels.
Site Plan of

Fourteen-Foot Bank Light

Approximate Scale
Figure 1: Construction details, from the Annual Report of 1886
South and sectional elevations (1886) of the caisson lighthouse established in 1887 at Fourteen Foot Bank in Delaware Bay. The cast-iron caisson was floated into position and filled with concrete. Compare this elevation with the exterior photograph of Sunk Point (Maryland) light, on page 117. Drawing in the author's collection.
United States Department of the Interior
National Park Service

National Register of Historic Places
Registration Form

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1. Name of Property
   historic name: Reedy Island Range Rear Light
   other names/site number: U.S. Coast Guard Light List #2195
   CBS #N-5120

2. Location
   street & number: Rt. 9 at Road 453
   city, town: Taylors Bridge - Townsend
   state: Delaware
   code: DE
   county: New Castle
   code: 003
   zip code: 19734

3. Classification
   Ownership of Property
   x private
   □ public-local
   □ public-State
   □ public-Federal
   Category of Property
   x building(s)
   □ district
   □ site
   x structure
   □ object
   Number of Resources within Property
   Contributing: 3
   Noncontributing: 2
   buildings
   □ 0
   sites
   □ 0
   structures
   □ 0
   objects
   □ 4
   □ 2
   Total
   Name of related multiple property listing: NA
   Number of contributing resources previously listed in the National Register: NA

4. State/Federal Agency Certification
   As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this 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. □ See continuation sheet.
   Signature of certifying official
   SHPO, Acting Director, Division of Historical & Cultural Affairs
   State or Federal agency and bureau
   In my opinion, the property □ meets □ does not meet the National Register criteria. □ See continuation sheet.
   Signature of commenting or other official
   State or Federal agency and bureau

5. National Park Service Certification
   I, hereby, certify that this property is:
   □ entered in the National Register.
   □ See continuation sheet.
   □ determined eligible for the National Register. □ See continuation sheet.
   □ determined not eligible for the National Register.
   □ removed from the National Register.
   □ other, (explain:)
   Signature of the Keeper
   Date of Action
6. Function or Use

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<th>Current Functions (enter categories from instructions)</th>
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<td>domestic single dwelling</td>
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<td>domestic secondary structure</td>
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7. Description

Architectural Classification (enter categories from instructions)

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<tr>
<td></td>
<td>roof Iron</td>
</tr>
<tr>
<td></td>
<td>other Iron</td>
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</table>

Describe present and historic physical appearance.

Reedy Island Range Rear Light (U.S. Coast Guard Light List number 2195) is a tall tower of large cast-iron pipe segments. The light is about two miles from the west bank of the Delaware River and is located in an agricultural setting at the rural crossroads known as Taylor's Bridge. Together with the front range light, mounted on a small tower dating from 1951 and not included as part of this nomination, Reedy Island Range Rear Light functions to mark the centerline of a portion of the main channel of the river. Completed in 1910, the facility included not only the light but also several related outbuildings now under private ownership: a keeper's dwelling, small barn, brick oil shed and a small farmshed. A modern (1988) non-contributing fiberglass building at the base of the tower houses an emergency communications and lighting center. It is Coast Guard owned and maintained. The ancillary structures are all part of the nominated property but the small farmshed is a non-contributing building.

The tower is 35' square in plan at the base, diminishing to 10' at the top. The tower's nine legs rest upon 6' feet-high octagonal poured-concrete pads. The pipe sections which make up both the vertical and horizontal members of the tower are held together by diagonal tie rods running between cast-iron junctions. Horizontal members are in two parts jointed in the middle through large circular flanges. The tower's skeletal frame supports a cylindrical watch-room of 10' diameter which in turn is surmounted by an octagonal lantern room with a pyramidal roof and orb-shaped ventilator-lightning rod. Both the large octagonal deck below the watch-room and the watch-room roof are fitted with simple cast iron railings. The light is reached by means of a 7' diameter central stair cylinder.

The ground entrance is on the south side and provides the only decorative feature of the light. Above the narrow double plate doors is a molded cornice resting on large fluted consoles. The rounded center section of this lintel is decorated with a star.

See continuation sheet
8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

☐ nationally  ☑ statewide  ☐ locally

Applicable National Register Criteria  ☑ A  ☐ B  ☑ C  ☐ D

Criteria Considerations (Exceptions)  ☐ A  ☐ B  ☑ C  ☐ D  ☐ E  ☐ F  ☐ G

Areas of Significance (enter categories from instructions)  Period of Significance  Significant Dates

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</tbody>
</table>

Cultural Affiliation

NA

Significant Person

Architect/Builder

unknown

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

The light station at Reedy Island Range Rear Light is significant as one of a small number of major Delaware range lights dating back to the first decade of the 20th century. Its construction technique is characteristic of the standardized skeleton towers which had evolved by the 1890s (Criterion C). The cast-iron pipe segments with flanged ends and special joint sockets made for a tower that was adaptable to different heights and other conditions, easy to erect, and capable of being dismantled and moved if needed. The light also has significance as part of the early 20th century improvements to the Delaware River channel (Criterion A). The continued growth of shipping to and from the port of Philadelphia, as well as faster and larger ships, made it necessary for the Corps of Engineers to dredge a deeper channel in the river. Consequently, the range lights established in the late 1870's, administered by the U.S. Lighthouse Service, Bureau of Lighthouses, were re-built and realigned as part of the project. The significance of Reedy Island Range Rear Light is augmented by the related buildings which surround the tower. The barn, oil shed and keeper's dwelling are important components of the site which reflect the operation of the facility before automatic electric lighting was installed. Relatively unaltered, these secondary structures contribute to the historical integrity of the site.

The Reedy Island Range Rear Light is also important to American Lighthouse history. The light was authorized by the Lighthouse Board but completed by the Bureau of Lighthouses. The latter agency was authorized in 1910. In 1939, the Bureau was absorbed into the U.S. Coast Guard.

Reedy Island Rear is an example of the second-generation of skeleton towers. Previous range lights also had a central cast-iron stair tower, watch-room, and lantern, but their outside bracing consisted of girders rivetted together at the joints. The advantage of the pipe segments at Reedy Island Rear is that

See continuation sheet
9. Major Bibliographical References

SEE ATTACHED SHEET

Previous documentation on file (NPS):
☐ preliminary determination of individual listing (36 CFR 67)
☐ 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 # DE - 11

Primary location of additional data:
☒ State historic preservation office
☐ Other State agency
☐ Federal agency
☐ Local government
☐ University
☐ Other

Specify repository:

10. Geographical Data

Acreage of property  .75

UTM References
A Zone Easting Northing
1 4 1 5 1
B Zone Easting Northing
1 4 1 8 4
C
D

Verbal Boundary Description

SEE ATTACHED SHEET

☒ See continuation sheet

Boundary Justification

The bounds are the original tax parcels that made up the Coast/Light Service property.

☒ See continuation sheet

11. Form Prepared By

name/title  SEE ATTACHED SHEET
organization Bureau of Archaeology & Historic Preservation
street & number 15 The Green
city or town Dover
state DE zip code 19901
The stair cylinder is constructed of heavy metal plates bolted together through welded-on interior flanges. Inside, the cast-iron steps spiral around the central column from which they are suspended. The walls of the hollow column are not solid but instead have a regular pattern of small rectangular openings. Set into the walls of the stair cylinder are cast-iron frames for the widely spaced window openings (fitted with two-over-four sash) and sockets for receiving the vertical members which brace the cylinder from the surrounding tower. The present light, a red beacon with integral lens and reflector, is not the original. It shines through the northeast face of the lantern, the only side not blocked off with metal plates. The tower is painted black, its original color. The light is set at 110 feet above the ground.

The dwelling to the southwest is a two-story hip-roofed clapboarded house of cruciform plan. Along the front part of the house is a porch with Tuscan columns and a rail of turned balusters. The house has a wooden cave cornice. The small hip-roofed barn has dormers front and rear and has a band of board-and-batten siding below the eaves. The oil shed with attached privy at the rear is constructed of white glazed brick. It has a hip-roof, and there are remnants of a sheet-metal classical cornice at the eaves. The outbuildings have standing-seam metal roofs. A small non-contributed wooden shed sits to the east of the barn. It is in bad condition and was not associated with the range light.

The light is in generally good condition, with fresh paint both inside and out; only minor penetration of moisture is occurring. Cracks in the foundation pads caused their replacement in January of 1989. The Coast Guard required the contractor to duplicate the original pads in material and size. The appearance of the tower today differs little from that shown in historical photographs. The replacement of the original illuminating apparatus is the chief alteration. Though the paint is in poorer condition, the privately owned dwelling, barn and also retain a high degree of historical integrity. The Coast Guard owned oil house is in good repair.
they could simply be fitted into the junctions, with only the tie rods needed to hold the structure together. Thus both design and erection of the tower were simplified.

Pipe-segment towers were used not only for range lights but also whenever a fairly protected land-based tower was needed. Coney Island Light (1891) in New York harbor and Cape Charles Lighthouse (1894) at the entrance to Chesapeake Bay are of similar age and construction. Unlike the earlier light towers, which had extensive Classical detailing, these later towers had only a vaguely Eastlake-inspired lintel over the entry as stylistic embellishment. The tower at Reedy Island represents the refined engineering and standardization of design which typified turn-of-the-century lighthouse construction. As such, it is very different in character from the Liston Range Rear Light (1877) located about five miles from the Reedy Island Range Rear Light.

Range lights like Reedy Island Rear function in pairs to indicate the centerline of the channel. The front light is lower in height and lines up with the higher rear light only when viewed from a ship on course. Reedy Island Range Light was one of several built or rebuilt following the 1901 dredging of a 30'-deep shipping channel to Philadelphia. Some of the pre-existing range lights, such as the Liston Range Rear Light were moved, others simply retained in place, and still other sections were marked by new lights such as Reedy Island Rear Light. The Reedy Island Range is used by ships leading down river. It is 6775 yards long and 200 feet wide.

The close cooperation between the Army Corps of Engineers and the various agencies responsible for the aids-to-navigation has a long history in the Delaware Bay and River. The Corps of Engineers built the Delaware Breakwater and the National Harbor of Refuge in Lewes and provided platform for the erection of lighthouses on both breakwater. The Corps of Engineers and the Coast Guard continue to cooperate in maintaining a safe and clear shipping channel.
The Reedy Island Range Rear Light as a federal constructed aid to navigation is important to the historic theme of transportation and communication. As an example of a specific solution to an engineering problem, i.e. the permanent display of a fixed point of light, the light and its related buildings is significant to the theme of architecture, engineering and decorative arts.

Constructed in a modern era of Delaware's history, the light and its outbuildings fall within the urbanization and suburbanization period in Delaware's history.

Geographically the light and its related buildings fall within the coastal zone.
Bibliography:


Lankton, Larry D. "Reedy Island Range Rear Light,: Typescript, Historic American Engineering Record (HAER DE-11)

National Archives, Still Picture Branch, photograph, 1910

U.S. Coast Guard, Third Coast Guard District, Governors Island, Civil Engineering Section, drawing file.

VERBAL BOUNDARY DESCRIPTION

The bounds of this nomination are the bounds of the original parcel of land which is today held by the U.S. Coast Guard and a private individual.

Deed references, recorded at the New Castle County Recorder's Office, Wilmington, DE.

Book D-19, page 97 (original 5.7 acre lighthouse parcel, September 11, 1901)

Book S-654, page 498 (portion of parcel sold in 1954)
United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section number 11 Page 1

Nomination originally prepared by: Bruce Clouette and Matthew Roth of
Historic Resource Consultants, 55 Van Dyke Avenue, Hartford, CT
under contract in 1983 to the United States Coast Guard.

Nomination updated and edited by: Stephen G. Del Sordo, Historian,
Bureau of Archaeology and Historic Preservation.
Site Plan of

Reedy Island Range Rear Light

modern communications shed (non-Cont.)

Oil Shed

Tower

Shed (non-cont.)

Barn

Dwelling

HIGHWAY 9

SOURCE: HAER, 1976
United States Department of the Interior
Heritage Conservation and Recreation Service

National Register of Historic Places
Inventory—Nomination Form

See instructions in How to Complete National Register Forms
Type all entries—complete applicable sections

1. Name

historic Mispillion Lighthouse and Beacon Tower

and/or common

2. Location

street & number Northeast end of County Road 203

city, town Milford

county Sussex

state Delaware

3. Classification

<table>
<thead>
<tr>
<th>Category</th>
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<tr>
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</table>

Accessible

X yes: restricted

X yes: unrestricted

X other: vacant bldg.

4. Owner of Property

name Lighthouse Property: Mr. & Mrs. Eugene Racz

street & number R.D. 1, Box 417; Mispillion Lighthouse Road

city, town Milford

county Sussex

state Delaware

5. Location of Legal Description

courthouse, registry of deeds, etc. Sussex County Courthouse

street & number The Circle

city, town Georgetown

state Delaware

6. Representation in Existing Surveys

title Cedar Creek Hundred Survey

has this property been determined eligible? ___ yes ___ no

date 1984

depository for survey records Bureau of Archaeology & Historic Preservation

city, town Dover

state DE
The steel beacon tower and the 108.4 x 75.15 foot parcel on which it is situated are owned by the U.S. Government. A specific address is as follows:

U.S. Coast Guard  
Third Coast Guard District  
Office of Aids to Navigation  
Governor's Island, Building 135 A  
New York, N.Y. 10004
7. Description

<table>
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<td>fair</td>
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Describe the present and original (if known) physical appearance

The Mispillion Lighthouse is a two-story, wood-frame, carpenter gothic structure with a wood-frame lighthouse tower rising from it. The entire structure is approximately 65 feet tall. Atop the tower is a steel and glass light chamber with a conical metal top. The building is "L" shape in plan with the tower rising from the point where the two sides of the "L" meet. The two lower stories are presently sided with red-painted asbestos shingles, while the lower portion of the tower below the light chamber is sided with machine-sawn, unfinished wooden shingles. Portions of the original wood weatherboarding which once covered the exterior of the entire structure are still visible at the rear of the building.

The lighthouse is largely unaltered in shape except that the original front and rear porches have been removed and the original octagonal railing around the outside of the light room is gone. In addition, the original six-over-six window sashes were replaced at an unknown time in the early 20th century with three-over-one sashes and one-over-one sashes in all but two windows. A 1953 painting of the lighthouse shows that the newer window units had already been installed at that time, and that the light room railing was already gone, though the porches remained.

The wood-shingled roof of the lighthouse is pierced by two original brick chimneys with arched brick tops. The gable ends retain their original simple Stick-style decorations, which include purlins and diagonal brackets at the bases of the roof planes with collar ties and king posts. The gable ends are finished with decorative sawn vertical board and batten trim. The building sits on original brick piers. Early photographs show it surrounded by a fence, but no trace of this remains.

Also on the lighthouse property are three more modern structures, none of which is associated with the historical function of the lighthouse. These include a two-story restaurant structure, a small bait and ice house, and a one-story concrete block dwelling. Only the bait and ice house is in the nominated area, however.

Also included in the nomination is a steel skeleton beacon tower, 60 feet in height, which has held the light since it was moved from the lighthouse in 1929. The beacon tower was originally built by the U.S. Coast Guard at Cape Henlopen in about 1924 to replace the Cape Henlopen Light, that structure having become unstable because of erosion. Cape Henlopen Lighthouse collapsed in 1926 and the site was deactivated. In 1929, the decision was made to move the tower to Mispillion and erect it there. The beacon tower occupies one corner of the original Lighthouse property which is still owned by the U.S. Government. The parcel of land it occupies is approximately 108 feet by 75 feet and it is located at the northernmost corner of the parcel. The tower is approximately 20 feet square, including its concrete supporting piers, at its base, tapering as it rises. The beacon was deactivated by the Coast Guard in 1984, although there are plans to reactivate it.

THIS PROPERTY CONTAINS ONE CONTRIBUTING BUILDING AND ONE CONTRIBUTING STRUCTURE
8. Significance

<table>
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<tr>
<th>Period</th>
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Specific dates 1873  Builder/Architect Unknown

Statement of Significance (in one paragraph)

The Mispillion Lighthouse is the sole surviving wood-frame lighthouse in the State of Delaware and one of only three Delaware Bay lighthouses still standing on Delaware soil (the other two are iron lighthouses at Taylor's Bridge and Port Penn, both of which are listed in the National Register). The Mispillion Lighthouse is significant under National Register Criterion "C" as a building which embodies the distinctive characteristics of a type and period of architecture important to the history of Delaware. The present Mispillion Lighthouse dates from 1873 and is the third such structure to have marked the entrance to the Mispillion River since 1831. The first lighthouse fell victim to erosion. The second, which was deactivated in 1859, was later sold and moved into the nearby community of Milford where it was converted into use as a storehouse. The present building was also deactivated in 1929 and was replaced by a 60-foot standard skeleton steel beacon tower. This steel structure was moved to Mispillion Light from Cape Henlopen where it had earlier been erected behind the old Cape Henlopen Lighthouse when that structure became seriously threatened by erosion. After the Henlopen Light collapsed in April, 1926, the decision was made to abandon the location as a lighthouse site and the steel tower became surplus. It was moved to Mispillion, where it still operates, because the wood-frame lighthouse was in poor repair and it was deemed less expensive to replace it with the steel tower than to repair it. The steel tower and a small plot of land on which it stands continue to be owned by the federal government. Because of its importance to this site and Cape Henlopen the tower is also nominated.

At the peak of its activity in the late 1800's, the Mispillion Light Station had a full-time lighthouse keeper. The station was located on a 2.161 acre tract of land, one of the original owners of which was former Delaware Governor Charles Polk. In addition to the combined lighthouse and keeper's dwelling structure, the station also had such structures as a barn, a storage building, a cow shed, a pig pen and a privy. In 1911 the original oil-powered lighting mechanism was replaced by an automated "4-tank AGA acetylene lighting system" which operated from acetylene gas produced in a small power house behind the lighthouse and stored in storage tanks inside the lighthouse structure. The introduction of this system made the position of lighthouse keeper unnecessary, but the lighthouse service made the decision to hire a local waterman as caretaker, paying him $60 per year and allowing him to live in the keeper's dwelling free of charge since, "it is anticipated that the total abandonment of the dwelling at this isolated point might invite occupancy and possible vandalism by the fishing contingent which operates in this vicinity."

In 1932, the federal government sold the lighthouse and most of the light station property to two local businessmen for $400, retaining the land on which the newer steel beacon tower stands. After acquiring the property, the purchasers erected a restaurant and a small house on the property and built a dock along the waterfront for use by local fishermen. Although the Mispillion light has continued to operate atop the steel tower with several brief interludes ever since, the days of its primary importance when wooden sailing vessels plied the river and newly-built boats from the Milford boatyards passed by on their way to the Delaware Bay are distant memories.
9. Major Bibliographical References


10. Geographical Data

Acreage of nominated property (22,500 square feet) .52 acres

Quadrangle name Mispillion River, Delaware

Quadrangle scale 1:24,000

UMT References

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</table>

Verbal boundary description and justification

See continuation sheet

List all states and counties for properties overlapping state or county boundaries

| state | code | county | code |

| state | code | county | code |

11. Form Prepared By

name/title Richard B. Carter / Sussex County Preservation Planner

organization Sussex County Preservation Office

date January, 1986

street & number P.O. Box 389

telephone (302) 856-7701, Ext. 361

city or town Georgetown

state Delaware

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

national state local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the Heritage Conservation and Recreation Service.

State Historic Preservation Officer signature

title date

For HCRS use only

I hereby certify that this property is included in the National Register

date

Keeper of the National Register

Attest:

date

Chief of Registration
National Archives; General Services Administration; Washington, D.C.

Record Group 26, Records of the U.S. Coast Guard:

1. Selected Records from Lighthouse Site File, Delaware, No. 19.

2. Excerpts from the Annual Reports of the U.S. Lighthouse Board, 1857-1907, contained in "Clipping File."

3. Correspondence of the U.S. Lighthouse Service for the period 1900-1939, contained in "File No. 1047."
The nominated area is a rectangle enclosing both the Mispillion Lighthouse and the steel U.S. Government beacon tower. The rectangle includes the entirety of the U.S. Government property at the site (a smaller rectangle of 75.15 feet by 108.4 feet) and a portion of the larger privately-owned property on which the Mispillion Lighthouse is situated. The nominated area is at the northeastern end of County Road 203 and at the northwestern end of the Mispillion Inlet, at the point where Cedar Creek and the Mispillion River join and enter the Delaware Bay. For a precise location, see the following attached documents:

1. Copy of Area Map and Site Map.


3. Photocopy of 1903 Survey drawing of the property as amended in 1904, 1907, and 1929, the original of which is in the National Archives, Records Group 26, Washington, D.C.
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 of eligibility for individual properties or districts. See instructions in Guidelines for Completing National Register Forms (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property
historic name National Harbor of Refuge and Delaware Breakwater Harbor Historic District
other names/site number S-186

2. Location
street & number Lewes Harbor, Cape Henlopen and the Delaware Bay not for publication
city, town Lewes
state Delaware code DE county Sussex code 1305 zip code 19958

3. Classification
Ownership of Property private
public-local
public-State
public-Federal
Category of Property building(s)
district
site
structure
object
Number of Resources within Property Contributing Noncontributing
1 1 buildings
1 0 sites
XX 17 X 2 structures
0 0 objects
XX 19 X 3 Total

Name of related multiple property listing: N/A
Number of contributing resources previously listed in the National Register 2

4. State/Federal Agency Certification
As the designated authority under the National Historic Preservation Act of 1966, 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 meets does not meet the National Register criteria. See continuation sheet.

Signature of certifying official
Director, Division of Historical and Cultural Affairs
State or Federal agency and bureau

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

Signature of commenting or other official N/A
Date
State or Federal agency and bureau

5. National Park Service Certification
I, hereby, certify that this property is:
X entered in the National Register. See continuation sheet.
X determined eligible for the National Register. See continuation sheet.
removal not eligible for the National Register.
removed from the National Register.
other, (explain):

Signature of the Keeper Date of Action


The National Harbor of Refuge/Breakwater Harbor is located at Lewes, Delaware at the mouth of the Delaware Bay where it empties into the Atlantic Ocean. The inner harbor, the Breakwater Harbor is now located behind Cape Henlopen. Due to natural forces, the Cape has been moving to the north and west into the harbor complex. Outside of the district but on its landward border is Cape Henlopen State Park, a small industrial complex and some resort development. Included within the district and the only point on which it touches land is the former United States Coast Guard Station. The station is now operated by the Pilots Association of the Delaware River and Bay as its station and headquarters. The breakwaters that create the two harbors are listed on the National Register of Historic Places.

The complex was begun in 1828 when two portions of the inner breakwater were constructed. They consisted of a rubble stone main breakwater 2,100 feet long (1 on USGS map) and an ice breaker pier (.2) that is 1,700 feet long. The ice breaker pier cuts across the line of the breakwater at an angle of 33 degrees. The two portions are 160 feet wide at the base and 20 feet wide above the water. The height of the breakwater above the water varies with the tide. These two portions of the inner breakwater are constructed of Brandywine granite from New Castle County, Delaware. The stone was loaded on barges, carried down the Delaware River and dumped overboard. The individual stone weighs from 1/4 to 6 tons each.

A lighthouse was constructed on the northeast end of the breakwater in 1848. Later a federal signal station and a maritime exchange telegraph station were built on the breakwater. These have all been removed.
8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

X nationally  □ statewide  □ locally

Applicable National Register Criteria  X A  □ B  □ C  □ D

Criteria Considerations (Exceptions)  □ A □ B □ C □ D □ E □ F □ G

Areas of Significance (enter categories from instructions)  

Transportation

Period of Significance

1826-1938

Significant Dates

NA

Cultural Affiliation

NA

Significant Person

NA

Architect/Builder

William Strickland and others

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

The Harbor of Refuge/Breakwater Harbor is a significant general aid to navigation that was begun in 1826. The original breakwater and ice pier were designed by William Strickland. This original harbor was the first such structure of its kind in the Western Hemisphere and the third in the world. The harbor was improved and enlarged during the nineteenth century when it reached its present size and configuration. During the twentieth century, the federal government improved and rebuilt the lighthouses and the Lifesaving/Coast Guard Station. The harbor is credited with saving countless ships and hundreds of lives. It continues to serve its original function although it is not usable by large draft ships.

The Breakwater and Harbor of Refuge Breakwater are listed in the National Register of Historic Places.

The safe harbor created by the two breakwaters was considered an important priority by shipowners from the early development of coastal navigation along the Atlantic Coast. The harbor is located at the mouth of the Delaware Bay. Up river is the port city of Philadelphia, one of the most important and busiest ports in the nation throughout our nation's history.

The entrance to the Delaware Bay is a very dangerous one. The water depth varies greatly due to the numerous shoals. Cape Henlopen, which marks the southern mouth of the Bay, shifts over time and it has an extensive shoal, known as Hens and Chickens shoal, directly to seaward. The cape and the shoals were marked with one of the first American lighthouses. Constructed in 1767, it fell into the sea due to erosion in 1926.

As commerce developed and the size and draft of sailing ships increased during the late eighteenth and early nineteenth centuries, the need for a safe haven at Lewes was extensively

See continuation sheet
9. Major Bibliographical References

SEE ATTACHED SHEET

Previous documentation on file (NPS):
☐ preliminary determination of individual listing (36 CFR 67)
☐ previously listed in the National Register
☐ previously determined eligible by the National Register
☐ designated a National Historic Landmark
☐ recorded by Historic American Buildings
☐ recorded by Historic American Engineering

Survey #

Record #

Primary location of additional data:
☒ State historic preservation office
☐ Other State agency
☐ Federal agency
☐ Local government
☐ University
☐ Other

Specify repository:

10. Geographical Data

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See continuation sheet

Verbal Boundary Description The bounds of the National Harbor of Refuge Breakwater Historic District are drawn on the attached map. The line on the outer edge of the Harbor of Refuge Breakwater MNOA is drawn to include the furthest outward extension of the breakwater base. Line DEFG is the inner limit of the Breakwater Harbor's deep basin. The district is only on land at the Pilot's Station headquarters and then only deep enough to extend 15 feet past the southern facade of the main station building.

Boundary Justification

The boundary includes all of the harbor area created by the two breakwaters plus the ice breaker piers and the former Coast Guard parcel.

See continuation sheet

11. Form Prepared By

name/title Stephen C. DelSordo, Historian
organization Bureau of Archaeology & Historic Preservation
date August, 1988
street & number 15 The Green
state DE
zip code 19901
In 1883, the open space between the two piers was closed. The stone came from the same quarries as the original piers. However, the stone was cut in a more regular fashion and was laid up with a steam derrick. Hence the appearance of the new section of the breakwater is much more regular. The newer section is slightly narrower than the original sections of the breakwater.

In 1896, a new and larger safe harbor was authorized by Congress. The National Harbor of Refuge is located 6,500 feet north of the Breakwater on a shoal known as the Shears. It was built with dressed stone and is very regular in appearance. The stone used is much larger than that of the Breakwater. Some of the stone weighs 13 tons. The Harbor of Refuge breakwater is 8,040 feet long at its low water mark and 7,950 feet long at the top. It is 40 feet wide. It was not built in a straight line but rather extends 2,500 feet northward and turns inward 18 degrees.

In 1901, a set of ten stone ice breaker piers were constructed 1,250 feet north of the Harbor of Refuge breakwater. They are constructed of dressed stone and lie in a line 1,300 feet long.

There are two lighthouses within the complex. The first is located on the eastern end of the inner breakwater. It is a small conical cast iron tower constructed in 1885. It is set upon a circular concrete foundation. The tower is 49 feet high. It is 22 feet in diameter at the base, tapering to 18 feet at the gallery or exterior walkway. The watchroom above the gallery is 11 feet in diameter.

The tower is composed of four tiers of cast iron plates bolted together. The interior of the tower is lined with 2 feet of brick. The dominate feature of the interior is a large central cast-iron column. The stairs between each level are set into the outer wall. Hardwood floors are laid over the iron plate subfloors. Much of the original woodwork is still intact although the lighthouse has undergone some modernization. The interior is divided into four levels. The first is an entrance level. The second is a kitchen, the third is a bathroom and the fourth is sleeping quarters.

The watchroom is a fifth level. It supports the lantern. The present light was installed after 1908. It is a small drum shaped Fresnel lens about 15" x 20". The focal plane of the light is 61 feet above sea level. The lantern is a glass and steel plate enclosure for the light. The glass is covered with red plastic inserts except for the northwest section.
Associated with the lighthouse is a reinforced concrete oil shed [8.7] built in 1912. It is 100 feet west of the lighthouse. It housed fuel for the light prior to its electrification as well as other flammable supplies for the lighthouse. There is also a small wooden access pier and walkway [8.8] near the old shed and connected to the lighthouse. This provided access to the facility. These were built in the 1940s to replace older similar piers and walkways.

The second lighthouse [9] is located on the east end of the Harbor of Refuge breakwater. It was constructed in 1926 as a replacement for an earlier lighthouse that was damaged in 1920. The foundation of the lighthouse is a cast iron caisson of curved plates bolted together. It is lined with three feet of poured concrete. A concrete wall surrounds the caisson.

The lighthouse tower is a three story cylindrical tower 25 feet in diameter with a one story watchroom above. The watchroom is 15 feet in diameter and is topped by an octagonal lantern with a pyramid roof. There is a gallery at both the watchroom and lantern level. The overall height of the lighthouse is 76 feet above the breakwater.

The interior of the lighthouse is dominated by a large central cylinder about 8 feet in diameter. The cylinder contains a spiral staircase. The walls within the lighthouse are covered with vertical beaded boards. The floors are narrow hardwood boards resting on I-beams running from the central cylinder to the outer walls.

The lighthouse has suffered some deterioration from the weather. A portion of the seaward gallery was damaged, along with the concrete base when a freighter ran into the lighthouse several years ago.

A number of small modern light towers are located within the harbor complex. One each is located on the northeast end of each breakwater. Two more are mounted on the 1901 ice breaker piers. One is on the most easterly pier and one is on the most westerly pier. All of the lights including the two lighthouses are electrified. The power is provided by a cable that comes from the shore and which is laid on the sea head.

The only portion of the historic district that touches land is at the former United States Coast Guard Station [1.10]. At the station is a modern residence [1.11] at the site of the original 1884 lifesaving boathouse [the boathouse was moved in 1978 to a spot
on the Lewes-Rehoboth Canal where it is operated as a museum by the Lewes Historical Society. There is also a modern pier and walkway [12] which provides ready access to the pilot boats.

The United States Coast Guard Station at Lewes Harbor is a two and one half story Colonial Revival, balloon-frame building constructed in 1938. Now functioning as a river pilot's station, the exterior of the building is little changed from its date of construction. The lot occupied by the station is not extensive. On the south side is the Cape May-Lewes ferry complex. On the north side of a small housing complex.

The station building is a five bay, center hall plan building with a matching one story wing on each gable end. The principle facade faces the harbor. It has a slightly raised foundation and a full basement. The entire building is covered in wood shingle, its original siding. Across the front is a screen enclosed porch supported by paired Tuscan columns. The porch balustrade matches a balustrade on the porch's flat roof. The windows are six-over-six, double hung sash protected by storm windows and the original louvered shutters. The corners of the building and the wings have Tuscan influenced corner boards. The rear facade has an entrance portico covering its offset entrance. The second floor window pattern is the same as that on the front facade.

The gable roof has a box cornice. The main block has three dormers on each face. The window openings are fashioned in a roman'esque arch. A single chimney stack rises from the north interior gable end of the main block but it is offset slightly towards the rear from the center ridge.

On top of the building is an enclosed observation platform. It is decorated with an original Chinese Chippendale railing. The tower itself has two-over-two double hung sash windows on all four sides. The windows are arranged in a modern interpretation of a palladian window with a wider center window and narrow flanking windows. Instead of the three window pattern on the west or rear side of the tower, that side has one window and a door. The tower has a shallow pyramid roof topped by a weathervane showing a sloop-rigged sailing vessel.

The wings provide balance to the main block. Each has three double hung sash windows across the front and rear. The north wing has a modern exterior gable end chimney. There is no chimney on the south wing.

The interior of the station has been altered from its original configuration by the pilots in order to make the building
functionable for their special needs. A large meeting room has been created on the first floor. This required that the original stair be relocated towards the north. The south wing had a fireplace and heavy wood panelling added to the walls on the first floor. On the second floor, a series of small bedrooms have been added. The building serves as a pilot's "motel" as well as headquarters, hence the need for bedrooms. The pilots are required to be on duty or on call during their shifts. The station provides them with comfortable quarters and work space while they wait for ships to arrive at the mouth of the bay.

A feature of the entire complex is a turning basin [13] that was dredged within the inner Breakwater Harbor. It is only apparent on nautical charts and is not shown on local or USGS maps. The turning basin provides a clear safe area for large vessels to maneuver without fear of running aground. The exact date of the initial dredging is not clear, however, it would appear to have been in existence by the end of World War I. Since the harbor complex is not used by modern cargo ships, the depth of the turning basin has not been maintained. The U.S. Coast Guard has established a moving area for vessels in the Delaware Bay just north of Lewes. It extends for several miles up the Bay.
# Contributing and Non-contributing Resources

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pursued by Philadelphia maritime interests. Ships that tried to take refuge behind Cape Henlopen in storms were often run aground.

In 1822, Congress allocated funds to study the possible construction of a harbor of refuge. A board of three experts was created to study the problem. They were General Simon Bernard, a former French officer who was the chief engineer of the U. S. Army; Major J. G. Totlen, his assistant and a former professor of mathematics at West Point; and Commodore William Bainbridge, an expert on coastal fortifications. They recommended a large permanent harbor. Their recommendation was favorably received. In 1825, Congress authorized the construction of the breakwater. William Strickland was appointed chief engineer.

As designed by Strickland, the harbor would be established with the construction of the long breakwater [.1] and the ice breaker pier [.2]. Work began in 1828, when contracts were let for the first shipments of stone. Strickland did not directly oversee the construction of the harbor, he preferred to remain in Philadelphia and continue his architectural practice. [In 1837, while working on the harbor, Strickland designed the New Sussex County Courthouse in Georgetown]. The day-to-day construction of the harbor was assigned to an officer from the U. S. Army. The construction of the harbor was not finished until 1839. By that time 835,000 tons of stone had been used to build the breakwater and ice breaker pier. The long construction period was due mostly to the small annual sums that the U. S. Congress appropriated for the harbor.

In 1833, the Army asked Strickland to design a lighthouse for the harbor. He submitted plans that year and construction started in 1834. The lighthouse was placed on the west end of the breakwater.

During those same years, mooring buoys were to be placed within the harbor for the convenience of ships. This was a tradition in European ports. There is no physical evidence that the buoys were ever provided. In 1876, the Western Union Telegraph Company was given permission to use the lighthouse as a telegraph station. Shortly thereafter, the Philadelphia Maritime Exchange built a building next to the lighthouse to use as a reporting station. These buildings were removed in 1885.
The harbor was an immediate success and it soon became evident that it was too small to provide a totally safe harbor. During storms more than 200 ships would crowd into the harbor. On a regular basis during the 1840s, 25 vessels a day would be in the harbor. The harbor was only about 400 acres in size. Furthermore, the gap allowed strong tides and ice flows to enter the harbor with resulting damage to the ships located there.

During the 1850s and the 1860s, regular repairs and additions were made to the ice breaker pier and the breakwater. The height of the breakwater was increased slightly. A major problem in the harbor was a constant shoaling problem. Several ships had run aground and larger ships had trouble entering and using the harbor.

In the 1870s and 1880s, the federal government increased the functions of the Breakwater Harbor. In 1871, the Army Corps of Engineers began construction of an iron pier out into the harbor. The pier was completed in 1882. It was designed to permit railroad connections directly to ships anchored in the harbor. The project was not financially successful. The pier was 1,700 feet long. It was constructed of wrought iron screw pile shafts with wood decking. Later in its life, it was used by the U. S. Lifesaving Station at the harbor and by the U. S. Quarantine Station at Lewes. That station had been established in 1889. The station was set upon 41 acres with a complex of buildings that developed into isolation wards and a hospital as well as quarters for station personnel. From 1917 to 1918, the U. S. Navy used the station as a Navy base. The Navy apparently held onto the station after World War I. The site was officially abandoned as a quarantine station in 1926. The buildings were all removed in 1931. The iron pier shafts are still in place. They are in bad repair and are not a part of the historic district as it was and is a hazard to navigation.

A lifesaving station was established on the harbor in 1882. The first building was a boathouse that stood near the present Coast Guard Station. The second building was a regular lifesaving station that included crew's quarters. The first building still survives. The lifeboat house is in Lewes on the Lewes and Rehoboth Canal where it functions as a museum. The lifesaving station was moved to Rehoboth Beach in 1938. It was used by the Veterans of Foreign Wars as a club house. It does not seem to have survived the intense development of Rehoboth Beach. The
present building [.10] used as teh pilot's station was constructed in 1938 by the U.S. Coast Guard.

The rise in activity within the Breakwater Harbor increased demands for a significant improvement to the harbor. The most obvious need was to close the gap between the breakwater itself and the icebreaker pier. The need for better protection was forcibly demonstrated when an October, 1877 hurricane destroyed a large number of ships within the harbor and a number of vessels could not get into the harbor.

In 1883, Congress authorized the closing of the gap between the icebreaker pier and the breakwater. The design of the closure was based on an 1836 engineering report by the Corps of Engineers. The base rests on a brush mattress that is 145 feet wide, 15 feet less than the original breakwater. The mass of the closure is rubble stone with a dressed stone cap which is 20 feet wide.

The slope of the closure is steeper than that of the original breakwater. The closure was not completed until 1898.

When the gap was closed, the 1848 lighthouse that had stood on the western end of the breakwater was rendered obsolete. In 1885, the U.S. Board of Lighthouse built the present light [.6] on the eastern end of the breakwater. The original lighthouse was removed. Its removal meant that the Western Union Telegraph Company had to build a new building on the breakwater. This building has also been removed. The light can be seen by vessels on the ocean side of the cape as well as by ships in the bay and Harbor. The lens in the lighthouse is the third one to be placed in the tower. It is one of the few remaining fresnel lenses in place in a working lighthouse in the United States.

In 1896, a new breakwater to be called "The National Harbor of Refuge" was authorized by Congress. It was to be constructed on a shoal known as "The Shears." In addition to the new breakwater, the plan called for the construction of a row of icebreaker piers which was begun in 1901. The entire project was finished in December of 1901. The total cost was $2,090,765.82. The construction techniques used to fill in the gap of the original breakwater were employed in the construction of the new
breakwater. The design and construction techniques were used as the model for other breakwaters in the United States planned after the success of the National Harbor of Refuge was demonstrated.

An important part of the design was the lighting of the National Harbor. A lighthouse was constructed on the eastern end of the breakwater. Colonial-Revival in design, it was heavily damaged in 1920. A new lighthouse [.] was built to replace it in 1926. This new lighthouse and the earlier one it replaced had increased in importance in 1924 when the 1767 Cape Henlopen lighthouse was abandoned. That lighthouse was in danger of falling into the sea and was considered by the U. S. Bureau of Lighthouses to be unusable. Hence the National Harbor of Refuge lighthouse was required to take over its duties. The Cape Henlopen light fell into the sea on April 13, 1926.

In 1938, the U.S. Government made their last major change to the National Harbor of Refuge and Breakwater Harbor. The original lifesaving station was declared surplus and moved away. A new Colonial-Revival style Coast Guard station was built to take its place. The lifesaving service boathouse remained in the front yard of the Coast Guard station until 1978 when it was moved into Lewes by the Lewes Historical Society.

In 1939, the U.S. Coast Guard absorbed the U.S. Bureau of Lighthouses. At this time the responsibility for the lighthouses and navigation markers with the Harbor of Refuge and the Breakwater Harbor became a Coast Guard function. The two lighthouses continued to be manned but that practice was discontinued in the 1950s. In 1939, the Coast Guard also assumed responsibility for the lighthouses in the Delaware Bay and along the Delaware River and Atlantic Coast. The Coast Guard also took over the lightships that marked the entrances to the shipping lanes in the Atlantic Ocean. The breakwaters and the icebreaker piers remain the responsibility of the U.S. Army Corps of Engineers.

The Coast Guard occupied the building until the early 1970s. The property was declared surplus and given to the University of Delaware. The University used the property as part of its marine studies complex. The building was used by the University for several years and then it was traded to the Pilots Association of the Delaware Bay and River who are the current owners. The Pilots Association uses the property to berth the pilot boats and
to provide a place for the pilots to wait for ships coming into the Delaware Bay. The control of the ship movements up the Delaware Bay and River is controlled by the pilots. They serve an apprenticeship that requires that they be able to draw a navigation map of the Bay and River from memory. As ships approach the mouth of the Bay, they are required to contact the pilots association and request that a pilot be placed on board. A special watch tower is maintained on the tip of Cape Henlopen in a converted World War II submarine watchtower. The radar and communications equipment there enables the Pilots Association to assist ships coming to the Delaware Valley ports. Their activities and the modern ship technology and radar equipment has meant that the National Harbor of Refuge and Breakwater Harbor no longer are as important to commercial navigation as they once were. Their primary function now is a safe recreational harbor for the resort town of Lewes. The harbor does remain important to the Cape May-Lewes Ferry operated by the Delaware River Port Authority. The ferry boat slip is located at the edge of the harbor and next to the pilot's station. The ferry boats usually travel through the National Harbor of Refuge harbor on their way to and from Cape May. On the ferry property there is a small unmarked cemetery that is used to mark the use of that property as a graveyard for sailors who died on ships in the breakwater harbor or who were brought here by ships for burial. However, the lighthouses are still an important and vital aid to navigation in that they help mark the dangerous entrance to the Delaware Bay.
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their religious system, or their institutions different things. This we are not obliged by Christianity, nor by that, nor by any rule of any line of distinction which can be

Nay, if I understand them, a true Protestant, much less a puritan, shall be a true Protestant, much less a puritan, shall be to interpose the Catholic system of

It is a necessary part of the Catholic system and its proselytes; and most Catholics use consent with this view. We should be on the

We are bound to do them justice and to be kind to their persons and property, so treated; and the free enjoyment of their

Further than this, protestants and others like them, of that community to be combated by argument and kindness, even the skeptics and irreligious, the ignorant and the learned and pious men. And may be

But let us take the maxim, sometimes attributed to them, unjustly, as it was to Paul, that they are the means, or to do evil that good may come.

We are bound to do them justice and to be kindness. Their persons and property so treated; and the free enjoyment of their allowed them. Further than this, protestants and others like them, of that community to be combated by argument and kindness, even the skeptics and irreligious, the ignorant and the learned and pious men. And may be

If they have been unjustly, let not such treatment be repeated. We hold to the pure doctrines, the sciences of our fathers, as we believe them agreed in the inspired Gospel. When we meet with Romans like Clemens and Seneca, we must love and love them with all their errors. For as learned and pious men. And may be

In our country, though sought for not to exist, except that Professor Wood some years ago, in the words, but less pure and of less extent that used by Colonel Dodge. It is probably chalk is formed by the carbonate of lime or compound salt; but pure chalk has been found in the United States.

Sonniet—from the Italian.

At length, when I beheld this happy change of fate, I thought how soon it will have died—When I consider how the honored head was struck by death's Uhertan blow and covered with snow, and how that country, in a mere deed—It was, therefore, should remain as weak, if possible, but never at rest. For the cause I have: I will not leave the country, nor its land, and throw myself on empty air or the earth. The blow was not the wonder to think that we are nothing...