

NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE
Office of Archives and History
Department of Cultural Resources

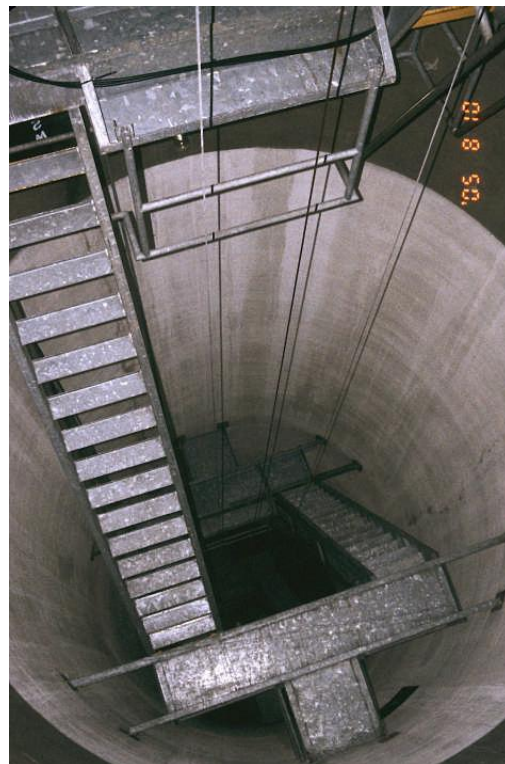
NATIONAL REGISTER OF HISTORIC PLACES

Oak Island Lighthouse

Caswell Beach, Brunswick County, BW0260, Listed 4/5/2007
Nomination by Beth Keane
Photographs by Beth Keane, August 2005 and June 2006



General view



View of interior

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

**NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM**

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of property

historic name Oak Island Lighthouse

other names/site number _____

2. Location

street & number 300A Caswell Beach Road, north side of NC Highway 133 not for publication N/A

city or town Caswell Beach vicinity N/A

state North Carolina code NC county Brunswick code 019 zip code 28465

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, 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. I recommend that this property be considered significant nationally statewide locally. (_____ See continuation sheet for additional comments.)

Signature of certifying official Date

North Carolina Department of Cultural Resources
State or Federal agency and bureau

In my opinion, the property _____ meets _____ does not meet the National Register criteria. (_____ See continuation sheet for additional comments.)

Signature of commenting or other official Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:	Signature of the Keeper	Date of Action
<input type="checkbox"/> entered in the National Register <input type="checkbox"/> See continuation sheet.	_____	_____
<input type="checkbox"/> determined eligible for the National Register <input type="checkbox"/> See continuation sheet.	_____	_____
<input type="checkbox"/> determined not eligible for the National Register	_____	_____
<input type="checkbox"/> removed from the National Register	_____	_____
<input type="checkbox"/> other (explain): _____	_____	_____
_____	_____	_____
_____	_____	_____

Oak Island Lighthouse
Name of Property

Brunswick County, NC
County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

 private
 public-local
 public-State
 public-Federal

Category of Property
(Check only one box)

 building(s)
 district
 site
 structure
 object

Number of Resources within Property
(Do not include previously listed resources in the count)

Contributing	Noncontributing	
<u>0</u>	<u>0</u>	buildings
<u>0</u>	<u>0</u>	sites
<u>1</u>	<u>1</u>	structures
<u>0</u>	<u>4</u>	objects
<u>1</u>	<u>5</u>	Total

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

Number of contributing resources previously listed in the National Register
N/A

6. Function or Use

Historic Functions

(Enter categories from instructions)
Cat: TRANSPORTATION Sub: water-related

Current Functions

(Enter categories from instructions)
Cat: TRANSPORTATION Sub: water-related

7. Description

Architectural Classification (Enter categories from instructions)
Other - lighthouse

Materials (Enter categories from instructions)
foundation Concrete
roof Metal
walls Concrete

other Aluminum

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets.)

Oak Island Lighthouse
Name of Property

Brunswick County, NC
County and State

8. Statement of Significance

Applicable National Register Criteria

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

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

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

C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations

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

A owned by a religious institution or used for religious purposes.

B removed from its original location.

C a birthplace or a grave.

D a cemetery.

E a reconstructed building, object, or structure.

F a commemorative property.

G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance

(Enter categories from instructions)

Maritime History

Engineering

Period of Significance

1958

Significant Dates

1958

Significant Person

(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

Brinkley Construction Company, W. F. & Son (builder)

Narrative Statement of Significance

(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)

preliminary determination of individual listing (36 CFR 67) has been requested.

previously listed in the National Register

previously determined eligible by the National Register

designated a National Historic Landmark

recorded by Historic American Buildings Survey # _____

recorded by Historic American Engineering Record # _____

Primary Location of Additional Data

State Historic Preservation Office

Other State agency

Federal agency

Local government

University

Other

Name of repository: _____

Oak Island Lighthouse
Name of Property

Brunswick County, NC
County and State

10. Geographical Data

Acreeage of Property 5.71 acres

UTM References (Place additional UTM references on a continuation sheet)

Zone Easting Northing
1 17 774190 3754010
2 _____

Zone Easting Northing
3 _____
4 _____
____ See continuation sheet.

Verbal Boundary Description

(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification

(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Beth Keane

organization Retrospective date January, 2007

street & number 6073 Gold Creek Estates Drive telephone 828-328-8147

city or town Hickory state NC zip code 28601

12. Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative black and white photographs of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

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

name Town of Caswell Beach

street & number 1100 Caswell Beach Road telephone 910-278-5471

city or town Caswell Beach state NC zip code 28465

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Project (1024-0018), Washington, DC 20503.

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National Park Service**

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Section 7 Page 1

**Oak Island Lighthouse
Brunswick County, NC**

NARRATIVE DESCRIPTION

The Oak Island Lighthouse is a part of a system of aids to navigation on the coast of North Carolina. The lighthouse is located at 300A Caswell Beach Road in the residentially-zoned Town of Caswell Beach near the eastern end of Oak Island in Brunswick County. Oak Island lies in a general east-west direction; consequently, the Atlantic Ocean is on the southern side of the island. Situated on a slight rise on an approximate one-third acre parcel on the north side of NC Highway 133 (Caswell Beach Road), the dramatic lighthouse is visible for miles from all directions. The parcel, originally in use as a part of the United States Coast Guard Station at Oak Island, was transferred to the Town of Caswell Beach in 2004. A small gravel parking lot is situated adjacent to the road, southwest of the lighthouse. The current United States Coast Guard Station, reconstructed in 2004 after a disastrous 2002 fire, is located immediately east of the lighthouse parcel. Beach cottages line both sides of the highway west and east of the lighthouse.

The nomination includes 5.36-acres of pristine dunes located on the south side of the road. The beach-front parcel was transferred to the Town of Caswell Beach as part of the National Park Service's Federal Lands-to-Parks Program at the same time the town acquired the Oak Island Lighthouse. The 1889 (former) United States Life-Saving Station (NR 2000), now a private residence, is located immediately east of the 5.36-acre parcel.

Several non-contributing objects and one structure are also included in the nomination. Erected within the last couple of years, they include two signs, a split rail fence, a boardwalk leading from the road to the beach, and a plaque mounted on a concrete base listing the founders of the Friends of the Oak Island Lighthouse.

Oak Island Lighthouse	1957	Contributing Structure
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Built in 1957, the Oak Island Light is one of the last lighthouses built in the United States. Standing atop a knoll, the structure, including the base and the eleven-foot-tall lantern housing, is 153 feet tall. However, when taking the rise into consideration, the height of the light above water is actually 169 feet as reported on nautical charts.

The cylindrical lighthouse base sits upon 24 concrete-filled steel pilings, 10 $\frac{3}{4}$ inches in diameter and buried 67 feet deep. The pilings are capped by a 30 foot wide by 3 foot deep octagonal concrete base upon which the tower structure was built. The tower, from the base to the gallery, is 142 feet tall and built of monolithic reinforced concrete. A uniform inside diameter of the tower measures 16 feet, 4 $\frac{3}{4}$ inches, while the wall is 8 inches thick. Above the gallery, the diameter is reduced to 12 feet and measures 14 feet to the base of the lantern housing. The 11-foot-tall lantern frame and floor, constructed of lightweight aluminum, was installed with the assistance of two Marine Corps helicopters.

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**Oak Island Lighthouse
Brunswick County, NC**

The three stripe color daymark pattern of the lighthouse is permanently cast into the concrete. The bottom 40 feet consists of the natural gray of Portland cement. The middle 50 feet was poured with white Portland cement mixed with white quartz aggregates. The top 52 feet is comprised of Portland cement with a black coloring agent added to the mix.

The metal door to the tower is located on the east side of the lighthouse and is reached by climbing eight concrete steps flanked by an aluminum tubing railing. A second, arched metal door opens onto the east side of the gallery landing. Windows, consisting of three evenly-spaced rectangular openings on both the east and west sides, were constructed of stainless steel, but the sashes have been replaced with vinyl. A small rectangular vent is positioned on both the north and south sides of the tower.

The characteristic flashing pattern for the lights is four one-second flashes every ten seconds. The lights are set in two banks, each with four sets of lights and reflectors. When the lighthouse was activated in 1958, the bottom bank contained the larger thirty-six-inch reflectors that housed 2500-watt mercury bulbs. The top bank contained twenty-four-inch reflectors and housed 100-watt quartz bulbs. These reflectors with their housings were adapted from aircraft spotlights used during World War II. While these lamps were in use from 1958 until 1962, the Oak Island light was the second brightest in the world, second only to the Creac'h Lighthouse on France's Isle d'Ouessant.

The original mercury bulbs in the lighthouse were too expensive and difficult to maintain. By 1963, light bulb technology had progressed enough to replace them with four, 1000-watt, 125-volt GE halogen lamps that produce 2.5 million candlepower. The intermittently flashing lights can be seen for twenty-three miles out to sea. Although the lights in the 1962 Sullivan's Island Lighthouse in South Carolina are brighter, the Oak Island Lighthouse still stands today as one of the brightest lighthouses in the United States.

Unlike traditional lighthouses, Oak Island Lighthouse does not include a spiral staircase. The gallery level is reached by mounting a series of interior ships ladders with eight landings and a total of 134 steps. The structural steel ladders are flanked by an aluminum railing. The first set of fifteen steps ascends to a landing that encircles the perimeter of the lighthouse. From the landing it is possible to observe a shaft with a pulley to which a metal box is attached. The box is used to haul tools, lamps, and other necessities to the top of the tower.

A heavy metal arched door opens onto the gallery. The gallery consists of a narrow catwalk that circumnavigates the tower. A handrail comprised of aluminum tubing posts and bars encloses the gallery. The lantern room is reached by ascending a fourteen-rung metal ladder attached to the exterior of the tower above the gallery. The four huge revolving lights fill the interior of the lantern room.

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**Oak Island Lighthouse
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Fence	2004	Non-contributing Object
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A chain link fence runs along the east, north, and west sides of the 0.35-acre lighthouse parcel, marking the boundary of the adjacent Coast Guard Station. A wood split rail fence separates the lighthouse parcel from Caswell Beach Road.

Boardwalk	2005	Non-contributing Structure
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A boardwalk, built in the spring of 2004 by the Town of Caswell Beach, provides access from the south side of Caswell Beach Road, opposite the lighthouse, across the dunes to the beach. The boardwalk is handicap accessible and has several benches. The boardwalk provides a good location from which to observe and photograph the lighthouse.

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**Oak Island Lighthouse
Brunswick County, NC**

STATEMENT OF SIGNIFICANCE

The Oak Island Lighthouse in Brunswick County, North Carolina, is nationally significant under Criterion C in the area of engineering and Criterion A in the area of maritime history. The period of significance is limited to 1958 the year that the lighthouse was activated by the United States Coast Guard. The lighthouse also meets criteria consideration G as it has achieved significance within the past fifty years. The Oak Island Lighthouse was the last lighthouse built in North Carolina and the second to the last coastal lighthouse built in the United States.

The Cape Fear River has long been an important shipping avenue to the inland port city of Wilmington. The entrance to the Cape Fear is marked by treacherous underwater shoals where water depths as shallow as three to seven feet stretch southeasterly for twenty-four miles from Bald Head Island straight out into the ocean. During the eighteenth and early nineteenth century, hundreds of vessels failed to navigate the shoals successfully resulting in numerous ship wrecks near the mouth of the Cape Fear River. The first of three lighthouses built on Bald Head Island to mark the channel was constructed in 1794. It was replaced by "Old Baldy" in 1817, followed by the Cape Fear tower in 1903. Oak Island Lighthouse, located opposite the channel from Bald Head Island, became the fourth lighthouse tower, and the only one without a resident keeper, to guide mariners navigating to the Port of Wilmington.

The Oak Island Lighthouse, constructed in 1957 and activated on May 15, 1958, is distinctive when compared to its predecessors that line the country's east coast. At the time the lighthouse was activated it was noteworthy for being the brightest lighthouse in the United States and the second brightest in the world. It employed carbon-arc mercury lamps in thirty-six-inch reflectors, adapted from aircraft spotlights used in World War II. It remained the brightest lighthouse in the nation from the time it was put into service in 1958 until 1962 with the Sullivan Island lighthouse near Charleston, South Carolina, was constructed.

The Oak Island Lighthouse has also achieved national significance as the last reinforced concrete tower built in the United States. The use of reinforced concrete in the construction of lighthouse towers began in 1910 on the West Coast, an area susceptible to earthquakes. The material was not only inexpensive, it required little maintenance and was also extremely strong. Oak Island's modern cylindrical tower was constructed with a slip form design into which concrete was poured and as it dried, the mold was raised allowing the next section to be poured until the tower was completed. The three major colors of the tower are integrated into the concrete. In 1962, the Coast Guard switched to aluminum as the primary building material for the Sullivan Island Lighthouse.

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**Oak Island Lighthouse
Brunswick County, NC**

Historical Background and Maritime History Context

In 1716, the colonial government established the first American lighthouse on Little Brewster Island in Boston Harbor. After America won its independence from Great Britain, the United States Congress created the Lighthouse Establishment in 1789 for the purpose of building lighthouses for the new nation. The Lighthouse Board took over this responsibility from 1852 until 1910. From 1910 until 1939 it became the duty of the Bureau of Lighthouses. In 1915 the Revenue Cutter Services and Life-Saving Service combined to become the United States Coast Guard. The Coast Guard became responsible for the building and maintenance of the country's lighthouses, just one form of thousands of different pieces of equipment known as "aids to navigation" the Coast Guard builds, installs, and maintains along the coasts of the United States and its territories and possessions. As lighthouses have become outdated forms of aids to navigation and are no longer used by commercial marine traffic, the Coast Guard has begun to slowly turn over the nation's lighthouses to the National Park Service or state and local preservation societies (Brinkley, p. 1).

In 1784, the North Carolina General Assembly realized the importance of the Cape Fear River as one of only two good locations for a deep-water ocean port along the entire coast of North Carolina. The General Assembly passed a law governing the navigation rules of the Cape Fear River and levied a sixpence per ton tax on all vessels entering the Cape Fear River to raise money to construct the first Cape Fear lighthouse. The legislation insured that there would be a lighthouse at the entrance to the Cape Fear River for the next two hundred years. A lighthouse was necessary in order for passenger and freight vessels to navigate around the "Frying Pan Shoal" where water depths as shallow as three to seven feet stretch southeasterly, slightly beneath the waves for twenty-four miles near the mouth of the Cape Fear River. A detour of approximately thirty miles around the shoals is necessary for deep drafting boats traveling north and south along the coast of North Carolina to avoid running aground (Brinkley, p. 1).

Smith Island (currently known as Bald Head Island), located on the southeast side of the mouth of the Cape Fear River, was selected as the logical location for the placement of the first three Cape Fear River lighthouses constructed near the mouth of the river. The owner, Benjamin Smith, a longtime member of the assembly and later governor of North Carolina, donated ten acres of high land on a sandy promontory on the island, overlooking both the river and the sea. Although construction began in 1789, it was not until 1792 that the federal government appropriated the additional money needed to finish construction of the lighthouse at the mouth of the Cape Fear River. The structure was not completed and put into service, however, until 1795. Mariners immediately complained that the light was inadequate in warning vessels away from the dangerous Frying Pan Shoals and in providing guidance for vessels seeking to enter the Cape Fear River. For those reasons and because of its precarious location on a shifting sand dune, it was taken down in 1813 (Stick, pp. 11-13).

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The second lighthouse, known as “Old Baldy,” was built in 1817 farther inland to protect it from erosion. This brick octagonal lighthouse remains the oldest standing lighthouse in North Carolina today and is maintained by the Old Baldy Foundation. Early mariners complained that Old Baldy’s light was not bright enough, was located too far inland, and was too short. Although the lamp and lens were upgraded several times, the Lighthouse Board eventually decided to replace it.

As early as 1761, a hurricane caused a drastic change in the Cape Fear River channel, opening a new inlet about eight miles to the north of Bald Head Island, providing a more direct connection between the Cape Fear and the Atlantic Ocean. A significant number of mariners began using the new inlet in preference to the meandering channel at the mouth of the river for which the original Bald Head lighthouse had been built. It was decided that a tower should be built closer to the new inlet and in 1866 a framed structure with a watchtower on top was erected at Federal Point. In addition, two range lights were built on Oak Island, located on the west side of the mouth of the river. First lit on September 7, 1848, these lights were often referred to as the “Caswell Lights” because of their nearness to Fort Caswell. The Caswell lights were free-standing brick towers, with a separate one-and-one-half-story cottage for the keeper (Zepke, p. 68).

The original brick beacons were in use only a few years before the Confederate Army extinguished all the lights on the Carolina coast including both the Bald Head Island lighthouse and the Federal Point tower, to prevent the Union Army from using them. Both of the Oak Island range lights were destroyed by retreating Confederate troops, who preferred to blow up the structures rather than see them fall into Union hands. After the Civil War, only the Federal Point lighthouse was relit (Zepke, p. 67).

In 1865, plans for new Oak Island range lights were drawn to include a front beacon, standing twenty-seven feet above sea level, and a rear beacon, a sophisticated four-level structure with living quarters. These plans, however, were apparently abandoned, as the lights that were finally rebuilt in 1879 included a front range light comprised of a wooden tower attached to a sixteen-foot high brick foundation, while the rear light was a simple structure mounted on skids so it could be moved with the shifting channel. The keeper’s house was a separate two-story house. An 1893 hurricane damaged the front beacon and keeper’s house beyond repair. By this time, changes in shipping routes had decreased the number of vessels along that part of the Cape Fear River, and the damaged range lights were decommissioned with no plans to repair them. In the meantime, an 1878 hurricane enlarged New Inlet to such an extent that it necessitated the construction of a giant seawall in 1881 to save Wilmington’s harbor, thereby rendering the Federal Point lighthouse ineffective (Zepke, pp. 77-78).

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**Oak Island Lighthouse
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Ships still needed to navigate the dangerous Frying Pan Shoals however, and Old Baldy was reactivated with an upgraded fourth-order Fresnel lens. Despite the upgraded lens and the addition of a lightship to mark the channel, mariners continued to complain of insufficient light to safely navigate the shoals. Although the Lighthouse Board pleaded with Congress for funds to increase Old Baldy's height from 90 to 150 feet and to upgrade the lens to a first-order Fresnel, Congress decided instead to build a new beacon at the highest point of the Cape Fear to serve the growing number of ships en route to Wilmington. Upon completion of the new lighthouse, Old Baldy would be downgraded to a low-intensity beacon (Zepke, p. 79).

It was not until 1903 that the skeletal steel Cape Fear tower was built on Bald Head Island at the point of land where the Frying Pan Shoal starts, a distance of two-and-a-half miles from the old Federal Point lighthouse. It stood 150-feet tall and had a first-order Fresnel lens with a range of approximately nineteen miles. Stairs to the top of the tower and its watch room were located in the interior of the structure. The lantern room contained a 160,000 candlepower light measuring ten feet high and six feet in diameter (Zepke, p. 80).

The 1903 tower served as a navigation aid for the mouth of the Cape Fear River until the construction of the Oak Island Lighthouse in 1957. The technology employed in the Cape Fear tower had become outmoded. To operate the tower was neither simple nor economical. The tower contained a fuel oil light that needed to be ignited and extinguished by the keeper daily. In addition, weights used to turn the light apparatus had to be hand cranked every three hours. The fuel oil and supplies for the keepers needed to be brought over from Southport regularly on a tender boat, and from there mules pulled the supplies down a three-mile path in dense subtropical forests to the lighthouse. It was determined that it would not be economically feasible to upgrade the Cape Fear tower, and in 1957 a decision was made by the Coast Guard civil engineers to replace it with the most modern lighthouse of its era. The Cape Fear tower was taken down so that it would not confuse mariners seeking its replacement on Oak Island (Brinkley, p. 1).

The Oak Island Lighthouse is located on property that has been in use as a United States Coast Guard station since the 1920s and prior to that it was a United States Lifesaving Station. Construction was started in July, 1957 and completed on December 18, 1957. The former keeper for the Cape Fear tower, Captain Charles Swann, threw the switch that activated the Oak Island Lighthouse on May 15, 1958, at a ceremony attended by a large number of visiting dignitaries. The total cost of the lighthouse came to \$110,000 with the construction of the tower amounting to \$90,000, while the lantern room cost \$20,000 (Zepke, p. 68).

As part of the Coast Guard installation, the entire lighthouse has never been open to the public, though the Coast Guard Auxiliary occasionally includes the lower level of the lighthouse on their tours of the Coast Guard Station during tourist season. On February 2, 2002, the

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Brunswick County, NC**

adjacent ten-year-old Coast Guard Station was destroyed by fire. The lighthouse was unharmed, however, and a new station was built in 2004 on the footprint of the destroyed building. In 2003, the federal government declared the Oak Island Lighthouse surplus property and gave it and five adjacent acres of ocean front land to the Town of Caswell Beach to be used for recreational purposes (Deed Book 1971, p. 315). The town agreed to erect and maintain two permanent signs on the property (one on each side of the street) proclaiming: “this park land was acquired through the Federal lands to parks program of the United States Department of the Interior, National Park Service, for the public’s recreational use and enjoyment.” On October 18, 2004, a ceremony was held to transfer the lighthouse to the Town of Caswell Beach. For now, the Coast Guard continues to operate and maintain the optics. A non-profit organization, the Friends of Oak Island Lighthouse, has been formed to preserve and maintain the lighthouse and grounds. Although the lighthouse tower is not open to the public, the town has recently provided visitors with a small gravel parking lot adjacent to the lighthouse and made the lighthouse grounds accessible. They have also constructed a boardwalk over the dunes on the opposite side of the street, providing beach access and an observation deck from which to view the lighthouse.

Engineering Context

The Coast Guard began using reinforced concrete lighthouse towers in 1910 at Point Arenas, California. The Point Arenas tower is 115 feet, one of the two tallest towers on the west coast. The tallest reinforced concrete tower, at 150 feet, is Navassa in the West Indies. The Brandywine Shoal Lighthouse, constructed in Delaware in 1914, was the first combination of a reinforced concrete tower on an underwater caisson base. A series of reinforced concrete towers of art-deco design were constructed in Alaska during the 1920s and 30s, one of which was destroyed by a tidal wave in 1946 (www.uscg.mil/history/h_lighthouses.html).

The use of concrete material in lighthouse tower construction was superior in many ways to iron and steel, employed during the second half of the nineteenth century. Concrete was less expensive and required much less maintenance. In addition, it was extremely strong. The sturdy concrete towers were primarily erected on the west coast because of the area’s susceptibility to earthquakes. Another advantage to the concrete towers was that coloring agents could be mixed into the concrete during construction eliminating the necessity of ever having to paint the lighthouses (www.uscg.mil/history/h_lighthouses.html).

In 1957, the United States Coast Guard civil engineers solicited bids on two different tower designs for the Oak Island Lighthouse, one calling for a steel framed tower with aluminum panels covering the frame while the second was for a reinforced concrete silo tower. No bids were submitted for the steel and aluminum design tower. W. F. Brinkley and Son Construction Company was one of only two contractors who submitted bids for the reinforced concrete design. The W. F. Brinkley and Son Construction Company, based in Granite Quarry, North

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**Oak Island Lighthouse
Brunswick County, NC**

Carolina, was selected as the builder of the lighthouse with a bid price of \$90,000. The owner of the company, W. F. Brinkley Sr., oversaw the construction and visited the site daily until the project was completed. Superintendent for the project was Howard D. Howell, with W. T. Dennis as assistant superintendent. Concrete for the piles and foundation was furnished by S & G Concrete Company in Wilmington. The concrete for the walls and floors was mixed on the site with a portable concrete mixer. R. T. Burney Company of Wilmington was given the subcontract to drive the ten-inch pipe piling (Brinkley, p. 4).

The foundation consists of twenty-four pilings, 10.75 inches in diameter and driven down sixty-seven feet and then filled with concrete. A three-foot-thick concrete slab was placed on the twenty-four pipe piling. The reinforcing steel was furnished by Hall-Hodges Company of Norfolk, Virginia. The structural steel, stairway ladders and aluminum railing was furnished and erected by Colonial Steel and Iron Company of Salisbury, North Carolina. The electrical subcontractor was Rockwell Radio and Electric Company of Rockwell, North Carolina. The hydraulic jacks, the metal forms, and the engineer for the project, Thos Vistrom, were furnished by B. M. Heede, Inc., Long Island, New York (Brinkley, p. 4).

The Oak Island Lighthouse was constructed using a system developed in Sweden, designed to eliminate the need for any extra labor other than the operator of the hydraulic jacks. All the jacks are connected through a system of oil pipes to a small electrically driven pump which is tended by only one man, regardless of the number of jacks used. This operator alone manages the entire lifting operation, controls the level of the form, and performs all other work connected with the lifting (Brinkley, p. 5).

Two steel slip forms were built for the project, one for the inside and one for the outside, each with a height of forty-eight inches. By placing the inside form first, the horizontal reinforcing steel bars could be placed and tied before the outside wall form was put in place. Because no wall ties could be used to hold the forms together, a metal yoke was used to hold the slip forms together while they were being jacked up. The walls of the lighthouse are 8-inches thick and the inside diameter is 16 feet, 4 $\frac{3}{4}$ inches. A concrete platform was built and attached to the top of the inside form in order to have a place to work and receive the concrete. The forms could only be jacked up after the forty-eight inches of concrete placed in the forms began to set up (Brinkley, p. 5).

The yoke with forms attached was lifted up by the hydraulic jack that applied the force smoothly and simultaneously at all points on the form. The concrete pouring began on a Monday morning, September 28th, and was continuous until the elevation of 148 feet was reached on the following Monday. This feat was accomplished by setting a concrete mixing plant on the site to allow for the continuous six-day, round-the-clock operation. Depending on

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the temperature and the weather, the forms were jacked from eight inches to one foot per hour (Brinkley, p. 5).

Above the gallery, the diameter was reduced to twelve feet and was fourteen feet high to the base of the lantern housing. This section was poured using two-foot-square steel forms and was not poured continuously (Brinkley, p. 5). The lantern housing was placed on top of the structure by two helicopters loaned to the Coast Guard by the United States Marine Corps. The lantern, which had been shipped from Portsmouth aboard the Coast Guard cutter *Narcissus*, was attached to the hovering aircraft piloted by Major R. D. McKittrick, USMC, and was lifted into position above the tower. After some jockeying necessitated by high winds, the assembly was lowered into place and secured by construction worker W. T. Dennis (Herring, pp. 93-94).

The Coast Guard also tasked its engineers with insuring the new lighthouse would meet the operational requirement of a fixed range of visibility of nineteen nautical miles and be visible as close to 100 percent of the nights of the year as economically possible. The light flashing pattern would also need to be very similar to that of the Cape Fear tower – one white flash each for four seconds and six seconds off. The engineers realized that the new lighthouse would have to be one of the brightest in the world to meet these specifications. The Oak Island Lighthouse was going to be located four miles farther inland than the Cape Fear tower, requiring a light that could both meet and exceed the fixed range of visibility of the Cape Fear tower and extend the range of visibility to a minimum of twenty-three nautical miles. The engineers estimated that they would need a light with twenty million effective candlepower (Brinkley, p. 2).

The Coast Guard engineers were challenged with creating this new lighting apparatus using common components, making it relatively maintenance free, able to control remotely, and keeping within a tight budget. They were aware that the candlepower existed because the Creac'h Lighthouse on France's Isle d'Ouessant, the brightest lighthouse in the world, used mercury bulbs to produce over 500 million candlepower to mark the southern entrance to the English Channel. The Coast Guard engineers used the same type of bulbs similar to commercial searchlights, spotlights, and airport beacons. Unlike older lighthouses that used a single lamp and lens to refract the light, the Oak Island Lighthouse used multiple bulbs and mirrors, or reflector lenses. The lights are set in two banks, each with four sets of lights and reflectors. The bottom bank contains the larger 36-inch reflectors that house 2500-watt mercury bulbs. The top bank contains 24-inch reflectors and houses 100-watt quartz bulbs. This bank is used eighty-five percent of the time during favorable weather conditions while the bottom bank is used the remaining fifteen percent of the time, during inclement weather (Brinkley, p. 2).

Although the bottom bank with the mercury bulbs produced seventy million candlepower of light, due to the rotation of the apparatus, the actual effective candlepower of the bottom bank was reduced to fourteen million candlepower. This candlepower still covered the required

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twenty-three nautical miles fixed range of visibility, however. In actuality, the glow of the light was visible over thirty nautical miles to the end of the Frying Pan Shoals. The mercury bulbs turned out to be too expensive and difficult to maintain even though they were used only during inclement weather and were later replaced with halogen bulbs that are still in use today. Until the construction of the Sullivan's Island, South Carolina, Lighthouse in 1962, the Oak Island Lighthouse was the brightest lighthouse in the United States and the second brightest in the world (Brinkley, p. 2).

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Section 10: Geographical Data

Verbal Boundary Description:

The boundaries for the Oak Island Lighthouse nomination are shown by a black line on the accompanying map, drawn at a scale of 1 inch = 60 feet.

Boundary Justification

The boundaries include two separate lots given to the Town of Caswell Beach by the United States Government in 2004. The first lot on the north side of N.C. Highway 133 is comprised of a 0.35-acre parcel of land upon which the lighthouse sits. The second parcel is located on the south side of N.C. Highway 133 and is comprised of 5.36 acres of undeveloped beachfront property. Both parcels have been historically associated with United States Coast Guard property and the Oak Island Lighthouse. In addition, the N. C. highway right-of-way is included in the nomination.

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Section Photos

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The following information applies to all photographs:

Name of Property: Oak Island Lighthouse

County and State where property is located: Brunswick County, North Carolina

Address: 300A Caswell Beach Road, Caswell Beach, NC 28465

Name of Photographer: Beth Keane

Date of Photographs: June, 2006

Location of Original Negatives: North Carolina State Archives, Raleigh

Photographs:

Photograph 1: Oak Island Lighthouse, camera looking northeast

Photograph 2: Oak Island Lighthouse, boardwalk, and Coast Guard station,
camera looking north

Photograph 3: Interior of Oak Island Lighthouse

Photograph 4: Arched metal door at gallery level

Photograph 5: Beach front parcel associated with the Oak Island Lighthouse,
camera pointing east