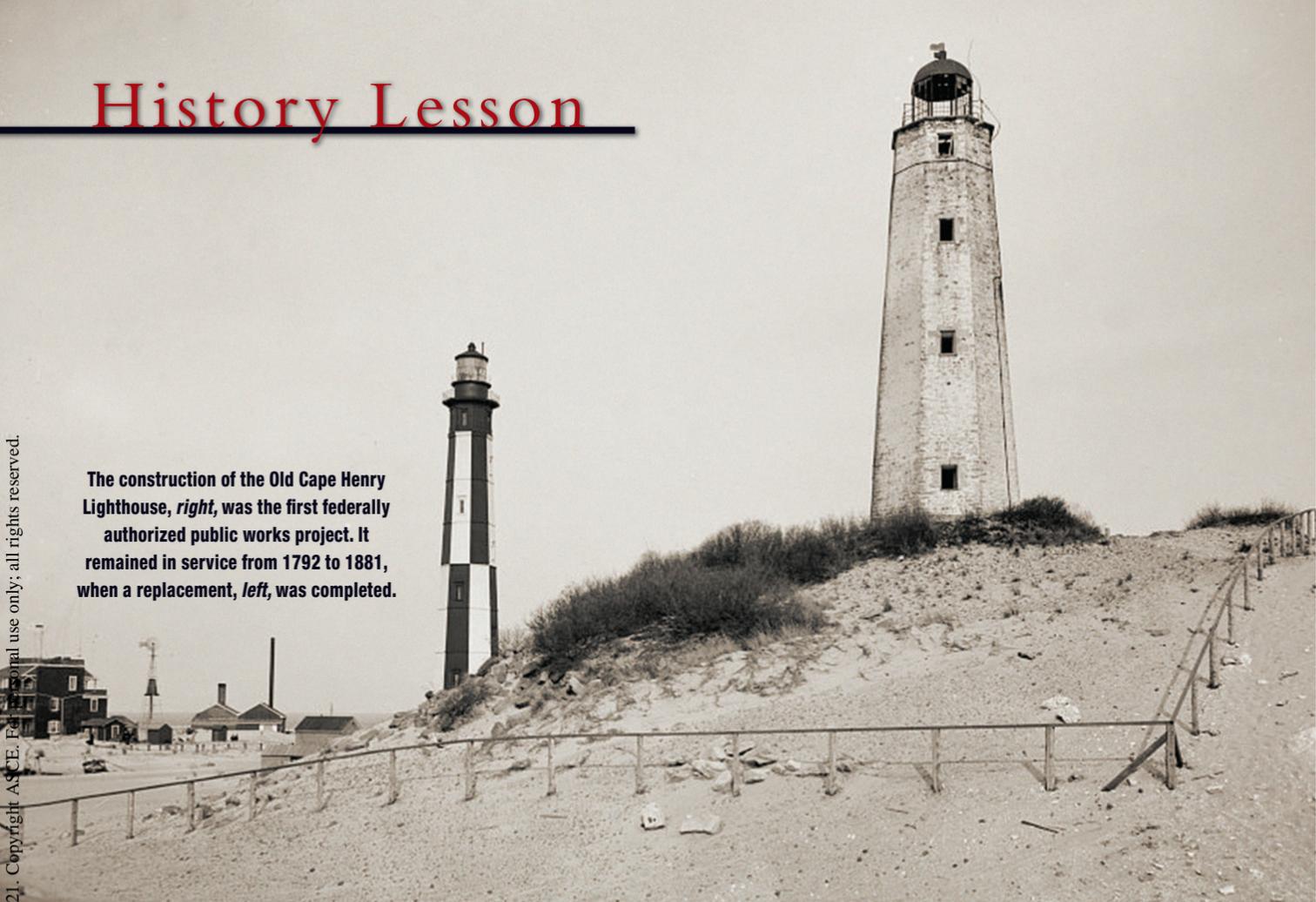


The construction of the Old Cape Henry Lighthouse, right, was the first federally authorized public works project. It remained in service from 1792 to 1881, when a replacement, left, was completed.



A Federal Endeavor: The Old Cape Henry Lighthouse

AS CONGRESS AND the president of the United States bicker over how to pay for improvements to the nation's infrastructure, it is worth remembering that the use of federal funds for such projects has a long history. In fact, the practice dates back to just the ninth act of the First Congress, the Lighthouses Act of 1789.

Prior to independence, the American colonies had separately erected lighthouses and other navigational aids for their own purposes, but the First Congress saw a need to centralize the ownership and operation of such facilities to serve the national interest. To this end Congress passed the Lighthouses Act, which required the states to cede all "lighthouses, beacons, buoys, and public piers" to the federal government.

The Act also expressly called for the construction of a lighthouse "near the entrance of the Chesapeake Bay, at such

place...as the President of the United States shall direct." Thus began the first federally authorized public works project, which is known today as the Old Cape Henry Lighthouse. Completed in 1792, it still stands just north of Virginia Beach, Virginia, marking the southern side of the entrance to the bay.

Virginians had long seen the need for a lighthouse at Cape Henry. Governor Alexander Spotswood proposed the idea in 1720, and the Virginia House of Burgesses approved it on the condition that Maryland share the cost of building and maintaining the structure. But Maryland authorities proved uncooperative, as did the English Board of Trade, so nothing was done. A 1727 proposal by Sir William Gooch, who was then Virginia's governor, met the same fate. In 1750 Thomas Lee, another prominent Virginian, again tried to advance the project. This time the Board of Trade responded fa-

vorably, but still no one could agree on who would pay for it.

Finally, in 1772 the legislatures of Maryland and Virginia agreed to share the cost of the project and to proceed with construction, appointing a group of directors to oversee the effort. The following summer, the directors visited Cape Henry to select a site. Having obtained the plans for two recently built lighthouses—one at Sandy Hook, New Jersey, the other at Cape Henlopen, Delaware—they set out to erect a similar structure at Cape Henry.

Despite a promising start, this effort too ended in failure. Establishing a proper foundation on the sandy beach proved more difficult than anticipated, and the transportation of more than 4,000 tons of sandstone to the site consumed a great deal of time and money. By mid-1775 the directors had spent most of their budget just procuring the stone and placing buoys on the nearby shoals.

Then the Revolutionary War broke out, bringing the entire project to a halt.

With the passage of the Lighthouses Act, on August 7, 1789, the newly formed U.S. Congress gave the Cape Henry project a fresh start. A few days later, President George Washington sent a copy of the legislation to Governor Beverley Randolph of Virginia. The state legislature quickly approved the project and arranged to cede a 2-acre site to the U.S. government on the condition that Virginians be allowed to continue fishing on the shore. Washington remained actively involved in the project, corresponding with both Randolph and Secretary of the Treasury Alexander Hamilton regarding the selection of a site, building materials, and other details.

According to the act, the secretary of the Treasury was to oversee all aspects of U.S. lighthouse operations, including the establishment of the lighthouse at Cape Henry. Thus it was Hamilton who solicited bids and prepared a contract with the second-lowest bidder, John McComb, Jr., on March 31, 1791. The \$15,200 construction contract was revised and signed by both parties in April.

The contract describes McComb as



John McComb, Jr., built the Old Cape Henry Lighthouse. The 1791 construction contract calls McComb a bricklayer, but he would later rise to prominence as a New York City architect. The lighthouse is depicted in the lower left corner of a late 18th century map, below.

a "bricklayer" from the state of New York, but he would soon rise to greater heights as a prominent builder and architect. After erecting two more lighthouses, both in New York, he went on to design a number of notable buildings that today are listed in the National Register of Historic Places, including the

Grange, Hamilton's private New York residence; Castle Clinton, a sandstone fortress in Manhattan's Battery Park; and New York City Hall (with principal architect Joseph-François Mangin).

The contract describes in considerable detail a structure much like the one the colony of Virginia had planned to build nearly 20 years earlier. It was to be an octagonal stone tower with three windows on the east side and four on the west. A masonry course called a water table would deflect water away from the base of the structure. At its base, the lighthouse would measure 26 ft in diameter, and its walls would be 6 ft thick. At the top, 72 ft above the water table, the structure would taper to a diameter of 16 ft 6 in. with walls 3 ft thick. A stone foundation 27 ft 6 in. in diameter would extend 13 ft below the water table.

At the top of this structure, McComb was to lay a copper-plated wooden floor that would extend 2 ft 8 in. beyond the outer wall to form a continuous eave finished with a cornice. Above this floor he was to erect a glass-enclosed lantern room that would be 10 ft high and 10 ft in diameter and be topped with a 5 ft high copper dome with iron rafters. A funnel would direct



GREEN-WOOD HISTORIC FUND, ABOVE; LIBRARY OF CONGRESS, BELOW

View of the lighthouse at Cape Henry, Virginia, looking to the North



the smoke from the lighthouse's eight lamps into a large copper ventilator "in the form of a man's head . . . so placed, as to be turned by a large vane which shall be fixed on the spire above it so that the hole for venting the smoke may always be to leeward." The contract also called for a two-story residence for the lighthouse keeper and a 12 ft wide, 20 ft long vault for the storage of oil.

Thomas Newton, Jr., a Virginia legislator who had previously been involved in the colonial lighthouse project, kept an eye on the project and correspond-

Benjamin Henry Latrobe sketched the lighthouse as it appeared in 1798. A more recent drawing, below, shows how the structure has changed over the years.

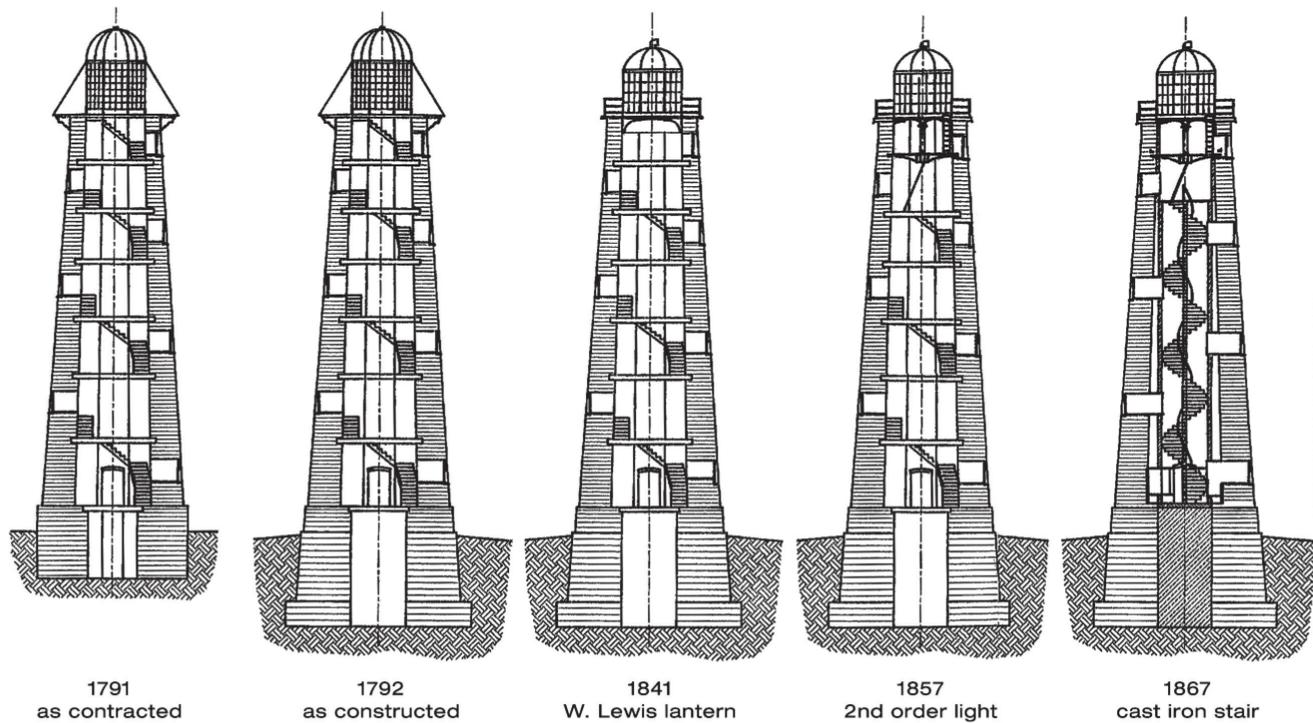
ed with Washington and Hamilton regarding the work in progress. Their letters reflect a particular interest in reusing the massive amount of stone that had been abandoned at the site in the 1770s. Unfortunately, the stone had since sunk deep into the sand. McComb managed to salvage some of it for use in the foundation but later complained

to Governor Henry Lee III, Randolph's successor, that he had found it buried at depths of 10 to 25 ft, much greater than the 8 to 10 ft he had been led to expect.

Shifting sands continued to vex McComb as the foundation work proceeded. At times sand poured into the excavation site, and the area would then have to be cleared all over again. Newton praised McComb for his perseverance, remarking that he "appears desirous of giving satisfaction in his work" and "merits much for his industry."

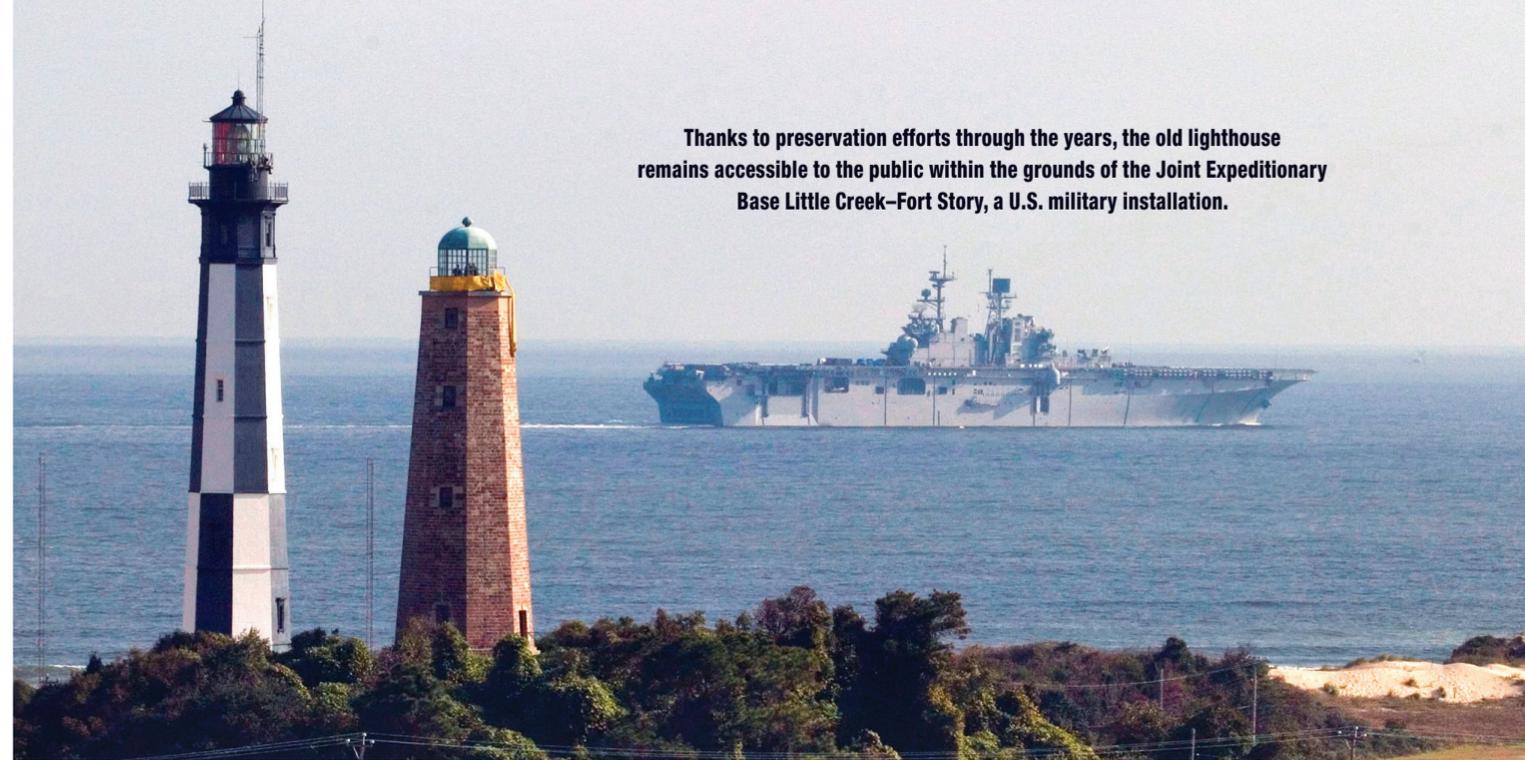
Upon reaching a depth of 13 ft, the maximum specified by the contract, McComb found nothing but loose sand, so he redesigned the foundation, deepening it to extend 20 ft below the water table and increasing its diameter to 33 ft. He charged the federal government \$2,500 for the additional work, increasing the total cost of the project to \$17,700.

As construction progressed, Washington received letters from numerous applicants requesting the position of lighthouse keeper. After careful consideration of the applicants' qualifications and character—no one "intemperate in drinking" was to be awarded the post—the president selected William Lewis, a naval officer from Virginia who had served in the Revolutionary War. Lewis died before reaching his post, however, and Lemuel Cornick, whom Newton



PRESERVATION VIRGINIA, BOTH

U.S. NAVY



Thanks to preservation efforts through the years, the old lighthouse remains accessible to the public within the grounds of the Joint Expeditionary Base Little Creek-Fort Story, a U.S. military installation.

had appointed to oversee the lighthouse's construction, took his place.

The lighthouse was completed and lit for the first time in October 1792. Its lantern, fueled by fish oil, was said to be visible up to 15 mi away.

In 1798, Benjamin Henry Latrobe, a distinguished architect and engineer, visited Cape Henry and made two sketches of the lighthouse, providing a unique perspective on the structure's appearance in the late 18th century. In his notes Latrobe expressed alarm that the tower had a wooden staircase, "which being necessarily soaked with oil, exposes the light to the perpetual risk of destruction by fire." Fortunately, the calamity he feared never came to pass, and a cast-iron spiral staircase was installed in 1867.

According to Latrobe, the lighthouse and keeper's residence stood atop the highest dune on the cape and were surrounded by a wooden platform. He noticed as he watched that this platform had an unusual, presumably unintended effect on the landscape. The wind swirling around the lighthouse "licks up the sand from the smooth surface of the timber and heaps it around in the form of a basin," Latrobe observed. The windswept sand accumulated around the edges of the platform to form the rim of the basin, which he estimated to be 20 ft high. Although the wall of sand "protects the keeper from the storms," he mused, it also

"renders his habitation one of the dreariest abodes imaginable."

The original lighthouse guided ships into Chesapeake Bay for many years, the only interruption, which was short, coming during the Civil War when Confederate raiders smashed the lantern in an act of sabotage. In 1872, however, inspectors noted "large cracks or openings" in the stone edifice. The tower was unsafe, they concluded, and besides, its "second-order" light was obsolete. The keeper's house too was deemed small and in poor condition. They recommended the facility be completely replaced.

Their recommendations were not heeded at first, but six years later funds were appropriated for a new lighthouse at Cape Henry. The replacement, which went into service on December 15, 1881, is a cast-iron and masonry structure 180 ft tall marked with vertical bands of black and white. It is located 350 ft southeast of the original lighthouse. The inspectors' warnings proved premature, however, as the Old Cape Henry Lighthouse still stands proudly more than 140 years after they issued their report.

Wind erosion has posed a continual threat to the old lighthouse over time. In the mid-19th century contractors built a wall around the site and paved the space inside the wall with stone. Over

the years, however, the pavement crumbled, and the wind attacked the base of the tower. By the mid-20th century the wind had reduced the height of the hill by 6 to 8 ft, exposing a large part of the foundation. Protecting the base of the structure from erosion has been a major focus of restoration efforts in recent years.

In addition to its own historical significance, the Old Cape Henry Lighthouse stands near the spot at which the founders of Jamestown, North America's first permanent English settlement, landed, on April 26, 1607. A plaque commemorating the event was placed on the lighthouse in 1896.

In 1930 the federal government transferred ownership of the Old Cape Henry Lighthouse to the Association for the Preservation of Virginia Antiquities, which is known today as Preservation Virginia. The structure was designated a national historic landmark in 1964 and was accorded landmark status in ASCE's Historic Civil Engineering Landmark Program in 2002. It

remains accessible to the public within the grounds of the Joint Expeditionary Base Little Creek-Fort Story, a U.S. military installation.

—JEFF L. BROWN



Jeff Brown is a contributing editor to Civil Engineering.