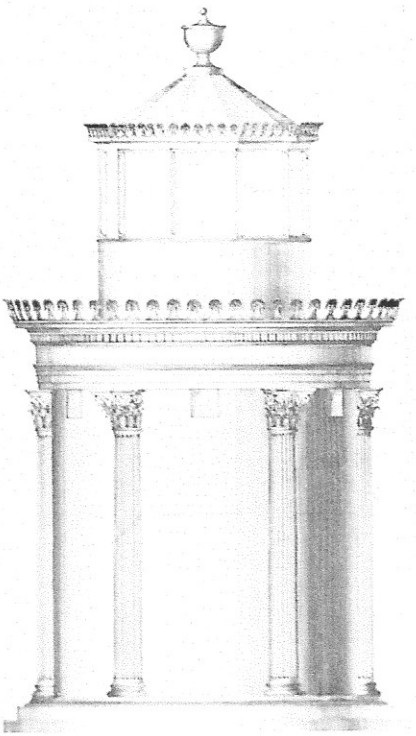
A NOTE ON THE DESIGN OF

THE PORTLAND BREAKWATER LIGHTHOUSE

Dennis L. Dollens

Lighthouses of iron were built as early as the eighteenth and throughout the nineteenth centuries; a few were even constructed in the twentieth. Many of these towers look more like oil rigs or riveted boilers than heroic structures associated with the sea and its lore. A diminutive exception is Maine's Portland Breakwater Lighthouse. Modeled after a classic Greek monument, this cast-iron masterpiece stands, darkened, a blind guardian of Portland Harbor.

Alan Stevenson, the engineer responsible for one of the earliest classics of lighthouse design, Skerryvore Lighthouse (1843) off the Scottish coast, and a member of the distinguished family of engineers and designers that included Robert Louis Stevenson (who incidently wrote "On a New Form of Intermittent Light for Lighthouses," which won a silver Medal from the Royal Scottish Society of Arts), states that the first iron lighthouse was designed by a Captain Brodie, R.N., for Bell Rock and the second by a Robert Stevenson in 1800. This latter structure, distinct from the classic stone towers of the nineteenth century, was "constructed of eight cast-iron pillars arranged in the form of a pyramid and tied together by means of horizontal and diagonal braces". In the same book, *A Rudimentary Treatise on the History, Construction and Illumination of Lighthouses* (London, 1850), Alan Stevenson further states that for some locations "iron lighthouses may be the most convenient and least expensive in prospect, [though] the stone tower is the more satisfactory".



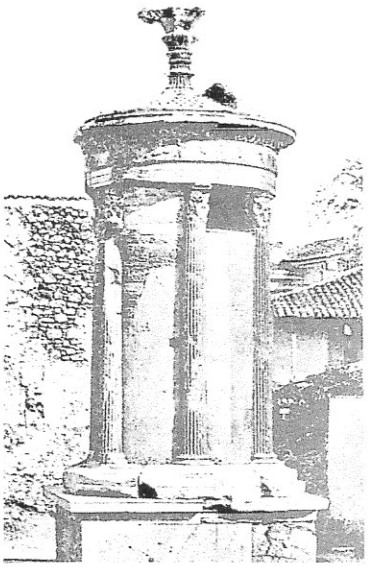
Historic American Building Survey Drawing

Undated drawing of elevation

For a brief period in the second half of the nineteenth century, cast-iron held the promise of revolutionizing architecture; entire structures could be designed piece by piece, molded, and cast at a foundry, assembled on the foundry floor for inspection, disassembled for shipping and re-assembled on site. Using cast-iron, as Margot Gayle has written, "Industrially produced architecture had arrived with . . . mass production of identical interchangeable parts." This process not only allowed for rapid assembly, it also provided great flexibility in ornamentation. Copies of classic buildings, orders, or details could be incorporated into a structure's mold, and cast, thus eliminating the need for the expense of on-site craftsmen.

Abandoned since 1943 the Portland Breakwater Lighthouse replaced an earlier wooden structure built in 1855. The new light, standing 24 feet from base to ventilator and measuring 11 feet 10 inches in diameter, was cast and delivered to its site, a granite sea wall originaly jutting 1990 feet into the water of Portland Harbor, in 1874, and lighted for the first time in June 1875. The Historic American Building Survey (HABS) notes that "it is possible that Thomas Ustick Walter, who designed and erected the National Capitol's cast-iron dome, might have had something to do with the structure." This seems probable given Walter's experience with cast-iron and his stylistic bias. A practicioner of historic styles, Walters is especially well known for his Greek Revival architecture, including Girard College in Philadelphia—a design based on a Greek temple using the Corinthian order.

Similarly, the design of the Portland Breakwater Lighthouse is derived from an ancient Greek structure—the Choragic Monument of Lysicrates in Athens. Varying proportions and taking liberties with detailing, whoever designed the tower was surely familiar with classical architecture. Nevertheless, the lighthouse differs from its inspirational source in several crucial aspects: most notably in the simplifying of the capitals and entablature as well as in the addition of portholes. As stated in the HABS *Main Catalog*, the light's "panoply of classical detail in cast-iron well illustrates the spirit of its age by using old forms in a new material". The design of a lighthouse with classical detailing, or any detailing at all for that matter, is a great departure from traditional lighthouse engineering. Experience taught engineers that only the strongest, most smooth-faced, circular and tapering shape was reliable when pitted against crashing seas and hurricane winds. Accordingly, lighthouses evolved as tall, slightly conical towers.



The Choragic Monument of Lysicraties

The Portland Breakwater Lighthouse, however, deviated from this conventional development, at least in part because of its unique location and modest, though important function—guiding seamen into the harbor—as

opposed to the typical placement and task of coastal or off-shore lights required to warn distant vessels of dangerous rocks or reefs.

The little tower, visible from Portland's Eastern Promenade, sits on a round bed of cast concrete atop a rusticated, octagonal granite base. The white shaft is one-inch-thick cast-iron bolted together at flanges hidden behind six fluted columns with Corinthian capitals. A layer of brick lines and backs up the cast-iron shell. The tower is pierced by six portholes as well as a quarter-inch iron-plate door, and its top is ringed by acroteria. Inside, a stairway leads to the black, cast-iron lantern with ten panes of glass. The lantern's roof slopes upward to a spherical, cast-iron lamp vent (the black ball) and leads, finally, to a three-pronged, bronze finial that served as a lightning rod.



Postcard view: Portland Breakwater Lighthouse

From its first night of service in 1875, the tower radiated a fixed red beam, the color produced by a red glass chimney surrounding the flame. In 1878, the lamp was modified in order to flash red every forty seconds. The mechanism for this flashing beam revolved by means of an "old style French clock" that ran the light for six hours after each winding. The oil lamp (converted to electricity in 1934) was vented through a tube leading from the upper part of the lens into the ventilator ball. All traces of the mechanical system disappeared long ago, as did the keeper's quarters, built in 1889 and seen in an old postcard view.

Today, left to the sea, salt, and wind, this 108-year-old structure will not likely last a fraction as long as its Athenian relative; but much as the Choragic Monument commemorates a forgotten theatrical triumph, the lighthouse memoralizes a mode of forgotten commercial enterprise and transportation. Losing its initial function, the Portland Breakwater Lighthouse takes on importance as a marker of past time, style, and construction. And it stands, today, searching for attention.

THE CAPE HATTERAS LIGHTHOUSE

Kitty Beasley Edwards

Since mariners began keeping records in 1526, more than 2,000 ships have been lost in the dangerous waters and shifting sands off North Carolina's treacherous coast, along the fabled Outer Banks. In contrast, no records show exactly how many ships—and lives—may have been saved by the old Cape Hatteras Lighthouse. Standing sentinel where the cape juts squarely into the graveyard of the Atlantic, the light, as described by Ben Lucien Burman in his *It's a Big Country*, rears "itself above the dunes like a stick of black-striped peppermint candy set on a cake with white icing".

Built in 1870 in this desolate spot, the lighthouse is now listed on the National Registry of Historic Places and opens to the thousands of visitors who come in summer, some to climb 257 steps (all that is allowed of the 268) in order to look out upon this part of the Cape Hatteras National Seashore, a part of the National Parks System, or to gaze seaward toward where the Diamond Shoals extend ten or so miles into the sea.

The lighthouse is not, however, an idle monument left over from another era. Even with today's navigational aids, its light is needed in this location, universally acknowledged by coastal geologists as having the highest concentration of wave energy on the East coast. The light warns of danger with a rotating aviation beacon visible twenty miles at sea as an abrupt flash every seven and a half seconds.

But even this, the country's tallest brick lighthouse, cannot always thwart its old adversary and protect ships—or itself. Today, and not for the first time, the Atlantic reaches for the lighthouse, marching almost up to its very base.

Laid when the present lighthouse was begun as a replacement for a shorter, inadequate one, this granite base surprisingly rests on wood: thirteen feet deep into the sand, below the water table, engineers crisscrossed heavy heart-pine beams twenty-four inches square. On this mammoth planking they settled the granite that supports the conical tower built of 1,250,000 bricks brought in scows from kilns along the James River in Virginia. Under the direction of the U.S. Army Engineer Corps, the walls of the structure thickened to fourteen feet of solid masonry at the bottom, tapered to eight feet at the top, towering 196 feet from base sill to the top brick.

No steel was used in the construction, since Bessemer's method had yet to find acceptance in this country, but the iron superstructure added twelve feet more to the tower's height. With its cast-iron stairway anchored in massive masonry, the overall structure weighs perhaps 2,000 tons, yet cost only $155,000 to build.

In his book *The Hatterasman*, Ben Dixon MacNeill admires the builders' skill: ". . . eighty years after it was built . . . the tower was minutely measured. It was found that it was not out of line by any measurable fraction of an inch."

MacNeill claims that islanders still recall "with remote glee" the story of how the Lighthouse got its distinctive paint job: "Somebody somewhere got the papers mixed up and the spiral striping that was intended for a new light tower fifty miles southwest on Cape Lookout was applied to the new Cape Hatteras tower, and the diamond shaped figures, suitable for warning traffic away