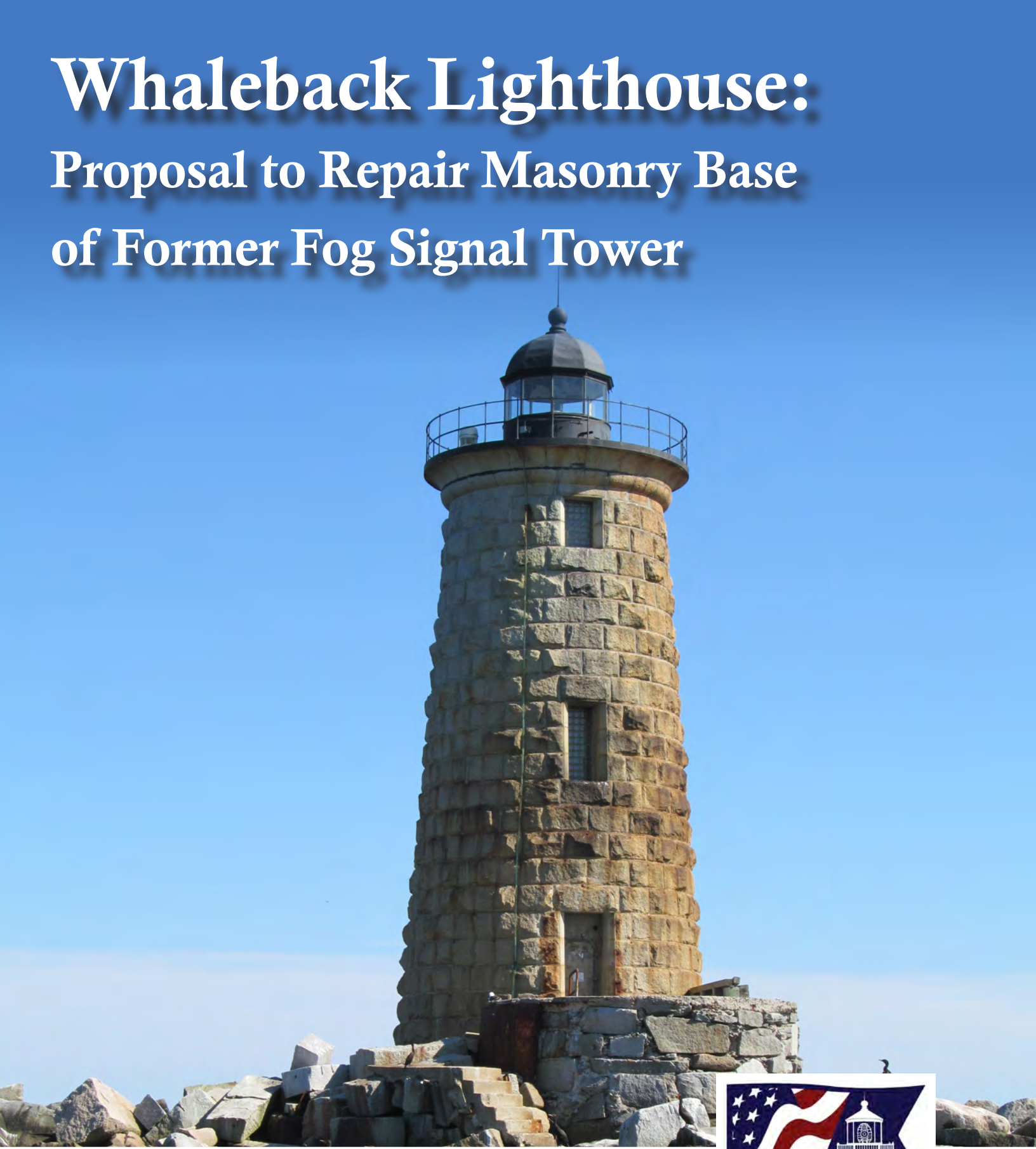
Whaleback Lighthouse:
Proposal to Repair Masonry Base of Former Fog Signal Tower



AMERICAN LIGHTHOUSE FOUNDATION

Submitted to NPS September 2016

Written and Compiled by:
Bob Trapani, Jr.
ALF Executive Director

The purpose of this proposal is to outline the American Lighthouse Foundation's proposed project to repair the masonry base of the former fog signal tower at Whaleback Lighthouse which is located in Kittery, Maine. ALF is seeking National Park Service approval to carry out this project in October and early November 2016.

Damage

In late-April 2016 it was discovered that the pressure-treated wooden bulkhead (approximately 14 by 20 feet in size) at Whaleback Lighthouse was missing. A site visit on April 30, 2016 confirmed no trace of the bulkhead's wooden construction was left present at the location. The only thing that remained were a few rusted and twisted pins that once anchored the bulkhead to the rock ledge.

It is believed that the bulkhead may have been washed away during the first week of April 2016 when the combination of astronomical high tides and formidable southerly seas impacted the Maine coast.

History of Bulkhead Protection

Though there is some debate as to whether the bulkhead at Whaleback Lighthouse was established as a form of protection for the site from storm seas, the U.S. Coast Guard's Industrial Support Detachment in Portland, Maine, believes the bulkhead did serve as a wave-attenuator at the site. The American Lighthouse Foundation concurs with this statement.

Looking back in the history of Whaleback Lighthouse, one can



Photos by Jeremy D'Entremont

Before (top) and after (bottom) view of the bulkhead location

discover in Federal reports where the United States Lighthouse Service – and later the U.S. Coast Guard, invested sizable funds in projects to repair or entirely rebuild the bulkhead and stone breakwaters at the wave-swept site.

According to New England lighthouse historian Jeremy D'Entremont, when the existing granite lighthouse at Whaleback was constructed in 1872, "The 1831 tower remained standing while the new one was built. Beginning in 1877, the old tower briefly served as a fog signal house with the installation of a new Daboll fog trumpet. Access to the rickety building was difficult in rough weather, so a new plan was devised."

D'Entremont goes on to note, "In 1878, a new cast-iron tower was built just to the north of the 1872 lighthouse to serve as a fog signal house. The tower, about half as tall as the lighthouse, was surmounted by a long iron tube and a third-class fog trumpet. This fog signal tower was painted red for some years. The remains of the original lighthouse were torn down in 1880."

The stone base for the original 1831 lighthouse, which was situated just southwest of the new lighthouse, also served as "bulkhead" protection for the site, which was increasingly important after the cast-iron fog signal tower was established in 1878. However, with its demise in 1880, a new protection system was necessary.

The most critical area to safeguard appeared to be the space between the granite lighthouse and cast-iron fog signal tower along the southwest side of the site. In the late-1800s, Annual Reports for the U.S. Lighthouse Service expressed concern for the adverse effects of the sea along this area as waves were reported to slam into the gap between the two towers in funnel-like fashion.

Stone breakwaters on both the east and west side of the lighthouse were eventually established as well, but required periodic attention due to the action of the sea, which would dismantle the stonework over time. Today, the west breakwater is compromised and the east breakwater has been rendered ineffective by the power of the sea.



ALF Photo

1872 lighthouse and 1878 fog signal tower at Whaleback

Incidentally, an approved 2016 Amendment to the American Lighthouse Foundation's original 2008 NHLPA application, will address the eventual repairs of these important breakwaters.

In contemporary times, the bulkhead at this site was constructed of pressure-treated wood and replaced on at least one other occasion due to damage.

Environment

The light station is exposed to the adverse effect of twice-daily tidal flows whose scourge is more powerful than the typical flood and ebb tides due to the swift currents present at the mouth of the Piscataqua River.

The Piscataqua River is the second fastest flowing river in the United States, averaging almost 3 knots on the incoming tide and 4 on the ebb. Over time, this unusually rapid flow of water systematically scours works of masonry whose structural integrity is not kept in optimum condition.

In addition to the ravaging tides, the lighthouse is subjected to an incredible pounding by the sea,

especially during fall and winter gales. During a strong storm, it is not uncommon to see waves break over the top of the lighthouse, and in doing so, also wrap around the conical lighthouse in furious fashion. It is plainly evident at the site that the sea has tossed huge granite rocks around like child's play.

There is also the adverse impact of the thunderous pounding and vibration of the sea, which over time, has shown to break down components like mortar, iron and wood at Whaleback.

Another common but no less destructive effect is that of the freeze / thaw cycle during winter months, where ice forms along the base and within the exposed stonework of structures like the old fog signal tower base.

Additional Factors

All of the aforementioned environmental factors – as well as the inherent presence of salt water and air, have all but reduced the mortar that holds the stonework of the old fog signal tower base to a granulated sandy form or along some distinct locations, removed it altogether.

Originally, the old fog signal tower base was enveloped by iron sheathing, similar in appearance to caisson lighthouses. However, over time the elements and the sea have combined to deteriorate, crack and destroy the protective iron sheathing.

Today, only parts of this iron sheathing remains, and even those parts that remain, are visibly failing from a structural integrity standpoint. The areas along the base where the iron sheathing is gone, has left the stonework totally exposed to the fury of the sea.

When initially constructed, the stonework did not have to withstand the elements and sea, and thus was not erected with the same precision and strength of structures that were expected to take on the brunt of the sea.

Photo by William Marshall



Importance

Though the granite lighthouse at Whaleback remains structurally sound, the same cannot be said for the old fog signal tower base just to the north of the lighthouse.

Not only is the protection of this vintage base important from a historical perspective, it is just as vital to the present and future of Whaleback Lighthouse.



Photo by Bob Trapani, Jr.

When the American Lighthouse Foundation obtained ownership of Whaleback Lighthouse in 2008 under the National Historic Lighthouse Preservation Act, a docking system (and repairs of the two breakwaters) were not addressed to the extent necessary. In the years that followed, experience revealed that a more in-depth solution to accessing and protecting the exposed offshore site was required.

This was addressed during a subsequent Amendment process, which the National Park Service and Maine Historic Preservation Commission approved in late-spring 2016.

The amended plan for a docking system incorporated the old fog signal tower base in two critical aspects. One, a seasonal gangway is to span a point along the western breakwater up to the elevated top surface of the old base, which safeguards visitors from having to traverse oddly strewn, angled and slippery rocks to access the lighthouse.

In addition, the flat surface along the top of the old base is the perfect congregating place for visitors to gather once having disembarked a boat or completed a tour of the historic site. It is also ideal for providing an initial orientation (both safety and historical) of the site.

While more time is needed to formulate engineering plans for a bulkhead replacement and the possible project to return the iron sheathing around the old fog signal tower base, it is not in the best interest of the historic site or the American Lighthouse Foundation's stewardship commitment to stand by while these costly and complex projects are designed.

With winter fast approaching, we can ill-afford to allow the sea to wreak havoc on the old base, which is a critical component to the overall restoration and public access plans at the site and is no longer afforded any protection from a bulkhead.

Action Plan

The American Lighthouse Foundation proposes to repair the old fog signal tower base in fall 2016. The urgency that surrounds this critical repair project cannot be overstated. It is vitally important that this work be carried out before the storm season arrives later this fall and winter.

Without repairs to the old fog signal tower base, the structure will be exposed to great risk of further damage.

With the approval of the National Park Service, the American Lighthouse Foundation (through its local chapter, Friends of Portsmouth Harbor Lighthouses) will contract with the J.B. Leslie Company of South Berwick, Maine, to enact the necessary repairs to the stone base.

The J.B. Leslie Company is highly respected by the Maine Historic Preservation Commission for their skilled work that adheres to the Secretary of the Interior's Standards for Preservation. In addition, the J.B. Leslie Company has performed diverse restoration at a dozen other Maine lighthouses and is very adept at working offshore sites like Whaleback Lighthouse.

Scope of Work

- Stage the old fog signal base (the base is over 20-feet in height)
- Remove deteriorated mortar and clean debris from the stonework
- Fill large gaps amongst the stonework with rocks native to the site and secure them in place with mortar
- Point the lower section of the stone base that is underwater at high tide with a Rapid Set mortar mix. This hydraulic cement is ideal for below water levels and will contain a corrosive inhibitor additive to further strengthen it for long-term durability
- Point the upper section of the stone base above high water with a Type II Portland cement with an acrylic masonry additive (K-88) to assist with preventing water intrusion



Photo by Bob Trapani, Jr.

Summary

With the approval of the National Park Service, the American Lighthouse Foundation will carry out the aforementioned scope of work on the old fog signal tower base during the months of October and early November 2016.

This project will be tedious at the outset due to the limited hours low tide will permit such work to occur along the base of the structure.

While this proposed work is being undertaken, the American Lighthouse Foundation and its local chapter, Friends of Portsmouth Harbor Lighthouses, will continue working with our marine engineer (Duncan Mellor, P.E., Principal Coastal Engineer for Tighe & Bond in Portsmouth, NH) on design options for the replacement of the bulkhead at Whaleback Lighthouse. Once plans have been finalized for a new bulkhead, the American Lighthouse Foundation will submit them to the National Park Service for review. We anticipate the design process to conclude in late 2016 / early 2017.



Photo by Bob Trapani, Jr.

View of the lower base with remnants of the iron sheathing and exposed masonry



Photo by Bob Trapani, Jr.

Looking down at the bulkhead that was lost at the site in early 2016



Photo by Bob Trapani, Jr.

A close-up of the lost bulkhead and the old fog signal tower base



Photo by Bob Trapani, Jr.

The present situation at Whaelback Lighthouse with no bulkhead, which fully exposes the old base



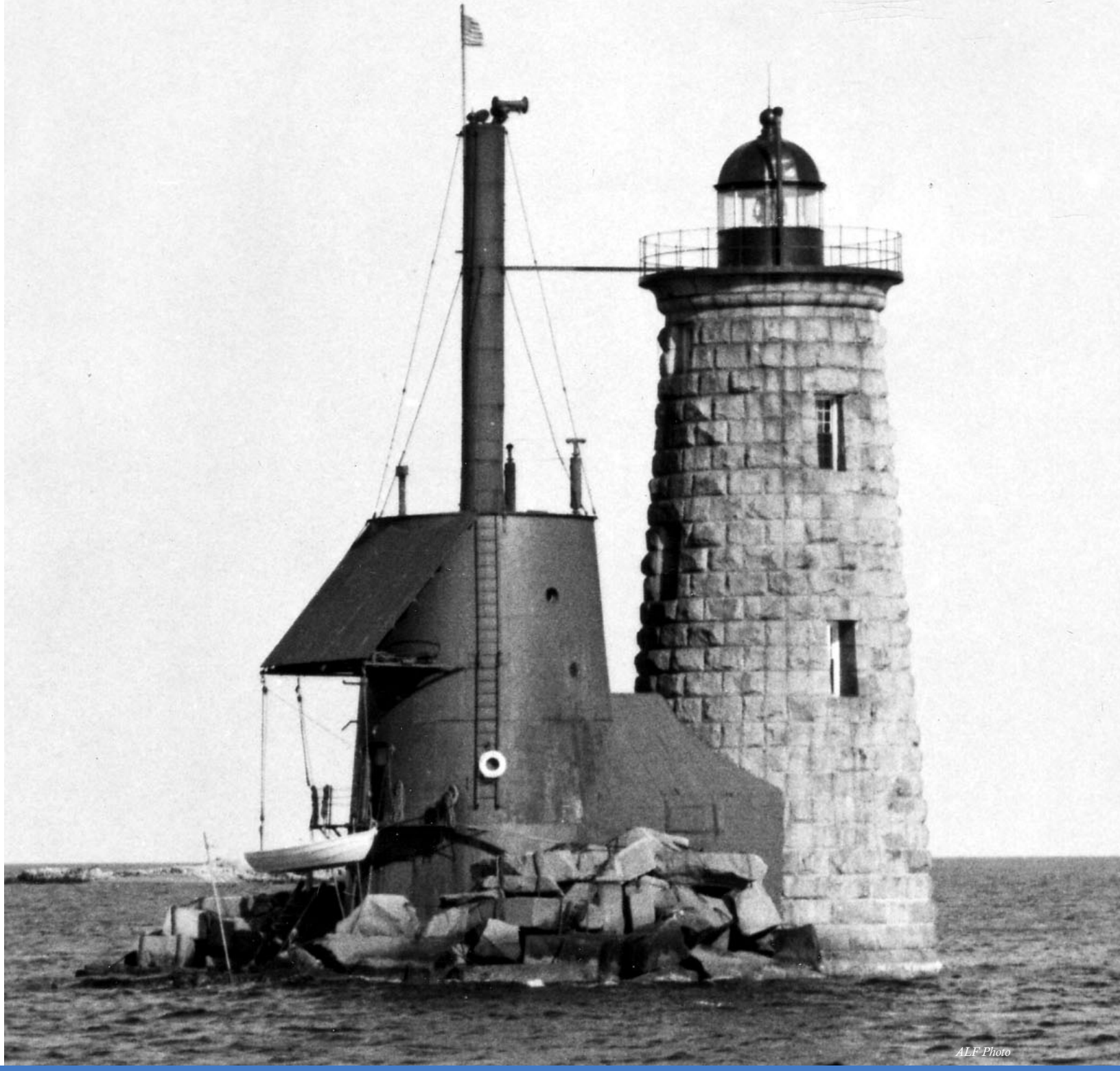
Photo by William Marshall

Storm seas wrapping around the base of the lighthouse may damage the old masonry base



Photo by Jeremy D'Entremont

An aerial view of Whaleback Lighthouse at low tide



ALF Photo

American Lighthouse Foundation
PO Box 565
Rockland, ME 04841

www.LighthouseFoundation.org