

Restoration Report

Burnt Island Light Station

Summer 2020



Property Owned by:

State of Maine, Department of Marine Resources

Project Funded by:

Donations to Keepers of the Burnt Island Light

Project Managed by:

Department of Marine Resources, Bureau of General Services

Report Written by:

DMR Education Director, Elaine P. Jones

Abstract

On November 9, 1821, Keeper Joshua B. Cushing lit up the Burnt Island Lighthouse for the very first time. After his tenure, 30 other men followed his footsteps up those winding stairs into the lantern-room to illuminate Boothbay Harbor's guiding light. This monument of hope and integrity has served mariners for nearly 200 years and its devoted keepers served it in return. However, in 1988 automation took away the last true lighthouse keeper, thus removing the love, attention, and financial backing that went into maintaining a lighthouse, keeper's dwelling, and outbuildings.

Built the year after Maine became a state, the lighthouse's rubble-stone construction has never been altered making it Maine's oldest "original" lighthouse. From afar and with a fresh coat of paint each year, the iconic beacon looked pretty good, but under a thick layer of stucco it was a different story. Not only had its 199-year-old mortar crumbled; its lantern-room and spiral stairs had rusted; its interior brick liner needed repairs; and surfaces inside and out needed paint. With its 200th Anniversary just one year away, there was no better time than now to restore the entire Burnt Island Light Station. It was high time to stop the deterioration and take action to preserve what was left and replace what was in disrepair.

In 1998, Burnt Island was transferred to the Department of Marine Resources (DMR) as part of the Maine Lights Program. In the years that followed, the agency's Education Director Elaine Jones stabilized the property with new roofs, heating system, septic system, interior work, and the installation of a waterline from the mainland. With the help of volunteers, she cleaned up the grounds by chipping hundreds of fallen trees, cleared brush, established public paths and gardens, added benches, built public restrooms and installed a docking system and moorings. She also raised over \$320,000 to build an outstanding Education Center that serves students, teachers, and visitors during day and overnight programs with dormitories that sleep 32 people.

In order to return the Burnt Island Lighthouse to its glory and preserve its legacy for the future, help was provided by a nonprofit friends group called the Keepers of Burnt Island Light (KBIL). They assisted in carrying out a fundraising campaign that received donations from hundreds of people through gift-giving and special events.

Prior to construction, extensive research was conducted to justify, document, and guide the restoration process. Standards and procedures for restoration were developed in cooperation with the Maine Historic Preservation Commission, United States Coast Guard (USCG), and Bureau of General Services (BGS). Architectural drawings, photographs, and oral histories were obtained from the National Archives and Coast Guard Historian in Washington D.C., the Coast Guard's Civil Engineering Unit in Providence, and from the children of lighthouse keeper Joseph Muise.

The BGS worked with the DMR to establish contracts with J.B. Leslie Co. of South Berwick and Marden Builders Inc. of Boothbay Harbor, Maine. The project started in mid-June and lasted through October. Both contractors were experienced in light station restoration, but in this case, masonry and metalwork were done by Leslie and carpentry work by Marden.

The project went smoothly, but as with all old structures there were unexpected surprises that included rotten sills and the need for new roofs. In October, a third contract went to carpenter Ted Shorette for roof replacement on three outbuildings – the work shed, boathouse, and coal bunker. All cost overruns were funded by KBIL.

They say that "A picture is worth a thousand words." So, this final report on the restoration of the Burnt Island Light Station will be a pictorial summary. It will not only take the reader through the steps, but it will cover materials used, history of the buildings, and documentation to support its restoration to circa 1950. The goal to preserve the strength, beauty, and legacy of this historic site has been met – enjoy the journey and the results!

History of the Burnt Island Lighthouse

Prior to the construction of inland roads, the ocean was the highway for moving lumber, lime, ice, fish, and other goods from Maine down the eastern seaboard and to foreign countries. In the early 1800's, the Secretary of the Navy made the following statement about the need for a lighthouse in Boothbay Harbor. "This is well known as one of the most important harbors upon the whole coast. It is easy of ingress and egress, large, safe in gales from any point of the compass, with good anchorage in any part of it. It is a harbor which all vessels bound east or west when met by head winds or unfavorable weather endeavor to make. It being a sort of rendezvous for coasters, more than three hundred sail have been anchored there at one time."

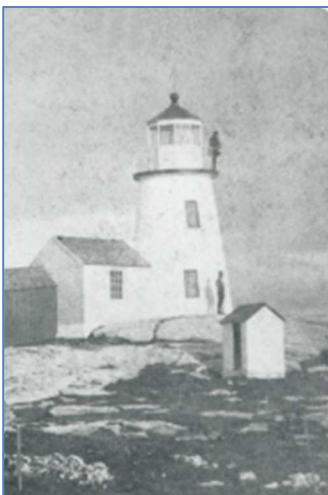
On March 3, 1821, the 16th Congress authorized the construction of the Burnt Island Lighthouse and two others along the coast of Maine. They appropriated a total of \$10,500 to build all three stations. Secretary of Treasury William H. Crawford was assigned the task of selecting a suitable site and he chose Burnt Island, located at the entrance of Boothbay Harbor. On May 25th, the U.S. government purchased the island for \$150 from local businessmen Jacob Auld and Joseph McCobb.

The government's builders were charged with the task of constructing a stone lighthouse and keeper's dwelling using granite blocks cut from the island. It was common practice back then to use locally acquired building materials instead of shipping raw materials to the site. The most probable harvest locations were the cellar hole under the keeper's dwelling and possibly the shoreline, even though signs of stonecutting are not obvious.

The construction style of Burnt Island's lighthouse is considered rubblestone. Think of it as a sandwiched wall consisting of an outer layer of granite and filler rock, a center core of cemented rubble (beach stone), and an inner layer of brick. The thickness of this wall varies as the conical structure tapers upward with a depth of four feet at the base and 18 inches at the top. The outside dimension at the base is 15 feet in diameter and almost 10 feet where the twenty-foot, tall tower meets the lantern for a total height of 30 feet.

The Burnt Island Lighthouse was established as the ninth station along the coast of Maine, but lighthouses two through eight were all rebuilt in the 1850s. Causes for their failure were attributed to the use of brackish or excessive water within the mortar, water penetration, inadequate ventilation, and/or building in cold weather - all affecting mortar set time and strength. Luckily, none of those conditions occurred at Burnt Island, and as a result, it holds the distinction of being Maine's oldest "original" tower. Only Portland Head Light surpasses Burnt Island in age; however, its tower is not entirely original having undergone five height changes since it was built in 1790 when Maine was part of Massachusetts.

Burnt Island's tower has remained constant, but changes have occurred to this aid to navigation. In 1857, the lantern was replaced and in 1889 white sectors became navigational paths. Also updated was the apparatus to create the light, going from 10 parabolic reflectors in 1821 to several styles of Fresnel lenses. Other equipment was modernized over time, but electrification in 1961 resulted in major changes - kerosene lamps were extinguished for the last time and hand-cranked mechanisms no longer spun the lens or sounded the fog bell.



1857



Circa 1880



Circa 1950



2008

Historic Documentation of Keeper's Dwelling

When the Burnt Island Lighthouse was built in 1821 a keeper's dwelling was also constructed. However, drawings or photographs that document this first house have never been found. The only clue about its construction was in the 1842 U.S. Light-House Establishment's Annual Report where it mentioned that Burnt Island's buildings needed repointing and whitewashing. This is an indication that it was a masonry structure, and is the likely explanation to why rough-cut, granite blocks can be found scattered around the island.

In 1857, the original house was demolished and replaced with today's wooden structure. Maine Historic Preservation Director Kirk Mohny reported that during this era William B. Franklin served as Army Engineer of the Light-House Board and was responsible for building design. His layout was typically a wooden dwelling with an attached covered walkway connecting the house to the lighthouse. Once construction was completed on Burnt Island, Keeper William McKown (1853-1861), and twenty-four keepers to follow, must've enjoyed the luxury of attending the light without going outside at night.

In 1859, the government conducted its initial photographic survey of lighthouses. A product of that survey was the first visual record of Burnt Island's buildings - a dwelling and covered walkway with board and batten siding. Noteworthy items in the photo include: a skylight between chimneys, an outhouse out the back door, the strategic positioning of three people to show perspective, a lack of trees, and the presence of stonewalls to contain livestock. The next oldest photograph taken in 1890, shows a white dwelling with three additional outbuildings: barn, work shed, and a chicken coup behind the shed.



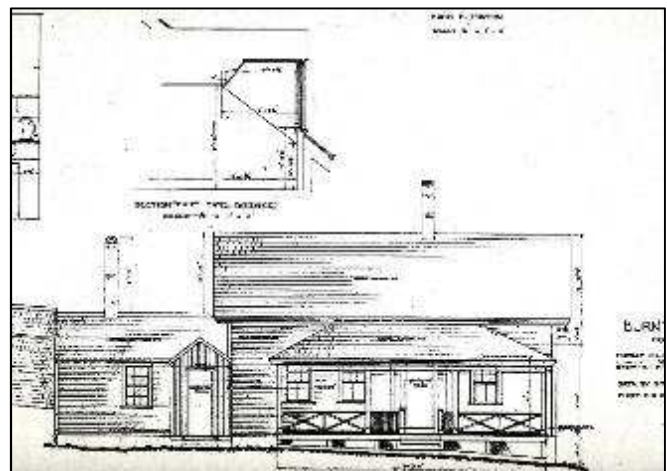
1859

Photographs from the U.S. Coast Guard Historian, Washington, D.C.

circa 1890



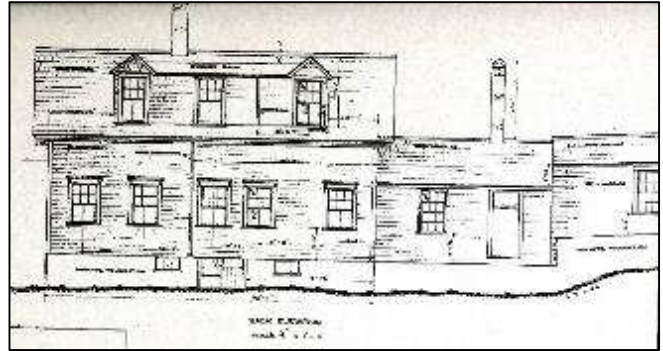
Photograph taken August 1950 during a Coast Guard inspection. USCG Civil Engineering Unit.



Architectural drawing - October 11, 1950. Acquired from US Coast Guard, Civil Engineering Unit.

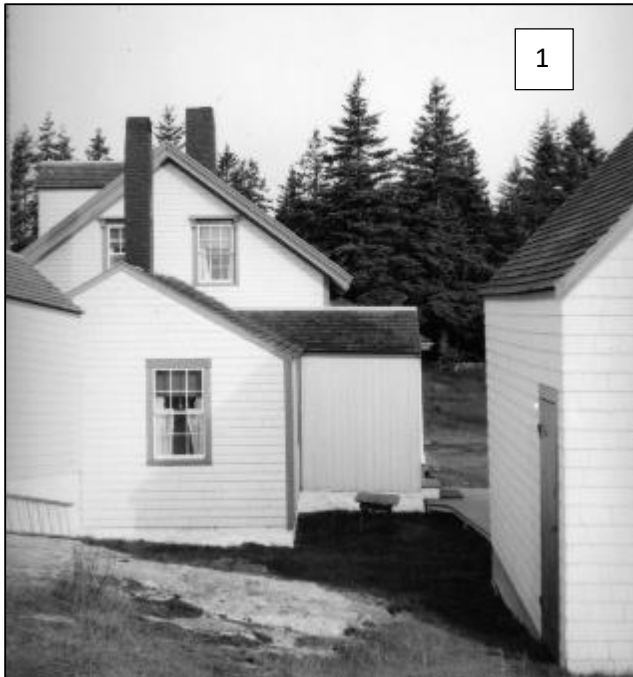


USCG photograph and architectural drawing of back of keeper's dwelling – 1950.

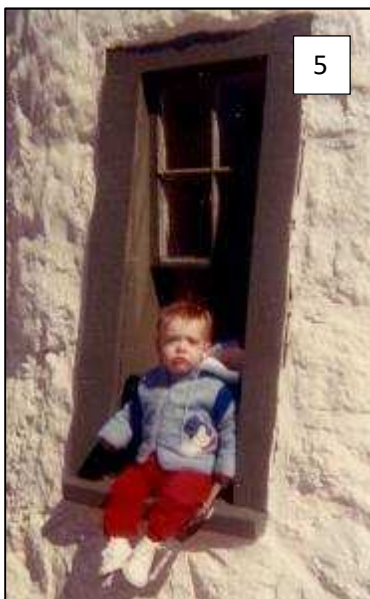


In August 1950, the above photos were taken by the lighthouse inspector when Keeper Joseph Muise was on duty (tenure 1936-1951). His children Willard, Adele, Prudy, and Ann returned to Burnt Island in 1999 to share their stories and interpret these photos. Not only did they provide valuable information, but as a result, they returned furnishings and artifacts such as the dining room table & chairs, mama's apron, dad's shaving mug, and much more to decorate the dwelling. Photos of themselves as children have also returned to the walls – note Willard in his Navy uniform to left of fireplace.

Historic Documentation of Outbuildings & 1950s Features



Black & White Photos - August 1950 by USCG (#1 & 4)
Color Photos of shed - 1955 by relief Keeper Ted Prescott (#2 & 3)
Photos of window & flagpole - 1970 by Keeper Tom Norton (#5 & 6)
Photo of boathouse and coal bunker - August 1960 by USCG (#7)



Lighthouse Restoration



Mobilization

Regarded as an experienced contractor for lighthouse restoration, J.B. Leslie Inc., of So. Berwick, Maine was awarded the contract to restore the Burnt Island Lighthouse. Owner James Leslie had worked on 21 other lighthouse stations prior to arriving on Burnt Island.

The landing site was prepped before June 18, 2020 when a crew of five moved equipment onto the island utilizing their boat, DMR's vessel Resourceful, and Fuller Marine Services barge pictured here. After landing the commercial compressor and other large equipment, the island's tractor transported their tools to the worksite.



Staging & Safety Measures

Metal staging was assembled around the twenty-foot masonry tower with base plates bolted to the surrounding ledge and roof brackets attached to the adjacent workroom. The entire scaffolding system was then wrapped with netting for worker safety and to contain demolition debris.

In order to keep curious visitors at a 50-foot distance, roped fencing surrounded the historic buildings with warning signs that read "Work Zone - Do Not Enter." During the period of construction, regular visitation hours of 10 AM – 5 PM were maintained, but the front of the dock was reserved for the contractor's boats. Therefore, weekday guests were primarily boaters who had paddled ashore.

Cleaning Exterior Surfaces & Joints

Surrounded by saltwater and exposed to the harshest weather, the tower's blocks and mortared joints were coated for protection. Therefore, the first step in the restoration process was to remove layers of paint, Thoroseal, and whitewash. A tool called a scabblor, pictured at left, removed the tough, outer covering from the granite blocks. Hand and pneumatic chisels were then used to remove old mortar from between the stones to a depth of at least 1.5 inches.

Both Portland and natural cement were found in the joints, an indication that the tower had been repointed at an earlier date. After analyzing the mortar's composition and brittleness, Jim Leslie estimated that a repointing occurred around 1920. The 1821 beige-colored mortar beneath the outer, gray cement was firm but it crumbled like sandstone.





Mortar from Different Periods

Beige Mortar (1821) Gray Mortar (circa 1920)



Tuck or Repointing Stonework

Even though masonry is among the most durable of historic building materials, it's also susceptible to damage from incorrect maintenance. Therefore, a qualified contractor was hired to properly stabilize, restore and protect the lighthouse. He also provided guidance to DMR staff on how to care for it in the future.

Beginning at its solid ledge foundation, increments of 3-4 feet were repointed at a time. After the mortar was removed, all empty joints were dry brushed and washed with water until the substrate was clean and sound.

Holes and gaps between some of the granite blocks were filled with additional rubble and Portland cement used to secure them in place. Large holes like pictured below provided a view of its middle layer which consisted of beach stones cemented together.



Due to its ability to breathe, natural cement was used to tuck-point all joints between granite blocks. This repointing process restored the physical and structural integrity of the masonry lighthouse.



All joints were filled with a natural cement that bound the individual granite blocks together as a structural whole. Filled in accordance with standard masonry practices for tuck-pointing, these joints should last 50-100 years.



Stucco

After mortared joints were dry, hand trowels were used to apply a coating of M12 premixed mortar from Edison Coatings over the granite blocks. This nonstructural, weatherproofing layer of stucco will prolong the life of the lighthouse by shedding rain and snow. As a permeable coating, it will allow moisture trapped inside the tower to escape, but at a microscopic level.

After stucco work was completed and dry, a hand-held grinding stone was used on the bottom part of the tower to create a smooth surface.

Using brushes and heavy-napped rollers, the final step was the application of two coats of a mineral wash called Edison EverKcoat 300. This potassium silicate, masonry paint is a breathable color coating.



Window Installation

Originally, the tower had two, double-hung, 4 over 4, true divided light windows. It is possible that at automation in 1988, the USCG replaced each with decorative, glass blocks that included a built-in vent.

The installation of new Marvin windows required cooperation between the masons and carpenters because of the wood to concrete interface. Pressure treated wooden frames were built by the Marden crew to receive the windows, while the Leslie crew filled all irregular surfaces with cement to create smooth, water-tight edges. After curing, the frame was screwed into the masonry and all perimeter edges caulked. An Ice and water shield membrane was secured under each window prior to its installation and then tapered trim boards were applied and painted gray. After installation, stucco was used to fill gaps between the tower and trim boards.



After 199 years, the masonry tower was found to be structurally sound, but it was high time to repoint the joints. Large holes created by missing rubblestone and attached sector boards were areas of concern for water infiltration. The return of real windows to the lighthouse made a huge difference. It now resembles its 1950 appearance, minus sector boards that will never return due to navigational equipment upgrades by the USCG.



Lantern Restoration

Around 1857, Burnt Island's stone tower was retrofitted with a new lantern as the older one could not support the installation of its new Fresnel lens. Since then, this cast-iron structure has been directly exposed to the elements, and since automation in 1988, maintenance has not been provided. Therefore, its roof and deck were severely rusted, and walls, railing, astragals, and ventilator ball moderately corroded.

J.B. Leslie's method to address the rusted metal in the least abrasive fashion was through use of a tool called a Sponge Jet. Tiny pieces of sponge were propelled at high pressure to remove rust from surfaces without eroding them. He rented the equipment from Sponge Jet of Newington, NH. (www.spongejet.com)

Powered by a commercial compressor near the island's landing site, a 300-foot hose ran to the media hopper near the tower, while another hose propelled the media from the hopper to the operator on the lantern-deck. In the top photo, the ground-crew would dump 30-pound bags of small, sponge pieces into the white hopper.

The operator of the sponge-blaster wore a protective suit, respirator, and ear protection. Plastic was attached to contain used media so that it could be cleaned and recycled. Pressure for propelling the media was controlled by the operator, thus allowing for precise removal of rust without damaging the metal.

A pneumatic needle-gun was used as the rust removal tool on the balcony's underside due to extensive corrosion. In more delicate situations like window astragals they were removed and cleaned by hand.

The only glitch experienced in the Sponge Jet cleaning process was a blown compressor hose. This resulted in a one-day delay until the barge could return to swap it out with a new one.



Workroom

Wrapped in a plastic cocoon to contain spent sponge-blasting media, old paint and Thoroseal were removed from the workroom's brick walls. All mortar joints were inspected with only a few places needing repointing. After all brick surfaces were cleaned, they were coated in the same manner as the tower with Edison stucco and mineral wash.

The wooden facade on the stainless-steel door was repainted white, and the bronze plaque that identifies Burnt Island Lighthouse as a historic site was reattached to the wall closest to the tower.





Rust Treatment

Contractor Jim Leslie stated that after all heavy rust was removed from metal surfaces, they were scraped, sanded, or wire-brushed to remove any residual corrosion. In order to seal out moisture and prevent future rust from forming, a product called OSPHO was then sprayed onto cleaned surfaces. In the treatment process, a chemical reaction causes the iron oxide (rust) to chemically change to iron phosphate a tough, hard surface ready to receive primer.

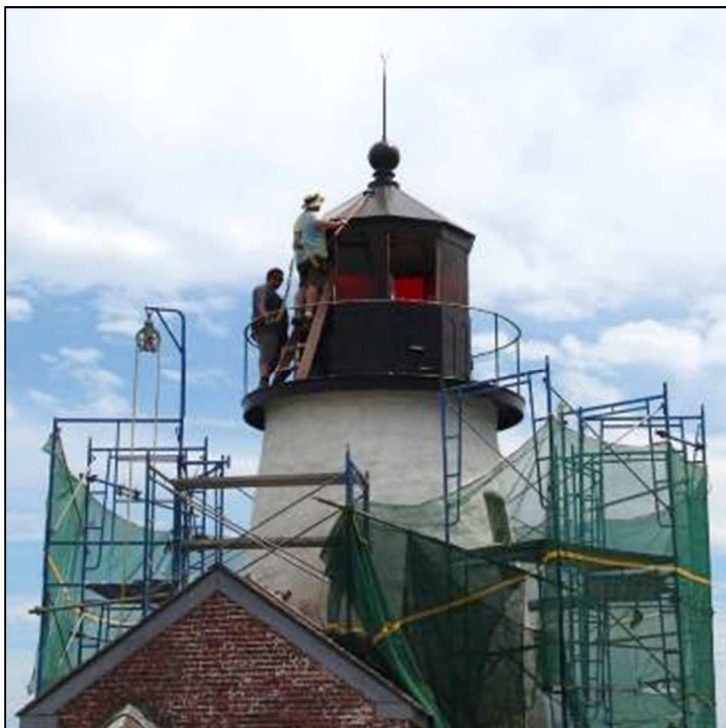
Priming & Painting Metal

A universal metal primer called Kem Bond HS was applied to the lantern's walls, roof, ventilator ball and its entire deck – top, bottom, and rim. The topcoat was a glossy, black, commercial-grade paint called Corothane, a Sherwin Williams product. After curing for 24 hours, a second coat of paint was applied. This product is advertised to provide UV and chemical resistance equivalent to two-part urethane coatings, thus creating an ultra-hard, durable finish.



Severe Corrosion

As pictured to the right, roof panels were severely rusted and pitted due to the elements and lack of maintenance.



Tower Interface

The steel to masonry interface between the deck and tower was sealed using a commercial, urethane caulking around the repointed edge of the tower. This will provide a flexible, water-tight junction between metal and stone.

Lantern Glass



The lantern's ten windows were comprised of two clear glass, four historic red glass, and four red plexiglass panels. The original plan was to replace the plexiglass panels with red glass, but unfortunately that didn't happen. Jim Leslie called several glass companies to secure a product that would meet the USCG's color and clarity standards. The three samples subjected to the LED lamp test (Burnt Island's future upgrade) failed after having produced light of unacceptable colors. To keep the project moving forward, the Coast Guard's offer to replace the crazed plexiglass panels at no cost was the best option as countless hours were spent on this venture.



Cracks in two of the historic, red glass panes were stabilized using JB Weld glass and windshield repair epoxy. Clear plexiglass liners have been cut to protect these panes, but attachment method has yet to be addressed.

All old caulking was cut out and metal astragals removed to access window panels. Several of the astragal's screws were damaged or rusted, so they were drilled out and replaced with stainless ones, while those reused were cleaned and repainted.

Once windows were removed, glass pockets and glass stops were sanded and wire-brushed to clean off dirt and rust. All rusted surfaces were treated with OSPHO rust converter, Kem Bond HS primer and black Corothane paint.



During reinstallation, 1/8" foam tape lined the glass pockets to prevent glass to metal contact, plus 1/8" rubber setting blocks were used between the glass stops and glass. All historic glass panels were never removed for fear of damage. However, their glass pockets were hand-sanded and treated in the same fashion as all metal.

White Sectors

In 1982, external sector boards (see 1950 lighthouse photo in historic section) were replaced by a metal framework inside the lantern-room. The clear panes of window glass that make up this navigational characteristic (white light) were replaced.

Note the missing panes of plexiglass in the photograph to the left. As work was being performed, the light was never extinguished as all windows were returned before sunset.



Lantern Interior

The lantern's interior was in decent shape with primary needs being paint and clear windows.

Constructed of cast iron, the ten sections were most likely transported to the site in pieces and assembled on top of the finished tower. The four parts (roof, windows, walls and floor) are all bolted together. The contractor scraped, primed and repainted all surfaces with white paint of commercial grade.

The round hole in the roof of the lantern allows for ventilation. A suggestion is to insert a small fan here as the heat is intense on summer days. Cooler air drawn up from below would also improve air circulation and help solve moisture problems.



White Sector Panels

The center photo shows the metal framework that holds red glass panels in front of the clear glass panes to form the white sectors. This framework was in good condition as was one eight-inch panel of real red glass. The Coast Guard sent new plexiglass to replace the other two crazed panels, but they were too thick to fit into the framework. Instead, one quarter inch thickness is needed, and that request to the USCG has yet to be made.



Lower Walls

In the lower portion of the lantern-room, the cast iron wall panels are lined with v-match boards. These wooden surfaces were cleaned and sanded where necessary prior to receiving a new coat of white paint.

The circular brass vents, once used to control airflow for the burning lamp, were in good shape with only one missing a brass handle.

The hatch door that leads to the balcony was cleaned and painted with a commercial grade, white paint. The door's latch still does not respond properly to the turn of the handle. This issue will need to be revisited in the spring as will the door's wooden façade.

Lantern Summary

The lantern looks great as compared to its rusted condition and leaky windows prior to restoration. Improved air-circulation using a fan and/or moisture control to include a dehumidifier at the base of the tower would be sensible improvements to keep mold, mildew, and moss from returning.

Lighthouse Interior



In 1901, these spiral stairs were installed when Burnt Island's light, became a flashing light, without the use of electricity. Like a grandfather clock, a falling weight down the center tube spun a bullseye lens to create its characteristic signal. The earlier staircase built into the brick liner went in the opposite direction with the three, arched, storage chambers for whale oil under those stairs.



At the base of the tower, the brick liner was in very good condition with minor repointing needed in places where a metal staircase once attached. The present spiral stairs are self-standing with a few attachment rods securing it to the wall at regular intervals. The center drop tube was painted gray as were the top and bottom surfaces of each step.

The three storage compartments, two window wells and brick architraves that top them are character defining features of the tower's interior. Once used to store whale oil, the three arched areas were cleaned and painted white as were the window wells.

Repairs to the brick liner were needed towards the top of the tower where two, large, cement patches covered the problems. Once removed, remnants of the old, metal stairs were found as were holes created by sector board attachment. New bricks were mortared in place to seal holes, but uncovered stair pieces were left exposed to highlight these features of earlier construction.



Burnt Island's first staircase may have resembled the one at Pemaquid Lighthouse pictured above. Note the scalloped edges and how the stairs were built into an additional course of brick.

In 1982, when the white sector boards were removed, the brick liner was damaged at their attachment points. As part of the restoration project, similar bricks were cut and mortared in place at those sites. (bottom left photo)

Masonry work also took place at the junction where the lantern rests on the top of the tower. The areas around support beams were reinforced and the top three courses of bricks repointed. These much-needed repairs will help stabilize this interface.



Dwelling Restoration



Circa 1950 architectural drawings and photographs guided the Marden crew through the restoration process. Lead carpenters studied these documents using them as references every step of the way. When they had questions or doubt, they turned to the project manager for answers. If she couldn't help, then Mike Johnson at the Maine Historic Preservation Commission was called for advice.

When the dwelling's clapboards were removed the underlying surface was the original siding applied in 1857. In the photos, note the lighter vertical stripes that mark where battens once existed. These wooden strips sealed the gaps where the brown boards met. This style known as board and batten siding was popular from 1845-1865 (See 1859 photo at beginning of report). Even after 163 years, most of the original boards were solid, except for those near door entrances. The old boards formed the perfect base for new trim and clapboards.

Hydrogap Drainable House-wrap

A product called Hydrogap was used as a house-wrap. It was stapled to all surfaces before new siding was applied. Known to eliminate moisture, this barrier will hopefully help protect the sheathing and clapboards from mold and rot.



In performance specifications, the manufacturer states that its 1 mm, blue bumps act as spacers allowing 100 times more water to drain versus standard wraps.



Gable Ends & Trim

Historic photographs and drawings helped identify building materials and guided the restoration. All materials found to be in good shape from the 1950s were retained, while some were repaired, and others totally reconstructed.

In the soffit areas, 1"x 8" shiplap boards replaced existing plywood, while 1"x 10" pre-primed, select boards were used for fascia. Frieze boards were 5/4"x 4" and corner boards were 5/4"x 5" both pre-primed and select as well. All sides and end cuts of trim boards were primed before being applied with 316 stainless steel nails.

A drainable building wrap called Hydrogap was applied under all clapboarded surfaces. (www.hydrogap.com)

Window Replacement

All existing Anderson windows (circa 1980) were removed and replaced with custom, Marvin clad, true-divided lite, double hung, g2 windows. The aluminum-clad had more detail than fiberglass composites, thus it was the better product for Burnt Island's restoration needs.

Approval for the selected windows by Mike Johnson at the Historic Preservation was received after the manufacturer declared their durability in a marine environment. These Marvin windows hold a 10-year warranty.

The project manager secured 28 custom windows by working directly with representatives from Marvin Window and Hammond Lumber. The windows differed in their number of panes with six-over-two used widely throughout the dwelling, six-over-six in the kitchen and southern gable end, and three-over-three in the bathroom.

Carpenters installed the windows according to manufacturer specifications and properly fitted, fastened, and sealed each unit. For longevity sake, the exterior trim consisted of custom mahogany sills and 5/4" x 4" "Lifespan," select-pine boards. The bracket-like decorative window trim shown below was carefully removed and saved. Punky top pieces were replaced with mahogany, while all knee braces were repainted and reused. All exterior trim was painted with Sherwin Williams' Resilience gray Federal standard #595-16251.



All interior, window trim was set aside and reused as it had been applied in 2000 when the dwelling's interior was restored. A small molding borders all lintels and styles, while plain blocks exist in the top corners. This design exists on all first-floor windows and second floor hallway windows, while bedroom windows have plain, flat, boards without corner blocks.

www.marvin.com/products/collections/signature/ultimate/double-hung-g2 and www.lifespansolidselect.com



Siding and Sill Repair

The pine clapboards applied to the dwelling and covered walkway in 1984 were in poor condition. Architectural drawings and photographs from the USCG Civil Engineering Unit in Rhode Island served as restoration blueprints for exterior detail. In 1950, shingles existed on the covered walkway, dormers and one of the kitchen's walls. Clapboards covered the remainder of the building and vertical siding was used on the kitchen's entryway.

Unfortunately, after siding was removed, rotten sills were found under doorways, the mudroom and the covered walkway. This was understandable due to age and wet environmental conditions, but these repair needs were unknown when the contract was signed. Therefore, the contract was amended to use contingency funding and extend the end date.



All rotten door sills were cut out from under the three doors and replaced, as were any deteriorated wall boards. Covered walkway repairs will be reported in a section to follow as that work was extensive.



The installation of siding was straight forward with eastern white cedar shingles from Maibec applied with a 5" exposure, and radially-sawn, white pine clapboards from Ward Clapboard Mill applied with a 4" exposure. The kitchen's entryway or mudroom received new sills and exterior sheathing of select pine tongue and groove, square-edged, random width (4"- 6"- 8") boards.

<http://www.maibec.com/en/wood/products/shingles>
<https://www.wardclapboard.com/about.html>



The covered walkway's double sill system was in poor shape with a good 20+ feet of the original sills and floor joists rotted due to direct contact with the ground and runoff water. A cement curb was poured for the new, pressure treated, outer sill pictured above.

In order to access the rotted, inner sill system and floor joists, the Douglas Fir floor pictured below was carefully lifted with every board numbered so that carpenters could return each to their original place. Fortunately, the square-headed nails were rusted, so the planks were easily lifted without damage.



Covered Walkway

The most fascinating part of the restoration project was the passageway that connects the dwelling to the lighthouse, because clues from the past surfaced in many places. When clapboards were removed, the old board and batten siding appeared again, but this time painted white. Written on the wall was:



"Thick fog today. Howard Haggett, Arrowsic, ME May 9, 1907"

A call to the Arrowsic Town Office uncovered that Mr. Haggett was a carpenter employed by the U.S. Lighthouse Service at that time.



This two-cent piece dated 1868 fell to the ground when work was done around the sill. Was it placed there by a worker? If so, why was it 11 years younger than the age of the building? Or, maybe it fell out of a Keeper's pocket and rolled between the inside/outside floor systems? Whatever its origin, the mysterious coin was returned to the place it was found along with a 2020 quarter.



Another interesting find was when boards were removed to access the rotten sill. An old floor cloth appeared along the edges of the original wooden floor. Was this the floor covering in 1857 when the structure was built? If so, when was the Douglas fir floor installed? Did that happen in 1868 and timed with the coin intentionally placed between the sills? These questions may never be answered.



The section of the covered walkway nearest the lighthouse was built directly on ledge, while the section closest to the dwelling was elevated on a granite block foundation. Subjected to 163 years of runoff, sills and floor joists closest to the tower were completely rotted as pictured in the photos to the left.

The larger center photo shows a cross section of the original, double-sill framework with sills supported on stone and 4"x 4" center posts to the ledge below. While scraping the area clean, bones, clam shells, and a raptor's talon were found. So how did they get there? Was it a local mink?

In the photo to the far right, the new floor system consists of 2"x 8" pressure treated cross beams every 6 feet with 2"x 6" pressure treated timbers running parallel to the walls and 16" on center. A subfloor of 7/8" boards covered the framework before the original flooring was nailed back in place using stainless steel.



Exterior Painting

In the 1902 *Instructions to Lighthouse Keepers* book, outside colors listed were dark red, brown or white for wooden structures with red or lead (dark gray) color for trim. In 1939 when the Coast Guard took control of light stations, the US Lighthouse Service's earlier color requirements changed - notably exterior trim.

At the onset of the project, the trim color was known to be gray, thanks to an oral history provided by Keeper Muise's children (residents 1936-1951) and colored slides taken by USCG relief keeper Ted Prescott. However, the exact shade was unknown.

So, as carpenters removed deteriorated trim boards they were on the lookout for samples of paint. The original trim board below best represents many time periods.



On the left, the charcoal color appears to be the oldest layer of paint and possibly the lead color mentioned in the 1902 instruction manual. In an 1885 photo, the siding and trim were both painted white. However, in a photo taken in June 1895 when the bell tower was being built, the trim was dark. The green trim color was there in 1998 when the property was acquired by the DMR, but was the gray the answer to our quest?

Trim board samples were brought to Mike Johnson at the Historic Preservation Commission in Augusta for analysis. Then, the search began for the true color. A call to Sherwin Williams paint store in Damariscotta led the project manager back to an old friend, one who had already done the research. With the board in hand, she visited Michael Kriendler at the Doubling Point Range Lights in Arrowsic. After comparing the board to his Federal Standard 595 Paint Specification color chips, the gray paint for the restoration's trim was determined to be Federal standard #595-16251.



Federal Standard #595 paint specifications
<http://www.sherwin-williams.com>

Dwelling Roof

In the early stages of the restoration project, another surprise surfaced when the condition of fascia and trim boards were being assessed. Lead carpenter Marc Holbrook discovered that the roofing shingles were being held on by a thread. Attached with galvanized nails in 2000, the nails holding the white, cedar shingles in place had rusted off. As a result, new roofs had to be included with a change order providing a time extension and the use of the contract's contingency funds for labor, while KBIL paid for all the materials.



A few years ago, the same scenario of rusted nails occurred on the backside of the dwelling with the ground that spring littered with shingles. That roof repair was done by DMRs contracted carpenter using stainless steel nails.

Approved for this project was an upgrade in materials to premium Alaskan yellow cedar shingles - 18" long and 5/8" butt. Prior to installation, 40 mil Grace Ice & Water Shield was adhered to the roof boards, topped by CedAir-Mat, a ventilation product used to create an airspace/cavity for air flow. Bostitch 6D, 2" ring shank, 316 stainless nails were used to attach the shingles with 5" exposure. A 2.67" strip of GAF zinc moss and mildew preventer was positioned under the 1"x 6" clear, vertical grain, red cedar, roof cap.

After removing the ridge cap, workers used roofing shovels to lift off the cedar shingles. The sections replaced in front were main roof, porch, ell, and entryway. A one-piece, cedar gutter was replaced along the main roof, while the porch gutter was refurbished as were the two wooden downspouts.



www.directcedarsupplies.com/products/roofing/shingles/alaskan-yellow-cedar-roofing-shingles/

www.advancedbuildingproducts.com/product/cedair-mat/

www.gcpat.com/en/solutions/products/grace-ice-water-shield-roofing-underlayment/grace-ice-water-shield-ht-us-version

Work Shed



Adjacent to the house, the work shed's restoration included three new windows, paint, roof, and flagpole. A few years ago, when the pine clapboards were removed, period shingles were exposed. Therefore, all siding and solid trim boards were hand-scraped and painted, while rotten ones were replaced.

The three windowsills were in terrible condition, so repairs were made before Marvin 6 over 6 windows could be installed. Due to rotten boards, several courses of shingles were removed under the second story window. Some shingles were reused, but others were not as the upper portions had worn thin in the space between shingle overlap. (middle photo)



The roof was an add on, as it like the house was destined to fly off due to rusted nails. Materials and labor were covered by the nonprofit group under a separate state contract with carpenter Ted Shorette. Like the house, Alaskan yellow cedar was used with similar application procedures.

The flagpole returned to its historic location at the peak of the shed. A 15-foot wooden pole was sanded, painted, and equipped with the necessary hardware before being topped with a gold ball. Wooden brackets of mahogany were made to attach it above the second story window and to the peak of the roof.



A few years ago, the shed's sills and a couple floor joists were replaced due to rot. At that time, an historically correct wooden skirt was constructed with hinged vents – one on each side of the building. This restoration was based on the 1950s color photograph included in the historic documents section of this report.



Boathouse & Coal Bunker

Unfortunately, like the house and shed, the crew used galvanized nails as fasteners, so its future was short-lived. KBIL's Board of Directors voted to provide additional funding to include new roofs to the boathouse and coal bunker as part of the total restoration project.

Marden Builders did not have the time to add these additional roofs to their schedule, so BGS signed a contract with carpenter Ted Shorette to perform the work. The nonprofit organization purchased all materials and sent a check to the DMR to cover labor for all three outbuilding's roofs.

The same materials used on the dwelling's roof were used here - Grace Ice & Water Shield, CedAir-Mat, and Alaskan yellow cedar - 18" long with 5/8" butt. The installation was also the same using 316 stainless nails and a 5" exposure. A zinc strip was positioned under the 1"x 6" cedar, roof cap.

This portion of the project was completed during the month of October, just before the buildings were winterized and the island closed for the season. Therefore, in the spring, a coat of fresh paint will be applied to the siding and trim by DMR staff and/or volunteers.

The restoration project did not originally include the boathouse as part of the plan. Therefore, it did not receive a new window on its back wall, nor were the clapboards replaced.

The boat-slip was totally rebuilt in 2008 by Fuller Marine Services using funds acquired from FEMA due to damages incurred by the Patriot's Day storm.



Before and After – Southern Side



Before and After – Northern Side

Project Summary

Boothbay Harbor's beloved lighthouse will shine on for at least another 200 years, thanks to the hundreds of generous donors and to the Keepers of Burnt Island Light - especially treasurer Jean McKay. The restoration project was an enormous undertaking that saved a maritime treasure for the State of Maine and for future generations. As an educational and recreational facility, it will continue to positively impact the Boothbay region and those who venture ashore.

Thanks also goes out to all the state employees across many agencies who came together to make this restoration happen. The collaborative effort involving five bureaucracies, a non-profit organization and three builders took time and patience, but all partners stayed focused on the same goal of saving this important piece of Maine's history – without the use of taxpayer's dollars.

The contractual process involved all levels of government because this construction project was not the norm – one funded by a nonprofit organization on a state site, with an active aid to navigation, that was listed on the National Register of Historic Places. Project managers who oversaw the construction were Jill Instasi of the Bureau of General Services and Elaine Jones of the DMR's Education Division with administrative support from Elaine Clark (BGS), Meredith Mendelson (DMR), and Carl Wilson (DMR).

The project's initial steps focused on gathering historic documentation that supported the restoration. Elaine Jones provided Mike Johnson at the Maine Historic Preservation Commission with historic photographs and architectural drawings that represented the restoration period of 1950. She also submitted work specifications that covered both masonry and carpentry components. This review process included many written and verbal communications, plus office and on-site visits.

The island factor was a challenge at times, but both contractors were no strangers to island work. Mobilization began in mid-June with a barge transporting heavy equipment and supplies. Each contractor had their own boat, but the DMR's Resourceful helped move large items ashore and the trusty John Deere tractor moved heavy and bulky materials to work sites. The island remained open to the public all season with work areas properly roped and marked to protect visitors.

Both contractors were easy to communicate with and responded favorably to questions and suggestions proposed by the project managers. Burnt Island was the 22nd lighthouse restoration done by the J.B. Leslie Co., so they were extremely knowledgeable about masonry and metalwork tasks associated with restoring the lighthouse. Their work was labor intensive from bottom to the top, inside and out.

The crew from Marden Builders were fantastic to work with and produced quality work every step of the way. They were easy to communicate with and worked well as a team, plus they were so attentive to detail, studying the historic documents and following them to a "T."



Crew of J.B. Leslie Co.
Owner Jim Leslie in front

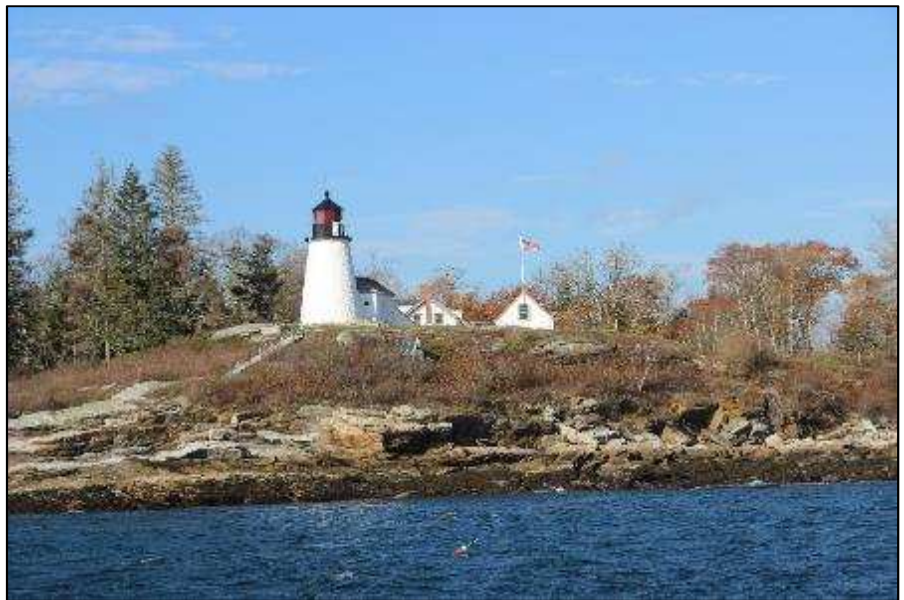


Crew of Marden Builders, Inc.
Owner Eric Marden in middle

Thank you for your interest in learning about this amazing restoration project. We hope that you will visit Burnt Island in 2021 to admire this success story in person. A heartfelt thanks goes out to all the donors who are responsible for "Keeping the Light Burning."

Burnt Island Light Station

Restoration Completed October 2020



Before and After





Photo by David Kynor

(www.davekynor.com)