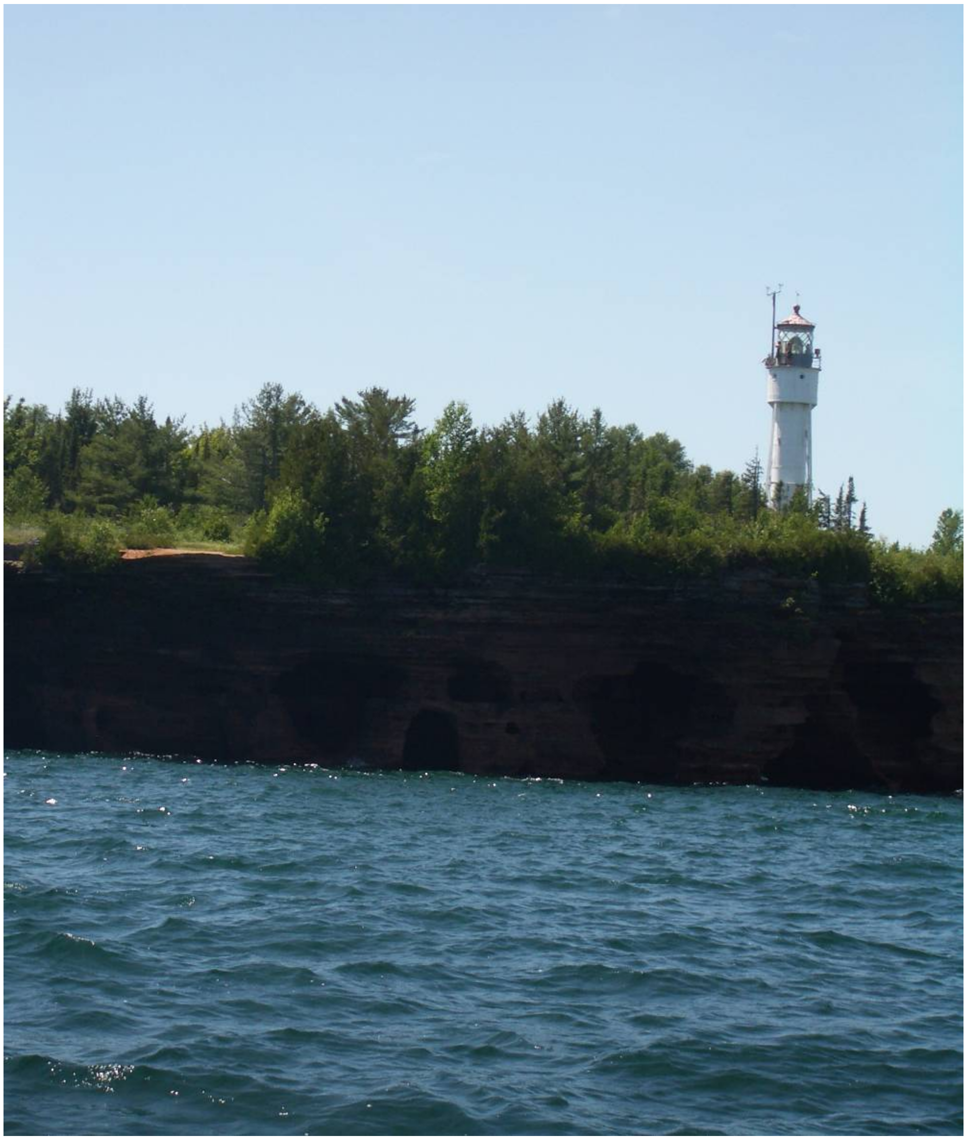
CULTURAL LANDSCAPE REPORT • HISTORIC STRUCTURE REPORT



Apostle Islands National Lakeshore – Bayfield, Wisconsin

VOLUME IV OF VI: DEVILS ISLAND CLR/HSR

APOSTLE ISLANDS NATIONAL LAKESHORE
LIGHT STATIONS OF MICHIGAN ISLAND, OUTER ISLAND, DEVILS ISLAND, LONG ISLAND AND SAND ISLAND

JULY 2011

CULTURAL LANDSCAPE REPORT, HISTORIC STRUCTURE REPORT AND ENVIRONMENTAL ASSESSMENT

VOLUME IV

APOSTLE ISLANDS NATIONAL LAKESHORE

BAYFIELD, WISCONSIN

LIGHT STATIONS OF MICHIGAN ISLAND, OUTER ISLAND, DEVILS ISLAND,
LONG ISLAND AND SAND ISLAND

JULY 2011
UNITED STATES DEPARTMENT OF THE INTERIOR

prepared for the
National Park Service

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CULTURAL LANDSCAPE REPORT AND HISTORIC STRUCTURE REPORT

LIGHT STATIONS OF MICHIGAN ISLAND, OUTER ISLAND, DEVILS ISLAND, LONG ISLAND AND SAND ISLAND

APOSTLE ISLANDS NATIONAL LAKESHORE

NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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FIGURES AND PHOTOGRAPHS

CHAPTER 1: INTRODUCTION

ORGANIZATION OF THE VOLUME

This volume presents the overall Light Station History, the Cultural Landscape Report (CLR), and the Historic Structure Report (HSR) for the Devils Island Light Station. This document is one of six volumes that present the comprehensive CLR/HSR for five of the six light stations in Apostle Islands National Lakeshore (park or APIS). The five light stations are Michigan Island, Outer Island, Devils Island, Long Island, and Sand Island. The light station at Raspberry Island was addressed previously in a separate report.

This volume presents detailed documentation of the light station's physical evolution and historical development; an evaluation of existing conditions for its associated buildings, structures, features and vegetation; an analysis of the cultural landscape and historic structures; and the recommended treatment for the Devils Island Light Station. Supplemental information applicable to all of the light stations, including Devils Island, is presented in Volume I, *Introduction and Overall Development History*.

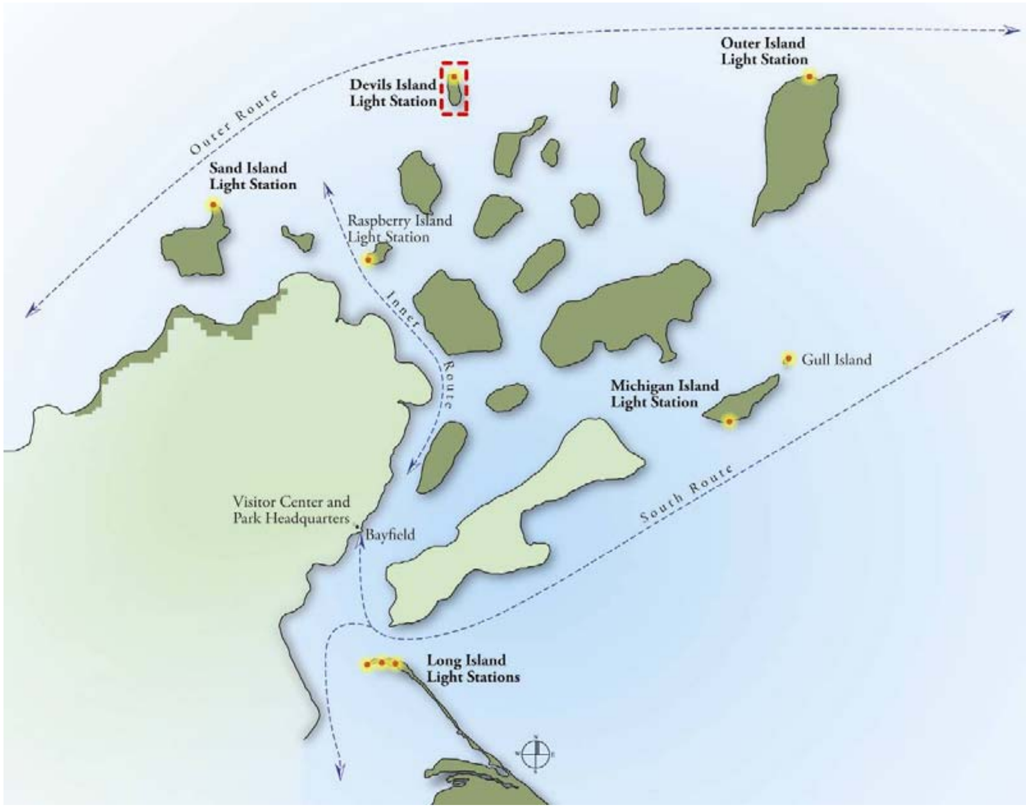
The island history is presented first, followed by the CLR and finally the HSR. Together, the combined CLR/HSR will guide the treatment of the significant resources associated with the Devils Island Light Station and provide guidance for the continued management of these resources consistent with the park's General Management Plan (GMP).

STUDY AREA

Devils Island is one of seven islands within the park, which includes the six light stations and Gull Island, and provides navigational aid for ships on Lake Superior. Devils Island is 1.3 miles long, 0.4 miles wide, and approximately 318 acres in size. The island is located at the northern edge of the park, approximately 21 miles from Bayfield, Wisconsin and 14 miles from Little Sand Bay. The 1894 H. Bamber reservation survey indicates that the entire island was purchased and set aside as the reservation, and notes it as being 320 acres in size. The Devils Island Light Station is located on the north shore of the island occupying approximately 10 acres with a Boathouse and landing area located at the south end of the island. The light station and Boathouse are connected by a trail corridor, formerly a road, established in the earliest years of the light station. The majority of the island, approximately 303 acres, is part of the Gaylord Nelson Wilderness area.

The Devils Light Station is an important navigational aid for the outer shipping route, serving the midpoint between the Sand Island Light Station and the Outer Island Light Station. The light station is located atop sandstone cliffs that rise approximately 20 feet above Lake Superior. The light station grounds are surrounded by boreal forest, dominated by spruce, fir, cedar, birch and aspen. The grounds consist of historic buildings and structures, clearings, site features and vegetation. The study area includes the original Devils Island Light Station Reservation, which encompassed the entire island.

Today, the island's land use is classified as the Apostle Islands National Lakeshore under the jurisdiction of the National Park Service (NPS). The light station continues to serve as an aid to navigation with the automated light tower and other aids maintained by the United States Coast Guard (USCG). The NPS maintains the sites and buildings, and the light station is frequented by visitors and park staff for its cultural and natural resources.



Devils Island Light Station Context Map (Source: MBD 2010)

SIGNIFICANCE OF DEVILS ISLAND

Devils Island is important to the Apostle Islands system because of the extent of its development as an outer route light station, and for its representation of the continuum of navigational aid technology during the period of significance of 1892 to 1978. The USCG remained on the island until automation in 1978, longer than any of the other Apostle light stations. During its peak, the light station contained three separate residential keeper's quarters, an extensive tram and loading system, a Boathouse and dock, a pump house and many other site features that supported the operation of the light station. Navigational aid equipment was wide ranging during the period of significance and included the Light Tower, radio beacons, fog signals and fueling equipment. The entirety of the Devils Island Light Station Reservation comprises its cultural landscape. However, the majority of its contributing features occur on the light station grounds at the north end of the island and at the Boathouse site at its southern end.

Contributing features include buildings and structures and their organization, historic cleared areas and corridors, circulation features, and the views of the light station from Lake Superior. Eleven structures on the List of Classified Structures (LCS) are on the grounds including the Devils Island Light Station Tower, Keepers Quarters, Assistant Keepers Quarters, Fog Signal Building, East Oil Storage Building (Oil House #1), the West Oil Storage Building (Oil House #2), Tramway Engine Building, Boathouse, pump house, dock, and the road corridor (cross-island trail).

With many of its original features intact and in good condition, the Devils Island Light Station clearly portrays the history of the light station as an aid to navigation. It continues to convey the development of navigational technology, the story of the people who resided at the light station and its management.

TREATMENT RECOMMENDATIONS SUMMARY

The treatment recommendations for the Devils Island Light Station are focused on revealing the role the light station had in the navigational history of the Apostle Islands, and in conveying the historical significance of the light station's cultural landscape and historic structures.

Rehabilitation has been identified as the general treatment approach for the Devils Island Light Station, as it is a holistic approach that addresses the island's extant cultural resources and the relationships between those resources. This approach protects those characteristics and features that convey the island's full historical and cultural significance, while allowing for those repairs, alterations, and additions necessary for the compatible use of the island.[1]

Rehabilitation also allows for noncontributing, compatible features to remain, and for the removal or relocation of noncontributing, noncompatible features. While the overall treatment intent of the cultural landscape is one of rehabilitation many individual treatment recommendations focus on preservation of existing features. Treatment recommendations include the following:[2]

1) Reestablish portions of the historic cleared areas of the light station;
2) Reestablish views from Lake Superior to the light station;
3) Preserve circulation features including the tram tracks and concrete walks;
4) Preserve small scale landscape features and structures;
5) Remove noncompatible features;
6) Rehabilitate the Light Tower, Keepers Quarters, Assistant Keepers Quarters and Fog Signal Building;
7) Preserve the Tramway Engine Building, Oil House # 1, Oil House # 2 and Boathouse.

The recommendations for treatment are comprehensive and are intended to address all aspects of the cultural landscape and historic structures. To achieve full implementation of these recommendations a phased approach for construction activities will be required. Initial actions may include basic preservation measures to protect and stabilize contributing features followed by more detailed repair measures as park resources allow.

In addition to recommendations for physical improvements, actions are proposed to provide improved visitor access, improved efficiency of park operational and maintenance activities, and improved protection of the light station's natural systems.

[1] Page et al 1998
[2] A glossary of terms used to describe treatment recommendations is included in the appendix of this volume.

CHAPTER 2: LIGHT STATION HISTORY

LIGHT STATION HISTORY

Devils Island was a critical navigation point marking the northwestern edge of the Apostle Islands. The Cleveland Vessel Owners Association recognized the need for a navigational aid on the Island, and requested a signal be located there. Congress approved the requested $15,000 appropriation in 1889, and added $5,500 for a fog signal the next year.[3]

The Lighthouse Board quickly realized it had sorely underestimated the costs to build on such a distant island with difficult landing and site conditions. The Board phased the construction into successive periods, based on available funding.

The first phase of improvements occurred in 1891 and 1892.[4] This phase included constructing a temporary wood light tower and an extensive complex of buildings and improvements. The wood tower was completed in 1891. It was fitted with a fourth order Fresnel lens casting a fixed red light. The light was first lit on September 30, 1891 and was visible for thirteen miles.

A wood frame Fog Signal Building with corrugated iron siding was also constructed in 1891. Work crews installed a pump house with piping to the Fog Signal Building that same year.[5]

Other buildings constructed in the 1891 and 1892 phase included a wood frame store house, a brick Oil House, the elegant brick Keepers Quarters and a Privy. Since the Keepers Quarters building site had almost no topsoil, workers blasted a sewer line into the partially exposed bedrock to drain the Privy.

During the 1891 and 1892 construction seasons, the crew also laid track for the tram, cleared ten acres of land and built a covered walkway down the bank at the north end of the Fog Signal Building. South of the station, the crews built a landing crib and a boathouse.

Apparently the construction had proceeded before a lighthouse reservation was established. The 1892 Annual Report of the Lighthouse Board indicates that the Board had submitted paperwork in that year, requesting that the United States Attorney's Office begin condemnation procedures to establish a lighthouse reservation. The 1893 Annual Report states that on June 5, 1892, the island was appraised at $1,600. The 1894 Annual Report notes the necessary proceedings had been completed to condemn the entire island for a lighthouse reservation. A "Reservation Survey" map, dated September 1894, shows that the entire island is included in the reservation.[6] Lighthouse Board reports indicate that $1,600 was paid for the land to the State of Wisconsin, based on the value determined in the condemnation hearings. The federal government filed a quit claim deed in August of 1895 to clear any tax liens on the property.[7]

While condemnation activities were in process, the Lighthouse Board requested an additional $22,000 from Congress in 1893. The requested funding was not appropriated until two years later. In 1895, with clear

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[3] Untitled typed history of Devils Island located in the Apostle Islands National Lakeshore files and prepared in 1951, presumably by USCG personnel. See also Pepper, Terry. Lighthouses of Lake Superior website www.terrypepper.com/lights/superior.htm accessed September and October, 2009

[4] Unless otherwise noted, construction and funding information for improvements at Devils Island was found in the Annual Reports of the Lighthouse Board. Transcripts of these reports are available in the Apostle Islands National Lakeshore files.

[5] The 1892 Lighthouse Board annual report noted the ten-inch steam whistle in the Fog Signal Building operated for 259 hours and consumed 13 ½ tons of coal.

[6] "Devils Island Light Station Reservation Surveyed" map located in the map files of the Apostle Islands National Lakeshore Administrative Offices.

[7] Annual Reports of the Lighthouse Board and Untitled typed history of Devils Island located in the Apostle Islands National Lakeshore files and prepared in 1951, presumably by USCG personnel

title and new funding, the Lighthouse Board ordered the new permanent light tower and approved drawings for the Assistant Keepers Quarters. A new third order Fresnel lens was commissioned from the Henri LePaute Company of France. The Assistant Keepers Quarters and associated Privy were completed in 1897. The boat landing was also extended and improved in 1897. The iron cylinder tower (Devils Island Light Station Tower) arrived in pieces and was completed by October of 1898.

The new tower stood unused for three years until the Fresnel lens arrived in 1901. Upon its arrival, the lens was immediately installed and illuminated. The light could be seen for 22 miles. The temporary wood tower stood a couple more years. The 1903 Annual Report of the Lighthouse Board noted the tower had been torn down.

Other improvements occurred in 1901. A new brownstone Tramway Engine Building with hoisting apparatus was constructed 1901. A woodshed for the Fog Signal Building was also built. In 1901 crews also cleared a road through the forest and the underbrush to the boathouse on the south side of the island.

By 1903, the elements of the station that are still extant included the Keepers Quarters, Fog Signal Building, Oil House, the Assistant Keepers Quarters, the metal Tower, the brownstone Tramway Engine Building, the tram tracks and the boathouse.

The two brick keepers' quarters stood side by side and were originally connected by wood plank walks. The wood walks were replaced by concrete walks. A 1909 plan shows the site layout, illustrating concrete walks and the tram. The date, 1909, is inscribed in the concrete in front of the Keepers Quarters, further supporting the likelihood that concrete walks replaced the wood walks in 1909. It appears that a wood frame dwelling was also used for a keepers quarters during that time. Historic photographs in the Apostle Islands administrative files show evidence of people living in each of the three buildings.

The approximately 80' tall light tower was similar in design to three other towers on the Great Lakes. These three other towers are at the Sturgeon Bay Canal on Lake Michigan, and at Manitou Island and Whitefish Point on Lake Superior. Although the oldest of the towers at Manitou and Whitefish (both 1861) were stable and are still standing, the Sturgeon Bay tower (1899) was rife with structural problems wrought by the heavy winds in the area. Even though it was supported by eight triangular lattice buttresses and secured with guy wires, the Sturgeon tower had to be reinforced and remodeled to withstand the winds. It was totally rebuilt in 1903 in a design that reused the original tower as the circular stairway within a larger structure.

Structural concerns also caused revisions to the Devils Island Tower. In 1915 exterior braces were added to the base of the tower. The Devils Island tower may have been remodeled in a manner similar to the Sturgeon tower. During a September 2009 field assessment, structural engineer David Wittman P.E. observed that the center cylinder and the additional braces are riveted together. Therefore, the tower is not made of cast iron. (Cast iron cannot be riveted.) Wittman believes the tower material is either wrought iron or steel. Future work could positively identify the material by doing a spark test, where one looks at the sparks generated by grinding on the material; or a sample of the material could be metallurgically tested.

A second Oil House was constructed sometime between 1908 and 1913.[8] It is likely that the lamp was changed to an oil vapor lamp in about 1913 or 1914 as part of a system wide upgrade to the vapor apparatus. A 1921 inventory noted the presence of the oil vapor lamp and said the Oil House had 250 gallons of oil stored in five gallon cans.

[8] The annual Lighthouse Board report for 1908 recommends a new oil house for Devils Island. A historic photograph in the Apostle Islands files dated 1913 show the house and the new tower.

Some form of radio transmission equipment was installed on the Island in the 1920s, but the exact function of the equipment is not clear. It is not apparent if the radio equipment was used for communication or as a fog signal. Different sources offer varying information related to the radio equipment. On May 28, 1920, the *Bayfield County Press* reported that representatives from the Navy were visiting to assist with placing both a new wireless telegraph apparatus and a radio compass station on Devils Island. The article noted that construction would begin in July. Historians indicate a radio beacon went into commission on October 30, 1925. [9] It is not clear if the wireless telegraph described in the 1920 newspaper report was different from the 1925 radio beacon or if the work anticipated in the newspaper article was delayed until 1925. Another source indicates that batteries that operated the original radio fog beacon were replaced by diesel engine run generators by 1928.[10] This source suggests the radio beacon was a fog signal, but the station also had a diaphone fog signal, lending doubt that the radio beacon was a fog signal.

The Fog Signal Building contained duplicate ten-inch steam whistles and boilers. A diesel engine powered diaphone, a modernization implemented at many light stations in the mid 1920s, replaced the steam powered whistles. The exact year that the diesel engine diaphone was installed remains to be determined but it appears likely that the diaphone was constructed between 1925 and 1929.[11]

An acetylene powered "winter light" was installed after the diaphone. [12] The light was connected to a gas tank fitted with a valve that was sensitive to the changing night and day time temperatures and could regulate the light operation through the winter months when the island was not occupied.

Docks

Like most of the weather-battered boathouses at the Apostle Islands light stations, the dock and boathouse suffered periodic destruction from storms and ice. By 1909 the Boathouse and dock had been substantially repaired and/or improved at least twice and a 76-foot long rubble sea wall had been installed (1906). Extensive work continued over the years, including a large scale repair of the dock and reconstruction of the sea wall undertaken by the United States Coast Guard (USCG) in 1947.

It is interesting that the cleared area adjacent to the dock and boathouse may have been used for gardening. Historian Jane Busch notes in her comprehensive historic resource survey that

> Walter Parker, who lived on Devils Island when his father was assistant keeper during the 1910s, remembered a garden by the boathouse with lettuce, peas, onions, and other vegetables, but no potatoes because the soil was too thin.[13]

Boats often landed on the east side of the island to avoid the rough waters. A 1921 inventory noted an old boating engine house had been moved to the east landing dock. The old engine house provided storage for gas and oil. One visitor to the east landing was President Calvin Coolidge who arrived with his wife and son for a mid-day picnic on August 8, 1928. The party toured the island and ate off of folding tables.

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[9] Sources reporting a 1925 installation include Pepper, Terry. Lighthouses of Lake Superior website www.terrypepper.com/lights/superior.htm accessed September and October, 2009: and Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Page 133.

[10] Rathbun, Peter A. "Special History Study: Light Stations of the Apostle Islands National Lakeshore—Draft." Springfield, IL and Hollandale, WI: Rathbun Associates for the National Park Service, Midwest Regional Office, 1988. Page 70.

[11] A chronology posted in the Keepers Quarters on Devils Island lists 1925; Terry Pepper op.cit. states 1926 on his website; and a diesel powered generator was installed for the radio beacon and was operating by 1929 per Rathburn op.cit., page 75.

[12] Terry Pepper provides a construction date of 1928 for the winter light per Lighthouses of Lake Superior website www.terrypepper.com/lights/superior.htm accessed September and October, 2009 but a plan of the winter light, dated 10/25/1937 is on file at the Apostle Islands administrative offices. It is more likely that the actual date of installation is 1937.

[13] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Page 295.

The crew at Devils had an early additional incentive to protect their boats, because in 1909 they were the first station in the Apostle Islands to get a motorized boat from the Lighthouse Board. The Board had begun placing motorized boats in service in 1905.
New Technology

Other changes also took place after the USCG took over the station in 1939. By 1941, the station was electrified.[14] Plans on file at the Apostle Islands National Lakeshore offices illustrate the USCG revisions to the Fog Signal Building. It appears a compressor was replaced in 1947 and changes were made to ventilation and the chimney in 1954. The USCG added a new radio room on to the building in 1962.

Devils Island was the headquarters for the USCG crew that oversaw various Apostle Islands light stations as each light station was automated and the keepers left the islands. A remodel of the second floor of the Keepers Quarters in 1946 indicates installation of cabinets and a sink that came from the Michigan Island station. The Assistant Keepers Quarters received a new indoor bathroom in 1950. The wood dwelling and two privies were demolished in 1956, as was the woodshed for the Fog Signal Building.

The USCG crew remained on the island until July 27, 1978. In 1989, in spite of protests from the National Park Service and local residents, the USCG removed the Fresnel lens and installed a solar powered light on the tower. The Park Service retrieved and stored the lens. A local resident filed a suit against the USCG for acting without proper notice as required by the tower's listing on the National Register of Historic Places. Eventually, in 1992, National Park Service conservators repaired and restored the lens and then reinstalled the lens in the tower. The lens is not in use. A VEGA VRB-25 solar light is located on the gallery railing and provides the light.

HISTORIC EVIDENCE

Historic photos of the island date back to 1893 and show the no longer existing second assistant keepers quarters, the temporary wood light tower, and various types of tram ramps. For more detailed descriptions of the photos, see the CLR and each building's Chronology of Alterations and Use in the HSR.

The historic drawings include two site maps, one from 1894 and the other from 1909. The 1894 map shows the location of the skeleton tower that was temporary until the funds could be raised for the current tower. (CLR Site Image DI-03) It also lists a "Siphon House," which is a "wood frame tin roof, 16.7' x 4.3'" structure.[15] This plan also shows the tramway route, the pipe that drew water from the lake which was pumped up into the Fog Signal Building, and it lists the dimensions and general materials of the buildings on the island. The 1909 map shows where the concrete walkways were located. (HSR Historic Drawing DI-13) There are two privies drawn, one behind the Keepers Quarters and the other behind the Assistant Keepers Quarters, each with walkways from their respective houses. There are no extant historic privies on Devils Island.

An undated elevation of the Tower without the 1915 structural bracing can be assumed to be the original construction drawing. (HSR Historic Drawing DI-01) In 1937, a winter light was installed in the Tower. (HSR Historic Drawing DI-15)

A 1946 plan to remodel the second floor of the Keepers Quarters called for the east bedroom to be turned into a kitchen for the first assistant. The remodel may have been done and then the Coast Guard reverted

[14] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Page 132.
[15] "Devils Island Light Station, Wis., Buildings Surveyed September 5th 1894 by H. Bamber," Site Map, 11-5D-34; RHL No.: 705,492.

the extra kitchen back into a bedroom, but there is no plumbing or structural evidence that the remodel ever occurred. (HSR Historic Drawing DI-18)

A collection of original construction plans for the Keepers Quarters and Assistant Keepers Quarters exists, as does a USCG era plot plan and a set of plans and elevations of the Keepers Quarters and Fog Signal Building that detail some alterations made during the USCG era. (HSR Historic Drawings DI-02 to 09 and 19 to 223)

OVERVIEW OF DEVELOPMENT AND USE

Date	Work Described
Annual Report for 1890	"*Devil's Island, Apostle Group, Lake Superior, Wisconsin*. – As appropriation of $15,000 was made for a light on Devil's Island, and the station will be built as soon as title to the site can be procured. A fog-signal is as necessary as the light. It can be built at an estimated cost of $5,500. The Board recommends that an appropriation of that amount be made therefor." ("1890 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
1891	Keepers Quarters, temporary wood tower, wood frame store house, Fog Signal Building, Tramway Engine Building, Boathouse and Oil House #1 constructed (Historic Drawings DI-01; N. Howk, Jan 2010; LCS, 2009)
Annual Report for 1891	*"Devils Island, Apostle Group, Lake Superior, Wisconsin*. - The act approved March 2, 1889, appropriated $15,000 for building a light station, and the act approved March 3, 1890, appropriated $5,500 for establishing a fog signal to complete the station to be erected on Devils Island. The appropriation for the light was insufficient. Devils Island is an isolated station with no adequate harbor. The light, which is to be flashing and of third order, will become one of the most important turning points in Lake Superior. In addition it is to have a fog signal, and provision must be made, therefor, for not less than three keepers. The station, exclusive of the fog signal, is estimated to cost $35,000, leaving an additional appropriation of not less than $22,000 to be made after paying for the land and other contingent expenses. In view of the improbability of securing the additional amount needed at the current session of Congress it was decided that, pending action in this regard, a temporary skeleton-frame tower should be built to prevent further delay in exhibiting the light and, while awaiting the arrival from France of the third order flashing lens required, to exhibit a fixed red light of the fourth order. The building of the duplicate fog signal boilers and machinery was in progress under contract at the end of the year. An addition of $22,000 is needed for furnishing the station with a permanent tower, and it is recommended that this amount be appropriated for that purpose. ***** ***** A fixed red light of the fourth order was shown from a temporary structure at this station on the night of September 30, 1891, for the first time. The light is 87 feet above the lake level, and it can be seen in clear weather about 13 miles. The fog signal is a 10-inch steam whistle." Request repeated in 1892. ("1891 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
Annual Report of 1895	"*Devil's Island, Apostle Group, Lake Superior, Wisconsin*. – The title papers to this island were recorded in the proper office. Cession of jurisdiction was obtained from the State of Wisconsin. The completing of this light station, at a cost not to exceed $22,000, was authorized by the act approved February 15, 1893, but no appropriation was then made. The act approved March 2, 1895, appropriated $22,000 "for constructing a permanent tower." As the completion of the station demands, in addition to the permanent tower, the building of additional quarters for keepers, and the purchase of a third-order lens to fully carry out the design, it is feared that under the wording of the act the work can not be done, as in order to do it economically the tower and dwelling should be built at one time. Recommendation is therefore made that the appropriation available for the completion of the station be made to include the erection of an additional keeper's dwelling." ("1895 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
Annual Report of 1896	"*Devils Island, Lake Superior, Wisconsin*. – The amount of the award for this island, $1,600, was paid in August, 1895. A quit-claim deed to the United States for the extinguishment of the outstanding tax title against Devils Island, Wisconsin, was duly recorded. A design was made for an iron tower. By the sundry civil appropriation act approved June 11, 1896, authority was given that $4,000 of the unexpected balance, or the appropriation of $22,000, made in the act approved March 20, 1895, for

Date	Work Described
	constructing a tower at Devil's Island light station, be applied to the construction of a light-keeper's dwelling at Devil's Island light and fog signal station. This will be done as soon as practicable." ("1896 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
1897	Assistant Keepers Quarters built (LCS, 2009)
Annual Report of 1897	"*Devils Island, Lake Superior, Wisconsin.* – Material for the construction of a keeper's dwelling was obtained and transported by the tender Amaranth to the station. Boiler tubes and pipes and fittings were purchased for making repairs to the fog-signal plant. Plans and specifications for a cylindrical tower are being prepared." ("1897 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
1898	Light Station Tower pieces made off-site and shipped to Devils Island; by 1901, Tower constructed and operational (LCS, 2009)
Annual Report of 1898	"*Devils Island, Lake Superior, Wisconsin.* – A working party arrived at the island July 1, 1897, and the building was begun and it has been partially completed. A contract was made for the construction, delivery, and erection of the light tower. In September the site for the foundation of the tower was begun. A contract for the third order lantern was made. In June, 1898, structural metal work of the tower, under contract, was completed, inspected, and shipped to the light station. A crib for extension to the boat landing was built, sunk in place, and filled with ballast stone and a superstructure was built above the water line. Some 36 feet of the old landing that was out of level were raised 26 inches on the west side and 8 inches on the east side and refilled with ballast stone. The center truss of the boathouse was repaired and the roof was painted." ("1898 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
Annual Report of 1899	"*Devils Island, Lake Superior, Wisconsin.* – The construction, delivery, and erection of this light tower by contract were completed on October 17, 1898. The hoisting engine was repaired and 160 feet of steel hoisting rope was provided." ("1899 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
1901	Tramway Engine Building built (Historic Drawing DI-11)
Annual Report of 1901	"*Devils Island, Lake Superior. Wisconsin.* – The illuminating apparatus for the new light was received in April at the light-house depot. A hoisting engine and derrick, together with a lot of material of various kinds for repairs, were taken to the station by the tender Amaranth, June 22, 1901. A working party was landed at the same time. About 1,000 feet of the roadway to connect the boathouse with the tower and other buildings of the station was cleared of timber and underbrush, a woodshed for the storage of fuel for the fog-signal plant was built, the stone for a small building for the protection of the hoisting engine at the north end of the island was quarried and dressed, the engine was removed, and the work on foundation of the new structure was commenced. The foundation for the derrick was commenced, two sections of portable tracks, each 20 feet long, were built, and the work of installing the third-order flashing lens in the new tower was commenced. This work is being paid for from the unexpended balance of the appropriation for Devils Island (Wisconsin) light-station." (1901 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
Annual Report of 1904	"*Devils Island (one of the Apostle Islands), Lake Superior, Wisconsin.* – The old frame tower and the lantern from which the temporary light was exhibited were taken down and the material stored. Various repairs were made." ("1904 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914)
1908-1913	Oil House #2 completed (N. Howk, Jan 2010)
1909	Concrete walks installed (Historic Drawings and Photos, c. 1909)
1915	Metal framework supports added to the Tower (LCS, 2009)
1925	Radio beacon installed in Fog Signal Building (J. Busch, 2008)
1928	Diesel-powered electric generator installed (J. Busch, 2008)
1937	Acetylene-powered Winter Light installed (J. Busch, 2008 and Historic Drawing DI-15)
1937-1941	Tower converted to electricity (J. Busch, 2008)
1944	Radio Room added to Fog Signal Building (APIS/NPS Business Office File # D3423 – Devils)
1946	Keepers Quarters plans to remodel 2nd floor, likely never completed (1946 USCG Historic Drawings DI-02)
1950	New indoor bath installed in Assistant Keepers Quarters (Historic Drawings, Plans by USCG)

Date	Work Described
1952	- East and West landings operational April 5: Description of Fog Signal Building specifically and general site condition: "Dry-rotted, buildings need painting." May 23-28: Installation of new fresh water pump. July: "Buildings being painted by station personnel." September: "Buildings good except for fog signal." October 3: "Repaired railroad and board walk." (USCG Log, summarized by Bob Mackreth, 2004)
1953	April 7: "Took down chicken coop behind small dwelling. Removed junk piles behind dwelling." April 21: "Several days – much painting to comply with new international safety code." April 22: "Dug hole for new 300 gal gasoline tank on east side of fog signal. New tanks placed in ground and connected up." May 21: Installation of new window in Keepers Quarters; "Making new window for hallway in building." June 12: "Removed wood shelters and dug up old fuel tanks outside fog signal." June 16: "Installed telephone communication system between dwellings and signal." July 14: "Installed and covered tile drain for septic tank." October 21: "Repaired rotted deck in S end of boathouse. Parts of foundation found to be rotted and should be repaired; letter will be sent." (USCG Log, summarized by Bob Mackreth, 2004)
1954	April: "Monthly report describes condition of buildings as 'Poor'; notes matter has been brought to attention of group office and Soo base." May 17: "Started breaking loose old cement around base of light tower and laying forms. Put in steel rods in rock at east landing for boats to tie to." May 26: "Removed old swing and birdhouse from station grounds." Swing was probably put up by First Asst. Keeper Tom Hassing (at Devils 1929-1933), photo in APIS archives. (S. Mackreth, 2011) June 23: "Completed installing timbers on E landing stairs." August: Monthly report –"Received bulldozer from Bayfield Moorings to repair island road leading to boathouse." August 16: "Started clearing land for road." September: Monthly report – "new roof on fog signal building." October: Continued to cut and lay logs for the road, created drainage ditches and moved soil. November: Monthly report –"'Outside of fog signal building in poor condition. Siding will have to be replaced where bad spots exist and the rest chipped and repainted. Work has started but will not be done until next season.'" (USCG Log, summarized by Bob Mackreth, 2004)
1955	May 30: "Removed all steel kitchen cabinets from dwelling that is not in use and transferred some to CG4o521 for transfer to other units." July: Monthly report –"Fog signal is in unsatisfactory condition due to old corrugated sheet metal siding: rusted out and deteriorated in places. All other siding has 'coats and coats of paint accumulated throughout the years that would take years to remove.' Recommends installation of white asbestos shingles; if approved they could be installed by station personnel. Attempts to remove paint have ceased." August: Removal of old siding and installation of new asbestos siding on Fog Signal Building. September 27: "Constructed cement stand for garbage cans and buckets away from barracks." September: Monthly report – "Boathouse badly needs new roof. Wood shingles are rotten and patching is little help. Should be reroofed next year." October 5: "Bulldozed old corrugated steel siding into woods away from fog signal." (USCG Log, summarized by Bob Mackreth, 2004)
1956	April 19: "Finished removal of outdoor toilets." May: Demolition of single-family home on site – May 2: "Demolition continues w 2 men. Salvaged doors, windows, some lumber. Burned remainder of building." Sept 8: "Planted clover and timothy along road side to prevent erosion." October 25: "Planted trees behind signal building…" (USCG Log, summarized by Bob Mackreth, 2004)
1956	Fog Signal Building's associated wood shed, two privies, and 2nd Assistant Keepers Quarters demolished

Date	Work Described
	(Historic Drawings, Plans by USCG, LCS, 2009)
1957	June 24: “Company from Duluth begins laying floor tile.” July 30: “Painting bottom of tower spruce green.” (USCG Log, summarized by Bob Mackreth, 2004)
1962	USCG installed fire alarm system and updated electrical system in Keepers Quarters and shed addition to the south side of the Fog Signal Building - built open sided, enclosed by 1994 (Historic Drawing DI-03, 1962 and Park Admin. Files D3423)
1965, Aug 8	“Bayfield 40 arrives with pump to pump out basement.” (USCG Log, summarized by Bob Mackreth, 2004)
1970	Apostle Islands National Lakeshore authorized
1978	Light automated and repairs to sewer system (J. Busch, 2008, and Park Admin. Files D3423)
1979	Garage door installed in south shed of Fog Signal Building, Boathouse battens painted and repaired, Boathouse reroofed, Keepers Quarters reroofed and exterior repointed and painted, Assistant Keepers Quarters reroofed and exterior repointed and painted (Park Admin. Files D3423)
1981	Keepers Quarters plans and specifications completed for sewage improvements and fire retardant installed on the roofs of the Keepers and Assistant Keepers Quarters (Park Admin. Files D3423)
1984	Cyclic maintenance of seven buildings including repointing brickwork, painting trim, and reglazing windows; painted interior of Fog Signal Building; replastered interior walls of Assistant Keepers Quarters (APIS/NPS Business Office File # D3423 – Devils)
1987	Installed chimney cap on Tower (Park Admin. Files D3423)
1989	Fresnel lens removed from Tower, VEGA VRB-25 optic installed (N. Howk, Jan 2010)
1991	Stabilization of Keepers and Assistant Keepers Quarters by Williamsport Preservation Training Center (Park Admin. Files D3423)
1992	Fresnel lens reinstalled in Tower (N. Howk, Jan 2010) Three doors hung in the Keepers Quarters after restoration/reconstruction by Williamsport Preservation Training Center; Fog Signal equipment discontinued (Park Admin. Files D3423)
1993	Door knobs and locks installed on both the Keepers Quarters and Assistant Keepers Quarters (Park Admin. Files D3423)
1994	Tramway cart stabilized and NPS replaced lock on Tower (Park Admin. Files D3423)
1997	Installation of shark-hook type rain gutters on the Keepers Quarters (Park Admin. Files D3423)
2000	Fog Signal Building’s main roof reroofed with asphalt shingles (HSPT Reports, 2009)
2001	Assistant Keepers Quarters reroofed with cedar shingles and Fog Signal Building’s south shed reroofed with corrugated aluminum (HSPT Reports, 2009)
2006	Oil House #1 and Boathouse reroofed with cedar shingles (HSPT Reports, 2009)
2007	Keepers Quarters reroofed with cedar shingles (HSPT Reports, 2009)
2009	SABIK 350 2-tier LED beacon installed on Tower walkway (N. Howk, Jan 2010)
2010	Emergency repairs to the Tower lens and lantern by Perini, Inc. and Lighthouse Lamp Shop, Inc. (Perini 9/2010)

CHAPTER 3: CULTURAL LANDSCAPE REPORT

DEVILS ISLAND EXISTING CONDITIONS

Introduction

The cultural landscape of the Devils Island Light Station is a composition of features that remain from its development as a light station and aid to navigation over the last 119 years. As one of six light stations in the Apostle Islands, Devils Island is a critical navigation point marking the northwest edge of the Apostle Islands. The intent of the Cultural Landscape Report (CLR), in conjunction with the Historic Structures Report (HSR) is to guide treatment and use of the aboveground resources associated with the light station. The CLR provides park managers with a comprehensive understanding of the physical evolution of the cultural landscape and provides guidance for its management.

The CLR was conducted at a limited level of research, investigation and documentation. This level of research uses select documentation of known and presumed relevance, including primary and secondary sources that are readily available. The periods of landscape change are described using narrative text, historic photographs and annotated historic drawings and maps. Archeological investigations are not included.[16] A more detailed description of the CLR methodology is included in Volume I, Chapter 2: *Methodology*.

The CLR begins with a description of the site development of Devils Island that documents the physical changes that have occurred on the light station reservation and light station grounds. The light station reservation is the land initially set aside for the construction of light station structures and in this case encompassed the entire island. In the CLR, the portion of the reservation that contains structures and buildings is referred to as the grounds. The site development is presented by the five periods of landscape change.

The second section presents the existing condition and analysis of the cultural landscape. This section is organized by cultural landscape characteristics. In September 2009, field investigations were conducted to document the existing condition of the cultural landscape characteristics: spatial organization, topography, views and vistas, circulation, buildings, structures, small scale features and vegetation. The documentation of the island's existing condition is illustrated with existing condition plans, diagrams and photographs that document its cultural landscape.

The analysis compares the island's history with its existing condition, and identifies those landscape characteristics that retain integrity and contribute to the significance and integrity of the Devils Island Light Station.

The historic period and existing condition assessment was developed using a variety of sources including: historic and current maps and photographs provided by the NPS APIS Archives, field work conducted in September 2009, and additional information provided by park staff.

[16] Page et al. 1998.

SITE DEVELOPMENT

A period of significance of 1852 to 1972 is recommended for the light stations of the Apostle Islands as a whole. This timeframe recognizes the role of the light at each island as part of a connected system of navigational aids for Lake Superior. The beginning date is the initial act of Congress authorizing construction of the first lighthouse in the Apostle Islands in 1852. The period of significance for Devils Island begins with the construction of the original wood light tower, Fog Signal Building, Tramway Engine Building, and Boathouse (1892) and ends with the Light Tower's automation in 1978. Five periods of landscape change document the evolution of the cultural landscape. Of these, three of the periods are within the Devils Island Light Station's period of significance; these periods are noted by italics.

- Pre-Lighthouse (1852 – 1891)
- *Early Light Station (1892 – 1893)*
- *Light Station Development (1894 – 1938)*
- *Coast Guard (1939 – 1978)*
- National Park Service (1970 to present)

The beginning and end of each period of landscape change corresponds to major physical changes, related to the site's use, technological advances, and/or governmental control of the island. The periods consider the social history of the island; however physical change in the cultural landscape is the primary rationale in defining the beginning and end of each period.

Brief narrative text, graphic illustrations (where applicable), and historic maps and photographs (where available), describe each period of landscape change. Additional information regarding the period of significance for the Apostle Islands light stations is presented in Volume I, Chapter 3: *Context, Current Designations, and Park Significance.*

Pre-Lighthouse (1852 – 1891)

This period began in 1852 with Congress authorizing the construction of the first lighthouse in the Apostle Islands, to be built at La Pointe Harbor on Madeline Island. The location was later revised to Long Island. Ultimately the location was again revised and the first lighthouse was built on Michigan Island in 1856. In 1871, a lighthouse reservation was recommended for Devils Island. By 1889, funding was appropriated to construct a light station. Funding for a fog signal followed in 1890. No physical improvements related to the light station were built on Devils Island during this period.

Early Light Station (1892 – 1893)

Construction of the light station began during this period, illustrated in Site Images DI-02 and DI-03. The period began in 1892 with construction of a temporary light tower on Devils Island. Two areas of the reservation were cleared of forest vegetation to build the features needed for a light station and a boat landing. On the north tip of the Island "Ten acres in the vicinity of the station were cleared of trees and brush in order that the light be more clearly seen."[17] At the south end a smaller area was cleared for the Boathouse and related improvements. A direct path was cleared linking the two sites.

In 1892, with the construction of a temporary wooden skeleton light tower and fog signal in place, the basic features of the light station grounds quickly developed.[18] Additional buildings immediately followed

[17]Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Page 140
[18]ibid, Page 129

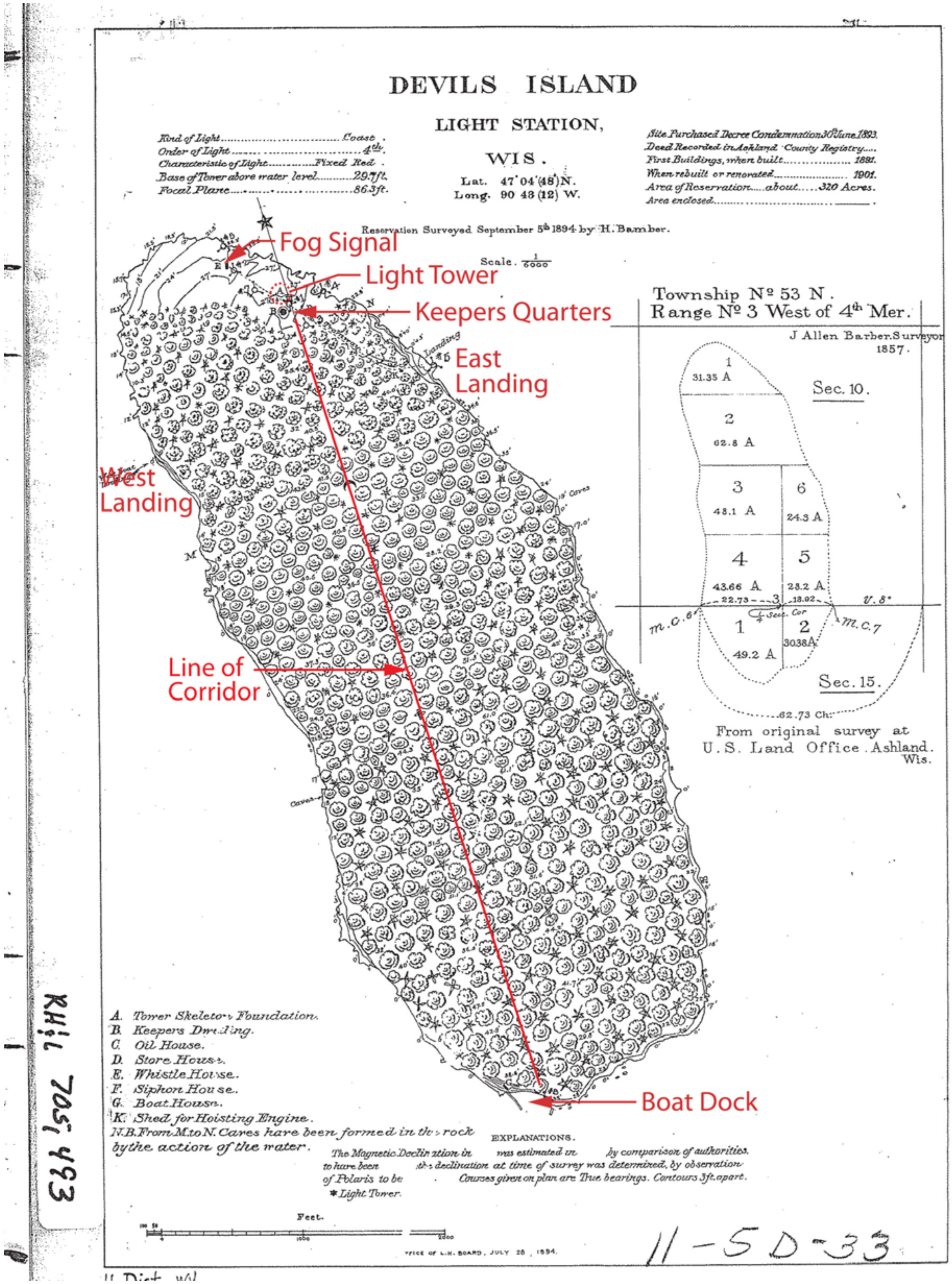
including: the two-story brick Keepers Quarters, Privy, Oil House, Fog Signal Building and Siphon House, and Store House.

Tram tracks were laid on wooden timbers to connect the light station buildings along a northwest to southeast line. A wooden inclined tramway was built at the southeastern end of the tracks, extending from the top of the cliff down to a boat landing of natural rock. This tram system was used to transport goods and fuel on small carts up to the island and along the track connecting the Keepers Quarters, Light Tower and Fog Signal Building. Similar systems were also constructed on Michigan, Outer, and Raspberry Islands.

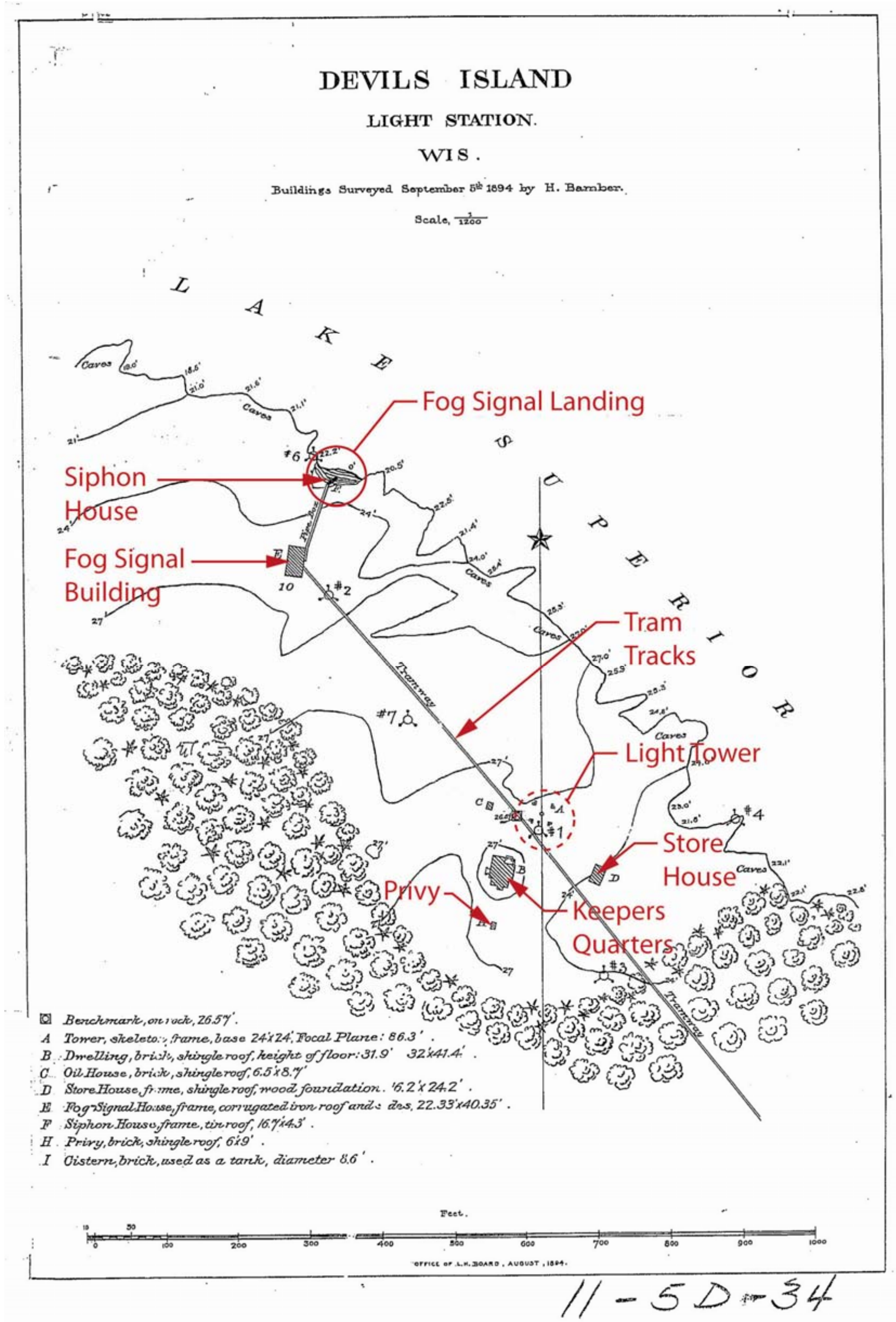
Other features built during this period included a wooden pipe box to bring water to the Fog Signal Building from the Siphon House and a covered stairway leading down the cliff to the Siphon House. Pedestrian circulation was improved by the addition of wooden planks installed between the tram tracks and around the Keepers Quarters.

At the south end of the island a landing crib and Boathouse were built. It is likely that this location was chosen because it is more protected than the landing sites on the northern portion of the island. Historic documents indicate that at least two landings were used near the light station during this period; a natural rock landing on the west side of Devils Island and the eastern landing where the wooden tramway was built.

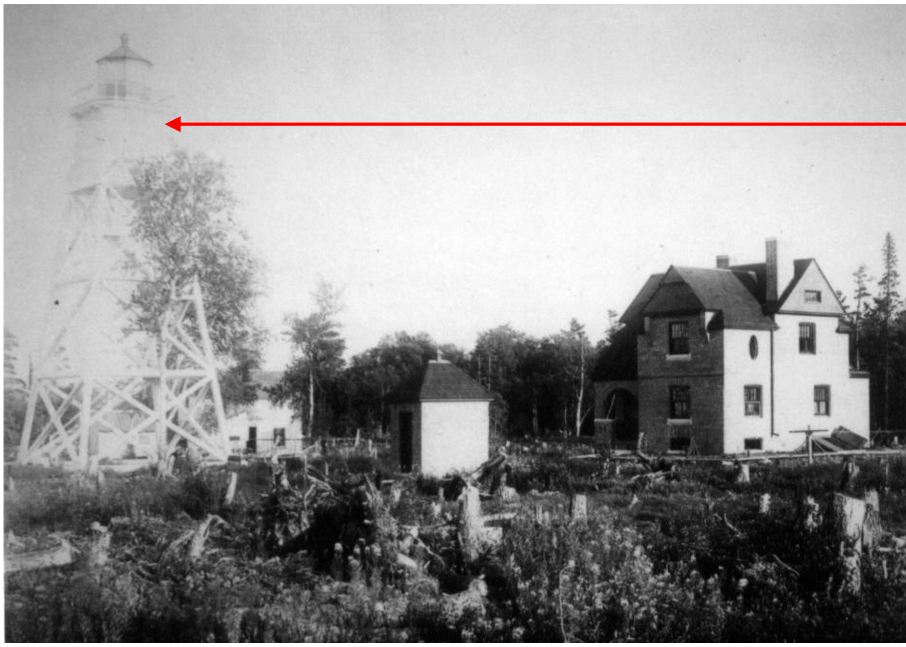
Early Light Station Historic Surveys and Photographs



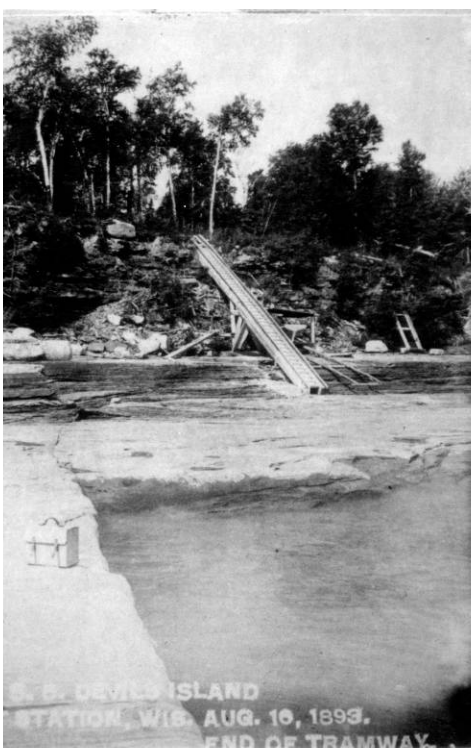
Site Image DI-01: Reservation Survey represents the Early Light Station period (1891-1893), 1894 (Source: NPS APIS Archives)



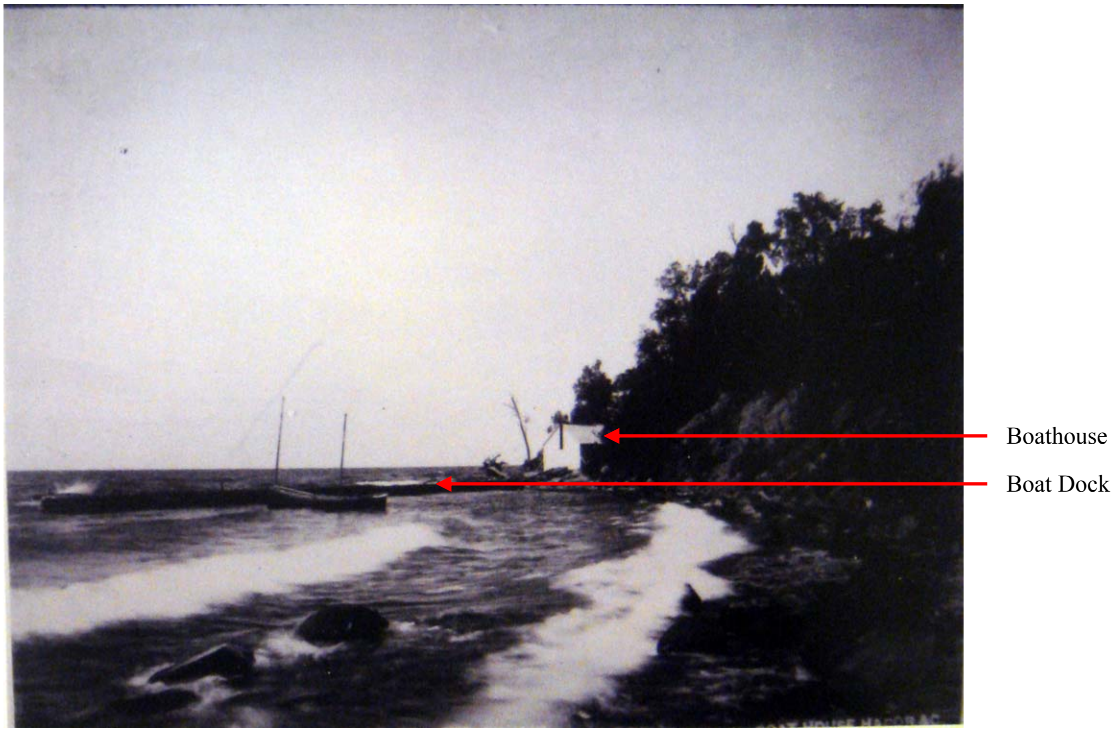
Site Image DI-02: Devils Island Light Station –North End of Island; represents the Early Light Station period (1891-1893), 1894 (Source: NPS APIS Archives)



Site Image DI-03: From left; Original wooden Light Tower, Store House, Oil House #1 and Keepers Quarters, c. 1893 (Source: NPS APIS Archives)



Site Image DI-04: Tramway at East Landing, c. 1893 (Source: NPS APIS Archives)



Site Image DI-05: Boathouse at southern tip of island, c. 1893 (Source: NPS APIS Archives)

Light Tower (1894 – 1938)

During this period, property condemnation was completed and a formal reservation was established.[19] The light station development continued with the addition of a new Light Tower, a second brick Keepers Quarters, and a wood frame Assistant Keepers Quarters. The most substantial addition to the light station during this period was the eighty-two foot tall Light Tower replacing the earlier (and much shorter) wooden light tower. The Light Tower represented a significant improvement as a navigational aid at the light station. The Tower was completed in 1898 but not placed into service until 1901. Another technological addition was the construction of the brownstone Tramway Engine Building built at the southeastern terminus of the tram tracks, or east landing, in 1891. The building housed a hoisting engine used for moving tram carts up and down the inclined tramway which had been in place since 1893.

By 1910, a third residence—the wood framed Assistant Keepers Quarters, was built to the east of the two brick keepers' quarters. The three residences stood side by side, connected by concrete walks. Many of the concrete walks were installed in 1909 to replace the wooden plank walkways. The concrete walks generally followed the routes previously established by the wooden planks and were built in an unusual manner specifically adapted to the island. Uniformly precast concrete slabs were built and placed end to end on the surface of the ground rather than excavating and laying slabs flush with the adjacent landscape. This was done for ease of construction on a rocky site with shallow soils.

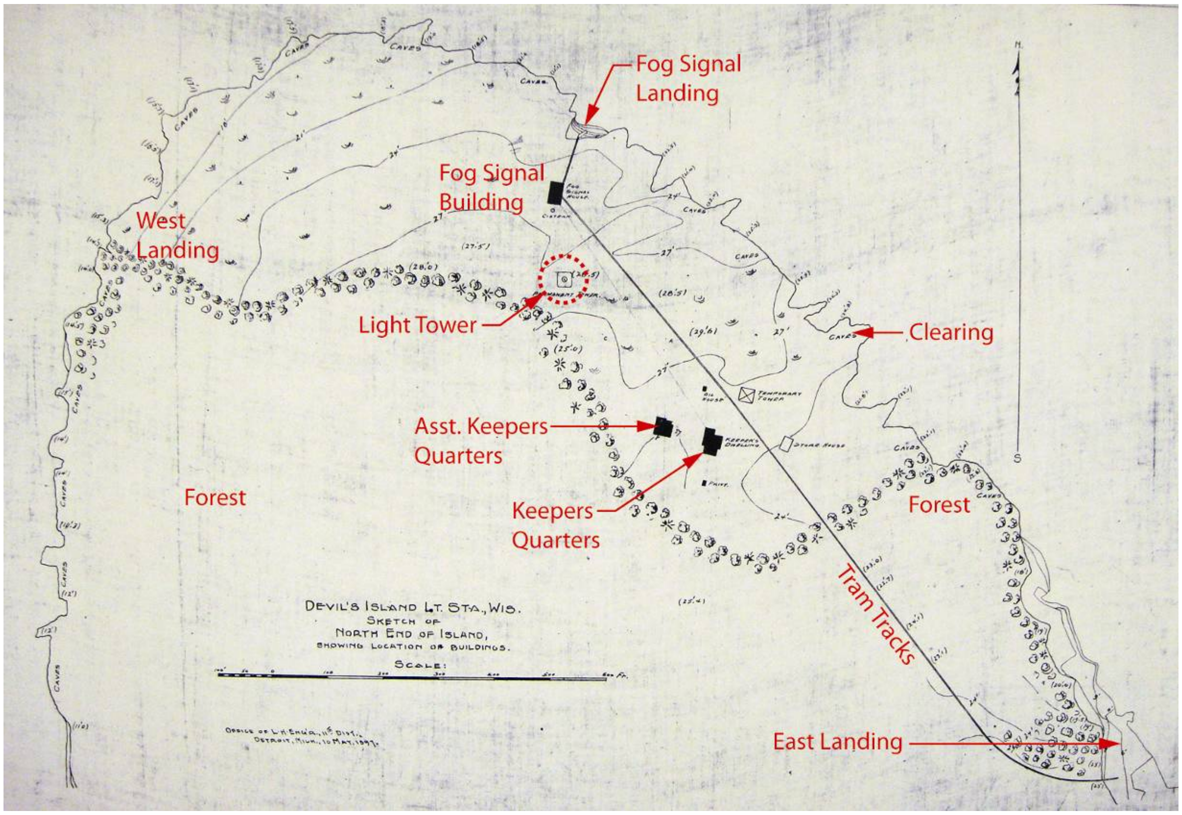
By 1913 all the buildings on the light station grounds that exist today were in place. Between 1908 and approximately 1913 a second Oil House was built near the new light tower, and in 1913 the large wooden store house was removed. During the 1920s and early 1930s the grounds were modified slightly with the addition and removal of small structures and features. The northwest portion of the light station grounds, near the Fog Signal Building, was continually modified during this period. Improvements were made to facilitate the loading of supplies and fuel by the construction of a derrick assembly near the Fog Signal landing. A compressed air diaphone replaced the fog signal 'whistle' system. In 1925, a steel framed radio transmission tower was built to replace the diaphone fog signal. The radio beacon installed was one of the first on the Great Lakes. In 1929, a wooden pump house (later replaced by the extant concrete pump house) was added to supply water to the residences, and a fuel storage tank was added south of Oil House # 1.

During much of this period the cleared area of the light station was maintained. This area is shown in historic photographs and the 1897 light station drawing (Site Image DI-07), and includes a contiguous cleared area linking the Keepers Quarters, Light Tower and West Landing area. Other improvements to the station included clearing and widening of the road linking the Boathouse site to the light station. The Boathouse and dock at the southern end of the island were subject to the harsh weathering conditions of Lake Superior and consequently were modified and repaired several times during this period.

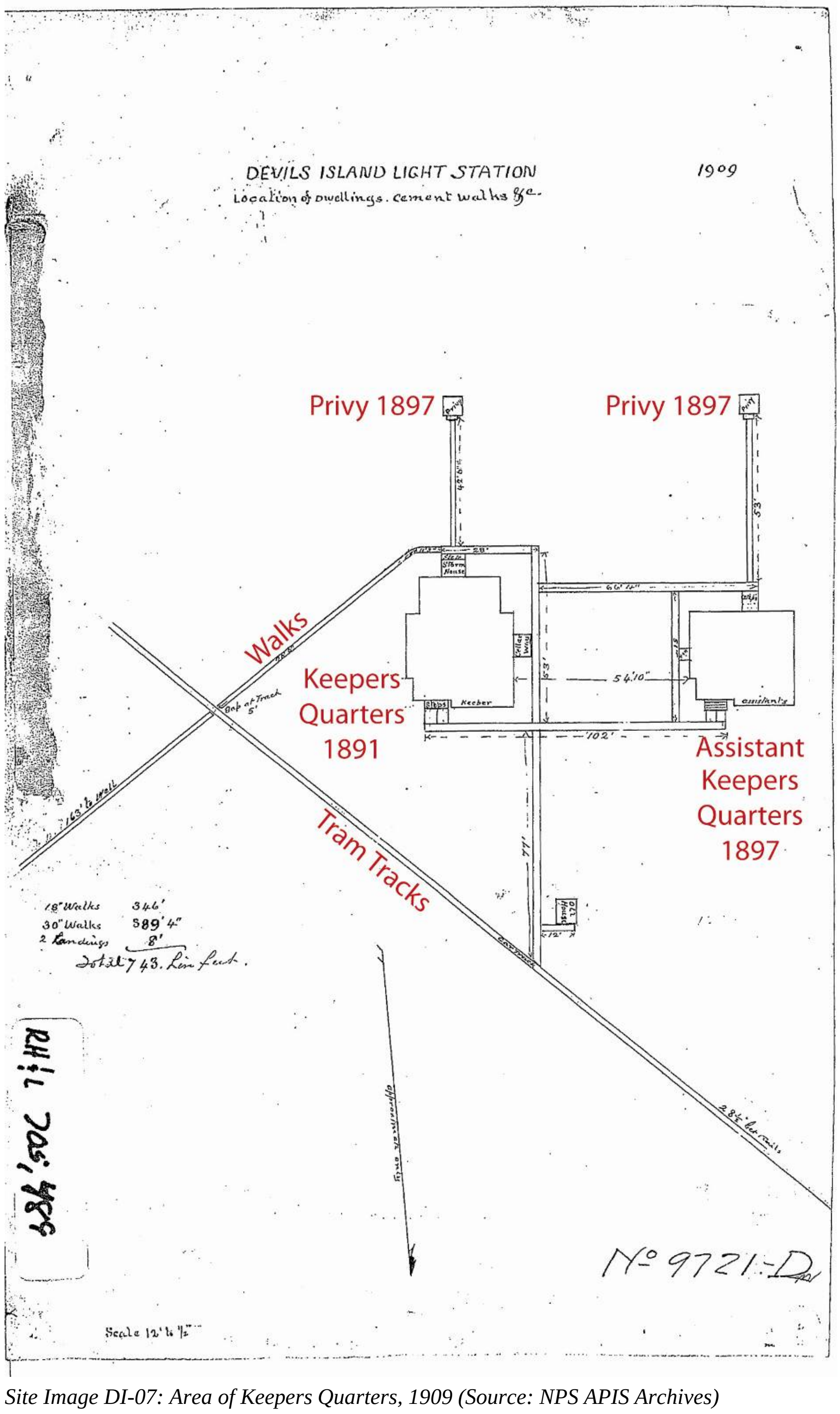
Domestic landscape plantings were not extensive on the light station and limited to a few trees and small planting beds near the Keepers Quarters. There is anecdotal evidence of a vegetable garden near the Boathouse although no further evidence of this was found on site or in historic documents and photographs.

[19] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008., Page 129

Light Tower Historic Surveys and Photographs

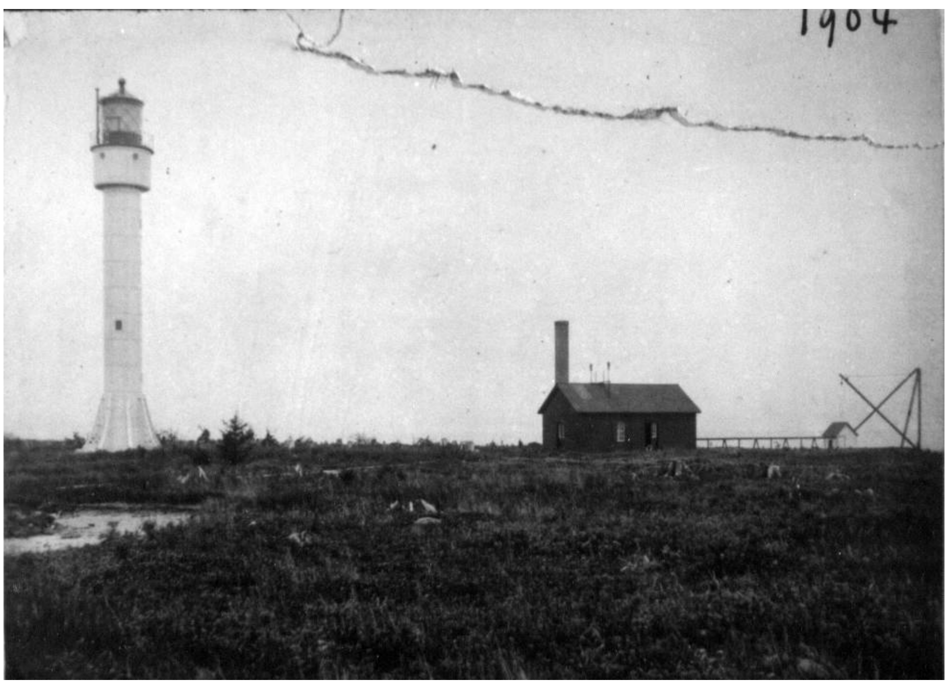


Site Image DI-06: Devils Island Light Station sketch represents the Light Tower Period (1894-1938), c. 1897 (Source: NPS APIS Archives)



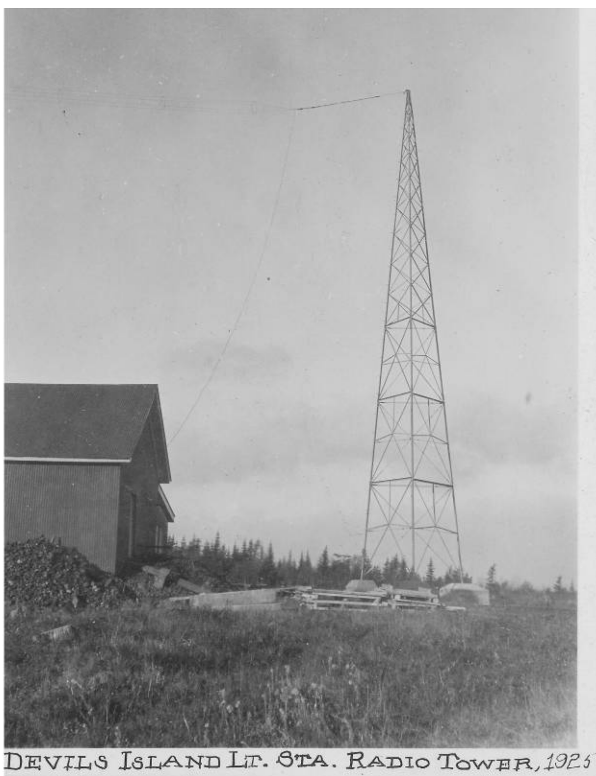
Site Image DI-07: Area of Keepers Quarters, 1909 (Source: NPS APIS Archives)

Site Image DI-08: Looking northwest along tram tracks; from left; Assistant Keepers Quarters, Keepers Quarters, Light Tower, Oil House # 1, Fog Signal Building, original light tower, store house, c. 1901 (Source: NPS APIS Archives)

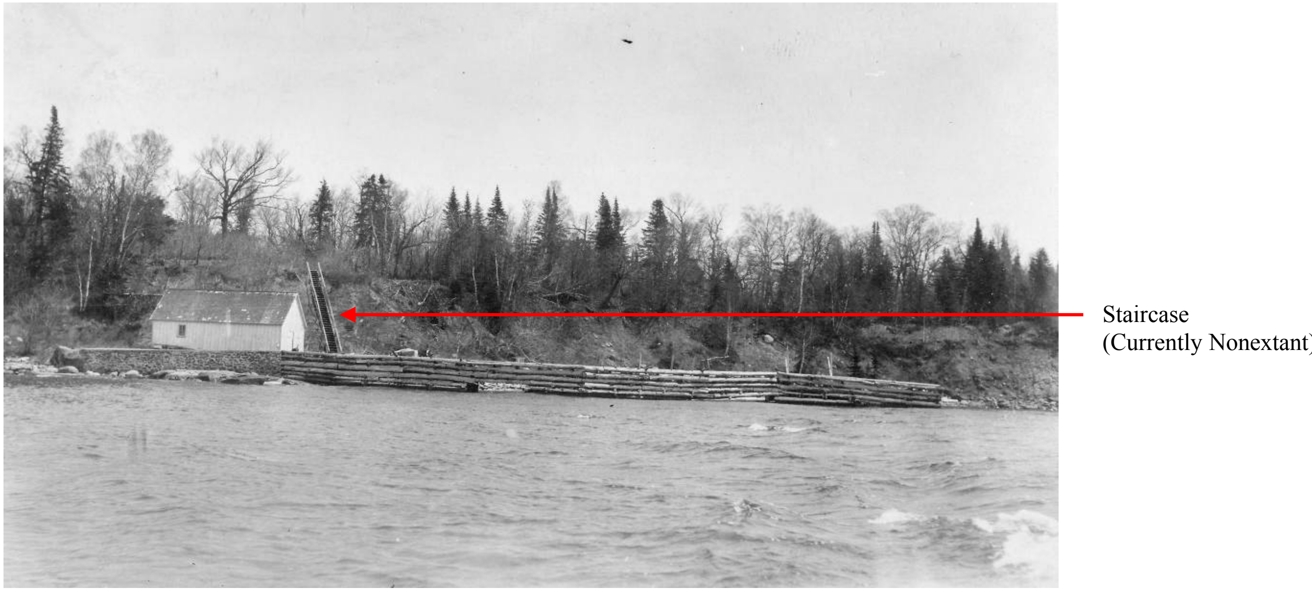


Site Image DI-09: From left; Light Tower, Fog Signal Building, Siphon House and derrick assembly. Note extent of clearing west of light station, 1904 (Source: NPS APIS Archives)

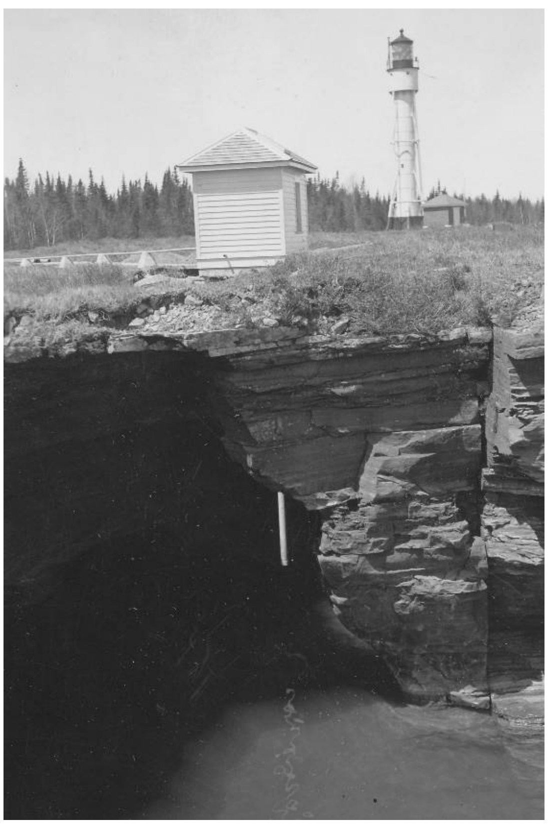
Site Image DI-10: Looking southeast from Light Tower. Note the smaller, wood framed Assistant Keepers Quarters, Privies, and concrete walks, c. 1917 (Source: NPS APIS Archives)



Site Image DI-11: Fog Signal Building and Steel Radio Tower, 1925 (Source: NPS APIS Archives)



Site Image DI-12: Boathouse, stone wall, rock and timber jetty and wood staircase southern end of Devils Island, c. 1927 (Source: NPS APIS Archives)



Site Image DI-13: Original pump house, c. 1935 (Source: NPS APIS Archives)

Site Image DI-14: Looking north towards light station from road corridor. Dwellings indicated, date unknown (Source: NPS APIS Archives)

Coast Guard (1939 – 1978)

In 1939, the United States Bureau of Lighthouses was eliminated and the United States Coast Guard (USCG) took over management of the light station. Following this, civilian lighthouse keepers were replaced by USCG staff. A USCG crew remained on the island until automation in 1978.

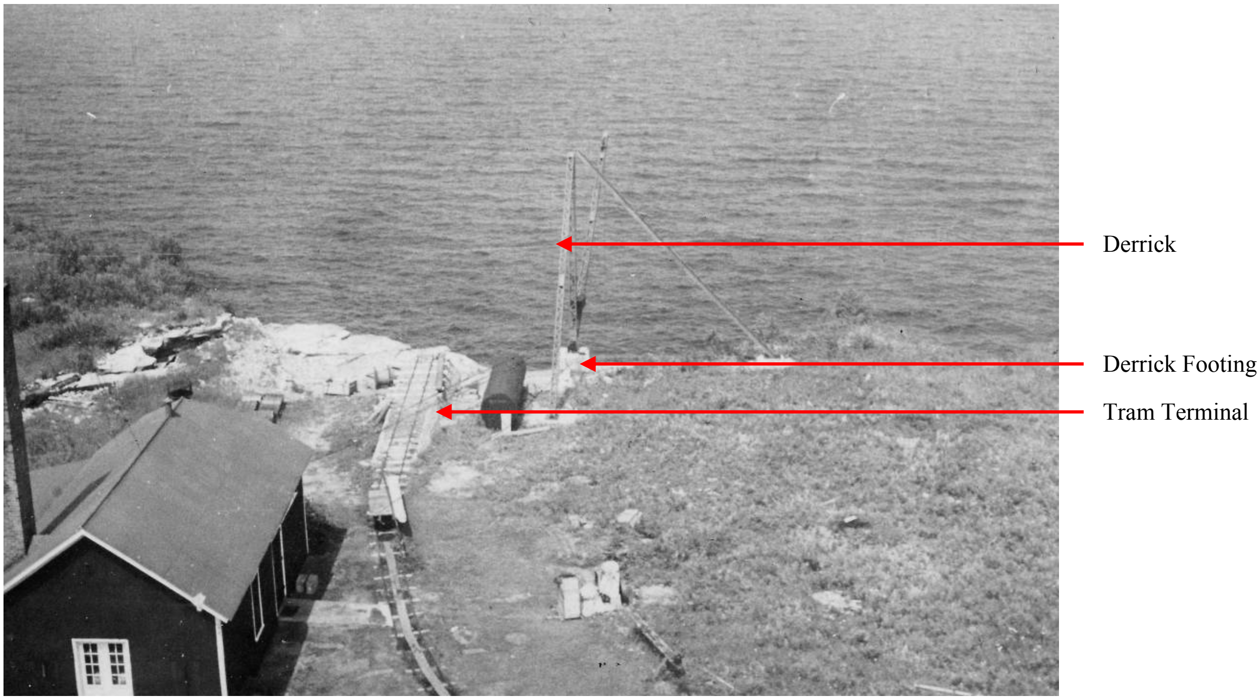
During this period the basic site arrangement and its features were retained but with slight modifications such as the addition of some site features and the deterioration of others. The most substantial change was the removal of the wood frame Assistant Keepers Quarters in 1956. In the 1940s, the inclined tramway was modified into a wooden staircase and then eventually removed. The derrick assembly and covered stairs leading down to the water near the Fog Signal Building were removed. The tram tracks were modified near the Fog Signal Building, and ultimately a stone elevated tram terminal was constructed. The USCG added many several small scale features to the grounds, primarily fuel tanks and other elements related to the day to day operation of the light station. Several small fiberglass generator huts were placed at the base of the Light Tower; the concrete footings for these are extant today. The road corridor from the Boathouse to the light station was used for transporting supplies and was maintained during this period.[20]

The original cleared area of the light station began reducing during this period due to the encroachment of the adjacent forest. The areas to the southeast along the tram tracks and to the west began to fill in, while the area between the Keepers Quarters and Light Tower remained cleared.

Coast Guard (USCG) Photographs

Site Image DI-15: From left, Oil House 1, Assistant Keepers Quarters (removed during this period), Keepers Quarters, Assistant Keepers Quarters and Privy. Note clearing and lack of domestic landscape plantings, c. 1945 (Source: NPS APIS Archives)

[20] ibid, Page 140



Site Image DI-16: Fog Signal Building, tram terminal, and derrick from Light Tower looking north, c. 1945 (Source: NPS APIS Archives)

Site Image DI-17: Painted fuel tank north of Light Tower, c. 1977 (Source: NPS APIS Archives)

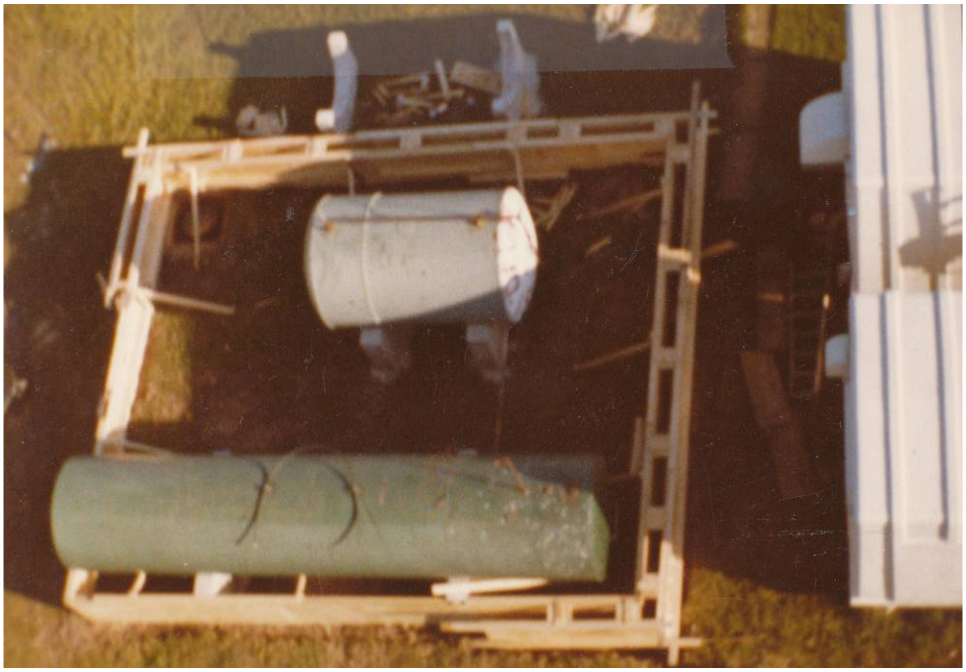
Site Image DI-18: Utility units and fuel tanks north of Light Tower, 1977 (Source: NPS APIS Archives)

National Park Service (1979 to present)

In 1970, the Apostle Islands National Lakeshore was established. The light station remained staffed by USCG until 1978 when the Light Tower was automated, eliminating the need for on-site personnel. NPS management opened to additional visitors and brought about changes in the landscape that primarily related to island access, recreation and visitor use. The basic configuration of the light station remains as it was during the previous period with all of the buildings and structures in place. The most prominent change to the landscape in this period was the reduction of the cleared area of the light station grounds due to forest encroachment. This change is most notable in the area between the Keepers Quarters and the Light Tower. The NPS performed periodic clearing maintenance activities, including work by the Young Adult Conservation Corps (YACC) in the early 1980s. This work was not frequent enough to maintain the cleared area. The forest encroachment into the cleared area began to change the composition of the cultural landscape from one large open site to two separate areas – a residential area (Keepers and Assistant Keepers Quarters) and a utilitarian area (Light Tower and Fog Signal Building).

Other work during this period relates to the NPS use of the island for recreation. Additions include trails, signage, vault toilet restroom, solar panel and minor improvements to historic light station features including upgrades to the buildings and structures, particularly for use as seasonal volunteer housing.

National Park Service Photograph



Site Image DI-19: Constructing fuel tank basin north of Light Tower, 1981 (Source: NPS APIS Archives)

ENVIRONMENTAL CONTEXT

Devils Island is 1.3 miles long and 0.4 miles wide and 318 acres in size. The maximum elevation above the lake is 58'.[21] Devils Island is unusual for the archipelago, since the island was not subject to extensive logging. The entire island was set aside as a lighthouse reservation and was not commercially logged. Vegetation was disturbed by light station establishment and operations, but the overall composition of the vegetative communities was not changed. The northern two-thirds of Devils Island supports "classic boreal forest" dominated by white spruce, balsam fir, white cedar, white birch, and aspen.[22] Devils Island also includes the best example of the krumholtz form of a type of wet mesic forest dominated white birch, balsam fir, white cedar, and Canada yew.[23] The stunted krumholtz growth form is caused by the harsh soil and climatic conditions found on Devils Island's coastal bluff-tops. Devils Island also includes wetlands associated with an inland bog. An unusual plant community occurs on the cliffs, including species such as butterwort, bird's-eye primrose (*Primula mistassinica*), three-toothed cinquefoil (*Potentilla tridentata*), fragile ferns (*Cystopteris* sp.), bog reedgrass (*Calamagrostis inexpansa*), and sedge (*Scirpus hudsonius*) (Judziewicz and Koch 1993). The area around the lighthouse has been repeatedly cleared for the past century, and contains a mixture of native and exotic plant species.[24] Forest trees now grow in formerly cleared areas surrounding and within the light station grounds.

As with the other islands, wildlife on Devils Island is not as diverse or abundant as that on the mainland.[25] Common mammal species include red squirrel (*Tamiasciurus vulgaris*), snowshoe hare (*Lepus americanus*), deer mouse (*Peromyscus maniculatus*), masked shrew (*Sorax cinereus*), and boreal redback vole (*Clethrionomys gapperi*). A variety of migratory birds use the island for foraging, nesting, and as a stop-over during migration. Devils Island is one of only several islands without a history of white-tailed deer.[26]

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[21] National Park Service (NPS). 2006. Apostle Islands National Lakeshore Website. Island Statistics. Last updated August 23, 2006. Available at http://www.nps.gov/apis/parkmgmt/upload/island%20statistics.PDF. Accessed December 7, 2009.
[22] Judziewicz, E. and R. Koch 1993 "Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin." *Michigan Botanist* 32(2): 43-193. Ann Arbor, MI.
[23] National Park Service. 2009. Apostle Islands National Lakeshore Draft General Management Plan/Wilderness Management Plan/Environmental Impact Statement. Bayfield, WI.
[24] Judziewicz, E. and R. Koch 1993 "Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin." *Michigan Botanist* 32(2): 43-193. Ann Arbor, MI.
[25] National Park Service. 2009. Apostle Islands National Lakeshore Draft General Management Plan/Wilderness Management Plan/Environmental Impact Statement. Bayfield, WI.
[26] ibid

EXISTING CONDITION ASSESSMENT AND LANDSCAPE ANALYSIS

The existing condition assessment and landscape analysis for the Devils Island Light Station are presented in this section. The light station reservation and the three individual sites within it are documented as one entity through the landscape characteristics that together comprise its cultural landscape. The presentation of the existing condition assessment and analysis is organized by landscape characteristics: spatial organization, topography, views and vistas, and circulation/accessibility; and identifies those buildings, structures, small scale features and vegetation that contribute to the cultural landscape.. An overview of the CLR methodology is presented in Volume I, Chapter 2: *Methodology*.

The landscape characteristics for the Devils Island Light Station are as follows. Their associated character-defining features contribute to the overall integrity of location, design, materials, workmanship, setting, association, and feeling.

- <u>Spatial Organization</u> - is the arrangement of elements creating the ground, vertical and overhead planes that define and create space, including the arrangement of topography and buildings.
- <u>Topography</u> – is the three-dimensional configuration of the landscape surface characterized by features and orientation; including bluffs, cliffs, slopes and drainages.
- <u>Views and Vistas</u> – are features that create or allow a range of vision which can be natural or designed and controlled; these include views of the light stations from Lake Superior and views from the light towers and lighthouses.
- <u>Circulation</u> – are spaces, features, and materials that constitute systems of movement.
- <u>Buildings</u> - buildings that are either currently or were historically habitable are presented in the Historic Structure Report.
- <u>Structures</u> - are smaller nonhabitable buildings or significant features (now or historically) such as privies, tramways, and outbuildings.
- <u>Small Scale Features</u> – elements that provide detail and diversity combined with function and aesthetics; including paving; structural remnants; tram tracks; site walls; signs; and walls of building ruins.
- <u>Vegetation</u> – Indigenous or introduced trees, shrubs, vines, ground covers, and herbaceous materials; including lawns, and landscape garden areas.

The existing condition of the Devils Island Light Station is presented first as a paragraph description. Annotated photographs support the condition assessment. The following criteria were used to evaluate condition:

- **GOOD –** The features of the landscape do not require intervention; only minor or routine maintenance is needed at this time.
- **FAIR –** Some deterioration, decline, or damage is noticeable; the feature may require immediate intervention; if intervention is deferred, the feature will require extensive attention in a few years.
- **POOR** – Deterioration, decline, or damage is serious; the feature is seriously deteriorated or damaged, or presents a hazardous condition; due to the level of deterioration, damage, or danger the feature requires extensive and immediate attention.

The landscape analysis, presented as narrative text, follows and provides an evaluation of the significance and integrity of each characteristic. The landscape analysis compares the site history with its existing condition to identify and evaluate those landscape characteristics that retain integrity and contribute to the significance of the light station.

The cultural landscape of the Devils Island Light Station has integrity as it retains the majority of its character-defining features and buildings that depict its role in the development of navigational aids in the Apostle Islands. The most important features include the buildings and light tower, cleared areas that define the spatial composition of the site, circulation, and small scale features.

Spatial Organization

The spatial organization of the Devils Island Light Station is of two distinct scales, the organization of the reservation and the light station grounds. While they are distinct they are also directly related. The cleared area of the reservation is also discussed under the vegetation feature.

Devils Island

Existing Condition. The overall spatial organization of Devils Island consists of the cleared areas of the light station grounds on the north end of the Island and the boathouse area at the south end, linked by a cleared corridor or path through the forested wilderness. The overall spatial organization of the island is in good condition.

Analysis. The spatial organization of Devils Island remains from the period of significance. The light station (north) and Boathouse (south) areas remain intact, along with the open corridor that bisects the forested island, connecting the north portion of the island to the south. The overall spatial organization of the island is a contributing feature.

Light Station

Existing Condition. The spatial organization of the light station is open to the sandstone cliffs of Lake Superior on the north and defined on the south by dense forest vegetation. The grounds are partially cleared of forest vegetation and are composed of two primary spaces, one to the north that includes the Light Tower and one to the south that includes the residences. The two clearings are linked by the tram tracks and a natural surface cleared hiking trail. The tram tracks connect the north and south cleared areas and extend in a southeast direction to the shoreline of the island. The tracks terminate at the northern end near the Fog Signal Building and at the Tramway Engine Building on the southeast end.

The buildings on the site help to define and mark the opposite ends of the light station grounds. The Fog Signal Building and Light Tower mark the northwest portion of the site and the keepers' dwellings anchor the southeast end.

The south clearing consists of the Keepers Quarters and Assistant Keepers Quarters centrally located in a maintained lawn area. The lawn edges are defined by forest vegetation and low, undulating landscape to the south, and tram tracks to the north and east. On the shoreline side of the tram tracks, an area of brush vegetation separates the lawn area from the cliff edge and Lake Superior. The Keepers Quarters, Assistant Keepers Quarters and the depression that marks the area of the non-extant third Keepers Quarters, are arranged in a formal pattern, sited on a row running east-west. A similar area surrounds the Light Tower, enclosed by forest vegetation, tram tracks and brush vegetation.

The Keepers Quarters and Tower clearings are separated by encroaching forest vegetation. The north clearing's west side is flanked by encroaching forest vegetation. To the east, the clearing is defined by the tram tracks. Across the tracks is the brush vegetation that extends along the cliff edge. The area of encroaching forest vegetation is approximately one acre.

The spatial organization of the Devils Island Light Station is in fair condition.

Analysis. The spatial organization of the light station grounds has changed substantially from its early development primarily due to the encroachment of forest vegetation into the area between the residences and the Light Tower, and in the areas surrounding the buildings and structures. Historic drawings and photographs indicate that originally the light station grounds were cleared from the Keepers Quarters area to the Light Tower and beyond to the western shoreline. The historic cleared area has been reduced from one large open clearing that contained all of the primary site buildings to two smaller clearings: one at the Light Tower and one near the Keepers Quarters that are distinctly separated by forest vegetation. The encroachment of vegetation has primarily occurred since the USCG crew left the island and regular maintenance of the cleared areas could not be achieved. The resulting change, two small cleared areas, diminishes the original form and composition of the light station.

The arrangement of buildings and structures also has grown and evolved from the initial construction of the light station to the end of the period of significance. The two most significant changes were the addition of the taller Light Tower during the Light Station Development period and the related removal of the original wood skeleton light tower. During the Coast Guard period the wood-framed Assistant Keepers Quarters was demolished; a slight depression is extant in the former location of this building. The arrangement of buildings and structures retains integrity and contributes to the cultural landscape of the Devils Island Light Station.

Spatial Organization Photographs

Site Image DI-20: View from the Light Tower showing the cleared area at the Keepers Quarters; top, c. 1940 (Source: NPS APIS Archives); below (2009) (Source: MBD Devils 040.jpg)

Topography

Existing Condition. The topography of Devils Island consists of low, undulating landscape that rises approximately 58’ above Lake Superior at its highest point. Bedrock under the northern two thirds of the island is the Devils Island brownstone formation. The outcrop along the island’s shoreline forms the island’s characteristic sandstone cliffs and sea caves. The topography at the light station grounds is generally level and elevated approximately 20’ above Lake Superior. A shallow depression exists east of the Keepers Quarters, marking the location of the non-extant Assistant Keepers Quarters.

The topography at Devils Island Light Station is in good condition.

Analysis. The topography of the Devils Island Light Station remains unchanged since the period of significance and is a contributing feature to the cultural landscape.

Topography Photographs

Site Image DI-21: Sandstone cliffs, 2009 (Source: MBD Devils 020.jpg)

Site Image DI-22: Devils Island topography, 2009 (Source: MBD P1020189.JPG)

Site Image DI-23: Shallow depression marking the nonextant Assistant Keepers Quarters and associated barn, 2009 (Source: MBD P1020058.JPG)

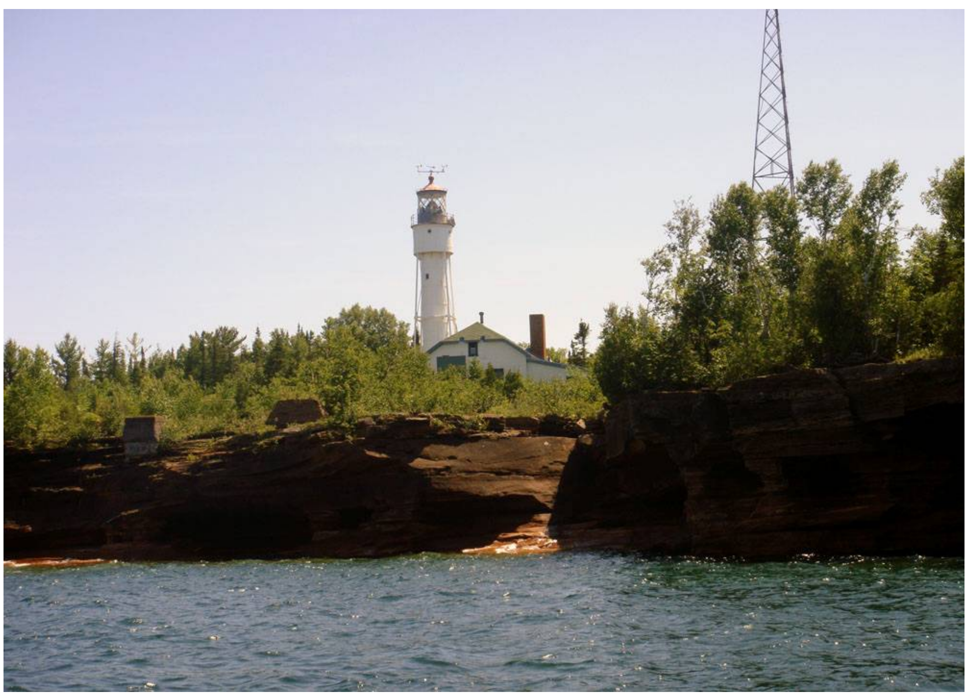
Views and Vistas

Existing Condition. Notable views to Devils Island include those of the Light Tower, the island's sandstone cliffs, and Keepers Quarters visible to passing ships and pleasure boats on Lake Superior. Vistas include those from atop the Light Tower looking south over the island and north, east and west over the waters of Lake Superior. The characteristic sandstone sea caves can be seen from several shoreline trails, most notably near the pump house. Views from the Keepers Quarters to the Light Tower are obscured and are in poor condition.

Analysis. The Light Tower and light station buildings are less visible from Lake Superior than they were during the period of significance. Once open and clear views are now blocked by the growth of brush along the eastern shoreline. The unchecked growth of trees in the former brushy field will soon result in a forest obscuring the light station from Lake Superior. Historic maps and photographs indicate that a much larger area west of the station was cleared. Presently, forest defines the entire western edge of the light station. Views in the light station grounds have also been substantially obscured by encroaching forest vegetation between the keepers' dwellings and the northern Light Tower area.

The encroaching forest and overgrowth of brush vegetation along the cliff edge and between the quarters and the tower has diminished the integrity of the cultural landscape. The views are contributing features to the cultural landscape and are in poor condition.

Views and Vistas Photographs



Site Image DI-24: View of Light Tower and Fog Signal Building from Lake Superior, 2009 (Source: MBD DSC00640.JPG)

Site Image DI-25: View to sea caves from footpath near Keepers Quarters, 2009 (Source: MBD Devils 078.jpg)

Site Image DI-26: View from Light Tower over Lake Superior, 2009 (Source: MBD P1020177.JPG)

Site Image DI-27: View from Keepers Quarters to Light Tower; top, c. 1930 (Source: NPS APIS Archives); below, 2009 (Source: MBD P1020029.JPG)

Circulation/Accessibility

This section describes the overall condition and analysis of circulation patterns and features of the Devils Island cultural landscape. Detailed descriptions of individual features, the boat dock, tram tracks and concrete walks are included in the Structures and Small Scale Features sections.

Devils Island Circulation

Existing Condition. Overall circulation on Devils Island is primarily related to the boat landing points, Boathouse and boat dock at the southern end of the island, connecting trails and circulation features present on the light station grounds. Several island access points have been historically used throughout the development of the Devils Island Light Station and remain in use today. The landing point at the southern end of the island includes a Boathouse, boat dock and jetty. Overall circulation on the light station and island is in fair condition.

Two sites are currently used for boat landings at the light station grounds, the east and west landings. The east landing is a flat rocky sandstone ledge east of the Tramway Engine Building. The west landing is also a flat sandstone ledge accessed by trails leading west from the light station. The landings are in good condition.

Another landing exists at the North Landing, along the northern shoreline and below the Fog Signal Building. The landing is near a sheltered cliff that includes the concrete foundation remnants of the derrick system formerly used to unload boats. This landing included a covered wooden stairway during the period of significance. The North Landing is no longer used and is in poor condition.

A narrow cleared and graded road with galvanized steel culverts bisects the island, extending from the light station grounds to the Boathouse on the south end of the island. The one mile-long corridor is maintained as a trail and is within the designated Gaylord Wilson Wilderness.

Analysis. In general access and circulation routes on Devils Island are similar to the original access points and routes that were established during its early development. Primary transit to the island was historically by boat, with landings at any of four locations: the North Landing (at the Fog Signal Building); the West Landing; the East Landing (at the Tramway Engine Building); and at the southern Boathouse. Boats landed at the different locations depending on the size and type of the vessel, weather and water conditions. The cleared trail/road corridor bisecting the island and linking the light station to the Boathouse site was first established in 1901 and has been maintained in various widths and conditions to present day. Site Image DI-12 shows a staircase once existed from the Boathouse site to the cleared trail/road corridor. The island also contains other natural surface trails which are considered noncontributing, compatible features. At the East Landing, the tramway and wooden staircase are nonextant and the landing has limited access for visitors. At the North Landing, near the Fog Signal Building, the original covered stairway is nonextant and the landing is no longer readily accessible from the cliffs above.

The overall circulation system of the island includes the boat dock, landing sites, trails to the West and East Landings, tram tracks, concrete walks, and the north-south trail corridor; and is a contributing feature.

Light Station Circulation

Existing Condition. Circulation within the light station grounds consists of the boat landings, tram system, natural surface trails, and concrete walks. Primary boat access to the light station grounds today is from the East and West Landings. The East Landing has a trail along the tram tracks that leads to the light

station grounds. The West Landing is connected to the light station grounds by two narrow trails (north and south from the station) through the forest.

The primary transit of materials on site historically was accomplished using the tram tracks that cross the light station grounds from north to south linking the Fog Signal Building, Keepers Quarters and Tramway Engine Building. The tracks are in fair to poor condition and are not fully functional.

Pedestrian circulation within the light station grounds is primarily along concrete walks, cleared trails and along the tram tracks. Many of the trails appear to follow an original alignment, extending from the light station grounds to the various landings. Historically, the north hiking trail to the West Landing followed the edge of the forest, but due to encroachment it is now bounded by forest on both sides. A hiking trail leads from the light station south into the surrounding forest terminating at the NPS Vault Toilet. Concrete sidewalks are placed in a rectilinear pattern connecting many of the buildings and structures on the grounds. This circulation system is in fair condition.

The boat dock, tramway and tram tracks are described in detail under the Structures section in this document.

Analysis. Most of the circulation patterns and routes within the light station grounds remain as they were during the period of significance. The concrete walks, many of which were preceded by wooden plank walkways are intact and still connect to both extant and nonextant features. The walks were built of precast concrete pieces placed directly on the ground surface. This material and method is found on other light stations in the Apostle Islands. The tram tracks are extant in most places and the tram system, while not functional, can be interpreted as a circulation feature.

The circulation system consisting of boat landings, concrete walks, trails and tram tracks, contributes to the cultural landscape. The trails and footpaths built during the NPS period do not diminish the integrity of the cultural landscape.

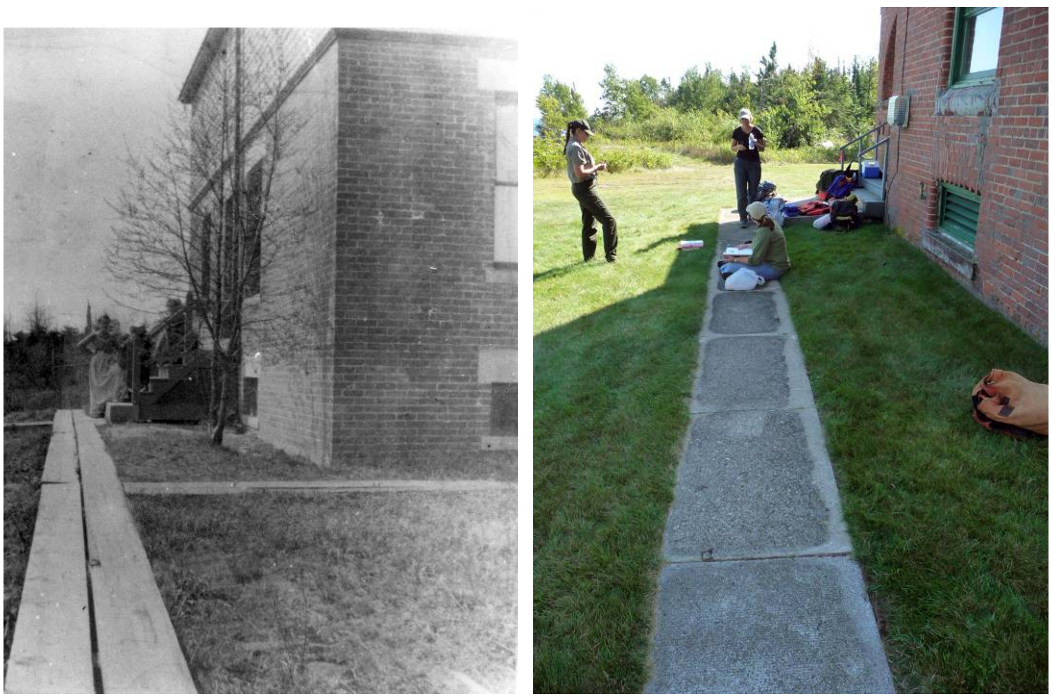
Accessibility (ABAAS). Accessibility on the light station, including its buildings and structures, is limited due to physical barriers and a lack of ABAAS compliant improvements. Visitor access to the island is by private or charter boat only. Access from the Boathouse site to the light station is along a natural surfaced trail (former road), approximately one mile long. Portions of this trail exceed acceptable slopes for outdoor accessible routes, including the route directly adjacent to the boat dock. Barriers to universal accessibility on the light station include: elevation changes at landing sites; steps leading into and through buildings and structures, the narrow width of site walks, and lack of accessible walking surfaces on the light station grounds. The light station grounds are relatively flat and present few physical barriers to improving accessibility other than those at the landing sites. The buildings present individual accessibility barriers and are discussed in the HSR. The Park Service is currently developing a park-wide Accessibility Self Evaluation and Transition Plan separate from this project to address visitor accessibility requirements related to ABAAS and Section 504 of the Rehabilitation Act. At the time of this report the plan is in progress.

Circulation Photographs

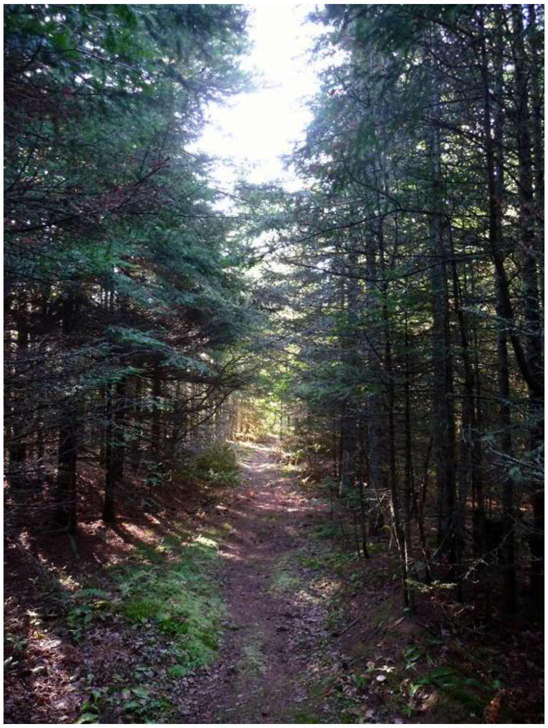
Site Image DI-28: Boathouse at south end of Devils Island, 2009 (Source: AH Devils DSC01033.JPG)

Site Image DI-29: Tram tracks between Fog Signal Building and Keepers Quarters, 2009 (Source: MBD Devils 072.jpg)

Site Image DI-30: Tram tracks at Tramway Engine Building, note extent of forest encroachment, 2009 (Source: MBD DSC_0006.JPG)



Site Image DI-31: Left - wood plank walk at Assistant Keepers Quarters, c. 1908 (Source: NPS APIS Archives); Right - concrete walk at Keepers Quarters, 2009 (Source: MBD Devils 021.jpg)



Site Image DI-32: Typical trail, 2009 (Source: MBD P1020020.JPG)

Buildings

The Devils Island Light Station buildings include: the Light Tower, Keepers Quarters, Assistant Keepers Quarters, Fog Signal Building, Oil House # 1, Oil House # 2, Tramway Engine Building, and Boathouse. For more information refer to the Historic Structure Report.

Structures

The structures on Devils Island provide a human scale and convey important history and use of the light station and Boathouse site. The structures at the light station include: the tram tracks, pump house, boat dock, radio antenna tower and NPS Vault Toilet. A physical description of each structure and its condition is presented first. An analysis of each structure follows and includes a determination of whether the structure is contributing or noncontributing. Structures are listed individually in Table DI-1.

Structures – Light Station Grounds

Tram Tracks

Existing Condition. The tram tracks on the light station connect the Fog Signal Building to the Tramway Engine House, running the length of the grounds (approximately 1600 linear feet) following a straight line that parallels the shoreline of the island. The tracks are cast iron 25 pound rails, spaced 36” on center and secured to timber and log ties set in a base material. The tracks remain in place but are nonfunctional as a system. The condition of the tram tracks is poor as the timbers beneath are rotted, the area between the tracks has become filled with soil and vegetation, and portions of the rails have been damaged and bent. Overall the tram tracks are in poor condition.

Analysis. The tram tracks, one of the earliest features on the light station grounds, were built in 1892. At the East Landing, a wooden tramway (nonextant) was used to raise fuel and supplies from the sandstone outcroppings up to the top of the cliff north of the Tramway Engine Building. Tram tracks are a feature common to Devils, Michigan, Outer, and Raspberry islands, constructed to transport materials and fuel within each light station. This feature was an important technological advancement for the day to day operations of the light station during the period of significance. Spatially, the tracks define the northeastern edge of the light station grounds and connect the buildings and structures on a northwest - southeast line. The tram tracks are an important contributing feature.

Pump House

Existing Condition. The pump house is located northeast of the Keepers Quarters, and is built into the edge of the shoreline cliff, overhanging open water below. It is a board formed, cast-in-place, concrete structure, approximately 10’x10’ in size, with a concrete stairway leading down to an access door on its north facade. The pump house has a square hatch with a metal cover on the roof. The stairway is in fair condition but lacks handrails and the guardrails along the cliff edge are not code compliant. The pump house is in poor condition and is nonfunctional.

Analysis. The concrete pump house was constructed during the Coast Guard period replacing a smaller, wooden framed structure that preceded it in the same location. The pump house was used to pump water from Lake Superior and deliver it to the residences and other parts of the grounds. The structure is notable for its cliff location and formed concrete construction.

Radio Beacon Tower

Existing Condition. The radio beacon tower is located directly west of the Fog Signal Building. The tower is a tripod shape, approximately 80' tall, constructed of a painted steel frame set on three concrete footings. The structural portions of the tower are in good condition although the tower no longer transmits signals.

Analysis. The tower represents an early technological improvement on the light station. This radio beacon was one of the first of its kind in the Great Lakes. Radio beacons eventually replaced steam powered fog signals, providing guidance for ships in conditions of low visibility. The radio beacon tower is an important contributing feature.

Structures – Boathouse Site

Structures at the Boathouse site include the boat dock and jetty/outer crib. The Boathouse is addressed in the Historic Structure Report. The grounds also include a stone wall that is described under Small Scale Features.

Boat Dock

Existing Condition. The boat dock is constructed of timber frame cribbing with a stone rubble infill and wood plank decking. The dock is approximately 120' in length by 15' wide and in conjunction with the stone jetty forms a small sheltered harbor. The dock is weather-battered with readily apparent damage to the timber cribbing and wood decking. The boat dock is in fair to poor condition.

Analysis. The Boathouse and dock has served as a boat landing since the beginning of the light station's development on Devils Island. Like most of the docks of the Apostle Islands the dock has been periodically damaged from wave action, storms and ice, and has been substantially modified and repaired several times. Historic drawings indicate that the existing dock is in the location of the original dock (c. 1906) and is of a similar shape and size to the dock work completed in 1947 by the USCG. The boat dock is a contributing feature.

Boat dock planning work is currently under study by the NPS under separate but related projects, including the Great Lakes Restoration Initiative.

Jetty/Seawall

Existing Condition. A stone jetty or seawall is located to the east of the boat dock, generally oriented in a north-south direction, enclosing the boat harbor. The jetty is approximately 90' long, and is in fair condition.

Analysis. The jetty was first constructed in the Early Light Station period and has been repaired, modified and added to several times during the period of significance. The location of the jetty has remained the same, originally built in c.1906 and underwent repairs by the USCG in 1947. The jetty is a contributing feature.

Table DI-1: Structures

Feature	Site Image #	Description	Condition	Contributing? /Rationale
Tram Tracks c. 1891 - 1893	DI-33	see above	Poor	Contributing; see text
Pump House 1940s	DI-34	see above	Poor	Contributing; see text
Radio Beacon Tower c. 1925	DI-35	see above	Good	Contributing; see text
Boat Dock at Boathouse Site c. 1906/1947	DI-37	see above	Fair - Poor	Contributing; see text
Jetty/Outer Crib c. 1906/1947	DI-37	see above	Fair	Contributing; see text
NPS Vault Toilet	DI-36	Wood frame, raised, NPS outhouse with concrete base/vault, accessed by a wooden staircase, located southeast of Keeper Quarters in forest	Good	Noncontributing - contemporary Compatible

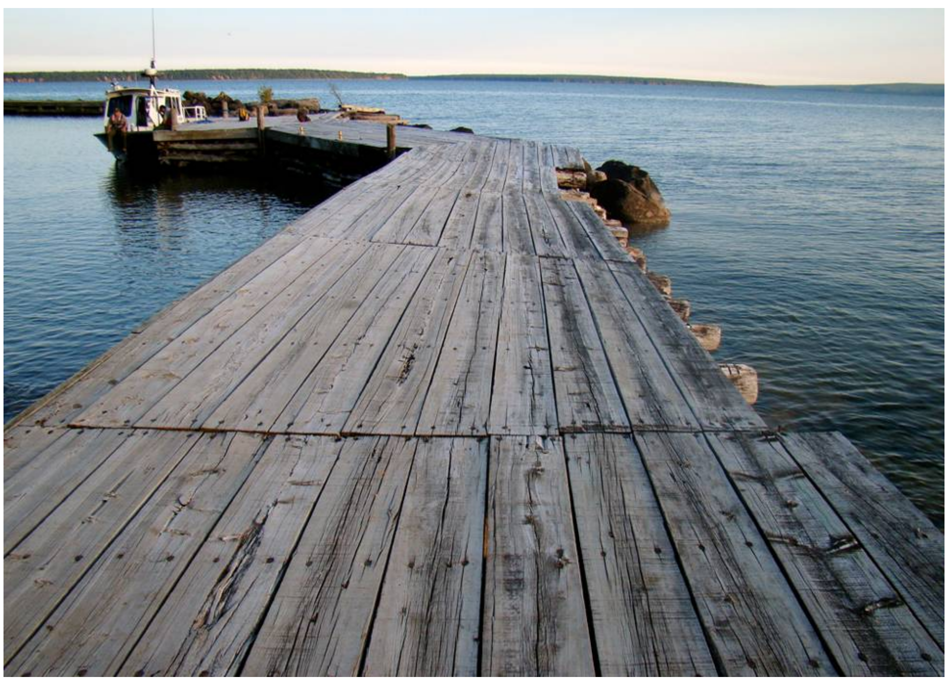
Site Structure Photographs

Site Image DI-33: Tram tracks near Fog Signal Building with radio beacon tower in background, 2009 (Source: MBD Devils 066.jpg)

Site Image DI-34: Pump house at cliff edge, 2009 (Source: MBD Devils 085.jpg)

Site Image DI-35: Radio beacon tower near Fog Signal Building, 2009 (Source: MBD Devils 041.jpg)

Site Image DI-36: NPS Vault Toilet, 2009 (Source: MBD DSC_0015.JPG)



Site Image DI-37: Boat dock at Boathouse site – south end of Devils Island; jetty in background, 2009 (Source: AH Devils 041.jpg)

Small Scale Features

The small scale features at the Devils Island Light Station include concrete walks, flagpoles, concrete footings, concrete well basin, piping, fuel tanks and basins, chain link fences, and a stone masonry wall at the Boathouse site. The small scale features range in condition from good to poor. The following describes the contributing small scale features that are important to the light station's history of navigation. They are the features that convey the development of navigational technology and influenced the manner in which the station operated. Descriptions of the remaining individual features, many of which are contributing, and their respective conditions are included in table DI-2.

Concrete Walks

Existing Condition. Typical to several of the Apostle Islands light stations, the concrete walks appear to be constructed of precast units 2.5'×4'×4" thick with some smaller units also installed. The walk sections have a fine aggregate finish and tooled edges. Historic photographs indicate that the concrete units were placed on top of the ground surface with no excavation. Other portions of the concrete walks appear to have been poured in place to infill odd shapes and address building edges. Overall the concrete walks are in good condition with only a few slabs requiring replacement due to severe cracking.

Analysis. The majority of the concrete walks on the grounds were installed in 1909 during the Light Tower period (1894–1938) many of them followed the previous layout of wood planks that was typical of the Apostle Islands light stations. The concrete walks were installed during the period when the light station was most vibrant. The walks are notable because of their precast fabrication and surface-laid installation. This material and installation method is common to other APIS light stations and helps to depict the related story of light stations. The concrete walks are an important contributing feature.

Stone Tram Terminal

Existing Condition. The stone masonry tram terminal is located at the northwest end of the tram tracks. The trapezoidal shaped raised platform is approximately 24'×8'×5' wide and the terminal is constructed directly on the exposed bedrock of the site. The tram tracks have been removed from the top of the terminal and brush vegetation has encroached at the base and top of the structure. The tram terminal is in fair condition.

Analysis. The tram terminal was associated with the Fog Signal Building and landing area below including the nonextant derrick assembly. This landing area was used for unloading goods and fuel from boats onto the terminal. Supplies were then transported to the light station on tram carts. This group of structures represents an important activity, a unique feature that occurred during the period of significance. The stone masonry construction of the terminal is the only of its kind on the light station grounds and is similar to the stone masonry wall adjacent to the Boathouse at the southern tip of the island. The tram terminal is a contributing feature.

Derrick Footings

Existing Condition. Four extant, concrete footings remain from the nonextant derrick assembly near the Fog Signal Building. The footings are cast-in-place, concrete with stone masonry and steel rod/bolt imbeds. The footings vary in size but are approximately 3'×3'×3'. The footings are in fair condition; however two of the footings have tipped over and are in danger of falling into the water.

Analysis. These footings are remnants of the derrick assembly formerly located in this area. The current footings date to 1944-45, but photographs from 1904 (Site Image DI-09) show derrick assemblies. The derrick footings in this location were likely replaced several times due to storm damage and heavy lake action. The footings represent the unique system of unloading and moving goods to the light station that is described above. The footings are contributing features.

Stone Wall at Boathouse

Existing Condition. A stone masonry wall is located adjacent to the Boathouse and boat dock. The trapezoidal shaped wall is approximately 20’×2’× 4’ and constructed of native stone, hand placed and mortared. The wall is in good condition.

Analysis. The stone wall supports the boat dock and protects boat dock and trail from shoreline wave action. The wall is similar in character and construction to the stone tram terminal near the Fog Signal Building. The specific date of the wall is unknown but it is thought to be from the Light Tower period (1894–1938). The stone wall is a contributing feature.

Table DI-2: Small Scale Features

Feature	Site Image #	Description	Condition	Contributing? /Rationale
Concrete Sidewalks (1909 - 1938)	DI-38, D-39	See above	Good	Contributing; see text
Tram Terminal (1904-1938)	DI-40	See above	Fair	Contributing; see text
Derrick Footings (1904-1938)	DI-41	See above	Fair	Contributing; see text
Stone Wall at Boathouse (1904-1938)	DI-42	See above	Good	Contributing; see text
Flagpole (c. 1918)	DI-43	Painted steel flagpole set on 18” square concrete base. Current flagpole c1918. A second flagpole was extant at the light station, shown in the Hassing Collection (APIS Archives) which date to 1929-1933.	Good	Contributing ; from the period of significance
Concrete Tramway Anchor (1891-1938)	DI-44	Cast in place concrete with steel anchors in location of nonextant tramway on East Landing	Fair	Contributing; from the period of significance, remnant of nonextant wood tramway
Supply Line (1930s)	DI-45	Galvanized supply line for (water) laid on surface	Fair	Contributing; from the period of significance
Witness Post (1938-1978)	DI-46	Steel post with sign, marking site of survey marker, text reads “witness post – please do not disturb nearby survey marker – for information write to the director, national geodetic survey, department of commerce, Washington DC, 20230”	Good	Contributing; from the period of significance

Feature	Site Image #	Description	Condition	Contributing? /Rationale
Fuel Tank Stand (1940s)	DI-47	Concrete fuel tanks stand adjacent to Oil House - 1	Good	Contributing; related to light station operation, from the period of significance.
Rock Etching - Devil at East Landing (c. 1925)	DI-48	Hand-carved devil in sandstone at East Landing	Fair	Contributing; from the period of significance
Rock Etching – Children's names (1904-1938)		Etching of keeper James Bard's children's names appear at the East Landing near the devil carving	Fair	Contributing; from the period of significance
Rock Etching – USCG Crest (1939-1978)	DI-49	Etching of USCG crest on sandstone outcrop near derrick footings	Good	Contributing; related to USCG presence on island, from the period of significance
Fog Beacon Frame (1966)	DI-50	Steel frame for nonextant fog beacon	Good	Contributing; aid to navigation from the period of significance
Fuel Tank Basin (1981)	DI-51	Concrete basin with 'rubber' liner, 30'x30'x3', two fuel tanks located inside basin. Concrete fuel tanks stand attached to the north side.	Fair	Noncontributing: constructed outside of the period of significance Noncompatible
USCG Painting on side of fuel tank (1977)	DI-52	USCG Painting on side of fuel tank north of Light Tower	Poor	Noncontributing; from the period of significance, but related to automation; Noncompatible
Well Head (1974-1975)	DI-53	Concrete pad with steel cover, located between residences	Good	Contributing; related to the Keepers Quarters, from the period of significance
Light Pole with Concrete Base (1969)	DI-54	Galvanized steel light pole on concrete base with five light fixtures	Fair - Poor	Contributing; related to light station operation from the period of significance
Water Line Base (1904-1938)	DI-55	Concrete footing for water line that ran from the original Pump House to dwellings	Fair	Contributing; related to light station operation from the period of significance
Wood Marker (contemporary)	DI-56	Vertical wood timber – may mark site of original wood light tower	Fair	Noncontributing Compatible
Septic Tanks (buried) (contemporary)	DI-57	Buried septic system	Good	Noncontributing Compatible
Concrete Paving (1939-1969)	DI-58	Remnant concrete paving at north side of concrete footings near Light Tower	Fair	Contributing; from the period of significance
Concrete Footings (1977)	DI-58	Series of 12 'sonotube' concrete footings, with threaded rebar imbeds – footings were for nonextant fiberglass generator (Gratiot) huts	Fair	Noncontributing; from the period of significance, but related to automation; Noncompatible

Feature	Site Image #	Description	Condition	Contributing? /Rationale
Chain Link Fencing and Gate (1966-1975)	DI-59	Galvanized chain link fence and gate	Poor	Contributing; from the period of significance
Solar Panel (contemporary)	DI-60	Solar panel on steel post with electric line	Good	Noncontributing Compatible
Park Sign (contemporary)	DI-61	NPS wooden park sign	Fair	Noncontributing Compatible
Fire Pit (contemporary)	DI-62	Steel fire pit	Good	Noncontributing Compatible

Small Scale Feature Photographs

Site Image DI-38: Concrete walk at Keepers Quarters – precast slab construction, 2009 (Source: MBD P1020148.JPG)

Site Image DI-39: Concrete walk to Pump House – precast slab construction, 2009 (Source: MBD Devils 088.jpg)

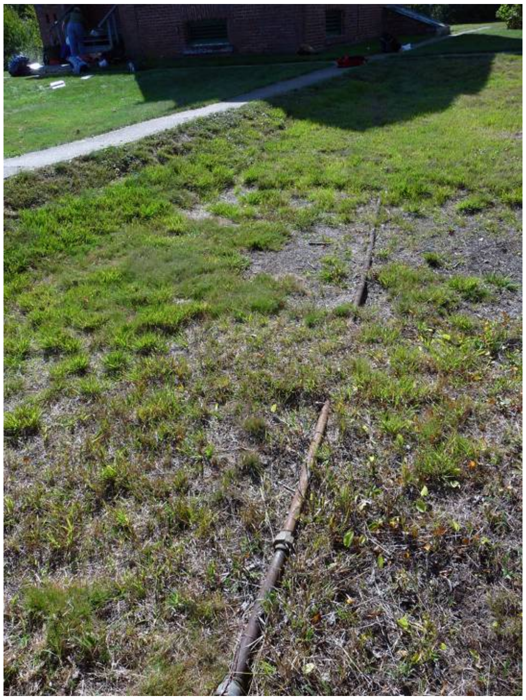
Site Image DI-40: Tram terminal, 2009 (Source: MBD Devils 050.jpg)

Site Image DI-41: Derrick footing, 2009 (Source: MBD Devils 060.jpg)

Site Image DI-42: Stone wall at Boathouse, 2009 (Source: AH DSC01075.jpg)

Site Image DI-43: Flagpole, 2009 (Source: MBD P1020108.JPG)

Site Image DI-44: Concrete tramway anchor at East Landing, 2009 (Source: MBD DSC_0084.jpg)



Site Image DI-45: Water supply line near Keepers Quarters, 2009 (Source: MBD P1020135.JPG)

Site Image DI-46: Witness post near Fog Signal Building, 2009 (Source: MBD Devils 064.jpg)

Site Image DI-47: Fuel tank stand adjacent to Oil House #1, 2009 (Source: MBD P1020117.JPG)

Site Image DI-48: Devil carving at East Landing, c. 2000 (Source: Photo courtesy of Susan Mackreth)

Site Image DI-49: Rock etching of USCG crest at derrick site, 2009 (Source: MBD Devils 057.jpg)

Fog Signal Removed

Site Image DI-50: Fog Signal Frame; top (1977) (Source: NPS APIS Archives); bottom (2009) Fog signal frame with fog signal removed, note extent of forest encroachment (Source: MBD Devils 045.jpg)

Site Image DI-51: Fuel tanks; top, (c. 1977) (Source: NPS APIS Archives); Fuel tanks with added concrete basin (constructed 1981); below (c. 2009) (Source: MBD Devils 035.jpg)

Remnant of "Devils Island U.S.C.G." painted sign

Site Image DI-52: Remnant of "Devils Island U.S.C.G." painted sign on side of Fuel Tank; top (c. 1977) (Source: NPS APIS Archives); Fuel Tanks; below (c. 2009) (Source: AH DSCN1735.JPG)

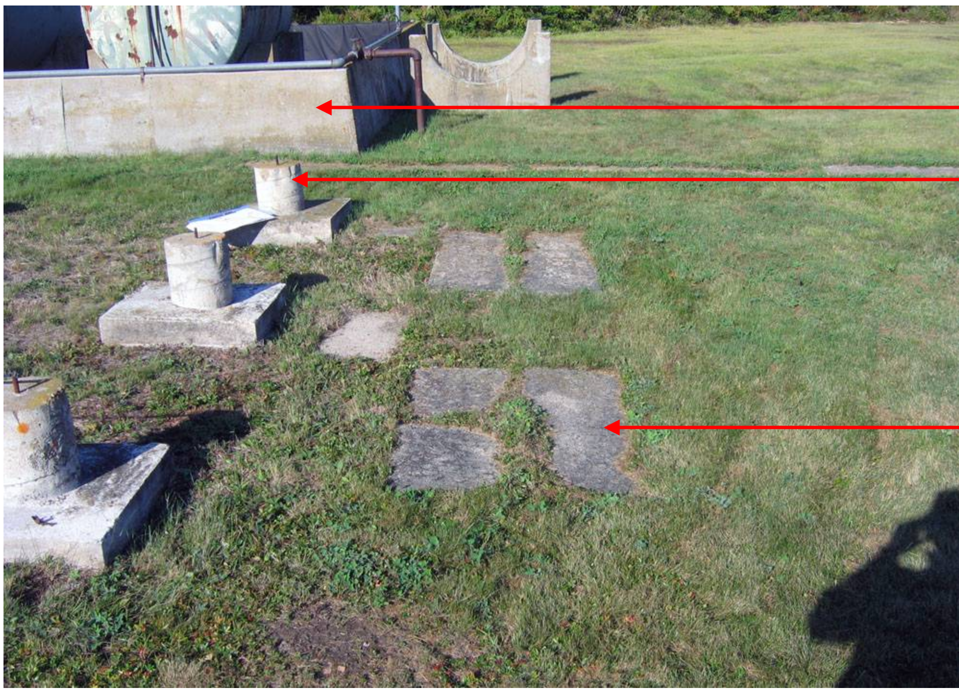
Site Image DI-53: Well head, 2009 (Source: MBD P1020100.JPG)

Site Image DI-54: Steel light post with concrete base, 2009 (Source: MBD P1020119.JPG)

Site Image DI-55: Concrete base for water line from Pump House to dwellings, 2009 (Source: MBD Devils 087.jpg)

Site Image DI-56: Wood post in brush east of Oil House # 2, 2009 (Source: MBD P1020036.JPG)

Site Image DI-57: Septic system, 2009 (Source: MBD Devils 074.jpg)



Concrete Fuel Basin

Concrete Footings

Concrete Paving

Site Image DI-58: Concrete footings and concrete paving near Light Tower, 2009 (Source: MBD Devils 025.jpg)

Site Image DI-59: Chain link fence and gate near Fog Signal Building, 2009 (Source: MBD Devils 044.jpg)

Site Image DI-60: Solar panel, 2009 (Source: MBD P1020078.JPG)

Site Image DI-61: Park sign at East Landing, 2009 (Source: MBD P1020017.JPG)

Site Image DI-62: Fire pit near Keepers Quarters, 2009 (Source: MBD P1020077.JPG)

Vegetation

Existing Conditions. Vegetation at Devils Island includes natural forested areas, cleared areas maintained as lawn and brush, and a few domestic landscape plantings. The northern two thirds of the island support a classic boreal forest of white spruce, balsam fir, white cedar, and white birch. The sandstone cliffs, especially at the northern tip, provide important habitat for State listed rare plants, including common butterwort (*Pinguicula vulgaris*) and bird's eye primrose (*Primula mistassinaca*).

The light station grounds include clearings maintained as mown lawn and areas that have been naturalized and maintained as a low brush landscape type. There are two clearings maintained as mown grasses, the south clearing surrounding the Keepers Quarters and the north clearing surrounding the Light Tower and Fog Signal Building.

Landscape plantings exist in only a few places on the grounds. A small landscape planter is next to the Oil House # 2 that includes a rosebush *(Rosa* sp.). A purple lilac shrub (*Syringa* sp.) is located west of the Keepers Quarters.

Descriptions of the vegetation features, many of which are contributing and their respective condition are included in table DI-3. The overall condition of the vegetation on the light station grounds is fair. The clearings at the light station are in poor condition. The forest reservation vegetation is in good condition.

Analysis. Historic drawings and photographs indicate that a significantly larger clearing existed than remains today. During the Early Lighthouse and Light Tower Periods, the light station was cleared from the Keepers Quarters on the south to the Light Tower and to the north, east, and west shorelines of the northern tip of the island. Today, a large portion of this open clearing has been filled in by encroaching forest vegetation resulting in two smaller, separated clearings immediately surrounding the keepers' dwellings and Light Tower/Fog Signal Building. A portion of the formerly cleared area west of the Light Tower is now included in the wilderness boundary. The cleared area of the light station is an important contributing feature. The relationship between the cleared area of the light station and the forest vegetation on the reservation has changed substantially since the period of significance. The extensive encroachment of forest vegetation into the original clearing diminishes the integrity of the cultural landscape.

Historically, landscape and garden plantings were not as prominent on Devils Island as on some of the other light stations. The shallow soil conditions made gardening and landscaping difficult. A few landscape plantings were established near the residences (see Site Image DI-10) and historic documents refer to a vegetable garden near the Boathouse site for a short time during the 1910s. The extant landscape plantings are contributing features.

Table DI-3: Vegetation

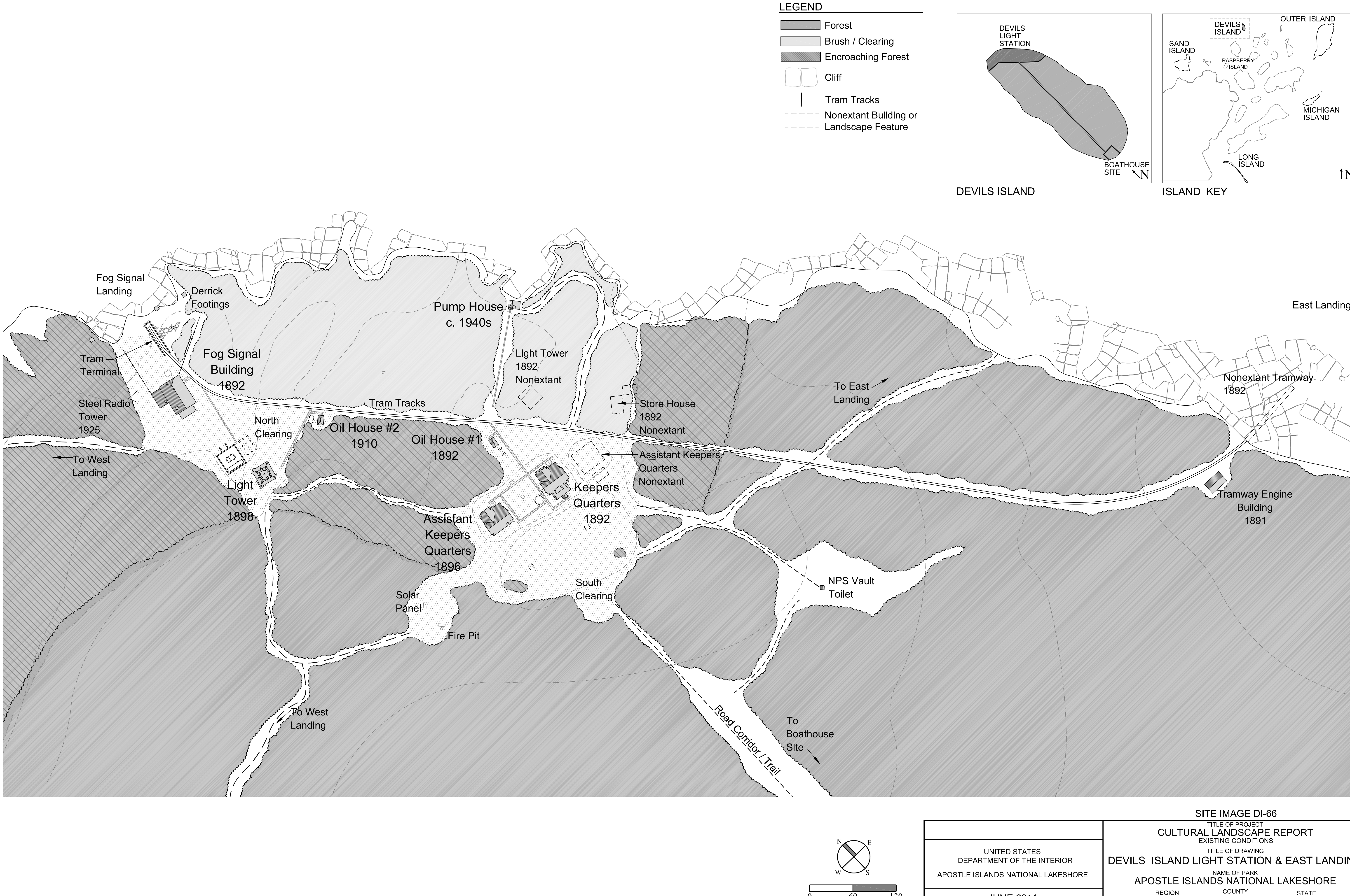
Feature	Site Image #	Description	Condition	Contributing? /Rationale
Forest - Reservation	DI-22	Natural forest area of island	Good	Contributing; from the period of significance
Cleared Area	DI-20	Areas of forest vegetation cleared for light station grounds	Poor	Contributing; from the period of significance
Lawn Area	DI-63	Mown grasses	Fair	Contributing; from the period of significance
Brush Area	DI-26	Areas cleared of forest with low naturalized vegetation	Fair	Contributing; from the period of significance
Domestic Plantings	DI-64	landscape plantings at Oil House # 2; rosebush	Fair	Contributing; from the period of significance
Lilac west of Keepers Quarters	DI-65	Purple lilac bush west of Keepers Quarters	Fair	Contributing; from the period of significance

Vegetation Photographs

Site Image DI-63: Mown lawn area near Keepers Quarters, 2009 (Source: MBD P1020148.JPG)

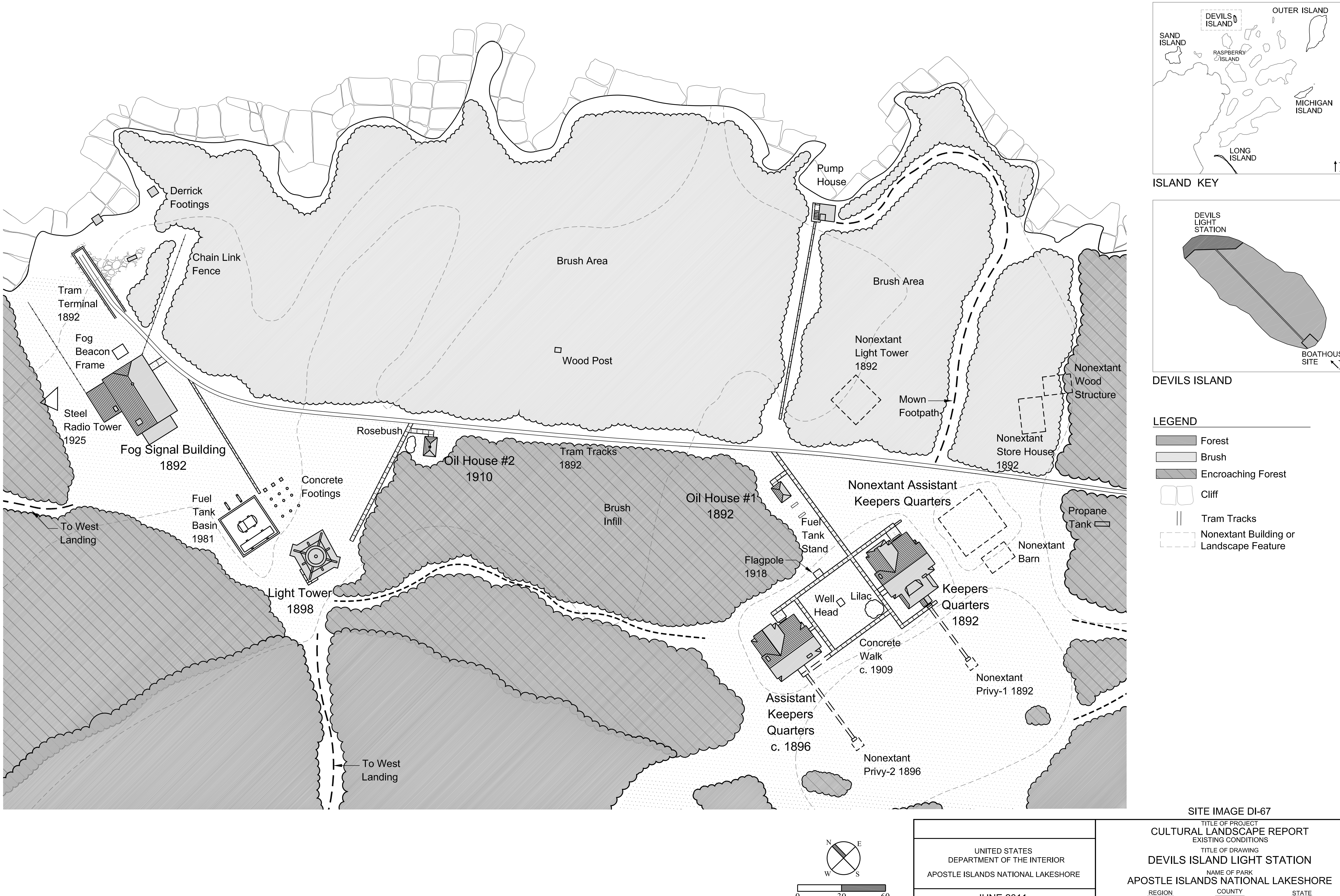
Site Image DI-64: Domestic planting at Oil House # 2; small stone lined planter with rosebush, 2009 (Source: MBD Devils 069.jpg)

Site Image DI-65: Purple lilac west of Keepers Quarters, 2009 (Source: MBD P1020103.jpg)



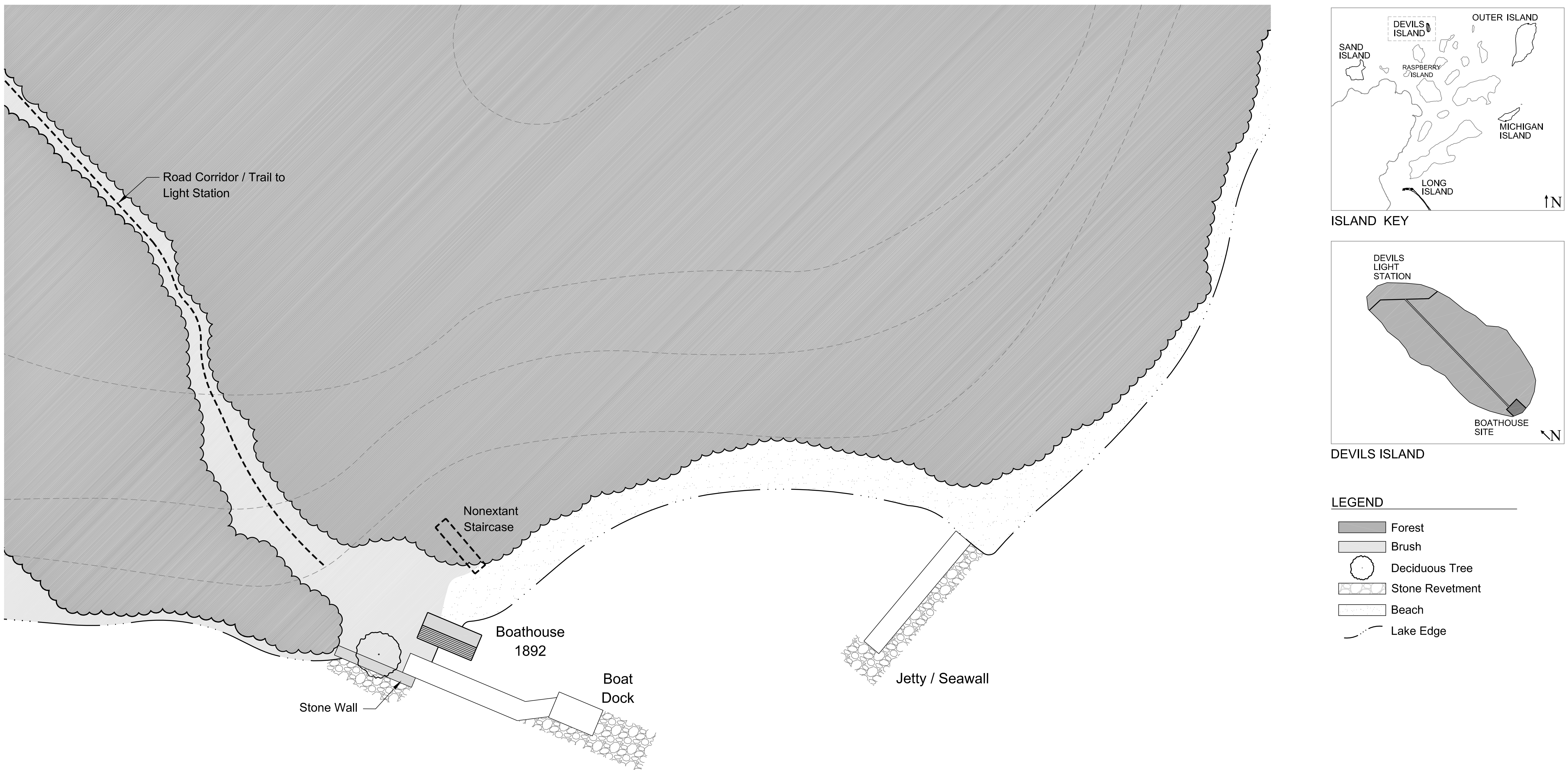
SITE IMAGE DI-66

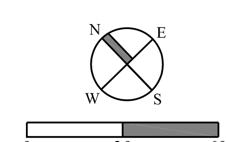
UNITED STATES DEPARTMENT OF THE INTERIOR APOSTLE ISLANDS NATIONAL LAKESHORE	TITLE OF PROJECT CULTURAL LANDSCAPE REPORT EXISTING CONDITIONS TITLE OF DRAWING DEVILS ISLAND LIGHT STATION & EAST LANDING NAME OF PARK APOSTLE ISLANDS NATIONAL LAKESHORE
JUNE 2011	REGION: MIDWEST — COUNTY: ASHLAND — STATE: WISCONSIN



SITE IMAGE DI-67

UNITED STATES DEPARTMENT OF THE INTERIOR APOSTLE ISLANDS NATIONAL LAKESHORE	TITLE OF PROJECT CULTURAL LANDSCAPE REPORT EXISTING CONDITIONS TITLE OF DRAWING DEVILS ISLAND LIGHT STATION NAME OF PARK APOSTLE ISLANDS NATIONAL LAKESHORE
JUNE 2011	REGION: MIDWEST · COUNTY: ASHLAND · STATE: WISCONSIN





SITE IMAGE DI-68

UNITED STATES
DEPARTMENT OF THE INTERIOR
APOSTLE ISLANDS NATIONAL LAKESHORE

JUNE 2011

TITLE OF PROJECT
CULTURAL LANDSCAPE REPORT
EXISTING CONDITIONS

TITLE OF DRAWING
DEVILS ISLAND BOATHOUSE

NAME OF PARK
APOSTLE ISLANDS NATIONAL LAKESHORE

REGION	COUNTY	STATE
MIDWEST	ASHLAND	WISCONSIN

DEVILS ISLAND CLR TREATMENT

Introduction

The treatment section of the CLR in conjunction with the HSR describes a strategy for the long-term management of the cultural landscape and historic structures of the Devils Island Light Station. The strategy is based on the analysis of the cultural landscape's characteristics, the history and period of significance for the light station, the existing condition of the historic features, and contemporary use of the light station. A general management philosophy of rehabilitation has been identified as the most appropriate approach for the cultural landscape. Rehabilitation will allow for repairs, alterations, and additions that will be necessary for the compatible use of the light station, and will preserve the characteristics and features that convey the light station's historical, cultural and architectural values.[27] These actions will enable the park to preserve the contributing resources of the cultural landscape, while allowing for specific alterations to accommodate contemporary use and interpretation of its history.

TREATMENT GOALS

- Preserve extant contributing cultural resources
- Reestablish missing resources
- Reveal the cultural landscape by representing the important characteristics from the period of significance
- Improve understanding of the overall system of light stations in the Apostle Islands for both visitors and park staff by incorporating interpretation of landscape resources that have been repaired or reestablished
- Aid in preserving the natural resources of the light station reservation by monitoring and controlling invasive plant material, protecting rare and sensitive native plants and directing visitor use

TREATMENT TERMINOLOGY

The following terms are used frequently in the CLR for actions that address the cultural landscape and its features, and are defined below. A more detailed glossary is presented in the Glossary of Terms at the end of this volume.

Maintain. Maintain includes the standard maintenance practices (mowing, pruning, thinning of vegetation, painting and cleaning of small scale features) that are necessary to retain a feature or area as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included.

Plant. Plant or planting includes the planting or removal and replanting of landscape material and vegetation as part of maintenance activities, or the restoration of missing landscape planting features.

Reestablish. The measures necessary to depict a feature or area as it occurred historically. Reestablish may include replacement of missing features (such as replacement of a pattern of planting) or a missing quality (e.g., reestablishment of a view).

[27] Landscape Lines.

Relocate. Relocate includes the removal and resetting of features in new locations. This is usually associated with noncontributing features.

Remove. The actions required to remove non-historic or noncontributing features. This is usually associated with noncompatible features in the landscape.

Repair. Repair includes the measures necessary to maintain features, components of features, and materials that require additional work. These may include repairing declining structures, small scale features (e.g., repair of a railing) or landscape plantings (e.g., repair mass planting by adding infill plantings). Features that are repaired shall match the original in design, color, texture, and where possible, material.

Restore. The measures necessary to depict a feature or area as it occurred historically. Restoration may include repair of a feature so that it appears as it did historically.

Retain. These are actions that are necessary to allow for a feature (contributing or noncontributing) to remain in place in its current configuration and condition.

Stabilize. Stabilize refers to immediate measures (more extensive than standard maintenance practices) that are needed to prevent deterioration, failure, or loss of features.

PREFERRED TREATMENT ALTERNATIVE

During the development of the CLR/HSR three treatment alternatives were produced and examined. The CLR/HSR contains only the Preferred Treatment Alternative. The additional treatment alternatives considered are presented in the Environmental Assessment.

Intent of Preferred Treatment Alternative

The Devils Island Light Station is most significant to the Apostle Islands system of light stations because: 1) it represents the development of navigational aids along the outer shipping route to Ashland and Bayfield; 2) it clearly depicts improvements in navigational and light station technology; and 3) it illustrates the historical relationship with the USCG. The lives of the keepers, their families, and later the USCG crews were impacted by the progression of new navigational technologies, made evident by the historic features of the cultural landscape. The light station's contributing features show a progression of new technologies and architecture on the station. The Devils Island Light Station is most significant to the Apostle Islands system of light stations because of the multiple landscape and building features that remain from the Coast Guard Period. By preserving, rehabilitating, or reestablishing these features, the treatment approach of the CLR/HSR strives to clearly depict the story of the Devils Island Light Station.

The intent of the preferred treatment is to rehabilitate the cultural landscape of the Devils Island Light Station to portray the period of navigational history that the light station best represents within the system. The period of significance for the Devils Island Light Station (1892 –1978) begins with the establishment of the first temporary wooden light tower, and ends with automation of the Light Tower. The extant contributing features best represent the Coast Guard period (1939–1978) when the light station was occupied and managed by the USCG (described in the Site Development section of this chapter). The USCG remained on site until 1978 and their influence on the cultural landscape is more evident at the Devils Island Light Station than any of the other Apostle Islands light stations. The treatment approach for the extant contributing features emphasizes this period. Recommendations also include the restoration of landscape features lost since the period of significance.

Preferred Treatment Alternative (Site Image DI- 70, Site Image DI-71)

The treatment measures are intended to preserve and rehabilitate the cultural landscape features. This requires a variety of actions that may be accomplished by either a series of preservation steps implemented over time or as a one-time action paired with future maintenance. Emphasis should be placed on the preservation and/or rehabilitation of the contributing features that most strongly define the character of the landscape as outlined above.

Specific treatment measures are depicted in a series of plan drawings and are accompanied by detailed narrative descriptions, organized by landscape characteristics and presented as follows.

SPATIAL ORGANIZATION/VIEWS AND VISTAS

Spatial organization is a key feature of the cultural landscape and is primarily defined at the Devils Island Light Station by the relationship between the buildings, structures, and cleared areas of the light station. While the arrangement of buildings, structures and circulation features have remained intact, with the exception of the removal of the wood-framed Assistant Keepers Quarters, the cleared area of the light station grounds has been substantially reduced from the period of significance. The encroachment of forest vegetation into the historic cleared area of the light station grounds has diminished the integrity of the light station by dividing the single historically cleared area into two smaller areas. Views from the waters of Lake Superior to the light station are also an important component of the cultural landscape. The growth and encroachment of forest vegetation, specifically trees, has also impacted views from the lake to the light station, although not to the extent found on other light stations. This encroachment of forest vegetation and change to the spatial organization of the light station has diminished the integrity of the cultural landscape.

Additional information regarding the means and methods of clearing forest vegetation are included in Volume I, Chapter 5: *Management Issues and in the vegetation section*.

The treatment recommendations for spatial organization and views/vistas include: 1) preserving the existing organization of buildings, structures, and site features; 2) reestablishing the cleared area of the landscape to better depict its condition during the period of significance; and 3) maintaining the cleared corridor of the hiking trail to the Boathouse and the tram track corridor to the Tramway Engine Building. Individual treatment measures are described as follows:

Light Station Clearing and Maintenance

This measure is intended to reestablish the cleared area of the light station to a condition that better represents the period of significance, specifically the Coast Guard period (1939–1978). Clearing to reestablish portions of the historic cleared area may be undertaken on an incremental approach addressing the most critical and beneficial areas first. Emphasis should be placed on areas that most strongly define the character of the landscape listed below in order of priority:

- Clearing for fire protection adjacent to existing buildings and structures;
- Clearing to prevent deterioration of contributing structures or small scale features such as the tram terminal;
- Clearing to reestablish the view between the Light Tower and Keepers Quarters;
- Clearing along the tram tracks between the Keepers Quarters and Tramway Engine Building;
- Clearing to maintain the connecting trail corridor between the Boathouse and light station;
- Clearing of forest west of Fog Signal Building.

CIRCULATION/ SITE ACCESSIBILITY

The circulation patterns and features on the site remain and are important elements of the cultural landscape. The circulation patterns are an integrated system of boat landings, roads/hiking trails, concrete walks and tram tracks. All of these improvements were installed to support the navigational and day-to-day operations of the light station. These features remain in much the same configuration as during the period of significance and are important to the integrity of the cultural landscape. The treatment measures focus on maintaining the circulation patterns and rehabilitating or preserving the circulation features. Features important to maintaining the integrity of the light station include the boat landing points, boat dock, road corridor/trail to Boathouse, tram tracks and concrete walks.

Tram tracks, concrete walks and all contributing trails and paths should be maintained in their current locations. Detailed recommendations for tram tracks and concrete walks are found in the structures and small scale features sections.

Trails and Paths

Maintain cleared corridors for all trails and footpaths on the light station. Trails are typically cleared and mowed to an approximate width of 8’.

Road Corridor

Maintain the former road corridor between the light station and the Boathouse area at the southern tip of the Island as a 10 foot-wide cleared corridor for a hiking trail. Clear and remove vegetation to maintain a corridor with clearance suitable for trail access. This corridor passes through the Gaylord Wilson Wilderness and any work shall meet all requirements and standards for the wilderness area.

Accessibility (ABAAS)

An Accessibility Self Evaluation and Transition Plan (Plan) separate from the CLR/HSR is being developed to provide an overall plan for the six light stations in the Apostle Islands – Raspberry, Michigan, Outer, Devils, Long, and Sand islands. This work is intended to address the park as a whole and the accessibility requirements related to visitor services to be achieved at each individual light station. At the time of this report the plan is in progress. The CLR/HSR incorporates several standard recommendations into each of the light station’s plans to prepare the light station grounds and buildings for the implementation of recommendations from the Transition Plan. Recommendations for the Devils Island Light Station are:

- Provide an outdoor accessible route (minimum 36” width) to a new accessible NPS restroom (under a separated project)
- Provide programmatic access to the Devils Island story at the light station and APIS Visitor Center in Bayfield.

Outdoor accessible routes shall meet the requirements of the ABAAS for width (36” minimum), slopes (less than 4.75%), and include passing areas. These requirements are readily achievable on the light station. Further discussion regarding the overall accessibility approach for the system of light stations is included in Volume I, Chapter 5: *Management Issues*.

STRUCTURES

There are several important structures within the light station. These features convey important details regarding the historical use and operation of the light station. Treatment recommendations are described in detail for major structures. In general the recommendations for these features are focused on the preservation and maintenance of existing contributing structures.

Tram Tracks

Stabilize the tram tracks from the tram terminal near the Fog Signal Building to the Tramway Engine Building. This action is intended to carefully reveal this contributing feature and to reduce further deterioration of the resource. The tram tracks are an important organizing feature of the site and convey details about the historical operation of the light station. Remove vegetation and excess soil between and adjacent to the rails to insure that the pattern of the track and rails remains clearly visible on the landscape. Removal of vegetation and soil should be done with hand equipment with care taken to avoid over excavation and damage to any ties or material below. Maintain an approximate 10' wide cleared corridor along the tracks in the forested area between the Keepers Quarters and Tramway Engine Building. The intent of this clearing is to maintain an open view corridor along the tram tracks. The work includes clearing of vegetation and trimming of corridor edges. Do not to disturb any isolated wetlands that may occur along the tracks.

Tram Terminal

Repair the tram terminal near the Fog Signal Building. The intent of the treatment measures is to preserve and reveal the resource as an important feature in the cultural landscape. The feature is currently obscured by vegetation and may become damaged by root growth on top of and around the terminal. The treatment measure includes removal of vegetation (shrubs and trees) from the top of the terminal and adjacent to it; stabilization of extant tram tracks on terminal; and masonry repair (pointing) of all stone work. Replacement stone and mortar shall match existing material and craftsmanship.

Pump House

Treatment measures to maintain the pump house include:

- Provide secure weather proof cover at door opening
- Replace missing guardrails
- Secure roof hatch
- Seal any cracks or leaks in the concrete structure
- Retain the galvanized water supply line between the Pump House and Keepers Quarters.

Radio Beacon Tower

The steel radio beacon tower represents an important advance in navigational aids on Devils Island and within the Apostle Islands system of light stations. Maintain the radio tower in its current configuration and location. Treatment includes maintenance of concrete footings and painting of structural steel to minimize corrosion of frame and hardware. Clear vegetation around the tower to better incorporate the tower into the grouping of structures and provide better access.

Boat Dock

The boat dock should retain its current, historic location and configuration. The boat dock should be repaired as needed and determined by APIS. Maintenance and repair work shall match original materials, form and craftsmanship. Further discussion regarding boat docks is included in the Volume I, Chapter 5: Management Issues.

Boathouse

See the Historic Structure Report for information on the Boathouse.

Jetty/Seawall

Maintain the stone jetty in its current location and configuration. Replace rubble as needed.

SMALL SCALE FEATURES

The small scale features on the light station provide a human scale while conveying important details regarding the history and use of the light station. Treatment recommendations are described in detail for contributing small scale features, and noncontributing features are presented in Table DI-4. In general the recommendations for these features are focused on preservation and include:

- Retain all contributing small scale features.
- Retain noncontributing, compatible features including park and trail signs.
- Remove noncontributing, noncompatible features

Concrete Walks

Maintain all concrete walks in the current, historic locations. Repair includes the removal and replacement of several isolated, severely damaged sections. Maintenance includes vegetation removal and minor leveling to eliminate trip hazards. Replacement of damaged sections shall be completed with precast units matching the various dimensions of the existing concrete slabs, poured and finished prior to installation. The finish of the replacement sections should match the finish of the historic material including aggregate size and tooling.

Fog Beacon Frame

Maintain the fog beacon frame north of the Fog Signal Building by clearing vegetation around the light and repainting metal sections as needed to prevent corrosion.

Derrick Footings

Stabilize the concrete derrick footings near the Fog Signal Building. Remove vegetation from the edges of the footings and reset two of the footings to prevent them from falling into the water.

Flagpole

Maintain the flagpole by repainting and replacing hardware and halyard as needed.

Park and Interpretive Signs

Measures related to park signage is not included in the CLR. Interpretive signage on the light station is addressed under the *Parks Long Range Interpretive Plan* and other studies. Additional discussion regarding interpretation is included in Volume I, Chapter 5: *Management Issues*.

Tramway Anchor

The tramway anchor on the rock outcrop east of the Tramway Engine Building is the only remaining extant piece of the tramway and should be preserved.

Stone Wall at Boathouse

Maintain the stone wall in its current location and configuration with minor mortar repair and protection of the wall base with riprap protection. Replacement stone and mortar shall match existing material and craftsmanship.

Chain Link Fencing and Gate

Maintain the chain link fencing and gate in their current location and configuration.

The following table (Table DI-4) provides recommendations for noncontributing small scale features.

Table DI-4. Small Scale Features (Noncontributing)

Feature	Compatible?	Status
Concrete Fuel Tank Basin	Noncontributing Noncompatible	Remove basin and associated fuel tanks
Concrete Footings	Noncontributing Noncompatible	Remove concrete footings for nonextant fiberglass generator huts
Wood Marker	Noncontributing Compatible	Retain - further investigation required.
Septic Tanks (buried)	Noncontributing Compatible	Retain
Solar Panel	Noncontributing Compatible location	Retain in existing location
Park Sign	Noncontributing Compatible	Not addressed in CLR
Fire Pit	Noncontributing Compatible location	Retain in existing location
Propane Tank	Noncontributing Compatible location	Retain in existing location

VEGETATION

Reservation Vegetation

Devils Island was not subject to extensive logging as the entire island was set aside as a lighthouse reservation and was not commercially logged. Vegetation was disturbed by light station establishment and operations, but the overall composition of the vegetative communities was not changed. The northern two-thirds of Devils Island supports “classic boreal forest” dominated by white spruce, balsam fir, white cedar, white birch, and aspen. Clearing work shall not disturb old growth vegetation and shall maintain a buffer as determined by field investigations at the time of clearing work.

Areas of the light station reservation that are to remain forested should be monitored for invasive plants. The most apparent invasive plant is periwinkle (*Vinca minor*). This plant is thought to have been introduced as a domestic landscape plant on the light station. Do not introduce potentially invasive plant material into the light station reservation.

Station Vegetation

Remove forest vegetation that has encroached on light station grounds to better represent the light station during the period of significance. Clearing includes the removal of forest trees and shrubs in historically cleared areas, and the establishment of a low brush ecotype similar to what currently exists between the shoreline and tram tracks. The intent of the clearing is to reestablish the visual connection between the Light Tower and Fog Signal Building area and the Keepers Quarters and to maintain open views of the light station from Lake Superior. Cleared areas shall be maintained as low brush vegetation by manual removal of tree and large shrub species on a regular basis. Additional information regarding the means and methods of clearing forest vegetation from the light station and the disposal of clearing debris are included in Volume I, Chapter 5: *Management Issues*.

There are a number of state listed rare plants along the northern edge of the island including common butterwort (*Pinguicula vulgaris*) and bird’s eye primrose (*Primula mistassinaca*). Special care will need to be taken during landscape clearing to protect these species from any impacts.

Isolated wetland areas occur in several areas on the light station primarily in a small area along the tram tracks between the Keepers Quarters and Tramway Engine Building, and along the cleared trail corridor south of the light station. Wetland areas shall not be disturbed.

Domestic Plantings

Historically domestic landscape and garden plantings did not play a significant role in the cultural landscape of the Devils Island Light Station. Historic documents reference a vegetable garden planted at the Boathouse site.

- Maintain contributing domestic shrub and perennial plantings at Oil House #2
- Remove noncontributing trees in lawn areas near Keepers Quarters

Clearing for Fire Prevention

Maintain cleared areas free of trees a minimum of 30' from buildings (including the Tramway Engine Building).

Light Station Clearing (Lawn)

This treatment measure is a moderate expansion of the existing cleared lawn area. The work includes clearing of forest trees, shrubs and ground covers and establishing lawn grasses in the newly cleared area. Maintenance includes regular mowing of the lawn area to discourage forest encroachment.

Low Brush Condition Photograph

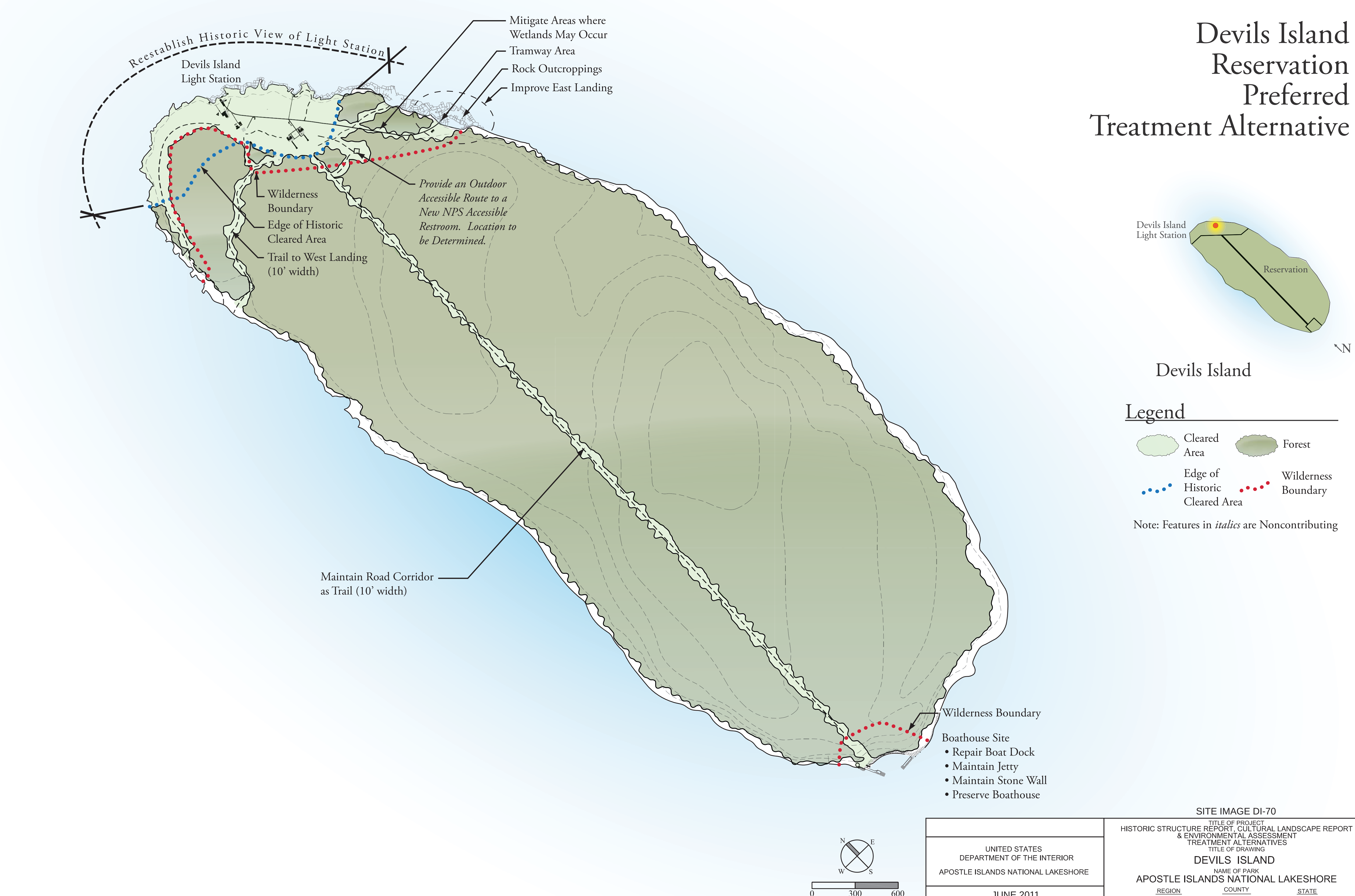
Site Image DI-69: Historic photograph of low brush condition at the Devils Island Light Station, c. 1901; (Source: NPS APIS Archives)

AREAS OF FURTHER INVESTIGATION

Archeological Investigations

Complete an archeological survey for all known resources in the light station reservation using nondestructive investigations to document the extent of buried or nonvisible cultural resources that exist across the Island. Consider using ground penetrating radar and other noninvasive measures to assist in locating resources. If a comprehensive survey for the entire Island is not possible, complete archeological investigations for proposed projects in advance of any other work on the project, including demolition. In compliance with the National Historic Preservation Act, and in consultation with the NPS Midwest Archeological Center, undertake archeological investigations for all projects, as appropriate to their scale, impacts, and extent of ground disturbance.

Devils Island Reservation Preferred Treatment Alternative



SITE IMAGE DI-70

UNITED STATES DEPARTMENT OF THE INTERIOR

APOSTLE ISLANDS NATIONAL LAKESHORE

JUNE 2011

TITLE OF PROJECT

HISTORIC STRUCTURE REPORT, CULTURAL LANDSCAPE REPORT & ENVIRONMENTAL ASSESSMENT TREATMENT ALTERNATIVES

TITLE OF DRAWING

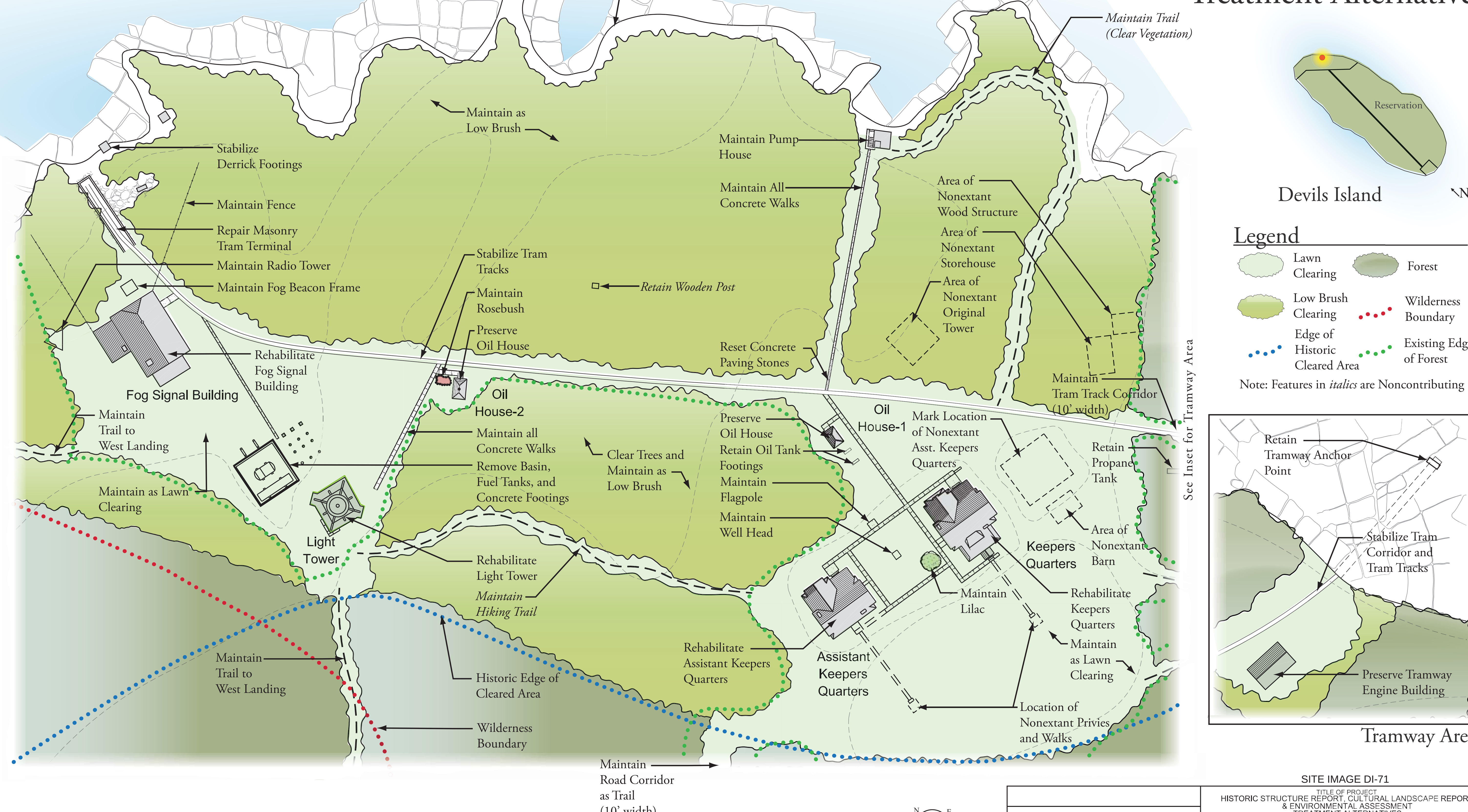
DEVILS ISLAND

NAME OF PARK

APOSTLE ISLANDS NATIONAL LAKESHORE

REGION	COUNTY	STATE
MIDWEST	ASHLAND	WISCONSIN

Devils Island Preferred Treatment Alternative



SITE IMAGE DI-71

UNITED STATES DEPARTMENT OF THE INTERIOR APOSTLE ISLANDS NATIONAL LAKESHORE	TITLE OF PROJECT HISTORIC STRUCTURE REPORT, CULTURAL LANDSCAPE REPORT & ENVIRONMENTAL ASSESSMENT TREATMENT ALTERNATIVES TITLE OF DRAWING DEVILS ISLAND LIGHT STATION NAME OF PARK APOSTLE ISLANDS NATIONAL LAKESHORE
JUNE 2011	REGION: MIDWEST · COUNTY: ASHLAND · STATE: WISCONSIN

DEVILS ISLAND INTRODUCTION

The following sections commence the HSR for Devils Island. The disciplines of Architecture, Structural, Mechanical (HVAC and plumbing), Electrical and Environmental Engineering are addressed individually (refer to Volume I, Chapters 1 and 2 for more details on report organization and methodology). The Island's extant buildings include:

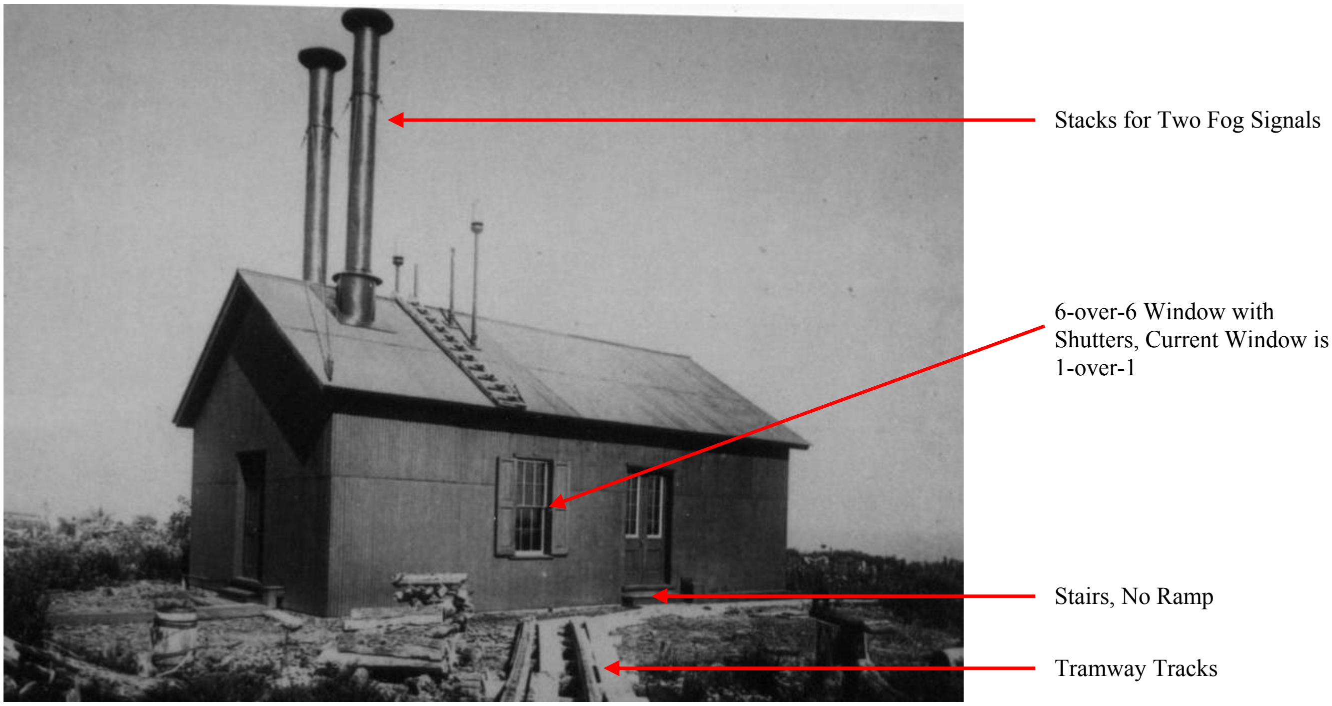
- Light Station Tower
- Keepers Quarters
- Assistant Keepers Quarters
- Fog Signal Building
- Oil House #1
- Oil House #2
- Tramway Engine Building
- Boathouse

The original construction of each building is discussed, followed by its specific history/chronology of alterations (determined by studying historic photos, historic drawings, examining park records and archives and on site investigations and observations by the Study Team).

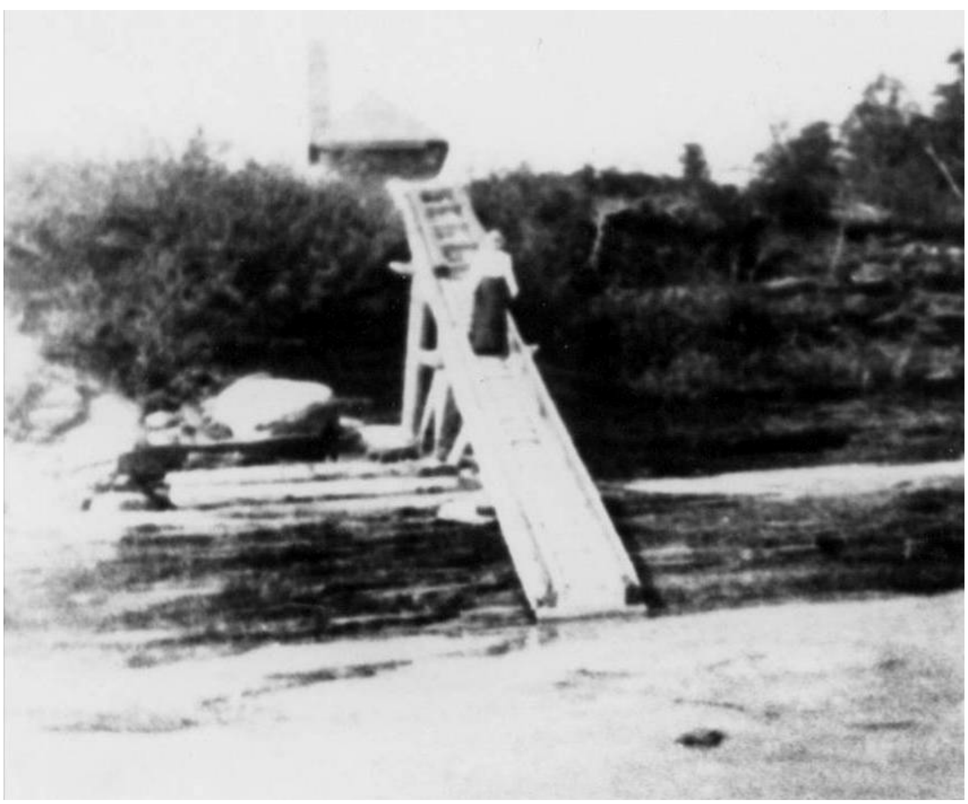
The Physical Description section describes the current conditions, by discipline and by component, as observed on site during the September 2009 site visit. Each component has been given a condition rating (as outlined in Volume I, Chapter 2: Methodology) in the Condition Assessment section. Treatment Recommendations are based on the preferred alternative of the May 2010 Value Analysis/CBA conducted at the park.

Historic Photographs

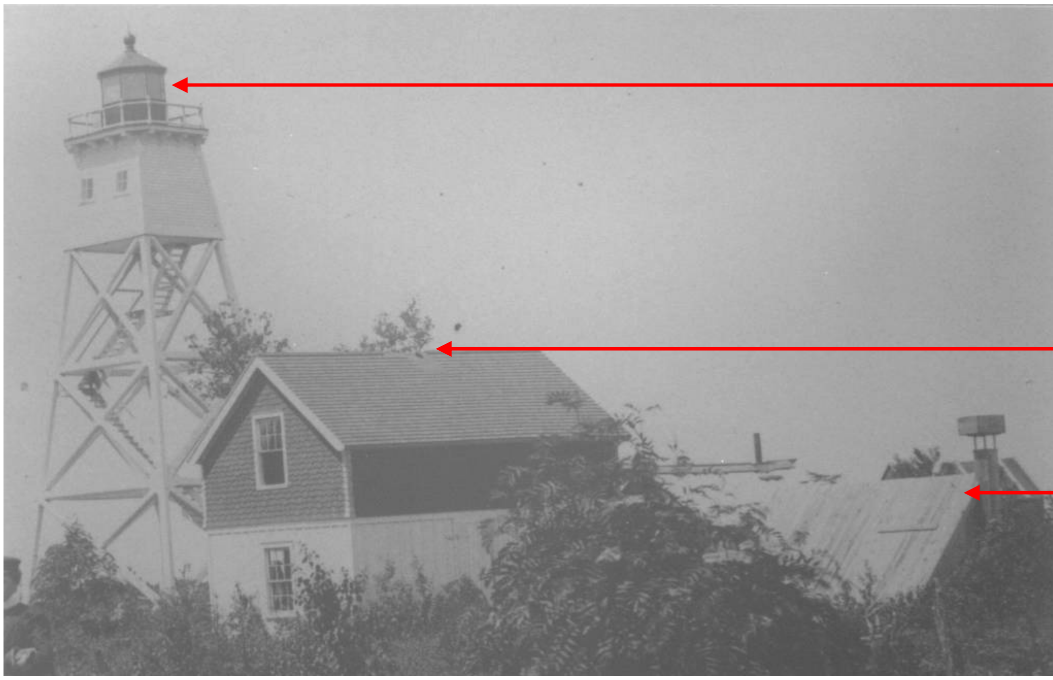
Historic Image DI-01: Keepers Quarters north and west elevations, 1893 (Source: NPS APIS Archives)



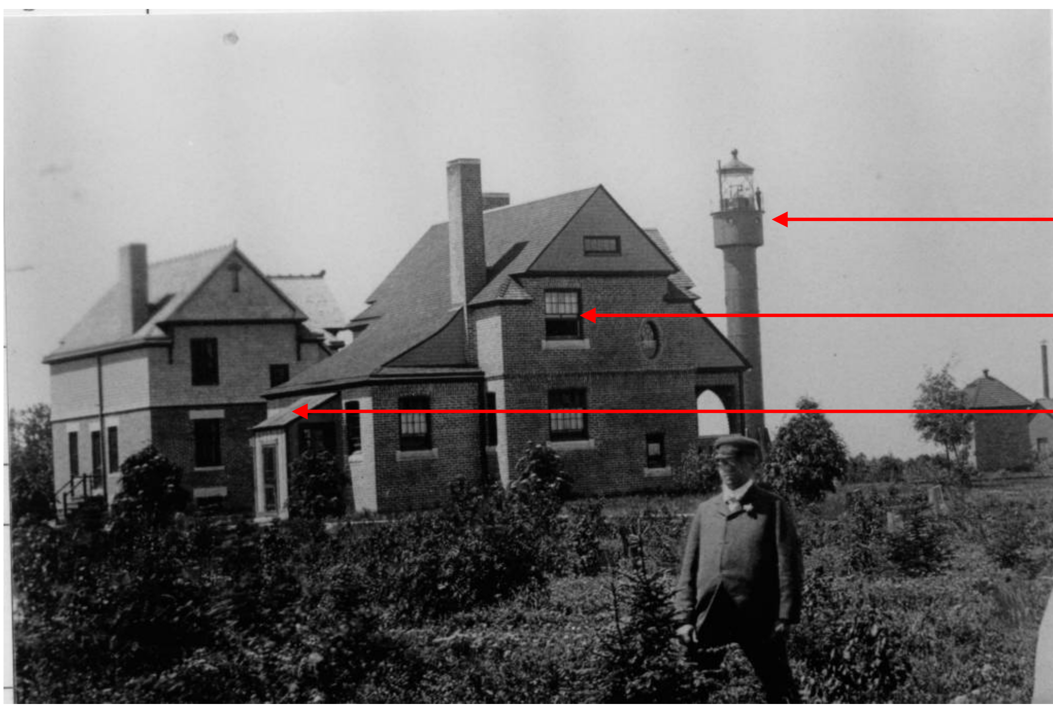
Historic Image DI-02: Fog Signal Building east elevation, 1893 (Source: NPS APIS Archives)



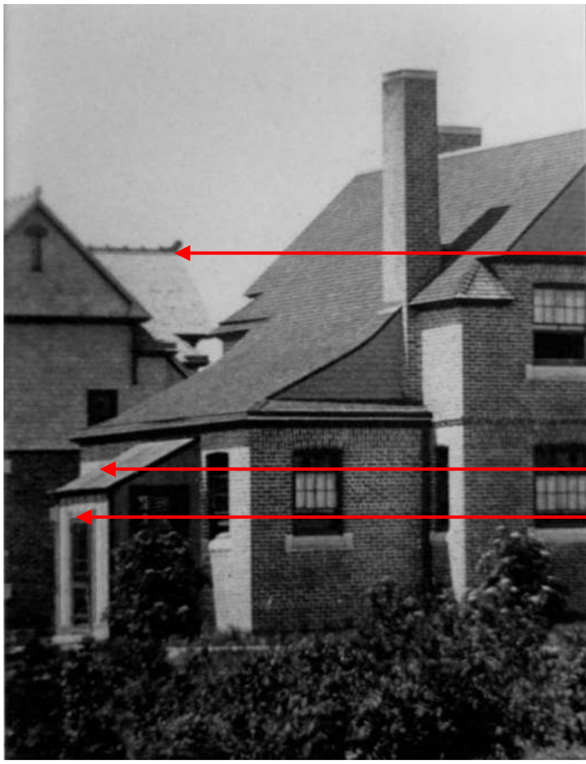
Historic Image DI-03: Tram ramp with Tramway Engine Building in background, unknown date (Source: NPS APIS Archives)



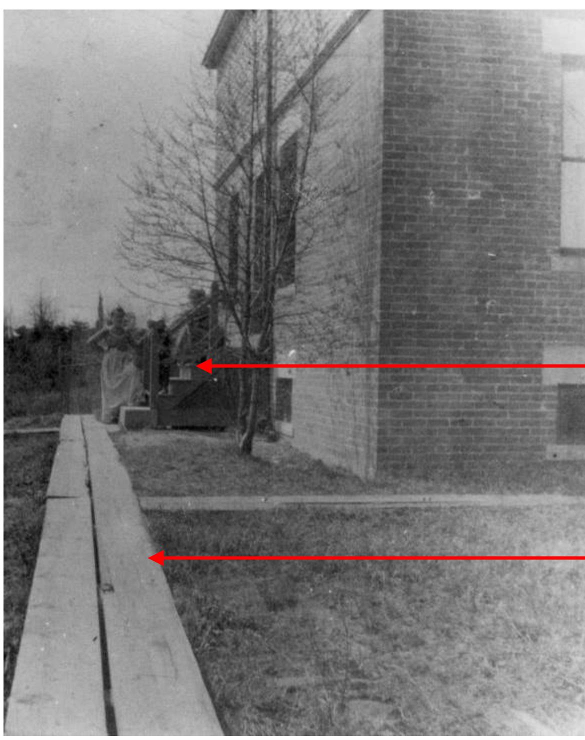
Historic Image DI-04: Temporary wood tower next to wood frame store house, 1901 (Source: NPS APIS Archives)



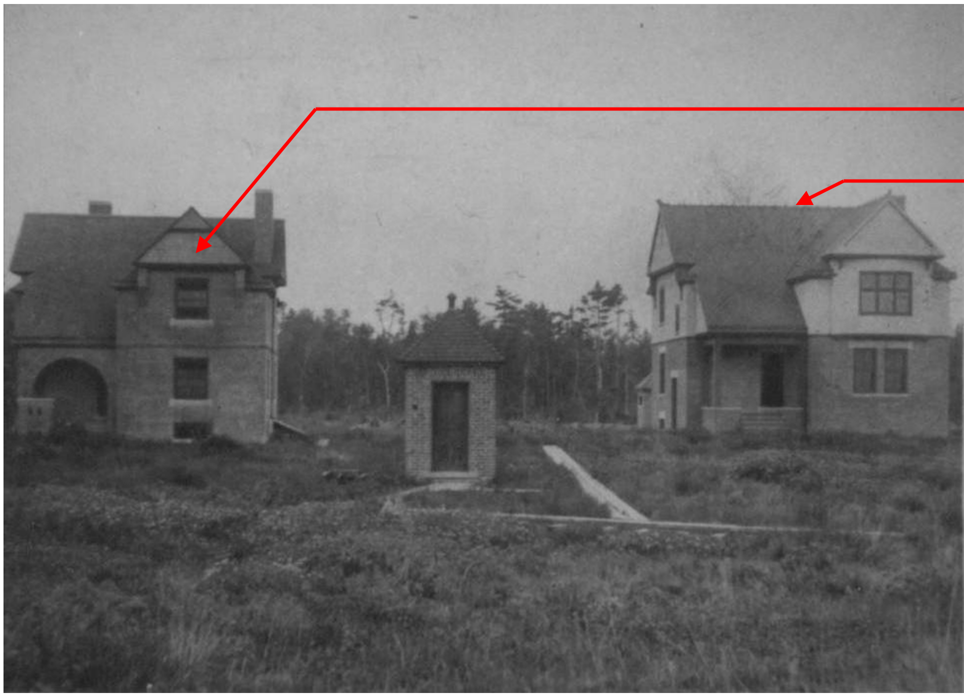
Historic Image DI-05: Keepers Quarters east elevation, c. 1901 (Source: NPS APIS Archives)



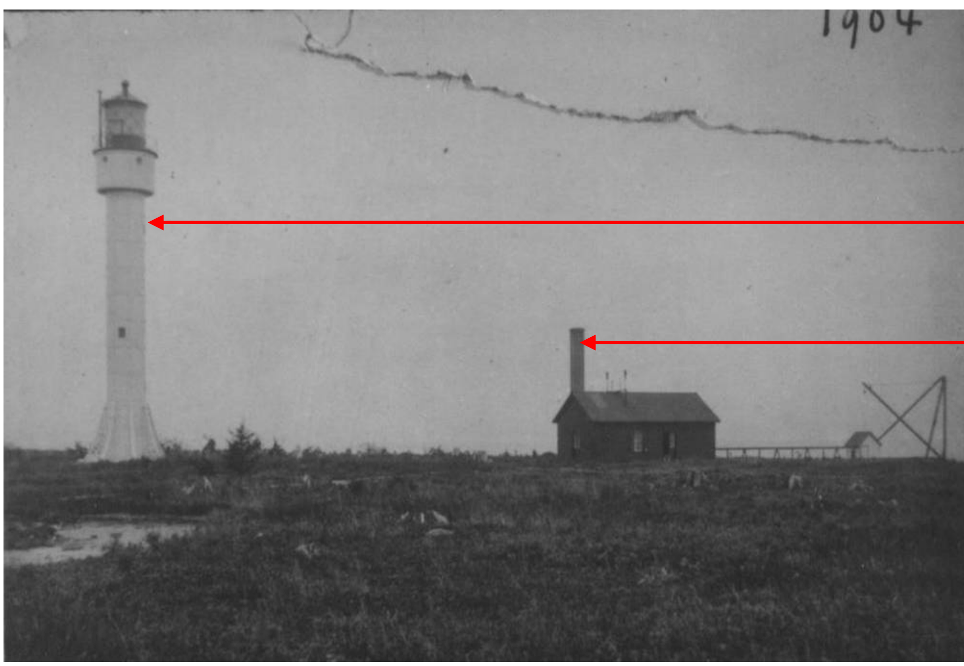
Historic Image DI-06: Close-up of Kitchen Entry of the Keepers Quarters, c. 1901 (Source: NPS APIS Archives)



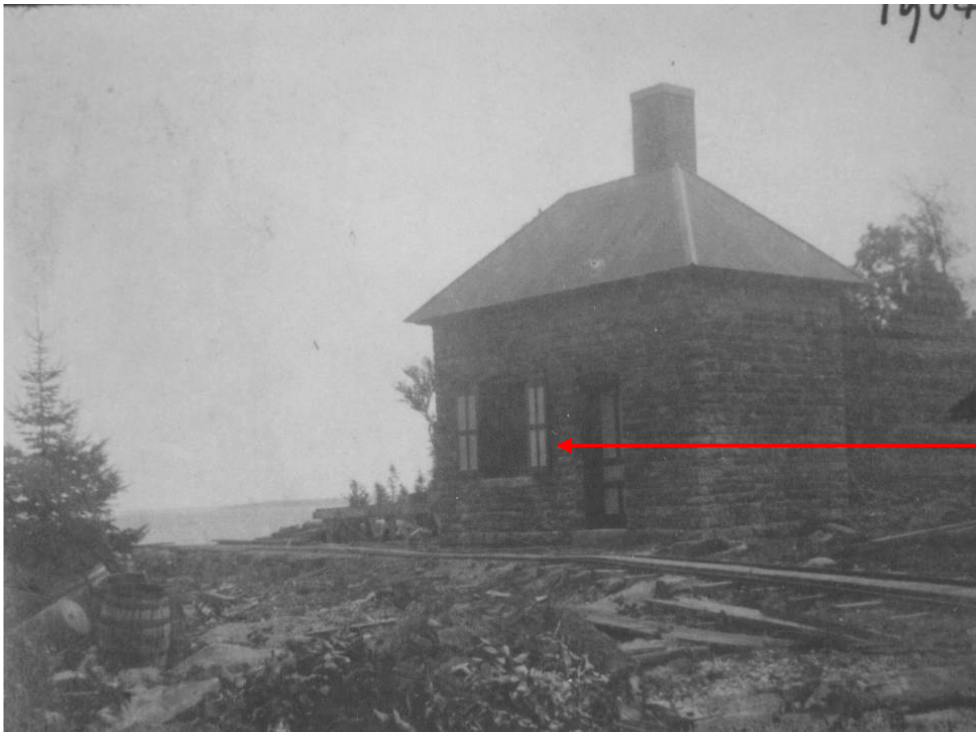
Historic Image DI-07: Wood walkways at quarters, c. 1908 (Source: NPS APIS Archives)



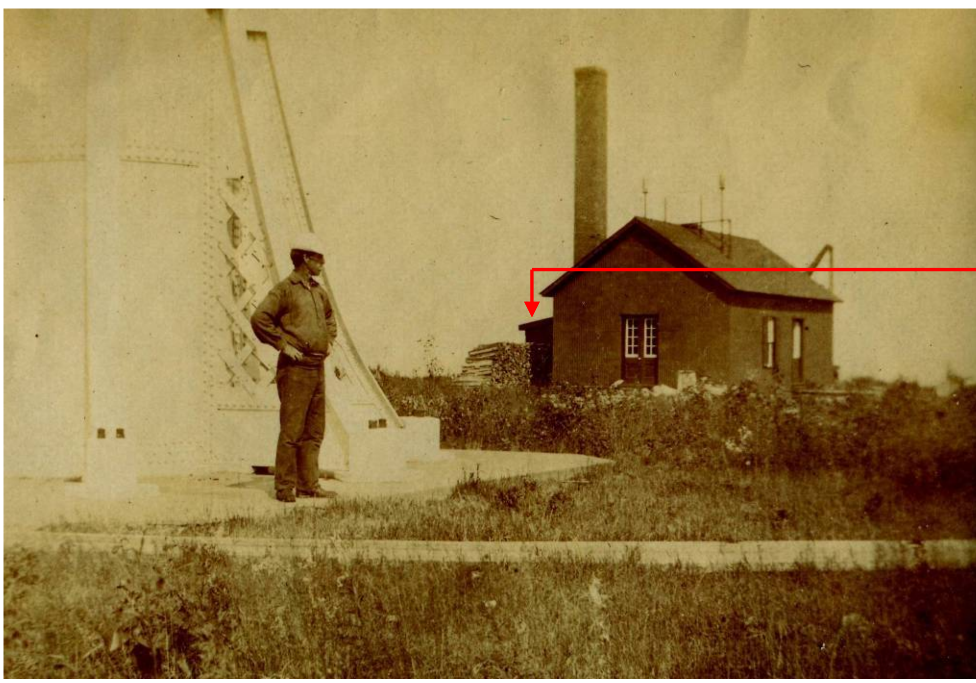
Historic Image DI-08: Oil House #1 north elevation, 1904 (Source: NPS APIS Archives)



Historic Image DI-09: Tower without steel supports looking northwest, 1904 (Source: NPS APIS Archives)



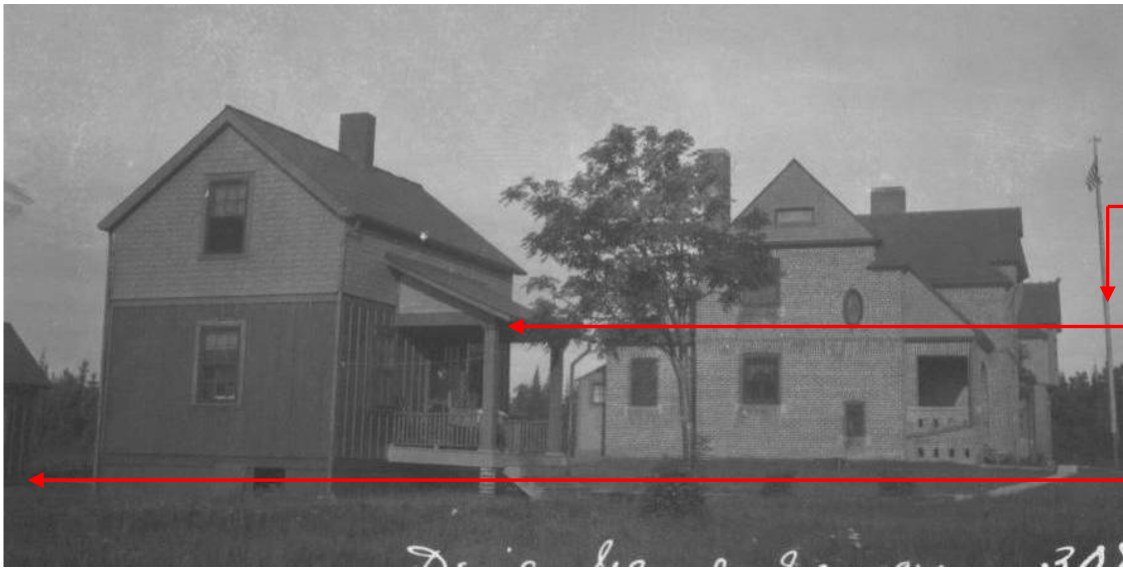
Historic Image DI-10: Tramway Engine Building north and west elevations, 1904 (Source: NPS APIS Archives)



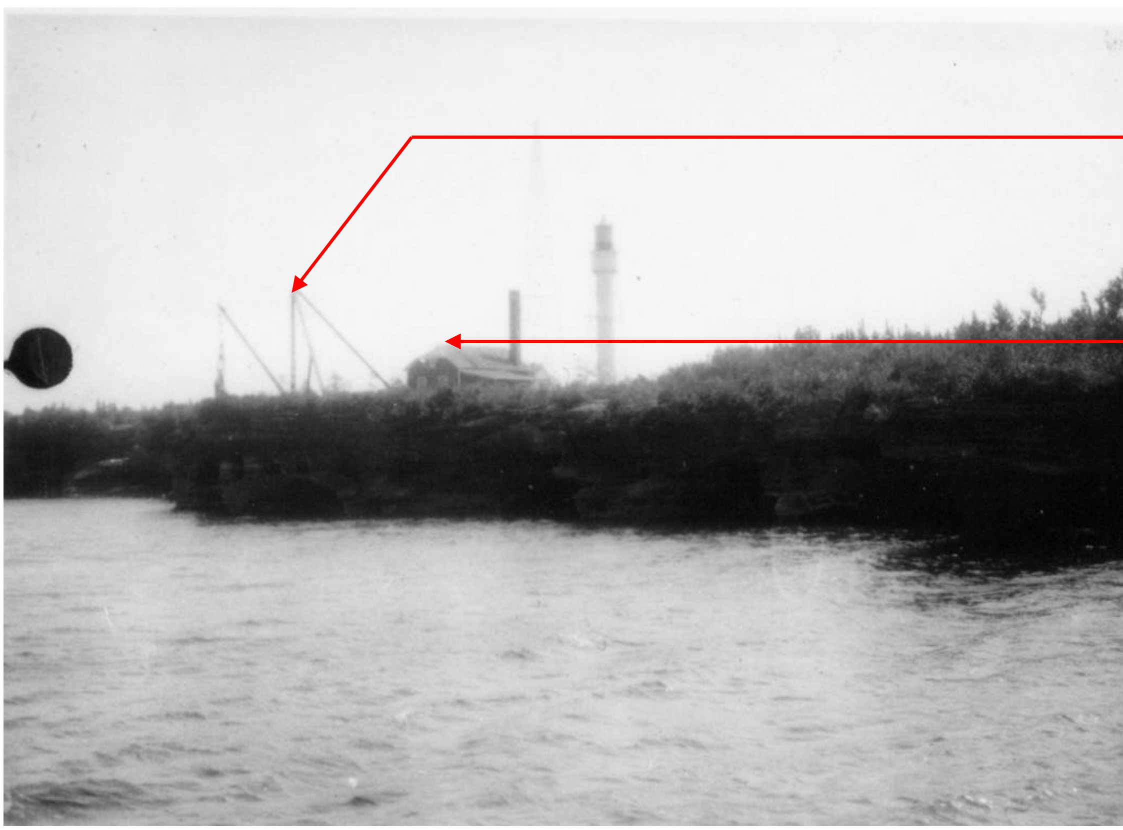
Historic Image DI-11: Fog Signal Building and L. Benton, looking north, 1905-1910 (Source: NPS APIS Archives, Lee Benton Collection)

Historic Image DI-12: Tram ramp, 1910 (Source: NPS APIS Archives)

Historic Image DI-13: Concrete walkways at quarters, 1916 (Source: NPS APIS Archives)

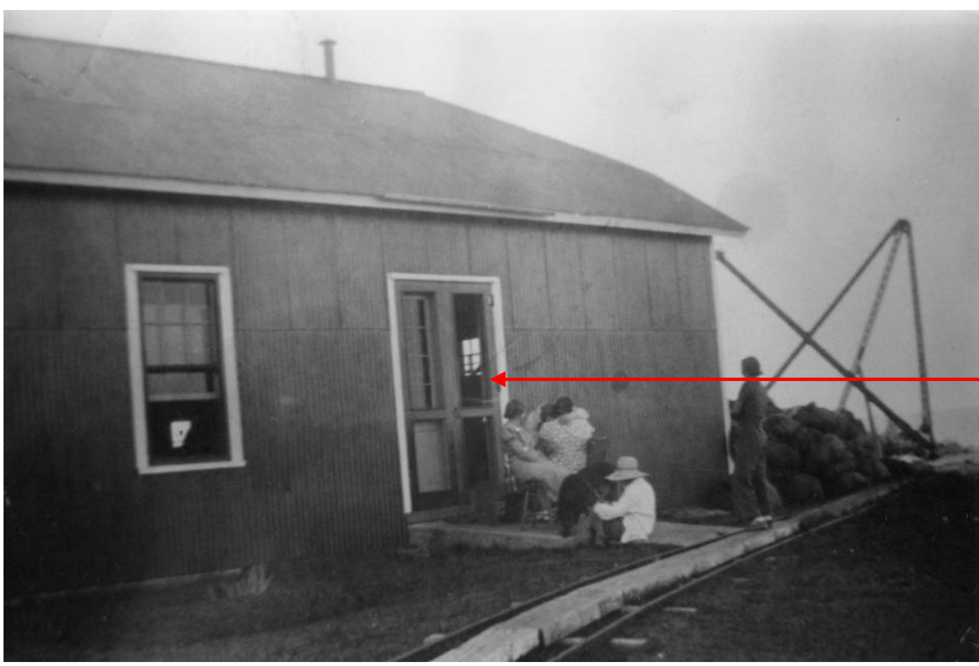


Historic Image DI-14: Second Assistant's Quarters and barn east of the Keepers Quarters, c. 1920 (Source: NPS APIS Archives)



Historic Image DI-15: Fog Signal Building and Tower, c. 1930 (Source: NPS APIS Archives)

Historic Image DI-16: Tram ramp, c. 1940 (Source: NPS APIS Archives)



Double Exterior
Door, Screen or
Glass

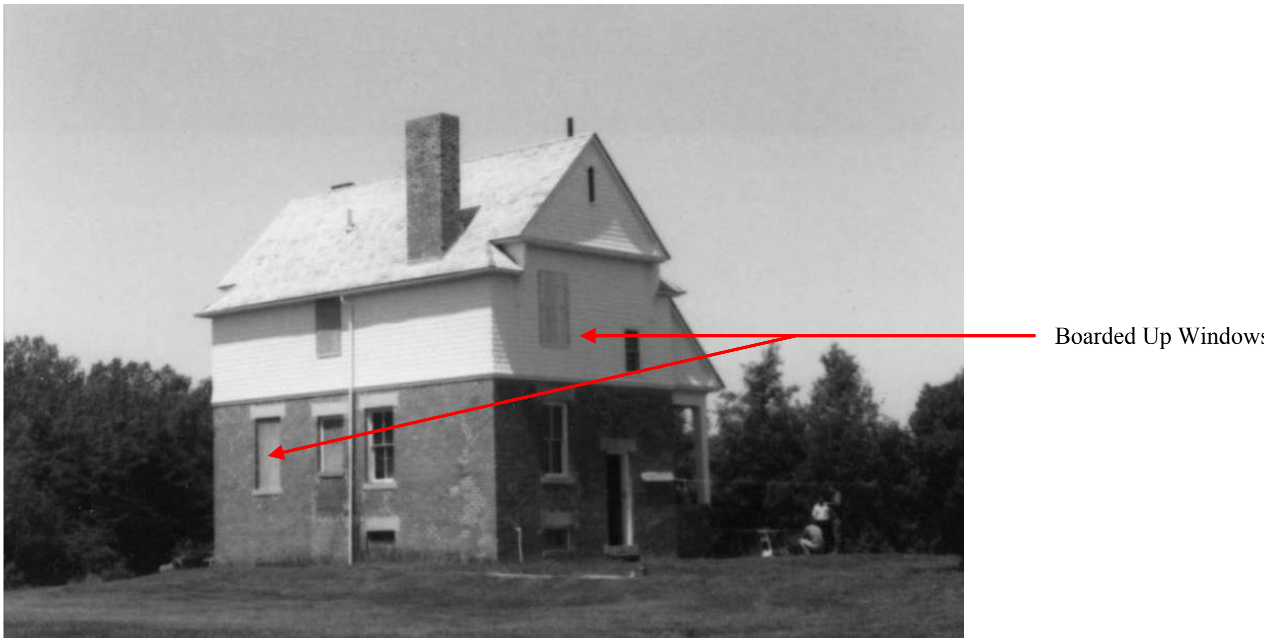
Historic Image DI-17: Fog Signal Building's east elevation entry door, c. 1940 (Source: NPS APIS Archives)

Historic Image DI-18: Tram cart, c. 1940 (Source: NPS APIS Archives)

Historic Image DI-19: The three quarters looking southeast, 1946 (Source: NPS APIS Archives)

Historic Image DI-20: Boathouse dock's cribbing, 1978 (Source: NPS APIS Archives)

Historic Image DI-21: Keepers Quarters east elevation, c. 1980 (Source: NPS APIS Archives)



Historic Image DI-22: Assistant Keepers Quarters looking northwest, 1980 (Source: NPS APIS Archives)

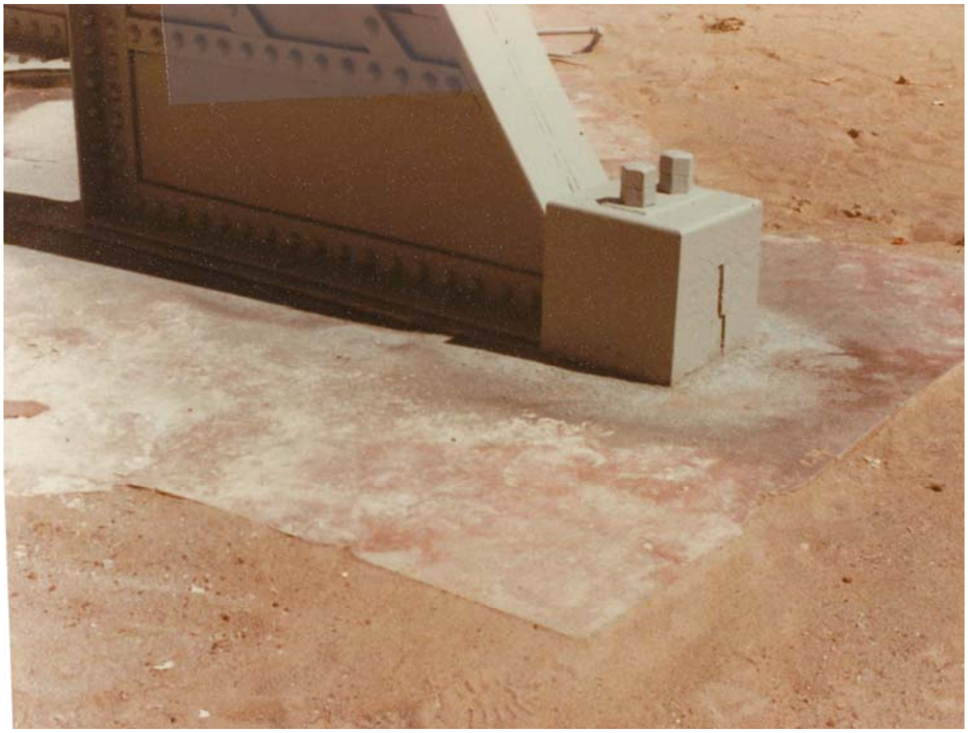
Historic Image DI-23: Devils Island Tower Foundation before repair work, 1978 (Source: NPS APIS Archives)

Historic Image DI-24: Devils Island Tower Foundation before repair work, 1978 (Source: NPS APIS Archives)

Historic Image DI-25: Devils Island Tower Foundation during repair work, 1978 (Source: NPS APIS Archives)

Historic Image DI-26: Devils Island Tower Foundation and Footings, 1978 (Source: NPS APIS Archives)

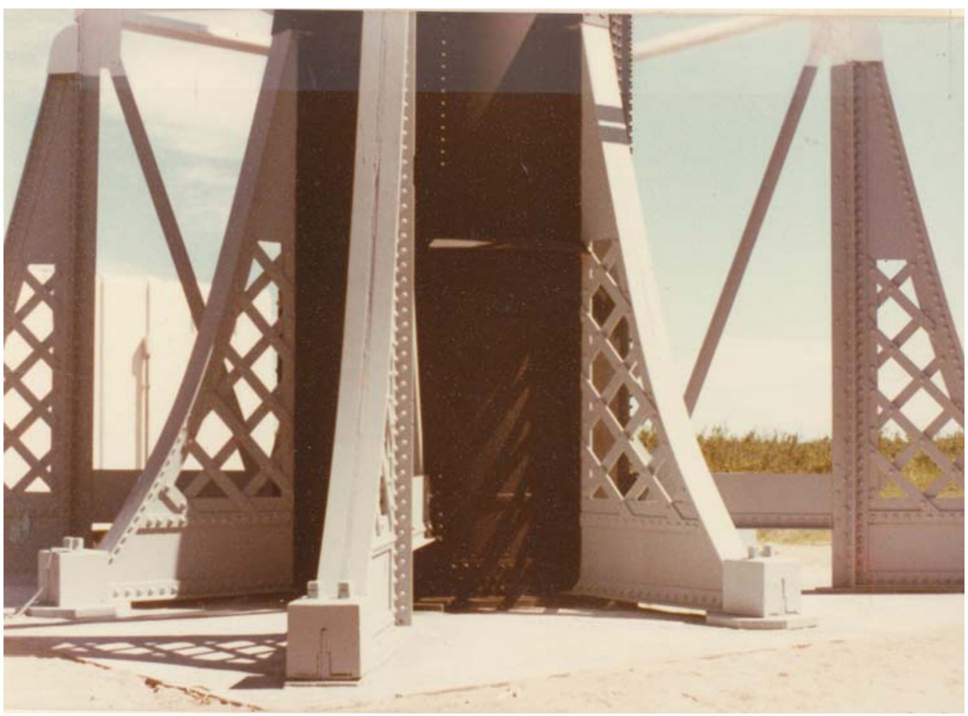
Historic Image DI-27: Devils Island Tower Foundation during repair work, 1978 (Source: NPS APIS Archives)



Historic Image DI-28: Devils Island Tower Foundation after repair work, 1978 (Source: NPS APIS Archives)

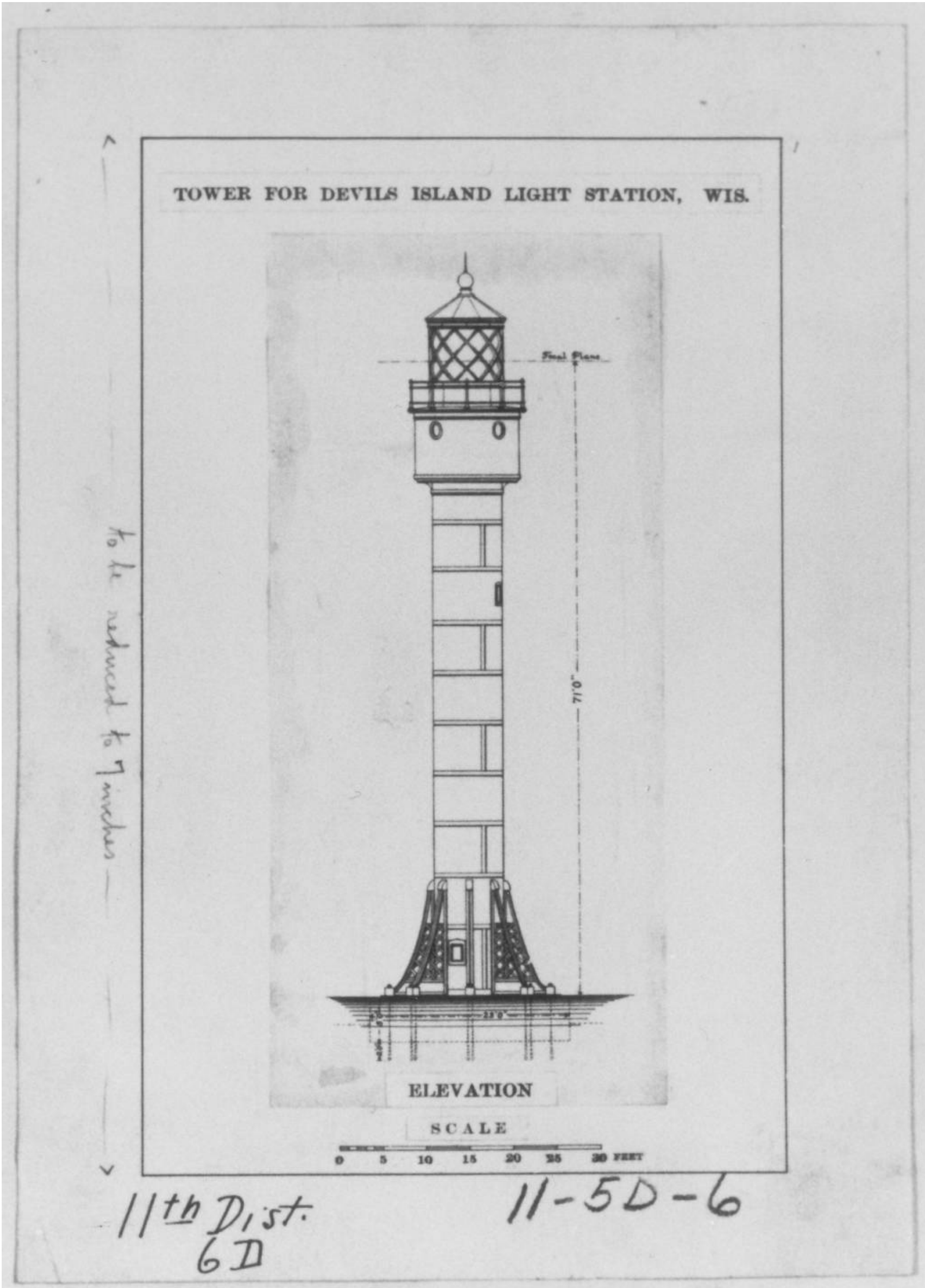
Historic Image DI-29: Devils Island Tower Foundation after repair work, 1978 (Source: NPS APIS Archives)

Historic Image DI-31: Devils Island Tower before painting, 1978 (Source: NPS APIS Archives)

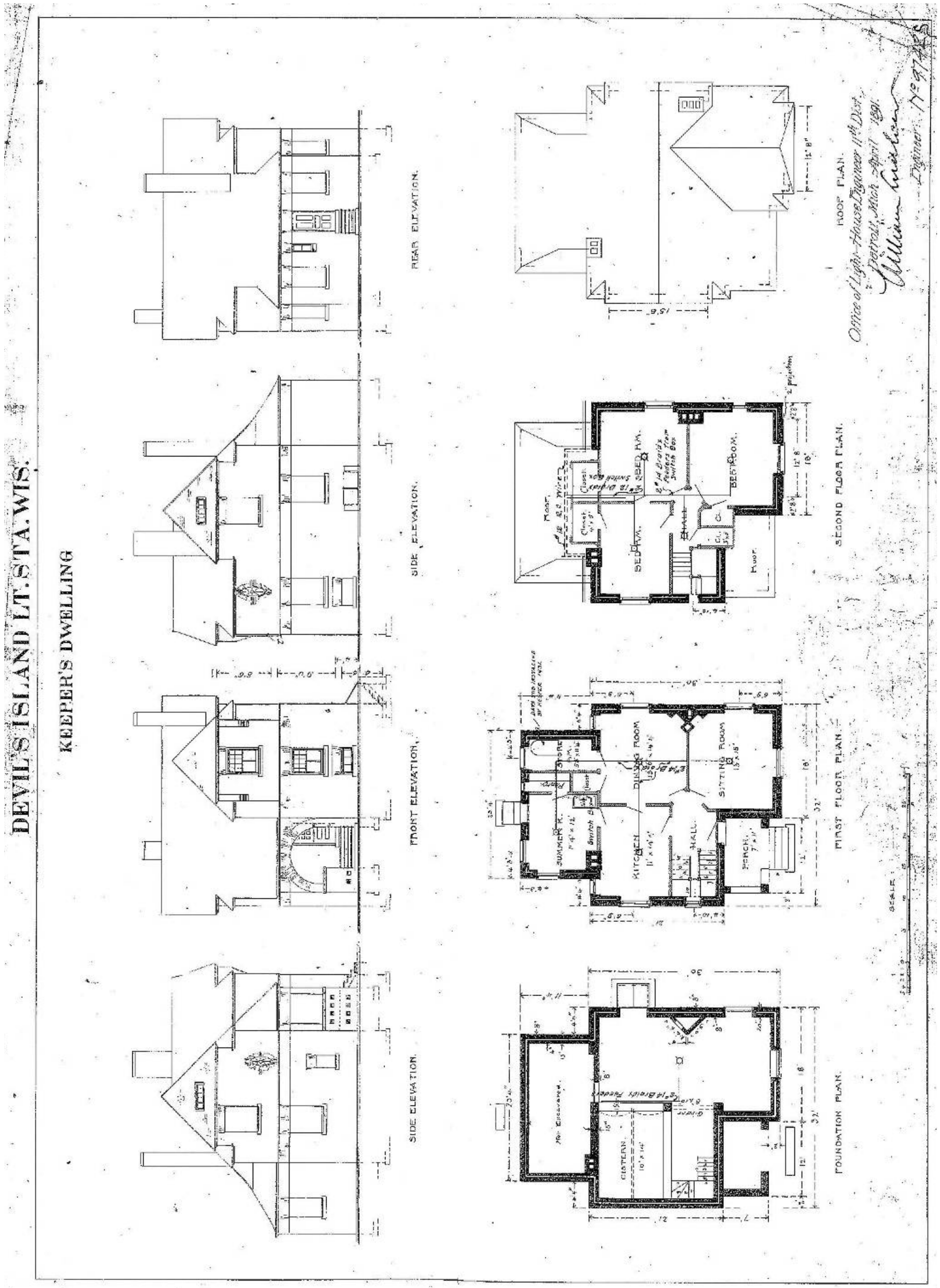


Historic Image DI-30: Devils Island Tower Foundation after repair work and painting, 1978 (Source: NPS APIS Archives)

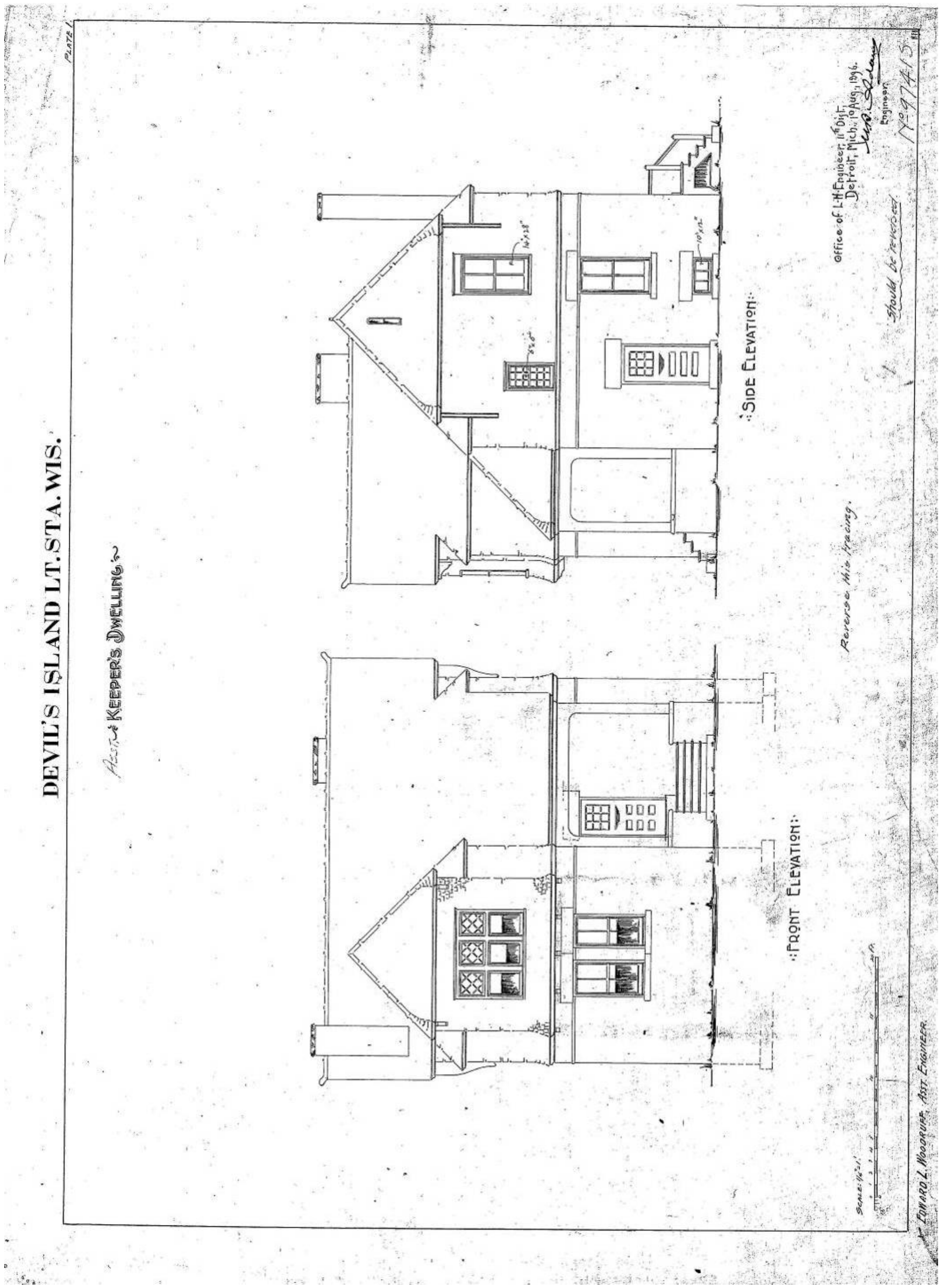
Historic Drawings



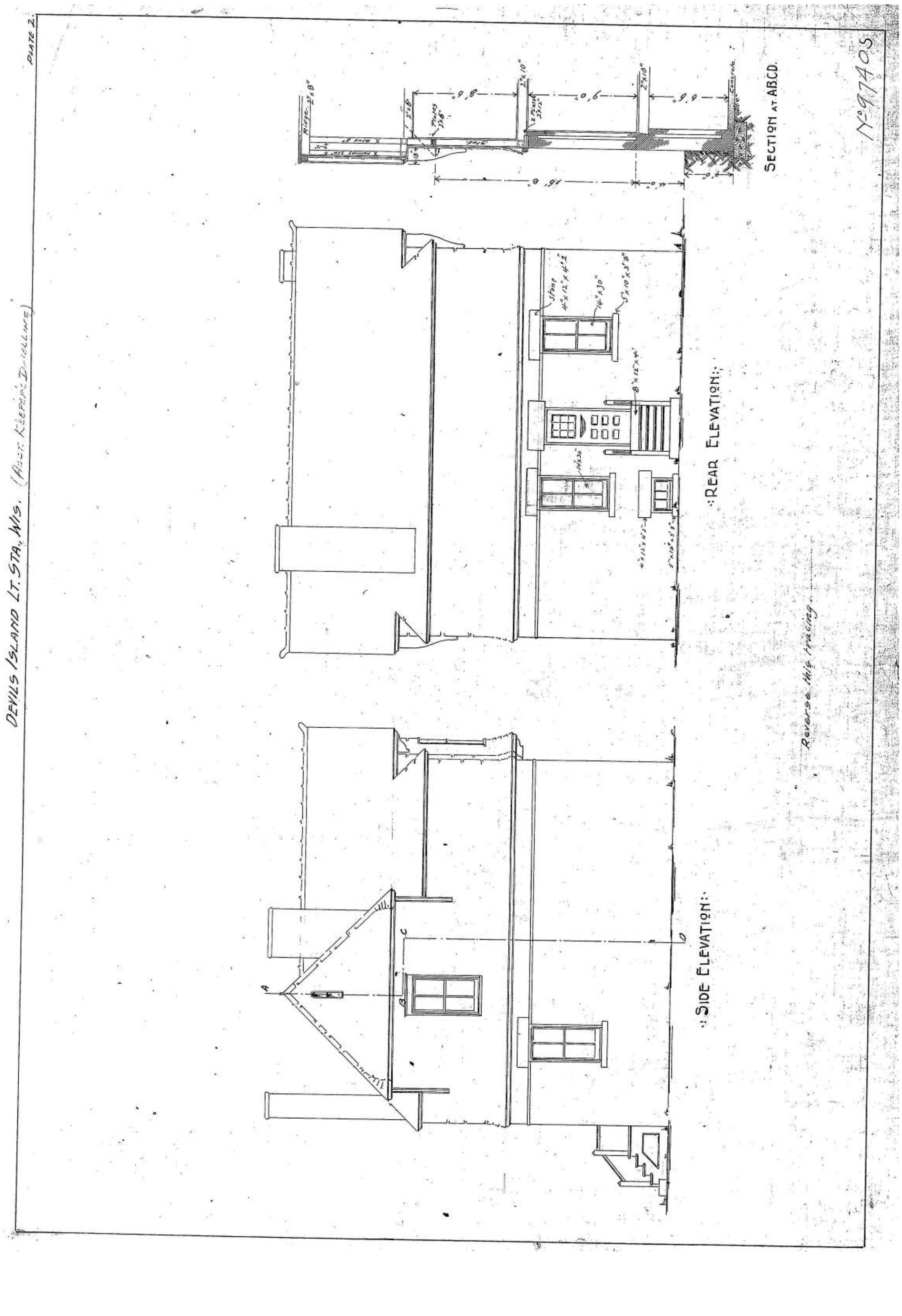
Historic Drawing DI-01: Unknown (pre-1915), Tower without structural bracing



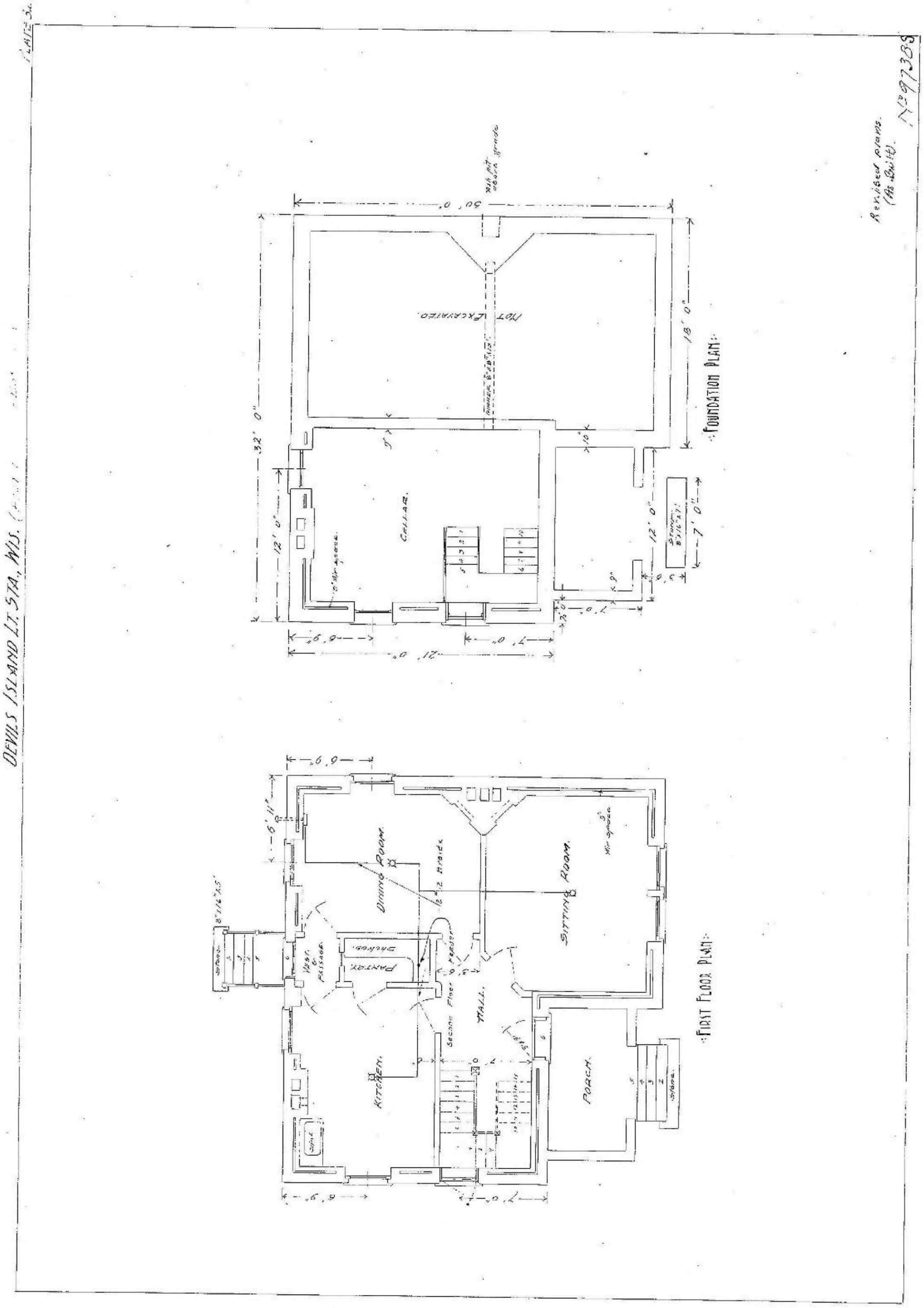
Historic Drawing DI-02: 1891 original construction drawings for the Keepers Quarters



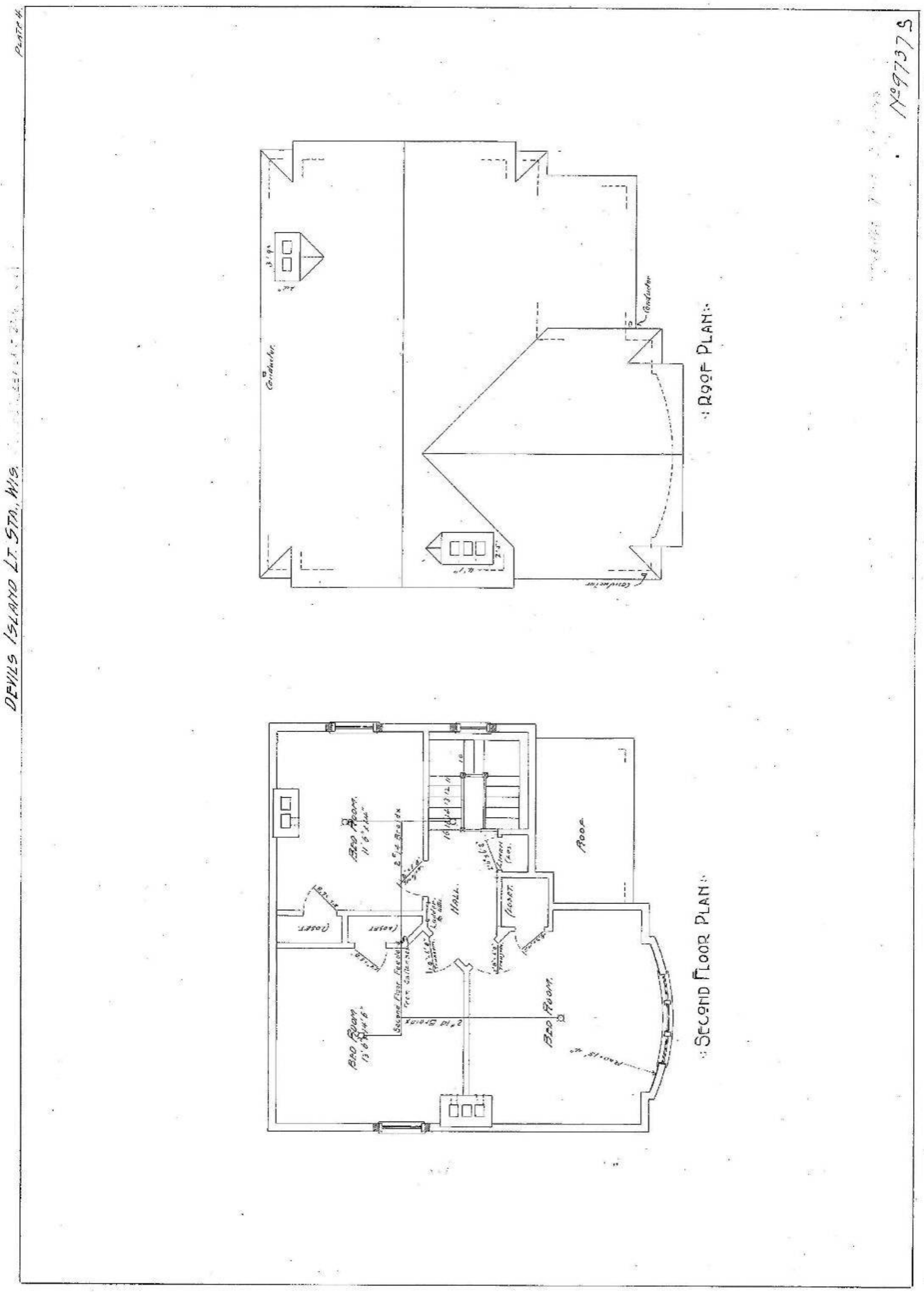
Historic Drawing DI-03: 1896 original front and side elevations for the Assistant Keepers Quarters (Note notation: "Reverse this tracing." actual Assistant Keepers Quarters is a mirror image of these elevations.)



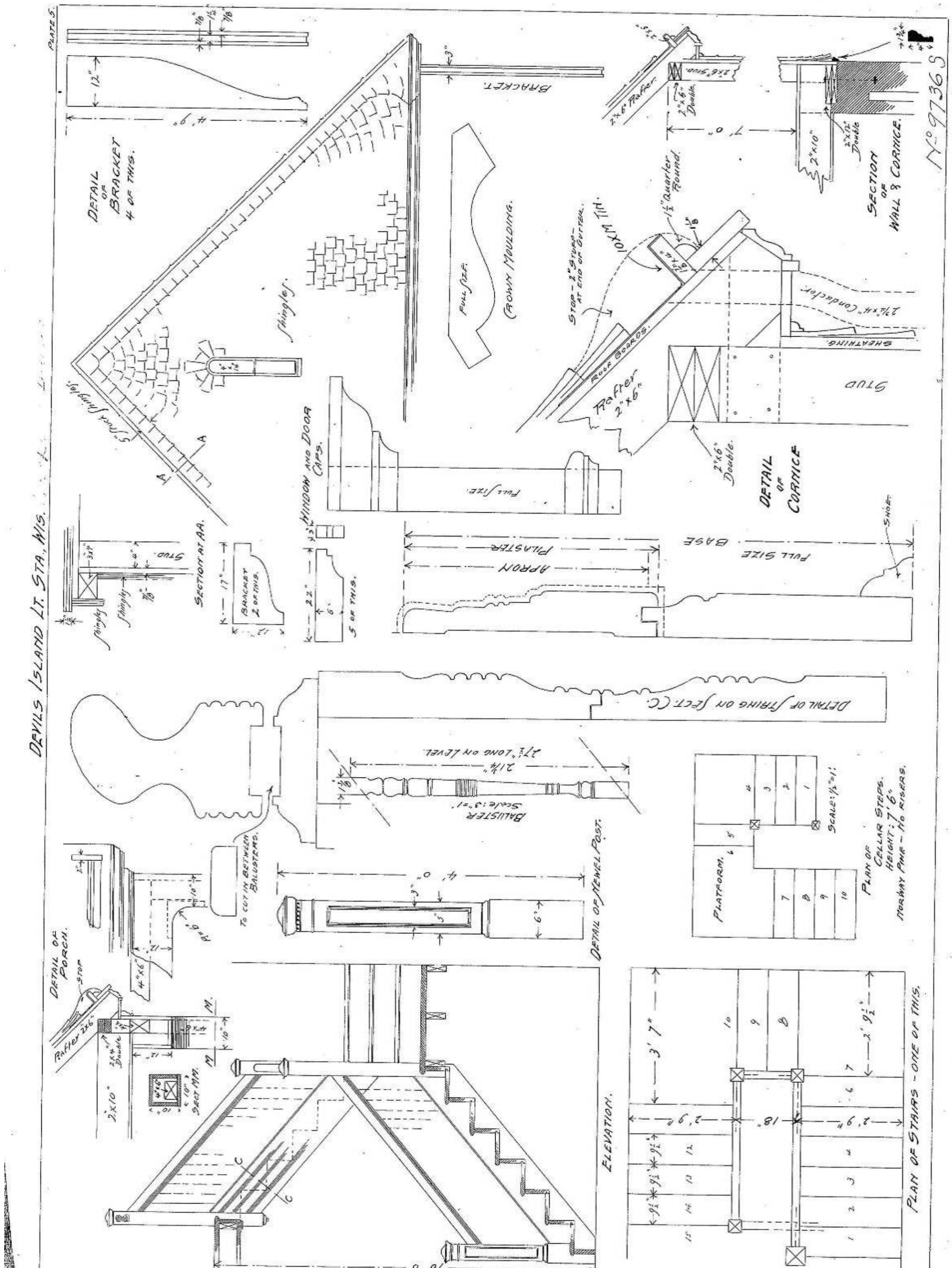
Historic Drawing DI-04: 1896 original rear and side elevations for the Assistant Keepers Quarters (Note: mirror image of the actual)



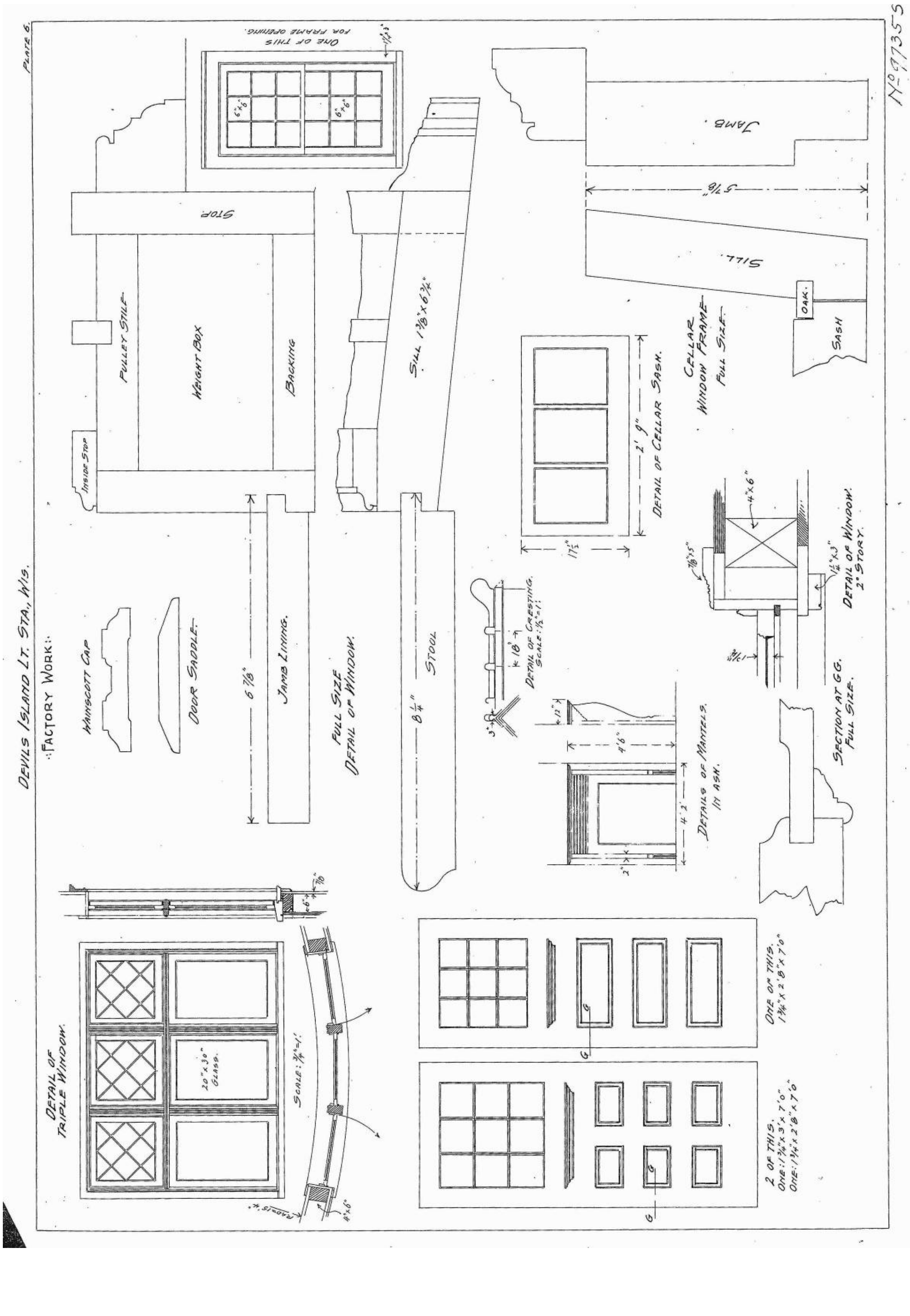
Historic Drawing DI-05: 1896 original first floor and foundation plans for the Assistant Keepers Quarters with revisions from an unknown date



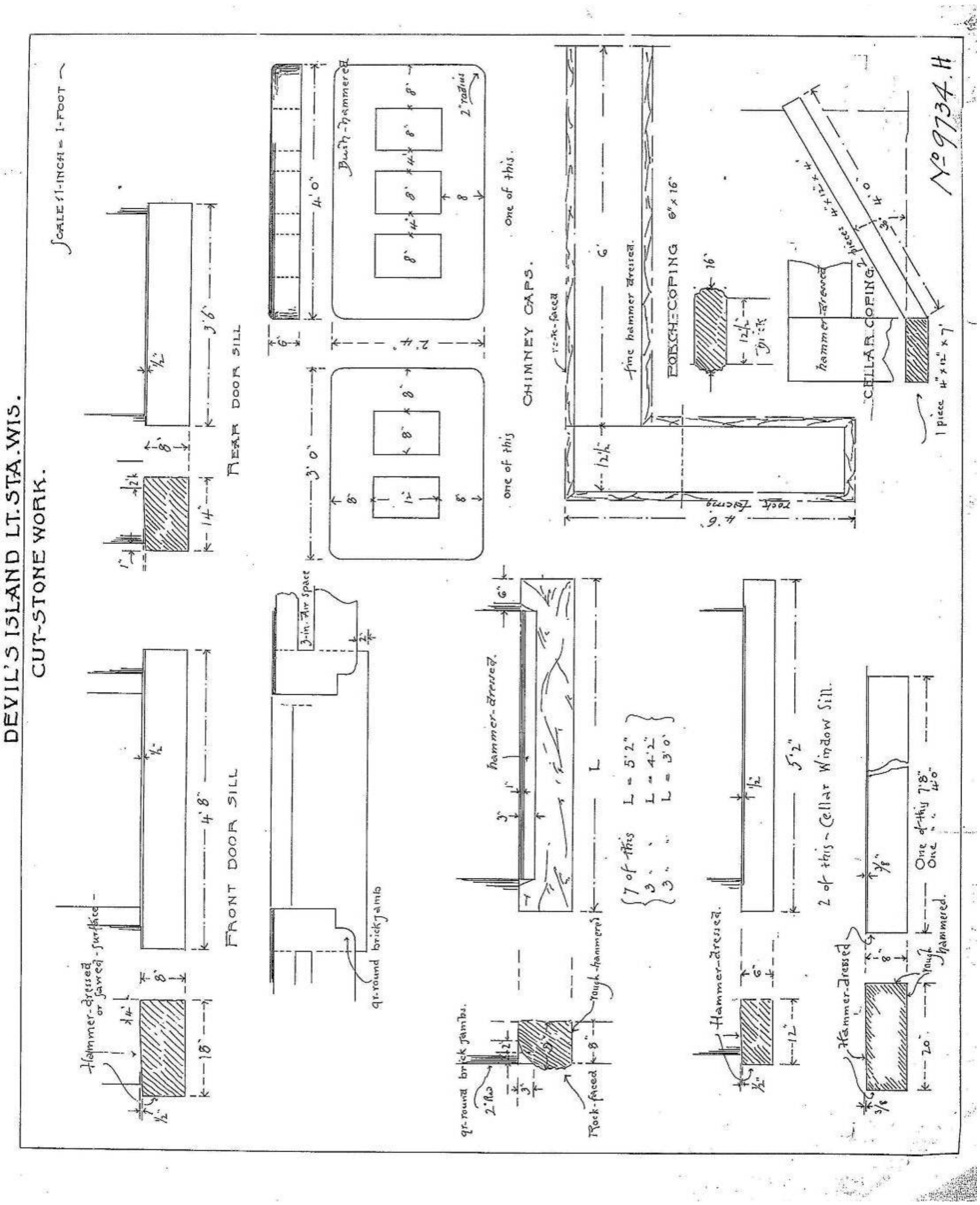
Historic Drawing DI-06: 1896 original second floor and roof plans for the Assistant Keepers Quarters



Historic Drawing DI-07: Details for the Assistant Keepers Quarters drawn in 1896



Historic Drawing DI-08: Details for the Assistant Keepers Quarters drawn in 1896



Historic Drawing DI-09: Stone work details for the Assistant Keepers Quarters drawn in 1896

DEVILS ISLAND LT. STA. WIS.

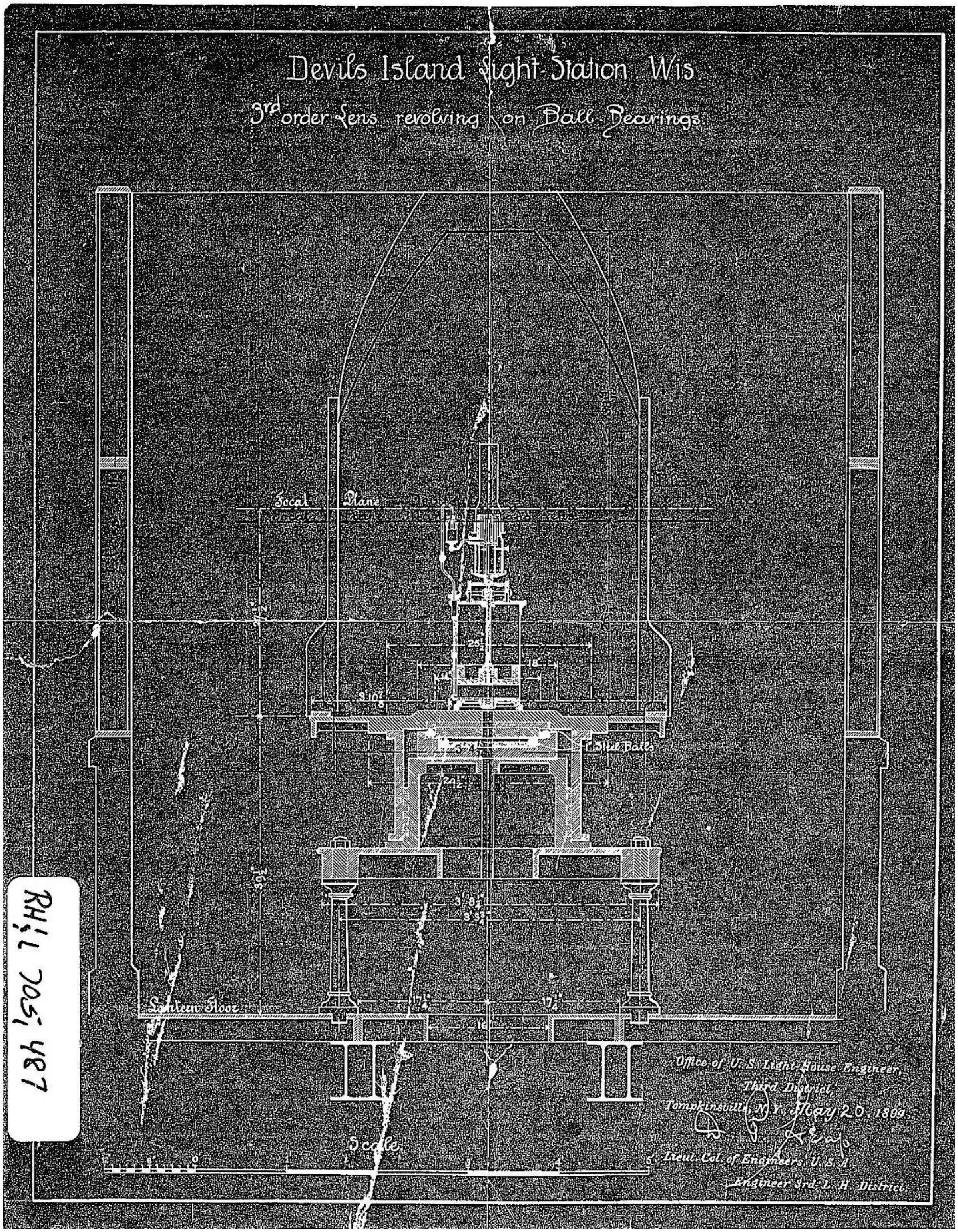
3º ORDER LANTERN.
STURGEON BAY CANAL LT. STA., WIS.

NAME OF PARTS.	Nº OF PIECES.	MARKS	Nº OF BOX.	WEIGHT.	REMARKS.
Parapet Plates, plain.	4	Ⓢ 2-4-6-8		1040	
" " ventilator.	3	3-5-7-Ⓢ		870	
" " small.	2	1-9-Ⓢ		370	Hinges attached to one of these.
Bolts to connect plates.	44		1	10	
Lining for parapet plates.	9	1-to 9 Ⓢ	3	347	
Battens " " "	10	1-to 10 Ⓢ	3	12	
Ro. Head Iron Screws for do.	82		1	2	
Brass Valves (complete.)	5	1-to 5 Ⓢ	1	75	Brass nuts att. to parapet plates.
C.S.K. Brass Screws for do.	30		1	1	
Washboard plates.	9	1-to 9 Ⓢ	3	171	42 in box. Bal. " plates.
C.S.K. Iron screws for do.	108		1	2	
Door sill.	1	Ⓢ Sill.	8	85	
" lintel	1	Ⓢ Lintel	5	35	
" Jambs.	2	Ⓢ Right Ⓢ Left	6	290	Hinges attached to left jamb.
Door, complete.	1	Ⓢ		345	Crated.
Half sash.	2	Ⓢ Right Ⓢ Left		180	Crated.
Sash.	16			1600	Crated.
Filing pieces.	17		5-6	510	
Bolts. Filing pcs. and sash to parapet and soffit.	102		1	25	
" Sash to sash.	52		1	10	
" " to Jambs.	16		1	3	
Soffit Plates.	9	1-to 9 Ⓢ		1026	
Lining for do.	9	1-to 9 Ⓢ	3	207	
Battens for do.	27		3	23	
Ro. Hd. screws for do.			1		
Hangers for Curtains.	14		2	10	
Ro. Hd. brass screws.			1		
Curtains.	14		9		
Roof plates. (Man hole.)	1	Ⓢ 1		298	
" " (Plain.)	8	Ⓢ 2-to 9		2366	
Zinc roof lining.	9	Ⓢ 1-to 9		72	Crated.
Battens for do.				10	
Ro. Hd. screws for do.			1	5	
Tin cone (complete)	1			60	Crated.
Spider ring.	1		7	27	

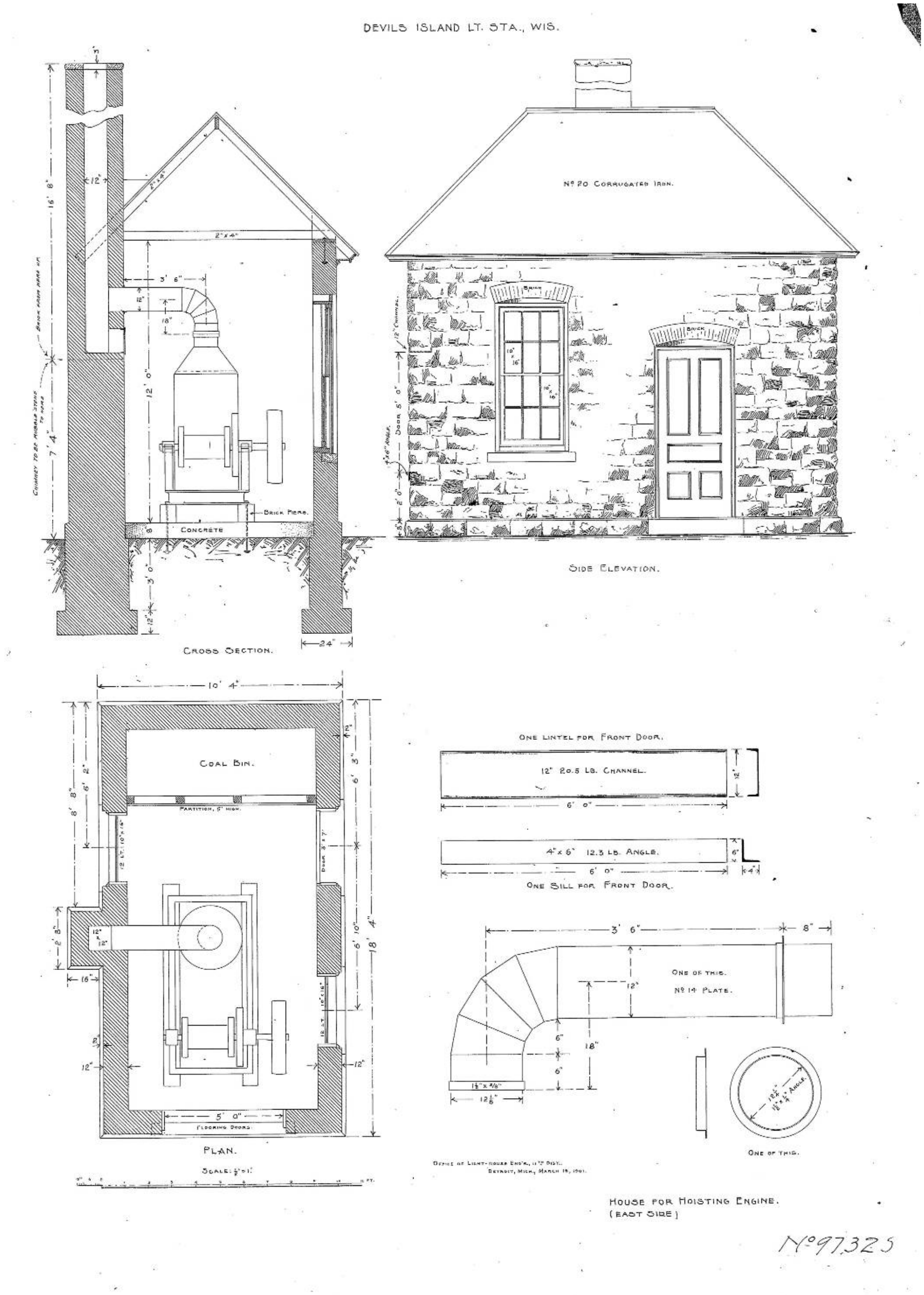
NAME OF PARTS.	Nº OF PIECES	MARKS.	Nº OF BOX.	WEIGHT.	REMARKS.
Lens bearings and screws	4			5	Attached to ring.
Pendant rods.	9		6	20	
Radial rods with jaws	9		6	65	
Ventilator moulding.	1			270	
" ball.	1			214	
Rosette.	1		7	29	
Beam for do.	1		6	16	
Collar bolt for do.	1		6	4	
Bolts to connect Roof plates.	81			20	in plates.
" " " roof to soffit.	36			10	" "
" " " " " Vent.	9			2	" "
Brass pinnacle.	1		6	12	
Railings	6		6	86	
Standards for do.	18		6	84	
C.S.K. Hd. Iron screws for rail.	18		1	1	
" " " " Door lintel.	4		1		
Rubber Gaskets.	8		9		
Hinge pins for Door.	3		1	5	
Roof manhole (complete.)	1		7	75	
Bolts (8) Brass washers (16)	24		1	2	
Handles for sash. O.S.	17		2		
Glass stops at Joints.	35		2		
" " - Parapet & soffit				363	Bolted to filing pcs.
" " on sash.					" " Sash.
H.H. Bolts for Glass stops 1/4"	800			35	Balance in sash
" " " " " 3/16"					in sash.
Glass △	8		10-11		
" ▽	9		10-11		Weights not
" △ ◁▷	3		10-11		given.
" ◇	24		10-11		
" Door.	2		10-11		
Ladder.	1			78	
		Total weight		11483	

Nº 9729.S

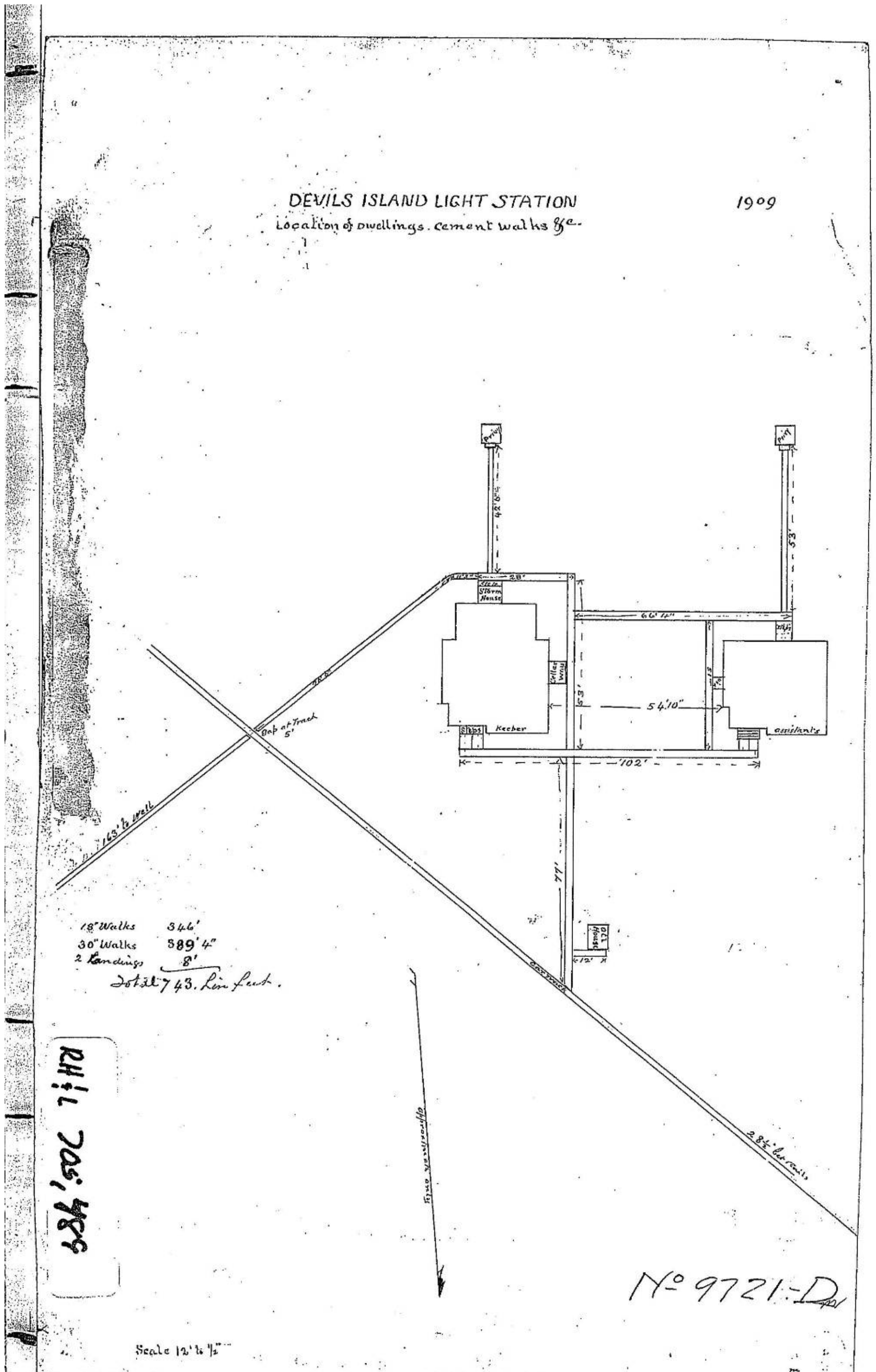
Historic Drawing DI-10: List of lantern parts, no date



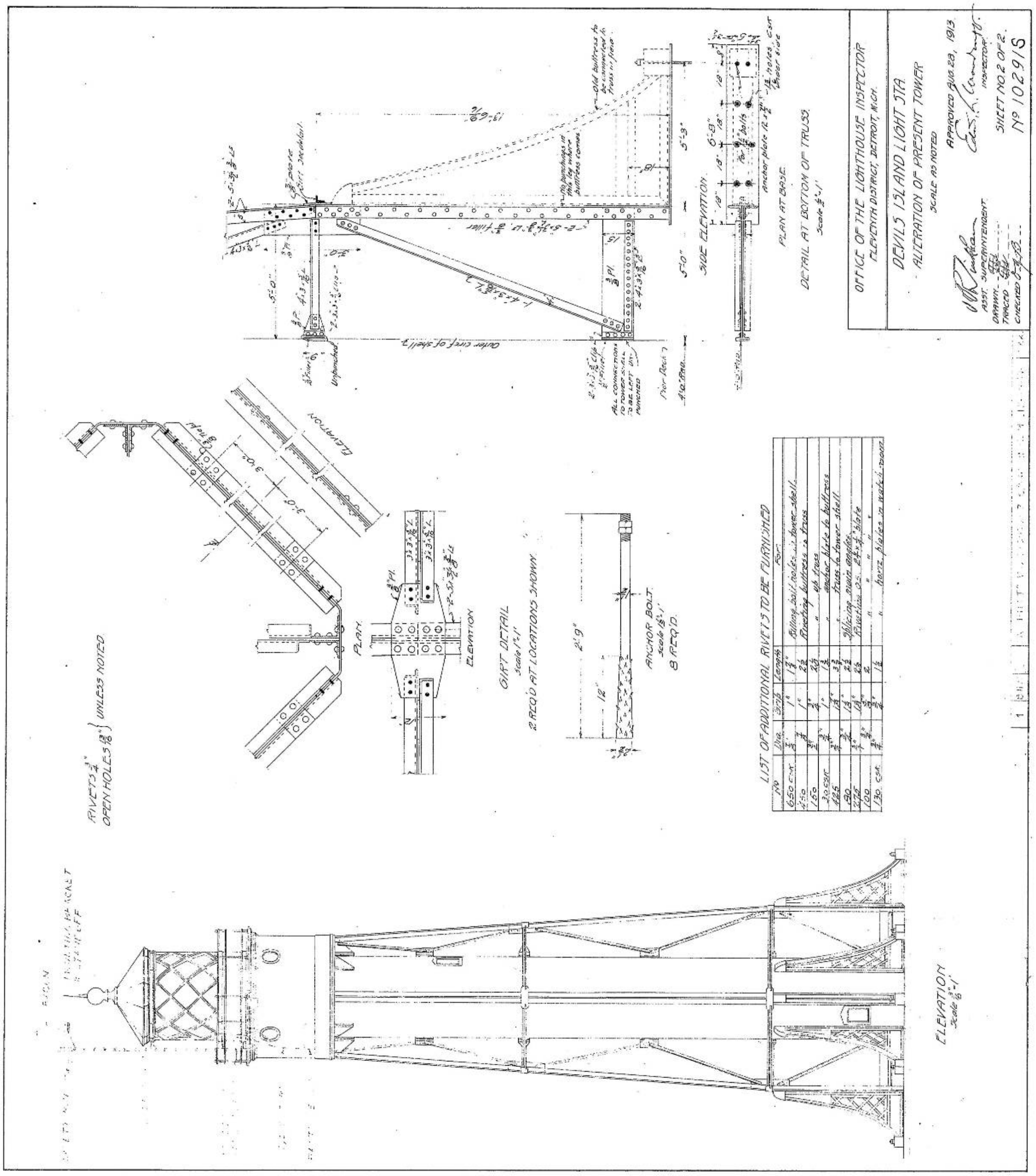
Historic Drawing DI-11: 1899 lens detail



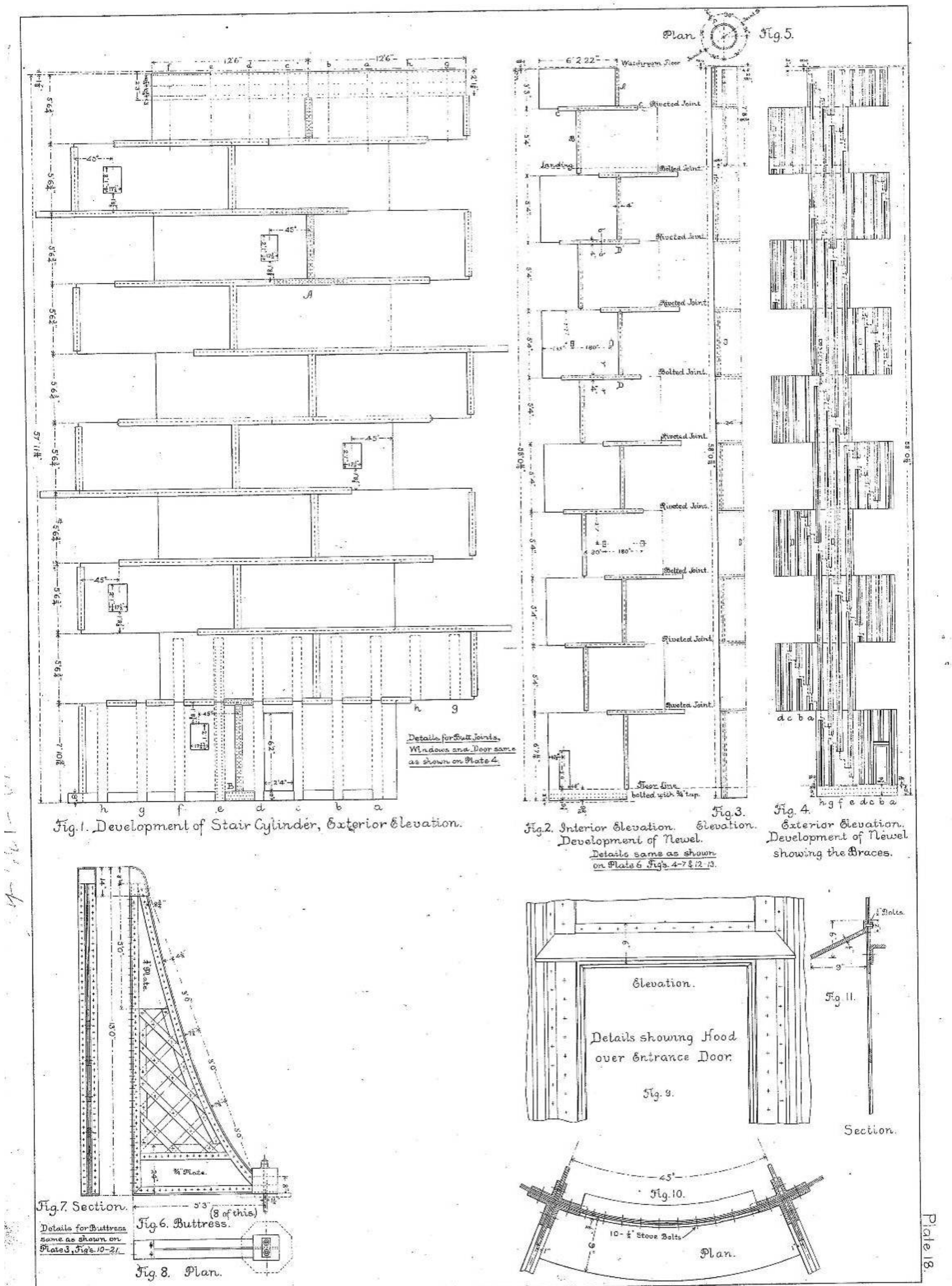
Historic Drawing DI-12: Tramway Engine Building Plans, 1901 (Note: 1901 is the date listed on drawing but the LCS lists the construction date as 1891)



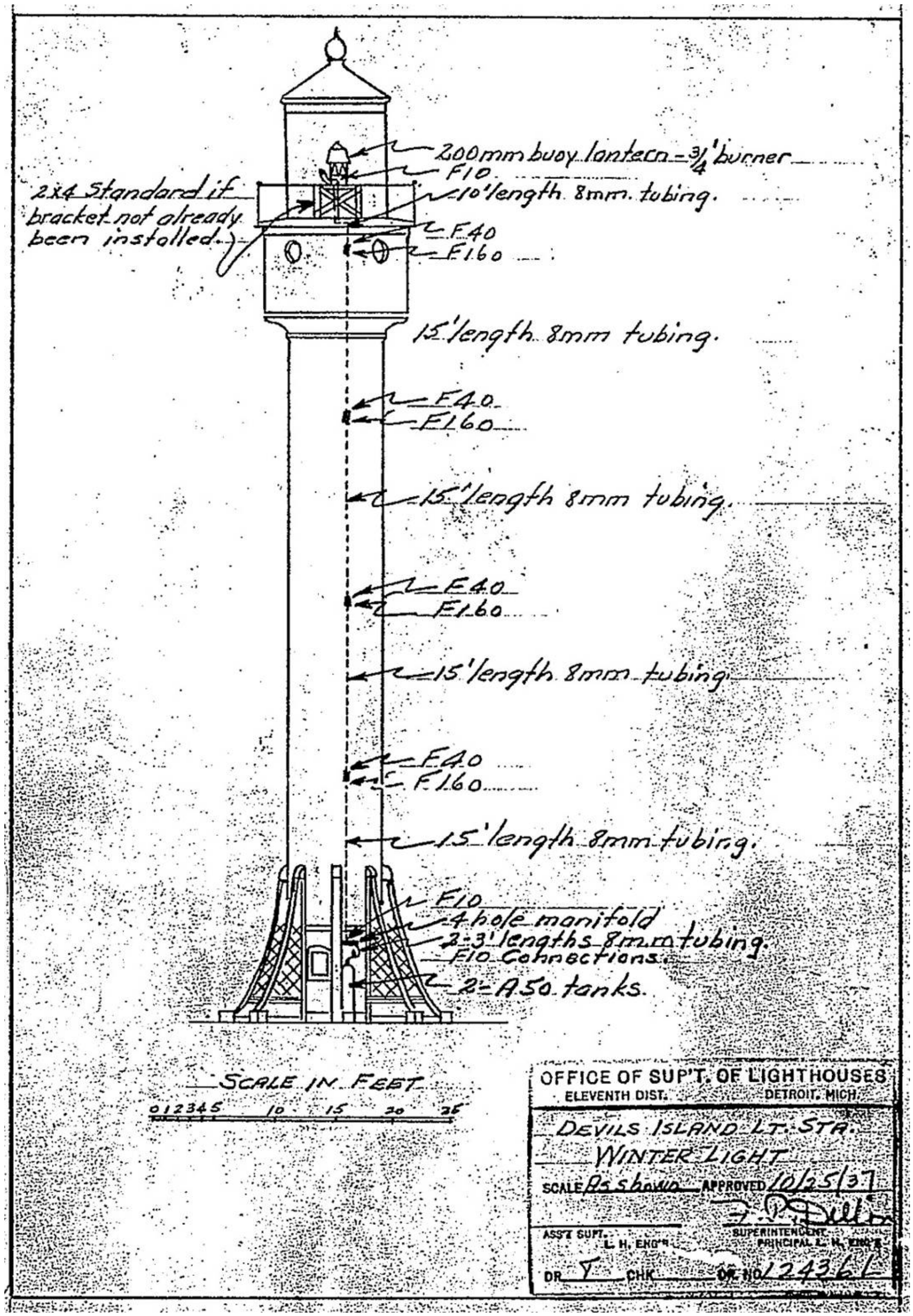
Historic Drawing DI-13: 1909 Site plan with concrete sidewalks



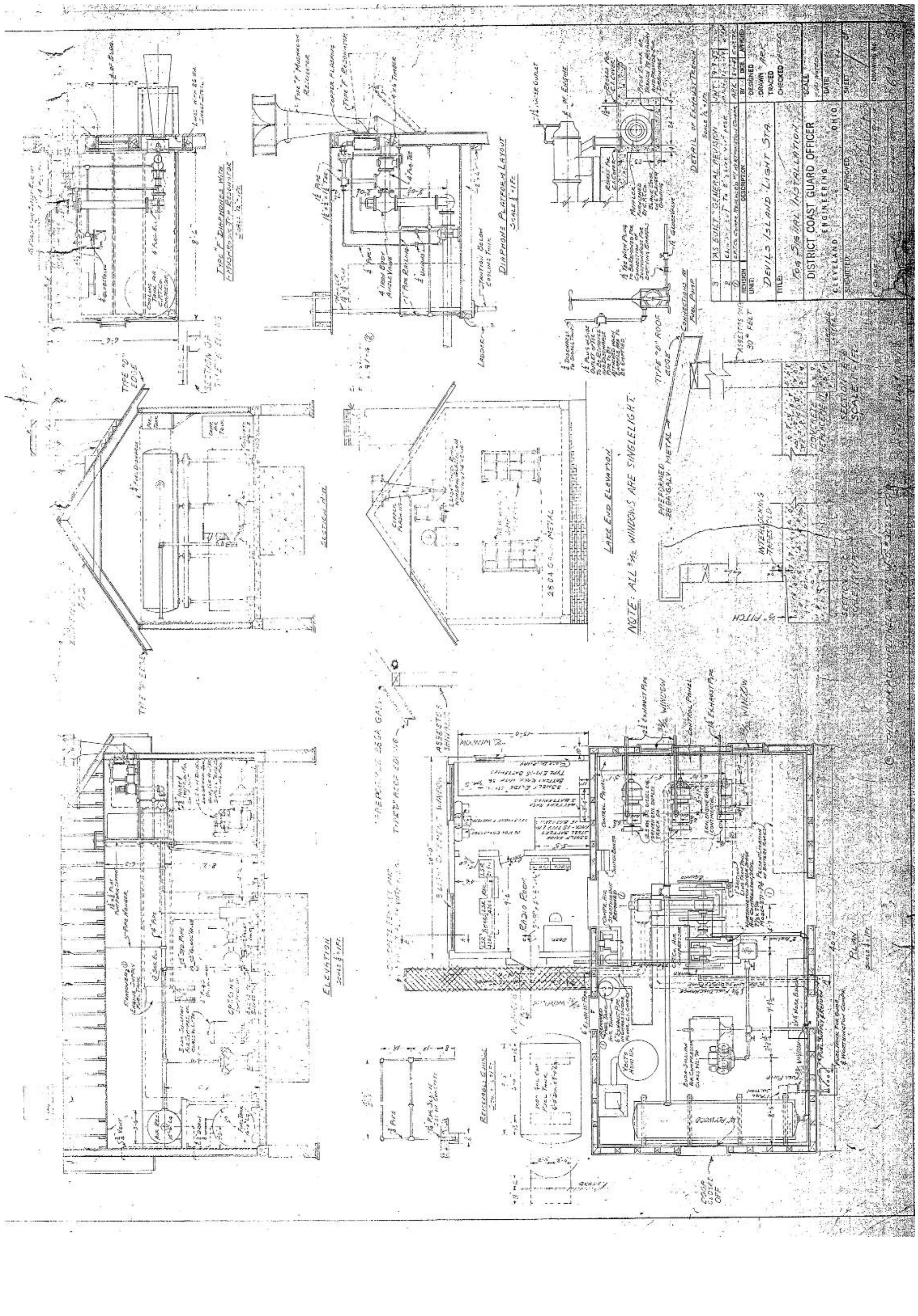
Historic Drawing DI-14: 1913 addition of structural supports



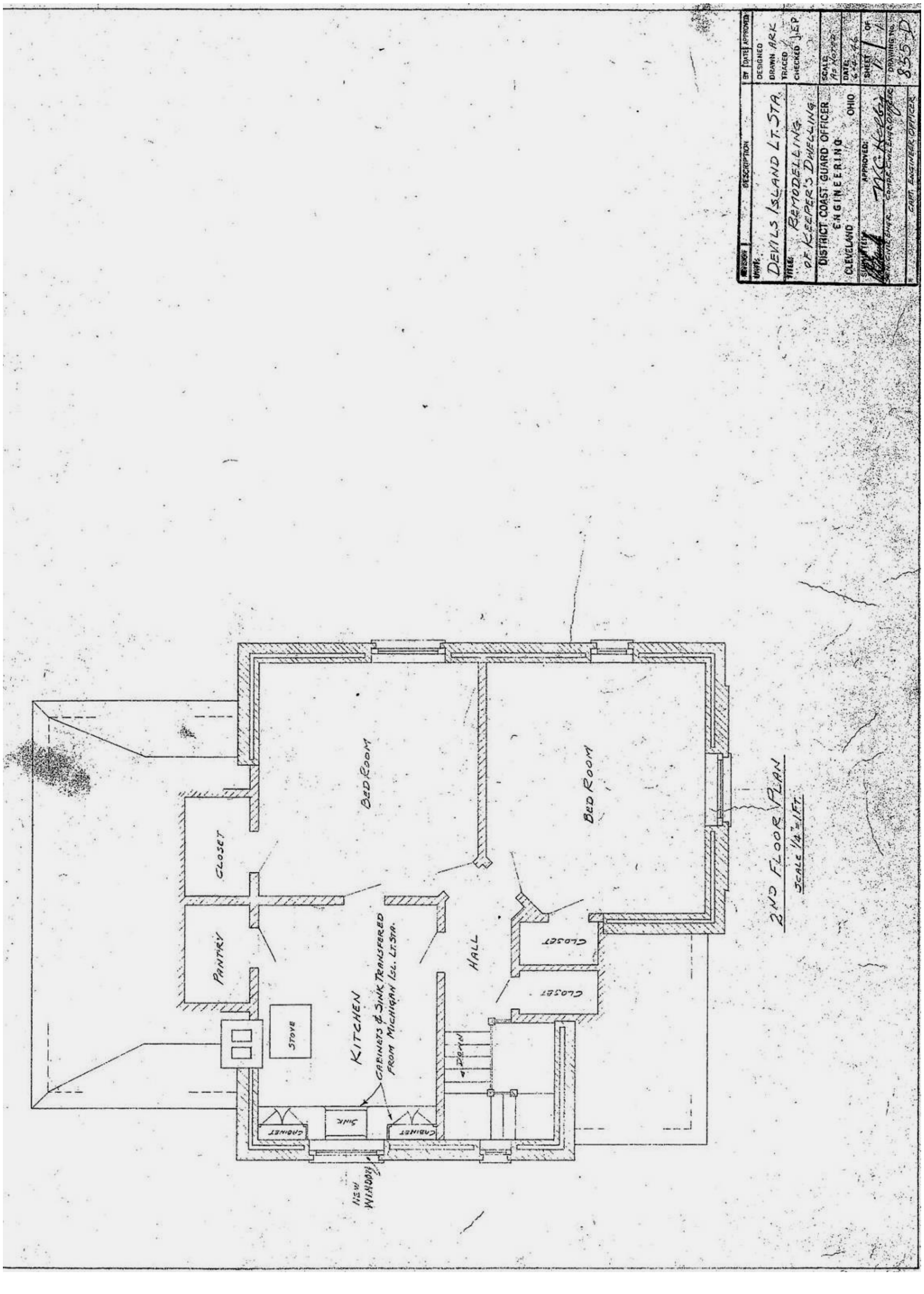
Historic Drawing DI-15: Detail of Tower stairs and buttressing, no date



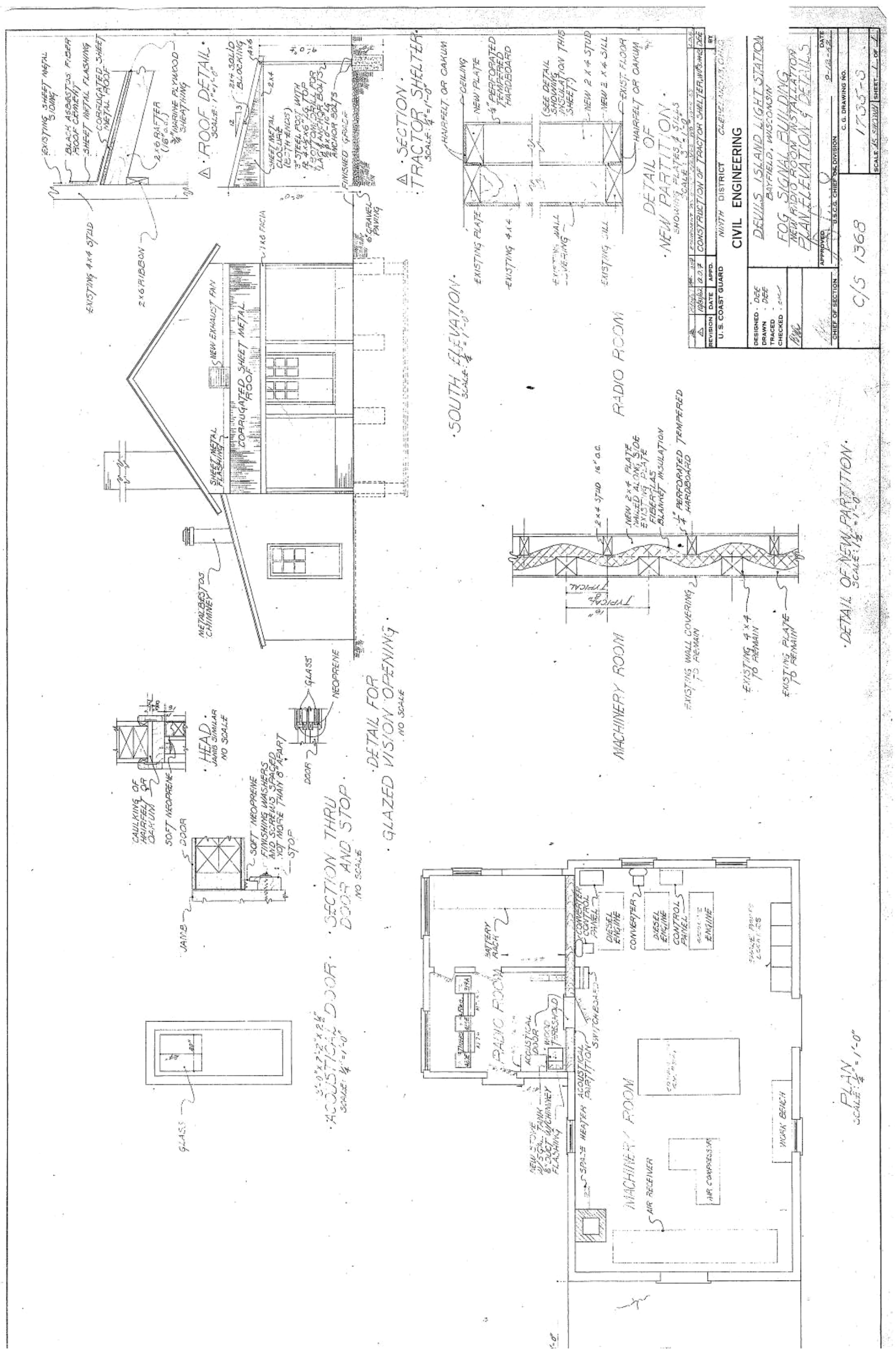
Historic Drawing DI-16: Winter light design, 1937



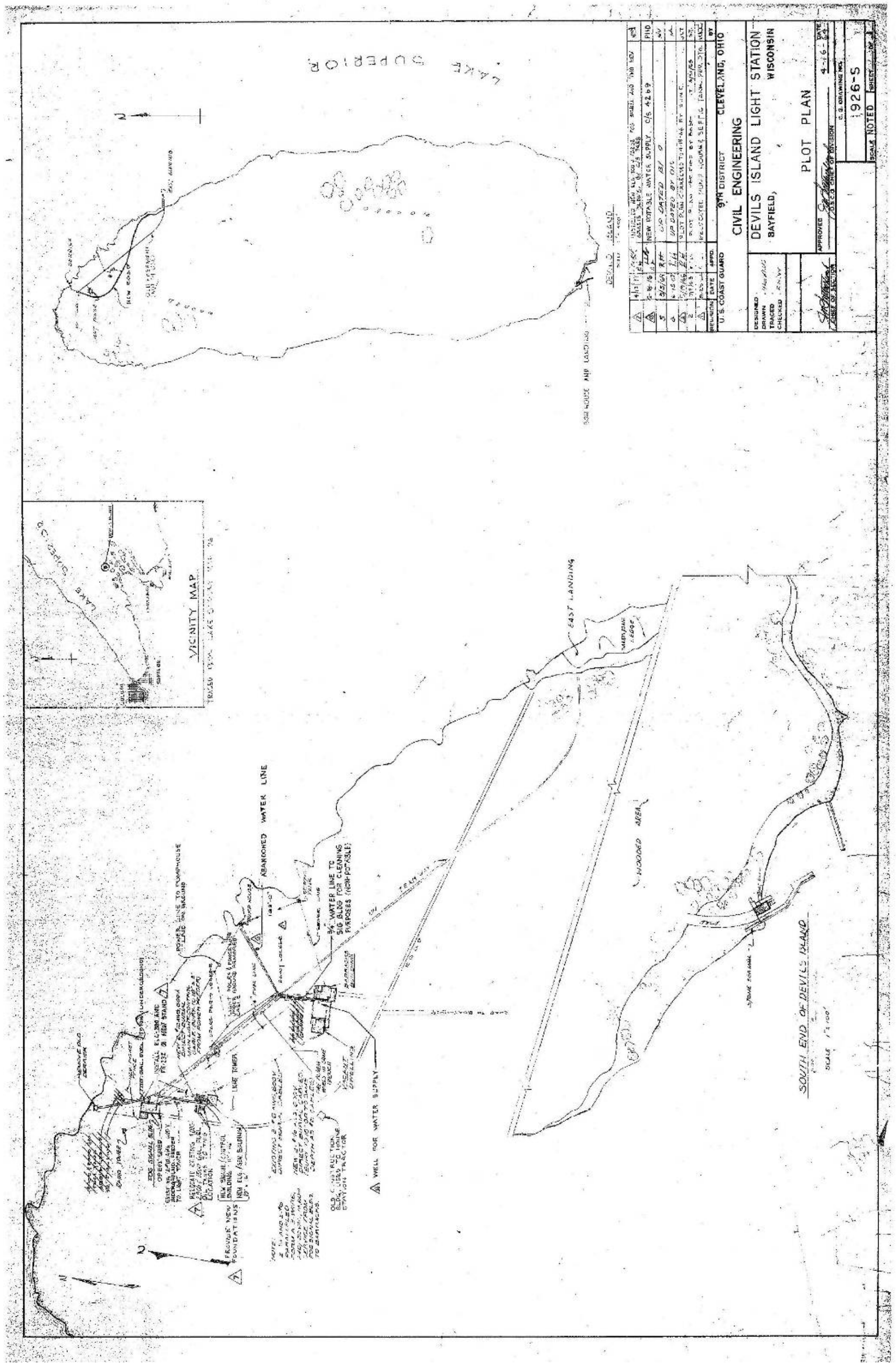
Historic Drawing DI-17: 1944 Coast Guard Fog Signal Building plans, elevations, and details



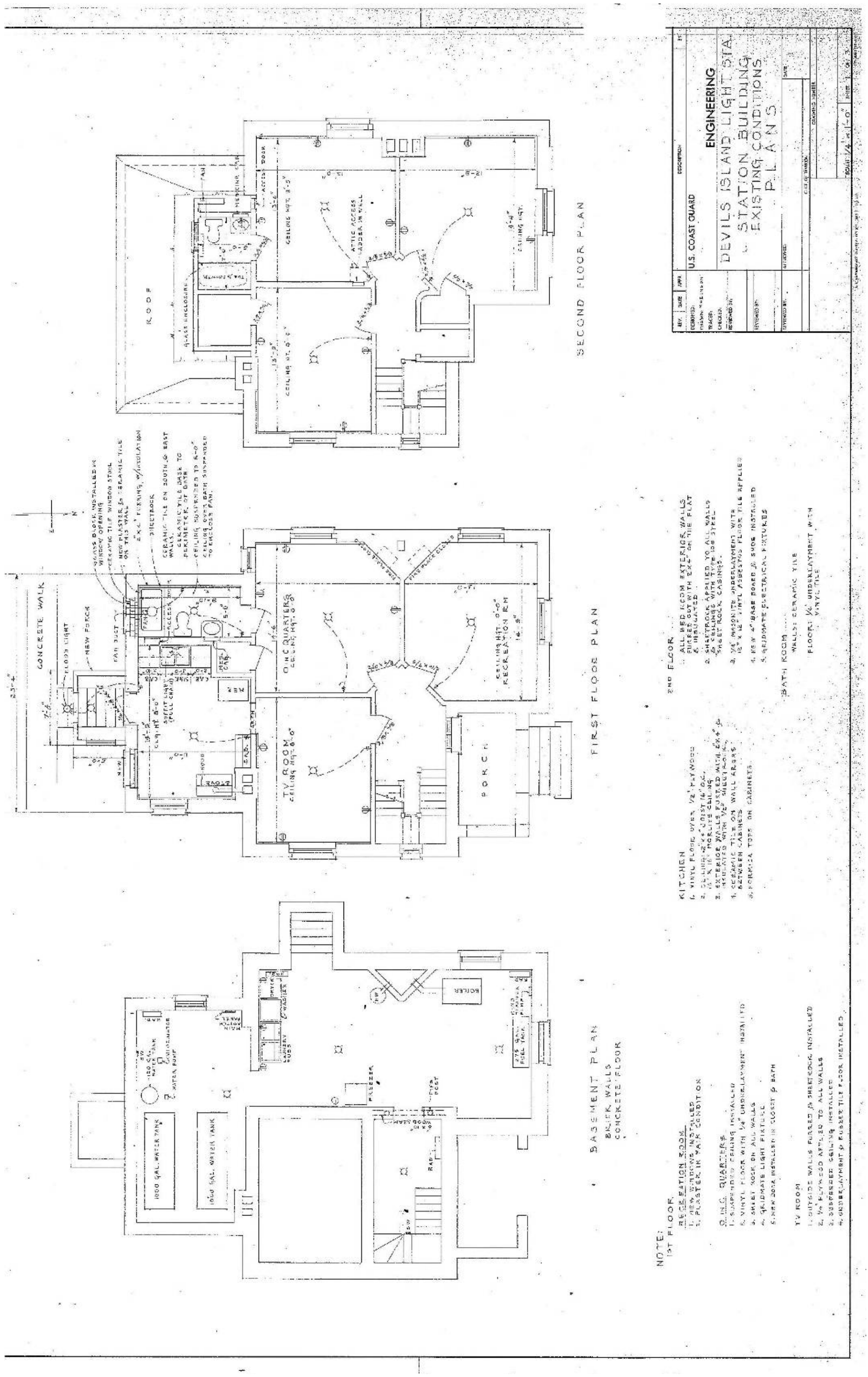
Historic Drawing DI-18: 1946 second floor plan to remodel Keepers Quarters as a duplex



Historic Drawing DI-19: 1962 plan, details and elevation of Fog Signal Building's additions

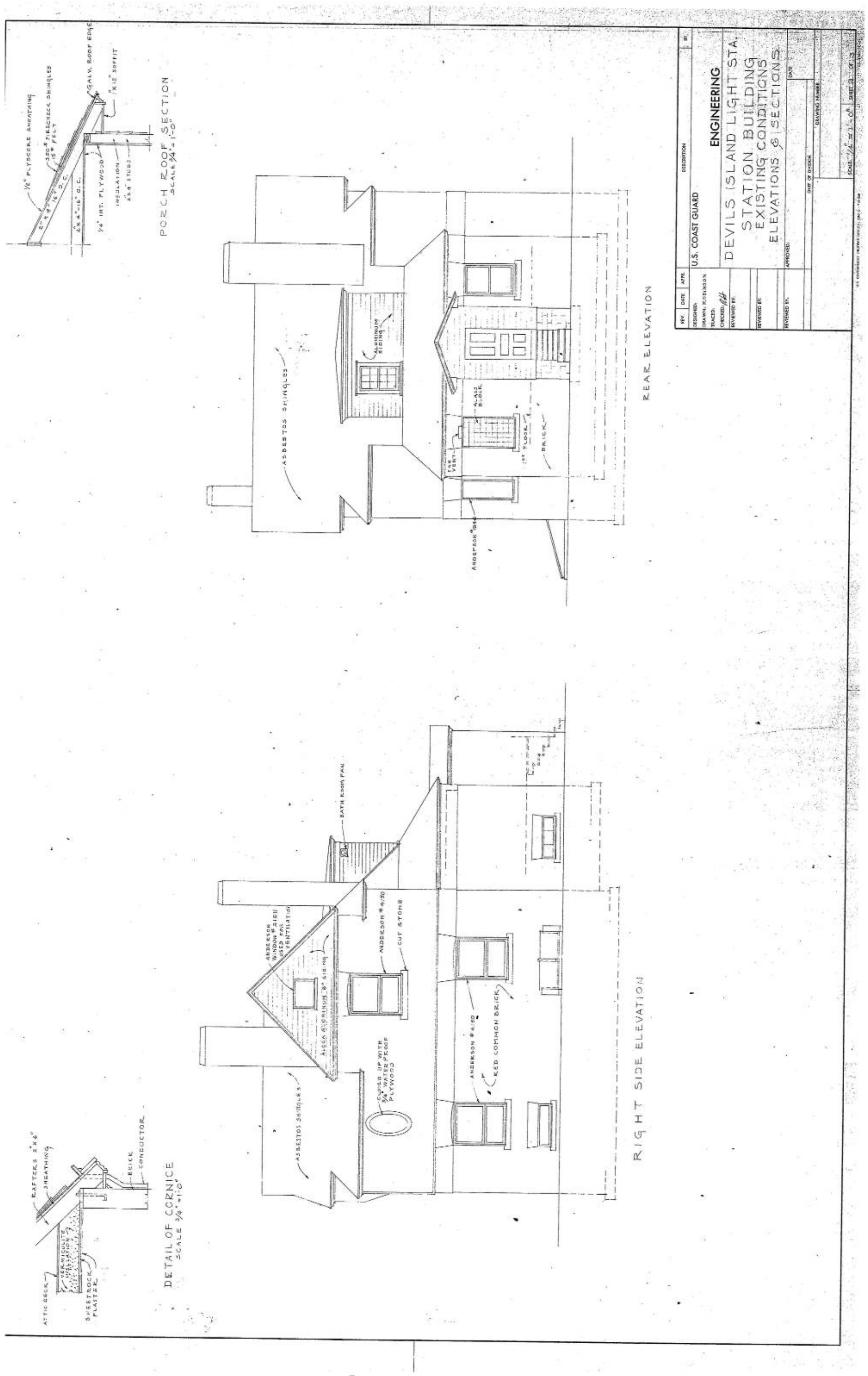


Historic Drawing DI-20: 1964 plot plan, United States Coast Guard (USCG) period



Historic Drawing DI-21: 1962-1965 USCG period plans of Keepers Quarters

Historic Drawing DI-22: 1962-1965 USCG period front and side elevations of Keepers Quarters with window notes

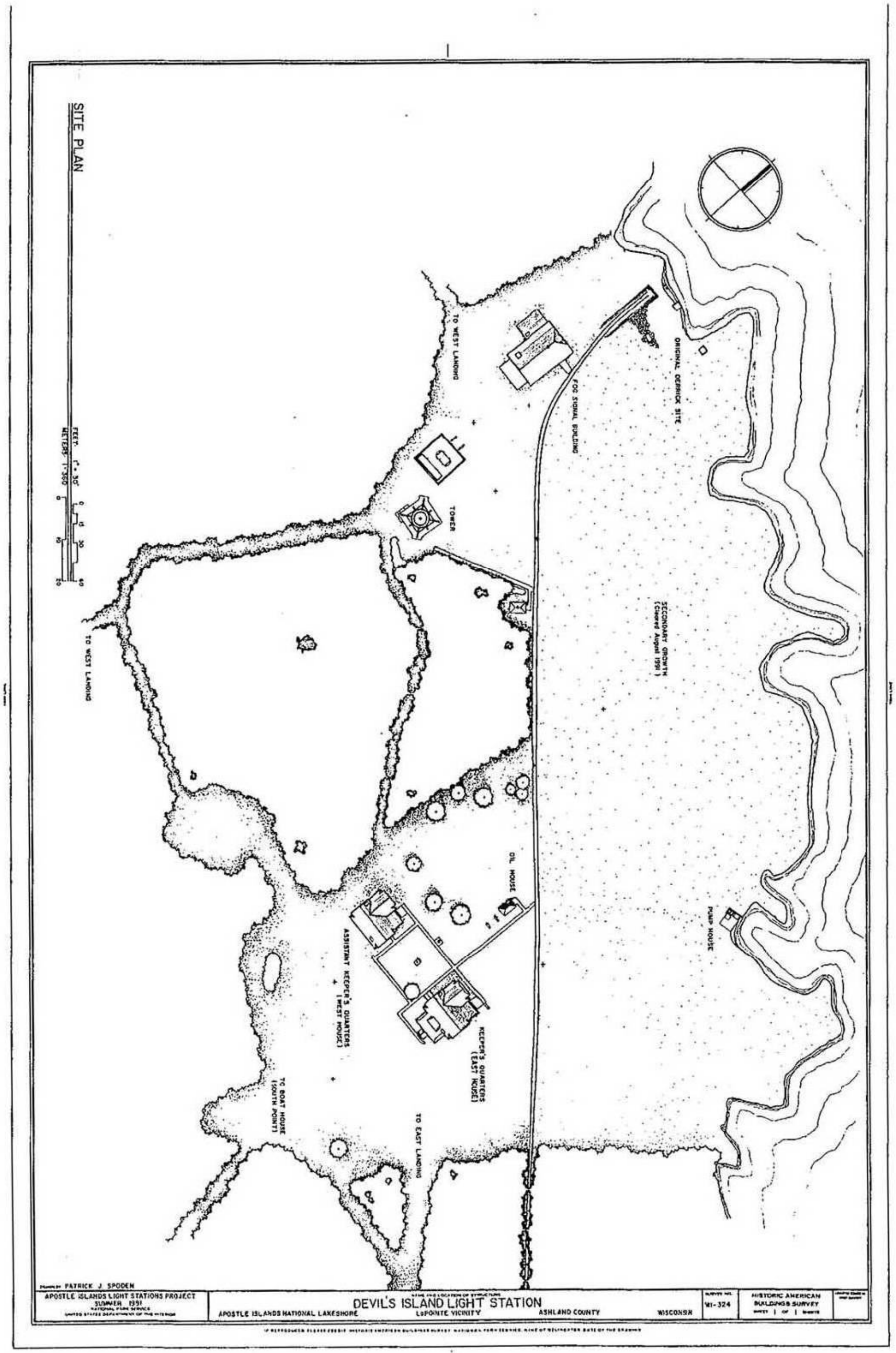


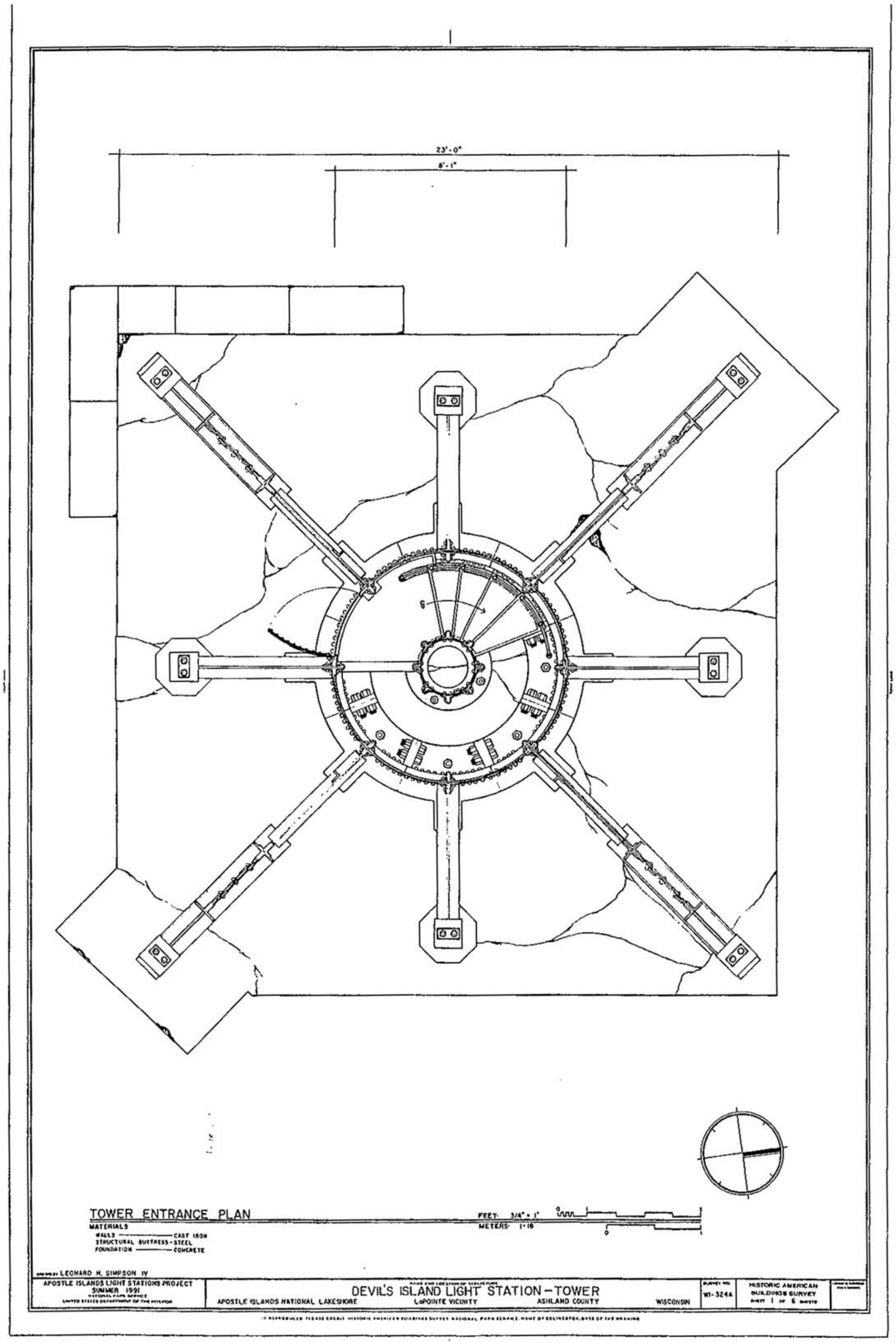
Historic Drawing DI-23: 1962-1965 USCG period rear and side elevations of Keepers Quarters with window notes

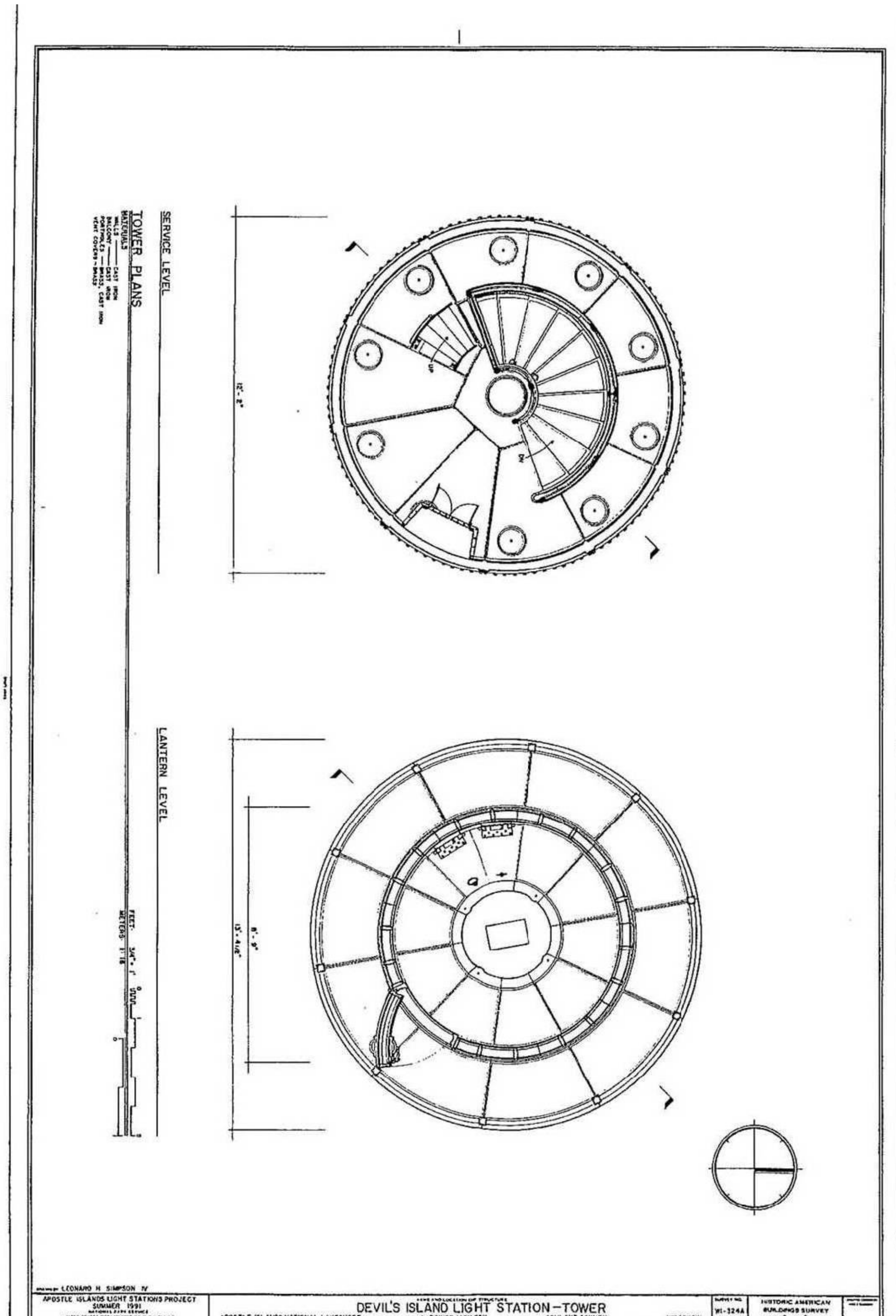
Existing Condition Drawings

The primary and secondary buildings on Devils Island were documented in the summer of 1990 by a team from the Historic American Buildings Survey (HABS). Since 1933, multiformat surveys in cooperation with government agencies have recorded the built environment in the United States. Measured drawings, large-format photographs and written histories have defined the survey technique for historic structures. The HABS collection currently contains detailed surveys on more than 38,600 historic structures. The following ten drawings contain the measured drawings produced by the HABS survey from 1990.

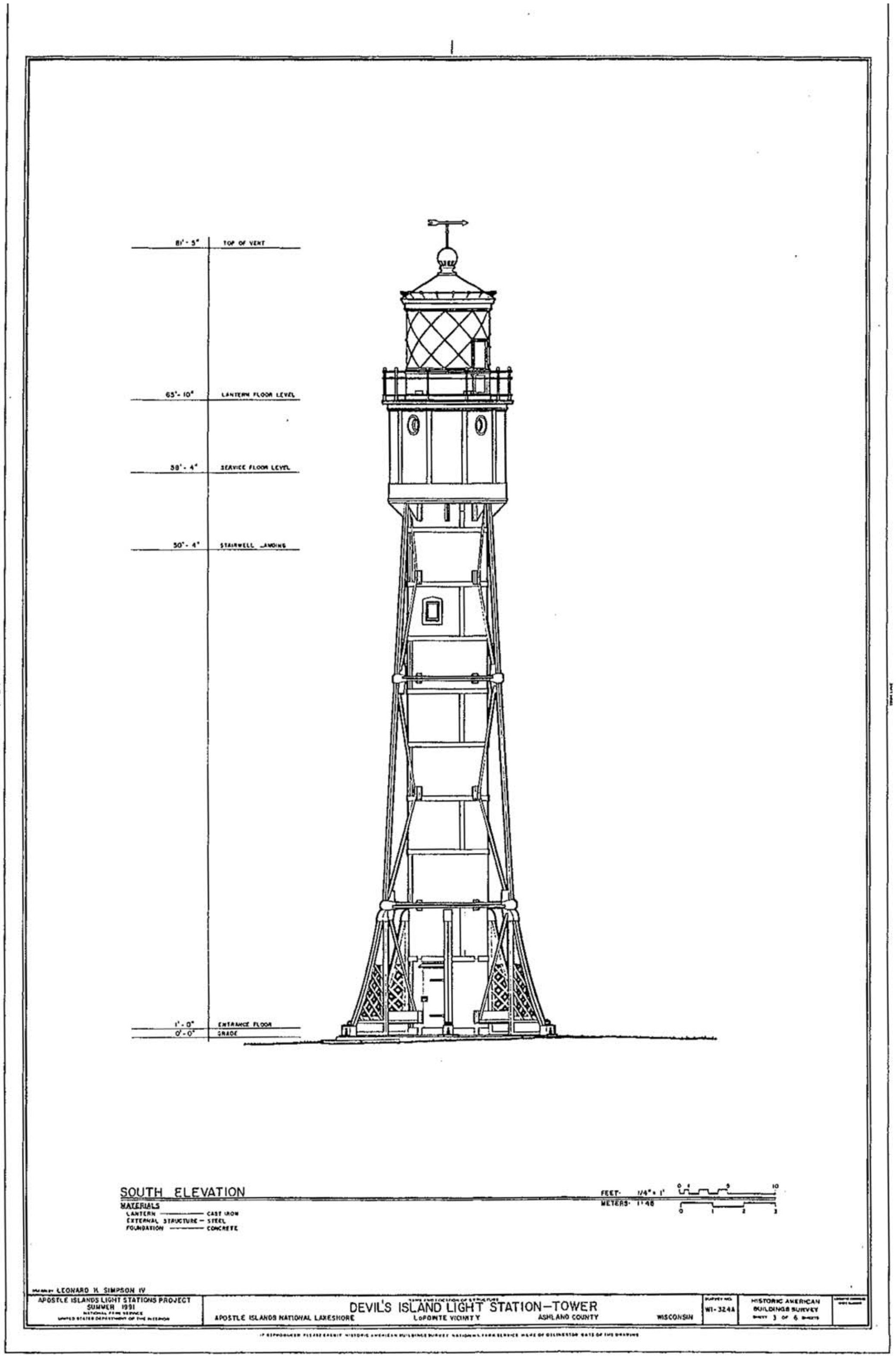
Typically, utilitarian buildings are not included in the HABS survey. In September of 2009, the architects and historic preservation specialists from Anderson Hallas Architects, PC surveyed the Fog Signal Building, Oil House #1 (east) and Oil House #2 (west) on Devils Island. These measured drawings have been included following the HABS drawings.

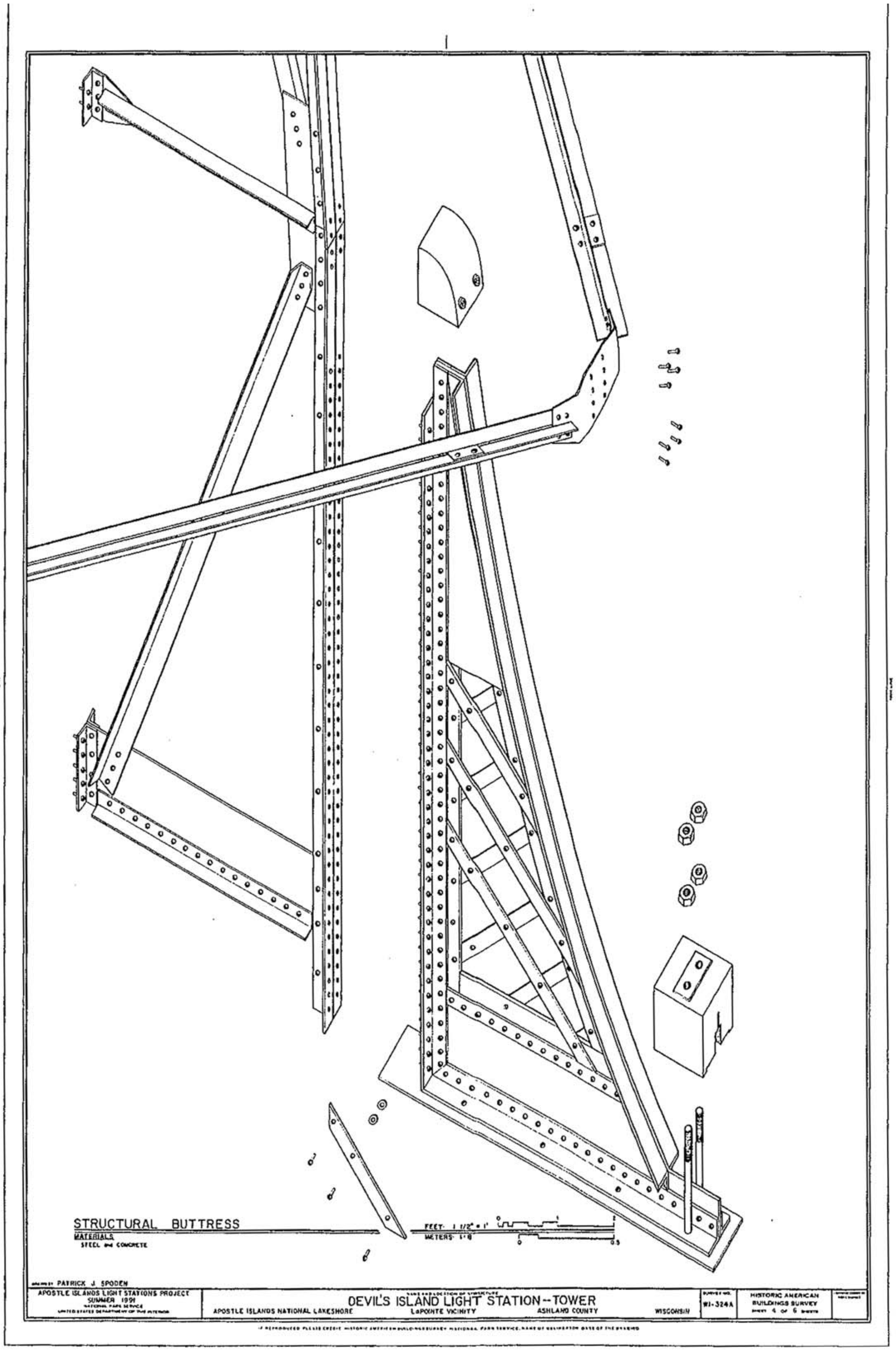

SITE PLAN
TO WEST LANDING
FOG SIGNAL BUILDING
ORIGINAL DERRICK SITE
TOWER
TO WEST LANDING
SECONDARY GROWTH
(Cleared August 1991)
OIL HOUSE
PUMP HOUSE
ASSISTANT KEEPER'S QUARTERS
(WEST HOUSE)
KEEPER'S QUARTERS
(EAST HOUSE)
TO BOAT HOUSE
(SOUTH POINT)
TO EAST LANDING
PATRICK J. SPODEN
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
NATIONAL PARK SERVICE
DEVIL'S ISLAND LIGHT STATION
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324
HISTORIC AMERICAN
BUILDINGS SURVEY

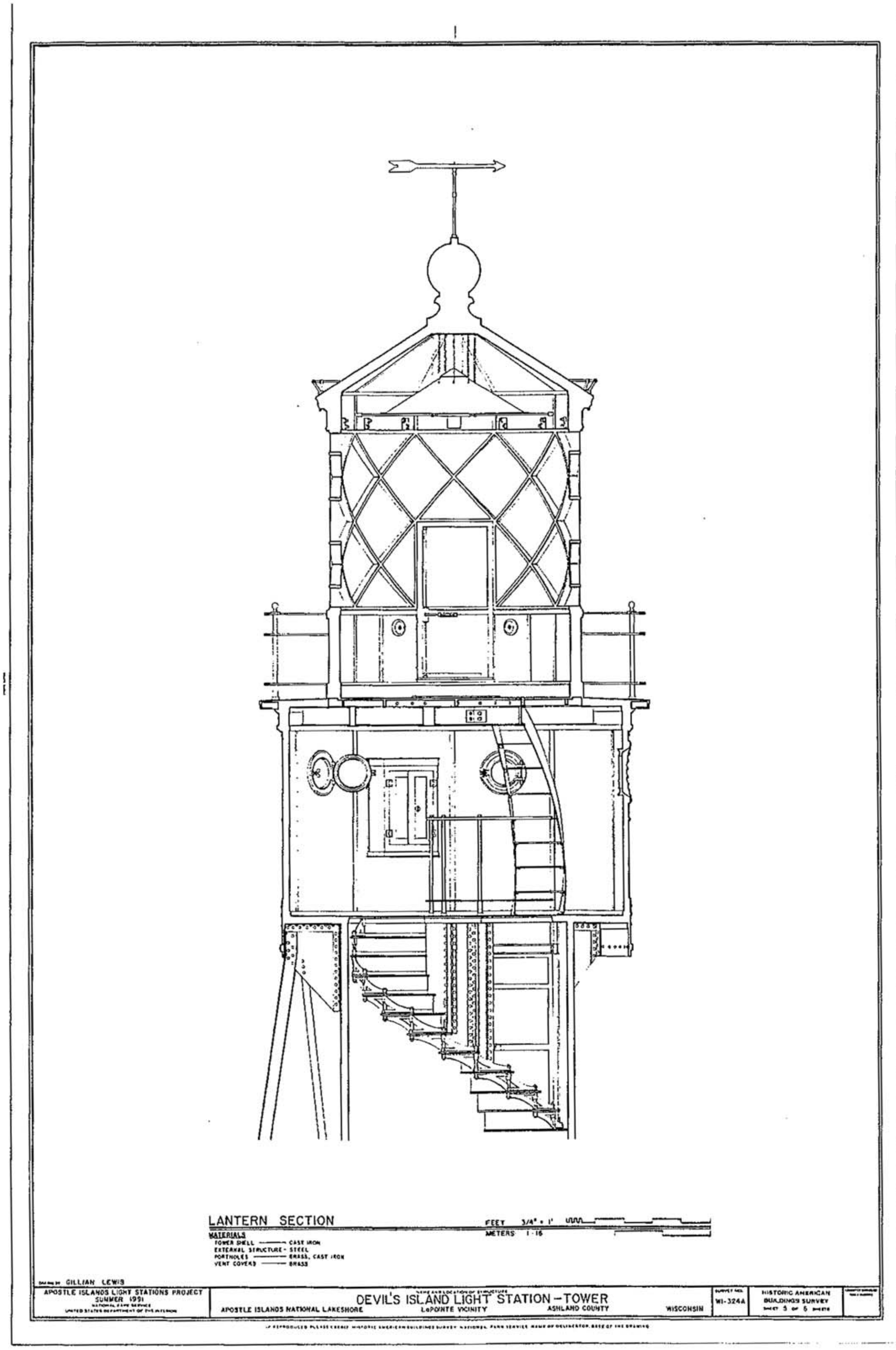

23'-0"
8'-1"
TOWER ENTRANCE PLAN
MATERIALS
WALLS — CAST IRON
STRUCTURAL BUTTRESS - STEEL
FOUNDATION — CONCRETE
FEET 3/4" = 1'
METERS 1:16
LEONARD H. SIMPSON IV
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION – TOWER
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324A
HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 1 OF 6 SHEETS

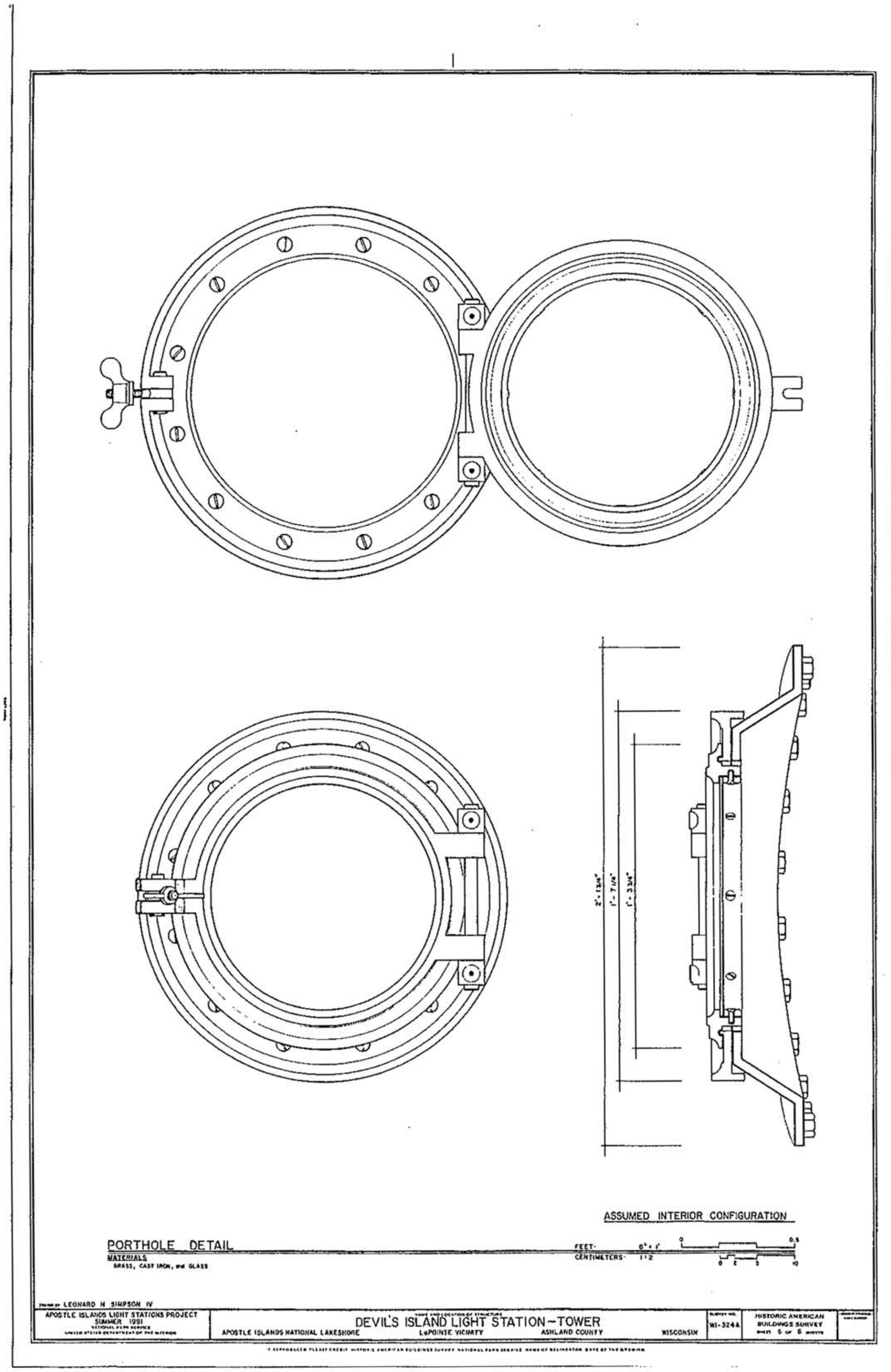


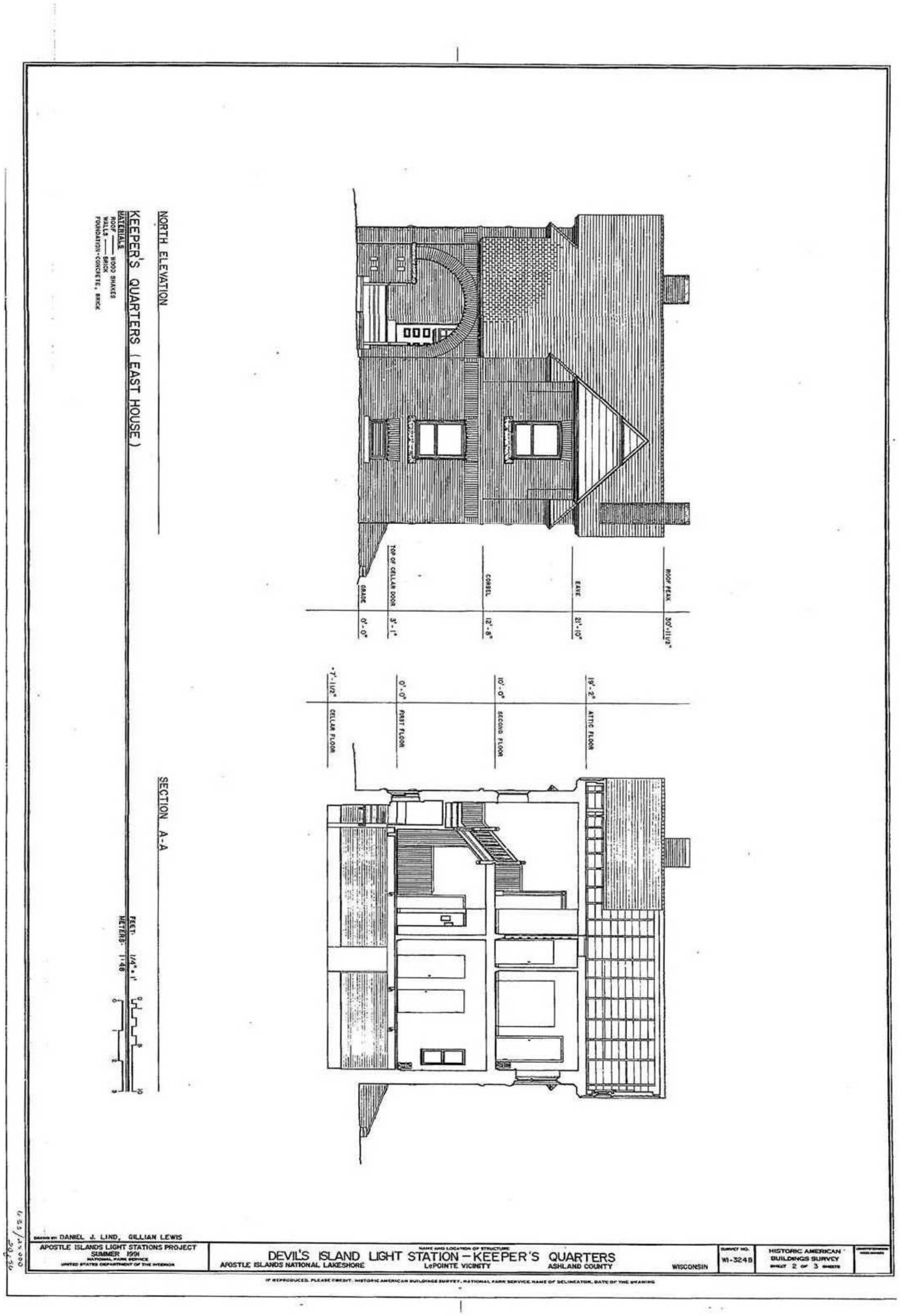
LEONARD H. SIMPSON IV
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION—TOWER
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324A
HISTORIC AMERICAN BUILDINGS SURVEY


81'-5" TOP OF VENT
65'-10" LANTERN FLOOR LEVEL
58'-4" SERVICE FLOOR LEVEL
50'-4" STAIRWELL LANDING
1'-0" ENTRANCE FLOOR
0'-0" GRADE
SOUTH ELEVATION
MATERIALS
LANTERN — CAST IRON
EXTERNAL STRUCTURE — STEEL
FOUNDATION — CONCRETE
FEET 1/4" = 1'
METERS 1:48
LEONARD H. SIMPSON IV
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION—TOWER
APOSTLE ISLANDS NATIONAL LAKESHORE
LAPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324A
HISTORIC AMERICAN BUILDINGS SURVEY
3 OF 6

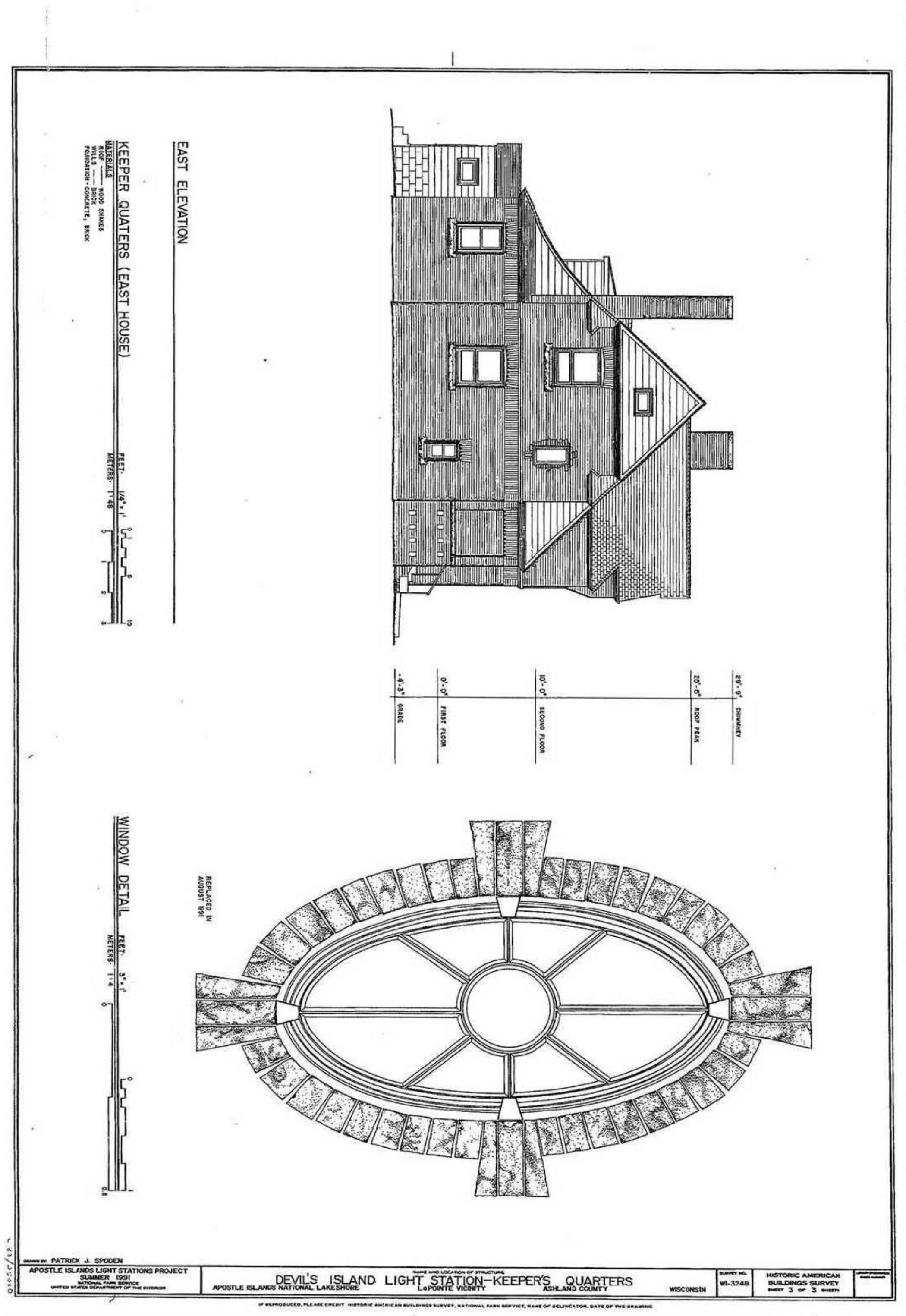

STRUCTURAL BUTTRESS
MATERIALS
STEEL and CONCRETE
FEET 1 1/2" = 1'
METERS 1:8
0
1
2
0
0.5
PATRICK J. SPODEN
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION -- TOWER
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324A
HISTORIC AMERICAN
BUILDINGS SURVEY
4 of 6

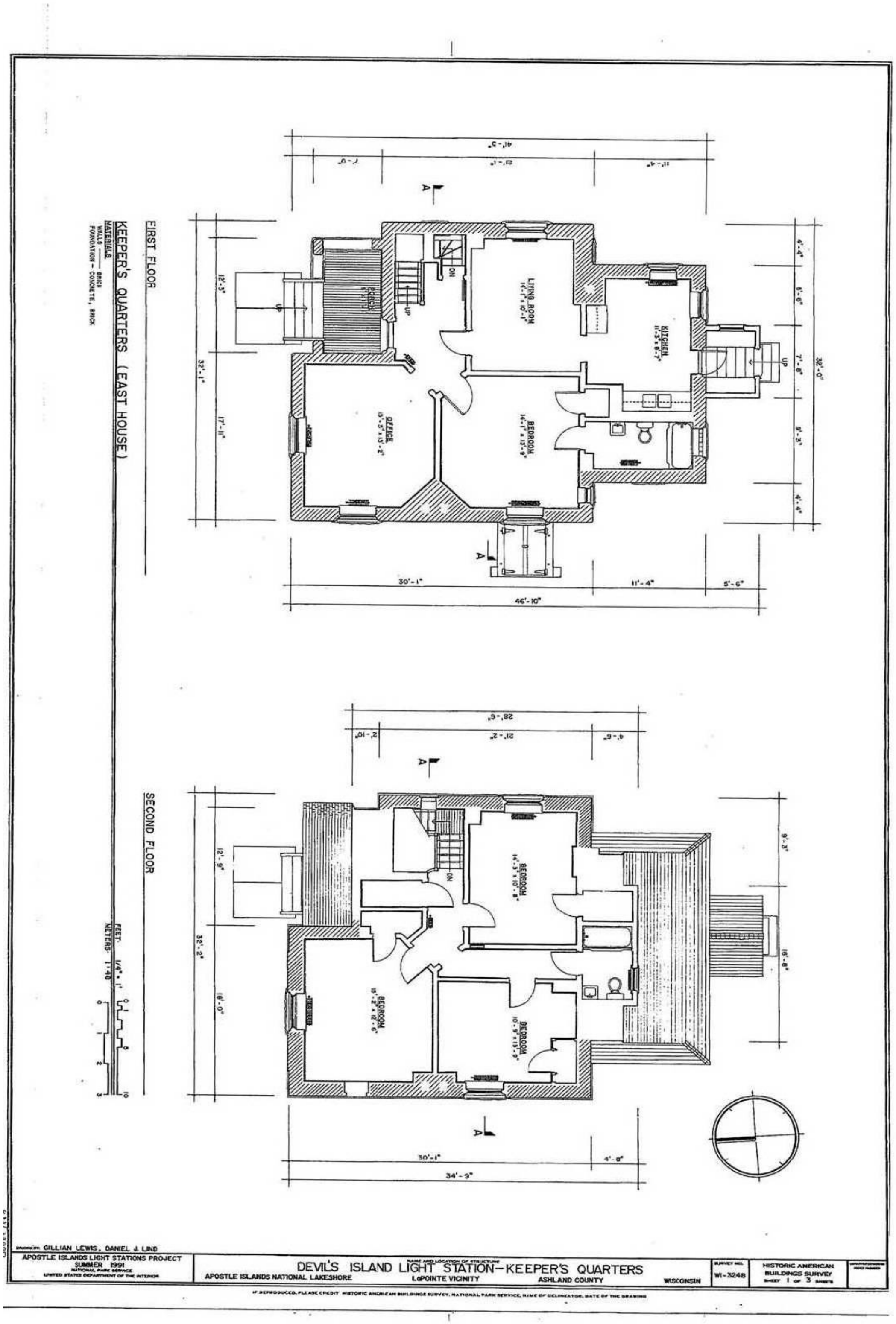

LANTERN SECTION
FEET 3/4" = 1'
METERS 1:16
MATERIALS
TOWER SHELL — CAST IRON
EXTERNAL STRUCTURE - STEEL
PORTHOLES — BRASS, CAST IRON
VENT COVERS — BRASS
GILLIAN LEWIS
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION – TOWER
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324A
HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 5 OF 5 SHEETS


2' - 1 3/4"
1' - 7 1/4"
1' - 3 3/4"
ASSUMED INTERIOR CONFIGURATION
PORTHOLE DETAIL
MATERIALS
BRASS, CAST IRON, and GLASS
FEET
CENTIMETERS
LEONARD H. SIMPSON IV
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION – TOWER
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324A
HISTORIC AMERICAN BUILDINGS SURVEY

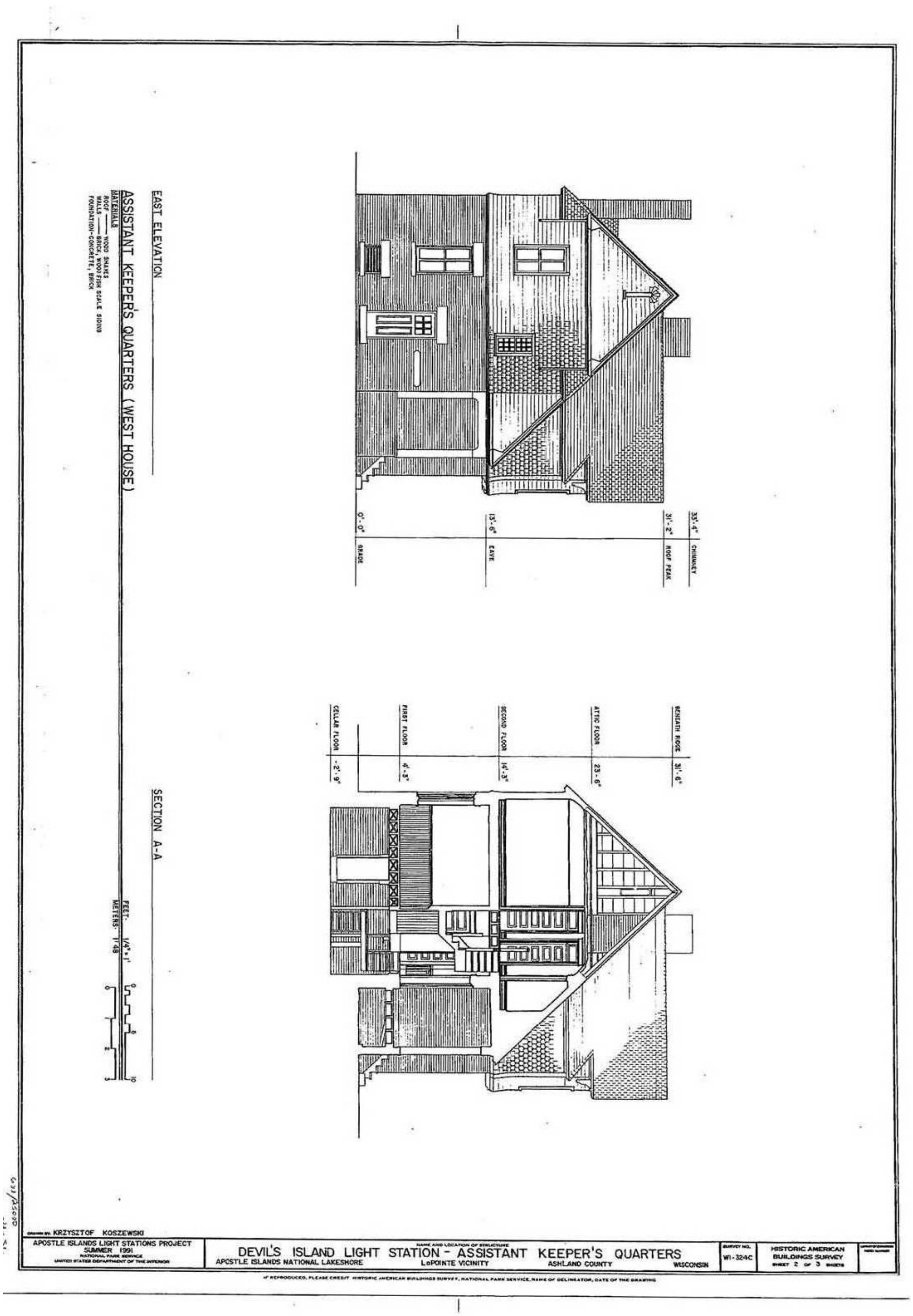


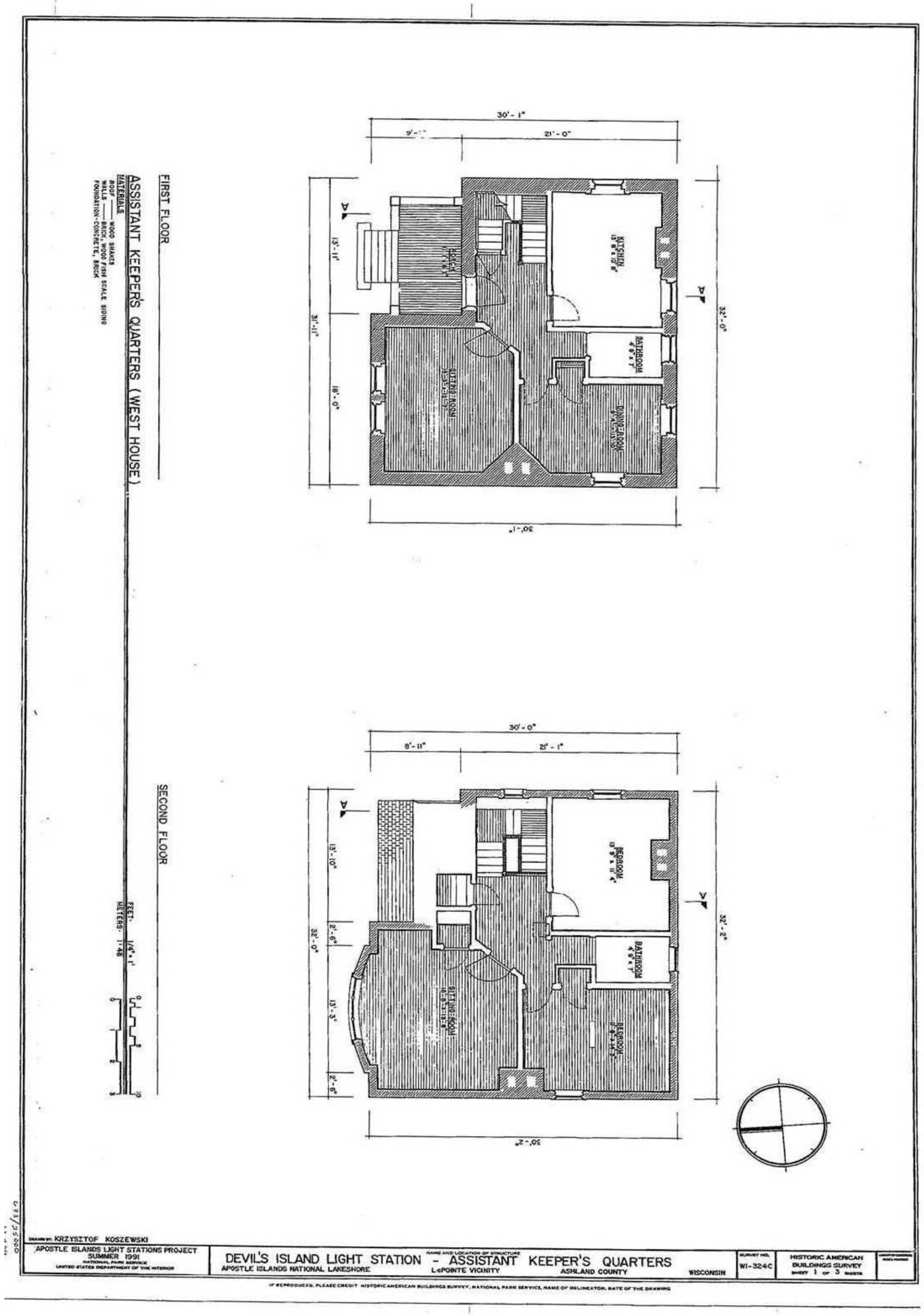
NORTH ELEVATION
KEEPER'S QUARTERS (EAST HOUSE)
SECTION A-A
ROOF PEAK 30'-11 1/2"
EAVE 21'-10"
CORBEL 12'-8"
TOP OF CELLAR DOOR 3'-1"
GRADE 0'-0"
ATTIC FLOOR 19'-2"
SECOND FLOOR 10'-0"
FIRST FLOOR 0'-0"
CELLAR FLOOR
DANIEL J. LIND, GILLIAN LEWIS
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
NATIONAL PARK SERVICE
DEVIL'S ISLAND LIGHT STATION — KEEPER'S QUARTERS
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324B
HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 2 OF 3 SHEETS

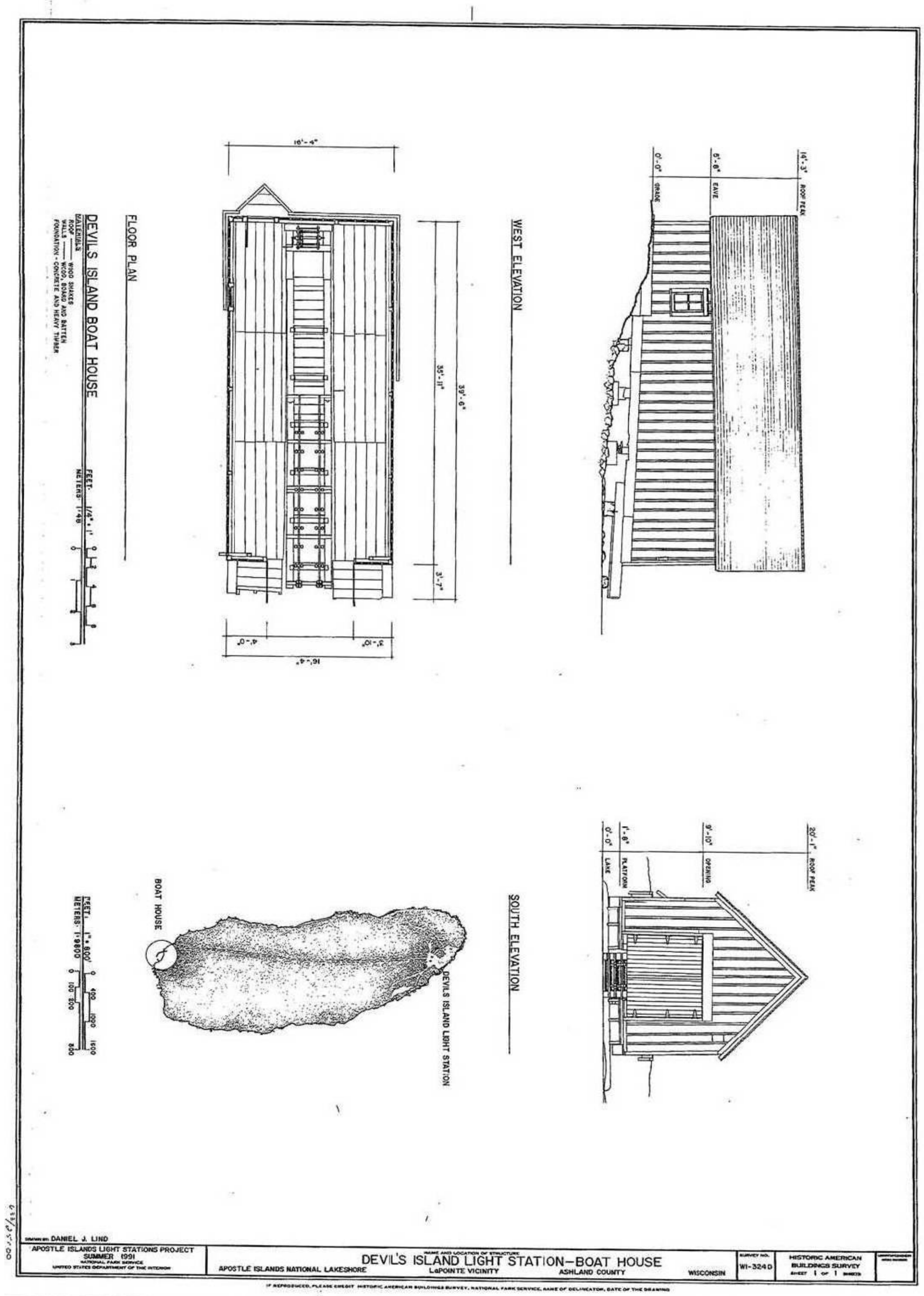

EAST ELEVATION
KEEPER QUATERS (EAST HOUSE)
WINDOW DETAIL
REPLACED IN AUGUST 1991
GRADE
FIRST FLOOR
SECOND FLOOR
ROOF PEAK
CHIMNEY
PATRICK J. SPODEN
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION—KEEPER'S QUARTERS
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
HISTORIC AMERICAN BUILDINGS SURVEY

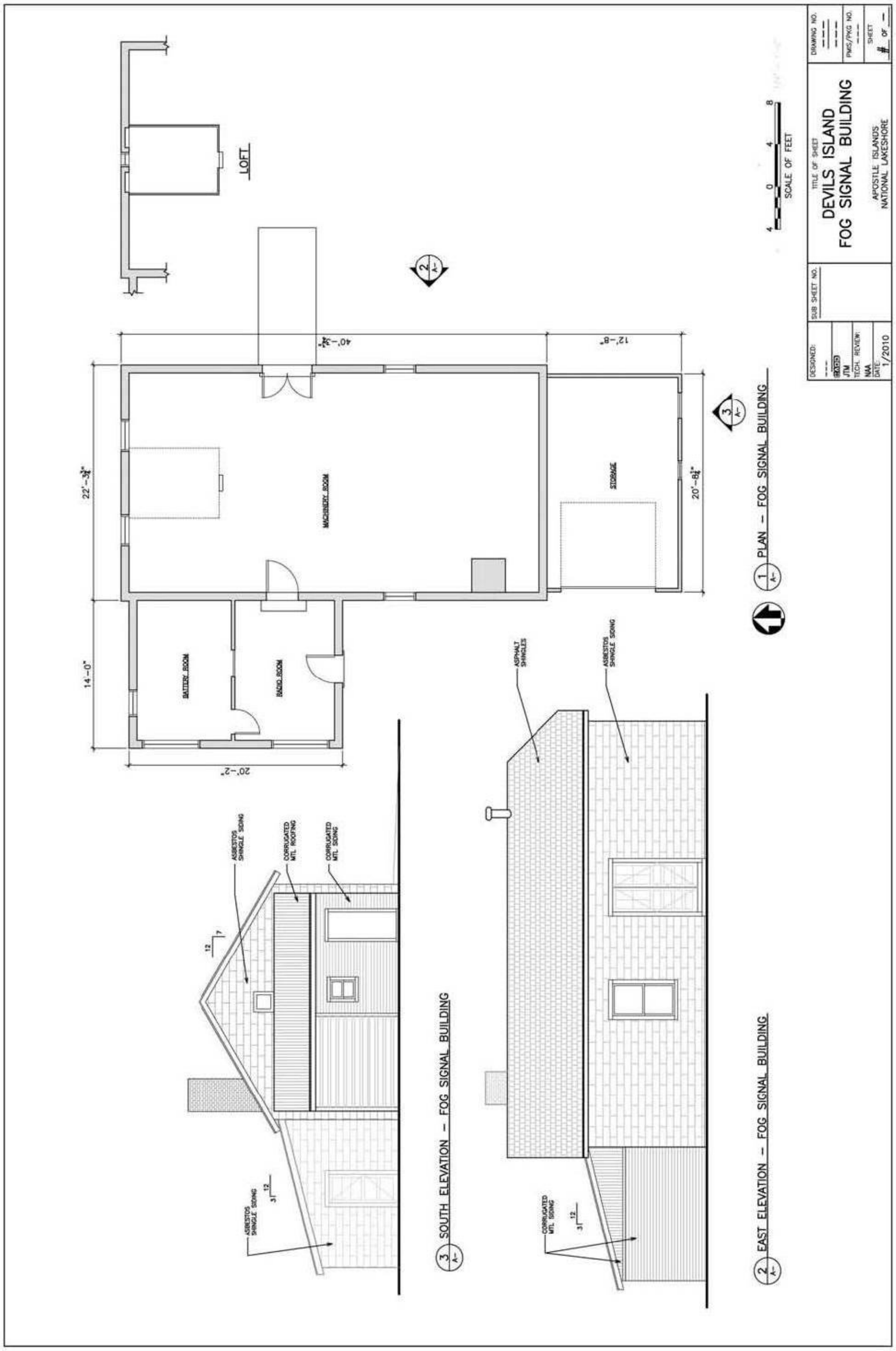


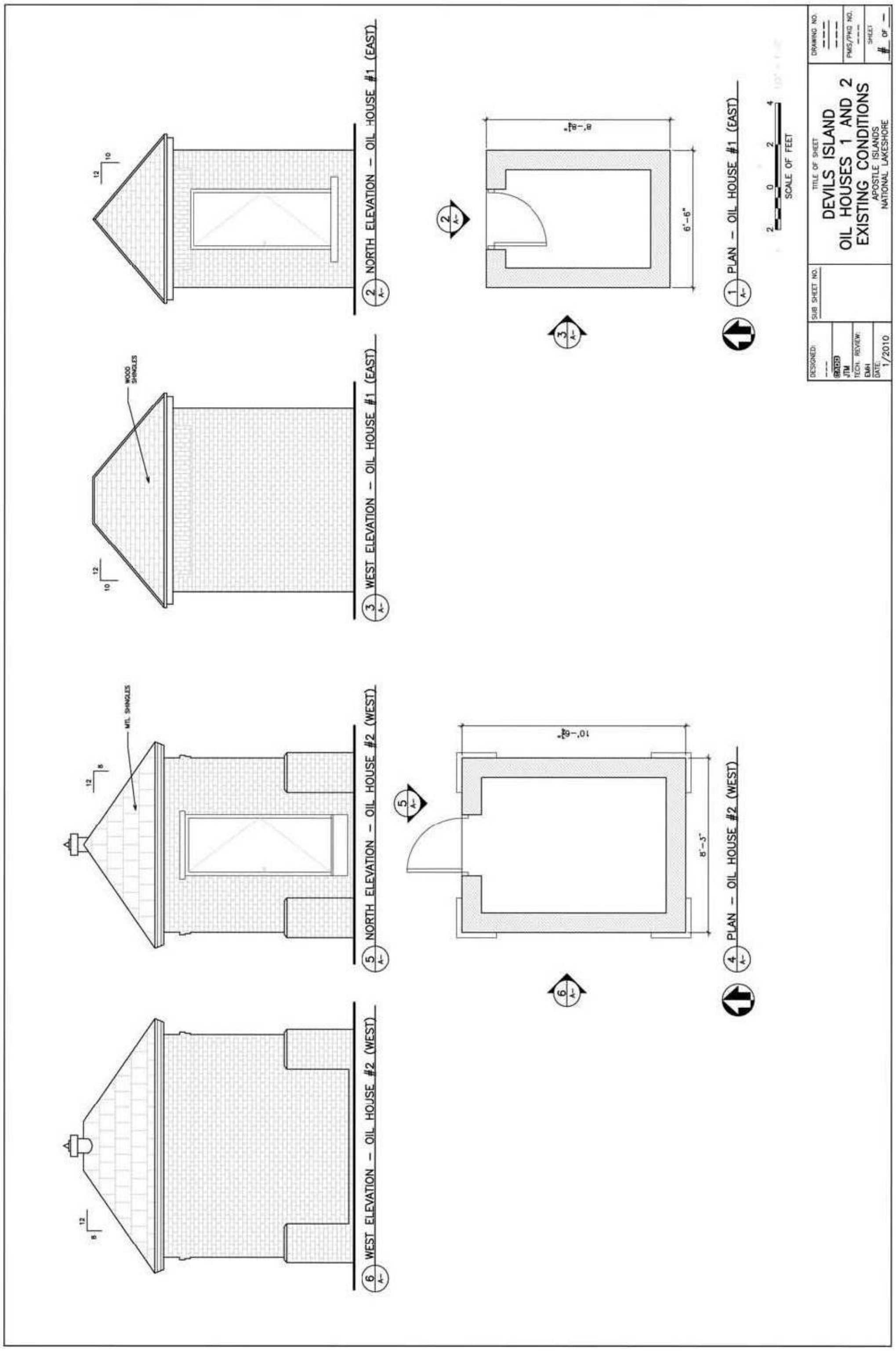
FIRST FLOOR
KEEPER'S QUARTERS (EAST HOUSE)
SECOND FLOOR
GILLIAN LEWIS, DANIEL J. LIND
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION–KEEPER'S QUARTERS
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324B
HISTORIC AMERICAN BUILDINGS SURVEY


EAST ELEVATION
ASSISTANT KEEPER'S QUARTERS (WEST HOUSE)
SECTION A-A
KRZYSZTOF KOSZEWSKI
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
DEVIL'S ISLAND LIGHT STATION - ASSISTANT KEEPER'S QUARTERS
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324C
HISTORIC AMERICAN BUILDINGS SURVEY


FIRST FLOOR
ASSISTANT KEEPER'S QUARTERS (WEST HOUSE)
SECOND FLOOR
DRAWN BY: KRZYSZTOF KOSZEWSKI
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
DEVIL'S ISLAND LIGHT STATION - ASSISTANT KEEPER'S QUARTERS
APOSTLE ISLANDS NATIONAL LAKESHORE
LePOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324C
HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 1 OF 3 SHEETS


FLOOR PLAN
WEST ELEVATION
SOUTH ELEVATION
DEVILS ISLAND BOAT HOUSE
BOAT HOUSE
DEVILS ISLAND LIGHT STATION
DANIEL J. LIND
APOSTLE ISLANDS LIGHT STATIONS PROJECT
SUMMER 1991
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
DEVIL'S ISLAND LIGHT STATION—BOAT HOUSE
APOSTLE ISLANDS NATIONAL LAKESHORE
LaPOINTE VICINITY
ASHLAND COUNTY
WISCONSIN
WI-324D
HISTORIC AMERICAN BUILDINGS SURVEY


DEVILS ISLAND
FOG SIGNAL BUILDING
APOSTLE ISLANDS NATIONAL LAKESHORE
SCALE OF FEET
LOFT
MACHINERY ROOM
STORAGE
BATTERY ROOM
RADIO ROOM
22'-3½"
20'-8¼"
14'-0"
20'-2"
12'-8"
1/2010
PLAN – FOG SIGNAL BUILDING
SOUTH ELEVATION – FOG SIGNAL BUILDING
EAST ELEVATION – FOG SIGNAL BUILDING
ASBESTOS SHINGLE SIDING
CORRUGATED MTL. ROOFING
CORRUGATED MTL. SIDING
ASPHALT SHINGLES


NORTH ELEVATION – OIL HOUSE #1 (EAST)
WEST ELEVATION – OIL HOUSE #1 (EAST)
WOOD SHINGLES
PLAN – OIL HOUSE #1 (EAST)
6'-6"
NORTH ELEVATION – OIL HOUSE #2 (WEST)
WEST ELEVATION – OIL HOUSE #2 (WEST)
MTL SHINGLES
PLAN – OIL HOUSE #2 (WEST)
8'-3"
SCALE OF FEET
DEVILS ISLAND
OIL HOUSES 1 AND 2
EXISTING CONDITIONS
APOSTLE ISLANDS
NATIONAL LAKESHORE
1/2010

LIGHT STATION TOWER

Chronology of Alterations and Use

Original Construction

The Devils Island Light Station Tower was built off site in sections and shipped to the island and constructed in 1898. The Tower is 82' tall and was erected as a cylindrical structure without the extensive framework seen today. In 1915, the skeletal metal bracing was added to provide additional support and was designed to match the character of the existing braces so as to appear original. A third order Fresnel lens was installed and put into service in 1901 and is currently mounted in the lantern, though it is no longer lit. By 1941, Devils Island had been converted to electricity but the Fresnel lens was used until 1989.[28]

Historic drawings include an undated elevation of the Tower without bracing, a list of parts for the Lantern (1896); an 1899 detail of the lens; the Tower stairs and buttressing details and elevations (no date); the construction documents for the 1913 steel support additions to the Tower (approved on August 28, 1913 but installed in 1915); and, the winter light construction drawing of 1937. (Historic Drawings DI-01, 14 to 16) The Tower stairs and buttressing details were most likely drawn for the 1915 addition of the steel supports. The winter light elevation was created to show how fuel would reach the lantern through 8mm tubing. The winter light was an automated light developed for the winters when the keepers would not be present. The light automatically turned on when the temperature dropped to a certain amount, suggesting night or bad weather, and then turned itself off when the temperature rose. (Historic Drawing DI-16)

Significant Alterations / Current condition

Significant alterations to the Devils Island Light Station Tower consist of the 1915 addition of the skeletal bracing to stabilize the Tower, installation of the winter light in 1937, the 1941 conversion of the Tower and its surrounding buildings to electricity, and a rehabilitation initiative in 2003 when the NPS maintenance personnel completed lead paint abatement and the interior was repainted by an outside paint contractor. In 1989, the USCG removed the Fresnel lens from the Tower and replaced it with a VEGA VRB-25 optic mounted on the lantern railing.[29] A lawsuit ensued and it was returned to the structure in 1992. Note that the lens sits approximately 18" lower than the original installation because the mounting standards were not installed and are currently in the park museum. In May of 2009, an LED-powered beacon was installed in the Tower.

The only mechanical components in the Tower are round, metal, passive air vents in the lantern.

There were never any alternating current electrical systems inside the Tower.

The Tower is currently in fair condition.

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[28] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008; and, N. Howk, January 2010

[29] N. Howk, January 2010

Summary of Documented Work on the Building

Date	Work Described	Source of Information
Annual Report of 1896	"*Devils Island, Lake Superior, Wisconsin*. – The amount of the award for this island, $1,600, was paid in August, 1895... A design was made for an iron tower."	"1896 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1897	"*Devils Island, Lake Superior, Wisconsin*…Plans and specifications for a cylindrical tower are being prepared."	"1897 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1898	"*Devils Island, Lake Superior, Wisconsin*… A contract was made for the construction, delivery, and erection of the light tower. In September the site for the foundation of the tower was begun. A contract for the third order lantern was made. In June, 1898, structural metal work of the tower, under contract, was completed, inspected, and shipped to the light station."	"1898 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1899	"*Devils Island, Lake Superior, Wisconsin*. – The construction, delivery, and erection of this light tower by contract were completed on October 17, 1898. The hoisting engine was repaired and 160 feet of steel hoisting rope was provided."	"1899 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1901	"*Devils Island, Lake Superior. Wisconsin*. – The illuminating apparatus for the new light was received in April at the light-house depot... and the work of installing the third-order flashing lens in the new tower was commenced. This work is being paid for from the unexpended balance of the appropriation for Devils Island (Wisconsin) light-station."	"1901 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
1915	Addition of steel skeletal bracing (drawings dated 1913)	Historic Drawing DI-14, and LCS, 2009
1928	Diesel-powered electric generator for the radio beacon installed	J. Busch, 2008, and N. Howk, Jan 2010
1928	Electric light installed (assume station converted to electricity around this time as well)	1928 USLHS "Light List" (S. Mackreth)
1937	Acetylene-powered Winter Light installed	Historic Image DI-15
1952, July-August	July 1: "Painting inside lantern." July 3: "Painting light tower." July 10: "Scraped black on tower, painted white on inside." August 6: "Painted overhang on light tower, inside of pump house." August 12: "…painting light tower, roof of spare parts locker." (one of the oil houses, also referred to as "gear locker") August 15: "Painted light tower, paint locker, and inside of fog signal."	USCG Log, summarized by Bob Mackreth, 2004
1952, September	September 11: "Painted bottom of light tower black." September 12: "Painted 'derrick, outside black on latern[sic] walk.'"	USCG Log, summarized by Bob Mackreth, 2004
1953, September	September 10: "Painting watch room of tower." September 21: "Painted deck in lens room of tower."	USCG Log, summarized by Bob Mackreth, 2004

Date	Work Described	Source of Information
	September 28: "Repairing concrete base of light tower."	
1954, May 17	"Started breaking loose old cement around base of light tower and laying forms."	USCG Log, summarized by Bob Mackreth, 2004
1954, September 23	"Finished laying cement at base of tower."	USCG Log, summarized by Bob Mackreth, 2004
1955, May 21	"Replaced red glass shade on main light."	USCG Log, summarized by Bob Mackreth, 2004
1957, July 30	"Painting bottom of tower spruce green."	USCG Log, summarized by Bob Mackreth, 2004
1978	The mat foundation was repaired at the northwest and southeast corners where the concrete had severely cracked near the anchor bolts. The corner of the original mat was removed about a foot inside of the crack by drilling a series of closely spaced holes and chipping the concrete away for the full depth of the mat. The mat appears to be unreinforced. Horizontal reinforcing bars were inserted into holes drilled into the chipped surface. The 1915 tapered anchor bolts were exposed, but were apparently not replaced even though they showed signs of rusting. New concrete was cast full depth of the mat.	1978 Photographs of the construction work, Historic Images DI-23 to 30, NPS APIS Archives
1987	Installed chimney cap on Tower	APIS/NPS Business Office File # D3423 – Devils
1989	USCG removes Fresnel lens, VEGA VRB-25 optic installed	"A Devil's Home Coming," APIS Newspaper, 1992
1992	Fresnel lens reinstalled without clockwork or pedestals, resulting in the lens +/-18" lower than the original installation	"A Devil's Home Coming," APIS Newspaper, 1992
1994	NPS replaced lock at Tower	APIS/NPS Business Office File # D3423 – Devils
2003	Lead abatement and painted	LCS, 2009
2004	Interior painted	HSPT Reports, 2009
2009, May	SABIK 350 2-tier LED beacon installed on Tower walkway	NPS Records, 2009
2010, Sept - Nov	Emergency repairs of the lens and lantern include removing and replacing lantern glazing, repairing door, replacing door window and repairs to ventilator system.	Perini Management Services, Inc. Treatment Plan dated 9/17/2010

General Physical Description

The conical Tower is constructed of metal panels that are bolted together and are supported by a concrete foundation and braced on the exterior with a steel skeletal frame. It has an interior cast iron stair and a metal door on the southwest elevation. The original Fresnel lens is in the lantern, though missing its pedestals, and a modern optic, mounted on the railing of the walkway, is used as the light.

Physical Description -- Architecture

Architecture – Roof
The roof is composed of cast iron panels painted red with a ball ventilator at the center with a weather vane. Access to the roof was difficult; assessment relies on photo documentation. (DI-LS-14 and 15)

Architecture – Exterior Walls
The exterior walls of the lantern are cast iron, cylindrical panel segments bolted together.

Architecture – Windows
Five "Port-hole" Style Windows. These windows are brass-framed on the interior and are 1'-3" in diameter. They are original to the structure. (DI-LS-06)

Single-Hung Rectangular Windows. These windows are single-hung, wood framed sash, with an ogee profile, and steel frame on the exterior. They have spring pin catches and are 1'-3" x 1'-10". The windows are original to the structure.

Architecture – Doors
Hatch Door at Lantern. This hatch door is composed of two, pie-shaped, metal plate sections with wall mounted catches and heavy-duty brass hinges. The dimension for each section is 1'-9" x 2'-6". (DI-LS-09)

Door to Watch Room. This door is plate metal with a turn lever and is painted white. The dimensions for the door are 2'-5" x 6'-7" x 3/8". (DI-LS-08)

Entry Door at Base of Tower. This door is made of 1/8" metal plate with rivets, painted gray. The dimensions are 2'-4" x 6'-2" x 3/8" frame with 1/8" plate. (DI-LS-04 and 05)

Architecture – Walk and Railing
There is a diamond plate deck that is 2'-4" wide. Metal rails are located at 7", 2'-3", and 3'-0". The rails are ½" x 2" bar stock. Metal posts are 1 5/8" diameter with ball finials at 4'-0" on center. All metal is painted and original to the structure. (DI-LS-16)

Architecture – Lantern
Cast iron walls rise 3'-2½" from the finished floor and are secured with screwed connections. The exterior panels are cast iron. Five 6½" diameter intake vents in the walls are controlled by brass caps that open as they are turned. There is no evidence of any upper vents at the exterior wall. Glazing is 6'-0" high curved segments with curved brass cross members, 1" x 4", bolted together, forming a lattice 2'-0 ½" on center. The glazing is unmarked and it is believed to have been replaced multiple times (this is consistent with the replacement glazing located in a closet in the second floor of the Assistant Keepers Quarters). Silicone sealant secures the interior. The glazing is held in-place with 1" wide heavy-duty brass stops at the exterior. The brass is bolted to the lattice frame at 6" on center. Brass handles are mounted onto the stops. A shallow, cone-shaped metal deflector, with a +/- 8" diameter vent hole at the center, is suspended +/-18" below the roof. The lantern door is 2'-6" x 5'-5" x 4" with three heavy cast iron hinges. A cross brace was added at some point to the center panel. The entire assembly (with the exception of the glazing and the cross brace) is original to the structure and is painted. (DI-LS-10, 11 and 12)

Architecture – Ceiling Finish
The ceiling finish is sheet metal, painted white with a screened in center to allow ventilation to the exterior ball finial. (DI-LS-13)

Architecture – Floor
The Tower base is a concrete mat foundation.

Architecture – Stairs
The spiral staircase is cast iron, painted gray. There are 75 treads leading to a door at the watch room landing, another eleven treads leading to the landing, and finally a ladder with eight rungs leading to the lantern level. The metal railing is 3'8" above the stair nosing and is 1" in diameter. The ladder railing is 2'above the treads and has a 1" diameter. The stair risers are 8" and the tread depth widens from 3 ½" to 6". (DI-LS-07 and 09)

Architecture – Accessibility
The building is currently not accessible. The south elevation, primary entry door opening is 2'2" clear with a grade to finished floor elevation change of 10 ½" with one 2" tall step at the door and a 5" tall concrete base reached by a 3 ½" tall concrete block step.

Physical Description -- Structural

Structural – Foundation
The foundation system consists of a concrete mat foundation under the Tower bracing and the center cylinder.

Structural – Floor Framing
The floor of the center cylinder is the concrete mat foundation.

The floors of the watch room and lantern are constructed of cast iron plates that are bolted together. The plates are supported on the center cylinder of the Tower. The watch room and lantern are accessed via a spiral cast iron stair in the center cylinder.

Structural – Roof Framing
The roof of the lantern is constructed of cast iron panels that are bolted together. The panels are supported on the walls of the lantern room.

Structural – Wall Framing
The walls of the center cylinder, center column and watch room are metal panels that are bolted together. The walls of the watch room are supported on the watch room floor and center cylinder. The walls of the center cylinder and center column are supported directly on the concrete mat foundation.

The walls of the lantern are cast iron panels that are bolted together. The panels bear directly on the floor of the lantern.

Structural – Lateral System
Lateral stability for the Tower is provided by eight sets of exterior braces and eight sets of interior braces.

Four of the exterior braces were added in 1915 to stiffen the Tower. The 1915 braces extend to the watch room floor and are attached to the center cylinder and watch room floor. They are interconnected with horizontal bracing at the 1/4 point and 2/3 point of the center cylinder. The four original exterior braces extend to the 1/4 point of the center cylinder. The exterior braces are attached to the concrete mat foundation. The eight sets of interior braces run intermittently up the center cylinder connecting the exterior walls to the center column. The bracing is interrupted each time the stair passes through it.

Structural – Load Requirements
The required floor load capacity of the watch room is 40 psf, the required floor load capacity of the lantern is 100 psf and the required roof snow load capacity is 32 psf.

Physical Description -- Mechanical

Mechanical – Plumbing Systems
None in the building.

Mechanical – HVAC
The only mechanical components in the Tower are circular metal passive air vents in the walls and the ball ventilator at the top of the lantern.

Mechanical – Fire Suppression
None in the building.

Mechanical – Other
Two abandoned steel fuel storage tanks remain to the north of the Tower. A 1,000 gallon and a 2,000 gallon fuel storage tank are mounted on concrete saddle-type supports inside a 3’ high concrete containment area that is lined with plastic cloth.

Physical Description -- Electrical

Electrical – System Configuration
The only electrical equipment in the Tower is the USCG's Light Beacon system. This consists of three 12 volt dc batteries that feed power to a LED powered beacon. The system employs a small photovoltaic array mounted on a frame attached to the base of the Tower at approximately 12’ above grade. A second set of liquid filled batteries appears to provide power for a piece of weather-related instrumentation equipment in the Tower.

Electrical – Wiring Devices
None in the building.

Electrical – Conductor Insulation
None in the building.

Electrical – Overcurrent Protection
None in the building.

Electrical – Lighting Systems
None in the building.

Electrical – Telecommunications
None in the building.

Electrical – Fire Alarm System
None in the building.

Electrical – Lightning Protection
There are no air terminals or down-cables associated with the Tower. However, each structural leg of the Tower is grounded at the base via a heavy gauge strap which appears to be connected to a buried ground rod or to the reinforcing in the Tower footings.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs). Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos
The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Adhesives (Multiple varieties of adhesives were seen on windows and penetrations), and,
2. Caulk (Caulking was observed around window and door penetrations, which can also include gasket applications between the window assemblies and the structure).

The assumed ACMs were observed to be in good condition.

Hazardous Materials – Lead Containing Paint
It is reported by the NPS Historic Structure Preservation Team that lead abatement was completed by maintenance personnel on the Devils Island Tower in or about 2003. The LCP removal process is reported to have been accomplished using abrasive blasting techniques. Detail regarding the specific means and methods, engineering controls and surface preparation techniques are not presently available. Based on project experience at other sites, there remains a potential for remnant and detectable lead to be present on the exterior surfaces of the Tower.

Detectable lead is assumed to be present in:

1. Interior Painted Surfaces, and,
2. Exterior Painted Surfaces.

Paint chip debris was noted in soils surrounding the Tower.

Hazardous Materials – Lead Dust

Surface wipe-sampling for lead dust was not conducted in the Tower because it is a noninhabited structure.

Hazardous Materials – Lead in Soils

Historical paint maintenance activities such as manual scraping, power-washing, sanding, abrasive blasting or the historical condition of exterior LCP may have created the potential to impact the surrounding soil. Areas of the surface soils adjacent to the structure were observed to have LCP debris, which may be sourced from historical operations or maintenance. Additional adjacent areas may also exhibit LCP debris or lead-contaminated soils, but are not observable.

Vegetative cover in the area is sparse and there exists a potential that this may be associated with lead-contamination in near-surface soils. Preliminary lead-in-soil sampling was performed to assess whether these near-structure soils contain lead concentrations above applicable soil standards.

One four aliquot soil sample was collected from ground surface adjacent to the concrete footings and a second composite sample was collected approximately five feet from the footings of the Tower.

1. Analysis of the composite soil sample collected adjacent to the footings resulted in 8,379 milligrams of lead per kilogram of soil (mg/kg).
2. Analysis of the composite soil sample collected from approximately five feet from the footings resulted in 8,615 mg/kg.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was not visually identified in the Tower.

Character Defining Features

Mass/Form. Cast iron conical Tower with exterior bracing, painted white with black accents and trim.

Exterior Materials. Cast iron panels.

Openings. A mix of small port hole openings, rectangular casements and diamond pattern glazing at the lantern.

Interior Materials. Exposed cast iron panels.

General Condition Assessment

In general, the Devils Island Light Station Tower is in good condition with the exception of the foundation (see structural assessment below).

Structurally, the Light Station Tower is in fair condition. The cracked mat foundation needs further investigation to determine if the cracks and deterioration are structurally significant.

Mechanically, the passive air vents at the top of the Tower are in fair condition.

Electrically, the Tower has no alternating current systems.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
<u>Condition:</u> *Good*
The cast iron roof is in good condition with the exception of peeling paint.

Architecture – Exterior Walls
<u>Condition:</u> *Good*
The exterior cast iron wall panels and metal cylinder panels are in good condition.

Architecture – Windows
<u>Condition:</u> *Good to Fair*
Five "Port-hole" Style Windows. These windows are in good condition.

Single-Hung Rectangular Windows. These windows are painted shut. Also, the pins are heavily painted and sluggish.

Architecture – Doors
<u>Condition:</u> *Good to Fair*
Hatch Door at Lantern. This pair of doors has minor paint deterioration.

Door at Watch Level. This door has minor paint deterioration and minor rust.

Entry Door at Base of Tower. This door has minor paint deterioration, minor rust and is missing mortise hardware.

Architecture – Walk and Railing
Condition: *Fair*
The metal decking, rails, and posts are in fair condition with red paint appearing beneath the most recent white paint layer.

Architecture – Lantern
Condition: *Poor*
The lantern glazing was repaired in 2009. Paint is peeling from the lattice structure at the exterior and the lower level of the interior. Rust stains indicate that wind-driven rain or condensation has probably entered the base of the lattice structure and rusted the steel plates. One handle is missing and some screws on the exterior have been sheared off. The intake vents at the lantern level are no longer operational due to caulking.

Architecture – Ceiling Finish
Condition: *Good*
The sheet metal ceiling is in good condition though it has pulled away in several locations. This does not appear to be reflective of exterior issues but perhaps is due to the Fresnel lens reinstallation.

Architecture – Floor
Condition: *Fair*
The concrete floor is in fair condition as the base and steps have large cracks (see structural assessment of foundation).

Architecture – Stairs
Condition: *Good*
This spiral staircase is in good condition.

Architecture – Accessibility
Condition: *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
Condition: *Unknown*
The visible portion of the foundation is in poor condition. The top surface of the mat is heavily cracked and the surface has started to deteriorate (DI-LS-17 and 18).

Structural – Floor Framing
<u>Condition:</u> *Good*
The floor inside the center cylinder is in good condition. The floors of the watch room and lantern are in good condition.

Structural – Roof Framing
<u>Condition:</u> *Good*
The roof of the lantern is in good condition.

Structural – Wall Framing
<u>Condition:</u> *Good*
The walls of the center cylinder, center column, watch room and lantern are in good condition.

Structural – Lateral System
<u>Condition:</u> *Fair*
Lateral stability of the Tower is fair. Cracking of the mat foundation could be affecting the performance of the exterior braces.

Structural – Load Requirements
<u>Condition:</u> *Good*
The roof and floor framing have adequate capacity to support the required loads.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems and Fire Suppression
<u>Condition:</u> *N/A*

Mechanical – HVAC
<u>Condition:</u> *Fair*
The passive air vents at the top of the Light Station Tower are in fair condition, but do not provide adequate ventilation to prevent condensation.

Mechanical – Other
<u>Condition:</u> *Poor and Fair*
The two abandoned fuel storage tanks to the north of the Tower are in poor condition. The plastic lined fuel containment system is in fair condition.

Condition Assessment -- Electrical

Electrical – System Configuration
<u>Condition:</u> *Good*
There are no alternating current electrical systems inside the Tower, but the USCG-owned LED Beacon Light equipment is in good condition.

Electrical – Conductor Insulation, Wiring Devices, Overcurrent Protection, Lighting Systems, Telecommunications, and Fire Alarm System
Condition: *N/A*

Electrical – Lightning Protection
Condition: *Fair to Poor*
Lightning protection systems for the Tower are intact and appear to be in fair condition, however over time, connections deteriorate and components corrode. The integrity of the system cannot be assured. One of the supplemental ground connections at one leg of the Tower appears to be loose.

Condition Assessment -- Hazardous Materials

Refer to 'Physical Description -- Hazardous Materials' for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Tower was constructed in 1898 and its skeletal steel bracing was added in 1915. The Fresnel lens was installed in 1901 and the light was automated in 1978. In 1989, the Fresnel lens was removed from the Tower by the USCG, but in 1992 it was reinstalled by the NPS.

The Tower is currently interpreted by guided visitor tours. The proposed use for the Tower is to continue this type of visitor access with an emphasis on rehabilitating the historic structure. Note that the park has recently completed an emergency stabilization project for the Fresnel lens and lantern.

Rehabilitation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the rehabilitation of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Severe*
Scrape and prep areas of rust and repaint the roof. Clean the dirt and debris blocking the ball ventilator.

Architecture – Exterior Walls
Priority: *Moderate*
Scrape and prep areas of rust and repaint the walls. Maintain operation of all ventilation components.

Architecture – Windows
Priority: *Moderate*
Restore operation to the single-hung rectangular windows, which have been painted shut, to enhance ventilation within the Tower. Scrape, sand and repaint.

Architecture – Doors
Priority: *Moderate*
Install missing hardware in-kind at the entry door at the base of the Tower and remove the rust from the cast components. Repaint all doors. Verify operation of all ventilation components.

Architecture – Walk and Railing
<u>*Priority:*</u> *Moderate*
Repaint metal decking, rails and posts. Investigate alternatives to discretely upgrade the existing railing to become a code compliant guardrail.

Architecture – Lantern
<u>*Priority:*</u> *Low*
Remove rust and patch the wall as required. Maintain proper operation of all wall ventilation components.

The following is based on the 9/17/2010 Perini report and would require the lantern to be brought off site: *Remove astragals and clean by mechanical methods; remove glass panes; clean lantern frame by mechanical methods, vacuum putty; apply butyl tape to lantern frame; install new glass panes; apply a top layer of butyl tape; install astragals and seal using a wet silicone caulk; replace sheared and damaged fasteners; pressure test the lantern using water; replace Plexiglas indoors with cured glass pane; and, realign door and frame to allow proper operation and fit.*

Architecture – Ceiling Finish
<u>*Priority:*</u> *Low*
No recommendations at this time.

Architecture – Floor
<u>*Priority:*</u> *Low*
No recommendations at this time.

Architecture – Stairs
<u>*Priority:*</u> *Low*
No recommendations at this time.

Architecture – Accessibility
<u>*Priority:*</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
<u>*Priority:*</u> *Unknown*
Surface cracking of the mat foundation indicates that the concrete mat may be deteriorating. The cracking may also be leading to corrosion or loss of uplift capacity of the anchor bolts. The condition of the concrete and the anchor bolts should be evaluated further.

Structural – Floor Framing
<u>*Priority:*</u> *Low*
No recommendations at this time.

Structural – Roof Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Wall Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Lateral System
<u>Priority:</u> *Low*
Lateral stability of the Tower should be evaluated further due to the cracking of the mat foundation.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems and Fire Suppression
<u>Priority:</u> *N/A*

Mechanical – HVAC
<u>Priority:</u> *Moderate*
The existing passive air vents at the top of the Tower do not provide sufficient ventilation to prevent condensation and high humidity levels inside the structure. Additional passive ventilation is recommended. Remove and clean dirt and debris from the ball ventilator; reinstall.

Treatment Recommendations -- Electrical

Electrical – System Configuration
<u>Priority:</u> *Low*
No recommendations at this time.

Electrical – Conductor Insulation, Wiring Devices, Overcurrent Protection, Lighting Systems, Telecommunications, and Fire Alarm System
<u>Priority:</u> *N/A*

Electrical – Lightning Protection
<u>Priority:</u> *Moderate*
Existing lightning protection is old and its effectiveness has not been established. It is recommended that a LPI (Lightning Protection Institute) certified inspector perform an inspection of the lightning system and provide findings and recommendations in accordance with LPI-175.

Treatment Recommendations -- Hazardous Materials

Hazardous Materials – Asbestos
<u>Priority:</u> *Low*
Recommend sampling of suspect asbestos containing materials, including caulking and adhesives.

Hazardous Materials – Lead-Containing Paint and Lead Dust
<u>*Priority:*</u> *Moderate*
Recommend stabilization or abatement of Lead-Containing Paint. Wipe sampling for lead dust is not recommended.

Hazardous Materials – Lead In Soils
<u>*Priority:*</u> *Moderate*
Recommend further soils characterization to confirm applicable regulatory requirements.

Hazardous Materials – Mold/Biological
<u>*Priority:*</u> *Low*
No recommendations at this time.

Alternatives for Treatment

The following are several considerations of alternatives for the proposed treatments:

1. If it is decided to allow public access to the catwalk, careful study will be needed for introducing a code compliant guard rail at the Tower walk that will not be visually disruptive to the historic character nor be a long term maintenance burden for park staff.
2. The park may want to reconsider having the public's contact with the fragile Fresnel lens area.
3. An alternative to be reviewed is to call for the installation of the missing pedestals to accurately portray the relationship of light: lantern heights. However, the complexity and cost associated with this should be weighed against the integrity of the interpretation.

Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Additional Hazardous testing and mitigation	Mitigation of hazardous material may require removal of historic materials.	Any mitigation will need to be evaluated for benefit and implemented sensitively to minimize damage to the resource.	- Improves safety for visitors and staff - Removes hazards from the cultural resource
2. Addition of ventilation elements	Intrusions to the historic character of the Light Station Tower.	Integrate additional louvers carefully to minimize damage to historic fabric.	- Improves ventilation in tower which helps preserve the historic elements from excessive moisture
3. Adding a code compliant guardrail at the Light Station Tower	Visually disruptive to the historic integrity of the Lighthouse.	Design a guardrail to be as 'invisible' as possible as viewed from the ground.	- Improves safety for visitors and staff
4. Removal of the lantern as outlined in the Perini report of 9/17/2010	Community will be concerned with the lantern/lens removal, even if for repairs. Concerns of possible damage during removal.	Evaluate all alternatives to determine if removal is required. If removal is needed, a strategy and schedule would need to be developed and vetted with park staff input.	-Removal would allow repairs in a controlled environment
5. Foundation mitigation	Investigating and installing new foundation elements and/or reinforcing existing will disturb the original historic fabric.	Evaluate benefit of invasive foundation repair versus the risk of continued/future damage to resource.	-Repair of the foundation will help protect the resource

Light Station Tower Photographs, 2009

DI-LS-01: North elevation, 2009 (Source: AH DSC00867)

DI-LS-02: Lantern, 2009 (Source: AH IMGP2878)

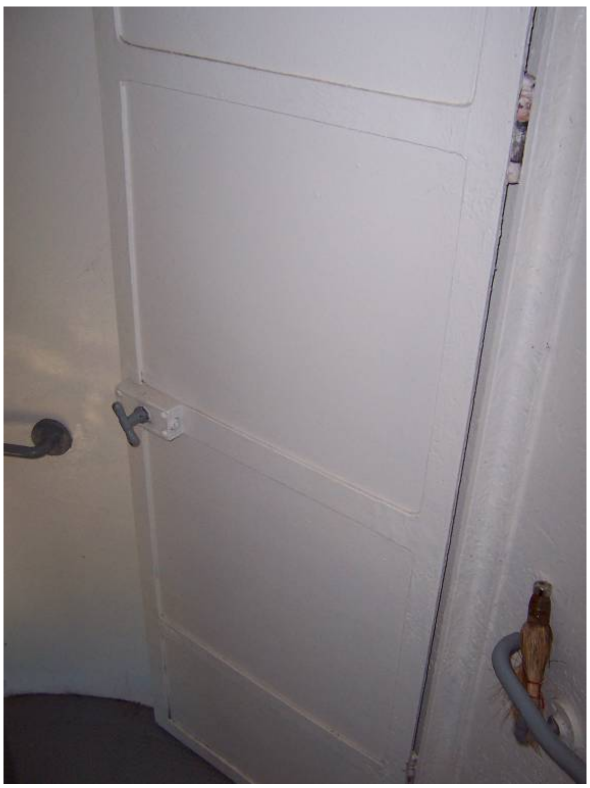
DI-LS-03: Entry and foundation (Source: AH DSC00945)

DI-LS-04: Entry door (Source: AH 100_9715)

DI-LS-05: Entry (Source: AH DSC00948)

DI-LS-06: Porthole style window (Source: AH 100_9711)

DI-LS-07: Stair, looking down (Source: AH DSC00853)



DI-LS-08: Door to watch room (Source: AH 100_9712)

DI-LS-09: Stair and hatch from service level to lantern (Source: AH 100_9708)

DI-LS-10: Lantern and glazing (Source: AH 100_9701)

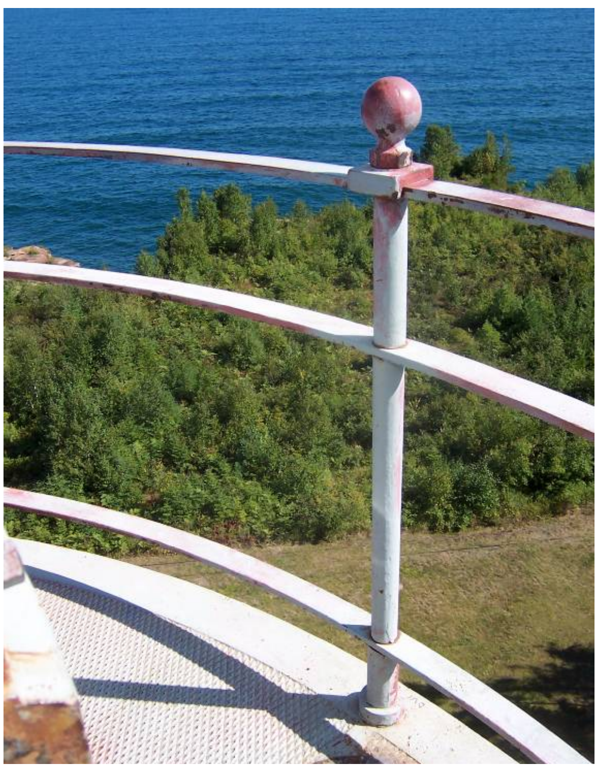
DI-LS-11: Glazing detail (Source: AH 100_9706)

DI-LS-12: Lantern door (Source: AH 100_9705)

DI-LS-13: Lantern ceiling (Source: AH 100_9702)

DI-LS-14: Lantern roof (Source: AH IMGP2862)

DI-LS-15: Lantern roof, glazing and trim detail (Source: AH IMGP2875)



DI-LS-16: Lantern walkway and railing (Source: AH 100_9704)

DI-LS-17: Severe cracking of mat foundation (Source: Martin/Martin)

DI-LS-18: Cracking of mat foundation (Source: Martin/Martin)

KEEPERS QUARTERS

Chronology of Alterations and Use

Original Construction

The Devils Island Keepers Quarters was constructed as a brick, single-family residence in 1891. Its style is an eclectic mix of Queen Anne, Richardsonian and Shingle Style all popular during the late 1800s. During the United States Coast Guard (USCG) Period (1939-1969), the building was used for offices and a bunkhouse.[30]

Significant Alterations / Current condition

As a consequence of its long-term occupation and varying uses, the Keepers Quarters underwent fairly extensive interior remodeling and some exterior changes that have altered its original character. From historic photos, it is clear that all of the original windows in the Keepers Quarters were replaced and the attic window opening was altered. By 1979-1980, the oval window on the west façade had been removed and replaced with a simple rectangular casement window. (Historic Image DI-21*)* Today, the oval window has been recreated. Historic photos also indicate that the kitchen entry had a shed roof (wood) and was sided with vertically oriented wood siding, circa 1901 (Historic Images DI-05 and 06*)*.

Historic drawings include the original construction set, plans and sections (April 1891); a plan of the remodeling of the Keepers Quarters (June 4, 1946); the existing sanitary facilities, details and diagrams of the flashing, dormers, and plumbing (March 30, 1965); and, USCG-era plans and elevations of the existing conditions. (Historic Drawing DI-02, 18, 21 to 23) The plan to remodel the second floor of the Keepers Quarters in 1946 was apparently never executed. The plan calls for turning the east bedroom into a kitchen, removing the hall and southwest bedroom's shared wall to create a larger bedroom, and changing what is currently the bath into a closet. These plans were meant to convert the quarters into a duplex but no physical evidence supports this design. (Historic Drawing DI-18)

Alterations to the Devils Island Keepers Quarters also include the recent rehabilitation that occurred in the past eleven years and was performed by the Historic Structure Preservation Team at the National Park Service. This includes a cedar shingle reroofing in 2007, replacement of the kitchen flooring, and rehabilitation of the foundation drain.

Many of the mechanical systems in the Keepers Quarters were installed in the 1940s by the USCG. Some of the systems have also been upgraded since the USCG occupation to allow for seasonal housing of park employees and volunteers. Some of the 1950s water and heating systems remain in place, although they are no longer functional.

At the time of construction, minimal electrical lighting and distribution was included. The building was remodeled, including new electrical, in 1928. In 1962, the USCG rehabilitated the building for full time occupancy, updating some electrical systems and adding a fire alarm system.

Currently, the building is in fair condition.

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[30]List of Classified Structures, National Park Service, 2009, And, Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008.

Summary of Documented Work on the Building

Date	Work Described	Source of Information
Annual Report for 1891	*"Devils Island, Apostle Group, Lake Superior, Wisconsin.* - The act approved March 2, 1889, appropriated $15,000 for building a light station..." Repeated in 1892.	"1891 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
1928	Building rehabilitated, including new electrical system	1928 Electrical Plan
1931	Bathtub installed by Keeper	Historic Drawing
1946	Plans show reconfiguration of second floor with installation of cabinets and a sink from Michigan Island – no evidence that the work was completed	1946 Historic Drawing
1952, June 20	June 20: "Painted quarters."	USCG Log, summarized by Bob Mackreth, 2004
1952, September 29	"Repaired porches on dwellings for painting. Painted #1 dwelling porch."	USCG Log, summarized by Bob Mackreth, 2004
1953, May – June	May 21: "Making new window for hallway in building." June 16: "Installed telephone communication system between dwellings and signal."	USCG Log, summarized by Bob Mackreth, 2004
1953, August - September	August 6: "Repaired crack plaster in office." September 16: "Layed(sic) linoleum in upper hallway."	USCG Log, summarized by Bob Mackreth, 2004
1953, November 5	"Installed meter in supervisor alarm system."	USCG Log, summarized by Bob Mackreth, 2004
1955, May	May 13: "Installed new windows in barracks #1 and signal building." May 30: "Removed all steel kitchen cabinets from dwelling that is not in use and transferred some to CG4o521 for transfer to other units."	USCG Log, summarized by Bob Mackreth, 2004
1955, October - November	October 27: "Installed eave trough and downspout on front of barracks." November 3: "Painted red stripe at location of all fire extinguishers in barracks." November 28: "Begin installing 'Marlite' tile in barracks bathrooms."	USCG Log, summarized by Bob Mackreth, 2004
1962	USCG installed fire alarm system and updated electrical system in Keepers Quarters and shed addition to the south side of the Fog Signal Building-built open sided, enclosed by 1994	Historic Drawing DI-03, 1962 and Park Admin. Files D3423
1963-1965	Rehabilitated by USCG, including updating electrical system and installing a fire alarm system	1963 Historic Drawing DI-04
1966	Second floor shed dormer added; new kitchen vestibule; first floor bath remodeled; new kitchen sink and cabinets; dropped ceilings installed; 2x4 furring at some exterior walls; new glass block window; new windows, doors and flooring; new light fixtures; small, south-facing window in original kitchen bricked-in; original kitchen renamed as television room for USCG staff.	1965 Sanitary Facilities Drawing and USCG Photo Collection, APIS Archives
1966-1977	Original oval window on east side of Keepers Quarters replaced with rectangular window.	USCG Photo Collection, APIS Archives
1966-1978	Hallway constructed between second floor bedrooms to access bathroom. Door in west wall of east side second floor bedroom eliminated. Door between what was originally the dining room	S. Mackreth, 2011

Date	Work Described	Source of Information
	and later became a bedroom, which it remains today, and the original kitchen, which became the TV room on the 1965 plans (see 1966 entry), was eliminated.	
1971	New roof installed; changed from tiles to shingles. In 1979, labeled as 'red asphalt shingles at roof' in Park Admin Files D3423.	Work Order #5600-71, USCG Photo Collection, APIS Archives
1979	Exterior repointed and painted	Park Admin. Files D3423
1981	Sewer and septic system installed, replaced an earlier version that was not original to the building, and fire retardant installed on the roofs of the Keepers and Assistant Keepers Quarters	1981 Mechanical Plan and Park Admin. Files D3423
1984	Cyclic maintenance of seven buildings including repointing brickwork, painting trim, and reglazing windows	Park Admin. Files D3423
1991	Stabilization of Keepers and Assistant Keepers Quarters by Williamsport Preservation Training Center	Park Admin. Files D3423
1992	Three doors hung in the Keepers Quarters after restoration/reconstruction by Williamsport Preservation Training Center	Park Admin. Files D3423
1993	Door knobs and locks installed on both the Keepers Quarters and Assistant Keepers Quarters	Park Admin. Files D3423
1997	Installation of shark-hook type rain gutters on the Keepers Quarters	Park Admin. Files D3423
2007	Reroofed with cedar shingles	HSPT Reports, 2009

Other Documented Work on the Building

Date Range	Work Described
c.1920	'BX' and 'Romex' electrical cables installed
c.1950	New heating and water systems installed
Pre-1979	Red asphalt shingles at roof
Pre-1980	South entry rebuilt with concrete masonry unit foundation and gable roof form replaced shed roof
Pre-1980	Porch screening removed
Unknown	Porch floor and joists replaced
Post-1991	Oval window reconstruction
1998-2009	Replaced kitchen flooring
1998-2009	Rehabilitated foundation drainage

General Physical Description

This building is a two-story brick single-family residence with an eclectic mix of architectural influences of the period. It is oriented to the north. The roof is asymmetrical with a central gable and dormers. There is an arched recessed entry porch on the north elevation, a one-story kitchen appurtenance on the south as well as a one level kitchen entry addition. There are four rooms on the first floor and three on the second floor.

Physical Description -- Architecture

Architecture – Roof

This roof is composed of cedar wood shingles with wood ridge caps and is reported to have been reroofed in 2007. The shingles have a 5” exposure and the roof has tie-off rings installed at the ridge, though they do not appear to comply with OSHA requirements. There is 1x open sheathing that has about 2” gap every third row. The south appurtenance has older cedar shingle roofing. There is a flashing combination of contemporary, prefinished red flashing drip edge at the eave, reinstalled modern step-flashings, and reinstalled flashing at the south dormer. (DI-KQ-05 and 32) The eave consists of a boxed soffit with ogee trim at the frieze board and fascia and extends +/-10”. All are wood painted white.

Architecture – Gutters and Downspouts

No gutter system currently exists on this building. There is one fluted downspout at the northwest corner of the entry porch. (DI-KQ-06) A previous gutter, possibly the original Yankee gutter, indicated on the construction drawings, appears to have been removed with the recent reroofing. This is evident due to the patched cornice trim +/- 12” long at the top of the downspout. In various historic photos, there are two downspouts evident – one on the east façade (c. 1893) and the other on the west façade (c. 1920) at the front porch. In both 1893 and 1904, a horizontal line above the eave indicates the original gutter as a yankee gutter. (Historic Images DI-01 and 09)

Architecture – Chimneys

There are two brick chimneys matching the exterior walls, one on the east façade and the other on the west. Each chimney has a cast concrete cap piece that is original to the chimneys. The corners of the chimneys utilize the rounded brick, similar to the house. (DI-KQ-07 and 08)

Architecture – Exterior Walls

The exterior walls are predominantly brick with the upper gable portions infilled with recently-installed chamfered wood shingles and contemporary 8” aluminum siding at the south dormer, east-facing gable end wall and south entry addition. Note that the shingled gables were previously also of aluminum 8” siding. It is assumed that the reintroduction of shingles is from the NPS era. The foundation of the southern addition is newer 8” concrete masonry block. The brick detailing is fairly elaborate with running bond and every sixth course a header bond. Two belt courses of corbelled brick occur at approximately the second floor level which delineates the lower portion of the wall from the upper, the former having more elaborate detail including a soldier course at the top and a “dentil” type of flared header brick work by way of alternating curved and standard bricks. The corner bricks at the first floor and basement levels are rounded as are the upper portions of the chimney’s lower bricks, but not the second floor level’s corner bricks. The second floor headers are flared but do not include the alternating curved bricks. The porch overhang’s east opening utilizes the alternating curved bricks. The north gable has corbelled bricks at either side of the window. There are two oval windows with a brick keystone at the top and bottom. The window sills at the basement are cast concrete while the first and second floors’ sills are rough brownstone with a vertical tooled, sloped chamfered edge. There are two openings with infill brick – one at the south addition and one at the living room.

A mortar sample taken at the east wall reveals that the composition of the original mortar is two parts sand to one part lime by volume, with moderately coarse sand. A sample at an area of recent repointing at the entry porch indicates that Portland cement was added to the lime and sand, suggesting that the repointing occurred in the late twentieth century.

Architecture – Windows

Oval Windows. There are two fixed, multi-lite oval windows located on the second floor. The original oval window on the east side of the building was replaced, c. 1966-1977 with a rectangular window. (Historic Images DI-01, 06 and 21) In 1991, from a note on a HABS drawing, a reconstructed oval window was installed. (DI-KQ-09, 28 and 31)

Attic Windows, Rectangular. There are two fixed sash at the attic level with approximate dimensions of 2'-0" x 1'-4". These windows are located on the west and east facades. The original, multi-lite (oriented horizontally) attic windows were wider than the current windows, according to historic photos and original drawings.

Basement Windows. There are three louvered wood vents at the basement level, painted white. Behind these nonhistoric wood louvered vents are three- and five-lite painted awnings with inset rounded profiles on their muntins. These windows appear to be the only original windows in the building.

Predominant Windows. This type of window is one fixed sash over one painted awning sash. The upper sash is larger than the lower sash. The windows are set in segmented brick arches with stone sills, have wood frames, and brick molding. The interiors are typically trimmed out in gypsum board returns and two of the windows have metal screens. All of the windows and trim are nonhistoric. Historic photos and original drawings appear to indicate eight- and ten-lite over two-lite double-hung and/or eight- over eight-lite and ten- over ten-lite double-hung as the predominant window at both levels (Historic Image DI-06).

Architecture – Exterior Doors

Main Entry Door and Screen Door. The entry door is original with five raised wood panels, stone sill, and two ball-tipped hinges. The exterior face is painted while the interior face is varnished. The door has contemporary hardware and brick molding around the exterior face. The interior has is shaped, decorative 5 ½" wood trim with a plinth block at the door's base and a rosette corner block trim. The door is 3'-0" x 6'-10" x 1 ¾". (DI-KQ-13 and 14) The entry's associated screen door is an aluminum framed door with three panels: aluminum at the lowest panel, glass at the middle panel, and screen at the upper, largest panel. Three screen doors, including this one, were hung in 1992 after the restoration/reconstruction project. In 1993, knobs and locks were installed.

Kitchen Entry Vestibule Door and Rear Door. The kitchen entry's vestibule at the back of the house has a painted, wood-framed screen door. The rear door that leads into the quarters from the vestibule is a hollow core door with three rectangular windows stair-stepped across the upper third of the door. Neither doors' hardware is original, but the screen door appears to be historic.

Basement Access Door. Two plywood panels with face-mounted hinges and padlock, painted blue. (DI-KQ-17)

Architecture – Exterior Trim

All trim is covered in other sections.

Architecture – Exterior Entry Porch

This porch has a wood floor with tongue and groove decking with a ¼" round base shoe at the brick wall junction (both floor and trim painted blue-gray). The floor does not appear to be original as the joist pockets, which can be seen and the level of the previous porch, may have been higher as indicated by the paint line. The porch was once screened-in. The wood stairs are contemporary and made of 2x12 treads, riser height between 4 ¼" and 7 ¾", and a loose 2x4 wood handrail. The porch's brick knee wall is capped

with painted brownstone. Underneath the porch is a black membrane attached to the exterior masonry wall. Sand and previous roofing debris has collected in the space. (DI-KQ-11 and 12)

Architecture – Basement Hatch

The side walls of the hatch are red brick and are separate from the house walls (not toothed into the original wall). The door frame is a stone ledge, the frame itself is wood (painted), and the double hatch doors are plywood (also painted). From original drawings and historic photos, the hatch location is original to the building, though the wood elements have been replaced through the years. (DI-KQ-10)

Architecture – Interior Doors

Historic Doors. This type of door is original with two vertical over one horizontal over two vertical raised panels. The doors have shaped, decorative 5 ½” wood trim with two hinges with acorn tips, modern hardware, and are painted. There are three historic doors on the first floor and one on the second floor. The first floor doors are 2’-10” x 6’-8” x 1 ¾”, while the second floor door is 2’-8” x 6’-10” x 1 3/8”. The original door to the first floor bedroom had a paint sample taken that showed the original coat of the door was a golden varnish. (DI-KQ-27)

Nonhistoric Doors. This type of door is hollow-core, wood veneer, and is in a variety of sizes with a variety of modern trim treatments (chamfered wood casing, frp, etc.). (DI-KQ-22)

Architecture – Wall Finishes

Basement. The two rooms in the basement both have exposed brick walls, unpainted.

Entry, Living Room, and Second Floor Hall. These three rooms all have nonhistoric 4x8 fiberglass reinforced plastic (frp) “wood” wall paneling. The entry and hall at the stair location also have 3 ½” historic beadboard wainscot with an elaborately shaped 3” chair rail at the top. Both the wainscot and beadboard are painted, but a paint sample from the entry wall shows that the beadboard originally had a golden varnish. The closet accessed from the second floor hall has the historic wall finish of painted plaster over lath.

Kitchen and Kitchen Vestibule. The kitchen has nonhistoric gypsum board walls painted peach with 4 ¼” x 4 ¼” nonhistoric pink ceramic tile surround on parts of north, east, and west walls. The kitchen vestibule has plywood that is plastered and painted on all walls except the north wall, which is painted brick. This room in its current state is not original to the building as a historic photo pre-1904 indicates a simple shed appurtenance at this location.

First Floor Office. This room has plaster over brick on the north and west walls. The south and east walls are also plaster.

First Floor and Second Floor Baths. Both baths have nonhistoric gypsum board walls with 4” x 4” nonhistoric pink ceramic tile wainscot and shower surround.

First Floor and Second Floor Bedrooms (One on First Floor, Three on Second Floor). All of the bedrooms have nonhistoric gypsum board walls that are painted. The closets for the south bedrooms located on the second floor are also nonhistoric gypsum board. The closets for the first floor bedroom and the second floor north bedroom have historic plaster over lath. A material sample taken at one of these closets indicates the plaster was a mixture of gypsum and sand rather than the typical mixture of lime and sand. The first floor bedroom closet also has historic 3 ½” wide beadboard with a simple 2 ½” cap rail, painted green. The east wall of the closet is missing the cap rail.

Architecture – Ceiling Finishes

Basement. The two rooms in the basement do not have ceiling finishes. The first floor framing system is exposed.

Entry, Living Room, First Floor Bedroom, and Second Floor Hall. These four rooms have nonhistoric acoustic lay-in ceiling tiles. The dropped ceilings, covering the historic ceiling finishes and original ceiling heights, may indicate poor plaster condition of the original ceiling. Each room's acoustic ceiling tiles are white but differ from each other in size and style. They were most likely installed during the USCG era of occupation. The second floor hall's closet has a ceiling finish that is the original plaster over lath. The first floor bedroom closet has the original ceiling height but the finish is covered by a wood panel.

Kitchen and Kitchen Vestibule. The kitchen has a contemporary dropped-ceiling finished with ceiling tiles, 1'4" square and painted white. The kitchen vestibule has a plywood ceiling painted yellow.

First Floor Office. This room has the original plaster over lath ceiling.

First Floor and Second Floor Baths. Both baths have nonhistoric gypsum board dropped-ceilings.

Second Floor Bedrooms (Three). All of the second floor bedrooms and closets, except for the southeast bedroom and closet, have historic plaster ceilings at their original heights. The southeast bedroom and closet have nonhistoric dropped gypsum board ceiling finishes. The north bedroom's closet ceiling finish is covered by paper apparently to mitigate a flaking paint and plaster issue.

Architecture – Interior Trim

Entry. The only trim in this room is the simple wood base shoe trim, painted yellow, along the base of the wainscot. The trim may be historic.

First Floor Office. This room has the only original wood base trim in the building. It consists of an ogee profile base 10 ½" high, with a simple wood base shoe. Both are painted white, but a paint sample has shown that the wood originally had a golden varnish.

Kitchen and Kitchen Vestibule. The kitchen has a very simple wood base trim and base shoe along parts of the north and east walls. The rest of the room has only the wood base shoe with glue and paint remains suggesting resilient base at one point. No trim in the kitchen is original to the building. The kitchen vestibule has a nonhistoric wood base-shoe located along all of the walls except for the north exposed brick wall.

First Floor and Second Floor Bedrooms (one on first floor, three on second floor). These four bedrooms have a modern, simple wood base and base shoe, all painted white. The only closet associated with a bedroom that has any trim is the second floor's north bedroom closet. This closet has some historic base with no base shoe and some of the same modern base that its bedroom contains.

Second Floor Hall. This room has the same original wood base trim, painted white, as is in the office, but without the base shoe, in partial sections. Where the original trim is not located, a simple modern base and shoe was installed, matching the height of the original. (DI-KQ-29) The closet associated with the hall also has the historic wood base without the shoe, but it is stained, not painted. A paint sample of the original trim has also identified that the original coat was a golden varnish.

Architecture – Floor
Basement. The two rooms in the basement both have concrete slab-on-grade floors that are original to the building.

Entry, Living Room, Office, First Floor Bedroom, Second Floor Hall, Second Floor Bedrooms. These eight rooms have nonhistoric resilient flooring in a variety of colors and styles. The 1962-1965 historic drawing from the USCG period identifies the first floor Bedroom's flooring as ¼" underlayment with vinyl flooring. The second floor flooring is labeled as ¼" masonite underlayment with 12"x12" vinyl asbestos floor tile. (Historic Drawing DI-20) The flooring in the first floor bedroom's closet is the original wood flooring (3 ½" wide boards), painted blue-gray.

Kitchen and Kitchen Vestibule. The kitchen has nonhistoric resilient flooring in a checkered pattern. The 1962-1965 historic drawing from the USCG period identifies the kitchen flooring as vinyl over ½" plywood. (Historic Drawing DI-20) The kitchen vestibule has nonhistoric resilient beige 9" tiles as flooring.
First Floor and Second Floor Baths. Both baths have nonhistoric resilient flooring in a mosaic pattern. The 1962-1965 historic drawing from the USCG period identifies the bathrooms' flooring as vinyl tiles over ¼" underlayment. (Historic Drawing DI-20)

Architecture – Stairs
First Floor to Basement Stairs. These stairs are wood with rubber grips on treads attached at the nosing with a metal bar. The stairs have a partial handrail that is a metal pipe painted yellow. There are nine risers at 8" high and one riser at the bottom that is 1'-2" high. The tread depth is 10 ¼" with a 1" nosing. These stairs are original to the building. (DI-KQ-15)

Kitchen Exterior and Interior Stairs. The exterior portion of these stairs is made of concrete (three risers), while the interior portion is made of wood with metal diamond plate nailed to the top of the treads (seven risers). There are no handrails. The exterior concrete portion of the stairs is nonhistoric, and it is likely that the interior is also nonhistoric. (DI-KQ-23 and 24)

First Floor to Second Floor Interior Stairs. These stairs are painted wood with rubber grips on treads attached at the nosing with a metal bar. The balusters, handrail, and newels are painted wood and appear to be original to the building. (DI-KQ-18)

Architecture – Casework
Kitchen. The kitchen has two sections of built-in nonhistoric base and wall cabinets along the west and north walls. The west wall's cabinets have a stainless steel countertop, while the north wall has a laminate countertop. (DI-KQ-21)

First Floor Bedroom's Closet. This closet has two segments of historic door casing acting as hook racks. Also, the closet contains a built-in painted wood shelving unit.

Second Floor Hall. Located along the south wall, there is a built-in attic ladder made from the 3 ½" wide beadboard placed horizontally, as was used elsewhere in this building.

Note that the 1946 plan called for Michigan Island cabinetry to be installed on the second floor. (Historic Drawings DI-17) Michigan was automated in 1943, signaling the end of the keepers' residency on the island, and therefore the interior finishes in the Keepers Quarters were no longer needed. It is unknown whether the cabinetry was installed at Devils, but due to on-site observation of window size, sill height, chase, and radiator all in-situ, it is unlikely it ever occurred.

Architecture – Accessibility
The building is currently not accessible. The north, primary entry door opening is 3'-0" clear with a grade to finished floor elevation change of 1'-11 ½" with five 5 ½" tall steps to the porch, then a 10" step to the door threshold. The south (Kitchen entry) door opening is 3'-0" clear with a grade to finished floor elevation change of 1'-8 ¾" with three stairs. The bottom stair is 8" tall, the middle stair is 5 ¾" tall, and the top stair is 7" tall. Within the building, no upgrades for accessibility have been completed.

Physical Description -- Structural

Structural – Foundation
The perimeter foundation system consists of brick masonry. The interior foundations are below interior brick masonry walls and could not be observed.
Structural – Floor Framing
The basement floor is a concrete slab-on-grade.

Framing for the front porch was measured to be 2x10 joists spaced at about 18". The joists span approximately 11'. The joists are supported on the brick perimeter walls. The porch is sheathed with 1x4 tongue and groove decking.

The first floor framing was measured to be FS 2x10 joists spaced at about 16" to 18". The joists span approximately 11' in the kitchen and 14' to16' in the remainder of the first floor. The joists are supported on the perimeter foundation walls and interior brick masonry walls. The floor is sheathed with diagonal, solid wood subflooring.

The second floor framing was not accessible and could not be measured. The joists span approximately 14' to 16'. The joists are supported on wood-framed partition walls and the exterior masonry walls.

Structural – Roof Framing
The main roof framing was measured to be FS 2x6 rafters spaced at about 16". The rafters span approximately 9' and 10.5'. The rafters are supported on the exterior masonry walls. The rafters are sheathed with solid wood underlayment.

The kitchen roof framing was not accessible and could not be measured. The rafters span approximately 11'. The rafters are supported on the exterior masonry walls.

Structural – Ceiling Framing
The second floor ceiling framing was measured to be FS 2x6 joists spaced at about 16". The joists span approximately 11' to 16'. The ceiling joists are supported on the exterior masonry walls and wood-framed partition walls.

Structural – Wall Framing
The exterior walls are constructed of brick masonry. The framing of the interior walls was not accessible and could not be measured.

Structural – Lateral System
Lateral stability for the building is provided by the exterior masonry walls.

Structural – Load Requirements
The required floor load capacity is 40 psf, the required snow load capacity of the porch is 60 psf and the required roof snow load capacity is 50 psf. The required ceiling live load capacity is 10 psf (no storage is allowed).

Physical Description -- Mechanical

Mechanical – Plumbing Systems
The original water supply for the building was a 10'x15' cistern built into the structure near the base of the stairs in the basement. The domestic water is currently supplied from a 135' deep well located to the west of the building. The well was put into operation in 1975. The domestic water system for the building includes an 11 gpm pump, filters, chlorine tank, and copper distribution piping. These components are all located in the basement. There is also a Bosch 117,000 btuh (British thermal unit per hour) tank-less propane water heater in the basement to provide domestic hot water for the building. (DI-KQ-39) Two abandoned 1,000 gallon capacity steel water storage tanks are located in the basement.

The original building had no flush toilets. The building was served only by a gray water sewer that discharged into the lake. Installation of this line required extensive blasting through the brownstone bedrock. This system was later replaced with a sewer and septic system. A 1974 drawings indicate a 1,200 gallon septic tank, chlorinator, and sand filter bed to the northeast of the Keepers Quarters. In 1981, the system was upgraded with the addition of a lift station and 2" PVC (polyvinyl chloride) forced main to a sand filter located to the south of the building complex. The waste piping is cast iron and PVC. The sewer main exits the building in the basement on the east side of the building and connects to a buried 6" main that runs northeast to the septic tank and lift station.

The plumbing fixtures have been upgraded with a stainless steel kitchen sink with a hot and cold single-spout faucet and also bathroom fixtures on the first and second floor. The first floor bath contains a tank-type toilet, a porcelain wall-hung lavatory with a hot and cold single-spout faucet, and a bathtub with a hot and cold faucet and shower. The second floor bath contains a tank-type toilet and enameled cast iron wall-hung lavatory with separate hot and cold faucets. There is also a free-standing laundry tub in the basement. The laundry tub does not have a faucet. The copper hot and cold water supply pipes terminate with valves above the tub along with a separate plastic spray nozzle and hose.

Mechanical – HVAC
The original heating source for the building would likely have been coal burning stoves. Two original brick chimney stacks still remain from the basement up through the roof. A radiant hot water heating system was later installed, likely around 1950, consisting of a fuel oil fired boiler in the basement, a pump, and piping to radiators in most of the rooms in the building. (DI-KQ-38) The boiler is still located in the basement, along with circulation pump, but the boiler and pump have been moved from the original location adjacent to the chimney vent stack. The boiler flue vent is no longer connected to the vent stack. Much of the galvanized steel distribution piping has been removed, but the cast iron radiators are still present in a majority of the rooms. In addition, there are three disconnected radiators stored in the basement. The steel fuel oil tank remains in the basement adjacent to the boiler. The heating water system is no longer operational. A new Empire 25,000 btuh console type propane room heater has been installed in the first floor living room. The 4" aluminum flue pipe has been installed inside one of the original chimney stacks.

The propane tank is located east of the building. Buried propane piping enters the basement with a pressure regulator and copper distribution piping to the heater, kitchen stove, and water heater.

Basement ventilation consists of ground level louvers. There are two 40”x20” wood slat louvers with operable windows on the inside, one on the west side and one on the north side of the building. There is also an additional 24”x20” wood slat louver, with an operable window on the inside, at the south end of the west wall. Exhaust fans have been installed in both the first and second floor bathrooms. The first floor bathroom fan is located in the ceiling above the bath with a 4”x8”sheet metal vent hood through the south wall above the glass block window. The second floor bathroom fan is located in the west wall above the toilet with a 10” square gravity vent cap on the exterior of the wall. A 16”x24” ventilation hood with a fan and filter has also been installed above the stove in the Kitchen.

Mechanical – Fire Suppression
None in the building.

Physical Description -- Electrical

Electrical – System Configuration

At one time, the Keepers Quarters was fed alternating current power from the Fog Signal building generators via an underground feeder. The Keepers Quarters is currently powered from a photovoltaic system consisting of a flat plate collector, approximately 80" x 52", located near the Assistant Keepers Quarters. PV system components are located in the basement of the Keepers Quarters. Incoming voltage from the PV collectors is converted to battery voltage via a Samlex VCT240-12-24 voltage converter. System storage batteries consist of eight 100 amp hour 12 volt units connected in parallel for 12 volt output. A Trace Engineering Disconnect/Overcurrent module provides battery disconnecting means. A total of three Trace Engineering C40 charge controllers control battery level and regulate collector voltage. A Trace Engineering DR Series power inverter/charger synthesizes 240/120 volt ac output voltage. The rating of the inverter was not observed; however the Trace DR series inverters only supported ratings of 1500, 2400 or 3600 VA. A Trace Engineering ac disconnect/conversion module interfaces between PV system and the building load. This system converts the direct current from the collectors and batteries to alternating current and provides building power through the ac power distribution system. Thus, when the system is turned on, limited ac power is provided for selected building lighting and receptacles through both new and existing wiring.

Electrical – Wiring Devices
Wiring Devices including receptacles and toggle switches are typical of the 1960's. In general, wiring devices are mounted in outlet boxes in walls. Receptacles within the building are of the two prong, nongrounded type. Many of the wiring devices are no longer connected to a source of power, but some are now connected to alternating current power via the existing PV collector and inverter system

Electrical – Conductor Insulation
Wiring in the Keepers Quarters, both old and new PV, where concealed or exposed is "Romex" construction with rubber insulated conductors in an overall sheath of braided cotton fiber. In areas where additional wiring has been added, surface raceway has been used to house conductors. None of the wiring includes a separate ground conductor.

Electrical – Overcurrent Protection
Overcurrent protection is by means of a 100 ampere 240/120 volt, single phase circuit breaker type panel board located in the basement. The original feed to the building was from a 100 ampere circuit breaker disconnect in the Fog Signal Building, however this underground feed has been disconnected at the panel board to allow the panel to be connected to the inverter system.

Electrical – Lighting Systems
Lighting systems inside of the building are incandescent and fluorescent lamp type consistent with the 1960s construction. Incandescent drums were used in sleeping areas. Fluorescent lighting has been used for kitchen lighting, bathroom lighting and recessed into a 2' x 4' suspended ceiling. Switching is via wall mounted toggle switches. Much of the lighting in the building is not connected to a source of alternating current power; however some selected lighting is connected to alternating current via the existing PV collector and inverter system.

Electrical – Telecommunications
There is a telephone in the building which at one time connected to a telephone in the Fog Signal Building. This telephone is not operational.

Electrical – Fire Alarm System
Fire alarm detection in the building consists of heat detectors located in every room. In addition, manual pull stations are located at exits from the building. The main fire alarm panel is a Gamewell "Flexalarm" system which was installed in the 1960s. The system is a three zone panel with one of the zones dedicated to the Fog Signal Building. The system is AC powered. Notification is via several sounders within the building. Additionally, there are two shrouded bells mounted on the outside of the building for exterior notification.

Electrical – Lightning Protection
Lightning protection consists of brass air terminals and brass or copper down- cables that appear to be terminated on buried ground rods. Air terminals are located along the peak of the roof, at the peak of each dormer, and on chimneys.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs). Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos
Asbestos is known to be present at the following homogeneous materials/areas:

1. Floor Tile.

The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Brick and Block Filler (The exterior of the structure is brick and has the potential to have a block filler or grout that is potentially asbestos containing),
2. Plaster,

3. Adhesives (Multiple varieties of miscellaneous adhesives were seen on heater components, under remnant flooring applications, and around windows,
4. Drywall,
5. Wall and Ceiling Interiors,
6. Lay in Ceiling Panels,
7. Sub-Flooring (Suspect ACMs in flooring applications were not observed and asbestos is commonly present in vapor barrier felts and tar-papers used in sub-flooring applications, and,
8. Asbestos-cement (Piping, wall-board, wall interior panels, roof flashing and roofing applications can be constructed of asbestos-cement. This type of application was not observed at the structure but may be present).

The assumed asbestos containing materials were observed to be in fair condition.

Hazardous Materials – Lead Containing Paint (LCP)

The Lead Containing Paint (LCP) inspection included a visual inspection of the structure. A previous inspection and testing for LCP was conducted using a x-ray florescence (XRF) detector coupled with bulk paint sampling and laboratory analysis. The XRF inspection was conducted by the NPS Staff in 1993. The findings of this study are incorporated into this report by reference.

Detectable lead in paint was confirmed for the following testing combinations:

1. Window Sashes – Wood substrate of various colors,
2. Window Trims - Wood substrate of various colors,
3. Doors - Wood and metal substrate of various colors,
4. Door Trims - Wood substrate of various colors,
5. Walls – Various substrates and colors, and,
6. Ceilings -Various substrates and colors.

Detectable lead is assumed to be present at the following locations:

1. Interior Painted Surfaces (Based on testing in the kitchen, bathroom, and bedrooms, LCP is assumed to be present on painted surfaces throughout the structure, and,
2. Exterior Painted Surfaces.

Based on the estimated dates of construction of the various structures and the available testing data, LCP is assumed to be present throughout the structure. The confirmed LCP was observed to be in fair condition and the assumed LCP was observed to be in fair condition.

Loose/flaking LCP is identified on the exterior painted walls of the structure. Paint chip debris is not noted on localized areas of surface soils surrounding Keepers Quarters.

Hazardous Materials – Lead Dust

Surface wipe-sampling for lead dust was conducted in the Keepers Quarters. A three wipe composite sample was collected from the first floor living room, bedroom, and visitor center floors.

1. Laboratory analysis showed 16 micrograms per square foot of floor space.

Hazardous Materials – Lead in Soils

Historical paint maintenance activities such as manual scraping, power-washing, sanding, abrasive blasting or the general poor and peeling condition of exterior LCP may have created the potential to impact the surrounding soil. Areas of the surface soils adjacent to the structure were not observed to have LCP debris and additional areas may exhibit LCP debris or lead-contaminated soils, but are not observable due to vegetative cover surrounding the structure. Preliminary lead-in-soil sampling was not performed to assess whether these near-structure soils contain lead concentrations above applicable soil standards.

Soil Sampling was not conducted around the Keepers Quarters.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was not visually identified in the Keepers Quarters.

Character Defining Features

Mass/Form. A two-story masonry Queen Anne style residence with asymmetrical form, a main gable roof and dormer, a semi-hipped exterior appurtenance (later altered with noncontributing shed dormer), a recessed porch with arched opening, and two brick chimneys.

Layout of Space. The rooms are generally separate and distinct and entered from a common stair/hall area. The 1955 and 1965 remodels of the bathrooms altered the original circulation pattern to allow access to the bathrooms.

Exterior Materials. Red brick with arched brick dentil detailing at the window openings, corbelled detailing at the front gable, stepped / soldier coursing detailing at the second floor line, brownstone sills (painted), wood ogee trim and wood wall shingles all painted white, and wood roof shingles.

Openings. A mix of wood double-hung windows (all replaced with fixed/awnings) painted green.

Interior Materials. The majority of the finishes have been altered with modern replacements with the exception of several areas of plaster, wood base trim, and the painted stair newel posts and balusters.

General Condition Assessment

In general, the Devils Island Keepers Quarters is in good to fair condition. Most of the ceiling and floor finishes appear to be covering up the historic ceilings and floors. Also, the existing interior paint scheme for the walls and stairs is peeling. The interior wall finishes of the vertical wood paneling at the entry, living room, and second floor hall also detract from the character of the building.

Structurally, the Keepers Quarters is in good condition with the exception of the front porch and first floor framing. The front porch and first floor framing are in fair condition.

Mechanically, the upgraded systems in the Keepers Quarters are generally in good condition.

Electrically, wiring and equipment in the Keepers Quarters ranges from poor to fair condition. Wiring remaining from the 1920s is in poor condition, while wiring installed in the 1960s is in fair condition. Overall, the systems within the Keepers Quarters, although modern, do not meet present codes and are generally beyond their expected life.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
<u>*Condition:*</u> *Good to Fair*
The main roof is in good condition. The south entry roof, which has the older cedar shingles, is in fair condition as it has moss growth and is weathered. The eaves, overall, appear to be in good condition with several areas of patching repair evident. The tie offs on the roof should not be used for life safety anchors until they can be certified as meeting OSHA requirements.

Architecture – Gutters and Downspouts
<u>Condition:</u> *Poor*
The sole remaining downspout is in poor condition as there is no existing gutter in situ.

Architecture – Chimneys
<u>Condition:</u> *Good*
The chimneys are in good condition. The previous repointing work is evident due to different mortar colors.

Architecture – Exterior Walls
<u>Condition:</u> *Good*
In general, the walls are in good condition. There are areas of previous pointing work where mortar color and tooling vary from the original. The mortar at the base of the walls typically has been more weathered. The north side exhibits some yellow algae growth. The west oval window opening was altered at the time of the window replacement as evidenced by the previous mortar repair. The finish of the aluminum siding is almost transparent. The wood shingles appear to be contemporary and the aluminum siding likely covers previously shingled areas.

Architecture – Windows
<u>Condition:</u> *Fair to Poor*
Oval Windows. The windows both have duct tape surrounding their frames and deterioration of members at joints. Original interior trim has been removed. They are in poor condition.

Attic Windows. There windows are fixed and appear to be in fair condition, although they are not original to the building.

Basement Windows. The louvered wood vents have peeling paint. The historic windows on the interior behind the louvers also have peeling paint, deterioration of members at joints, and rotting wood sills. Overall, the basement windows are in poor condition.

Predominant Windows. This type of window is generally in poor condition with peeling paint, deterioration of members at joints, rotting wood sills, and missing glazing compound. All original interior trim was removed. Also, one glass pane is covered and one window is bricked over.

Architecture – Exterior Doors
<u>Condition:</u> *Fair*
Main Entry Door and Screen Door. This door has modern hardware that is incompatible with the historic door which is in fair condition. Its associated aluminum screen door is in fair condition.

Kitchen Entry Vestibule Door and Rear Door. The vestibule screen door is in fair to poor condition as the paint is peeling, the screen is sagging in areas and the hardware does not provide a functioning lock. The hollow core rear entry door is in fair condition.

Basement Access Doors. These two plywood panel doors have rusted hardware and padlocks, peeling paint, especially at bottom of doors, and are in fair condition.

Architecture – Exterior Trim
<u>*Condition:*</u> *N/A*

Architecture – Exterior Porch
<u>*Condition:*</u> *Good to Fair to Poor*
The porch is in overall good condition, the newer wood floor is in fair condition, and the stair and railing are in poor condition because they do not meet modern safety codes.

Architecture – Basement Hatch
<u>*Condition:*</u> *Fair*
The basement hatch is in fair condition as the previous pointing is evident on the side walls (different color mortar) and the wood hatch frame is rotted at the bottom.

Architecture – Interior Doors
<u>*Condition:*</u> *Fair*
Historic Doors. This type of door is generally in fair condition as the paint is badly peeling and the modern hardware is incompatible with the historic doors.

Nonhistoric Doors. These doors are in fair condition and are not original to the building.

Architecture – Wall Finishes
<u>*Condition:*</u> *Fair to Poor*
The basement rooms' brick walls are in fair condition with some mortar missing and efflorescence around window areas. The frp paneling in the entry, living room, and second floor hall is in good condition, but detracts from the building's historic character. The historic beadboard wainscot and rail of the entry and hall are in fair condition with peeling paint, areas of missing or replaced rail, and minor separation of bead and board. The second floor hall's closet of historic plaster over lath is in fair condition with peeling paint and minor separation at junctures of walls and ceiling. The kitchen gypsum board walls and ceramic tile surround are in good condition. The kitchen vestibule has peeling paint on the plywood and on the brick. Overall, it is in fair condition. There are cracks located on the east, north, and west walls of the first floor office. The wall finish is in poor condition. The gypsum board walls and tile wainscots and surrounds for both the first and second floor baths are in fair condition with some areas of moisture and staining at the first floor bath's walls where the paint has peeled away. All of the gypsum board bedrooms and closets are in good condition, except the second floor's north bedroom. This bedroom has water stains at the southeast corner above the door and at the southwest corner. The closet for the second floor north bedroom with plaster over lath wall finish is in poor condition as brown paper is covering up 70% of the closet to prevent the flaking plaster from falling. The first floor bedroom closet's plaster walls are in fair condition as is the wainscot and cap rail.

Architecture – Ceiling Finishes
<u>*Condition:*</u> *Good to Fair to Poor*
The nonhistoric acoustic ceiling tiles in the entry, living room, first floor bedroom, and second floor hall are in good condition but detract from the building's historic character. The second floor hall's closet with its plaster ceiling intact is in fair condition as there are some cracks and separation at junctures with the walls. The first floor bedroom closet most likely has flaking paint and plaster as a wood board panel is covering the historic ceiling, so it can be assumed it is in poor condition. The kitchen's ceiling tiles are in fair condition as there is some buckling and water stains at the north and west corners. The kitchen

vestibule's ceiling is in good condition with minor stains. The original ceiling in the first floor office has peeling and cracking paint. Overall, the ceiling is in fair condition. The first floor bath has moisture issues above the shower as the gypsum board is peeling. The bath's ceiling finish is in poor condition. The second floor bath's ceiling is in good condition. The second floor southeast bedroom's and closet's gypsum board ceilings are in good condition. The southwest bedroom and closet have historic plaster ceilings that are in good condition. The north bedroom's plaster ceiling shows lots of patching but is in good condition. The north bedroom's closet ceiling is assumed to be in poor condition due to the paper covering installed.

Architecture – Interior Trim
Condition: *Good to Fair*
The wood base shoe trim in the entry is partially missing on the north and south walls. Overall, it is in fair condition with its missing segments and peeling paint. The first floor office's historic trim is in fair condition as the base and base shoe have peeling paint, scratches and gouges in the wood, and misaligned corner joints. The kitchen's partial base is in fair condition, as is the base shoe that runs around the room. The kitchen vestibule's wood base shoe is in good condition. The first floor bath's ceramic tile base is in good condition. The four bedrooms (one on first floor, three on second floor) have a modern, simple wood base trim and base shoe, all painted white, in fair condition. The only closet associated with a bedroom that has any trim is the second floor's north bedroom closet. This closet has some historic base with no base shoe and some of the same modern base that its bedroom contains and is in fair condition as well. The second floor hall's historic base and modern base are in fair condition. The historic base in the closet associated with the hall is in good condition.

Architecture – Floor
Condition: *Good to Fair*
The concrete basement floor is in fair condition.

The resilient flooring in the entry, living room, office, first floor bedroom, second floor hall, second floor bedrooms is in fair condition but it detracts from the building's historic character. There are some instances of warping and buckling. The flooring in the first floor bedroom's closet is in good condition with minor fading of paint. The kitchen's resilient flooring is in good condition. The kitchen vestibule's resilient tiles are in poor condition as many of the tiles at the north end of the room have become unglued from the nonhistoric wood board flooring. The first and second floor baths' similarly styled resilient flooring is in good condition.

Architecture – Stairs
Condition: *Good to Fair to Poor*
Basement to First Floor Stairs. The partial handrail is inadequate for code purposes. The bottom stair tread is missing resulting in a dangerous and unmarked drop of 1'-2". These stairs are in poor condition.

Kitchen Exterior and Interior Stairs. These stairs are not code compliant. Also, the concrete portion of the stairs is leaning and the concrete threshold is missing a large piece. Overall, the condition of the stairs is fair.

First Floor to Second Floor Stairs. These stairs have peeling paint but are overall in good condition.

Architecture – Casework
<u>*Condition:*</u> *Good*
The kitchen's two sections of built-in nonhistoric base and wall cabinets are both in good condition. The first floor bedroom's closet hook racks and built-in shelving are in good condition. The second floor hall's built-in attic ladder located on the south wall is in good condition.

Architecture – Accessibility
<u>*Condition:*</u> *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
<u>*Condition:*</u> *Good*
The visible portion of the perimeter foundation system is in good condition. A few small cracks were observed in the walls. The interior foundations could not be observed, thus their condition is unknown. No obvious signs of distress or damage were observed.

Structural – Floor Framing
<u>*Condition:*</u> *Fair*
The basement floor slab is in good condition.

The framing for the first floor is in fair condition. Floor joists that are headed off above doors and windows are not properly supported. (DI-KQ-33) The middle of a triple 2x10 beam below the entry has been cut out and pipe columns have been installed each side of the cutout. The floor joists above the cutout are unsupported and the pipes are crushing into the beam. (DI-KQ-34) One floor joist has been damaged. (DI-KQ-35) Floor joists are unsupported on either side of an opening in an interior wall at the cistern. (DI-KQ-36)

Framing for the front porch is in poor condition. The east ends of the joists are rotten. The east edge of the tongue and groove decking is also rotten. (DI-KQ-37)

The second floor framing could not be observed, thus its condition is unknown. No obvious signs of distress or damage were observed.

Structural – Roof Framing
<u>*Condition:*</u> *Good*
The main roof framing is in good condition.

The kitchen roof framing could not be observed, thus its condition is unknown. No obvious signs of distress or damage were observed.

Structural – Ceiling Framing
<u>*Condition:*</u> *Good*
The second floor ceiling framing is in good condition.

Structural – Wall Framing
<u>Condition:</u> Good
The exterior walls are in good condition. The interior walls could not be observed, thus their condition is unknown. Wall finishes on the first and second floors were cracked above the first floor beam that had been cut.

Structural – Lateral System
<u>Condition:</u> Good
Lateral stability of the building is good.

Structural – Load Requirements
<u>Condition:</u> Good
The roof, ceiling, porch and first floor framing have adequate capacity to support the required loads. The capacity of the second floor framing is unknown.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems
<u>Condition:</u> Good to Fair
The domestic water system for the building is in good condition. This includes a 135' well, an 11 gpm pump, water filters, chlorine tank, propane water heater, and copper distribution piping. Two abandoned 1,000 gallon capacity water storage tanks located in the basement are in fair condition. The abandoned cistern near the base of the stairs in the basement could not be accessed. The condition could not be determined.

The majority of the current sewer system is in good condition. This includes the PVC building sewer piping, buried 6" building main, lift station, 2" PVC forced main, and sand filter located to the south of the building complex. Portions of the cast iron building sewer piping have been replaced with PVC. The remaining cast iron waste piping is in fair condition. The condition of the buried sewer main could not be determined.

The stainless steel kitchen sink, bathroom fixtures, and associated faucets are in good condition. The free-standing laundry tub in the basement is in fair condition. The hot and cold water supply valves and spray nozzle for the laundry tub are in good condition.

Mechanical – HVAC
<u>Condition:</u> Fair
The abandoned fuel oil-fired boiler and circulation pump located in the basement are in poor condition. Much of the galvanized steel heating water distribution piping has been removed, but the cast iron radiators are still present in most of the rooms. The radiators are in fair condition. The fuel oil tank in the basement adjacent to the boiler is in fair condition. The heating water system is no longer operational. The new propane heater and associated flue vent are in good condition. The propane building entry, pressure regulator, and copper distribution piping from the basement up to the first floor are also in good condition.

The basement ventilation louvers are in fair condition. The total square footage of the basement louver openings meets code requirements for non-mechanical basement ventilation if the windows on the inside of the louvers are left open. The first and second floor bathroom exhaust fans are in fair condition. The associated exterior exhaust vent hoods are in poor condition with rust damage. The kitchen ventilation hood

and fan are in poor condition.

Mechanical – Fire Suppression
<u>Condition:</u> *N/A*

Condition Assessment -- Electrical

Electrical – System Configuration
<u>Condition:</u> *Poor*
The underground feeder that supplies power to the building is nearly 50 years old and is beyond its expected serviceable life. This feeder has been disconnected. Photovoltaic equipment in the building is less than 15 years old and is in good condition; however the Trace Engineering DR series of equipment is no longer manufactured or supported. If significant additions or expansions are to be made in the PV system, the existing equipment will likely need to be replaced with new equipment that meets all current NEC and UL standards.

Electrical – Wiring Devices
<u>Condition:</u> *Fair*
Wiring Devices including receptacles and switches are in fair condition.

Electrical – Conductor Insulation
<u>Condition:</u> *Poor and Good*
Original "BX" and "Romex" cables installed within the building in the 1920s are in poor condition and are well beyond their usual life expectancy. Wiring installed in the 1960s is generally in good condition. Newer PV related wiring is in good condition. Devices, including receptacles, wall switches and other outlets are generally past their service life.

Electrical – Overcurrent Protection
<u>Condition:</u> *Fair*
The existing panel board in the building is nearly 50 years old, but is in fair condition. It is currently being used to distribute power form the photovoltaic system throughout the building.

Electrical – Lighting Systems
<u>Condition:</u> *Fair*
Lighting systems within the building are in fair condition and can continue to be utilized as needed.

Electrical – Telecommunications
<u>Condition:</u> *Poor*
The telephone in the building is not functional.

Electrical – Fire Alarm System
<u>Condition:</u> *Poor*
The fire alarm system in the building is old enough that parts and service are no longer available.

Electrical – Lightning Protection
Condition: *Fair to Poor*
Lightning protection systems are intact and appear to be in fair condition, however over time, connections deteriorate and components corrode. The integrity of the system cannot be assured.

Condition Assessment -- Hazardous Materials

Refer to 'Physical Description -- Hazardous Materials' for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Keepers Quarters was constructed in 1891 as a residence for the keepers who operated the first tower, a temporary wood tower, and later maintained the cast iron tower. The building also served as offices and a bunkhouse when the USCG was in control of the light station from 1939 to 1978.

The Keepers Quarters is currently supporting guided visitor tours on the first level and seasonal housing for staff and volunteers on the upper level. The proposed use for the Keepers Quarters is to rehabilitate it and maintain the current use as seasonal staff housing and interpretation.

Rehabilitation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the rehabilitation of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Low*
Verify/provide proper blocking for roof tie offs. Replace weathered south entry roof with cedar shingles in-kind. Scrape, sand and repaint the soffit, fascia and frieze board.

Architecture – Gutters and Downspouts
Priority: *Low*
Because the walls and foundation are in good condition and there does not appear to be a moisture problem, there is no recommendation at this time to provide a new gutter system.

Architecture – Chimneys
Priority: *Low*
No recommendations at this time.

Architecture – Exterior Walls
Priority: *Low*
Repoint masonry walls where weathered and/or to repair past repointing work with mortar to match original in color, composition and joint profile.

Architecture – Windows
Priority: *Severe*
Repair frames and members at joints of the oval windows; remove duct tape. Epoxy stabilize deteriorated wood sills. Install glazing compound where missing and replace the one covered pane with glass in-kind. Scrape, sand and repaint all wood components.

Architecture – Exterior Doors
Priority: *Moderate*
Scrape, sand and repaint the basement hatch doors. Verify rusted hardware is operational, clean and re-oil.

Consider retaining the existing modern hardware to represent the USCG's presence and alterations to the building.

Architecture – Exterior Porch
Priority: *Moderate*
Coordinate porch work with the floor framing work. Scrape, sand and repaint the porch. Add a discrete code compliant guardrail at the porch as it will be open to the public. Add code compliant handrails at the porch stair.

Architecture – Basement Hatch
Priority: *Moderate*
Epoxy stabilize the rotting wood hatch frame. Replace through-rotted members. Scrape, sand and repaint the hatch frame.

Architecture – Interior Doors
Priority: *Low*
Scrape, sand and repaint all doors currently painted. Verify all hardware is operational.

Architecture – Wall Finishes
Priority: *Moderate*
Retain all modern finishes to interpret the USCG's occupation which is the timeframe during which these finishes were installed. Scrape, prep and repaint gypsum wall and trim members. Patch areas of damaged gypsum board and plaster, prep and repaint. Retain all frp, paneling and tile in situ.

Architecture – Ceiling Finishes
Priority: *Moderate*
Retain all modern finishes to interpret the USCG's occupation which is the timeframe during which these finishes were installed. Scrape, prep and repaint gypsum ceilings. Patch areas of damaged gypsum board or plaster, prep and repaint. Retain all suspended ceiling grids. Consider removing tiles to interpret USCG alterations.

Architecture – Interior Trim
Priority: *Low*
Retain all varieties of interior trim. Infill missing trim members with in-kind trim. Scrape, sand and repaint.

Architecture – Floor
<u>Priority:</u> *Moderate*
Retain all modern finishes to interpret the USCG's occupation of the building which is the timeframe during which these finishes were installed. Repair areas of warping and buckling to provide a level floor surface for the public. Reattach the loose resilient tiles at the kitchen vestibule.

Architecture – Stairs
<u>Priority:</u> *Moderate*
Install a code compliant hand rail at the basement stair. Evaluate risk of public access at the basement and kitchen due to the non-code compliant stairs. Scrape, sand and repaint the second floor stairs.

Architecture – Casework
<u>Priority:</u> *Low*
No recommendations at this time.

Architecture – Accessibility
<u>Priority:</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Floor Framing
<u>Priority:</u> *Moderate*
The first floor framing at the cut out beam should be repaired. The deteriorated decking and framing at the front porch should be repaired.

<u>Priority:</u> *Low*
The framing of headers for the first floor joists above doors and windows should be strengthened to meet IEBC and NPS requirements. The damaged first floor joist should be repaired. The opening in the masonry wall in the basement at the cistern should be repaired to properly support the first floor joists.

Structural – Roof Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Ceiling Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Wall Framing
Priority: *Low*
No recommendations at this time.

Structural – Lateral System
Priority: *Low*
No recommendations at this time.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems
Priority: *Moderate*
It is recommended that the sewer and septic system be cleaned, tested, and inspected with repairs as necessary for an operational system.

Mechanical – HVAC
Priority: *Moderate (Ventilation); Low (Radiators and Propane Piping)*
While the total square footage of the existing basement ventilation louvers meets code requirements, additional passive ventilation is recommended to prevent condensation and high humidity levels in the basement.

It is recommended that the cast iron radiators be cleaned and restored for historic preservation. All unused propane piping be should be removed.

Mechanical – Fire Suppression
Priority: *N/A*

Treatment Recommendations -- Electrical

Electrical – System Configuration
Priority: *Moderate*
Electrical devices, lighting and wiring that no longer are connected to a source of power should remain in place for historical context. It is recommended that the PV array, inverter, battery system and wiring be utilized to provide power for new receptacles and lighting for visitor areas, staff housing, and for new refrigerator and stove. However, if after thorough evaluation the existing PV system proves to be inadequately sized for new modifications, PV system components should be replaced as required with new components that meet current NEC and UL standards. Wiring, overcurrent protection, and devices remaining from the 1920s should be disconnected and abandoned. All existing electrical systems that remain energized, including existing PV batteries and components, should be inspected and tested for proper operation. All new electrical wiring and equipment shall be in accordance with the National Electrical Code.

Electrical – Wiring Devices
Priority: *Moderate*
Electrical wiring devices in circuits that are to remain in service should be replaced with new. Ungrounded receptacles should be replaced with grounded.

Electrical – Conductor Insulation
Priority: *Moderate*
It is recommended that all existing wiring that is to remain energized should be inspected and tested for proper operation. Wiring without ground conductor that is to remain energized should be replaced with wiring that is equipped with a ground conductor. It is recommended that new wiring associated with new electrical systems be in accordance with the National Electrical Code, NPS and Federal Standards and Regulations.

Electrical – Overcurrent Protection
Priority: *Moderate*
It is recommended that all existing overcurrent protective devices which are to remain operational should be inspected and tested for proper operation. It is recommended that overcurrent protection, including main breakers and branch circuit panel boards be in accordance with the National Electrical Code, NPS and Federal Standards and Regulations.

Electrical – Lighting Systems
Priority: *Moderate*
It is recommended that existing lighting be modified to accommodate the new visitors areas, and staff housing. New lighting should be provided where necessary to accommodate the revised uses.

Electrical – Telecommunications
Priority: *Low*
No recommendations at this time.

Electrical – Fire Alarm System
Priority: *Moderate*
It is recommended that the existing nonfunctioning fire alarm system remain in place for historical context. It is recommended to provide battery powered smoke detectors inside and outside sleeping rooms and carbon monoxide sensors as required.

Electrical – Lightning Protection
Priority: *Moderate*
Existing lightning protection is old and its effectiveness has not been established. It is recommended that a LPI (Lightning Protection Institute) certified inspector perform an inspection of the lightning system and provide findings and recommendations in accordance with LPI-175.

Treatment Recommendations -- Hazardous Materials

Hazardous Materials – Asbestos
Priority: *Moderate*
Recommend sampling of suspect asbestos containing materials, including: brick and block filler, plaster, adhesives, wall and ceiling interiors, lay in ceiling panels, sub-flooring, and asbestos-cement.

Hazardous Materials – Lead-Containing Paint and Lead Dust
Priority: *Moderate*
Recommend stabilization or abatement of Lead-Containing Paint.

Hazardous Materials – Lead In Soils
Priority: *Moderate*
Recommend further soils characterization to confirm applicable regulatory requirements.

Hazardous Materials – Mold/Biological
Priority: *Low*
No recommendations at this time.

Hazardous Materials – Petroleum Hydrocarbons
Priority: *Low*
No recommendations at this time.

Alternatives for Treatment

The following are several considerations of alternatives for the proposed treatments:

1. Initially, an alternate treatment recommendation was explored which would have removed the modern finishes and alterations that represent the occupation by the Coast Guard. However, it was deemed that in light of the period of significance (through 1978) for this island and the extent to which these alterations are intact, this building can contribute to the story of the Coast Guard at the light stations.
2. Consider minimizing systems repair/upgrades.

Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Additional Hazardous testing and mitigation	Mitigation of hazardous material may require removal of historic materials.	Any mitigation will need to be evaluated for benefit and implemented sensitively to minimize damage to the resource.	- Improves safety for visitors and staff - Removes hazards from the cultural resource
2. Visitor access into former residence	Change in Use: Upgrades for code and safety may be required and may alter the historic fabric.	Integrate upgrades to minimize damage to historic fabric.	- Allows visitors to experience the cultural resource first hand - Improves safety for visitors and staff
3. Add code compliant guardrail and handrail at porch and stair	Modern code upgrade could be visually disruptive to the historic integrity of the building.	Design a guardrail and handrail as discretely as possible.	- Improves safety for visitors and staff

Keepers Quarters Photographs, 2009

DI-KQ-01: North elevation, 2009 (Source: AH IMGP2880)

DI-KQ-02: East elevation, 2009 (Source: AH IMGP2881)

DI-KQ-03: South elevation, 2009 (Source: AH IMGP2882)

DI-KQ-04: West elevation, 2009 (Source: AH IMGP2883)

DI-KQ-05: South elevation roof shingles (Source: AH IMGP2884)

DI-KQ-06: Downspout at north elevation porch (Source: AH IMGP2887)

DI-KQ-07: West chimney detail, trim and wall shingles (Source: AH IMGP2888)

DI-KQ-08: East chimney detail and roofing (Source: AH IMGP2891)

DI-KQ-09: Oval window detail, east elevation (Source: AH 100_9718)

DI-KQ-10: West hatch doors and foundation (Source: AH IMGP2892)

DI-KQ-11: Main entry porch and stair, looking southwest (Source: AH CIMG3707)

DI-KQ-12: Porch floor and walls, looking southwest (Source: AH CIMG3709)

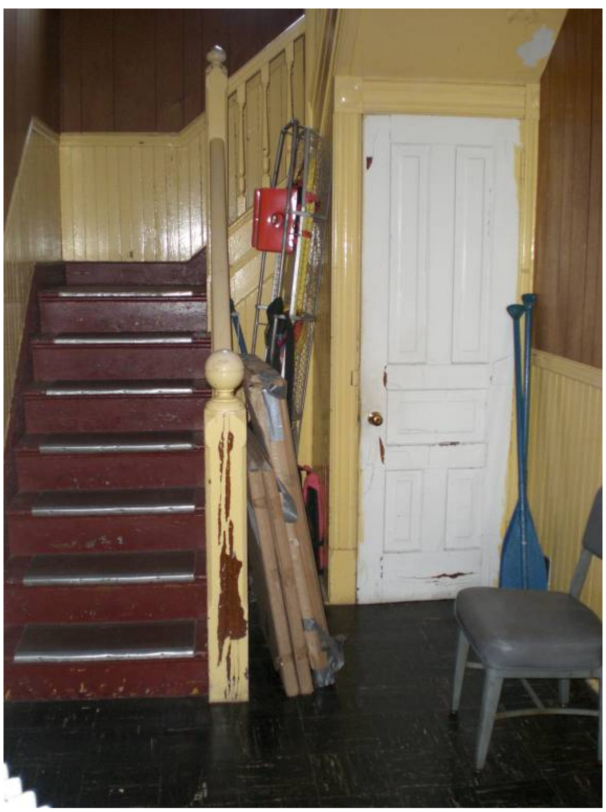
DI-KQ-13: Main entry screen door (Source: AH 100_9722)

DI-KQ-14: Main entry door, interior (Source: AH 100_9723)

DI-KQ-15: Basement stair to first floor entry (Source: AH DSC00982)


DI-KQ-16: Basement, looking west (Source: AH CIMG3830-A)

DI-KQ-17: Basement, south elevation (Source: AH CIMG3831-A)



DI-KQ-18: Entry, east elevation, stairs to second floor and door to basement stair (Source: AH CIMG3717)

DI-KQ-19: Living room, looking southeast (Source: AH CIMG3722)

DI-KQ-20: Kitchen, looking southeast (Source: AH CIMG3730)

DI-KQ-21: Kitchen cabinets, west elevation (Source: AH CIMG3734)

DI-KQ-22: Kitchen door, south elevation (Source: AH CIMG3735)

DI-KQ-23: South elevation kitchen entry stair, interior section (Source: AH CIMG3737)

DI-KQ-24: South elevation kitchen entry stair, exterior section (Source: AH DSC00960)

DI-KQ-25: First floor bath (Source: AH CIMG3748)

DI-KQ-26: First floor bedroom, west elevation (Source: AH CIMG3757)

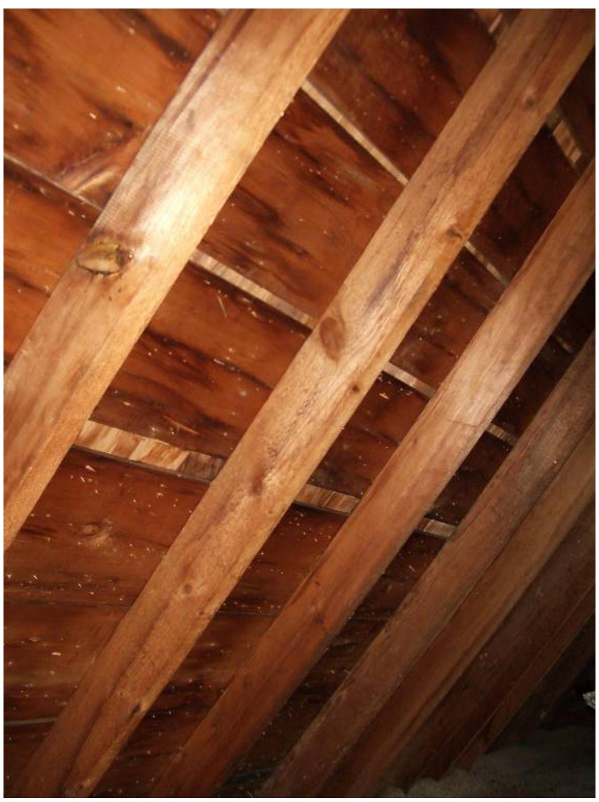
DI-KQ-27: Office, looking southeast (Source: AH CIMG3772)

DI-KQ-28: Stairs to second floor and oval window, looking down (Source: AH DSC00974)

DI-KQ-29: Second floor hall, looking west (Source: AH DSC00973)

DI-KQ-30: Bath, looking southwest (Source: AH CIMG3796)


DI-KQ-31: North bedroom, west elevation (Source: AH CIMG3817)


DI-KQ-32: Attic roof structure (Source: AH IMGP2886)

DI-KQ-33: Joist header above hatch doors (Source: Martin/Martin)

DI-KQ-34: Cut out (3) 2x10 beam (Source: Martin/Martin)

DI-KQ-35: Damaged floor joist (Source: Martin/Martin)

DI-KQ-36: No joist support at cistern (Source: Martin/Martin)

DI-KQ-37: Deterioration at front porch (Source: Martin/Martin)

DI-KQ-38: Cast iron radiator (Source: RMH)

DI-KQ-39: Domestic water treatment in the basement (Source: RMH)

ASSISTANT KEEPERS QUARTERS

Chronology of Alterations and Use

Original Construction

The building was constructed in 1897 as a two-story, single family brick residence in a simplified form of the Shingle style. In the second half of the 20th century, it was remodeled to serve as a USCG "crew's quarters."[31]

Significant Alterations / Current condition

Similarly to the Keepers Quarters, the Assistant Keepers Quarters underwent a number of interior and exterior alterations to accommodate its ongoing and long term use. Many of the changes affected the building's original character, although not to the same extent as the Keepers Quarters. At the exterior, the character defining roof cresting was removed as was the yankee gutter system – both of which are evident in historic photos and original construction details but no longer exist. (Historic Image DI-13). A 1980 image of the rear of the Quarters shows that there are three windows, two on the first floor, and one on the second floor, which are boarded-up. (Historic Image DI-22*)* These have since been repaired or replaced as they are visible today.

Construction drawings approved August 10, 1896 for the Assistant Keepers Quarters include details of the main staircase, exterior trim, cut-stonework, windows, and doors, much of which exists today. (Historic Drawings DI-03 to 09)

Other alterations consist of the modifications to include indoor bathrooms on both floors, the replacement of some windows and the rehabilitation work that was performed in the past eleven years by the Historic Structure Preservation Team at the NPS. Other recent work includes a cedar shingle reroofing in 2001, painting of the exterior, and repointing of the brick mortar.

The majority of the mechanical systems in the building have either been removed or left in disrepair. There is no functional heat in the building and much of the plumbing system has been disconnected.

The Assistant Keepers Quarters was rehabilitated, including the electrical systems, in 1928. The majority of the electrical equipment in the Assistant Keepers Quarters building has been removed.

Currently, the building is fair to good condition.

[31] List of Classified Structures, National Park Service, 2009.

Summary of Documented Work on the Building

Date	Work Described	Source of Information
Annual Report for 1891	*"Devils Island, Apostle Group, Lake Superior, Wisconsin*. - The act approved March 2, 1889, appropriated $15,000 for building a light station..." Repeated in 1892.	"1891 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1895	"*Devil's Island, Apostle Group, Lake Superior, Wisconsin*… The completing of this light station, at a cost not to exceed $22,000, was authorized by the act approved February 15, 1893, but no appropriation was then made. Then act approved March 2, 1895, appropriated $22,000 "for constructing a permanent tower." As the completion of the station demands, in addition to the permanent tower, the building of additional quarters for keepers, and the purchase of a third-order lens to fully carry out the design, it is feared that under the wording of the act the work can not be done, as in order to do it economically the tower and dwelling should be built at one time. Recommendation is therefor made that the appropriation available for the completion of the station be made to include the erection of an additional keeper's dwelling."	"1895 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1896	"*Devils Island, Lake Superior, Wisconsin*. – The amount of the award for this island, $1,600, was paid in August, 1895… A design was made for an iron tower. By the sundry civil appropriation act approved June 11, 1896, authority was given that $4,000 of the unexpected balance, or the appropriation of $22,000, made in the act approved March 20, 1895, for constructing a tower at Devil's Island light station, be applied to the construction of a light-keeper's dwelling at Devil's Island light and fog signal station. This will be done as soon as practicable."	"1896 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1897	"*Devils Island, Lake Superior, Wisconsin*. – Material for the construction of a keeper's dwelling was obtained and transported by the tender Amaranth to the station."	"1897 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
1901	5'x10' cistern built	Mechanical Plan
1928	Rehabilitated, including new electrical systems	Electrical Plan
1950	New indoor baths installed	Historic Drawings, Plans by USCG
1952, May 30	May 30: "Installed gas propane stove in crew's quarters replacing kerosene stove which cracked open and leaked fuel on deck." ('Crew's quarters = Assistant Keepers Quarters)	USCG Log, summarized by Bob Mackreth, 2004
1952, September 30	"Repaired and painted porch on crew's dwelling."	USCG Log, summarized by Bob Mackreth, 2004
1953, May - June	May 1: "Painted hallway and dayroom in buff." (Assume Keepers Quarters) June 16: "Installed telephone communication system between dwellings and signal."	USCG Log, summarized by Bob Mackreth, 2004
1953, November 10	"Installed new stair treads in barracks."	USCG Log, summarized by Bob Mackreth, 2004
1979	Repainted, repointed and reroofed with cedar shingles	Photo c.1979 and APIS/NPS Business Office File # D3423 – Devils
1981	Fire retardant installed on the roofs of the Keepers and Assistant Keepers Quarters	APIS/NPS Business Office File # D3423 – Devils

Date	Work Described	Source of Information
1984	Cyclic maintenance of seven buildings including repointing brickwork, painting trim, and reglazing windows; replastered interior walls of Assistant Keepers Quarters	APIS/NPS Business Office File # D3423 – Devils
1991	Stabilization of Keepers and Assistant Keepers Quarters by Williamsport Preservation Training Center	APIS/NPS Business Office File # D3423 – Devils
1993	Door knobs and locks installed on both the Keepers Quarters and Assistant Keepers Quarters	APIS/NPS Business Office File # D3423 – Devils
2001	Reroofed with cedar shingles	HSPT Reports, 2009

Other Documented Work on the Building

Date Range	Work Described
1934-1943	Cresting and wood shingles removed and replaced with wood shingles
Pre-1979	Red asphalt shingles at roof
1998-2009	Painted exterior
1998-2009	Repointed brick mortar

General Physical Description

This building is a two-story residence with a brick foundation, masonry exterior walls at the first floor and framed exterior walls at the second level, sided with decorative wood shingles. Its cross gable roof has boxed eaves and two brick chimneys. There is a second story bow window on the north elevation. It is essentially rectangular in plan, facing north similar to the adjacent Keepers Quarters, and has three rooms on each floor.

Physical Description -- Architecture

Architecture – Roof
This roof is comprised of cedar shingles with wood ridge caps and is reported to have been reroofed in 2001. The shingles have a 5” exposure and the roof has tie-off rings installed at the ridge, though they do not appear to comply with OSHA requirements. There is 1x open sheathing (consistent with wood shingle applications) that has about a 2” gap every third row. Historic photos and drawings indicate a ridge cresting detail and Yankee gutter that are not in situ today. (Historic Image DI-06, 08 and 13)

The eave consists of a boxed soffit with ogee trim at the frieze board and fascia and extends 1’-6” at the main roof, all wood painted. There are portions of soffit which are painted tongue and groove at the north gable.

Architecture – Gutters and Downspouts
There is no existing gutter at the porch’s north eave, though a visible previous patch indicates a downspout to a yankee gutter. There is a new galvanized 6” half-round gutter at the northwest corner and a 3” fluted downspout. The downspout has portions which are reused and the soffit at this location also has a patch indicating a yankee/integral gutter. The south elevation has a new 6” half-round galvanized gutter connected to a 3” diameter fluted downspout which appears to be new. The details of the original construction drawings show a tin-lined yankee gutter connecting to a conductor through the soffit. The roof plan shows three locations for conductors which are generally where the current two downspouts remain and the porch downspout is missing. Note that there is a stack of gutter downspout pieces located in the basement. (DI-AKQ-05)

Architecture – Chimneys
There are two brick chimneys matching the exterior walls, one on the west façade and the other on the south. Each chimney has a stone cap piece that is original to the chimneys and detailed on the original construction drawing set. (Historic Drawing DI-08 and DI-AKQ-07)

Architecture – Exterior Walls
The exterior wall consists of red brick, simple running bond on the first floor level. Window openings have a brownstone sill and header flush with the face of the brick. There is also a rowlock course at the approximate grade level. The second floor level walls are finished in a recently-installed chamfered-shape wood shingle. The original construction drawings show radiating shingles at the apex of the gable and irregular coursing at the remainder of the gable end. It is difficult to decipher if this was the actual installation design from historic photos though it does not appear so. The second floor north projection features a bowed, shingled wall and tripartite window below the shingled gable. The wall projects slightly from a rectangular, shingled dormer. The wall extends approximately 2-feet from the first floor exterior wall and features five decorative wood brackets beneath. The wood shingles flare at approximately 3” at the transition with a wood ogee closer trim piece. There is a cementitious parge coat at the base of the wall +/- 4’-8” above grade and below the rowlock course. On the south elevation, a former door opening was infilled with a substitute brick and mortar. A new window was installed in the opening, with a precast concrete sill. Historic photos indicate a privy was located directly south of this door opening.

A mortar sample taken at the exterior west wall indicates that the mortar was soft, composed of very fine sand, and has a sand to lime composition of 3:1, by volume.

Architecture – Windows
Basement Windows. The basement has two types of windows: wood slat vents (two) and cast iron vents (two). The wood slat vents measure 2’-8” x 1’-6”, and the cast iron vents measure 1’-4” x 1’-2”. (DI-AKQ-14)

Top of Stairs/Second Floor Hall Window. This window is nine- over nine-lite, double-hung. The window is 1’-10” x 3’-6”.

Second Floor Bath. This window is a six- over six-lite, double-hung. Operation is by a spring tape set into the jamb. The window is 2’-6” x 3’-8”. The window appears to have been added at the time of the addition of the interior baths. (DI-AKQ-25)

Tripartite Bow Window. This unique, curved window has diagonal wood lattice and one fixed sash over one fixed sash. The upper section of the three identical windows is 1’-10” x 1’-11”, and the lower section is 1’-10” x 2’-10”. (DI-AKQ-26 and 27)

Predominant Windows. This type of window is a two- over two-lite, double-hung, with a four-lite storm window. The storm window aligns with the two-over-two pattern and is screwed to the wood frame. The windows are painted on the exterior and natural or varnished on the interior. The windows on the first floor are trimmed with brick molding and have a stone header and sill. The hardware is modern – a brass thumb turn lock - and sash cords appear recent but the pulley is original. The glass also appears to be original because it is wavy. The second floor windows are trimmed with painted wood. The interior trim is typically 5” wide varnished, shaped, and decorative oak with a crown molding. Roller shade brackets are extant. The typical dimension for the predominant window is 2’-9” x 5’-6”. (DI-AKQ-20, 21 and 22)

Attic Window. There is an arched-top, two-lite, fixed sash window in the attic. It is wood framed and nonhistoric. (DI-AKQ-30)

Architecture – Exterior Doors
Main Entry Door. This door is nine-lite over six raised wood panels and is nonhistoric. The knob hardware is a period replica with a keyed deadbolt, likely installed by the park in 1993. The exterior face is painted while the interior is varnished. The door is 2’11 ½” x 6’ 11 ½” x 1 ¾”. (DI-AKQ-11 and 12)

East Entry Door. This door is nine-lite (half lite) over three raised horizontal panels and is nonhistoric. It has a stone sill and a stone header, three hinges, replica knob hardware the same as the main entry door, and a keyed deadbolt, likely installed by the park in 1993. The door is 2’7 ½” x 6’11 ½” x 1 ¾”.

Basement Coal Chute at West Elevation. This coal chute is made of cast iron, painted white. Its dimensions are 1’8” x 10” x ½”.

Architecture – Exterior Trim
The exterior trim consists of the ogee transition trim at the top of the brick, soffit, two wood brackets each at the east, west, and north gables, shingle detailing at the gables’ fascia, and five shaped wood corbels at the bow tripartite window. (DI-AKQ-06)

Architecture – Exterior Entry Porch
The porch floor is contemporary. The columns and beam are built-up of 1x and appear to be replicated from newer material. The porch was screened-in as seen in a post-1915 historic photo. (DI-AKQ-08 and 09)

Architecture – Interior Doors
First Floor Historic Doors. This type of door has a typical opening size of 2’8” x 7’ x 1 ¼” with two hinges. The doors and trim appear to be made from oak or ash. The trim is typically 5” wide varnished, shaped, and decorative oak with a crown molding (same as interior window trim). The extant door type is five panel, varnished, with dimensions of 2’4 ½” x 7’ x 1 ¼”.

Second Floor Historic Doors. This type of door’s typical opening size is 2’4” to 2’8” x 6’7” x 1 ¼” with a 1’ transom. The doors and trim appear to be made from oak or ash. The doors each have a transom light without glass. The trim is continuous, framing the door and transom. The trim is typically 5” wide varnished, shaped, and decorative oak with a crown molding (same as interior window trim). These doors also have knob hardware, are varnished, and have two ball-tipped hinges. The extant door type is five panel with a 5” raised, decorated trim.

Architecture – Wall Finishes
Basement. The basement has exposed common bond brick walls.

Entry, Kitchen, Dining Room, Sitting Room, Second Floor Hall, Second Floor Bedrooms and Second Floor Sitting Room. These eight rooms have original plaster over lath wall finishes. The entry and kitchen also have sections of 3 ½” wood beadboard wainscot, stained dark, with partial cap rail. A paint sample taken in the first floor sitting room reveals that the original paint color for this room was green. The original color of the entry was yellow. A material sample of the entry also revealed that the original plaster is lime based and composed of much coarser sand and a different composition than the plaster sample from the Keepers Quarters, due to the differences in construction timeframes.

First Floor and Second Floor Baths. Both baths have plaster over lath wall finishes, despite that these rooms were originally a vestibule and closet.

Architecture – Ceiling Finishes
Basement. The basement does not have a finished ceiling; the first floor flooring system is exposed.

Entry, Kitchen, Dining Room, Sitting Room, Second Floor Hall, Second Floor Bedrooms and Second Floor Sitting Room. These eight rooms have original plaster over lath ceiling finishes.

First Floor and Second Floor Baths. Both baths have plaster over lath ceiling finishes, though the first floor maybe newer plaster after the plumbing above was installed.

Architecture – Interior Trim
Entry, Dining Room, Sitting Room, Second Floor Hall, Second Floor Bedrooms and Second Floor Sitting Room and Associated Closet. These rooms have an elaborate base, 10" high with a top 2" ogee profile design and a lower shaped portion (about 4" from the top, half-way from the top to the bottom). It also has an elaborate base shoe with an ogee profile. The wood base and shoe are both dark stained or painted. The dining room and the second floor southeast bedroom also have wood, 2" wide picture rails on the walls. The picture rails for both rooms are stained dark. Both the base trim and the picture rail are original to the building.

Kitchen. The kitchen has a very simple wood base shoe at the bottom of the wainscot, stained dark. This is original to the building.

Dining Room Closet. This closet has a simple wood base trim, stained dark, with no base shoe. It is unknown if the base trim is original to the building.

First and Second Floor Baths and Second Floor Southwest Bedroom Closet. These rooms have a less elaborate base and shoe than the entry and other rooms as the trim has a basic ogee profile 1" wide at the top. The base and shoe are both stained dark. These base trims are original to the building.

Architecture – Floor
Basement. The accessible room in the basement has a concrete slab-on-grade floor that is original to the building.

Entry, Dining Room and Associated Closet, Sitting Room. These four rooms have the original wood flooring (3 ½" wide boards), stained.

Kitchen, First and Second Floor Baths, Second Floor Southeast Bedroom. These four bedrooms have modern resilient sheet flooring.

Second Floor Hall and Closet, Second Floor Southwest Bedroom and Associated Closet, Second Floor Sitting Room and Associated Closet. These six rooms have the same wood flooring as the entry, dining room and closet, and sitting room, except the wood is painted blue-gray.

Architecture – Stairs
Exterior Entry Porch Stairs. The stairs are made of 2x12 treads, six risers (including concrete base) with riser heights between 7 ¼" to 7 ¾", and no handrails. (DI-AKQ-08 and 10)

Basement to First Floor Stairs. These stairs are open wood stairs painted blue-gray. There are five risers (8" high) to a landing and then another five risers to the basement. The treads are 10 ½" deep with a 1"

nosing. The stairs have a partial handrail at the bottom portion of stairs made from one 2x4 painted yellow. The stairs are original to the building. (DI-AKQ-13)

First Floor to Second Floor Stairs. These stairs are stained wood with only the newels remaining in the balustrade. A rope is acting as the handrail. There are seven risers (8" high) to a landing and then another eight risers. The treads are 10 ¾" deep with a 1" nosing. The stairs and newels are original to the building. (DI-AKQ-16)

Architecture – Casework

Dining Room Closet. This closet has segments of base seen elsewhere in the house used as supports for a metal shelving bar but were possibly used historically for hooks or nails. The wood is original to the building.

Second Floor Hall's Closet. This closet has a piece of 3" wide simple wood board and may be original to the building.

Second Floor Sitting Room's Closet. This closet has a dark stained wood built-in shelving unit and is not original to the structure but is historic.

Architecture – Accessibility

The building is currently not accessible. The north primary entry door opening is 2'11 ½" clear with a grade to finished floor elevation change of 4'3 ¾". The threshold step is 8" tall. The east entry door opening is 2'7 ½" clear with a grade to finished floor elevation change of 8" tall or greater. This door has a stone sill. Within the building, there have been no accessibility upgrades.

Physical Description -- Structural

Structural – Foundation

The perimeter foundation system consists of brick masonry. The interior foundations are below interior brick masonry walls and could not be observed.

Structural – Floor Framing

The basement floor is a concrete slab-on-grade.

Framing for the front porch was measured to be 2x8 joists spaced at about 18". The joists span approximately 11'. The joists are supported on the brick perimeter walls. The porch is sheathed with 1x4 tongue and groove sheathing.

The first floor framing was measured to be FS 2x10 joists spaced at about 16". The joists span approximately 14' to 16'. The joists are supported on the perimeter foundation walls and interior brick masonry walls. The floor is sheathed with diagonal solid wood subflooring.

The second floor framing was not accessible and could not be measured. The joists span approximately 14' to 16'. The joists are supported on wood-framed partition walls and the exterior masonry walls.

Structural – Roof Framing
The roof framing was measured to be FS 2x6 rafters spaced at about 16”. The rafters span approximately 9’ and 10.5’. The rafters are supported on the exterior wood-framed walls. The rafters are sheathed with spaced solid wood underlayment.

Structural – Ceiling Framing
The second floor ceiling framing was measured to be FS 2x6 joists spaced at about 16”. The joists span approximately 11’ to 16’. The ceiling joists are supported on the exterior wood framed walls and wood-framed partition walls.

Structural – Wall Framing
The exterior walls are constructed of brick masonry up to the second floor and wood-framed above that. The second floor wood framing was not accessible and could not be measured. The framing of the interior walls, where it was accessible, was measured to be FS 2x4 studs spaced at about 16”.

Structural – Lateral System
Lateral stability for the building is provided by the exterior masonry and wood-framed walls.

Structural – Load Requirements
The required floor load capacity is 40 psf, the required snow load capacity of the porch is 60 psf and the required roof snow load capacity is 50 psf. The required ceiling live load capacity is 10 psf (no storage is allowed).

Physical Description -- Mechanical

Mechanical – Plumbing Systems
The original water source for the building was a 5’x10’cistern built in 1901 and located in the cellar of the building. There is currently no active domestic water service to the building. Only small sections of galvanized steel water piping remain.

The sanitary sewer serving the building has been disconnected. Portions of the cast iron waste piping remains in place from the first and second floor bathrooms to the basement. The 4” cast iron waste main terminates with an open pipe in the basement. It is not connected to the building sewer main that originally extended south from the building.

The only plumbing fixtures that remain in place are the bathtubs in the first and second floor bathrooms and a laundry tub in the basement. The second floor toilet and lavatory are loose on the floor of the room. The remaining plumbing fixtures have been removed and all the fixtures have been disconnected from the plumbing systems. All faucets have been removed.

Mechanical – HVAC
The original heating for the building would have been coal burning stoves. The original brick chimney stacks still remain from the basement up through the roof. At one time there was a boiler located in the basement with cast iron radiators. Only one of the radiators remains and the boiler has been removed.

Basement ventilation consists of two 32”x18” ground level wood slat louvers with wire mesh screen and operable windows on the inside, one on the east side of the building and one on the south side. There are

also two 16”x12” ground level openings on the west side of the building covered with an open metal grating.

Mechanical – Fire Suppression
None in the building.

Physical Description -- Electrical

Electrical – System Configuration
Power for the Assistant Keepers Quarters comes from the service panel in the basement of the Keepers Quarters. The power for the building is currently off. The majority of the electrical equipment in the Assistant Keepers Quarters building has been removed. Remaining items consist of disconnected wiring and boxes.

Electrical – Wiring Devices
Wiring Devices within the building have been removed. Only outlet boxes and conductors remain.

Electrical – Conductor Insulation
Wiring in the Assistant Keepers Quarters is generally "Romex" construction with rubber insulated conductors in an overall sheath of braided cotton fiber. Romex cable is exposed in the basement and is concealed in walls and ceilings in the upper levels of the building. None of the wiring includes a separate ground conductor and receptacles within the building are of the two prong, nongrounded type. Much of the wiring is exposed and is not terminated at outlet and lighting junction boxes.

Electrical – Overcurrent Protection
Overcurrent protection for the building is located in the panel board in the basement of the Keepers Quarters. There is no individual main disconnect switch for the Assistant Keepers Quarters.

Electrical – Lighting Systems
Lighting in the building has been removed.

Electrical – Telecommunications
None in the building.

Electrical – Fire Alarm System
None in the building.

Electrical – Lightning Protection
Lightning protection consists of brass air terminals and brass or copper down- cables that appear to be terminated on buried ground rods. Air terminals are located along the peak of the roof, on the peak of each dormer, and on each chimney.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs) at Devils Island. Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos

The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Adhesives (Multiple varieties of miscellaneous adhesives were seen on heater components, under remnant flooring applications, and around windows,
2. Plaster,
3. Drywall,
4. Thermal System Insulation (TSI) (Was not observed and asbestos is commonly present in insulation on water pipes, metal ducting for heating systems, behind floor registers, steam piping, etc.,
5. Sub-Flooring (Suspect ACMs in flooring applications were not observed and asbestos is commonly present in vapor barrier felts and tar-papers used in sub-flooring applications. Roofing Materials),
6. Brick and Block Filler (The exterior of the structure is brick and has the potential to have a block filler or grout that is potentially asbestos containing),
7. Caulk (Caulking was observed around window and door penetrations, which can also include gasket applications between the window assembly and the structure, and,
8. Asbestos-cement (Piping, wall-board, wall interior panels, roof flashing and roofing applications can be constructed of asbestos-cement. This type of application was not observed at the structure but may be present).

The assumed ACMs were observed to be in poor condition.

Hazardous Materials – Lead Containing Paint

Detectable lead is assumed to be present at the following locations:

1. Interior Painted Surfaces, and,
2. Exterior Painted Surfaces.

Based on the estimated dates of construction of the various structures, LCP is assumed to be present throughout the structure. The confirmed LCP was observed to be in poor condition and the assumed LCP was observed to be in poor condition.

Loose/flaking LCP is identified on the exterior painted walls of the structure. Paint chip debris is not noted on localized areas of surface soils surrounding the Assistant Keepers Quarters.

Hazardous Materials – Lead Dust

Surface wipe-sampling for lead dust was not conducted in the Assistant Keepers Quarters because lead dust was assumed to be present due to the poor condition of assumed LCP.

Hazardous Materials – Lead in Soils

Historical paint maintenance activities such as manual scraping, power-washing, sanding, abrasive blasting or the general poor and peeling condition of exterior LCP may have created the potential to impact the surrounding soil. Areas of the surface soils adjacent to the structure were not observed to have LCP debris and additional areas may exhibit LCP debris or lead-contaminated soils, but are not observable due to

vegetative cover surrounding the structure. Preliminary lead-in-soil sampling was not performed to assess whether these near-structure soils contain lead concentrations above applicable soil standards.

Soil Sampling was not conducted around the Assistant Keepers Quarters.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was visually identified in the Assistant Keepers Quarters.

Character Defining Features

Mass/Form. A two-story masonry Queen Anne style residence with asymmetrical form, a main gable roof with a front gable dormer with bow window, a recessed porch, and two brick chimneys.

Layout of Space. The separate discrete rooms are arranged off of a central hall/stair for all levels. The rooms do not open to one another.

Exterior Materials. Lower level is red brick, upper level is painted wood wall shingles. Painted wood trim detailing includes corbels, ogee cornice at the soffits and an ogee drip edge trim at the masonry to wood shingle transition. The wood trim is painted both green and white.

Openings. The openings consist of a mix of wood double hung and casement windows, all painted dark green. The doors are six- (or nine-) lite over three panel painted wood.

Interior Materials. The interior materials are fairly intact and consist of painted plaster, stained woodwork, doors and floors, with the exception of some missing elements at the entry area (balusters, wainscot and base trim.)

General Condition Assessment

In general, the Devils Island Assistant Keepers Quarters is in good condition on the exterior and in poor condition on the interior. The historic ceilings are deteriorating and the wood floors are worn. The wood base and balustrade of the main stairs have been partially removed. However, overall, the Assistant Keepers Quarters reflects much better the historic qualities and character of the original construction than the Keepers Quarters.

Structurally, the Assistants Keepers Quarters is in good condition with the exception of the front porch. The front porch framing and decking are in poor condition.

Mechanically, the majority of the systems in the building has either been removed or is in poor condition.

Electrically, the systems within the Assistant Keepers Quarters have largely been removed. Boxes, wiring and equipment that remain are in poor condition

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
<u>*Condition:*</u> *Good*
This roof eaves and soffits are in good condition. The tie offs on the roof should not be used for life safety anchors until they can be certified as meeting OSHA requirements.

Architecture – Gutters and Downspouts
<u>*Condition:*</u> *Good*
The existing gutters and downspouts are in good condition as both downspouts extend 12’-0” away from the foundation. There is no gutter and downspout at the entry porch.

Architecture – Chimneys
<u>Condition:</u> *Good*
Both chimneys are in good condition.

Architecture – Exterior Walls
<u>Condition:</u> *Good*
The exterior walls are generally in good condition with a few exceptions. These include eroded mortar at the west edge of the entry porch where a downspout existed, historically. Also, the masonry at the porch appears to be stressed at the intersection of the stringer support beam and the northwest column bearing point. The shingles, though weathered with peeling paint, are in fairly good condition.

Architecture – Windows
<u>Condition:</u> *Good to Fair*
Basement Windows. The two different types of basement windows are both in fair condition. The louvered wood slat vents have paint peeling and the cast iron vents have rust issues.

Top of Stairs/Second Floor Hall Window. This window has no lifting hardware, so it's very difficult to operate, and the interior varnish is fading. Overall, it is in good to fair condition.

Second Floor Bath. This window's frame is painted white while the trim is varnished oak. Also, it has no lifting hardware, so it's very difficult to operate. Overall, however, it is in good to fair condition.

Tripartite Bow Window. The three windows are overall in good condition. The only issues observed were that the interior finish does not match the trim and the crown molding trim has some chips in the wood.

Predominant Windows. The predominant windows have no lifting hardware and so are difficult to operate and have inconsistent finishes on the interior faces. Also, some of the wood storm windows are deteriorating (particularly the bottom rail), and the glazing compound is failing on some of the storm windows. The glazing compound could not be observed at windows. Overall, however, the windows are in good to fair condition.

Attic Window. The arched attic window is in good condition.

Architecture – Exterior Doors
<u>Condition:</u> *Fair*
Main Entry Door. This door is in fair condition as it has replica hardware and peeling paint.

East Entry Door. This door is in fair condition as it has replica hardware and peeling paint.

Basement Coal Chute at West Elevation. This coal chute is in fair condition with some rust issues.

Architecture – Exterior Trim
<u>Condition:</u> *Good*
The wood trim appears to be in good condition, though with peeling paint.

Architecture – Exterior Entry Porch
Condition: *Poor*
The existing porch is in poor condition and is exhibiting signs of stress. The base of the columns is wicking up moisture from the stone. The masonry knee wall at the northeast corner is pulling away from the stair stringer beam and the porch floor and the northeast column is out of plumb.

Architecture – Interior Doors
Condition: *Fair to Poor*
First Floor Historic Doors. Most interior doors and some trim have been removed from the building, most likely pilfered. Three doors on the first floor have been removed. Extant doors have blistered varnish and are missing knob hardware.

Second Floor Historic Doors. Most interior doors and some trim have been removed from the building, most likely pilfered. Five doors on the second floor have been removed. Extant doors have blistered varnish and are missing knob hardware.

Architecture – Wall Finishes
Condition: *Good (Masonry) to Fair (Wainscot) to Poor (Plaster)*
The basement's exposed brick walls are in good condition. Overall, the plaster is in poor condition with cracks, holes, and staining. The wainscot is generally in fair condition, though some pieces are missing. The sitting room's walls appear to have been sealed with some form of sealant to prevent further deterioration.

Architecture – Ceiling Finishes
Condition: *Good and Poor*
Overall, the condition of the ceiling finishes is poor though the entry, kitchen, and dining room ceiling finishes are in good condition. The first floor sitting room is in poor condition as paint and plaster have fallen to reveal lath. The second floor hall, second floor sitting room, and both bedrooms all have large sections of the ceiling finishes missing, revealing the lath above the plaster. (DI-AKQ-29) The first floor and second floor baths' ceiling finishes are in good condition, with only minor gouges on the south end of the second floor bath's plaster ceiling.

Architecture – Interior Trim
Condition: *Fair*
Overall, where the trim is intact, it is in fair condition with some staining, wear and irregular joint issues.

Architecture – Floor
Condition: *Good (Concrete) and Poor (Wood and Resilient)*
The basement slab has minor cracks and stains typical for its use and age and is in good condition. In general, the wood flooring is in poor condition due to some warping, poorly applied stain or peeling paint. The resilient flooring is in poor condition due to scarring and wearing.

Architecture – Stairs
Condition: *Fair to Poor*
Exterior Entry Porch Stairs. These stairs are in poor condition as they are uneven, have peeling paint, and no handrail.

Basement to First Floor Stairs. These stairs have a partial handrail, but the handrail is inadequate and not code compliant. Also, the blue-gray paint is peeling heavily. The stairs are in fair condition.

First Floor to Second Floor Stairs. These stairs are missing most of the balustrade, only the newel posts remain. Stain is faded and worn. Overall, the stairs are in poor condition.

Architecture – Casework
Condition: *Fair*
Overall, the casework is in fair condition with pieces that are damaged, warped, or missing.

Architecture – Accessibility
Condition: *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
Condition: *Good*
The visible portion of the perimeter foundation system is in good condition. The interior foundations could not be observed, thus their condition is unknown. No obvious signs of distress or damage were observed.

Structural – Floor Framing
Condition: *Fair*
The basement floor is in good condition. The framing for the first floor is in fair condition. Floor joists that are headered off above doors and windows are not properly supported (DI-AKQ-31). One floor joist has been cut for plumbing work and another joist is damaged (DI-AKQ-32). The base of four posts that support the stair and first floor are rotten. (DI-AKQ-33)

Framing for the front porch is in poor condition. The east ends of the joists are rotten. The east edge of the tongue and groove decking is also rotten (DI-AKQ-34).

The second floor framing could not be observed and its condition is unknown. No obvious signs of distress or damage were observed.

Structural – Roof Framing
Condition: *Good*
The roof framing is in good condition.

Structural – Ceiling Framing
Condition: *Good*
The second floor ceiling is in good condition.

Structural – Wall Framing
Condition: *Good*
The exterior masonry walls are in fair condition. There are numerous cracks in the north and east walls of the front porch that indicate settlement of the foundation (DI-AKQ-35 and 36). The framing of the interior walls, where it was accessible, is in good condition. The condition of the remainder of the walls is unknown. No obvious signs of distress or damage were observed.

Structural – Lateral System
Condition: *Good*
Lateral stability of the building is good.

Structural – Load Requirements
Condition: *Good*
The roof, ceiling and first floor framing have adequate capacity to support the required loads. The capacity of the second floor framing is unknown.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems
Condition: *Poor*
There is currently no active domestic water service to the building. Only small sections of galvanized steel water piping remain.

The sanitary sewer serving the building has been disconnected. The sections of cast iron sewer piping left in place from the first and second floor bathrooms to the basement are in poor condition.

The plumbing fixtures that remain in place are in poor condition. These include bathtubs in the first and second floor bathrooms and a laundry tub in the basement. The second floor toilet and lavatory are loose on the floor of the room and are in poor condition. The remaining plumbing fixtures have been removed and all the fixtures have been disconnected from the plumbing systems.

Mechanical – HVAC
Condition: *Fair to Poor*
All heating systems have been removed from the building. The remaining radiator is in poor condition. The basement ventilation louver is in fair condition. The metal ventilation grilles are in fair to poor condition. The total square footage of the basement louver openings exceeds code requirements for non-mechanical basement ventilation if the windows on the inside of the louvers are left open.

Mechanical – Fire Suppression
Condition: *N/A*

Condition Assessment -- Electrical

Electrical – System Configuration
Condition: *Poor*
The underground feed from the Keepers Quarters has been in place for at least 45 years and has exceeded its expected life.

Electrical – Wiring Devices
Condition: *N/A*
Wiring Devices have been removed.

Electrical – Conductor Insulation
Condition: *Poor*
Wiring within the building is in poor condition and no longer meets NEC requirements.

Electrical – Overcurrent Protection
Condition: *Poor*
Overcurrent protection for the Assistant Keepers Quarters does not meet NEC requirements.

Electrical – Lighting Systems
Condition: *Poor*
Lighting fixtures have been removed.

Electrical – Telecommunications and Fire Alarm System
Condition: *N/A*

Electrical – Lightning Protection
Condition: *Fair to Poor*
Lightning protection systems are intact and appear to be in fair condition, however over time, connections deteriorate and components corrode. The integrity of the system cannot be assured.

Condition Assessment -- Hazardous Materials

Refer to ‘Physical Description -- Hazardous Materials’ for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Assistant Keepers Quarters was constructed in 1897 as the residence for the assistant keeper and his family. During the USCG period (1939-1969), the residence was used as a storage, and possibly a residential facility.

The Assistant Keepers Quarters is currently vacant and has no public access. The proposed use for the building is to rehabilitate it for self-guided visitor tours.

Rehabilitation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the rehabilitation of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Low*
Verify/provide proper blocking for roof tie offs. Scrape, sand and repaint the soffit, fascia and frieze board.

Architecture – Gutters and Downspouts
Priority: *Low*
Add a gutter and downspout at the porch where one previously existed.

Architecture – Chimneys
Priority: *Low*
No recommendations at this time.

Architecture – Exterior Walls
Priority: *Moderate*
Scrape, sand and repaint the wood shingles. Coordinate masonry work at the porch with foundation/floor framing work. Repoint the masonry at the west edge of the porch.

Architecture – Windows
Priority: *Moderate*
Provide missing hardware at the windows. Scrape, sand and repaint the windows and storms where they are currently painted. Reglaze the storm windows and repair the bottom stiles.

Architecture – Exterior Doors
<u>Priority:</u> *Moderate*
Scrape, sand and repaint the doors using the paint analysis to guide the color selection. Apply a rust inhibitor to the coal chute's susceptible components to prevent further rusting.

Architecture – Exterior Trim
<u>Priority:</u> *Low*
Scrape, sand and repaint the trim using the paint analysis to guide the color selection.

Architecture – Exterior Entry Porch
<u>Priority:</u> *Severe*
Coordinate porch work with foundation and framing work. Scrape, sand and repaint. Consider adding a code compliant guardrail at the porch due to unsupervised public access.

Architecture – Interior Doors
<u>Priority:</u> *Low*
Scrape, sand and refinish the extant doors. Provide missing hardware in kind. Provide missing trim elements to match existing and refinish.

Architecture – Wall Finishes
<u>Priority:</u> *Moderate*
Patch and repair areas of damaged plaster. Prepare and repaint. Provide portions of missing wainscot to match existing. Scrape, sand and refinish wainscot.

Architecture – Ceiling Finishes
<u>Priority:</u> *Severe*
Patch and repair areas of damaged plaster. Prepare and repaint.

Architecture – Interior Trim
<u>Priority:</u> *Low*
Provide missing trim in-kind and match existing profile and finish.

Architecture – Floor
<u>Priority:</u> *Moderate*
Refinish the existing wood floor. Repair the resilient flooring or remove and replace it with a similar pattern and color. Salvage small sections of resilient flooring for future interpretive use.

Architecture – Stairs
<u>Priority:</u> *Severe*
Install code compliant handrails at all stairs. Replace the missing balustrade in-kind and match the existing finish. Replace porch stair stringers to provide even riser depths and repaint. Refinish stair to second level.

Architecture – Casework
<u>Priority:</u> *Low*
Repair or replace damaged or missing pieces in-kind.

Architecture – Accessibility
<u>Priority:</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Floor Framing
<u>Priority:</u> *Severe; Low*
The deteriorated decking and framing at the front porch should be repaired.

The framing of headers for the first floor joists above doors and windows should be strengthened to meet IEBC and NPS requirements. The damaged first floor joists should be repaired. The deteriorated portions of the posts in the basement should be repaired.

Structural – Roof Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Ceiling Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Wall Framing
<u>Priority:</u> *Low*
The cracking in the north and east walls of the front porch should be repaired. The cause for the settlement of the walls should be investigated further.

Structural – Lateral System
<u>Priority:</u> *Low*
No recommendations at this time.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems
Priority: *Low*
The existing plumbing fixtures and plumbing piping are no longer functional. Unattached plumbing fixtures should be removed. It is recommended that the plumbing piping be removed or capped. The sewer pipe serving the building should be capped below grade.

Mechanical – HVAC
Priority: *Moderate (Ventilation); Low (Radiators)*
While the total square footage of the existing basement ventilation louvers meets code requirements, additional passive ventilation is recommended to prevent condensation and high humidity levels in the basement.

It is recommended that the cast iron radiators be cleaned and restored for historic preservation.

Mechanical – Fire Suppression
Priority: *N/A*

Treatment Recommendations -- Electrical

Electrical – System Configuration
Priority: *Moderate*
Existing electrical systems in the building are nonfunctional and there is no source of ac power for the building. It is recommended to remove all exposed existing electrical equipment and wiring

Electrical – Wiring Devices
Priority: *Low*
No recommendations.

Electrical – Conductor Insulation
Priority: *Low*
No recommendations.

Electrical – Overcurrent Protection
Priority: *Low*
No recommendations.

Electrical – Lighting Systems
Priority: *Moderate*
Lighting within the building has been removed. It is recommended that associated boxes and wiring be removed.

Electrical – Telecommunications and Fire Alarm System
Priority: *N/A*

Electrical – Lightning Protection
Priority: *Moderate*
Existing lightning protection is old and its effectiveness has not been established. It is recommended that a LPI (Lightning Protection Institute) certified inspector perform an inspection of the lightning system and provide findings and recommendations in accordance with LPI-175.

Treatment Recommendations -- Hazardous Materials

Hazardous Materials – Asbestos
Priority: *Moderate*
Recommend sampling of suspect asbestos containing materials, including: brick and block filler, plaster, Thermal Systems Insulation, adhesives, wall and ceiling interiors, lay in ceiling panels, sub-flooring, and asbestos-cement.

Hazardous Materials – Lead-Containing Paint and Lead Dust
Priority: *Moderate*
Recommend stabilization or abatement of Lead Containing Paint. Lead dust wipe sampling not recommended.

Hazardous Materials – Lead In Soils
Priority: *Moderate*
Recommend further soils characterization to confirm applicable regulatory requirements.

Hazardous Materials – Mold/Biological
Priority: *Low*
No recommendations at this time.

Hazardous Materials – Petroleum Hydrocarbons
Priority: *Low*
No recommendations at this time.

Alternatives for Treatment

The following are several considerations of alternatives for the proposed treatments:

1. Add a code compliant guardrail (42”) at the porch due to risk of unsupervised public tours at this building.
2. Consider retaining areas of plumbing, heating and electrical for interpretive purposes.

Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Visitor access into former residence	Change in Use: Upgrades for code and safety may be required and may alter the historic fabric.	Integrate upgrades to minimize damage to historic fabric.	- Allows visitors to experience the cultural resource first hand - Improves safety for visitors and staff
2. Self-guided component of visitor tours	Places the building at further risk of vandalism.	Study historic elements present in proposed self-guided area and determine protection methods against possible vandalism.	-Allows visitors a greater freedom to experience the cultural resource first hand -Staff does not need to be present for visitors to enjoy resource
3. Add code compliant guardrail and handrail at porch and stair	Modern code upgrade could be visually disruptive to the historic integrity of the building.	Design a guardrail and handrail as discretely as possible.	- Improves safety for visitors and staff
4. Additional Hazardous testing and mitigation	Mitigation of hazardous material may require removal of historic materials.	Any mitigation will need to be evaluated for benefit and implemented sensitively to minimize damage to the resource.	- Improves safety for visitors and staff - Removes hazards from the cultural resource

Assistant Keepers Quarters Photographs, 2009

DI-AKQ-01: North elevation, 2009 (Source: AH IMGP2896)

DI-AKQ-02: East elevation, 2009 (Source: AH IMGP2895)

DI-AKQ-03: South elevation, 2009 (Source: AH IMGP2900)

DI-AKQ-04: West elevation, 2009 (Source: AH IMGP2898)

DI-AKQ-05: West elevation gutters and downspout (Source: AH IMGP2899)

DI-AKQ-06: East elevation trim and wall shingles (Source: AH IMGP2912)


DI-AKQ-07: South chimney (Source: AH IMGP2885)


DI-AKQ-08: East elevation of entry porch and stair (Source: AH IMGP2914)

DI-AKQ-09: Entry porch eave detail (Source: AH IMGP2901)

DI-AKQ-10: Entry porch and stair (Source: AH IMGP2915)

DI-AKQ-11: Main entry door (Source: AH 100_9747)

DI-AKQ-12: Main entry door, interior (Source: AH CIMG3844)

DI-AKQ-13: Basement stair to east entry door and first floor (Source: AH CIMG3910)

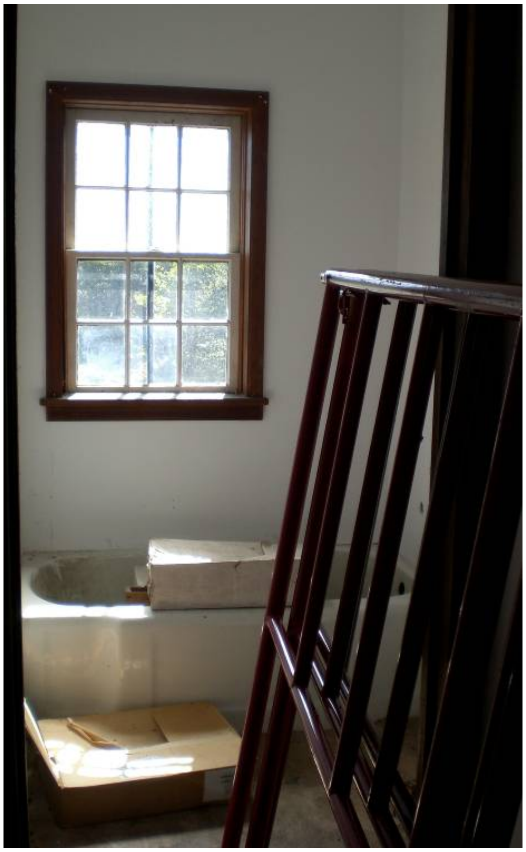
DI-AKQ-14: Basement, west elevation (Source: AH CIMG3905)

DI-AKQ-15: Basement (Source: AH IMGP2906)

DI-AKQ-16: Stairs to second floor, east elevation, looking up (Source: AH CIMG3845)

DI-AKQ-17: Entry hall, looking northwest (Source: AH CIMG3843)

DI-AKQ-18: Kitchen, south elevation (Source: AH CIMG3848-A)



DI-AKQ-19: First floor bath and window (Source: AH CIMG3855)

DI-AKQ-20: Dining room, west elevation (Source: AH CIMG3860)

DI-AKQ-21: Sitting room, north elevation (Source: AH CIMG3869)

DI-AKQ-22: Sitting room window detail (Source: AH 100_9742)

DI-AKQ-23: Second floor hall with attic access hatch, looking west (Source: AH CIMG3870)

DI-AKQ-24: Southeast bedroom, looking northeast (Source: AH CIMG3876)

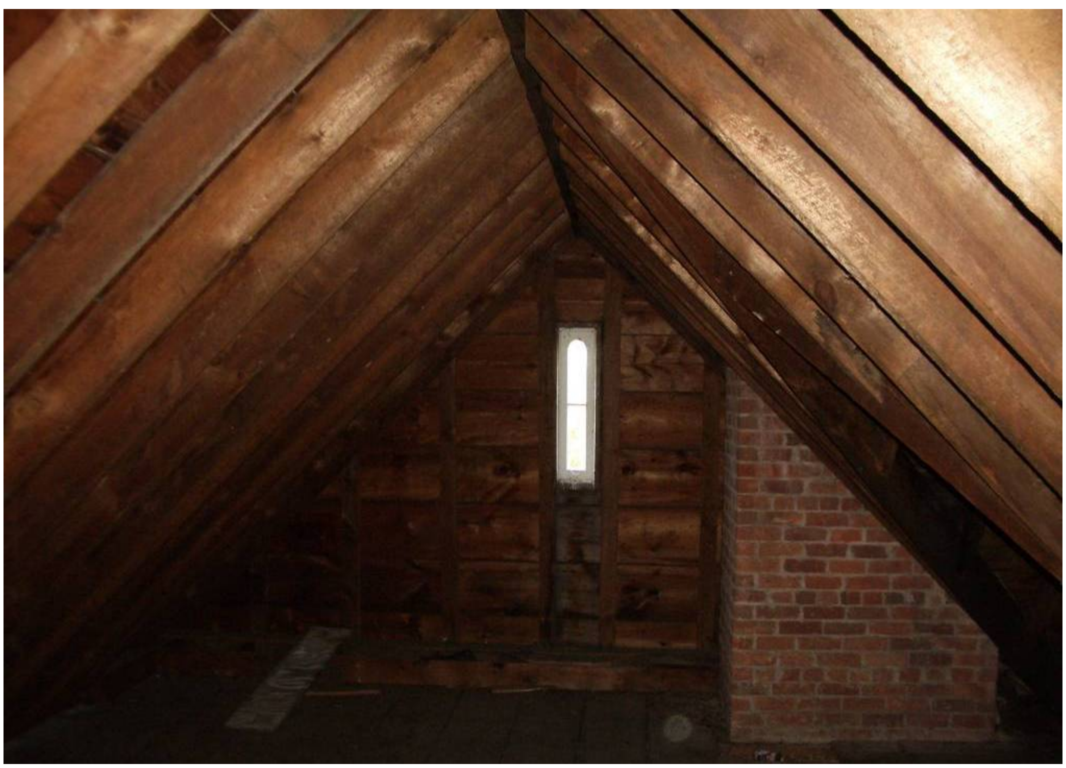
DI-AKQ-25: Second floor bath, south elevation (Source: AH CIMG3881)

DI-AKQ-26: Second floor sitting room, north elevation (Source: AH CIMG3891)

DI-AKQ-27: Second floor sitting room, bow window sash detail (Source: AH 100_9745)

DI-AKQ-28: Second floor sitting room, looking southeast (Source: AH CIMG3894)

DI-AKQ-29: Second floor sitting room closet ceiling (Source: AH CIMG3896)



DI-AKQ-30: Attic window, chimney and roof framing, west elevation (Source: AH IMGP2904)

DI-AKQ-31: Joist header above basement window (Source: Martin/Martin)

DI-AKQ-32: Damaged floor joist (Source: Martin/Martin)

DI-AKQ-33: Deterioration at base of post at basement (Source: Martin/Martin)

DI-AKQ-34: Deterioration at front porch (Source: Martin/Martin)


DI-AKQ-35: Cracked masonry at front porch (Source: Martin/Martin)


DI-AKQ-36: Cracked masonry at front porch (Source: Martin/Martin)

FOG SIGNAL BUILDING

Chronology of Alterations and Use

Original Construction

The Devils Island Fog Signal Building was constructed in 1891, the same year that the temporary wood tower was put into use. In 1925, one of the first radio beacons on the Great Lakes was installed in the Fog Signal Building. The radio beacon replaced the compressed air diaphone, which in its turn, had replaced the original fog whistle.[32] In the latter half of the 20th century, the building was used as a United States Coast Guard (USCG) facility.[33]

Significant Alterations / Current condition

Perhaps more than any other building on the light station, the Fog Signal Building evolved, reflecting architectural responses to changing technology. An 1893 photo of the Fog Signal Building looks very different from its current version. The exterior was originally a simple gable form with corrugated roofing and siding per an 1894 site plan. The east elevation's window was a six-over-six double hung, not the one-over-one double-hung that it is today. Each exterior door had eight lites over one panel where the current doors each have four lites over four panels. The 1893 photo also shows how the tramway's tracks lead directly from the shore to the building. Two large stacks/pipes were connected to the two fog signals and their equipment. (Historic Image DI-02*)* The stacks were removed from the building by 1904 when a tall masonry chimney appears in their place. (Historic Image DI-09) By 1905 to 1910, a west shed addition is visible in a photo from the Lee Benton Collection. (Historic Image DI-11) By 1930, the clipped gable on the north end of the roof is evident as is the west shed addition. (Historic Image DI-15) A photo from the 1940s depicts a double exterior door, each leaf constructed of two glass or screen panels in a wood frame, with the original doors behind them. (Historic Image DI-17*)*

Historic drawings include the USCG-era Fog Signal installation, plans, sections, elevations, and details (possibly original and reused for rehabilitation study, approved October 16, 1944 with drawing revision tags noted through 1955); and, the south shed addition, plans, sections, elevations, and details (approved September 12, 1962). (Historic Drawing DI-19) The USCG drawings of 1944 show plans for rehabilitation, specifically replacing the air compressor and the chimney cap. APIS documents also indicate that the Radio Room was constructed in 1944. (Historic Drawing DI-17) The 1962 construction drawings depict open framing for the south shed which was walled in by 1979. They also include the exhaust vent at the south elevation above the shed. (Historic Drawing DI-19)

Both the original 1891 steam whistle fog signal equipment and the 1926 compressed air diaphone fog signal equipment have been removed from the building. Currently, the two horns and some supporting equipment are stored in the Hokenson Fishery Ice House loft.[34] Very little mechanical equipment remains in the building.

Presently, there is no electrical generator in the building, so there is no source of alternating current power for the building or for other buildings on the island. In 1962, the USCG installed newer radio equipment at the south shed. At that time, some of the electrical distribution was updated.

The building is currently in fair condition.

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[32] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008.
[33] List of Classified Structures, National Park Service, 2009.
[34] From S. Mackreth, January 2010

Summary of Documented Work on the Building

Date	Work Described	Source of Information
Annual Report for 1890	"*Devil's Island, Apostle Group, Lake Superior, Wisconsin*. – As appropriation of $15,000 was made for a light on Devil's Island, and the station will be built as soon as title to the site can be procured. A fog-signal is as necessary as the light. It can be built at an estimated cost of $5,500. The Board recommends that an appropriation of that amount be made therefor."	"1890 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report for 1891	*"Devils Island, Apostle Group, Lake Superior, Wisconsin*. - The act approved March 2, 1889, appropriated $15,000 for building a light station, and the act approved March 3, 1890, appropriated $5,500 for establishing a fog signal to complete the station to be erected on Devils Island… The building of the duplicate fog signal boilers and machinery was in progress under contract at the end of the year."	"1891 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1896	"*Devils Island, Lake Superior, Wisconsin*. – The amount of the award for this island, $1,600, was paid in August, 1895… By the sundry civil appropriation act approved June 11, 1896, authority was given that $4,000 of the unexpected balance, or the appropriation of $22,000, made in the act approved March 20, 1895, for constructing a tower at Devil's Island light station, be applied to the construction of a light-keeper's dwelling at Devil's Island light and fog signal station. This will be done as soon as practicable."	"1896 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
Annual Report of 1897	"*Devils Island, Lake Superior, Wisconsin*... Boiler tubes and pipes and fittings were purchased for making repairs to the fog-signal plant…"	"1897 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
By 1904	Stacks for fog signals replaced by masonry chimney	Historic Photo, 1904, APIS Archives
By 1905-1910	West Shed addition constructed	Lee Benton Historic Photo Collection, APIS Archives
1925	Radio beacon installed in Fog Signal Building	J. Busch, 2008
1926	Compressed air diaphone fog signal installed	J. Busch, 2008
1944	Radio Room added to Fog Signal Building	APIS/NPS Business Office File # D3423 – Devils
1947	Compressor replaced	1944 Historic Drawings, Plans by USCG
1952, April - May	April 5: Description of Fog Signal Building specifically and general site condition: "Dry-rotted, buildings need painting." April 15: Replaced 5kw Kohler generator with 2kw Kohler generator May 15: "Installed washbowl at fog signal." May 23-28: Installation of new fresh water pump	USCG Log, summarized by Bob Mackreth, 2004
1952, August - October	August 15: "Painted light tower, paint locker, and inside of fog signal." August 22: "Painting in fog signal." September: "Buildings good except for fog signal."	USCG Log, summarized by Bob Mackreth, 2004

Date	Work Described	Source of Information
	October 6: "Covered workbench with sheet metal." (workbench in Fog Signal Building) October 17: "Repaired leaks in roof of fog signal."	
1953, April 22	"Dug hole for new 300 gal gasoline tank on east side of fog signal. New tanks placed in ground and connected up."	USCG Log, summarized by Bob Mackreth, 2004
1953, June	June 12: "Removed wood shelters and dug up old fuel tanks outside fog signal." June 16: "Installed telephone communication system between dwellings and signal."	USCG Log, summarized by Bob Mackreth, 2004
1953, October 13	"Dismantled old coal furnace in signal."	USCG Log, summarized by Bob Mackreth, 2004
1954	Changes to ventilation and chimney	1944 Historic Drawings with 1955 Revisions, Plans by USCG
1954, September	Monthly report – "new roof on fog signal building." September 20: "Filled old well on side of signal."	USCG Log, summarized by Bob Mackreth, 2004
1954, November	Monthly report –"'Outside of fog signal building in poor condition. Siding will have to be replaced where bad spots exist and the rest chipped and repainted. Work has started but will not be done until next season.'"	USCG Log, summarized by Bob Mackreth, 2004
1955, May	May 13: "Installed new windows in barracks #1 and signal building." May 24: "Painted inside of FS gray."	USCG Log, summarized by Bob Mackreth, 2004
1955, July - August	July: Monthly report –"Fog signal is in unsatisfactory condition due to old corrugated sheet metal siding: rusted out and deteriorated in places. All other siding has 'coats and coats of paint accumulated throughout the years that would take years to remove.' Recommends installation of white asbestos shingles; if approved they could be installed by station personnel. Attempts to remove paint have ceased." August: Removal of old siding and installation of new asbestos siding on Fog Signal Building.	USCG Log, summarized by Bob Mackreth, 2004
1955, October 5	"Bulldozed old corrugated steel siding into woods away from fog signal."	USCG Log, summarized by Bob Mackreth, 2004
1956, October 25	"Planted trees behind signal building…"	USCG Log, summarized by Bob Mackreth, 2004
1956	Associated wood shed demolished	Historic Drawings, Plans by USCG
1961	Two generators installed	Mechanical Plan
1962	Shed addition to the south side of the Fog Signal Building constructed - built open sided, enclosed by 1994	1962 Historic Drawing and Park Admin. Files D3423
1979	Garage door installed in south shed of Fog Signal Building	Park Admin. Files D3423
1992	Fog Signal equipment discontinued	Park Admin. Files D3423
2001	Reroofed main roof with interlocking asphalt shingles (green)	HSPT Reports, 2009
2001	Exterior repainted	HSPT Reports, 2009
2001	Reroofed South Shed with corrugated diamond aluminum	HSPT Reports, 2009

Other Documented Work on the Building

Date Range	Work Described
1901-1904	Removal of two metal smoke stacks, new masonry chimney built (c.1904 historic photos)
1906-1930	North end of gable clipped, West Shed addition (Radio Room) constructed (c.1930 historic photos)
1962-1979	South Shed enclosed, asbestos siding and metal siding installed, chimney shortened (c.1979 photos)

General Physical Description

This building is a one-story utilitarian wood frame structure with a brick foundation. It has a gable roof with one end clipped, boxed rafter tails and one brick chimney. There are two shed additions, one on the west and one on the south elevation.

Physical Description -- Architecture

Architecture – Roof
There are three types of roofing on this structure. The main roof has a modern green three-tab asphalt shingle roof c. 2000. There is a stock of the green shingles in the building. The west shed has red asphalt roll roofing. The south shed has corrugated metal with no closure piece at the eave, c. 2001. There are tie off rings installed at the ridge, though they do not appear to comply with OSHA requirements. A site plan dated 1894 notes that the original roof has "corrugated iron". It is no longer in situ. The sheathing is solid, (i.e. not spaced) which is consistent with the original noted material of corrugated iron.

The eave varies from one portion of the building to another. The eave of the main roof and the west shed consist of a closed raked soffit covered with galvanized sheet metal. The south shed has an open eave, with rafters exposed (no soffit material) though with a 1x painted fascia and a closed rake of just a painted 1x.

Architecture – Chimney and Ventilator
The running bond brick chimney has a rowlock course at every eighth course and a parge coat at the top. (DI-FSB-09 and 10) 1989 photos show a thicker concrete chimney cap which is no longer in situ. Previous repointing is evident at the chimney. Historic photos indicate that the chimney was significantly taller previously. The ventilator is galvanized sheet metal located at the ridge of the main roof.

Architecture – Exterior Walls
The exterior walls are of frame construction (noted as 4x4 per 1962 remodel drawings) and have asbestos shingles painted white (10" wide x 24" long) at the main portion of the building and the west shed portion. Per historic photos, the exterior walls were a corrugated sheet metal. The south shed addition consists of three types of corrugated metal panels running horizontal except at the shed's half-gable end where it runs vertically. Wood 1x and 2x trim separates the various types of corrugated metal siding. The brick foundation is visible at the base of the walls in some areas. (DI-FSB-06)

Architecture – Windows
Typical Window. This type of window is a one- over one-lite, double-hung, and is original to the building. There are five of these windows around the building. Each window has a thumb turn latch, ogee profile at the sash members, and a handle lift (varies at each window). The interior trim is 2 ½" Anderson style and

the exterior trim is 1” x 3 ½”. The sill is 3 ½” wide. There is no skirt around the sill on the exterior. All wood members are painted. This type of window is 3’-0” x 5’- 11 ½”.

Fixed Lite Window. This window is a one- over one-, fixed lite sash, and is original to the garage addition (when it was enclosed). It is located on the south end of the garage addition. There is no interior trim except the natural wood frame, and the exterior trim is 3 ½” wide with a 1 ½” wide sill. The exterior is painted. This window is 1’-8 ½” x 2’-5”.

Awning Window. This window type has three-lites, is fixed, and is original to the west shed addition. There are two of these windows located on the west side of the building. Each window has a thumb turn latch and quarter round stop. The interior trim is wood ¾” x 3 ¾” and the exterior trim is 1” x 3 ½”. The sill is 3 ½” wide. There is no skirt around the sill on the exterior. All wood members are painted. This window type is 5’-5” x 2’-5”.

North Double-Hung Window. This window is a one- over one-lite, double-hung, and is original to the building. The window is located on the north wall. It has a lift handle only (no latch) and an ogee profile. The interior trim is ¾” x 3 ½” and the exterior trim is 1” x 3 ½”. The sill is 3”. There is no skirt around the sill on the exterior. All wood members are painted. The window is 2’-6” x 4’-11”.

North Gable Window. This window is a one- over one-lite, double-hung, and is original to the building. The window is located on the north gable above two typical windows. The window has an ogee profile and an exterior metal screen. The interior trim is ¾” x 3 ½” and the exterior trim is 1” x 3 ½”. All wood members are painted. The window is 1’-4” x 2’-9”.

Vent Opening. This opening on the south elevation is currently covered by sheet metal. In the 1962 remodel drawings, it is labeled as a new exhaust fan. The opening is 1’- 4 ½” x 1’- 4 ½”.

Architecture – Exterior Doors

Main Entry Door (into Machinery Room). This is a double door; each door has four-lites over four wood flat panels, and is not original to the building but an early modification. The doors have a concrete sill, keyed knob, padlock, and three ball-tipped hinges. The exterior trim is 7/8” x 3 ½” and the interior trim is 2 ½” Anderson style. The muntins and rails have inset quarter round stops, and profiles. All wood members are painted. Each door is 2’-3 ½” x 7’- 0” x 1 ¾”. Historic photos also show a double screen door. (Historic Image DI-18 and DI-FSB-12)

South Shed/Storage Door. This door is made of plywood and is not original to the building. On the interior face, the door is a five panel wood. The wood trim is ¾” x 3 ½”, painted green. The door is 2’-6” x 6’-6” x 1 ¼”.

Garage Door. This door is contemporary, made of aluminum siding. The door is 8’-10” x 8’-0”.

Radio Room Entry Door. This door is wood, has three horizontal lites over two horizontal raised wood panels, and appears to be original to the west shed. The door has a metal threshold, knob handle, padlock, and two ball-tipped hinges. Wood trim is ¾” x 3 ½”, painted green, with quarter round stops. All wood members are painted. The door is 2’-6” x 6’-7” x 1 ¼”. (DI-FSB-11 and 17)

Architecture – Exterior Trim

The exterior trim consists of various 1x and 2x trim separating the different types of siding at the south shed. There is a 1x1 angle corner trim piece at the exterior corners of the asbestos siding. (DI-FSB-08 and 09)

Architecture – Interior Doors

Machinery Room Door to Radio Room. This door is a half-lite wood door, and was installed in 1962 per the remodel drawings. It is labeled as an "Acoustical Door." It has a routed groove detail in the field of the door panel, modern knob lockset, and three ball-tipped hinges. The trim is 2 ½" Anderson style on both sides of door. This door also has weather-stripping. All wood members are painted. The door is 3'-0" x 7'-2" x 2 ½". (DI-FSB-15)

Radio Room Door to Battery Room. This door is the far west interior door. It is a stile and rail door with a flat wood panel and its unknown if it's original to the west shed addition. There is a vent cut into the lower part of the door. Hardware is knob style and it has two hinges. The southern facing trim is ¾" x 3 ½", and the northern facing trim is ¾" x 2 ½". All wood members are painted. The door is 2'-0" x 6'-7" x 1 ¼". (DI-FSB-16)

Architecture – Wall Finishes

Machinery Room. This room's wall finish is sheet metal with rivets. The walls are painted white over gray. This finish is original to the building.

South Shed/Storage. This room's north, south, and east walls are corrugated aluminum sheeting with wood studs (the inside of the exterior walls and siding). The west wall is asbestos shingle siding.

Radio Room. This room's north, south and west walls are plaster over lath, which is original to the west shed addition. The east wall is white peg board, which is not original to the shed (labeled on the 1962 remodel drawings as "1/4" perforated tempered hardboard").

Battery Room. The room's east wall has peg board as the wall finish, which is not original to the building (labeled on the 1962 remodel drawings as "1/4" perforated tempered hardboard"). The north, south, and west walls are horizontal wood planking, painted white, and which is original to the shed addition. Part of the north wall (the eastern section) has masonite covering an old opening. The north, south, and west walls have masonite wainscot with a beveled wood cap acting as the top rail. The masonite covering and wainscot and wood cap top rail are not original to the building.

Architecture – Ceiling Finishes

Machinery Room. This room's ceiling finish is sheet metal with rivets, painted white. This ceiling is original to the building.

South Shed/Storage. This room's ceiling is composed of corrugated aluminum with wood beams and plywood sheathing. The ceiling finish is not original to the building.

Radio Room. This room's ceiling finish is multi-layered. The current finish is a dropped ceiling composed of acoustical tiles. Above the acoustical tiles is a layer of masonite. Above the masonite there are wood boards painted beige. The wood boards are original to the west shed addition but the masonite and acoustical tiles are not. (DI-FSB-18)

Battery Room. This room's ceiling finish is wood boards painted white, which are original to the west shed addition.

Architecture – Interior Trim

Machinery Room. The machinery room's concrete floor is angled up (about 60˚) to form a perimeter curb.

South Shed/Storage. Along the northern wall, the brick foundation of the original structure acts as base trim for the addition.

Radio Room. This room's base is a simple wood board painted white and black. The base is not original to the west shed addition.

Battery Room. This room has a simple wood board base with black vinyl glued onto the western wall. The north, south, and east walls are partially trimmed in black vinyl base.

Architecture – Floor

Machinery Room. The machinery room has a concrete floor painted red.

South Shed/Storage. The south shed/storage has concrete blocks supporting plywood sheeting covering most of the floor. This floor is not original to the building.

Radio Room. This room's floor is concrete covered by rubber tread mats.

Battery Room. This room's floor is multi-layered. The most recent flooring is the grooved rubber mats above pale resilient tiles. The older concrete flooring is visible in small sections.

Architecture – Stairs

Interior Stairs from Machinery Room to Radio Room. These stairs are painted concrete. There is no handrail. There are two risers (6" high), painted bright yellow, and the widest tread is 4'-10" wide. These stairs are most likely original to the west shed addition.

There is also a metal ladder to the fog signal mezzanine.

Architecture – Accessibility

The building is currently not accessible. The east primary entry double door opening is 2'4" clear, per door, with a grade to finished floor elevation change of 11 ½". The south shed/storage entry door is 2'6" clear with a grade to finished floor elevation change of less than 4". The radio room's entry door opening is 2'6" clear with a grade to finished floor elevation change of 1". There is a flush, 1" tall stone sill to the metal threshold. Within the building, there have been no accessibility upgrades.

Physical Description -- Structural

Structural – Foundation

The perimeter foundation system of the original building consists of brick masonry walls. The foundation of the west addition could not be observed and is unknown. The foundation for the south addition was measured to be an 8" wide concrete stem wall with four pilasters along the south wall at the column locations. The foundation below the stem wall could not be observed.

Structural – Floor Framing

The floor of the original building and the west addition is a concrete slab-on-grade. The floor of the south addition is 3 1/2" thick precast concrete planks placed on-grade. The floor framing for the elevated platform was measured to be 2x6 joists spaced at about 15".

Structural – Roof Framing
The roof framing of the original building was measured to be FS 2x6 rafters spaced at about 18”. The rafters span approximately 10.5’. The rafters are supported on the exterior wood-framed walls. The rafters are sheathed solid wood underlayment.

The roof framing of the west addition was measured to be FS 2x6 rafters spaced at about 22”. The rafters span approximately 14’. The rafters are supported on the exterior wood frame walls. The rafters are sheathed with solid wood underlayment.

The roof framing of the south addition was measured to be 2x6 rafters spaced at about 16”. The rafters span approximately 12’ and are sheathed with plywood sheathing. The rafters are supported on the south wall of the original building and by a 4x6 wood beam along the south wall. The wood beam is supported by four steel columns. The outside diameter of the columns was measured to be approximately 3 3/8”. The columns are spaced at approximately 6’8”. The columns bear on the concrete foundation.

Structural – Wall Framing
The exterior wall framing of the original building and west addition was not accessible and could not be measured. The interior wall framing of the west addition was also not accessible and could not be measured.

The exterior wall framing of the south addition was measured to be 2x4 studs spaced at about 18”.

Structural – Lateral System
Lateral stability for the original building and west addition is provided by the exterior wood-framed walls that are sheathed on both sides with solid wood siding. Lateral stability for the south addition is provided by the south wall of the original building, the steel columns along the south wall and the wood framed walls that are sheathed with metal siding.

Structural – Load Requirements
The required floor load capacity is 125 psf for light storage on the slab-on-grade and the elevated floor framing. The required ceiling live load capacity is 10 psf (no storage is allowed). The required roof snow load capacity is 36 psf.

Physical Description -- Mechanical

Mechanical – Plumbing Systems
Water for the Fog Signal Building was originally supplied from a pump house near the shore of the lake to the north of the building. This water supply would have been primarily for the steam powered fog signal. The pump house has been abandoned. The current domestic water system in the building consists of an elevated 500 gallon plastic nonpotable water storage tank that supplies water to a wall-hung hand sink at the north end of the building. A fill pipe connection with an exterior shut-off valve is located on the east side of the building. A 1 ½” steel piping runs from the fill pipe connection to the tank location.

There are no active sewer lines serving the building. The 2” steel gray water drain from the hand sink exits the building through the north wall and discharges above grade.

The only plumbing fixture in the building is an enameled cast iron hand sink on the north wall with hot and

cold faucets. Only the cold water faucet is connected to the nonpotable water supply. There is no hot water connection.

Mechanical – HVAC
The original coal burning heaters have been removed. A brick vent stack remains at the southwest corner of the building.

An 8” metal turbine vent for attic ventilation is still place at the north end of the roof. A motorized exhaust fan was installed through the south wall of the building. The fan is not functional and the outside wall opening has been sealed off with a sheet metal cover plate.

Mechanical – Fire Suppression
None in the building.

Mechanical – Other
A large steel fuel tank (approximately 1,000 gallons) remains at the south end of the building. This served the generators that powered a large air compressor installed in 1947 for an air diaphone fog signal. A floor trench covered with metal plate contained a 6” compressor exhaust pipe that discharged into an exhaust tunnel extending to the west of the building. This tunnel has been filled and is no longer visible outside the building. The covered trench is still intact inside the building although the generator and associated equipment have been removed. A pair of 2” exhaust pipes and mufflers associated with two generators installed in 1961 remain in place near the south end of the main building with the exhaust pipes extending through the east wall of the building about 7’ above grade. The generators have been removed. An abandoned 2” galvanized steel fuel line enters the building from below grade near the southeast corner of the main building.

Physical Description -- Electrical

Electrical – System Configuration
There is evidence that generators provided power for the building at one time. Much of the old power distribution equipment remains, but is not functional. Wiring within the building is wire in conduit.

Electrical – Wiring Devices
Wiring Devices including receptacles and toggle switches are typical of the period in which they were installed. Some devices date back to the late 1920's. Others are more modern. All receptacles are of the ungrounded type.

Electrical – Conductor Insulation
Building wiring is routed in conduit. Conduit is galvanized rigid steel, or electro-metallic tubing. Conductors remaining from the 1926 installation are rubber insulated copper. Conductors installed in 1962 or later are thermoplastic insulated copper.

Electrical – Overcurrent Protection
Overcurrent protection consists of a 200 ampere 240/120 volt single phase disconnect that feeds a wiring trough from which all building disconnects are fed. The 200 ampere disconnect originally connected to an

on-site generator, however the generator has been removed. Therefore, there is no source of power for the building. A 200 ampere, 12 space, panel board for the building contains seven one- or two-pole circuit breakers.

Electrical – Lighting Systems
Lighting in the building is via incandescent lamp sources including porcelain keyless lamp holders and RLM (industrial stem mounted pendant) type fixtures.

Electrical – Telecommunications
There is a phone in the building that originally communicated with the Keepers Quarters. This phone is no longer operational.

Electrical – Fire Alarm System
Heat detectors in this building and manual pull stations form one zone of the main fire alarm panel located in the Keepers Quarters.

Electrical – Lightning Protection
This building does not have lightning protection.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs) at Devils Island. Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos
The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Adhesives (Multiple varieties of miscellaneous adhesives were seen on heater components, under remnant flooring applications, and around windows),
2. Caulk (Caulking was observed around window and door penetrations, which can also include gasket applications between the window assembly and the structure), and,
3. Asbestos-cement (Siding and chimney were observed to be asbestos cement. Piping, wall-board, wall interior panels, roof flashing and roofing applications can be constructed of asbestos cement. This application was not observed at the structure but may be present).

The assumed ACMs were observed to be in good condition.

Hazardous Materials – Lead Containing Paint
Detectable lead is assumed to be present at the following locations:

1. Interior Painted Surfaces, and,
2. Exterior Painted Surfaces.

Based on the estimated dates of construction of the various structures, LCP is assumed to be present throughout the structure. The confirmed LCP was observed to be in poor condition and the assumed LCP was observed to be in poor condition.

Loose/flaking LCP is identified on the exterior painted walls of the structure. Paint chip debris is not noted on localized areas of surface soils surrounding the Fog Signal Building.

Hazardous Materials – Lead Dust

Surface wipe-sampling for lead dust was not conducted in the Fog Signal Building because it is a noninhabited structure.

Hazardous Materials – Lead in Soils

Historical paint maintenance activities such as manual scraping, power-washing, sanding, abrasive blasting or the general poor and peeling condition of exterior LCP may have created the potential to impact the surrounding soil. Areas of the surface soils adjacent to the structure were not observed to have LCP debris and additional areas may exhibit LCP debris or lead-contaminated soils. Preliminary lead-in-soil sampling was not performed to assess whether these near-structure soils contain lead concentrations above applicable soil standards.

Soil Sampling was not conducted around the Fog Signal Building.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was not visually identified in the Fog Signal Building.

Hazardous Materials – Petroleum Hydrocarbons

Localized areas of staining were observed on concrete floors in the Oil Houses. Stained areas are likely associated with fuel oil, diesel or other petroleum hydrocarbons. Tank and piping systems may also contain petroleum hydrocarbons.

Character Defining Features

Mass/Form. The main mass is a simple gable which is clipped on the west end, a red brick chimney and two shed roof additions.

Exterior Materials. A mix of asbestos shingles and corrugated metal shingles and roof mixed of green asphalt shingles, roll roofing and corrugated roofing.

Openings. Typically wood double-hung single-lite sashes.

Interior Materials. The interior materials are a mix of materials due to the various additions and are painted sheet metal panels, plaster, masonite and exposed exterior siding materials. The floor is a concrete slab.

General Condition Assessment

In general, the Devils Island Fog Signal Building is in fair condition.

Structurally, the original Fog Signal Building and west addition are in good condition. The south addition is in poor condition.

Mechanically, very little equipment remains in the building.

Electrically, systems in the Fog Signal Building are all beyond their expected life.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
<u>*Condition:*</u> *Good*
All roofs appear in good condition at this time, with the exception of the missing closure piece at the eave of the south shed. The tie offs on the roof should not be used for life safety anchors until they can be certified as meeting OSHA requirements.

Architecture – Chimney and Ventilator
<u>*Condition:*</u> *Good*
The chimney appears to be in good condition, however, many of the mortar joints at the southwest corner appear to be weathered. The ventilator is also in good condition.

Architecture – Exterior Walls
<u>*Condition:*</u> *Good (Shingles) and Poor (Foundation Brick)*
The walls are overall in good condition except for these instances: there are several shingles that have chipped edges and there is no trim piece separating the alternating metal siding on the west face of the south shed. However, the walls appear to shed water adequately. The east face of the south shed has several edges of metal panels which allow weather infiltration. The exposed brick at the base of the main building is in poor condition. Refer to structural assessment for exterior wall framing issues.

Architecture – Windows
<u>*Condition:*</u> *Fair to Poor*
Typical Window. In general, the paint is weathered and not all windows are operable. Also, the hardware is rusted, the glazing compound is loose, and metal capped sills along the west side are badly rotted.

Fixed Lite Window. In general, the paint is weathered, the hardware is rusted, and the glazing compound is loose.

Awning Window. In general, the paint is weathered, the hardware is rusted, the glazing compound is loose, and the capped sills along the west side are badly rotted.

North Double-Hung Window. In general, the paint is weathered, the hardware is rusted, and the glazing compound is loose.

North Gable Window. In general, the paint is weathered, the hardware is rusted, and the glazing compound is loose.

Vent Opening. This opening is covered by sheet metal, so its condition is unknown, but it no longer acts as a vent nor contains an exhaust fan.

Architecture – Exterior Doors
<u>*Condition:*</u> *Good to Fair to Poor*
Main Entry Door. The main entry door has missing stops and peeling paint. Overall, the double doors are in fair condition.

South Shed/Storage Door. The exterior of the south shed/storage door has peeling paint and deteriorating and chipped trim. The interior, however, has a natural finish and is in good condition.

Garage Door. The garage door is contemporary and is in good condition.

Radio Room Entry Door. The radio room door is in poor condition as the stile is broken, the stops are loose, and the door handle is missing its core.

Architecture – Exterior Trim
<u>*Condition:*</u> *Good*
Overall, the exterior wood trim is in good condition; however, several of the wood trim members have peeling paint. The sheet metal trim is in good condition. The “L” corner trim is in fair condition and appears to be generally serviceable.

Architecture – Interior Doors
<u>*Condition:*</u> *Fair*
Machinery Room Door to Radio Room. The machinery room door is in fair condition. The lockset is too shallow for the door thickness and there is paint peeling at the trim and edges of the door. Also, the weather-stripping is brittle.

Radio Room Door to Battery Room. The radio room door does not operate due to the floor deformation. The screen on the vent is torn.

Architecture – Wall Finishes
Condition: *Good to Fair*
The machinery room's paint on the sheet metal is peeling extensively; otherwise, the finishes are in good condition. The south shed/storage's wall finishes are in good condition. The radio room's peg board along the eastern wall is in good condition. The other walls have plaster over lath with cracks along the western wall and stains throughout. The battery room's peg board along the eastern wall is in good condition. The painted horizontal wood planking along the other walls is in fair condition as the boards are clearly visible through the paint. The masonite covering the old opening and acting as the wainscot is in fair condition with some paint and patching issues.

Architecture – Ceiling Finishes
Condition: *Good to Fair*
The machinery room's painted sheet metal is peeling everywhere; otherwise, the room is in good condition. The south shed/storage's ceiling is in fair condition. The radio room's acoustical tiles are in fair condition as they are missing in a few locations. The masonite is in fair condition as the visible sections show the ceiling finish is mostly intact. The original wood board is also in fair condition as the visible areas show some missing boards and large separations between boards. The original board ceiling finish in the battery room is in fair condition. The paint is peeling, there are noticeable separations between boards, and there is some deflection occurring in the center of the ceiling.

Architecture – Interior Trim
Condition: *Fair to Poor*
The machinery room's angled concrete base trim is in fair condition; there are areas of missing paint along the north, south, and west walls. The radio room's simple wood board base is in fair condition. There is some wear and tear visible. The black vinyl base and wood board with vinyl attached are in poor condition in the battery room. Most of the missing vinyl has fallen off; there are some areas where the adhesive has weakened and the vinyl is separating from the wall.

Architecture – Floor
Condition: *Fair to Poor (Resilient Tiles and Concrete Floor)*
The machinery room's concrete floor is in fair condition due to peeling paint, especially in heavy-wear areas and around the brick chimney, and general wear attributed to equipment storage. The south shed/storage's nonhistoric concrete blocks and plywood are in fair condition. The radio room's rubber tread mats are in fair condition as is the original concrete flooring (where visible). The grooved rubber mats in the battery room are in fair condition, yet the resilient tiles beneath are in poor condition. The original concrete flooring that is visible appears to be in fair to good condition.

Architecture – Stairs
Condition: *Good*
Interior Stairs from Machinery Room to Radio Room. These stairs are in good condition though they are not code compliant. There are minor chips in the concrete and there is no handrail.

The metal ladder to the mezzanine is in good condition.

Architecture – Accessibility
Condition: *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
<u>Condition:</u> *Good*
The visible portion of the perimeter foundation system of the original building appears to be in good condition. The foundation of the west addition could not be observed, thus its condition is unknown. No obvious signs of distress or damage were observed. The visible portion of the concrete foundation for the south addition appears to be in good condition.

Structural – Floor Framing
<u>Condition:</u> *Good*
The concrete slab-on-grade floors in the original building and the west addition are in good condition. The radio room door drags on the slab in the west addition. This may be due to settlement of the slab but it is not of structural concern. The precast concrete plank floor of the south addition is in good condition. The floor framing for the elevated platform is in good condition; however, the platform does not have the minimum required live load capacity. The edge of the platform toward the center of the building is only supported by one column that is not located at the midspan of the header beam but is centered on the existing storage tank (DI-FSB-21).

Structural – Roof Framing
<u>Condition:</u> *Good*
The roof framing of the original building and the west addition is in good condition. The roof framing of the west addition does not have the minimum required snow load capacity.

The roof framing of the south addition is in good condition. However, the notching of the joists at both ends is a poor detail that will affect their strength (DI-FSB-22 and 23). The joist support on the south wall of the original building is not properly attached.

Structural – Ceiling Framing
<u>Condition:</u> *Good*
The ceiling framing of the original building and the west addition is in good condition. The ceiling framing of the west addition does not have the minimum required live load capacity.

Structural – Wall Framing
<u>Condition:</u> *Good*
The exterior wall framing of the original building and west addition could not be observed, thus its condition is unknown. The interior wall framing of the west addition could not be observed, thus its condition is unknown. No obvious signs of distress or damage were observed.

The exterior wall framing of the south addition is in poor condition. The sill plate was not treated with preservatives and is rotten along the entire east wall (DI-FSB-24). Only two anchor bolts were holding the south wall to the foundation. The number of wall studs had not been increased on each side of door and window openings to account for the studs that were interrupted by the openings. The east and west walls are nailed to the south wall of the original building in only a few locations.

Structural – Lateral System
<u>*Condition:*</u> *Good*
Lateral stability of the original building and west addition is good. Lateral stability of the south addition is poor. The roof and walls are not properly attached to the original building and the walls are not properly attached to the concrete foundation.

Structural – Load Requirements
<u>*Condition:*</u> *Poor*
The roof and ceiling framing of the original building have adequate capacity to support the required loads. The roof framing of the west addition does not have adequate capacity to support the required loads. The capacity of the roof is approximately 28 psf. The ceiling framing of the west addition has adequate capacity to support the required loads. The roof and wall framing of the south addition do not have adequate capacity to support the required loads. The floor framing of the elevated floor in the original Fog Signal Building has a capacity of approximately 70 psf which is not adequate for light storage loads.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems
<u>*Condition:*</u> *Fair to Poor*
The elevated plastic nonpotable water storage tank is in fair condition. The galvanized steel piping that supplies water to the hand sink is in poor condition. The fill piping to the tank is in fair condition.

There are no active sewer lines serving the building. The drain from the hand sink is in poor condition. This drain exits the building through the north wall and discharges above grade. Although the waste from the sink would be considered gray water, the direct discharge is in violation of current plumbing code.

The enameled cast iron hand sink on the north wall is in fair condition. The associated nonpotable cold water faucet is also in fair condition.

Mechanical – HVAC
<u>*Condition:*</u> *Fair to Poor*
The original coal heaters have been removed. A brick vent stack remains at the southwest corner of the building.

The turbine attic vent is in fair condition. The exhaust fan through the south wall of the building is in poor condition and the wall opening has been sealed off.

Mechanical – Fire Suppression
<u>*Condition:*</u> *N/A*

Mechanical – Other
<u>*Condition:*</u> *Fair*
The 1,000 gallon fuel tank at the south end of the building is in fair condition.

Condition Assessment -- Electrical

Electrical – System Configuration
Condition: *Poor*
The diesel engine generator for the building has been removed and power feeds to the building service disconnect have been cut.

Electrical – Wiring Devices
Condition: *Poor*
Wiring Devices for the building are in poor condition.

Electrical – Conductor Insulation
Condition: *Poor*
Wiring within the building is in poor condition; it is over 50 years old and is beyond its expected serviceable life.

Electrical – Overcurrent Protection
Condition: *Poor*
Overcurrent protection for the building, including fused disconnects, circuit breakers etc. are in poor condition and are beyond their expected serviceable life.

Electrical – Lighting Systems
Condition: *Poor*
Lighting in the building is old, and if it were operational, would not meet present codes.

Electrical – Telecommunications
Condition: *Poor*
Telecommunications equipment within the building is no longer operational.

Electrical – Fire Alarm System
Condition: *Poor*
Fire alarms within the building, including heat detectors and pull stations, are no longer serviceable.

Electrical – Lightning Protection
Condition: *N/A*

Condition Assessment -- Hazardous Materials

Refer to 'Physical Description -- Hazardous Materials' for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Fog Signal Building was constructed in 1891 as a support building for the temporary wood light tower. Even after the automation of the cast iron tower, the Fog Signal Building maintained its use as a support and systems building.

The Fog Signal Building is currently used for storage by the NPS. The proposed use for the Fog Signal Building is to rehabilitate the building for self-guided visitor tours to highlight the technology aspects of a light station. The fog horns are currently stored elsewhere on NPS property and are intended to be returned to this building.

Rehabilitation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the rehabilitation of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Low*
Verify/provide proper blocking for roof tie offs. Install the missing closure piece in-kind at the eave of the south shed.

Architecture – Chimney and Ventilator
Priority: *Low*
Monitor mortar joints for future repointing.

Architecture – Exterior Walls
Priority: *Low*
Repair or replace chipped shingles with similarly sized replacement shingle. Install a trim piece separating the alternating orientation of the metal siding on the west face of the south shed. Repair or replace the deteriorating exposed brick at the base of the main building with new to match the original in color, composition and dimension.

Architecture – Windows
Priority: *Moderate*
Remove glazing compound for replacement. Epoxy stabilize deteriorated sills. Scrape, sand and repaint windows. Remove hardware and clean and repair as needed. Verify smooth operation of all windows.

Architecture – Exterior Doors
<u>Priority:</u> *Moderate*
Replace missing stops. Epoxy stabilize deteriorated trim. Scrape, sand and repaint (only where previously painted) doors and trim. Provide and install missing hardware.

Architecture – Exterior Trim
<u>Priority:</u> *Low*
Scrape, sand and repaint the wood trim using the paint analysis to guide the color selection.

Architecture – Interior Doors
<u>Priority:</u> *Low*
Replace the lockset and weather-stripping in the machine room door. Repaint the door and door trim. Trim the radio room door as it does not function currently due to the floor deformation. Replace the torn vent screen.

Architecture – Wall Finishes
<u>Priority:</u> *Moderate*
Scrape, sand and repaint all the sheet metal of the machine room.

Architecture – Ceiling Finishes
<u>Priority:</u> *Moderate*
Scrape, sand and repaint all the sheet metal of the machine room and the beadboard in the battery room. Install missing acoustical tiles at the radio room. Consider removing the acoustical tiles but retaining the grid to help inform the room's interpretation and the USCG alterations.

Architecture – Interior Trim
<u>Priority:</u> *Low*
Reattach the vinyl base in the battery room.

Architecture – Floor
<u>Priority:</u> *Low*
Repaint the machinery room concrete floor. Verify flush floor conditions to minimize risk of trip hazards as this building is planned to be open to the public, unsupervised.

Architecture – Stairs
<u>Priority:</u> *Moderate*
Access by the public to these areas should be evaluated with the associated risk of this floor elevation change.

Architecture – Accessibility
<u>Priority:</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
Priority: *Low*
No recommendations at this time.

Structural – Floor Framing
Priority: *Low*
No recommendations at this time.

Structural – Roof Framing
Priority: *Moderate*
The roof framing of the south addition should be investigated further because of the notching of the rafters at both ends and the attachment of the rafter support to the south wall of the original building.

Priority: *Low*
The roof framing of the west addition should be investigated further and if needed, upgraded to meet IEBC and NPS requirements.

Structural – Ceiling Framing
Priority: *Low*
The ceiling framing of the west addition should be investigated further and if needed, upgraded to meet IEBC and NPS requirements. The calculated capacity is 4 psf and the required capacity is 10 psf.

Structural – Wall Framing
Priority: *Moderate*
The exterior wall framing of the south addition should be replaced with construction that will meet IBC and NPS requirements.

Structural – Lateral System
Priority: *Moderate*
The lateral load resisting system for the south addition should be replaced with construction that will meet IBC and NPS requirements.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems
Priority: *Low*
No recommendations at this time.

Mechanical – HVAC
Priority: *Low*
No recommendations at this time.

Mechanical – Fire Suppression
<u>*Priority:*</u> *Low*
No recommendations at this time.

Treatment Recommendations -- Electrical

Electrical – System Configuration
<u>*Priority:*</u> *Low*
Electrical systems in the building are nonfunctional. Diesel generator sets have previously been removed. Existing electrical devices and wiring should remain in place for historical context. No recommendations at this time.

Electrical – Wiring Devices
<u>*Priority:*</u> *Low*
No recommendations at this time.

Electrical – Conductor Insulation
<u>*Priority:*</u> *Low*
No recommendations at this time.

Electrical – Overcurrent Protection
<u>*Priority:*</u> *Low*
No recommendations at this time.

Electrical – Lighting Systems
<u>*Priority:*</u> *Moderate*
Many lighting fixtures are broken. It is recommended that broken fixtures be replaced with similar period fixtures or removed.

Electrical – Telecommunications
<u>*Priority:*</u> *Low*
No recommendations at this time.

Electrical – Fire Alarm System
<u>*Priority:*</u> *Low*
No recommendations at this time.

Electrical – Lightning Protection
<u>*Priority:*</u> *N/A*

Treatment Recommendations -- Hazardous Materials

Hazardous Materials – Asbestos
Priority: *Moderate*
Recommend sampling of suspect asbestos containing materials, including adhesives, caulk, and asbestos-cement.

Hazardous Materials – Lead-Containing Paint and Lead Dust
Priority: *Moderate*
Recommend stabilization or abatement of Lead Containing Paint. Lead dust wipe sampling not recommended.

Hazardous Materials – Lead In Soils
Priority: *Moderate*
Recommend further soils characterization to confirm applicable regulatory requirements.

Hazardous Materials – Mold/Biological
Priority: *Low*
No recommendations at this time.

Hazardous Materials – Petroleum Hydrocarbons
Priority: *Moderate*
Further investigation and sampling is recommended.

Alternatives for Treatment

1. One alternative treatment for consideration would be to remove the south shed addition. The garage door was added a year after the period of significance of this island. It was later enclosed in 1994.
2. Consider removal of asbestos shingles to prevent long term hazardous materials issue due to continued chipping and difficulty of finding a similar sized replacement shingle.

Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Visitor access into former utilitarian building	Change in Use: Upgrades for code and safety may be required and may alter the historic fabric.	Integrate upgrades to minimize damage to historic fabric.	- Allows visitors to experience the cultural resource first hand - Improves safety for visitors and staff
2. Self guided component of visitor tours	Places the building at further risk of vandalism.	Study historic elements present in proposed self guided area and determine protection methods against possible vandalism.	-Allows visitors a greater freedom to experience the cultural resource first hand -Staff does not need to be present for visitors to enjoy resource
3. Additional Hazardous Testing and Mitigation	Mitigation of hazardous material may require removal of historic materials.	Any mitigation will need to be evaluated for benefit and implemented sensitively to minimize damage to the resource.	- Improves safety for visitors and staff - Removes hazards from the cultural resource
4. Reinforce south addition roof framing	Roof framing reinforcement may disturb the resource's existing roofing and/or ceiling materials.	Any reinforcement will need to be evaluated for benefit and implemented sensitively to minimize damage to the historic fabric.	- Improves safety for visitors and staff - Reinforcement will aid in protecting the resource

Fog Signal Building Photographs, 2009

DI-FSB-01: Aerial from Light Station Tower, 2009 (Source: AH DSC00854)

DI-FSB-02: South elevation, 2009 (Source: AH DSC00869)

DI-FSB-03: East elevation, 2009 (Source: AH DSC00870)

DI-FSB-04: North elevation, 2009 (Source: AH IMGP2927)

DI-FSB-05: West elevation, 2009 (Source: AH IMGP2926)

DI-FSB-06: West elevation siding and foundation detail (Source: AH IMGP2933)

DI-FSB-07: East elevation siding and foundation detail, hose bib and piping (Source: AH IMGP2937)

DI-FSB-08: East elevation siding and trim (Source: AH IMGP2935)

DI-FSB-09: South elevation trim, roofs and chimney (Source: AH IMGP2931)

DI-FSB-10: Southwest roofing, trim, siding and chimney (Source: AH IMGP2940)

DI-FSB-11: Radio room entry door (Source: AH 100_9693)

DI-FSB-12: East entry (main) door and ramp (Source: AH 100_9690)

DI-FSB-13: Machinery room, south elevation (Source: AH CIMG3644)

DI-FSB-14: Machinery room and loft, north elevation (Source: AH CIMG3648)

DI-FSB-15: Machinery room door to radio room (Source: AH 100_9697)

DI-FSB-16: Radio room, west elevation (Source: AH CIMG3680)

DI-FSB-17: Radio room and west entry door, looking southwest (Source: AH CIMG3683)


DI-FSB-18: Radio room, southeast ceiling (Source: AH CIMG3689)


DI-FSB-19: Battery room, looking southwest (Source: AH CIMG3693)

DI-FSB-20: South shed/storage, east elevation (Source: AH CIMG3652)

DI-FSB-21: Offset column at loft header beam (Source: Martin/Martin)

DI-FSB-22: Notched joist at eave (Source: Martin/Martin)

DI-FSB-23: Notched joist at rafter bearing (Source: Martin/Martin)

DI-FSB-24: Deteriorated sill plate (Source: Martin/Martin)

OIL HOUSE #1

Chronology of Alterations and Use

Original Construction

The Devils Island Oil House #1 (east) was constructed in 1892.[35]

The building is located between the Keepers and Assistant Keepers Quarters. (Historic Image DI-01*)*

There are no available historic drawings for this building.

Significant Alterations / Current condition

One alteration to the Devils Island Oil House #1 is the cedar shingle reroofing that occurred in 2006. The Historic Structure Preservation Team at the NPS completed this project. The original roofing material is unknown but it is unlikely that it was a combustible material. Many of the other oil houses have metal shingles.

This building contains no mechanical or electrical systems and is currently used as storage.

This building is currently in good condition.

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[35] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008.

Summary of Documented Work on the Building

Date	Work Described	Source of Information
1952, August	August 12: "…painting light tower, roof of spare parts locker." (one of the oil houses, also referred to as "gear locker") August 15: "Painted light tower, paint locker, and inside of fog signal."	USCG Log, summarized by Bob Mackreth, 2004
2006	Reroofed with cedar shingles	HSPT Reports, 2009

General Physical Description

This building is a small one-story, single room utilitarian brick structure with a brick foundation. The roof is hipped with wood shingles and the eaves are boxed and trimmed. The hollow core, wood door is located on the north elevation.

Physical Description -- Architecture

Architecture – Roof
The roof is hipped with wood (cedar) butt shaped shingles with a 5" exposure. It was reroofed in 2006. The roof has prefinished metal (red) drip flashing and a galvanized ridge flashing on wood with prefinished ball closure pieces at each corner. In 1904, it does not show signs of having ridge trim. The eave consists of a boxed soffit with ogee trim as the closure to the masonry. The eave extends +/- 9" with all members wood, painted. The sheathing was not visible so it is unknown if it is spaced.

Architecture – Exterior Walls
The exterior walls consists of red brick running bond with a rowlock course below the floor slab, soldier course detailing at top of the wall, and a flared brick header of soldier course at the door opening. The walls are similar to those of the Keepers Quarters. A mortar sample taken revealed that the mortar was composed of lime and coarse sand, with a rough mixture of one part lime to two parts sand, by volume. The mixture composition is similar to the Keepers Quarters mortar, but the sand coarseness differs.

Architecture – Door
The entry door is a contemporary wood, flush, hollow-core door with two hinges and contemporary hardware. (DI-OH1-06)

Architecture – Exterior Trim
Refer to roofing section. (DI-OH1-05)

Architecture – Wall Finish
The interior wall finish for this building is the original running bond brick painted white.

Architecture – Ceiling Finish
The ceiling finish is composed of 3 ½" wide beadboard painted blue-gray. This finish is original to the building.

Architecture – Floor
The floor is concrete that is painted red. The floor is original to the building.

Architecture – Casework
There are two wood shelving units, painted blue-gray, on the northeast and southwest walls. Both shelves look modern.

Architecture – Accessibility
The building is currently not accessible nor is there a clear 5’-0” diameter space within. The entry door opening is 2’-6” clear with a grade to finished floor elevation change of 1’- 1 ½” with no stairs. This door has a concrete sill.

Physical Description -- Structural

Structural – Foundation
The perimeter foundation system consists of brick masonry walls.

Structural – Floor Framing
The floor is a concrete slab-on-grade.

Structural – Roof Framing
The roof framing was not accessible and could not be measured.

Structural – Wall Framing
The exterior walls are constructed of brick masonry.

Structural – Lateral System
Lateral stability for the building is provided by the brick masonry walls.

Structural – Load Requirements
The required floor load capacity is 125 psf and the required roof snow load capacity is 40 psf.

Physical Description -- Mechanical

Mechanical – Plumbing Systems
None in the building.

Mechanical – HVAC
None in the building.

Mechanical – Fire Suppression
None in the building.

Physical Description -- Electrical

Electrical – System Configuration
None in the building.

Electrical – Wiring Devices
None in the building.

Electrical – Conductor Insulation
None in the building.

Electrical – Overcurrent Protection
None in the building.

Electrical – Lighting Systems
None in the building.

Electrical – Telecommunications
None in the building.

Electrical – Fire Alarm System
None in the building.

Electrical – Lightning Protection
None in the building.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs) at Devils Island. Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos
The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Adhesives,
2. Wall Interiors,
3. Brick and Block Filler (The interior of the structure is brick and has the potential to have a block filler or grout that is potentially asbestos containing, and,

4. Asbestos-cement (Piping, wall-board, wall interior panels, roof flashing and roofing applications can be constructed of asbestos-cement. This type of application was not observed at the structure but may be present).

The assumed ACMs were observed to be in fair condition.

Hazardous Materials – Lead Containing Paint

Detectable lead is assumed to be present at the following locations:

1. Interior Painted Surfaces, and,
2. Exterior Painted Surfaces.

Based on the estimated dates of construction of the various structures, LCP is assumed to be present on painted surfaces throughout the structure. The assumed LCP was observed to be in poor condition.

Paint chip debris was not observed on the ground surface.

Hazardous Materials – Lead Dust

Surface wipe-sampling for lead dust was not conducted in the Oil Houses because they are noninhabited structures.

Hazardous Materials – Lead in Soils

Historical paint maintenance activities such as manual scraping, power-washing, sanding, abrasive blasting or the general poor and peeling condition of exterior LCP may have created the potential to impact the surrounding soil. Areas of the surface soils adjacent to the structure were not observed to have LCP debris and additional areas may exhibit LCP debris or lead-contaminated soils. Preliminary lead-in-soil sampling was not performed to assess whether these near-structure soils contain lead concentrations above applicable soil standards.

Soil Sampling was not conducted around the Oil Houses.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was not visually identified in the Oil Houses.

Hazardous Materials – Petroleum Hydrocarbons

Localized areas of staining were observed on concrete floors in the Oil Houses. Stained areas are likely associated with fuel oil, diesel or other petroleum hydrocarbons. Tank and piping systems may also contain petroleum hydrocarbons.

Character Defining Features

Mass/Form. A simple masonry utilitarian hipped roof structure.

Exterior Materials. Red brick with wood shingle roof.

Openings. One modern flush hollow core door.

Interior Materials. Exposed masonry, concrete floor slab and painted beadboard ceiling.

General Condition Assessment

In general, the Devils Island Oil House #1 is in good condition. The original beadboard ceiling, brick walls, and concrete floor are in good condition. The modern hollow core door is in fair condition but shows signs of delaminating.

Structurally, the Oil House #1 is in good condition.

There are no mechanical or electrical systems in Oil House #1.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
Condition: *Good*
This roof and eave are in good condition.

Architecture – Exterior Walls
Condition: *Fair*
The walls are in fair condition with previous repointing work evident by the varying mortar color and tooling. There are many joints with loose or missing mortar.

Architecture – Exterior Door
Condition: *Fair*
The entry door is in fair condition as the frame of the door is beginning to separate from the masonry near the bottom hinge.

Architecture – Exterior Trim
Condition: *N/A*

Architecture – Wall Finish
Condition: *Good*
The painted brick walls are in good condition.

Architecture – Ceiling Finish
<u>*Condition:*</u> *Good*
The ceiling finish is in good condition.

Architecture – Floor
<u>*Condition:*</u> *Good to Fair*
The concrete floor is in fair condition as the red paint has all but deteriorated. The concrete is intact.

Architecture – Casework
<u>*Condition:*</u> *Fair*
The wood shelves have peeling paint, stains, and a few are uneven. Overall, the shelves are in fair condition.

Architecture – Accessibility
<u>*Condition:*</u> *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
<u>*Condition:*</u> *Good*
The visible portion of the perimeter foundation system appeared to be in good condition. No obvious signs of distress or damage were observed.

Structural – Floor Framing
<u>*Condition:*</u> *Good*
The concrete slab-on-grade is in good condition.

Structural – Roof Framing
<u>*Condition:*</u> *Unknown*
The roof framing could not be observed, thus its condition is not known. No obvious signs of distress or damage were observed.

Structural – Wall Framing
<u>*Condition:*</u> *Good*
The exterior walls are in good condition.

Structural – Lateral System
<u>*Condition:*</u> *Good*
Lateral stability of the building is good.

Structural – Load Requirements
Condition: *Good*
The slab-on-grade has adequate capacity. The roof framing could not be observed, thus its capacity is unknown.

Condition Assessment -- Mechanical

N/A

Condition Assessment -- Electrical

N/A

Condition Assessment -- Hazardous Materials

Refer to 'Physical Description -- Hazardous Materials' for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Oil House #1 was constructed in 1892 as a support building for the temporary wood tower. Since the automation of the cast iron tower light, the building has served as storage.

The building is currently used for storage by the NPS. The proposed use for the Oil House #1 is to remain as a storage building with no public access.

Preservation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the preservation of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Low*
No recommendations at this time.

Architecture – Exterior Walls
Priority: *Low*
Remove loose mortar and repoint with mortar matching original lime based mortar.

Architecture – Exterior Door
Priority: *Low*
Reattach the frame to the masonry.

Architecture – Wall Finish
Priority: *Low*
No recommendations at this time.

Architecture – Ceiling Finish
Priority: *Low*
No recommendations at this time.

Architecture – Floor
<u>Priority:</u> *Low*
No recommendations at this time.

Architecture – Casework
<u>Priority:</u> *Low*
No recommendations at this time.

Architecture – Accessibility
<u>Priority:</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Floor Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Roof Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Wall Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Lateral System
<u>Priority:</u> *Low*
No recommendations at this time.

Treatment Recommendations -- Mechanical

N/A

Treatment Recommendations -- Electrical

N/A

Treatment Recommendations -- Hazardous Materials

Hazardous Materials – Asbestos
Priority: *Low*
Recommend sampling of suspect asbestos containing materials, including adhesives, wall interiors, brick and block filler, and asbestos cement.

Hazardous Materials – Lead-Containing Paint and Lead Dust
Priority: *Moderate*
Recommend stabilization or abatement of Lead Containing Paint. Lead dust wipe sampling not recommended.

Hazardous Materials – Lead In Soils
Priority: *Low*
Recommend further soils characterization to confirm applicable regulatory requirements.

Hazardous Materials – Mold/Biological
Priority: *Low*
No recommendations at this time.

Hazardous Materials – Petroleum Hydrocarbons
Priority: *Low*
Recommend further investigation and sampling.

Alternatives for Treatment

One alternative treatment for consideration could be for the use by the park to include this building for interpretive use on the interior as opposed to continued use as park storage. However, due to the limited options for the necessary maintenance functions' storage at this remote site, retaining the storage use on the interior is deemed appropriate. At the time of future reroofing a noncombustible material may be considered.

Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Additional Hazardous Testing and Mitigation	Mitigation of hazardous material may require removal of historic materials.	Any mitigation will need to be evaluated for benefit and implemented sensitively to minimize damage to the resource.	- Improves safety for visitors and staff - Removes hazards from the cultural resource

Oil House #1 Photographs, 2009

DI-OH1-01: North elevation, 2009 (Source: AH DSC00874)

DI-OH1-02: East elevation, 2009 (Source: AH DSC00875)

DI-OH1-03: South elevation, 2009 (Source: AH DSC00876)

DI-OH1-04: West elevation, 2009 (Source: AH DSC00877)

DI-OH1-05: Roof, trim and wall detail (Source: AH IMGP2919)

DI-OH1-06: North elevation entry door (Source: AH 100_9779)

DI-OH1-07: South view into interior (Source: AH CIMG3670)

OIL HOUSE #2

Chronology of Alterations and Use

Original Construction

The Devils Island Oil House #2 (West) was constructed between 1908 and 1913.

There are no available historic drawings for this structure.

Significant Alterations / Current condition

There have been no significant alterations to the Devils Island Oil House #2.

This building contains no electrical systems and is currently used as storage. The only mechanical feature is a circular metal vent that has been sealed off from the interior.

The Oil House #2 is currently in stable condition.

Summary of Documented Work on the Building

Date	Work Described	Source of Information
1952, August	August 12: "…painting light tower, roof of spare parts locker." (one of the oil houses, also referred to as "gear locker") August 15: "Painted light tower, paint locker, and inside of fog signal."	USCG Log, summarized by Bob Mackreth, 2004

General Physical Description

The building is a small, one-story, one room, rectangular utilitarian brick structure on a brick foundation with built out corner plinth bases. The hipped roof has boxed eaves with a painted ogee wood fascia. The roof is covered with scallop-pressed metal shingles except at the apex, which has a circular metal ridge vent painted the same color as the roof shingles. The metal door is located on the northeast elevation.

Physical Description -- Architecture

Architecture – Roof
The roofing is metal shingle, painted dark red, which appears to be original. There is no drip edge flashing evident and the shingles hang over the edge of the eave. The eave extends +/- 12" and consists of a boxed wood soffit with ogee trim at the fascia and as a closure at the wall: soffit. All are painted wood.

Architecture – Exterior Walls
The exterior walls consist of running bond over-sized brick (3 ½" tall, 8 ¾" long, and 4" thick) with plinths at the base of each corner. A sloped parge coat allows drainage from the plinth. Two courses corbel out at the top of the wall just below the final course which is flush to the plane of the exterior wall. A mortar sample taken indicates that the mortar is composed of Portland cement and sand mortar, is hard, and has a gray color. Fine sand was used.

Architecture – Door
The entry door and frame are made of painted plate steel. This door has two hinges and the lockset has been removed. The door appears to be original to the building. The door is reinforced with additional plate steel at its perimeter and across the center on both sides, resembling rails and stiles. A paint sample taken of the door trim (made of plate steel) indicates that the oldest layers of paint were white. There have been eighteen layers of paint on the plate steel, and its variety of colors includes dark gray, green, yellow-orange, and the present-day maroon. (DI-OH2-01)

Architecture – Exterior Trim
Refer to roof section.

Architecture – Wall Finishes
The wall finish for this building is the original oversize common bond brick, unpainted.

Architecture – Ceiling Finishes
The ceiling finish is composed of 3 ½" wide beadboard, painted white. The finish is original to the building.

Architecture – Interior Trim
There is no interior trim in this building.

Architecture – Floor
The floor is concrete, painted red. The floor is original to the building.

Architecture – Casework
There are three wood shelving units, painted blue-gray. The two identical units are four shelves, located on the southeast and northwest walls. The southwest wall also has one low, deep shelf (2'-7" deep). All shelves look modern. (DI-OH2-05)

Architecture – Accessibility
The building is currently not accessible nor is there a clear 5'-0" diameter space within. The entry door opening is 2'-7" clear with a grade to finished floor elevation change of 1'- 0" with a 1" threshold height and no stairs.

Physical Description -- Structural

Structural – Foundation
The perimeter foundation system consists of brick masonry walls.

Structural – Floor Framing
The floor is a concrete slab-on-grade.

Structural – Roof Framing
The roof framing was not accessible and could not be measured.

Structural – Wall Framing
The exterior walls are constructed of brick masonry.

Structural – Lateral System
Lateral stability for the building is provided by the brick masonry walls.

Structural – Load Requirements
The required floor load capacity is 125 psf and the required roof snow load capacity is 40 psf.

Physical Description -- Mechanical

Mechanical – Plumbing Systems
None in the building.

Mechanical – HVAC
A circular metal roof vent remains in place.

Mechanical – Fire Suppression
None in the building.

Physical Description -- Electrical

Electrical – System Configuration
None in the building.

Electrical – Wiring Devices
None in the building.

Electrical – Conductor Insulation
None in the building.

Electrical – Overcurrent Protection
None in the building.

Electrical – Lighting Systems
None in the building.

Electrical – Telecommunications
None in the building.

Electrical – Fire Alarm System
None in the building.

Electrical – Lightning Protection
None in the building.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs) at Devils Island. Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos

The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Adhesives,
2. Wall Interiors,
3. Brick and Block Filler (The interior of the structure is brick and has the potential to have a block filler or grout that is potentially asbestos containing, and,
4. Asbestos-cement (Piping, wall-board, wall interior panels, roof flashing and roofing applications can be constructed of asbestos-cement. This type of application was not observed at the structure but may be present).

The assumed ACMs were observed to be in fair condition.

Hazardous Materials – Lead Containing Paint

Detectable lead is assumed to be present at the following locations:

1. Interior Painted Surfaces, and,
2. Exterior Painted Surfaces.

Based on the estimated dates of construction of the various structures, LCP is assumed to be present on painted surfaces throughout the structure. The assumed LCP was observed to be in poor condition.

Paint chip debris was not observed on the ground surface.

Hazardous Materials – Lead Dust

Surface wipe-sampling for lead dust was not conducted in the Oil Houses because they are noninhabited structures.

Hazardous Materials – Lead in Soils

Historical paint maintenance activities such as manual scraping, power-washing, sanding, abrasive blasting or the general poor and peeling condition of exterior LCP may have created the potential to impact the surrounding soil. Areas of the surface soils adjacent to the structure were not observed to have LCP debris and additional areas may exhibit LCP debris or lead-contaminated soils. Preliminary lead-in-soil sampling was not performed to assess whether these near-structure soils contain lead concentrations above applicable soil standards.

Soil Sampling was not conducted around the Oil Houses.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was not visually identified in the Oil Houses.

Hazardous Materials – Petroleum Hydrocarbons

Localized areas of staining were observed on concrete floors in the Oil Houses. Stained areas are likely associated with fuel oil, diesel or other petroleum hydrocarbons. Tank and piping systems may also contain petroleum hydrocarbons.

Character Defining Features

Mass/Form. A simple masonry utilitarian hipped roof structure.

Exterior Materials. Oversized red brick with plinth bases built out at each corner and a metal shingle roof painted red.

Openings. One plate steel door.

Interior Materials. Exposed masonry, concrete floor slab and painted bead board ceiling.

General Condition Assessment

In general, the Devils Island Oil House #2 is in good condition. The original beadboard ceiling is in fair condition. The historic brick walls and exterior door are in good condition as only minor wear and tear is visible on these elements. The concrete floor is a little more damaged than in the Oil House #1 but the damage does not need to be addressed at this time.

Structurally, the Oil House #2 is in good condition.

Mechanically, there are no systems in the Oil House #2 except a circular metal roof vent that has been sealed off inside the building.

Electrically, there are no systems in the Oil House #2.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
<u>*Condition:*</u> *Fair*
This roof is in fair condition as one portion of the ridge cap is missing (on the northeast corner), but was located on the ground near the structure. Also, paint is peeling in some areas and signs of rust are visible under the paint. The eave and trim is in good condition.

Architecture – Exterior Walls
<u>*Condition:*</u> *Good*
The exterior walls are in good condition.

Architecture – Door
<u>*Condition:*</u> *Good*
The entry door is in good condition with some minor blistering paint.

Architecture – Exterior Trim
<u>*Condition:*</u> *N/A*

Architecture – Wall Finish
Condition: *Good*
The unpainted brick is in good condition.

Architecture – Ceiling Finish
Condition: *Good*
The ceiling finish is in good condition as there is some separation visible between the beadboard segments and the paint is peeling heavily in the northeast area. The circular metal vent is in good condition.

Architecture – Floor
Condition: *Good*
The concrete floor is in good condition as the red paint has all but deteriorated. The concrete is intact but worn.

Architecture – Casework
Condition: *Good*
The three wood shelves have chips and gouges in wood. Overall, the shelves are in good condition.

Architecture – Accessibility
Condition: *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
Condition: *Good*
The visible portion of the perimeter foundation system appeared to be in good condition. No obvious signs of distress or damage were observed.

Structural – Floor Framing
Condition: *Good*
The concrete slab-on-grade is in good condition.

Structural – Roof Framing
Condition: *Unknown*
The roof framing could not be observed, thus its condition is not known. No obvious signs of distress or damage were observed.

Structural – Wall Framing
Condition: *Good*
The exterior walls are in good condition.

Structural – Lateral System
<u>Condition:</u> *Good*
Lateral stability of the building is good.

Structural – Load Requirements
<u>Condition:</u> *Good*
The slab-on-grade has adequate capacity. The roof framing could not be observed, thus its capacity is unknown.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems and Fire Suppression
<u>Condition:</u> *N/A*

Mechanical – HVAC
<u>Condition:</u> *Fair*
A circular metal roof vent is in fair condition, but the vent opening has been sealed off inside the building making the vent nonfunctional.

Condition Assessment -- Electrical

N/A

Condition Assessment -- Hazardous Materials

Refer to 'Physical Description -- Hazardous Materials' for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Oil House #2 was constructed between 1908 and 1913. In 1921, it was identified as oil storage for the oil vapor lamp. Since its inception, similar to Oil House #1, this building has acted as a storage facility.

Oil House #2 is currently used for storage by the NPS. The proposed use for this building is to preserve it and possibly add a view panel at the door to provide visual access to visitors.

Preservation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the preservation of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Moderate*
Remove the existing metal shingles. Verify that the substrate is sound, replace as needed if not. Install a new prefinished metal shingle to match the existing including a hipped ridge cap trim.

Architecture – Exterior Walls
Priority: *Low*
No recommendations at this time.

Architecture – Door
Priority: *Low*
No recommendations at this time.

Architecture – Vent
Priority: *Low*
Repaint the vent coordinated with the roofing work.

Architecture – Wall Finish
Priority: *Low*
No recommendations at this time.

Architecture – Ceiling Finish
<u>*Priority:*</u> *Low*
Scrape, sand and repaint beadboard ceiling.

Architecture – Floor
<u>*Priority:*</u> *Low*
No recommendations at this time.

Architecture – Casework
<u>*Priority:*</u> *Low*
No recommendations at this time.

Architecture – Accessibility
<u>*Priority:*</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
<u>*Priority:*</u> *Low*
No recommendations at this time.

Structural – Floor Framing
<u>*Priority:*</u> *Low*
No recommendations at this time.

Structural – Roof Framing
<u>*Priority:*</u> *Low*
No recommendations at this time.

Structural – Wall Framing
<u>*Priority:*</u> *Low*
No recommendations at this time.

Structural – Lateral System
<u>*Priority:*</u> *Low*
No recommendations at this time.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems and Fire Suppression
<u>*Priority:*</u> *N/A*

Mechanical – HVAC
Priority: *Low*
No recommendations at this time.

Treatment Recommendations -- Electrical

N/A

Treatment Recommendations -- Hazardous Materials

Hazardous Materials – Asbestos
Priority: *Low*
Recommend sampling of suspect asbestos containing materials, including adhesives, wall interiors, brick and block filler, and asbestos cement.

Hazardous Materials – Lead-Containing Paint and Lead Dust
Priority: *Moderate*
Recommend stabilization or abatement of Lead Containing Paint. Lead dust wipe sampling not recommended.

Hazardous Materials – Lead In Soils
Priority: *Low*
Recommend further soils characterization to confirm applicable regulatory requirements.

Hazardous Materials – Mold/Biological
Priority: *Low*
No action recommended.

Hazardous Materials – Petroleum Hydrocarbons
Priority: *Low*
Recommend further investigation and sampling.

Alternatives for Treatment

Although a view panel has been proposed as a possibility, consideration should be given if a physical barrier is required in allowing the Oil Building #2 to be open to the public during the time of guided use at the light station. Such an addition might be more of a maintenance burden than the risk of the public entering the Oil House #2.

Another alternative could be for the public to only experience Oil House #2 from the exterior.

Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Additional Hazardous Testing and Mitigation	Mitigation of hazardous material may require removal of historic materials and may affect the adjacent landscape/fabric.	Any mitigation will need to be evaluated for benefit and implemented sensitively to minimize damage to the resource.	- Improves safety for visitors and staff - Removes hazards from the cultural resource
2. Introduce a Plexiglas panel or similar product for visual access by visitors	- Creates a false atmospheric division at structure. - Installation methods may damage historic fabric.	Study alternative methods for allowing visitors visual access to the structure.	- Improves visitor experience
3. Replace the existing roof shingles inkind	Replacement would require removal of the old (not original) building material.	There is an available material currently which matches the existing in size, material and color.	- Replacement shingles at the shed roof will likely be a longer lasting alternative than repainting the existing and thereby reduce future maintenance costs

Oil House #2 Photographs, 2009

DI-OH2-01: Northeast elevation, 2009 (Source: AH DSC00872)

DI-OH2-02: Southeast elevation, 2009 (Source: AH DSC00873)

DI-OH2-03: Northwest elevation, 2009 (Source: AH DSC00871)

DI-OH2-04: Trim, roof and roof vent (Source: AH IMGP2922)

DI-OH2-05: Interior, looking southwest (Source: AH CIMG3660)

TRAMWAY ENGINE BUILDING

Chronology of Alterations and Use

Original Construction

The Devils Island Tramway Engine Building was constructed in 1901, the same year that the Fresnel lens was installed and put into service in the temporary wood tower. The tramway was vital to island construction projects as materials were hauled up from the water to the Tower site via the cart system. Therefore, the building that housed the hoisting engine was one of the first structures constructed on the site. This is further evidenced by the local brownstone blocks that the building is built of versus the red brick used for the other buildings.

A tramway track sloped away from the Engine Building down the steep cliff edge and onto a natural landing of flat rock. Unfortunately, due to wave action, the tram ramp was washed away frequently and is no longer extant. There are multiple historic images that show different ramps due to the almost yearly destruction of the structures in the winter. (Historic Images DI-03, 12, and 16*)* The tram cart itself has not seemed to change much from its 1940 form. (Historic Image DI-18*)*

Historic drawings include the “House for Hoisting Engine”, plans and sections (1901). The plans show the coal bin location that is further evidenced by the physical remnants in the building. (Historic Drawing DI-12)

Significant Alterations / Current condition

There have been minor significant alterations to the Devils Island Tramway Engine Building. Original shutters have been removed and the window was changed. The coal bin’s wood walls on the interior of the building were removed at some point after the tramway was no longer in use.

The building originally housed a coal-fired steam hoist engine. The original mechanical equipment has been removed. There are no electrical systems in the Tramway Engine Building.

The building is currently in fair condition.

Summary of Documented Work on the Building

Date	Work Described	Source of Information
Annual Report of 1901	"*Devils Island, Lake Superior. Wisconsin*… A hoisting engine and derrick, together with a lot of material of various kinds for repairs, were taken to the station by the tender Amaranth, June 22, 1901. A working party was landed at the same time. About 1,000 feet of the roadway to connect the boathouse with the tower and other buildings of the station was cleared of timber and underbrush,… the stone for a small building for the protection of the hoisting engine at the north end of the island was quarried and dressed, the engine was removed, and the work on foundation of the new structure was commenced. The foundation for the derrick was commenced, two sections of portable tracks, each 20 feet long, were built… This work is being paid for from the unexpended balance of the appropriation for Devils Island (Wisconsin) light-station."	"1901 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914

General Physical Description

This building is a small, one-story, one room, rectangular utilitarian structure made of brownstone with a hipped roof. It has an exterior brick chimney and brick arched door and window openings.

Physical Description -- Architecture

Architecture – Roof
The roof consists of a modified hipped roof with corrugated sheet metal roofing. The roof has rounded cap flashing at the ridges and hips. Roofing is attached to 1x16 (+/-) sheathing boards. There are no gutters or downspouts. (DI-TEB-05) The roof overhangs are 1'2" deep on all sides of the building and are painted. The fascia has an ogee profile. There is a second, smaller ogee trim at the wall/soffit interface. (DI-TEB-06)

Architecture – Chimneys
The chimney is stone to 6' and then brick to +/- 8' above the eave line. The cap is made from cast-in-place concrete. The flashing is saw-cut into the brick on the diagonal. (DI-TEB-05 and 07)

Architecture – Exterior Walls
The exterior walls are brownstone quarried blocks from the area, 16" thick. The northeast façade has the main door, a window, and two metal ventilation pipes at the floor level. The southeast elevation has the opening for the hoist cables. The southwest elevation has the second window and the chimney that is located 6'6" from the south corner and is 2'4" wide with a depth of 12". The northwest elevation has no openings or features.

Architecture – Windows
Fixed Lite Window. Currently, there are two windows that are twelve-lite fixed sash. Original construction drawings indicate six- over six-lite double-hung windows, but since there are no indications of weight pockets at the walls, it can be assumed that the fixed sash window type is original to the building. (Historic Drawing DI-12) The windows are located on the southwest and the northeast elevations of the building. Both windows have their original wood frame, painted, with brick molding around the exterior face and a segmented brick arch header. The windows are held in with thumb turns and have wood sills. They also have original hinges for shutters on the exterior, but the shutters are not in-situ. The windows are 3'8 ½" x 4'6". (DI-TEB-11)

Hoist Opening. This opening was used for the hoisting engine machine and cables. It is original to the building but is currently boarded over with nonhistoric beadboard. The opening is 5'x 5'. (DI-TEB-12)

Architecture – Exterior Doors
The entry door is a two-vertical over one-horizontal over two-vertical wood panel door. The door is original to the building. The door has a padlock and two ball-tipped hinges. Both sides of the door are painted and there is brick molding on the exterior as well as a segmented brick arch header. The door also has a concrete sill. The door is 2'11 ½" x 6'11" x 1 ¾". (DI-TEB-08, 09 and 10)

Architecture – Wall Finishes
The wall finish for this building is plaster over masonry, painted white. The brownstone was quarried locally. The plaster stops on the northwest façade +/- 5'from the floor and there are post holes in the southwest and northeast walls 3' from the northwest wall. This signals the dimensions of the original coal bin that existed in that portion of the building. (DI-TEB-13) Bricks form a segmented arch around the opening for the hoisting engine. An ash clean-out is located on the southwest wall with an exhaust opening into the chimney above. The clean-out is original but the exhaust opening is modern.

Architecture – Ceiling Finishes
The ceiling finish is composed of 3 ½" wide beadboard, painted blue-gray, with a rough opening for attic access.

Architecture – Floor
The floor is concrete with an embedded brick pad with concrete in the center. The concrete is smooth until the coal bin begins on the northwest section. In the coal bin area, the concrete is left rough and unfinished. The concrete and brick pad are original to the building.

Architecture – Accessibility
The building is currently not accessible. The primary entry door opening is 2'11 ½" clear with a grade to finished floor elevation change of less than 6" with a concrete sill.

Physical Description -- Structural

Structural – Foundation
The perimeter foundation system consists of stone masonry walls.

Structural – Floor Framing
The floor is concrete slab-on-grade.

Structural – Roof Framing
The roof framing was measured to be FS 2x4 rafters at 24”. The rafters span approximately 4’. The rafters are supported on the exterior walls. The rafters are sheathed with solid wood underlayment.

Structural – Ceiling Framing
The ceiling framing was measured to be FS 2x4 joists spaced at about 28”. The joists span approximately 8’. The ceiling joists are supported on the stone masonry walls.

Structural – Wall Framing
The exterior walls are constructed of stone masonry.

Structural – Lateral System
Lateral stability for the building is provided by the stone masonry walls.

Structural – Load Requirements
The required floor load capacity is 125 psf, the required ceiling load capacity is 10 psf (no storage is allowed) and the required roof snow load capacity is 22 psf.

Physical Description -- Mechanical

Mechanical – Plumbing Systems
None in the building.

Mechanical – HVAC
None in the building.

Mechanical – Fire Suppression
None in the building.

Mechanical – Other
The only remaining equipment in the building is a 55 gallon drum with a vent connecting to the original brick vent stack. The drum appears to have been converted to serve as an incinerator. The vent is constructed with coffee cans.

Physical Description – Electrical

Electrical – System Configuration
None in the building.

Electrical – Wiring Devices
None in the building.

Electrical – Conductor Insulation
None in the building.

Electrical – Overcurrent Protection
None in the building.

Electrical – Lighting Systems
None in the building.

Electrical – Telecommunications
None in the building.

Electrical – Fire Alarm System
None in the building.

Electrical – Lightning Protection
None on the building.

Physical Description -- Hazardous Materials

Landmark Environmental collected 12 bulk samples from a total of 12 different types of suspected asbestos containing materials (ACMs) at Devils Island. Of the 12 suspect ACMs that were sampled and analyzed, a total of three suspect ACMs resulted in concentration of greater than one percent (positive for asbestos).

Hazardous Materials – Asbestos
The following suspect ACMs were not sampled due to inaccessibility or park limitation regarding potential for damage to structures. Asbestos is assumed to be present in:

1. Adhesives,
2. Wall Interiors,
3. Plaster.

The assumed ACMs were observed to be in fair condition.

Hazardous Materials – Lead Containing Paint
Detectable lead is assumed to be present.

1. Exterior Painted Surfaces.
2. Interior Painted Surfaces.

Based on the estimated dates of construction of the various structures, LCP is assumed to be present. The assumed LCP was observed to be in poor condition.

Paint chip debris was not observed on the ground surface.

Hazardous Materials – Lead Dust

Wipe sampling for lead dust was not conducted at the Tramway Engine Building because it is a noninhabited structure.

Hazardous Materials – Lead in Soils

Preliminary lead-in-soil sampling was not performed to assess whether these soils contain lead concentrations above applicable soil standards.

Soil Sampling was not conducted around the Tramway Engine Building.

Hazardous Materials – Mold

Inspections of the structure were performed to identify the readily ascertainable visual extent of the mold growth. Moisture testing in building materials was not performed nor was sampling of building materials performed for microbial analysis. Mold was not visually identified in the Tramway Engine Building.

Hazardous Materials – Petroleum Hydrocarbons

Localized areas of staining were not observed on concrete floors in the small shed at the Tramway Engine Building.

Character Defining Features

Mass/Form. A simple one level hipped roof masonry structure with a brick chimney.

Exterior Materials. Rough brownstone with brick accents and patching. Exterior trim is painted both green (openings) and white (soffits). Roof is painted corrugated metal panels with painted rounded hip ridge caps.

Openings. Two fixed wood windows (twelve-lite), one five panel wood door and one tongue and groove wood board panel all painted green.

Interior Materials. Exposed brownstone with areas of plaster; painted bead board ceiling and a concrete floor.

General Condition Assessment

In general, the Devils Island Tramway Engine Building is in good condition.

Structurally, the Tramway Engine Building is in good condition.

Mechanically, the original coal fired steam hoist engine has been removed.

Electrically, there are no systems in the Tramway Engine Building.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
<u>*Condition:*</u> *Good*
The roofing is in good condition as it is well fastened. The soffits and overhangs have weathered and alligatored paint, but are overall in good condition.

Architecture – Chimneys
<u>*Condition:*</u> *Fair*
The chimney is in fair condition as the upper portion of the chimney is in need of repointing and there are two cracks in the concrete cap that appear to be stress fractures.

Architecture – Exterior Walls
<u>*Condition:*</u> *Good*
The exterior walls in general are in good condition. There is moss and lichen growth at the foundation level on the northeast and northwest facades as well as at the base of the chimney on the southwest facade. There is also a diagonal stair step crack running from the east corner to the center of the wall on the southeast façade.

Architecture – Windows
Condition: *Fair*
Fixed Lite Window. The two windows of the building are in fair condition. There wood sills are rotting and their glazing compounds are failing.

Hoist Opening. This opening could not be assessed due to being covered by beadboard.

Architecture – Exterior Doors
Condition: *Fair*
The entry door is missing its knob hardware and the interior and exterior paint is peeling.

Architecture – Wall Finishes
Condition: *Fair*
The building's wall finishes are generally in fair condition. A good majority of the white paint and plaster has fallen off the brownstone walls, a stair step crack is located at the east corner runs from ceiling to floor, and there are rust stains around the ash clean out on the southwest wall.

Architecture – Ceiling Finishes
Condition: *Good*
The ceiling finish is in good condition.

Architecture – Floor
Condition: *Fair*
The finished concrete floor and brick pad show years of wear as an equipment building with some gouges and cracks in the flooring. The unfinished concrete for the coal bin area also shows wear. Overall, the floor is in fair condition considering the building's use and character.

Architecture – Accessibility
Condition: *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
Condition: *Good*
The visible portion of the perimeter foundation appeared to be in good condition.

Structural – Floor Framing
Condition: *Good*
The concrete slab-on-grade is in good condition.

Structural – Roof Framing
Condition: *Good*
The roof framing was in good condition.

Structural – Ceiling Framing
<u>*Condition:*</u> *Good*
The ceiling framing was in good condition.

Structural – Wall Framing
<u>*Condition:*</u> *Good*
The exterior walls are in good condition. There was one diagonal crack in the southeast façade. The crack appears to be old and stable. The crack is not a structural concern.

Structural – Lateral System
<u>*Condition:*</u> *Good*
Lateral stability of the building is good.

Structural – Load Requirements
<u>*Condition:*</u> *Good*
The roof framing, ceiling framing and slab-on-grade have adequate capacity to support the required loads.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems, HVAC, and Fire Suppression
<u>*Condition:*</u> *N/A*

Mechanical – Other
<u>*Condition:*</u> *Poor*
The 55 gallon drum and coffee can vent is in poor condition.

Condition Assessment -- Electrical

N/A

Condition Assessment -- Hazardous Materials

Refer to 'Physical Description -- Hazardous Materials' for detailed descriptions of locations and conditions of hazardous materials.

Ultimate Treatment and Use

The Tramway Engine Building was constructed in 1901 from local brownstone and served as the tramway engine's system center as well as storage. An area in the rear of the building stored coal which was used to power the hoist engine. Once the tram engine was automated, the Tramway Engine Building became a storage facility.

This building is currently vacant and has no visitor access. The proposed use for the Tramway Engine Building is to preserve the historic character of the structure and maintain its current use with no public access.

Preservation (stabilization) is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the stabilization of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
Priority: *Low*
Scrape, sand and repaint wood soffits and overhangs.

Architecture – Chimneys
Priority: *Moderate*
Repoint the upper portion of the chimney and monitor the cracked concrete cap. Repointing mortar shall match the original in color, composition and joint profile.

Architecture – Exterior Walls
Priority: *Low*
Repoint the diagonal stair-step crack running from the east corner to the center of the wall on the southeast façade. Continue to monitor it. Repointing mortar shall match the original in color, composition and joint profile.

Architecture – Windows
Priority: *Moderate*
Epoxy stabilize the two rotting sills and install new glazing compound in both windows.

Architecture – Exterior Door
<u>Priority:</u> *Low*
Install missing knob hardware in-kind and scrape, sand and repaint the interior and exterior of wood door.

Architecture – Wall Finishes
<u>Priority:</u> *Low*
No recommendations at this time due to the proposed limited use.

Architecture – Ceiling Finishes
<u>Priority:</u> *Low*
No recommendations at this time.

Architecture – Floor
<u>Priority:</u> *Low*
No recommendations at this time.

Architecture – Accessibility
<u>Priority:</u> *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Floor Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Roof Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Ceiling Framing
<u>Priority:</u> *Low*
No recommendations at this time.

Structural – Wall Framing
Priority: *Low*
No recommendations at this time.

Structural – Lateral System
Priority: *Low*
No recommendations at this time.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems, HVAC, and Fire Suppression
Priority: *N/A*

Mechanical – Other
Priority: *Low*
No recommendations at this time.

Treatment Recommendations -- Electrical

N/A

Treatment Recommendations -- Hazardous Materials

The Tramway Engine Building was not accessed or observed during the September 2009 Site Inspections by Landmark Environmental.

Alternatives for Treatment

One alternative would be to undertake the repair of the stress crack – though under stabilization, treatment is not deemed necessary or a wise use of the limited available construction funds.

Assessment of Effects for Recommended Treatments

There are no apparent adverse effects of the recommended treatments.

Tramway Engine Building Photographs, 2009

DI-TEB-01: Southeast elevation, 2009 (Source: Martin/Martin Devils Island 16 Sep 09 376.jpg)

DI-TEB-02: Northeast elevation, 2009 (Source: Martin/Martin Devils Island 16 Sep 09 374.jpg)

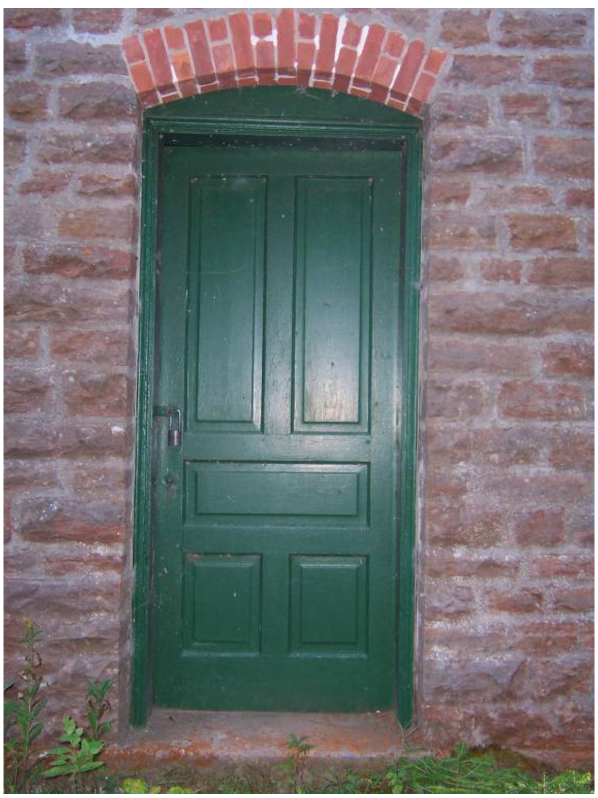
DI-TEB-03: Northwest elevation, 2009 (Source: Martin/Martin Devils Island 16 Sep 09 373.jpg)

DI-TEB-04: Southwest elevation, 2009 (Source: Martin/Martin Devils Island 16 Sep 09 366.jpg)

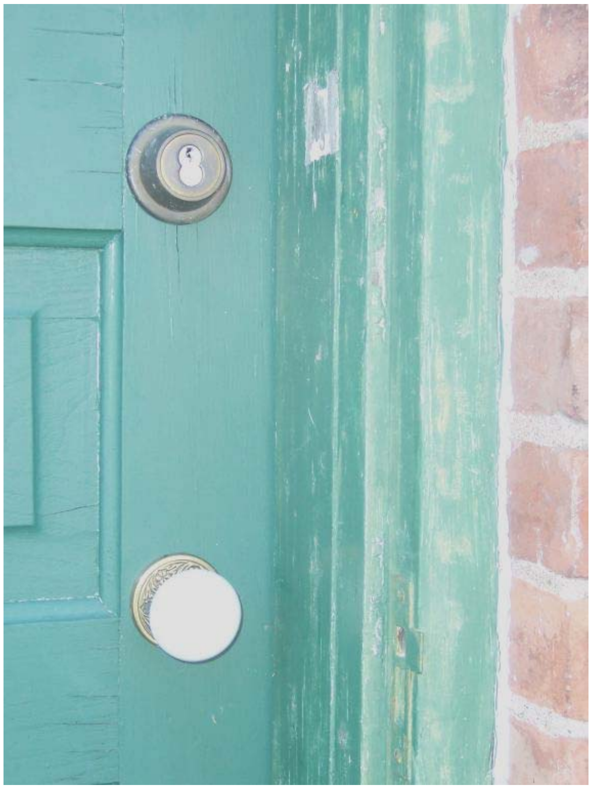
DI-TEB-05: Roof and chimney detail (Source: Martin/Martin Devils Island 16 Sep 09 375.jpg)

DI-TEB-06: Eave detail (Source: AH 100_9762)

DI-TEB-07: Southwest elevation, chimney, trim and roof detail (Source: AH 100_9756)



DI-TEB-08: Northeast entry door (Source: AH 100_9759)

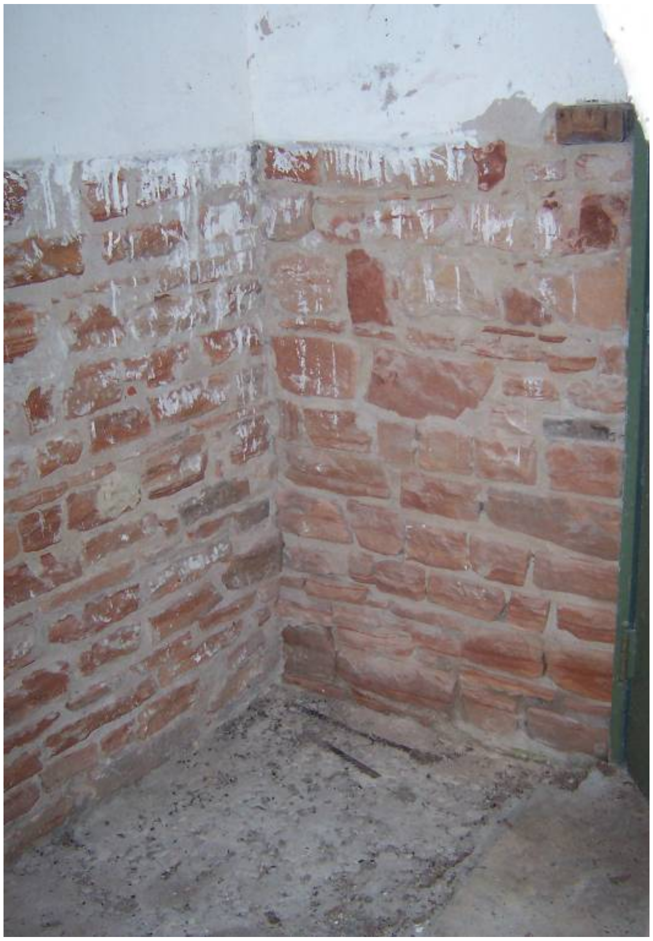


DI-TEB-09: Lockset detail, exterior (Source: AH 100_9755)

DI-TEB-10: Lockset detail, interior (Source: AH 100_9768-A)

DI-TEB-11: Window, looking northwest (Source: AH 100_9766)

DI-TEB-12: Hoist door, looking southeast (Source: AH 100_9763A)


DI-TEB-13: Coal bin area behind door (Source: AH 100_9772-A)

BOATHOUSE

Chronology of Alterations and Use

Original Construction

The Devils Island Boathouse was constructed in 1891, the same year that the Fresnel lens was installed in the temporary wood tower and put into service.[36]

The Boathouse's dock was rehabilitated in 1978 as it appears the planking was lost or damaged and needed to be restored. The cribs and timber structure of the dock are visible in the 1978 image. (Historic Image DI-20)

There are no available historic drawings for this building.

Significant Alterations / Current condition

One alteration to the Devils Island Boathouse is the cedar shingle reroofing that occurred in 2006. This was completed by the Historic Structure Preservation Team of the NPS. The spaced sheathing indicates the original roofing was wood shingle.

The Boathouse has never contained mechanical or electrical systems.

There is currently a large boulder underwater that is directly in the path of the boat ramp, preventing access into the building and corresponding boat storage (the primary function of the building). If the Boathouse is to be rehabilitated so as to be functional again, the boulder must be removed.

[36] List of Classified Structures, National Park Service, 2009.

Summary of Documented Work on the Building

Date	Work Described	Source of Information
Annual Report of 1898	"*Devils Island, Lake Superior, Wisconsin*… A crib for extension to the boat landing was built, sunk in place, and filled with ballast stone and a superstructure was built above the water line. Some 36 feet of the old landing that was out of level were raised 26 inches on the west side and 8 inches on the east side and refilled with ballast stone. The center truss of the boathouse was repaired and the roof was painted."	"1898 Annual Report of the Lighthouse Board," Devils Island listings in Lighthouse Establishment Annual Reports 1890-1914
1952, October 10	"Built anchor for hoist in top of boat house."	USCG Log, summarized by Bob Mackreth, 2004
1953, June 2	"New hoist for boathouse."	USCG Log, summarized by Bob Mackreth, 2004
1953, October 21	"Repaired rotted deck in S end of boathouse. Parts of foundation found to be rotted and should be repaired; letter will be sent."	USCG Log, summarized by Bob Mackreth, 2004
1955, September	Monthly report – "Boathouse badly needs new roof. Wood shingles are rotten and patching is little help. Should be reroofed next year."	USCG Log, summarized by Bob Mackreth, 2004
1978-1979	Reroofed with asphalt shingles and exterior battens repaired and painted	Historic Image DI-22 and APIS/NPS Business Office File # D3423 – Devils)
2006	Reroofed with cedar shingles	HSPT Reports, 2009

General Physical Description

This building is a one-story, one room, rectangular, utilitarian wood frame structure with a timber foundation. It has a simple gable roof with boxed rafter tails and board and batten siding. There is a boat door on the south elevation and a beadboard main door on the north elevation.

Physical Description -- Architecture

Architecture – Roof
The Boathouse was reroofed in 2006 with 5" exposure cedar shingles. The current roof has a prefinished red metal drip edge flashing at the starter course that extends 7" up the roof. The sheathing is spaced. Tie-off rings were installed at the ridge, though they do not appear to meet OSHA requirements, and there is a wood ridge cap. There is 1x6 frieze board and 1 x 4 ½" fascia at the gables and eaves. (DI-BH-15)

Architecture – Exterior Walls
The exterior walls are wood frame with board and batten siding. The battens are shaped and have an ogee profile.

Architecture – Window
The window in this building is a two- over two-lite, fixed sash, original to the building. It is located on the west side of the building. The sash is painted on both the interior and exterior faces. The exterior trim is 1 1/8" x 4 ½". The window is 2'1" x 3' 1". A paint sample taken at the exterior window trim indicates nine layers of paint, either dark green or white, with extremely weathered wood beneath. (DI-BH-11)

Architecture – Exterior Doors

Entry Door. This door is made of vertical tongue and groove wood planks, 3 ½" wide with bead, and is original to the building. The door has two strap hinges and a spring-loaded handle. There is a wood sill and the exterior trim is 1 1/8" x 4 ½", painted. The door is 2'7 ½" x 6'8" x ¾". A paint sample taken at the exterior door trim shows an impressive number of paint layers, especially for an exterior sample. The oldest layer of paint is gray and the wood beneath is heavily weathered. A sample from the eave trim indicates that its oldest layer of paint was the same shade of gray. (DI-BH-09 and 13)

Boat Doors. This set of two doors are made of vertical tongue and groove wood planks, ¾" x 5 ¼", and are original to the building. The door has no drip edge trim at the header but has a 1x4 base trim. The doors each have three strap hinges and they are currently barred and roped shut. The exterior trim is ¾" x 3 ½" painted wood. Each door is 4'3" x 7'3" x ¾". (DI-BH-14)

Architecture – Exterior Trim

The exterior trim consists of the base trim (has no slope) and the 1x4 corner boards. All the trim is wood and is painted. (DI-BH-08)

Architecture – Wall Finishes

There are no finished wall surfaces inside the Boathouse, but the unfinished rough framing and back sides of the vertical boards that side the exterior of the building are visible.

Architecture – Ceiling Finishes

There is no ceiling finish as the wood rafters, joists, sheathing, and roofing planks are exposed. This roof structure is original to the building.

Architecture – Interior Trim

There is no interior trim in this building. The wall framing is exposed.

Architecture – Floor

The floor is made of wood planks varying in size from 5 ½" to 1' wide. There is a boat ramp in the center of the floor that is 4'3" wide and angles up the length of the building to end at the hoisting mechanism located along the north wall. The floor and boat ramp are original to the building.

Architecture – Stairs

Exterior Stairs to Entry Door. These stairs are wood and unpainted. The stairs are recessed into the hillside and also help to act as a small retaining wall around the door area. There is one triangular tread (1'7" wide, 3" thick) attached to a wood frame structure that forms a triangle with the door. The distance from the ground to the top of the tread is 8 ½". The distance from the top of the tread to the top of the wood frame is 5". The distance between the door's threshold and the edge of the tread is 1'5". These stairs are not original to the building. (DI-BH-10)

Architecture – Accessibility

The building is currently not accessible. The north entry door opening is 2'7 ½" clear with a grade to finished floor elevation change of 1'1 ½".

Physical Description -- Structural

Structural – Foundation
The floor framing of the Boathouse is supported by wood beams that rest directly on the ground or are supported by wood timbers placed on the ground. The beams are not accessible and could not be measured.

Structural – Floor Framing
The floor framing was not accessible and could not be measured. The floor is sheathed with FS 2x12 planks.

Structural – Roof Framing
The roof framing consists of FS 2x4 rafters spaced at about 24”. The rafters span approximately seven feet. The rafters are supported on the exterior wood-framed walls. The rafters are sheathed with spaced solid wood underlayment.

Structural – Wall Framing
The walls are constructed of FS 4x4 posts spaced at anywhere from three feet to nine feet. A FS 4x4 girt spans across the top of the posts. FS 4x4 girts span between the posts at mid-height and at the floor. The walls are sheathed with vertical FS 1x solid wood siding.

Structural – Lateral System
Lateral stability for the building is provided by the exterior wood-framed walls.

Structural – Load Requirements
The required floor load capacity for the boathouse is 125 psf if it used for light storage. The required roof snow load capacity is 36 psf.

Physical Description -- Mechanical

Mechanical – Plumbing Systems
None in the building.

Mechanical – HVAC
None in the building.

Mechanical – Fire Suppression
None in the building.

Mechanical – Other
The Boathouse contains a cast iron hand operated gear winch at the north end of the building that would have been used to pull boats up a ramp into the Boathouse.

Physical Description -- Electrical

Electrical – System Configuration
None in the building.

Electrical – Wiring Devices
None in the building.

Electrical – Conductor Insulation
None in the building.

Electrical – Overcurrent Protection
None in the building.

Electrical – Lighting Systems
None in the building.

Electrical – Telecommunications
None in the building.

Electrical – Fire Alarm System
None in the building.

Electrical – Lightning Protection
None on the building.

Physical Description -- Hazardous Materials

The Boathouse was not accessed or observed during the September 2009 Site Inspections by Landmark Environmental.

Character Defining Features

Mass/Form. A simple utilitarian gable roof structure on the water's edge.

Exterior Materials. Wood board and batten siding painted white, exterior trim painted green and wood shingles at the roof.

Openings. One fixed four-lite sash painted green; one pair of doors at the launch and one entry door all constructed out of tongue and groove boards and painted green.

Interior Materials. Exposed wood framing at walls and roof and wood boards at the floor.

General Condition Assessment

In general, the Devils Island Boathouse is in fair condition due to the effects of the exposed location and the consistently moist condition on the wood doors, window and floor boards.

Mechanically, there are no systems in the Boathouse except a hand-operated metal winch.

Electrically, there are no systems in the Boathouse.

The following section is a discipline-by-discipline, component-by-component condition assessment of the building. Refer to Volume I, Chapter 2: Methodology for definitions of the condition ratings.

Condition Assessment -- Architecture

Architecture – Roof
Condition: *Good*
This roof is in good condition. However, the tie offs on the roof should not be used for life safety anchors until they can be certified as meeting OSHA requirements.

Architecture – Exterior Walls
Condition: *Good to Fair*
The exterior walls are in good condition. The batten is split over the west window. Some battens and trim at the base of the wall are rotting due to moisture wicking from level top of base trim (refer to structural assessment for wall framing issues).

Architecture – Window
Condition: *Fair*
The window is in fair condition as the glazing compound is brittle and failing and the sill is weathered.

Architecture – Exterior Doors
Condition: *Poor*
Entry Door. The base of the door panel is rotting away and the base of the exterior trim is rotted and split off. Overall, the door is in poor condition.

Boat Doors. This set of doors has badly peeling paint and the bases of the doors are weathering. These doors are also in poor condition.

Architecture – Exterior Trim
<u>*Condition:*</u> *Good*
The trim is in good condition.

Architecture – Floor
<u>*Condition:*</u> *Fair*
The wood floor is in fair condition as the northeast section of flooring has some rotting planks.

Architecture – Stairs
<u>*Condition:*</u> *Poor*
Exterior Stairs to Entry Door. These stairs, while in good condition, do not meet code/functional needs without a wider landing.

Architecture – Accessibility
<u>*Condition:*</u> *Poor*
This building is not accessible.

Condition Assessment -- Structural

Structural – Foundation
<u>*Condition:*</u> *Good and Unknown*
The visible portions of the wood timbers supporting the first floor at the water line are in good condition. The balance of the floor framing appears to rest directly on the ground but was not accessible, thus its condition is not known.

Structural – Floor Framing
<u>*Condition:*</u> *Unknown*
The floor framing could not be observed, thus its condition is unknown. No obvious signs of distress or damage were observed. The floor sheathing is in fair condition. The sheathing in the northeast corner was deteriorated.

Structural – Roof Framing
<u>*Condition:*</u> *Fair*
The roof framing is in fair condition. There did not appear to be enough collar ties to keep the walls from spreading out.

Structural – Wall Framing
<u>*Condition:*</u> *Good*
The walls are in good condition.

Structural – Lateral System
<u>*Condition:*</u> *Fair*
Lateral stability of the building is fair. The capacity of the exterior wood-framed walls is questionable.

Structural – Load Requirements
<u>*Condition:*</u> *Good*
The roof framing has adequate capacity to support the required loads. The floor framing could not be observed, thus its condition is unknown.

Condition Assessment -- Mechanical

Mechanical – Plumbing Systems, HVAC, and Fire Suppression
<u>*Condition:*</u> *N/A*

Mechanical – Other
<u>*Condition:*</u> *Poor*
The cast iron hand operated gear winch at the north end of the building is in poor condition with considerable rust damage.

Condition Assessment -- Electrical

N/A

Condition Assessment -- Hazardous Materials

The Boathouse was not accessed or observed during the September 2009 Site Inspections by Landmark Environmental.

Ultimate Treatment and Use

The Boathouse was originally built in 1891 to provide access to the site for construction crews. It has served as a boathouse and docking area since then, and has undergone many restorations and repairs due to the severe weather conditions that characterize its location.

Currently, the Boathouse's water entrance is blocked due to rocks in the way of the ramp. It is used by the NPS for storage. The proposed use for the Boathouse is to preserve its historic character and maintain its current use as a storage facility.

Preservation is the recommended treatment for the building.

Requirements for Treatment

Compliance requirements for treatment currently include laws, regulations, and standards as outlined by the NPS and listed in Volume I, Administrative Data section of this report.

The recommended treatments are tailored to the Preferred Alternative as the outcome of the Value Analysis/CBA for the project. As individual buildings are rehabilitated, specific alternatives will present themselves during design and construction. The following section is a discipline-by-discipline, component-by-component description of the treatments proposed for the preservation (stabilization) of the building. Refer to Volume I, Chapter 2: Methodology for the priority rating definitions.

Treatment Recommendations -- Architecture

Architecture – Roof
<u>*Priority:*</u> *Low*
Verify/provide proper blocking for roof tie offs. Scrape, sand and repaint fascia, soffit and frieze board.

Architecture – Exterior Walls
<u>*Priority:*</u> *Low*
Coordinate exterior wall repair with foundation and wall framing work. Once walls are stabilized, repair damaged boards and battens. Scrape, sand and repaint.

Architecture – Window
<u>*Priority:*</u> *Moderate*
Epoxy stabilize the sill. Remove the glazing compound and replace. Scrape, sand and paint.

Architecture – Exterior Doors
<u>*Priority:*</u> *Moderate*
Epoxy stabilize the bases of the doors. Scrape, sand and paint.

Architecture – Exterior Trim
<u>*Priority:*</u> *Low*
Scrape, sand and paint.

Architecture – Wall Finish
Priority: *Low*
No recommendations at this time other than the wall framing mitigation.

Architecture – Ceiling Finish
Priority: *Low*
No recommendations at this time.

Architecture – Interior Trim
Priority: *Low*
No recommendations at this time.

Architecture – Floor
Priority: *Low*
Replace rotting floor planks in-kind.

Architecture – Stairs
Priority: *Low*
Excavate a code compliant landing and build a new wood stair of treated lumber.

Architecture – Accessibility
Priority: *Low*
Provide program access through interpretive exhibits and waysides at the Visitor Center.

Treatment Recommendations -- Structural

Structural – Foundation
Priority: *Low*
The foundation of the Boathouse should be replaced with construction that will meet IBC and NPS requirements.

Structural – Floor Framing
Priority: *Low*
The floor framing of the Boathouse should be investigated further and if needed, replaced with construction that will meet IEBC and NPS requirements. The deteriorated floor sheathing should be replaced.

Structural – Roof Framing
Priority: *Low*
The roof framing of the Boathouse should be investigated further and if needed, upgraded to meet IEBC and NPS requirements.

Structural – Wall Framing
<u>Priority:</u> *Low*
The wall framing of the Boathouse should be investigated further and if needed, replaced with construction that will meet IBC and NPS requirements.

Structural – Lateral System
<u>Priority:</u> *Low*
Lateral load resisting system of the building should be investigated further and if needed, replaced with construction that will meet IBC and NPS requirements.

Treatment Recommendations -- Mechanical

Mechanical – Plumbing Systems, HVAC, and Fire Suppression
<u>Priority:</u> *N/A*

Mechanical – Other
<u>Priority:</u> *Low*
No recommendations at this time.

Treatment Recommendations -- Electrical

N/A

Treatment Recommendations -- Hazardous Materials

The Boathouse was not accessed or observed during the September 2009 Site Inspections by Landmark Environmental.

Alternatives for Treatment

Reconsider altering the stair/landing due to preservation/stabilization only of this structure.

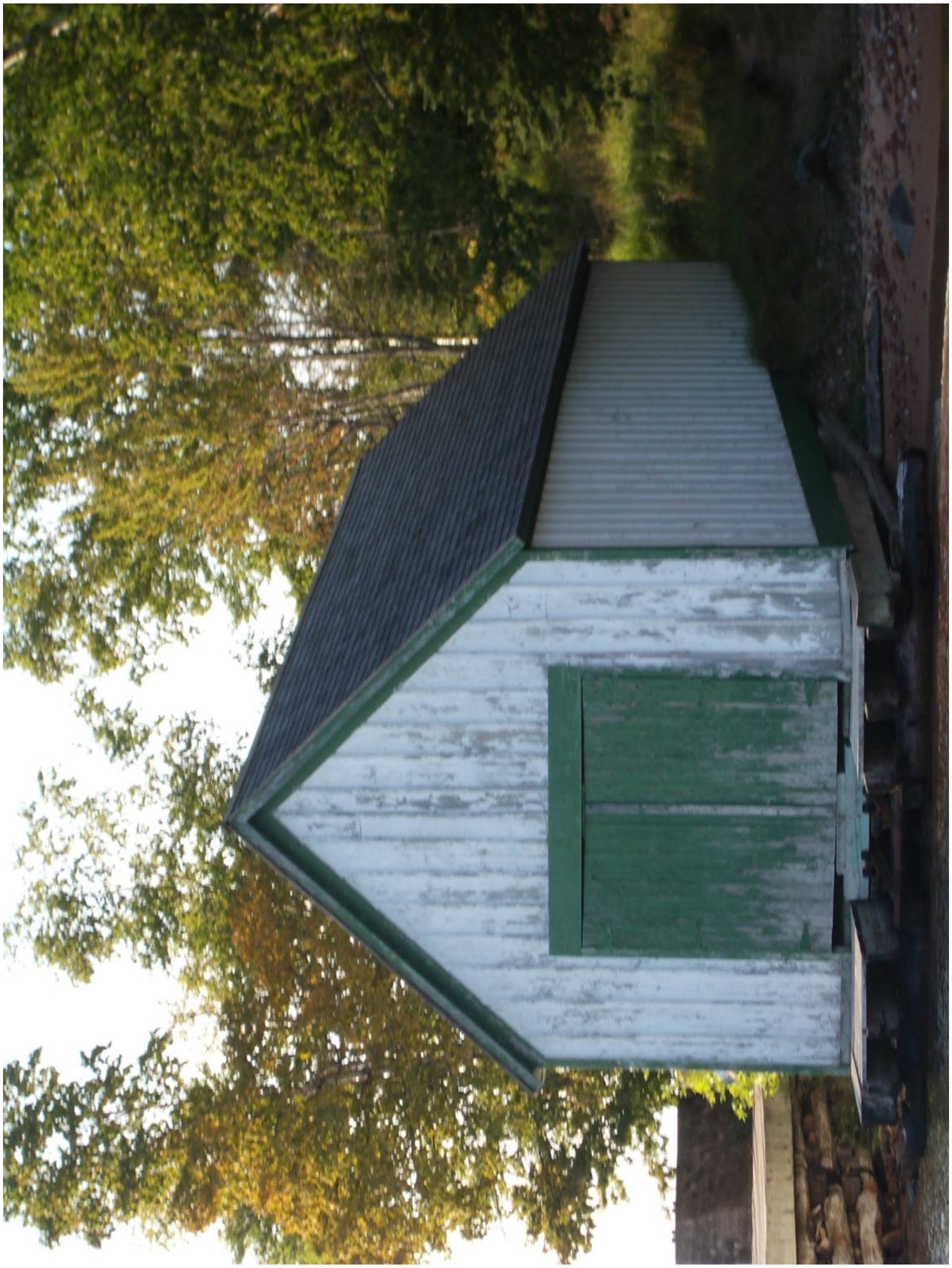
Assessment of Effects for Recommended Treatments

The following table includes an analysis of the major treatment recommendations which affect Section 106 Compliance:

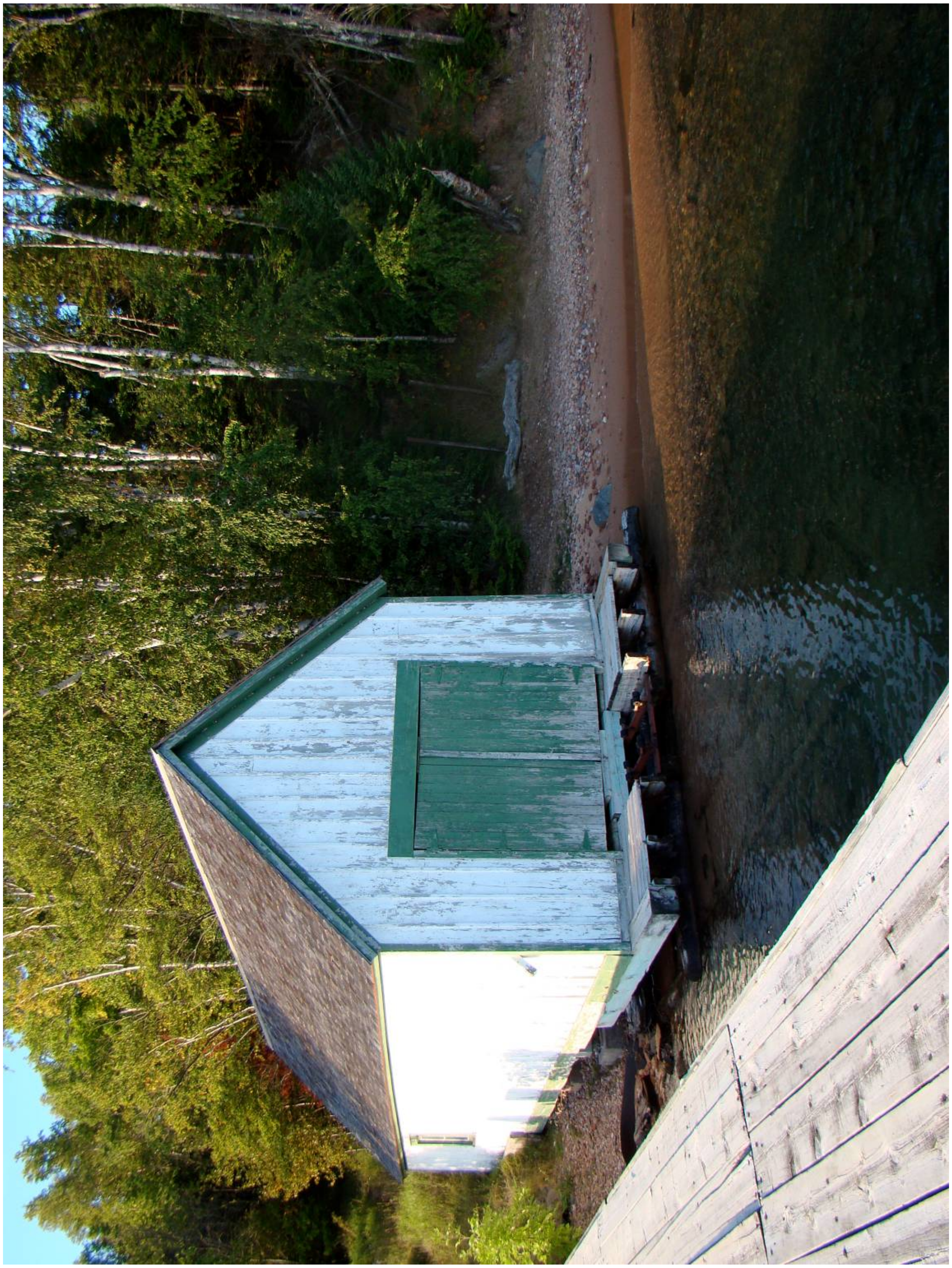
Recommended Treatment	Potential Effects	Mitigating Measures	Beneficial Effects
1. Installation of a new foundation	A new foundation could affect the relationship to grade and water level. A new foundation would require removal of existing base materials.	A new foundation will need to be evaluated for its benefit and implemented sensitively to minimize damage to the resource and its environment. Archeological monitoring with the excavations will be required. A foundation design, which, when completed, has the elevations of the sills, thresholds, etc. to match existing should be provided.	- Improves safety for visitors and staff - New foundation will aid in the preservation of the structure

Boathouse Photographs, 2009

DI-BH-01: Approach from the west, 2009 (Source: AH IMGP2944)



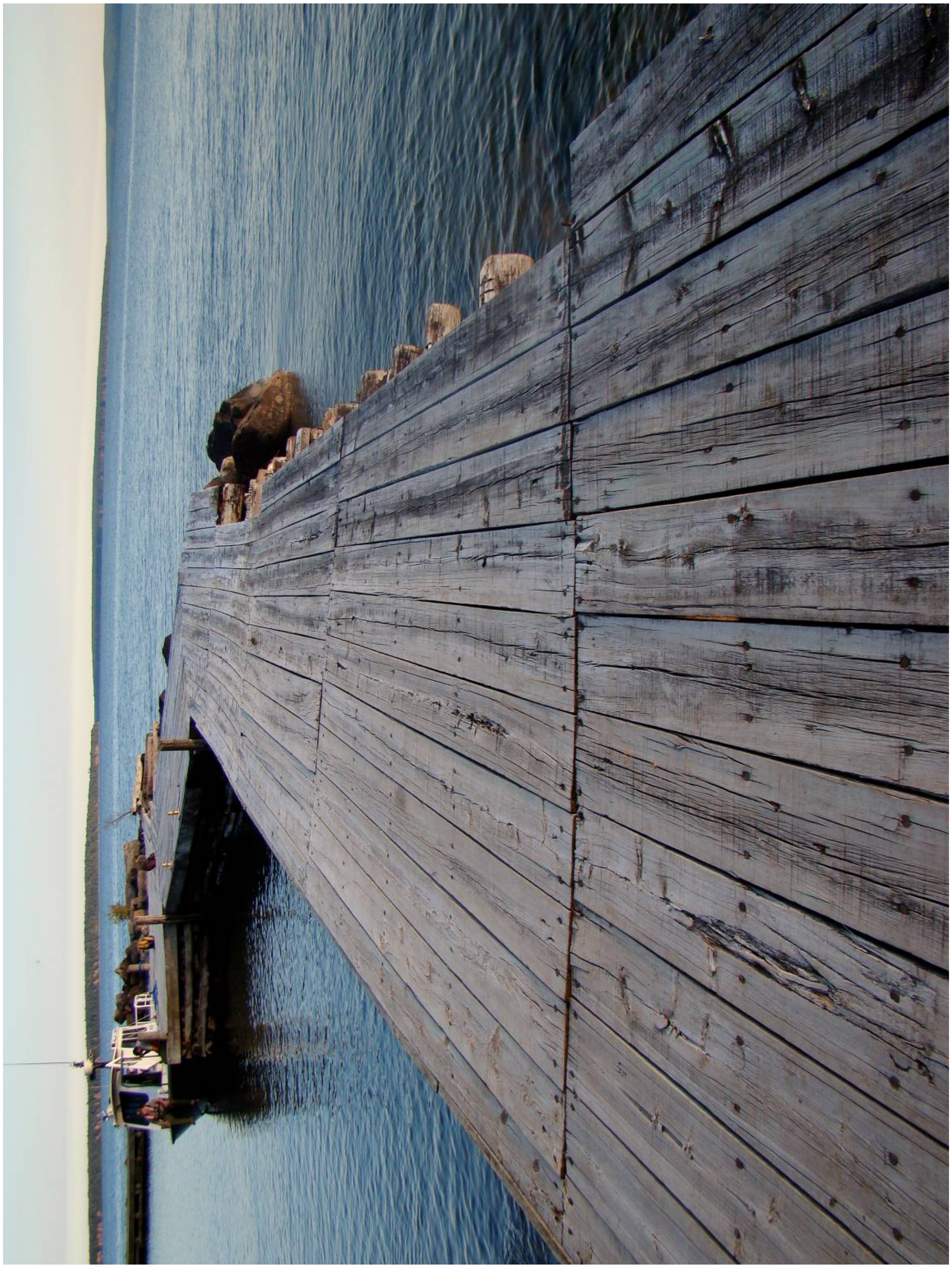
DI-BH-02: South elevation, 2009 (Source: AH IMGP2946)



DI-BH-03: West elevation, 2009 (Source: AH DSC01043)

DI-BH-04: North elevation, 2009 (Source: AH IMGP2948)

DI-BH-05: East elevation, 2009 (Source: AH DSC01040)



DI-BH-06: Dock, looking south, 2009 (Source: AH DSC01067)

DI-BH-07: Stone retaining wall, looking northeast (Source: AH DSC01076)

DI-BH-08: North elevation trim and roof detail (Source: AH IMGP2951)

DI-BH-09: North elevation entry door trim detail (Source: AH IMGP2955)

DI-BH-10: Entry door stair detail (Source: AH DSC01062)

DI-BH-11: West elevation window, exterior (Source: AH IMGP2954-A)

DI-BH-12: Entry door and hoisting mechanism, north elevation (Source: AH DSC01053)

DI-BH-13: Entry door, interior (Source: AH DSC01058)

DI-BH-14: Boathouse door, interior (Source: AH DSC01046)

DI-BH-15: Roof framing, looking south (Source: AH DSC01051)

GLOSSARY OF TERMS

PRIMARY TREATMENT APPROACH – PRESERVATION

Preservation standards include measures necessary to sustain the existing form, integrity, and materials of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. Preservation requires the retention of the greatest amount of historic fabric, including the landscape's historic form, features, and details as they have evolved over time. Limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work is permitted.

HOW TERMINOLOGY IS USED IN THE PRESERVATION APPROACH

Maintain – are those standard maintenance practices that are necessary to retain the features of a property as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included. Limited and sensitive upgrading of building systems (mechanical, electrical, plumbing) and other code related work is appropriate.

Plant – the removal and replanting of landscape plantings and vegetation as part of maintenance activities

Protect – short term and minimal measures used to stabilize and protect features, such as fencing around landscape features

Relocate – the removal and resetting of noncontributing features

Remove – the removal of nonhistoric features

Repair – features, components of features and materials that require additional work. These may include declining building features (e.g., roofing, foundation, mechanical systems) structures, small scale features (e.g., repair of a railing) or landscape plantings (e.g., repair mass planting by adding infill plantings). Features that are repaired will match the old in design, color, texture, and if possible, material. Distinctive features that are repaired will match the old in design, color, texture, and if possible, material. Replacement work will only occur when historic fabric is deteriorated beyond repair. Evaluation of restoration and low-impact options must be exhausted before replacement is considered feasible.

Retain –are those actions that are necessary to allow for a feature (contributing or noncontributing) to remain in place in its contributing current configuration and condition. Retention of historic fabric is the primary tenet for preservation treatment of historic properties. The extent of historic fabric represents historic integrity which is fundamental to the recognition and status of historical development.

Stabilize – immediate measures (more than standard maintenance practices) are needed to prevent deterioration, failure, or loss of features.

PRIMARY TREATMENT APPROACH – REHABILITATION

Rehabilitation in intended to return a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values. Rehabilitation allows for repairs, alterations, restoration of missing features, and additions necessary to enable a compatible use for a property as long as

the portions or features which convey the historical, cultural, or architectural values are preserved. Limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work is permitted.

HOW TERMINOLOGY IS USED IN THE REHABILITATION APPROACH

Maintain – are those standard maintenance practices that are necessary to retain the features of a property as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included. Limited and sensitive upgrading of building systems (mechanical, electrical, plumbing) and other code related work is appropriate.

Plant – the removal and replanting of landscape plantings and vegetation as part of maintenance activities or the restoration of missing features.

Reestablish – are those measures necessary to depict a landscape feature as it occurred historically. Reestablishment may include the replacement of missing landscape features such as views, planting patterns, spatial relationships, or small scale features.

Relocate – remove and reset noncontributing features

Remove – removal of nonhistoric features

Repair – features, components of features and materials that require additional work. These may include declining building features (e.g., roofing, foundation, mechanical systems) structures, small scale features (e.g., repair of a railing) or landscape plantings (e.g., repair mass planting by adding infill plantings). Features that are repaired will match the old in design, color, texture, and if possible, material. Distinctive features that are repaired will match the old in design, color, texture, and if possible, material. Replacement work will only occur when historic fabric is deteriorated beyond repair. Evaluation of restoration and low-impact options must be exhausted before replacement is considered feasible.

Restore – are those measures necessary to depict a feature or area as it occurred historically. Restoration may include repair of a feature so that it appears as it did historically or it may include replacement of missing features or qualities. Restoration is undertaken when a “period of significance” is determined and that period of significance (original construction or a succeeding period representing a continuum of change for the property) becomes a project goal. Restoration is only recommended when restorative details can be substantiated by documentary and physical evidence. Without indisputable evidence restorative work risks conjectural decision making, leading to inaccurate and inappropriate historical appearance. Restoration must avoid the creation of a false sense of historical development.

Retain –are those actions that are necessary to allow for a feature (contributing or noncontributing) to remain in place in its contributing current configuration and condition. Retention of historic fabric is the primary tenet for preservation treatment of historic properties. The extent of historic fabric represents historic integrity which is fundamental to the recognition and status of historical development.

Stabilize – immediate, more extensive measures (more than standard maintenance practices) are needed to prevent deterioration, failure, or loss of features.

PRIMARY TREATMENT APPROACH – RESTORATION

Restoration standards allow for the accurate depiction of a property as it appeared at a particular time in its history by means of the removal of features from other periods in its history and reconstruction of missing

features from the period of significance. The limited and sensitive upgrading of systems (mechanical, electrical, plumbing) and other code related work is appropriate.

HOW TERMINOLOGY IS USED IN THE RESTORATION APPROACH

Maintain – are those standard maintenance practices that are necessary to retain the features of a property as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included. Limited and sensitive upgrading of building systems (mechanical, electrical, plumbing) and other code related work is appropriate.

Plant – the removal and replanting of landscape plantings and vegetation as part of maintenance activities or the restoration of missing features

Relocate – remove and reset noncontributing features

Remove – removal of nonhistoric features

Reestablish – are those measures necessary to depict a landscape feature as it occurred historically. Reestablishment may include the replacement of missing landscape features such as views, planting patterns, spatial relationships, or small scale features.

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Stabilize – immediate, more extensive measures (more than standard maintenance practices) are needed to prevent deterioration, failure, or loss of features.

CONDITION ASSESSMENT DESCRIPTION LEVELS
Feature Condition Definitions
(Note: These terms are also applied to the overall structure/building.)

GOOD The feature is intact, structurally sound and performing its intended purpose. The feature needs no repair or rehabilitation, but only routine or preventive maintenance.

FAIR The feature is in fair condition if either of the following conditions is present:
- There are early signs of wear, failure or deterioration though the feature is generally structurally sound and performing its intended purpose – or –
- There is failure of a portion of the feature.

POOR The feature is in poor condition if any of the following conditions is present:
- The feature is no longer performing its intended purpose – or –
- Significant elements of the feature are missing – or –
- Deterioration or damage affects more than 25% of the feature – or –
- The feature shows signs of imminent failure or breakdown.

UNKNOWN Not enough information is available to make an evaluation.

RATINGS OF TREATMENT SEVERITY
An impact is a detectable result of an agent or series of agents having a negative effect on the significant characteristics or integrity of a structure and for which some form of mitigation or preventative action is possible. The assessment should include only those impacts likely to affect the structure within the next five years.

The Level of Impact Severity and their definitions are given below. For all levels, except UNKNOWN, two criteria are given. At least one of the criteria must be met for the declared Level of Impact Severity.

SEVERE
1. The structure/feature will be significantly damaged or irretrievably lost if action is not taken within two (2) years.
2. There is an immediate and severe threat to visitor or staff safety.

MODERATE
1. The structure/feature will be significantly damaged or irretrievably lost if action is not taken within five (5) years.
2. The situation caused y the impact is potentially threatening to visitor or staff safety.

LOW
1. The continuing effect of the impact is known and will not result in significant damage to the structure/feature.
2. The impact and its effects are not a direct threat to visitor or staff safety.

UNKNOWN Not enough information is available to make an evaluation.

DEFINITIONS OF TERMS

A

AAS: Atomic Absorption Spectroscopy

AC: Alternating current; the movement of current through an electrical circuit that periodically reverses direction. Alternating current is the form of electric power that is delivered to businesses and residences.

ACM: Asbestos Containing Material

Accessibility: a term used to describe facilities or amenities to assist people with disabilities and can extend to Braille signage, wheelchair ramps, elevators/lifts, walkway contours, reading accessibility, etc. According to its website, the Park Service is "committed to making all practicable efforts to make NPS facilities, programs, services, employment, and meaningful work opportunities accessible and usable by all people, including those with disabilities. This policy reflects the commitment to provide access to the widest cross section of the public and to ensure compliance with the Architectural Barriers Act of 1968, the Rehabilitation Act of 1973, the Equal Employment Opportunity Act of 1972, and the Americans with Disabilities Act of 1990. The Park Service will also comply with section 507 of the Americans with Disabilities Act (42 USC 12207), which relates specifically to the operation and management of federal wilderness areas. The accessibility of commercial services within national parks are also covered under all applicable federal, state and local laws" (source: http://www.nps.gov/aboutus/eeo.htm).

AES-ICP: Atomic Emission Spectroscopy – Inductively Coupled Plasma

AIHA: American Industrial Hygiene Association

Air Terminal: A rod that extends above a surface to attract lightning strikes.

AL: Action Level

B

Beam*:* a structural member, usually horizontal, with a main function to carry loads cross-ways to its longitudinal axis.

Branch Circuit: Insulated conductors used to carry electricity to an associated device or devices that originate from a single circuit breaker.

BTUH: British Thermal Unit per Hour; A traditional unit of energy.

BX Cable: Cable with flexible steel armored outer tube with individual copper conductors insulated with rubber and covered with a cotton braided sheath.

C

Cantilever: refers to the part of a member that extends freely over a beam or wall, which is not supported at its end.

Cast Iron: a large group of ferrous alloys that are easily cast. Cast iron tends to be brittle and is resistant to destruction and weakening by oxidation. The amount of carbon in cast irons is 2.1 to 4 wt%.

CFR: Code of Federal Regulation

Cistern: An underground receptacle for storage of liquids, usually water.

Clay Sewer: Sewer pipe made from vitrified clay that is highly resistant to corrosion.

Column: a main vertical member that carries axial loads from beams or girders to the foundation parallel to its longitudinal axis.

D

DC: Direct current; the unidirectional flow of current through an electrical circuit. Direct current is produced through such sources as batteries, thermocouples, or photovoltaic solar cells.

Dead Load: describes the loads from the weight of the permanent components of the structure.

Deflection: the displacement of a structural member or system under a load.

DRO: Diesel-Range Organics

E

ELPAT: Environmental Lead Proficiency Analytical Testing

EMT: Electro-metallic tubing; A metallic tube raceway that is used to carry and protect current carrying conductors or cables.

EPA: Environmental Protection Agency

F

Flue Vent: A duct or pipe conveying combustion by-products from a heater or furnace.

Fluorescent: A source of light that emits light radiation at longer wavelengths and lower energy.

Footing: a slab of concrete or an assortment of stones under a column, wall, or other structural member to transfer the loads of the member into the surrounding soil.

Foundation: supports a building or structure.

FRP: Fiberglass reinforced plastic

Full Sawn (FS): Lumber cut, in the rough, to its full nominal size.

G

Gable: located above the elevation of the eave line of a double-sloped roof.

Galvanized Steel: Steel coated with zinc carbonate to resist corrosion.

GPM: Gallon per minute; a standard unit of volumetric liquid flow rate.

Grade: the ground elevation of the soil.

Gravity Vent: Openings in a roof intended to vent hot air by the action of convection.

Gray Water: Wastewater generated from domestic washing activities and not containing human waste.

GRO: Gasoline Range Organics

H

Header: a member that carries joists, rafters or beams and is placed between other joists, rafters or beams.

Hip Roof: a roof sloping from all four sides of a building.

HUD: Housing and Urban Development

HVAC: Heating, Ventilation, and Air Conditioning.

I

IAQ: Indoor Air Quality

IEUBK: Integrated Exposure Uptake Biokinetic

Incandescent: A source of light that works by incandescence, or works by a heat-driven light emission through black-body radiation.
Inverter: A device that converts electrical direct current (DC) to electrical alternating current (AC).

J

Joist: a horizontal structural load-carrying member which supports floors and ceilings.

K

kVA: Kilovolt-ampere equal to 1,000 volt-amperes. kVA is a unit to express the apparent power consumed in an electrical circuit or electrical device.

kW: Kilowatt equal to 1,000 watts. A kilowatt is typically used to express the output power consumption of large devices or electrical systems.

L

LBP: Lead-Based Paint

LCP: Lead-Containing Paint

LCS: Lead-Contaminated Soils

Leach Field: A drain field used to remove contaminants and impurities from liquid that emerges from a septic tank.

LED: Light emitting diode; a semiconductor light source that can emit light in various colors and brightness.

Live Load: nonpermanent loads on a structure created by the use of the structure.

Load: an outside force that affects the structure or its members.

Louver: An opening with horizontal slats angled to allow passage of air while keeping out rain and snow.

M

Mg/kg: Milligrams per Kilogram

N

NEC: National Electric Code.

NESHAP: National Emission Standards for Hazardous Air Pollutants

Nonpotable Water: Water that has not been approved for safe human consumption.

NVLAP: National Voluntary Laboratory Accreditation Program

O

OSHA: Occupational Safety and Health Administration

Overcurrent Protection: A fuse, circuit breaker or relay that will open the electrical circuit when the downstream electrical current exceeds the stated current rating.

P

Passive Ventilation: Ventilation of a building without the use of a fan or other mechanical system.

Pitch: the slope of a member defined as the ratio of the total rise to the total run.

PLM: Polarized Light Microscopy

PV: Photovoltaic; An array of solar modules or cells that collect solar energy and convert the energy into direct current electricity.

PVC: Polyvinyl Chloride; A biologically and chemically resistant plastic widely used for household sewage pipe.

R

Rafter: a sloped structural load-carrying member which supports the roof.

RBM: Regulated/Hazardous Material

Reaction: the force or moment developed at the points of a support.

RLM: Industrial stem mounted reflector.

Romex: Wiring with rubber insulated conductors in an overall sheath of braided cotton fiber.

S

Seismic Load: loads produced during the seismic movements of an earthquake.

Septic Tank: A sewage tank containing anaerobic bacteria which decomposed waste discharged into the tank.

Shear: forces resulting in two touching parts of a material to slide in opposite directions parallel to their plane of contact.

Shelter: a structure that can be used for rustic camping in the event that staff are not able to leave the island due to weather. No utilities are provided.

Snow Load: loads produced from the accumulation of snow.

Span: the distance between supports.

Step-down Transformer: A device that converts a high voltage down to a lower voltage through a series of winding coils.
***Structural Steel*:** an iron alloy with a carbon content of 0.16% to 0.29%. Steel is malleable, and easily welded.

Strut: a structural brace that resists axial forces.

Stud: a vertical wall member used to construct partitions and walls.

T

Thermal Expansion Tank: A tank used in a closed water heating system to absorb excess water pressure caused by thermal expansion.

TSI: Thermal System Insulation

Turbine Vent: Vents utilizing rotating wind vanes to create air flow.

V

Vent Stack: A vertical pipe proving ventilation.

W

WAC: Wisconsin Administrative Code

WDNR: Wisconsin Department of Natural Resources

Wrought Iron: an iron alloy with very low carbon content, in comparison to steel. Wrought iron is tough, malleable, ductile, and easily welded.

X

XRF: X-ray fluorescence analyzer

Other

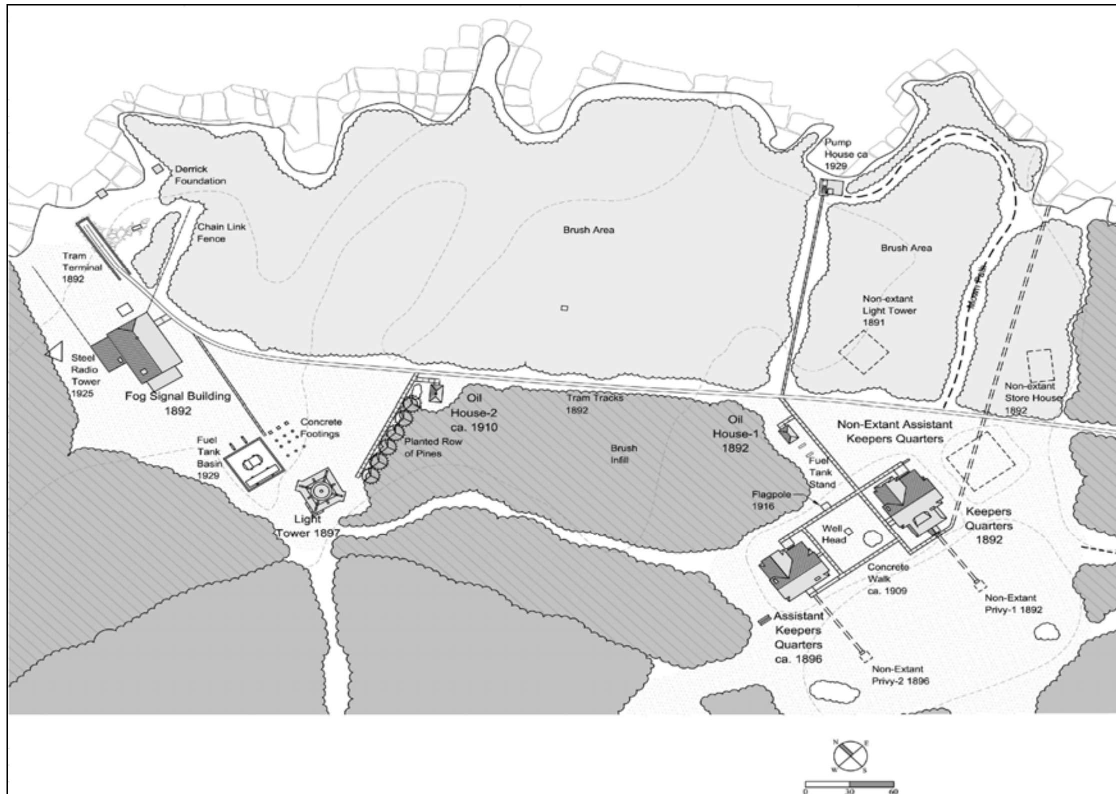
30 µg/m3: 30 micrograms per cubic meter

µg/SF: Micrograms of Lead Dust per Square Foot of Floor Space

1x: Piece of dimensional lumber 1” (nominal) / ¾” (actual) thick

APPENDIX A: MATRIX OF TREATMENT ALTERNATIVE

REVISED 07.12.2011



Existing Conditions Site Plan - for reference only

General Description:
This treatment alternative proposes rehabilitating each island's cultural landscape to best portray the continuum of navigational history that characterizes the Apostle Islands as a system of light stations. Each island (and each light station) conveys specific characteristics related to particular periods of development in the navigation of the archipelago. This treatment will reveal this continuum by restoring missing historic features, and by repairing or altering others to convey the full historical significance of the system. Additions that are necessary to enable the compatible use of the light stations or islands are allowed as long as portions or features that convey the historical, cultural, or architectural values are preserved.

Period of Significance: 1892 - 1978

Please refer to the proposed treatments below.

	Tower	Keepers Quarters	Assistant Keepers Quarters	Fog Signal Building	Oil House #1	Oil House #2	Tramway Engine Building	Boathouse
Proposed Use of Building	Rehabilitate for guided visitor use.	Rehabilitate for guided visitor use 1st floor; staff housing 2nd floor and 1st kitchen/bath.	Rehabilitate for self guided visitor use.	Rehabilitate for self guided visitor use.	Preserve and maintain current use as NPS storage.	Preserve and add a plexi panel at door for visitor visual access.	Preserve and maintain current use as vacant, no visitor access.	Preserve and maintain current use as NPS storage.
Architecture	Increase ventilation; Repair/replace the lantern glazing and glass; repair/replace broken/missing mullions; repaint exterior complete; repair operability to windows; investigate replacing one sash with a secure louver; repair doors and paint; Investigate limiting visitor access to Fresnel lens and enhancing visitor viewing of lens from the exterior.	Replace south entry roof shingles; repair windows and doors and repaint; add handrail to porch; repair basement hatch; repair interior doors; retain and repair modern and historic wall, ceiling and floor finishes.	Add gutter and downspout to porch; repoint masonry (minimal); repair porch floor; repaint wall shingles and trim; repair windows and doors and repaint; replace missing interior trim, doors and fixtures in kind; patch and repair damaged plaster at walls and ceilings; refinish wood trim, casework and wood flooring; repair resilient flooring.	Install missing eave closure trim; repair framing at south shed; repoint chimney and exposed brick foundation; repair chipped siding shingles; repair windows and doors and repaint; repaint exterior trim, repair interior doors, walls and ceiling finishes; paint interior complete; add handrail to stair. Install the original fog signal equipment currently stored on Sand Island, though system is not intended to be operational.	Repair door. Repoint masonry.	Provide new roof shingles to match existing. Repaint door. Install plexi-panel system(operable) to allow visitors to see Coast Guard era equipment but maintain security and weather tight closure.	Repaint soffit and overhangs; repoint chimney and repair cap; repair sills and glazing at windows; replace missing hardware at door and repaint.	Address roofing and siding as needed after structural mitigation is complete; repair doors, window and sill; repaint exterior complete.
Structural	Investigate structural significance of concrete foundation cracking	Repair first floor framing at cut beam, repair porch joists and decking, properly support first floor joists at windows and cistern, repair damaged first floor joists	Repair porch joists and decking, properly support first floor joists at windows, repair damaged first floor joists, repairs stair posts in basement, repoint cracked masonry	Replace south addition, strengthen ceiling joists and roof rafters of west addition	No action at this time	No action at this time	Monitor stress crack at southeast.	Construct a concrete foundation, repair and strengthen first floor joists and deck, strengthen or reframe walls, strengthen or reframe roof
Mechanical	Increase ventilation for moisture control.	Increase ventilation for moisture control. Clean, inspect, and test sewer/septic system. Perform repairs as needed for operational septic system. Replace or refurbish historic radiators. Remove propane piping to refrigerator and stove.	Increase ventilation for moisture control. Clean historic radiators as interpretative props. Remove or reinstall unattached plumbing fixtures. Cap or remove open plumbing piping.	No action at this time.	No action at this time.	No action at this time.	No action at this time.	No action at this time.
Electrical	Provide additional PV power to facilitate running of new ventilation equipment. Engage an LPI (Lightning Protection Institute) certified inspector to perform an inspection of the lightning protection system and provide findings and recommendations in accordance with LPI-175.	Provide new power wiring, receptacles and lighting for visitor areas and staff housing areas. Provide required life safety systems including single station fire alarm and CO sensors. Leave existing fire alarm system in place to maintain historic context. Verify that existing PV system including inverter and power distribution system is suitably sized and fully operational, and extend system to building equipment. Engage an LPI (Lightning Protection Institute) certified inspector to perform an inspection of the lightning protection system and provide findings and recommendations in accordance with LPI-175.	Provide additional PV power to facilitate running of new ventilation equipment as needed. Replace broken or missing lighting fixtures and receptacles with period fixtures and receptacles. If required, provide building power distribution and wiring and connect building to site PV system. Engage an LPI (Lightning Protection Institute) certified inspector to perform an inspection of the lightning protection system and provide findings and recommendations in accordance with LPI-175.	Replace broken lighting fixtures and rehabilitate wiring systems.	No action at this time.	No action at this time.	No action at this time.	No action at this time.
HazMat	Soil characterization (lead); field screen of tank storage area for hydrocarbon characterization	Soil characterization (lead); asbestos sampling of materials to be preserved/stabilized; remove lead paint	Soil characterization (lead); asbestos sampling of materials to be preserved/stabilized; remove/stabilize lead paint	Soil characterization (lead); asbestos sampling of materials to be preserved/stabilized; abatement of damaged asbestos siding; remove lead paint (interior of structure)	Remove/stabilize lead paint	Remove/stabilize lead paint	Asbestos sampling of materials to be preserved/stabilized; remove/stabilize lead paint	Remove/stabilize lead paint
Accessibility	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.	Program access through interpretive wayside exhibits.

APPENDIX B: SUMMARY OF HAZARDOUS MATERIAL FINDINGS

LIGHT STATION TOWER

Building Number	LCS ID 017081
Building Name	Devils Island Light Station Tower
>1% Asbestos Confirmed	
Asbestos Assumed[37]	Adhesives, Insulation, and Caulking
Detectable Lead in Paint Confirmed	
Detectable Lead in Paint Assumed	*
Lead Dust on Floors >40 µg/SF Confirmed [38]	
Lead Dust on Floors >40 µg/SF Assumed [2]	Yes
Lead Dust on Floors <40 µg/SF Confirmed [2]	
Visual Mold	
Lead in Soils >50 mg/kg[39]	Roof Dripline and 5'-0" Out from Roof Dripline
Lead in Soils <50 mg/kg	
Lead in Soils Assumed	

< = Greater Than
< = Less Than
µg/SF = Micrograms of Lead Dust per Square Foot of Floor Space
mg/kg = Milligrams of Lead per Kilogram of Soil

[37] Materials listed are those identified or assumed to be present during the September 15, 2009 site assessment
[38] In accordance with EPA 40 CFR part 457 the clearance level for lead dust on floors in child occupied housing is 40 micrograms of lead dust per square foot of floor space.
[39] In accordance with NR720, WIS. Adm Code; 50 milligrams per kilogram, is the conservative acceptable residual containment level for lead in soil based on human health risk from direct contact (ingestion or inhalation) related to nonindustrial land use and considering more than one contaminant may be present in the soil. However, site specific Risk Assessment is recommended to identify the site specific clean up levels for lead contaminated soil at each of these sites.
* Apostle Islands National Lakeshore Staff reported that abatement of lead containing paint on the Devils Island Tower occurred in 2003. Testing to confirm the absence of lead paint was not conducted during the September 15, 2009 site assessment.

KEEPERS QUARTERS

Building Number	LCS ID 017082
Building Name	Devils Island Keepers Quarters
>1% Asbestos Confirmed	Floor Tile
Asbestos Assumed[40]	Plaster, Brick/Block Filler, Drywall, Adhesives, Insulation, Lay-in Ceiling Panels, Tar and Tar Paper and Caulking
Detectable Lead in Paint Confirmed	Walls, Ceilings, Doors, Door Trims, Window Trims and Window Sashes
Detectable Lead in Paint Assumed	Interior Painted Surfaces and Exterior Painted Surfaces
Lead Dust on Floors >40 µg/SF Confirmed [41]	
Lead Dust on Floors >40 µg/SF Assumed [2]	
Lead Dust on Floors <40 µg/SF Confirmed [2]	Floors
Visual Mold	
Lead in Soils >50 mg/kg[42]	
Lead in Soils <50 mg/kg	
Lead in Soils Assumed	Yes

< = Greater Than
< = Less Than
µg/SF = Micrograms of Lead Dust per Square Foot of Floor Space
mg/kg = Milligrams of Lead per Kilogram of Soil

[40] Materials listed are those identified or assumed to be present during the September 15, 2009 site assessment
[41] In accordance with EPA 40 CFR part 457 the clearance level for lead dust on floors in child occupied housing is 40 micrograms of lead dust per square foot of floor space.
[42] In accordance with NR720, WIS. Adm Code; 50 milligrams per kilogram, is the conservative acceptable residual containment level for lead in soil based on human health risk from direct contact (ingestion or inhalation) related to nonindustrial land use and considering more than one contaminant may be present in the soil. However, site specific Risk Assessment is recommended to identify the site specific clean up levels for lead contaminated soil at each of these sites.

ASSISTANT KEEPERS QUARTERS

Building Number	LCS ID 017083
Building Name	Devils Island Assistant Keepers Quarters
>1% Asbestos Confirmed	
Asbestos Assumed[43]	Plaster, Brick/Block Filler, Drywall, Adhesives, Insulation, Sheet Flooring, Tar and Tar Paper and Caulking
Detectable Lead in Paint Confirmed	
Detectable Lead in Paint Assumed	Interior Painted Surfaces and Exterior Painted Surfaces
Lead Dust on Floors >40 µg/SF Confirmed [44]	
Lead Dust on Floors >40 µg/SF Assumed [2]	Yes
Lead Dust on Floors <40 µg/SF Confirmed [2]	
Visual Mold	Yes
Lead in Soils >50 mg/kg[45]	
Lead in Soils <50 mg/kg	
Lead in Soils Assumed	Yes

< = Greater Than
< = Less Than
µg/SF = Micrograms of Lead Dust per Square Foot of Floor Space
mg/kg = Milligrams of Lead per Kilogram of Soil

[43] Materials listed are those identified or assumed to be present during the September 15, 2009 site assessment
[44] In accordance with EPA 40 CFR part 457 the clearance level for lead dust on floors in child occupied housing is 40 micrograms of lead dust per square foot of floor space.
[45] In accordance with NR720, WIS. Adm Code; 50 milligrams per kilogram, is the conservative acceptable residual containment level for lead in soil based on human health risk from direct contact (ingestion or inhalation) related to nonindustrial land use and considering more than one contaminant may be present in the soil. However, site specific Risk Assessment is recommended to identify the site specific clean up levels for lead contaminated soil at each of these sites.

FOG SIGNAL BUILDING

Building Number	LCS ID 017084
Building Name	Devils Island Fog Signal Building
>1% Asbestos Confirmed	
Asbestos Assumed[46]	Transite, Caulk and Adhesives
Detectable Lead in Paint Confirmed	
Detectable Lead in Paint Assumed	Interior Painted Surfaces and Exterior Painted Surfaces
Lead Dust on Floors >40 µg/SF Confirmed [47]	
Lead Dust on Floors >40 µg/SF Assumed [2]	Yes
Lead Dust on Floors <40 µg/SF Confirmed [2]	
Visual Mold	
Lead in Soils >50 mg/kg[48]	
Lead in Soils <50 mg/kg	
Lead in Soils Assumed	Yes

< = Greater Than
< = Less Than
µg/SF = Micrograms of Lead Dust per Square Foot of Floor Space
mg/kg = Milligrams of Lead per Kilogram of Soil

[46] Materials listed are those identified or assumed to be present during the September 15, 2009 site assessment
[47] In accordance with EPA 40 CFR part 457 the clearance level for lead dust on floors in child occupied housing is 40 micrograms of lead dust per square foot of floor space.
[48] In accordance with NR720, WIS. Adm Code; 50 milligrams per kilogram, is the conservative acceptable residual containment level for lead in soil based on human health risk from direct contact (ingestion or inhalation) related to nonindustrial land use and considering more than one contaminant may be present in the soil. However, site specific Risk Assessment is recommended to identify the site specific clean up levels for lead contaminated soil at each of these sites.

OIL HOUSE #1

Building Number	LCS ID 017085
Building Name	Devils Island Oil House #1
>1% Asbestos Confirmed	
Asbestos Assumed[49]	
Detectable Lead in Paint Confirmed	
Detectable Lead in Paint Assumed	Interior Painted Surfaces and Exterior Painted Surfaces
Lead Dust on Floors >40 µg/SF Confirmed [50]	
Lead Dust on Floors >40 µg/SF Assumed [2]	Yes
Lead Dust on Floors <40 µg/SF Confirmed [2]	
Visual Mold	
Lead in Soils >50 mg/kg[51]	
Lead in Soils <50 mg/kg	
Lead in Soils Assumed	Yes

< = Greater Than
< = Less Than
µg/SF = Micrograms of Lead Dust per Square Foot of Floor Space
mg/kg = Milligrams of Lead per Kilogram of Soil

[49] Materials listed are those identified or assumed to be present during the September 15, 2009 site assessment
[50] In accordance with EPA 40 CFR part 457 the clearance level for lead dust on floors in child occupied housing is 40 micrograms of lead dust per square foot of floor space.
[51] In accordance with NR720, WIS. Adm Code; 50 milligrams per kilogram, is the conservative acceptable residual containment level for lead in soil based on human health risk from direct contact (ingestion or inhalation) related to nonindustrial land use and considering more than one contaminant may be present in the soil. However, site specific Risk Assessment is recommended to identify the site specific clean up levels for lead contaminated soil at each of these sites.

OIL HOUSE #2

Building Number	LCS ID 017086
Building Name	Devils Island Oil House #2
>1% Asbestos Confirmed	
Asbestos Assumed[52]	
Detectable Lead in Paint Confirmed	
Detectable Lead in Paint Assumed	Interior Painted Surfaces and Exterior Painted Surfaces
Lead Dust on Floors >40 µg/SF Confirmed [53]	
Lead Dust on Floors >40 µg/SF Assumed [2]	Yes
Lead Dust on Floors <40 µg/SF Confirmed [2]	
Visual Mold	
Lead in Soils >50 mg/kg[54]	
Lead in Soils <50 mg/kg	
Lead in Soils Assumed	Yes

< = Greater Than
< = Less Than
µg/SF = Micrograms of Lead Dust per Square Foot of Floor Space
mg/kg = Milligrams of Lead per Kilogram of Soil

[52] Materials listed are those identified or assumed to be present during the September 15, 2009 site assessment
[53] In accordance with EPA 40 CFR part 457 the clearance level for lead dust on floors in child occupied housing is 40 micrograms of lead dust per square foot of floor space.
[54] In accordance with NR720, WIS. Adm Code; 50 milligrams per kilogram, is the conservative acceptable residual containment level for lead in soil based on human health risk from direct contact (ingestion or inhalation) related to nonindustrial land use and considering more than one contaminant may be present in the soil. However, site specific Risk Assessment is recommended to identify the site specific clean up levels for lead contaminated soil at each of these sites.

APPENDIX C: MATERIAL ANALYSIS REPORTS, DEVILS ISLAND

DEVILS ISLAND ACM SAMPLE CHART

Sample #	Sample Date	API ID	Sample Location	Material Description	Laboratory Result
B-DIAKQ-WP1-01	9/15/2009	25192	Assistant Keepers Quarters	White granular plaster w/ white paint	ND
B-DIAKQ-DW1-01	9/15/2009	25192	Assistant Keepers Quarters	White granular plaster w/ white paint	ND
B-DIAKQ-WT1-01	9/15/2009	25192	Assistant Keepers Quarters	White/multi-colored paint and White plaster	ND
B-DIAKQ-SF1-01	9/15/2009	25192	Assistant Keepers Quarters	Tan/multi-colored sheet vinyl and Tan fibrous woven backing	ND
B-DIFSB-FT1-01	9/15/2009	25196	Fog Signal Building	Tan tile w/ yellow adhesive and Gray leveling compound	ND
B-DIKQ-FT1-01	9/15/2009	25191	Keepers Quarters	Black Tile	12% Chrysotile
B-DIKQ-FT2-01	9/15/2009	25191	Keepers Quarters-First floor bedroom	White tile and Yellow mastic	ND
B-DIKQ-FT3-01	9/15/2009	25191	Keepers Quarters-Kitchen	White tile and Amber mastic	ND
B-DIKQ-FT4-01	9/15/2009	25191	Keepers Quarters-Second Floor	Green tile and Yellow mastic	4% Chrysotile in Green tile
B-DIKQ-FT5-01	9/15/2009	25191	Keepers Quarters-Second Floor	Brown/tan tile and Black mastic	Trace Chrysotile in Black mastic, 7% chrysotile in Brown/tan tile
B-DIKQ-FT6-01	9/15/2009	25191	Keepers Quarters	Green sheet vinyl w/ black fibrous backing	ND
B-DIKQ-WT1-01	9/15/2009	25191	Keepers Quarters-First floor bedroom	White/multi-colored paint and White plaster	ND

ND=None Detected
TR=Trace, <1% Visual Estimate

DEVILS ISLAND LEAD SAMPLE CHART

Sample ID	Sample Type	API ID	Sample Location	Sample Date	Sample Area (sq ft)	Lead (ug)	Reporting Limit (ug/sq ft)	Lead Concentration (ug/sq ft)
W-091509-DIKQ-01	Composite Wipe	25191	Keepers Quarters	9/15/2009	0.33	5	15	16

APPENDIX D: FABRIC ANALYSIS

Fabric Analysis
Devils Island Light Set #1
Apostle Island National Lakeshore
October 12, 2009

On Tuesday, October 6, 2009, David Arbogast, architectural conservator, of Davenport, Iowa, received a large box containing paint and mortar samples from Elizabeth Hallas, AIA, LEED AP. Senior Associate of Anderson Hallas Architects, PC of Golden, Colorado. She is in the process of preparing Historic Structures Reports for the historic lighthouse complexes of the Apostle Islands National Lakeshore, headquartered in Bayfield, Wisconsin. As part of the HSRs paint and mortar/plaster analysis is required in an attempt to ascertain historic finishes, mortars, and plasters for the subject structures. The samples were divided into sets contained within large manila mailing envelopes. The analysis follows the order in which the large envelopes have been arranged. The fourth and fifth sets which are contained within this report were from the first and second sets of samples collected from the complex at the Devils Island Light. There were 27 samples in the first of these two sets (nos. 64 – 90), of which 24 were paint samples and three (nos. 82, 84, and 85) were of plaster and mortar. The second set (nos. 91 – 119) contained 29 samples, of which 23 were paint samples and six (nos. 100, 101, 102, 103, 104, and 106) were of plaster and mortar.

During the preceding twenty or more years Mr. Arbogast has performed paint analyses for various structures at the Apostles Islands. Those samples and his reports are in the archives at the headquarters in Bayfield and may be examined in relation to the findings from this analysis.

The first set of paint samples was visually examined on Monday, October 12 and Tuesday, October 13, utilizing the same procedures used for the first set of samples. Numbering of the samples followed the order established with the first three sets, beginning with 64 and ending with 90. The following results were obtained from the analysis:

Keeper's Quarters

Sample 64	**Munsell**
Dark gray	N 5.0/
White	5Y 9/1

Sample 64 was collected from the exterior handrail of the keeper's quarters. It retained only two layers of paint of which the older was white.

Keeper's Quarters

Sample 65	**Munsell**
Dark green	2.5G 4/4
Gray	5Y 7/1
White	5Y 9/1

Sample 65 came from the exterior window trim of the keeper's quarters. Its analysis revealed three layers of paint with white being the oldest of the three. The substrate was extremely weathered wood.

Keeper's Quarters

Sample 66	**Munsell**
Dark green	2.5G 4/4
Gray	5Y 7/1
Gray	5Y 6/1
White	5Y 9/1

Gray	5Y 7/1
Gray	5Y 6/1
Charcoal	5Y 3/1
Gray	5Y 7/1

Sample 66 was removed from the exterior door trim of the keeper's quarters. It retained eight paint layers of which the oldest was a standard gray color seen in many other samples.

Keeper's Quarters

Sample 67	**Munsell**
Dark green	2.5G 4/4
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Black	N 1.0/
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Charcoal	5Y 3/1
Charcoal	5Y 3/1
Charcoal	5Y 3/1
White	5Y 9/1

Sample 67 was from the exterior vent trim of the keeper's quarters. Its analysis revealed an extremely large number of fine, evenly applied paint layers of which the oldest was white.

Keeper's Quarters

Sample 68	**Munsell**
Yellow	2.5Y 8.5/6
Off-white	5Y 8.5/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Dark gray-green	5GY 4/1
White	5Y 9/1
Dark gray-green	5GY 4/1
Light gray-green	5GY 8/1
Gray-green	5GY 7/1
White	5Y 9/1
Golden varnish	--------
Golden varnish	--------

Sample 68 was found on the entry wall. Its quality was truly outstanding, with the upper set of white layers clearly demarcated by thin dirt layers. The large number of layers was also most impressive. Of greatest interest were the two golden varnish layers which appeared as remnants beneath the oldest white layer.

Keeper's Quarters

Sample 69	**Munsell**
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Gray-green	5GY 6/1
Gray-green	5GY 6/1
White	5Y 9/1
Golden varnish	--------
Golden varnish	--------

Sample 69 was collected from the entry door. Its oldest layers were comparable with those of its predecessor, sample 68, with remnants of a pair of golden varnish layers underneath a layer of white paint.

Keeper's Quarters

Sample 70	**Munsell**
Peach	10YR 8/4
Peach	10YR 8/4
Peach	10YR 8/4
White	5Y 9/1
Tan	2.5Y 7/2
Tan	2.5Y 7/2
Tan	2.5Y 7/2

Sample 70 was collected from the kitchen wall. The oldest trio of tan layers was relatively coarse and thick and filled with microbubbles. They reacted with hydrochloric acid, giving clear indication that they were probably calcimine paint.

Keeper's Quarters

Sample 71	**Munsell**
Gray	N 6.0/
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1

Sample 71 was from the exit wall. Its oldest set of four layers were similar to the tan layers of sample 70, being relatively thick and coarse with a violent reaction with hydrochloric acid indicating in this case probable whitewash.

Keeper's Quarters

Sample 72	**Munsell**
Yellow	2.5Y 8.5/6
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1

Sample 72 was removed from the exit wall. It varied from its counterpart, sample 71 only in its most recent layer which was yellow rather than gray. In this case the oldest four layers matched the apparent whitewash of sample 71.

Keeper's Quarters

Sample 73	**Munsell**
White	5Y 9/1
Yellow	2.5Y 8.5/6
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Light blue	5B 8/2

Sample 73 was taken from the office wall/ceiling. Beneath layers of white and yellow paint was a set of three apparent layers of whitewash with a light blue calcimine layer at the bottom.

Keeper's Quarters

Sample 74	**Munsell**
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Dark gray-green	5GY 4/1
Gray-green	5GY 5/1
White	5Y 9/1
White	5Y 9/1
Gray	5Y 7/1
Light blue	5BG 8/2
White	5Y 9/1
Golden varnish	--------
Golden varnish	--------

Sample 74 was collected from the office trim/baseboard. It was excellent in its quality with crisp layers delaminating from each other in many cases. As was the case with samples 58 and 69 there were remnants of a pair of golden varnish coats beneath the oldest layer of white paint.

Keeper's Quarters

Sample 75	**Munsell**
Pastel pink	2.5YR 9/2
Light blue	5BG 8/2
White	5Y 9/1

White	5Y 9/1
Paper	--------

Sample 75 came from the first floor bedroom wall. Above a substrate of paper was a set of four paint layers with pastel pink being the most recent.

Keeper's Quarters

Sample 76	**Munsell**
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Paper	--------

Sample 76 was removed from the first floor bathroom wall/ceiling. Above a substrate of paper was a set of four calcimine layers with four off-white paint layers above it. There were also black spots on the paint layers, which may be mold or mildew.

Keeper's Quarters

Sample 77	**Munsell**
Pastel peach	10YR 9/2
White	5Y 9/1
White	5Y 9/1
Pastel peach	10YR 8/2
Dark gray-green	5GY 4/1
Gray-green	5GY 6/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Golden varnish	--------
Golden varnish	--------

Sample 77 was from the second floor hall door trim. The top layer of pastel peach was unusually shiny. Beneath a relatively large number of paint layers was a pair of golden varnish layers.

Keeper's Quarters

Sample 78	**Munsell**
Light green	5GY 7.5/2
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1

Paper	--------

Sample 76 was found on the wall of bedroom #2. The base layer of paper was detached from the paint layers above it, of which the oldest four white layers were whitewash or calcimine paint.

Keeper's Quarters

Sample 79	**Munsell**
White	N 9.5/
Light green	5GY 7.5/2
Paper	--------

Sample 79 was taken from the wall of bedroom #1 of the second floor. There were two very thin paint layers firmly bonded to the paper substrate.

Keeper's Quarters

Sample 80	**Munsell**
Yellow	2.5Y 8.5/6
Tan	2.5Y 7/4
Light green	5GY 7.5/2
Gray-green	5GY 6/1

Sample 80 was collected from the second floor closet. Beneath four paint layers was a stark white substrate which was relatively thick. This may have been the skim coat of plaster or multiple coats of whitewash. It tested positively for lime content.

Keeper's Quarters

Sample 81	**Munsell**
Blue	5B 6/7
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Golden varnish	--------
Golden varnish	--------

Sample 81 came from the first floor bedroom door of the keeper's quarters. The top layer was a thin layer of bright blue paint beneath which was four layers of white paint. At the bottom was a uniform pair of golden varnish layers.

Sample 82 was the first of the plaster and mortar samples of the set. It was analyzed on Tuesday, October 14, using the standard testing procedure developed by E. Blaine Cliver, Regional Historical Architect of the North Atlantic Region of the National Park Service. The sample was from the second floor closet plaster of the keeper's quarters. It was off-white in color and consisted of small bits of plaster and a small amount of hair. There was a nonmeasurable reaction with the hydrochloric acid, indicating a mixture of gypsum and sand as opposed to lime and sand. The sand sieve analysis revealed relatively fine sand. All of it passed the largest sieve and almost 11% passed all of the sieves.

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 82
Building: Keeper's Quarters, Devils Island, Apostle Islands NL
Location: Second floor closet plaster
Sample Description: Off-white, soft, miniscule reaction, extremely fast filtering time

Test No. 1 – Soluble Fraction

Data:

1. 185.5 Container A weight
2. 202.4 Container A and sample
3. 771.65 Barometric pressure
4. 23 Temperature
5. 0.00 Liters of water displaced
6. Off-white Filtrate color
7. Gray Fines color
8. Yes Hair or fiber ______ type
9. 2.9 Fines and paper weight
10. 2.8 Filter paper weight
11. 198.5 Sand and Container A weight
12. 9.9 cc. of sand
13. 41.7 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:

15. 16.9 Starting weight of sample: No. 2 – No. 1
16. 0.1 Weight of fines: No. 9 – No. 10
17. 13.0 Weight of sand: No. 11 – No. 1
18. .76154 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 6.9 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.00 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 0 00 Gram weight of CaCO3: 100 x No. 20
22. 6.9 Gram weight of Ca(OH)2: No. 19 – No. 21
23. .0932 Mols. of Ca(OH)2: No. 22 divided by 74
24. 6.9 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 0.00 Gram weight CO2: No. 20 x 44
26. 4.10 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. ------ %CO2 gain: No. 25 divided by No. 26

Conclusions:

28. 16.90 Gram weight of sample: No. 15 – No. 25
29. 0.59 Fine parts/volume: No. 16 divided by No. 28
30. 58.58 Sand parts/volume: (No. 17 divided by No. 28) x No. 18
31. ______ Lime parts/volume: (No. 24 divided by No. 28) x 1.1

Cement (if present)

32. ______ Portland cement parts/volume: (No. 16 divided by No. 28) x 0.78
33. ______ Natural cement parts/volume: (No. 16 divided by No. 28) x 0.86
34. ______ Lime with cement parts/volume: (No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	106.8	106.8	0.0	0
No. 20	107.4	106.4	1.0	7.81

No. 30	102.5	99.3	3.2	25.00
No. 40	104.9	100.7	4.2	32.81
No. 50	96.2	93.2	3.0	23.44
Base	72.6	71.2	1.4	10.94

Keeper's Quarters

Sample 83	**Munsell**
Tan	2.5Y 8/5

Sample 83 continued the paint samples and was found on the basement stair wall of the keeper's quarters. Beneath a layer of tan paint was a stark white substrate which was relatively thick. This may have been the skim coat of plaster or multiple coats of whitewash. It tested positively for lime content.

Sample 84 was a mortar sample taken from the masonry of the keeper's quarters. Its analysis revealed a composition of approximately two parts of sand to each part of lime by volume. Its sand sieve analysis revealed moderately fine sand of which all passed the largest sieve and almost 9% passed all of the sieves.

Sample 85 was of the mortar patch from the keeper's quarters. It differed significantly from its counterpart, sample 84. Rather than being composed of lime and sand it gave strong evidence of being composed of Portland cement in addition to the lime and sand. This is a typical late twentieth century mortar formula for restoration. The sand sieve analysis revealed an extraordinarily fine sand of which all easily passed the two largest sieves. Well over a third of it pass all of the sieves and well over half of it was trapped in the finest sieve.

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 84
Building: Keeper's Quarters, Devils Island, Apostle Islands NL
Location: Masonry mortar
Sample Description: Tan, soft, fast and bubbly reaction, rapid filtering time

Test No. 1 – Soluble Fraction

Data:

1. 188.9 Container A weight
2. 201.4 Container A and sample
3. 771.65 Barometric pressure
4. 23 Temperature
5. 0.15 Liters of water displaced
6. Champagne Filtrate color
7. Dark tan Fines color
8. No Hair or fiber______type
9. 3.1 Fines and paper weight
10. 2.6 Filter paper weight
11. 197.7 Sand and Container A weight
12. 6.2 cc. of sand
13. 37.5 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:

15. 12.5 Starting weight of sample: No. 2 – No. 1

16._____0.5_____Weight of fines: No. 9 – No. 10
17._____8.8_____Weight of sand: No. 11 – No. 1
18._____.7045__Sand density: No. 12 divided by (No. 13 – No. 14)
19._____3.2_____Weight of soluble content: No. 15 – (No. 16 + No. 17)
20.____0.00625_Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21.____0.625____Gram weight of CaCO3: 100 x No. 20
22.____2.575____Gram weight of Ca(OH)2: No. 19 – No. 21
23.___.0348____Mols. of Ca(OH)2: No. 22 divided by 74
24._____3.04____Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25._____0.28____Gram weight CO2: No. 20 x 44
26._____1.81____Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27._____15.47___%CO2 gain: No. 25 divided by No. 26

Conclusions:

28.___12.22___	Gram weight of sample:	No. 15 – No. 25
29.___4.09___	Fine parts/volume:	No. 16 divided by No. 28
30.___50.74___	Sand parts/volume:	(No. 17 divided by No. 28) x No. 18
31.___27.36___	Lime parts/volume:	(No. 24 divided by No. 28) x 1.1

Cement (if present)

32.__________	Portland cement parts/volume:	(No. 16 divided by No. 28) x 0.78
33.__________	Natural cement parts/volume:	(No. 16 divided by No. 28) x 0.86
34.__________	Lime with cement parts/volume:	(No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	106.8	106.8	0.0	0.00
No. 20	108.1	106.4	1.7	21.52
No. 30	101.9	99.2	1.7	21.52
No. 40	103.4	100.7	2.7	34.18
No. 50	94.3	93.2	1.1	13.92
Base	71.9	71.2	0.7	8.86

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No.__________85__________
Building:__________Keeper's Quarters, Devils Island, Apostle Islands NL__________
Location:__________Mortar patch__________
Sample Description:____Off-white, soft, fast and bubbly reaction, moderate filtering time__________

Test No. 1 – Soluble Fraction

Data:

1.____185.1____Container A weight	8.__Yes__Hair or fiber______type
2.____195.9____Container A and sample	9.__3.1___Fines and paper weight
3.____771.65____Barometric pressure	10._2.7___Filter paper weight

4. 23 Temperature
5. 0.40 Liters of water displaced
6. Off-white Filtrate color
7. Pastel pink Fines color
11. 191.3 Sand and Container A weight
12. 3.6 cc. of sand
13. 34.9 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:
15. 10.4 Starting weight of sample: No. 2 – No. 1
16. 0.4 Weight of fines: No. 9 – No. 10
17. 6.2 Weight of sand: No. 11 – No. 1
18. .5806 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 3.8 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.016675 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 1.67 Gram weight of CaCO3: 100 x No. 20
22. 2.13 Gram weight of Ca(OH)2: No. 19 – No. 21
23. .0288 Mols. of Ca(OH)2: No. 22 divided by 74
24. 3.37 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 0.73 Gram weight CO2: No. 20 x 44
26. 2.00 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. 36.50 %CO2 gain: No. 25 divided by No. 26

Conclusions:
28. 9.67 Gram weight of sample: No. 15 – No. 25
29. 4.14 Fine parts/volume: No. 16 divided by No. 28
30. 37.23 Sand parts/volume: (No. 17 divided by No. 28) x No. 18
31. ______ Lime parts/volume: (No. 24 divided by No. 28) x 1.1

Cement (if present)
32. ______ Portland cement parts/volume: (No. 16 divided by No. 28) x 0.78
33. ______ Natural cement parts/volume: (No. 16 divided by No. 28) x 0.86
34. 4.55 Lime with cement parts/volume: (No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	106.8	106.8	0.0	0.00
No. 20	106.4	106.4	0.0	0.00
No. 30	99.3	99.2	0.1	1.64
No. 40	101.2	100.7	0.5	8.20
No. 50	96.5	93.2	3.3	54.10
Base	73.4	71.2	2.2	36.07

Assistant Keeper's Quarters

Sample 86	**Munsell**
White	N 9.5/
White	N 9.5/
Charcoal	5Y 2/1
Gray	5Y 7/1
Black	N 0.5/
Black	N 0.5/
Charcoal	5Y 3/1

Sample 86 resumed the paint sample series and was taken from the porch post of the assistant keeper's quarters. Beneath a pair of stark white layers was a series of black and charcoal colored layers with a gray sandwiched between them.

Assistant Keeper's Quarters

Sample 87	**Munsell**
Dark green	2.5G 3/4
White	N 9.5/

Sample 87 was collected from the exterior window trim of the assistant keeper's quarters. Above a very weathered wood substrate were two thin layers of which the older was stark white.

Assistant Keeper's Quarters

Sample 88	**Munsell**
Black	N 0.5/
White	N 9.5/

Sample 88 came from the exterior window trim paint of the assistant keeper's quarters. Like its counterpart, sample 87 it retained only two paint layers on its wood surface.

Assistant Keeper's Quarters

Sample 89	**Munsell**
Dark green	2.5G 3/4
White	N 9.5/

Sample 89 was removed from the exterior door trim of the assistant keeper's quarters. It was identical to sample 87, including the weathered wood substrate.

Assistant Keeper's Quarters

Sample 90	**Munsell**
Pink	2.5R 8.5/3
Yellow	2.5Y 8.5/4
Light green	7.5G 8/2
Gray	5Y 6/1
Light gray	5Y 8/1
Tan	2.5Y 8/4
Tan	2.5Y 8/4
Dark green	7.5G 3/2
Green	7.5G 6/2

Sample 90 was from the sitting room of the assistant keeper's quarters. It retained a succession of paint layers which were very thin and evenly applied. The oldest surviving color was green.

Assistant Keeper's Quarters

Sample 91	**Munsell**
White	5Y 9/1
Tan	2.5Y 7/4

Tan	2.5Y 7/4
Yellow	2.5Y 8/6

Sample 91 was the first samples of the second set of samples from Devils Island. It was a paint sample collected from the first floor hallway of the assistant keeper's quarters. It retained four paint layers. The oldest yellow paint was quite variable in its thickness.

Assistant Keeper's Quarters

Sample 92	**Munsell**
White	5Y 9/1
Tan	2.5Y 7/4
Tan	2.5Y 7/4

Sample 92 came from the second floor stair/hallway of the assistant keeper's quarters. Its analysis revealed three layers of paint with tan being the oldest of the three.

Assistant Keeper's Quarters

Sample 93	**Munsell**
Dark green	2.5G 4/4
Tan	2.5Y 7/4
Tan	2.5Y 7/4

Sample 93 was removed from the second floor sitting room wall of the assistant keeper's quarters. It was similar to its counterpart, sample 92, but with a dark green layer on its surface rather than white. There was a distinct dirt film on the dark green layer.

Assistant Keeper's Quarters

Sample 94	**Munsell**
White	5Y 9/1

Sample 94 was from the second floor sitting room ceiling of the assistant keeper's quarters. It revealed only a single layer of white paint which was firmly adhered to its plaster substrate.

Assistant Keeper's Quarters

Sample 95	**Munsell**
Blue-green	2.5BG 6/4
White	5Y 9/1

Sample 95 was found on the wall of bedroom 2 of the assistant keeper's quarters. In addition to the white layer seen in its counterpart, sample 94 there was a blue-green layer above it.

Assistant Keeper's Quarters

Sample 96	**Munsell**
Pastel green	5G 9/1
White	5Y 9/1

Sample 97 was collected from the second floor bathroom of the assistant keeper's quarters. Beneath a layer of pastel green paint was a typical white layer.

Assistant Keeper's Quarters	
Sample 97	**Munsell**
Green	10G 7/2
White	5Y 9/1
Gray	N 5.5/
White	5Y 9/1

Sample 97 was collected from bedroom #1 of the second floor of the assistant keeper's quarters. It revealed four paint layers of which a typical white color was the oldest layer.

Assistant Keeper's Quarters	
Sample 98	**Munsell**
White	5Y 9/1
White	5Y 9/1
Pastel green	5G 9/1
Dark gray	5Y 5/1
Charcoal	N 3.5/

Sample 98 was from the stair to the basement of the assistant keeper's quarters. Its analysis revealed five thinly-applied layers. The oldest charcoal-colored paint was cleanly disengaged from its substrate.

Assistant Keeper's Quarters	
Sample 99	**Munsell**
Gray	N 6.0/
Dark gray	N 4.5/
Gray	5Y 5.5/1
Dark gray	5Y 5/1
Black	N 1.0/
Tan	2.5Y 7/4
Charcoal	N 3.5/

Sample 99 was removed from the stair to the basement of the assistant keeper's quarters. Other than its oldest charcoal-colored layers it was quite dissimilar to its counterpart, sample 98. Here again the oldest layer did not retain any substrate beneath it.

Sample 100 continued the mortar and plaster series and was from the first floor hallway plaster of the assistant keeper's quarters. It was tan in color. Unlike other plaster samples, this sample had a fast and bubbly reaction, indicating the presence of lime along with the sand. The fines, which were minimal, contained a small amount of hair. An approximate ratio of four parts of lime to seven parts of sand was revealed. The sand sieve analysis revealed surprisingly coarse sand of which almost 7% failed to pass any of the sieves and almost half was trapped in sieve #20, the second largest sieve. Only slightly over 4% made it through all of the sieves.

Sample 101 was taken from the mortar of the assistant keeper's quarters. It was dark tan in color and was relatively soft. The softness in addition to a fast and bubble reaction indicated a lime and sand mixture of which there was approximately three times as much sand as there was lime, by volume. There was an unusually large proportion of fines produced which have been assumed to be dirt associated with the original

sand. The sand sieve analysis revealed very fine sand of which over 18% passed all of the sieves, almost 32% was trapped in the finest sieve and less than 2% failed to pass any sieve.

Sample 102 was collected from the mortar patch of the assistant keeper's quarters. It was off-white in color and was relatively soft. It gave clear evidence of being composed of sand, lime, and Portland cement. The relatively large water displacement is typical of lime mortars, but the prolonged reaction is typical of Portland cement mortars. A lime mortar typically has a rapid filtering time. This had a moderate filtering time. There were, however, no gelatinous by-products which characterize some Portland cement mortars but not all. The sand sieve analysis revealed very fine sand of which over 16% passed all of the sieves and slightly over 41% was trapped in the finest sieve.

Sample 103 came from the mortar of oil house #1. It was very soft and was off-white in color. It was also well below average in size (20.0 grams being the standard size). It had a fast and bubbly reaction and a rapid filtering time, both of which a typical indications of a lime and sand mortar. There was a proportionally large amount of fines which were probably dirt in association with the sand. If so, then the approximate mixture was five parts of lime to eight parts of sand, by volume, or, roughly, one part of lime to two parts of sand. The sand sieve analysis revealed coarse sand. Although all of it passed the largest sieve, slightly over one-fifth was trapped in the next sieve, #20. Over 37% was trapped in sieve #30 and over one-quarter was trapped in sieve #40.

Sample 104 was removed from the mortar patch of oil house #1. It was off-white in color and was relatively soft. It gave clear evidence of being composed of sand, lime, and Portland cement. The relatively large water displacement is typical of lime mortars, but the prolonged reaction is typical of Portland cement mortars. A lime mortar typically has a rapid filtering time. This had a moderate filtering time. There were, however, no gelatinous by-products which characterize some Portland cement mortars but not all. The sand sieve analysis revealed very fine sand of which over 32% passed all of the sieves and over 46% was trapped in the finest sieve.

Sample 106 was the mortar from oil house #2. It was gray and hard, which are both indications of a Portland cement and sand mortar. Although the sample size was small it had a minimal water displacement, a prolonged reaction and only moderate filtering time which are also indications of a Portland cement and sand sample. The sand sieve analysis revealed fine sand of which all passed the largest sieve and over one-fifth passed all of the sieves. Almost 45% was trapped in the finest sieve, #50 and almost one-quarter was trapped in the next finest sieve, #40.

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 100
Building: Assistant Keeper's Quarters, Devils Island, Apostle Islands NL
Location: First floor hallway plaster
Sample Description: Tan with pieces of thin white skim coat, soft, fast and bubbly reaction, extremely fast filtering time

Test No. 1 – Soluble Fraction

Data:

1. 187.8	Container A weight	8. Yes	Hair or fiber______type
2. 221.5	Container A and sample	9. 2.7	Fines and paper weight
3. 771.65	Barometric pressure	10. 2.7	Filter paper weight
4. 23	Temperature	11. 214.7	Sand and Container A weight
5. 0.40	Liters of water displaced	12. 16.0	cc. of sand
6. Off-white	Filtrate color	13. 55.6	Weight of graduated cylinder and sand
7. Pink-tan	Fines color	14. 28.7	Weight of graduated cylinder

Computations:

15. 33.7 Starting weight of sample: No. 2 – No. 1
16. 0.o Weight of fines: No. 9 – No. 10
17. 26.9 Weight of sand: No. 11 – No. 1
18. .5948 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 6.8 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.0166753 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 1 67 Gram weight of CaCO3: 100 x No. 20
22. 5.13 Gram weight of Ca(OH)2: No. 19 – No. 21
23. 0.0693577 Mols. of Ca(OH)2: No. 22 divided by 74
24. 6.37 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 0.73 Gram weight CO2: No. 20 x 44
26. 3.79 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. 19.26 %CO2 gain: No. 25 divided by No. 26

Conclusions:

28. 32.97	Gram weight of sample:	No. 15 – No. 25
29. 0.00	Fine parts/volume:	No. 16 divided by No. 28
30. 48.53	Sand parts/volume:	(No. 17 divided by No. 28) x No. 18
31. 27.25	Lime parts/volume:	(No. 24 divided by No. 28) x 1.1

Cement (if present)

32.____________	Portland cement parts/volume:	(No. 16 divided by No. 28) x 0.78
33.____________	Natural cement parts/volume:	(No. 16 divided by No. 28) x 0.86
34.____________	Lime with cement parts/volume:	(No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	108.6	106.8	1.8	6.77
No. 20	119.4	106.4	13.0	48.87
No. 30	104.5	99.3	5.2	19.55
No. 40	104.4	100.8	3.6	13.53
No. 50	95.1	93.2	1.9	7.14
Base	72.3	71.2	1.1	4.14

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 101

Building: Assistant Keeper's Quarters, Devils Island, Apostle Islands NL

Location: Mortar
Sample Description: Dark tan, soft, fast and bubbly reaction, extremely rapid filtering time

Test No. 1 – Soluble Fraction

Data:

1. 192.0 Container A weight
2. 209.3 Container A and sample
3. 771.65 Barometric pressure
4. 23 Temperature
5. 0.23 Liters of water displaced
6. Off-white Filtrate color
7. Pink-tan Fines color
8. No Hair or fiber ______ type
9. 3.6 Fines and paper weight
10. 2.7 Filter paper weight
11. 205.2 Sand and Container A weight
12. 8.7 cc. of sand
13. 41.9 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:

15. 17.3 Starting weight of sample: No. 2 – No. 1
16. 0.9 Weight of fines: No. 9 – No. 10
17. 13.2 Weight of sand: No. 11 – No. 1
18. .659 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 3.2 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.0095883 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 0.96 Gram weight of CaCO3: 100 x No. 20
22. 2.24 Gram weight of Ca(OH)2: No. 19 – No. 21
23. 0.030286 Mols. of Ca(OH)2: No. 22 divided by 74
24. 2.95 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 0.42 Gram weight CO2: No. 20 x 44
26. 1.75 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. 24 %CO2 gain: No. 25 divided by No. 26

Conclusions:

28. 16.88 Gram weight of sample: No. 15 – No. 25
29. 5.33 Fine parts/volume: No. 16 divided by No. 28
30. 51.78 Sand parts/volume: (No. 17 divided by No. 28) x No. 18
31. 19.22 Lime parts/volume: (No. 24 divided by No. 28) x 1.1

Cement (if present)

32. ______ Portland cement parts/volume: (No. 16 divided by No. 28) x 0.78
33. ______ Natural cement parts/volume: (No. 16 divided by No. 28) x 0.86
34. ______ Lime with cement parts/volume: (No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	107.0	106.8	0.2	1.51
No. 20	107.8	106.4	1.4	10.61
No. 30	100.9	99.3	1.6	12.12
No. 40	104.2	100.8	3.4	25.76
No. 50	07.4	93.2	4.2	31.82
Base	73.6	71.2	2.4	18.18

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 102
Building: Assistant Keeper's Quarters, Devils Island, Apostle Islands NL
Location: Mortar patch
Sample Description: Off-white, soft, fast and bubbly reaction followed by prolonged reaction, moderate filtering time

Test No. 1 – Soluble Fraction

Data:
1. 185.5 Container A weight
2. 205.7 Container A and sample
3. 760.99 Barometric pressure
4. 23 Temperature
5. 0.66 Liters of water displaced
6. Off-white Filtrate color
7. Light gray Fines color
8. No Hair or fiber ______ type
9. 3.3 Fines and paper weight
10. 2.8 Filter paper weight
11. 198.9 Sand and Container A weight
12. 8.1 cc. of sand
13. 42.2 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:
15. 20.2 Starting weight of sample: No. 2 – No. 1
16. 0.5 Weight of fines: No. 9 – No. 10
17. 13.4 Weight of sand: No. 11 – No. 1
18. .6045 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 6.3 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.0271341 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 2 71 Gram weight of CaCO3: 100 x No. 20
22. 3.59 Gram weight of Ca(OH)2: No. 19 – No. 21
23. .0485 Mols. of Ca(OH)2: No. 22 divided by 74
24. 5.59 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 1.19 Gram weight CO2: No. 20 x 44
26. 3.33 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. 35.74 %CO2 gain: No. 25 divided by No. 26

Conclusions:

28.	19.01	Gram weight of sample:	No. 15 – No. 25
29.	2.62	Fine parts/volume:	No. 16 divided by No. 28
30.	42.63	Sand parts/volume:	(No. 17 divided by No. 28) x No. 18
31.		Lime parts/volume:	(No. 24 divided by No. 28) x 1.1

Cement (if present)

32.		Portland cement parts/volume:	(No. 16 divided by No. 28) x 0.78
33.		Natural cement parts/volume:	(No. 16 divided by No. 28) x 0.86
34.	0.58	Lime with cement parts/volume:	(No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio

No. 10	107.2	106.8	0.4	2.99
No. 20	107.0	106.4	0.6	4.48
No. 30	100.1	99.3	0.8	5.97
No. 40	104.7	100.8	3.9	29.10
No. 50	98.7	93.2	5.5	41.04
Base	73.4	71.2	2.2	16.42

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 103
Building: Oil House #1, Devils Island, Apostle Islands NL
Location: Mortar
Sample Description: Off-white, very soft, fast and bubbly reaction, rapid filtering time

Test No. 1 – Soluble Fraction

Data:
1. 188.9 Container A weight
2. 197.5 Container A and sample
3. 760.99 Barometric pressure
4. 23 Temperature
5. 0.17 Liters of water displaced
6. Champagne Filtrate color
7. Tan Fines color
8. No Hair or fiber ______ type
9. 3.1 Fines and paper weight
10. 2.6 Filter paper weight
11. 194.4 Sand and Container A weight
12. 3.9 cc. of sand
13. 34.3 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:
15. 8.6 Starting weight of sample: No. 2 – No. 1
16. 0.5 Weight of fines: No. 9 – No. 10
17. 5.5 Weight of sand: No. 11 – No. 1
18. .709 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 2.2 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.0069891 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 0.70 Gram weight of CaCO3: 100 x No. 20
22. 1.50 Gram weight of Ca(OH)2: No. 19 – No. 21
23. .0203 Mols. of Ca(OH)2: No. 22 divided by 74
24. 2.02 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 0.31 Gram weight CO2: No. 20 x 44
26. 1.20 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. 25.83 %CO2 gain: No. 25 divided by No. 26

Conclusions:
28. 8.29 Gram weight of sample: No. 15 – No. 25
29. 6.03 Fine parts/volume: No. 16 divided by No. 28
30. 47.04 Sand parts/volume: (No. 17 divided by No. 28) x No. 18
31. 33.04 Lime parts/volume: (No. 24 divided by No. 28) x 1.1

Cement (if present)
32. ______ Portland cement parts/volume: (No. 16 divided by No. 28) x 0.78

33.____________Natural cement parts/volume: (No. 16 divided by No. 28) x 0.86
34.____________Lime with cement parts/volume: (No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	106.8	106.8	0.0	0.00
No. 20	107.5	106.4	1.1	20.37
No. 30	101.3	99.3	2.0	37.04
No. 40	102.2	100.8	1.4	25.93
No. 50	93.7	93.2	0.5	9.26
Base	71.6	71.2	0.4	7.41

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 104
Building: Oil House #1, Devils Island, Apostle Islands NL
Location: Mortar patch
Sample Description: Off-white, soft, fast and bubbly reaction followed by prolonged reaction, moderate filtering time

Test No. 1 – Soluble Fraction

Data:
1. 185.1 Container A weight
2. 206.3 Container A and sample
3. 760.99 Barometric pressure
4. 23 Temperature
5. 0.80 Liters of water displaced
6. Off-white Filtrate color
7. Pastel pink Fines color
8. No Hair or fiber______type
9. 3.3 Fines and paper weight
10. 1.9 Filter paper weight
11. 198.4 Sand and Container A weight
12. 8.1 cc. of sand
13. 42.0 Weight of graduated cylinder and sand
14. 28.7 Weight of graduated cylinder

Computations:
15. 21.2 Starting weight of sample: No. 2 – No. 1
16. 1.4 Weight of fines: No. 9 – No. 10
17. 13.3 Weight of sand: No. 11 – No. 1
18. .609 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 6.5 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.0328898 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 3.29 Gram weight of CaCO3: 100 x No. 20
22. 3.21 Gram weight of Ca(OH)2: No. 19 – No. 21
23. .0434 Mols. of Ca(OH)2: No. 22 divided by 74
24. 5.64 Gram total weight of Ca(OH)2: 74 x (No. 20 + No. 23)
25. 1.45 Gram weight CO2: No. 20 x 44
26. 3.36 Gram weight total possible CO2: 44 x (No. 20 + No. 23)
27. 43.15 %CO2 gain: No. 25 divided by No. 26

Conclusions:

28. 19.75 Gram weight of sample: No. 15 – No. 25
29. 7.09 Fine parts/volume: No. 16 divided by No. 28
30. 41.01 Sand parts/volume: (No. 17 divided by No. 28) x No. 18
31. ____ Lime parts/volume: (No. 24 divided by No. 28) x 1.1

Cement (if present)
32. ____ Portland cement parts/volume: (No. 16 divided by No. 28) x 0.78
33. ____ Natural cement parts/volume: (No. 16 divided by No. 28) x 0.86
34. 2.52 Lime with cement parts/volume: (No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	106.8	106.8	0.0	0.00
No. 20	106.7	106.4	0.3	2.27
No. 30	99.8	99.3	0.5	3.79
No. 40	102.8	100.8	2.0	15.15
No. 50	99.3	93.2	6.1	46.21
Base	75.5	71.2	4.3	32.58

Mortar/Plaster/Stucco Analysis Test Sheet

Sample No. 106
Building: Oil House #2, Devils Island, Apostle Islands NL
Location: Mortar
Sample Description: gray, hard, fast and bubbly reaction followed by prolonged reaction, rapid filtering time

Test No. 1 – Soluble Fraction

Data:
1. 187.8 Container A weight
2. 195.7 Container A and sample
3. 760.99 Barometric pressure
4. 23 Temperature
5. 0.05 Liters of water displaced
6. Off-white Filtrate color
7. Light gray Fines color
8. No Hair or fiber ____ type
9. 2.2 Fines and paper weight
10. 1.8 Filter paper weight
11. 191.7 Sand and Container A weight
12. 3.4 cc. of sand
13. 32.7 Weight of graduated cylinder and sand
14. 28.8 Weight of graduated cylinder

Computations:
15. 7.9 Starting weight of sample: No. 2 – No. 1
16. 0.4 Weight of fines: No. 9 – No. 10
17. 3.9 Weight of sand: No. 11 – No. 1
18. .8718 Sand density: No. 12 divided by (No. 13 – No. 14)
19. 3.6 Weight of soluble content: No. 15 – (No. 16 + No. 17)
20. 0.0020556 Mols. Of CO2: No. 5 x No. 3. x 0.016 divided by (No. 4 + 273.16 C.)
21. 0 21 Gram weight of CaCO3: 100 x No. 20
22. 3.39 Gram weight of Ca(OH)2: No. 19 – No. 21

23. 0.04587 Mols. of $Ca(OH)_2$: No. 22 divided by 74
24. 3.55 Gram total weight of $Ca(OH)_2$: 74 x (No. 20 + No. 23)
25. 0.09 Gram weight CO_2: No. 20 x 44
26. 2.11 Gram weight total possible CO_2: 44 x (No. 20 + No. 23)
27. 4.27 %CO_2 gain: No. 25 divided by No. 26

Conclusions:

28. 7.81	Gram weight of sample:	No. 15 – No. 25
29. 5.12	Fine parts/volume:	No. 16 divided by No. 28
30. 43.53	Sand parts/volume:	(No. 17 divided by No. 28) x No. 18
31.	Lime parts/volume:	(No. 24 divided by No. 28) x 1.1

Cement (if present)

32. 3.99	Portland cement parts/volume:	(No. 16 divided by No. 28) x 0.78
33.	Natural cement parts/volume:	(No. 16 divided by No. 28) x 0.86
34.	Lime with cement parts/volume:	(No. 16 x o.2) divided by No. 28 x 1.1

Test No. 2 – Sand Sieve Analysis

Sieve	Sieve w/ sand weight	Sieve weight	Sand weight	Sand ratio
No. 10	106.8	106.8	0.0	0.00
No. 20	106.6	106.4	0.2	5.26
No. 30	99.5	99.3	0.2	5.26
No. 40	100.7	100.8	0.9	23.68
No. 50	94.9	93.2	1.7	44.74
Base	72.0	71.2	0.8	21.05

Oil House #1

Sample 105	**Munsell**
Dark green	2.5G 4/4
White	5Y 9/1

Sample 105 resumed the paint sample series. It was taken from the trim of the oil house #1. It analysis showed only two, thin layers of paint with white being the older of the two.

Oil House #2

Sample 107	**Munsell**
Maroon	7.5R 3/5
Yellow-orange	10YR 7/8
Maroon	7.5R 3/5
Yellow-orange	10YR 7/8
Yellow-orange	10YR 7/8
Dark green	2.5G 4/4
Yellow-orange	10YR 7/8
Dark green	2.5G 4/4
Dark green	2.5G 4/4
Dark green	2.5G 4/3
Dark green	2.5G 4/3
Dark green	2.5G 4/2

Dark green	2.5G 3/2
Gray	5Y 6/1
Dark gray	5Y 4/1
Dark gray	5Y 4/1
White	5Y 9/1
White	5Y 9/1

Sample 107 was collected from the trim of oil house #2. It was very good in its quality with only the oldest pair of white layers exhibiting marked deterioration. The layer number of thin, evenly-applied layers was quite impressive both for the number and for the variety of colors.

Lighthouse

Sample 108	**Munsell**
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
Tan	10YR 8/4
Tan	10YR 8/4
Tan	10YR 8/4
Tan	10YR 8/4
Red	7.5R 5/5
White	5Y 9/1

Sample 108 came from the interior of the lighthouse. Beneath a set of stark white paint layers was another set of warm tan layers. Beneath that set was a variable layer of red, below which was a layer of oil-based white paint.

Lighthouse

Sample 109	**Munsell**
Gray	N 6.0/
Gray	N 6.0/
Charcoal	N 1.5/
Dull red	7.5R 6/3
Gray	N 6.0/
Charcoal	N 2.0/
Gray	N 6.0/
Charcoal	N 3.0/

Sample 109 came from the floor/stair of the lighthouse. It was extremely challenging in its quality. The top pair of gray layers were in excellent condition but the layers beneath them were in extremely poor condition. The intermediate gray layers were extremely thin and the other layers were thick and flaky.

Fog Signal

Sample 110	**Munsell**
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/

White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
Dark tan	2.5Y 6/4
Dark tan	2.5Y 6/4
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/2
Light gray	5Y 8/2
Light gray	5Y 8/2
Brown	2.5Y 5/4
Dark tan	2.5Y 6/2
Dark gray	N 4.0/
Gray	N 5.5/
Charcoal	N 2.0/
White	5Y 9/1
Very dark maroon	10R 2/2

Sample 110 was removed from the interior of the fog signal. Its quality was truly outstanding with clear layers of thinly applied paint. The oldest very dark maroon layer retained no substrate beneath it and was variable in color with some black areas as well.

Fog Signal

Sample 111	**Munsell**
Gray	N 5.0/
Dark gray	N 4.0/
Gray	N 5.0/
Gray	N 5.0/
Gray	N 5.0/
Gray	N 5.0/
Dark gray	N 4.0/
Gray	N 5.0/
Dark gray	N 4.0/
Dark gray	N 4.5/
Dark gray	N 4.0/
Gray	5Y 6/1
Gray	5Y 6/1
Gray	5Y 6/1
Light gray	5Y 8/1
Gray	5Y 6/1
Dark maroon	7.5R 3/4
Dark maroon	7.5R 3/4
Dark green	2.5G 3/4
Dark green	2.5G 3/4
Dark green	2.5G 3/4
Dark maroon	7.5R 3/4
Dark glossy varnish	--------

Sample 111 was from the interior of the fog signal. Like sample 100 it revealed a large set of clearly distinct layers. The oldest layer was a very dark varnish with an extremely high gloss so that no substrate remained beneath it.

Fog Signal

Sample 112	**Munsell**
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
White	N 9.5/
Dark tan	2.5Y 6/4
Dark tan	2.5Y 6/4
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1
Off-white	5Y 8.5/1

Sample 112 was found on the new addition interior of the fog signal. It matched sample 110 layer for layer until it ended at an off-white layer.

Fog Signal

Sample 113	**Munsell**
Dark green	2.5G 3/4
White	N 9.5/
White	N 9.5/
White	5Y 9/1

Sample 113 was taken from the door trim of the fog signal. There were two paint layers – dark green and stark white atop a thick collection of stark white, whitewash layers which was above another collection of slightly off-white whitewash layers.

Fog Signal

Sample 114	**Munsell**
Dark green	2.5G 3/4
Dark green	2.5G 4/4
Dark green	2.5G 4/4

Sample 114 was collected from the window trim of the fog signal. It revealed three extremely thin layers of dark green paint.

Boat House

Sample 115	**Munsell**

White	N 9.5/
White	N 9.5/

Sample 115 came from the exterior siding of the boat house. It retained a thin layer of stark white paint atop a thick encrustation of whitewash layers.

Boat House

Sample 116	**Munsell**
Dark green	2.5G 3/4
White	N 9.5/
Dark green	2.5G 3/4
White	5Y 9/1
Dark green	2.5G 3/4
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Dark green	2.5G 3/4

Sample 116 was removed from the exterior wood trim of the boat house. Beneath a set of nine paint layers was extremely weathered wood.

Boat House

Sample 117	**Munsell**
Dark green	2.5G 3/4
White	N 9.5/
Gray	5Y 5/1
Tan	2.5Y 7/6
Tan	2.5Y 7/6
Brown	10YR 5/2
Charcoal	N 2.0/
White	5Y 9/1
White	5Y 9/1
White	5Y 9/1
Dark green	2.5G 3/4
Gray	5Y 7/1

Sample 117 was from the exterior door trim of the boat house. It revealed an impressive number of paint layers, especially for an exterior sample. The oldest gray layer was applied to heavily weathered wood.

Boat House

Sample 118	**Munsell**
Tan	2.5Y 7/6
Tan	2.5Y 7/6

Sample 118 was found on the interior door trim of the boat house. It retained only two layers of tan paint which matched the pair of tan layers in its counterpart, sample 117.

Boat House

Sample 119	**Munsell**

Dark green	2.5G 3/4
Dark green	2.5G 3/4
White	N 9.5/
White	N 9.5/
White	N 9.5/
Dark green	2.5G 3/4
Gray	5Y 9/1

Sample 119 was taken from the eave trim of the boat house. It retained gray paint on its weathered wood surface as in sample 117.

A number of conclusions can be drawn from the analysis, as follow:

1. There was a fair degree of consistency between the several of the samples, making it possible to draw some firm conclusions.

2. A number of samples had so few layers that one of the following conclusions can be reached:

    a. The oldest layers had either weathered away over time, which is probable with exterior paint.

    b. They may have been stripped. This would be especially true if the older finish was a calcimine paint, which is impossible to cover with any coating, including calcimine paint itself. It was an extremely popular paint for interior plaster surfaces during the nineteenth and early twentieth centuries. In light of the use of whitewash, which is a related waterborne paint, the probability of calcimine paint here is very high.

    c. The element itself had been replaced or is of recent date.

    d. Other coverings such as wallpaper or calcimine paint may have preceded the paint and were removed prior to painting. Wallpaper was a popular covering, especially for damaged plaster.

    e. Because very little is known today about calcimine paint a few comments are in order to explain it.

       It was immensely popular throughout the nineteenth century and into the early twentieth century. It was cheap, easily applied and removed, had a very soft and lustrous sheen, and could be mixed and used by the average homeowner who could not afford a painter. In this case it could have been applied by Coast Guard personnel rather than painters. Decorative painters frequently used it because of its sheen. It is still in production to this day, although it is very rarely used.

       It is waterborne glue distemper paint which, unlike its cousin, whitewash, must be entirely removed prior to repainting. The difference between calcimine paint and whitewash is in the formulation. Calcimine paint was developed for interior use only and was developed to carry a pigment whereas the high lime content of whitewash prevented it from taking on a pigment. Whitewash was primarily used for exteriors and for dark service areas of interiors.

       Nothing will stick to it, including calcimine paint. Its absence, therefore, is about the only means of its detection. This is a real Catch-22. Because it was typically removed prior to repainting its presence is usually indicated either through historic documentation (which is very rare) or the very small number of layers where many would normally be found or where other, similar surfaces retain considerably more.

3. There is no doubt that at least one element (the door trim – Sample 113) of the fog signal was whitewashed as its probable original finish.

4. Many samples revealed lengthy sequences of paint layers with some of these samples having an exterior exposure. These are most likely to have retained original finishes and stand in contrast with those samples with very few layers which, logically, probably did not reveal original finishes.

5. Of some interest was the apparent original golden varnish layers seen on several samples from the keeper's quarters. Although golden varnish was typically used on woodwork, it was also found on wall surfaces.

6. As can be seen with many of the mortar sample discussions no relative ratios of sand to Portland cement or sand to Portland cement and lime has been state. The acid reduction method which was used is better than other methods for determining lime to sand ratios. Hence, they were provided for those samples composed of sand and lime. For samples containing Portland cement, the best this form of testing can do is to indicate the presence of Portland cement and the sand itself.

   The primary goal in repointing is to achieve a compatible mortar. This can be done for lime and sand samples that were analyzed. It can also be done for Portland cement samples with a bit of trial and error. If the mortar is very hard then a higher ratio of Portland cement to sand will work. One must take into consideration any deterioration of the masonry as a result of the mortar. If this has been the case it may be advisable to use a softer mortar for repointing.

   The other primary mode of mortar analysis is spectrographic testing. Unfortunately, it also cannot accurately determine exact ratios of Portland cement to sand and/or to lime.

   The secondary goal is to match the appearance of the mortar, which depends to a very large extent on the sand. This is where acid reduction testing shines. It provides and exact calculation of the sand grain sizes as well as a sample of the sand for matching of color. If the sand is carefully matched then the appearance will be successful. This is especially critical in partial repointing and patching.

7. There are instances where the narrative of the mortar make up refers to Portland – but the data sheet following does not include it in line #32. The reason for this is that rather than a number for lime content, the calculation is made for lime with Portland cement content. If the sample merely had Portland cement and sand there would be a number for Portland cement

As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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