NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

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NAT. REGISTER OF HISTORIC PLACES
NATIONAL PARK SERVICE

United States Department of the Interior
National Park Service
NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

1. Name of Property

historic name Burlington Breakwater
other names/site number N/A

2. Location

street & number Burlington Harbor   not for publication
city or town Burlington   X vicinity Burlington
state Vermont code VT county Chittenden zip code 05401

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ✓ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ✓ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally ___ statewide ✓ locally. (___ See continuation sheet for additional comments.)

[signature] 1 April 2002
Signature of certifying official Date

Federal Preservation Officer, US Army Corps of Engineers
State or Federal agency and bureau

In my opinion, the property X meets ___ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

Suzanne C. Jamele, National Register Specialist 1-28-02
Signature of commenting or other official Date

Vermont State Historic Preservation Office
State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:
✓ entered in the National Register [signature] 6/6/03
___ See continuation sheet.
___ determined eligible for the National Register ___ See continuation sheet.
___ determined not eligible for the National Register
___ removed from the National Register
___ other (explain):

for Signature of Keeper Date of Action

5. Classification

Ownership of Property
(Check as many boxes as apply)

___ private
___ public-local
___ public-State
_X_ public-Federal

Category of Property
(Check only one box)

___ building(s)
___ district
___ site
_X_ structure
___ object

Number of Resources within Property

Contributing	Noncontributing	
		buildings
		sites
1		structures
		objects
1		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

Cat: TRANSPORTATION Sub: water-related

Current Functions
(Enter categories from instructions)

Cat: TRANSPORTATION Sub: water-related

7. Description

Architectural Classification
(Enter categories from instructions)

Other: Breakwater

Materials
(Enter categories from instructions)

foundation Stone
roof N/A
walls Wood
other

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

See Continuation Sheet

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

_X_ A Property is associated with events that have made a significant contribution to the broad patterns of our history.

___ B Property is associated with the lives of persons significant in our past.

_X_ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

___ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations
(Mark "X" in all the boxes that apply.)

___ a owned by a religious institution or used for religious purposes.
___ b removed from its original location.
___ c a birthplace or a grave.
___ d a cemetery.
___ e a reconstructed building, object,or structure.
___ f a commemorative property.
___ g less than 50 years of age or achieved significance within the past 50 years.

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

Areas of Significance
(Enter categories from instructions)

MARITIME HISTORY
ENGINEERING
COMMERCE

Period of Significance
1836 - 1950

Significant Dates
1836
1867
1874

Significant Person
(Complete if Criterion B is marked above)
N/A

Cultural Affiliation
N/A

Architect/Builder
U.S. Department of War, Topographic Bureau
Whitney, Luther

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)
___ preliminary determination of individual listing (36 CFR 67) has been requested.
___ previously listed in the National Register
___ previously determined eligible by the National Register
___ designated a National Historic Landmark
___ recorded by Historic American Buildings Survey # ________
___ recorded by Historic American Engineering Record # ________

Primary location of additional data:
_X_ State historic Preservation Office
___ Other State agency
_X_ Federal agency
___ Local government
___ University
___ Other
Name of repository:
US Army Corps of Engineers, Albany Field Office
Lake Champlain Maritime Museum

10. Geographical Data

Acreage of Property 9.77 acres

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	18	641100	4926000	3			
2				4			

__ See continuation sheet.

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Ann Cousins
organization ____ date April 10, 2001
street & number 253 Valley View Rd. Ext telephone (802) 434-5014
city or town Richmond state VT zip code 05477

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets
Maps
A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.
Photographs
Representative black and white photographs of the property.
Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name Chief, Property and Accounting Section; US Army Engineer District, New York

street & number Federal Building; 26 Federal Plaza telephone (212) 264-0230

city or town New York state NY zip code 10278-0090

Description

Burlington Harbor, Vermont, is on the eastern shore of Lake Champlain, approximately forty miles south of the US-Canadian border, seventy miles north of the southern end, or head, of the lake, and twenty miles southeast of Plattsburgh, New York. The harbor is approximately 2,000 acres, half-moon shaped, defined on the south by Shelburne Point, on the north by Appletree Point, and protected on the west, toward the broad lake, by a 4,157-foot breakwater that extends generally parallel and approximately 1,000 feet from the shore. The breakwater's main section is 3,793 linear feet. Isolated from the main section by a 200-foot opening at the north is a 364-foot section. The breakwater has a seven-leg, roughly zigzag configuration. The oldest section, built from 1836 to 1854, is 1,069 linear feet, just south of mid-point, comprising the third and fourth legs from the south. From 1867 to 1874 the structure was extended 831 feet northerly and 617 feet southerly. Between 1874 and 1886 it was again lengthened in both directions a total of 1,036 feet. The northernmost 364-foot section, built from 1889 to 1890, was the last section to be built. Since then, the work on the breakwater has been classified as maintenance. Despite the series of repairs, the Burlington breakwater is a significant example of a 19th century timber-cribbed breakwater and retains its historic integrity of location, design, setting, materials, workmanship, feeling and association.

Above water, the superstructure rises approximately eight feet above low water mark. Overall, the distinctive light gray appearance of the wall comes from the Barre granite armor and capstone dating from 1961 and 1965 repairs. The slabs are closely laid on a rubble core. Four stretches along the harbor face, ranging from approximately 50 to 100 feet long, are notably different. Appearing to be stone patches, smaller and more cube-shaped, the southernmost is a white and gray Danby Gray marble. The patch is located near the southern end of the second leg (from the south). North of that, in the third leg is Redstone riprap, which appears to have been quarried from the Cliff Street quarry in Burlington, no longer active. Two other stretches of the fifth leg are faced with a weathered limestone block.

The Barre granite cap of the stone superstructure is level, approximately ten feet wide. Sides of closely laid armor slabs slope to below low water line at approximately 45 degrees on the lake and harbor sides of the wall. Smaller sized, irregular limestone makes up the core and riprap along the lake face below the water surface. Closest to the surface and most prevalent is a yellow to pinkish limestone, native to the eastern shore of Lake Champlain with quarries located in Colchester, Shelburne and Charlotte. At least one lakeside quarry in Shelburne had a cutout for boats to dock and receive a load of stone. The two northern-most legs of the main breakwater include distinctive quarry-cut "blue stone" native to the western shore of Lake Champlain. This stone likely dates from the 1880s when Luther Whitney worked on the breakwater and contracted with the Clark quarry in Willsboro, New York to supply the stone.

The irregular broad zigzag shape of the breakwater is attributed to different phases of construction, roughly followed the convex contour of the shoreline. The outermost legs, which point back toward the shore, were purposefully angled in to take advantage of shallower 30-foot depths as a cost-saving measure.[1]

The breakwater substructure is crib construction, with timber cells filled with stone for ballast. Each crib is typically 80 to 110 feet long, varying in width from 24 to 35 feet. Notched timbers in alternate rows of headers and stretchers formed the cribs. Only the eastern, harbor-side, cribwork remains exposed below the water's surface. The western, lake face, is totally reinforced with riprap.

The construction of the cribwork is remarkable. Hemlock forms the below-low-water portion, and white pine is used on the upper-most courses. The superstructure was originally built of white pine, though the timber structure was replaced by stone, then concrete, and again by stone. Below water, crib timbers are approximately 1' x 1' hewn or sawn. Several rounded logs remain in debris fields where the cribbing failed. The round logs may have been from the interior support structure, crib floors, or from the bottom courses. Preliminary reconnaissance suggests that the earliest cribwork is laid on a narrow foundation, in contrast to sections built after 1867, which are raised off the lake bottom onto a rubble foundation.

The method of construction consisted of first placing a stone mound, or foundation, along the proposed line, the width on top being sufficient to support wooden cribs, which were then sunk into position and filled with stone. Until 1890 the breakwater was built with hemlock and white

[1] *Burlington Harbor*, 1888, 2.

pine timber to its full height of 8 feet above low water. Repairs in the 1880's and new construction of the northernmost section in 1890 replaced the timber with a stone superstructure, which proved to be more durable and less expensive than the timber. The down side was that the stone weighed more than the original wooden superstructure, and some sections of the cribwork eventually were deflected outward, and in some cases failed under the weight. Irons spikes, and later tie rods, were added to reinforce the cribbing. The foundation cribs showed signs of failure in 1898, and several repair cribs were sunk during the following ten years. Extensive riprapping to support the lake face was initiated in 1912.

Concrete superstructure was first employed on the breakwater in 1901. In 1925, approximately 100 linear feet of old stone superstructure was removed, pre-cast concrete set in place and timbers renewed on the lake face. Extensive repairs were made to the cribs in November 1934, and again in September 1936. At that time a contract with John Forward & Company of Medford, Massachusetts resulted in placing new capstone, rubble fill, and new timbers on the lakeface. In 1941 under a contract with Champlain Transportation Company of Burlington, 130 feet of core and cap stone were placed. Dating from a 1961 repair, the lakeside of the crib wall is buttressed with stone riprap, sloping from the top of the crib to the lake bottom. The core stone is covered with quarry cut Barre granite armor stone. The historic cribbing is visible on the harbor side.

Modern metal navigational light towers, dating from around 1960, are located at each end of the breakwater around. A submarine cable provides power for the northern tower, and solar charged batteries power the southern light tower. The first light was placed on the breakwater in 1842, a lantern maintained by the steamboat company. Lighthouses were built at each end in 1886 and the old signal lanterns were replaced by beacon lights with a Fresnel lens around a kerosene wick. Automatic lights, eliminating the need for a light tender, did not appear until 1938. In 1874, a prefabricated light-keeper's house was erected on the breakwater north of center, though none of the tenders ever lived there. The house appears in an 1877 birdseye map of Burlington. The house was sold at auction in 1884, and today stands, though somewhat changed, at #24 Blodgett Street in Burlington.

The summary included in the 1890 U.S. Army Chief of Engineers Report to Congress provides a description of the construction, from 1836 through 1890:

This improvement dates from 1836. Modifications of the original plan have been made from time to time so as to afford adequate protection to the increasing commercial and shipping interests of the harbor.... In 1874 a modification was proposed whereby an extension 2,000 linear feet northward was effected; in 1884 an extension to the south was proposed by the officer then in charge; and again in 1886 a plan for further extensions, both to the north and to the south, which outlined the locations, covering considerable of the shore in both directions, was considered by the Board of Engineers and received its authoritative sanction in regard to the distance from shore for the proposed extensions whenever built; and a 200-foot opening recommended at the northern end of the existing structure also received approval....The last modification, made in 1886, provides for further extension of the breakwater, both to the north and to the south, with its gradual withdrawal as it is prolonged into water about 30 feet deep, instead of 38 feet deep, so as to reduce the cost....The total cost expended to date has been $561,340.05.[2]

[2] *Burlington Harbor*, 1890, 1-2.

Statement of Significance

On December 24, 1833 the House of Representatives passed a resolution directing the Secretary of War to prepare a survey and estimates for the erection of breakwaters on Lake Champlain in the harbors of Burlington, Vermont, Port Kent, and Plattsburgh, New York. The purpose was to provide shelter to docks and wharves and protection to lake commerce and US military interests. Three years later, construction commenced in Burlington and Plattsburgh, and by 1854, an approximately 1,000-foot, broad V-shaped breakwater was completed in Burlington. As lake commerce and the row of docks and wharves grew along Burlington's waterfront, so too did the need to lengthen the line of protection. In 1867, the Board of Engineers recommended extending the breakwater 1,500 feet northward. An 831-foot northern extension was built, and 617 feet were added at the south end, making the total length, 2,517 feet at the close of 1874. In 1874, a plan was adopted for a 2,000-foot extension northward, and by 1886, 3,560 feet of the breakwater had been completed. That year a plan was again adopted to extend the breakwater 500 feet northerly and 1,000 feet southerly. By 1899, the breakwater was built to its present configuration of approximately 4,163-feet. The structure is roughly zigzag-shaped with the northernmost 359-foot section separated from the main structure by a 248-foot gap to allow easier navigation. From 1867 to 1961, the breakwater underwent a series of repairs and modifications primarily to the superstructure. Built with stone-filled cribs set on a sand and rubble foundation, the original plans allowed an alternative to replace the timber superstructure (above low water mark) with stone in order to provide more durability. As the original timber superstructure rotted, sections were replaced first with a timber parapet top, and later the repairs were made with more durable and less expensive stone. By 1900 the entire superstructure was stone. In 1901, concrete was introduced for repairs to the superstructure. Ultimately, the concrete cap did not wear well, and it was removed in 1961, replaced again with a stone armor and cap superstructure. Today, the Burlington breakwater serves as a significant example of 19th century timber-cribbed breakwater construction, qualifying the property for National Register listing under Criteria C. The chronology of its construction correlates with the lake-related commercial growth along Burlington's waterfront, qualifying the property for National Register listing under Criteria A.

On February 26, 1834, Lewis Cass, Secretary of War, presented to the 23rd Congress a report and estimates prepared by the Topographical Bureau for the improvement of Burlington, Port Kent, and Plattsburgh bays on Lake Champlain. The estimate for a 1,000-foot Burlington breakwater was $28,727.18; for a 675-foot Port Kent breakwater, $43,876.27; and for a 1,000-foot Plattsburgh breakwater, $24,003.16.[1] Three years later, construction commenced in Burlington and Plattsburgh, but the Port Kent breakwater was stricken from the 1836 Harbor Bill despite intense lobbying from Port Kent entrepreneurs.[2] Ultimately, Lake Champlain would have five federal breakwaters: 1) Burlington; 2) Plattsburgh; 3) Swanton, Vermont (309 feet of the proposed 1900-foot breakwater were built); 4) Rouses Point, New York; and 5) Gordon Landing, Grand Isle, Vermont. The Burlington, Plattsburgh, and Swanton breakwaters were timber-cribbed construction. The Rouses Point and Gordon Landing structures, being in shallower water, were stone mound. All of the breakwaters are extant, though the Swanton structure is totally submerged and non-functional.

Safety and economic considerations were the primary rationales for the breakwaters. Another interest was a strategic military consideration. An excerpt from an 1845 Topographical Bureau Board of Engineers' report to Congress states that "upon this lake we are engaged in the construction of two breakwaters – one at Plattsburg [sic], the other at Burlington both essential to secure a landing at these places. And as these towns are both of them important points, in any views of military operations on that frontier, the necessity of having secure landing places there is too apparent to need further remark."[3] To put the military consideration in an historic context, the United States had been at peace with England for only twenty-eight years. Trade issues remained with Canada. A year earlier, in 1844, work began on Fort Montgomery, near the New York - Canadian border. Lake Champlain had long been recognized as a critical north-south strategic corridor, its significance well understood from the Revolutionary War and War of 1812.

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[1] Congress, Harbors-Plattsburg, Port Kent, Burlington Bay, Letter from the Secretary of War, 23rd Cong., 1st sess., 1833-4, HR Doc. 131.

[2] Congress, New York – Breakwater, Port Kent, Memorial of Inhabitants of the Northern Section of New York for a Breakwater at Port Kent, NY, 24th Cong., 2nd Sess., 1836, HR Doc. 44.

[3] Ibid., and *Burlington Harbor, VT 1834-193-*, unpublished compilation of record transcripts, U.S. Army Corps of Engineers Albany Station, Troy, NY, "House Doc. No. 2 – 29th congress, 1st session, Report of the chief topographical engineer (Report No. 7) Bureau of Topographical Engineers, November 6, 1845," Burl. H. 1845 #1.

With waterways the major transportation route, safeguarding Lake Champlain was critical to US security.

Brigade Major and Topographical Engineer, Hartman Bache, prepared the first survey report and estimates for constructing the Burlington breakwater:

> "Philadelphia, February 7, 1834.
>
> BURLINGTON BAY, VERMONT-- This bay is situated upon the eastern shore of Lake Champlain, about mid-way of its greatest length, and where it expands to a width of nearly ten miles. It may be said to be comprised within a line drawn from Potter's [Shelburne] Point to Appletree Point, distance about four miles, having a maximum depth of two miles. These limits include the subordinate waters of Shelburne Bay and the cove lying between Sharp Shin and Appletree Points. The formation of the bottom is singularly uniform until at the distance of about a mile, it attains a depth of nearly 100 feet....
>
> Protection is already afforded upon the land side against all winds from the NW round by the east to the SW, leaving the quadrant to the west (more properly from N.51°-30'W. to S 40°-30'W. or 85°) open to the full sweep of the lake; to provide against the effects of which, is the object of the proposed breakwater.
>
> At present, the commerce of the place is put to considerable hazard in consequence of exposure in this direction. Instances frequently occur, in which vessels unable to beat out, in order to seek other grounds for safety, have been either sunk at their anchors or the wharf, or been stranded on the beach. As a place to winter, or for the construction and repair of vessels, this bay, in its present condition, is entirely ineligible."[4]

Major Bache's report provided safety and economic considerations, in particular noting the "increased importance [Burlington] is likely to attain, by the prosecution of the railroad from Boston to Ogdensburg, N.Y., which contemplates taking Burlington in the route."[5] The plan proposed a breakwater 1000 feet in length, with the south wing 555 feet long, the north wing 435

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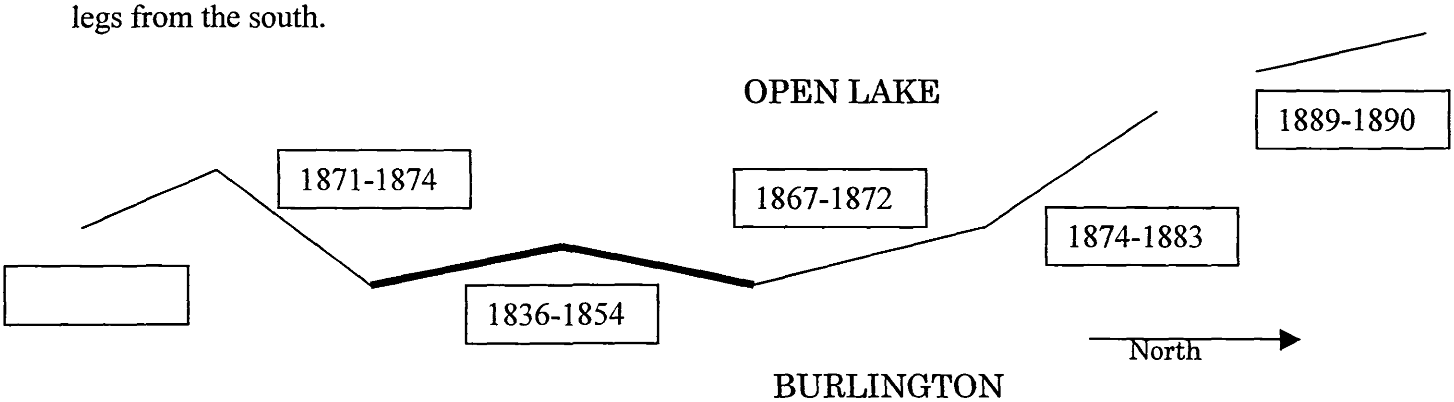
[4] *Burlington Harbor, VT: 1834-193-*, a compilation of annual reports to Congress, Army Corps of Engineers Albany Station, Troy, NY, 1834, 3.

[5] Ibid.

to 445 feet long, 48 feet wide, and 32 feet high, located in about 24 feet of water, 450 feet in advance of the wharves. The plan called for a structure built of round and squared hemlock from the base to within seven feet from top, the upper seven feet built of round and squared white pine; which, at that time, cost twice as much as the hemlock. The crib floors were to be built of round hemlock, with stone used for ballast. "The surface of the work exposed to the lake is proposed to be vertical, as best suited to resist the action of the swell."[6]

> "White pine is proposed for all the structure, upward, from one foot below the lowest water of the lake, as more durable when exposed to the alternate action of the water and the atmosphere. Squared timber is recommended for the facing of the work from the top to three feet below the same line, as affording a better surface for the action of the sea. All the timber, whether round or square, to be of not less than one foot. Should it be deemed desirable to render these works more permanent, a stone superstructure may be substituted, upon the decay of the woodwork above the low water line. Upon the other hand, should they prove in any instance injurious to the navigation, they may be raised in parts without any serious expense or difficulty, by removing a portion of the stone."[7]

A series of three appropriations, July 4, 1836 for $10,000; March 3, 1837 for $10,000; and July 7, 1838 for $50,000 were approved to build the 1000-foot breakwater. This broad-V-shaped original section of breakwater is south of center, comprising what are now the third and fourth legs from the south.



[6] Ibid., 1834, 2-4.
[7] Congress, Harbors-Plattsburg, Port Kent, Burlington Bay, HR Doc. 131.

An 1837 Topographical Bureau report states that "...work is progressing with commendable rapidity; two large cribs, each one hundred feet long having been sunk and secured."[8] In 1838 two additional 100-foot piers were sunk on either side; the 1837 piers were filled with stone and covered with three-inch plank on the lake face. Simultaneously, across the lake in New York, the Plattsburgh breakwater had approximately 620 feet of crib-work in place by 1838, finished to the high water mark and filled with stone. "As soon as the ice has formed of sufficient strength, it is contemplated to finish that part of the work of those piers which lie above high-water mark."[9]

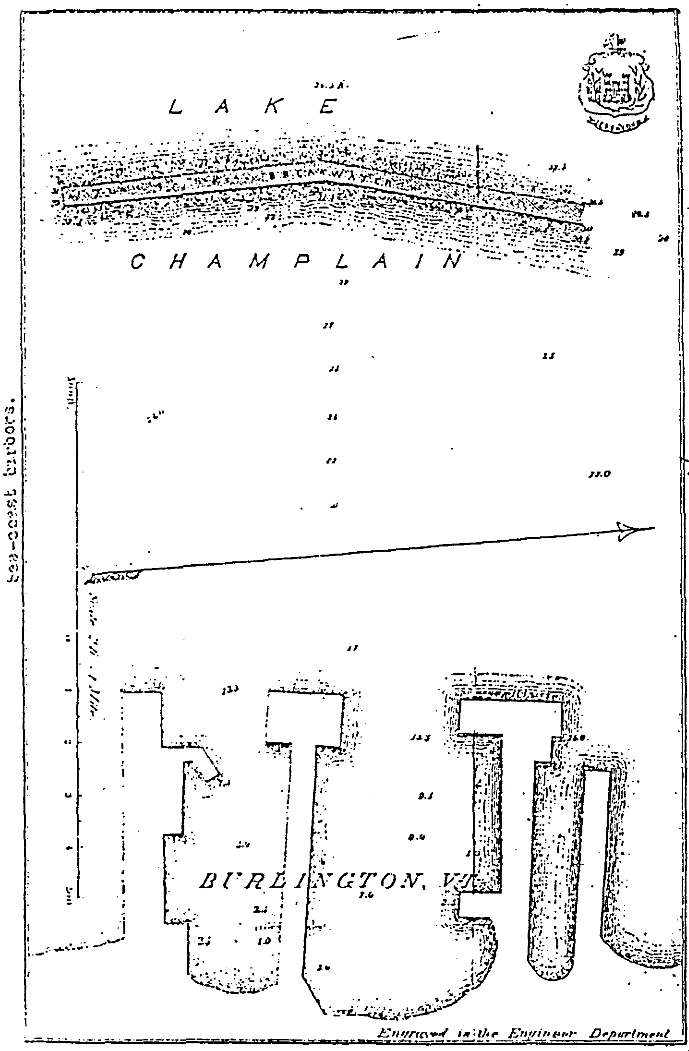
Annually throughout the project, the Chief Topographical Engineer submitted to Congress a status report, budget and proposal for appropriations for the following year. Those reports, which are on file at the Army Corps of Engineers Albany Field Office, are an extraordinary record of construction and repairs for the individual Lake Champlain breakwaters. They served as a way for Corps site engineers to learn about, compare, test and report back findings related to new designs and building techniques. In the case of Burlington, they also provide insight into harbor commerce and development, often including data from the customs office. The Report of the Bureau of Topographical Engineers, dated December 30, 1839 recorded in Senate Doc. No. 58, and House of Representatives Doc. No. 2, provides additional background about the construction process at the Burlington Breakwater:

> The cribs are made 100 feet long, 50 feet wide at the bottom, and 35 feet wide at the water's surface, having a slope on the interior side of about 65 degrees with the horizon. The exterior side is perpendicular. From the water's surface the work is built up perpendicular, both upon the interior and exterior sides, for an additional height of 8 feet, making a total height of 40 feet from the bottom, presenting an entire vertical wall on the exterior side to resist the force of the waves. By a reference to the report of Major H. Bache, of the Corps of Topographical Engineers, of February 1834, I find this plan of presenting a vertical wall, to resist the action of the waves, particularly recommended. It has so far proved advantageous as regards this work, no part of it having yet suffered injury from the force of the waves during the heavy gales of wind."[10]

[8] *Burlington Harbor*, 1837, 4.
[9] Ibid., 1838, 2.
[10] Ibid., 1839, 1.

By 1842, 600 feet of the Burlington breakwater were finished and an additional 100 feet were built nearly to water level but left unfinished for lack of funds. As a result several vessels ran on the partially submerged structure. In 1844, the total amount appropriated was $80,000, and the extent of work completed was 900 feet. Ten years later, the breakwater stretched 1069 feet, marking the completion of the first phase of the project.

Burl. H. 1865 #4



House Executive Documents, 1st Sess., 39th Cong., 1865-66, vol.3, Doc.59: Lake and Sea-coast Harbors.

In the decade leading to and including the Civil War, little or no funds were appropriated for repairs or expansion despite repeated recommendations to extend the structure northward and raise it by four feet. The 1861 Topographical Engineer's report noted that the breakwater was completely submerged in April, and timbers above the low water mark of the original construction were rotted, needing to be replaced. The message was repeated in subsequent years, but it was not until 1867 that the second wave of expansion and appropriations for repairs began. That year, the Board of Engineers adopted plans to extend the breakwater to the north approximately 1500 feet using cribs ranging from approximately 80-100 feet long by 30 feet wide. As before, the plans called for the lower twenty feet of the cribbing to be of hemlock, with the upper portion, including superstructure, to be built of pine timbers, with stone ballast.[11]

This expansion coincided with a boom at Burlington's commercial waterfront. Lake Champlain was a major commercial artery, and Burlington a primary port, bolstered by the completion of the Champlain Canal in 1823, opening the lake to New York and the eastern seaboard markets. In 1843, the completion of the twelve-mile Chambly Canal around the Richelieu River rapids between St. Jean and Chambly reaped additional economic benefit. With railroad service established in 1849, Burlington was poised to become one of the largest inland shipping ports in the country, particularly after the signing of trade agreements in the mid-1850s, which permitted American entrepreneurs to import large quantities of plentiful and inexpensive Canadian timber. In 1854, the Chief of Engineers reported that "it is supposed that when the treaty of reciprocity between the United States and the British provinces goes into effect the commerce of this district will quadruple within eighteen months."[12]

"The Champlain Valley, formerly an exporter of timber to Canada and New York City, now became an entrepôt where Canadian wood was cut, planed, stored and re-shipped to markets throughout the United States. Burlington served as the main processing center for imported timber...."[13] "By 1868 thirty acres around the [Burlington] wharves were stacked with lumber brought there by some 400 vessels.... At the height of the boom 1,021 steamers, ships, and canal

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[11] Ibid., 1866-1867, 1.

[12] Ibid. 1854, 2.

[13] Crisman, Kevin, "Lake Champlain Commercial Navigation," Draft National Register Nomination, 1990, 18.

boats...were registered in the Champlain district.... In the vintage year of 1873 when it was the third largest lumber port in the United States, Burlington received 170 million board feet."[14] The port bustled with the transfer of goods between boat, factory and rail. Wharf building extended to the south, and so too did the need for extending the breakwater southward to expand the line of protection. By 1871, 669 feet of the recommended 1500-foot northern extension remained to be constructed, however, the wharves developed so far southward that the call to extend the breakwater in that direction became more urgent than proceeding with the northern extension.[15]

At one time there was a small stone house located at the south end of the original breakwater, pictured as a three-story building in an 1880s Birdseye view of Burlington. An 1896 map refers to the structure as the "Stone House."[16] A 1905 map identifies it as a "Storehouse."[17] At that time, the building was used to store oil and supplies for the lamp. Electrical and battery powered towers on concrete pads at either end of the breakwater now serve as navigation lights. At the end of World War II the City of Burlington built a peace fountain on the breakwater across from Battery Park. The fountain was a jet of water powered by an electric pump housed in a corrugated metal building south of the fountain. The fountain and pump house were removed in 1961 for repairs.

The *1871 Report of Operations on the Improvement of Burlington Harbor, Vermont* provides interesting insight into the process for securing bids and carrying out seasonal construction projects. On August 18, 1870, advertisements were issued for proposals to extend the breakwater in a northerly direction for a distance of 175 feet. Less than a month later, on September 5 at 12 o'clock noon, bids were opened. Luther Whitney was awarded the contract. Three months later, the work was completed. "The extension is in two cribs, one 80 feet in length and one 91

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[14] Ralph Nading Hill, Lake Champlain: Key to Liberty, with epilogue by Arthur Cohn (Woodstock, VT: The Countryman Press, 1995), 233-4.

[15] *Burlington Harbor*, 1870, 1-2 and 1871, 2.

[16] Map traced from a litho-tracing made under direction of Capt. Smith S. Leach, Corps of Engineers, by F. M. Barston, Ass't Eng'r. dated 1896. Map No. 2/605 N.Y. File No. 29/1588. Albany Field Office.

[17] *Breakwater At Burlington Harbor, Vermont*, To Accompany Project Submitted April 29, 1905 For Application of Appropriation Made by Act of March 3, 1905. Albany Field Office.

feet in length, each 30 feet in width; these cribs were both completed, sunk, and filled with stone by December 31, 1870; the work on the superstructure is to be completed during the present season."[18] Luther Whitney had previously provided stone for the breakwater, but the 1870 contract marks the beginning of nearly two decades that Whitney served as the primary contractor for breakwater construction—by far the longest tenure of any the breakwater's contractors. During his time, the Keeseville, New York contractor built the two southernmost and much of the northernmost leg of the main section of the breakwater.

On August 12, 1887, Whitney entered into a contract to build a 240-foot extension at the southern end of the breakwater. The contract recorded in the Bureau of Engineers' records, along with 1887 records from the Clark Quarry in Willsboro, New York, provide insight into material, tools, and labor costs, as well as construction methods. According to the annual Bureau of Engineers report, work was commenced August 22, and there were 2,449 cubic yards of rubble-stone placed in the foundation before the close of navigation. At the close of 1888, 4,209 cubic yards had been placed in the foundation making it high enough to receive the cribs.[19] Ledger records from the Clark quarry in Willsboro, New York indicate that G. A. Clark played a supervisory role on site in Burlington. Clark's personal ledgers itemize money (cash and check) received and paid out on behalf of Whitney. Pay out in August/September 1888 includes $8.50 for men to unlode [sic] timber; $1 to hire a boat; crobars [sic] $1.74; axes $1.40; handles $.50; pail and differs $.80; hinges, lock and nails $1.42; telegram $.25; $20 board for G. A. Clark; plus $335.12 for men for August. That month Mr. Clark received $16.60, G. J. Hagar-$18.08, G. Towle $1.34, and E. H. Wilders received $5.[20] Stone samples from the breakwater include dark blue limestone, unique to the western shore of Lake Champlain, undoubtedly from the Clark quarry.[21] The stone and cribwork are tangible evidence of this well-documented phase of the breakwater's construction.

A tunnel-like void in the second leg (from the south) cribbing bears some discussion within the historic context. This section of the breakwater was built in the 1870s. There is no known

[18] *Burlington Harbor*, 1871, 1-2.
[19] Ibid., 1888, 3; 1889, 2.
[20] Records from Clark Quarry, Willsboro, NY; Private collection.
[21] John Cleary, Interview by author, 30 September 1999, Richmond, VT.

historical rationale for why the wall might have contained a tunnel. Archival and physical examination suggest that the 8-foot wide void is unintentional and appears to have been caused from collapsed sidewalls of the crib-work.[22] No where else along the wall is there anywhere near the size gap as the 8-foot section. One explanation for the gap may be the storm of 1876: "During the month of February, 1876, 220 feet of the southern end of the breakwater was materially injured by a succession of ice-floes coming in contact with it during the prevalence of a terrific northwesterly storm. This section, consisting of two cribs, each 110 feet in length, was sundered from the main body of the work, in a southerly direction, leaving a clean gap between the two of 26 feet; the structure is somewhat distorted, stands about 15 inches out of vertical, with its top or surface about 4 feet below its original level."[23] The 26-foot gap was repaired in 1877, though the coincidence of location suggests a possible relation.

A dramatic breakwater story, also storm-related, took place the same year, on December 9, 1876. That day, the 88-foot sailing canal schooner *General Butler* was making its way to Burlington Marble Company carrying thirty-one tons of Isle La Motte marble when it encountered a northern gale. Just off the breakwater, the storm proved to be too much for the aging boat, crippling its steering mechanism and leaving the vessel to drift at the mercy of the winds and rain.[24] Despite the Captain's attempt to rig a spare tiller bar onto the ship's steering gear, the vessel ran onto the southern end of the breakwater. There were five people aboard. Each time the vessel lifted on top of the breakwater, one of the people would make the eighteen-foot jump to the ice-covered wall.[25]

On shore, James Wakefield, a Burlington ship chandler, watched the drama unfold and knew that something had to be done. With his young son, Wakefield commandeered a 14-foot Burlington Lighthouse rowboat to the breakwater. They quickly moved the freezing people into the boat and pulled them to the harbor where they were taken to the warm offices of a doctor who shortly

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[22] Art Cohn, preliminary findings as result of underwater examination August 1999.
[23] *Burlington Harbor*, 1876, 1.
[24] Daily Free Press and Times, Morning edition. 11 December 1876.
[25] R. Montgomery Fischer, ed., A Report on the Nautical Archeology of Lake Champlain, with contributions by: Jack Chase, Arthur B. Cohn, and Kevin Crisman (Burlington, VT: The Champlain Maritime Society, 1985), 21.

pronounced them all out of danger.[26] One of the passengers on board, Elisha Goodsell, was the operator of the Goodsell stone quarry on Isle La Motte. Also on board were the teenage daughter of the captain and her friend, making their way to Burlington for Christmas shopping.[27] According to the newspaper account, the daughter was not swayed by the event. As soon as she recovered, she asked when the boat could be raised for her return voyage home.

The *General Butler* was never raised, and the shipwreck is now a popular dive site, part of the Lake Champlain Underwater Historic Preserve and listed in the National Register of Historic Places (listed October 22, 1998). An interesting sidebar: Captain William Montgomery's oldest son, also William Montgomery, followed in his father's footsteps in the lake trade. His diary notes that in 1895 he worked out of Isle La Motte aboard the schooner *J. P. Howard* hauling stone in the summer for the expansion of the Burlington breakwater.[28]

By 1883, the total expenditure for the breakwater was $452,030 with 3,271 linear feet of breakwater constructed. That year $50,000 was requested for repairs and extension of the wall. The report indicated that the superstructure of about 1,000 linear feet immediately south of the light-keeper's house was much decayed and would require repairs at an early date. Before the repairs could be carried out, a gale severely damaged this section. In planning the repairs, a new design was introduced with a timber superstructure only six feet above low water mark (the original was eight feet), and a ten-foot-wide, ten-foot-high parapet facing the lake. In 1885 the repairs were carried out using the modified superstructure design.

Maritime importation peaked in Burlington in the 1880s. Reports from the Collector of Customs indicate that during 1883, 778 steamers with 363,783 tonnage, and 362 sailing vessels with 54,300 tonnage arrived at Burlington harbor. Value of imports was $1,140,300 and included coal, lumber, timber, and general merchandise.[29] By 1885, customs records count 989 steamers,

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[26] Ibid., 21-2.

[27] Arthur Cohn and Marshall True, "The Wreck of the *General Butler* and the Mystery of Lake Champlain's Sailing Canal boats," Vermont History 60 (Winter 1992) : 29-30.

[28] Diary of William Montgomery of Isle La Motte, 1895. Private family collection. Cohn and True, 41.

[29] *Burlington Harbor,* 1883.

36 sailing vessels, and 182 tow (barges) arriving at the harbor with a total tonnage of 444,506 valued at $463,161. And in 1890, the total number of vessels in foreign trade dropped to 180 with a total value of imports, $426,953. Where lumber had been the chief import product over the past half century, customs record indicate that coal was the major product at the end of the nineteenth century. In 1891 28,058 tons of lumber valued at $221,029 were imported, compared to coal imports, which totaled 109,800 tons valued at $630,859. Despite the apparent decline in foreign trade, traffic at the Burlington harbor remained high. In 1895, 2,167 vessels arrived at Burlington from other lake ports; from Canadian ports there were 118 vessels. That year merchandise received included general merchandise ($1,250,000), coal ($305,473), lumber ($240,671), stone ($20,360), pickets ($12,665), and hay ($7,200), with lesser amounts of lath, iron pipes, beans, and gravel; though, the principal item of commerce was passenger traffic. In 1905, Champlain Transportation Company operated three steamers, the largest being 273 feet in length and 68 feet beam, making 405 trips, and carrying 107,538 passengers to or from the port of Burlington.[30] The population of Burlington at the time was around 40,000 people. As passenger traffic remained stable through the early 20th century, merchandise commerce dropped dramatically, primarily due to railroad competition. In comparison to 1885's total tonnage of 444,506, in 1912, the total tonnage of the harbor was 65,381, and by 1914, it was 20,279 short tons.[31]

Throughout the late 1880s and 1890s, appropriations, as they became available, were directed toward repairing the aging superstructure and extending of the line of protection northward and southward to keep pace with the expanding line of docks and wharves. On April 29, 1886, M. B. Adams, Major of Engineers, prepared a report calculating the most economical proportion and depth of foundations. This report had a tremendous effect on the appearance and orientation of the breakwater. The design modification was said to lessen "the cost of such work... is of easy and general applications, [and] absolutely unique in its deduction and applications...."[32] The report was deemed of such importance, that it was included in its entirety in the Topographical Bureau Burlington breakwater 1887 report. As Major Adams' modifications were incorporated,

[30] Ibid., 1906, 3.
[31] Ibid., 1915, 4.
[32] Ibid., 1887, 2.

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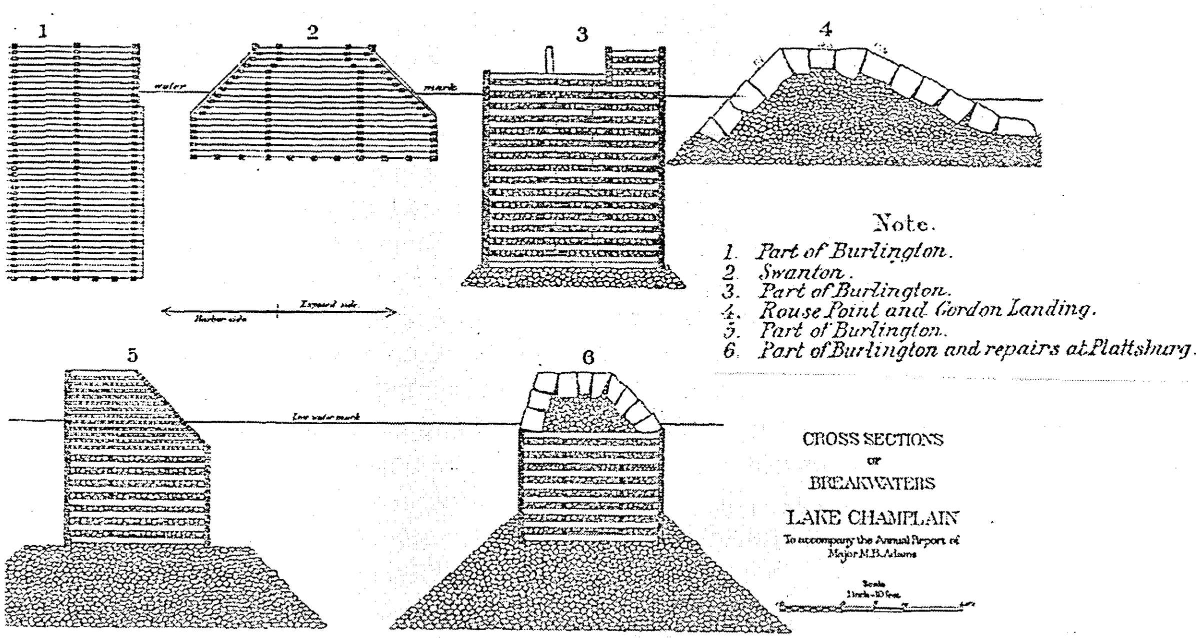
NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

the southernmost leg of the breakwater angled substantially closer into the shore, "prolonged into water about 30 feet deep instead of 38, to reduce the cost of the work."[33]

In 1891, the Chief of Engineers recommended establishing a commission on harbor line, to limit the extensions of docks and wharves out into the harbor, in order to prevent restrictions of the harbor capacity, particularly in consideration of the breakwater being only 1,000 feet from shore. That year's report also described a new method developed by Major M. B. Adams for building a superstructure of all stone, rather than stone and timber as in previous years. The reason was to alleviate the high maintenance associated with rot, just as Major Bache had suggested in the 1834 survey and estimate. Appended to Major Adams' report was a chart of Lake Champlain breakwaters' cross-sections to illustrate the development of the newly approved all-stone superstructure.



[33] Ibid., 1888, 1.

The all-stone superstructure was tested in 1890 on the 360-foot new construction north of the 200-foot opening and also used for repairs at Plattsburgh. Reportedly the method met all expectations and provided a very cheap and durable breakwater resulting in the systematic replacement of the aging timber superstructure by stone.[34] Major Adams' mode of building stone superstructures was commended several years later and a call was made in 1893 for him to develop a comprehensive report for distribution to officers in charge of similar work for further testing on lakes where storm waves are more formidable than on Lake Champlain. The report and responses are included in the 1893 Chief Engineer's report.[35]

Major Adams describes the process for setting the armor and capstones from a derrick scow and partly from a wall derrick running on a track laid on the crown of the completed work. Below the water line, "when a large stone has been selected, dogged, and swung into its position, it is held there by the derrick until sufficient rubblestone has been run down under it, in a wooden trough, and forced home with a strong pole…." Above water, the rubble stone was carefully placed by hand.[36]

By 1896, the breakwater was 4,200 feet in length. Decay of the older parts of the superstructure had made renewal or repair more urgent than the extension, and the systematic replacement of the timber superstructure with a stone parapet was underway. While work progressed on the superstructure, it was found that in some places the outward thrust against the front side of the cribs was greater than the wooden cross-ties would stand. It therefore became necessary to introduce iron tie-rods, to strengthen the crib.[37]

In 1901, another method of superstructure design was introduced when a 140-foot section of the stone and timber superstructure was removed and replaced with a concrete superstructure. The contractor was William James Daly of Odgensburg, New York. The 8-foot tall concrete superstructure was built as a monolithic arch having a rubble core and resting upon concrete footing blocks, which were placed upon a carefully prepared foundation below the water surface.

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[34] Ibid., 1892, 2-3.
[35] Ibid., 1893, 3.
[36] Ibid., 1893, 4-5.
[37] Ibid., 1898, 2.

The cost was about $30 per linear foot. In his report of that year, Colonel J. W. Barlow recommended the reconstruction of the remainder of the superstructure south of the section that had been rebuilt with stone in 1897.

The River and Harbor Act of June 13, 1902, appropriated $57,750 for the repair and maintenance of the Burlington breakwater, which was applied to continuing the crib repair and replacing the wood superstructure with concrete or stone. On March 30, 1903, a contract was entered into with John Cashman, of Quincy or Braintree, Massachusetts to complete the work and to build a boat landing at the north end of the breakwater. In the execution of the superstructure repairs, in 1908, it was discovered that the substructure on the lake face for a distance of 1,165 feet was unstable. A recommendation was made to build a rubble mound extending the full height of the substructure cribs, and on June 25, 1910 the River and Harbor Act, appropriated $52,000 to carry out the repair. In December 1911 a contract was signed with E. C. Sickles for 50,000 short tons rubblestone and 2,000 short tons large stone and for the construction of the rubble mound. Rubble facing would eventually line the full length and height of the lake face.

Diver inspection in 1915 found the stone cribs to be in good condition, nevertheless in 1917 a contract was signed with James Cashman to provide 300 feet of facing, totaling 10,650 tons of rubblestone for the lake face of the northern section. While the entire lake face was rip-rapped, the cribbing was left exposed on the harbor face.

In 1925, under a contract with Louis J. Seeling of Red Bank, New Jersey, approximately 100 linear feet of old stone superstructure were removed and pre-cast concrete was set in place and timbers on the lake face renewed. Repairs to the cribs and placing new stone were carried out by U. S. forces rather than through hired labor in November 1934. A contract with John Forward & Company of Medford, Massachusetts signed in December 1935 resulted in the placing of new capstone, fill with rubble stone and new timbers on the lake face. Another contract was signed in August 1939 with the same contractor, for the repair of 70 linear feet of stone protection mound and 200 linear feet of capstone. Stone was obtained from Isle La Motte.[38]

[38] Ambrose F. Brennan, Engineer in Charge, Albany Suboffice, to District Engineer, New York District, New York, NY, 1 March 1954. Army Corps of Engineers, Albany Office.

In 1941 repairs were again carried out, this time under a contract with the Champlain Transportation Company of Burlington, to place 130 linear feet of core and capstones.[39] Stone was furnished from quarries at Barre, Vermont, and shipped to Burlington by rail. The specifications for repair included hourly wage rates for laborers:[40]

Blacksmith	$1.00
Blacksmith's helper	.60
Blaster	.85
Diver	15.00 per day
Diver (standing by)	12.00 per day
Diver's tender	1.00
Dockbuilders	1.00
Launchman	.75
Derrick operator	1.25
Fireman	.75
Scowman	.50
Shoreman	.50
Truck driver	.50

Following the 1941 repairs, there would be no further maintenance of the breakwater over the next twenty years despite increased deterioration due to displacement from failure of the crib system. In 1951, a memorandum from Marson Construction Company, Somerville, Massachusetts, to Mr. J. P. Groenendyke, Chief, Operations Division, notes the failure of the cribbing in several locations, which in turn displaced the concrete and stone superstructure. In 1958, a section of concrete superstructure collapsed leaving an 80-foot breach between Stations 24+0 and 24+80. An assessment report submitted by Remo Lusarti, Assistant Engineer in Charge, indicated that deterioration of the concrete and displacement of the blocks, particularly

[39] Ambrose F. Brennan, Engineer in Charge, Albany Suboffice, to Don O'Brien, Burlington, 7 August 1958. Army Corps of Engineers, Albany office.

[40] "Repairs toe Breakwater: Burlington Harbor, Vermont Specifications," U.S. Engineering Office, NY District, NY, 1941.

at the north end of the southern arm, appeared to have increased considerably.[41] An inspection by J. Gelberman, Assistant Chief, Operations Division noted that the leaning of the concrete superstructure was due to deterioration of the top courses of the wood cribbing. Diver inspection revealed that while the crib timbers were generally in excellent shape, the fastenings had deteriorated causing localized collapse of the concrete superstructure.[42]

Ten years later an approximately $2 million repair was initiated. The 1961 rehabilitation included rebuilding the entire superstructure of the breakwater to its original height of eight feet above low lake level. Deteriorated sections of the cribbing were reinforced along the entire lakeface using a mound of cover and core stone founded on a layer of bedding stone to buttress the structure. Six ton granite cover stones were placed from the cap to well below the water surface, to assure little movement of the core stone.

The 1961 rehabilitation resulted in the gray stone appearance of the breakwater superstructure that remains today. The substructure, which is a tangible, intact record of crib construction, is totally covered with riprap on the lake side, but exposed on the harbor side. The massive hemlock and white pine timbers are well preserved in Lake Champlain's cold fresh waters. While there is little commercial activity on the lake, Burlington Harbor and Shelburne Bay are a Mecca for recreational boaters and home of the Lake Champlain Transportation Company and the U. S. Coast Guard. As Burlington seeks to revitalize its waterfront for public use, the breakwater continues to serve its original function...to protect the waterfront's commercial (though no longer directly lake-based) prosperity and assure public safety.

[41] Remo J. Lusardi, Assistant Engineer in Charge, Albany Suboffice, "Burlington Breakwater" 4 November 1959. Army Corps of Engineers, Albany Office.

[42] J. Gelberman, Assistant Chief, Operations Division :Inspection of Burlington Harbor Breakwater – Meeting with Mayor Fitzpatrick" 2 November 1959. Army Corps of Engineers, Albany Office.

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Verbal Boundary Description

The bounds of the Burlington Breakwater are defined by the centerline of the roughly zigzag 4,157-foot breakwater, extending 50 feet on either side and at either end of the structure. The Breakwater is clearly shown on the USGS map.

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

The boundary includes the breakwater and twenty feet to either side. The boundary is sufficient to convey the significance of the property.