

GREAT SALT POND

BLOCK ISLAND

RHODE ISLAND

SURVEY

(REVIEW OF REPORTS)



CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

MARCH 30, 1951

Approved & filed by 13d Engineer (1st Regt) dated 30 Mar 1951 800.92 (Block Island Great Salt Pond, R.I.) - 9



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON

IN REPLY REFER TO: ENGWID

6 December 1951

SUBJECT: Review of Reports on Great Salt Pond, Block Island,
Rhode Island

TO: The Division Engineer
New England Division
Corps of Engineers
BOSTON, MASSACHUSETTS

1. There are herewith for your information and files copies of the report of the Board of Engineers for Rivers and Harbors, 30 October 1951, and the proposed report of the Chief of Engineers, on a review of reports on Great Salt Pond, Block Island, Rhode Island. A copy of letter of this date furnishing a copy of the report to Mr. Philip Mancini, Director, Department of Public Works, State House, Providence, Rhode Island, in accordance with the provisions of Section 1 of Public Law 14, 79th Congress, is inclosed.

2. When the report is transmitted to Congress by the Secretary of the Army, with the views of the State of Rhode Island, and the comments of the Bureau of the Budget as to the relationship of the report to the program of the President, a copy of the transmittal letter will be furnished your office.

BY ORDER OF THE CHIEF OF ENGINEERS:

3 Incls (dup)
1 Cy rept R&H Bd
2 Cy rept CofEngrs
3 Cy ltr OCE to State
of R.I. 6 Dec 51

W. D. MILNE
Colonel, Corps of Engineers
Deputy Chief of Civil Works
for Rivers and Harbors

U S ENG OFFICE
NEW ENGLAND DIV.
800.92 (BLOCK ISLAND)*GREAT SALT POND, R.I.)-16
DEC 7 11 50 AM '51
BOSTON, MASS.



CORPS OF ENGINEERS, U. S. ARMY
BOARD OF ENGINEERS FOR RIVERS AND HARBORS
WASHINGTON 25, D.C.

ENGBR

30 October 1951.

827(Great Salt Pond, Block Island, R. I.)

Subject: Great Salt Pond, Block Island, Rhode Island.

To: The Chief of Engineers, U. S. Army.

1. This report is submitted in response to the following resolution adopted 4 March 1947:

Resolved by the Committee on Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved 13 June 1902, be, and is hereby, requested to review the reports on Great Salt Pond, Block Island, Rhode Island, submitted in House Document Numbered 330, Seventy-seventh Congress, First Session, and previous reports, with a view of determining if the existing project should be modified in any way at this time.

2. Block Island, with an area of 11 square miles, lies 12 miles off the southern coast of Rhode Island and 15 miles northeast of the eastern extremity of Long Island. There are two artificial harbors on Block Island. One, known as "Harbor of Refuge" or "Old Harbor", on the east side, was created by construction of breakwaters; and the other, Great Salt Pond on the west side, was created by cutting an entrance channel through the barrier beach into Great Salt Pond, a landlocked body of water with an area of 700 acres and depths ranging up to 50 feet. The mean tidal range is 2.6 feet. The existing Federal project for Great Salt Pond provides for a channel from Block Island Sound to Great Salt Pond, 600 feet wide and 25 feet deep in the central 150 feet, sloping gradually to a depth of 12 feet in a width of 504 feet, thence with a 1 on 4 bottom slope up to the high-water mark; two riprap jetties at the entrance, the northerly one 1,200 feet long and the southerly one 1,691 feet long, constructed to a project height of 8 feet above mean low water; stone revetments and sand fences to protect the banks through the original beach; an entrance channel 100 feet wide and 12 feet deep from Great Salt Pond into Trim Pond and a basin of about 1.4 acres in Trim Pond with the same depth. The north jetty has not been constructed and its elimination from the project was recommended by the Chief of Engineers on 24 June 1926. The project is about 33 percent complete. The controlling depth in the central 150-foot zone of the entrance channel was 17 feet in August 1950. Project costs to 30 March 1951, were \$189,037 for new work and \$87,496 for maintenance, a total of \$276,533. The estimated cost of annual maintenance is \$3,000. Local interests, including the State of Rhode Island, have expended \$200,800 for improvement of Great Salt, Trim, and Harbor Ponds.

3. Block Island had a permanent population of 706 in 1950, principally centered around Harbor of Refuge. The summer population is augmented by several thousand vacationists. The permanent inhabitants are

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ENGBR

827(Great Salt Pond, Block Island, R. I.)

Subject: Great Salt Pond, Block Island, Rhode Island.

principally engaged in activities pertaining to fishing and catering to summer visitors. Great Salt Pond, with the only yacht facilities on the island, is the principal haven for transient recreational craft. Ten fishing boats are based in Great Salt Pond and about 60 other boats use the harbor during the spring and fall fishing seasons. Many transient recreational and fishing craft use the harbor for refuge and overnight stops. The island is served by boat service from the mainland. Terminal and transfer facilities in the Great Salt Pond consist of three privately owned wharves open to all, one shipyard with two marine railways, and the United States Coast Guard Station. Two deteriorated marginal wharves are located in Trim Pond. Space is available for additional terminals. Commerce of Great Salt Pond during the 10-year period 1940 through 1949 ranged from a minimum of 869 tons in 1947 to a maximum of 9,579 tons in 1948, and averaged 3,605 tons annually. Traffic during 1949 consisted of 7,531 tons of freight, exclusive of 895 automobiles accompanying passengers. The principal items of freight were 1,281 tons of fish, 479 tons of coal, and 5,735 tons of miscellaneous commodities. Vessel traffic exclusive of recreational craft during 1949 included 316 round trips by craft with drafts ranging from 10 to 13 feet and 2,506 by craft drawing less than 10 feet, a total of 2,822 round trips.

4. Local interests desire relief from the difficulties arising from shoaling of the entrance channel. They state that sand, moving around or over the south jetty and trapped by the Coast Guard launchways, has reduced the width of usable channel to less than 100 feet. This shoaling causes numerous groundings of vessels, prevents proper access during storms, and impairs effective operation of the Coast Guard Station.

5. The division engineer finds that shoaling occurs on the south side of the entrance channel, adjacent to the Coast Guard Station and opposite the outer end of the jetty, due to sand moving over, around, and through the south jetty. The shoaling encroaches upon the launchways at the Coast Guard Station and necessitates frequent removal of the sand from the rails. The most suitable method for reducing shoaling in the channel is by constructing a groin about 500 feet long and 12 feet above mean low water, located about 1,000 feet south of the south jetty. The division engineer estimates the cost of construction at \$85,000 and the annual carrying charges at \$4,600, including \$200 for maintenance. The proposed groin would eliminate part of the shoaling which now occurs in the entrance channel. He estimates the benefits at \$2,300 from reduced cost of maintenance dredging. The benefit-cost ratio is 0.5. Drafts of vessels using Great Salt Pond during the last 10 years have not exceeded 13 feet. Maintenance of the entrance channel to a depth of 18 feet at mean low water would therefore be ample for existing and prospective traffic. Records indicate that it would be necessary to remove 8,300 cubic yards of material annually in order to adequately maintain the entrance channel. The cost of removal by hopper dredge is estimated at \$4,200 which is less than the estimated annual charge for the considered groin. The division engineer concludes that continued maintenance of the entrance channel into Great Salt Pond to a depth of 18 feet at mean low water is justified and can be accomplished under existing authorization, but construction of additional permanent works to prevent shoaling is not warranted. He recommends that no modification be made to the existing project at this time.

ENGBR

827(Great Salt Pond, Block Island, R. I.)

Subject: Great Salt Pond, Block Island, Rhode Island.

6. Local interests were informed of the nature of the report of the division engineer and were invited to submit additional information to the Board. No communications have been received.

Views and Recommendations of the Board of Engineers for Rivers and Harbors.

7. The Board of Engineers for Rivers and Harbors concurs generally in the views and recommendations of the division engineer. The estimated annual charges for necessary permanent works to remedy shoaling in the entrance channel exceed the annual charge for dredging to maintain a suitable channel. Therefore, construction of additional permanent works is not warranted. The Board accordingly reports that modification of the existing project for Great Salt Pond, Block Island, Rhode Island, is not advisable at this time.

For the Board:

G. J. Nold,
Major General,
Chairman.

Inclosures returned, no change.



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON 25, D. C.

ENGWD

Subject: Great Salt Pond, Block Island, Rhode Island

To: THE SECRETARY OF THE ARMY

1. I submit herewith for transmission to Congress the report of the Board of Engineers for Rivers and Harbors in response to resolution of the Committee on Public Works of the United States Senate, adopted 4 March 1947, requesting the Board to review the reports on Great Salt Pond, Block Island, Rhode Island, submitted in House Document Numbered 330, Seventy-seventh Congress, First Session, and previous reports, with a view of determining if the existing project should be modified in any way at this time.
2. The Board reports that modification of the existing project for Great Salt Pond, Block Island, Rhode Island, is not advisable at this time.
3. After due consideration of this report, I concur in the views of the Board.

Lewis A. Pick
Lieutenant General
Chief of Engineers

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TABLE OF CONTENTS

<u>Paragraph No.</u>	<u>Subject</u>	<u>Page No.</u>
	Syllabus	ii
1.	Authority	1
2.	Reports Under Review	1
3.	Description	2
8.	Tributary Area	3
10.	Prior Reports	4
11.	Existing Corps of Engineers Project	6
16.	Local Cooperation on Existing Project	8
17.	Other Improvements	8
18.	Terminal Facilities	9
19.	Improvements Desired	10
20.	Commerce	10
22.	Vessel Traffic	12
23.	Difficulties Attending Navigation	13
24.	Water Power and Other Special Subjects	13
25.	Plan of Improvement	13
26.	Aids to Navigation	14
27.	Shore Line Changes	14
31.	Estimate of First Cost	15
32.	Estimate of Annual Charges	16
33.	Estimate of Benefits	16
36.	Comparison of Benefits and Costs	17
37.	Proposed Local Cooperation	17
38.	Coordination with Other Agencies	17
39.	Discussion	18
46.	Conclusions	20
49.	Recommendations	21

NOT FOR PUBLIC RELEASE

SURVEY
(REVIEW OF REPORTS)

ON

GREAT SALT POND, BLOCK ISLAND, RHODE ISLAND

SYLLABUS

The Division Engineer finds that maintenance of the entrance channel can be accomplished more economically by dredging than by an alternative method of accomplishing maintenance under existing authority by the construction of permanent works as desired by local interests. He recommends that no modification be made to the existing project at this time.

NOT FOR PUBLIC RELEASE

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
P. O. BOX 2316
BOSTON 7, MASS.

30 March 1951

SUBJECT: Survey (Review of Reports) on Great Salt Pond, Block
Island, Rhode Island.

TO: The Chief of Engineers, Department of the Army,
Washington 25, D. C.

AUTHORITY

1. This report is submitted in compliance with the following
resolution adopted March 4, 1947 by the Committee on Public Works of
the United States Senate;

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE
UNITED STATES SENATE, That the Board of Engineers for
Rivers and Harbors, created under Section 3 of the
River and Harbor Act, approved June 13, 1902, be, and
is hereby, requested to review the reports on Great
Salt Pond, Block Island, Rhode Island, submitted in
House Document Numbered 330, Seventy-seventh Congress,
First Session, and previous reports, with a view of
determining if the existing project should be modified
in any way at this time."

A review report of survey scope was authorized March 26, 1947 by the
Chief of Engineers.

REPORTS UNDER REVIEW

2. The report under review, published as House Document No. 330,
77th Congress, 1st session, concerns the development of a channel from
Great Salt Pond into Trim Pond and the development of the latter pond
as an inner harbor. This report was favorable to the modification of
the then existing project for Great Salt Pond to provide for the inner
harbor. Prior reports concerned the development of Great Salt Pond as
a harbor and its connection with the sea. Detailed data on these
reports are given in Paragraph 10.

DESCRIPTION

3. Block Island, 11 square miles in area, lies in an advanced position at sea, about 12 miles off the southerly coast of Rhode Island and 15 miles northeast of Montauk Point, the easterly tip of Long Island. It is fully exposed to all oceanic storms. The nearest mainland harbors are Point Judith, Rhode Island, 13 miles north-northwest; Newport, Rhode Island, 25 miles northeast, and Stonington, Connecticut, 23 miles northwest.

4. There are two harbors on the island neither of which is natural. The first harbor variously called "Harbor of Refuge", "East Harbor", and "Old Harbor" was developed on the east side of the island by breakwater construction as the result of a Federal survey which was made in 1867.

5. The second harbor, located on the west side of the island, is Great Salt Pond which was originally a landlocked body of water and was connected to the sea in 1895 by an artificial channel out through the barrier beach separating it from Block Island Sound. The greatest length of the pond is 1.31 miles and the greatest width is 1.06 miles. The pond covers 700 acres, of which about 500 acres have depths of 3 or more feet, 300 acres have depths of 12 or more feet and 150 acres have depths in excess of 18 feet, with the greatest depth being over 50 feet. Channel depths vary from 12 to 25 feet. Federal improvements, commenced in 1896, comprise the entrance channel and southerly jetty.

6. An artificial channel, excavated between 1900 and 1904, connects Great Salt Pond to Trim Pond which lies to the southeast. Under the modification of 1945, this second pond is designated in the Federal Projects as the "Inner Harbor". At that time, the controlling depth in the channel was 5 to 6 feet and in the basin was 10 to 13 feet for an area of about 2 acres. Trim Pond is connected also by an artificial channel to a third pond, Harbor Pond, which lies to the southeast.

7. A Coast Guard facility is located just inside Great Salt Pond. Several wharves are located on the shores of both ponds. There are no bridges across the harbor or channels. The mean range of tide is 2.6 feet and the spring range is 3.2 feet. The locality is shown on the United States Coast and Geodetic Survey Charts Numbered 276, 1210, and 1211, and on the plan accompanying this report.

TRIBUTARY AREA

8. The town of New Shoreham occupies all of Block Island. Census figures for the period 1920 to 1950 are as follows:

<u>Year</u>	<u>Population</u>
1920	1038
1925	1070
1930	1029
1936	1044
1940	848
1950	706

The decrease in population between 1936 and 1940 is locally attributed in part to fishermen seeking better harbor facilities in other ports. During World War II, the decline continued due to islanders seeking employment in industrial plants on the mainland. During the war, about 400 members of the armed services were quartered on the island. Since the war, former islanders have returned to the island with about 12 new homes being established in 1948. The 1950 census indicates that the prewar population has not been regained. The permanent population is principally centered around the Harbor of Refuge. In addition, there is a summer population of several thousand people. The total real estate valuation in 1948 was \$745,520. The island has a network of 30 miles of improved roads and a permanent registration of about 300 automobiles, with the total number of cars being increased by summer visitors.

9. The principal island industries are fishing and summer visitor entertainment. The major part of the local fishing fleet is based in the Harbor of Refuge with about 10 local boats being based in Great Salt

Pond. Three companies are engaged in buying and selling fish, and one in manufacturing ice for packing fish. Great Salt Pond is the principal haven for transient pleasure craft, with the only yacht facilities on the island being located there. Fishing vessels use the inner harbor for refuge and overnight stops. Summer vacationists are accommodated at 10 hotels of capacities of 125 to 250 guests, numerous lodges at capacities of 15 to 25 guests, and 175 to 200 summer homes. Year round daily transportation of passenger, freight and mail is provided by a motor vessel plying between Point Judith, Rhode Island, and the island. Additional transportation is provided in the summer to Providence, Rhode Island, and New London, Connecticut.

PRIOR REPORTS

10. Great Salt Pond has been the subject of several previous reports. Pertinent data with reference to these reports are embodied in the following tabulations:

<u>Published In</u>	<u>Nature of Report</u>	<u>Work Considered and Estimated Cost</u>
House Ex. Document No. 81, 40th Congress, 2nd Session, 1867	No Recom- mendation	Report considered need of a harbor on Block Island and suggested construction of a breakwater on east side of island as being preferable to dredging channel into Great Salt Pond.
House Document No. 57 54th Congress 1st Session 1895	Favorable	Recommended channel 600 feet wide at mean low water with controlling depth of 25 feet for width of 150 feet thence decreasing to a depth of 12 feet in a width of 504 feet and thence side slopes of 1 on 4 to high water. Also extending the existing south jetty 700 feet to the 18-foot contour at a height of 8.0 feet above mean low water, and constructing a 510-foot north jetty to the 12-foot contour. Estimated cost - \$97,597.94 for new work in addition to \$50,000 available from State and Town.

Published in	Nature of Report	Work Considered and Estimated Cost
Annual Report Chief of Engineers for 1900	Favorable	Modification of project by extending project length of south jetty 350 feet and north jetty 600 feet, with north jetty located 600 feet from south jetty, and by providing stone revetment and sand fences to protect original beach at channel cut. Modification approved June 15, 1900.
House Document No. 60 58th Congress 2nd Session 1903	Favorable	Recommended completion of work in progress, dredging channel to 18-foot depth for width of 300 feet, thence sloping to 12-foot depth and extending the south jetty 230 feet to 21-foot contour, with further work limited to maintenance of project to these limits, which eliminates north jetty and reduces control depth. Work to be accomplished with available funds at estimated cost of \$30,000. Recommendation not adopted.
House Document No. 313 61st Congress 1st Session 1909	Unfavorable	Adverse consideration of project to connect Trim Pond with Great Salt Pond to form Inner Harbor.
House Document No. 21 63rd Congress 1st Session 1913	Unfavorable	Adverse consideration of widening entrance channel to Great Salt Pond to 700 feet and dredging to a depth of 25 feet for a central width of 250 feet.
House Document No. 467 69th Congress 1st Session 1926	Unfavorable	Considered elimination of proposed north jetty.
Unpublished Report by Chief of Engineers June 13, 1932	Unfavorable	Considered improvements other than those authorized by existing project not necessary.
Unpublished Preliminary Exam. and Survey Report Transmitted to Congress March 19, 1936.	Unfavorable	Adverse consideration of dredging a 14-foot channel into Trim Pond, and a 14-foot basin and a 12-foot anchorage in the pond to provide an inner harbor.

Published in	Nature of Report	Work Considered and Estimated Cost
House Document No. 330 77th Congress 1st Session 1941	Favorable	Recommended a 100-foot wide, 12-foot deep channel from Great Salt Pond into Trim Pond and a 12-foot basin, 1.4 acres in area, in Trim Pond. Estimated cost of new work is \$16,000 and of annual maintenance is \$500 in addition to requirements of existing projects in Great Salt Pond. Local cooperation required, including 50 percent cash contribution but not exceeding \$8,000.

EXISTING CORPS OF ENGINEERS PROJECT

11. The several features of the existing project are authorized by the following River and Harbor acts:

<u>Act</u>	<u>Work Authorized</u>	<u>Documents</u>
June 3, 1898	Channels and jetties	House Document 57, 54th Congress, 1st Session.
June 13, 1902	Extending south jetty and dredging	Specified in act. Annual report for 1900. *
March 2, 1945	Channel and basin in inner harbor	House Document 330, 77th Congress, 1st Session.

* On page XVIII of Appendix D of the Annual Report of the Chief of Engineers, for 1900, under item 18, Great Salt Pond, Block Island, R.I., it is stated, "Under date of June 15, 1900, a modified project was approved, extending the south jetty 350 feet and building a north jetty 600 feet from it and about 1200 feet long,----". This modification also provided for revetment and sand fences where the channel cut through the original beach.

12. The existing authorized project provides for a channel from Block Island Sound to the pond 600 feet wide and 25 feet deep in the central 150 feet, sloping gradually to a depth of 12 feet in a width of 504 feet, thence with a 1 on 4 bottom slope up to the high-water mark; for two riprap jetties at the entrance, the northerly one 1200 feet long and the southerly one 1691 feet in length, constructed to a project height of 8.0 feet above mean low water; stone revetments and

sand fences to protect the banks through the original beach; an entrance channel 100 feet wide from Great Salt Pond into Trim Pond and a basin of about 1.4 acres in Trim Pond, both to a depth of 12 feet.

13. On June 24, 1927 in House Document No. 467, 69th Congress, 1st Session, the Chief of Engineers recommended curtailment of the existing project by omitting construction of the proposed north jetty. Congress has not acted upon this recommendation.

14. The Federal project is about 33 percent complete. Work accomplished consists of a 300-foot wide channel into Great Salt Pond having a depth of 18 feet for a width of 300 feet and a depth of 25 feet for a central width of 150 feet; a south jetty having a total length of 1691 feet including 837 feet constructed by the state; and stone revetments and sand fences along the south bank of the cut through the barrier beach. In August 1950, the controlling depth of the central 150-foot width of the Federal improved channel was 17 feet, except for shoals to mean low water near the southerly channel limit adjacent to the Coast Guard Station. In the southwesterly 75-foot strip, where the project depth of 18 feet was obtained, the inner shoal is from 2 to 4 feet above mean low water. The north-easterly 75-foot strip gradually shoaled to depths ranging from 19 feet adjacent to the center strip to 9 feet along the outer edge. The 18-foot strips have not been maintained since 1935, and the 25-foot channel since 1943. No work has been accomplished in Trim Pond since it was included as the Inner Harbor by the modification of the project authorized in 1945. In 1944, the channel into Trim Pond was restored to a 10-foot depth under authority contained in the River and Harbor Act of October 17, 1940.

15. The total cost of new work to date has been \$189,036.65, and of maintenance has been \$87,496.50, including war time expenditures in Trim Pond, making the total cost of permanent work \$267,533.15. The estimated amount required to be appropriated to complete the work is \$378,900.00. The latest estimated total cost for new work, revised in 1945 is \$568,000, exclusive of \$8,000 to be contributed by local interests. The latest estimated annual cost for maintenance, made in 1950, is \$3,000. Between 1918 and 1943, about \$55,000 was expended for maintenance of the entrance channel, which represents an average annual expenditure of about \$2,200. Rate of shoaling since 1944 and present dredging costs indicate that the present annual cost of maintaining the channel would be about \$4,200.

LOCAL COOPERATION ON EXISTING PROJECT

16. Local cooperation has not been required for the improvement of Great Salt Pond proper. Under the River and Harbor Act approved March 2, 1945, authorizing improvement of Trim Pond as the Inner Harbor, local interests are required to make a cash contribution of 50 percent of the first cost of the improvement, not exceeding \$8,000, furnish bulkheaded areas suitable for disposal of dredged materials for initial and maintenance dredging, and hold the United States free from claims for damages resulting from the improvement. Beyond offering disposal areas, local interests have not met the requirements.

OTHER IMPROVEMENTS

17. The State of Rhode Island and the Town of New Shoreham have expended a total of \$191,000 toward the improvement of Great Salt Pond. In 1894 work was commenced on a 300-foot wide and 12-foot deep channel between Great Salt Pond and Block Island Sound, and on two stone jetties to protect the channel, the south jetty being 837 feet long and the north jetty 250 feet long. This work cost approximately

\$125,000 and was in progress when the Federal project was authorized in 1896. Between 1900 and 1904, an 80-foot wide and 15-foot deep channel was dredged from Great Salt Pond to Trim Pond and a 3.3 acre basin was dredged in the latter pond at a cost of \$66,000. In addition, the Town of New Shoreham has spent approximately \$9,800 dredging for drainage and sanitation purposes a channel from Trim Pond to Harbor Pond.

TERMINAL FACILITIES

18. There are three privately-owned wharves on Great Salt Pond, all of which are open to public use on equal terms. The principal wharf located near the entrance to Trim Pond, is used for passenger and commercial freight lines, and affords 300 feet of deep water berth, plus additional berth for small craft. A secondary wharf 200 feet long used by a fish market, is attached to the main wharf. About 3,000 feet southeast of Cormorant Point, on the west side of the pond, there is a 500-foot timber wharf with a 150-foot "T" head, that is used for servicing of pleasure craft. On the east side of the pond, about one mile from the entrance, is the only shipyard on the island. This shipyard has a "T"-wharf which is 140 feet long and 90 feet across the head and has a 40-foot extension. The yard also has two railways, which can handle craft up to 60 feet long and 14 feet wide and having drafts of 12 feet. The Coast Guard maintains a two rail launchway adjacent to the entrance, which projects 100 feet beyond the high water line. There are two deteriorated marginal wharves in Trim Pond having lengths of 230 feet and 60 feet. There is space available for development of additional terminals in both Great Salt Pond and Trim Pond.

IMPROVEMENTS DESIRED

19. In order to obtain the views of interested parties concerning the improvements desired, a public hearing was held at Block Island, Rhode Island, on July 23, 1947. The hearing was attended by representatives of local and state governments, and various business interests. It developed that local interests desire maintenance of the entrance channel or other work to prevent shoaling due to littoral sand movement. It was submitted that sand moving around or over the south jetty had been trapped by the Coast Guard launchways with resultant narrowing and shoaling of the channel to the extent that the usable channel width was reduced to less than 100 feet and numerous groundings had occurred. It was stated that the shoaling prevents proper access to the harbor for vessels seeking refuge during storms and impairs efficient operation of the Coast Guard Station due to sand clogging the launching rails. Local interests, though discussing merits of jetty extensions, groins, and sand fences, did not advance a definite proposal of remedial works desired.

COMMERCE

20. The following tables present a comparative statement of yearly freight and passenger traffic for the years 1940 to 1949 and freight in detail for 1949.

Commerce Since 1939

<u>Year</u>	<u>Tons</u>	<u>Passengers</u>	<u>Year</u>	<u>Tons</u>	<u>Passengers</u>
1940	3643	75020	1945	1389	-
1941	4936	98074	1946	2295	8430
1942	1762	92	1947	869	16184
1943	2205	4399	1948	9579	39200
1944	1843	-	1949	7531 *	54912

*Exclusive of 895 automobiles accompanying passengers.

FREIGHT TRAFFIC, 1949

DOMESTIC
(Short tons)

Commodity	Coastwise		Local	Total
	Receipts	Shipments		
ANIMALS AND ANIMAL PRODUCTS, EDIBLE:				
Fish, fresh, or frozen, except shellfish	-	50	1,231	1,281
Fish, canned, except shellfish	5	8	-	13
WOOD AND PAPER				
Sawmill Products (Lumber)	23	-	-	23
NON-METALLIC MATERIALS				
Anthracite coal	479	-	-	479
MISCELLANEOUS COMMODITIES				
Commodities, n.e.c.	4,637	1,098	-	5,735
TOTAL	5,144	1,156	1,231	7,531

The above statistics do not include the use of the harbor by the Armed Forces during the war period when 400 personnel were based in the Great Salt Pond area nor supplies for this group, including construction material, which were received in the harbor. Commerce is regularly carried on the year round by one 110-foot motor vessel operating from Point Judith and supplemented during the summer by additional vessels operating from Point Judith and Providence, Rhode Island and New London, Connecticut. The vessel operating the year round regularly sails from the Harbor of Refuge, using Great Salt Pond during adverse easterly storms. The supplemental vessels, all landing in Great Salt Pond, include one of 1164 gross tons and 221 feet in length, and a second of 420 gross tons and 132 feet in length. Unscheduled trips are also made by small tankers, barges and other coastwise craft.

21. The commerce to a large degree is dependent upon the summer visitor industry, which was curtailed during the war years. During that period, commerce reflected the islanders' needs. In 1947, the summer

visitor industry began to resume its place in the island's economy, although two of the largest hotels remained closed until 1948. Prior to the war, there was considerable commerce in fish, particularly from wharves in the Inner Harbor. A small amount of this business was resumed in 1947. The fluctuations shown in passenger traffic are due in part to the variable use of the Harbor of Refuge and Great Salt Pond, and in part to the number of passenger boat lines in operation.

VESSEL TRAFFIC

22. The number and size of commercial vessels using Great Salt Pond are indicated in the following statement of traffic covering the 10-year period prior to 1949, the latest year for which statistics are available.

	<u>Trips Inbound and Outbound</u>									
Draft (Ft.)	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
10 to 13	402	352	-	-	-	-	128	325	328	316
Under 10	532	444	126	244	44	46	68	66	850	2506
TOTAL	934	796	126	244	44	46	196	391	1178	2822

Prior to 1948, the above trips do not include those made by the local fishing fleet of 10 vessels, those made by the fishermen from the Harbor of Refuge seeking refuge in easterly storms, and those made by the 50 to 60 outside fishermen who base in the harbor during the spring and fall fishing season. The tabulation of trips is also exclusive of pleasure craft which are using the harbor in increasing numbers. In addition, summer passenger lines were reestablished in 1948 after being suspended during World War II.

DIFFICULTIES ATTENDING NAVIGATION

23. The navigable width of the maintained 150-foot by 25-foot entrance channel has been reduced by shoaling on the south side. As a result, groundings have occurred, particularly by transient vessels. Most of these groundings occurred on the unmarked shoal on the south side of the 25-foot channel. The Coast Guard launchways have to be cleared frequently of sand. The area in front of the ways was dredged in 1948. The Coast Guard planned to redredge this area in 1950 in conjunction with maintenance dredging in the channel. However, due to lack of funds, no channel dredging was accomplished, and the Coast Guard deferred their work. Shoaling is an obstacle to effective operation of the Coast Guard Station.

WATER POWER AND OTHER SPECIAL SUBJECTS

24. The waterway is tidal. Matters of water power or flood control are not pertinent to this report. None of the work contemplated would have an adverse effect on wildlife or shellfish.

PLAN OF IMPROVEMENT

25. The only plan considered herein and desired by local interests is the construction of sand retaining works to arrest the transportation of sand into the channel. The plan is based upon field surveys made in 1948 and 1950, and was selected as the most suitable and economical of several considered methods of arresting sand movement. A groin would be constructed normal to the shore line about 1000 feet southerly of the south jetty. It would have a top elevation of 12 feet above mean low water extending from the onshore 12-foot contour about 250 feet to a point 100 feet seaward of the high water line, and then sloping to an elevation of one foot above mean low water in a distance of 250 feet. The total length of the groin would be 500 feet. The top elevation was selected in consideration of the height of the existing

jetty, over which sand is presently transported, the height of the adjacent advancing dune, and the elevation at which the dune is stabilized by grass growth. The groin would be extended shoreward to intercept high ground at about the elevation of heavy grass growth. The length of the groin and the position of change in top elevation were selected on the basis of a comparison of shore lines which indicate an average progression of 8 feet per year for the past forty years, and an anticipated effective life of 30 years for the structure. A steel sheet-pile groin was selected in preparing the cost estimates.

AIDS TO NAVIGATION

26. The United States Coast Guard has been consulted on the matter of aids to navigation and has advised that none are required for the proposed groin.

SHORE LINE CHANGES

27. Block Island is directly exposed to the Atlantic Ocean and is subject to erosion by waves set up by southeast and southwest winds. Littoral currents transport the eroded materials northward along the island to the long trailing shoal at the north tip of the island. The jetties and breakwaters at the two harbors intercept this movement and quantities of sand are trapped, a condition evidenced through comparison of old and recent United States Coast and Geodetic Survey charts.

28. At the entrance to Great Salt Pond, the net effect of the 250-foot north jetty appears to have been a minor realignment for several hundred feet of the immediate shore line, while the effect of the 1691-foot south jetty has been to advance the shore line seaward at the average rate of about 8 feet per year. This jetty was initially 837 feet long and its length was increased several times as the shore line advanced. Sand has passed over, through, and around the jetty. Greatest sand movement has occurred opposite the outer and inner ends. Wind

transport has also been a factor in shore line changes. Sand fences built around 1900 were successful, but are now buried under 2 to 4 feet of sand. The sand is stabilized at present by a growth of grass at elevations higher than 8 feet above mean low water.

29. North of the inlet channel, the present day beach is generally cobble paved, but the adjacent coast does not evidence active erosion. South of the inlet channel the beach is sandy, being nourished to a considerable degree from the eroding face of Sandy Hill, which is about 100 feet high and is situated about a mile from the inlet. It is evident that the south jetty interrupts the northerly littoral drift and traps some of the moving sand. That part of the sand which moves around or over the jetty is deposited in the channel or removed by tidal scour.

30. The significant effect of the proposed groin would be the arresting of sand now moving into the entrance channel from the south. Between the groin and the existing south jetty, there would be a realignment of the shore line. Immediately south of the groin, the shore line would prograde more rapidly due to the effective trapping of littoral drift from Sandy Hill. In other areas, the proposed structure would have no major effect upon the island's shore line.

ESTIMATE OF FIRST COST

31. The estimate of first cost of the construction considered is as follows:

Construction

<u>Steel Sheet-Pile Groin</u>	
500 linear feet at \$170	\$85,000

The unit price is based on March 1951 cost indices for the type of work involved and includes allowances for contingencies, inspection, engineering and overhead.

ESTIMATE OF ANNUAL CHARGES

32. The estimated annual carrying charges have been computed on an assumed life of 30 years with all work being accomplished by the United States and with interest rates of 3 percent.

a. Federal Investment

Construction Cost (Corps of Engineers) \$85,000

b. Federal Annual Carrying Charges

Interest on Investment	\$ 2,600
Amortization of Investment	1,800
Estimated Annual Maintenance	<u>200</u>

TOTAL ANNUAL FEDERAL CARRYING CHARGE \$ 4,600

ESTIMATE OF BENEFITS

33. The primary benefit that might be derived from the construction of sand retaining works would accrue to the Federal Government through savings in annual maintenance costs. The channel was completed in 1908 to the maintained dimensions, i.e., 18 feet deep for a width of 300 feet with the central portion 150 feet wide and 25 feet deep. A total of 115,000 cubic yards of material was removed in maintenance dredging between 1908 and 1943. The 1950 condition survey indicated that approximately 75,000 cubic yards required removal to restore channel dimensions. These quantities represent an average annual rate of shoaling of about 4,500 cubic yards for the 42-year period. The annual rate of shoaling up to 1935 in the 18-foot strips was 2,100 cubic yards, increasing to 2,300 cubic yards between 1935 and 1950. The annual rate of shoaling in the 25-foot channel up to 1943 was 1,600 cubic yards, increasing to 6,000 cubic yards between 1943 and 1950. The total present annual rate of shoaling is, therefore, about 8,300 cubic yards. Based on current price levels for dredging by seagoing hopper dredges, the most economical type of plant for this work, the estimated annual cost of channel maintenance is about \$4,200.

34. The proposed groin would decrease the quantity of sand moving northerly into the channel for a period of about 30 years. Net shoaling in the channel probably would equal the average rate of shoaling which occurred prior to the time the shoreline advanced to the end of the south jetty, or approximately 3,700 cubic yards. The net decrease in the annual cost of maintenance would equal the cost of removing about 4,600 cubic yards (8,300 cubic yards less 3,700 cubic yards), or \$2,300, which is the annual net benefit.

35. Under existing conditions, visiting craft seeking refuge from storms frequently run aground. Difficulty at the entrance may be attributed partly to lack of a warning buoy on the inner shoal on the south side of the channel adjacent to the Coast Guard Station. Since available width opposite the shoal is 180 feet with depths in excess of 18 feet and since maintenance dredging would remove this shoal, no benefits can be attributed to the proposed groin through possible prevention of reoccurrence of the shoal.

COMPARISON OF BENEFITS AND COSTS

36. The evaluated annual benefits of \$2,300 and the estimated annual charges of \$4,600 result in a benefit-cost ratio of 0.5.

PROPOSED LOCAL COOPERATION

37. The benefits to be derived from the proposed work would be entirely of a general character and no local cash contribution should be required, but local interests should furnish all land, easements, and rights-of-way necessary for the maintenance of the project, as has been done in the past.

COORDINATION WITH OTHER AGENCIES

38. All Federal, state and local agencies having interests in the development and use of the waterway were notified of the hearing held July 23, 1947. Subsequent discussions were held with representatives of

the town of New Shoreham and the State of Rhode Island who feel that construction of sand retaining works would meet the needs of the locality. Adequate maintenance of the channel would meet local needs also.

DISCUSSION

39. Block Island is located about 12 miles off the southerly coast of Rhode Island. The principal industries on the island are fishing and the entertainment of summer visitors. The island is served by two harbors, Great Salt Pond on the west side and the Harbor of Refuge on the east side. Great Salt Pond is the principal harbor for pleasure craft frequenting the area. It also is used by commercial vessels carrying freight and passengers and by fishermen. While the Harbor of Refuge is the principal fishing port on the island, 10 fishing vessels are based in Great Salt Pond and a transient fleet of 50 to 60 vessels use the pond during the spring and fall fishing seasons. The harbor is used as a place of refuge when easterly storms prevent access to the so-called Harbor of Refuge on the east side of the island.

40. Shoaling exists on the south side of the entrance channel to Great Salt Pond, adjacent to the Coast Guard Station and opposite the outer end of the jetty, due to sand moving over, around, and through the south jetty. The shoaling extends to the launchways at the Coast Guard Station, necessitating frequent removal of sand from the rails. The shoal has reduced the 150-foot by 25-foot channel section to a width of 100 feet near the Coast Guard Station and the southerly 75-foot by 18-foot channel section is completely closed off by a shoal reaching elevations from 2 to 4 feet above mean low water. A channel 180 feet wide with a controlling depth of 18 feet extends from deep water into the Pond. Shoaling is reported to make entrance to the harbor hazardous, particularly for visiting boatsmen who are unfamiliar with local conditions.

41. No definite plan of improvement was submitted by the local interests who desire adequate maintenance of the entrance channel. During the public hearing, the extension of the south jetty, use of sand fences and the construction of groins were mentioned as possible remedial action to be taken for the reduction of excessive shoaling.

42. At one time, wind transport of sand was a problem in this area and about 1900, a series of sand fences were constructed along the center of the barrier beach south of the inlet. The topographic survey made in 1948 indicated that the fences are not buried under 2 to 4 feet of material. The survey showed that the area has an elevation generally in excess of 10 feet above mean low water, with a ridge in excess of 15 feet in elevation extending almost entirely across the barrier. The barrier supports a good growth of grass above the 8-foot contour and a very heavy growth above the 12-foot contour. It is concluded that the present high elevation of the land and the heavy grass growth which stabilizes it serves to reduce wind transport of sand into the channel to a negligible amount. Some wind transport probably occurs along the bare dune at low elevations adjacent to the shore line.

43. The most suitable method for reducing shoaling in the channel is to prevent sand movement along the beaches by the construction of a suitable groin normal to the shore, about 1,000 feet south of the south jetty. This groin should have a length of about 500 feet and a height of about 12 feet. The shore line is prograding at the rate of about 8 feet per year. The proposed groin would have an effective life of approximately 30 years.

44. The construction of a suitable groin would eliminate part of the shoaling now occurring in the entrance channel, and would decrease the costs of maintenance dredging. Resultant savings would total about \$2,300 annually. The construction would not reduce present navigation

hazards. These can be rectified only by dredging and improved marking of the channel limits. The proposed groin might reduce shoaling at the Coast Guard launchways. However, the benefit to accrue from such reduction is largely problematical and should not be included as justification for construction of additional permanent works. The ratio of evaluated benefits to annual charges for the groin, estimated to be \$4,600 per year is 0.5 to 1.0, indicating that the erection of additional sand retaining works is not warranted under existing conditions.

45. The study of shoaling in the entrance channel has indicated that the present average annual rate is about 8,300 cubic yards. The cost of removing this quantity by seagoing hopper dredges would be about \$4,200. The estimated annual cost of maintenance of \$3,000 made in 1950 for the entire project is too low. The estimated cost of future maintenance of the entire project is indicated below:

<u>Dredging</u>	<u>Annual Cost</u>
Entrance channel	\$ 4,200
Channel and basin	
Inner Harbor	1,000
<u>Maintenance, south jetty</u>	<u>800</u>

TOTAL ESTIMATED MAINTENANCE COST \$ 6,000

CONCLUSIONS

46. The construction of sand retaining works, as desired by local interests to reduce shoaling in the entrance channel and thus assure adequate maintenance of depths, is not warranted at this time. Use of a seagoing hopper dredge for maintenance dredging would provide adequate results at lesser cost. The cost of dredging must be compared against the cost of permanent works, as in the past, to determine the economic advisability of constructing sand barriers to reduce the cost of dredging. At the present time, the cost of dredging is such as to make construction of additional permanent works uneconomical at this

site. Since the cost of dredging reflects the cost of construction work in general, it is believed that future evaluation of costs will dictate the same conclusion, barring a substantial increase in the annual rate of shoaling.

47. Great Salt Pond is used by commercial craft transporting food stuffs and other commodities to and from the island. It is used also by commercial fishing craft and pleasure boats. Over 2,800 vessel trips were recorded in 1949, exclusive of a substantial pleasure craft traffic. The maximum draft of vessels using the harbor for the past 10 years has not exceeded 13 feet. Maintenance of the entrance channel is amply justified. Future maintenance should be limited to maintaining the entrance channel at a depth not exceeding 18 feet at mean low water.

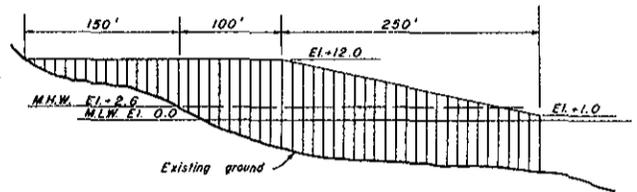
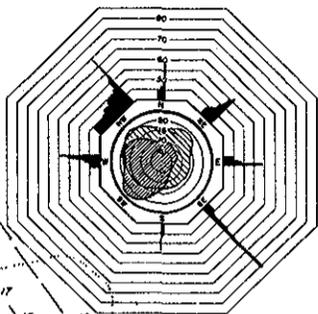
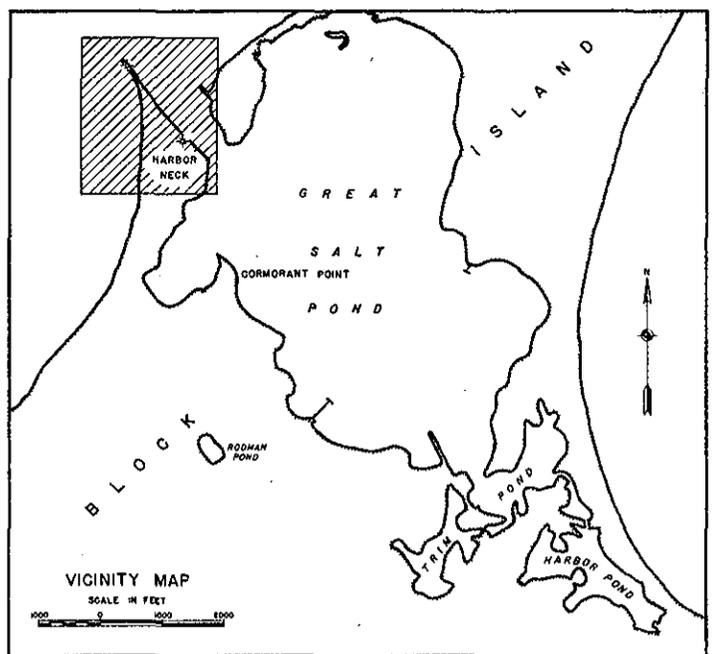
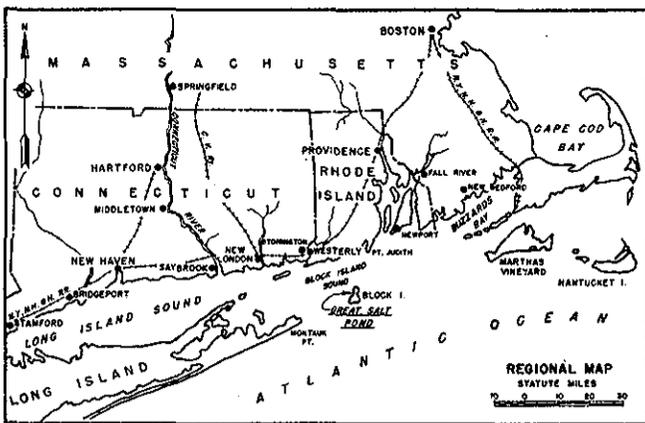
48. Future work necessary for effective, economical maintenance of the entrance channel, including construction of warranted permanent works to reduce dredging costs, can be accomplished under the existing authorization. The estimated maintenance cost of the existing project should be \$6,000 annually. This revision is due to increased shoaling in the entrance channel revealed by recent surveys.

RECOMMENDATIONS

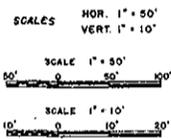
49. The Division Engineer recommends that no modification be made to the existing project at this time.

H. J. WOODBURY
Colonel, Corps of Engineers
Division Engineer

1 Incl;
Plate No.1

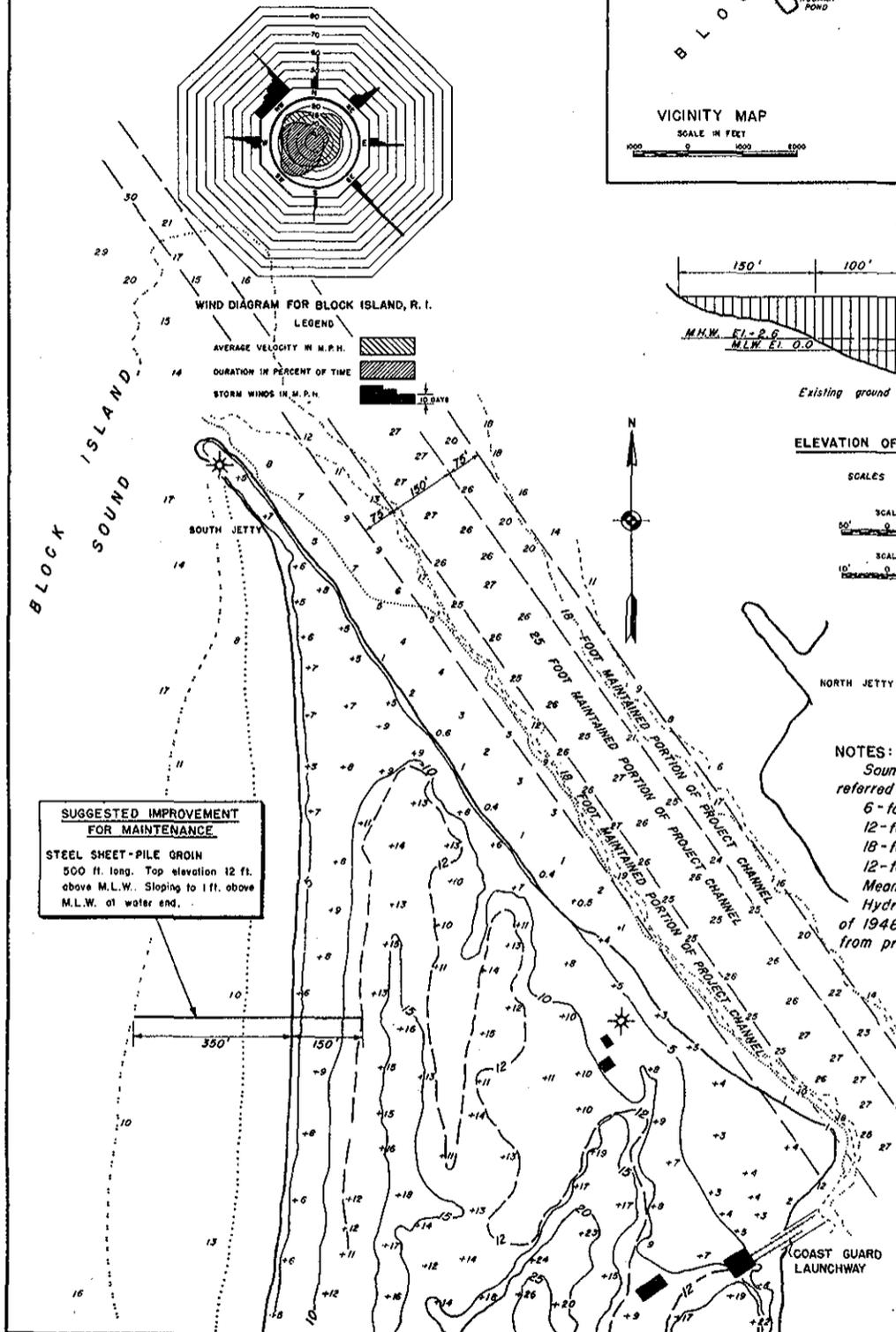


ELEVATION OF PROPOSED GROIN



NOTES:
Soundings and Elevations are in feet and are referred to the plane of Mean Low Water.
6-foot Water contour shown thus:
12-foot Water contour shown thus:
18-foot Water contour shown thus:
12-foot Land contour shown thus:
Mean High Water (2.6) shown thus:
Hydrography and topography from surveys of 1948 & 1950. Shoreline east of channel from previous surveys.

SUGGESTED IMPROVEMENT FOR MAINTENANCE
STEEL SHEET-PILE GROIN
500 ft. long. Top elevation 12 ft. above M.L.W. Sloping to 1 ft. above M.L.W. at water end.



GREAT SALT POND
BLOCK ISLAND, R. I.
SCALE IN FEET
0 100 200 300 400 500

NEW ENGLAND DIVISION, BOSTON, MASS. MAR 21, 1951

APPROVED: [Signature]
CHIEF ENGINEERING DIVISION
TO ACCOMPANY SURVEY REPORT DATED MAR 30, 1951

FILE NO. B. I. S. P. 135