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NANTASKET PIER
HULL, MASSACHUSETTS

SMALL BOAT NAVIGATION PROJECT

RECONNAISSANCE REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

OCTOBER 1980

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# INTRODUCTION

This report is a preliminary engineering and economic feasibility study of navigation improvements at Nantasket Pier, Hull, Massachusetts.

Nantasket Pier is a municipal structure located off the Weir River in Hull, Massachusetts. It is currently used by some commercial fishermen to offload their catch. Local interest have identified the need for improvement of the pier facilities in order to improve operational efficiency for those vessels currently using the pier and to attract new commercial fishermen to the pier in an attempt to bolster the local economy. Currently, the town has price quotations from several contractors for rehabilitation of Nantasket Pier and is applying for State and/or Federal assistance in this reconstruction. An essential portion of local improvement plans is the provision for sufficient anchorage space in which new vessels may moor.

On 10 July 1979, the town of Hull officially requested that the Corps of Engineers initiate an investigation under the authority of Section 107 of the River and Harbor Act of 1960 to study the feasibility of Federal participation in construction of these anchorage areas.

## Study Authority

This reconnaissance report was prepared and is submitted under the authority and provisions of Section 107 of the 1960 River and Harbor Act, as amended.

## Purpose and Scope of Study

Local interests have requested that the Corps of Engineers study the feasibility of providing navigational improvements (anchorage areas) in support of local development initiatives. The purpose of this study is to determine if there is economic justification for undertaking a detailed study of these mooring improvements in the Nantasket Pier area by attempting to determine if there is some feasible plan that may, with detailed study, prove to be in the Federal interest if constructed. The study was developed using readily available information obtained from the town of Hull, concerned citizens, and a reconnaissance investigation of the area. The scope of the study was limited to a preliminary economic evaluation of a limited number of alternative plans of improvement at a level of detail sufficient to identify if the need exists for further study. The scope is also limited almost exclusively to economic and readily apparent social and environmental considerations.

The geographic scope of this study was generally limited to the Nantasket Pier area on the Weir River and that portion of the Weir River used as access to the pier.

## Study Participants and Coordination

Various offices and officials of the town of Hull were coordinated with closely, in an attempt to define the problems and needs of the study area and to identify readily available data to be used in this report.

## Previous Studies

Federal - In September 1979 a favorable Section 107 Reconnaissance Report proposing navigation improvements for the benefit of the projected recreational boating fleet at the planned Hull Marina area was completed by the New England Division, Corps of Engineers. The proposed improvements consist of an access channel 2,400 feet long by 100 feet wide by 6 feet deep (MLW) and a turning basin 2 acres by 6 feet deep (MLW), and would be located in the cove between White Head and Sagamore Head, (see Figure 1). The report was received favorably by the town, and work on the Detailed Project Report is scheduled to commence when funding becomes available.

Studies of Others - No recent formal studies have been performed for the study area. The Department of Public Works in Hull has assembled some data for the proposed pier improvements but this data is not in report form.

## The Report and Study Process

This report is the culmination of a reconnaissance effort, designed to utilize readily available data and make a preliminary evaluation of the feasibility of performing a detailed study of navigation improvements at Nantasket Pier. Most of the data utilized was obtained from local sources. All pertinent information accumulated in this data review is included in the body of this report.

# PROBLEM IDENTIFICATION

In this section, background information about existing conditions is presented along with a scenario of conditions expected to occur without any Federal action. This information is analyzed to identify problems, needs, and opportunities for the study area. Planning constraints are then identified by analyzing existing physical conditions, laws, policies, and economies. Finally, specific planning objectives are formulated for the project through concurrent considerations of national objectives; local conditions, problems, needs, and opportunities; planning constraints; and local plans for development.

## National Objectives

Planning for navigational improvements in the Nantasket Pier area is performed in accordance with the principles and standards as set forth in 1973 by the National Water Resources Council in "Principles and Standards for Planning Water and Related Land Resources." The purpose of the

"Principles and Standards" is to promote the quality of life by planning for equal attainment of these national objectives as defined below:

NED Objective -

To enhance national economic development by increasing the value of the nation's output of goods and services and to improve national economic efficiency.

EQ Objective -

To enhance the quality of the environment by the management, conservation, preservation, creation, restoration, and improvement of certain natural resources, cultural resources, and ecological systems.

It must be emphasized that ideally the two national objectives should be sought equally. In this reconnaissance report, however, detailed environmental analyses were not possible in consideration of the funding limitations and study scope. This report, therefore, emphasizes the fulfillment of the NED objective more than the EQ objective.

## The Study Area and Existing Conditions

The town of Hull is located in eastern Massachusetts, jutting out into Massachusetts Bay north of Hingham and Cohasset (see Figure 1). Located approximately 20 miles south of Boston, the town is bordered on the west by Hingham Bay and on the north and east by Massachusetts Bay. The town consist of two bodies of land, the larger portion being an elongated hood separating Hingham and Massachusetts Bay and the smaller consisting of Peddock's Island. The Weir River almost separates the larger land mass from the mainland in the southeast portion of town. Access to Hull is provided by State Routes 3A, 128 and 228 with Route 228 being the connecting highway that services the commercial and downtown areas. As the attached map (see Figure 2) illustrates, the proposed area of local development is located in the cove between Hampton Circle and Rockaway, adjacent to Nantasket Pier. The project area has a tidal range of 9.4 feet and can be located on U.S. Geological Survey Maps titled "Hull" and "Nantasket Beach."

Hull is a suburban residential and resort community of 10,500 residents with employment centering around service and retail trade. The town is a popular resort area due to its proximity to Boston and the location of Nantasket Beach within the town. Nantasket Beach draws a large number of visitors with an excursion boat operating daily between Boston and Nantasket Pier during the summer season. Bay State Spray & Provincetown Steamship Co., operates commuter boats between Boston and Hull accommodating 150,000 passengers yearly. Fishing is also of importance to the community with finfish and lobster being the prime commodities. The local commercial fleet consists of 18 lobster boats and 10 finfish boats from 26 to 42 feet in length. In 1978, the existing fleet landed 1,500,000 pounds

of fish valued at $680,000. Fishermen unload at Pemberton Pier on Windmill Point, Allerton Harbor, and Nantasket Pier. Unloading facilities at Allerton Harbor are cramped and the questionable structural integrity of Pemberton Pier has prompted the Metropolitan District Commission to initiate plans for the replacement or reconstruction of the pier in the next few years.

There is an existing Federal channel extending from the mouth of the Weir River to the Steamboat Wharf at Nantasket Beach. The dimensions of the existing Federal channel are a 12-foot depth and a 150-foot width for a length of 1.6 miles. Project improvements were completed in 1894. In 1960, the Commonwealth of Massachusetts dredged a channel 100 feet wide and 15 feet deep to service the Nantasket Ferry. This channel is shown on Figure 1.

Terminal and transfer facilities in the area consist of a town wharf, boat yard, five seasonal mooring and supply areas, a marine railway capable of handling vessels up to 42 feet in length and eight tons in weight, two booms, and two hydraulic trailers.

## Conditions If No Federal Action Taken

If no Federal action is taken to provide anchorage areas adjacent to Nantasket Pier, rehabilitation of the structure would probably proceed if funding were available. Expansion of the existing commercial and recreational fleets at Nantasket Pier would be limited due to the lack of sufficient safe mooring space for new vessels. The Metropolitan District Commission will continue in the reconstruction of Pemberton Pier on Windmill Point. The Massachusetts Department of Environmental Quality Engineering has plans to dredge a 15+ acre anchorage facility capable of accommodating commerical vessels at Allerton Harbor that probably would be encouraged by the lack of a Federal anchorage facility at Nantasket Pier. Since Nantasket Pier is serviced by an existing Federal channel, it is anticipated that commuter boat service will continue to be available at Nantasket Pier.

## Problems, Needs, and Opportunities

At the present time, some commercial fishing activity in Hull is centered around Nantasket Pier. Approximately 1.2 million pounds of finfish and 275,000 pounds of lobster are offloaded at facilities in Hull each year. The major problems at Nantasket Pier are the inadequate depths surrounding the Nantasket Pier for fishing vessels, the lack of adjacent mooring space, and the poor condition of the pier. The present fishing fleet consists of vessels ranging from 26 to 42 feet in length with an average draft of 4.5 feet. The lack of water compels most vessels to wait for adequate depth prior to unloading their catch at Nantasket Pier, thus causing a considerable delay to the fleet and negative growth potential of the pier areas. The lack of an anchorage area near the pier compels vessel owners to moor their craft along the length of the Weir River and at

Allerton Harbor where sufficient water depth is available. This creates considerable congestion in the Weir River, causing delays and creating a safety hazard.

Establishing anchorage areas in conjunction with locally sponsored support facilities, pier rehabilitation and dredging of berthing areas would increase the efficiency of the existing fleet by reducing congestion in the Weir River by providing more sheltered anchorage areas encouraging the fishing fleet to moor at a central location where future expansion would be feasible.

## Planning Constraints

In an attempt to develop management measures that may solve the problems and fulfill the needs identified above, consideration must be given to certain constraints known to exist that limit the available scope of solutions and are, therefore, used to direct plan formulation and restrict impacts. Such constraints can be of many different types originating from different sources. They may include natural conditions within the project site, technological states of the art, economic limitations, or legislative restrictions. No constraints were identified.

## Planning Objectives

Planning objectives are basically statements that restate national, State, and local water and related land resource management problems and needs for the given study area in a positive manner. Planning objectives must be clearly stated so that they can be used as measure for plan evaluation.

Planning objectives can be delineated by basically two methods of approach:

(1) Addressing known areas of public concern

(2) Anticipating future "without project" conditions to identify problems and needs not so readily apparent to the public at the present time.

When all present and anticipated resource needs are identified, the planning objectives can be formulated. When used in conjunction with planning constraints, planning objectives provide the most valuable tool for plan formulation and subsequent evaluation.

Based on consideration of known areas of public concern and anticipated "without project" conditions, the following planning objective was identified for the study:

Provide adequate mooring areas in the Nantasket Pier area during the period 1980-2030.

## FORMULATION OF PRELIMINARY PLANS

Systematic consideration of the problems, needs, and opportunities led to the formulation of alternative preliminary plans. These plans, designed to achieve the national objectives and the planning objective stated previously were developed in consideration of the previously identified planning constraints. State and local objectives were also paramount considerations in the evaluation of alternative plans.

### Management Measures

As the basis for formulating alternative plans, a broad range of management measures can be identified to address the planning objectives. Management measures can generally be categorized as either structural or non-structural, and each should be considered in equal detail.

Structural measures would generally involve variations on dredging of various anchorage areas for mooring of commercial vessels. Non-structural measures would principally involve the determination of achieving the planning objectives by other means at lower costs, such as mooring vessels in naturally deep areas adjacent to the Weir River channel.

At this stage of study, the following five management measures were identified as meeting the overall study objectives:

(1) Dredge anchorage basins adjacent to Nantasket Pier.

(2) Dredge anchorage spaces adjacent to the Weir River.

(3) Develop naturally deep areas adjacent to the Weir River without dredging.

(4) Moor the commercial fleet at Allerton Harbor.

(5) Transfer the commercial fleet to other rivers and harbors with more adequate facilities.

### Plan Formulation

Utilizing a knowledge of the problems and needs in the study area, management measures were combined into various plans for managing the area's resources. Resource plans were refined into definitive alternative plans of action that meet the planning objective and area needs. In this preliminary phase, three alternatives were identified as viable plans. Equal consideration was given to both structural and non-structural plans:

(1) No Action Plan - This consists of maintaining present conditions in the Nantasket Pier area. The result of this alternative would be a mooring area adjacent to the Weir River channel and at other developed areas in the community.

(2) Combination of Natural Areas and Dredging - This would involve location of limited depth natural areas and dredging the minimum amount necessary to provide sufficient anchorage space.

(3) Develop Natural Deepwater Areas - This plan would entail the location and marking of natural deep water areas adjacent to the Weir River for mooring of vessels.

(4) Dredging of Anchorages - This would involve dredging of sufficient anchorage areas for the existing and anticipated fleet immediately adjacent to Nantasket Pier as planned by local interests.

(5) Develop Alternative Anchorages - This would involve developing an alternate anchorage area at another location in Hull or elsewhere.

If more detailed study is recommended, more and better defined alternatives will be considered.

## ASSESSMENT OF A SINGLE PLAN

As stated in the introduction section of this report, the purpose of this report is to determine if there is some feasible plan that may prove to be in the Federal interest. This is done only as a decision-making tool to evaluate the need for detailed study of many alternatives. The plan evaluated herein is not necessarily the plan that will be selected after a detailed analysis is performed, should a detailed study be recommended. The following plan is initially evaluated over the others based upon the availability of data at this early stage of study and expressed local desires.

### Alternative Plan Chosen for Evaluation

For the purpose of evaluation of the need for a detailed study, Alternative 4, the dredging of anchorages areas adjacent to Nantasket Pier, will be evaluated. Sufficient hydrographic data is not currently available to truly evaluate the other identified alternatives at the present time, but they will be fully evaluated if a detailed study is recommended.

The plan to be evaluated is depicted graphically in Figure 2. It includes an 8-acre anchorage area which is considered to be adequate to accommodate the existing fleet of 28 fishing vessels and an anticipated expansion of 4 new fishing vessels based on a capacity of 4 boats per acre. Establishing anchorage areas at the head of the existing Federal channel will lessen congestion and increase the efficiency of commercial operations. Depth of the anchorage has been determined by a percentage breakdown of the existing fleet. As the various types of craft draw from 3.5 feet to 6.5 feet, a design depth of 8 feet MLW is considered to be sufficient to meet the present and future needs of boaters.

Quality estimates within the proposed anchorage areas are based on a USGS Survey Map titled "Nantasket Beach, Mass." and a field inspection of the area. An average water depth of 0 feet MLW has been estimated, and material to be dredged is assumed to be mud and sand.

The dredged materials might be utilized for landfill, but as this is dependent on the composition of the material, the more expensive option of ocean disposal has been used herein for estimating all construction costs. A historically utilized disposal area, the Boston Foul Area, is located approximately 21 nautical miles from the project site and disposal at this location will be assumed. An analysis of disposal alternatives will be performed as part of any detailed project report written by this office.

Estimate of First Cost

The plan of improvement would involve dredging an anchorage of eight acres with the cost of construction a Federal responsibility. Maintenance of the dredged areas would also be a Federal responsibility. The U.S. Coast Guard will provide and maintain all navigational aids. The estimated first cost is based on December 1979 price levels, using a bucket dredge with disposal at sea within 21 nautical miles from the project site. An estimate for navigational aids has been made for this report based on projects of similar size. Specific costs for navigational aids will be obtained from the U.S. Coast Guard if a detailed study is performed. Table I depicts the first cost of the evaluated plan of improvement.

TABLE I
FIRST COST

| | | |
|---|---|---|
| Dredging (Ordinary Material) 126,800 c.y.@ $6.90/c.y. | | $ 874,920 |
| Contingencies (15%) | | 131,240 |
| Engineering and Design (8%) | | 70,000 |
| Supervision and Administration (8%) | | 70,000 |
| Subtotal | | $1,146,160 |
| U.S. Coast Guard Aids to Navigation | | 4,000 |
| TOTAL FIRST COST | | $1,150,160 |
| | Say | $1,150,000 |

Annual charges are based on an estimated project life of 50 years and an interest rate of 7-3/8%. Maintenance of the project is based on an assumed annual shoal rate of 3%. The annual charges are shown on Table II.

TABLE II
ANNUAL CHARGES

| | | |
|---|---|---|
| Interest and Amortization ($1,150,000 x .07591) | | $ 87,300 |
| Annual Maintenance 2,500 c.y.@ $8.00/c.y. | | 20,000 |
| Navigation Aids | | 1,000 |
| TOTAL ANNUAL CHARGES | | $108,300 |
| | Say | $108,000 |

Discussion of Benefits

There is little doubt that establishing a Federal anchorage adjacent to the reconstructed Nantasket Pier would be beneficial to the local economy in Hull but presently, economic benefits are questionable from a Federal analysis of the available marine facilities in Hull. The majority of the approximately 28 fishing craft in the Hull fleet currently anchor at Allerton Harbor and in the vicinity of Windmill Point. Unloading facilities at these locations are cramped but are no worse than those found at Nantasket Pier and are located more than two miles closer to the fishing grounds than Nantasket Pier. If those fishing craft currently anchoring at other facilities in Hull were to transfer their operations to Nantasket Pier, a net benefit to the region would not result under Federal guidelines for economic analysis. Commercial craft transferring to Nantasket Pier from nearby ports may experience a small benefit in transportation savings but the major benefit to be gained would be through the attraction of new boats to the reconstructed Nantasket Pier. However, at the present time, planned improvements to existing facilities may preclude the need for additional anchorage facilities at Nantasket Pier.

The Commonwealth of Massachusetts has plans to dredge a 15+ acre anchorage at Allerton Harbor to a depth capable of accommodating commercial vessels. If the existing commercial fleet were to anchor at Allerton, it would occupy less than half of the area to be improved. Although Allerton Harbor is heavily utilized by recreational craft at the present time, construction of the proposed Hull Marina (500 boat capacity) is expected to attract a number of recreational craft away from Allerton Harbor and allow additional commercial boats to moor there. In addition, the Metropolitan District Commission plans to rebuild Pemberton Pier and this will afford both fishermen and the commuter boats a greatly improved facility over the present structure.

The town of Hull has a number of waterfront facilities, but many of these such as Nantasket and Pemberton Piers are in need of replacement or major rehabilitation.

Since the community has no comprehensive waterfront redevelopment plans at the present time, we evaluated the town's request for additional anchorage areas based on the existing facilities and the current planned improvements for Hull. These planned improvements appear to adequately address the needs of the local fleet. The town is initiating work on a comprehensive waterfront plan and toward this end will receive professional planning assistance from the Metropolitan Area Planning Council (MAPC). In addition, the town owns land adjacent to Nantasket Pier and is trying to promote fish processing facilities at that site. For the present, planned developments by both the Metropolitan District Commission and the Commonwealth of Massachusetts appear to adequately address the needs of the existing commercial fleet in Hull. The town has not yet completed a final plan of rehabilitation for Nantasket Pier, and it is possible that the

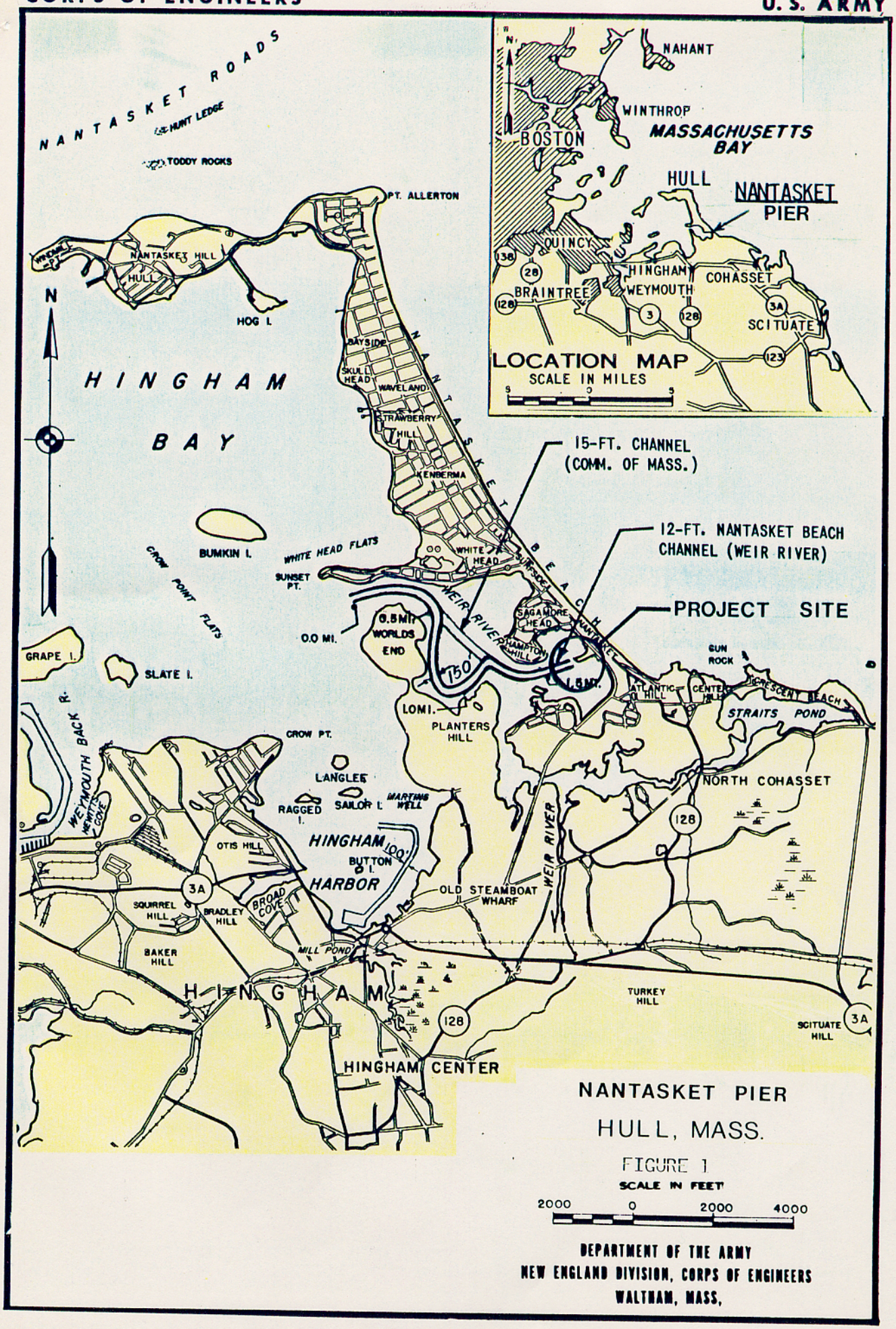
recommendations of the MAPC planners may affect the present objectives of the community in its desire to improve waterfront facilities. Should the community decide to develop Nantasket Pier as the prime commercial facility in Hull and should the town begin reconstruction of Nantasket Pier as a multipurpose commercial facility, reexamination of the need for a Federal anchorage may be warranted. However, at the present time the need for a Federal anchorage at Nantasket Pier is not justified.

## Correspondence

In a letter dated 9 December 1980, the Hull Board of Selectmen concurred with the findings of this report. A copy of the letter is attached.

## Recommendations

The Division Engineer recommends no further study at Nantasket Pier be undertaken at this time.




NANTASKET PIER

HULL, MASS.

FIGURE 1

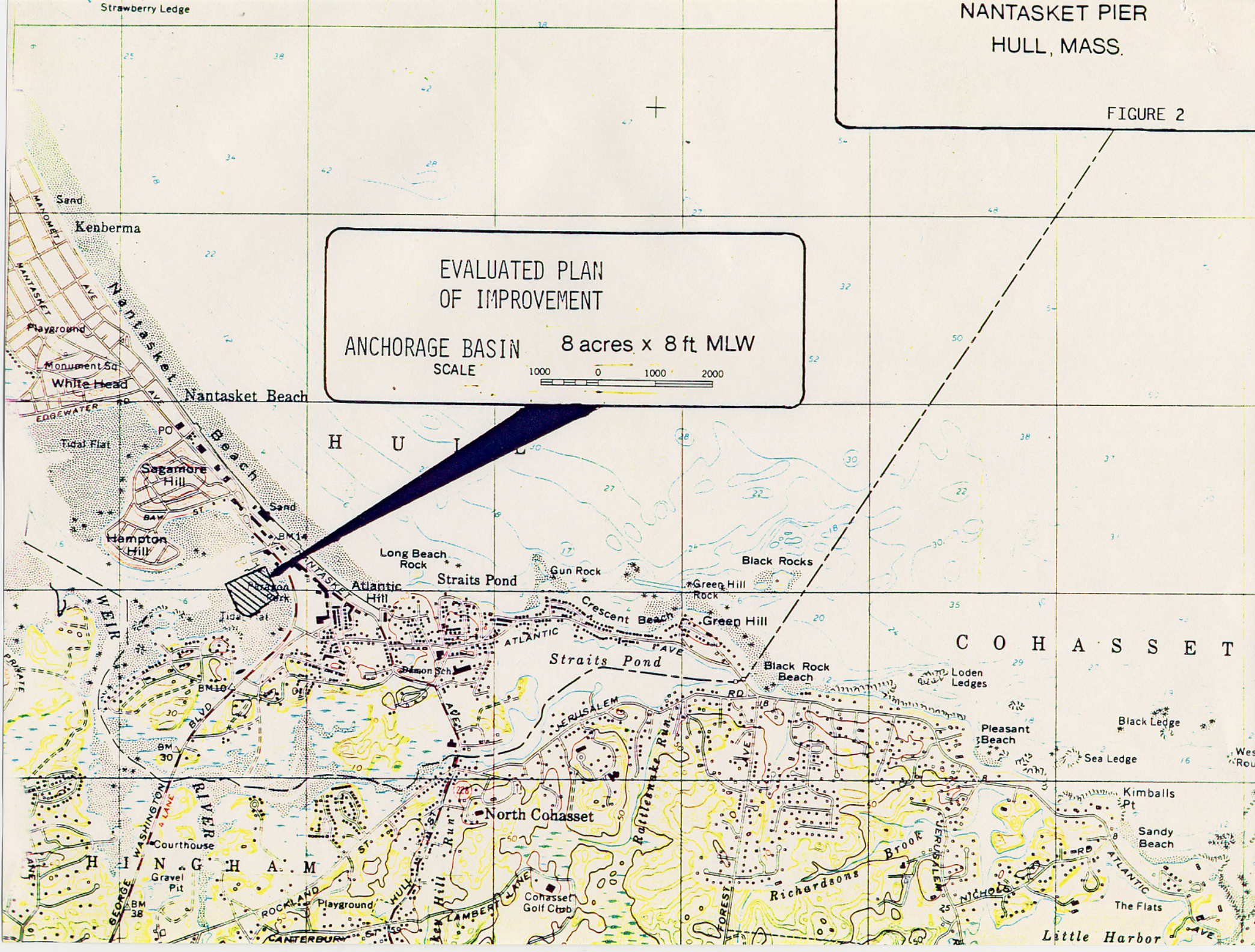
SCALE IN FEET

2000 0 2000 4000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

NANTASKET PIER
HULL, MASS.

FIGURE 2



# Town of Hull

BOARD OF SELECTMEN

MUNICIPAL BUILDING
HULL, MASSACHUSETTS 02045

December 9, 1980

Colonel William E. Hodgson, Jr.
Acting Deputy Division Engineer
Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Colonel Hodgson:

The Board of Selectmen has reviewed your correspondence dated November 10, 1980 regarding the Nantasket Pier Reconnaissance Report for Small Navigation Improvements.

The Board concurs with the reports conclusion and extends its appreciation to your agency for the time and effort involved.

The Board is hopeful, that in the near future, it will be able to economically justify a solution to the navigational difficulties associated with the Nantasket Pier area.

Once again, your assistance has been appreciated. A great deal of information has been learned from your report.

Sincerely yours,

Christopher J. McCabe

Christopher J. McCabe
Executive Secretary

CJM/b