EXAMINATION OF SOCIAL AND ECONOMIC ELEMENTS RELATED TO THE PROPOSED IMPROVEMENTS AT BRIGEPORT HARBOR, CONNECTICUT

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SECTION I. INTRODUCTION

The safe navigation of deep draft vessels in Bridgeport Harbor is essential to the economic well being of the entire Bridgeport area. Major terminals have been established in the inner harbor at the mouth of the Pequonnock River, and other tributaries, as well as the adjacent Black Rock Harbor. These facilities now annually ship and receive about 3.5 million tons of petroleum products, lumber, sand and gravel, building materials and scrap iron. Waterborne commerce at Bridgeport Harbor consists mostly of petroleum products which are essential to the energy needs of the entire region surrounding the harbor, which is approximately 741,000 people or 23% of the population of the State of Connecticut.

Over the years the use of the harbor by large deep-draft vessels has been increasing. This has made navigation in the existing channel and turning basin very hazardous even for the experienced harbor pilots. Presently the larger of the vessels entering the harbor are approximately 800 feet in length. This size vessel makes maneuvering with fully loaded cargoes nearly impossible. An accident of grounding, of which there have been two, could be disastrous both economically and environmentally, not to mention loss of life.

In order to accomodate these larger vessels, improve the opera - tional safety of the harbor, enhance the recreational boating facilities, and realize cost savings for all harbor users, local residents and municipal officials have requested formulation of plans to deepen the federal channel, increase the turning basin area and improve the smaller commercial/recreational facilities.

Section I of this report outlines the authority, purpose and scope of the study. Section II develops the base conditions in the study area by discussing the economic, environmental, cultural and sociological settings as they exist today. These base conditions are also projected into the future to demonstrate the anticipated outlook for the study area assuming that channel improvements are not undertaken. Section III discusses the various problems associated with navigation of the deep-draft channel as it exists today and offers solutions to these problems as requested by local interests. Section IV gives the results of the first stage of planning which investigates the advisability of conducting a further, more detailed study of the requested channel improvements. Possible future economic, environmental, cultural and sociological effects are given, assuming the requested channel improvements are made. Additionally, conditions requiring further study are discussed and possible alternatives to the originally proposed improvements are given. Section V outlines guidelines and procedures

by which the remainder of the study will be conducted in order to meet all study objectives. Section VI presents the conclusions reached in the study to this date and the report recommendations.

PURPOSE

The purpose of this reconnaisance report is to determine the advisability of continuing with a more detailed study of the requested channel improvements for deep-draft navigation and recreational boating in the Bridgeport Harbor area. In addition, this report will extablish the procedure by which more detailed studies will be conducted and will be used as a management tool to assist motivation, direction and coordination of further investigations.

The report will:

- Provide the planner with an advance planning tool for developing a plan of action.
- Define at the earliest practicable date, the anticipated problems associated with the analysis, formulation, policies, needs and scale of studies required during the course of the investigation.
- Insure early and continued coordination with, and services from other federal, state and local agencies and generate response from responsible and informed local groups.
- Show the need for futher studies as determined by the preliminary investigation of economic, environmental, cultural and sociological considerations of the requested channel improvements.
- Provide the Chief of Engineers with advance information on the nature of the investigation.

AUTHORITY

RESOLVED BY THE COMMITTEE OF PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board of Engineers, for Rivers and Harbors be, and is hereby, requested to view the reports on Bridgeport Harbor Connecticut, submitted in House Document No. 136, 85 Congress, 1st Session, with a view to determine the economic justification and environmental acceptability of providing navigation improvements for deep-draft vessels, commercial fishing boats, recreational craft and related purposes in Bridgeport Harbor, including the harbor's tidal tributaries and nearby Black Rock Harbor, Cedar and Burr Creeks, and the tidal portion of Ash Creek.

The Resolution was made at the request of the Honorable Abraham Ribicoff and the Honorable Lowell P. Weicker, Jr.

On 30 November 1977, an announcement of the initiation of the study was sent to congressional representatives, state and municipal officials, state and federal agencies, the news media and concerned individuals.

A public meeting was held in Bridgeport, CT on 19 December 1978 to determine the nature and extent of navigation improvements desired in the Bridgeport Harbor and vicinity and the need for such improvements.

SCOPE

Based on the responses to that meeting, investigations will explore the immediate and future needs of the study area, which include economic, environmental, cultural and sociological considerations. These investigations will determine whether there is a need for conducting a full scale feasibility study and environmental investigation and to establish a realistic plan of study.

Upon approval of this report, a more detailed study will be made of the requested improvements and other alternatives.

PRIOR REPORTS AND STUDIES

TABLE I

ACTS	WORK AUTHORIZED	DOCUMENTS & REPORTS
July 4, 1836	Fayerweather Island seawall	
Mar. 3, 1899	Shore protection of Fayerweather Island	Annual Report 1899 pg. 1;73
Mar. 2, 1907	West breakwater and present project dimensions of east breakwater	H. Docs. 275 & 521 5th Cong. 2d sess.
Mar. 2, 1919	Present project depths of 18 and 12 anchorage basins	H. Doc.898, 63d Cong. 2d sess.
July 3, 1930	25-foot entrance channel, 25-foot anchorage and an 18 foot channel through Johnsons River, present project dimensions of channel through Pequonnock River, Yellow Mill Pond, Black Rock Harbor and Cedar Creek	H. Doc. 281, 71st Cong. 2d sess.
Aug. 26, 1937	25-foot channel through main harbor, and present project location and extent of 18 and 12 foot anchorage basins	H. Doc. 232, 75th Cong.

ACTS	WORK AUTHORIZED	DOCUMENTS & REPORTS
Mar. 2, 1945	30-foot channel; elimination of 12 foot anchorage	H. Doc 819, 76th Cong. 3d sess.
July 24, 1946	30-foot turning basin and 15 and 9 foot channels in Johnsons River	H. Doc. 680, 79th Cong. 2d sess.
July 3, 1958	Present depth and extent of main channel, and turning basin south and southeast of C Cilco Terminal; Black Rock Harbor breakwater; Burr and Cedar Creek anchorage. Upper anchorage; lower Johnsons River anchorage	H. Doc. 136, 85th Cong.

Maintenance Dredging

Maintenance dredging has been performed on an irregular basis to remove shoal material that has accumulated over the years in the Federal project. The scheduling of maintenance dredging is dependent on two factors; the rate of shoaling and the type of vessel utilizing the project. The latter factor also dictates the depth to which a project will be dredged. The depth might be less, but not more than the authorized depths. Preliminary estimates indicate the need to remove approximately 300,000 cubic yards of sediment from the main channel and approximately 100,000 cubic yards from the side channels. The method of dredging, hydraulic or clamshell bucket, will be dependent on the disposal site chosen for the spoil. Improvement dredging, depending on the location, may alleviate the need for some of the maintenance work.

Previous Maintenance

In 1963, approximately 24,000 cubic yards were removed from Johnsons River and disposed of at the Bridgeport Dumping Ground. Under new work, dredging of the 35 foot main channel at Bridgeport was accomplished in 1961 and 1962 when 1,450,000 cubic yards and 675,000 cubic yards respectively were removed. In 1961, the dredged material was placed on Long Beach in Stratford and Pleasure Beach in Bridgeport.

Desired Improvements

The following navigation improvement needs and desires were expressed to the Corps at the Public Hearing held on 19 December 1978 in Bridgeport.

Widen the existing main channel and deepen it from 35 to 40 feet.

Redesignate the 25 foot anchorage as an extension of the existing turning basin and deepen both to 40 feet.

Dredge an area in front of the Union Square Docks to a depth of 30 feet.

Provide recreational and navigational improvements in the Pequonnock and Johnson Rivers.

Construct rock breakwaters at the entrance to Black Rock Harbor.

Provide anchorages within Black Rock Harbor, on both sides of the channel.

Provide anchorages in Cedar and Burr Creeks.

Dredge the 18 foot channel in Cedar Creek to a depth of 22 feet.

Widen Pleasure Beach and Seaside Park with suitable materials from the dredged channels.

COORDINATION

The study of the Bridgeport Harbor area was contributed to greatly by the interests of private industry as well as the valued cooperation of state and local agencies.

During the course of this study correspondence has been maintained with the National Marine Fisheries, Bridgeport Harbormaster, Cilco Terminal Inc., United Illuminating Corp., City of Bridgeport Planning Office, City of Bridgeport Economic Development, University of Bridgeport, Bridgeport Chamber of Commerce, Greater Bridgeport Regional Planning Agency, Town of Stratford Conservation Officer, Town of Stratford Mayor's Office, Hoffman's Fuel Co., U.S. Coast Guard, Black Rock Yacht Club.

SECTION II. BASE CONDITIONS

This section of the report will familiarize the reader with the existing environmental, cultural, economic and sociological conditions which prevail in the study area. This section also offers projections in regard to any significant changes in these items which may be expected in the future assuming that no federal improvements are undertaken. The following sections discuss projections assuming that the federal improvements are undertaken. By comparing these so-called "with" and "without" project projections, an analysis can be made of the probable impacts that would be directly attributable to the proposed improvements.

ENVIRONMENTAL CONDITIONS

1. Setting

Bridgeport Harbor is on the north shore of Long Island Sound approximately 57 miles east of New York City and twenty miles west of New Haven. The harbor consists of two main areas. The main harbor which is located in the central and eastern portion of Bridgeport and Black Rock Harbor which is located in the western portion. The branches of the main harbor are the Pequonnock River, Johnson River and Yellow Mill Channel. Black Rock Harbor branches into Cedar Creek which ends in an east and west branch.

The harbor area, which is shown on Plate I, following page 34, is subject to fresh water flow from the Pequonnock River, which results in some silting and shoaling at the mouth of the river.

A dredged channel 35 feet in depth and 400 feet wide extends from Long Island Sound into the main harbor between two breakwaters, a distance of about 3.5 miles. Beyond the breakwaters are two anchorages of 25 feet and 18 feet on either side of the channel and a turning basin at the eastern end of the harbor. To the east is Johnsons River, north of Pleasure Beach, which has a dredged channel 15 feet deep and a variable width. There are two anchorages of 9 feet and 6 feet on the west side of the channel just before the depth drops to 9 feet, and a 6 foot anchorage at the end of the channel. Pleasure Beach Bridge, a swing type bridge, is located approximately 1000 yards before the entrance to Johnsons River and has a clearance of 7 feet. Beyond the bridge and along the River itself are private yacht clubs and oil storage and receiving installations.

Yellow Mill Channel has a dredged channel 200 feet wide and 18 feet deep and extends about .8 miles north of the main channel. Parts of the channel are bare at low tide. A bascule bridge at Stratford Avenue about .3 miles above the entrance, has a clearance of 11 feet.

The Pequonnock River, the main channel and tributary, varies in width from 600 feet at the bend with the outer harbor to about 125 feet at Berkshire Avenue. The channel is easily navigated by smaller craft, however, larger vessels rarely travel very far up the channel without tug assistance. This 1.1 mile long channel has four bridges that require tending on the channel, with clearances that vary from 4 feet to 65 feet.

The study area is comprised of the S.M.S.A. (Standard Metropolitan Statistical Area) for Bridgeport which consists of Bridgeport, Derby, Easton, Fairfield, Milton, Monroe, Shelton, Stratford and Trumbull. The city of Bridgeport, which has the greatest influence on this area, was first settled in 1639 by residents of the older Connecticut settlements of Fairfield and Stratford. It was incorporated as a town in 1821 and was chartered as a city in 1836.
Bridgeport was developed as an industrial center beginning from the Civil War until the present day. From the mid-nineteenth century to 1960, the growth of Bridgeport has been largely due to immigration. In recent years, with the construction of interstate highway systems, Bridgeport has become very accessible to the entire northeast region of the country. The Connecticut Turnpike (I-95) passes directly through the city, and the Merritt Parkway (Rte. 15) has a new direct connection via Route 25. The region has been successful in attracting industrial development and service industries, and has become an important industrial area in the Connecticut economy.

2. Climatology

Mild winters and mild summers are the rule for the Bridgeport area. The wind off Long Island Sound during the summer months keeps temperatures somewhat cooler than further inland. The mean annual temperature is 51°. The mean low temperature is 28.4° which usually takes place in January, and the mean high temperature occurs in the month of July and is 73.3°. Table 2 summarizes the recorded temperatures in Bridgeport.

TABLE 2
Monthly Temperature
Bridgeport, Connecticut
(1935-1974)

Month	Mean	Maximum	Minimum
January	28.4	34.9	21.9
February	30.4	38.5	22.2
March	37.8	46.4	29.1
Arpil	47.9	57.7	38.1
May	58.3	68.5	48.0
June	67.8	77.8	57.8
July	73.3	82.9	63.6
August	71.8	81.3	62.2
September	65.1	74.7	55.5
October	54.7	64.6	44.7
November	43.9	52.3	35.4
December	33.0	40.6	25.3
Annual	51.0	60.0	42.0

Extremes:	Record	Maximum	100°F
	Record	Minimum	-3°F

The mean annual precipitation recorded by the U.S. Weather Bureau is 43.92 inches with average monthly precipitation ranging from 3.39 inches to 4.06 inches. Maximum monthly rainfall recorded in 39 years was 17.70 inches, and the minimum recorded rainfall was 0.07 inches. Table 3 summarizes precipitation records in Bridgeport.

TABLE 3
Monthly Precipitation
Bridgeport, Connecticut
(1935-1974)
(Inches)

Month	Mean	Snowfall Mean
January	3.50	7.2
February	3.39	8.3
March	3.92	5.4
April	3.86	0.5
May	3.71	T
June	3.32	0.0
July	3.70	0.0
August	4.06	0.0
September	3.51	0.0
October	3.32	T
November	3.85	0.5
December	3.78	5.2
Annual		
Annual	43.92	27.1

Extremes:	Monthly Max.	17.70	Inches	Rainfall
	Monthly Min.	0.07	Inches	
	Monthly Max.	26.2	Inches	Snowfall
	Monthly Min.	N/A	N/A	

3. Historical-Archeological Features

Bridgeport reflects the characteristics of a modern industrial center and is the second busiest port in the state. The downtown area is one which is presently undergoing urban renewal projects which include the restoration of some of the older buildings in the city. The shoreline, like all of Long Island, is dotted with sandy beaches, pleasure boat marinas, small communities and large industrial facilities.

There is no evidence to date that indicates any archeological sites exist in Bridgeport Harbor. There has been no explorations of the harbor area which has not been previously dredged, however, there may be some archeological sites in these areas.

4. Fisheries Resources

Long Island Sound is well suited for the production of oysters. There are approximately 6,450 acres of leased land off the shores of the three shore towns of the Greater Bridgeport Region. Though the oyster industry has been small in Connecticut relative to other industries, there are indications that situations are improving and this could develop into a more noted economic force for the State of Connecticut.

There are extensive shellfish beds off Bridgeport including many near the mouth of Johnsons River and in many parts of the inner and outer harbors. In the 1890's, with 19 steamers and 200 schooners or sloops working, these beds produced as many as 600,000 bushels of seed oysters (Crassostrea Vergenica) a year.

What has historically been both a profitable commercial industry and a recreational pastime has declined over the past several years; the last good harvest being in 1973. However, shellfish operations in the harbor are improving. The area just outside of the harbor near the channel is one of the main areas in Connecticut for oyster and clam (Mya Arenaria) sitting. Local fishermen set 30,000 - 40,000 bushels of oysters in 1976.

There are no commercial deep sea fishing vessels in Bridgeport Harbor. However, there are several charter fishing boats. Table 4 gives a list of fish found in the Bridgeport area. A large amount of recreational fishing takes place from the wharf at Pleasure Island.

TABLE 4

FINFISH OBSERVED IN BRIDGEPORT HARBOR AREA

Sand Shark	Sea Robin
Smooth Doyfish	Blackfish
Skate	Canner
American Eel	Mackerel
Manhaden	Puffer
Herring	Alewife
Frost Fish	American Shad
Sheepshead Minnow	White Perch
Flounder	Sea Bass
Killifish	Striped Bass
Silverside	Bulefish
Stickleback	Scup
Pipefish	Tautog
	Weakfish

Source: U.S. Department of Commerce
National Marine Fisheries Service

ECONOMIC, CULTURAL AND SOCIOLOGICAL CONDITIONS

To a large degree the resources of a region determine the status of its economic well-being and growth potential. A general understanding of these resources and development trends in the area is helpful in identifying regional problems and needs and selecting appropriate solutions. The following paragraphs discuss the resources of the study region - the Bridgeport Standard Metropolitan Statistical Area (SMSA); as well as its development and economy. Much of the information within these paragraphs has been taken from reports published by State and local planning agencies and the local Chambers of Commerce.

It should be noted at this point that the City of Bridgeport has the greatest influence on decisions concerning channel improvements to its Main Harbor and Black Rock Harbor, and would be most affected by such improvements. Furthermore, information is more readily available on this city than on other surrounding communities. For these reasons, discussions in the following paragraphs focus primarily upon the City of Bridgeport.

1. Population and Housing

The decade between 1940 and 1950 saw the largest increase in population in the City of Bridgeport since 1920. Between 1950 and 1970, the population in the city remained relatively stable, declining slightly by approximately 1.4%. During the same twenty year period, the population of the Bridgeport SMSA increased by about 40%. These trends are shown in Table 5.

Information on the number of dwelling units within the Bridgeport area is contained in Table 6. During the period of 1950 to 1970, the number of dwelling units increased by about 17% within the City of Bridgeport, and by about 44% within the SMSA as a whole. Comparing the population and housing data for this time span, it was observed that while increases in population and dwelling units proceeded at roughly the same pace throughout the Bridgeport SMSA, an increase of dwelling units within the City of Bridgeport occurred during a period of slight population decline.

Table 7 presents the population projections for the region. As shown here the region's population is expected to increase 42.4% from 1980 to 2020.

TABLE 5

Population of Bridgeport City and SMSA (1840 to 1977)

Year	Bridgeport City	% Change	Bridgeport SMSA	% Change
1977*	148,400	-5.2%	406,800	1.3%
1970	156,542	-0.1	401,752	14.7
1960	156,748	-1.2	350,115	22.4
1950	158,709	7.9	286,147	20.8
1940	147,121	0.3	236,817	
1930	146,716	2.2		
1920	143,555	40.7		
1910	102,054	43.7		
1900	70,996	45.3		
1890	48,866	76.8		
1880	27,643	45.7		
1870	18,969	56.7		
1860	12,106	99.1		
1850	6,080	84.6		
1840	2,394	-		

*Population data for 1977 taken from estimate by the Connecticut Department of Health.

TABLE 6

Housing in Bridgeport City and SMSA

Time Period	Increase in Number of Dwelling Units			
	Bridgeport City		Bridgeport SMSA	
	Number	% Total	Number	% Total
1970 - 1974	1,677	3.1	7,301	5.7
1960 - 1970	3,021	5.8	17,676	15.9
1950 - 1960	5,066	10.9	24,497	28.3
Before 1950	46,588	-	86,441	-
Increase 1950 to 1970		16.7%		44.2%

Source: Greater Bridgeport Regional Planning Agency

TABLE 7

Population Projections for Bridgeport, Connecticut SMSA*

Year	Population
1970	401,752
1980	447,415
1985	472,341
1990	498,482
2000	456,210
2020	637,069

Source: 1972 Obers Series E Population Projection

* Standard Metropolitan Statistical Area

2. Economy and Land Use

Bridgeport is one of several major harbors within Long Island Sound, and is second only to New Haven's shipping tonnage. The harbor is a key oil receiving port in Long Island Sound. Other notable imports include metals, sand and gravel, scrap iron, and lumber. Iron and steel have been the major exports, but have declined in recent years. Within the area are several petroleum receiving, shipping and handling facilities, the United Illuminating Company power generation plants, the Cilco dry bulk and general terminal, public and private marinas for recreational boats, and a number of large industries.

Important basic industries within the area include manufacturing, trade, and port-related activities. Historically, manufacturing, particularly in defense industries, has constituted the economic base for the Bridgeport region. Major manufacturing goods produced include firearms, brass goods, aluminum and zinc castings and valves, electrical appliances, wiring devices, aircraft and plastics.

The City of Bridgeport has a total area of about 11,450 acres, of which 770 acres consist of water area. Approximately 90% of the land area within the city is developed. Major land uses include industrial, commercial, residential (single and multi-family), and transportation. Open space land includes parks, institutional, and recreational uses.

The City of Bridgeport has traditionally been the major retail and commercial center for the SMSA. However, the suburban growth within the surrounding towns making up the Bridgeport SMSA has led to some locational shifts with respect to retail sales as retailers expand and follow their market. Even with these shifts, the city still accounts for 40% of the total retail sales of the entire SMSA. The downtown commercial area, known as the Central Business District, takes in 12% of the total retail sales for the SMSA.

Residential land use, ranging from low to high density within the city, and low to moderate density throughout the rest of the Bridgeport SMSA, is expected to remain relatively stable. Some shift towards higher density residential land use will occur over the coming decades in response to population increases.

The cities and towns comprising the Bridgeport SMSA are cognizant of the aesthetic and recreational value of open space within their region. The recreational usage of open land and related water areas include hunting, fishing, picnicking, boating, camping, viewing in scenic areas, and use of established parks, museums, cultural features, and recreational facilities. Long Island Sound provides beaches for swimming, an area for

recreational boating, and opportunities for both shore and deep water fishing. Indications are that the current trend to preserve as much land and water area as possible for future ecological and recreational purposes within the SMSA will continue.

3. Employment

Although the economy of the Bridgeport SMSA has shown signs of recovery from the effects of the recessions of the early seventies, the region still has a moderate to high unemployment rate. From 1970 to 1976, average unemployment ranged from 6% to 11%.

Table 8 indicates the employment breakdown by industry for the City of Bridgeport. It can be seen that manufacturing provides for the major share of the city's employment. Along with the trade and service industries, this accounts for almost 80% of the total jobs available.

The Bridgeport Labor Market Area includes all the communities that make up the Bridgeport SMSA. The data for the city reflects the general employment situation of the SMSA.

TABLE 8
1970 Employment by Industry
City of Bridgeport

Industry	Number of Employees	Percent of Total
Manufacturing	37,120	43.8
Construction	3,680	4.4
Transportation, Communications & Public Utilities	4,180	4.9
Wholesale & Retail Trade	15,620	18.4
Finance, Insurance, & Real Estate	3,600	4.3
Services	13,130	15.5
Government	7,350	8.7
TOTAL NON-AGRICULTURAL EMPLOYMENT	84,680	100.0%

Source : U.S. Census Data ?

4. Transportation

The Bridgeport SMSA utilizes all modes of public, private and commercial transportation generally used in the United States. The area is served by extensive highway and roadway systems including Interstate 95, and State Highways 8, 15 and 25. Daily passenger and freight rail service is provided to cities throughout the Northeast by Conrail and Amtrak. Waterborne commerce is handled through the port of Bridgeport, second largest in the state. Igor I. Sikorsky Memorial Airport, located in Bridgeport, provides facilities for both commercial and general aviation. Five transit companies provide regularly scheduled bus service along routes in Bridgeport, Fairfield, Stratford, and a portion of Trumbull.

In addition to the transportation facilities directly serving the SMSA, other similar facilities are nearby. These include major ports and airports in Connecticut, Massachusetts, New York and New Jersey; a number of Interstate and State highways; and rail service connections to most of the Northeastern United States and portions of Canada. These transportation facilities afford the region an extensive market for goods and services within a one to two day delivery area.

Within the SMSA, most passenger transportation is provided by private automobile, usually with only a single occupant. The remainder is by bus, train, or taxi. A small percentage of passenger transportation is provided by private aircraft, boats or ferry. Freight is primarily carried by truck, freighter or barge. Rail transport also accounts for a notable volume of freight within the region.

5. Harborside Development

As of 1978, there were 29 piers, wharves and docks located within the Bridgeport Harbor area. Sixteen of these are found in Bridgeport Harbor, while the remaining thirteen are in Black Rock Harbor. However, a number of these facilities are in poor condition and are presently unused. Table 9 gives a functional listing of the various docking facilities in the Bridgeport Harbor area.

The major docks located within the Main Harbor are Shell Oil (Buckley Brothers) docks; the Cilco Terminal Docks; the Steel Point Station and Harbor Station docks, owned and operated by the United Illuminating Company; and the city-owned Union Square dock, which services the Long Island Ferry.

Several manufacturing and other industries are located along the harbor to take advantage of the relatively safe and easy method of transportation it provides for large quantities of raw materials or products which would be difficult or costly to move overland.

A number of commercial boatyards, private yacht clubs, etc., and municipal and private marinas are found in both the Main and Black Rock Harbors.

TABLE 9

FUNCTIONAL USES OF PIERS, WHARVES AND DOCKS
BRIDGEPORT AND BLACK ROCK HARBORS

FUNCTION	NUMBER OF FACILITIES*
Cargo Handling:	
General Cargo	1
Containers	1
Dry bulk Commodities	1
Heavy Lift Items	2
Sand & Gravel	1
Lobster, Fish, other Seafoods	2
Petroleum Products	9
Wire & Submarine Cable	1
Scrap Metal	2
Bunkering	1
Fueling Vessels	1
Marine Repairs	4
Passengers	1
Rock Salt	1
Cement	1
Pumice	1
Moorings:	
Excursion Boats	2
Fishing Boats	2
Miscellaneous	5

*Sum of Number of Facilities is greater than the actual number of docks due to several multi-function facilities.

Planning for development of the harbor includes the renovation of the municipal Union Square Dock, and redevelopment of an existing bus station and Old Railroad Station near the waterfront, all as part of an on-going Waterfront Park Project; the expansion of the ferry service between Bridgeport and Long Island; and the establishment of a Foreign Trade Zone at the Municipal Industrial Park in Black Rock Harbor. The Cilco Terminal in Bridgeport Harbor plans to expand its facility, but is unable to acquire

sufficient land. It has been proposed that Bridgeport become one of three petroleum importing areas within Long Island Sound with offshore terminals.

Various offshore and onshore oil handling facilities such as fixed piers, pipelines, and additional storage areas would be required for such a venture. A portion of the Great Meadows Salt Marsh, to the east of Bridgeport Harbor in Stratford, has been proposed as a site for future harbor related development by private interests. However, the Town of Stratford is attempting to preserve this valuable estuary area as a wildlife sanctuary and prohibit all future development there. This marsh is the largest of its kind in the State of Connecticut.

6. Harbor Improvements

The existing federal project in Bridgeport Harbor is shown on the Project Map, Plate I. It was adopted on 4 July 1836, and modified a number of times, the latest being 3 July 1958. A description of the improvements as of 30 September 1976 is as follows. All depths refer to mean low water.

The existing federal project provides for:

(1) A main channel 35 feet deep at mean low water, 400 feet wide, extending from Long Island Sound to Tongue Point, widening to approximately 600 feet at the bend opposite Cilco Terminal, and narrowing to 300 feet at the lower end of the Pequonnock River Channel at a point 800 feet below the Stratford Avenue Bridge a distance of about 3.5 miles; and a turning basin 35 feet deep southest of Cilco Terminal.

(2) Two riprap breakwaters, one extending 900 feet westerly from a point near Fayerweather Island on the east side of the entrance to Black Rock Harbor, and one extending 650 feet southeasterly on the west side of the entrance; both breakwaters to have a top width of 8 feet at an elevation of 10 feet above mean low water, and side slopes of 1 on 1.5; with such riprap required to prevent erosion of the slopes opposite the inner ends of the breakwaters.

(3) The provision of a small-craft anchorage in Burr and Cedar Creeks consisting of a 28-acre anchorage with a depth of 6 feet, in Burr Creek and on each side of Cedar Creek adjacent of Burr Creek.

(4) A 2-acre anchorage area with a depth of 6 feet at the head of Johnson's River, between the existing federal channel and Hollisters Dam.

(5) A 2.4 acre anchorage area with a depth of 9 feet and a 0.6 acre anchorage with a depth of 6 feet in Johnson's River, these areas to be provided partially by dredging and partially by reducing the width of the existing Federal channel opposite and north of the present Miamogue Yacht Club.

(6) Two riprap breakwaters, one 3,823 feet long on the easterly side, and one 2,110 feet long on the westerly side of the entrance to the main harbor.

(7) The construction and maintenance of shore protection on Fayerweather Island, including a seawall connecting the northerly and southerly portions of the island.

(8) Two anchorage basins: One 25 feet deep and 23 acres in area, opposite Tongue Point; one 18 feet deep and 29 acres in area, adjoining the main channel on the west above Tongue Point.

(9) Pequonnock River Channel, 18 feet deep and from 125 to 200 feet wide from the lower bridge to a point about 500 feet below the dam at Berkshire Avenue, about 1.1 miles.

(10) Yellow Mill Pond Channel, 18 feet deep and 150 to 200 feet wide from the 35-foot channel to a point about 370 feet from Crescent Avenue, about one mile.

(11) Johnson's River Channel, 15 feet deep and generally 200 feet wide from the 25-foot anchorage to a point 1,700 feet below Hollisters Dam, thence 9 feet deep and 100 feet wide to a point about 600 feet below Hollisters Dam, about one mile.

(12) Black Rock Harbor and Cedar Creek Channel, 18 feet deep and 100 to 200 feet wide from the 18-foot contour in Black Rock Harbor to the heads of both branches of Cedar Creek, about 2.4 miles.

what about ash Creek?

The existing project is completed except for the dredging of 6-foot anchorages at Burr and Cedar Creeks, and the construction of breakwaters at the entrance to Black Rock Harbor. The total cost of the completed overall work was $4.3 million.

7. Waterborne Commerce

Table 10 contains information on the waterborne commerce at Bridgeport Harbor for the period 1970 to 1977.

TABLE 10

Comparative Statement of Commerce

Year	Tons	Percent Increase
1970	3,843,722	-
1971	3,548,554	- 7.7
1972	3,471,623	- 2.2
1973	3,553,980	2.4
1974	3,295,195	- 7.3
1975	2,860,171	-13.2
1976	3,265,193	14.2
1977	3,495,140	7.0

Table 11 gives a breakdown of waterborne commerce for the year 1977 showing petroleum products, steel, zinc, copper and miscellaneous metals, lumber, pumice, scrap metal and waste paper as being the principal commodities handled at the port. It can be seen that petroleum products constitute the bulk of the waterborne commerce at Bridgeport Harbor, comprising 77% of the total commerce tonnage.

TABLE 11 - FREIGHT TRAFFIC 1977 (Short Tons)

Commodity	Total	Foreign		Domestic		
		Imports	Exports	Coastwise		Local
				Receipts	Shipments	
Total	3,495,140	1,228,664	42,956	2,107,875	112,500	3,145
Sand, Gravel, Crushed Rock	25,802	-------	-------	25,802		
Nonmetallic Minerals, Nec	58,085	58,085	-------	-------	-------	-------
Vegetables and Prep, Nec	51	51	-------	-------	-------	-------
Alcholic Beverages	11	11	-------	-------	-------	-------
Textile Fibers, Nec	1,264	504	760	-------	-------	-------
Lumber	34,306	34,306	-------	-------	-------	-------
Veneer, Plywood, Worked Wood	13,313	13,313	-------	-------	-------	-------
Wood Manufactures, Nec	17	17	-------	-------	-------	-------
Paper and Paperboard	22	22	-------	-------	-------	-------
Basic Chemicals and Prod.,Nec	216	216	-------	-------	-------	-------
Gasoline	1,012,163	51,923	-------	906,047	54,193	-------
Jet Fuel	3,731	-------	-------	3,731	-------	-------
Kerosene	1,218	-------	-------	1,218	-------	-------
Distillate Fuel Oil	595,086	24,899	-------	542,004	28,183	-------
Residual Fuel Oil	1,251,082	612,919	-------	629,073	5,945	3,145
Rubber an Misc. Plastic Prod.	63	63	-------	-------	-------	-------
Misc. Nonmetallic Mineral Prod	12	12	-------	-------	-------	-------
Iron, Steel Shapes, Exc Sheet	114,141	114,141	-------	-------	-------	-------
Iron and Steel Plates Sheet	205,801	203,819	1,982	-------	-------	-------
Iron and Steel Pipe and Tube	6,863	6,836	-------	-------	-------	-------
Ferroalloys	3,693	3,693	-------	-------	-------	-------
Iron and Steel Products, Nec	10,201	10,201	-------	-------	-------	-------
Nonferrous Metals, Nec	2,779	2,779	-------	-------	-------	-------
Copper Alloys, Unworked	44,260	31,586	-------	-------	12,674	-------
Lead and Zinc, Unworked	58,846	58,846	-------	-------	-------	-------
Aluminum and Alloys Unworked	48	48	-------	-------	-------	-------
Fabricated Metal Products	10	10	-------	-------	-------	-------
Machinery, Exc Electrical	199	109	90	-------	-------	-------
Motor Vehicles, Parts, Equip.	4	-------	4	-------	-------	-------
Misc Transportation Equip.	180	180	-------	-------	-------	-------
Iron and Steel Scrap	36,454	-------	24,954	-------	11,500	-------
Paper Waste and Scrap	15,214	48	15,166	-------	-------	-------
Commodities, Nec	5	-------	-------	-------	5	-------

VESSEL TRAFFIC

Fully loaded 37,000 dead weight ton (DWT) vessels having lengths of 660 feet and drafts of 36 feet are the largest vessels which can enter Bridgeport's main Harbor at this time. Larger vessels up to 800 feet long with DWT of 70,000 have entered the harbor partially loaded. All ships entering the harbor are tug assisted. Due to the shallow depths and shoaling which occurs within the harbor, the deep draft vessels are often required to wait for high tide before entering the harbor. As a result, the majority of shipping using Bridgeport Harbor have shallow drafts of 20 feet or less, and are of the towed barge type vessel. A breakdown of trips and drafts of vessels involved in waterborne commerce at Bridgeport Harbor during 1978 is given in Table 12.

explore possibility of barge traffic from Black Rock Harbor being eliminated.

The trend in deep draft vessel usage is to increase the carrying capacity to take advantage of reduced transportation costs. Thus, the use of vessels with larger dead weight tonnages and deeper drafts will be increasing in the future. Without channel improvements, only shallower draft and partially full vessels will be able to use the harbor.

There is no specific data on the movements of recreational boats throughout the harbor areas. The following lists the approximate numbers of boats moored in various locations in 1978:

Ash Creek	700
Black Rock Harbor	1000
Bridgeport Harbor	375
Pequonnock River and Johnsons River	525

The only operational constraints imposed on recreational boating are the lack of additional anchorage areas, the clearance of the Pleasure Bay Bridge, the channel depths at Ash Creek and the need for more navigation facilities in the Pequonnock and Johnsons River.

What are they?

,005

TABLE 12

TRIPS AND DRAFTS OF VESSELS CARRYING COMMERCE - 1978

Harbor or Waterway Draft (feet)	Self Propelled Vessels			Non-Self Propelled Vessels		Total
	Passenger Dry Cargo	Tanker	Towboat or Tugboat*	Dry Cargo	Tanker	
37-38	1	3	--	--	--	4
35-37	2	6	--	--	--	8
33-35	4	12	--	--	--	16
31-33	1	6	--	--	--	7
29-31	4	8	--	--	--	12
27-29	4	12	--	--	--	15
25-27	6	18	--	--	--	24
23-25	5	13	--	--	--	18
21-23	5	12	--	--	--	17
20 and less	4144 **	--	--	25	338	4507
Total	4176	90	--	25	338	4629

* Towboats or tugboats accompany all vessels into or out of the harbor.

** Include trips made by ferry to Point Jefferson from Union Square Dock

SECTION III. PROBLEMS AND NEEDS

This section of the report presents the specific problems and desires associated with the Bridgeport Harbor area as identified by State and municipal officials, individuals and other interested users of the waterways.

Information used to determine specific problems and desires was provided by various waterway users at the public meeting held in Bridgeport on 19 December 1978 and through several subsequent meetings with individuals. The Bridgeport harbor master was particularly helpful, as well as many property owners along the waterfront, who provided pertinent information and suggested solutions to the problems.

Four separate potential problem areas were analyzed. They are as follows:

Ash Creek (Fairfield, CT) —> State to recommend a separate GRR study

- Insufficient channel depth for larger recreational boats.

what size and types of boats have problems navigating the channel?

Black Rock Harbor

- Insufficient depth in channel - tugboats assisting barges up the channel are churning up silt and scraping bottom.
- Inadequate wave protection - at storm conditions lack of breakwaters has caused much damage to recreational fleet moored in the harbor.
- Insufficient anchorage in Cedar and Burr Creek areas.

Bridgeport Harbor

- Insufficient depth in channel - fully loaded tankers and deep-draft vessels cannot use existing channel to enter harbor.
- Insufficient turning area in which to maneuver tankers and other large deep-draft vessels.

Pequonnock River and Johnsons River

- Inadequate recreational navigation facilities.

The major problems identified focus primarily on the conditions and needs in Black Rock Harbor and Bridgeport Harbor.

The Black Rock Harbor area has three major problems. The first is the depth of the existing channel through Cedar Creek. The authorized depth is eighteen feet, however, tugboats which draw eighteen feet, assisting oil barges up the channel, often churn up silt when they hit the bottom of the channel. This causes maneuvering problems and an interruption of recreational boating activity in the harbor area. It should be noted that in the summer months, approximately 1000 pleasure boats are moored in Black Rock Harbor.

The fuel oil terminals in Cedar Creek supply approximately sixty fuel oil distributors with home heating oil. These distributors supply a large percentage of the homes and small businesses in the Greater Bridgeport area. The deliveries required to keep these terminals supplied have increased and they are expected to be more frequent in the future.

The harbor master has suggested deepening the channel to 22 feet. This would allow tugs to pass safely through the channel and provide reasonable clearance for future siltation of the bottom.

The second major problem in Black Rock Harbor is the lack of protection to the inner harbor from wave action, during storms, which frequently come in across Long Island Sound. Damage to the boats moored in the harbor and shorefront facilities themselves, has run into thousands of dollars every time there is a severe storm. The local community feels certain that rock breakwaters at the entrance will solve the problem.

A third problem in Black Rock Harbor is the lack of an anchorage in Burr Creek. The Creek is a small area adjacent to Cedar Creek. The area is well protected and would make a fine mooring area. Some boats anchor there now but they are grounded at low tide. Local residents who use the harbor would like to see an anchorage dredged in this area as the demand for recreational boating in this area is very high and space is limited. There is a tremendous amount of support from local residents and municipal officials for all of the improvements discussed.

Bridgeport Harbor has two major problems and they are generated by the functions of the two largest terminals in Bridgeport Harbor, United Illuminating Corp. (U.I.) and the Cilco Terminal. U.I. is an electric generating utility complany serving the Greater Bridgeport area, a population of 741,000, or 23% of the population of Connecticut. U.I. is also the largest taxpayer in the City of Bridgeport. At present U.I. cannot accept large fully loaded oil tankers at their off-loading facility near Tongue Point in the inner harbor. Because of the existing 35 foot depth in the channel and turning basin, large tankers must be scheduled to enter the harbor 3/4 to 1/2 full, or with a draft of around 32 feet. This causes problems with the scheduling and requires more frequent tanker deliveries to supply the generating station, resulting in increased costs per unit of fuel.

Some vessels have waited up to six hours to catch the incoming tide in order to make a safe passage. As of this writing, ships preparing to dock at U.I. have run aground on two different occasions. Fortunately neither of these incidents resulted in oil spills.

Cilco Terminal handles cargo vessels carrying dry bulk commerce. They have the largest amount of dock frontage, 1100 feet, of any user in the harbor. The terminal frequently handles two vessels of the 600 foot range simultaneously. However, it now must handle some vessels near

800 feet in length. Because of the draft required for these vessels Bridgeport cannot be the first port of discharge. Like U.I., Cilco cannot accept fully loaded large vessels.

The Cilco terminal receives more than ten vessels per month, of these, an increasing amount draft 35 feet or more. The terminal has also, for the last five years or so, been buying up property so it may expand its facility. If these plans amount to a larger storage capacity as they are designed to, the ability to handle larger vessels in the channel will be even more important.

The solution to this problem is, of course, to deepen the channel to allow fully loaded vessels to use the harbor. This would enable U.I. to accept larger quantities of oil in each delivery thus lowering the cost, and also allow the Cilco terminal to accomodate larger draft vessels, thereby, increasing the amounts of cargo it could receive. It has been suggested by commercial interests that the depth of the entrance channel be increased to 40 feet.

In addition to the channel depth problems in the main harbor is the size of the turning basin. This area is located at the bend in the main channel at the mouth of the Pequonnock River. Harbor pilots have reported difficulty in maneuvering large vessels to both U.I. and Cilco, and owners of both firms have expressed the desire to have the basin enlarged. They feel that if the basin had been enlarged and deepened, the groundings that took place may have been avoided. With the trend of using larger vessels in the harbor, the present problems are only going to get worse. The harbor pilots have suggested that the existing 25 foot anchorage be made part of the turning basin, and be deepened along with the main channel. With this added area, larger vessels in the 800 foot range could be handled with an acceptable degree of safety.

SECTION IV. STAGE I PLANNING

This section of the report presents the results of study efforts to date. Efforts have included: identification of problems and desires expressed by local interests; an identification of existing and projected environmental, economical, social and cultrual base conditions; and a formulation of alternatives, which is presented in this section.

Due to the preliminary nature of this state of the study, alternative plans of improvement have not been fully developed. Rather the plans have been developed only in enough detail to show justification for proceeding on to a more detailed stage of study. A plan for conducting further stages of study is included in Section V.

CONSIDERED PLANS FOR IMPROVEMENTS

Improvements of the federal channels as expressed by local interests are considered to have merit and will be considered for further study. However, plans by private interests for a containerization terminal located behind Pleasure Beach have been omitted from this study due to the on-going litigation over DEP permits and because of the Town of Stratford's desire to transform that area, the Great Meadows Marsh, into a wildlife sanctuary.

Alternatives for the desired improvements are included in Table 13. The "do'nothing" alternative would have several effects both direct and indirect. This alternative would permit continuation of hazardous navigational conditions and high overhead costs of shipping operations. Present operating costs would at best remain at present levels but would more likely increase. This situation would not compare favorably with the operating expenses of more modern and larger vessels that would have to be diverted elsewhere. This may or may not force some facilities to relocate, but would certainly prevent any further development of existing industries in the main harbor. It would also limit Bridgeport to receiving a fixed sized fleet which could possible become obsolete as larger, more efficient vessels are built.

To address the problems and needs as expressed by local interests, the harbor was broken into four areas. The following is a listing by each area, and the alternatives considered:

TABLE 13

Desired Alternatives

Bridgeport Harbor and Vicinity

Ash Creek (Recreational Boating)

1. No Work
2. Dredge channel to 6 feet
3. Dredge channel to 8 feet
4. Dredge channel to 10 feet

Black Rock Harbor (Recreational and Commercial)

1. No work
2. Maintenance Dredge Existing Channel Only
3. Dredge existing channel to 22 feet (not including Maintenance Dredging)
4. Construct previously authorized breakwaters at entrance to Black Rock Harbor
5. Dredge authorized anchorages in Cedar and Burr Creeks
6. Dredge additional anchorages in Black Rock Harbor
7. Maintain existing channel, dredge Cedar and Burr Creek anchorages, dredge additional anchorages in Black Rock Harbor, and construct rock breakwaters

Bridgeport Harbor (Commercial)

1. No Work
2. Dredge existing 25 foot anchrage to 35 feet
3. Dredge existing 35 foot channel and turning basin to 40 feet
4. Dredge area in front of Union Square Dock to 30 feet
5. Dredge main channel, turning basin and 25 foot anchorage to 40 feet, dredge area in front of Union Square Dock to 30 feet

TABLE 13

Desired Alternatives

Bridgeport Harbor and Vicinity

(continued)

Pequonnock River and Johnson's Creek

1. No work
2. Provide additional recreational boating facilities in the Pequonnock River (self liquidating)
3. Provide 6 foot channel and 1.4 acre recreational improvements in Johnson's River

Plate 1 shows the Project Map for Bridgeport and Black Rock Harbors as it exists today. Figure 1 shows a detailed enlargement of the 25 foot anchorage area which would be deepened under alternate 3 for Bridgeport Harbor. This is the area where the groundings have taken place. Figure 2 shows an enlargement of the Burr Creek area adjacent to Cedar Creek where dredging has been authorized but not completeed. This is alternate 5 for Black Rock Harbor.

PROJECT COSTS

Project costs would be directly attributable to breakwater construction, dredging and removal of material from the channel areas to designated disposal sites. In addition to the project cost of breakwater construction, dredging, removal and disposal of materials, an allowance of 15% is included to compensate for unforeseen construction problems. A factor for engineering design, supervision and administration is also included, based on similar previous projects. A breakdown of these costs is shown in Table 14.

Since the project is based on an economic life of 50 years, project costs are annualized over this period. The capital recovery factor used for this process is based on the interest rate of 6 7/8%. The cost of additional maintenance is also included in the annual charges. Table 15 summarizes these annual charges.

TABLE 14

PROJECT COSTS

Ash Creek	Quantity	Project Cost
Alternative 1		
No work	0	0
Alternative 2		
6 ft. Channel	9,600 c.y.	$ 99,400.

TABLE 14 (con't.)

Alternative 3	Quantity	Project Cost
8 Ft. Channel	31,700 c.y.	$270,000
Alternative 4		
10 Ft. Channel	55,100 c.y.	$436,000
Black Rock Harbor		
Alternative 1		
No Work	0	0
Alternative 2		
Maintenance Dredging	428,900 c.y.	$2,423,000
Alternative 3		
Dredge to 22 Ft. + 1 Ft. O.D. (Not including maintenance dredging)	337,700 c.y.	$2,002,000
Alternative 4		
Rock Breakwaters only	48,000 tons	$1,704,000
Alternative 5		
Dredge authorized anchorages in Cedar & Burr Creeks	280,000 c.y.	$1,724,000
Alternative 6		
Dredge additional anchorages in Black Rock Harbor	94,000 c.y.	$639,900

TABLE 14 (con't.)

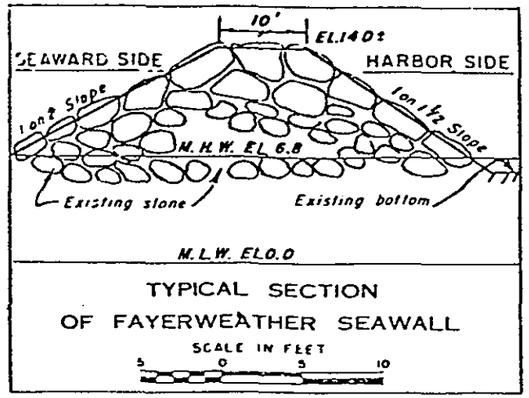
Alternative 7	Quantity	Project Cost
Maintain existing channel, dredge Cedar and Burr Creek Anchorages, dredge additional anchorages in Black Rock Harbor, construction Rock Breakwaters	803,000 c.y. 48,000 Tons	$5,950,000
Bridgeport Harbor		
Alternative 1		
No Work	0	0
Alternative 2		
Dredge 25 ft. anchorage to 35 ft. + 2 ft. O.D.	108,000 c.y.	$741,000
Alternative 3		
Dredge main channel and turning basin to 40 ft. + 2 ft. O.D.	2,699,000 c.y.	$13,302,000
Alternative 4		
Dredge area at Union Square Dock to 30 ft. + 2 ft. O.D.	25,600 c.y.	$212,600
Alternative 5		
Dredge main channel, turning basin, 25 ft. anchorage to 40 ft. and Union Square Dock to 30 ft.	2,981,600 c.y.	$11,792,000
Pequonnock River and Johnsons River		
Alternative 1		
No Work	0	0
Alternative 2		
Provide additional recreational boating facilities (self-liquidating) - Pequonnock River	100 slips	$300,000

TABLE 14 (con't)

Alternative 3	Quantity	Project Cost
Provide 6 ft. channel and 1.4 acre anchorage Johnsons River	72,000 c.y.	$537,000

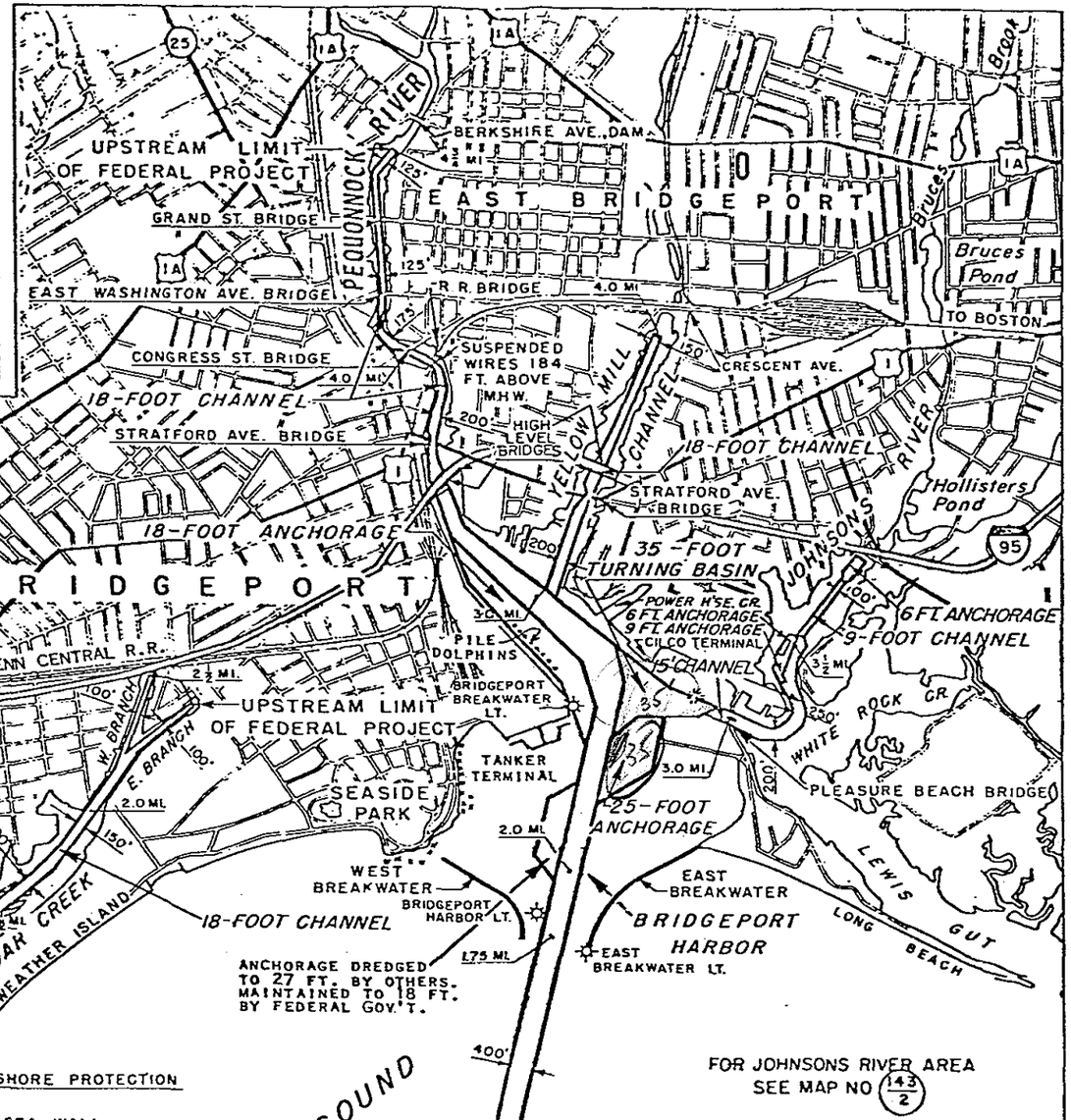
CORPS OF ENGINEERS

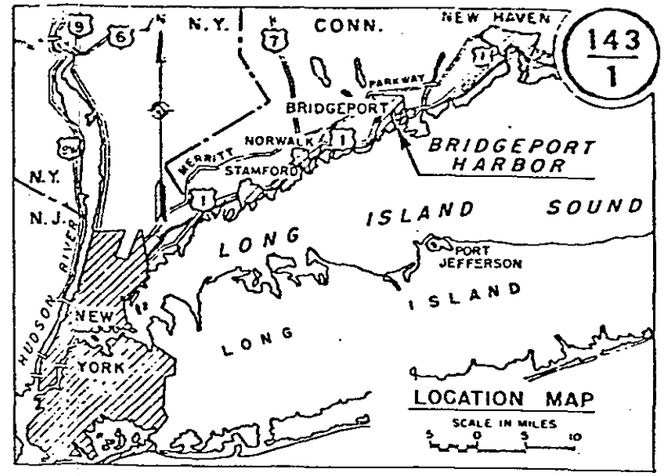
U.S. ARMY



TYPICAL SECTION
OF FAYERWEATHER SEAWALL

SCALE IN FEET
5 0 5 10





BRIDGE CLEARANCES

POQUONOCK RIVER

GRAND ST. BRIDGE (BASCULE)
Hor. 71ft. Vert. 13 FT. M. H.W.

EAST WASHINGTON AVE. BRIDGE (BASCULE)
Hor. 69 FT. Vert. 4 FT. M.H.W.

CONGRESS BRIDGE (BASCULE)
Hor. 67 FT. Vert 8 FT. M.H.W.

R.R. BRIDGE (BASCULE)
Hor. 7.0 ft. Vert. 18 FT. M.H.W.

STRATFORD AVE. BRIDGE (BASCULE)
Hor. 135 ft. Vert. 7 FT. M.H.W.

HIGH LEVEL BRIDGE
Hor 150 ft. Vert 65 FT. M.H.W.

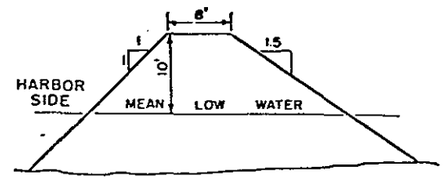
YELLOW MILL CHANNEL

STRATFORD AVE BRIDGE (BASCULE)
Hor. 82 FT. Vert 11 FT. M.H.W.

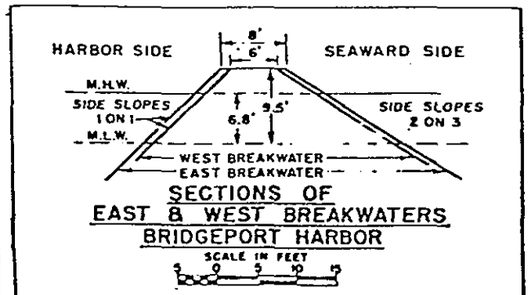
HIGH LEVEL BRIDGE
Hor. 100 ft. Vert 40 ft. M.H.W.

JOHNSONS RIVER

PLEASURE BEACH BRIDGE (SWING)
Hor. 70 FT. Vert. 7 FT. M.H.W.



SECTIONS OF
EAST & WEST BREAKWATERS
BLACK ROCK HARBOR



SECTIONS OF
EAST & WEST BREAKWATERS
BRIDGEPORT HARBOR

SCALE IN FEET
5 0 5 10

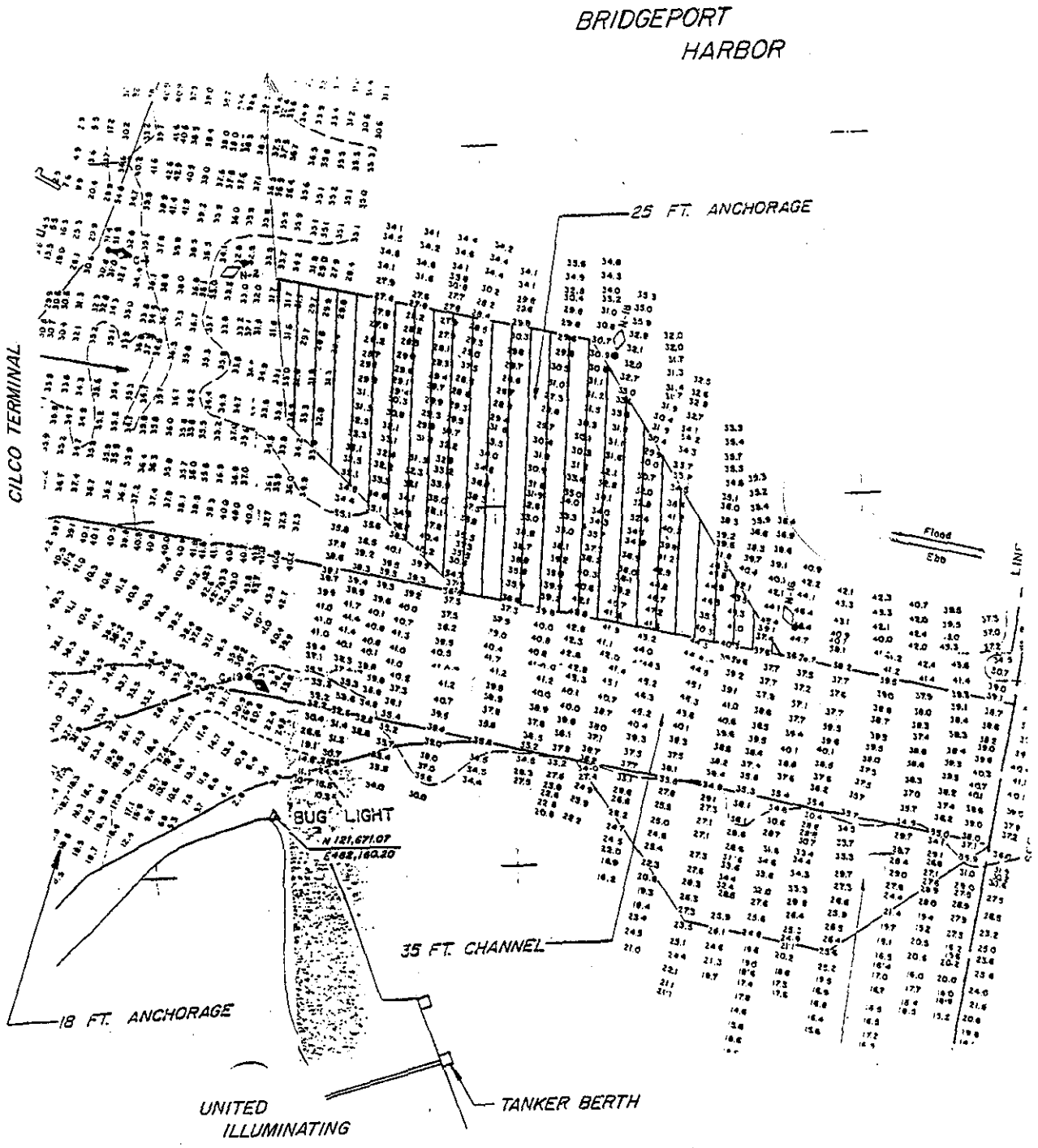
BRIDGEPORT HARBOR, CONN.

JUNE 1979

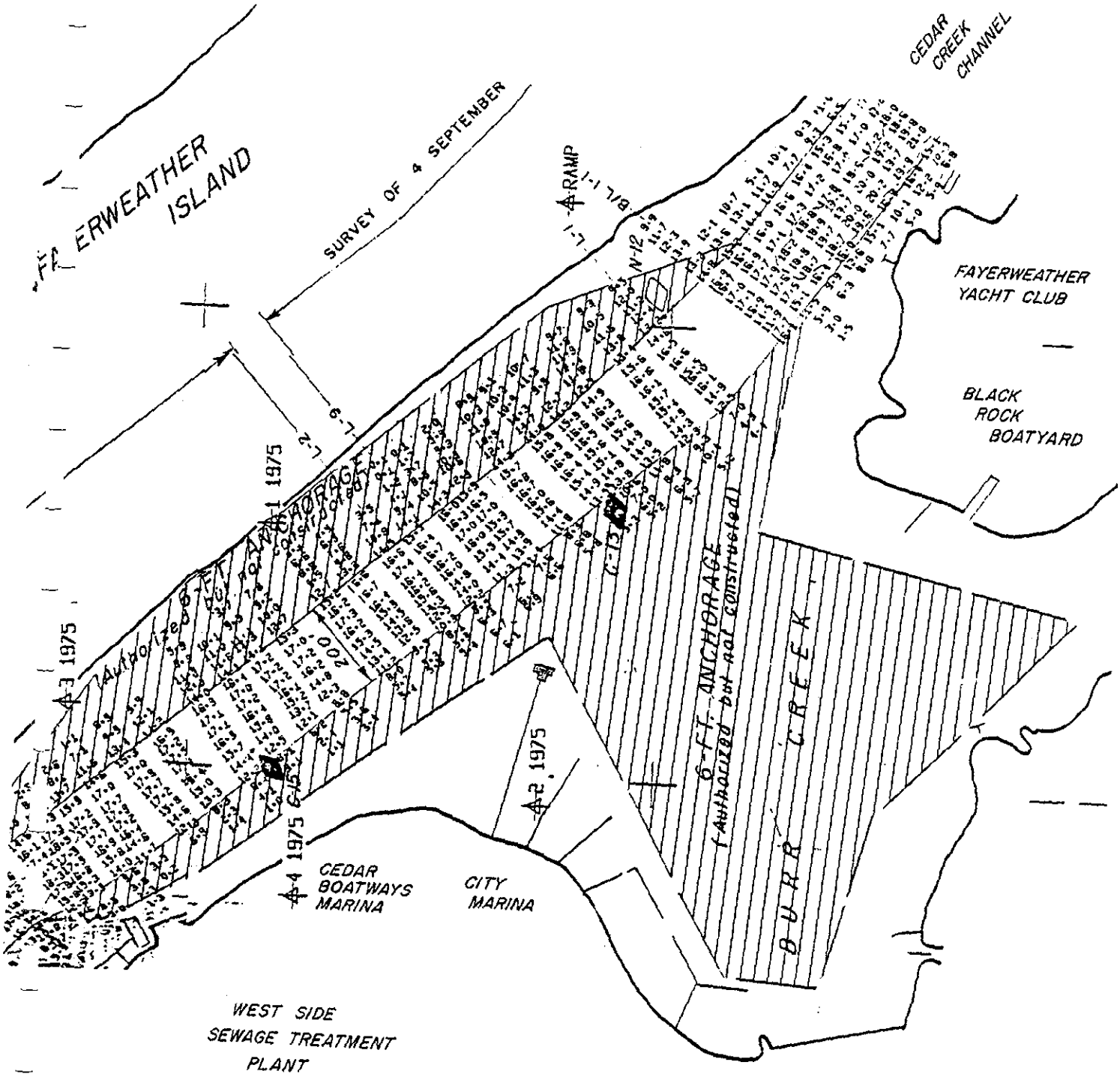
IN 2 SHEETS SCALE IN FEET SHEET
1000 0 1000 2000 3000

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

PLATE 1



BRIDGEPORT HARBOR
DEEP DRAFT NAVIGATION
FIGURE 1



BRIDGEPORT HARBOR
DEEP DRAFT NAVIGATION
FIGURE 2

TABLE 15

ANNUAL CHARGES

* Annual Charge = (Tot. Est. First Cost) x (Capital Recovery Factor)
* Capital Recovery Factor = 0.07131
* Project Life = 50 years
* Interest Rate = 6 7/8% — change to 7 1/8 %

Any required maintenance would be done in conjugation with maintenance of the entire existing channel.

Alternative*	Annual Charge
Ash Creek	
1	$ 0
2	9,600
3	26,100
4	42,600
Black Rock Harbor	
1	0
2	215,800
3	176,000
4	151,300
5	151,900
6	59,800
7	520,800
Bridgeport Harbor	
1	0
2	65,400
3	1,084,000
4	18,200
5	1,079,300
Pequonnock River and Johnsons River	
1	0
2	39,000
3	47,400

* Areas of Alternatives are listed in Table 13.

10,799,400

PROJECT BENEFITS

As presented herein there are twelve separate alternatives for improvements in four harbor areas in addition to the "Do Nothing" posture. Since there is a mix of commercial and recreational benefits to be considered, each improvement alternative was evaluated separately.

In order to determine project benefits all public and private establishments that would benefit from such improvements were interviewed with respect to their harbor operations. Information was gathered concerning vessels used, commodities handled and amounts imported and exported. This information was gathered for the present condition. From this, future conditions with and without channel improvements can be projected. By comparing the "with project" and "without project" projections, benefits which would directly result from harbor improvements can be made.

Using this analysis the annual benefits calculated and shown below can be compared to the annual costs of each of the various improvement alternatives as discussed in this section of the report under "Economic Justification."

The first area considered is Ash Creek, which is 3000 feet west of Black Rock Harbor. This area is used exclusively for recreational boating and the benefits derived from each alternative are based on the ease of operation for the larger boats moored in this area and the potential increases in fleet value. Some secondary benefits may be realized from added employment at the marina facilities for the maintenance of these larger size boats. Based on the recreational fleet mix the annual benefits of deepening this channel are as follows:

Alternate	Annual Benefit
° Dredge channel to 6 feet	$ 36,052
° Dredge channel to 8 feet	$ 96,038
° Dredge channel to 10 feet	$ 165,121

The second area is Black Rock Harbor. Unlike Ash Creek, this estuary contains commercial establishments which use the main channel to receive various products including petroleum. There are also several lobster companies as well as a large recreational fleet comprised of several marinas. Benefits from any improvements to this area would thus serve two constituencies.

The oil receiving facilities in Black Rock Harbor, including Santa Fuel, D'Addario Fuel and Crowley Fuel, receive all their cargo by barge. Since the cost per barrel of oil shipped by barge is constant for barges up to twenty-five foot draft, there are no direct benefits derived by either maintenance dredging or channel dredging to 22 feet.

The increased depth however, would provide a safe passage for the tugboats escorting these barges and reduce the potential of mishaps while transporting the petroleum products. In addition, this would give the tugs a clearance of four feet at channel bottom and prevent the churning up of silt and sediment. This improvement would have the most effect on the commercial establishments, its main feature being one of safety in transportation.

The construction of breakwaters at Black Rock Harbor would mainly benefit the recreational fleet. This improvement would make the harbor much safer and allow for the expansion of some of the marinas, among which is a city owned facility. The benefits derived from breakwater construction therefore, are based on projections of property damages that would result from major storm events over the next fifty years. Historical records of damaged property from storm events are the basis of such projections.

An additional improvement for recreational concerns is the dredging of the Burr Creek area for anchorage. This construction would provide additional mooring area for the City Marina which is a municipal facility. The benefit associated with this alternative is the additional mooring space.

The annual benefits calculated for each of the Black Rock Harbor alternatives are as follows:

Alternate	Annual Benefit
° Maintenance dredge existing channel	None
° Dredge existing channel to 22 feet	None
° Construct Rock Breakwaters	$ 200,000
° Dredge authorized anchorages in Cedar and Burr Creeks	$ 88,982
° Dredge additional anchorages	$ 15,966
° Previous three alternatives combined	$ 304,948

The third area of the project is the main Bridgeport Harbor. The benefits derived from dredging the federal channel to 40 feet and enlarging the turning basin are the savings in transportation cost realized by allowing the fleet mix to change to larger, more efficient vessels. The savings in scheduling, off-loading sequence for vessel routes, and maneuverability within the harbor all account for cost savings.

Several oil receiving facilities in the main harbor, including SunOil Company, Shell Oil Company, and Hoffman Fuel receive all their cargo by barge or small tanker and, as such, derive no benefit from channel improvements.

In addition to economic benefits, there would be secondary, or intangible benefits realized by a reduction of navigation hazards and potential accidents. The prime intangible benefit is the safety of the operation of the existing tanker fleet. The improvements would also modify the existing project sufficiently to allow navigation of larger vessels proposed for use with the result that fewer trips would be required. The reduction in vessel trips would reduce the potential for accidents.

However, the maginitude of potential accidents would increase somewhat, in proportion to the increase in size of the new vessels over the present limits on size. The benefits that would reduce hazardous conditions in navigation cannot be assigned a monetary value, However, they should be considered in weighing the economic benefits.

The third alternative in the main harbor is the dredging of the channel to 30 feet in front of Union Square Dock. The benefits of dredging this area would be realized most by the use of visiting vessels. The Navy, as mentioned in correspondence, has had visiting vessles in the past and had no adequate berth for public viewing. This alternative would also provide a City owned waterfront dock which could be used for this purpose and enable any vessels tied up in this location to remain a safe distance from the federal channel. It is possible, however, that specific development proposals for the docking area could alter this benefit analysis.

The major secondary benefit to all the alternatives in the main harbor are those derived from the disposal of dredged material at Pleasure Beach and Seaside Park which would help alleviate erosion problems in these areas. Such filling, however, could not take place until the sediments in the dredged material could be analyzed to insure no hazardous agents will be introduced into these highly used recreational areas.

The annual benefits calculated for each of the main harbor alternatives is as follows:

Alternate	Annual Benefit
° Dredge existing 25 foot anchorage to 35 feet	$ 1,148,193
° Dredge existing 35 foot channel & turning basin to 40 feet	$ 529,935
° Dredge area in front of Union Square Dock	$ 12,480
° Previous three alternatives combined	$ 1,766,451

The fourth area of improvement is the consideration of dredging certain areas of the Pequonnock River and Johnson's Creek to expand the recreational boating anchorage facilities of the harbor. These improvements are based on the tremendous demand for such facilities throughout the region. Obviously, as planned, these improvements would derive benefits from the increased value of the recreational boating fleet that would be expanded in size as a result of the additional anchorage space.

The annual benefits calculated for this alterantive are as follows:

Alternate	Annual Benefit
° Provide additional recreational boating facilities, Pequonnock River (self-liquidating)	$55,845
° Provide six foot channel and 1.4 acre recreational improvements in Johnson's River	$ 5,772

ECONOMIC JUSTIFICATION

By comparing the annual benefits to the annual costs, a determination as to the economic justification of project alternatives can be made. According to current regulations, a project is economically justified if the benefit cost ratio as determined by dividing the annual benefits by annual costs, as shown in Table 16, is greater than unity.

TABLE 16

Economic Justification

Alternative	B/C Ratio
Ash Creek	
1. No Work	0.00
2. Dredge channel to 6 feet	3.76
3. Dredge channel to 8 feet	3.68
4. Dredge channel to 10 feet	3.88
Black Rock Harbor	
1. No Work	0.00
2. Maintenance dredge exisitng channel	0.00
3. Dredge existing channel to 22 feet (no maintenance)	0.00
4. Construct authorized breakwaters	1.32
5. Dredge authorized anchorages, Cedar and Burr Creeks	0.59
6. Dredge additional anchorages	0.27
7. Combination of Alternatives 4,5 and 6	0.59
Bridgeport Harbor	
1. No Work	0.00
2. Dredge anchorage to 35 feet	17.56
3. Dredge channel and turn basin to 40 feet	0.49
4. Dredge area at Union Square Dock	0.69
5. Combination of Alterantives 2,3 and 4	1.64
Pequonnock River and Johnsons River	
1. No Work	0.00
2. Provide additional recreational boating facilities in Pequonnock River (self-liquidating)	1.43
3. Provide 6 foot channel and 1.4 acre recreational improvements in Johnsons River	0.12

IMPACT ASSESSMENT

1. Dredging Impacts

The potential impacts of the dredgeing operations on the water quality of Bridgeport Harbor would be increased turbidity, dissolved oxygen reduction, disturbance and release of nutrients, heavy metals, oil, grease and other potentially toxic materials in the sediment. All of these effects however will be short term.

Temporary dissolved oxygen reduction may occur in the waters surrounding the dredging operation due to the suspension of organic compounds which may be in high concentrations in Bridgeport Harbor. The release of unpleasant odors would also likely take place with these operations.

There would be direct impact on the area dredged to the organisms that dwell on the harbor bottom. Some of the larger and more mobile species may be able to leave the dredging area, but most benthic life in these confines would be destroyed. As the composition of the bottom is changed the species inhabiting this area may be altered and as the suspended sediments settle again, they may accumulate in clams or oysters.

There may also be some interuption of vessel traffic in the channel when dredging operations take place. Scheduling problems with the oil receiving facilities, because of their frequent deliveries, would more than likely result.

2. Disposal Impacts

At this time specific disposal sites have not been chosen, and the composition of the sediments has not been analyzed. Therefore, no definite statements can be made, only general observations.

Disposal sites which are located in or near the harbor would be the most advantageous. There have been offers by local officials to use the Seaside Park peninsula, however this too would need further study. In any event, care should be taken to minimize the damage to bottom dwelling organisms which may be destroyed by a dredging pile. This pile of dredged material could also effect the water quality as it erodes from underwater currents.

Use of inland disposal would require transporting the dredged material over local roads. Such impacts would require further study and cannot be adequately discussed at present.

Open water disposal is another alternative. This method would again depend on the composition of the material to be disposed of. Potentially degrading Class II or Class III material may result in harm to the aquatic life system if it is not properly capped with suitable Class I material. Potential long term effects include the erosion of the

dredged material pile on to the ocean floor. Short term effects would be increases in the turbidity, reductions in dissolved oxygen and releases of heavy metals, nutrients and other possible pollutants. These short term impacts however, would not, to any great extent, alter the biological community.

ITEMS REQUIRING FURTHER STUDY

Although the proposed improvements to Bridgeport Harbor would not have any major impacts on the regional environment, more detailed information is needed to project a more realistic picture. Recommendations for Stages II and III of the study plan will provide information useful in determining sensitive environmental areas. The proposed improvements will also be reviewed and refined in regard to their economic and engineering feasibility. Some of the more important areas are listed below:

- Probability of oil tanker or barge accidents in Bridgeport and Black Rock Harbors, both under existing conditions and with proposed improvements to determine exact need for modifications.
- Areas that would be impacted in the event of an oil spill in both Bridgeport and Black Rock Harbors. This should be analyzed with the latest accepted technology which is readily available.
- A survey of the biological communities which may be affected in the improvement area.
- Sediment analysis of material that will be dredged and classification for disposal.
- Analysis of potential disposal sites and expected impacts.
- Determination of area required for maneuvering large vessels to establish demensions of adequate turning basin for future size vessels.
- Improvement construction costs to be reviewed and refined.

SECTION V. STAGE II AND STAGE III PLANNING

This section of the report develops a plan for making subsequent studies of economic, environmental, cultural and sociological aspects of the requested channel improvements and other alternatives. The development of this Plan of Study is incorporated in Stage I of a 3-stage planning process. In each stage of study, problems are identified, alternatives formulated and impacts are assessed. Stage I is the preliminary study which establishes the advisability of proceeding with subsequent planning stages and establishes the procedures by which the study will be conducted. The approval of this Plan of Study by the Division Engineer as required by current regulations marks the end of Stage I. Stage II studies will more fully detail and evaluate significant problems and alternatives outlined in Stage I. Stage III will completely detail the recommended plans which satisfy the multi-objective planning framework of the Principles and Standards process discussed in the following paragraphs. The end of Stage III is marked by the submission of a Feasibility Report and Environmental Impact Statement to the Board of Announcement by the Division Engineer. These studies determine if the Federal Government can contribute assistance toward solving the problems by project construction or by implementation of other programs. Figure 3 gives a schedule of work to be completed through the end of Stage III.

STUDY GUIDELINES

Studies will include survey report details as required by EM1120-2-101, as amended, subject: "Survey Investigations and Reports, General Procedures". This manual incorporates the basic instructions for the planning, conduct and processing of survey reports through authorization of projects by Congress. The EM1120-2-101 series of manuals, as amended, provided basic information and guidance on the origin, conduct, and principles and procedures of engineering and economic investigations for civil work projects. The task of investigation requires the following items:

- Careful coordination and cooperation among all federal and non-federal interests concerned.
- Basic research of hydrologic and hydraulic conditions.
- Gathering and analysis of economic data.
- Deriving and comparing the relative merits of all practicable solutions for related and conflicting demands for water uses and site development.

FIGURE 3
To Be Inserted

- Assuring optimum use of resources and sites and securing the maximum net benefits.

- Determining the most equitable sharing of costs under the law among federal and local interests.

- Presenting a satisfactory and adequate report on the matter for the information of all concerned and for a basis of action by Congress.

Studies will be conducted in accordance with ER 1105-2-200, "Planning Process: Multiobjective Planning Framework". This regulation establishes guidance for implementing and planning requirements of the Water Resources Council's Principles and Standards (P&S) and related policies. It does so by describing the planning process under which alternative plans are prepared and evaluated and by identifying the changes from existing guidance that are necessary as a result of the P&S and related policies. The objective of this regulation is to guide planning for the conservation, development, and management of water and related land resources. This is accomplished by systematically preparing and evaluating alternative plans that address publicly identified problems, needs, concerns and opportunities. Alternative plans will consider non-structural and structural measures as co-equal approaches to managing resources. Through this process, decision makers at all levels will be provided information necessary to make effective choices regarding resource management under existing and projected conditions.

CONSTRAINTS AND CONTROLS

To date, this study has been funded to initiate preliminary planning and to complete a Plan of Study. Studies will be continued only so long as a possibility remains that a workable, economically feasible, and environmentally and socially acceptable plan of improvement can be recommended. Based on scheduled funding, it is estimated that the Feasibility Report and Environmental Impact Statement will be completed in FY 1981.

PROCEDURES FOR SELECTION OF IMPROVEMENTS

Stage II and III studies will be conducted by formulating and analyzing alternative plans of improvement. These alternatives will be compared during the planning process by considering multiple objectives including national economic development, regional development, environmental quality and social well-being as described in following paragraphs.

The economic feasibility of alternatives will be judged by the benefit-cost ratio method and by using the principle of maximization of benefits. Project effects that cannot be incorporated in the benefit-cost evaluation will be assessed separately in accordance with guidelines of ER 1105-2-105, subject: "Guidelines for Assessment of Economic, Social and Environmental Effects of Civil Works Projects", published 28 September 1972. The regulation is designed to insure that all significant adverse and beneficial effects of Corps of Engineers projects are fully considered in pre and post-authorization planning. The guidelines have been approved by the Secretary of the Army and comply with the directive of Congress contained in Section 122 of the River and Harbor and Flood Control Act of 1970, Public Law 91-611. These guidelines supplement and extend the requirements of the National Environmental Policy Act of 1969, (Public Law 91-190).

OBJECTIVES OF THE INVESTIGATION

The purpose of the feasibility study and environmental impact investigation is to determine and report to the Congress of the United States the advisability of providing federal assistance for navigation improvements to Bridgeport Harbor waterways in regard to economic, environmental, cultural and sociological considerations. In accomplishing this goal, consideration will be given to finding solutions to immediate and long-term navigation problems and needs. In order to meet these goals, equal consideration will be given to the following objectives:

1. National Economic Development (NED)

   Maintaining or increasing the value of the nation's output of goods and services as well as improving national economic efficiency may be achieved through the development of water and related land resources. In accordance with this objective, the present and projected needs will be assessed for navigation and other related elements of land and water resources development. The annual costs for this purpose will be compared against annual benefits in the interest of selecting a project based on national economic development.

2. Regional Development

   The region's income gains and the additional economic impact will be evaluated on the basis of the possible expansion of business, industry, and recreation and on population and social developments that could result from a comprehensive plan of improvement.

3. Environmental Quality (EQ)

The preservation and enhancement of the Nation's environmental resources is essential to insure their availability for future use. The investigation will consider the preservation of natural and cultural areas, creation or restoration of scenic areas, preservatisn and enhancement of recreational areas, and the rehabilitation and protection of aesthetic values in the study area. In accordance with the National Environmental Policy Act of 1969, all available means will be utilized to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations.

4. Social Well-being

The social well-being of the greatest number of people shall be the overriding consideration in determining the best use of water and related land resources. Consideration will be given to project effects on real income, security of life, health and safety, education, cultural and recreational opportunities, emergency preparedness and other factors. Hardship and basic needs of particular groups within the general public will be of concern, but care shall be taken to avoid resource use and development for the benefit of a few to the disadvantage of many.

These objectives will be addressed in a Feasibility Report and Environmental Impact Statement. Prior to issuing these, an effects assessment will be made which will cover all environmental, social, cultural and economic effects to insure that all significant adverse and beneficial project effects are systematically identified and assessed and the feasibility and cost of eliminating or minimizing adverse effects is taken fully into account. Preliminary project benefits and adverse project effects on the environment, recreation, and aesthetics of the area have been made apparent by the present stage of the study.

Project decisions and recommendations will be made in the best overall interests of the public with a balance maintained between elements of dollar benefits and costs, the degree of satisfaction of public needs, and the extent of other types of effects. To accomplish this, the

tentative profile of existing conditions obtained from prior studies will be augmented to show projection of conditions with and without project alternatives over the life of the project. Significant effects will be identified and evaluated. Any desirable project modifications revealed by the assessment will be considered. Survey studies will draw on all known sources of information for effects assessment.

COORDINATION

Coordination will be maintained through the municipal and private interests previously contacted in this study. Each stage of the study will also be presented for comment or concurrence by other federal, state, regional, local, and civic agencies having an interest in the planning of navigation improvements to the Bridgeport Harbor area and related land and water resources. Interests will be kept informed of planning efforts and will be able to make comments and criticisms as informal workshop meetings, described below, are scheduled: one during the formulation stage of the study; the other at the conclusion of the study to keep the public informed and to receive their views. Additional meetings can be arranged if the need arises.

A formulation stage public meeting will be held in the course of report preparation in order to present the advantages and disadvantages of all alternative solutions developed and to incorporate public views and desires in selection of alternatives and plan formulation. A late stage public meeting will be held before report completion to present the findings of detailed studies, including the rationale for any proposed solution, and the tentative recommendations.

ESTIMATE OF COSTS

The preparation of budgetary data for the Bridgeport Harbor Study is predicated upon the estimated amount of money needed to complete the work items considered necessary for a Level C study. The total estimated funds required to complete the 3-stage study is $. The distribution of funds will provide for identification of the needs of each area under investigation by FY 1979 with the completion of alternative solutions by FY 1980 and the selection of final alternatives by FY 1981.

SECTION VI. CONCLUSIONS AND RECOMMENDATIONS

APPENDIX A

BENEFIT CALCULATIONS

INDEX

Recreational Benefits ASH CREEK

700 Boats

Outboard				already depreciated		
1.	10-14 ft.	35	x	$2850/2	=	$ 49,875
2.	15-20 ft.	185	x	$3534/2	=	$326,895
3.	21+ ft.	91	x	$6270/2	=	$285,285
Inboard						
4.	15-20 ft.	125	x	$6726/2	=	$420,563
5.	21-30 ft.	82	x	$14,706/2	=	$602,946
6.	31-40 ft.	40	x	$35,454/2	=	$709,080 10%
7.	40+ ft.	10	x	$95,931/2	=	$479,655 10% at 6
Cruising Sailboats						
8.	15-20 ft.	28	x	$5358/2	=	$ 75,012
9.	21-30 ft.	71	x	$13,623/2	=	$483,617 10%
10.	31-40 ft.	3	x	$37,107/2	=	$ 55,660 20%
Daysailers						
11.	8-15 ft.	10	x	$1254/2	=	$ 6,270
12.	16-20 ft.	15	x	$3078/2	=	$ 23,085
13.	21-25 ft.	5	x	$9804/2	=	$ 24,510
				TOTAL	=	$3,542,453

"Net return for hire and utilization"

49,875	x	14%	=	$6,983	x	90%	=	$ 6,285
326,895	x	13%	=	$42,496	x	90%	=	$ 38,246
285,285	x	13%	=	$37,087	x	75%	=	$ 27,815
420,563	x	12%	=	$50,468	x	90%	=	$ 45,421
602,946	x	12%	=	$72,354	x	90%	=	$ 65,119
709,080	x	11%	=	$77,999	x	75%	=	$ 58,499
479,655	x	10%	=	$47,966	x	75%	=	$ 35,975
				$ 335,353				$277,360

(ASH CREEK cont.)

"Net return for hire and utilization"

75,012	x	8%	=	$6,001	x	90%	=	$ 5,401
483,617	x	8%	=	$38,689	x	90%	=	$ 34,820
55,660	x	7%	=	$3,896	x	75%	=	$ 2,922
6,270	x	12%	=	$752	x	90%	=	$ 677
23,085	x	12%	=	$2,770	x	90%	=	$ 2,493
24,510	x	11%	=	$2,696	x	90%	=	$ 2,426
				$ 54,804				$ 48,739
				$ 335,353				$ 277,360
				$ 390,157				326,099

Recreational Benefits ASH CREEK

Dredge Channel to 6 ft.

Outboard									
1.	$ 49,875	x	14%	=	$ 6,983	x	100%	=	$ 6,983
2.	$326,895	x	13%	=	$42,496	x	100%	=	$42,496
3.	$285,285	x	13%	=	$37,087	x	90%	=	$33,378
Inboard									
4.	$420,563	x	12%	=	$50,468	x	100%	=	$50,468
5.	$602,946	x	12%	=	$72,354	x	100%	=	$72,354
6.	$709,080	x	11%	=	$77,999	x	90%	=	$70,199
40'+ 7.	$479,655	x	10%	=	$47,966	x	75%	=	$35,975
Cruising Sail									
8.	$ 75,012	x	8%	=	$ 6,001	x	100%	=	$ 6,001
9.	$483,617	x	8%	=	$38,689	x	90%	=	$34,820
31'-40' 10.	$ 55,660	x	7%	=	$ 3,896	x	75%	=	$ 3,896
Day Sail									
11.	$ 6,270	x	12%	=	$ 752	x	100%	=	$ 752
12.	$ 23,085	x	12%	=	$ 2,770	x	90%	=	$ 2,493
13.	$ 24,510	x	11%	=	$ 2,696	x	90%	=	$ 2,426
									$362,151

Net Benefit = $362,151 - $326,099 = $36,052

Recreational Benefits ASH CREEK

Dredge to 8 ft.

Outboard								
1.	25(2,850/2)	x	14%	=	4,987	x	100%	= $ 4,987
2.	175(3,534/2)	x	13%	=	40,199	x	100%	= $40,199
3.	100(6,270/2)	x	13%	=	40,755	x	95%	= $38,717
Inboard								
4.	115(6,726/2)	x	12%	=	46,409	x	100%	= $46,409
5.	90(14,706/2)	x	12%	=	79,412	x	100%	= $79,412
6.	50(35,623/2)	x	11%	=	97,963	x	90%	= $88,166
7.	15(95,931/2)	x	10%	=	71,948	x	90%	= $64,753
Cruising Sail								
8.	35(5,358/2)	x	8%	=	7,501	x	100%	= $ 7,501
9.	80(13,623/2)	x	8%	=	43,594	x	100%	= $43,594
10.	7(37,107/2)	x	7%	=	7,621	x	90%	= $ 6,859
Day Sail								
11.	2(1,254/2)	x	12%	=	150	x	100%	= $ 150
12.	5(3,078/2)	x	12%	=	923	x	95%	= $ 878
13.	1(9,804/2)	x	11%	=	539	x	95%	= $ 512

TOTAL = $422,137

Net Benefit = $ 422,137 - $ 326,099 = $ 96,038

Recreational Benefits ASH CREEK

Dredge Channel to 10 ft.

Outboard								
1.	20(2,850/2)	x	14%	=	3,990	x	100%	= $ 3,990
2.	165(3,534/2)	x	13%	=	37,902	x	100%	= $ 37,902
3.	115(6,270/2)	x	13%	=	46,836	x	98%	= $ 45,931
Inboard								
4.	110(6,726/2)	x	12%	=	44,391	x	100%	= $ 44,391
5.	75(14,706/2)	x	12%	=	66,177	x	100%	= $ 66,177
6.	60(35,623/2)	x	11%	=	117,556	x	95%	= $115,205
7.	25(95,931/2)	x	10%	=	119,914	x	90%	= $107,923
Cruising Sail								
8.	23(5,358/2)	x	8%	=	4,292	x	100%	= $ 4,292
9.	85(13,623/2)	x	8%	=	46,318	x	100%	= $ 46,318
10.	15(37,107/2)	x	7%	=	19,481	x	98%	= $ 19,091
Day Sail								
11.	- (1,254/2) -							
12.	- (3,078/2) -							
13.	8(9,804/2)	x	11%	=	4,314	x	100%	= $ 4,314
							TOTAL	= $491,220

Net Benefit = $491,220 - $326,099 = $165,121

BLACK ROCK HARBOR

Breakwater Construction Benefits

Black Rock Marina Storm Damages:

1975 - $20,000

1976 - $12,000

1977 - $55,000 (includes damage to docks)

Assume Annual Net Benefit = ~~$200,000~~ straight average = $29,000

Recreational Benefits

Additional Anchorages in Black Rock Harbor

Area = 5.5 x $(200)^2$ / 43,560 = 5.05Ac

~~5~~ Acres x 7 Boats/Acre = ~~35~~ 315 Boats

Outboard								
1.	2	x	2,850/2	=	2,850	x	14%	= $ 399
2.	11	x	3,534/2	=	19,487	x	13%	= $ 2,533
3.	5	x	6,270/2	=	15,675	x	13%	= $ 2,038
Inboard								
4.	6	x	6,726/2	=	20,178	x	12%	= $ 2,421
5.	4	x	14,706/2	=	29,412	x	12%	= $ 3,529
6.	2	x	35,424/2	=	35 424	x	11%	= $ 3,897
7.	-							
Cruising Sail								
8.	1	x	5,358/2	=	2,679	x	8%	= $ 214
9.	1	x	13,623/2	=	6,812	x	8%	= $ 545
10.	1	x	3,710/2	=	1,855	x	7%	= $ 130
Day Sail								
11.	1	x	1,254/2	=	627	x	12%	= $ 75
12.	1	x	3,078/2	=	1,539	x	12%	= $ 185
13.	-							

Net Benefit for new fleet = $15,966

BLACK ROCK HARBOR

Recreational Benefits

Cedar Creek & Burr Creek

Dredge Authorized Areas

Area = 27.5 Acres

Maximum Number of New Moorings

27.5 x 7 Boats/Acre = 193 Boats (all new)

Outboard						
1.	10-14 ft.	13 x $2,850/2	=	18,525 x 14%	=	$ 2,593
2.	15-20 ft.	62 x $3,534/2	=	109,554 x 13%	=	$ 14,242
3.	21+ ft.	28 x $6,270/2	=	87,780 x 13%	=	$ 10,534
Inboards						
4.	15-20 ft.	18 x $6,726/2	=	60,534 x 12%	=	$ 7,624
5.	21-30 ft.	21 x $14,706/2	=	154,413 x 12%	=	$ 18,530
6.	31-40 ft.	11 x $35,454/2	=	194,997 x 11%	=	$ 21,450
7.	40+ ft.	1 x $95,931/2	=	47,966 x 10%	=	$ 4,797
Cruising Sailboats						
8.	15-20 ft.	7 x $5,358/2	=	18,753 x 8%	=	$ 1,500
9.	21-30 ft.	6 x $13,623/2	=	40,869 x 8%	=	$ 3,270
10.	31-40 ft.	6 x $37,107/2	=	11,130 x 7%	=	$ 779
Day Sail						
11.	8-15 ft.	10 x $1,254/2	=	6,270 x 12%	=	$ 752
12.	16-20 ft.	7 x $3,078/2	=	10,773 x 12%	=	$ 1,293
13.	21-25 ft.	3 x $9,804/2	=	14,706 x 11%	=	$ 1,618
			Net Benefit for new fleet		=	$ 88,982

x 2

BRIDGEPORT HARBOR COMMERCIAL BENEFITS

AT SEA SHIPPING RATES	1978 DOLLARS		"TANKERS" FOREIGN FLAG
DWT	1975		
20,000	$490 + 21%	=	$592/hour
25,000	$520 + 21%	=	$629/hour
37,000	$590 + 21%	=	$714/hour
50,000	$670 + 21%	=	$811/hour
IN PORT			
DWT			
20,000	$370 + 21%	=	$448/hour
25,000	$395 + 21%	=	$478/hour
37,000	$460 + 21%	=	$557/hour
50,000	$520 + 21%	=	$629/hour

Domestic vessels less than 20,000 DWT at $0.30 per barrel

AT SEA	$390/hour
IN PORT	$344/hour

BRIDGEPORT HARBOR COMMERCIAL BENEFITS

AT SEA SHIPPING RATES — 1978 DOLLARS — DRY BULK CARRIERS FOREIGN FLAG

DWT	1977		
15,000	$364 + 7%	=	$389/hour
25,000	$455 + 7%	=	$487/hour
35,000	$540 + 7%	=	$579/hour
50,000	$619 + 7%	=	$662/hour

IN PORT

DWT

15,000	$282 + 7%	=	$302/hour
25,000	$345 + 7%	=	$369/hour
35,000	$399 + 7%	=	$430/hour
50,000	$451 + 7%	=	$483/hour

Domestic vessels less than 15,000 DWT (Barges)

AT SEA	$309/hour
IN PORT	$224/hour

ANNUAL TRANSPORTATION BENEFITS

YEAR	COST - NO PROJECT	COST - PROJECT	NET BENEFIT
	UNITED ILLUMINATING COMPANY		
1978	$ 7,825,356	$ 7,753,878	$ 71,478
1981	7,825,356	7,066,326	759,030
1990	9,210,816	8,728,506	482,310
2000	11,568,440	10,425,288	1,143,152
2010	12,551,514	12,577,206	- 25,692
2020	15,661,302	15,184,260	477,042
2030	19,510,302	19,384,290	126,012
		TOTAL	$3,033,332
		AVERAGE	$ 433,333
	CILCO TERMINAL		
1978	$ 6,652,389	$ 6,644,331	$ 8,058
1981	3,186,419	3,178,361	8,058
1990	3,131,987	3,123,927	8,060
2000	4,266,874	2,751,300	1,515,574
2010	7,147,183	4,789,147	2,358,036
2020	10,416,312	7,349,927	3,066,385
2030	11,163,343	8,883,045	2,280,298
		TOTAL	$9,244,469
		AVERAGE	$1,320,638

all future benefit would be discounted

TOTAL NET BENEFIT = $ 1,753,971

613,089

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,247,959 YEAR: 1978

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
3	37-38	50	$ 811	$ 629	300	36	$ 797,852
6	35-37	37	714	557	300	30	1,385,460
12	33-35	37	714	557	300	30	2,770,920
6	31-33	25	629	478	300	24	1,201,032
8	29-31	20	592	448	300	24	1,506,816
21	< 29	< 20	390/2	344/2	24	18	163,296

TOTAL ANNUAL COST $ 7,825,356

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela. Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,322,836 YEAR: 1981

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
3	37-38	50	$ 811	$ 629	300	36	$ 797,832
6	35-37	37	714	557	300	30	1,385,460
12	33-35	37	714	557	300	30	2,770,920
6	31-33	25	629	478	300	24	1,201,032
8	29-31	20	592	448	300	24	1,506,816
21	< 29	< 20	390/2	344/2	24	18	163,296

TOTAL ANNUAL COST $ 7,825,356

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela. Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,587,403 YEAR: 1990

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
3	37-38	50	$ 811	$ 629	300	36	$ 797,832
9 9	35-37	37	714	557	300	30	2,078,190
~~15~~ 13	33-35	37	714	557	300	30	~~3,463,650~~ 3,001,830
~~8~~ 7	31-33	25	629	478	300	24	~~1,201,032~~ 1,401,204
~~8~~ 9	29-31	20	592	448	300	24	~~1,506,816~~ 1,695,168
~~21~~ 18	29	20	390/2	344/2	24	18	~~163,296~~ 139,968

TOTAL ANNUAL COST $ ~~9,210,816~~ 9,114,192

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,~~904,883~~ 597,403

YEAR: 2000

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
3	37-38	50	$ 811	$ 629	300	36	$ ~~787~~ 787,832	
~~10~~ 10	35-37	37	714	557	300	30	~~2,309,100~~	2,309,100
~~21~~ 13	33-35	37	714	557	300	30	~~5,200,020~~	3,001,680
~~8~~ 7	31-33	25	629	478	300	24	~~1,601,376~~	1,401,204
~~8~~ 7	29-31	20	592	448	300	24	~~1,506,816~~	1,318,464
~~21~~ 18	29	20	390/2	344/2	24	18	163,296	139,968

TOTAL ANNUAL COST ~~$11,568,440~~ $8,968,398

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,587,905 ~~2,285,860~~

YEAR: 2010

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
3	37-38	50	$ 811	$ 629	300	36	$ 797,832	
~~12~~ 11	35-37	37	714	557	300	30	~~2,770,920~~	2,540,010
~~23~~ 13	33-35	37	714	557	300	30	~~5,310,930~~	3,001,830
~~10~~ 7	31-33	25	629	478	300	24	~~2,001,720~~	1,401,204
~~8~~ 5	29-31	20	592	448	300	24	~~1,506,816~~	941,760
21 18	29	20	390/2	344/2	24	18	~~163,296~~	139,968

TOTAL ANNUAL COST ~~$12,551,514~~ $8,822,604

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: ~~2,743,032~~ 1,587,563

YEAR: 2020

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
3	37-38	50	$ 811	$ 629	300	36	$ 797,832	
~~15~~ 12	35-37	37	714	557	300	30	~~3,463,650~~	2,709,200
~~30~~ 14	33-35	37	714	557	300	30	~~6,927,300~~	3,232,746
~~14~~ 6	31-33	25	629	478	300	24	~~2,802,408~~	1,201,032
8 4	29-31	20	592	448	300	24	~~1,506,816~~	753,408
~~21~~ 16	< 29	20	390/2	344/2	24	18	~~163,296~~	124,416

TOTAL ANNUAL COST ~~$15,661,302~~ $8,818,628

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: ~~3,291,658~~ 1,567,408

YEAR: 2030

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
3	37-38	50	$ 811	$ 629	300	36	$ 797,832	
~~15~~ 13	35-37	37	714	557	300	30	~~3,463,650~~	3,001,830
~~38~~ 14	33-35	37	714	557	300	30	~~8,774,580~~	3,232,740
~~24~~ 5	31-33	25	629	478	300	24	~~4,804,128~~	1,000,560
~~8~~ 3	29-31	20	592	448	300	24	~~1,506,816~~	565,056
~~2~~1/6	29	< 20	390/2	344/2	24	18	~~163,296~~	124,446

TOTAL ANNUAL COST ~~$19,510,302~~ $8,722,734

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,247,959 YEAR: 1978

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
3	37-38	50	$ 811	$ 629	300	~~30~~ 36	$ ~~786,510~~ $791,832
6	35-37	37	714	557	300	~~24~~ 30	~~1,365,408~~ 1,385,460
12	33-35	37	714	557	300	~~24~~ 30	~~2,730,816~~ 2,770,920
6	31-33	25	629	478	300	24	1,201,032
8	29-31	20	592	448	300	24	1,506,816
21	< 29	< 20	390/2	344/2	24	18	~~163,296~~ $7,825,336

TOTAL ANNUAL COST $ ~~7,753,878~~

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,322,836 YEAR: 1981

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
~~64~~	37-38	50	$ 811	$ 629	300	30	$ ~~1,310,850~~	1,048,680
9	35-37	37	714	557	300	24	2,048,112	
10	33-35	37	714	557	300	24	2,275,680	
3	31-33	25	629	478	300	24	600,516	
4	29-31	20	592	448	300	24	753,408	
~~15~~ 11 trips	< 29	< 20	390/2	344/2	24	18	~~77,760~~	101,088

TOTAL ANNUAL COST ~~$7,066,326~~ 6,827,

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: 1,587,403 YEAR: 1990

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
~~5~~	37-38	50	$ 811	$ 629	300	30	$ ~~1,835,190~~	$ 1,310,850
10	35-37	37	714	557	300	24	2,275,680	
~~1~~ 15	33-35	37	714	557	300	24	~~3,185,952~~	3,413,520
3	31-33	25	629	478	300	24	600,516	
4	29-31	20	592	448	300	24	753,408	
~~1~~ 14	< 29	< 20	390/2	344/2	24	18	~~27,760~~	108,864
							TOTAL ANNUAL COST $ ~~8,728,506~~	$ 8,462,850

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: ~~1,904,883~~ 587,403

YEAR: 2000

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
~~10~~ 9	37-38	50	$ 811	$ 629	300	30	$ ~~2,621,700~~ 2,359,530
~~12~~ 11	35-37	37	714	557	300	24	~~2,730,816~~ 2,503,248
~~16~~ 11	33-35	37	714	557	300	24	~~3,641,088~~ 2,503,248
3	31-33	25	629	478	300	24	600,516
~~4~~ 2	29-31	20	592	448	300	24	~~753,408~~ 376,704
~~10~~ 14	< 29	< 20	390/2	344/2	24	18	~~77,760~~ 108 864

TOTAL ANNUAL COST ~~$10,425,289~~ 8,452,110

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: ~~2,285,860~~ 1,587,403

YEAR: 2010

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
~~13~~ 11	37-38	50	$ 811	$ 629	300	30	$ ~~3,408,210~~	$ 2,883,370
~~14~~ 10	35-37	37	714	557	300	24	~~3,185,952~~	2,275,680
~~20~~ 11	33-35	37	714	557	300	24	~~4,551,360~~	2,503,248
3 2	31-33	25	629	478	300	24	~~600,516~~	400,344
4 2	29-31	20	592	448	300	24	~~753,408~~	376,704
~~10~~ 14	< 29	< 20	390/2	344/2	24	18	~~77,760~~	108,864

TOTAL ANNUAL COST ~~$12,577,206~~ $ 5,544,710

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: ~~2,743,032~~ 1,587,403

YEAR: 2020

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
~~16~~ 12	37-38	50	$ 811	$ 629	300	30	$ ~~4,194,720~~	$ 3,146,040
~~16~~ 9	35-37	37	714	557	300	24	~~4,096,224~~	2,048,112
~~24~~ 9	33-35	37	714	557	300	24	~~5,461,632~~	2,048,112
3	31-33	25	629	478	300	24	600,516	
~~4~~ 2	29-31	20	592	448	300	24	~~753,408~~	376,704
~~10~~ 14	< 29	< 20	390/2	344/2	24	18	~~97,760~~	108,864

TOTAL ANNUAL COST ~~$ 15,184,260~~ $ 8,328,348

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

UNITED ILLUMINATING COMPANY

TONNAGE: ~~3,291,638~~ 1,587,403

YEAR: 2030

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST	
~~19~~ 13	37-38	50	$ 811	$ 629	300	30	$ ~~4,981,230~~	3,408,210
~~24~~ 9	35-37	37	714	557	300	24	~~5,461,632~~	2,048,112
~~33~~ 8	33-35	37	714	557	300	24	~~7,509,744~~	1,820,544
~~8~~ 2	31-33	25	629	478	300	24	~~600,516~~	400,344
~~4~~ 2	29-31	20	592	448	300	24	~~753,408~~	376,704
~~10~~ 14	< 29	< 20	390/2	344/2	24	18	~~77,760~~	108,864

TOTAL ANNUAL COST ~~$19,384,290~~ 8,162,778

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Tankers based on 4300 nautical miles, round trip, at 14.5 knots. Sole supplier in Venezuela.
Barges based on 24 hour round trip from New Jersey.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 535,636 YEAR: 1978

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	506,370
9	29-35	25	487	369	415	24	1,898,649
4	27-29	15	389	302	415	24	674,732
16	21-27	< 15	390	344	415	24	2,721,696
74	< 20	< 15	390/2	344/2	24	18	575,424

TOTAL ANNUAL COST $ 6,652,389

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 567,774 YEAR: 1981

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	506,370
4	29-35	25	487	369	415	24	843,844
3	27-29	15	389	302	415	24	506,049
3	21-27	< 15	390	344	415	24	510,318
70	< 20	< 15	390/2	344/2	24	18	544,320

TOTAL ANNUAL COST $ 3,186,419

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 664,188 YEAR: 1990

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	506,370
4	29-35	25	487	369	415	24	843,844
3	27-29	15	389	302	415	24	506,049
3	21-27	< 15	390	344	415	24	510,318
63	< 20	< 15	390/2	344/2	24	18	489,888

TOTAL ANNUAL COST $ 3,131,987

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 797,026 YEAR: 2000

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	506,370
4	29-35	25	487	369	415	24	843,844
4	27-29	15	389	302	415	24	674,732
9	21-27	< 15	390	344	415	24	1,530,954
56	< 20	< 15	390/2	344/2	24	18	435,456

TOTAL ANNUAL COST $ 4,266,874

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 956,431 YEAR: 2010

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	506,370
5	29-35	25	487	369	415	24	1,054,805
8	27-29	15	389	302	415	24	1,349,464
21	21-27	< 15	390	344	415	24	3,572,226
50	< 20	< 15	390/2	344/2	24	18	388,800

TOTAL ANNUAL COST $ 7,147,183

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 1,147,712 YEAR: 2020

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	506,370
6	29-35	25	487	369	415	24	1,494,846
16	27-29	15	389	302	415	24	2,698,928
30	21-27	< 15	390	344	415	24	5,090,730
45	< 20	< 15	390/2	344/2	24	18	349,920

TOTAL ANNUAL COST $ 10,416,312

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - NO PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 1,377,254 YEAR: 2030

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	36	$ 275,518
2	35-37	35	579	430	415	30	542,060
8	29-35	25	487	369	415	24	1,687,688
19	27-29	15	389	302	415	24	3,204,977
30	21-27	< 15	390	344	415	24	5,103,180
45	< 20	< 15	390/2	344/2	24	18	349,920

TOTAL ANNUAL COST $ 11,163,343

TOTAL COST = (1) $[(4)(6) + (5)(7)]$

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 535,636 YEAR: 1978

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	~~30~~ 32	$ 272,620
2	35-37	35	579	430	415	~~24~~	501,210
9	29-35	25	487	369	415	24	1,898,649
4	27-29	15	389	302	415	24	674,732
16	21-27	< 15	390	344	415	24	2,721,696
74	< 20	< 15	390/2	344/2	24	18	575,424

TOTAL ANNUAL COST $ ~~6,644~~,331

*TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 567,774 YEAR: 1981

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	30	$ 272,620
2	35-37	35	579	430	415	24	501,210
4	29-35	25	487	369	415	24	843,844
3	27-29	15	389	302	415	24	506,049
3	21-27	< 15	390	344	415	24	510,318
70	< 20	< 15	390/2	344/2	24	18	544,320

TOTAL ANNUAL COST $ 3,178,361

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 664,188 YEAR: 1990

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
1	37-38	50	$ 622	$ 483	415	30	$ 272,620
2	35-37	35	579	430	415	24	501,210
4	29-35	25	487	369	415	24	843,844
3	27-29	15	389	302	415	24	506,049
3	21-27	< 15	390	344	415	24	510,318
63	< 20	< 15	390/2	344/2	24	18	489,888

TOTAL ANNUAL COST $ 3,123,927

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 797,026 YEAR: 2000

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
2	37-38	50	$ 622	$ 483	415	30	$ 545,240
3	35-37	35	579	430	415	24	250,605
4	29-35	25	487	369	415	24	843,844
3	27-29	15	389	302	415	24	506,049
3	21-27	< 15	390	344	415	24	170,106
56	< 20	< 15	390/2	344/2	24	18	435,456

TOTAL ANNUAL COST $ 2,751,300

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 956,431 YEAR: 2010

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
3	37-38	50	$ 622	$ 483	415	30	$ 817,860
4	35-37	35	579	430	415	24	1,002,420
5	29-35	25	487	369	415	24	1,054,805
4	27-29	15	389	302	415	24	674,732
5	21-27	< 15	390	344	415	24	850,530
50	< 20	< 15	390/2	344/2	24	18	388,800

TOTAL ANNUAL COST 4,789,147

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 1,147,712 YEAR: 2020

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
4	37-38	50	$ 622	$ 483	415	30	$ 1,090,480
5	35-37	35	579	430	415	24	1,253,025
6	29-35	25	487	369	415	24	1,265,766
8	27-29	15	389	302	415	24	1,349,464
12	21-27	< 15	390	344	415	24	2,041,272
45	< 20	< 15	390/2	344/2	24	18	349,920

TOTAL ANNUAL COST $ 7,349,927

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

BRIDGEPORT HARBOR - WITH PROJECT

TRANSPORTATION COSTS

CILCO TERMINAL

TONNAGE: 1,377,254 YEAR: 2030

(1) NO. OF VESSELS	(2) DRAFT IN FT.	(3) DWT (000)	(4) RATE AT SEA	(5) RATE IN PORT	(6) HOURS AT SEA*	(7) HOURS IN PORT	TOTAL COST
5	37-38	50	$ 622	$ 483	415	30	$ 1,363,100
7	35-37	35	579	430	415	24	1,754,235
8	29-35	25	487	369	415	24	1,687,688
10	27-29	15	389	302	415	24	1,686,830
12	21-27	< 15	390	344	415	24	2,041,272
45	< 20	< 15	390/2	344/2	24	18	349,920

TOTAL ANNUAL COST $ 8,883,045

TOTAL COST = (1) [(4)(6) + (5)(7)]

* Freighters based on average 6000 nautical miles round trip at 14.5 knots. Points of origin include Europe, Asia and Africa. Barges based on average 24 hour round trip from U. S. East Coast.

COMMERCIAL BENEFITS FOR UNION SQUARE DOCK

Barge transport for two visiting vessels per year that would accept community visitors.

Using 16 hours of barge transport per vessel, the benefits would be:

2 X 16 X $390/hour = $12,480

justified, recommend for development

Recreational Benefits

Peguonnock River

100 Slips

Outboard							
1.	10-14 ft.	7 x $2,850/2	=	$ 9,975	x 14%	=	$ 1,397
2.	15-20 ft.	30 x $3,534/2	=	$ 53,010	x 13%	=	$ 6,903
3.	21+ ft.	15 x $6,270/2	=	$ 47,025	x 13%	=	$ 6,113
Inboard							
4.	15-20 ft.	17 x $6,726/2	=	$ 57,171	x 12%	=	$ 6,861
5.	21-30 ft.	11 x $14,706/2	=	$ 80,883	x 12%	=	$ 9,706
6.	31-40 ft.	6 x $35,454/2	=	$106,362	x 11%	=	$11,670
7.	40+ ft.	1 x $95,931/2	=	$ 47,966	x 10%	=	$ 4,797
Cruising Sail							
8.	15-20 ft.	3 x $5,358/2	=	$ 8,037	x 8%	=	$ 643
9.	21-30 ft.	3 x $13,623/2	=	$ 20,434	x 8%	=	$ 1,635
10.	31-40 ft.	3 x $37,107/2	=	$ 55,661	x 7%	=	$ 3,896
Day Sail							
11.	8-15 ft.	2 x $1,254/2	=	$ 1,254	x 12%	=	$ 150
12.	16-20 ft.	1 x $3,078/2	=	$ 1,539	x 12%	=	$ 185
13.	21-25 ft.	1 x $9,804/2	=	$ 4,902	x 11%	=	$ 539
				$494,219			$55,845

Net Benefit for 100 Boats = $55,845

Recreational Benefits

Johnson's River

6 ft. Anchorage

Area = 1.4 Acres Mooring

1.4 x 8 Boats/Acre = 11 Boats

"Assume All Powerboats"

additional anchorage space provided would increase benefit by increasing # of boats.

Outboard							
1.	10-14 ft.	1 x 2,850/2	=	2,850 x 14%	=	$	399
2.	15-20 ft.	4 x 3,534/2	=	7,068 x 13%	=	$	919
3.	21+ ft.	2 x 6,270/2	=	6,270 x 13%	=	$	815
Inboard							
4.	15-20 ft.	2 x 6,726/2	=	6,726 x 12%	=	$	807
5.	21-30 ft.	1 x 14,706/2	=	7,353 x 12%	=	$	882
6.	31-40 ft.	1 x 35,454/2	=	17,727 x 11%	=		$1,950
				$47,994			$5,772

Net Benefit for new fleet = $5,772