TABLE I-10

DREDGING HISTORY OF OAKLAND HARBOR PROJECT

Fiscal Year	Quantity Removed (c.y.)		Method of Dredging	Portion of Project Dredged [1]
1931*	2,060,500	2,588,800	hydraulic pipeline(?)	O,I,T
1931	527,800		hopper	E
1932	564,500	764,100	hydraulic pipeline(?)	O,I,T
1932	200,600		hopper	E
1933	163,500		"	E
1934	13,131		"	I [2]
1935	1,124		hydraulic pipeline	T
1936	2,326		hopper	E
1937	431,400	952,200	hydraulic pipeline	I
1937	520,800		hopper	E
1938	4,101		clamshell	I,T
1939	166,200		hopper	I
1940	974,700		"	E
1941	5,500		"	I,T
1942*	1,077,500		"	E
1943	871,000	1,120,200	"	I
1943	249,200		"	E
1944	4,200		clamshell	I
1945	759,800		hopper	E
1946	461,500		"	O,I
1947	1,148,500		"	E,O,I
1948	1,095,500		"	E,O,I
1949	385,500		"	E
1950	1,332,600		"	O,I [3]
1951	249,900		"	I
1952	1,069,900		"	I
1953	365,900		"	O,I
1954	527,200		"	O,I
1955	845,400		"	O,I
1956	372,500		"	O,I
1957	406,000	432,700	"	O,I
1957	17,700		clamshell	T
1958	463,000		hopper	O,I
1959	670,000		"	O,I
1960	1,730,000		"	O,I
1961	1,730,000		"	O,I
1962	915,000		"	O,I
1963	1,122,000		"	O,I
1964	1,559,800		"	O,I
1965	1,018,400		"	I
1966	180,800		"	I
1967	593,400		"	O[4],I

TABLE I-10 (Cont'd)

Fiscal Year	Quantity Removed (c.y.)		Method of Dredging	Portion of Project Dredged 1/
1968	238,900		hopper	O
1969	334,700	346,500	hopper	O,I
1969	11,800		clamshell	I
1971	213,000		hopper	O,I
1972	364,000		"	O
1973	387,500		"	O
1974	324,000	2,214,000	"	O
1974*	1,890,000		clamshell	I
1975	250,000	322,000	hopper	O
1975*	72,000		hopper	I
1976	250,000	450,000	"	O
1976	200,000		"	I

1/ O = Oakland Outer Harbor
I = Oakland Inner Harbor
T = Tidal Canal
E = Entrance channel to both harbors

2/ Test dredging to see if hopper could be used in Inner Harbor.

3/ Beginning with F.Y. 1950, "O, I" includes dredging of entrance channel, "E".

4/ Included dredging of Navy basin (MOTBA-North).

* Includes improvements to the project.

1.084 Since the majority of dredgings were completed by hopper, disposals took place in the Bay. Dredgings back to fiscal year 1970 were disposed at the Alcatraz site, except for a small portion of the improvement dredging in F.Y. 1975 that was disposed of outside the Golden Gate at the 100-Fathom site. Before 1970, hopper dredgings were either disposed of near Yerba Buena Island or somewhere between Yerba Buena Island and San Francisco. Hydraulic pipeline material was probably disposed of on land adjacent to the channel.

1.085 c. Proposed Maintenance. Both Oakland Inner and Outer Harbors are dredged annually. Oakland Outer is scheduled to be maintained in December-March 1975-76 (F.Y. 1976) when approximately 250,000 cubic yards will be removed by hopper and disposed of at the Alcatraz site. The more frequent shoal areas in Outer Harbor are shown on Plate I-10.

1.086 Since Oakland Inner Harbor was deepened last year, it is difficult to anticipate where future shoals will accumulate. However, Oakland Inner Harbor is scheduled to be maintained during December 1975 through March 1976 when about 200,000 cubic yards will be dredged by hopper and the material disposed of at the Alcatraz site.

1.087 A Final Environmental Impact Statement was written on the deepening of Oakland Inner Harbor (Phase I) in 1973 (211), and a draft statement on the maintenance of Oakland Outer Harbor in 1972 (213). A final statement for the Outer Harbor maintenance will not be written since the impacts will be discussed in the Composite Statement.

1.088 d. Related Projects. Improvements to Oakland Outer Harbor are under consideration by the Corps, which include widening and deepening from 35 to 42 - 44 feet. The study was authorized under House Resolution dated 14 June 1972 which essentially directed the Corps to prepare a Survey Report on the needs and plan for improvement, and an environmental evaluation of the proposed development. Preliminary details of the project, alternatives and environmental considerations are discussed in the Working Paper issued in December 1974 (208).

1.089 Aside from Corps dredging activities in the harbor, the Port of Oakland, U.S. Navy, Coast Guard and private interests have their own dredging requirements. The largest non-Corps authorized dredgings in Oakland Harbor are the Port of Oakland, the Military Ocean Terminal, Bay Area (MOTBA) sites, the Naval Supply Center, and Alameda Naval Air Station fleet carrier basin. The above Navy facilities, at the request of the Navy, are maintained by the Corps, and are addressed in further detail elsewhere in this report. The smaller Navy dredging requirements, such as shoal removal around their piers, are done by the Navy.

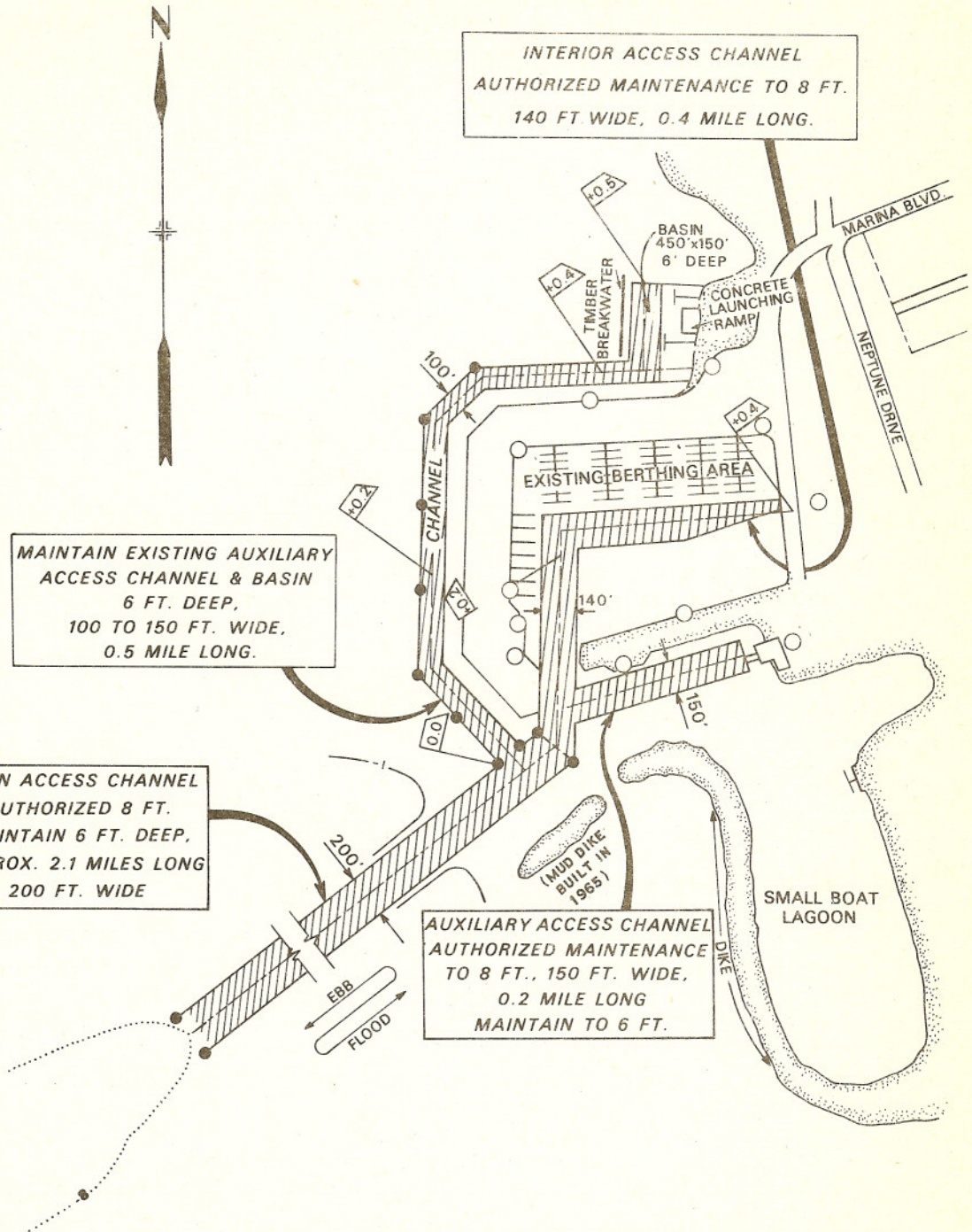
1.090 Since the purpose of Federal access channels is to provide safe navigation to destined ports, the ships, once having arrived, must have adequate depths for safe moorage. For this reason, the Port of Oakland regularly dredges a sizable amount of sediments from their piers and berths. Over the last three years, the Corps has received applications from the Port for dredging over 430,000 cubic yards or about 143,000 cubic yards annually. Dredgings were completed mostly by clamshell and disposal took place either at the Alcatraz site or at the 100-Fathom ocean disposal site. Over the next few years the Port of Oakland expects their own maintenance dredging will average 200,000 cubic yards annually.

1.091 Other dredging activities around the harbor are on a smaller scale and over the past four years amounted to about 225,000 cubic yards or 56,000 cubic yards per year.

7. San Leandro Marina.

1.092 a. Congressional Authorization. During the late 1950's and 1960's, the Corps was studying the feasibility of Federal participation in developing harbors for light-draft vessels under the authority of the Rivers and Harbors Act of 1950. In 8 September 1964, the City of San Leandro submitted a resolution requesting Federal maintenance of their locally-built access channels to San Leandro Marina. Since the resolution was consistent with the objectives of the Federal study, the access channels came under special investigation, and the Corps soon thereafter recommended that the San Leandro Marina access channels come under Federal maintenance. The project was adopted under House Document No. 91-428 dated 16 December 1970 (1st Cong., 2d Sess.) which provided for the maintenance of the 2.1 mile long, 200-foot wide main access channel to eight feet deep; interior access channel, 0.4 mile long, 140 feet wide, eight feet deep, which serves the main berthing areas; north auxiliary access channel, 0.5 mile long, 100 feet wide, six feet deep, branching from the main channel just outside of and paralleling the north breakwater and ending in a 450 x 150-foot turning basin, six feet deep; and an auxiliary access channel, 0.2 mile long, 150 feet wide, eight feet deep branching to the east from the interior channel just beyond the harbor entrance and following the south side of the south dike (Plate I-11). Although the main channel and auxiliary channel south of the south dike are authorized to eight feet, all channels are presently maintained to six feet. Congress has not yet appropriated funds for deepening, and until such time, the entire project will be maintained to six feet.

1.093 b. Dredging History. Since Federal participation in this project is a recent endeavor, the Corps has only maintained it once in 1973 when 330,100 cubic yards were removed by hydraulic pipeline and pumped onto land 3,000 feet southeast of the main access channel. The project was initially constructed by the City of San Leandro in 1961 when the marina and channels were dredged and surrounding dikes built. The main access channel was hydraulically dredged and the material pumped to an adjacent water area 1,500 feet south of and paralleling the main access channel. Material dredged from the auxiliary and interior channels was used for dike construction and adjacent landfill. First maintenance occurred in 1965 when 49,000 cubic yards were dredged from the entrance channel by clamshell and the material used to create a mud dike to protect the harbor entrance (see Plate I-11). In 1966, the marina channels were hydraulically maintained (225,000 cubic yards) and material disposed on land and in a shallow aquatic area, 1,500 feet south of the head of the main channel, thereby creating a small mud island (Plate I-12). Concurrent with this maintenance was the construction of the small boat lagoon for sailboats immediately south of the marina.



NOTE: ALL CHANNELS TO BE MAINTAINED TO 6 FT.. DEPTH UNTIL MAIN ACCESS CHANNEL IS DREDGED TO 8 FT. DEPTH.

● CHANNEL MARKER

SCALE IN FEET
500 0 500

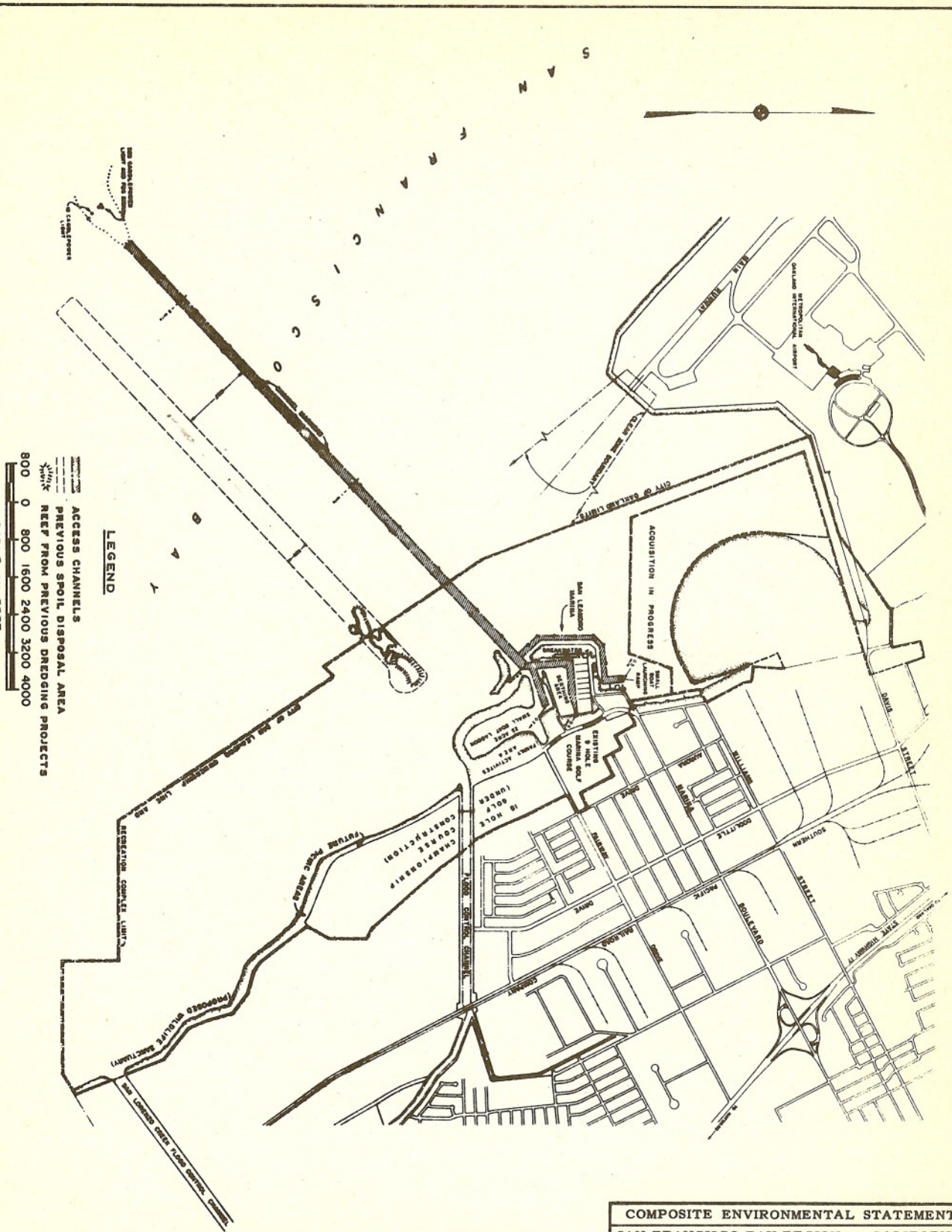
COMPOSITE ENVIRONMENTAL STATEMENT
SAN FRANCISCO BAY REGION CALIFORNIA

SAN LEANDRO MARINA

PROJECT LOCATION

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: TO ACCOMPANY C.E.S.
CHECKED: DATED FEB 1975

PLATE I-11



COMPOSITE ENVIRONMENTAL STATEMENT	
SAN FRANCISCO BAY REGION	CALIFORNIA
SAN LEANDRO MARINA	
SHORELINE COMPLEX	
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E	
DRAWN:	FILE NO.
TRACED:	TO ACCOMPANY C.E.S.
CHECKED:	DATED FEB 1975

PLATE I-12

1.094 c. Proposed Maintenance. Based on the last two maintenance dredgings, the project will probably be maintained on a five to six year cycle when approximately 225,000 cubic yards will be removed (which is equivalent to an average annual quantity of 42,000 cubic yards). Next maintenance is tentatively scheduled for fiscal year 1978 but confirmation of any set time depends on the hydrographic survey results, which are periodically taken to determine the amount and location of the shoals. Future disposal has not been determined but the previously used aquatic site will not be used.

1.095 d. Related Projects. There are several related projects in the immediate area. One includes studying the feasibility of building additional breakwaters near the entrance of the harbor to reduce or eliminate wave damage to the moored recreational boats. The study is being conducted by the Corps and a Draft Environmental Statement was publically issued concerning the details of the study (205). The City of San Leandro has been given two Corps permits for the Marina area: restoration of the 1965-constructed mud island (see Plate I-12) by using 8,000 cubic yards of dredged material from alongside the main access channel; and retention of three wood pilings inside the Marina for moorage posts. One pending permit application by Spinnaker Yacht Club is for construction of a yacht club on the south dike road, facing the entrance of Laguna del Sol.

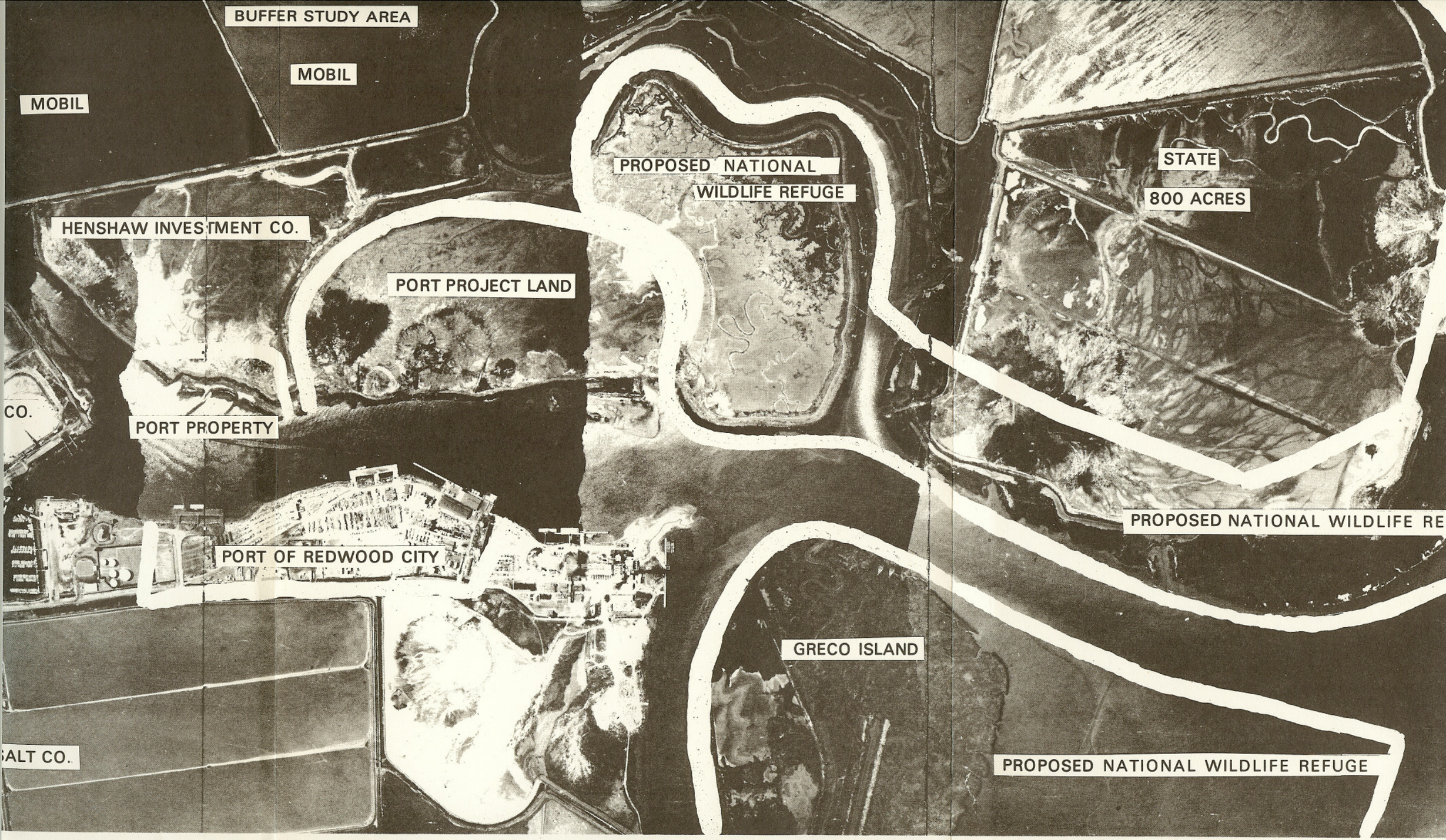
1.096 Other projects in the immediate vicinity but not directly related to San Leandro Marina include developing an 18-hole championship golf course south of the marina (125 acres of the course is under Corps jurisdiction); filling a two-acre area adjacent to San Lorenzo Creek with 9,000 cubic yards of material obtained from an existing quarry; and Corps flood control projects in San Lorenzo Creek and San Leandro Creek. The San Lorenzo Creek flood control project was completed in 1962 while the San Leandro Creek project was completed in 1974. A Final Environmental Statement for San Leandro Creek was issued in November 1971.

8. Redwood City Harbor.

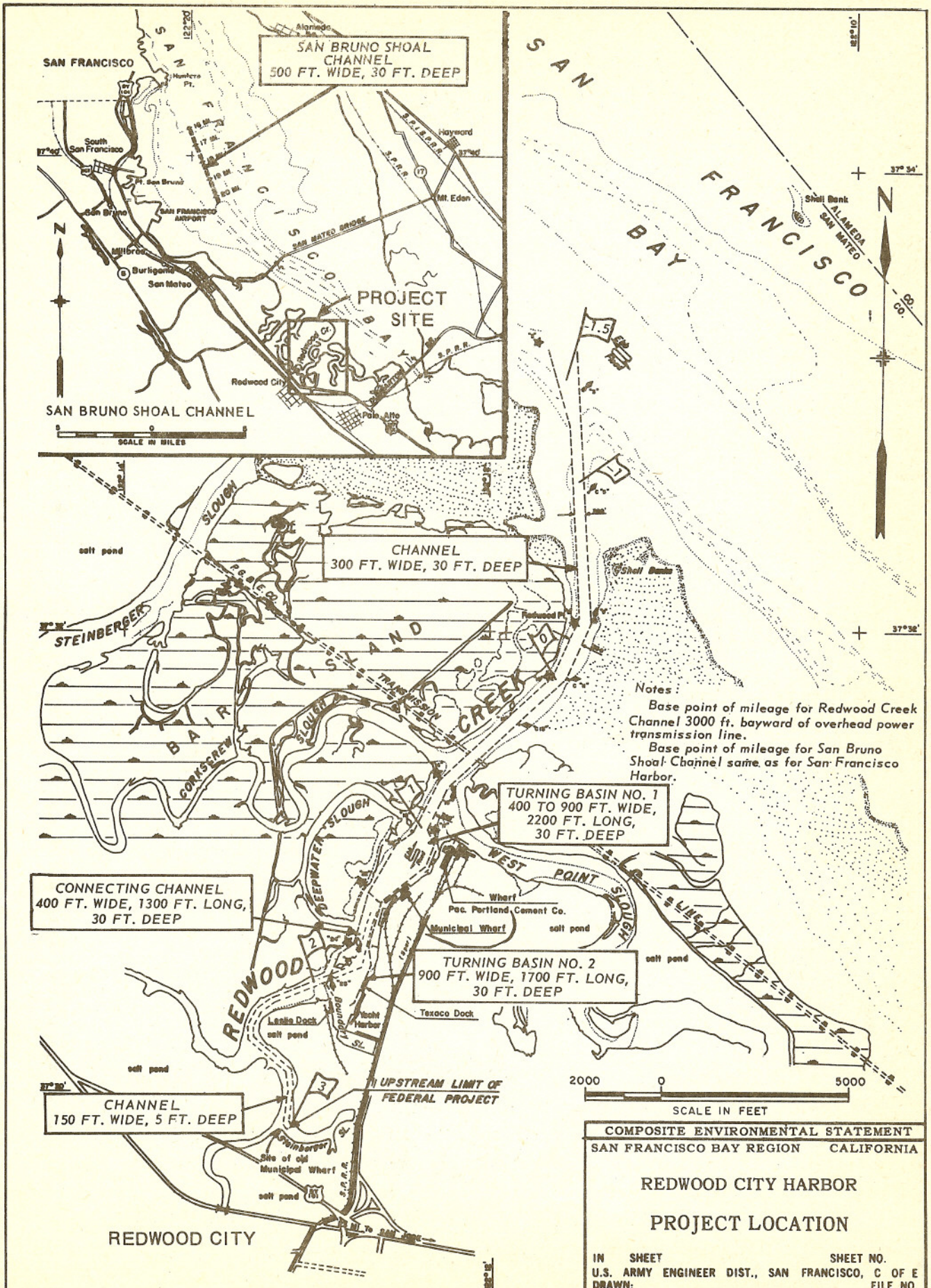
1.097 a. Congressional Authorization. The Redwood City Harbor channel, located 20 nautical miles south of San Francisco in San Mateo County, was first authorized under the Rivers and Harbors Acts of 5 July 1884 and 13 June 1902. Eight years later, the Congressional Act of 25 June 1910 authorized a five-foot channel to Steinberger Slough which was completed in 1911. The Act of 3 July 1930 authorized a 20-foot deep entrance channel to West Point Slough (completed in 1931), and the Act of 30 August 1935 allowed deepening of this channel to 27 feet with a turning basin of the same depth being 1,800 feet long and 700 feet wide. This improvement was completed in 1937. On 2 March 1945, Congress approved the dredging of a channel 30 feet deep and 500 feet wide across San Bruno Shoal and the enlarging and deepening of the 27-foot channel and turning basin in Redwood Creek to a depth of 30 feet. The Act of 17 May 1950 added a 30-foot channel to a point 1,300 feet upstream of the first basin and a second turning basin 30 feet deep, 900 feet wide, and 1,700 feet long at the junction of Redwood Creek and Boundary Slough. It was about this time that the project's name was changed from Redwood Creek to Redwood City Harbor. Plate I-13 shows the Port and the surrounding area as it appeared in 1972.

1.098 In summary, the existing project dimensions include a channel 500 feet wide, 30 feet deep across San Bruno Shoal in San Francisco Bay; a channel 300 feet wide and 30 feet deep to the confluence of West Point Slough and Redwood Creek, Turning Basin No. 1 at that location 2,200 feet long and from 400 to 900 feet wide; thence a channel 400 feet wide, 30 feet deep and approximately 1,300 feet long to Turning Basin No. 2, approximately 900 feet wide, 1,700 feet long, and 30 feet deep; thence a channel 150 feet wide and five feet deep extending to Steinberger Slough. Plate I-14 shows the project as presently authorized. The primary users of the channel are Leslie Salt Company and one oil company.

1.099 b. Dredging History. A summary of dredging since 1931 is listed below:



LAND OWNERSHIP IN PORT OF REDWOOD CITY AREA



COMPOSITE ENVIRONMENTAL STATEMENT

SAN FRANCISCO BAY REGION CALIFORNIA

REDWOOD CITY HARBOR

PROJECT LOCATION

IN SHEET SHEET NO.
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: TO ACCOMPANY REPORT
CHECKED: DATED FEB 1975

PLATE I-14

TABLE I-11

DREDGING HISTORY OF REDWOOD CITY HARBOR PROJECT

Fiscal Year	Quantity Removed (c.y.)		Method of Dredging	Portion of Project Dredged 2/
1931*	611,600		hydraulic pipeline	R
1937*	1,266,700		" "	R
1938*	730,900		" "	R
1939	10,000		clamshell	R
1940	467,200		hopper	R
1941	66,700		"	R
1942	701,400		"	R
1945	188,800		hydraulic pipeline	R
1947	315,700		hopper	R
1948	707,800		"	S
1949	445,800		"	R
1950	123,600		hydraulic pipeline	R
1951	331,300		hopper	R
1953	360,900		"	R
1954	62,900		"	R
1955	199,200		"	R
1956	389,500		"	R
1957	158,000		"	R
1958	99,000		"	R
1959	268,000		"	R
1960	68,700	1,192,700	hydraulic pipeline	R
1960	1,124,000		hopper	S
1961	431,900		hydraulic pipeline	R
1962	773,000		hopper	R
1964	444,100		"	R
1965	295,200		"	R
1966	910,500		"	R
1967	379,100	397,100	"	R
1967	18,000		"	S
1968	312,600		"	R
1969	201,000	524,500	"	S
1969	323,500		"	R
1970	639,000		"	R
1971	816,100		"	R
1972	0		"	R
1973 1/	5,000		"	R

* Includes improvement work.

1/ Experimental dredging operation related to Dredge Disposal Study.

2/ R -- Redwood Harbor.
S -- San Bruno Shoal Channel.

1.100 The existing project was completed in 1965 and has been maintained since then. San Bruno Shoal has not been dredged since 1969. Based on the period 1966-1975, the average annual quantity dredged in Redwood City Harbor is estimated at about 325,000 cubic yards.

1.101 Material dredged for the construction and maintenance of Redwood City Harbor has been deposited in South Bay and at various land disposal sites surrounding the project. Plate I-13 shows several mounds of dredged material behind diked areas adjacent to the northwest and northern sides of the turning basins on former marsh north of the entrance channel. Although the disposal areas are separated from the basin by dikes, these levees have been broken in several locations, allowing tidal inundation from Deepwater Slough.

1.102 The former disposal sites have not been developed, and are currently supporting moderate vegetation and wildlife. Land directly north of the first turning basin is owned by the Port, and is listed as undeveloped port land (Plate I-13).

1.103 A Draft Environmental Impact Statement on maintenance dredging in Redwood City Harbor was prepared by the San Francisco District in June 1972 (199). The Final Statement will not be written since it is now incorporated into the Composite Environmental Statement.

1.104 Approximately 5,000 cubic yards were dredged by hopper in March 1973 from the channel entrance and disposed of at the old South Bay disposal site (see Plate II-33). The purpose of this experimental operation was to assess the recovery time of bottom fauna at the dredge site and to observe the impact of disposal based on this limited quantity of material. The results are presented in Sections II and IV of the Composite Statement.

1.105 c. Proposed Maintenance. Historically, Redwood City Harbor has been maintained annually but since 1971 no maintenance dredging has been performed. Although dredging was scheduled for the summer of 1974, this action was postponed until February, 1975. At that time the project was further postponed due to the absence of a disposal site suitable to all agencies concerned with the project.

1.106 For environmental reasons, the Corps does not allow Bay disposal of sediments at any site south of the Alcatraz Disposal site, which is too expensive to haul Redwood City Harbor sediments to. This has prompted the search for a land disposal site, and four potential areas have been identified (see Plate I-15). Site 1, which is approximately 135 acres, is owned by the Port and is their preferred choice for disposal since it would create high ground for future port development. Sites 3 (100 acres) and 4 (90 acres) are owned by the Leslie Salt Company and Site 2 (110 acres) by the Henshaw Investment Company. These four sites are described in further detail in Section II.

1.107 No definite decision has been made as to the ultimate disposal for the maintenance dredging material of Redwood City Harbor. A hydrographic survey was conducted in June 1975 to determine the amount of shoal material to be removed.

1.108 An estimated 300,000 cubic yards will be removed during the next maintenance.

1.109 Assuming suitable land disposal sites can be obtained, a hydraulic dredge will be used inside the harbor, and if San Bruno Shoals needs maintenance, a hopper or clamshell dredge will be used. Monitoring of sediments for pollutants will be done. Authorized depth and sizes will be followed with a two-foot overdepth allowed.

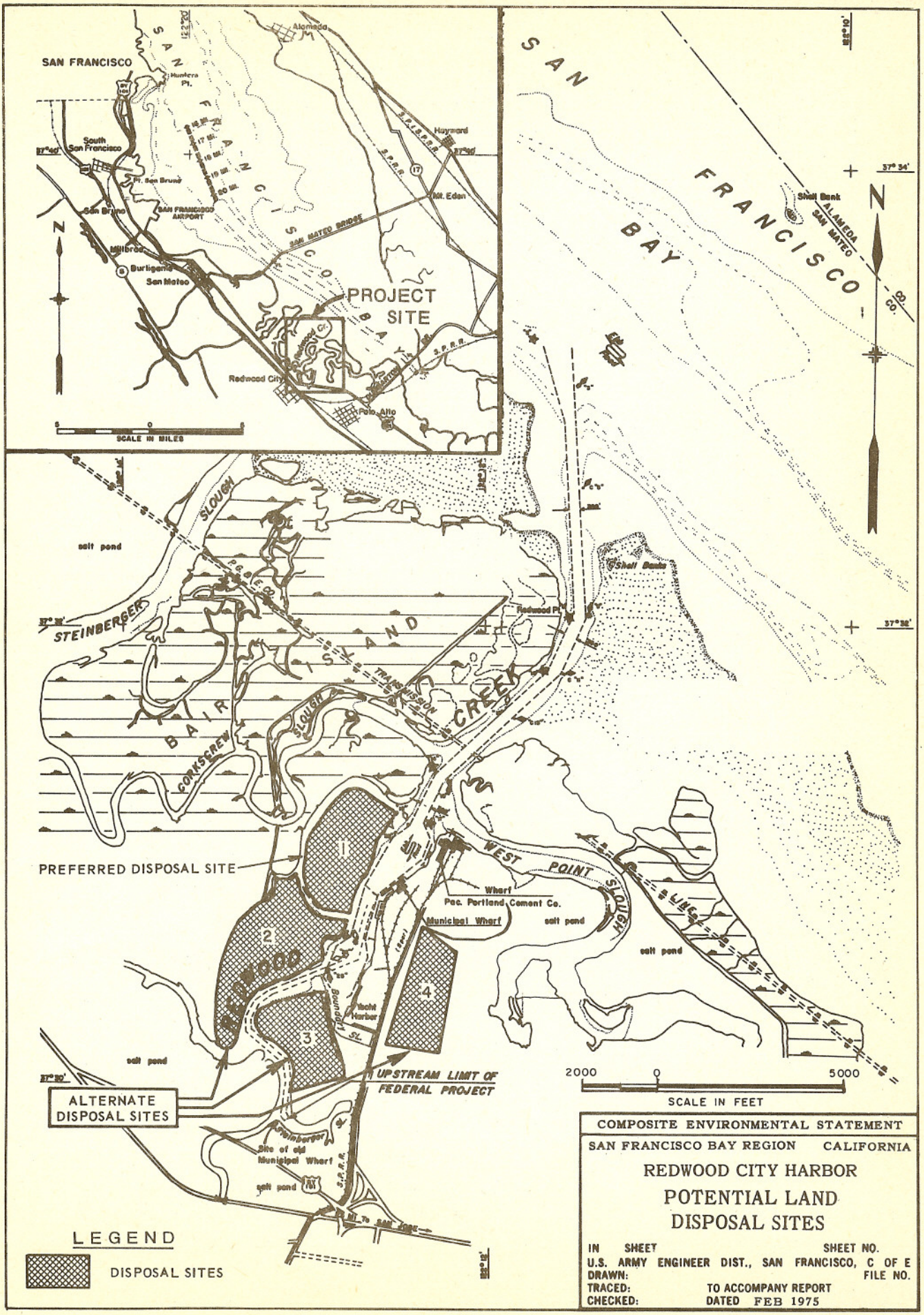
1.110 d. Related Projects. At present, there is one dredging permit application from the Port of Redwood City under consideration by the Corps. The Port has requested permission to dredge 32,000 cubic yards from Deepwater Slough in order to create 4,350 feet of levee on their Bair Island Property west of turning basin number 1.

1.111 In 1975, the Port of Redwood City was issued a permit to dredge 5,000 cubic yards from Pier 5. The disposal site for the permit was objected to by several agencies and the application was changed to dispose of the dredged material at the Alcatraz Disposal Site. This permit was issued in April 1975 (Corps Public Notice #75-224-028A).

1.112 Public Notice #74-0-78 identifies the permit request for levee creation. An environmental impact report (EIR) prepared by the Port was submitted to the Corps. The proposed levee would prevent tidal inundation into Deepwater Slough from Redwood Creek and Corkscrew Slough. This would allow the area to be used for containing dredge materials from the Corps maintenance dredging program, and result in the creation of high ground for future port development. The Port owns the property and is required to provide a disposal site for harbor dredging.

1.113 Since the levee construction involves a disposal site which has been objected to by several agencies, an environmental impact statement (EIS) to be prepared by the Corps is required. In July of 1974 the Port withdrew their application, but in October they resubmitted it. The EIR was circulated by the Corps as a Working Paper and comments were received by 13 December 1974. These comments were incorporated into a draft EIS completed in August 1975. A completed final statement is expected early in 1976.

1.114 The only dredging permits recently issued for Redwood City Harbor were in 1971 and 1975. In 1971, Lockheed Missles and Space Company was awarded a permit to remove 19,600 cubic yards from Redwood Creek and to create a barge mooring area. The material was deposited shoreward of existing levees on the north side of the creek.



COMPOSITE ENVIRONMENTAL STATEMENT

SAN FRANCISCO BAY REGION CALIFORNIA

REDWOOD CITY HARBOR
POTENTIAL LAND DISPOSAL SITES

IN SHEET SHEET NO.
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: TO ACCOMPANY REPORT
CHECKED: DATED FEB 1975

PLATE I-15

9. Sausalito Operations Base Yard.

1.115 The Corps of Engineers Operations Base, located on the waterfront in Sausalito, is operated both by the South Pacific Division and the San Francisco District. In addition to housing the hydraulic model of San Francisco and Suisun Bays and other facilities, the base operates five docks: the Debris Dock, North and South Docks, which are connected by a concrete ramp, and two small floating docks which are connected to the ramp (Plate I-16). The turning basin, referred to as the Marinship turning basin, and the one-mile long entrance channel serve the docks and are maintained to a depth of 23 feet (Plate I-17).

1.116 a. Dredging History. The turning basin and channel were originally dredged by Bechtel Corporation during the early 1940's when they maintained a shipyard at the site for constructing Liberty Ships for the war effort. After the war, the Maritime Administration took over the property and in the late 1940's transferred most of it to the Corps of Engineers, which had planned to build a hydraulic model of the Bay in one of the buildings. The South Dock was used to berth the Corps hopper dredges when they were in the Bay, and the basin and channel have since been maintained to 23 feet (the hopper dredge Biddle has a stern draft when empty of 22 feet).

1.117 Major maintenance of the project occurs every three to four years, when about 90,000 cubic yards of shoal sediments are removed by hopper. The average annual quantity is therefore estimated at approximately 25,000 cubic yards. The project has been maintained since 1950, and the frequency is shown in Table I-12:

TABLE I-12

DREDGING HISTORY OF SAUSALITO OPERATIONS BASE

Fiscal Year	Quantity Removed (c.y.)	Method of Dredging
1951	60,000	hopper
1959	45,000	"
1961	206,000	"
1967	147,000	"
1968	10,000	"

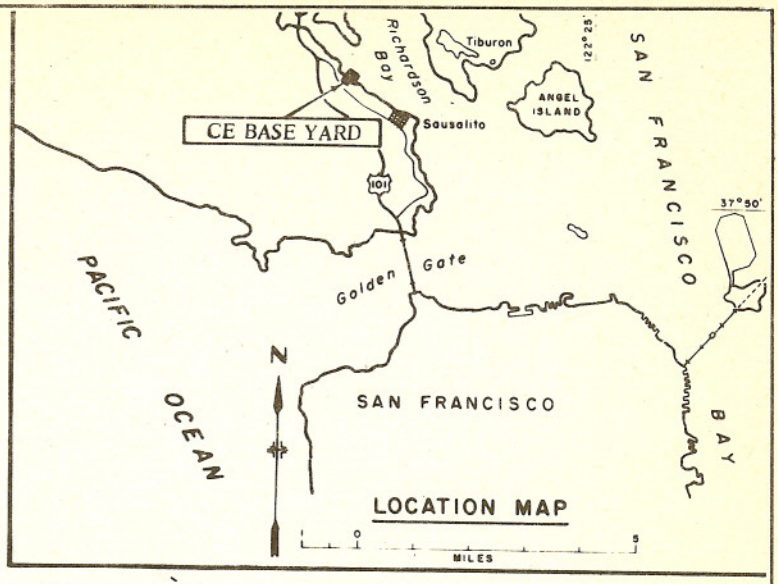
Disposal of the material during 1951, 1959, and 1961 took place at the mouth of Richardson Bay, offshore of the Yellow Bluff light station, in about 100 feet of water. Since then, the material has been disposed of at the Alcatraz site. No major maintenance work is scheduled for FY 1976 because of a proposed improvement plan which is discussed under "Related Projects" below.

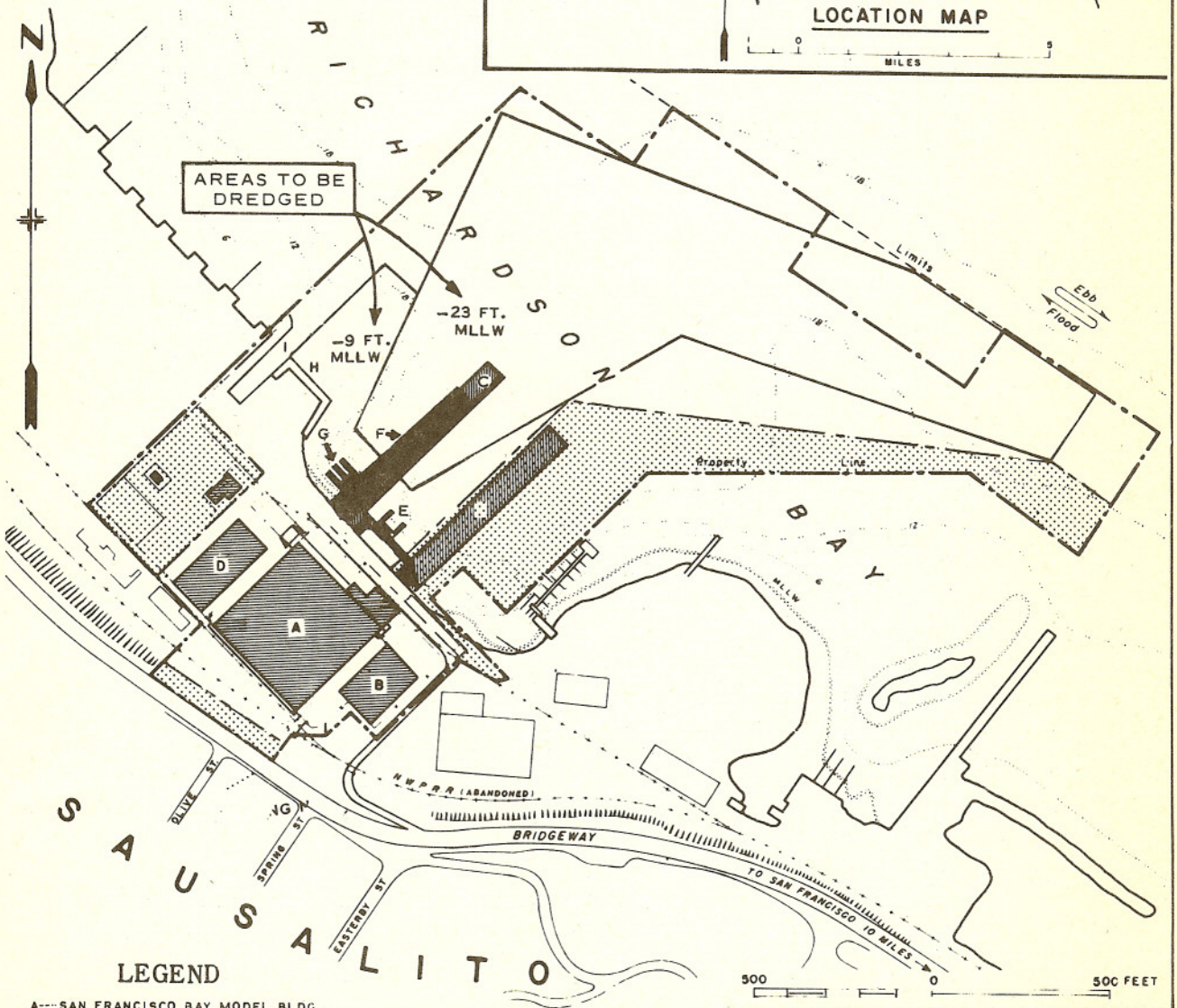
1.118 b. Related Projects. There are three major buildings on the base yard which include the South Pacific Division's Soil and Materials Testing Laboratory, the District's San Francisco Bay Model building, and the equipment repair shop. As the name implies, the laboratory conducts engineering and scientific tests on soils and sediments for the three Corps districts under the South Pacific Division (San Francisco, Sacramento, and Los Angeles Districts). Tests include analyses of sediment quality from each navigation project which are compared to EPA sediment quality criteria for ocean disposal.

1.119 Construction of the hydraulic model of the Bay was authorized by Congress in 1950 and completed in 1957. The Sacramento-San Joaquin Delta was added to the model in 1969. The model, built to a horizontal scale of one foot equals 1,000 feet and a vertical scale of one foot to 100 feet, is used to analyze hydraulic problems that cannot be resolved from textbooks, experience, or mathematical treatment alone. Its purpose is to provide a better understanding of natural occurrences; to demonstrate whether hydraulic structures will accomplish the desired results before construction; and to study freshwater flows, saltwater intrusion, and dispersion of pollutants resulting from spills, discharges, and from all drainage areas including the Central Valley.

1.120 The mission to collect and remove floating debris from San Francisco Bay as authorized in 1950 is based at this yard. Collection of floating debris is a year-round operation, accomplished by three vessels which are berthed at the floating docks. The debris is off-loaded at the Debris Dock until it can be trucked to select disposal areas.

1.121 In 1972, the Corps and the General Service Administration agreed to declare as excess 3.6 acres of dry land and about nine acres of submerged land including the South Dock (Plate I-16). The remaining facilities at the base yard will be consolidated and renovated to maintain the existing services. Plans are to remove the North Dock, which is in a state of deterioration, and to replace it with a new concrete dock with smaller floating docks attached to its north side. Improvements along the shore





LEGEND

A---SAN FRANCISCO BAY MODEL BLDG.

B---SOUTH PACIFIC DIVISION, SOIL AND MATERIALS TESTING LABORATORY

C---EXISTING NORTH DOCK

D---EQUIPMENT REPAIR SHOP

E---EXISTING FLOATING DOCK

F---NEW DOCK

G---NEW FLOATING DOCK

H---DEBRIS DOCK

I---RAMP

AREAS EXCESSED

COMPOSITE ENVIRONMENTAL STATEMENT

SAN FRANCISCO BAY REGION CALIFORNIA

SAUSALITO OPERATIONS BASE

PROJECT LOCATION

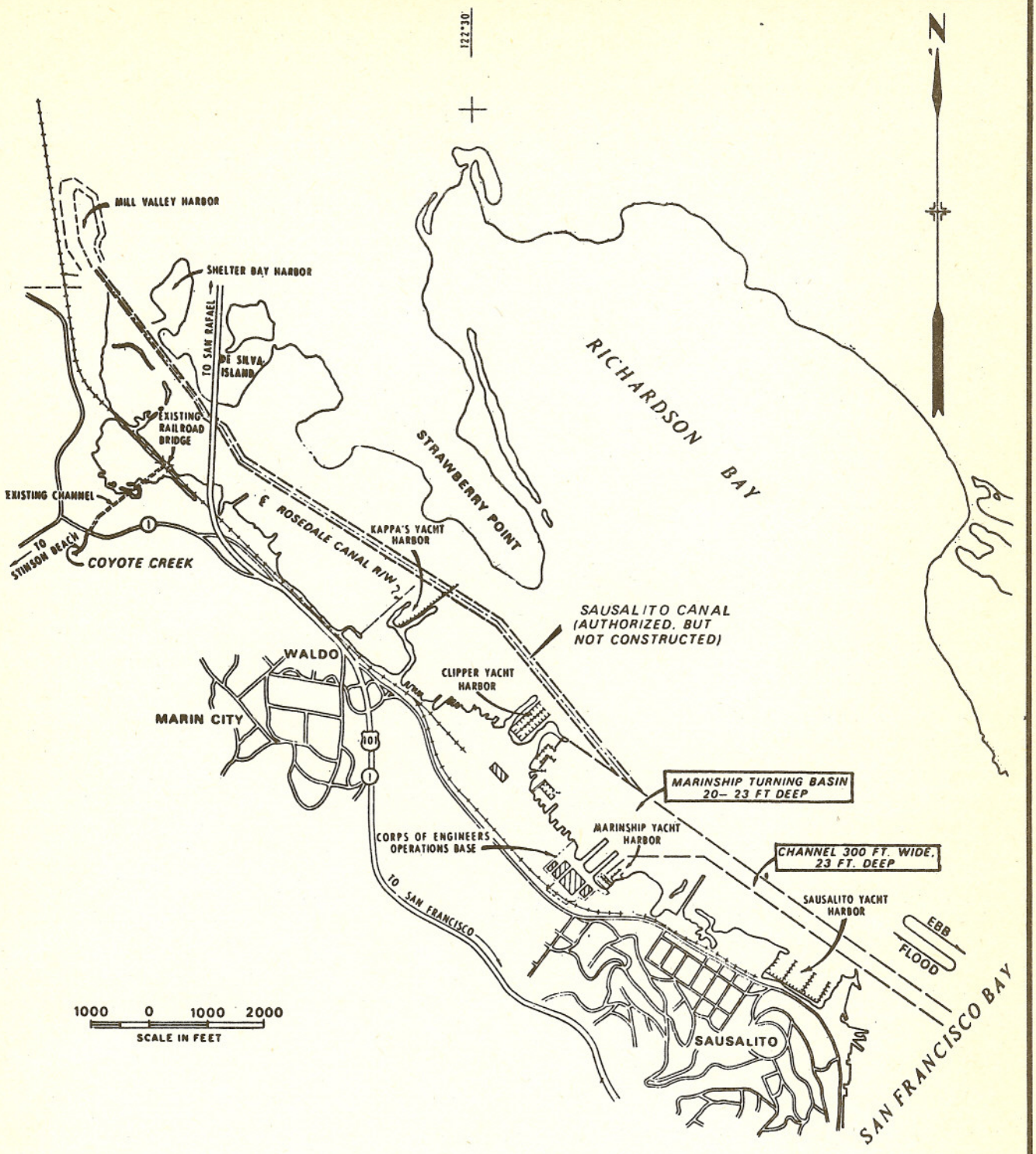
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

DRAWN: FILE NO.

TRACED: TO ACCOMPANY REPORT

CHECKED: DATED FEB 1975

PLATE I-16



COMPOSITE ENVIRONMENTAL STATEMENT

SAN FRANCISCO BAY REGION CALIFORNIA

SAUSALITO AREA

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: TO ACCOMPANY REPORT
CHECKED: DATED FEB 1975

PLATE I-17

front from the South Dock to the Debris Dock and maintaining a modified turning basin to the same 23-foot depth are also envisioned. Initial dredging of the modified basin is expected to be about 380,000 cubic yards. The hopper dredges would berth at the new North Dock when operating in the Bay. An environmental assessment on the modification of the yard was recently prepared (February 1975) and can be inspected at the San Francisco District Office. Plans are to commence construction in January 1976 which will take 12 months to complete.

1.122 In addition to the hopper dredges and debris removal vessels, small survey boats are berthed at the docks. The bayward end of the North Dock is leased to Ocean Traders Fish Company, a commercial fishery outfit, which moor their fishing boats there. A more detailed description of the facilities can be found in Section II under the Port and Terminal Characteristics of the Bay.

1.123 An eight-foot deep channel from Marinship turning basin to a small craft harbor at Mill Valley, a total length of 2-1/2 miles, was authorized under the Rivers and Harbors Act of 1970 but to date no work has been performed (Plate I-17). The project has been rendered inactive by the Corps.

1.124 Occasionally, private owners apply for Corps permits to construct docks and houseboat moorings and to perform dredging along the Sausalito waterfront. Mr. Ned Martin has applied for a permit to construct a 102-berth marina, to be called Pelican Harbour, approximately one-quarter mile down the shoreline from the Sausalito Operations Base. Adjacent to the proposed marina, the Sausalito Yacht harbor periodically applies for a permit to dredge their own berthing area. Their last permit application was approved in 1972 to dredge 75,000 cubic yards of shoal material and dispose of it at Alcatraz. None of these activities is directly affected by Corps activities at the Operations Base.

10. Suisun Bay Channel.

1.125 a. Congressional Authorization. Suisun Bay Channel (Plate I-18) is located approximately 30 miles northeast of San Francisco and is an integral part of the waterways which provide access to the Pacific Ocean from inland ports of California. The project was initially adopted by the Rivers and Harbors Act of 2 March 1919, which provided for a channel 300 feet wide with depths of 24 feet across the lower shoal near Bullshead Point, 20 feet across Point Edith and Middle Ground Shoals and 18 feet through New York Slough. Improvement of this project was authorized by the Act of 21 January 1927, changing the depth of the entire project to 26 feet. Further improvements were authorized by the Act of 3 July 1930, changing the depth to 30 feet at Bullshead Point Shoal, and providing for a channel 250 feet wide and 20 feet deep south of Seal Island. The Act of 30 August 1935 increased the authorized depth to 30 feet at Point Edith and Middle Ground to the mouth of New York Slough.

1.126 The existing authorized dimensions include: a channel 300 feet wide and 30 feet deep through Bullshead Point, Point Edith, and Middle Ground Shoals to the mouth of New York Slough and for a channel 250 feet wide and 20 feet deep south of Seal Island.

1.127 b. Dredging History. The Suisun Bay Channel was first dredged in October 1919 and completed in the latter part of February 1920. An historic summary of dredging is shown as follows:

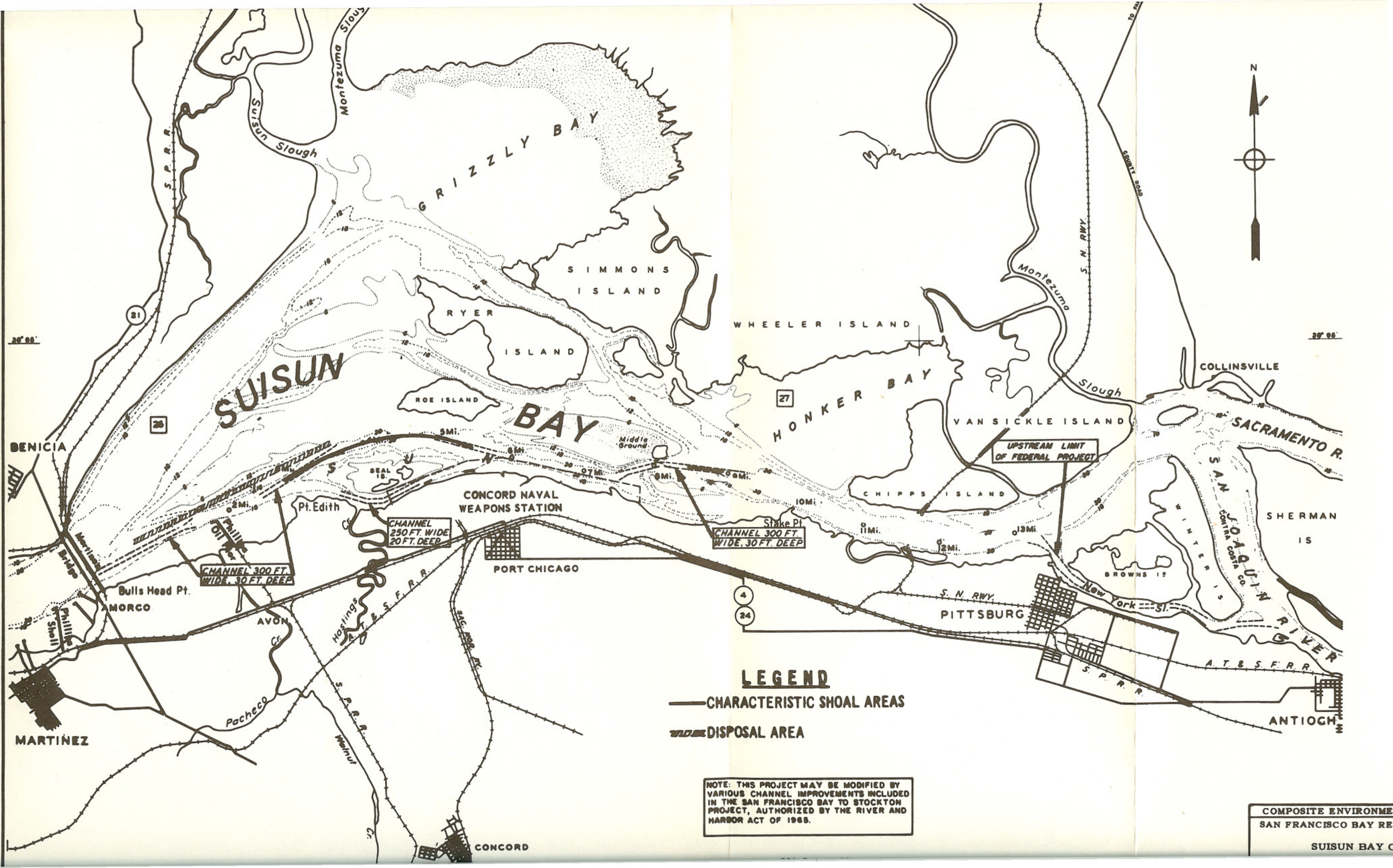

GRIZZLY BAY
SUISUN BAY
HONKER BAY
SIMMONS ISLAND
RYER ISLAND
ROE ISLAND
WHEELER ISLAND
VAN SICKLE ISLAND
CHIPPS ISLAND
BROWNS IS
WINTER IS
SHERMAN IS
SEAL IS.
Middle Ground
Suisun Slough
Montezuma Slough
SACRAMENTO R.
SAN JOAQUIN RIVER
BENICIA
MARTINEZ
AMORCO
Bulls Head Pt.
AVON
Pt. Edith
CONCORD NAVAL WEAPONS STATION
PORT CHICAGO
PITTSBURG
ANTIOCH
COLLINSVILLE
CONCORD
Stake Pt
New York Sl.
CONTRA COSTA CO.
S. P. R. R.
A. T. & S. F. R. R.
S. N. RWY.
SAC. NOR. RY.
COUNTY ROAD
Pacheco Cr.
Hastings Cr.
Walnut Cr.
Martinez Bridge
Shell
Phillips
5Mi.
6Mi.
7Mi.
8Mi.
9Mi.
10Mi.
11Mi.
12Mi.
13Mi.
2Mi.
CHANNEL 300 FT. WIDE, 30 FT. DEEP
CHANNEL 250 FT. WIDE 20 FT. DEEP
CHANNEL 300 FT. WIDE, 30 FT. DEEP
UPSTREAM LIMIT OF FEDERAL PROJECT
N
LEGEND
CHARACTERISTIC SHOAL AREAS
DISPOSAL AREA
NOTE: THIS PROJECT MAY BE MODIFIED BY VARIOUS CHANNEL IMPROVEMENTS INCLUDED IN THE SAN FRANCISCO BAY TO STOCKTON PROJECT, AUTHORIZED BY THE RIVER AND HARBOR ACT OF 1965.
COMPOSITE ENVIRONME
SAN FRANCISCO BAY RE
SUISUN BAY C

TABLE I-13

DREDGING HISTORY OF SUISUN BAY CHANNEL

Fiscal Year	Quantity Removed (c.y.)	Method of Dredging	Portion of Project Dredged 1/
1919	no yardage recorded	hopper	A,B,C,D
1920	no yardage recorded	hydraulic pipeline	A,B,C,D
1922	144,500	hopper	A
1924	98,400	"	A
1924	68,800	"	C
1925	32,000	"	A
1925	53,800	"	B
1925	91,700	"	C
1927*	103,400	"	A
1928	164,200	"	A
1929	190,900	"	C
1930*	39,100	hydraulic pipeline	B,C
1931*	637,100	" "	B,C
1931*	423,000	" "	E
1931*	277,100	hopper	A
1932*	37,100	"	A
1932	42,000	"	B
1932	185,600	"	C
1932	63,700	"	E
1933*	19,300	"	A
1933	66,600	"	C
1934*	38,600	"	E
1935	96,600	hydraulic pipeline	A
1936	183,000	hopper	A,B,C,E
1938	297,100	"	B,E
1938	125,700	hydraulic pipeline	F
1939	183,300	" "	B,F
1939	282,400	hopper	A,B,C
1940	82,100	hydraulic pipeline	A
1940	184,400	hopper	F
1940	385,000	"	C,F
1941	314,700	"	A,C,F
1942	153,400	"	A,B,C,F
1943	593,200	"	A,B,C,F
1945	510,000	"	A,B,C,F
1947	244,200	hydraulic pipeline	C
1947	30,200	" "	A,B,F
1948	237,500	" "	A,B,F
1948	129,800	hopper	A
1949	299,200	hopper	scattered locations

TABLE I-13 (Cont'd)

Fiscal Year	Quantity Removed (c.y.)	Method of Dredging	Portion of Project Dredged 1/
1950	290,000	hopper	scattered locations
1951	125,500	"	"
1952	213,700	"	"
1953	145,000	"	"
1954	296,200	"	"
1955	84,800	"	"
1956	66,700	"	"
1957	161,000	"	"
1958	78,200	"	"
1959	235,250	"	"
1960	234,000	"	B,C
1961	225,700	"	A,B,C,E,F
1962	183,600	"	A,B,C,E,F
1963	302,600	"	A,B,C,E,F
1964	567,100	"	A,B,C,E,F
1965	308,000	"	A,B,C,E,F
1966	54,500	"	A,B,C,E,F
1967	394,700	hydraulic pipeline	No Data
1967	35,900	clamshell	No Data
1969	312,500	hydraulic pipeline	No Data
1970	154,800	" "	scattered locations
1972	50,000	No Data	No Data
1973	101,700	hydraulic pipeline	B,C,F
1975	98,500	hopper	B,F

1/ A - Bullshead Point
B - Point Edith
C - Middle Ground
D - New York Slough
E - Seal Island
F - Roe Island

* Indicates improvement or new work.

It is important to note that the Corps does not necessarily dredge the entire channel. The Corps only dredges those parts of the channel which are shoaled above the authorized depth. Plate I-18 shows the predominant shoal areas usually dredged by the Corps. Other minor shoal areas are dredged less frequently. The channel was last dredged in Mar-Apr 1975 with an estimated 98,500 cubic yards removed and placed in the authorized open water disposal site, which is approximately 500 feet wide and 2.8 miles long, north of and parallel to the channel at a minimum distance of 500 feet from the channel (See Plate I-18).

1.128 c. Proposed Maintenance. Critical shoaling areas of the channel require dredging every 12 months; however, those areas of a less critical nature have been deferred since Fiscal Year 1971 due to unresolved objections raised regarding several proposed disposal sites. The average annual amount of dredged material is 220,000 cubic yards with similar amounts scheduled for future maintenance. Most of this quantity will be removed from the predominant shoaling areas. A disposal site has not yet been selected. Dredged material may be deposited alongside the channel; at the Carquinez Strait disposal site; or at a land disposal site. The Composite Statement will evaluate the effects of aquatic disposal in the Suisun Bay. The western portion of the channel from the Martinez bridge to Avon will be maintained to depth of 35 feet to allow tanker access to the Avon oil pier. This additional five feet of depth is maintained under the authority of the Rivers and Harbors Act of 27 October 1965.

1.129 An environmental working paper on maintenance dredging in the Suisun Bay area was written in 1974 (206). This document was attached as Appendix A to the Working Paper Composite. Information from Appendix A is now an integral part of this Draft Composite.

1.130 d. Related Projects. Deepening Suisun Bay Channel to 45 feet from Martinez to Avon, and to 40 feet from Avon to Point Edith with two feet allowable overdepth, and widening to 650 feet from Martinez to Point Edith, have all been authorized under the Rivers and Harbors Act of 27 October 1965, but have not been accomplished. These navigation improvements are being studied as part of the Baldwin and Stockton Ship Channels Project, which is under advanced engineering and design studies. The Suisun Bay Channel deepening and widening would involve removal of 5,200,000 cubic yards of material, increasing the future annual requirement for maintenance to 500,000 cubic yards.

1.131 Private maneuvering areas near Suisun Bay Channel are periodically dredged by Shell, Phillips and Exxon oil companies. At the west end of the channel next to the Martinez bridge, Exxon maintains an oil pier at Benicia, and Shell and Phillips maintain oil piers at Martinez. Farther upstream at Avon, Phillips maintains an additional oil pier.

Under the proposed Baldwin Ship Channel project, the Corps of Engineers would initially dredge 670,000 cubic yards at these maneuvering areas and would assume responsibility for annual maintenance dredging of 170,000 cubic yards thereafter. Dredging of these maneuvering areas, as well as the enlargement of Suisun Bay Channel mentioned above, will be discussed in a separate environmental working paper to be issued in December 1975 (233).

1.132 Periodic dredging is required for the U.S. Navy at Concord Naval Weapons Station, and is dependent on continued maintenance of Suisun Bay Channel. Concord NWS is described in the following pages as a separate project.

1.133 Pacific Gas and Electric Company periodically dredges the maneuvering area at their fuel unloading pier at the Pittsburg Power Plant. A Corps permit, described in Public Notice No. 74-129-99 (a), was recently issued to PG&E to dredge 49,000 cubic yards and construct additional facilities at this pier. The status of PG&E dredging is also dependent on continued maintenance of Suisun Bay Channel.

1.134 Urich Oil Company was issued Corps permit No. 5137 in October 1973 to construct a petroleum tanker facility and dredge approximately 70,000 cubic yards of material near Pacheco Slough to be deposited on dry land near their site. This new oil facility will undoubtedly require maintenance dredging in future years and would also be dependent on continued Corps maintenance of Suisun Bay Channel.

1.135 The Sacramento District of the Army Corps of Engineers performs maintenance dredging on the Sacramento River and San Joaquin River deepwater channels. Both these channel projects are dependent on continued maintenance of Suisun Bay Channel. Dredging of New York Slough is also dependent on the status of Suisun Bay Channel and is described in the following pages as a separate project.

1.136 Other activities in this area are not directly dependent on the existence of Suisun Bay Channel, but have particular significance to Corps dredging: (1) H. C. Thomsen Sand Dredging, Inc., was issued Corps permit No. 5104 in May 1973 to dredge approximately 50,000 cubic yards of sand annually for commercial purposes along the south side of the ship channel between Middle Ground Island and Stake Point; (2) Tidewater Sand and Gravel was issued Corps permit No. 5140 in October 1973 to dredge approximately 50,000 cubic yards of material annually from the same area, and barge the material; and (3) F. E. Crites, Inc., has applied for a Corps permit to operate a sand reclamation facility on its property at Pittsburg by dredging 300,000 cubic yards of sand from Suisun Bay annually, pumping the material through a pipeline to diked ponds on shore at Pittsburg, then selling and trucking the material to customers in the Bay Area.

1.137 Other indirectly related activities are planned by F. E. Crites, Inc., which has applied for three Corps permits: (1) for the purpose of constructing a barge canal on their property by dredging 200,000 cubic yards and placing the material on adjacent land; and (2) for a long-range development of McAvoy Harbor by dredging a new berthing basin for recreational boats and placing the dredged material on their property.

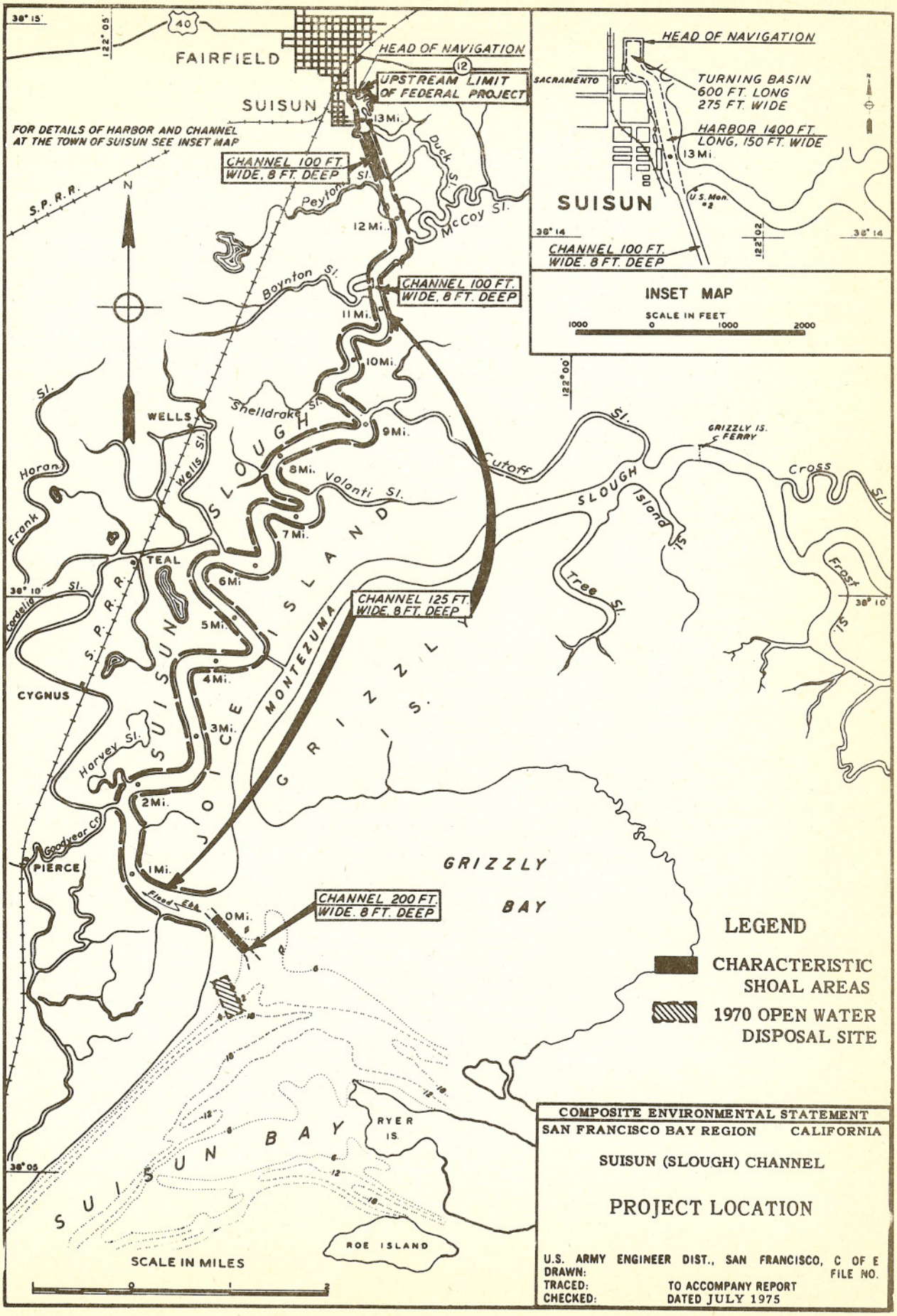
1.138 Realignment of Suisun Bay Channel is presently being considered by the Corps in order to eliminate up to 100,000 cubic yards of dredging. Such realignment might require new Congressional authorization.

11. Suisun (Slough) Channel.

1.139 a. Congressional Authorization. Suisun (Slough) Channel (Plate I-19) extends the entire length of Suisun Slough, a tidal inlet with its mouth on the northwest side of Suisun Bay, about seven miles northeast of Benicia and 36 miles northeast of San Francisco. The project was initially adopted by the Rivers and Harbors Act of 25 June 1910. It provided for a harbor at the city of Suisun, 1,400 feet long and 150 wide and 6 feet deep, and a cut-off 3,000 feet long, 80 feet wide and 6 feet deep from the basin to Peytonia Slough. Improvement of this project was authorized by the Rivers and Harbors Act of 4 March 1913, which changed the length of the harbor at the city of Suisun to 1,407 feet and the width from the basin to Peytonia Slough to 125 feet. These improvements were modified by the Rivers and Harbors Act of 26 August 1937, changing the length of the harbor at the city of Suisun back to 1,400 feet, with an extension for a turning basin 600 feet long and 275 feet wide and 8 feet deep. The 1937 Act also changed the widths of the entrance channel to 200 feet, and 100 to 125 feet in the remaining parts of the project, and the depth to 8 feet.

1.140 The existing authorized dimensions consist of: a channel with an 8 foot depth from Suisun Bay to and in the basin at the city of Suisun, the head of navigation, about 13 miles in length with channel widths of 200 feet in the entrance channel, and 100 to 125 feet in the remaining parts of the project channel; and for a 1,400 by 150 foot harbor at Suisun, with an extension for a turning basin 600 feet long and 275 feet wide.

1.141 b. Dredging History. The initial dredging of Suisun Channel was started in March 1912, but the material encountered was so soft that the banks could not be made to stand with the excavated material placed on them. A historic summary of dredging follows:



COMPOSITE ENVIRONMENTAL STATEMENT

SAN FRANCISCO BAY REGION CALIFORNIA

SUISUN (SLOUGH) CHANNEL

PROJECT LOCATION

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN:
TRACED:
CHECKED:
FILE NO.
TO ACCOMPANY REPORT
DATED JULY 1975

TABLE I-14

DREDGING HISTORY OF SUISUN (SLOUGH) CHANNEL

Fiscal Year	Quantity Removed (c.y.)	Method of Dredging	Portion of Project
1912*	No Data	No Data	No Data
1914*	165,215	hydraulic pipeline	harbor & upper end of channel
1921	1,500	remove rock	two miles below head of navigation
1927	37,041	hydraulic pipleine	harbor
1933	149,554	" "	scattered locations
1946*	144,156	hydraulic pipeline clamshell	mouth of Suisun Slough turning basin at town
1947*	851,310	hydraulic pipeline clamshell	mouth of Suisun Slough turning basin at town
1949	12,407	hydraulic pipeline	" " " "
1952	44,834	hopper	mouth of Suisun Slough
1955	67,097	hydraulic pipeline	" " " "
1956	105,810	" "	scattered locations
1960	51,000	" "	" "
1961	130,700	" "	" "
1964	94,191	clamshell	mouth of Suisun Slough
1966	281,437	hydraulic pipeline	scattered locations
1969	177,719	" "	" "
1970	90,811	" "	harbor
1970	81,594	" "	mouth of Suisun Slough

*Indicates new or improvement work.

Maintenance dredging is performed about every two to three years on demand. Dredging was last performed in 1970 when 172,405 cubic yards of material were removed by hydraulic pipeline from the harbor and the mouth with the material from the harbor being placed on land along the west edge of Suisun Channel between Peytonia and Boynton Sloughs. Material removed from the mouth was placed in open water along the eastern edge of Morrow Island. This open water disposal site is shown on Plate I-19 and is described as follows:

Suisun Channel Disposal Site 38°06'17"N, 122°03'40"W
Location: minimum distance 550 yards southwest of
Depth: approximately 10 feet
Size: rectangle 1500 x 2500 feet, long axis bearing

Quantities during each dredging of Suisun Channel average approximately 100,000 cubic yards in the turning basin and 80,000 cubic yards in the mouth, which is equivalent to an average annual quantity of 72,000 cubic yards for the two areas combined.

1.142 c. Proposed Maintenance. Maintenance has been deferred since Fiscal Year 1972 due to State and Federal agency objections to disposal practices. The next maintenance is indefinite at this time. The only areas to be dredged, however, will be the characteristic shoal areas located at the mouth and at the head of Suisun Slough; not along its length. The physical constraints of the project vicinity will almost certainly require hydraulic pipeline/land disposal near the harbor, and either land or open water disposal near the mouth of Suisun Slough.