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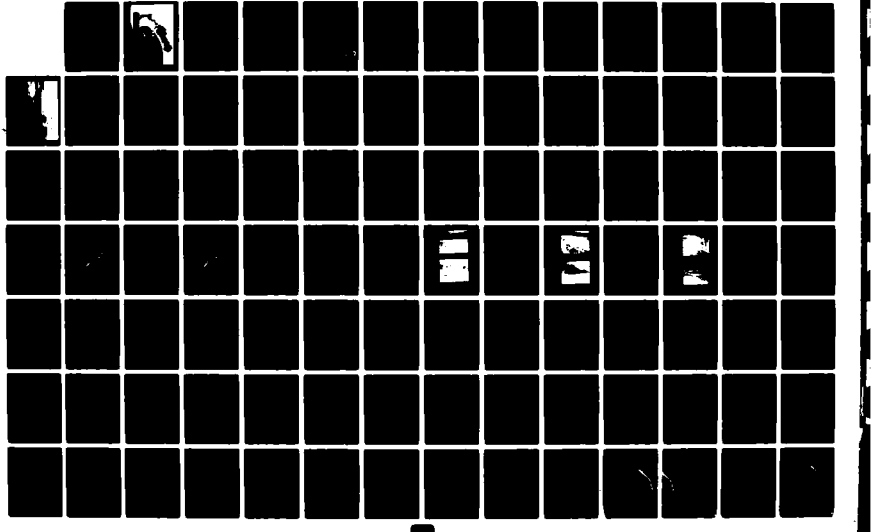

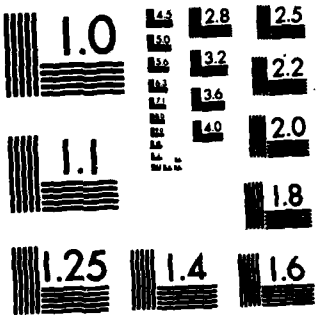

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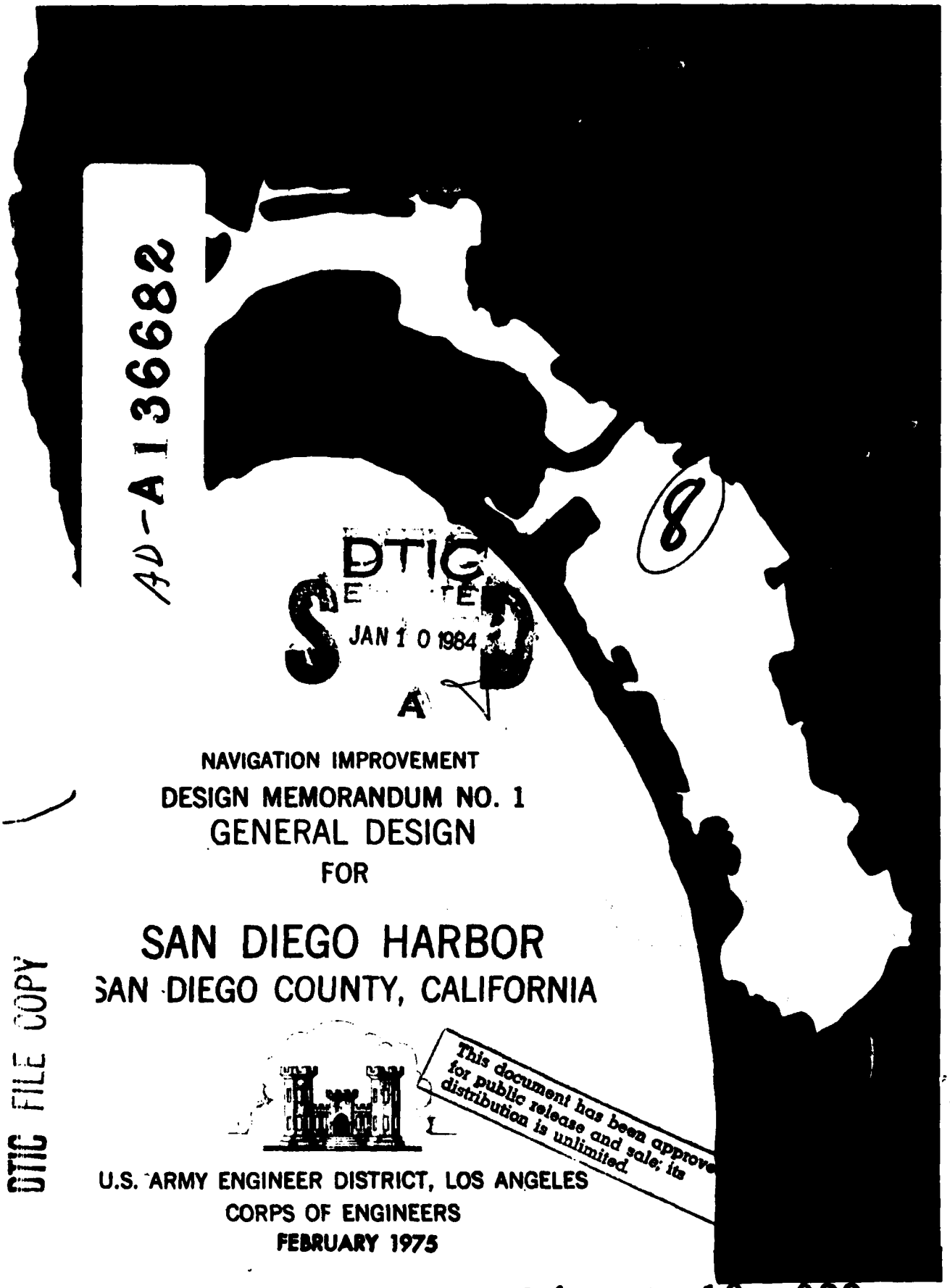

NAVIGATION IMPROVEMENT

DESIGN MEMORANDUM NO. 1

GENERAL DESIGN

FOR

SAN DIEGO HARBOR

SAN DIEGO COUNTY, CALIFORNIA

U.S. ARMY ENGINEER DISTRICT, LOS ANGELES
CORPS OF ENGINEERS

FEBRUARY 1975

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A136 682 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) NAVIGATION IMPROVEMENT DESIGN MEMORANDUM NO. L GENERAL DESIGN FOR SAN DIEGO HARBOR SAN DIEGO COUNTY, CALIFORNIA	5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053	12. REPORT DATE FEBRUARY 1975 13. NUMBER OF PAGES
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A plan of improvement for the harbor at San Diego, California, was authorized by the River and Harbor Act approved 13 August 1968 (Public Law 90-483, 90th Congress, 2d Session), to provide adequate waterways for access to newly constructed terminals and to meet the growing demand for additional marine-oriented industry. The district engineer now submits a recommended plan of improvement which consists of widening and straightening sections of the north bay channel; deepening and widening the central bay channel;	

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

deepening, widening and extending the south bay channel

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

(1)

SPLED-CW

28 February 1975

SUBJECT: San Diego Harbor, California

Division Engineer, South Pacific
ATTN: SPDED-TC

1. In accordance with ER 1110-2-1150, paragraph 20a, dated 1 October 1971, submitted for your review and approval are 20 copies of the General Design Memorandum and Environmental Impact Statement for San Diego Harbor, California.

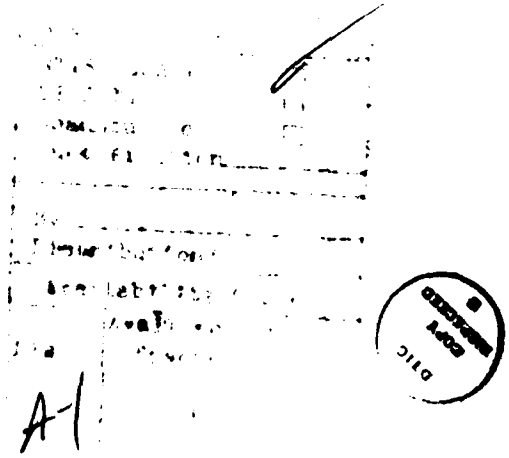
2. The estimated cost for the dredging is based on cost for similar dredging projects in the area.

3. The Section 221 Agreement with local interests will be forwarded under separate cover.

4. The benefit-cost ratio for the project recommended is 3.4 to 1.

2 Incl
1. GDM & EIS (20 cys)
2. Agreement fwd sep

JOHN V. FOLEY
COL, CE
District Engineer



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SAN DIEGO HARBOR, CALIFORNIA

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

PLATES

GENERAL DESIGN MEMORANDUM FOR CHANNEL DREDGING

SAN DIEGO HARBOR

SAN DIEGO, CALIFORNIA

SYLLABUS

A plan of improvement for the harbor at San Diego, California, was authorized by the River and Harbor Act approved 13 August 1968 (Public Law 90-483, 90th Congress, 2d Session), to provide adequate waterways for access to newly constructed terminals and to meet the growing demand for additional marine-oriented industry.

The district engineer now submits a recommended plan of improvement which consists of widening and straightening sections of the north bay channel; deepening and widening the central bay channel; deepening, widening and extending the south bay channel. (See Pl. 1.)

Approximately 8.5 million cubic yards of dredged material would be removed from the authorized channels and deposited in fill areas designated by the San Diego Unified Port District.

The total cost for the improvement of the harbor facilities is estimated to be $16,696,000. The cost to the United States Government for dredging the navigation channels is estimated to be $12,141,000. The time required to complete the general navigation features is estimated at 28 months.

Local interest would be responsible for all other improvements needed to complete the harbor.

The recommended plan deviates from the plan set forth in House Document No. 365 by reducing the length of the channel and by elimination of Glorietta Bay, D Street, G Street and H Street fill areas for ecological considerations.

GENERAL DESIGN MEMORANDUM
FOR CHANNEL DREDGING

SAN DIEGO HARBOR

SAN DIEGO, CALIFORNIA

PERTINENT DATA

Tide Data at National City, San Diego Bay:

GENERAL

(Datum plane is mean lower low water (MLLW) - elev. 0.0 ft.)

Range of Tide:

Mean Higher High Water	5.30
Mean High Water	5.20
Mean Tide Level	3.05
Mean Low Water	0.90
Mean Lower Low Water	0.00
Extreme Tide Range	9.5

Project Data:

(All miles are statute miles unless otherwise indicated)

	Width (ft.)	Miles	Depth (ft.)
Entrance channel	800	2.4	42
North Bay channel	800-600	4.6	42
Carrier Turning Basin	2,900-2,800		42
Turning Basin	2,000-1,900		35
Central Bay channel (with turning basin)	1,900-600	5.0	35 to 42
South Bay channel (with turning basin)	1,350-600	0.9	35
Project Length		12.9	

Commerce Information (1969-1970)

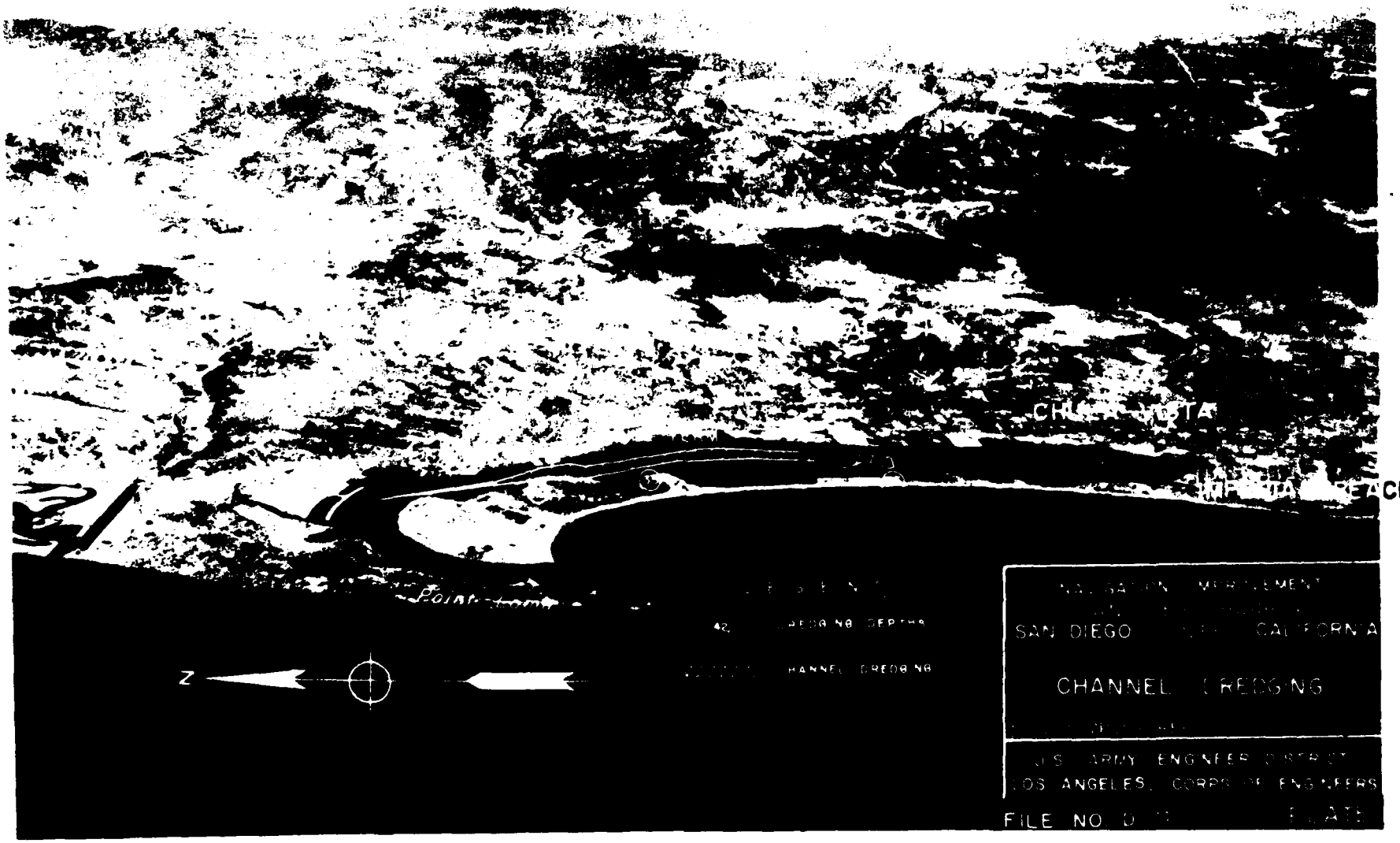
Commercial Fishing From Port	65.5 M lbs. Approx.
Air Freight	19.0 M lbs. Approx.
Total Cargo over Piers	1,308,017 tons
Inbound	650,877 tons
Outbound	648,973 tons
Bunkers	8,167 tons
Vessels calling at Port (all flags)	681

Project Purpose:

To facilitate deeper draft vessel maneuverability in the channels, safer passage and access to marine facility development in the south bay area.

Estimated Cost and Benefit-Cost Ratio

Federal First Costs	
95.9 percent of general navigation facilities	$12,141,000
U.S. Navy utility relocation	1,380,000
U.S. Coast Guard Aid to Navigation	5,000
Total Federal First Costs	$13,526,000
Non Federal First Costs	
Cash Contribution 4.1 percent of general navigation facilities	$519,000
Retaining dikes at 5th Avenue	650,000
Utility relocations	1,576,000
New and improved berthing areas	425,000
Total Non-Federal First Costs	$3,170,000
Total First Costs of Project	$16,696,000
Additional Federal Annual Maintenance	$40,000
Benefit-Cost Ratio (@3-1/4 percent interest.)	3.4 to 1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SAN DIEGO
CHANNEL DREDGING
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
FILE NO.
DATE

DESIGN MEMORANDUM NO. 1

GENERAL DESIGN

FOR

SAN DIEGO HARBOR

SAN DIEGO, CALIFORNIA

I -PROJECT AUTHORIZATION

1-01. AUTHORITY. This design memorandum is submitted pursuant to Act of Congress, Public Law 90-483, 90th Congress, 2d session, approved August 13 1968, which reads in part as follows:

> Sec. 101. That the following works of improvement of rivers and harbors and other waterways for navigation, flood control, and other purposes are hereby adopted and authorized to be prosecuted under the direction of the Secretary of the Army and the supervision of the Chief of Engineers, in accordance with the plans and subject to the conditions recommended by the Chief of Engineers in the respective reports hereinafter designated. The provisions of section 1 of River and Harbor Act approved March 2, 1945 (Public Law No. 79-14, 79th Congress, 1st session), shall govern with respect to projects authorized in this title; and the procedures therein set forth with respect to plans, proposals, or reports for works of improvement for navigation or flood control and for irrigation and purposes incidental thereto, shall apply as if herein set forth in full.
>
> * * * * * * * * *
>
> * * * San Diego Harbor, California: House Document No. 365, 90th Congress, 2d Session, at an estimated cost of $5,360,000.
>
> * * * * * * * * *
>
> The estimated first cost was $8,160,000, exclusive of navigation aids and relocation of utilities of the United States Navy, of which $5,360,000 would be the Federal cost of construction, and $2,800,000 non-Federal including $230,000 as a cash contribution.

1-02. The provisions of section 1, of the River and Harbor Act approved March 2, 1945, are not applicable to San Diego Harbor. These provisions concern the interests and rights of States in the development, utilization, and control of water in rivers within State boundaries. The proposed project would have no effect on rivers in the tributary area.

PROJECT AS DESCRIBED IN PROJECT DOCUMENT

1-03. The plan of improvement for San Diego Harbor, California which was recommended for approval in the Chief of Engineers' report dated 3 June 1968, was published as part of House Document No. 365, 90th Congress, 2d session. House Document No. 365, hereinafter referred to as the project document. The plan set forth in the project document recommended that the existing project for San Diego Harbor be modified to provide for deepening, widening and extending the present navigation channels and turning basins to provide: (a) an entrance channel 42 feet deep and 800 feet wide from mile 2.4 in the north bay, narrowing to 600 feet wide at mile 3.0 and continuing at the same depth and width to mile 6.57, with additional widening at mile 6.0; and a trapezoidal turning basin 2,800 feet long, 2,900 feet wide on the western side and 1,900 feet wide on the eastern side, all as originally dredged by the U.S. Navy; (b) additional widening on the south side of the 42-foot channel at the bends at miles 3.0, 3.7, 4.6 and 5.3 on the north side of the 42-foot channel and turning basin between miles 6.0, and 7.1; (c) dredging the central bay channel to a depth of 40 feet between miles 7.1, and 8.84 and to a depth of 35 feet between miles 8.84 and 12.0, with a turning basin 40 feet deep between miles 8.25 and 8.84; (d) a channel 30 feet deep on either side of the 40-foot-deep channel (between pierhead lines) between channel mile 6.8 and 8.5; (e) deepening and extending the south bay channel to a depth of 35 feet between miles 12.0 and 13.5, with a turning basin 35 feet deep between miles 12.4 and 12.9; (f) deleting from the project the uncompleted triangular approaches to the 26-foot and 35-foot-deep anchorage areas (northward of the channel and adjacent to Harbor Island); and (g) deleting from the project the undredged area at the south end of the seaplane basin in South Bay.

1-04. LOCAL COOPERATION SPECIFIED IN THE PROJECT DOCUMENT. The local cooperation specified in the project document and set forth in the authorizing legislation requires that, prior to construction, local interests agree to:

a. Contribute in cash 4.1 percent of the first cost of dredging, exclusive of the cost of spoil-retaining works, presently estimated at $230,000, such contribution to be made in a lump sum prior to construction;

b. Provide without cost to the United States, all lands, easements, and rights-of-way required for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of spoil, and also provide necessary retaining dikes, bulkheads, and embankments therefore or the costs of such retaining works;

c. Subject to Section 9, P.L. 93-251, hold and save the United States free from damages that may result from the construction and maintenance of the project;

d. Provide and maintain at local expense adequate public terminal and transfer facilities open to all on equal terms;

e. Provide and maintain without cost to the United States depths in berthing areas and local access channels serving the terminals commensurate with depths provided in the related project areas;

f. Accomplish without cost to the United States such utility or other relocations or alterations as necessary for project purposes, except for such utilities as are owned by the United States Navy; and

g. Establish regulations prohibiting discharge of pollutants into the waters of the harbor by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State, and local authorities responsible for pollution prevention and control.

h. Comply with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat 1894, approved 2 January 1971).

II - EXISTING CORPS OF ENGINEERS PROJECT

2-01. GENERAL. The existing project was authorized by the River and Harbor Act of 1852 and subsequent River and Harbor Acts. The project was the first river and harbor work by the Corps of Engineers in California. The completed parts of the authorized project consist of:

Feature	Design depth (ft.)	Width (ft.)	Approx. length (ft.)
Earthen dike	-	-	7,735
Rubblemound jetty (Zuniga)	-	-	7,500
Entrance channel	40	800	12,000
North Bay channel	35	2,200	17,000
South Bay channel	30	1,500-2,500	20,000
Chula Vista channel	20	200	2,600
Anchorage areas	26-35	1,200	12,000
Seaplane basin	8	1,500	12,000
Turning basin	35	*3,600	(*)
Middle Ground channel	36	-	-
Seaplane basin	10	5,000-8,500	10,000

*Diameter

2-02. MODIFICATION OF EXISTING PROJECT. The modification of the existing project consists of the following:

	Design depth (ft.)	Width (ft.)	Approx. length (ft.)
Entrance channel	42	800	12,700
North Bay channel	42	600-800	24,900
Carrier turning basin	42	1,900-2,900	2,800
Central Bay channel (with turning basin)	40	600-1,900	9,200
Central Bay channel	35	600-1,300	16,700
South Bay channel (with turning basin)	35	600-1,350	7,900

2-03, COSTS. The total Federal costs for the existing project to 30 June 1973 are as follows:

Funds	New Works	Maintenance	Total
Federal*			
Regular**	8,600,281	1,075,681	675,962
Public Works	86,352	0	86,352
Emergency relief	1,226,793	0	1,226,793
Contributed, other	4,441	0	4,441
Total cost to date	9,917,867	1,075,681	10,993,548

* Excluded Coast Guard costs.
**Includes $154,704 for new work and $59,904 for maintenance of previous project. Includes $87,144 for reconnaissance and condition surveys since fiscal year 1958. In addition, includes $144 for retroactive pay increase shown in "maintenance" figure only.

2-04. MAINTENANCE. The last maintenance work, which consisted of dredging to project depth in the vicinity of Mile 12, was accomplished by the Corps of Engineers dredge "Harding" in March and April 1971. Approximately 210,000 cubic yards of material was dredged from the channel and disposed of at sea.

2-05. ZUNIGA JETTY. Zuniga Jetty extends approximately 7,500 feet from the shore on Zuniga Shoal. It was constructed over a 10 year period, 1894 to 1902, to serve as a training wall to concentrate tidal flows and to keep the entrance channel scoured to project depth. The jetty was not constructed to the full design height or section. Rehabilitation work was performed from the landward end to station 14+00 by the Navy in 1942. Settlement and flattening of the slopes have occurred, particularly in the outermost third of the jetty. As a result of this settlement, parts of the jetty are awash or submerged at most tide stages, creating a hazard to navigation. In 1970 maintenance repair of the rubblemound jetty at a cost of approximately $127,000 was accomplished. This work consisted of completing the addition of 5 platforms on the jetty for navigation lights, which were installed by the U.S. Coast Guard.

III – INVESTIGATIONS AND COORDINATION

3-01. SURVEYS AND STUDIES MADE IN CONNECTION WITH THE PROJECT DOCUMENT. The studies made for the report of the district engineer in the project document considered expanding and improving deep draft navigation facilities in San Diego by modifying the existing project. The purpose of the study was to determine the need, the engineering feasibility and the extent of Federal interest. These surveys and studies included:

a. HYDROGRAPHIC SURVEYS. A controlled hydrographic survey was made of the area in 1961. This survey was supplemented by maps prepared by local agencies, charts of the U.S. Coast and Geodetic Survey, commercial and Navy aerial photographs, hydrographic surveys that were made in 1962, 1964, 1965, 1966, and by the use of available condition surveys.

b. SITE INVESTIGATIONS AND EXPLORATIONS. A geological reconnaissance was made of the harbor area. No subsurface explorations were undertaken in the area proposed for improvement. Instead, available data were used and are discussed in Appendix 1, Geology and Soils.

c. In March 1965, the San Diego Unified Port District (SDUPD) explored the site of the proposed marine terminal to be constructed at the foot of National City marine terminal. In September 1965, the Division of Bay Toll Crossings, Department of Public Works, State of California, explored the alinement of the proposed San Diego-Coronado bridge. The results of these investigations were made available to the Corps of Engineers. The subsurface work comprised explorations for foundation materials.

d. The borings made by the SDUPD ranged in depth from 42 feet to 44 feet below mean lower low water. The types of material encountered were sand, silt, clay, and various mixtures of these materials, with shells and gravel at various depths and locations.

e. The borings made by the Division of Bay Toll Crossings ranged in depth from 65 feet to 70 feet below mean lower low water. The types of material encountered were sand, silty sand, and sand-clay mixtures, with shells at various depths and locations. The data obtained in this investigation indicate the materials that would be encountered in the areas proposed for dredging would present little or no unusual problems.

f. ECONOMIC INVESTIGATIONS. Economic studies of future potential commerce were made to evaluate benefits accruing from the proposed improvements to the deep-draft commercial channels. Data on vessels and vessel traffic included statistics on existing vessel traffic, the number of vessels with loaded drafts too great for unrestricted navigation in San Diego Harbor, estimates of future vessel traffic and operating cost for various types of vessels. Several field inspections of the area were made by the District Engineer.

g. CONSULTATIONS WITH INTERESTED PARTIES. From the inception of the study, meetings were held with representatives from Federal, State and local agencies. Public hearings were held on May 25, 1960, at San Diego, California, regarding navigation improvements of San Diego Harbor.

h. MODEL STUDY. In 1967 and 1968 a hydraulic model of San Diego Bay, California, was constructed at the U.S. Army Engineer Waterways Experiment Station in Vicksburg, Mississippi to study the effects of a proposed second entrance on the hydraulic and flushing characteristics of the bay. The fixed-bed type model was constructed to linear scale ratios of 1:500 horizontally and 1:100 vertically. It was carefully adjusted to accurately reproduce observed prototype tides, tidal current directions and velocities, and the dispersion of dye tracers. Since the waters within the bay and the adjacent ocean areas are essentially homogeneous, it was not necessary to reproduce salinity effects in the model. Tests were conducted for two different second entrance locations near the south end of the bay. It was found that maximum current velocities throughout the northern half of the bay were generally reduced by about 70 percent by both plans. The results of dye tracer tests showed that both plans would appreciably improve the overall flushing characteristics of the bay, with the northernmost second entrance producing the most improvement in flushing. With either second entrance in the model, it appeared that the nodal point of the incoming tide was somewhat to the south of the nodal point for the outgoing tide, thus creating a circulation pattern with a net flow into the bay through the existing entrance and a net outflow through the proposed second entrance. This study is described in detail in the "Summary Report, San Diego Bay Model Study," dated June 1971.

3-02. SURVEYS AND STUDIES MADE SUBSEQUENT TO PROJECT AUTHORIZATION. Subsequent to project authorization, the following studies were made to update and refine the information contained in the "Interim Review of Reports for Navigation, San Diego Harbor, San Diego County, California," dated April 1967.

a. HYDROGRAPHIC. Hydrographic surveys were made in November 1970 and February 1971, by the U.S. Army Engineer District, Los Angeles. These surveys were made in connection with the maintenance dredging performed in the bay.

b. SITE INVESTIGATIONS AND EXPLORATIONS. A geological reconnaissance was made of the harbor area during October and November 1970. Thirty-one holes were jetted or drilled to a depth equal to or greater than the proposed channel depth. Samples were recovered by directing return fluid from the hole into a four-compartment settling tank. One or two standard penetration tests were made at each hole to indicate the relative density or consistancy of materials encountered. The results of these investigations appear in Appendix 1, Geology and Soils. Conferences in 1971 resulted in the decision that samples for special environmental tests were required throughout the study area. Investigations, sampling, and testing to determine environmental qualities were done in June 1971, December 1971, January 1972, August 1972, December 1972, and March 1973. Field methods, laboratory testing, and results are discussed in the appendix.

c. ECONOMIC INVESTIGATIONS. The economic study of future potential commerce, made for the project document, has been reviewed and updated in terms of population, resources and industry. An evaluation was made of existing commerce which provided the basis for new projections and for computations of benefits which would accrue from the project improvements. The results of this evaluation are given in Appendix 5.

d. ENVIRONMENTAL STUDY. An environmental study was made of San Diego Harbor and its surrounding territory in accordance with Public Law 91-190, National Environmental Policy Act. This study entitled "Environmental Statement, San Diego Harbor, San Diego County, California" is submitted under separate cover, in conjunction with this report. In addition to this study, chemical and biological analyses were made by the Environmental Protection Agency and the Corps of Engineers laboratories of bottom, bay sediments corresponding to the materials which are to be dredged in conjunction with this project. The results of these analyses are given in Appendix 1, Geology and Soils.

e. SHORELINE INVESTIGATIONS. Historically the littoral transport along the Silver Strand Beach is predominantly northward from its natural sand source at the Tijuana River to Zuniga Shoal. The natural source of sediment is now lost, since most of the Tijuana River drainage basin has been severed from the coast. Subsequently, the Silver Strand Beach area has been nourished artifically and, more recently, from erosion occurring in the vicinity of Imperial Beach and southward.

(1) In 1959 and 1961, groins were constructed north of Imperial Beach. Surveys made after the construction indicate that erosion continued north of the groins until 1965. Surveys of the area made in 1967, indicate some accretion on the north side of the groins, possibly due to short-term reversal in the direction of littoral transport. Since the long-term littoral transport is to the north, this sand will eventually be depleted and beach erosion will again be a problem in the area.

(2) Two locations were considered on the seaward side of the project for deposition of dredged spoil. One is opposite the channel on the ocean beach north of Silver Strand State Park, which the Navy uses for amphibious landing training, and the other is on the ocean beach from a point south of the Silver Strand Beach Park to the mouth of the Tijuana River.

(3) Placing dredged material on the Silver Strand Beach would act as an immediate source of nourishment for the area cell, would be beneficial for the maintenance of the beach, and would provide for normal beach erosion for many years.

(4) Placement of dredged material on the seaward side of the Silver Strand is not expected to have an adverse effect on the beach environment. Given sufficient time, the material is expected to eventually move up coast to the Zuniga shoal area.

f. COORDINATION WITH OTHER AGENCIES. Throughout the study, the U.S. Army Engineer District, Los Angeles, has maintained coordination with the U.S. Navy, U.S. Coast Guard, U.S. National Marine Fisheries Service, Environmental Protection Agency, Bureau of Sport Fisheries and Wildlife–U.S. Department of Interior, Water Quality Control Board of California–State of California, California Department of Fish and Game, California State Lands Commission, Department of Parks and Recreation–State of California, city of Coronado and the San Diego Unified Port District. Coordination effected is discussed in more detail in Appendix 7. While this memorandum was being prepared, the Bureau of Sports Fisheries and Wildlife were furnished preliminary plans for the channel improvement for their review and comment. Copies of their letters are inclosed in Appendix 7.

g. PUBLIC HEARING. A public hearing concerning this project was held on 22 Aug 1973 in National City, California. The presiding officer was the District Engineer, U.S. Army Engineer District, Los Angeles, California. The hearing was attended by more than 60 people, with 15 speakers expressing their views. A synopsis of the public hearing is given in Appendix 9.

IV – LOCAL COOPERATION

4-01. LOCAL INTERESTS COMPLIANCE WITH REQUIREMENTS OF LOCAL COOPERATION. By resolution No. 74-17 adopted 29 January 1974 the Board of Port Commissioners of the San Diego Unified Port District, indicated their acceptance of the proposed plan of improvement for San Diego Harbor, and assumed the responsibility of providing the items of local cooperation as required in the authorizing legislation. (See Appendix 6, Resolution by Local Interests.)

4-02. The cost to local interests for their share of the improved navigation facilities is now estimated at $465,000. The increase stems from increased costs for dredging and disposal of channel materials. The cost of self-liquidating items necessary to complete the plan of development is estimated at $30,000,000. The $30,000,000 figure reflects an increase of $9,000,000 or 43 percent above the cost set forth in the project document.

4-03. The Unified Port District, acting as the cooperating local agency, has been actively associated with the development of the harbor plan. The Unified Port District coordinated and developed the plan for relocating the public utilities crossing the bay between San Diego and Coronado.

4-04. PRINCIPAL OFFICERS. The principal officers and representatives responsible for fulfilling items of local cooperation are the seven members of the Board of Port Commissioners of the San Diego Unified Port District, 3165 Pacific Highway, San Diego, California 92101. Their names, titles and addresses are as follows:

C. Robert Campbell, Chairman
43 Corte Maria
Chula Vista, California 92010

Miles D. Bowler, Commissioner
212 Daisy Street
Imperial Beach, California 92032

Harvey Furgatch, Commissioner
2575 Ardath Road
La Jolla, California 92037

Lorenz H. Ruehle, Commissioner
837 Ethel Place
National City, California 92050

Walter A. Vestal, Commissioner
570 C Avenue
Coronado, California 92118

Dudley D. Williams, Commissioner
1327 La Palma
San Diego, California 92109

Frank L. Hope Jr., Commissioner
1475-6th Ave.
San Diego, California 92101

V – LOCATION OF PROJECT AND TRIBUTARY AREAS

5-01. PROJECT LOCATION AND DESCRIPTION. San Diego Bay is located in the extreme southwest corner of California, just north of the United States-Mexican boundary, and is approximately 96 and 506 nautical miles southeast of Los Angeles Harbor and San Francisco Bay, respectively. San Diego Bay is a landlocked, crescent-shaped body of water about 14 miles in length, varying in width from 1,600 to 14,000 feet, with a surface area at half tide of approximately 18.5 square miles. Its depth varies from zero (mudflats exposed at low tide) at the southern end of the bay, to over 60 feet near the harbor entrance. The bay has two ephemeral rivers (Sweetwater and Otay) and three so called tributary creeks. Fresh water flows from these tributaries only after or during periods of prolonged and heavy rainfall. Such occurrences are infrequent and are of short duration. The harbor entrance is located at the northwestern end of the bay between Point Loma – a high headland – on the west and Zuniga Point on the east. The north and central part of the bay has been improved and is used by recreational boats, commercial vessels and the U.S. Navy. A naval seaplane basin about 1-1/2 miles wide, 3 miles long, and 10 feet deep is located in the southern part of the bay adjacent to the Silver Strand but it is no longer used.

5-02. TRIBUTARY AREAS. The commercial tributary area for San Diego Harbor is divided into an immediate tributary area and a general tributary area (See plate 1, appendix 3). The immediate tributary area consists of the Southern California counties of Imperial and San Diego. The general tributary area includes the southern half of Arizona, New Mexico (less the eight northernmost counties), West Texas and the Mexican states of Chihuahua, Sonora and Baja California Norte.

5-03. POPULATION. The preliminary 1970 U.S. Census reported a population of 1,425,000 for the immediate tributary area and 2,803,000 for the commercial tributary area (excluding Mexico.) The population projection for the year 2020 is 3,743,000 for the immediate tributary area and 9,102,000 for the commercial tributary area. Detailed information on present and future population is given in Appendix 3, Economic Study.

5-04. CHARTS AND MAPS. The area under study is shown on U.S. Coast and Geodetic Survey charts numbers 5105 and 5107, on U.S. Geological Survey 7.5 minute quadrangles Imperial Beach, National City and Point Loma, and plate 4.

VI - PROJECT RECOMMENDED IN THIS MEMORANDUM

6-01. RECOMMENDED PROJECT PLAN. The recommended project consists of widening, deepening and extending the existing channels to allow deeper draft vessels to use the existing commercial facilities in the harbor and to provide access to new facilities being constructed in the South Bay area. The new plan recommends that the existing project be modified by deepening, widening and extending the present navigation channels and turning basins to provide: (a) additional widening of the north bay channel on the south side of the 42-foot-deep channel at the bends at miles 3.0, 3.7, 4.6 and 5.3, and on the north side of the 42-foot-deep channel and turning basin between miles 6.0 and 7.2; (b) dredging the central bay channel to a depth of 40 feet between miles 7.2 and 8.84 and to a depth of 35 feet between miles 8.84 and 12.0 with a turning basin 40 feet deep between miles 8.25 and 8.84; and (c) deepening and extending the south bay channel to a depth of 35 feet between miles 12.0 and 12.9+, with turning basins 35 feet deep between miles 11.67 and 12.24, and between miles 12.53 and 12.9+.

6-02. RECOMMENDED DISPOSAL OF DREDGED MATERIAL. The project document required local interests to provide areas for disposal of dredged material, including necessary retaining dikes, bulkheads, embankments or the costs of such retaining works. Disposal of dredged material for the recommended plan is shown and discussed below:

Disposal Area	Quantity (cu. yds.)
a. 5th Avenue	1,306,000
b. Imperial Beach	2,000,000
c. Bay Side of Silver Strand south of Naval Amphibious Base	400,000
d. Disposal at sea	1,174,000
e. Silver Strand Ocean Beach	3,655,000
Total cu. yds.	8,535,000

6-03. PROPOSED STRUCTURES AND IMPROVEMENTS BY THE UNITED STATES. Improvements to be constructed by the United States with funds provided in the proportion of 95.9 percent by the United States and 4.1 percent by local interests would involve dredging throughout the bay to provide the depths and widths as described in paragraph 6-01. Aids to navigation would be provided by the U. S. Coast Guard at Federal expense.

6-04. CHANNELS. The channel improvements consist of dredging approximately 8.5 million cubic yards of material from the north bay channel, central bay channel and south bay channel. All channels will be dredged to project depth plus one foot for overdepth

dredging. Cut slopes would be 1V to 3H. The plan provides for easier steerage and safer passage of larger and deeper draft vessels, both naval and commercial, through the turns in the north bay channel to Navy areas, to the 10th Avenue and to the National City marine terminals.

6-05. The location and description of the improvements are defined by areas as follows:

a. North Bay Channel. This segment of the channel improvement extends from mile 2.4 to mile 7.0. The improvements consist of widening the 42-foot-deep channel at four of the five bends located at miles 3.0 - 3.7 - 4.6 and 5.3, by dredging 42 foot deep triangular shaped areas about 200 feet wide by 2,000 feet long and widening the north side of the 42 foot deep channel section contiguous to the carrier turning basin between channel miles 6.1 and 7.0 by dredging a 42 foot deep triangular shaped area 460 feet wide by 4,800 feet long.

b. Central Bay Channel. This segment of the channel is between miles 7.0 and 11.67. The improvements consist of widening the channel contiguous to the carrier turning basin by dredging a 42-foot-deep channel with a width of 460 feet at mile 7.0, increasing to a width of 600 feet at mile 7.2 to 7.85; dredging a 40-foot-deep channel with a width of 600 feet at mile 7.20, increasing to a width of 1,300 feet at mile 8.25; dredging a 40 foot deep channel and turning basin with a width of 1,300 feet at mile 8.25 increasing to width of 1,900 feet at mile 8.5; dredging a 40 foot deep channel and turning basin with a width of 1,900 feet between miles 8.5 and 8.84; dredging a 35-foot-deep channel, narrowing in width from 1900 feet at mile 8.84 to 1300 feet at mile 9.1 (the site of the San Diego-Coronado High Level Bridge); continuing with two channels under the bridge, between bridge piers, each 600 feet wide; and dredging a 35-foot-deep channel with varying widths (1300 feet to 600 feet) from miles 9.1 to 11.67.

c. South Bay Channel. This segment of the channel extends from miles 11.67 to 12.9+. The improvement consists of dredging a 35-foot-deep channel and two combined turning basins varying in width from 600 feet to 1,350 feet between miles 11.67 and 12.24, and between miles 12.53 and 12.9+.

6-06. DREDGING AND DISPOSAL SITES. Dredging and disposal sites are discussed below:

a. Dredging. Approximately 174,000 cubic yards of material from the bends in the north bay and 1,000,000 cubic yards of nonstructural material will be dredged from the channel between miles 10.2 and 11.6 and disposed in the open ocean. The dredging of the 174,000 cubic yards is planned to be accomplished with a Government hopper dredge. The dredging of the 1,000,000 cubic yards is planned to be performed with a clam shell bucket, loaded onto a barge and hauled to the open ocean for disposal. The remainder of the dredging (totaling about 7,371,000 cubic yards) would be performed by hydraulic dredge and disposed of in the fill areas adjacent to the bay and on the ocean beach.

b. Disposal Sites. The dredged material will be disposed in the areas listed in paragraph 6-02. Each of these areas is discussed below. Correspondence with Federal and non-Federal agencies concerning disposal of dredged materials appear in Appendix 7.

(1) 5th Avenue Site

(a) The 5th Avenue site is located on the west shore of the central bay, opposite channel mile 7.6 to 8.6. The fill site at 5th Avenue on which the dredge spoil will be placed is under the jurisdiction of the San Diego Unified Port District. About 1,306,000 cubic yards of spoil will be used to create 22 acres of landfill in water depths of 15 to 30 feet. The fill will be protected from erosion by stone revetment. The sediment to be deposited in this area will be dredged from the reach between miles 6.0 and 8.6. Analysis indicates the sediments consist of fine sand and silty sand. The material, when hauled by conventional dredging procedures will meet current EPA criteria for open water disposal.

(b) Non-mobile marine organisms in the disposal sites will be destroyed by burial. Mobile organisms will be displaced and stressed by competition in adjacent habitats. The flora and fauna in the disposal site are limited both in populations and diversity, therefore the overall ecological impact of their localized destruction is not of major significance in terms of the bay's total biological resource. The protective stone revetment placed on the peremeter of the fill area will create new rocky habitat and permit establishment of organisms preferring this habitat.

(c) The land created by depositing dredge spoil in the 5th Avenue fill will accrue to the SDUPD, who plan to develop the area as a recreational marina. The development is closely related to the renewal and upgrading of downtown San Diego through the Central City Plan being developed through the joint efforts of San Diego City and County and the SDUPD.

(2) Imperial Beach Site.

(a) The Imperial Beach ocean fill is located opposite the City of Imperial Beach. The fill will widen the beach approximately 250 feet and will extend about 8,300 feet southward from groin No. 1 in the Imperial Beach groin field to a point approximately 1/2-mile north of the mouth of the Tijuana River. The Imperial Beach site is under the jurisdiction of the City of Imperial Beach.

(b) The material placed at Imperial Beach will nourish a badly eroded beach and will enhance its recreational potential. Analysis indicates the material to be placed on the beach is a fine grained sand. Wave action will remove the fine silts and clays from the area and distribute much of the coarse silt and very fine sand offshore, outside the surf zone. Much of the remaining sand will be transported to the north or south, depending on the littoral current direction prevailing following the period of discharge. A northward movement will probably result from discharge during the summer and early fall; conversely, the southern movement of the discharged material will be favored by the discharge of spoils during the winter and spring.

(c) The imperial Beach fill is likely to adversely affect those organisms that live on the beach and in the surf zone. However, because the sand is eroded away from the beach during the winter to expose beds of cobbles, marine life on Imperial Beach is less diverse and abundant than on the Silver Strand. The abundant cobbles in the area and the unstable beach discourage fish spawning; therefore, impacts at Imperial Beach will be less severe than those at the Silver Strand and spoil deposition during the summer will not have the potential adverse impacts on fish that may occur on the Silver Strand.

(3) Bay Side of the Silver Strand South of Naval Amphibous Base.

(a) The Silver Strand bayward fill is located just south of the Naval Amphibious base and will extend along the beach 700 yards, reaching offshore 150 yards. Initially, the beach will be widened about 190 feet, and it is expected that this width will stabilize at approximately 140 feet after the expected beach equilibrium profile is achieved. This site is under the jurisdiction of the U.S. Navy and the fill will accrue to the U.S. Navy.

(b) In the initial stages of the study, disposal of over 5,000,000 cubic yards of dredged material south of the Naval Amphibious Base was considered. However, this consideration was dropped when opposition to the creation of this large fill was expressed by various Federal and non-Federal interests.

(c) Subsequently, disposal of a smaller quantity was planned for this area – approximately 1,000,000 cubic yards. This quantity would have been placed in three areas discussed below:

(1) Area contiguous to the south boundary of the Naval Amphibious Base. The Navy planned to use the dredged material placed here to repair erosion and to improve the beach so that rafts could be assembled with greater ease and efficiency. Dredged material would also have been used to create a sandy beach to front and enlisted man's service club and to provide recreation for U.S. Navy personnel.

(2) Area on the mudflat which was created by deposition of dredge spoil from the Coronado Cay project. The Navy planned to use the dredged material placed in this area to create a water-oriented recreation park for the general public. Currently, the general public interfers with the Navy's training mission on the bay side of the Silver Strand by picnicking on the beach and waterskiing in the amphibious training area. By providing facilities for public use in this area, the Navy hoped to relocate the general public from its training area to prevent further interference with the training mission.

(3) Area on the bayside of the Silver Strand. The Navy would use the material placed on the bayside of the Silver Strand between the south boundary of the Naval Amphibious Base and the mudflats to restore a badly eroded beach and to restore its value for training Naval personnel in amphibious landing operations. This is the only area available to Navy on the west coast for training in quiet water landing tecnhiques.

(d) The areas listed in subparagraphs (1) and (2) above were dropped from the recommended plan because of opposition from the Bureau of Sports Fisheries and Wildlife, the National Marine Fisheries, and the California Department of Fish and Game. Each of these agencies also opposed filling the area listed in subparagraph (3) above. The area listed

in subparagraph (1) is an intertidal and subtidal zone. In contains eelgrass and has an abundant variety of large invertebrates and fishes. The area listed in subparagraph (2) is a mudflat and provides for a high bird resting and feeding area. The area listed in subparagraph (3) above contains eelgrass and a variety of invertebrates.

(e) A number of meetings were held with representatives of the U.S. National Fisheries Service, U.S. Bureau of Sports Fisheries and Wildlife, the California Department of Fish and Game, the U.S. Navy, and the Los Angeles District in an attempt to resolve the opposition to filling the area listed in subparagraph (3) above. At these meetings, it was resolved to place a fill 700 yards along the shore reaching 150 yards offshore.

(f) Analysis indicates most of the material to be placed on the bayward beach is a fine grained sand. Wave action will remove the fine silts and clays from the area, but at a much slower rate than on the ocean beach. It is anticipated that the beach slope above MLLW will stabilize between a 10 to 14 horizontal to 1 vertical and below MLLW will stabilize between a 20 to 24 horizontal to 1 vertical. During the placement of the fill, eel-grass would be covered with some loss and there would be a short-term loss of non-mobile organisms from burial and mobile organisms would be displaced and stressed by competition in adjacent habitats.

(4) Disposal at Sea.

(a) The EPA has designated two open water sites for aquatic disposal at San Diego.

(b) The first site (Point Loma Site) is located in water about 250 feet deep at 32 degrees 35' 00" N, 117 degrees 20' 40" W – 5.4 nautical miles offshore. The second site (100 fathom site) is located in water 100 fathoms deep at 32 degrees 36' 50" N, 117 degrees 20' 40" W – 7.7 nautical miles offshore.

(c) The material to be placed at the first site will be dredged from the bends in the North Bay. Analysis indicates the materials to be dredged will be sand.

(d) Analysis indicates material dredged from the channel between mile 10.2 and 11.6 is not suitable for disposal of the Point Loma site but is suitable for disposal at the 100 fathom site. The material to be placed at this site consists of muck, silty clay, organic silt, silty sand and sand. The material is also unsuitable for disposal on the ocean beach or in a structural land fill.

(5) Silver Strand Ocean Beach Site.

(a) The Silver Strand Ocean beach fill is located on the Silver Strand. The fill's southern boundary starts at the north boundary of Silver Strand State Park and terminates at the south boundary of the Naval Amphibious Base. It will widen the beach about 400 feet for a distance of about 10,000 feet. This site is under the jurisdiction of the U.S. Navy and is used to train Navy personnel in amphibious landing operations.

(b) Analysis indicates the material to be deposited at this site is predominately medium and fine grained sands, but may include silt and clay in some cases. Wave action will remove the fine silts and clays from the area and distribute much of the coarse silt and very fine sand offshore, outside the surf zone. Much of the remaining sand will be transported to the north or south, depending on the littoral current direction prevailing following the period of discharge. A northward movement will probably result from discharge during the summer and early fall; conversely, the southern movement of the discharged material will be favored by the discharge of spoils during the winter and spring.

(c) The disposal of this material on the beach is likely to adversely affect those organisms that live on the beach and in the surf zone. However, the invertebrate populations on the Silver Strand beach fluctuate greatly in the number from time to time as the result of natural or unknown causes. The deposition of materials on this beach is being restricted from 15 September to 15 February. This restriction was adopted to minimize interference with the training of Naval personnel in amphibious landings and to minimize interference with fish spawning on the beach.

6-07. LANDS AND RIGHTS-OF-WAY (INCLUDING SPOIL AREAS). The recommended plan of improvement would not require the dedication of lands for project construction. No relocations are involved so that PL 91-646 need not be considered. Local interests have agreed to provide suitable areas for disposal of pipeline dredge spoil, together with necessary retaining dikes, bulkheads and embankments. The resolution adopted by the Board of Port Commissioners of the United Port District appears in Appendix 6. Spoil areas will be required for initial new-work dredging. However, maintenance dredging in the future may be accomplished by hopper dredge and spoil areas may not be required.

6-08. REMOVAL AND RELOCATION OF UTILITIES. The recommended plan of improvement will require removing and relocating the following utilities: 2 waterlines, 1 sewerline, 1 natural gasline, 3 power cables and 4 telephone cables. All transbay public utilities were installed under permit from the Secretary of the Army, with one exception; an 8 inch waterline installed by California American Water Company in 1886, prior to the River and Harbor Act of 1889. By the terms of paragraph (f) of the installation permit, the Secretary of the Army has the authority to direct the owner to remove or alter any structural work which, in his opinion, shall cause unreasonable obstruction to the free navigation of said waters, at no cost to the United States. The Unified Port District, under items of local cooperation is required to . . . "accomplish without cost to the United States, such utility or other relocations or alterations as necessary for project purposes, except as to such utilities as are owned by the United States Navy." Costs for relocating 2 waterlines and 1 sewerline, owned by the Navy, are shown as a Federal first cost; costs incurred for relocating all other public utilities will be borne by local interests. The plan for removal and relocation of utilities appears in Appendix 2, Removal and Replacement of Utilities.

VII - DEPARTURES FROM PROJECT DOCUMENT PLAN

7-01. GENERAL. The plan recommended in this design memorandum is identical in concept to the plan of improvement recommended in the project document. Minor departures from the project document resulted from (a) changes in channel depths; (b) changes in disposal of materials; (c) shortening of the channel; (d) change in turning basins; and (e) decrease the quantity of materials to be dredged. These differences are described in the following paragraphs.

7-02. CHANNEL DEPTHS. Under the project document plan the channel was to be dredged to a depth of 42 feet to mile 7.1. As shown on the project plan, mile 7.1 was contiguous to the south boundary of the carrier turning basin. Subsequent to project authorization, it was determined that the southern boundary of the 42-foot-deep carrier turning basin intersected the channel at mile 7.2 instead of mile 7.1 as initially thought. The channel depth between mile 7.1 and 7.2 was increased to 42 feet so that the channel contiguous to the carrier turning basin would be the same as the carrier turning basin.

7-03. CHANNEL LENGTH. Under the project document plan the project channel was to extend to mile 13.5, the northern corner of the G Street terminal. With the deletion of the D, G and H Street fill areas, the proposed South Bay channel was terminated at mile 12.9+, to correspond to the south edge of the Sweetwater Channel.

7-04. TURNING BASINS. Under the Project Document Plan, a 35-foot-deep channel and combined turning basin varying in width from 600 to 1,350 feet between miles 12.4 and 12.9+ was authorized. In April 1974, the SDUPD requested a revision of this turning basin design. The SDUPD requested that two turning basins of different configuration be substituted for the aurhorized single basin. The SDUPD desired the change to improve ship docking and turnaround. The two turning basins are located between miles 12.53 and 12.9+. The configuration of the two turning basins are shown on plates 1, 4, and 6.

7-05. Dredged quantities were computed and there was only a minor quantity difference between the two concepts. Since the revision had little apparent effect on costs and was desired by local interests to improve ship docking and turnaround, the revision was incorporated into the plan recommended in this memorandum. A copy of SDUPD's letter requesting the change is included in Appendix 7.

7-06. DISPOSAL OF DREDGED MATERIAL. Under the project document plan, it was estimated that 12,014,000 cubic yards of material would be dredged from the channels. Under the recommended plan, a lesser amount, estimated at 8,535,000 cubic yards will be dredged. The difference resulted from a shortening of the channel and greater refinement in the computation of the quantities to be dredged. The recommanded plan calls for disposal of dredged material as shown on plate 6 and as follows. A comparision is made below with the project document disposal plan:

Disposal Area	Recommended Disposal Quantity (cu. yds.)	Project Document Disposal Quantity (cu. yds.)	Quantity Differences (cu. yds.)
a. Fifth Avenue	1,306,000	2,017,000	-711,000
b. Glorietta Bay (deleted)	0	1,680,000	-1,680,000
c. D, G and H Street Marine Terminals (deleted)	0	1,870,000	-1,870,000
d. Disposal at Sea (Structural Material)	174,000	84,000	+90,000
e. Disposal of Non-Structural Material at sea	1,000,000		+1,000,000
f. Seaward Beaches	5,655,000	6,363,000	-708,000
g. Bayward fill south of Navy Amphibious Base	400,000		+400,000
Total cu. yds.	8,535,000	12,014,000	-3,479,000

7-07. The reduction in volume for the 5th Avenue disposal area (Item a) resulted from a reduction in size and greater refinement in outlining and computing material quantities. The Glorietta Bay disposal area (Item b) and the D, G and H Street disposal areas (Item c) were deleted from the project plan because of environmental objections to filling these areas as discussed in subsequent paragraphs. The increase in volume for disposal at sea (structural material), (Item d) resulted from greater refinement in outlining and computing quantities of the material to be dredged from the bends in the north bay. Disposal of non-structural material at Sea (Item e) was added to the project plan because disposal of non-structural material, unsuitable for disposal on the ocean beach or in a land fill on which structures were to be built, was not contemplated in the project document. The increase in volume disposed on the seaward and bayward beaches (Items f and g) resulted from changes between the disposal plan in the project document and in this memorandum. The project document provided that all material excess to that placed in designated areas be disposed on bayward and seaward beaches. The project document did not specify how much was to be placed at each location. The recommended plan provides that all material that is not disposed in designated areas be disposed on seaward and bayward beaches as follows: (1) seaward beaches (Item f) 5,655,000 cubic yards, and (2) bayward beach (Item g) 400,000 cubic yards.

VIII – BASIS FOR DESIGN

8-01. GENERAL. Criteria and assumptions used in the design are in general agreement with published manuals, directives and with established practices of the Los Angeles District. The following paragraphs briefly indicate the scope of the investigation and make reference to supporting appendices.

8-02. GEOLOGY AND SOILS. A report on geology and soils is given in Appendix 1. The materials to be excavated in the harbor area vary from coarse sand to organic silt.

8-03. TIDES AND CURRENTS. The tides in San Diego Bay are classed as "mixed type", with a marked variation between the two high tides and two low tides that occur every day. The higher tide always precedes the lower low. Near the bay entrance the mean tidal range is 3.7 feet. The range between mean higher high water (MHHW) and mean lower low water (MLLW) is 5.3 feet. The extreme range of tides within the bay is 9.5 feet. The bay has a tidal prism of about one-third of its volume.

8-04. The tidal currents in the bay are strongest in the entrance and in the northern part of the bay. The current directions alternate about every 6 hours with the change in tide. Surface velocities in the north bay range up to 2.9 knots on the ebb tide and 2.2 knots on the flood tide. In the central and south bay, tidal currents velocities are greatly reduced.

8-05. During 1967, current velocities were measured in San Diego Harbor for the second entrance model study. Measurements were made with current meters on four different ranges. Velocities were determined at three different locations on each range. At each location, a velocity measurement was made at the surface, at mid-depth, and on the bottom of the bay. The first range was located approximately 3,000 feet bayward of Ballast Point; the second range was located opposite Harbor Island; the third was located opposite the 10th Avenue Terminal; and the fourth range was located opposite the seventh street channel at approximate channel mile 11.2. Current velocities obtained were used to calibrate the model for the second entrance model study performed at Vicksburg. From the data collected from the model study and from the prototype, it was possible to make a comparision of current velocities throughout the bay. Between Ballast Point and the 7th Street channel, current velocities are reduced approximately 50 percent.

8-06. WATER QUALITY. Water quality in San Diego Bay has experienced a spectacular improvement since 1963, when discharge of sewage into the bay was stopped. Some minor corrective work remains in oil and trash prevention and cleanup. From a report titled "Vessel Pollution Study, San Diego Bay, California," June 1969, by the Federal Water Pollution Control Administration (renamed Environmental Protection Agency), water quality and characteristics are noted as follows:

a. Water temperatures vary from about 14 degrees C to 24 degrees C. In the deeper portions of the bay, the difference between surface and bottom temperatures is about one to two degrees centigrade.

b. Salinity averages about 33.8 parts per thousand (ppt).

c. Transparency, as measured by Secchi disc, ranges from an average of 13 to 15 feet near the entrance to lows of 7 to 10 feet in other parts of the bay. The transparencies observed compared favorably with the standards adopted by the San Diego Regional Water Quality Control Board, State of California.

d. Average total nitrogen values range from 0.30 mg/l to about 0.60 mg/l. Total phosphorus values from about 0.04 mg/l to 0.11 mg/l. The nutrient levels found are not considered to be high.

e. Oily surface films are frequently found in San Diego Bay. Floating sewage, garbage and trash are noted on occasion, but continuing efforts are being made to alleviate these conditions.

f. Dissolved oxygen data show considerable variation, both longitudinally and horizontally with levels ranging from about 5 to 8 mg/l. Water quality standards generally stipulate that dissolved oxygen should exceed 6.0 mg/l. In some instances this objective is not being achieved.

g. Bacterial density data show that median total coliform levels greater than 200/100 ml are confined to a relatively small area of the bay. Fecal coliform density levels in the bay are generally lower with a density ranging between 100 and 500/100 ml as compared to 200/100 ml, a level which has been suggested as a limit for primary contact recreational water.

8-07. CHANNEL DESIGN. Vessel traffic is discussed for the year 1960-1970 in Appendix 4 in terms of vessel types, trips and draft class. Most of the commercial vessels, excluding commercial fishing boats have loaded drafts of from 20 to 30 feet. These include bulk carriers, general cargo carriers, container ships and tankers. Navigation clearances and channel dimensions required to accommodate the predominant sizes of Naval as well as Commercial vessels using San Diego Harbor are shown below.

Vessel	Number	Transits/Yr (Round Trip)	Channel Dimensions Width (Ft)	Depth (Ft)
Carrier*	N/A	N/A	600	48
Cruiser-Destroyer Fleet*	N/A	1,296	600	35
Amphibious Fleet*	N/A	4,800	400	30
Service Fleet**	14	1,240	400	30
Coast Guard Fleet***	6	2,180	400	35
Large Tankers*	N/A	50	600	42
Dry Cargo Vessels*	N/A	N/A	400	35
Commercial Fishing*	145	N/A	400	25
Recreational Boats*	3,990	N/A	400	25
Container Ships	N/A	N/A	400	35

* Number of vessels and/or transits per year were not available.
** Consists of two repair ships, nine fleet tugs and three ships from other Ports.
*** Includes patrol craft, high and medium endurance cutters, buoy tender and ice breakers.
N/A – Not available.

The joint use of the existing harbor entrance by recreational, commercial, and naval vessels causes traffic congestion and hazardous conditions. The congestion is influenced by the large recreational fleet berthed at Shelter Island and by Navy operations. The greatest congestion occurs when the Navy fleet leaves the harbor on Monday or returns to the harbor on Friday. The SDUPD's manager of marine operations reported that about 7 percent of the commercial vessels entering or leaving the port are delayed by Navy vessel movements. Delays vary from 10 minutes to 1 hour. Amphibious type ships transit the entire harbor for landing craft operations on the beaches along the Silver Strand. Further, a tuna fleet of about 145 boats transits the harbor with an average of five trips per year for each boat. Commercial and recreational craft are projected to increase in number and will increase existing congestion, particularly if a second entrance is not constructed. Projected development in the south bay at Coronado Cays, Glorietta Bay, Coronado Yacht Club, National City-Paradise Marina, and Chula Vista Marina would add about 5,000 recreational craft by the year 2000.

8-08. Based on the information and projection of vessel traffic developed for the survey report, the design vessel selected to determine the channel dimensions to the 10th Avenue marine terminal should be in the 24,000 dead-weight-ton, bulk carrier class with a summer loaded draft of 34 feet 4 inches, a length of 582 feet 11 inches, and a beam of 78 feet 4 inches. Commercial vessels expected to utilize the recommended channel to the National City marine terminal are the general cargo type vessels of the class C-3 and C-4 Mariner. The C-4 Mariner, larger of the two, has a loaded draft of 29 feet 11 inches, a beam of 76 feet, and a deadweight of 12,900 tons. Therefore, a C-4 Mariner vessel was selected as the design vessel for the channel extending from the 10th Avenue marine terminal to the National City marine terminal for both the survey report and the design memorandum.

a. Based on the drafts of the selected design vessels, the channel depths were calculated as shown below:

(1) Central Bay channel (mile 7.2 to mile 8.84).

	Feet
Vessel draft (prototype vessel - bulk carrier - 24,000 deadweight tons)	34.3
Squat and trim, underway	2.0
Allowance for low tide	1.0
Keel clearance	3.0
Design depth	40.3
Call	40

(2) Central Bay channel and South Bay channel (mile 8.84 to mile 13.2).

	Feet
Vessel draft (prototype vessel, Mariner)	29.9
Squat and trim underway	1.6
Allowance for low tide	1.0
Keel clearance	3.0
Total	35.5
Call	35

b. The minimum design channel width needed for two lanes of traffic, based on the requirements of the prototype vessels indicated above, is 600 feet. This is apparent first, because of the configuration of the bay and second, because the proposed 35-foot-deep channel is located within an existing 30-foot-deep channel. Therefore, widening the channel south of channel mile 8.84, is required to provide safe navigation.

c. Channel alinement in the Central Bay is predicated on keeping the new channel as straight as possible and avoiding the U. S. Navy piers so as to preclude naval vessels from backing directly into the mainstream of traffic. In addition, the channel alinement will be under the two highest spans of the San Diego-Coronado Bridge.

d. A width and a length of 1,400 feet is required in the turning basin adjacent to the 10th Avenue marine terminal for the turning of a prototype vessel, without the use of tug assistance. A combined turning basin and channel is proposed so that vessels may make necessary maneuvers to pass beneath the San Diego-Coronado Bridge.

e. The minimum turning distance required for the prototype vessel using the National City Marine terminal is 1,350 feet, width and length.

8-09. SHORELINE CHANGES. The project modification is not expected to adversely effect the adjacent shoreline area; but to furnish sand, which will act as beach nourishment within the Silver Strand cell.

IX - ALTERNATIVES

9-01. GENERAL. Alternatives to the proposed project that were considered are: (a) the "no action" alternative; (b) the lightering alternative; (c) channel dredging alternatives; and (d) various plans for disposal of the dredge spoil generated by the proposed project. These alternatives are discussed in subsequent paragraphs.

9-02. NO ACTION ALTERNATIVE. The "no action" alternative would involve no deepening, widening, or extending of navigation channels in San Diego Bay. Because no dredging would be accomplished, no dredge spoil disposal would be required. Under present conditions, which would continue under the "no action" alternative, the existing channel depths are inadequate to accommodate fully-loaded, contemporaneous general cargo vessels (C-4 class) and are inadequate to accommodate fully-loaded, liquid or dry bulk carriers, cable ships, and containerized carriers at the National City marine terminal. Without channel deepening, the SDUPD could not develop and utilize the existing capabilities of its existing terminals effectively and economically. Because of insufficient channel depths, fully-loaded, deep-draft vessels likely to call at San Diego Harbor would be required to wait for favorable tides prior to entering or departing the port, or to alter their destination to Los Angeles-Long Beach Harbors where deeper-draft channels already exist; however, loading facilities at Los Angeles-Long Beach Harbors are fully utilized at present and expansion of that port is needed. Land areas with transportation access adjacent to ship channels are not available for expansion of the Port to enable it to handle the projected future waterborne commerce. Under the "no action" alternative the cost of handling cargo in the Port of San Diego would increase.

9-03. The National City marine terminal, in the southern portion of the bay, is the Port's newest cargo facility. However, only a portion of the new development was set aside for cargo handling while the remainder, in accordance with provisions of the Federal Grant, is intended for suitable water-oriented industry. A recently completed berth on the west face has been developed as a container terminal, with a 500-foot wharf and container crane, paved container storage area, and a 100,000 square foot warehouse.

9-04. A large part of the National City marine terminal has been leased to International Telephone and Telegraph Corporation (ITT) for the construction and loading of large-diameter submarine communication cables. These cables must be fabricated in continuous segments which, because of their length, are difficult to transport on land. Therefore, they must be assembled in a dockside factory where they can be loaded directly on board a specially designed cable laying ship. ITT plans to use two such ships in this area. One has a loaded draft exceeding 30 feet. The SDUPD has guaranteed that channels of adequate depth will be available for this vessel. If the "no action" alternative were selected, it is possible that at least some channel dredging would be carried out by local interests in order to meet their commitments. Dredging by local interests, however, would require a permit from the Corps of Engineers.

9-05. If the project is not implemented, the construction of the proposed boat basin in the 5th Avenue area will certainly be delayed and may possibly be cancelled altogether. This would aggravate a predicted shortage of small- craft slips. Existing small-craft basins in the area are being rapidly filled and are approaching their maximum capacity.

9-06. Without the project, sand would not be available to replenish shoreline erosion losses on the Silver Strand, both on the seaward ocean beaches and on the bayward side at the U. S. Naval Amphibious Base. Alternative sources of beach replenishment sand are not available at comparable economic costs.

9-07. The beneficial effects of the "no action" alternative include: (a) no reduction in the surface area of the bay; (b) no reduction in the tidal prism or in the tidal current velocities; (c) no disturbance of bay fauna and flora and habitats within the bay; (d) no disturbance of habitats on or seaward of the Silver Strand; (e) only limited increases in marine traffic in the bay and marine pollution of the bay (including oil spills), resulting from maritime activities; (f) no marked increase in vehicular traffic and air pollution throughout the country resulting from the growth induced by the project; and (g) no change in the appearance of the bay or the bay and ocean shorelines.

9-08. The "no action" alternative was rejected because the Port of San Diego could not develop and utilize the existing capability of its existing terminals effectively and economically, and because the adverse environmental impacts of the recommended plan for the proposed project, although significant, were very small when considered as an increment of the total available resource in the project area and were offset by beneficial impacts made possible by the proposed project.

9-09. LIGHTERING ALTERNATIVES. Lightering of general cargo from the 10th Avenue Marine Terminal to the National City Marine Terminal was considered as an alternative to the proposed channel. The SDUPD estimates that this would cost an additional $12 a ton for handling the cargo. This cost would be economically infeasible because cargo can be off-loaded at Los Angeles-Long Beach harbors and shipped overland for less than $12 a ton. If the cargo derived from and destined to the tributary area of the Port of San Diego were handled through Los Angeles-Long Beach harbors, the equivalent annual charges would be $9.6 million. The alternative of shipping cargo through Los Angeles-Long Beach harbors was not economically feasible.

9-10. The LASH ("Lighter Aboard Ship") system improves on the lightering concept by using shallow draft barges that are carried aboard and off-loaded from a mother ship. The LASH mother ships now operating on the west coast have a draft of 35 feet. The Pacific Far East Lines, have six LASH vessels in operation on the Orient-California trade route, but do not feel that the LASH system would be applicable in San Diego Harbor. They feel that LASH vessels calling at San Diego Harbor would handle cargo in the conventional manner by offloading dockside at either the 10th Avenue or National City Marine Terminals. The company stated that any other method of handling cargo from LASH vessels at San Diego would be uneconomical. In any event, there would be no way to insure that shippers handling cargo destined for San Diego would place these cargoes on LASH ships. The LASH alternative was rejected because it was not economically justified and did not appear technologically feasible. The environmental assessment of the LASH alternative, as it would apparently function at San Diego Harbor, would be substantially the same as for the recommended plan.

9-11. CHANNEL DREDGING ALTERNATIVES. Alternative depths, lengths, widths and alinements of channels were examined. These alternative channel dimensions are discussed in the following subparagraphs.

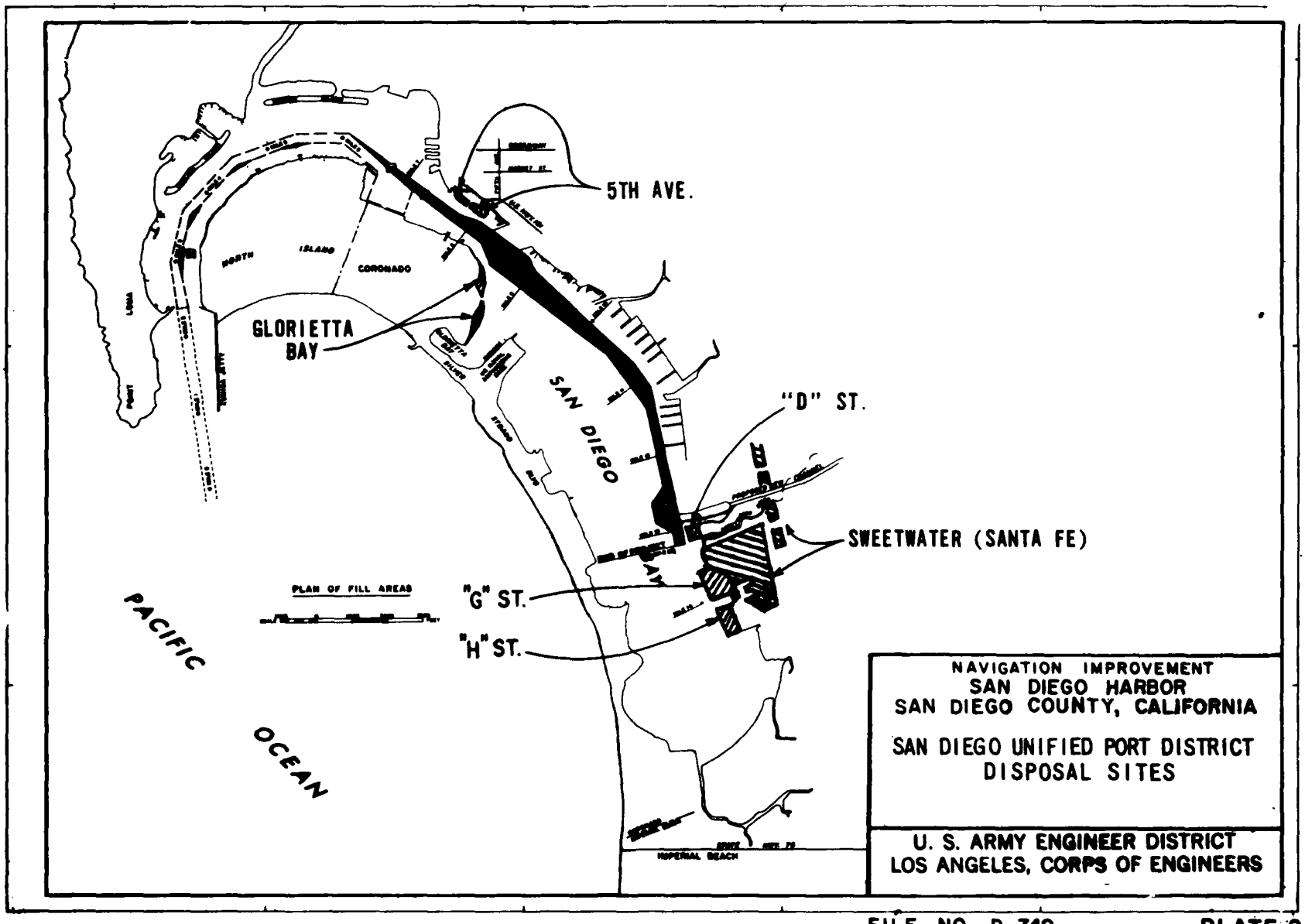
a. Depths. The north bay channel is presently 42 feet in depth. The exisintg 35-foot-deep channel to the 10th Avenue Marine Terminal was examined with a view to deepening to alternative depths of 42, 43 or 45 feet instead of the recommended 40 feet. Were the existing 35-foot-deep channel deepened to 43 or 45 feet, the north bay channel would require corollary deepening, disturbing more benthic habitat. It was determined that the appropriate prototype design vessel was a bulk carrier of 24,000 deadweight tons. This vessel has a loaded draft of 34.3 feet. With an allowance of 1.0 foot for low tide, 2.0 feet for vessel squat and trim, and 3.0 feet for keel clearance, a total of 6.0 feet in excess of the vessel draft is required. Therefore, a minimum channel depth of about 40 feet is necessary. Provision of a 40-foot-deep channel from the 42-foot-deep north bay channel to the 10th Avenue Marine Terminal is economically warranted, although benefits would not be maximized. Depths in excess of 40 feet warrant future consideration, but the 40-foot-deep channel results in benefits in excess of costs and will accommodate contemporaneous bulk carriers in service. Depths in excess of 40 feet past 10th Avenue Marine Terminal are therefore not recommended at present. The channel leading to the National City Marine Terminal was examined with a view to deepening to alternative depths of 33, 37 or 40 feet instead of the recommended 35 feet. It was determined that the appropriate prototype design vessel was a C-4 Mariner general cargo vessel. This vessel has a loaded draft of 29.8 feet. With an allowance of 1.0 foot for low tide, 1.6 feet for vessel squat and trim, and 3.0 feet for keel clearance, a total of 5.6 feet in excess of vessel draft would be required. It was determined, however, that 5.0 feet would be adequate, based on 0.6 foot less keel clearance. The alternative of deepening to 33 feet was therefore eliminated. Provision of a 35-foot-depth at this time is economically warranted, although benefits would not be maximized. Depths in excess of 35 feet warrant future consideration, but the 35-foot-deep channel will result in benefits in excess of costs and will accommodate the C-4 Mariner, which is the contemporaneous general cargo vessel in service. Depths in excess of 35 feet to the end of the channel were therefore not recommended at present. Sixteen channel deepening alternatives were considered and are listed below. A summary of the annual benefits and costs for each alternative is given in tables XI-1. Depths greater than 45 feet were considered infeasible because the entire channel from mile 0.0 to 12.9 and the turning basins within the bay would have to be dredged, resulting in excessive costs in terms of benefits generated.

Channel Deepening Alternatives

	Depths from mile 0.0 to 8.84	Depths from mile 8.84 to 12.9+
Alternate 1	40	33
Alternate 2	40	35
Alternate 3	40	37
Alternate 4	40	40
Alternate 5	42	33
Alternate 6	42	35
Alternate 7	42	37
Alternate 8	42	40
Alternate 9	43	33
Alternate 10	43	35
Alternate 11	43	37
Alternate 12	43	40
Alternate 13	45	33
Alternate 14	45	35
Alternate 15	45	37
Alternate 16	45	40

b. Widths and Alinements. Channel widths and turning basin dimensions were examined in view of the maneuvering requirements of commercial and naval ships (in the north bay channel and turning basin) and of the prototype commercial design vessels in the other channels. The selected channel widths and turning basin dimensions are the minimum required for safe maneuvering by ships underway. Channel alinements are predetermined by the location of existing facilities that the channels serve (wharfs, piers, terminals); therefore, alternative alinements were not considered.

c. Channel Length. The authorized project provided for channel deepening to mile 13.5. When the G and H Street spoil disposal sites were withdrawn, the need to dredge the channel to mile 13.5 was eliminated. Consideration was then given to dredging the channel to mile 13.2 or to mile 12.9. Dredging the channel to mile 13.2 would provide material for disposal in the D Street fill, thereby creating additional land for terminal facilities, together with channel access to the terminal. The Corps of Engineers by joint coordinated action with SDUPD, consistant with SDUPD's master plan, determined that additional terminal facilities will be needed if the Port of San Diego is to accommodate the projected future waterborne commerce. The development of commerical terminal facilities north of D Street would require displacement of existing facilities and would not, therefore, result in expanded facilities. However, the Bureau of Sport Fisheries and Wildlife and the State of California Department of Fish and Game oppose the D Street fill, based on the adverse consequences resulting from loss of mudflats and increased industrial activity adjacent to the Sweetwater marsh. By joint coordinated action between the SDUPD and the Corps of



FILE NO. D-749 PLATE 2

Engineers, it has been determined that the need for expanded terminal facilities does not now outweigh the adverse effects resulting from the D Street fill and has therefore rejected the alternative of deepening the channel between mile 12.9 and mile 13.2 and placing the resulting spoil in the D Street fill.

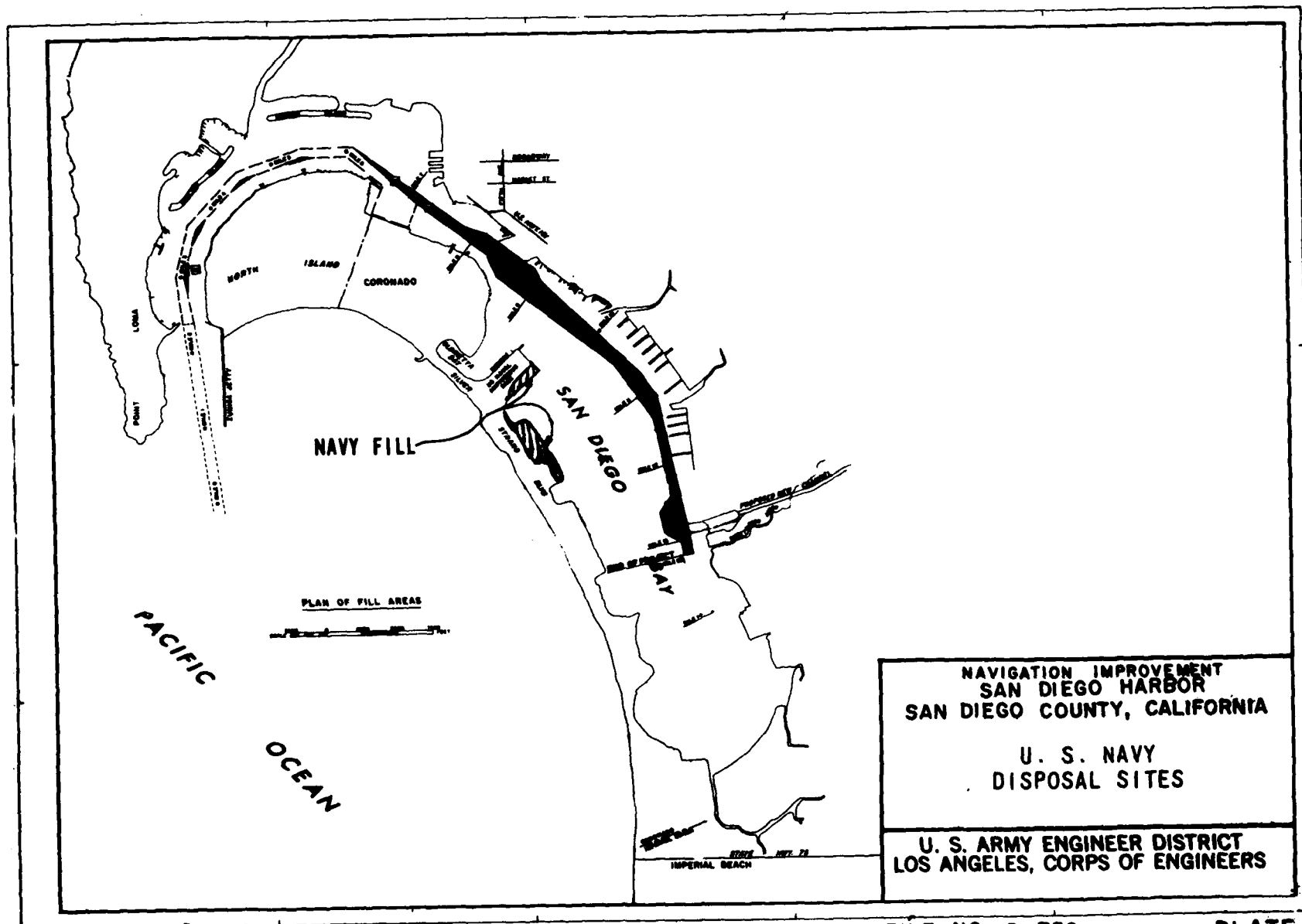
9-12. GENERAL ALTERNATIVES FOR DISPOSAL OF DREDGE SPOIL. Under the authority for the proposed project, SDUPD is responsible for providing dredge spoil disposal areas. When studies for the proposed project were initiated, the SDUPD provided a list of potential disposal sites; all but one of the sites were on property under the jurisdiction of the SDUPD. The exception was a site offered by the Santa Fe Railway Company and owned by them. All of these sites are on tidelands except the Santa Fe site, which is marshy lowland. No upland dry land sites were located, even after extensive investigation by the SDUPD. The sites furnished are tabulated below and are shown on plate 2.

Fill Areas	
5th Avenue	1,306,000 cubic yards
Glorietta Bay	1,289,000 cubic yards
D Street	453,000 cubic yards
G Street	1,792,000 cubic yards
H Street	3,397,000 cubic yards
Sante Fe	5,620,000 cubic yards

9-13. In addition, oceanside and bayside beaches of the Silver Strand were also available for disposal of dredged materials.

9-14. Shortly after work started on this memorandum, the U.S. Navy when contacted offered additional sites in the bay in which 5,469,000 cubic yards of dredged material could be placed. The areas were located south of the Naval Amphibious Base and are shown on plate 3.

9-15. One-by-one as time progressed, disposal sites were withdrawn from consideration. Starting with the disposal sites given in the project document. First the G and H Street sites were withdrawn. This was followed by the large fill site on the Naval Amphibious Base, then by the Glorietta Bay Site, then by the D Street fill site, and lastly a part of the small fill site on Navy property south of the Naval Amphibious Base was eliminated from the recommended plan. All of these sites were withdrawn because of opposition from one or more agencies. Disposal on the Santa Fe property was eliminated from consideration because of the windfall benefits which would have occured to the railway company and because of environmental objections. The National Marine Fisheries, the Bureau of Sports Fisheries and Wildlife, the California Department of Fish and Game, and other organizations objected to disposal of dredged material at the D Street, G Street and H Street fill areas because of the environmental impact of filling the lowlands and marshes contiguous to the Sweetwater and Paradise marsh systems. Also, because of detrimental environmental effects,



NAVIGATION IMPROVEMENT
SAN DIEGO HARBOR
SAN DIEGO COUNTY, CALIFORNIA

U. S. NAVY
DISPOSAL SITES

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS

FILE NO. D-750 PLATE 3

these same agencies opposed filling at the Glorietta Bay Site and part of the reduced fill site on the Naval Amphibious Base. (The area contiguous to the south boundary of the Naval Amphibious Base and the area located on the mud flat created from the dredge spoil from the Coronado Cay project.) Letters from concerned agencies and the LAD concerning the disposal of dredge spoil at these are included in Appendix 7. Alternate plans for spoil disposal were developed using the feasible spoil disposal sites. These disposal sites are listed below:

Site	Capacity
5th Avenue	1,306,000
Naval Amphibious Base (bayside)	400,000
Ocean beaches	Unlimited
Deep ocean (offshore)	Unlimited
Burial in hole within bay.	Unlimited

9-16. The recommended dredging will require disposal of almost 8,535,000 cubic yards of dredge spoil. In two instances, there are no feasible alternatives to disposal in accordance with the recommended plan in one instance because of the nature of the material, and in the other instance by the location of the material. The 1,000,000 cubic yards of nonstructural material is unsuitable for either beach replenishment or for landfill. During project formulation, consideration was given to dredging a hole in the floor of the south bay, placing that sandy material on the beach, and placing the nonstructural material within the dredged hole. This method was of unproven engineering feasibility and had no economic advantage; the method was therefore discarded. The 174,000 cubic yards of material to be dredged from the bends of the north bay channel, although suitable for beach replenishment, cannot economically be transported to the beach or to any of the proposed fill areas unless it is handled twice. During project formulation, consideration was given to interim disposal of the material in the central bay and subsequent rehandling to place it on the beach. There was no economic advantage to this course of action and salvage of the small quantity of beach replenishment material involved did not warrant incurring the increase in turbidity that would have resulted from this action; the method was therefore discarded. The balance of the dredge spoil, 7,361,000 cubic yards, is suitable for ocean beach replenishment or can be disposed of at sea as alternatives to landfill. These general alternatives are discussed in paragraphs 9-17 through 9-22.

a. Before the open ocean was selected as the disposal site for the nonstructural materials, disposal in a hole in the bay opposite mile 11.0 was considered. Material dredged from the hole would have been used to create a dike around the hole. The dike would serve as a filter and a barricade to minimize the turbidity within the bay from the disposal of the nonstructural material. After the nonstructural material had been deposited in the hole, it

was planned to place a 5-foot layer of sand from the dikes on top of the nonstructural material. Any material in the dike excess to that required for the 5-foot layer would have been placed on the ocean beach, and the bay bottom would be returned to its original depth.

b. A foundation and materials exploration was performed of the materials to be dredged to create the hole in the bay. The work performed and the results of this exploration are described in Appendix 1.

c. Disposal of the nonstructural material in the bay was not selected for the following reasons:

(1) Costs for disposal in the hole exceeded those for disposal in the open ocean.

(2) The uncertainties associated with disposal of the nonstructural material in a hole in the bay were sufficient to require that arguments for this alternative be particularly compelling. These arguments were not forthcoming and because disposal at sea had less uncertainty and greater confidence, insofar as ecological effects are concerned, disposal of the nonstructural material in the open ocean was selected to that of disposal in the hole in the bay.

9-17. OCEAN DISPOSAL ALTERNATIVE TO IN-BAY OR OCEAN BEACH DISPOSAL. Under this alternative all dredge spoil would be disposed of at sea. Because of the quantity of material involved, it is probable that a hopper dredge would be used, although a clamshell or hydraulic dredge could be used by placing or pumping the material onto barges, which would convey the material to sea.

9-18. The ocean disposal alternative for dredge spoil disposal was rejected in all instances, except for the nonstructural material and the material dredged from bends for the following reasons:

a. Ocean disposal would waste valuable and high quality beach replenishment material and would forego the option of mitigating shoreline erosion on bayward and ocean beaches of the Silver Strand.

b. Ocean disposal would cost an estimated $8 million more than the recommended plan.

c. The dredging technology feasible under this alternative would cause excessive turbidity within the bay.

9-19. The sites selected for ocean disposal are located approximately 5 and 7 miles southwest of Point Loma in the vicinity of lat. 32 degrees, 35 minutes, 0 seconds and long. 117 degrees, 17 minutes, 30 seconds and lat. 32 degrees, 35 minutes, 50 seconds and long. 117 degrees 20 minutes, 40 seconds. These sites are on EPA's approved list for disposal of dredged materials. Disposal of polluted material would be in 100 fathoms, lat. 32 degrees 36'50"N. and 117 degrees 20'40"W, about 7 miles southwest of Point Loma and unpolluted material in 45 fathoms, lat. 32 degrees, 35'0"N and long. 117 degrees 17'30"W.

9-20. OCEAN BEACH DISPOSAL ALTERNATIVE TO IN-BAY FILL. The general alternative of ocean beach disposal is feasible in the instances where in-bay disposal at 5th Avenue, or the U.S. Naval Amphibious Base is recommended. Under this alternative, 7,361,000 cubic yards of material would be placed on the ocean beaches instead of the 5,655,000 cubic yards proposed in the recommended plan. Economic and intangible benefits to be derived from the recommended in-bay fills would be foregone.

9-21. A detailed consideration of the alternative of ocean beach disposal at each in-bay disposal site proposed in the recommended plan is presented in the next paragraph, as is the alternative of either placing material at Silver Strand State Beach or at Imperial Beach.

9-22. ALTERNATIVES TO PROPOSED DISPOSAL. The alternatives considered for each disposal site and the reasons for their rejection are presented in the following paragraphs.

a. 5th Avenue. The alternative to placement of 1,306,000 cubic yards of dredge spoil at 5th Avenue is placement of the material on the ocean beach.

(1) The major advantages of ocean beach disposal are:

(a) An additional 1,306,000 cubic yards of material would be available for beach nourishment.

(b) About 22 acres of San Diego Bay would not be filled; this fill would result in a 0.25 percent reduction in the tidal prism.

(c) Nonmobile organisms in the disposal site, would not be destroyed by burial; mobile organism would not be displaced and stressed by competition in adjacent habitats.

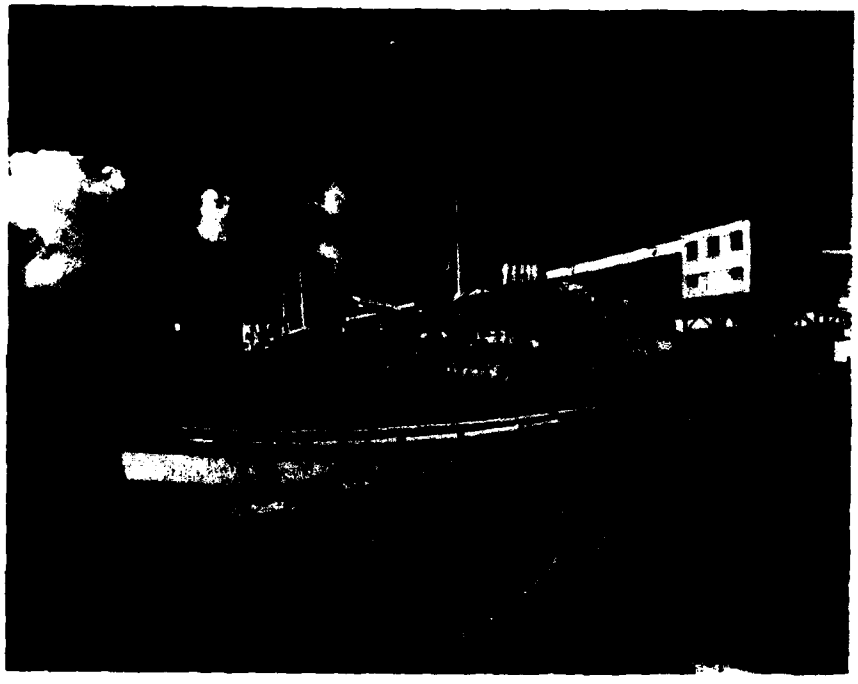
(2) The major disadvantages of ocean beach disposal are:

(a) The beneficial uses for water-associated and water-oriented recreation at the small boat basin would be foregone.

(b) Increased employment and economic benefits resulting from the construction and operation of boat basins and marinas, tourist and recreational facilities made possible by the projected 5th Avenue landfill would be foregone.

(3) The disadvantages of ocean disposal were considered to outweight the advantages; therefore ocean beach disposal of the 1,306,000 cubic yards of dredge spoil in lieu of its disposal at the 5th Avenue fill site is not recommended.

5TH AVENUE FILL AREA



10TH AVENUE MARINE TERMINAL BULK LOADER

b. "D" Street. This alternative was part of the recommended plan until January 1974 when the SDUPD decided to drop the "D" Street fill because of land use controversies and opposition from the Bureau of Sport Fisheries and Wildlife and the California Department of Fish and Game. In this alternative about 453,000 cubic yards of spoil from the reach between miles 12.9 and 13.2 would be used to create 26 acres of landfill at the "D" Street disposal site. The fill would be placed on the east shore of the bay between the present mouth of the Sweetwater River and the future mouth of the proposed Sweetwater River flood control channel in water above the mean lower water datum.

(1) The major advantages of this alternatives area:

(a) Construction of the "D" Street terminal would enable the SDUPD to relocate interim shipping activities presently being conducted at the National City marine terminal and to use the resulting space at the National City marine terminal for maritime industry, in accordance with provisions of the Federal Grant intended to stimulate employment.

(b) Cargo handling capabilities would be increased and higher wharfage revenues will be generated. Because of the extensive U.S. Navy holdings and urban development peripheral to the bay, there are no available areas where adjacent deepwater channels can be provided and where there are sufficient backup lands with access to land transportation. The "D" Street Terminal will enable the Port to handle the projected break bulk general cargo; without additional lands adjacent to deepwater channels, the growth of the Port will be constrained.

(c) Urban development would be stimulated as a result of economic growth resulting from the proposed project. A broadened employment base will result in accelerated population growth, an increased need for urban services and other attendant factor associated with urban growth.

(2) The major disadvantages of this alternative are:

(a) The mudflats at the D Street fill site would be destroyed; existing organisms would be destroyed by burial; and the mudflats would not be available as a feeding area for birds.

(b) The 26-acre fill that would be created would be available for development and the site would not act as a buffer between existing industrial development and part of the Sweetwater marsh.

(c) About 26 acres of San Diego Bay would be filled; this fill would result in a 0.25 percent reduction in the tidal prism.

(d) The first cost of the project would be increased by $480,000, comprising the cost of the dredging between miles 12.9 and 13.2 and the cost of the retention dikes. The advantage of not performing the recommended channel dredging were previously discussed in paragraph 9-07.

10TH AVENUE MARINE TERMINAL

"D" STREET AREA

(3) The advantages of not filling the site were considered to outweigh the disadvantages; therefore, this alternative was not recommended.

c. U.S. Navy Amphibious Base. The alternative to placement of about 400,000 cubic yards of dredge spoil on the bayside of the Silver Strand south of the U.S. Naval Amphibious Base is placement of the material on the ocean beach.

(1) The major advantages of ocean beach disposal are:

(a) An additional 400,000 cubic yards of material would be available for beach nourishment.

(b) About 15 acres of San Diego Bay would not be filled; this would result in a 0.20 percent reduction in the tidal prism.

(c) There would be no short-term loss of nonmobile organism from burial; mobile organisms would not be displaced and stressed by competition in adjacent habitats.

(d) There would be no permanent alteration of shallow water habitats in the area that would be revetted.

(2) The major disadvantages of ocean beach disposal are:

(a) Existing shoreline erosion on the bayward side of the Silver Strand would not be mitigated; the affected utilities and State Highway No. 75 would continue to be jeopardized.

(b) Improvement of the quiet water landing area for amphibious training of the U.S. Navy would not be accomplished. This bayward beach is the only area the Navy has for quiet water amphibious landing training on the Pacific Coast.

(3) The disadvantages of ocean beach disposal were considered to outweigh the advantages; therefore, ocean beach disposal of the 400,000 cubic yards of dredge spoil in lieu of its disposal on the bayward side of the Silver Strand south of the U.S. Navy Amphibious Base is not recommended.

d. Silver Strand Ocean Beach. The alternative to placement of 3,655,000 cubic yards of dredge spoil on the Silver Strand ocean beach is placement of the material at Imperial Beach.

(1) The major advantage of this alternative is the deposited material to the Jetty would create a wider beach and provide more material for the littoral processes in the Silver Strand littoral cell.

(2) The disadvantages are:

(a) An increased project cost of $2,741,250 as a result of an additional cost of $0.75 a cubic yard for pumping the material to Imperial Beach.

BAYSIDE BEACH SOUTH OF NAVAL AMPHIBIOUS BASE
NOTE EXPOSED WATER LINE AND ERODED BEACH

BAYSIDE BEACH SOUTH OF NAVAL AMPHIBIOUS BASE

(b) Although the net direction of littoral transport is upcoast, there is downcoast littoral transport part of the year. Excess material moved downcoast could impair the entrance to the Tijuana estuary through shoaling.

(3) The disadvantages of this alternative were considered to outweigh the advantages, therefore, this alternative was not recommended.

e. Imperial Beach. The alternative to the planned deposition of 2,000,000 cubic yards of dredge spoil on Imperial Beach is placement of this sand on the disposal area of the Silver Strand ocean beach. The placement of the 2,000,000 cubic yards would be in addition to the scheduled disposal of 3,655,000 cubic yards on the Silver Strand disposal site in the recommended plan. The major advantage of this alternative is a reduced project cost resulting from lesser pumping distances to the Silver Strand disposal site than to the Imperial Beach site. If other things were equal, it is estimated that the shorter pumping distances would result in a reduced project cost of $0.75 per cubic yard.

(1) The disadvantages of this alternative are:

(a) A badly eroded beach would not be repaired.

(b) Because the U.S. Navy carries out training activity on the Silver Strand disposal area during summer months, dredge spoil deposition can only be carried out from September through April. Additional restrictions on beach disposal occur during February through September because of fish spawning in the beach areas. This alternative, which increases the amount of spoil placed on the Silver Strand, increases the time during which spoil deposition must take place. Instead of deposition for 2 construction seasons during the months of September through January, this alternative would require deposition for 3 construction seasons during the September through January period. This not only extends the length of the construction contract, it increases the number of mobilizations and demobilization required of the contractor, thus increasing the cost of performing the work.

(2) The disadvantages of this alternative were considered to outweigh the advantages; therefore, this alternative was not recommended.

9-23. UTILITY RELOCATIONS. The alternatives to the proposed relocations are discussed briefly in the following subparagraphs:

(a) U.S. Navy Facilities. If the channels are deepened there is no alternative to removal of existing lines, because the Navy is obligated to this action by terms of the permit authorizing the installation of the lines. The alternative to installation of the new waterline is purchase of water service from the California-American Water Company. This would cost about $200,000 more per year than the proposed method of purchase from the City of San Diego and transportation in a new Navy-owned line. This alternative was rejected because it was not economically feasible. The alternative water source may be used as an interim measure if dredging precludes completion of the new line prior to the removal of the existing lines.

(b) San Diego Gas and Electric Company and Pacific Telephone and Telegraph Company Facilities. If the channels are deepened there is no alternative to removal of existing lines nor to reinstallation of facilities to maintain utility services. The San Diego Gas and Electric Company and the Pacific Telephone and Telegraph Company are obligated to this action by terms of the permits which authorized the installation of the utilities.

X – ENVIRONMENTAL ANALYSIS

10-01. SETTING. The study area for the environmental statement consists of those areas of San Diego Bay and its littoral regimen that will be affected by the proposed project. San Diego Bay has an area, at half tide, of about 18 square miles. The bay is separated from the Pacific Ocean by a sandspit, the Silver Strand, that extends northward to the bay's entrance in the lee of Point Loma. Except for dredged channels, general water depths exceed 30 feet in the north bay, range from 10 to 15 feet in the central bay, and from 0 to 8 feet in the south bay. The bay is used for commercial shipping, is home base for over 18 percent of the U.S. Navy's active fleet (a percentage which was increased when the Long Beach Facility transfered to San Diego in 1974), and provides major tourist and recreational facilities. The climate is subtropical and mild, encouraging these latter uses.

10-02. BAY WATERS. Water temperatures in the north bay are similar to those in the ocean waters outside the bay; temperatures in the shallow south bay waters are sometimes as much as 7 to 9 degrees higher. Salinities are typical of those of the ocean, because of the infrequent occurrence of rainfall runoff and because sewage effluent is not discharged into the bay. The bay is relatively unpolluted, although waste discharge and accidental spills from vessels still contribute some pollution to bay waters.

10-03. LITTORAL AND BAY FLOOR SEDIMENTS. The ocean beaches of the Silver Strand are sand beaches. The direction of net littoral transport is upcoast (from Mexico toward Point Loma). Shoreline erosion of the ocean beaches is estimated at about 1 million cubic yards of sand annually. The bay floor sediments are primarily sand and silty sand in the northern bay and on the western margin, transitioning to bay muds in the south bay and on the eastern margin. In areas that have been dredged in the past, the bay muds have been removed, exposing sandy substrate. Extensive sampling and chemical analyses of the sediments to be dredged indicate that the material is generally suitable for use as fill or for beach nourishment, except for about 1 million cubic yards of material that is too fine for these uses. A thin layer of very fine material is present in some of the project area; this layer contains most of the contaminants associated with the sediments and is undoubtedly the result of past discharges of sewage and other contaminants in the bay. The underlying material is relatively free of contaminants. When homogenized (as the material will be when dredged) the sediments meet all requirements of the Environmental Protection Agency and the Regional Water Quality Control Board – San Diego Region.

10-04. HABITATS. The benthic habitats that would be affected by the proposed dredging and filling vary from low value and diversity to very high value and diversity. The substrate of the existing dredged channels and basins, having been subject to disturbance by man's activities, provides lower value habitat than the substrate in areas that have not been previously dredged. The intertidal and shallow subtidal areas at the U.S. Naval Amphibious Base spoil disposal areas are of high value and diversity for marine organisms.

10-05. ENDANGERED AND RARE SPECIES. Four endangered and five rare species of water-associated birds have been identified in the study area. Two of these species, the light-footed clapper rail and the Savannah sparrow, nest in the Sweetwater marsh. The other species feed in the study area. One of the rare species, the black brant, is dependent upon eel-grass; eel-grass is present in the subtidal areas of the U.S. Naval Amphibious Base.

10-06. HISTORICAL AND CULTURAL SITES. Two National Register properties are located in the study area, the vessel "Star of India" and Cabrillo National Monument.

10-07. RECREATION. An estimated 500,000 persons annually participate in water-oriented recreational activities in San Diego Bay, including swimming, boating, fishing and shellfishing. The bay provides slips or moorings for over 4,800 recreational and fishing boats. In addition, the periphery of the bay provides extensive commercial recreational facilities, as well as parks and picnic areas.

10-08. AIR POLLUTION. Major sources of air pollutants are motor vehicles, industrial and commercial activities, and aircraft. Motor vehicles are responsible for an estimated 70 to 80 percent of the pollutants. Air pollution exceeds state health standards 43 to 60 days a year.

10-09. ENVIRONMENTAL IMPACT OF THE PROPOSED PROJECT. The impacts of the recommended plan on the environment are discussed in the following paragraphs. The expression "temporary" refers to the construction period, "shore-term" refers to a single generation, and "long-term" refers to the foreseeable future. "Direct impacts" refer to those that will result from the project construction activities; "indirect impacts" refer to those additional impacts that will result from use of the project. Impacts on the social and economic environment are discussed in paragraph 11-11 and Appendix 8 of this report.

10-10. IMPACTS ON WATER QUALITY. There will be temporary turbidity in the areas of dredging or dredge spoil disposal; however, water quality requirements established by the Regional Water Quality Control Board – San Diego Region will be met. As an indirect effect of the project, there will be ship traffic in areas not presently navigable by deep-draft vessels, with a consequent threat of pollution from accidental spillage.

10-11. IMPACTS ON TIDAL FLUSHING. There will be a 37-acre reduction in the surface water area of San Diego Bay (0.4 percent), and 0.41 percent reduction in the tidal prism of the bay, and a small decrease in the rate of tidal flushing.

10-12. IMPACTS ON BEACH EROSION. Over 5 million cubic yards of beach replenishment material will be placed on Imperial beach and the ocean beaches of the Silver Strand; additional material will be placed on eroding bay beaches in the U.S. Naval Amphibious Base. This material will mitigate existing shoreline erosion problems on the bay side of the Silver Strand and will provide beach replenishment material to the coastal littoral system.

10-13. IMPACTS ON HABITATS AND ORGANISMS. Benthic habitats will be permanently altered by the channel deepening; non-mobile organisms will be destroyed by removal and mobile organisms will be stressed. In the areas of dredge spoil disposal, organisms will be destroyed by burial. High-value intertidal and shallow subtidal areas at the U.S. Naval Amphibious Base will be subject to short-term destruction; natural regeneration is probable in less than 25 years. In areas where the spoil will be retained on steep slopes rather than placed on existing slopes, the habitat destruction and alteration will be long-term. The benthic habitat at 5th Avenue, will be destroyed by fill deposition. Organisms on the Silver Strand ocean beach will be destroyed by burial, but rapid

repopulation can be expected. Discharge of dredge spoil will cause temporary turbidity. Contaminants associated with the dredged material will be introduced into marine waters and will be available to the marine food web. The short-term alteration of the habitat at the U.S. Naval Amphibious Base will reduce feeding areas available to rare and endangered species of water associated birds.

10-14. IMPACTS ON RECREATION. As an indirect impact of the project, a small-boat marina and supporting water-associated public use facilities and commercial recreation facilities will be provided at 5th Avenue. A public-use recreational area will be provided on the bay side of the Silver Strand south of the U.S. Naval Amphibious Base. Recreational ocean beaches on the Silver Strand will be widened.

10-15. IMPACTS ON HISTORICAL AND CULTURAL SITES. No National Register properties or other historical or cultural sites will be affected by the proposed project.

10-16. OTHER IMPACTS. There will be an increase in air pollution as an indirect effect of the growth-inducing aspects of the project; this increase will be consistent with the projections used in the State of California Air Implementation Plan. There will be a temporary, minor interference with maritime traffic as a result of construction of the project.

10-17. ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED. The adverse environmental effects that cannot be avoided should the proposed project be constructed in accordance with the recommended plan are: (a) the destruction of organisms and alteration of habitats in the areas to be dredged; (b) the permanent destruction of intertidal and shallow subtidal habitats of high ecological value; (c) a 0.4 percent decrease in the area of San Diego Bay resulting from 33 acres of fill; (d) an estimated 1.6 percent decrease in the rate of flushing of the bay by tidal currents; (e) temporary turbidity in nearshore ocean waters while spoil is discharged; (f) possible adverse effects on marine organisms as a result of dispersion of contaminants associated with the dredge spoil; (g) temporary minor interference with marine traffic; (h) indirect adverse effects resulting from growth inducing features of the proposed project.

10-18. ENVIRONMENTAL ASPECTS OF ALTERNATIVES. Alternatives to the proposed project that were considered are: (a) the "no action" alternative; (b) the lightering alternative; (c) channel dredging alternatives; and (d) various plans for disposal of the dredge spoil generated by the proposed project. The environmental aspects of these alternatives are discussed in the following paragraphs.

10-19. "NO ACTION" ALTERNATIVES. Under the "no action" alternative the project area would remain as it is at present. The major beneficial environmental effects of this alternative are that there would be no reduction in the surface area of the bay nor alteration in the tidal flushing characteristics, no destruction of organisms or habitats within the bay, and no secondary pollution resulting from growth-inducing aspects of the project. The major adverse environmental effects of this alternative are that beach replenishment material would not be provided to mitigate shore erosion on the ocean and bay sides of the Silver Strand. The alternative was rejected because it did not provide for

efficient use of existing facilities at the Port of San Diego, nor for expansion of the Port to accommodate projected waterborne commerce.

10-20. LIGHTERING ALTERNATIVES. The environmental effects of the lightering alternatives are substantially the same as those just discussed for the "no action" alternative. The lightering alternative was rejected for economic reasons.

10-21. CHANNEL DREDGING ALTERNATIVES. Alternative channel depths would not have significantly different environmental effects than the recommended plan. Alternative widths and alinements were not considered. The major channel dredging alternative that has environmental aspects is the alternative of dredging the channel to mile 13.2. This alternative is essentially an alternative of completing the "D" Street fill because if that fill area is created a deep-draft channel leading to it is necessary. The alternative of terminating the channel at mile 13.2 would have beneficial monetary effects. Because of objections of the BSF&WL and the California Department of Fish and Game to the adverse environmental impacts; this alternative was rejected because the need for expanded terminal facilities was deemed to not outweigh the adverse environmental consequences.

10-22. OCEAN DISPOSAL ALTERNATIVE. This alternative considered ocean disposal of all dredge spoil generated by the project. This alternative would waste into the ocean suitable beach nourishment material, thereby foregoing an opportunity to mitigate shoreline erosion. Ocean disposal of material could also adversely affect marine organisms by introducing the contained contaminants into the food chain, thereby concentrating toxic waste. Because of the quantities of material involved, a Government hopper dredge would probably be used if this alternative was selected; this dredging method would probably cause increased turbidity within the bay during construction. The ocean disposal alternative for all dredge spoil was rejected for these reasons and because of its high cost.

10-23. OCEAN BEACH DISPOSAL ALTERNATIVE. Ocean beach disposal of dredged material is feasible in the instances where in-bay disposal at 5th Avenue or the U.S. Naval Amphibious Base is recommended. The environmental aspects of ocean beach disposal in these instances are discussed in the next paragraphs.

10-24. ALTERNATIVES TO PROPOSED DISPOSAL. The environmental aspects of alternatives considered for each proposed disposal site are discussed in the following subparagraphs.

a. 5th Avenue. The environmental advantages of placing the material on the ocean beach instead of in the recommended disposal site are that the material would be available for beach nourishment, 22 acres of San Diego Bay would not be filled and the organisms and benthic habitats in the fill area would not be destroyed. The disadvantages are that the water-oriented recreational facilities would be foregone. Ocean beach disposal in lieu of the 5th Avenue fill was rejected because the need for the small boat basin and its associated recreational features was deemed to outweigh the destruction of habitat.

b. U.S. Naval Amphibious Base. The environmental advantages of placing the material on the ocean beach instead of in the recommended disposal sites are that the material would be available for beach nourishment, 15 acres of San Diego Bay would not be filled and the organisms and highly diverse subtidal and intertidal habitats in the fill area would not be subject to short-term destruction (in part) or to permanent alteration. The environmental disadvantages are that a public-use recreational area would be foregone and shoreline erosion would not be mitigated. The alternative was rejected because of these disadvantages and because facilities for the U.S. Naval Amphibious Base would not be provided.

c. Silver Strand Ocean Beach. The alternative to placing 3,655,000 cubic yards of dredge spoil on the Silver Strand Ocean Beach is placement on Imperial Beach. The major advantage of this alternative is that the material would move upcoast in the direction of net littoral transport and nourish the entire Silver Strand. This would alleviate a severe shoreline erosion problem. However, there is downcoast littoral transport part of the year and material in excess of that stabilized by groins or other structures at Imperial Beach could impair the entrance to the Tia Juana esturay through shoaling. This alternative was rejected because of its cost and because of the possible adverse effects of excess material on the Tia Juana estuary.

d. Imperial Beach. The alternative to placing 2,000,000 cubic yards of dredge spoil on Imperial Beach is placement on the Silver Strand Ocean Beach. The major advantage of this alternative is a reduced project cost resulting from lesser pumping distances to the Silver Strand disposal site than to the Imperial Beach site. The major disadvantage to this alternative is that the time to construct the project would be extended one construction season with attendant added cost for performing the work. This alternative was rejected because of the need to repair a badly eroded beach, the additional costs which would result from an additional construction season to perform the dredging contract.

10-25. RELATIONSHIP BETWEEN LOCAL AND SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY. Cumulative and long-term impacts of the project will result in a decrease in the surface area of San Diego Bay and in the bay's tidal flushing. Benthic and intertidal habitats will be permanently destroyed or will suffer significant short-term impacts. Air pollution and accidental spillages from vessels into the bay waters will increase as an indirect effect of the project. These changes will all act to decrease long-term biological productivity. Expansion of port facilities cannot be achieved without incurring these long-term effects.

10-26. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED. Thirty-seven surface acres of San Diego Bay will be filled. There will be a slight reduction (0.41 percent) in the tidal prism of the bay and a resulting reduction in tidal flushing. The destruction or alteration of habitat within the bay will be an irreversible commitment in areas where material will be removed or placed and where depths of water will be permanently changed.

10-27. RESTORATION OF EELGRASS. The U.S. Navy Delta Beach fill proposal would only be acceptable to National Marine Fisheries Service, U.S. Fish and Wildlife Service and California Department of Fish and Game if the existing grass beds at the fill site would be restored once the filling process was completed. If a feasible eelgrass restoration program can be formulated, the program could be accomplished after disposal is completed. A study could be initiated during dredging and disposal operations to study the problem, quantify the number of acres of eelgrass affected by the 400,000 yards of fill which would cover about 15 acres, prepare a detailed cost estimate and prepare a supplement to the environmental statement. The supplement will be coordinated, finalized and filed with Council on Environmental Quality prior to placing dredge material on Navy's Delta Beach.

XI – PROJECT FORMULATION AND JUSTIFICATION

11-01. GENERAL. The recommended alternative provides for channel depths of 40 feet to mile 8.84 and 35 feet to mile 12.9+; stopping the channel dredging at mile 12.9+; and disposing of the dredged material in the open ocean, in the 5th Avenue fill, in the fill south of the Naval Amphibious Base, and on the ocean beach. The recommended alternative was chosen from those considered because it best accomplishes the project purpose in light of the overall public interest. The plan with the greatest economic benefits provided for depositing dredge spoil at the "D" Street site. Because of environmental objections to filling the "D" Street site as discussed previously, this alternative was not selected as the recommended alternative. The disposal of the dredged material for the recommended plan is shown on plate 6. The schedule for accomplishing the dredging for the recommended plan to prevent interference with the Navy's amphibious training mission and with the furnishing of utility services to North Island and Coronado, is also shown on plate 6.

11-02. ECONOMIC JUSTIFICATION. The estimated annual benefits, the estimated annual charges, and the ratio of benefits to charges for the alternatives considered are given in table XI-1. The principle of maximization of net benefits was considered but the plan in which benefits were maximized was not selected. A major revision to the authorized project would have been required if the principle of maximization of net benefits had been applied in the formulation of the recommended modifications to the existing project.

11-03. The economic study reveals the maximum net benefits would accrue at channel depths of 43 feet at 10th Avenue marine terminal and 40 feet at the National City. It is noted, however, that at depths of 40 and 35 feet, respectively, for terminals indicated above, (authorized project depths) the returns per dollar invested are greater than the returns for depths of 43 and 40 feet, respectively, to the terminals indicated above.

11-04. It is concluded that the most feasible project to serve the immediate needs would be based on a 40-foot channel depth at 10th Avenue marine terminal and a 35-foot channel depth at National City marine terminal. It is further concluded that prior to 1985 the project should be reevaluated in terms of changed economic, social and environmental conditions to determine the justification for deeper channels.

11-05. The net annual benefits varied from $1,689,000 for a channel of 40 feet to 10th Avenue Marine Terminal and 33 feet to mile 12.9+ to $2,224,000 for a channel of 45 feet to 10th Avenue Marine Terminal and 40 feet to mile 12.9+.

TABLE XI-1

San Diego Harbor
Summary of Benefits and Costs for Alternative Depths
10th Avenue and Marine Terminals
National City

Channel Alternatives*	Equivalent Annual Benefits ($1,000)	Equivalent Annual Costs ($1,000)	Benefit Cost Ratio	Net Benefits ($1,000)
1	2,290	601	3.8	1,689
2**	2,474	646	3.8	1,828
3	2,674	693	3.9	1,981
4	2,836	765	3.7	2,071
5	2,471	640	3.9	1,831
6	2,655	685	3.9	1,970
7	2,855	732	3.9	2,123
8	3,017	804	3.8	2,213
9	2,548	698	3.7	1,850
10	2,732	744	3.7	1,988
11	2,932	790	3.7	2,142
12***	3,094	862	3.6	2,232
13	2,656	814	3.3	1,842
14	2,840	859	3.3	1,981
15	3,040	906	3.4	2,134
16	3,202	978	3.3	2,224

*See paragraph 9-11 for a description of alternatives.
**Recommended project.
***Projects with maximum net benefits.

11-06. ENVIRONMENTAL AND ECOLOGICAL IMPACT. A complete discussion of the environmental impacts of the project is given in the Environmental Statement and are summarized in Section X of this report. The information in the following paragraphs 11-07 through 11-10 was obtained from these two sources.

11-07. The project improvement, since it involves dredging, will cause some disruption of the marine organisms now living on the channel bottom. However, the bottom of the existing channels have been previously dredged and natural repopulation has not yet achieved a climax community.

11-08. The construction of fills in the harbor may have both detrimental and beneficial effects. Concerning detrimental effects, organisms will be destroyed by burial, and intertidal mudflats will be subject to permanent as well as short-term destruction. Discharge of dredge spoil will cause temporary turbidity. The beneficial effects will be the creation of new habitats for marine life in the rock revetments at 5th Avenue. The effects on the currents and flushing characteristics will be minor and relatively insignificant.

11-09. Deposition of material on the ocean and bay beaches of the Silver Strand will provide material to mitigate existing shoreline erosion problems on the bay side of the Silver Strand and will provide beach replenishment material to the coastal littoral system. Some short-term destruction of marine organisms is expected to result from the discharge of dredge spoil on the beaches.

11-10. In the study area, five rare and endangered species of water-associated birds have been identified. Two of these species, the light-footed clapper rail and the Savannah sparrow, nest in the Sweetwater marsh. The other species feed in the study area.

11-11. SOCIO-ECONOMIC EFFECTS OF THE PROJECT. The proposed project will have significant short- and long-term beneficial effects on net national and regional economic development by reducing shipping transportation costs, increasing employment, income and revenues and improving the balance of payments. It is expected that no significant adverse social or economic effects will result from the project. All segments of society should benefit from it. See Appendix 8 entitled "Socio-Economic Effects of the Proposed Project".

XII – ACCESS ROADS AND RAILROADS

12-01. Access to San Diego Harbor is by surface streets, by major thoroughfares, by freeways and by railroads. Harbor Drive, a major thoroughfare for vehicular traffic, traverses the north and east shore of the harbor from Point Loma to 8th Street in National City. Interstate Freeway No. 5 runs parallel to the east shore of the bay, while California State Highway No. 75 traverses the Silver Strand from Imperial Beach to Coronado and then crosses the bay to San Diego via the Coronado-San Diego Bridge. The harbor is served by the Atchison, Topeka and Santa Fe Railway and the San Diego and Arizona Eastern Railway—a branch of the Southern Pacific Railroad Company.

XIII – UTILITIES RELOCATION

13-01. GENERAL. The project document required the relocation of three waterlines, a sewerline, four natural gas/pipelines, six powerlines, and four telephone cables. It also required removal of a submarine cable and the deepening of berthing areas (serving existing terminals and terminals under construction) to depths commensurate with those provided in the project channels. In 1969, the California American Water Company relocated one of the waterlines, and in 1972 the city of Coronado installed a new sewerline across the bay. The U.S. Navy has contracted a long-time usage agreement for sewer service with the City of Coronado in this new line.

13-02. All utilities except an 8-inch waterline were installed under permit from the Secretary of the Army. Two of the waterlines and one sewerline crossing the bay are owned by the U.S. Navy. The remainder of the lines are owned by public utility companies. Costs for removal and replacement of the Navy utilities are shown as a Federal first cost; the cost for removal and replacement of the other utilities will be borne by local interests.

13-03. The 8-inch water pipeline, mentioned above, was installed by the California Water Company without permit in 1886, prior to the enactment of the River and Harbor Act of 1899. By letter dated 2 November 1970, the California American Water Company contended it was not obligated to relocate or remove this facility at company expense since the line was installed prior to the River and Harbor Act. The abandoned waterline in the proposed dredging area will be removed by the Unified Port District (see table 2-1, Appendix 2).

13-04. The "No Action" alternative of not relocating the utilities was rejected as being non-responsive to the needs of Coronado and the U.S. Navy. Alternate plans for the relocation of utilities were not developed or considered since the relocation of the public utilities and Navy utilities in connection with the proposed project is the responsibility of local interests and the Navy respectively.

13-05. Appendix 2, titled "Removal and Replacement of Utilities" describes the removal and replacement of the utilities in the bay to be accomplished in connection with this project.

XIV – REAL ESTATE REQUIREMENTS

14-01. All rights-of-way and lands necessary for project construction, maintenance and spoil disposal will be furnished by local interests as required by the authorizing legislation. Spoil areas will be utilized at 5th Avenue during project construction. Maintenance dredging in the future may be accomplished by hopper dredge and spoil areas may not be required.

14-02. SHORELINE OWNERSHIP. Ownership of the tidelands and submerged lands to be occupied by the project is vested in the State of California, except for that portion which is within the limits of the San Diego Unified Port District, and the U.S. Government, under the jurisdication of the U.S. Navy. The area on the seaward side of the Silver Strand, shoreward of the high tide line, is under the jurisdiction of the U.S. Navy by reason of a long-term lease from the State of California.

XV – COST ESTIMATES

15-01. GENERAL. The total first cost for the San Diego Harbor project as submitted in this design memorandum is estimated at $16,696,000, comprising a cost of $13,526,000 to the United States and $3,170,000 to local interests. The cost to local interests does not include the cost of self-liquidating items such as slips, structures, utilities, roads, etc.

15-02. SUMMARY OF ESTIMATED FIRST COST. A summary of the estimated first costs for the principal elements of the project based on Jan 1975 price levels is given in the following table:

Summary of Estimated First Cost for
Interior Channel Deepening
San Diego Harbor, Calif.

No.*	Item	Total
	FEDERAL COSTS	
09	Channels	11,247,000**
30	Engineering and Design	693,000
31	Supervision and Administration	720,000
	Cost of general navigation facilities	12,660,000
	Less cash contribution of local interest	519,000
	Cost to Corps of Engineers	12,141,000
	Cost to U.S. Navy, utility relocation	1,380,000
	Cost to U.S. Coast Guard for aids-to-navigation	5,000
	Total Federal Costs	13,526,000
	NON-FEDERAL COSTS	
	Required contribution (4.1 percent of cost of general navigation facilities)	519,000
	Utility relocation	1,576,000
	Retaining dikes	650,000
	New and improved berthing areas	425,000
	Total Non-Federal Costs	3,170,000
	Total cost of project	16,696,000

* Cost account number defined in ER 11-2-101.
**Includes contingency of 12 percent.

15-03. COMPARISON OF PRESENT ESTIMATE OF FIRST COST WITH PREVIOUS ESTIMATES. A comparison of the present estimate of first costs with the previous approved estimate shown on the project cost-estimate (PB-3) report prepared and approved by the Division Engineer and with the project document is given in the following table:

Comparison of the Present Estimate of First Cost
With the Latest Approved Estimate and with the Project-Document
Estimate-Interior Channel Deepening, San Diego Harbor, Calif.

No.*	Item	Estimated Costs Project Document (Jan. 1967 Price Level)	Approved (PB-3 Estimate 1 July 1974)	Current Jan 1975 Price Level
	FEDERAL COST			
.09	Dredging	$5,132,000	$8,671,000	$11,247,000
.30	Engineering and Design	152,000	566,000	693,000
.31	Supervision and administration	306,000	493,000	720,000
	Subtotal	$5,590,000	9,730,000	12,660,000
	Less local contribution of cost of general navigation improvements	$230,000	400,000	519,000
	Net Cost to Corps of Engineers	5,360,000	9,330,000	12,141,000
	Costs to U.S. Navy for utility relocations	1,500,000	2,530,000	1,380,000
	Cost to U.S. Coast Guard for aids-to-navigation	40,000	40,000	5,000
	Total Federal Costs	6,900,000	11,900,000	13,526,000
	NON-FEDERAL COSTS			
	Cash contribution	230,000	400,000	519,000
	Dikes	550,000	927,000	650,000
	Relocation of utilities	1,275,000	2,204,000	1,576,000
	Deepening of existing and providing new berthing	745,000	2,189,000	425,000
	Total Non-Federal First Cost	2,800,000	5,720,000	3,170,000
	Total Project First Cost	$9,700,000	$17,620,000	$16,696,000

15-04. The differences in cost between the present estimates and the previous approved estimates are explained in the following subparagraphs:

a. Dredging estimated costs for project document plan are based on dredging of 12,014,000 cubic yards and disposal of dredged materion on seaward and bayward beaches of San Diego Harbor and selected bayfills. Estimated costs for recommended plan of GDM are based on dredging 8,535,000 cubic yards and disposal of dredged material on environmentally acceptable sites including ocean disposal. (See paragraph 7-06.)

b. Dredging. The PB-3 estimated cost of the dredging increased $3,539,000 over the project-document estimate because of modified price levels projected to 1 July 1974. The present estimated cost of dredging is $2,576,000 more than the PB-3 estimate. This difference resulted from an increase in the unit price of dredging, from a net increase in contingencies and from a changed disposal plan. Contingencies were reduced from 15 percent in the PB-3 estimate to 12 percent in the present estimate, but a net increase resulted from the higher dredging costs. The unit cost for dredging was increased as a result of a reassessment of past dredging experience in the Los Angeles District and of a change in the public's attitude concerning disposal of dredged material in San Diego Bay and on the ocean beach from that which prevailed at the time of project authorization. This changed attitude resulted in the elimination or reduction in size from the recommended plan, of several areas which were included in the project document plan, and in the disposal, in the open ocean, of 1,000,000 cubic yards of nonstructural material. Under the project document plan this material would have been placed on the ocean beach, and the waves would have washed it out to the open sea. These changes resulted in higher costs because of increased pumping distances and added handling. The average unit cost for dredging increased as follows: project document plan, $0.425 per cubic yard; current PB-3, $0.725 per cubic yard and present estimate, $1.32 cubic yard, based on revised disposal plan.

c. U.S. Navy Utility Relocation. The PB-3 estimate for U.S. Navy utility relocation increased $1,030,000 over the project-document estimate because of modified price levels projected to 1 July 1974. The present estimated cost is $1,150,000 less than the PB-3 estimate. The difference resulted from a decrease in the work to be performed. In lieu of relocating their sewerline, the Navy is using space in a newly-constructed city of Coronado line.

d. U.S. Coast Guard Aids to Navigation. The PB-3 estimate for cost of aids to navigation remained unchanged from the project document estimate. The present estimated cost of aids to navigation is $35,000 less than the PB-3 estimate because new aids to navigation will not be required to mark the proposed channel project. The existing buoys located along the channel will be relocated to provide suitable markings.

e. Engineering and Design. The PB-3 estimate for engineering and design cost increased $414,000 over the project-document estimate to design alternatives for the disposal of dredged material, increased foundation and material explorations, preparation of an environmental statement, and increased salaries. The present estimated cost for engineering and design is $127,000 more than the PB-3 estimate because of an increase in engineering, economic and environmental studies.

f. Supervision and Administration. The PB-3 estimated cost for supervision and administration increased $187,000 over the project-document because of modified price levels projected to 1 July 1974 and increase due to P.L. 92-313. The present estimated cost for supervision and administration is $227,000 more than the PB-3 estimate as a result of an increase of estimated cost of construction, supervision and inspection.

g. Non-Federal Costs.

(1) Cash Contribution. The PB-3 estimated costs for the cash contributions increased $170,000 over the project-document because of modified price levels to 1 July 1974. The present estimated costs for the cash contribution is $119,000 more than the PB-3 because of an increase in estimated first costs for constructing the project.

(2). Dikes. The PB-3 estimated costs for dikes increased $377,000 over the project-document because of modified price levels projected to 1 July 1974. The present estimated cost for dikes is $277,000 less than the PB-3 estimate as a result of less work, of a clearer definition and a more refined estimate of the work to be performed.

(3) Relocation of Utilities. The PB-3 estimated costs for relocation of utilities is $929,000 over the project-document as a result of modified price levels projected to 1 July 1974. The present estimated cost for utility relocations is $628,000 less than the PB-3 estimate because of a decrease in the work required. A waterline scheduled for relocation (See House Document No. 365) by the California American Water Company was relocated in 1969.

(4) Deepening of Existing and Providing New Berthing Facilities. The PB-3 estimated costs for deepening and providing new berthing facilities increased $1,444,000 because of modified price levels and because of an increase in the estimated cost furnished by local interests in July 1971. The present estimated cost for deepening of existing and for providing new berthing facilities is $1,764,000 less than the PB-3 estimate because local interests deepened existing berthing facilities within the bay last year, and because of a reevaluation by local interests of the work remaining to be performed.

15-05. DETAILED ESTIMATE OF FIRST COST. The detailed estimate of first cost is based on January 1975 for similar work in the Los Angeles area. The unit prices for large quantities of dredging are estimated to increase at least 10 percent over July 1973 due to increase in fuel, electricity and labor. Detailed estimates of first costs for the construction of the general navigation improvements for the project are as follows:

Detailed Estimate of First Cost
for Interior Channel Deepening
San Diego Harbor, Calif.
(January 1975 Price Levels)

Cost Account No.*	Item	Unit	Quantity	Unit Price	Amount
	CHANNEL IMPROVEMENTS				
	FEDERAL COSTS				
	Corps of Engineers:				
09.	Dredging:				
	North Bay Channel (Bends Material to be dredged by Government Hopper Dredge and hauled to Ocean (Pt. Loma Site 32 degrees 35' 00"N 117 degrees 17' 30"W	Cu. Yd.	174,000	$1.10	191,000
	Central Bay Channel Material to be deposited in 5th Ave Site	Cu.Yd.	1,306,000	0.70	914,000
	Material to be deposited south of Naval Amphibious Base	Cu.Yd.	400,000	0.90	360,000
	Material to be deposited in open ocean (nonstructural material) (100 fathoms) 32 degrees 36' 50"N 117 degrees 20' 40"W	Cu. Yd.	1,000,000	2.20	2,200,000

Detailed Estimate of First Cost
for Interior Channel Deepening
San Diego Harbor, Calif.
(January 1975 Price Levels)

Cost Account No.*	Item	Unit	Quantity	Unit Price	Amount
	Material to be deposited on Silver Strand Beach	Cu.Yd.	2,700,000	0.85	2,295,000
	South Bay Channel material to be deposited on Silver Strand Beach	Cu.Yd.	955,000	0.85	812,000
	Material to be deposited on Imperial Beach	Cu. Yd.	2,000,000	1.60	3,200,000
	Stand-by costs	4 months		17,500/month	70,000
	Contingencies (12 percent)				1,205,000
	Subtotal				11,247,000
30.	Engineering and Design				
	Design Memorandum				633,000
	Plans and Specifications				30,000
	Engn. during construction				30,000
	Subtotal				693,000

Detailed Estimate of First Cost
for Interior Channel Deepening
San Diego Harbor, Calif.
(January 1975 Price Levels)

Cost Account No.*	Item	Unit	Quantity	Unit Price	Amount
31.	Supervision and administration				
	Supervision and inspection of construction				384,000
	District office overhead				280,000
	GSA building space payment				56,000
	Subtotal				720,000
	Total				12,660,000
	Less local contribution (4.1 percent of cost of general navigation features)				519,000
	Total Corps of Engineers Cost				$12,141,000
	U.S. Navy:				
02.3	Utility relocation				1,380,000
	U.S. Coast Guard:				
	Aids to navigation				5,000**
	Total Federal First Cost				$13,526,000

Detailed Estimate of First Cost
for Interior Channel Deepening
San Diego Harbor, Calif.
(January 1975 Price Levels)

Cost Account No.*	Item	Unit	Quantity	Unit Price	Amount
	NON-FEDERAL COSTS				
	Cash contribution				519,000
	Utility relocation				1,576,000**
	Retaining Dike***				
	5th Avenue				
	Diking	Cu.Yd.	133,000	1.60	$213,000
	Filter Blanket	Tons	12,000	10.00	120,000
	Revetment Stone	Tons	28,100	10.65	299,000
	Storm Drain Extension				18,000
	Subtotal				650,000
	New and improved berthing areas				425,000
	Total Non-Federal costs				3,170,000
	TOTAL FIRST COST				16,696,000
	TOTAL PROJECT COSTS****				16,696,000

* Cost account number as defined in EM 11-2-101 Army Programs, Civil Works Activities.

** Includes contingencies, engineering and design, and supervision and administration.

*** Cost for dredging 133,000 cubic yards from channel to construct dikes at 5th Avenue was allocated to dike costs and not to channel dredging.

****Excluding preauthorization study cost of $210,000 and self-liquidating items to be provided by local interests at an estimated cost of $30,000,000.

XVI – SCHEDULE FOR DESIGN AND CONSTRUCTION

16-01. GENERAL. The plans and specifications are scheduled to be completed by August 1975. Construction funds have been made available to initiate construction since F.Y. 1974, however construction has not started because of environmental considerations concerned with the disposal of the dredged material. Allotment of Federal funds would be required for the Corps of Engineers as follows:

Fiscal Year	Funds Required	Funds Budgeted
1976		3,500,000
1976T		900,000
1977	6,700,000	
1978	1,041,000	
Total	$12,141,000	

16-02. CONSTRUCTION.

a. Navigation Features. Construction of the navigation features would take approximately 28 months and would overlap into three fiscal years. The detailed schedule for dredging the channel is shown on plate 6. The factors which required the development of this detailed dredging schedule are discussed below:

(1) The disposal site on he Silver Strand Ocean Beach is used by the U.S. Navy for amphibious boat landing and underwater training. The training is primarily conducted during the summer months and disposal on this beach must be accomplished during the winter months to prevent interference with the Navy training mission. Further, additional restrictions on disposal occur during February through September because of fish spawning in the beach areas. Thus any dredging placed on the Silver Strand has to be scheduled to be performed during the period from 15 September to 15 February. Further, the site selected for disposal on the Silver Strand is adjacent to the northern boundary of the Silver Strand Beach State Park which receives its heaviest use during the summer months, dwindling to practically nothing during the winter months. Placement on the Silver Strand during the summer would impair and interfere with the use of the Silver Strand Beach State Park.

(2) Between channel miles 7.5 and 8.0, in the no anchorage area, the channel is crossed by public utilities and Navy utilities. The San Diego Unified Port District is responsible for relocating the public utilities. Under the permit authority which provided for the installation of the utility, the owner is required to relocate the utility or pay for its relocation if it interferes with navigation. The Port District, working with the owners of public utilities, developed a schedule for the relocation of the utilities. Essentially the utility relocations will be accomplished under a repetitive operation: (a) remove utilities from the area to be dredged, (to be accomplished by the owner), (b) dredge the area by the Government from which the utilities have been removed, and (c) relocation by the owner at his convenience of his utilities in the area just dredged. This schedule was necessary to provide for the relocation of the utilities without any interference of service to Coronado or North Island. Relocation of the Navy's 24-inch waterline will be accomplished by the Navy, and will follow the three step procedure outlined above and will be coordinated with the relocation of the public utilities.

b. Dikes. Dikes for retention of dredged material at the 5th Avenue fill site will be placed above elevation -4.0 MLLW (channel side) and -2.0 MLLW (interior basin side). They will be constructed under the channel dredging contract and will be paid for by local interests, the San Diego Unified Port District. The sand to construct the dikes will be obtained from the channel dredging.

XVII – OPERATION AND MAINTENANCE

17-01. Maintenance of the navigation aids and all water areas and depths within project limits would be a Federal civil-works responsibility. Maintenance outside of the project limits would be the responsibility of local interests.

17-02. Relatively little maintenance of the project depths could be expected as the bay is not subject to littoral movements, being protected by the Point Loma headland. Annual maintenance for the existing project is $20,000 a year for the entrance channel and $20,000 a year for dredging of the commercial navigation channels inside the bay. The estimated average annual maintenance for the proposed channel extensions and for items added to the existing maintenance project is estimated at $45,000. The new average annual maintenance cost would be $85,000.

XVIII – HEALTH CONTROL

18-01. The change in the water-vegetation regimen resulting from this project would be minimal. In commenting about the proposed channel improvements in 1967, the U.S. Public Health Service said "These improvements should not adversely affect vector problems if the spoil material is exposed to the fill acres in a manner so as not to block existing drainage or create pools in which mosquitos and other aquatic insects of public health importance could breed. The California Department of Public Health in 1967, stated that the project appears to have little direct effect on the public health of the community.

XIX – POLLUTION CONTROL

19-01. GENERAL. Early in the preparation of this memorandum, a testing and analysis program of the materials to be dredged from the channel was begun. The purpose of this program was to determine the level of pollutants in the material to be dredged.

19-02. Pollution problems in San Diego Bay have been historically documented in a study entitled "A Staff Report to the San Diego Regional Water Quality Control Board, San Diego Bay - 1966" and in an article published in the Civil Engineering-ASCE magazine, March 1972 issue, entitled "Clean Up of San Diego Bay".

19-03. Settlement of the San Diego Bay area began in 1769. Over 100 years later (1885-1887), the first sanitary ssewer system was installed. This system, consisting of 40 miles of sewer, serviced the area from 25th Street to the bay and northward as far as Balboa Park. Untreated waste was collected in a "sewage reservoir," located several hundred feet offshore from the foot of Market Street. It was designed, presumably, to release the sewage on an outgoing tide by means of an automatic tide gate.

19-04. As population increased the system grew, so that by 1941 San Diego and the cities of Chula Vista, National City, Coronado, and several military establishments had nine outfalls emptying untreated domestic sewage and industrial waste into the bay. In 1940, the City of San Diego launched a program to counteract bay and beach pollution with the construction of a 20-mile interceptor sewer from La Jolla south to National City, terminating at a 14 mgd primary treatment plant. The plant, located at the foot of 32nd Street, was completed and placed in operation in 1943. Then, only seven outfalls continued to discharge raw sewage into the bay. The plant was overloaded shortly after completion, but further expansion was delayed until 1948. Again, the enlarged facilities completed in 1950 were immediately overloaded.

19-05. In 1950, the newly formed California Regional Water Quality Control Board, San Diego Region (CRWQCB,SDR) recognized the need for action to protect San Diego Bay from becoming a marine desert and requested that a study committee be formed from representatives of each municipality surrounding the bay, including the County of San Diego. Within 6 months, money was appropriated by the San Diego County Board of Supervisors, and a board of three engineers was retained to supervise a countywide sewerage survey. Their work was published in 1952 as a "Report on the Collection, Treatment and Disposal of the Sewage of San Diego County." Attention focused on the bay. It was recommended that the sewage from the metropolitan areas should be brought together into a single interceptor system with a primary-treatment plant at Point Loma.

19-06. The CRWQCB,SDR undertook a comprehensive survey of the bay to determine its capacity to continue receiving an increased volume of wastes. This study was published in 1952 as a "Report on the Extent, Effects and Limitations of Waste Disposal Into San Diego Bay." In 1954, the "Report on San Diego Bay Area Sewerage Problems" brought the 1952 Board report up-to-date and emphasized existing conditions.

19-07. In 1955, the CRWQCB,SDR adopted Resolution 55-1, a resolution enunciating the beneficial uses of San Diego Bay water to be protected and adopting water quality criteria pertaining thereto.

19-08. The culmination of these reports and other studies was the construction of the San Diego Metropolitan Sewerage System, placed in operation in August 1963. This system removed all domestic sewage discharges from San Diego Bay, except those contributed by the city of Coronado and the Naval Amphibious Base. Both of these discharges were eventually connected to the metropolitan system in February 1964. The ultimate capacity of this system is for an expected population of 2,300,000. Removal of all domestic waste discharges from the bay focused attention on the effects of other discharges still entering bay waters, notably those discharges from the industrial concerns utilizing the bay for waste disposal.

19-09. One by one, industrial concerns located around the bay have stopped discharging waste products from their operations into the bay and are now discharging them into the metropolitan sewage system. The North Island Naval Air Station industrial complex is presently building a $2,000,000 treatment plant to treat effluent waste discharge, prior to discharging it into the metropolitan sewage system (MSS). The only industrial firm which does not discharge its effluent into the MSS is the Westgate cannery. They return fluming water to the bay, which has been treated with chlorine and from which particles have been removed.

19-10. Ordinances are now being considered for controlling waste discharges into the bay from houseboats and recreational craft.

19-11. The Navy plans to install sewage holding tanks on its entire fleet by 1977, in an attempt to keep from polluting harbors and territorial waters. Testifying in 1972 before the CRWQCB SDR, the Commandant of the Eleventh Naval District, stated that ". . . 10 of the first 25 ships to receive holding tanks and oil pollution control systems next year would be based in San Diego Harbor."

19-12. TESTING AND ANALYSIS OF DREDGED MATERIALS. Cores and samples of bottom sediments to be dredged were obtained and submitted to the Environmental Protection Agency (EPA) laboratory at Alameda and the South Pacific Division laboratory to determine the level of pollutants in the material to be dredged. A general environmental sampling program in June 1971 included the entire project area. Additional cores and samples were secured at various times throughout preparation of this memorandum when additional information was needed.

19-13. Analyses performed by personnel of the SPD laboratory, Sausalito, and the EPA laboratory, Alameda, on various bottom sediments from San Diego Harbor have established the following:

a. Concentrations of heavy metal and other pollutants are practically restricted to the upper few feet of material on the bay floor.

b. Heavy metal and other pollutants are associated with and concentrated in the silt-clay-colloidal particle size fraction of polluted sedments. A few samples were separated on the No. 200 sieve and each fraction tested for pollutants. The sand fraction of each divided sample had substantially less of each pollutant than the finer fraction. Generally, a material with less than 40 percent passing the No. 200 sieve has two or less of the basic seven tests with results higher than the 1971 EPA limits.

c. Zinc is the material which most consistently exceeds the limit of 1971.

d. A few polluted samples were tested to determine if sea water would remove pollutants and carry them away in runoff from spoil areas. No metals were accumulated in the sea water and pollutants that were absorbed did not exceed the 1971 EPA limits.

19-14. DISPOSAL OF DREDGED MATERIAL. The plan for excavating the channel and disposing of the dredged material recommended in this general design memorandum will enhance the environment within the bay and will provide for controlled disposal of the dredged materials. Wherever the dredging will remove surface layers of sediment that are polluted, leaving unpolluted or less polluted sediments exposed, there will be a long-term beneficial impact. However, because the concentration of contaminants in the surface layers is not considered to be particularly alarming, this benefit should not be overemphasized.

19-15. When the sediments to be dredged were evaluated in terms of the EPA interim criteria of 1971, the results showed, in isolated cases, that some of the materials exceeded the criteria for pollution in several parameters, i.e., zinc and lead. Subsequently, in May of 1973, the EPA issued new criteria for evaluating pollution in dredged materials. The 1973 criteria differs from the 1971 criteria in that the 1973 criteria does not present specific quantified criteria for water quality parameters. Under the 1973 criteria, dredged material is considered unpolluted if ". . . it produces a standard elutriate in which the concentration of no major constituent is more than 1.5 times the concentration of the same constituent in the water from the proposed disposal site used for the testing. . . .Material which is determined to be unpolluted may be dumped at any site which has been approved for the dumping of settleable solid wastes of natural origin." The data presented in Appendix 1 would indicate that the material to be dredged would meet the 1973 criteria because the standard elutriate was far below the allowable 1.5-time concentration.

19-16. Recommendations for handling and monitoring the waste discharge from the dredging have been received from CRWQCB, SDR. Disposal of dredged material will comply with the CRWQCB, SDR's recommendations. A copy of their recommendations is inclosed in Appendix 7.

XX – ECONOMIC ANALYSIS

20-01. GENERAL. The economic analysis consists of an economic base study, a review of historical and existing vessel traffic and cargo, a projection of vessel traffic and cargo, an evaluation of benefits and a description and evaluation of the social and economic effects of the project.

20-02. Included in the economic base study was an analysis of past, present and future growth factors in the tributary area and Asian-Pacific Basin countries. The factors included population growth trends; points of origin and destination of cargo; trends in agriculture, industry and mining; employment and income; consumption patterns; availability of resources; gross regional and national product; population distribution patterns; and, population-land relationships and land values.

20-03. On the basis of the factors indicated above, import cargo projected to increase from 1,091,000 in 1971 to 3,409,000 tons in year 2030. For the same period, exports are projected to increase from 580,000 tons to 2,975,000 tons. See Appendix 3 and 4.

20-04. An investigation was made of the Port of Ensenada to determine whether the Port would be a significant competitive port. It was found that the Port of Ensenada did not have channels of sufficient depth to accommodate projections of future vessel sizes; that transportation and back-up areas at San Diego Port provide more convenient and expeditious handling of cargo, and that shipping risks were greater at the Port of Ensenada. Information on future plans for the Port of Ensenada were not available; therefore, no assessment was made with respect to any future change in its competitive position. See Appendix 5, "Benefit Analysis", for a detailed analysis of the benefits attributed to the project modification.

20-05. SUMMARY OF TANGIBLE BENEFITS. Tangible benefits accruing from the harbor improvement would consist of savings in overland transportation costs, savings from use of large ships, from land enhancement and from extended economic life resulting from advanced replacement of utilities.

Average Annual Benefits
from the Recommended Plan of Improvement
(in thousands of dollars)

Item	General	Local	Total
Savings from use of large ships	2,321	0	2,321
Land enhancement	51	51	102
Advance utility replacement	25.5*	25.5**	51
Total	2,398	76	2,474

* Replacement of U.S. Navy utilities.
**Replacement of local interests utilities.

20-06. INTANGIBLE BENEFITS. In addition to the tangible benefits, certain secondary and intangible benefits would accrue from the project modification. Expenditures for construction of the project, for shipment of additional cargo resulting from the project, for construction of new facilities resulting from the project – all will have a multiplier effect and will enhance the strength of the local and regional economy. No attempt was made to quantify secondary and tertiary benefits resulting from the primary expenditures. These benefits were classified as intangible, because it would be difficult at this time to measure the primary expenditure and to determine the multiplier which would be applicable under these circumstances. Significant differences between the intangible benefits analysis in the project document and this document are as follows: In the project document, the intangible benefits consisted of the possible additional accrual of fishing benefits and the reduction of injuries and deaths which would result from the proposed Zuniga Jetty rehabilitation ((a) the Zuniga improvement portion of the recommended plan was developed and (b) the survey report did not discuss the multiplier effect of project expenditures on local and regional economies).

20-07. ESTIMATED ANNUAL CHARGES. The estimated annual charges for the project modification are $725,000 reflecting: (a) interest and amortization of the estimated total cost for the economic life of the project (3-1/4 percent for 50 years) in the sum of $680,000; and (b) additional annual Federal maintenance cost of $45,000. These charges are $38,000 less than those estimated in the project document plan (as updated in the PB-3 of 1 July 1973). Changes resulted from an overall decrease in the work to be performed.

20-08. BENEFIT COST RATIO. For an economical life of 50 years the estimated annual benefits are $2,474,000 and the estimated annual charges are $725,000. The benefit-cost ratio is therefore 3.4 to 1.

XXI - APPORTIONMENT OF COSTS

21-01. GENERAL. As considered herein, project costs include only those items that would not be self-liquidating. Self-liquidating items are to be provided by local interests and include wharfs, transit sheds, and other allied terminal installations.

21-02. Under the project document, monetary benefits from channel improvements were determined to be 4-1/10 percent local, and 95-9/10 percent general in nature. Thus, pursuant to general policy, the Federal Government would bear 95.9 percent of the cost of the proposed channel improvement, excluding the pre-authorization studies, aids to navigation, and relocation of the U.S. Naval utilities. Local interests would contribute 4.1 percent of the cost of dredging the project channels.

21-03. Local benefits accrue from land enhancement to the areas that are owned by the Unified Port District. The project-document provided that material dredged from the channel was to be deposited in submerged areas at 5th Avenue, Glorietta Bay, D Street, G Street, and H Street. It was estimated that 165 acres would be enhanced with an average annual equivalent benefit to local interests of $109,200.

21-04. As discussed previously in this memorandum, areas at D, G, and H Street, and at Glorietta Bay which were to be filled were withdrawn from consideration. The plan recommended in this design memorandum will utilize areas at 5th Avenue for placement of dredge materials. This fill, created for local interests, will enhance 22 acres of land, with an average annual equivalent benefit of $102,400 to local interests.

21-05. While the amount of land created and the land enhancement benefits thereof have been decreased from those described in the project-document, local interests have indicated that they agree to no change in their cash contributions of 4.1 percent of the first cost of dredging the project channels. The materials that were scheduled to be placed in the D, G, and H Street fills under the project-document plan will now be placed on the ocean beach. This material will provide material for beach nourishment. Placing material either on the beach or in a fill area will result in an enhancement to the beach or on land respectively, creating both general and local benefits. The pumping distance to the beach is approximately the same as it would have been to the D, G and H Street fills; therefore, it is estimated that the cost for placing the material on the beach would be the same as it would have been if material had been placed in the D, G, or H Street fills.

21-06. DIKES. As covered in the project-document, furnishing the dikes, bulkheads, and embankments for the 5th Avenue fill is the responsibility of local interests. No dikes, bulkheads, or embankments are required to retain the dredged material placed below -4.0 and -2.0 MLLW in the 5th Avenue fill. Above -4.0 and -2.0 MLLW dikes will be constructed to the section shown on plate 7.

21-07. The SDUPD has requested that the construction of the dikes be included and accomplished under the channel dredging contract. They propose to advance sufficient funds to accomplish this work at the time they make their cash contribution for the first cost of the dredging. A separate bid item will be provided in the construction contract so that the cost for this item can be determined. Also a separate item for removal of the California American Water Company's 8-inch water pipeline will be included in the construction contract. At the conclusion of the construction contract, any unused money furnished by the SDUPD for this work will be returned. Sand for these dikes will be obtained from the channel dredging.

XXII – VIEWS OF FEDERAL AND NON-FEDERAL INTERESTS

22-01. Prior to finalizing this report, draft copies were sent to the following interests for their views and comments.

U.S. Navy
U.S. Coast Guard
U.S. Bureau of Sport Fisheries and Wildlife
Environmental Protection Agency
National Marine Fisheries Service
The State of California
San Diego County Comprehensive Planning Organization
San Diego Unified Port District
San Diego Gas and Electric Company
Pacific Telephone Company
San Diego Chapter Sierra Club

22-02. Letters and/or resolutions received from the above agencies expressing their views and recommendations are contained in Appendix 7 and are summarized here.

a. U.S. Navy.

(1) The Navy submitted a letter dated 20 May 1974 in which the Navy concurred with the project and the proposed dredge spoil disposal sites on Navy property with the expectation that the conditions for disposal of dredged material described in COMELEVEN Letter, 11460 Ser. 178/32 dated 7 Nov. 72 will be satisfied. The conditions outlined in the Navy's letter of 7 Nov 72 deals with disposal of the Silver Strand Beach.

Response: Provisions will be made in the specifications to provide for disposal on the Silver Strand as outlined in the Navy's letter of 7 Nov. 1972.

(2) On 24 May 1974, the recommended plan of improvement was changed by deleting a disposal site for 160,000 cubic yards of dredge spoil on the bayward side of the Silver Strand in the area contiguous to the south boundary of the Naval Amphibious Base and a disposal site for 340,000 cubic yards of dredge spoil on the bayward side of the Silver Strand on the mudflat which was created by deposition of dredge spoil from the Coronado Cay project. Dredge spoil which was to be placed in these areas will be placed on the Silver Strand ocean beach. The Navy in a letter dated 24 June 1974, offered the following comments to the change:

(a) The Navy has yielded to civilian use of the Delta Beach area for water-oriented recreation, open to the general public when training is not in progress.

(b) The disposal site for approximately 340,000 cubic yards should be maintained. It is felt, in light of the recent decision to allow public use of the beaches and water contiguous to the Naval Amphibious Base for water skiing, that off the highway parking will have to be provided. Further, by filling the mudflat area, additional beach area could be made available for joint use which in turn would move the recreational activity away from Beach Lane Delta.

(c) The Navy concurred with the deletion of the disposal site for 160,000 cubic yards on the south side of the Naval Amphibious Base, and they had no objection to placement of the 160,000 cubic yards on the Silver Strand ocean beach.

(d) The Navy will defer to other interested agencies comments with regard to the impact on the natural environment.

(3) After a series of meetings with representatives of the National Marine Fisheries, Bureau of Sports Fisheries, California Department of Fish and Game, U.S. Navy, Los Angeles District, the U.S. Navy described their need for the bayside fill south of the Amphibious Base in their letter to the Corps dated 22 October 1974. Because of the objections to the subject fill, objections as to the size, the Navy in the interest of expediting the project accepted the purposed compromise proposed by the National Marine Fisheries, Bureau of Sports Fisheries, and California Department of Fish and Game in their letter of 8 January 1975.

(a) U.S. Coast Guard. In its letter of 17 May 1974, the Coast Guard did not comment on the draft design memorandum. In their letter they stated: "The environmental impact statement has been reviewed and there are no objections to the project and no comments on the content of the statement."

(b) U.S. Bureau of Sport Fisheries and Wildlife. In their letter dated 9 July 1974, the Bureau of Sport Fisheries and Wildlife furnished their comments to the draft design memorandum dated March 1974 as amended on 24 May 1974. The Bureau of Sport Fisheries and Wildlife expressed concern about the landfill to be placed at 5th Avenue and to be placed on Navy property bayward of the Silver Strand. The Bureau also suggested two alternative dredge disposal sites if some of the material earmarked for the 5th Avenue fill and the Navy Amphibious Base fill is placed elsewhere. A summary of their comments and our responses are given below.

Comment: The Bureau of Sports Fisheries and Wildlife stated that they did not object to the creation of a harbor for recreation boats, but questioned the need for placement of over 1,250,000 cubic yards to accomplish this purpose. Further, they requested that the SDUPD submit a detailed plan describing how the site will be developed and a commitment that the proposed fill will only be used to support water-oriented and water-dependent activities.

Response: The Corps of Engineers by joint coordinated action with SDUPD, consistant with the SDUPD's master plan, determined the size and the configuration of the 5th Avenue fill. The size adopted was one which provided for recreation other than merely boating. The SDUPD has not yet developed a detailed plan describing how this site will be developed. However, the SDUPD has engaged a consulting firm to prepare an economic feasibility report for the redevelopment of the entire San Diego Centre City waterfront. Further, the SDUPD is in the process of engaging a second consulting firm – a land use planning and urban design firm to prepare a precise redevelopment plan. The 5th Avenue fill including riprapping, will be an important part of the overall project. Before construction begins, it is expected that this project will run the whole gamut of Federal and State approval processes.

The SDUPD believes that it would be ill-advised to develop a detailed plan for the 5th Avenue fill area before the above described studies have been completed. However, the SDUPD has prepared conceptual plans for the development of the 5th Avenue site which were furnished to the Fish and Wildlife Service on 7 June 1974.

Comment: The Bureau of Sport Fisheries and Wildlife stated they were encouraged to learn of the two fills proposed for the Navy property bayward of the Silver Strand which were deleted from the project. However, they stated the general design memorandum fails to adequately describe the remaining fill at this site, that the draft EIS suggests that the fill is required to protect utility poles and that placing rock riprap along the present shoreline is a better means of accomplishing the desired protection.

Response: Subsequent to their letter of 9 July 1974, representatives of the Bureau of Sports Fisheries attended a series of meetings with representatives of the National Marine Fisheries, California Department of Fish and Game, U.S. Navy and the Los Angeles District concerning the fill south of the Naval Amphibious Base. The Navy at these meetings emphasized their need to have this beach restored to improve its use as a quiet water landing area for amphibious training operations. As a result of these meetings as discussed in paragraph 6-06 b (3) and concurred in their letter of 8 January 1975, the size of this fill was established at 700 yards along the beach, reaching 150 yards into the bay. The cross section of this fill is shown under typical section E on plate 7 and the location as shown on plate 6. This fill will protect the utility poles on the shoreline, but its primary purpose is to restore the beach to improve its use as a quiet water landing area. Riprapping, a modest fill, bayward of the present shoreline as suggested, would negate the use of this beach by the Navy for training in Amphibious landing operations.

Comment: The Bureau of Sport Fisheries and Wildlife suggested two alternative disposal sites if some of the material earmarked for the 5th Avenue site and the Navy Amphibious base site was placed elsewhere. The first site suggested was the Border Field State Park and the second was the sand and gravel excavation pits in the Tijuana River bed in the vicinity of Dairy Mart Road.

Response: Use of these two sites were never considered for economic reasons. Pump costs to these sites would usually prevent their being considered or used. Both sites are located a considerable distance from the dredging site.

b. U.S. National Marine Fisheries Service.

Comments were requested on the draft environmental statement and on the draft design memorandum. Comments received were limited to the draft environmental statement.

c. Environmental Protection Agency. In letters dated 8 July 1974 and 21 August 1974, the EPA furnished their comments to the draft environmental statement and the draft design memorandum, respectively. The first letter eseentially reviewed criteria for disposal of dredge spoil while the second letter contained specific recommendations for the disposal of the dredge spoil. In their letter of 8 July 1974, EPA classified their comments on the draft environmental statement as Category E.R.-2.

Response: The District Engineer and members of his staff met with representatives of Region IX EPA on 31 August 1974 and 25 September 1974. At these meetings technical agreement was reached with EPA representatives on the comments set forth in the letters referenced above and confirmed in EPA's letter dated 10 October 1974. Agreements reached at these conferences were:

(1) The material to be dredged from miles 10.2 to 11.6, will be deposited in the EPA-designated 100-fathom site (32 degrees 36'50"N, 117 degrees 20'40"W).

(2) The dredged material that is to be deposited on Imperial Beach can contain no more than 20 percent fines (material passing a 200-mesh sieve) and will be monitored during construction to assure this maximum figure.

(3) To initiate an additional exploration and testing program in order to obtain sufficient data both as to gradation and pollution, and determine the acceptability of the material from the South Bay for disposal at Imperial Beach in accordance with EPA's criteria.

If the data obtained from the additional testing program determines that any part of the material to be dredged from the south bay is unsuitable for disposal on Imperial Beach, it will be disposed in the open ocean at either the Point Loma site or the 100 fathom site. This data was not included in their report since it would have delayed its preparation and because only one agency was interested in the data. While disposal in the open ocean would cost more than disposal on Imperial Beach, the cost will be small. Again, it was not deemed appropriate to delay the preparation of the report since these costs, if they occurred, would be covered by the 12 percent contingency factor in the cost estimate.

d. The State of California.

(1) The State furnished their comments to the draft design memorandum and draft environmental statement in their letter of 9 July 1974. Additional comments were furnished in their letter of 2 October 1974. At the time, they furnished their initial comments, the State had not received the notice changing the recommended plan for dredging the harbor. The notice was mailed 29 May 1974, but was never received by the State. The letter of 9 July 1974 stated that the State opposed the San Diego Harbor project until the dredge spoils (1,000,000 cubic yards) planned for the Naval Amphibious Base are placed on an ocean beach disposal area in the vicinity of Imperial Beach. The notice changing the recommended plan deleted a large portion of the fill south of the Naval Amphibious Base.

(2) Subsequent to their letter of 9 July 1974, representatives of the State of California attended a series of meetings with representatives of the National Marine Fisheries, Bureau of Sports Fisheries and Wildlife, U.S. Navy, and the Los Angeles District concerning the fill south of the Naval Amphibious Base. The Navy at these meetings emphasized their need to have this beach restored to improve its use as a quiet water landing area for amphibious training operations. As a result of these meetings, as discussed in paragraph 6-06. b (3), the size of this fill was established at 700 yards along the beach, reaching 150 yards into the bay.

(3) The State made two specific comments concerning the draft design memorandum which are listed below:

(a) The State requested the authority for departing from the criteria cited by the Federal principles and standards for planning water and related land resources.

Response: The principles and standards were not applied because the standards provided that they need not be applied to authorized and funded projects.

(b) The State noted that recreation benefits were not included as one of the benefits attributable to the project, and costs of certain self-liquidating items were excluded from the benefit-cost analysis.

Response: In the project document, recreational benefits were considered, but the need for Federal participation was not apparent at that time. Further, fishing benefits were also considered. However, since the Zuniga Jetty was not improved or rehabilitated and access to the jetty was not allowed across Navy property, no recreational benefits were taken for jetty fishing. Land enhancement benefits were taken in lieu of recreational benefits for the 5th Avenue fill. If both recreation and land enhancement benefits were counted, this would result in a double counting. Self-liquidating item costs are not included in the benefit-cost analysis in accordance with Corps of Engineer's policy.

e. San Diego County Comprehensive Planning Organization. The San Diego County Comprehensive Planning Organization was furnished the draft design memorandum and the draft environmental statement for review and comment. They limited their comments to the draft environmental statement.

f. San Diego Unified Port District. In a letter dated 6 June 1974, the San Diego Unified Port District furnished their comments to the draft design memorandum and the draft environmental statement. Comments to the draft design memorandum and the draft environmental statement involved suggested changes to update and clarify both documents. These suggestions have been incorporated into both documents.

g. San Diego Gas and Electric Company. In a letter dated 22 May 1974, the San Diego Gas and Electric Company furnished their comments to the draft environmental statement and draft design memorandum. Comments to the draft design memorandum involved suggested revisions to update and clarify those portions of the memrandum dealing with the San Diego Gas and Electric Company's utility relocations. These revisions have been incorporated in the design memorandum.

h. Pacific Telephone Company. While both the draft design memorandum and the draft environmental statements were furnished to the Pacific Telephone and Telegraph Company for review, they limited their comments to the environmental statement.

i. San Diego Chapter Sierra Club. No comments were received.

XXIII – STATEMENT OF FINDINGS

23-01. The District Engineer finds as follows:

a. The principal elements of the project are the deepening and widening of existing waterways for access to newly constructed terminals and the placement of the dredged material: (a) in a diked fill opposite 5th Avenue in the City of San Diego; (b) on the ocean and bayside beaches of the Silver Strand south of the Naval Amphibious Base; (c) on Imperial Beach; and (d) in the open ocean.

b. An environmental impact statement has been compiled which: (a) covers all known environmental impacts; (b) examined the cost and economic impacts of the proposed project; (c) considered the project effects on the surrounding community; (d) reviewed engineering plans for the project; and (e) suggested alternatives. The findings and comments of all interested parties have been reviewed and the possible alternatives considered.

c. In the evaluation the following points were considered:

(1) Engineering considerations. The recommended project has been designed to accomplish its purposes with as little resulting noise, air and water pollution as possible. Detailed analysis indicates that the dredging of the existing waterways to a depth of 40 feet to channel mile 8.84 and 35 feet to the end of the project is necessary to accommodate large vessels currently in use and anticipated to be built in the near future. This depth can be obtained without affecting existing structures along the channels other than utilities, which would be relocated by local interests and the U.S. Navy. Alternative solutions involving lightering or diversion of cargoes to other ports, would as previously noted, be prohibitively expensive. Alternative solutions involving construction of channels to depths less than 40 and 35 feet or deepening of some but not all of the existing inner harbor channels and basins, do not provide the requisite facilities needed to handle the anticipated vessel traffic. Alternative methods of disposal of the dredged materials out to sea would increase the overall project costs and are unacceptable to fish and game agencies if deposited in landfills around the periphery of San Diego Bay. There would be no difference in the comparative effects of these alternative methods and the recommended plan on the Federal operation and maintenance of the project.

(2) Economic considerations. The City of San Diego, the immediate tributary area, and extensive hinterlands will benefit substantially from increased trade as the result of the project's completion. The planned disposal method is consistant with plans of the local sponsor. The recommended plan does not provide for the maximum net benefits, but does yield the greatest return on the investment. The recommended plan provides for the most feasible project to serve the immediate needs and recognizes that prior to 1985, the project should be reevaluated in terms of changed social, economic, and environmental conditions to determine the justification for deeper channels.

(3) Social well being considerations. The citizenry of the San Diego Area will benefit from wages and taxes generated by the project and by the resulting increase in trade. The proposed project will have significant short and long-term beneficial effects on net national and regional economic development by reducing shipping transportation costs, increasing employment, income and revenues and improving the balance of payments. It is expected that no significant adverse social or economic effects will result from the project.

(4) Environmental considerations. The recommended project will permanently alter bottom habitats in the areas that will be dredged; and will eliminate harbor bottom habitats and open water in the area used for disposal. The project will slightly reduce the rate of flushing of the bay. There will be temporary turbidity in the areas of dredging or dredge spoil disposal. Pollutants associated with the dredged material will be introduced into marine waters and will be available to the marine food chain. The short-term alternative of the habitat at the U.S. Naval Amphibious Base will reduce feeding areas available to rare and endangered species of water associated birds. Minor amounts of pollutants are expected to be dispersed into the harbor waters as a result of dredging, but most of the bottom sediments with pollutants dredged from the harbor will be disposed in the open ocean, thus permanently removing them from the marine ecosystem. Possible adverse environmental impacts will be short-lived and are outweighed by economic and social benefits. Alternatives involving lightering or diversion of cargoes to other ports would leave present environmental conditions unchanged in the immediate area, although, as noted, the opportunity to upgrade the quality of the substrate by removal of pollutants from the harbor would be foregone. In addition, if cargoes were diverted to other ports there would be, as also noted previously, environmentally undesirable effects due to increased land transportation requirements to bring the diverted cargoes into the San Diego area and its hinterland. Alternative solutions involving construction of depths less than recommended or deepening of only a portion of the channels and basins have similar impacts to those of the recommended plan, which, of course, are generally proportional to their comparative extent. Spoil disposal in deepwater at sea would eliminate any impact of such disposal within the immediate harbor area. However, there would be certain adverse environmental effects on the marine ecosystem in the vicinity of the EPA approved dump site.

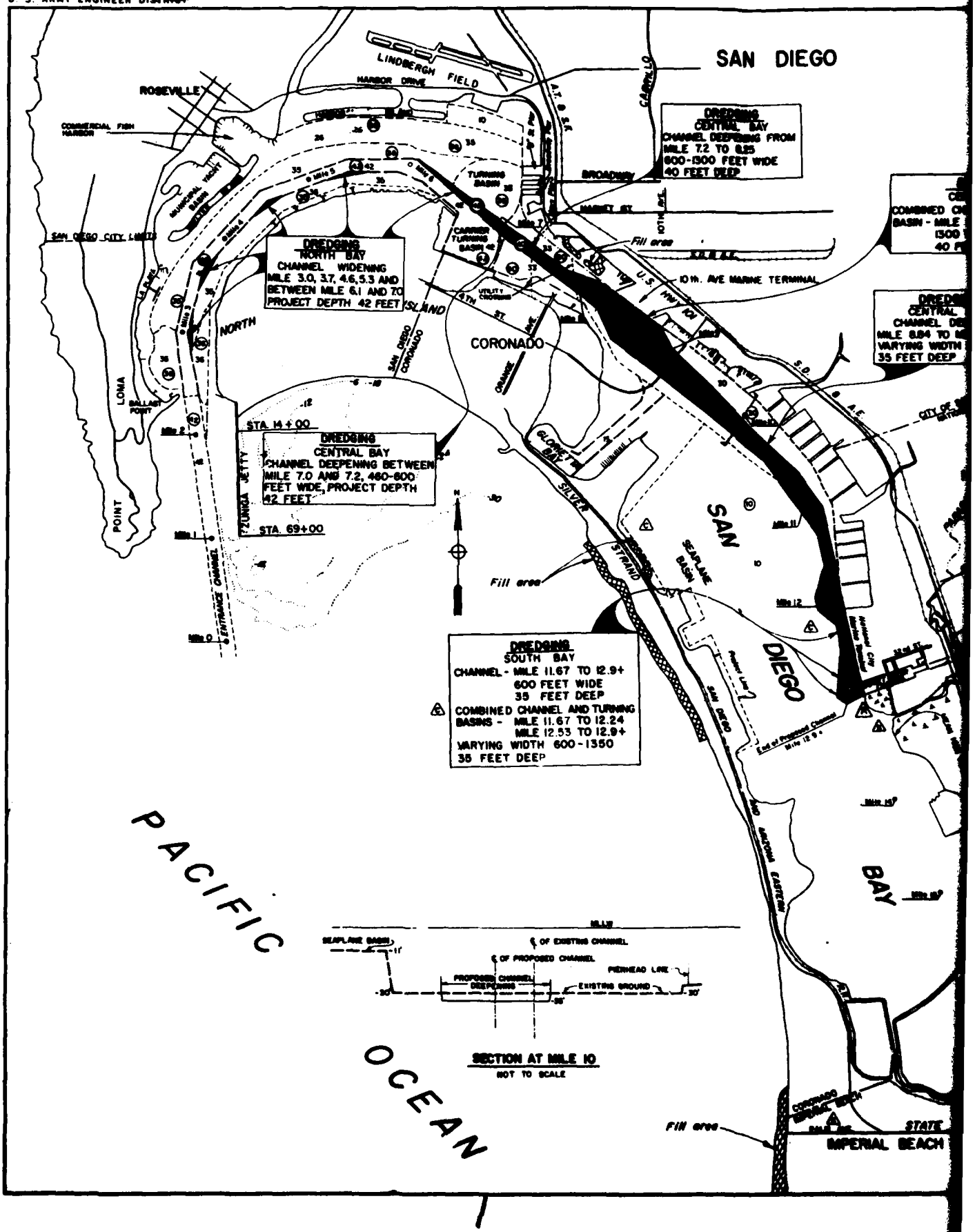
d. The desired purpose of the project can best be obtained by the recommended plan. Alternatives have been considered, including the lightering of cargoes, the no action alternative, the alternative of utilizing the harbors at Los Angeles and Long Beach for these cargoes, and alternatives in the method of spoil deposition. Each has been found less satisfactory than the recommended plan. The lightering of cargoes was not selected because the cost for lightering cargoes from one vessel to another made this alternative economically infeasible. The no action alternative would involve no deepening of the existing waterways. The no action alternative was rejected because the Unified Port District could not develop and utilize the capability of its existing terminals effectively and economically. The environmental impacts of the recommended plan for the proposed project were small and were offset by beneficial impacts made by the proposed project. The alternative plans utilizing harbors at Los Angeles and Long Beach were rejected for economic reasons. The project is feasible, and as formulated would minimize environmental damage.

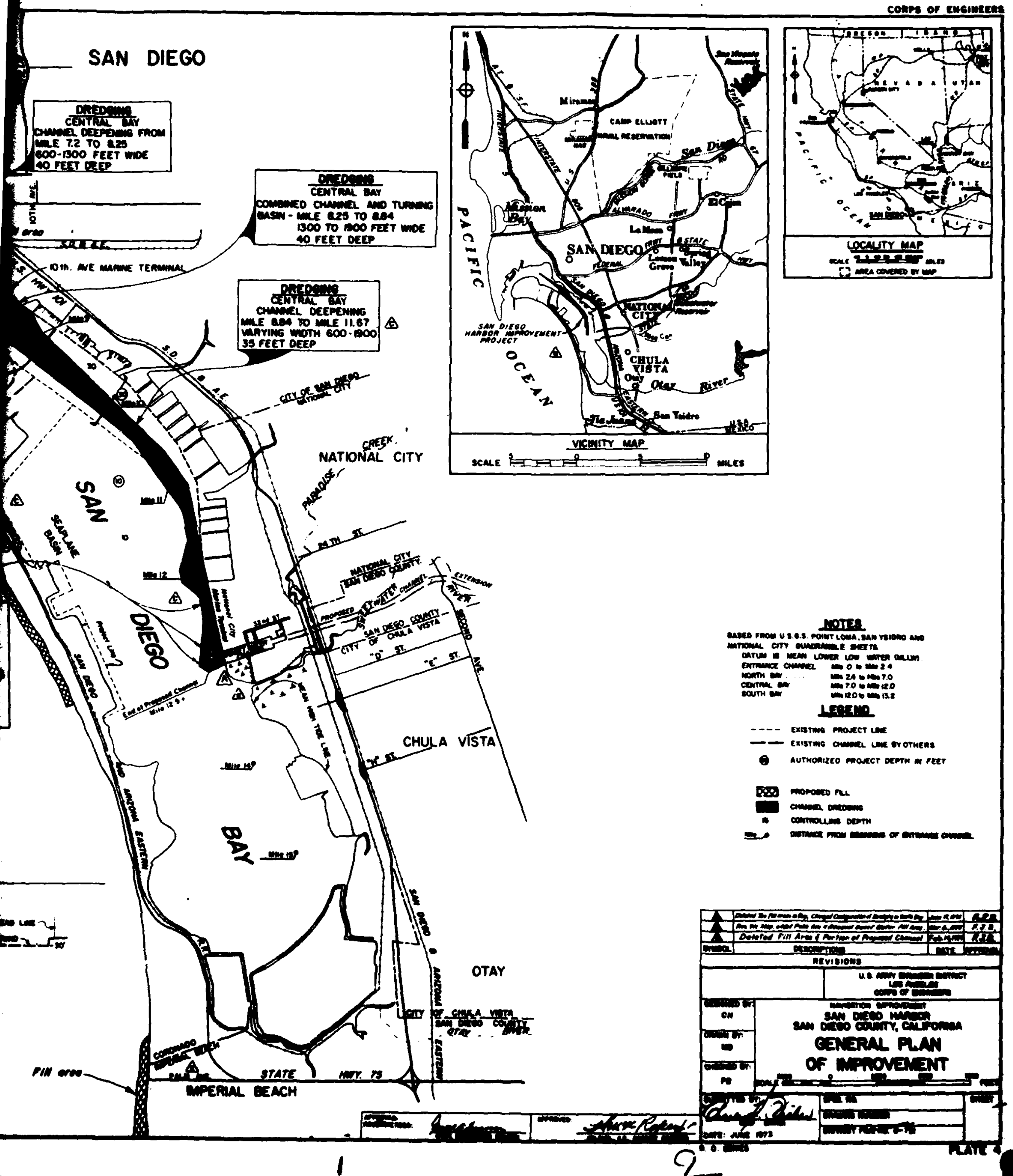
XXIV – CONCLUSIONS AND RECOMMENDATIONS

24-01. CONCLUSIONS. The San Diego Harbor Channel dredging project is well justified. It would provide deeper channels to serve larger vessels carrying both the cargo flowing through the harbor today and the future potential tonnage which can be expected to flow through the harbor. It would provide added recreational facilities in conjunction with community recreational plans. The benefit cost ratio for the entire project is 3.4 to 1. It is considered in the overall national, regional, and local interests that the project be constructed as presently recommended.

24-02. RECOMMENDATIONS. The district engineer recommends that the project described in this general design memorandum and as shown on plate 4 be constructed as soon as possible.

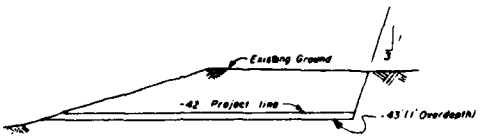
U. S. ARMY ENGINEER DISTRICT



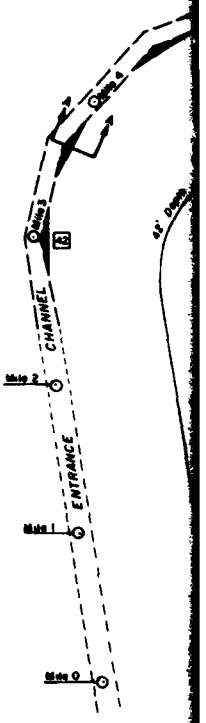

CORPS OF ENGINEERS
SAN DIEGO
DREDGING
CENTRAL BAY
CHANNEL DEEPENING FROM
MILE 7.2 TO 8.25
600-1300 FEET WIDE
40 FEET DEEP
DREDGING
CENTRAL BAY
COMBINED CHANNEL AND TURNING
BASIN - MILE 8.25 TO 8.84
1300 TO 1900 FEET WIDE
40 FEET DEEP
10th. AVE MARINE TERMINAL
DREDGING
CENTRAL BAY
CHANNEL DEEPENING
MILE 8.84 TO MILE 11.67
VARYING WIDTH 600-1900
35 FEET DEEP
CITY OF SAN DIEGO
NATIONAL CITY
NATIONAL CITY
PARADISE CREEK
SAN
SEAPLANE BASIN
DIEGO
BAY
24TH ST.
NATIONAL CITY
SAN DIEGO COUNTY
SWEETWATER CHANNEL
SWEETWATER RIVER
EXTENSION
SAN DIEGO COUNTY
CITY OF CHULA VISTA
"D" ST.
"E" ST.
SECOND AVE
CHULA VISTA
"H" ST.
MEAN HIGH TIDE LINE
End of Proposed Channel
SAN DIEGO & ARIZONA EASTERN
OTAY
CITY OF CHULA VISTA
SAN DIEGO COUNTY
OTAY RIVER
CORONADO
STATE HWY. 75
IMPERIAL BEACH
Fill area
SAN DIEGO
PACIFIC OCEAN
Miramar
CAMP ELLIOTT
Mission Bay
San Diego River
El Cajon
La Mesa
Lemon Grove
Spring Valley
NATIONAL CITY
CHULA VISTA
Otay
Otay River
San Ysidro
Tia Juana
U.S.A.
MEXICO
SAN DIEGO HARBOR IMPROVEMENT PROJECT
VICINITY MAP
SCALE 5 0 5 10 MILES
PACIFIC OCEAN
NEVADA
UTAH
LOCALITY MAP
AREA COVERED BY MAP
NOTES
BASED FROM U.S.G.S. POINT LOMA, SAN YSIDRO AND NATIONAL CITY QUADRANGLE SHEETS.
DATUM IS MEAN LOWER LOW WATER (MLLW).
ENTRANCE CHANNEL Mile 0 to Mile 2.4
NORTH BAY Mile 2.4 to Mile 7.0
CENTRAL BAY Mile 7.0 to Mile 12.0
SOUTH BAY Mile 12.0 to Mile 13.2
LEGEND
EXISTING PROJECT LINE
EXISTING CHANNEL LINE BY OTHERS
AUTHORIZED PROJECT DEPTH IN FEET
PROPOSED FILL
CHANNEL DREDGING
CONTROLLING DEPTH
DISTANCE FROM BEGINNING OF ENTRANCE CHANNEL
Deleted Fill Area & Portion of Proposed Channel
SYMBOL
DESCRIPTIONS
DATE
APPROVAL
REVISIONS
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS
NAVIGATION IMPROVEMENT
SAN DIEGO HARBOR
SAN DIEGO COUNTY, CALIFORNIA
GENERAL PLAN
OF IMPROVEMENT
DESIGNED BY: CN
DRAWN BY: MD
CHECKED BY: PB
DATE: JUNE 1973
PLATE 4

TYPICAL CROSS - SECTION A-A OF
TRIANGULAR AREA

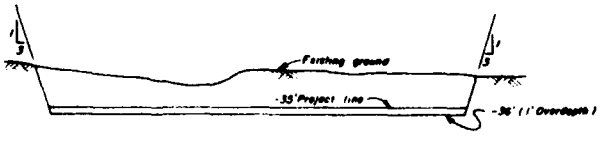
HORIZ SCALE 100 0 100 200 300 FEET
VERT SCALE 10 0 10 20 30 FEET



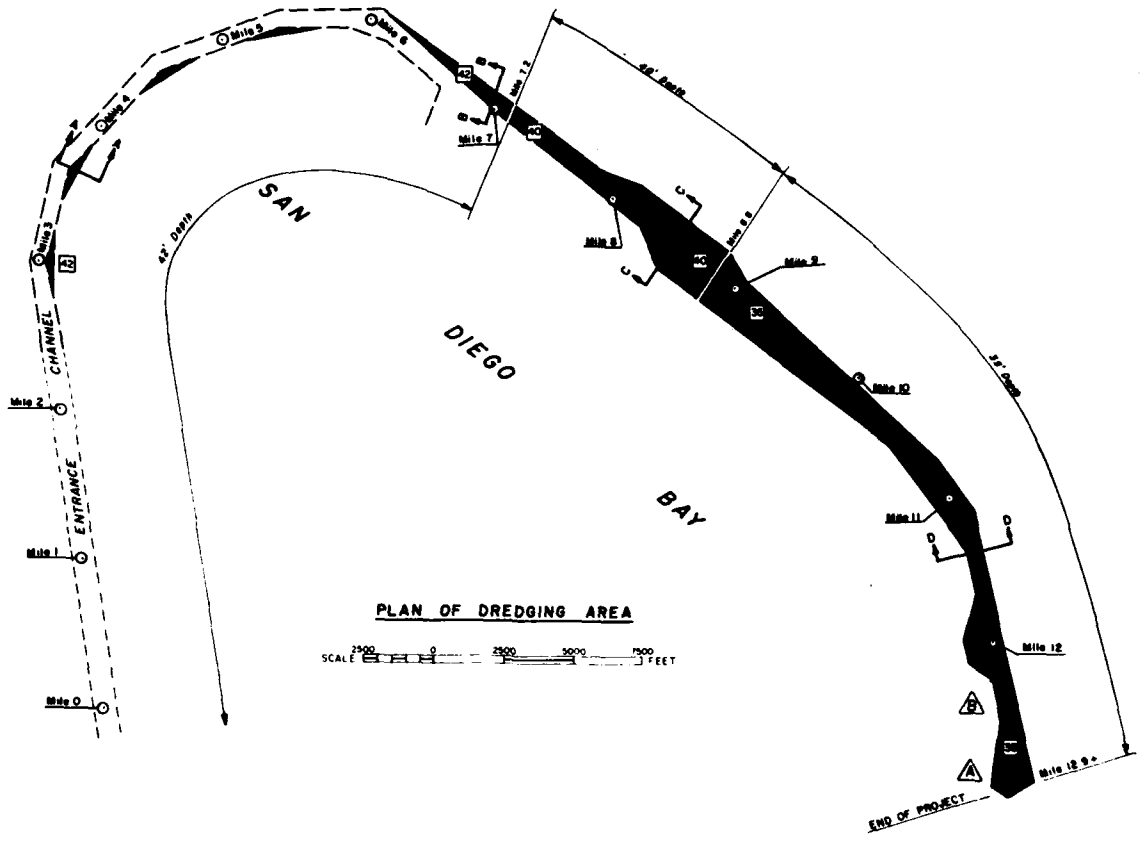
TYPICAL CROSS - SECTION B-B



TYPICAL CROSS - SECTION C-C

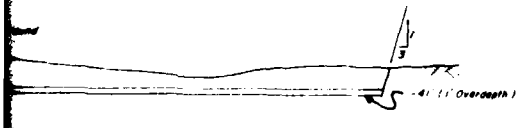


TYPICAL CROSS - SECTION D-D



PLAN OF DREDGING AREA

SCALE 2500 0 2500 5000 7500 FEET



SYMBOL	DESCRIPTIONS	DATE	APPROVAL
2	Changed Configuration of Dredging in South Bay	June 1973	F.J.G.
1	Revised End of Project From Mile 12.2 to Mile 12.9+	Feb. 1973	F.J.G.

REVISIONS

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DESIGNED BY: F.J.G.
DRAWN BY: G.S.O.
CHECKED BY: M.M.D.

NAVIGATION IMPROVEMENT
SAN DIEGO HARBOR
SAN DIEGO COUNTY, CALIFORNIA

GENERAL PLAN & CROSS SECTIONS FOR DREDGING

SCALE AS SHOWN

SUBMITTED BY: [signature] Chief, Design Branch
DATE: AUGUST 1973

SPEC. NO.
DRAWING NUMBER
DISTRICT FILE NO. 6-705

SHEET

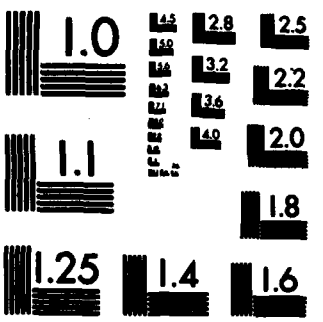
PLATE 6

AD-A136 682 NAVIGATION IMPROVEMENT DESIGN MEMORANDUM NUMBER 1 GENERAL DESIGN FOR SAN..(U) ARMY ENGINEER DISTRICT LOS ANGELES CA 28 FEB 75 F/G 13/2 NL

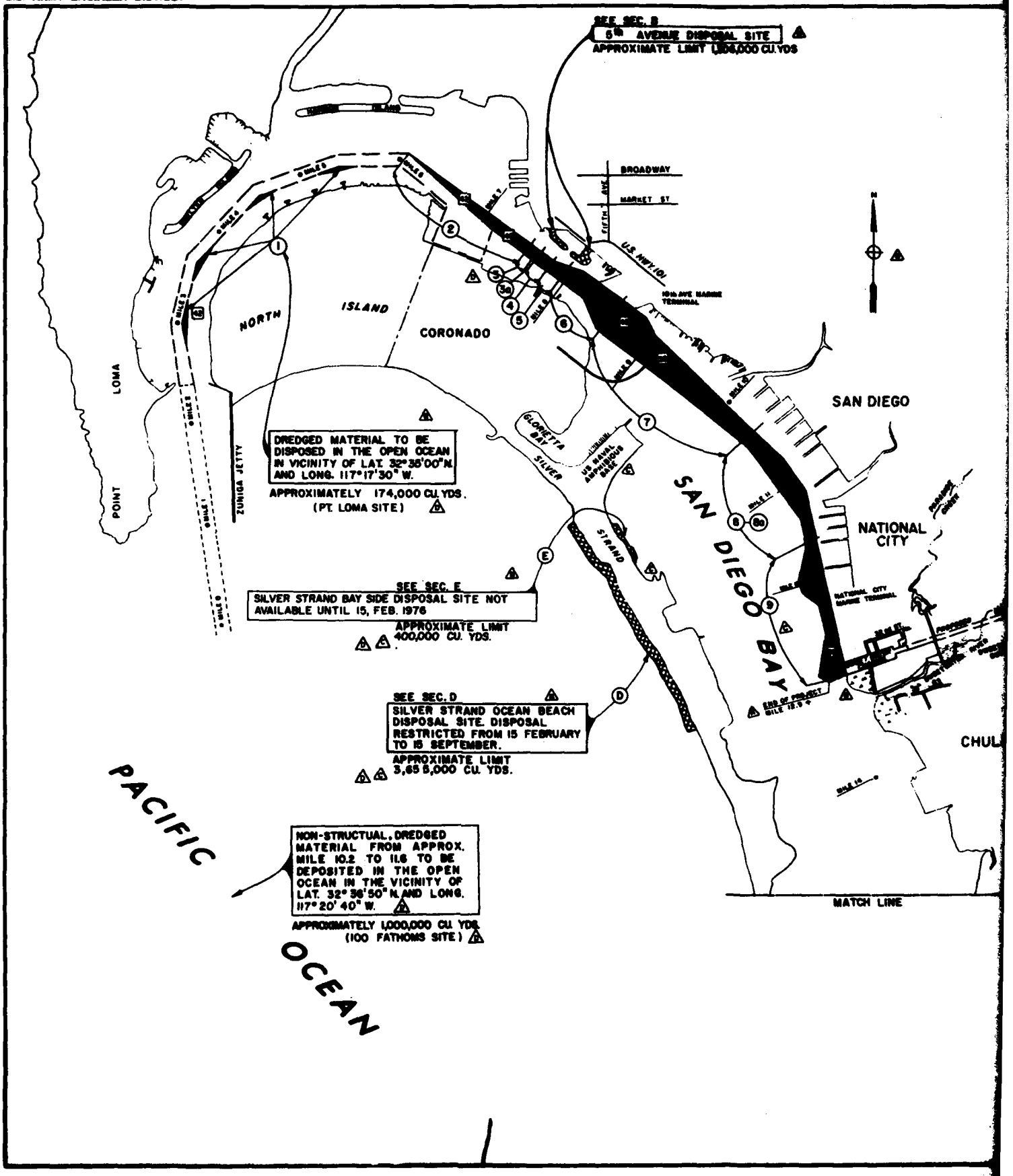
2/2

UNCLASSIFIED

END
DATE FILMED
2-84
DTIC



U.S. ARMY ENGINEER DISTRICT



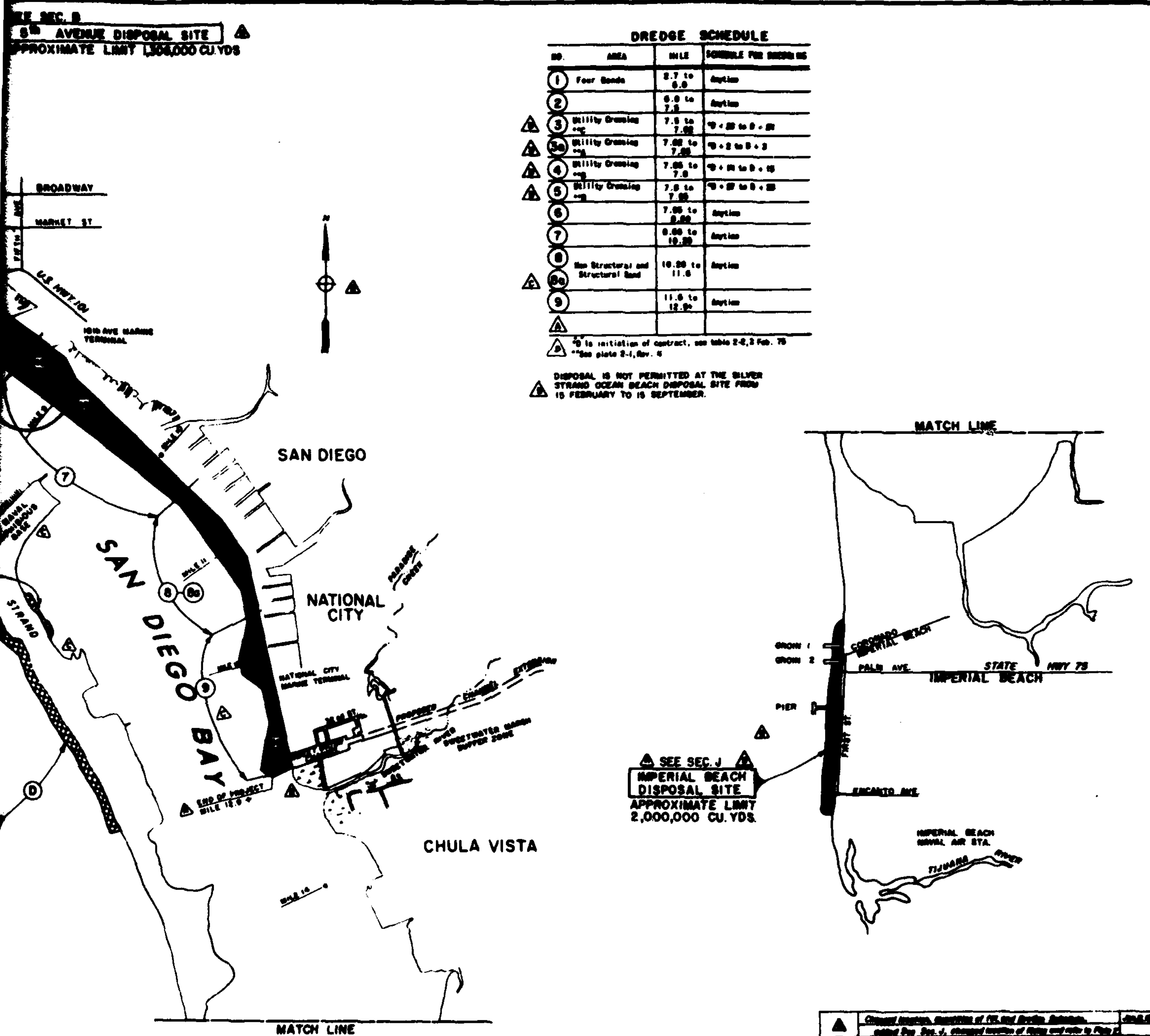
CORPS OF ENGINEERS

DREDGE SCHEDULE

NO.	AREA	MILE	SCHEDULE FOR DREDGING
1	Four Bends	2.7 to 6.0	Anytime
2		6.0 to 7.5	Anytime
3	Utility Crossing **	7.5 to 7.62	*0 + [illegible] to 0 + [illegible]
3a	Utility Crossing **	7.62 to 7.65	*0 + 2 to 0 + 3
4	Utility Crossing **	7.65 to 7.8	*0 + [illegible] to 0 + 15
5	Utility Crossing **	7.8 to 7.95	*0 + [illegible] to 0 + [illegible]
6		7.95 to 8.60	Anytime
7		8.60 to 10.20	Anytime
8 / 8a	Non Structural and Structural Sand	10.20 to 11.6	Anytime
9		11.6 to 12.9+	Anytime

*0 is initiation of contract, see table 2-2, 2 Feb. 75
**See plate 2-1, Rev. 4

DISPOSAL IS NOT PERMITTED AT THE SILVER STRAND OCEAN BEACH DISPOSAL SITE FROM 15 FEBRUARY TO 15 SEPTEMBER.



NOTES

ALL SECTIONS AND DETAILS ON PLATE 7.

LEGEND

AREA TO BE DREDGED.

DISPOSAL AREA.

SYMBOL	DESCRIPTION	DATE	APPROVAL
	Changed location, quantities of fill and Dredge Schedule.		
	Deleted disposal sites C and F and changed portion...		
	Added 8a to Dredge Schedule.		
	Changed configuration of dredging in South Bay.		
	Revised Mileages, Area Disposal Area, Added Legend		
	Proposed Relief... Deleted Area 10		

REVISIONS

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

NAVIGATION IMPROVEMENT
SAN DIEGO HARBOR
SAN DIEGO COUNTY, CALIF.

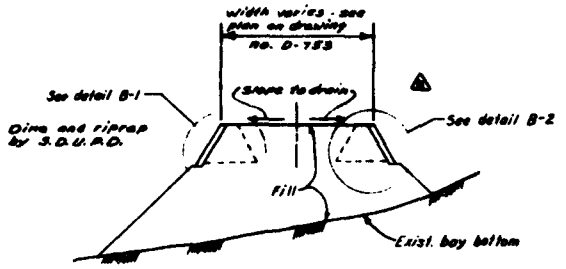
GENERAL PLAN OF DISPOSAL AREAS

DESIGNED BY: FJB
DRAWN BY: [illegible]
CHECKED BY: [illegible]

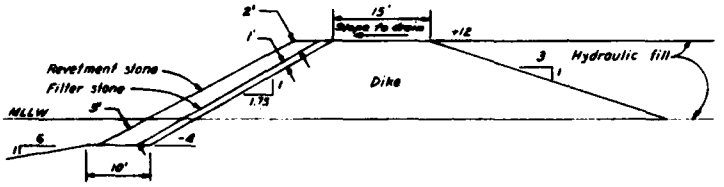
DATE: AUGUST 1973

PLATE

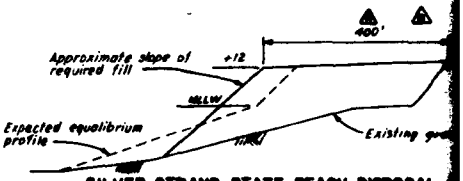
1 2



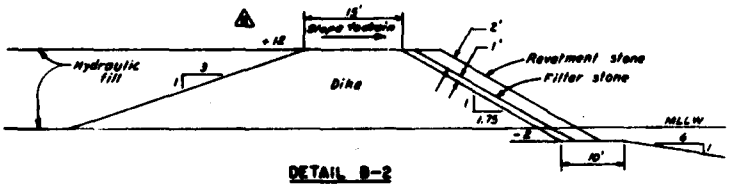
TYPICAL SECTION B
FIFTH AVE. FILL AREAS
NOT TO SCALE



DETAIL B-1
TYPICAL SECTION
NOT TO SCALE



SILVER STRAND STATE BEACH DISPOSAL
TYPICAL SECTION D
NOT TO SCALE



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TYPICAL SECTION
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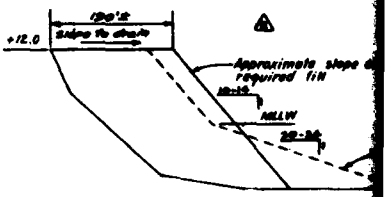
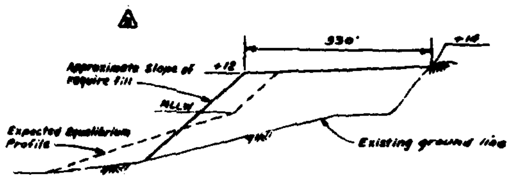


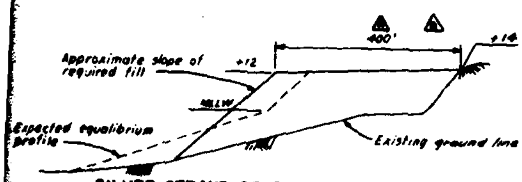
TYPICAL SECTION E
NOT TO SCALE



IMPERIAL BEACH DISPOSAL SITE

TYPICAL SECTION J

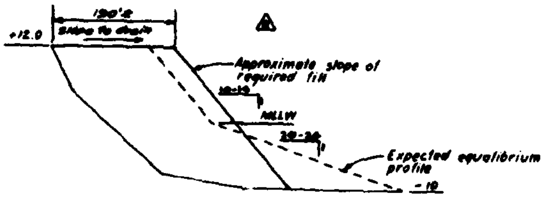
NOT TO SCALE



SILVER STRAND STATE BEACH DISPOSAL SITE

TYPICAL SECTION D

NOT TO SCALE



TYPICAL SECTION E

NOT TO SCALE

Note:
FOR GENERAL PLAN OF DISPOSAL AREAS SEE DWG. FILE NO. D-[illegible]

SYMBOL	DESCRIPTIONS	DATE	[illegible]
▲	[illegible] Sec. C and Sec. F	[illegible]	[illegible]
▲	[illegible]	[illegible]	[illegible]
	Changed [illegible]	[illegible]	[illegible]
▲	[illegible]		

REVISIONS

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

NAVIGATION IMPROVEMENT
SAN DIEGO HARBOR
SAN DIEGO COUNTY, CALIF.

CROSS SECTIONS OF FILL AREAS

SCALE AS SHOWN