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Seal Beach - Anaheim Bay Harbor, Orange County, California

EQUITY STUDY FOR BEACH EROSION CONTROL

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

MARCH 1980

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18643

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA

EQUITY STUDY

FOR BEACH EROSION CONTROL

Prepared by:

U.S. Army Corps of Engineers
Los Angeles District, California

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March 1980

U.S. Army Corps of Engineers

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA

EQUITY STUDY
FOR BEACH EROSION CONTROL

TABLE OF CONTENTS

Item	Page
THE STUDY AND REPORT	1
AUTHORIZATION	1
PURPOSE AND SCOPE OF STUDY	1
PRIOR REPORTS	2
DESCRIPTION OF THE STUDY AREA	8
SAN GABRIEL RIVER TO ANAHEIM BAY (SEAL BEACH)	8
SURFSIDE-SUNSET BEACH	9
BOLSA CHICA STATE BEACH	9
HUNTINGTON BEACH	9
NEWPORT BEACH (UPCOAST SEGMENT)	9
NEWPORT BEACH (DOWNCOAST SEGMENT) AND BALBOA BEACH	10
GEOLOGY	10
GEOMORPHOLOGY	10
GEOLOGIC CONDITIONS	11
FAULT ZONES	11
TSUNAMIS	12
LITTORAL CELLS	13
SAN PEDRO CELL	13
SEAL BEACH	13
BEACH EROSION AND NOURISHMENT	16
FUTURE BEACH NOURISHMENT	16
STATEMENT OF THE PROBLEM	18
PRIOR APPORTIONMENT OF COSTS	18
COMPARISON OF APPORTIONMENT OF COSTS	18
SEAL BEACH SEGMENT	19
SURFSIDE - SUNSET AND NEWPORT BEACH SEGMENTS	19
ESTIMATE OF BEACH NOURISHMENT COSTS	21
ESTIMATE OF ANNUAL CHARGES	22
FEDERAL INTERESTS	24
COORDINATION	24
CONCLUSIONS	24
RECOMMENDATIONS	25

TABLES

Title	Page
PRIOR REPORTS	3
SUMMARY OF ARTIFICIAL NOURISHMENT	17

PHOTOGRAPHS

Title	
SEAL BEACH OCEAN FRONT	26

TABLE OF CONTENTS - Continued

PLATES

No.	Title
1.	LOCALITY MAP
2.	DESCRIPTION MAP
3.	LITTORAL CELLS IN SOUTHERN CALIFORNIA
4.	SEAL BEACH, HYDROGRAPHIC SURVEY
5.	WINTER PROFILES, STA. 0+00 TO STA. 24+16
6.	WINTER PROFILES, STA. 30+96 TO STA. 48+50
7.	SUMMER PROFILES, STA. 0+00 TO STA. 24+16
8.	SUMMER PROFILES, STA. 30+96 TO STA. 48+50

APPENDICES

No.	Title
1.	COMMENTS OF OTHER AGENCIES
2.	EXTRACT OF TEXT FROM PERTINENT FEDERAL LAWS, H. DOC. 349/83/2, AND H. DOC. 602/87/2

SEAL BEACH-ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY
FOR BEACH EROSION CONTROL

SYLLABUS

The purpose of this study is to review the requirements of local cooperation for the project at Anaheim Bay, California, with particular reference to Federal and non-Federal cost sharing, and to report the findings of such review to Congress. The engineering aspects of the Anaheim Bay Harbor (Seal Beach) and the San Gabriel River to Newport Bay (Surfside-Sunset and Newport Beach) beach erosion control projects are also reviewed.

The cost-sharing responsibilities for the Anaheim Bay Harbor (Seal Beach) project were 33 percent Federal and 67 percent non-Federal for project construction and 100 percent non-Federal for maintenance. Local interests for the Seal Beach segment have stated that the cause of erosion in this area is the same as that in the downcoast Surfside-Sunset and Newport Beach segments, and that the cost-sharing responsibilities for maintenance at Seal Beach should be the same as that for the downcoast beach segments. The cost-sharing responsibilities for the downcoast beach segments of Surfside-Sunset and Newport Beach were 67 percent Federal and 33 percent non-Federal for periodic nourishment and maintenance.

This study disclosed that the Seal Beach segment and the Surfside-Sunset and Newport Beach segments of the southern California coastline have the following similarities: they are part of the same general littoral cell, known as the San Pedro littoral cell; they are part of the same tributary drainage area; their beach erosion problems were caused by the same Federal structures and events; and the beach erosion problem at both Seal Beach and Surfside-Sunset can be judged to be attributable to the installation of the Anaheim Bay breakwaters.

It is recommended that the Federal Government provide, in equity, 67 percent of the costs of periodic nourishment and maintenance for protection of the Seal Beach, Orange County, California, shoreline.

The local cooperation requirements comprise the following:

a. Provide 33 percent of the costs of periodic nourishment and maintenance for protection of Seal Beach, Orange County, California;

b. Provide at their own expense all necessary lands, easements, and rights-of-way;

c. Hold and save the United States free from all claims for damages that may arise before, during, or after prosecution of work;

d. Furnish assurances satisfactory to the Secretary of the Army that they will:

(1) Maintain the protective measures and provide periodic nourishment of the protective beach during their economic life as may be required to serve their intended purpose with Federal assistance as recommended herein;

(2) Control water pollution to the extent necessary to safeguard the health of bathers; and

(3) Maintain continued public ownership of the shores and their administration for public use during the economic life of the project.

SEAL BEACH-ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL

THE STUDY AND REPORT

Thousands of bathers and sun fanciers visit Seal Beach and the Seal Beach pier annually. Convenient beach front parking, village shops, and annual surfing festivals make the beach area a favorite spot for southern Californians. Several sport-fishing boats depart from the Seal Beach pier daily, while anglers fish from the pier. Maintaining the recreational beach for the general public is deemed within the national interest.

AUTHORIZATION

This general investigation report presents the study results of the existing U.S. Army Corps of Engineers beach erosion control project at Seal Beach, Orange County, California. The project was completed in 1959 under the name of Anaheim Bay Harbor, Orange County, California. This study was authorized by section 38 of Public Law 93-251, 93d Congress, House Resolution 10203, Title 1 - Water Resources Development, March 7, 1974.

Section 38 of Public Law 93-251 reads as follows:

* * * * * * *

> Sec. 38. The Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to review the requirements of local cooperation for the project for Anaheim Bay, California, authorized by the River and Harbor Act of 1954 for Seal Beach, California, with particular reference to Federal and non-Federal cost sharing, and to report the findings of such review to Congress within one year after the date of enactment of this section.

* * * * * * *

This study was not undertaken within one year after the date of enactment of Public Law 93-251, because funds were not available until October 1977.

PURPOSE AND SCOPE OF STUDY

The purpose of this study is to review the requirements of local cooperation for the project at Anaheim Bay, California, with particular reference to Federal and non-Federal cost sharing and to report the findings of such review to Congress. The engineering aspects, based on available data, are also reviewed in this report.

An analysis and assessment of the engineering, environmental, and socioeconomic impacts of various beach erosion control measures in accordance with the provisions of the Water Resources Council, "Principles and Standards for Planning Water and Related Land Resources," (P&S) 38 FR 24778 2 4869, September 10, 1973, and the engineering regulations on water resources planning are beyond the scope of this study; therefore, they have not been made. In addition, the cost-sharing policies proposed by the President in a message to Congress on 6 June 1978 (EC 1105-2-95, Planning, Implementation of President's Cost Sharing Policies, 9 April 1979) were not used in this study, since they are not applicable to authorized and completed projects.

PRIOR REPORTS

Prior reports on beach erosion control and shore protection within the study area and other reports containing pertinent data are given in the following table. House Document 349, 83d Congress, 2d session (H. Doc. 349/83/2), "Anaheim Bay Harbor, California," March 10, 1954, and House Document 602, 87th Congress, 2d session (H. Doc. 602/87/2), "San Gabriel River to Newport Bay, Orange County, California," October 2, 1962, provide the basic data for this investigation and will be discussed in more detail in subsequent paragraphs.

PRIOR REPORTS

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA

Title	Date	Prepared by	Document No.
UNITED STATES:			
Supplemental Report on Survey of Newport Bay, Calif.	Sept. 25, 1933	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.*
Beach Erosion Study, Orange County, Calif.	Feb. 19, 1940	U.S. Army Corps of Engineers, Beach Erosion Board.	H. Doc. 637/76/3.**
Shore-Protection Report on Orange County, Calif.	Nov. 4, 1941	U.S. Army Corps of Engineers, Shore Protection Board.	Unpublished.**
Newport Bay Harbor, Calif.	Dec. 18, 1943	U.S.Army Corps of Engineers, Los Angeles District.	S. Doc. 138/78/1.**
Survey Report on Anaheim Bay Harbor, Calif.	Apr. 9, 1947	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.**
Review of Reports, Navigation, Los Angeles and Long Beach Harbors, Calif., with a View to Extending Existing Breakwater.	July 1, 1948	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.**
Longshore Current Observations in Southern California.	Jan. 1950	Scripps Institution of Oceanography.	Beach Erosion*** Board Tech. Memo. No. 13.

Note: See footnotes at the end of table.

PRIOR REPORTS

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA - Continued

Title	Date	Prepared by	Document No.
Review of Report, Navigation on Alamitos Bay, Calif.	Nov. 15, 1954	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.**
Anaheim Bay Harbor, Calif.	Mar. 10, 1954	U.S. Army Corps of Engineers, Los Angeles District.	H. Doc. 349/83/2.**
Wave Action and Sand Movement Near Anaheim Bay, Calif.	Feb. 1956	U.S. Army Corps of Engineers, Beach Erosion Board.	Beach Erosion.** Board Tech. Memo. No. 68.
San Gabriel River to Newport Bay, Orange County, California, Appendix V, Phase II, Beach Erosion Control Study.	Oct. 2, 1962	U.S. Army Corps of Engineers, Los Angeles District.	H. Doc. 602/87/2.
(No design memorandum issued for stage 1.) Criteria set forth in letter from Los Angeles District to South Pacific Division, subject: "Anaheim Bay to Newport Harbor, California: Beach Erosion Project."	Aug. 13, 1963	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
Design Memorandum for Beach Stabilization, Stage 2 Construction (Groin and Beach Fill) in the Segment Santa Ana River to Newport Pier, Orange County, California.	Aug. 1967	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***

Note: See footnotes at the end of table.

PRIOR REPORTS

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA - Continued

Title	Date	Prepared by	Document No.
Design Memorandum-Annex A for Beach Stabilzation, Stage 2 Construction (Additional Groin and Beach Fill).	July 1968	U.S.Army Corps of Engineers, Los Angeles District.	Unpublished.***
Design Memorandum for Stage 3 Construction, Beach Stabilization with Groins and Beach Fill at Newport Beach, Orange County, California.	Jan. 1969	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
(No design memorandum issued for stage 4A). Design Analysis for Stage 4A Construction, Periodic Beach Nourishment at Surfside-Sunset Beach, Orange County, California.	Sept. 1970	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
Beach Erosion Control Report, Cooperative Research and Data Collection Program of Coast of Southern California, Cape San Martin to Mexican Boundary, Three-Year Report 1967-68-69.	Dec. 1970	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
Design Memorandum for Stages 4B and 5 Construction, Beach Stabilization with Groins and Beach Fill at Newport Beach, Orange County, California.	Mar. 1972	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***

Note: See footnotes at the end of the table.

PRIOR REPORTS

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA - Continued

Title	Date	Prepared by	Document No.
Final Environmental Statement, Surfside-Sunset and Newport Beach, Orange County, California.	Sept. 1974	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
Shore Protection Improvement, Design Analysis for Stage 7 Construction, Periodic Beach Nourishment at Surfside-Sunset Beach, Orange County, California.	June 1978	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
Final Supplement to the Final Environmental Statement, Surfside-Sunset and Newport Beach, Orange County, California.	Jan. 1978	U.S. Army Corps of Engineers, Los Angeles District.	Unpublished.***
LOCAL INTERESTS:			
Relative Stability of the Southern California Shoreline.	About 1940	Grant & Shepard.	Unpublished.***
Report on Shore Protection, Vicinity of Anaheim Harbor, California.	Feb. 5, 1947	R. L. Patterson.	Unpublished.***
Report on Beach Erosion, Vicinity of Anaheim Harbor, Orange County, California.	Feb. 1, 1957	R. L. Patterson.	Unpublished.***

Note: See footnotes at the end of table.

PRIOR REPORTS

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA - Continued

Title	Date	Prepared by	Document No.
Shoreline Erosion Along the California Coast.	July 1977	State of California, The Resources Agency, Department of Boating and Waterways.	Unpublished.***

Footnotes:

* Available in the office of the Chief of Engineers, Washington, D.C.

** Available in the offices of: the District Engineer, Los Angeles, Calif.; the Division Engineer, South Pacific Division, San Francisco, Calif.; and the Chief of Engineers, Washington, D.C.

*** Available in the office of the District Engineer, Los Angeles, Calif.

DESCRIPTION OF THE STUDY AREA

The study area is on the coast of southern California. It extends along the Orange County coastline for about 17 miles from the mouth of the San Gabriel River downcoast to the entrance of Newport Bay Harbor (pl. 1). The shoreline, which is part of the general San Pedro littoral cell (pls. 2 and 3), generally consists of sandy beaches and is backed by low alluvial bays and marshes, bluffs, the Pacific Coast Highway 101, marina and non-marina residential developments, and industrial developments. The project area is broken by jettied channels at the mouth of the San Gabriel River, the entrance to Anaheim Bay Harbor (U.S. Naval Weapons Station), the mouth of the Santa Ana River, and the entrance to Newport Bay Harbor. The Seal Beach and Surfside-Sunset Beach areas have the same tributary drainage areas. Although the specific area of shoreline under investigation is the San Gabriel River to Anaheim Bay segment (Seal Beach), a description of the entire 17-mile shoreline and a discussion of the status of Federal shore protection works are presented in the subsequent paragraphs in order to fully address the problem for which Seal Beach is being investigated.

SAN GABRIEL RIVER TO ANAHEIM BAY (SEAL BEACH)

This shoreline extends about 1 mile southeast from the mouth of the San Gabriel River to the west breakwater of Anaheim Bay Harbor of the U.S. Naval Weapons Station (pl. 4). The beach, which is bisected by the Seal Beach pier and reinforced concrete groin, is publicly owned and operated by the City of Seal Beach. The area landward from the public beach and street is residential. The Board of Supervisors of Orange County noted recession in the shoreline in the years 1947 through 1951. This segment is addressed in H. Doc. 349/83/2. Federal participation (authorized by the River and Harbor Act of 1954, Public Law 780, 83d Congress, 2d session, 3 September 1954) in shore protection works in this segment of shoreline comprised construction of a reinforced concrete groin about 750 feet long, adjacent to the Seal Beach pier, and development of a protective beach by the placement of about 225,000 cubic yards of sand. This project was completed in September 1959. The Federal Government contributed $89,000, which amounted to about 33 percent of the project costs. This is explained in more detail under a subsequent heading titled "Prior Apportionment of Costs."

Anaheim Bay Harbor takes up about 0.5 mile of shoreline. Two converging rubblemound breakwaters protect the harbor. The west breakwater is about 3,500 feet long and the east breakwater is about 3,950 feet long; they were constructed by the U.S. Navy in 1944. This harbor serves the U.S. Naval Weapons Station at Los Alamitos. It also provides the only entrance channel to the public marina facility of the Sunset Aquatic Park and the private residential marina development of Huntington Harbour.

SURFSIDE-SUNSET BEACH

This shoreline extends 1.7 miles downcoast from the east breakwater of Anaheim Bay Harbor. It contains 0.2 miles of Federally owned beach, 0.5 mile of the privately owned beach of Surfside Colony, and 1.0 mile of the publicly owned beach known as Sunset Beach. Sunset Beach is operated by the County of Orange. These beaches are backed by private residences. Public access is from the street. Severe beach erosion occurred in 1963 along Surfside-Sunset Beach. The authorized project in this reach is renourishment of the beach at approximate 5-year intervals. Such nourishment at Surfside-Sunset Beach has taken place in 1964 (about 4,000,000 cubic yards of sand), 1971 (about 2,400,000 cubic yards of sand), and 1979 (about 1,500,000 cubic yards of sand) and has controlled the erosion in this area. This segment is addressed in H. Doc. 602/87/2 and was modified by the Chief of Engineers, September 13, 1963. On each occasion the Federal Government has contributed 67 percent of the cost. This is explained in more detail under a subsequent heading entitled "Prior Apportionment of Costs."

BOLSA CHICA STATE BEACH

This shoreline extends about 3 miles downcoast from Sunset Beach to the upcoast bluffs of Huntington Beach. This public beach is operated by the State of California. It is backed by Pacific Coast Highway and a tidal slough and marsh area that is partly owned by the California State Department of Fish and Game and is known as Bolsa Bay. Tidal water flows from Bolsa Bay into Sunset Bay and then out to the sea through Anaheim Bay Harbor. No Federal participation in construction of shore protection works has been required in this area.

HUNTINGTON BEACH

The Huntington Beach shoreline consists of two segments: a privately owned 2.3-mile reach extending downcoast from Bolsa Chica State Beach to the Huntington pier and a publicly owned 3.3-mile reach extending downcoast from the Huntington pier to the Santa Ana River jetties. The privately owned segment is a sandy beach backed by bluffs and is used for oil production; however, the beach is accessible to the public at either end. Beach facilities are maintained by the City of Huntington Beach. The publicly owned segment is separated into the Huntington Beach City Park, extending from the Huntington Beach pier to the ocean terminus of Huntington Beach Boulevard, and the Huntington Beach State Park, extending from Huntington Beach Boulevard to the mouth of the Santa Ana River. No Federal participation in shore protection works has been required in this area.

NEWPORT BEACH (UPCOAST SEGMENT)

This reach of shoreline extends about 2 miles from the Santa Ana River jetties to the Newport pier. The concave shoreline consists of a public beach area backed by private residences. The beach is operated by the City of Newport Beach. Severe beach erosion occurred in 1965,

1966, and 1967. This segment is addressed in H. Doc. 602/87/2 and was modified by the Chief of Engineers, September 13, 1963. Federal participation (authorized by the River and Harbor Act of 1962, Public Law 87-874, 87th Congress, 2d session, 23 October 1962) in beach erosion control in this segment of shoreline consisted of placement of about 2 million cubic yards of sand and construction of eight rubblemound groins (including conversion of two steel sheet-pile groins to rubblemound groins). This construction was completed in stages: Stage 2 construction, in November 1968; stage 3 construction in November 1969; and stages 4B and 5 construction, in March 1973. Construction of an offshore breakwater to be used as a sand trap and located on the upcoast side of the Santa Ana River is authorized, but is deferred pending demonstration of need. The total construction costs for the work to date are about $2,614,000; and the Federal government contributed about $1,751,000, which amounts to 67 percent. This is explained in more detail under a subsequent heading titled "Prior Apportionment of Costs". The groins and sandfill have controlled the erosion in this area.

NEWPORT BEACH (DOWNCOAST SEGMENT) AND BALBOA BEACH

This shoreline extends about 3.5 miles downcoast from the Newport pier to the entrance jetties of Newport Bay Harbor and is bisected by the Balboa pier. The segment extending about 1.7 miles downcoast from the Newport pier to the Balboa pier is part of Newport Beach, and the segment extending about 1.8 miles downcoast from the Balboa pier to the entrance of Newport Bay Harbor is Balboa Beach. The public beach on both segments is backed by private residences and by a private residential marina development known as Newport Bay Harbor. The City of Newport Beach operates both beach segments. No Federal participation in construction of shore protection works has been required in this area.

GEOLOGY

The landforms that include Seal Beach have the same general characteristics and origin as those in other areas along the southern California coastline between Long Beach and Newport Beach. All these landforms were created by accretion of flood deposits from the inland high areas that were re-worked by the ocean processes to form the beaches. The coastline has been modified by movement on the nearby Newport-Inglewood fault zone that created the low hills, mesas, and coastal bluffs along this zone. These orogenic processes coupled with eustatic changes in the ocean level have given the shore its present configuration.

GEOMORPHOLOGY

The shore on which Seal Beach is located is the seaward boundary of a relatively flat 20- by 50-mile plain known as the Los Angeles Basin. The plain, however, continues into the ocean over 20 miles where it is known as the Continental Borderland. On land, the plain is interrupted only by a succession of low hills and mesas which follow the coast,

particularly in Orange County. These are separated by gaps through which the San Gabriel and Santa Ana Rivers drain the southern portion of the basin. Until fairly recently in geologic time, the rivers would change course flowing into the ocean through different gaps.

Locally, Seal Beach caps one of the mesas called Landing Hill. It attains a peak elevation of about 60 feet sloping gradually towards the ocean. It levels onto a slight terrace between elevation 5 and 10 feet (Mean Sea Level) several thousand yards inland from the shore. The beach at one time was continuous for miles up and downcoast, interrupted only by the streams through the gaps. The present beach is one mile long, having been isolated by development of jetties for the Long Beach Marina and San Gabriel River to the northwest and the breakwaters for the Anaheim Bay Navy facility to the southeast. The beach itself is bisected by the Seal Beach pier and also changes character within the one-mile section. Upcoast from the Seal Beach pier, the beach is relatively wide abutting a 5 to 10 foot high bluff. Downcoast from the Seal Beach pier, the beach is considerably narrower and merges with a low continuation of the beach which extends inland up to several hundred yards. Offshore, the ocean floor is very flat beyond the mean surf line. The floor slopes roughly 1V on 150H to about elevation minus 18 feet Mean Lower Low Water (MLLW) then flattens further to 1V on 250H beyond.

GEOLOGIC CONDITIONS

The geologic conditions existing at Seal Beach are the same as elsewhere along the Orange County coast. The area is underlain by some 30,000 feet of marine sandstone and siltstone sediments over a crystalline rock basement. During the Pleistocene age (about 2,000,000 to 15,000 years ago), regional deformation began along several fault systems through southern California, warping and rupturing the sediments. Locally, Landing Hill and the other mesas are surface uplifts caused by movement along the Newport-Inglewood fault zone. During the last ice age (about 40,000 years ago), the sea level lowered so that the rivers carved the gaps through the uplift zone. When the sea level again rose (about 15,000 years ago) the gaps partially backfilled with lagoonal, tidal marsh, and flood plain deposits. These deposits reach a maximum thickness of 35 to 40 feet and consist of mostly thinly interbedded, silts and clays with some sands. Along the beach, ocean processes have reworked the deposits leaving the sands. Upcoast from the pier, the sand is mostly fine to medium graded and micaceous. Downcoast from the Seal Beach pier, the sand is coarser and cleaner.

FAULT ZONES

The Newport-Inglewood fault zone passes roughly one mile inland at Landing Hill. The fault is active as evidenced by the 1933 Long Beach earthquake, which measured 6.3 magnitude (Richter). This event originated from movement on the fault off Newport Beach; future events could occur ranging up to a magnitude 7. The ground water level occurs

at sea level and along the coast the water is saline. However, movement of the fault has disrupted all but the most recently deposited sediments creating a barrier to the intrusion of saline water inland of the fault. In the gaps, where the recent sediments occur, some intrusion has occurred which is now being checked by artificial barrier projects.

TSUNAMIS

Tsunamis are phenomena which could impact the shoreline. These are normally generated by a large offshore earthquake, but not usually in California. Most are generated in distant regions such as Alaska or Chile and are greatly reduced by the time they reach the southern California coast. The 1964 Alaskan earthquake produced a tsunami which was 4-feet high when it hit the Orange County coast. The largest known locally produced tsunami occurred in 1927, west of Point Arguello. This wave was 6-feet high at the nearby community of Surf. However, there are no records of damage in the southern California area as a result from tsunamis.

LITTORAL CELLS

The Seal Beach shoreline is part of the general San Pedro littoral cell (pl. 3). A littoral cell can be defined as a segment of coastline that encompasses the following: complete cycles of sediment supply, described as sediment sources; zones of ultimate sediment losses, described as sediment sinks; and, littoral transport paths, described as either alongshore sediment transport or offshore-onshore sediment transport. Although the Seal Beach shoreline is within the general San Pedro littoral cell, the net alongshore transport direction along Seal Beach is opposite the net alongshore transport direction along the remainder of the shoreline within the San Pedro cell. The reason for this difference in net transport direction at Seal Beach is due to the construction of navigation structures in both the Los Angeles-Long Beach area and in the Seal Beach area.

SAN PEDRO CELL

The San Pedro cell is naturally bounded by the rocky headland at Point Fermin, on the northwest boundary, and the Newport submarine canyon on the southeast boundary. The major natural sources of sediment into the cell are from the Los Angeles River, the San Gabriel River, and the Santa Ana River. Periodic nourishment along the shorelines of Seal Beach, Surfside-Sunset Beach, and Newport Beach has been an artificial source of sediment into the cell. Other natural sources of sediment are from cliff, dune, and backshore erosion within the cell. A natural sink for sediment leaving the cell is the Newport submarine canyon. Also, deflation of the sand dunes creates sinks in the backshore area. The alongshore transport of sediment could be either in an upcoast or downcoast direction, depending on the wave approach direction toward shore. The predominate alongshore transport direction within the general San Pedro cell is thought to be downcoast. Little is known about the offshore-onshore transport within the cell.

SEAL BEACH

The construction of the Los Angeles-Long Beach breakwaters and the Anaheim Bay breakwaters have modified the wave regimen, and hence the littoral transport regimen, in the Seal Beach and Surfside-Sunset Beach areas. Prior to 1943, the Los Angeles - Long Beach offshore breakwater had not been constructed far enough eastward (downcoast) to affect littoral transport. There was no interruption or diminution of wave action in the Seal Beach area. Sand from San Gabriel River delta deposits and perhaps from the east end of the Alamitos Peninsula area continued to be transported downcoast, building out the coast line. Although some of the sand probably passed around the end of the then existing Anaheim Bay west breakwater, a considerable amount remained at Seal Beach. Construction of the third jetty at the Alamitos Bay entrance in 1944 further limited eastward littoral transport past that point. Subsequent construction of the Long Beach breakwater affected

the pattern of wave refraction in the Seal Beach area. The extension of the Anaheim Bay west breakwater to its present location and alinement caused an upcoast reflected wave.

Indications are that, in general, southerly waves control the shore regimen and tend to cause upcoast movement through out both east and west segments of the Seal Beach shore. The observed counterclockwise rotation of the Seal Beach shore with attendant movement of large quantities of material in an upcoast direction bears out the validity of this conclusion.

A discussion of the littoral conditions of the area was provided in H. Doc. 349/83/2 (pgs. 19 and 20) and is restated as follows:

* * * * * *

LITTORAL DRIFT

25. The direction and rate of movement of littoral material along the shore within the area under investigation was the subject of an extensive analysis reported in detail in appendix 3 to this report. In this analysis, use was made of observed wind and wave data, analytical wave data, and observations of the littoral currents. The analytical data indicated the avenues of approach of the principal wave trains that reach the outer edge of the Continental Shelf between San Pedro and Newport Beach. Estimates were made of the relative amounts of wave work reaching the area through the two open corridors of wave approach to the shore area under consideration, one from the west through Santa Cruz Basin, the other from the south through the Gulf of Santa Catalina. Refraction diagrams were prepared to indicate the direction of wave approach at the shoreline for six characteristic wave trains arriving at the edge of the Continental Shelf. These diagrams also include studies of diffraction around the east end of Long Beach breakwater and reflection off the Anaheim Bay Harbor breakwaters.

26. As a result of the wave studies, the probable predominant direction and the relative rate of movement of littoral material were determined for each shore segment. It was found that because of the sheltering effect of the Long Beach breakwater, the Belmont and Peninsula segments were affected primarily by swell from the south which causes a predominant up-coast movement. It was estimated that the rate of movement diminishes from the Alamitos Bay jetties to-ward Belmont pier. The

amount of wave action reaching the shore area west of Belmont pier was considered negligible. Along the Seal Beach shoreline, the direction of movement of littoral material is difficult to determine because of many factors involved. Diffraction around the end of the offshore breakwater tends to cause westerly waves to approach shore approximately normal to the offshore contours in the vicinity of the Alamitos Bay jetties. Farther to the east and especially in the East Seal Beach segment, diffraction effects due to the offshore breakwater were indicated to be relatively small, but reflection of waves by the west breakwater at Anaheim Bay Harbor apparently tends to offset the effect of the formerly predominant down-coast forces that had been applied by unrestricted westerly waves. This indicates that in general southerly waves control the shore regimen and tend to cause upcoast movement throughout both east and west segments of the Seal Beach shore. The observed counterclockwise rotation of the Seal Beach shore with attendant movement of large quantities of material in an upcoast direction bears out the validity of the analysis.

27. Down coast from Anaheim Bay Harbor, the wave analysis indicated predominant downcoast littoral drift. Because of the effect of the reflection of southerly waves off the east breakwater, exceptionally strong down-coast drift was indicated in the West Surfside segment. The diagrams indicated that moderate downcoast drift should predominate between the middle of Surfside Beach and Santa Ana River. Within the limits of the West Newport segment, the orientation of the shoreline is such that littoral drift in both directions may occur alternately with about equal strength. Between Newport pier and Newport Bay Harbor entrance, downcoast littoral drift may be slightly predominant because the southerly waves come in almost normal to shore. As a result, considerable erosion may be expected in the West Newport segment during prolonged episodes of southerly swell when the up-coast component of wave work in the Newport and Balboa segments is too small to carry sand westward past Newport pier.

* * * * * * *

The Seal Beach area can be considered a subcell of the San Pedro cell (in regards to net transport direction) due to modifications in the wave regimen that resulted from the construction of navigation structures.

BEACH EROSION AND NOURISHMENT

After initial project construction (1959) to 1968, sand has been artificially placed (about 33,000 cu. yds./yr.) on the upcoast and downcoast segments of Seal Beach from sand sources outside of Seal Beach. From 1964 to 1976, sand has been artificially replaced (about 20,000 cu. yds./yr.) from a wide beach area at the upcoast end of Seal Beach, near the mouth of the San Gabriel River, to narrow beach areas on the downcoast ends of each segment. This artificial replacement of sand within the Seal Beach segment was necessary to maintain the dry recreational beach and protect the public parking lots and streets (see figure on pg. 26). A tabulation of artificial nourishment is provided on page 17 of this report.

An artificial nourishment quantity of about 50,000 cubic yards per year (30,000 cu. yds./yr. from sand sources outside the Seal Beach segment and 20,000 cu. yds./yr. from sand replacement within the Seal Beach segment) is a rough estimate for beach nourishment, based on the following:

a. Comparative beach profiles for the years 1958 through 1978 (pls. 5 thru 8).

b. History of artificial placement of sand from sand sources outside of the Seal Beach segment for the years 1959 through 1968.

c. History of artificial replacement of sand from sand sources within the Seal Beach segment for the years 1964 through 1976.

This estimate assumes that artificial nourishment from sources outside the Seal Beach segment would be required in the future, although it has not been required since 1968. A major problem in the comparative beach profile analysis was that the comparative profiles did not close in the offshore area at the seaward boundary used in the analysis. The problem could be caused by insufficient hydrographic survey data beyond the minus 30 foot MLLW depth, or sounding errors in the collection of the survey data. More surveys and studies are required to get an accurate estimate of the amount of artificial nourishment required for Seal Beach.

FUTURE BEACH NOURISHMENT

An artificial nourishment quantity of 30,000 cubic yards per year (based on data taken from 1958 to 1978) is selected for the amount of sand required to maintain Seal Beach. The assumption made here is that sand taken from outside the Seal Beach segment may still be required in the future, but at a smaller quantity (10,000 cu. yds./yr. rather than 30,000 cu. yds./yr.) than was required prior to 1968. This assumption is valid, because sand has not been obtained from outside sand sources since 1968. The 30,000 cubic yards per year for artificial nourishment would be obtained from outside the Seal Beach area (San Gabriel River or offshore sources) and it is expected that this would preclude the need

SUMMARY OF ARTIFICIAL NOURISHMENT *
SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA

Year	Quantity of material (Cu.yds.)	Placement on Seal Beach	Source of material	Contracting agency
1954	800,000	Upcoast and downcoast segments	Long Beach Marina	City of Long Beach
1956	200,000	Downcoast segment	Anaheim Bay Harbor	U.S. Navy
1959	225,000	Upcoast and downcoast segments	San Gabriel River	City of Seal Beach
1964 and 1965	45,000	Downcoast end of upcoast segment	Upcoast end of upcoast segment	Do.
1965 and 1966	8,000	Do.	Do.	
1967 and 1968	70,000	Upcoast and downcoast segments	San Gabriel River	Los Angeles Flood Control District
1969 and 1970	130,000	Downcoast segment	Upcoast end of upcoast segment	City of Seal Beach
1970 and 1971	9,100	Downcoast end of upcoast segment	Do.	Do.
1971 and 1972	33,400	Downcoast end of upcoast segment and upcoast end of downcoast segment	Do.	Do.
1973	8,500	Downcoast end of upcoast segment	Do.	Do.
1974	3,000	Downcoast end of upcoast segment and upcoast end of downcoast segment	Do.	Do.
1975	5,400	Downcoast segment		Do.
1976	1,900	Downcoast end of upcoast segment and upcoast end of downcoast segment	Do.	Do.

* Data based on records from the U.S. Army Corps of Engineers, Los Angeles District, and the City of Seal Beach, Department of Public Works.

for annual replacement of sand from within the beach area. It could be placed at 5-year intervals in the amount of 150,000 cubic yards simultaneously with the artificial nourishment at Surfside-Sunset Beaches. The 150,000 cubic yards at 5-year intervals could be decreased if shoaling occurs at the mouth of the San Gabriel River at a faster rate than historical records indicate, or it could be increased if it does not satisfy the local erosion problem and increased shoaling does not occur at the mouth of the river.

STATEMENT OF THE PROBLEM

The City of Seal Beach is the local sponsor for the Seal Beach segment and is now paying 100 percent of the maintenance costs for sand replenishment. In the adjacent Surfside-Sunset and Newport Beach segments, the local interests are paying 33 percent of the costs for maintenance of their protective measures. The City of Seal Beach stated that it is faced with the same cause of erosion as in the Surfside-Sunset and Newport Beach segments and that the city's cost sharing responsibillity for maintenance of their beach should be the same as that for the downcoast beach segments (app. 1, pg. A-1). The County of Orange has passed a resolution in agreement with the City of Seal Beach (app. 1, pg. A-3).

PRIOR APPORTIONMENT OF COSTS

The apportionment of costs for the Seal Beach segment and for the Surfside-Sunset and Newport Beach segments are not the same because there were different Federal laws applicable to cost apportionment at the time each segment was authorized as a project. These laws controlled the rationale for the recommended plans, local cooperation requirements, and apportionment of costs. The pertinent Federal laws were as follows:

a. Public Law 79-727, August 13, 1946.
b. Public Law 84-826, July 28, 1956.
c. Section 103, Public Law 87-874, October 23, 1962.

The text of these laws has been extracted in part, and is contained in Appendix 2 of this report. Prior to October 1962, the Federal share of the costs for restoration and protection of publicly owned shores was 33 percent; and after October 1962, the Federal share was increased to 50 percent. All remaining work on authorized projects that had not been substantially completed prior to approval of the 1962 act was recomputed on the basis of this new Federal cost sharing criterion, pursuant to section 103, Public Law 87-874, October 23, 1962.

COMPARISON OF APPORTIONMENT OF COSTS

A comparison of the rationale for the apportionment of costs between the Seal Beach segment and the Surfside-Sunset and Newport Beach segments of the authorized project is presented in the subsequent paragraphs.

SEAL BEACH SEGMENT

It was acknowledged in H. Doc. 349/83/2 (reports by both the District Engineer and the Beach Erosion Board of the U.S. Army Corps of Engineers as well as the Chief of Engineers of the U.S. Department of Defense) that erosion of the shore adjacent to Anaheim Bay Harbor was due to a combination of structures and events that modified the local shore regimen. These structures and events were as follows: flood control and water conservation in the tributary drainage areas reduced the volume of natural littoral supply; the offshore breakwater prevented the normal downcoast drift of the littoral contributions of the Los Angeles and San Gabriel Rivers; and the breakwaters of Anaheim Bay Harbor constituted a complete littoral barrier that locally modified the wave pattern and intensified erosion of the shore. No legal precedent had yet been established that the United States was liable for shore damages that occurred as a result of Federally constructed harbor or shoreline structures. However, provision was made for Federal participation in erosion prevention, regardless of the cause of the erosion, under Public Law 79-727, August 13, 1946, in an amount not to exceed 33 percent of the first costs of protective works along shore areas that were owned by the non-Federal public. The costs of project maintenance were to be borne by the non-Federal public. More relevant detail is contained in extracts of H. Doc. 349/83/2 presented in Appendix 2 of this report.

SURFSIDE-SUNSET AND NEWPORT BEACH SEGMENTS

Although the general cost sharing policy for Federal participation was 33 percent pursuant to Public Law 84-826, July 28, 1956, a justification to investigate the reallocation of cost sharing was provided by Section 112, Public Law 85-500, July 3, 1958. This law is stated, in part, as follows:

* * * * * * *

> Sec. 112. The Secretary of the Army is hereby authorized and directed to cause surveys to be made at the following named localities and subject to all applicable provisions of section 110 of the River and Harbor Act of 1950: * * *
>
> Anaheim Bay, California, with a view to determining the extent of Federal aid which should be granted in equity without regard to limitations of Federal law applicable to beach erosion control.

* * * * * * *

The resulting equity study of the District Engineer of the U.S. Army Corps of Engineers addressed the structures that caused erosion of the shoreline in Orange County, their relative effects on the beaches, and the purposes for which they were built. These structures were the same flood control features, offshore breakwaters, and Anaheim Bay breakwaters that were first discussed in H. Doc. 349/83/2. The Beach Erosion Board of the U.S. Army Corps of Engineers (in concurrence with the Chief of Engineers of the U.S. Army Corps of Engineers) concluded that construction of any one of the groups of improvements alone would have created about the same degree of shoreline erosion and that each of these causes of erosion was of equal importance. The Beach Erosion Board recomputed the extent of Federal aid in equity to be 67 percent instead of the 61 percent computed by the District Engineer. The Bureau of the Budget of the Executive Office of the President (in concurrence with the Secretary of the Army of the U.S. Department of the Army), concurred with the Beach Erosion Board's recommendation for 67 percent Federal participation; however, they based it upon the installation of the Anaheim Bay breakwaters by the Navy as wartime measures under which there was no opportunity for adequate technical consideration of adverse effects and in which it was not possible to obtain review and concurrence by local interests. The beach erosion problem at Seal Beach was thought, at the time, to be solved. More relevant detail is contained in extracts of H. Doc. 602/87/2 and is provided in Appendix 2 of this report.

ESTIMATE OF BEACH NOURISHMENT COSTS

The estimated beach nourishment costs for Seal Beach are based on a 5-year replenishment plan. Unit prices were estimated through analysis of bid abstracts for previous similar jobs and adjusted to 1979. A summary of the estimated costs is shown below:

a.	Beach replenishment at 5-year intervals:	
	(1) 150,000 cu. yds. @ $2.00 per cu. yd. .	$300,000
	(2) Contingencies (20 percent)	60,000
		$360,000
b.	Engineering and design (plans & specifications) @ 8 percent	28,800
		$388,800
c.	Supervision and administrative @ 5.95 percent	23,100
		$411,900

This estimate excludes $70,000 for preauthorization studies. The Federal investment would be $276,000 (67 percent of $411,900) and the non-Federal investment would be $135,900 (33 percent of $411,900), assuming the same cost apportionment as used for the adjacent Surfside-Sunset and Newport Beach segments.

ESTIMATE OF ANNUAL CHARGES

The estimated annual charges for beach nourishment reflect interest on the project cost (beach nourishment at 5-year intervals) at an annual rate of 7 1/8 percent and amortization of the total investment in 50 years and 100 years. The method of computation was to discount each of the beach nourishment costs during the amortization period back to a present worth value, add it to the intial cost, and then determine the annual cost by applying the appropriate capital recovery factor. Estimates of annual charges for 50 years and for 100 years are shown below:

a. Amortization period of 50 years:

(1)	Federal investment	$276,000
	(a) Present worth value:	
	$276,000 x 3.27933 *	$905,100
	(b) Annual charges:	
	$905,100 x 0.073607 **	$66,600
(2)	Non-Federal investment	$135,900
	(a) Present worth value:	
	$135,900 x 3.27932 *	$445,700
	(b) Annual charges:	
	$445,700 x 0.073607 **	$32,800
(3)	Total annual charges:	
	(a) Federal	$66,600
	(b) Non-Federal	$32,800
		$99,400

b. Amortization period of 100 years:

(1)	Federal investment	$276,000
	(a) Present worth value:	
	$276,000 x 3.38579 ***	$934,500
	(b) Annual charges:	
	$934,500 x 0.071323 ****	$66,700
(2)	Non-Federal investment	$135,900
	(a) Present worth value	
	$135,900 x 3.38579 ***	$460,100
	(b) Annual charges:	
	$460,100 x 0.071323 ****	$32,800
(3)	Total annual charges:	
	(a) Federal	$66,700
	(b) Non-Federal	$32,800
		$99,500

Thus, the estimated annual charge over a 50 year period is $99,400 and over a 100 year period is $99,500 at an interest rate of 7 1/8 percent.

* Present worth factor for costs accruing at 5-year intervals, including the intitial cost, at an interest rate of 7 1/8 percent and amortization period of 50 years.

** Capital recovery factor, uniform annual series, at an interest rate of 7 1/8 percent and amortization period of 50 years.

*** Present worth factor for costs accruing at 5-year intervals, including the initial cost, at an interest rate of 7 1/8 percent and amortization period of 100 years.

**** Capital recovery factor, uniform annual series, at an interest rate of 7 1/8 percent and amortization period of 100 years.

FEDERAL INTERESTS

Tangible benefits that accrue from the Seal Beach project are derived from prevention of the loss of public and private land, public and private improvements, and public recreational beach. An average of about 690,000 persons per year is the estimated present beach use for Seal Beach. The estimate is based on attendance records from 1974 through 1978, which were provided by the City of Seal Beach, Department of Public Works. Large intangible benefits, not susceptible to monetary evaluation, also result from the project at Seal Beach. These intangible benefits are from the prevention of the loss of a healthful recreational area that is widely used during the summer months, contiguous business expansion and related community growth, and the general wealth of the area that results in higher assessed values and increased tax revenues. Prevention of damages to property and of loss of recreational beach is deemed a national interest. Continued periodic nourishment and maintenance of Seal Beach would assure the accrual of both tangible and intangible benefits.

COORDINATION

Coordination has been maintained with representatives from the City of Seal Beach throughout the study in the form of meetings and telephone contacts with city officials.

CONCLUSIONS

The conclusions, based on the review of H. Doc. 349/83/2, March 10, 1954, and H. Doc. 602/87/2, October 2, 1962, and the analysis in this report, are as follows:

a. The Seal Beach segment and the Surfside-Sunset and Newport Beach segments of the southern California coastline are part of the same general littoral cell, known as the San Pedro Cell, and the same tributary drainage area. The littoral transport regimen along the City of Seal Beach and the Surfside-Sunset Beach areas have been modified by the construction of navigation structures.

b. The shoreline erosion problems at Seal Beach and at Surfside-Sunset Beach stem from the same causes: namely, flood control and water conservation in the tributary drainage areas and navigation improvements in upper Orange County, California.

c. The selected sand requirement of 30,000 cubic yards per year (based on data taken from 1958 to 1978) for periodic nourishment is more than was originally estimated. An estimate of 10,000 cubic yards per year for annual periodic maintenance was given in H. Doc. 349/83/2. The estimated 30,000 cubic yards per year would insure accrual of both tangible and intangible benefits at Seal Beach, Orange County, California.

RECOMMENDATIONS

The recommendations for consideration by Congress are as follows:

That, in equity, the Federal Government provide Federal funds in the amount of 67 percent of the costs of periodic nourishment and maintenance for protection of the Seal Beach, Orange County, California, shoreline; such costs are estimated to be $99,400 per year based on an annual interest rate of 7 1/8 percent and on amortization period of 50 years.

That periodic artificial nourishment for Seal Beach be accomplished at the same time as for Surfside-Sunset whenever possible, since they are adjacent areas and had been included together in the originally authorized project.

That local cooperation requirements comprise the following:

a. Provide 33 percent of the costs of periodic nourishment and maintenance for protection of Seal Beach, Orange County, California;

b. Provide at their own expense all necessary lands, easements, and rights-of-way;

c. Hold and save the United States free from all claims for damages which may arise before, during, or after prosecution of work;

d. Furnish assurances satisfactory to the Secretary of the Army that they will:

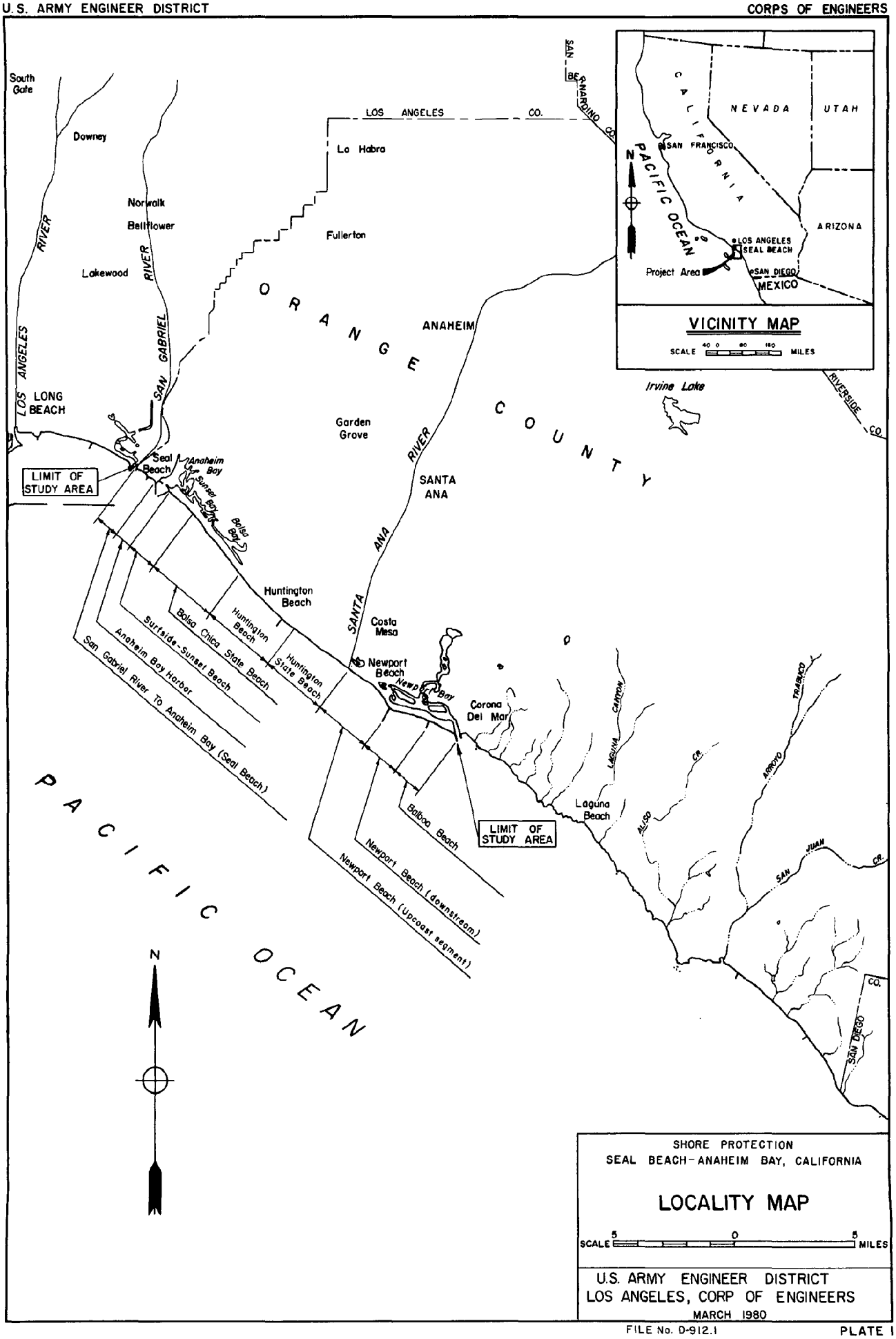
(1) Maintain the protective measures and provide periodic nourishment of the protective beach during their economic life as may be required to serve their intended purpose with Federal assistance as recommended herein;

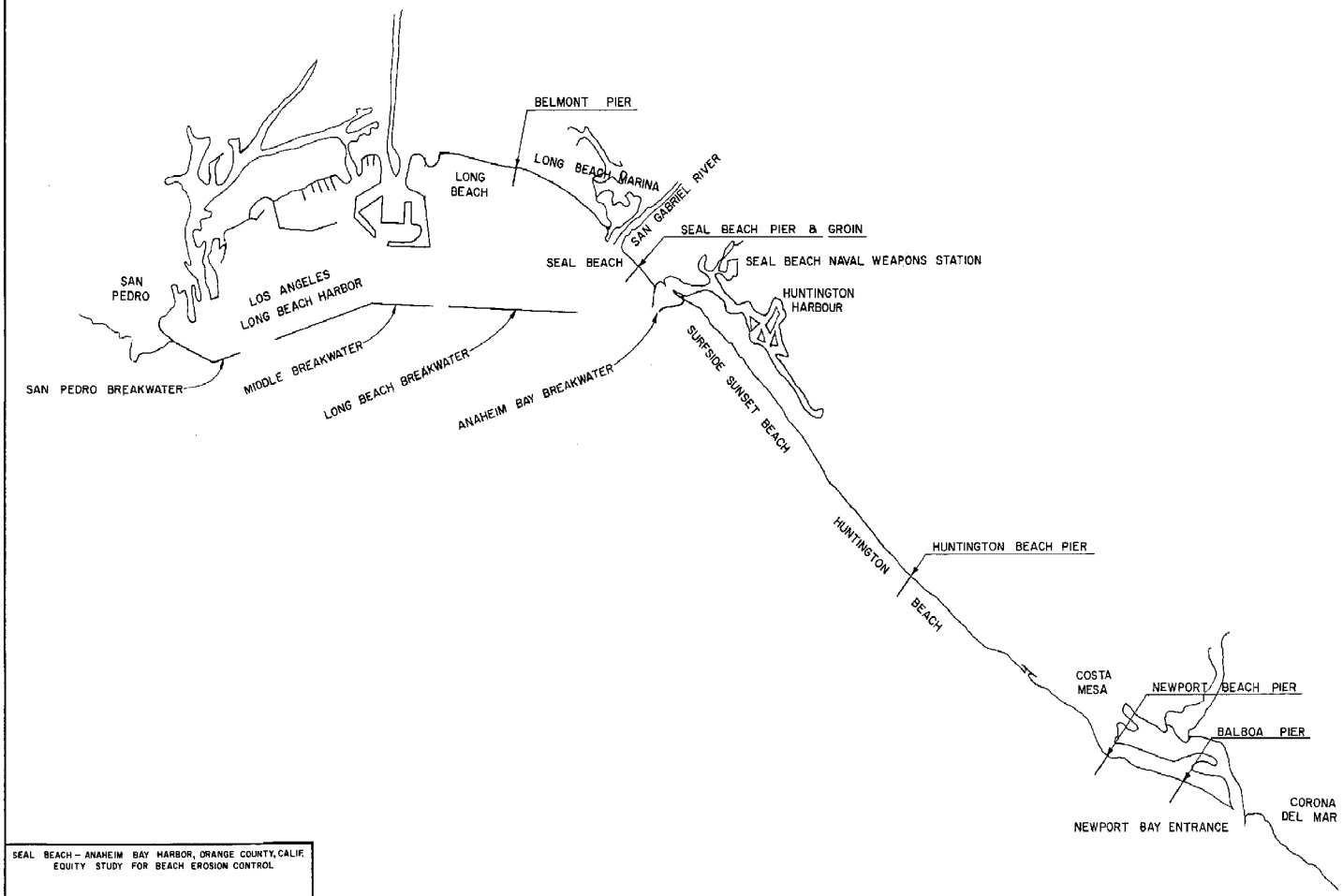
(2) Control water pollution to the extent necessary to safeguard the health of bathers; and

(3) Maintain continued public ownership of the shores and their administration for public use during the economic life of the project.

GWYNN A. TEAGUE
COL, CE
District Engineer

Seal Beach ocean front - looking west from Naval Weapons Station - showing sand dike crest placed by the City of Seal Beach. (Aug. 12, 1969, 3 p. m., low tide.)


South Gate
Downey
Norwalk
Bellflower
Lakewood
LOS ANGELES RIVER
SAN GABRIEL RIVER
LONG BEACH
LOS ANGELES CO.
SAN BERNARDINO CO.
La Habra
Fullerton
ORANGE COUNTY
ANAHEIM
Garden Grove
SANTA ANA RIVER
SANTA ANA
Irvine Lake
RIVERSIDE CO.
LIMIT OF STUDY AREA
Seal Beach
Anaheim Bay
Sunset Bay
Bolsa Bay
Huntington Beach
Huntington Beach
Huntington State Beach
Bolsa Chica State Beach
Surfside-Sunset Beach
Anaheim Bay Harbor
San Gabriel River To Anaheim Bay (Seal Beach)
Costa Mesa
Newport Beach
Newport Bay
Corona Del Mar
Laguna Canyon
Laguna Beach
Aliso Cr.
Arroyo Trabuco
San Juan Cr.
San Diego Co.
Balboa Beach
Newport Beach (downstream)
Newport Beach (Upcoast segment)
LIMIT OF STUDY AREA
PACIFIC OCEAN
N
CALIFORNIA
NEVADA
UTAH
ARIZONA
MEXICO
SAN FRANCISCO
LOS ANGELES
SEAL BEACH
SAN DIEGO
Project Area
VICINITY MAP
SCALE 40 0 80 160 MILES
SHORE PROTECTION
SEAL BEACH-ANAHEIM BAY, CALIFORNIA
LOCALITY MAP
SCALE 5 0 5 MILES
U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORP OF ENGINEERS
MARCH 1980



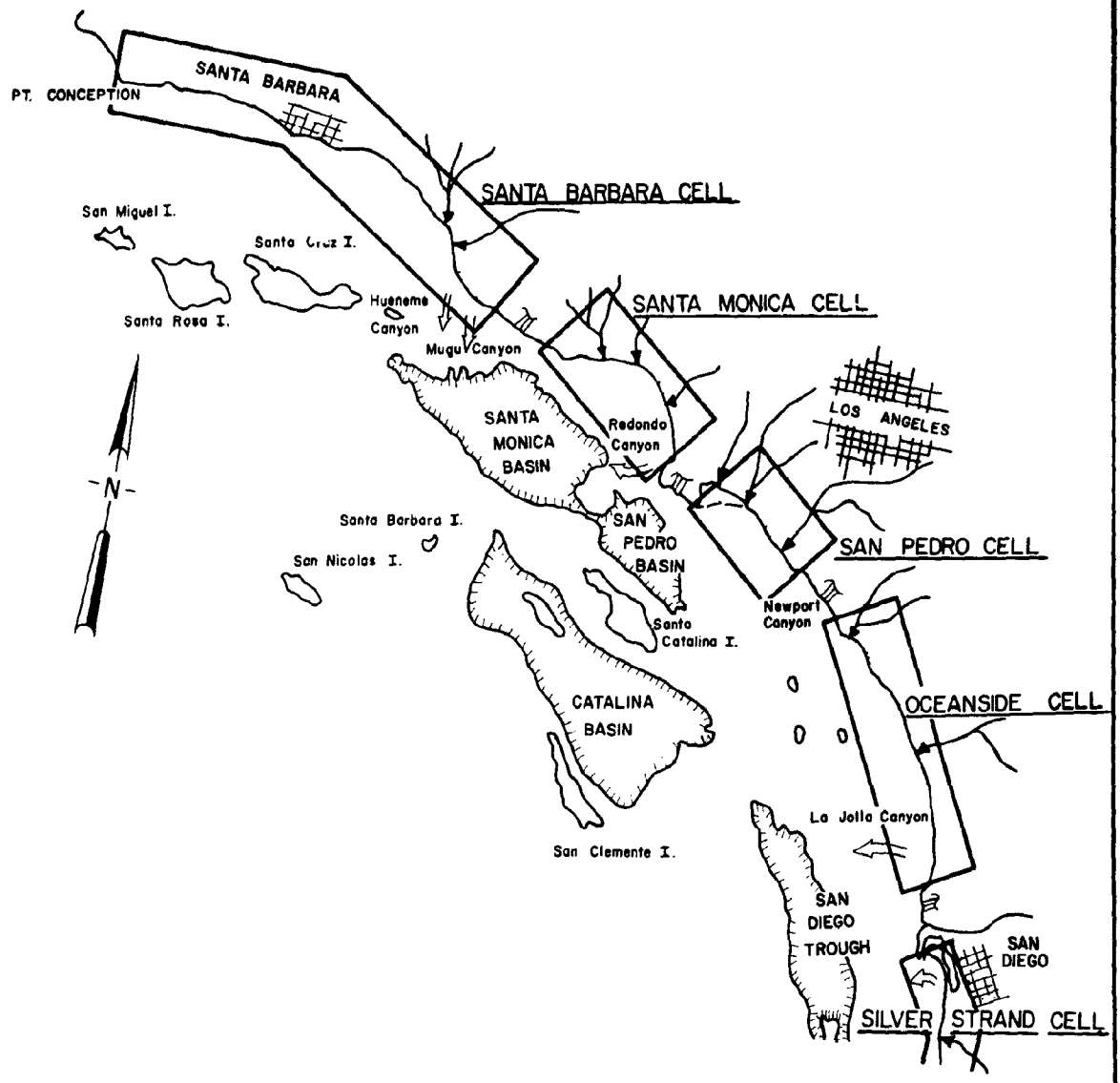
SEAL BEACH – ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIF.
EQUITY STUDY FOR BEACH EROSION CONTROL

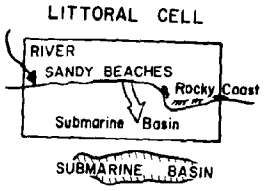
DESCRIPTION MAP

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

DATE: MARCH 1980

PLATE 2





NOTE: Based on Progress Report No. 3 on Sediment Management for Southern California Mountains, Coastal Plains and Shoreline (EQL Open File Report No. 77-8), November 1977. By Environmental Quality Laboratory California Institute of Technology and Shore Processes Laboratory Scripps Institution of Oceanography.

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE CO., CALIF.
EQUITY STUDY FOR BEACH EROSION CONTROL

LITTORAL CELLS IN SOUTHERN CALIFORNIA

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

MARCH 1980

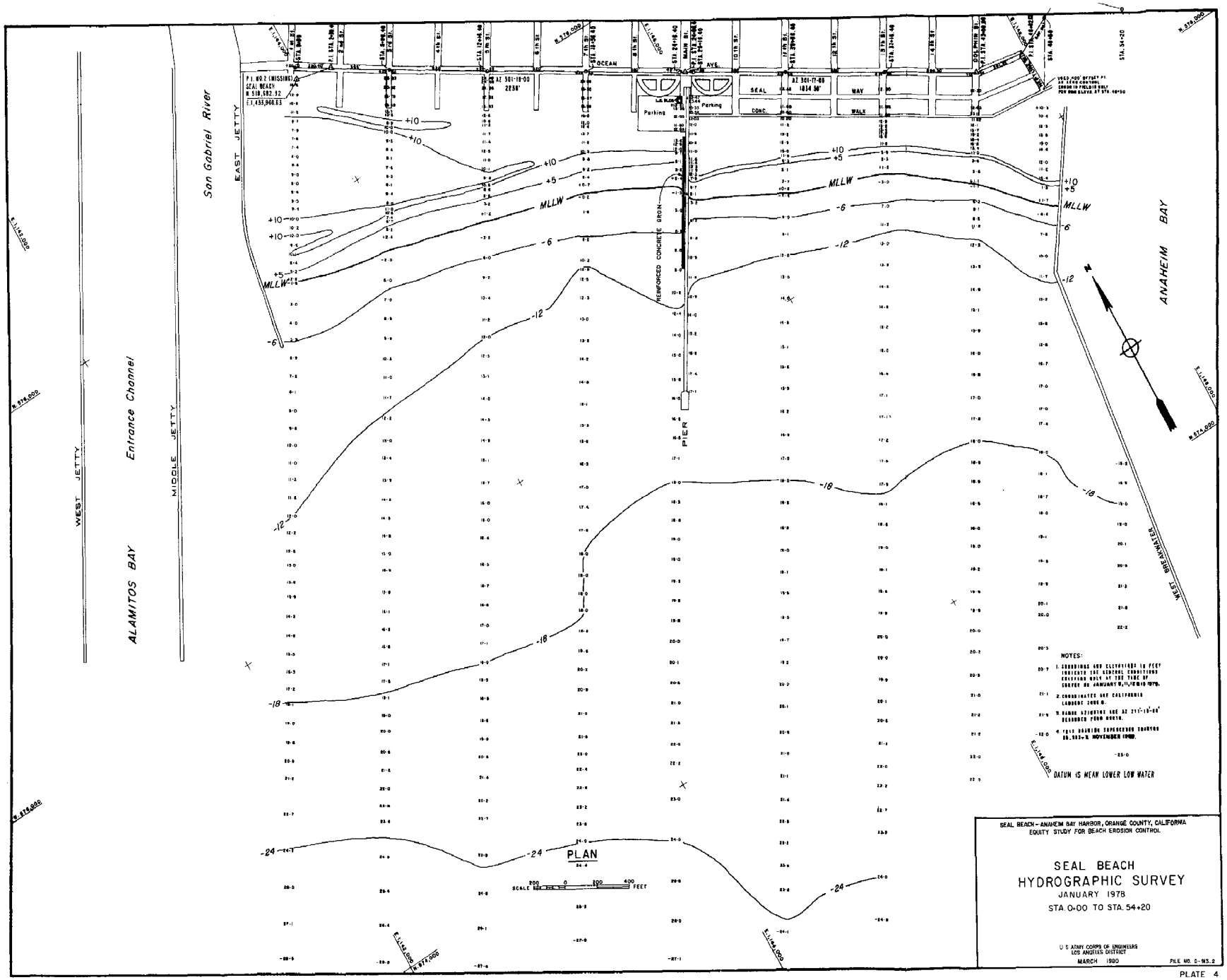
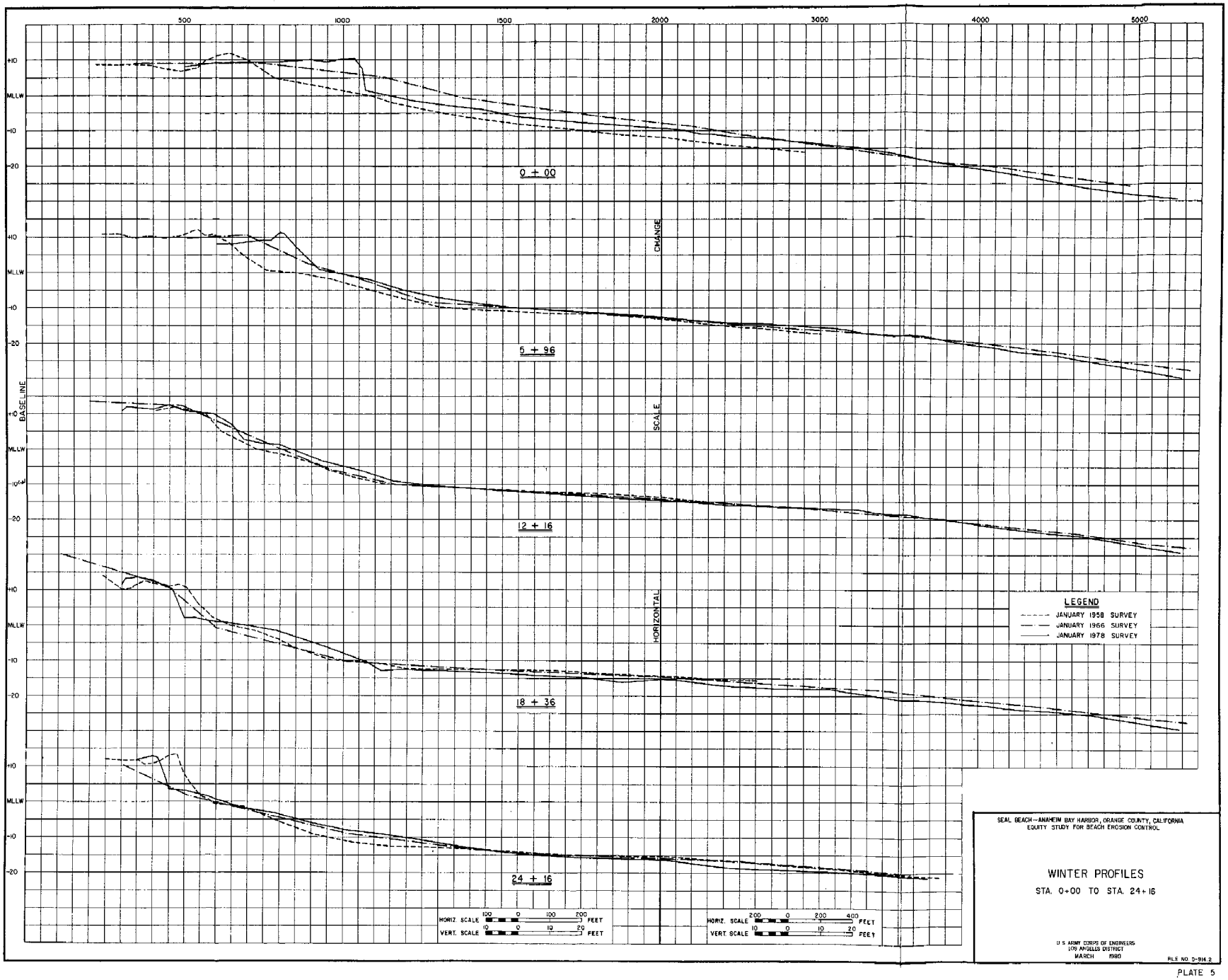

San Gabriel River
EAST JETTY
WEST JETTY
MIDDLE JETTY
Entrance Channel
ALAMITOS BAY
ANAHEIM BAY
WEST BREAKWATER
OCEAN AVE.
SEAL WAY
CONC. WALK
Parking
REINFORCED CONCRETE GRON
PIER
MLLW
+10
+5
-6
-12
-18
-24
PLAN
SCALE 200 0 200 400 FEET
NOTES:
DATUM IS MEAN LOWER LOW WATER
SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL
SEAL BEACH
HYDROGRAPHIC SURVEY
JANUARY 1978
STA. 0+00 TO STA. 54+20
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
MARCH 1980
FILE NO. D-913.2

PLATE 4



SEAL BEACH–ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL

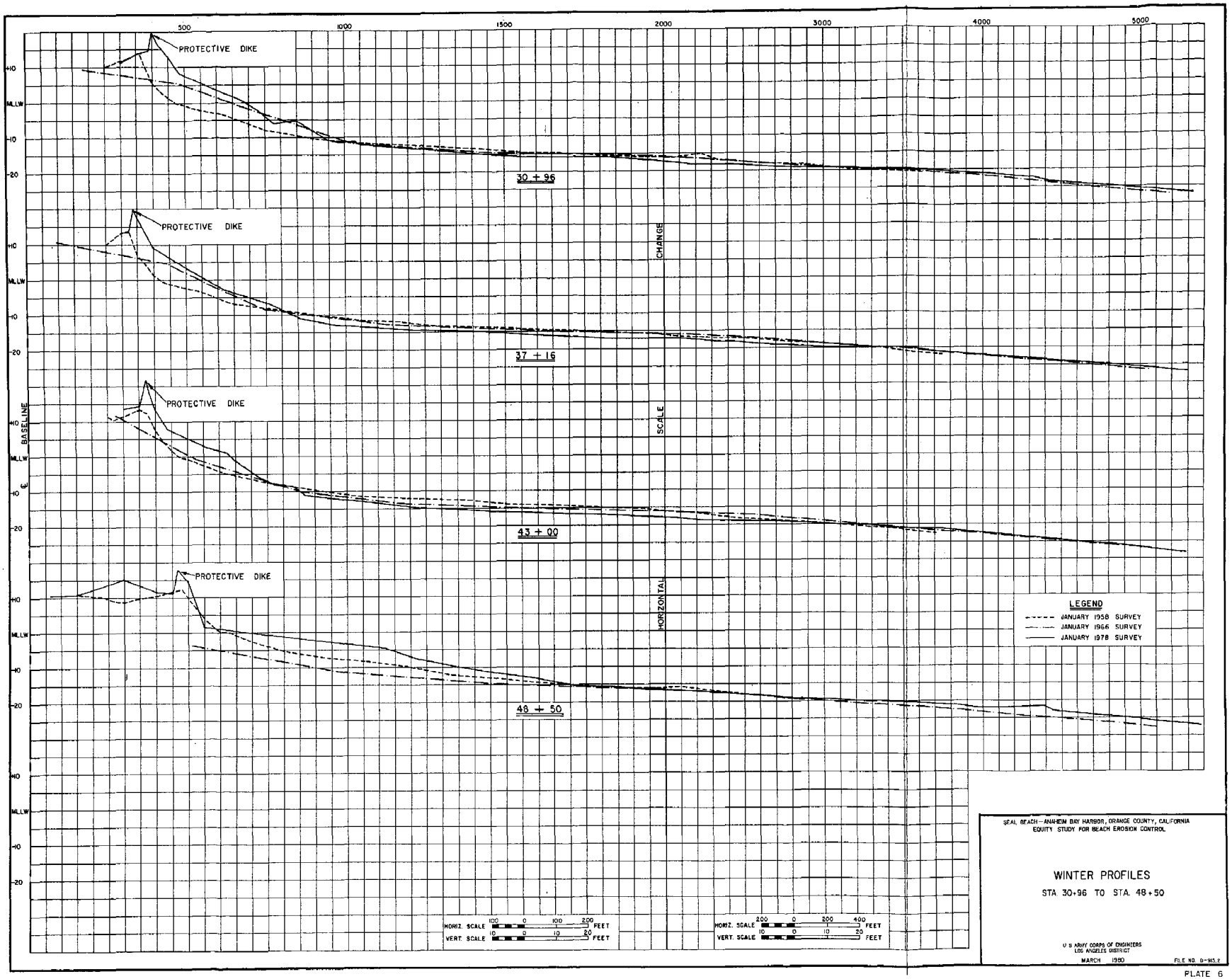
WINTER PROFILES

STA. 0+00 TO STA. 24+16

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
MARCH 1980

FILE NO. D-914.2

PLATE 5



SEAL BEACH—ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL

WINTER PROFILES

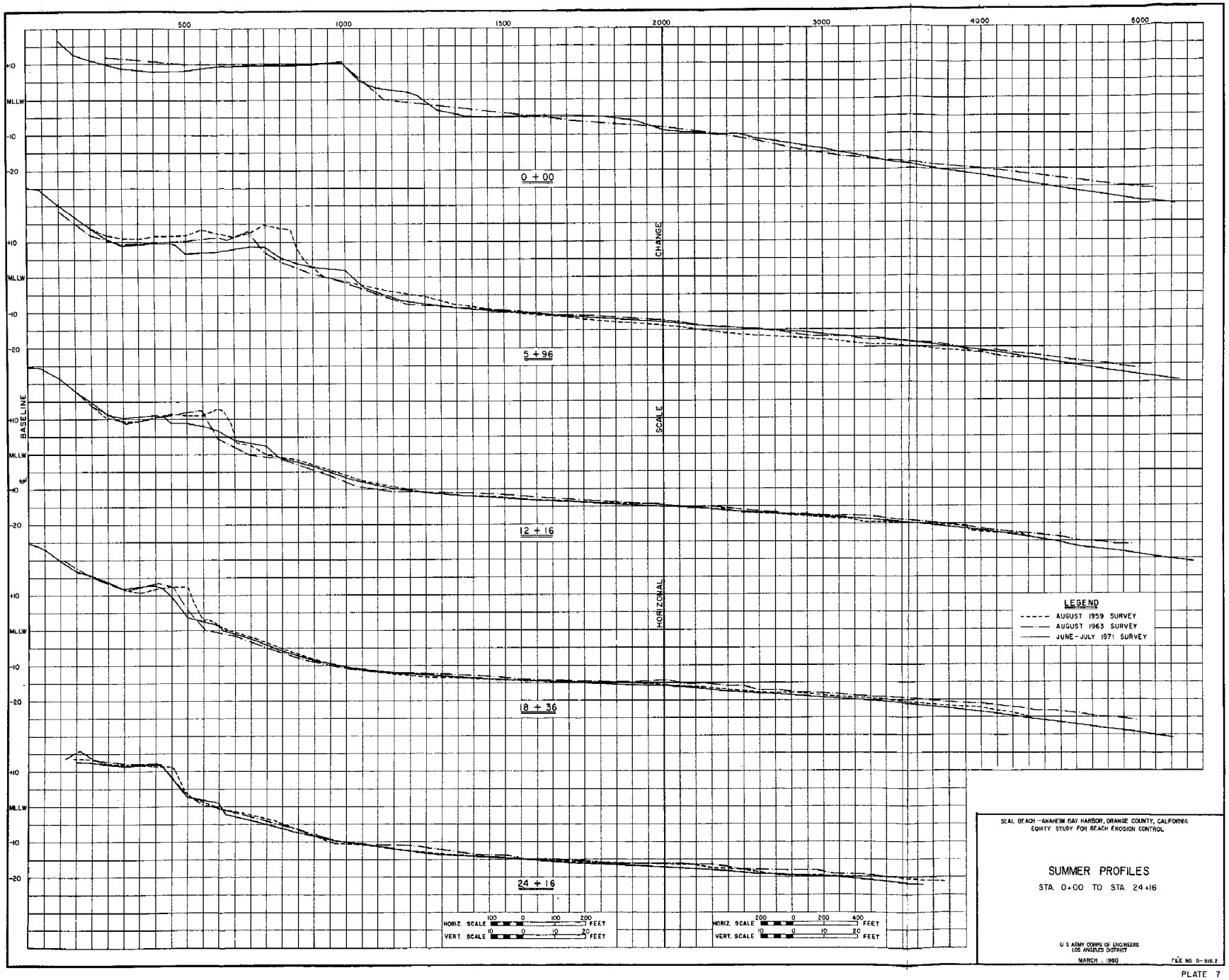
STA 30+96 TO STA. 48+50

U S ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

MARCH 1980

FILE NO. D-965.2

PLATE 6



SEAL BEACH – ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL

SUMMER PROFILES

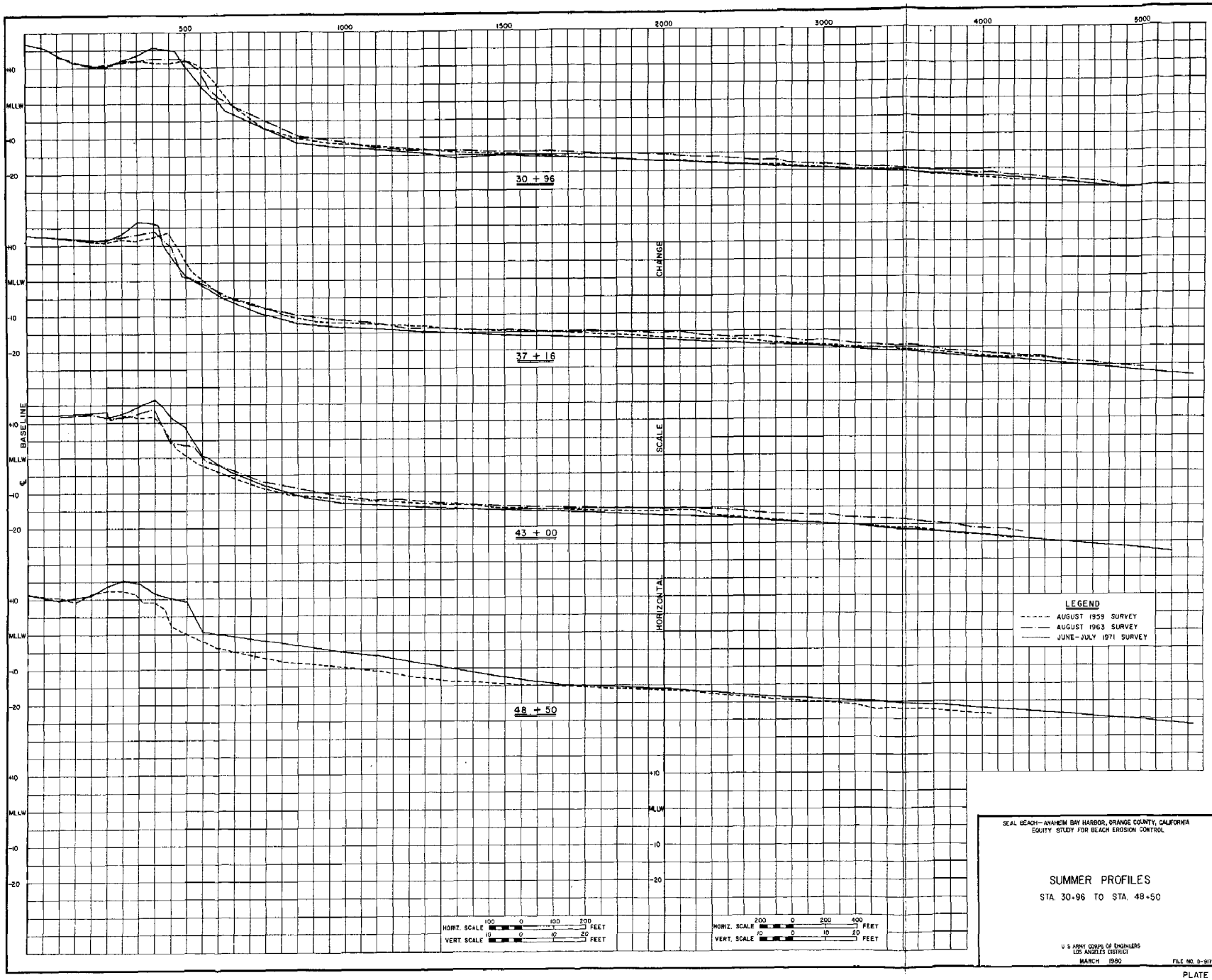
STA. 0+00 TO STA. 24+16

U S ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

MARCH , 1980

FILE NO. D-910.2

PLATE 7



SEAL BEACH—ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL

SUMMER PROFILES

STA. 30+96 TO STA. 48+50

U S ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

MARCH 1980

FILE NO. D-917.2

PLATE 8

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY
CALIFORNIA

EQUITY STUDY
FOR BEACH EROSION CONTROL

APPENDIX 1

COMMENTS OF OTHER AGENCIES

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY
CALIFORNIA

EQUITY STUDY
FOR BEACH EROSION CONTROL

COMMENTS OF OTHER AGENCIES

TABLE OF CONTENTS

Page

COMMENTS OF:
The City of Seal Beach, July 23, 1971.....A-1
The County of Orange (Resolution), March 6, 1973.....A-3
The City of Seal Beach .....
The County of Orange .....
The State of California Resources Agency.....

July 23, 1971

The Honorable Craig Hosmer
Member of Congress, 32nd District
The House of Representatives
Washington, D. C. 20515

Dear Congressman Hosmer:

The City of Seal Beach has, over a period of years, been confronted with continuing problems related to beach erosion and the costly remedy of sand replenishment.

Our records indicate, and my own discussion with Orange County Supervisor David Baker and Director of Harbors and Beaches Kenneth Sampson, indicate that you are generally aware of these problems. Assuming that, I will not attempt to cover the history, but merely summarize our problems and respectfully request your assistance in affecting a solution.

First, the City of Seal Beach has been paying one-hundred per cent (100%) of the cost of sand replenishment along the shoreline for some years. In 1970 the city expended $65,553 for 130,000 cubic yards of sand. Originally the Corps of Engineers studies indicated that the sand replenishment would be approximately 10,000 cubic yards per year. This estimate was based on the Corps of Engineers' study related to the effects on the shoreline after certain jettys and groins were constructed in this area.

Secondly, it is our understanding that beach areas adjacent to Seal Beach receive federal financial assistance for sand replenishment. The most recent example of such a project is at Surfside beach which is immediately to the south of Seal Beach.

It is our position that the City of Seal Beach is faced with beach erosion problems similar to other areas, but receives no federal financial assistance as do other similar jurisdictions.

The amount of money expended by Seal Beach for sand replenishment in 1970 was a significant amount in terms of a small community's budget, and, in addition, we are observing significant beach erosion problems again this year.

We have discussed this problem with Orange County Supervisor David Baker, Mr. Kenneth Sampson, and representatives of the Corps of Engineers. All of these people agree that Seal Beach is not receiving federal financial assistance as do other jurisdictions, an that our only remedy is to request special legislation which would p vide for the federal government to reimburse the City in the amount of money, $65,553., for sand replenishment in 1970.

I am hopeful that you will agree with our position and respectfully request that your office introduce the appropriate legislation which would reimburse the City of Seal Beach the extraordinary amount of money it cost us for sand replenishment along the beach in 1970.

We will be pleased to provide you with any other data or material which you may require, or meet with you or your representative to di: cuss the total problem.

Thank you for your consideration.

Very truly yours,

THE CITY OF SEAL BEACH

H. K. Holden

H. K. Holden
Mayor

Copy to:
David Baker, Board of Supervisors
Kenneth Sampson, Director of Beaches and Harbors
Charles H. Fischer, Chief, Coastal Engineering Branch, Army Engineers

RESOLUTION OF THE BOARD OF SUPERVISORS OF

ORANGE COUNTY, CALIFORNIA

March 6, 1973

On motion of Supervisor Baker, duly seconded and carried, the following Resolution was adopted:

WHEREAS, the City of Seal Beach is required to pay the total cost of sand replenishment on its beaches; and

WHEREAS, other coastal areas of this County suffering beach erosion problems receive aid on the basis of 67% federal share and 16 1/2% State share; and

WHEREAS, citizens of Seal Beach bear the entire cost of sand replenishment;

NOW, THEREFORE, BE IT RESOLVED that this Board does hereby request the Congress of the United States to enact legislation providing for the federal government and the State sharing in the cost of sand replenishment for the City of Seal Beach in the same manner as other coastal areas receive aid.

BE IT FURTHER RESOLVED that copies of this Resolution be forwarded to Senators Alan Cranston and John Tunney and to Representatives Charles E. Wiggins, Craig Hosmer, Richard T. Hanna, Andrew J. Hinshaw, Delwin M. Clawson, and Clair W. Burgener.

/

/

AYES: SUPERVISORS DAVID L. BAKER, RONALD W. CASPERS, RALPH A. DIEDRICH, AND RALPH B. CLARK

NOES: SUPERVISORS NONE

ABSENT: SUPERVISORS R. W. BATTIN

RECEIVED 3-9-73 CITY CLERK

STATE OF CALIFORNIA)
) ss.
COUNTY OF ORANGE)

I, WILLIAM E. ST JOHN, County Clerk and ex-officio Clerk of the Board of Supervisors of Orange County, California, hereby certify that the above and foregoing Resolution was duly and regularly adopted by the said Board at a regular meeting thereof held on the 6th day of March, 1973, and passed by a unanimous vote of said Board members present.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 6th day of March, 1973.

WILLIAM E. ST JOHN
County Clerk and ex-officio Clerk
of the Board of Supervisors of
Orange County, California

By June Alexander
Deputy

Resolution No. 73-236
Proposed legisation re
reimbursement of beach
erosion costs--Seal Beach

CHP:lb
F0192-32

OFFICE OF COUNTY COUNSEL ORANGE COUNTY

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY

CALIFORNIA

EQUITY STUDY

FOR BEACH EROSION CONTROL

APPENDIX 2

EXTRACT OF TEXT FROM PERTINENT FEDERAL

LAWS, H. DOC. 349/83/2, AND

H. DOC. 602/87/2

SEAL BEACH - ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA

EQUITY STUDY

FOR BEACH EROSION CONTROL

APPENDIX 2

TABLE OF CONTENTS

Item	Page
SCOPE	A2-1
PERTINENT FEDERAL LAWS ON APPORTIONMENT OF COSTS	A2-2
PUBLIC LAW 79-727, AUGUST 13, 1946	A2-2
PUBLIC LAW 84-826, JULY 28, 1956	A2-3
SECTION 103, PUBLIC LAW 87-874, OCTOBER 23, 1962	A2-4
HOUSE DOCUMENT 349, 83d CONGRESS, 2d SESSION	A2-5
SECRETARY OF THE ARMY	A2-5
BUREAU OF THE BUDGET	A2-6
CHIEF OF ENGINEERS	A2-7
BEACH EROSION BOARD	A2-10
DISTRICT ENGINEER	A2-12
HOUSE DOCUMENT 602, 87th CONGRESS, 2d SESSION	A2-14
SECRETARY OF THE ARMY	A2-15
BUREAU OF THE BUDGET	A2-16
CHIEF OF ENGINEERS	A2-18
BEACH EROSION BOARD	A2-19
DISTRICT ENGINEER	A2-21

SEAL BEACH-ANAHEIM BAY HARBOR, ORANGE COUNTY, CALIFORNIA
EQUITY STUDY FOR BEACH EROSION CONTROL

SCOPE

This appendix is an extract of the pertinent Federal laws that control the rationale for the recommended plans, local cooperation requirements and apportionment of costs for the Seal Beach and the Surfside-Sunset and Newport Beach Federal projects. Extracts of the reports by the:

a. Secretary of the Army,

b. Bureau of the Budget,

c. Chief of Engineers,

d. Beach Erosion Board,

e. District Engineer,

as presented in both H. Doc. 349/82/2 and H. Doc. 602/87/2, are provided in this appendix.

PERTINENT FEDERAL LAWS ON APPORTIONMENT OF COSTS

The Act approved August 13, 1946 (Public Law 727, 79th Cong.), as amended by the Act approved July 28, 1956 (Public Law 826, 84th Cong.), and further amended by section 103 of the River and Harbor Act of October 23, 1962 (Public Law 87-874, Stat. 1178-1179), provides the basic authority for Federal aid toward shore restoration and protection. The pertinent text of these acts are stated in the subsequent paragraphs:

PUBLIC LAW 79-727, AUGUST 13, 1946

This act reads, in part, as follows:

* * * * * * *

Sec. 1. That with the purpose of preventing damage to public property and promoting and encouraging the healthful recreation of the people, it is hereby declared to be the policy of the United States to assist in the construction, but not the maintenance, of works for the improvement and protection against erosion by waves and currents of the shores of the United States that are owned by States, municipalities, or other political subdivisions: Provided, That the Federal contribution toward the construction of protective works shall not in any case exceed one-third of the total cost: Provided further, That where a political subdivision has heretofore erected a sea wall to prevent erosion, by waves and currents, to a public highway considered by the Chief of Engineers sufficiently important to justify protection, Federal contribution toward the repair of such wall and the protection thereof by the building of an artificial beach is authorized at not to exceed one-third of the original cost of such wall, and that investigations and studies hereinafter provided for are hereby authorized for such localities: Provided further, That the plan for protection shall have been specifically adopted and authorized by Congress after investigation and study by the Beach Erosion Board under the provisions of section 2 of the River and Harbor Act approved July 3, 1930, as amended and supplemented.

Sec. 2. When the Chief of Engineers shall find that any such project has been constructed in accordance with the authorized plans and specifications he shall cause to be paid to the State, municipality, or political subdivision the amount authorized by Congress.

Sec. 3. The Chief of Engineers may, in his discretion, from time to time, make payments on such construction as the work progresses, but these payments, including previous payments, if any, shall not be more than the United States pro rata part of the value of the labor and materials which have been actually put into such construction in conformity to said plans and specifications: Provided, That the construction of improvement and protective works may be undertaken by the Chief of Engineers upon the request of, and contribution of required funds by, the interested State, municipality or other political subdivision.

Sec. 4. As used in this Act, the word "shores" includes all the shore lines of the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and lakes, estuaries and bays directly connected therewith.

* * * * * * *

PUBLIC LAW 84-826, JULY 28, 1956

This Act reads, in part, as follows:

* * * * * * *

The Act entitled "An Act authorizing Federal participation in the cost of protecting the shores of public owned property", approved August 13, 1946, is hereby amended to read as follows: "That (a) with the purpose of preventing damage to the shores of the United States, its territories and possessions and promoting and encouraging the healthful recreation of the people, it is hereby declared to be the policy of the United States, subject to the following provisions of this Act to assist in the construction, but not the maintenance, of works for the restoration and protection against erosion, by waves and currents, of the shores of the United States, its territories and possessions.

"(b) The Federal contribution in the case of any project referred to in subsection (a) shall not exceed one-third of the cost of the project, and the remainder shall be paid by the State, municipality, or other political subdivision in which the project is located.

"(c) When in the opinion of the Chief of Engineers the most suitable and economical remedial measures would be provided by periodic beach nourishment, the term 'construction' may be construed for the purposes of this Act to include the deposit of sand fill at suitable intervals of time to furnish sand supply to project shores for a length of time specified by the Chief of Engineers.

* * * * * * *

SECTION 103, PUBLIC LAW 87-874, OCTOBER 23, 1962

This Act reads, in part, as follows:

* * * * * * *

(a) The Act approved August 13, 1946, as amended by the Act approved July 28, 1956 (33 U.S.C. 426e-h), pertaining to shore protection, is hereby further amended as follows:

(1) the word "one-third" in section 1(b) is deleted and the word "one-half" is substituted therefor;

(2) the following is added after the word "located" in section 1(b): "except that the costs be allocated to the restoration and protection of Federal property shall be borne fully by the Federal Government, and, further, that Federal participation in the cost of a project for restoration and protection of State, county, and other publicly owned shore parks and conservation area may be, in the discretion of the Chief of Engineers, not more than 70 percent per centum of the total cost exclusive of land costs, when such areas: Include a zone which excludes permanent human habitation; include but are not limited to recreational beaches; satisfy adequate criteria for conservation and development of the natural resources of the environment; extend landward a sufficient distance to include, where appropriate, protective dunes, bluffs, or other natural features which serve to protect the uplands from damage; and provide essentially full park facilities for appropriate public use, all of which meet with the approval of the Chief of Engineers";

***(b) The cost-sharing provisions of this Act shall apply in determining the amounts of Federal participation in or payments toward the costs of authorized projects which have not been substantially

completed prior to the date of approval of this Act, and the Chief of Engineers, is authorized and directed to recompute the amounts of Federal participation toward the costs of such projects accordingly.

* * * * * * *

Prior to October 1962, the Federal share of the costs for restoration and protection of publicly owned shores was 33 percent; and after October 1962, the Federal share was increased to 50 percent. All remaining work on authorized projects that had not been substantially completed prior to approval of the 1962 act was recomputed on the basis of this new Federal cost sharing criterion under section 103, Public Law 87-874, October 23, 1962.

HOUSE DOCUMENT 349, 83d CONGRESS, 2d SESSION

This document provided for about 33 percent Federal participation in the first costs of constructing measures for restoration and protection of publicly owned parts of the shores in Orange County, California, extending from the San Gabriel River to Los Patos Avenue (now Warner Ave.) in Sunset Beach. For clarity, the recommended plan and local cooperation requirements are extracted from the following reports contained in H. Doc. 349/83/2: the U.S. Department of the Army, Secretary of the Army; the Executive Office of the President, Bureau of the Budget; the U.S. Department of the Army, Office of the Chief of Engineers; the U.S. Army Corps of Engineers, Beach Erosion Board; and the U.S. Army Corps of Engineers, Los Angeles District. Information pertinent to the 1954 authorized project is provided in the subsequent paragraphs.

SECRETARY OF THE ARMY

The report of the Secretary of the Army is stated (pg. VII, H. Doc. 349/83/2), in part, as follows:

* * * * * * *

DEAR MR. SPEAKER; I am transmitting herewith a report dated November 30, 1953, from the Chief of Engineers, United States Army, together with accompanying papers and an illustration, on a preliminary examination and survey of the harbor at Anaheim Bay, Calif., with a view to shore protection, authorized by the River and Harbor Act approved on July 24, 1946.

In accordance with section 1 of Public Law 14, 79th Congress, the views of the State of California and the Department of the Interior are set forth in the enclosed communications, together with the reply of the Chief of Engineers to the State of California.

Although the Bureau of the Budget advises that there is no objection to the submission of the report to the Congress, it states that no committment can be made at this time as to when any estimate of appropriation would be submitted for construction of the projects, if authorized by Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation. The complete views of the Bureau of the Budget are contained in the attached copy of its letter.

* * * * * * *

BUREAU OF THE BUDGET

The report of the Bureau of the Budget is stated (pgs. VII and VIII, H. Doc. 349/83/2), in part, as follows:

* * * * * * *

The Chief of Engineers recommends, subject to certain conditions, adoption of projects by the United States authorizing Federal participation by the contribution of Federal funds in an amount equal to the portion of the cost applicable to protecting the Federally owned frontage plus one-third of the first cost of measures for the restoration and protection of the other publicly owned portions of the shore in Orange County, Calif., from San Gabriel River to Los Patos Avenue in Sunset Beach, under the plans comprising artificial placement of approximately 200,000 cubic yards of sand on the shore and the construction of one groin at Seal Beach, and placement of a feeder beach in amount of approximately 1,000,000 cubic yards of sand at Surfside. The estimated land cost, based on 1952 prices, is $486,000 of which $186,000 is for Seal Beach and $300,000 is for Surfside. The recommended total Federal contribution, under present conditions of ownership, is $148,000. The total annual benefits are estimated at $153,000. The total annual cost is estimated at $106,170, of which $5,770 is Federal and $100,400 is local. The resultant benefit cost ratio is 1.45.

I am authorized by the Director of the Bureau of the Budget to advise you that there would be no objection to the submission of the report to Congress. No commitment, however, can be made at this time as to when any estimate of appropriation would be

submitted for construction of the projects, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

* * * * * * *

CHIEF OF ENGINEERS

The report of the Chief of Engineers is stated (pgs. 1 through 3, H. Doc. 349/83/2), in part, as follows:

* * * * * * *

3. The Seal Beach shore with a frontage of 6,100 feet is publicly owned. Adjacent to the Anaheim Bay east breakwater, there is a Federally owned frontage of 900 feet. The remainder of the Surfside shore, amounting to 3,200 feet, is privately owned. The Sunset Beach shore, 6,200 feet in length, is publicly owned.

4. Anaheim Bay has been developed as a harbor by the United States Navy. The entrance thereto is protected by two converging breakwaters.

5. Local interests desire that measures be taken to remedy the instability of the shores adjacent to Anaheim Bay. They believe that the shore problems are due to structures built by the Federal Government.

6. The district engineer has investigated the history and present conditions along the shores in the vicinity of Anaheim Bay, and has developed plans for restoration and protection of the shore. He finds that the proposed measures are economically justified and recommends adoption of a project by the United States authorizing reimbursement of local interests, subject to certain conditions, to the extent of the first cost of protecting the federally owned shore and one-third of the first cost of protecting the other publicly owned shores under a plan comprising artificial restoration of the beach and the construction of one groin. The division engineer concurs in the recommendation of the district engineer.

7. After full consideration of the reports of the district and division engineers, and after affording local interests full opportunity to be heard, the Beach Erosion Board concurs in the recommendations of the reporting officers that Federal participation in protecting the shores adjacent to Anaheim Bay is

justified to the maximum extent permissible under the policy established by Public Law 727, 79th Congress. Accordingly, the Board recommends that projects be adopted by the United States authorizing Federal participation, subject to certain conditions, by the contribution of Federal funds in an amount equal to the portion of the cost applicable to protecting the federally owned frontage plus one-third of the first cost of measures for the restoration and protection of the other publicly owned portions of the shore in Orange County, Calif., from San Gabriel River to Los Patos Avenue in Sunset Beach, under the plans comprising artificial placement of approximately 200,000 cubic yards of sand on the shore and construction of one groin at Seal Beach, and placement of a feeder beach in amount of approximately 1,000,000 cubic yards of sand at Surfside, all substantially in accordance with the plans recommended by the district engineer.

8. In the opinion of the Beach Erosion Board, the recommended protective measures would stabilize and improve the shores in the vicinity of Anaheim Bay. Under the recommended Federal aid projects the United States would contribute one-third of the first cost of the Seal Beach project and, based on present conditions of ownership, 28.8 percent of the first cost of the Surfside and Sunset Beach project. The estimated Federal shares are presently estimated at $62,000 and $86,400, respectively, a total of $148,400. It is proposed that appropriate local agencies would, among other things, finance the remaining costs of the remedial measures amounting to $337,600 and maintain the measures thereafter at an estimated annual cost of $6,000 for Seal Beach and $80,000 for the Surfside-Sunset Beach area.

9. After the consideration of these reports, I concur generally in the views of the Beach Erosion Board. The recommended plans are the most suitable for restoration and protection of the shores in the vicinity of Anaheim Bay. They are amply justified by prospective benefits from prevention of damage to public and private property. The equitable distribution of costs called for in legislation authorizing this study was subsequently given definition in the statement of policy of the United States in Public Law 727, 79th Congress. Such equitable distribution may not in any case include Federal participation in excess of one-third of the total cost of construction for protection of publicly owned shores and may not include Federal assistance in

maintenance. Those federally constructed works which may have contributed to the causes of excessive beach erosion having been constructed in the public interest, the Federal Government may not be held responsible for such damages as might result from their construction or operation. This is a policy which has been repeatedly upheld in the courts. However, the public benefits from the proposed improvement justify the indicated Federal assistance under Public Law 727, which is permitted without regard to underlying causes of damage.

10. Accordingly, I recommend adoption of projects by the United States authorizing Federal participation by the contribution of Federal funds in an amount equal to the portion of the cost applicable to protecting the federally owned frontage plus one-third of the first cost of measures for the restoration and protection of the other publicly owned portions of the shore in Orange County, Calif., from San Gabriel River to Los Patos Avenue in Sunset Beach, under the plans comprising artificial placement of approximately 200,000 cubic yards of sand on the shore and construction of one groin at Seal Beach, and placement of a feeder beach in amount of approximately 1 million cubic yards of sand at Surfside, all substantially in accordance with the plans recommended by the district engineer and the Beach Erosion Board with such modifications as in the discretion of the Chief of Engineers may be advisable, at an estimated total cost of $486,000 of which the estimated Federal share is $148,400. Federal participation is recommended subject to the conditions that local authorities:

(a) Adopt the aforementioned plans of protection and improvement;

(b) Submit for approval by the Chief of Engineers prior to commencement of work detailed plans and specifications for the project and also the arrangements for prosecuting the work;

(c) Assure maintenance of the protective and improvement measures during their useful life, including replenishment of the feeder beach at suitable intervals, as may be required to serve their intended purpose;

(d) Provide at their own expense all necessary lands, easements, and rights-of-way;

(e) Hold and save the United States free from all claims for damages which may arise before, during, or after prosecution of the work;

(f) Assure that water pollution that would endanger the health of the bathers will not be permitted; and

(g) Assure continued public ownership of the shore upon which the amount of Federal participation is based, and its administration for public use only.

* * * * * * *

BEACH EROSION BOARD

The report of the Beach Erosion Board is stated (pgs. 3 and 4, H. Doc. 349/87/2), in part, as follows:

* * * * * * *

2. The Beach Erosion Board has carefully considered the views and recommendations of the reporting officers. It concurs in the plan of protection developed by the reporting officers and that the recommended protective measures would stabilize and improve the shore and are economically justified.

3. The Board notes and concurs in the conclusions of the reporting officers that erosion of the shores adjacent to Anaheim Bay has been caused by a combination of structures and events that has modified the local shore regimen. It also concurs in the opinion that, in addition to defrayment of the portion of the costs relating to protection of Federal property, a normal responsibility of the United States requiring no special legislation, the public interests involved warrant Federal participation to the maximum extent permissible based on Public Law 727, 79th Congress, which established existing policy for Federal assistance in the cost of shore protection. Local interests have indicated their opinion that this law is not applicable to this case. However, the Board is of the opinion that this law is the only expression of Federal policy on this subject available at this time. The law explicitly limits Federal assistance in the protection of non-Federal publicly owned shores to one-third of the total first cost of construction regardless of circumstances causing the erosion problem. Accordingly, the Board recommends that projects be adopted by the United States authorizing Federal participation by the contribution of Federal

funds in an amount equal to the portion of the cost applicable to protecting the federally owned frontage plus one-third of the first cost of measures for the restoration and protection of the other publicly owned portions of the shore of Orange County, Calif., from San Gabriel River to Los Patos Avenue in Sunset Beach under the plans comprising artificial placement of approximately 200,000 cubic yards of sand on the shore and construction of one groin at Seal Beach, and placement of a feeder beach in amount of approximately 1 million cubic yards of sand at Surfside, all substantially in accordance with the plans recommended by the district engineer. The estimated cost of this work is $186,000 for Seal Beach and $300,000 for Surfside, a total of $486,000. The estimated Federal shares for the two localities are $62,000 and $86,400, respectively.

4. Federal participation is recommended subject to the conditions that local authorities:

(a) Adopt the plan of protection and improvement recommended in the preceding paragraph;

(b) Submit for approval by the Chief of Engineers prior to commencement of work detailed plans and specifications for the project and also the arrangements for prosecuting the work;

(c) Assure maintenance of the protective and improvement measures during their useful life, including replenishment of the feeder beach at suitable intervals, as may be required to serve their intended purpose;

(d) Provide at their own expense all necessary lands, easements, and rights-of-way;

(e) Hold and save the United States free from all claims for damages that may arise before, during, or after prosecution of the work;

(f) Assure that water pollution that would endanger the health of the bathers will not be permitted; and

(g) Assure continued public ownership of the shore upon which the amount of Federal participation is based, and its administration for public use only.

* * * * * * *

DISTRICT ENGINEER

The report of the District Engineer is stated (pgs. 41 through 43, H. Doc. 349/83/2), in part, as follows:

* * * * * * *

IX. CONCLUSIONS

99. The district engineer concludes that:

(a) Erosion of the shore adjacent to Anaheim Bay Harbor is due to a combination of structures and events that have modified the local shore regimen. Flood control and water conservation in the tributary drainage areas have reduced the volume of natural littoral supply. The offshore breakwater has prevented the normal downcoast drift of the littoral contributions of Los Angeles and San Gabriel Rivers. The Anaheim Bay Harbor breakwaters in addition to constituting a complete littoral barrier have locally modified the wave pattern and intensified erosion of the shore.

(b) Although Anaheim Bay Harbor may have some effect on the beaches upcoast from the Alamitos Bay entrance, the effect is small and plans for corrective action have been recommended in another report previously submitted by the district engineer.

(c) The considered extension of the offshore breakwater chain and the proposed extension of the Alamitos Bay entrance jetties, if consummated, would have no harmful effects on the adjacent shores. Whatever effects they might have would tend to be beneficial.

(d) Erosion of the East Seal Beach shore segment can best be corrected by a concrete steelpile groin 700 feet long in the vicinity of the Seal Beach pier, an initial beach fill of about 200,000 cubic yards, and subsequent beach nourishment at the rate of about 100,000 cubic yards every 10 years.

(e) Erosion of the shore downcoast from Anaheim Bay Harbor can best be corrected by restoring the littoral drift artificially. Although the present measured rate of loss is about 150,000 cubic yards annually, nourishment at the rate of 200,000 cubic yards annually will be required if the material is taken from the tidal marshland behind the local

beaches. The initial fill should be dredged from the stilling basin between the two converging breakwaters of Anaheim Bay Harbor. An initial fill of 1 million cubic yards of this material, which proved to be mostly good beach sand in a previous dredging operation, should last 5 years before requiring replenishment, which should be in deposits of about 1 million cubic yards every 5 years.

(f) The proposed downcoast beach-nourishment program would restore the normal littoral regimen at least as far as the Santa Ana River outlet and eventually would benefit the beaches as far as the Newport Bay Harbor entrance.

(g) In accordance with the provisions of Public Law 727, 79th Congress, and in recognition of full Federal responsibility for protecting federally owned shores, the Federal Government should pay one-third of the first cost only of the proposed protective works at Seal Beach and 28.8 percent of the proposed initial protective fill to be placed downcoast from Anaheim Bay Harbor.

(h) The total first cost of the proposed protection would be $486,000 and the annual charges, $106,170. Benefits in the amount of $153,500 would accrue from the prevention of loss of land and improvements, prevention of loss of recreational beach, and obviation of highway and railroad relocation. Although the project would be justified by a benefit-cost ratio of 1.45 to 1 on the basis of tangible benefits alone, large unevaluated intangible benefits would provide added justification for the proposed work.

(i) Local interests in Orange County generally favor the proposed plan of improvement but object to the allocation of costs, holding that the United States should bear the full cost of beach restoration, protective works, and maintenance of littoral supply.

(j) Because the primary beneficiaries of the structures that have caused the present erosion condition are in one county and the effects of the erosion are being felt in another county, the State of California should arbitrate the allocation of costs to be borne by local interests.

(k) The dredging of Anaheim Bay Harbor by the Department of the Navy in 1944-45 could not have raised high tidal levels at Sunset Bay appreciably but may

have caused a more complete drainage of the sloughs by the ebb tide. Because the effects noted by the Sunset Beach Chamber of Commerce in 1948 were minor and caused no appreciable material damage, no corrective action was considered.

X. RECOMMENDATIONS

100. The district engineer recommends that the local interests protect the shores adjacent to Anaheim Bay Harbor by the initial deposition of a 200,000-cubic yard fill at Seal Beach, construction of a groin 700 feet long at Seal Beach to retain the fill, and the initial deposition of a 1-million-cubic-yard fill at Surfside, all at a cost presently estimated to be $486,000. He recommends that one-third of the first cost of protecting the publicly owned shores and the full first cost of protecting the federally owned shores within the problem area presently estimated to be $148,400, be reimbursed to local interests in a lump sum upon completion of the initial work, provided that such reimbursement be subject to the conditions that local interests shall, within a reasonable period of time following the adoption of this project by the United States, through a competent and duly authorized public body, furnish assurances satisfactory to the Secretary of the Army that they will: (1) assume the cost of all lands, easements, and rights-of-way required for constructing the recommended groin and placing the recommended beach fills; (2) maintain the groin and replenish the beach material at Seal Beach and at Surfside as required substantially in accordance with the plan proposed in this report; (3) hold and save the United States free from damages arising from groin construction and dredging and disposal activities; (4) hold open to the public all of the beaches that are now in public ownership in those littoral compartments that are affected by Anaheim Bay Harbor; and (5) continue the control of pollution along these beaches to the extent necessary to safeguard the health of bathers.

* * * * * * *

HOUSE DOCUMENT 602, 87th CONGRESS, 2d SESSION

This document superseded the recommendations in H. Doc. 349/83/2 and provided for 67 percent Federal participation in the first costs of constructing beach erosion control measures within the project limits. In addition, 67 percent Federal participation was provided for the costs

of periodic nourishment and maintenance. (Seal Beach was not included in the new recommendations for Federal participation because one of the conclusions in H. Doc. 602/87/2 was that the plan of protection as recommended in H. Doc. 349/83/2 was accomplished in 1959 and appeared to be successful. Very little maintenance of the groin had been required and the protective beach had reached a state of stabilization, requiring no beach replenishment. The Anaheim Bay Harbor breakwaters were considered a benefit to Seal Beach rather than a detriment and thus the Federal share of 33 percent of the total costs of protective measures as established in H. Doc. 349/83/2 was considered equitable.) For clarity, the recommended plan and local cooperation requirements are extracted from the following reports contained in H. Doc. 602/87/2: the U.S. Department of the Army, Secretary of the Army; the Executive Office of the President, Bureau of the Budget; the U.S. Department of the Army, Office of the Chief of Engineers; the U.S. Army Corps of Engineers, Beach Erosion Board; and the U.S. Army Corps of Engineers, Los Angeles District. Information pertinent to the 1962 authorized project is provided in the subsequent paragraphs:

SECRETARY OF THE ARMY

The report of the Secretary of the Army is stated (pg. VII, H. Doc. 602/87/2), in part, as follows:

* * * * * * *

> I am transmitting herewith a favorable report dated 8 August 1962, from the Chief of Engineers, Department of the Army, together with accompanying papers and illustrations, on a cooperative beach erosion control study of the shore from San Gabriel River to Newport Bay, Orange County, California, Appendix V, phase II, authorized by the River and Harbor Act, approved 3 July 1930, as amended and supplemented, and a survey of Anaheim Bay, California, authorized by the River and Harbor Act, approved 3 July 1958.
>
> * * * The Bureau of the Budget notes that this is one of several recent reports in which measures are proposed to mitigate adverse effects of previously constructed projects. The Bureau sets forth in detail its views concerning responsibility for such mitigation measures. A copy of the letter from the Bureau is inclosed.
>
> The Bureau of the Budget advises that, subject to consideration of its comments, there is no objection to the submission of the report to the Congress; however, it states that no commitment can be made at this time

as to when any estimate of appropriation would be submitted for construction of the project modification, if authorized by the Congress, since this would be governed by the President's budgetary objecttives as determined by the then prevailing fiscal situation.

* * * * * * *

BUREAU OF THE BUDGET

The report of the Bureau of the Budget is stated (pgs. VIII through X, H. Doc. 602/87/2), in part, as follows:

* * * * * * *

This is one of several project reports that have been recently submitted to the Bureau of the Budget in which measures are proposed to mitigate adverse effects of previously constructed projects. The San Gabriel River to Newport Bay project is unique among these projects in that the recommended measures would mitigate adverse effects that are the cumulative result of a complex interaction of many improvements undertaken progessively over a long period of time. The United States has no legal liability for the adverse effects of such a sequence of water resources improvements and the Bureau of the Budget believes it would be unwise that the responsibility for mitigating such effects be assumed as a matter of policy wholly by the Federal Government. In formulating individual water resources projects, the adverse effects expected to result are taken into account in evaluating the economic feasibility of proposed improvements and measures to mitigate such effects are incorporated in project plans when this can be done. Based upon such an evaluation, a decision is made as to the desirability of the development under consideration. This decision involves not only the United States but also the State and local interests and governmental agencies who are consulted and who normally promote and actively seek such improvements.

It is, of course, not unlikely that over a period of time the cumulative effect of progressive development of water resources will result in certain unforeseen changes in the natural regimen which may prove adverse in some respects. The costs of mitigating such effects obviously cannot be considered in evaluating the individual projects which, in combination with others, ultimately produce the unforeseen and undesired result.

In the planning of each project available knowledge and techniques are used to provide for reasonable assessment of the effect of the improvements under consideration. This having been done, it would appear that the Federal Government cannot reasonably accept an obligation to mitigate all future adverse effects flowing from the development measures which it under takes. Accordingly, the Bureau of the Budget believes that measures to relieve adverse effects of normal progressive water resources development should be considered on their own merits and that policies applicable to Federal participation and cost sharing for the purposes served by the mitigation measures at the time that they are proposed should apply.

The report of the Chief of Engineers indicates that the beach erosion problem in the San Gabriel River to Newport Bay area is a result of three groups of erosion-causing structures--(1) flood control and water conservation features along the Los Angeles, San Gabriel and Santa Ana Rivers, (2) improvements for general navigation, particularly the downcoast extension of the Long Beach breakwater and the Alamitos Bay and San Gabriel River jetties, and (3) the jetties constructed at the entrance to Anaheim Harbor. The Beach Erosion Board, in whose views the Chief of Engineers concurs, concluded that construction of any one of the groups of improvements alone would have created about the same degree of shoreline erosion that now exists in Orange County and that each of these causes of erosion was of equal importance. The Bureau of the Budget would have no objection to Federal participation to the extent of 67 percent of the cost of the beach erosion control project for San Gabriel to Newport Bay based upon the installation of the Anaheim Bay jetties by the Navy as wartime measures under which there was no opportunity for adequate technical consideration of adverse effects and in which it was not possible to obtain review and concurrence by local interests. However, we would strongly recommend against basing any general navigation improvements mentioned above. Subject to your consideration of the above comments, I am authorized by the Director of the Bureau of the Budget to advise you that there would be no objection to the submission of the report to

Congress. No commitment, however, can be made as to when any estimate of appropriation would be submitted for the project modification since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

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CHIEF OF ENGINEERS

The report of the Chief of Engineers is stated (pg. 1, H. Doc. 602/87/2), in part, as follows:

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1. I submit for transmission to Congress the report of the Beach Erosion Board accompanied by the reports of the District and Division Engineers on a beach erosion study of the shore of Orange County, California from the San Gabriel River to Newport Bay. The study was made by the Corps of Engineers in cooperation with the State of California under the provisions of section 2 on the River and Harbor Act approved July 3, 1930, as amended, also in compliance with section 112 of the River and Harbor Act of 1958 (Public Law 85-500) which directed a determination of the extent of Federal aid which should be granted in equity without regard to the limitations of law applicable to beach erosion control.

2. After full consideration of the report of the District and Division Engineers, the Beach Erosion Board recommends that in lieu of the existing project for Surfside, California (Anaheim Bay Harbor), a project be adopted by the United States authorizing Federal participation, subject to certain conditions of local cooperation, by the contribution of Federal funds in amount of 67 percent of the first costs and costs of periodic nourishment and maintenance for protection of the shore from Surfside to Newport Beach, California. The recommended protective measures comprise a protective and feeder beach at Surfside, and an offshore breakwater at Newport Beach to provide an impounding area from which sand would be dredged and returned periodically to the feeder beach, all substantially in accordance with the plan of the District Engineer, with such modification thereof as may be considered advisable by the Chief of Engineers. The presently estimated first costs and Federal share thereof are $4,250,000 and $2,845,000

respectively. Estimated annual periodic nourishment and maintenance costs are $471,000, with a Federal share of $315,600.

3. After due consideration of these reports, I concur in the views and recommendations of the Board.

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BEACH EROSION BOARD

The report of the Beach Erosion Board is stated (pgs. 4 and 5, H. Doc. 602/87/2), in part, as follows:

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VIEWS AND RECOMMENDATIONS OF THE BEACH EROSION BOARD

8. The Board has carefully considered the report of the District and Division Engineers and the information presented by local interests. The Board concurs in the method of protection and improvement recommended by the reporting officers as being the most suitable and economical plan for the entire shore from Surfside to Newport Beach. Other plans considered are not feasible because of lack of sufficient suitable sand in available borrow areas or greater costs. Local protection at Surfside would result in transfer of the eroding area alongshore with eventual loss of beaches as far as Newport Beach. The Board also concurs in the conclusion of the reporting officers that the project for the shore from Surfside to Newport Beach is justified by prospective benefits and in equity Federal aid in initial construction, periodic nourishment and maintenance is warranted in view of the adverse effects on the shore of Federal structures at the entrance to Anaheim Bay, the breakwaters of Los Angeles-Long Beach Harbor and flood control structures on streams in the adjacent area. Stability of the shore will be dependent upon periodic nourishment and since material for that purpose will be available under the proposed plan for as long as can be foreseen there is no necessity for placing a time limit on Federal aid for this feature of the project.

9. The Board has considered the apportionment of costs in equity as derived by the District Engineer. It considers that the Anaheim Bay jetties were of equal

importance with the flood control and navigation improvements in contributing to erosion of the Orange County beaches.

Accordingly the Board has recomputed the extent of Federal aid in equity as 67 percent instead of 61 percent of the costs.

10. In accordance with existing statutory requirements, the Board states its opinion that:

a. It is advisable for the United States to adopt a project authorizing Federal participation in the costs of restoring and protecting the shore from Surfside to Newport Beach;

b. The public interest involved in the proposed measures is associated with prevention of damages to publicly owned property and recreational benefits to the public; and

c. The share of the expense which should be borne by the United States in equity is 67 percent of the first costs and costs of periodic nourishment and maintenance.

11. The Board recommends that in lieu of the existing project for Surfside, California (Anaheim Bay Harbor) a project be adopted by the United States authorizing Federal participation by the contribution of Federal funds in amount of 67 percent of the first costs and costs of periodic nourishment and maintenance of a plan comprising restoration of the beach in the Surfside-Sunset Beach area, a feeder beach for nourishing the shore from Surfside to Newport Beach, and an offshore breakwater at Newport Beach to provide an impounding area from which sand would be transferred periodically to the feeder beach at Surfside, substantially in accordance with the plan of the District Engineer, with such modifications thereof as may be considered advisable by the Chief of Engineers. The estimated first costs and Federal share thereof under the recommended project are respectively $4,250,000 and $2,845,000.

The estimated periodic nourishment and maintenance costs and Federal share thereof are respectively $471,000 and $315,600 annually.

12. Federal participation is recommended subject to the conditions that responsible local authorities:

a. Obtain approval by the Chief of Engineers of detailed plans and specifications and of arrangements for prosecuting all or any one phase of the work prior to commencement of such work;

b. Furnish assurances satisfactory to the Secretary of the Army that they will:

(1) Maintain the protective measures and provide periodic nourishment of the protective beach during their economic life, as may be required to serve their intended purpose with Federal assistance as recommended herein;

(2) Control water pollution to the extent necessary to safeguard the health of bathers;

(3) Maintain continued public ownership of the shores and their administration for public use during the economic life of the project.

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DISTRICT ENGINEER

The report of the District Engineer is stated, in part, in the subsequent paragraphs.

The allocation of costs, based on equity, and the reasoning behind considering the Anaheim Bay Harbor breakwaters a benefit in the Seal Beach area are stated (pgs. 62 and 63, H. Doc. 602/87/2) as follows:

* * * * * * *

132. Cost allocation based upon equity.

(a) Anaheim Bay to Newport pier.--Analysis of the structures that have caused erosion of the Orange County beaches; their relative effects upon these beaches; and the purpose for which these structures were built; result in the following summary of the allocation of costs between the Federal Government based upon "equity" as directed by Congress in Public Law 85-500, 3 July 1958:

Table No. 6
Anaheim Bay to Newport pier cost allocation

Category	Type of Structure	Importance factor	Proportion of costs			
			Direct		Weighted	
			Federal	Local	Federal	Local
(1)	Flood control features	2	80	20	160	40
(2)	Offshore breakwaters	2	22	78	44	156
(3)	Anaheim Bay jetties	1	100	0	100	0
	Total				304	196
	Total per cent				61	39

(b) San Gabriel River to Anaheim Bay.--While the construction of the offshore breakwater and the flood control works and jetties on the San Gabriel River have combined to deny the natural supply of littoral drift to this beach, the construction of the Anaheim jetties has served to prevent additional loss of sand from the area. In 1954, 800,000 cubic yards of sand was placed on this beach from dredging of the Long Beach Marina and, in 1956, an additional 200,000 cubic yards of sand was deposited from Navy dredging, all at no added cost to the eroded area. Surveys show that between 1934 and 1958 there was a net gain of over 1,000,000 cubic yards of beach sand in this area. The problem subsequent to the 1948 extension of the offshore breakwater was the undesirable alinement of the beach created by the effect of the offshore breakwater upon the direction of wave travel. This condition was corrected in 1959 by construction of a groin and transfer of 225,000 cubic yards of sand from the west to the east segment of the beach. The Federal Government has reimbursed the city of Seal Beach for one-third of the cost of this project. Additional sand will be deposited upon this beach from the bed of the San Gabriel River during future heavy runoff to further widen this beach. Using the same criteria as to the relative effects of the flood-control and navigation structures on the beach between Anaheim Bay and the Newport pier, except to consider the Anaheim jetties as a benefit rather than a

detriment to the Seal Beach area, results in an equitable Federal share of one-third of the cost of protective measures as previously established in House Document 349, 83d Congress, and constructed in 1959.

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The conclusions and recommendations of the District Engineer are stated (pgs. 79 through 81, H. Doc. 602/87/2) as follows:

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CONCLUSIONS

151. The district engineer finds that erosion has occurred along the shore of the northern part of Orange County, Calif., from the vicinity of Anaheim Bay to the Newport Beach fishing pier, and that protective shore measures are required to prevent further damage by beach erosion and extensive loss of beach material into the Newport submarine canyon. Erosion is especially severe along the shore fronting the communities of Surfside and Sunset Beach, where wave action has caused loss of land, installations, and property damage. Erosion has also occurred offshore and along the shores of Bolsa Chica and Huntington Beach State Parks and the beach areas fronting the cities of Huntington Beach and Newport Beach. At the present time no overall plan of protection has been adopted, with the result that beach erosion of the public and private shore continues.

152. The district engineer also finds that the shore area between the Newport Beach fishing pier and the jetties at the entrance to Newport Harbor is essentially stable and that no corrective measures are required.

153. The district engineer further finds that at Seal Beach the plan of protection as recommended in House Document 349/83/2 and authorized by Public Law 780/83/2 was accomplished in 1959 and has been successful. Very little maintenance of the groin has been required, and the protective beach has reached a state of stabilization requiring no beach replenishment.

154. The district engineer concludes that, with the exception of Seal Beach, the <u>authorized plan</u> of shore protection for the remainder of the upper portion of Orange County does <u>not</u> provide the most suitable means of shore protection and should be modified.

155. The district engineer also concludes that inasmuch as erosion of the Orange County, phase 2, shore area has been caused in part by events and also by the construction of Federal structures that in "equity", the Federal Government should assume a larger share of the cost of restoration of the public and privately owned shores downcoast from the Anaheim Bay jetties and should also assume a greater share of the cost of future periodic beach replenishment.

156. The district engineer finally concludes that the authorized plan for improvement for the upper Orange County shore is inadequate to provide the sustained protection required under existing conditions and should be modified by a comprehensive plan which would provide protection to the shore and would at the same time reduce the loss of littoral material into the submarine canyon. This plan would include the construction of a single detached offshore breakwater, and a protective artificial beach fill, all at a total first cost of $4,250,000 (excluding $25,000 preauthorization-study costs). The tangible benefits resulting from the proposed plan of shore protection for the Orange County phase 2 area would average about $2,221,000 per year, and the average annual charges for the protective works would be about $613,000. The benefit-to-cost ratio would be 3.6 to 1.

RECOMMENDATIONS

157. The district engineer recommends modification of the authorized project at Anaheim Bay Harbor, Calif., to provide for construction of a single detached offshore rubblemound breakwater, averaging about 2,600 feet in length and located along the minus 24-foot contour (MLLW) just upcoast of the Newport Beach fishing pier, and the deposition of approximately 3,000,000 cubic yards of suitable beach building material along the upper Orange County phase 2 shoreline in the vicinity of Surfside-Sunset Beach to provide a protective beach generally 500 feet in width and 9,200 feet in length. This recommended project is in lieu of the existing project for the shore area downcoast of Anaheim Bay (Surfside-Sunset Beach). Total first costs of the recommended project (excluding preauthorization study costs) are presently estimated to be $4,250,000.

158. The district engineer also recommends that on the basis of "equity", the Federal share of the total first cost of the construction would be sixty-one percent (61%) of the presently estimated first cost ($4,250,000), an amount estimated at $2,591,000. He also recommends that the United States participate in the annual cost of periodic beach nourishment and maintenance of the breakwater - a total annual cost presently estimated at $471,000, of which the Federal share, in equity, also would be 61 percent, presently estimated at $287,500.

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