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EAST BAY MARINA

FINAL DETAILED PROJECT REPORT AND IAL ENVIRONMENTAL IMPACT STATEMENT

LEVEL II

DECEMBER 1980

Department of the Army
Seattle District, Corps of Engineers

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The report presents a detailed project report and environmental impact assessment for the proposed construction of the East Bay Marina, Olympia, Washington. The proposed federal portion of the project would include an entrance channel providing access to the moorage area; a channel providing access to the moorage area; a channel providing access to a public boat launching ramp; a floating breakwater and recreational facilities on the breakwater.

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

EAST BAY MARINA
OLYMPIA, THURSTON COUNTY, WASHINGTON

FINAL
DETAILED PROJECT REPORT,
SECTION 107, 1960 RIVER AND HARBOR ACT
AND
ENVIRONMENTAL IMPACT STATEMENT

DECEMBER, 1980

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS

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SYLLABUS

This detailed project report (DPR) and environmental impact statement (EIS) are prepared under authority of Section 107 of the 1960 River and Harbor Act, as amended. The report recommends Federal participation in construction of a small boat marina at East Bay, Olympia Harbor, Washington, including recreational facilities for fishing and sightseeing on the floating breakwater.

Additional moorages are urgently needed in the region. The 800 spaces to be provided by the proposed marina would satisfy a portion of the moorage need.

The proposed Federal portion of the project would include an entrance channel; a channel providing access to the moorage area; a channel providing access to a public boat launching ramp; a 700-foot-long, 16-foot-wide, 5-1/2-foot-deep concrete floating breakwater; and recreational facilities on the breakwater.

Federal dredging would involve removing 700,000 cubic yards from the entrance and access channels, and local dredging of about 475,000 cubic yards from the moorage area. Dredged material would be placed behind a locally constructed dike to provide space for the Port's cargo handling area expansion and for the marina access roads, parking areas, service facilities, and space for other marina ancillary services. The Federal Government would maintain the general navigation facilities. Local interests would construct and maintain the moorage floats; maintain the moorage area and the recreational facilities on the breakwater; and operate and maintain a water quality aeration system as part of the marina facilities. Aids to navigation would be installed and maintained by the U.S. Coast Guard.

The first cost of the general navigation facilities and the breakwater recreational facilities would be $3,531,000. This includes $2,599,000 for the breakwater and entrance and access channels; $152,000 for a water quality aeration system; $27,000 for environmental quality monitoring during construction; $90,000 for breakwater recreational facilities; $578,000 for locally constructed dikes for dredged material; $40,000 for locally provided lands, easements, and rights-of-way; and $45,000 for aids to navigation by the U.S. Coast Guard.

The first cost to the Federal Government would be $1,396,000, which includes the $45,000 aids to navigation by the U.S. Coast Guard. Average annual costs would be $295,000, and average annual benefits would be $1,567,000. The benefit-to-cost ratio would be 5.3 to 1. The above costs do not include $329,000 preauthorization study costs.

EAST BAY MARINA
OLYMPIA, THURSTON COUNTY, WASHINGTON

FINAL
DETAILED PROJECT REPORT
SECTION 107, 1960 RIVER AND HARBOR ACT

DECEMBER, 1980

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS

DETAILED PROJECT REPORT
SECTION 107, RIVER AND HARBOR ACT
EAST BAY MARINA
OLYMPIA, WASHINGTON

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OLYMPIA, WASHINGTON

DETAILED PROJECT REPORT
SECTION 107, 1960 RIVER AND HARBOR ACT

SECTION 1. INTRODUCTION

AUTHORITY

1-1. This report is submitted in accordance with provisions of Section 107 of the 1960 River and Harbor Act, as amended. By letter dated 5 April 1974, the Port of Olympia requested Federal assistance in construction of a small boat marina in the Olympia area (Appendix C, Pertinent Correspondence).

1-2. Section 107 authorizes the Secretary of the Army to allocate funds for construction of small navigation projects when, in the opinion of the Chief of Engineers, such work is advisable. Not more than $2 million of Federal funds under this authority can be allocated for any one project.

PURPOSE AND SCOPE OF REPORT

1-3. This report examines the economic justification and the advisability of Federal participation in providing a small boat marina at Olympia Harbor, Washington, plate 1.

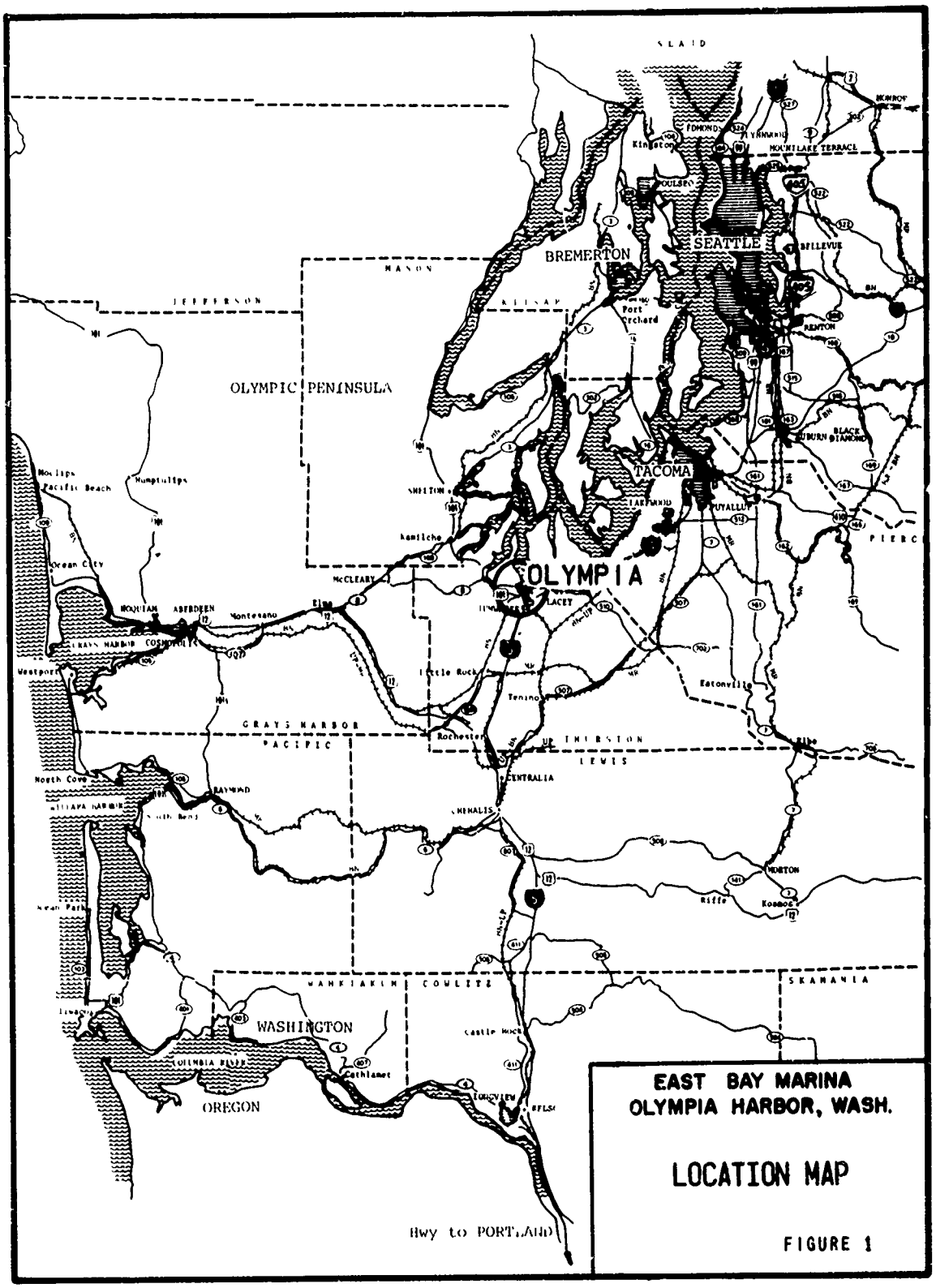
LOCATION

1-4. The city of Olympia, capital of the State of Washington, is located in Thurston County at the extreme southern end of Puget Sound (figure 1).

EXTENT OF INVESTIGATIONS

1-5. A reconnaissance was made of southern Puget Sound to determine the most acceptable site. Fieldwork included hydrographic and topographic surveys of the area, foundation explorations, and surveys of land values and environmental setting. Pleasure boat owners, marina operators, commercial fishermen, and representatives of various organizations, associations, industries, and governments were interviewed to determine local interests.

1-6. Hydraulic model studies of various sizes and configurations of floating breakwaters for the East Bay site were conducted by the Corps Waterways Experiment Station (WES), Vicksburg, Mississippi. The results are contained in a WES report. Other special studies by the Port and


SEATTLE
BREMERTON
TACOMA
OLYMPIA
OLYMPIC PENINSULA
JEFFERSON
MASON
KITSAP
PACIFIC
GRAYS HARBOR
THURSTON
LEWIS
WAHKIAKUM
COWLITZ
SKAMANIA
WASHINGTON
OREGON
Hwy to PORTLAND
EAST BAY MARINA
OLYMPIA HARBOR, WASH.
LOCATION MAP
FIGURE 1

the University of Washington included hydraulic model tests of the proposed plan and alternative plans to determine basin exchange and mixing characteristics. Design, economic, and environmental studies were also performed.

1-7. The Seattle District conducted a water quality sampling program from June to October 1977 in East Bay, Olympia Harbor, Washington. A Washington Department of Ecology (WDE) study of Budd Inlet water quality was conducted from 1977 to 1978 and generally corroborated the findings of the Corps sampling program. Results of the sampling program and the WDE study are unpublished but have been coordinated with the appropriate Federal and state agencies and are avalable at the District office.

RELATED REPORTS AND PREVIOUS STUDIES

1-8. "The Pleasure Boating Study, Puget Sound and Adjacent Waters," dated November 1968, projected demand for moorages, launching ramps, and other marine facilities in 19 subregions to 1980, 2000, and 2020.

1-9. "Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters," dated October 1980, projected demand and need for moorages to the year 2000.

1-10. "Floating Breakwater Wave Attenuation Tests for the East Bay Marina, Olympia Harbor, Washington," Hydraulic Model Investigation, U.S. Army Engineer Waterways Experiment Station TR-HL-79-13, Vicksburg, Mississippi, August, 1979.

1-11. A report was prepared by the Washington Department of Fisheries (WDF) for the Seattle District which presented additional information on the problems and effects of harbor and channel dredging and the associated disposal of the dredged material in the open-water disposal site in Dana Passage on the marine environment.

PUBLIC INVOLVEMENT

1-12. Public involvement in the early stages of planning consisted of public participation at meetings for the Port of Olympia's application for a Shoreline Substantial Development Permit from the State of Washington. Public hearings were also held by the State Shoreline Hearing Board when granting of the permit was challenged by concerned citizens.

1-13. A newsletter was mailed to about 150 interested agencies, organizations, industries, and individuals on 13 February 1979. The Port of Olympia held a public meeting on the proposed marina on 21 February, 1979. A public meeting notice was mailed 5 September 1980 informing the public of the results of studies conducted in 1979 and 1980, and announcing the pending public meeting. A final public meeting was held by the Port of Olympia with a presentation by the Corps of

Engineers on 16 September 1980. Findings and tentative recommendations were discussed with the public given an opportunity for questions and comments.

1-14. Public comments on the proposed project are reflected in appendix H.

AGENCY COORDINATION

1-15. Engineering and environmental data were furnished to state and Federal agencies as they became available. The U.S. Fish and Wildlife Service (USFWS) report, dated 18 July 1979, and a letter appending that report, dated 12 September 1979, are included in appendix F. Letters from the WDF, dated 18 July 1979 and 25 September 1979, commenting on the USFWS report are also included in appendix F. Appendix H contains comments received during the study from:

Congressman Don Bonker
State Senator Del Rausch
State Representative Mike Kreidler
State Representative Ron Keller
City of Olympia
City of Tumwater
City of Lacey
League of Womer Voters of Thurston County
Olympia Area Chamber of Commerce

1-16. A draft Detailed Project Report/draft Environmental Impact Statement (DDPR/DEIS) was distributed for public and agency review in December 1979. Comments received and Corps of Engineers responses are contained in appendix H.

1-17. Considerable further coordination with state and Federal agencies and the Port of Olympia took place during studies conducted subsequent to the distribution of the DDPR/DEIS, in response to comments received during agency review (see appendices A, G and H).

SECTION 2. STUDY AREA DESCRIPTION

PHYSIOGRAPHY

2-1. Land and Water Features. The city of Olympia lies at the extreme southern end of Puget Sound (see figure 1, page 1-2). A peninsula about 4,400 feet long and varying in width from 1,000 to 2,200 feet extends north from the southern shore of Budd Inlet, separating the inlet into two waterways, the Deschutes (West) Waterway and East Waterway (East Bay) (plate 1). The southern portion of the peninsula is commercial and light industrial. The approximate northern two-thirds of the peninsula is heavy industrial and port related activities. The area includes cargo handling space for the Port of Olympia's three-berth, deep-draft shipping wharves on the west shore of the peninsula bordering West Waterway. The East Bay project site is close to the urban area of the city which is the population center of Thurston County. East Bay provides natural protection from all storms except those coming from a northerly direction. Parts of the bay bottom are exposed at low tide but can be transited by shallow-draft vessels on the mid to high tide. East Bay tidal areas are now vacant. The east shore of the bay is occupied by residences flanking East Bay Drive.

GEOLOGY AND SOILS

2-2. East Bay is underlain by a sequence of recent bay muds, fine grained glacial outwash, and lake sediments. The outwash consists of upper and lower units of sand and silty sand which are medium-dense to dense with the upper member being slightly less dense. Thickness of the upper unit varies from 2 feet to over 60 feet, the thicker portions occurring generally under the west and south portions of East Bay. The bottom of the lower sand was not penetrated. Interfingered with the outwash are gray, glaciolacustrine silts containing some sandy lenses. The macerial is soft to medium stiff and thickness varies from less than 15 feet to over 60 feet. Within the silts is an irregular bed of sand which carries ground water under artesian pressure. This aquifer generally slopes to the northwest with observed elevations ranging from -13 feet to a maximum of -108 feet.

2-3. The bay muds are recent deposits of silty organic clays which vary in thickness from less than 10 feet to over 30 feet. They are very soft, possess a high water content, low density, and low shear strength. Muds are replenished by sediments from the Deschutes River and by the decomposition of organisms living in the present estuarine environment.

CLIMATE

2-4. Climate in the Olympia area is characterized by mild, wet winters and cool, dry summers. Daily and seasonal temperature ranges are small. Freezing rarely occurs during the winter months, and the duration is only a few days. Rainfall is heaviest during the winter months, about 57 percent of the mean recorded annual rainfall occurring between November and February.

TIDAL VARIATIONS

2-5. Tides of Puget Sound are of the mixed type and have the diurnal inequality typical of the Pacific Coast of North America. Tidal elevations range from -4.7 feet to +18.2 feet mean lower low water (MLLW).

AFFECTED ENVIRONMENT

2-6. Water Quality. Budd Inlet is a very productive area having about the same salinity, nutrients, and turbidity as the other bays of southern Puget Sound. Phytoplankton production and standing crops in Budd Inlet increase greatly in late summer. Fluctuations in phytoplankton production and abundance contribute to the changes observed in ammonia, biological oxygen demand (BOD), dissolved oxygen (DO), phosphates, suspended solids, and turbidity of the water.

2-7. Olympia Harbor, the lower portion of Budd Inlet, has greater turbidity and nutrient concentrations and lower salinity and DO concentrations than Budd Inlet as a whole. The major causes of these differences are freshwater inflow, reduced flushing, and the discharge of domestic sewage. Olympia Harbor also exhibits relatively high coliforms; lower Budd Inlet is decertified for commercial shellfish harvest by the Washington Department of Social and Health Services.

2-8. WDE has classified Budd Inlet as class "A" (very good) waters and lower Budd Inlet, including East Bay, as class "B" (good) waters. Recent studies by the Corps (1977) and WDE (1977-1978, unpublished) indicate that a significant water quality problem occurs in lower Budd Inlet due to a sag in DO during late August/early September. During these late summer months, this sag develops fairly rapidly. In 1977, a fish kill was reported in East Bay as DO levels dropped to 1-2 milligrams per liter (mg/l) in inner West Bay (WDE, 1977-1978) and 0-1 mg/l in East Bay (Corps, 1977).

2-9. This condition persisted for 2 to 4 weeks, and then DO slowly returned to acceptable levels (about 5-6 mg/l). The sag appears regularly each year at about the same time, although not always of the same duration or to the same extent. The period monitored (1977-1978) was a year of very low precipitation in which the amount of freshwater inflow was less than normal. Therefore, it probably represents a

worst-cast condition. However, DO levels are normally lower south of Priest Point (plate 2c) as compared to the rest of Budd Inlet.

2-10. Phytoplankton blooms (Certatium sp.) appear to be the main contributor to the DO sag. The deep navigation channel and turning basin in West Bay is a major influence. Seasonal flushing discharges from Capitol Lake (plate 2c) also have some influence. The injection of primary treated effluent into Olympia Harbor and thus into East Bay via prevailing currents was thought to be a major contributor to the problem. It was therefore expected that conversion to secondary treatment, scheduled to begin in 1981, would relieve the problem. However, injection of primary treated effluent does not correlate with timing of the sag and, therefore, secondary treatment is unlikely to significantly affect the sag (see EIS).

2-11. Terrestrial and Marine Ecology. Southern Puget Sound is a rich and diverse system, providing critical habitat for a variety of plant and animal species. Intensive industrialization has occurred in the more northerly sections of the Sound, at Seattle and Tacoma, leaving southern Puget Sound as a resource producer (timber, commercial fishing, aquaculture) and a recreational playland. Therefore, it is not surprising that many of the state's most unspoil and productive shorelines are found in this area.

2-12. Budd Inlet is the most developed estuary in southern Puget Sound, but intensive human use is largely confined to the Olympia area leaving much of the inlet's shoreline in a relatively undisturbed state. The land surrounding Budd Inlet is mostly forested with second growth deciduous or confier species. Lower West Bay and the port peninsula are sparsely vegetated due to industrial usage. Species present include grasses, weeds, and other disturbance tolerant plants. However, the East Bay shoreline, particularly the east side, is more richly vegetated due to its residential and park use. Present are Douglas fir, western red cedar, maple, and red alder, with cultivated lawns and shrubbery in the residential areas.

2-13. Along the urban shoreline, vegetation is sparse and confined to upper limits of tidal influence. Small patches of pickleweed (Salicornia sp.) and seaweed (Ulva or Monostroma sp. and Enteromorpha sp.) occur sparsely throughout the port area. Rockweed (Fucus sp.) occurs in heavy concentrations in riprap and along East Bay tidelands at the northern tip of the peninsula. Most mudflats are coated by a mat-like brownish microscopic algae and are populated by many of the marine invertebrate species characteristic of southern Puget Sound beaches. Invertebrates in the port area display a low diversity, but not necessarily low populations, characteristic of a stressed environment.

2-14. Fisheries Resources. Five species of salmonidae are known to spawn in the Deschutes Basin: fall chinook, coho, chum salmon, and

sea-run cutthroat and steelhead trout. In addition to the native runs upriver, the WDF manages a highly successful salmon propagation program in Capitol Lake. Salmon returns to the Deschutes system averaged 21,200 fish (all species) for the years 1969-1971 (WDF, 1975). Outmigration by juvenile salmonids occurs in the spring to early summer months for all species except for fall chinook whose outmigration can extend to mid-September. This schedule would indicate few juveniles are present during the DO sag described previously. Adult chinook and sea-run cutthroat would be present in some numbers. Marine species found in Olympia Harbor include pile perch, dogfish, starry flounder, herring, sculpin, and stickleback (see EIS).

2-15. Wildlife Resources. Waterbirds are represented by a diversity of species and are numerous throughout the winter months. The productive areas of Olympia Harbor are principally tidelands. East Bay and West Bay tidelands are frequented by bottom feeding birds. East Bay serves as a refuge for waterbirds during storms. Rafts of canvasback ducks have also been observed regularly wintering in the area; the species has been declining nationally (see appendix F).

2-16. Owing to the urbanized nature of Olympia, terrestrial mammals are probably confined to smaller species, principally rodents (mice and rats), moles, perhaps gophers, and a few predators; shrews; feral cats; etc. As most are nocturnal, presence and numbers are not readily evident, but due to the lack of habitat, numbers are expected to be small. Marine mammals are known to utilize Budd Inlet; however, their occurrence in Olympia Harbor is unlikely. Harbor seals are observed regularly along the undisturbed shorelines and in outer Budd Inlet.

2-17. Endangered Species. No flora or fauna under consideration for endangered or threatened status, or so designated, as published in the 20 May 1980 Federal Register (50 CFR 17), are known to occur in the Olympia area.

2-18. Historical and Archeological Sites. A review of the 6 February 1979 National Register of Historic Places and archeological records at the University of Washington, Department of Anthropology, indicates no known historic or prehistoric sites exist within the project area that might be affected by the proposed marina construction. The DDPR/DEIS was reviewed by the Washington State Office of Archeology and Historic Preservation (see appendix H).

ECONOMIC AND SOCIAL CONDITIONS

2-19. Natural Resources. Thurston County is mostly flat except for hilly areas in the south and west. Urban development is concentrated in the northern end of the county in the Tumwater-Olympia-Lacey area (see figure 1, page 1-2) and along the Interstate 5 corridor. Most of the county outside the urbanized area is heavily forested. Mineral production is minimal. The southern end of Puget Sound provides opportunities

for pleasure boating and waterborne commerce. About 1,500 commercial vessel trips were reported during 1977. Eight private marinas are located in Budd Inlet, and numbers of pleasure boats already use the inlet, particularly during pleasant weather.

2-20. Population. Thurston County population was estimated at 107,000 in April 1978, an increase of 30,100 since 1970.[1/] The 1970-1978 average annual growth rate of 4.2 percent was well above the 1.3 percent for the State of Washington. Population estimates for April 1978 and projections from various sources are presented in table 2-1.

2-21. Employment and Industry. Average monthly covered employment in Thurston County in 1975 totaled 27,911,[2/] an increase of 30.8 percent over 1971, compared with 21.7 percent over the same period for the State of Washington. The largest employer in Thurston County was the Government sector, with 40.2 percent of the 1975 labor force. The largest employer within the manufacturing sector was the lumber and wood products industry, with 32 firms employing 1,095 persons. The average annual unemployment rate for Thurston County during 1978 was 6.4 percent, compared with 6.8 percent for the State of Washington. April 1979 unemployment rate was 6.7 percent for Thurston County and 7.4 percent statewide.

2-22. Income. Personal income in Thurston County rose from $424 million in 1969 to $581 million in 1975 (in 1975 dollars), an average annual growth rate of 5.4 percent, significantly above the statewide rate of 2.4 percent.

2-23. Government. Thurston County is served by three elected commissioners. The proposed marina is part of the overall development plan for the city approved by the Thurston County Regional Planning Commission.

2-24. Transportation. Thurston County is served by all major forms of transportation (see figure 1, page 1-2). A network of state, county, and local roads complement Interstate 5, the major north-south highway in the state, and U.S. Highway 101, a major access route to the Washington Coast and the Olympic Peninsula.

2-25. Tourism and Recreation. Olympia lies at the junction of a major north-south and a major east-west route. The State Capitol and other state facilities are tourist attractions. Rural areas of the county offer opportunities for camping and lake- and river-oriented recreation. Boating and fishing are available in Puget Sound to the north, and many miles of beaches offer crabbing, clamming, and oystering.

1/Population Trends, 1978, Office of Financial Management, Population Studies Division, Olympia, Washington (August 1978).

2/Covered employment includes employees eligible for unemployment insurance under the Washington State Employment Security Act.

TABLE 2-1

POPULATION ESTIMATES AND PROJECTIONS
STATE OF WASHINGTON AND THURSTON COUNTY

	1970	1978	Average Annual Percentage Change
Washington	3,413,250	3,774,300	1.3
Thurston County	76,894	107,000	4.2

PROJECTIONS FOR COUNTY
1980-2000

Source	1980	1985	1990	1995	2000	Average Annual Percent Change[1/]
BPA[2/]	98,600	111,600	125,300	138,700	--	1.5
PNW Bell[3/]	95,200	105,000	115,000	--	--	0.6
County[4/]	114,700	130,000	160,000	--	--	3.4
State[5/]	95,800	106,800	118,000	128,900	139,700	1.2
OBERS[6/]	102,000	106,000	111,000	--	119,000	0.5

1/Applied to 1978 base of 107,000.

2/Population, Employment and Housing Units, Projected to 1995 - Washington, Bonneville Power Administration (1976).

3/Population and Household Trends, Pacific Northwest Bell (1976).

4/Thurston County Planning Commission (1974).

5/Washington State Office of Program Planning and Fiscal Management (1972).

6/OBERS Series "E", U.S. Water Resources Council (1972). Average annual growth rate for subarea 1714, Puget Sound, applied to 1978 base of 107,000.

2-26. Community Facilities and Services. Police and fire protection are provided to the port area by the city of Olympia. Water is available to the Olympia-Lacey-Tumwater urban area from an abundant ground water supply. Municipal and industrial sewage service in the Olympia area is provided by the Olympia Sewage Treatment Plant. Secondary treatment will be provided by 1981.

2-27. Future Development. The area is expected to show a moderate rate of growth through the year 2000 (table 2-1). The pattern of Thurston County development through the end of this century is one of healthy growth, with rising income and employment and an economy increasingly based on services and Government employment.

EXISTING CORPS OF ENGINEERS PROJECTS

2-28. An existing Corps project in the West Waterway of Budd Inlet provides for a channel 500 feet wide and 30 feet deep (MLLW) from deep water in Budd Inlet to the Port Terminal (plate 1). The Project is 83 percent complete. The portion of the project, widening the entrance channel and enlarging the turning basin, has been classified "deferred."

SECTION 3. AVAILABLE SMALL BOAT AND RECREATIONAL FACILITIES

3-1. In 1978, seven marinas accounted for about 1,000 wet moorages in Thurston County. The marinas varied in size from 10 to 410 spaces. One of the largest, having 240 spaces, is a yacht club and furnishes space to members only.

3-2. The only publicly owned moorage facility is a dock owned by the city of Olympia and operated by the City Parks and Recreation Commission. It provides about 25 transient moorages. The time limit for any one stay is 3 days and no permanent moorages are furnished. Fishing from the dock is not permitted at the present time, but is projected for the future.

3-3. The yacht club marina furnishes adequate shoreside and sanitary facilities, as well as fuel and utilities at dockside, but these are available only to members. Some of the other marinas provide launching and fuel facilities. Shoreside facilities are limited with a few offering potable water and/or electricity at the dock. None have sanitary pump out facilities.

3-4. One marina offers dryland storage on dollies under a shelter for about 30 craft under 20 feet in length. A hoist and sling are available for launching the craft.

SECTION 4. PLAN FORMULATION

PROBLEMS AND NEEDS

4-1. The need for additional pleasure boat moorages in the southern Puget Sound region was outlined in the report "Pleasure Boating Study, Puget Sound and Adjacent Waters, State of Washington," November 1968. An update of this study is contained in "Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters, State of Washington," October 1980. The update shows that while moorage supply has about doubled since 1968, in Thurston County, demand still significantly exceeds supply. For the three counties essentially comprising the southern Puget Sound area (Thurston, Mason and Pierce) the estimated need for additional moorages in 1978 was over 5,000 spaces. Growth of pleasure boating in the Olympia area has been hampered by lack of available moorages, both public and private.

IMPROVEMENTS DESIRED

4-2. The Port of Olympia, local sponsor of the proposed project, desires Federal assistance in constructing a small boat marina to satisfy a portion of the need for pleasure craft moorages in the south Puget Sound region. Provisions for temporary tieup of pleasure boats at the floating breakwater and facilities for recreational fishing and sightseeing on the breakwater have also been requested by the Port. The Port further requests additional cargo handling area utilizing the material dredged from the proposed marina. While not a part of the marina project, the cargo fill area is reviewed in this report because it is a disposal site for dredged material from the project and because it is a part of the overall plan of development by the Port.

4-3. Federal, state, and local agencies; state, county, and municipal government entities; and business, industry, and concerned individuals are aware of the need for additional small boat facilities in the south Puget Sound region. Interviews with owners and operators of the marinas in the area elicited only one opposed to the Port's plan of development. Natural resources agencies recognize the need for additional moorages, but are concerned about the filling of tidelands and the maintenance of water quality in East Bay.

PLANNING OBJECTIVES

4-4. To provide additional moorages in southern Puget Sound with special consideration given to the vicinity of Olympia.

4-5. To provide recreational facilities such as a pier for fishing and sightseeing, utilizing the breakwater required for protection of the moorage area.

4-6. To efficiently utilize water and land resources to improve the quality of life by contributing to the objectives of national economic

development and environmental quality as set forth in the Water Resource Council's Principles and Standards for Planning Water and Related Land Resources.

4-7. To select a specific plan based on a set of technical, economic, environmental, and social well-being criteria and aspects that permits a fair and objective appraisal of the consequences and feasibility of the various alternative plans.

PLANNING CRITERIA

- o Adequate land and water access.
- o Adequate land area and access for shoreside and marina support facilities, including parking.
- o Location central to users.
- o Proximity to dredged material disposal area.
- o Conformity with local land use planning, including the Port's overall plan of development.
- o Compatibility with the management of other port facilities.
- o Constructibility.
- o Availability of utilities.
- o Esthetics of the marina and surroundings.
- o To the maximum extent practical, avoid development in natural areas in favor of development in areas already modified by human or other activities.
- o Minimize adverse effects to water quality and circulation.
- o Minimize adverse effects to aquatic, wetland, and upland habitats.
- o Minimize disturbance to existing residential and industrial areas.
- o Oceanographic data including significant wave height and tide range.
- o Standards for minimum channel widths in sheltered waters detailed in "Marina Recommendations for Design, Construction, and Maintenance," Second Edition, 1961, National Association of

Engine and Boat Modifications, Incorporated, New York 17, New York. (For the exposed entrance channel, a safety margin was added to the minimum width to allow for the yawing and resultant difficulty of controlling boats traversing open waters.)

- o Depths of entrance and access channels and moorage area adequate for the largest craft projected to use the facility and to maintain satisfactory water circulation.
- o Annual costs and benefits based on a 50-year period of analysis and a 7-3/8 percent interest rate.
- o General public acceptance of the proposed plan.
- o Consideration of public health, safety, and social well-being.

POSSIBLE SOLUTIONS

4-8. Alternatives considered for this study are no action, dryland storage for boats generally under 27 feet in length, potential wet moorage marina sites in the southern Puget Sound area, and alternative plans at a selected site.

4-9. Alternative 1 - No Action. This alternative would satisfy few of the planning objectives. It would provide none of the needed moorages in the southern Puget Sound region and would provide no protected area for a launching ramp for trailered boats. However, it would have the least environmental impact, maintain existing water quality, and minimize community disruption.

4-10. Alternative 2 - Dryland Storage. This alternative would satisfy some of the planning objectives. It would not provide wet moorages required by boats over 27 feet in length. Dryland storage facilities would require additional wetland structural measures: launching ramps, piers for temporary tieup of craft, and breakwater protection for the launching and tieup facilities. Access roads, parking, and shoreside facilities would be required. Dryland storage could supplement a marina plan and could relieve some congestion on the highways by providing storage near the water, eliminating the need to trailer boats into and out of the area. It would, however, be limited generally to boats under 27 feet in length, as larger boats are difficult to launch and retrieve. This alternative would be entirely a local option because Federal laws, policies, and regulations do not permit Federal participation by the Corps of Engineers in the planning or construction of dryland storage.

4-11. Alternative 3 - Wet Moorages. Wet moorages would more completely satisfy the planning objective of providing needed moorages in the southern Puget Sound area. This alternative would be eligible for

Federal participation by the Corps of Engineers in planning or construction.

SITE SELECTION

4-12. Ten marina sites (figure 2) were evaluated for their ability to provide suitable wet moorages according to the planning objectives and general criteria outlined in paragraphs 4-5 through 4-9.

4-13. This evaluation eliminated sites 1, 2, 5, and 6, primarily because project costs exceeded benefits. The sites would require relocation of residential areas and had insufficient land available for shoreside and marina support facilities, including parking, without filling highly productive intertidal lands. Land access was limited and utilities would not be readily available. The sites would not be compatible with local land-use planning or the Port's overall plan of development, and would not be suitable for integrating management with other port activities. Site 2 also would require industrial and commercial business relocation. The sites would require excessive dredging and filling of intertidal areas and do not have the support of the local sponsor or the public.

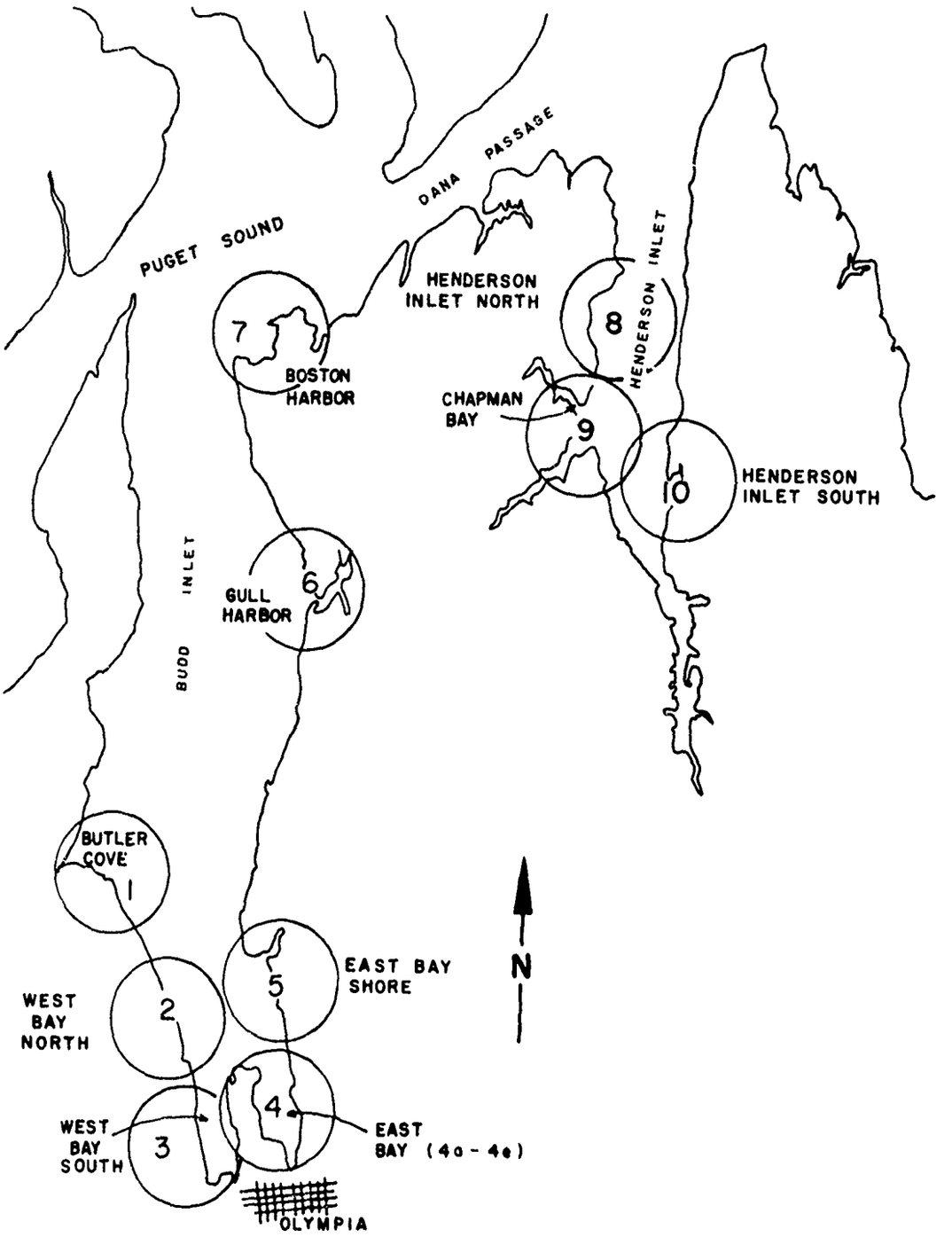
4-14. Site 3 would interfere with deep-draft navigation. The site would not be compatible with the Port's overall plan of development. Insufficient land was available for shoreside and marina support facilities, including parking, without filling highly productive intertidal lands. It does not have the support of the local sponsor or the public.

4-15. Sites 7 through 10 were opposed by residents objecting to the change of residential areas to marina use, with sites 7 and 9 also requiring industrial and commercial business relocation. Major environmental impacts were also associated with sites 7 through 10. These sites did not have the support of the local sponsor. Utilities would not be readily available, and land access was not satisfactory. Sites 8 through 10 were not compatible with local land-use planning or the Port's overall plan of development. Management would be difficult to integrate with existing port activities.

4-16. Accordingly, site 4, East Bay, Olympia Harbor, Washington, was selected for further evaluation.

SELECTING A PLAN

4-17. Five alternative plans were considered for East Bay, site 4. They are designated as plans 4a through 4e and are discussed in the following paragraphs and shown schematically on plate 2c. Economic data shown are those used during plan formulation (April 1979 price level and 6-7/8 percent interest rate). Plan 4a provided the maximum contribution to the national economic development (NED) while minimizing environmental damage and was designated the NED Plan. None of these plans



ALTERNATIVE SITES

FIG. 2

meets the criteria for an Environmental Quality (EQ) Plan. However, plan 4b came closer to meeting the requirements of an EQ Plan and was designated the Least Environmentally Damaging (LED) Plan of the five plans evaluated.

4-18. The overall plan of development for the Port of Olympia includes expansion of the cargo handling area for deep-draft shipping berths on the west side of the peninsula. The proposed deep-draft cargo expansion area is immediately adjacent to the proposed marina. The Port proposes to fill the proposed expansion cargo area with dredged material from the marina. A consultant's study for the Port of Olympia [1/2/] indicated an additional 36 acres of cargo area would be required by the year 1990 if the Port of Olympia was to remain competitive with other Puget Sound ports. The Corps of Engineers has examined the consultant's reports, comparing the 36 additional acres with available cargo area for similar Pacific Northwest ports, and finds the requested cargo area is not excessive. Accordingly, the Corps concurs with the consultant's study. The following plans, 4a through 4e, provide the fill area for cargo handling (acres noted in parenthesis): 4a (24.2); 4b (0); 4c (7.4); 4d (22); and 4e (24.2). About 3 acres of this cargo fill area for plans 4a and 4e would be required for a pond for settlement of storm water surface drainage from the marina service area, parking areas, and the cargo area prior to discharge into West Bay.

4-19. Site 4, East Bay, is in an area which has been highly industrialized for many years. Two sawmills, operated on this site for about 40 years, were discontinued about 1967. The East Bay area was the site for storing logs for milling, transferring to other mills in the area, or exporting. Discharge of sawmill and other wastes into East Bay and the effect of log storage degraded the tidelands and submerged lands until few benthic species inhabit the area. This factor, together with the degraded water quality and the source of this degradation discussed in other sections of this report and the accompanying EIS, makes it improbable the East Bay tidelands and submerged lands could naturally return to a productive state in the foreseeable future. Consequently, relatively little benthic production would be lost by filling the tidelands for additional Port cargo area, marine support area, and the ancillary services area, and by utilization of the submerged lands for the marina.

1/Port of Olympia East Bay Harbor Project, a General Overview and Evaluation, August 1977, prepared by J. Eldon Opheim, Consultant.

2/The Proposed Expansion of Cargo Storage Area at the Port of Olympia, An Economic Assessment, August 1977, by Dr. Phillip J. Borque, Professor of Business Economics, University of Washington, Seattle, Washington.

4-20. Site 4, Plan 4a (NED Plan) (Plate 2c). This plan provides for 800 moorages and involves a total of 110.2 acres, which includes 43.7 acres of tidelands, 65.5 acres of submerged lands, and 1.0 acre of uplands. Dredging 31.3 acres for the moorage area and 25.5 acres for the entrance and access channels totals 1.175 million cubic yards. The dredged material would be used to fill 24.2 acres for the Port's proposed cargo handling area, 26.6 acres for local interest development of marina support facilities, access roads and parking, and 2.6 acres of miscellaneous areas to provide proper surface drainage. The moorage area and access channels would be protected from northwest winds by a 700-foot floating breakwater. This plan meets all of the planning objectives, conforms to the Port's overall plan of development, has the support of the local sponsor and does not involve deepwater disposal of dredged material and its associated costs. The benefit/cost ratio during plan formulation was 1.3 to 1 (The project has a current favorable benefit/cost ratio of 5.3 to 1)[1/].

4-21. Site 4, Plan 4b (LEDP Plan) (Plate 2c): This plan provides for 800 moorages and involves a total of 89 acres. Dredging 1,230,000 cubic yards of material would be required from the 31 acres for the moorage area and 28 acres for entrance and access channels. Filling of 27.0 acres would be required for marina support facilities, access roads, parking, and 2.6 acres of miscellaneous area fill. Eight hundred thousand cubic yards of dredged material would be disposed of in the open-water site in Dana Passage approved by the State Department of Natural Resources (DNR). The cost would be $680,000 greater than land disposal costs proposed in plan 4a. This plan has a benefit/cost ratio of 2.2 to 1. The moorage area and access channels would be protected by a 250-foot floating breakwater. This is a plan which satisfies the planning objectives; makes the most significant contribution toward preserving, enhancing, maintaining, or restoring the cultural and natural resources of the study area; and causes the least environmental impact while addressing the planning objectives. However, Plan 4b does not satisfy the need for additional cargo handling area, which is a part of the overall plan of development for the Port of Olympia, and does not have the support of the local sponsor.

4-22. Site 4, Plan 4c (Plate 2c). This plan provides for 800 moorages and involves a total of 97 acres. Dredging 1.1 million cubic yards of material would be required from the 32 acres of moorage area and 28 acres of entrance and access channels. Dredged material would be used to fill 26.6 acres for marina support facilities, access roads, and parking; 7.4 acres for cargo handling area; and 2.6 acres of miscellaneous fill area. Five hundred thousand cubic yards of dredged material

1/Substantial increase in the benefit/cost ratio resulted primarily from an update of average depreciated values of pleasure craft to 1980 prices. Also more current moorage demand data became available in 1980 (see section 6).

would be disposed of in the DNR open-water site in Dana Passage at an additional cost of $425,000 over land disposal proposed in plan 4a. This plan has a benefit/cost ratio of 2.3 to 1. The moorage area and access channels would require a 400-foot floating breakwater. The plan meets all of the planning objectives, but does not conform to the Port's overall plan of development and does not have the support of the local sponsor.

4-23. Site 4, Plan 4d (Plate 2c). This plan provides for 500 moorages and involves a total of 89.6 acres. Dredging 1.1 million cubic yards of material would be required from the 15 acres of moorage area and the 24 acres of entrance and access channels. Dredged material would be used to fill 26 acres for marina support facilities, access roads, and parking; 22 acres for cargo handling area; and 2.6 acres of miscellaneous fill area. Three hundred and seventy thousand cubic yards of dredged material would be disposed of in the existing DNR open-water site in Dana Passage at an additional cost of $315,000 over land disposal proposed in plan 4a. The moorage area and access channels would be protected by a 900-foot floating breakwater. The plan meets some of the planning objectives, but provides only a few of the needed moorages in the region. Additional moorage space would have to be provided at a future date. It provides much of the cargo area needed by the Port, but because of insufficient moorages, the plan does not have the support of the local sponsor. The plan shows minimal economic justification with a benefit/cost ratio of 1.2 to 1.

4-24. Site 4, Plan 4e (Plate 2c). This plan provides for 700 moorages and involves a total of 87.6 acres. Dredging 1.0 million cubic yards would be required from the 27.5 acres of moorage area and 23.1 acres of entrance and access channels. Dredged material would be used to fill 10.2 acres for marina support area, access roads and parking; 24.2 acres for cargo handling area; and 2.6 acres of miscellaneous fill area. Five hundred fifty thousand cubic yards of dredged material would be disposed of in the existing DNR open-water site in Dana Passage at an additional cost of $468,000 over land disposal in plan 4a. The moorage area and access channels would be protected by a 1,600-foot floating breakwater. This plan meets the planning objectives. However, the site is at the northernmost tip of the peninsula separating East Bay and West Bay and would be subjected to the most severe wave climate of all of the plans for site 4. Ths size and length of the breakwater would make it the most expensive for all plans at site 4, and it shows minimal economic justification with a benefit/cost ratio of 1.2 to 1. Choosing this plan would not eliminate filling of submerged lands and tidelands for the Port's cargo handling area, as that area will probably be filled whether a marina is built or not. Without additional tideland filling, plan 4e has too little land available for marina support facilities. Also, the access roads would be excessively long. For these reasons, it is not favored by the Corps, and it does not have the support of the local sponsor.

4-25. Plans 4a through 4e, described above, were evaluated to determine which one best satisfied the needs of the Port for additional moorages and cargo handling area considering the financial capability of the local sponsor, the desires of local interests, and the physical constraints of the East Bay site. The environmental, economic, and engineering considerations associated with these plans are presented in the display of plan effects (exhibit 1). This evaluation indicated a maximum of 800 moorages should be provided, while maximizing the Port's cargo handling area, with the space and dredged material fill available at East Bay. Thus, plan 4a was selected as the plan to propose for development.

4-26. After selection of the general plan, further consideration was given to alternative breakwaters and anchoring systems, and combinations of each, including:

a. no breakwater,

b. rubblemound breakwater,

c. timber-pile breakwater, and

d. floating breakwater - rectangular modules:

(1) Concrete block anchors for each module.

(2) Timber stake pile anchors for each module.

4-27. Wave analysis, water circulation, and flushing characteristics studies indicated a floating breakwater would be more desirable than a fixed breakwater. A cost analysis of the anchoring system determined stake pile anchors would be the least costly. Accordingly, a concrete floating breakwater with timber stake pile anchors was selected.

SECTION 5. PLAN OF IMPROVEMENT

PLAN DESCRIPTION

5-1. General. An artist's sketch of the general layout of the proposed plan is shown on the photo,[1/] page 5-2. Design of the marina is shown on plates 2a, 2b, 3a, and 3b. Design details are presented in appendix B. Included are an entrance channel, access channel, moorage area with piers and floats, a breakwater for protection of the moorage area and the access channel, access to the breakwater for recreational purposes, and the dredged material disposal area. Breakwater recreational facilities are detailed in appendix C. A design and construction schedule is shown on plate 12.

5-2. Subsurface Exploration. Several generations of subsurface exploration in the project area are detailed in the accompanying plates. Plate 4 shows the contours of the bottom of the bay muds based on all subsurface explorations, and plate 5 shows the geologic section through East Bay sediments. Location of the foundation borings are shown on plate 6. Logs of the borings are shown on plates 7 through 11.

5-3. Foundation Conditions.

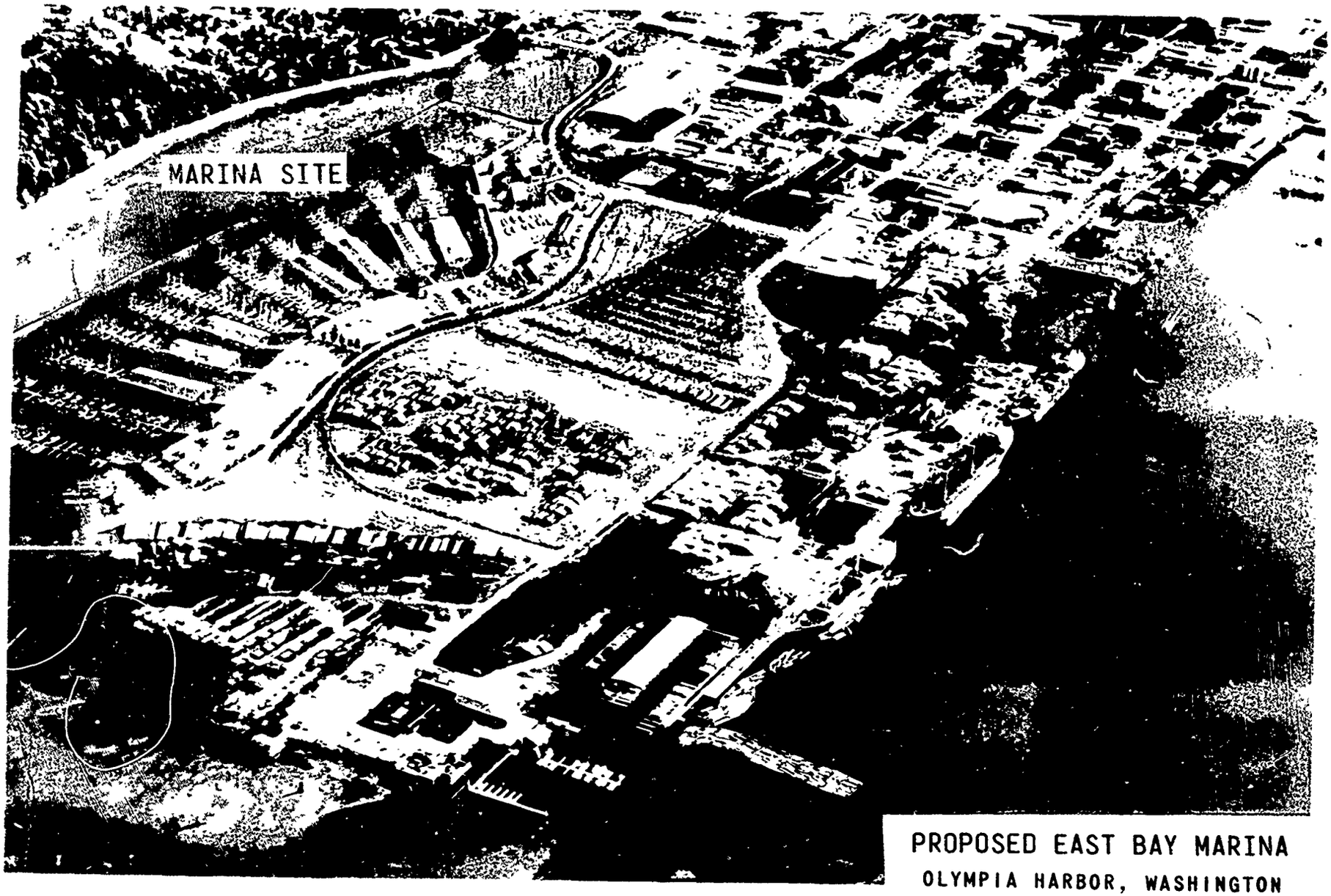
a. Materials to be dredged by the Corps of Engineers for the access channel would consist predominantly of very soft to soft organic silts and sands, with a few zones of medium-dense sands. With the exception of broken piles, sunken logs, and other debris on the bay bottom, dredging is not expected to be unusually difficult. Dredged slopes are planned at 1 vertical on 4 horizontal.

b. Artesian water was encountered on boring 73-8[2/] at approximate elevation -105 feet and in boring 78-F at approximate elevation -42 feet. In addition, artesian water was reported by Dames and Moore[3/] in two borings (20 and 25) located on land east of the project along East Bay Drive. Measurements in boring 78-F indicated head slightly above elevation 21 feet MLLW. The top of the artesian zone is approximately 30 feet below the maximum depth of dredging at the closest point. During periods of low tide, the artesian head may be nearly equal to the weight of overlying soil. Therefore, there is some chance of instability in this area as a result of dredging. The hazard is believed to be relatively small, however, and chances of wholesale failure of the aquifer into the dredged channel are remote. Exploratory borings already penetrating the aquifer have provided some relief to the artesian pressures. In addition, an examination of water well logs in

1/Artist sketch reflects general concept of recommended plan. Details may not be in exact agreement with plates 2a and 2b.

2/See plates 6-11 for boring locations and logs.

3/Engineering consultants for the Port of Olympia, report dated 18 April 1973, and related reports available from the Port office.



PROPOSED EAST BAY MARINA
OLYMPIA HARBOR, WASHINGTON

PHOTOGRAPH 1

the East Bay area reveals that water levels in many of them, while reflecting artesian conditions, vary with the tide. This observation indicates that the artesian aquifer is already locally vented into the tidal waters.

5-4. Breakwater. The breakwater would be a concrete, floating structure consisting of seven hollow, rectangular modules. Each module would be 100 feet long, 16 feet wide, and 5.5 feet deep. Freeboard on the breakwater would be about 1.5 feet. The breakwater would be held in place by anchor lines attached to steel H stake piles driven to full embedment in the medium dense sands below bay muds as shown on plate 3a. The stake pile anchors would be tied to the corners of each module by a 15-foot 1-1/8-inch diameter stud chain connected to a 135-foot-long 7/8-inch diameter galvanized bridge rope cable with impressed current cathodic protection to prevent corrosion. The modules would be connected by thread bar tendons as shown on plate 3b. Final design of the outer concrete module would incorporate an attachment for installation of a navigation light by the U.S. Coast Guard. Also incorporated into the breakwater design would be facilities for mooring boats to the marina side of the breakwater, fenders for protection of the moored craft, and access from the shore to the breakwater. Dredging to 12 feet below MLLW (about 95,000 cubic yards) would be required underneath the breakwater to prevent the breakwater from settling on the bottom during low tides.

5-5. Entrance Channel. About 245,000 cubic yards of material would be dredged for a 150-foot-wide, 3,700-foot-long entrance channel. Dredging would be to 13 feet below MLLW to provide passage to and from deep water in Budd Inlet and the proposed marina entrance.

5-6. Access Channel. About 360,000 cubic yards would be dredged from the two access channels. One channel would run from the marina entrance, extending 3,000 feet southward along the eastern border of the moorage area to provide access to the moorage floats. This channel would be 100 feet wide, dredged to 13 feet below MLLW. The other access channel would extend from the launching ramp 600 feet eastward to the marina access channel. This channel would be 100 feet wide, dredged to 12 feet below MLLW.

5-7. Moorage Area. About 475,000 cubic yards would be dredged from the proposed 31.3-acre moorage area. Dredging would be to 8 feet below MLLW at the southern end, thence to 10 and 12 feet below MLLW, shown on plate 2a. Such a bottom profile would require boats with shallower drafts to moor at the southern end of the marina, but would give better flushing action than a basin dredged to a constant depth.

5-8. Moorage Facilities. Adequate moorage facilities, floats, docks, or piers necessary for 800 small boat moorages.

5-9. Boat Launching Ramp. A boat launching ramp and an access channel to the launching ramp as shown on plate 2a.

5-10. Dredged Material Disposal Areas. The 700,000 cubic yards dredged from the entrance channel, access channels, and beneath the breakwater, and the approximately 475,000 cubic yards dredged from the 31.3-acre moorage area, would be deposited behind dikes to elevation 20 feet below MLLW. This disposal area would provide about 24.2 acres for the Port of Olympia's cargo handling area, 26.6 acres for local interest development of marina support facilities and marina parking areas, and about 2.6 acres of miscellaneous fill for landscaping and proper surface drainage. Because the soft bay mud extends to 20 feet below MLLW over part of the retention dike alinement, detailed stability analyses of the dike will be required prior to government use for retention of dredged material.

5-11. Dredged Material Retention Dike. Three to 8 feet of soft bay mud overlies a substratum capable of supporting the proposed dike for retention of dredged materials. This soft material will be excavated by a barge-mounted clamshell dredge and deposited in the disposal area along the proposed alinement of the dike. The retention dike will be constructed of pit-run granular fill imported from upland sources. The fill will be truck hauled, and end dumped and/or brought in by barge.

5-12. Marina Support Facilities. Access roads, marina parking, sanitary facilities, public viewing, and other shoreside and marina ancillary facilities would be constructed on the dredge fill areas noted above.

5-13. Recreational facilities on the floating breakwater are detailed in appendix C.

5-14. Aids to Navigation. Aids to navigation would be installed by the U.S. Coast Guard. To reduce the cost of installation, standards or bases for navigation lights, or other aids required on the floating breakwater will be incorporated in the final design of the breakwater by the Corps of Engineers.

5-15. Real Estate. Project costs of lands, easements, and rights-of-way are the market value of those lands required for the Federal portion of the project, the general navigation facilities, while project construction will alter the use of the lands. With the exception of the entrance channel (from deep water in Budd Inlet to the floating breakwater) land required for project construction, including tideland disposal area, is owned by the Port of Olympia, the local sponsor of the project.

5-16. The land occupied by the entrance and the main access channel has been designated by the State of Washington as a "State Waterway" for navigation purposes, and dredging for the channels will not alter its designated use.

The proposed breakwater will be a floating structure, anchored by cables to timber stake pile anchors driven into the bottom of the bay. While some initial dredging would be required under the breakwater, the land

under it will remain as submerged land and its use will not be altered. Accordingly, the only cost of lands, easements, and rights-of-way for the marina project (table 5-1) will be the 100-foot-wide, 504-foot-long access channel to the boat launching ramp. The "without project" value would be the project costs for lands required.

5-17. Mitigation Features. Because the project will result in loss of wetlands and attendant fish and wildlife habitat, a number of measures were recommended by the U.S. Fish and Wildlife Service (FWS) to mitigate anticipated losses (see appendixes F and G). Measures which the Port of Olympia has agreed to undertake as a result of extensive coordination with the FWS and the Port include:

- o Maintenance of the West Bay lagoon in a natural condition.
- o Retention and replacement of project-removed piling for wildlife habitat.
- o Possible creation of waterfowl and waterbird islands in East Bay.

These, and other measures which are being or will be accomplished as actions already mandated by existing permits or laws and regulations are discussed in appendixes F and G).

5-18. Model and computer studies indicated a probable reduction in East Bay dissolved oxygen levels due to a project-related reduction in water exchange. As a condition of project approval, the Environmental Protection Agency (EPA) required that an aeration system be installed to maintain Class B water quality standards within the marina (see appendix G). Accordingly, an aeration system is a mitigation feature of the Federal project with 33 aeration units to be located throughout the marina (see appendix D).

CONSTRUCTION

5-19. Assuming authorization and availability of funds, it is estimated that the general navigation facilities, breakwater recreational facilities, moorage area, cargo handling fill, and the fill areas for access roads, marina parking, and shoreside facilities with dredged material could be designed and constructed in less than 2 years. Construction of the general navigation facilities alone is estimated at 15 months. Consideration will be given to utilizing two contracts for the Federal work; one contract for dredging, and the other for the floating breakwater.

OPERATIONS

5-20. Police and Fire Protection. The Port of Olympia's security force would be increased to provide routine protection. City police and State Patrol are available for additional assistance. Fire protection, provided by the city, is adequate for the proposed marina.

5-21. Coast Guard Protection. The Olympia area is patrolled by Coast Guard vessels on the basis of need and as resources are available. The projected boating increase could result in a substantial increase in the number of Coast Guard search and rescue cases in the surrounding area.

5-22. Sewage and Waste Disposal. Port facilities would be connected to the Olympia Sewage Treatment Plan. Expansion of the local sewage treatment facility to include secondary sewage treatment is scheduled for completion in 1981, and it will adequately handle all sewage disposal needs of the Port. A storm sewer network will serve all paved areas on the Port peninsula.

5-23. Refuse Collection. Refuse collection provided by the city of Olympia would be expanded to include the marina and commercial tenants.

5-24. Other Utilities and Services. Water service and power outlets would be provided, including those on the floating breakwater. Public telephone booths would be located at various points within the marina. Major buildings would be served with natural gas. Public restrooms would be constructed at approximately 600-foot intervals along the seawall walkway. Bus service to and from the port area would be provided by Inter-City Transit Commission.

5-25. Water Quality Monitoring.

a. During Construction. Water quality will be monitored in East Bay by the Corps of Engineers during dike construction and during dredging operations. Design of this monitoring program will be coordinated with and approved by WDE and EPA. Parameters normally measured during monitoring programs of this type include dissolved oxygen (DO) concentrations, turbidity, salinity, pH, and temperature. Details of the during-construction monitoring program will be determined during the plans and specifications stage of this project.

b. Post Construction. A water quality monitoring program of the East Bay marina will be carried out by the Port of Olympia after the marina has been constructed. Continuous monitoring of DO is essential during the critical summer months. Monitoring will determine when the aeration system for East Bay should be operated. The Corps of Engineers will monitor the activities of the Port and collect some additional water quality data to verify conclusions reached through use of the EPA model (section 4.1.3.2 of the EIS). Details of the postconstruction monitoring program will be determined during the plans and specifications stage of this project.

5-26. Fish Monitoring. Depending upon the timing of the dike construction and dreding operations during the construction of the East Bay marina, a monitoring program may be necessary to determine whether or not large concentrations of fish, mainly smelt and herring, are present

in the construction area (see WDF letter, appendix G). This monitoring program will be coordinated with, and approved by, the WDF. Details of this program will be determined during the plans and specifications stage of this project.

MAINTENANCE

5-27. Dredging. Maintenance dredging of the moorage area is estimated at 25,000 cubic yards at year 25. Maintenance dredging of the entrance and access channels is estimated at 50,000 cubic yards at year 25. Accordingly, maintenance dredging may be required only once during the 50-year life of the project. Maintenance dredging would be by clamshell, with barge disposal in deep water at Dana Passage about 7 nautical miles north of East Bay (figure B-11, appendix B).

5-28. Breakwater. The concrete modules of the floating breakwater would be designed for a 50-year life. However, annual maintenance of cathodic protection and repairs for spalling of the concrete may be required. Above-water inspections of the breakwater would be made annually and after storms. Below water inspection of the breakwater modules, piles, anchor chains, and connectors would be made by divers every 3 years. Breakwater maintenance will be a responsibility of the Corps of Engineer.

5-29. Moorage Support and Recreational Facilities. Periodic maintenance of the moorage floats, docks, piers, or wharves; access roads; marina parking; shoreside facilities; recreational facilities on the floating breakwater; and other marina support facilities would be undertaken by the Port of Olympia.

5-30. Water Quality Aeration System. Annual operation and maintenance of the marina aeration system will be required, including care of the portable aeration units, by the Port of Olympia.

ESTIMATES OF COSTS

5-31. Estimates of first and Federal maintenance costs are detailed in Appendix B, "Analysis of Design and Estimates of Cost." The costs are based on October 1980 price levels. First costs of the general navigation facilities and recreational facilities on the floating breakwater for the selected plan are summarized in table 5-1. Federal and non-Federal maintenance costs and average annual maintenance costs are summarized in table 5-2. Costs of breakwater recreational facilities are detailed in appendix C.

TABLE 5-1

SUMMARY OF ESTIMATED FIRST COSTS[1/]

1.	General Navigation Facilities		
	a. Breakwater	$730,000	
	b. Dredging Entrance and Access Channels	1,015,000	
	c. Contingencies	475,000	2/
	Subtotal	$2,220,000	
	d. Engineering and Design	241,000	2/
	e. Supervision and Administration	138,000	2/
	Subtotal - General Navigation Facilities	$2,599,000	
2.	Aeration System (Portable Units)[5/]	152,000	
3.	Environmental Monitoring During Construction	27,000	
4.	Locally Constructed Dikes for Federal Dredging	578,000	3/
5.	Lands for General Navigation Facilities	40,000	
	Subtotal	$3,396,000	
6.	Aids to Navigation - U.S. Coast Guard	45,000	
	Subtotal - General Navigation Facilities	$3,441,000	
7.	Recreation Facilities on Floating Breakwater[4/]		
	a. Direct Construction Costs	$62,000	
	b. Contingencies	16,000	
	c. Engineering and Design	6,000	
	d. Supervision and Administration	6,000	
	Subtotal - Recreation Facilities	$ 90,000	
	TOTAL FIRST COSTS	$3,531,000	

1/October 1980 price levels numbers rounded.

2/Does include contingencies, E&D, or S&A on general navigation portion of aeration system but not on locally constructed dikes for dredge disposal.

3/Port of Olympia estimated cost. Includes contingencies, E&D, and S&A.

4/Does not include facilities for temporary tieup of pleasure boats.

5/Portion of aeration system costs that is attributable to general navigation facilities. Contingencies, E&D and S&A are reflected in the above allowances for general navigation facilities.

TABLE 5-?

ESTIMATED FEDERAL PROJECT MAINTENANCE COSTS

FEDERAL	Costs 2/	Average 1/ Annual Costs
1. Breakwater		
a. Above-Water Inspection (Annually and After Storms)	$1,200	$1,200
b. Below Water Inspection (Every 3d Year)	5,800	1,800
c. Repairs and Replacement		
(1) Spalling - Annually	1,200	1,200
(2) Maintain Cathodic Protection System (Annually)	1,200	1,200
(3) Replace Anodes on Cathodic Protection System (25-Year Intervals)	7,000	100
2. Dredging - Deepwater Disposal (Every 25 Years)	174,000	2,200
3. Annual Water Quality Monitoring	4,000	4,000
Subtotal		11,700
4. Contingencies		3,300
5. Engineering and Design		1,000
6. Supervision and Administration		1,000
TOTAL - Corps of Engineers		$17,000
7. Aids to Navigation - U.S. Coast Guard		4,000
Subtotal - Federal Cost		$21,000
NON-FEDERAL		
8. Maintenance of Recreation Facilities On Federal Floating Breakwater		1,000
9. Operation and Maintenance of Aeration System		5,000 3/
Subtotal - Non-Federal Cost		$6,000
TOTAL FEDERAL AND NON-FEDERAL		$27,000

1/Numbers rounded; 7-3/8 percent interest rate, 50-year project life.
2/Does not include contingencies, E&D, and S&A.
3/Annual cost of operating, maintaining, and replacing aeration system ($12,000) treated as entirely a local cost, but portion (45 percent) is attributable to general navigation facilities and included in benefit-to-cost ratio.

SECTION 6. BENEFIT DETERMINATION

6-1. General. The primary source of data for this report was the 1980 Recreational Small Boat Moorage Study,[1/] supplemented by interviews with Port of Olympia staff and local marina operators. The Puget Sound and Adjacent Waters (PS&AW) Recreation Moorage Study divided the Puget Sound region into three divisions, with Thurston, Mason, Clallam, and Jefferson Counties constituting the western division. Thurston County was considered the primary recreational boating market for the proposed project, although moorage demand may come for other areas in Puget Sound or northwestern Oregon.

6-2. Methodology.

a. Average annual benefits accruing to each type of pleasure craft were computed in conformance with EM 1120-2-113, "Benefit Evaluation and Cost Sharing for Small Boat Harbor Projects" (1 June 1959). Pleasure craft benefits were based on the assumption that a reasonable estimate of pecuniary recreational navigation benefits to a boat user is the net rate of return he would receive if he operated his boat on a rental or

1/Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters, U.S. Army Corps of Engineers, Seattle District, October 1980. This study assessed existing moorage demand, supply, and need for the 12 counties contiguous to Puget Sound and adjacent waters. Moorage need was projected to the year 2000 charter basis. Assuming straight-line depreciation, average depreciated value over service life of a boat is equal to one-half of average value of a comparable new boat, including cost of outfitting the boat with navigation and safety equipment. The average depreciated values, the range of rates of return for the three types of craft considered, and percentages used in this report are shown in table 6-1. Average annual benefits were based on October 1980 price level, 7-3/8 percent interest rate, and a 50-year (1983-2033) project life.

TABLE 6-1

RECREATIONAL CRAFT BOAT VALUES
AND RATES OF RETURN

Type of Boat	Average Depreciated Market Value	Net Annual Rate of Return (Percent)	Percent Used In This Report
Inboard	$36,900	8 - 12	10
Outboard	$3,300	10 - 15	13
Auxiliary Sailboat	$26,700	6 - 9	8

b. For this analysis, three types of moorages were considered. "Permanent moorage" is defined as year-round moorage at home port. "Temporary moorage" is moorage away from home port where a boat is kept from 4 to 29 days in the study area. Data from a questionnaire survey conducted for the 1980 Recreational Small Boat Moorage Study showed average stay for temporary craft was 13 days during the summer and 14 days during the winter. "Transient moorage" is defined as moorage for boats with home port elsewhere which moor in the study area from 1 to 3 days. Average stay for transient craft was 3 days during the summer and 3 days during the winter.

c. As shown in table 6-2, percent use of home based moorage by permanent, temporary, and transient craft was estimated in order to distribute benefits to the proposed moorage facility. Percentages for permanent craft were estimated from responses to the questionnaire survey. By definition of temporary and transient craft, moorage use by these vessels was assumed to be 100 percent for the few days they are moored at East Bay. Benefits provided by the proposed marina were reduced by the percent of time permanent craft were assumed to be cruising or using other docking facilities.

TABLE 6-2

RECREATIONAL CRAFT - PERCENT OF TIME AT HOME MOORAGE

Type of Craft	Moorage Type		
	Permanent	Temporary	Transient
Inboard	92	100	100
Outboard	95	100	100
Auxiliary Sailboat	87	100	100

6.03 Boating Population and Distribution. Population in the PS&AW western division in 1978 was 190,800 and the estimated total number of pleasure craft was 19,200. Consequently, there was approximately one pleasure craft for every 10 people, or about 101 boats per 1,000 population. Based on a telephone survey of marinas in Thurston County, an estimated 60 percent of required moorages would be for inboards,1/ 10 percent for outboards, and 30 percent for auxiliary sailboats. Among power craft moored at local marinas, there has been a substantial shift toward larger inboard power boats.

6.04 Benefits to Permanent Recreational Craft.

a. Need for additional permanent pleasure boat moorages to be supplied by the proposed marina was determined from the 1980 PS&AW Recreational Boat Moorage Study. This study showed a 1978 year round

1/Inboard includes those craft classified as inboard-outboard.

permanent demand for 1,137 moorages in Thurston County. Future increases in the quantity of permanent moorage spaces demanded per yearat East Bay was assumed to increase at the same rate as pleasure boat ownership. The 1980 PS&AW moorage study determined that the most likely scenario of future pleasure boat ownership growth was based on projected population growth, plus one-half the projected growth rate for per capita real income. The estimated quantity of permanent moorage demanded at East Bay was based on current population and per capita income projections for the western division. An average annual growth rate of 4.4 percent between 1978 and 1980, 3.4 percent between 1980 and 1990, and 2.6 percent between 1990 and 2033[1/] was used to project permanent moorage demand. Project year one (1) was assumed to be 1983 with project economic life of 50 years.

b. Within Thurston County, 1,103 wet moorage and dry storage slips were identified in 1978 (1980 PS&AW Recreational Boat Moorage Study). Based on current local moorage patterns, an estimated 80 percent, or 882, of these moorage spaces were designated for permanent craft. During the summer and winter boating seasons, 10 percent, or 110 moorages, were assumed to be reserved for temporary craft, while the remaining 10 percent (110 moorage spaces) would be reserved for transient craft. It is assumed that the proposed East Bay small boat marina (800 berths) will satisfy, in 1983 and beyond, a maximum of 75 percent of all new permanent, temporary, and transient moorage requirements in Thurston County. Because of leasing priority given to permanent tenants, the percent of temporary and transient moorages supplied by East Bay will decline throughout project life (1983-2033).

c. Permanent moorage demand and needs satisfied by East Bay Marina for selected years are presented in table 6-3. Permanent moorage demand is projected to increase from 1,137 in 1978 to 5,220 spaces by the year 2033. In the absense of additions to, or construction of, alternative moorage facilities, permanent moorage usage at East Bay would increase from 366 in 1983 (project year one) to capacity (800 spaces) by the year 1995.

TABLE 6-3

PERMANENT MOORAGE REQUIREMENTS
THURSTON COUNTY, 1978-2033

Year	Projected Demand	Existing Moorage Spaces	Permanent Moorage Requirements	Requirements Satified by East Bay
1978	1,137	882	255	
1983	1,370	882	488	366
1990	1,731	882	849	637
1995	1,968	882	1,086	800
2033	5,220	882	4,338	800

1/Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters, U.S. Army Corps of Engineers, Seattle District, October 1980, page 26, Pleasure Boat Projections.

d. Average annual benefits by type of craft requiring permanent moorages are shown in table 6-4. Benefits provided by the proposed marina do not include that percent of time the boats are cruising and using other docking facilities.

TABLE 6-4

ANNUAL BENEFITS BY TYPE OF CRAFT
PERMANENT CRAFT

Type of Craft	Average Depreciated Value	Annual Percent Net Return	Percent Use of Home Moorage	Annual Benefits Per Craft
Inboard	$36,900	10	92	$3,395
Outboard	$3,300	13	95	$408
Auxiliary Sailboat	$26,700	8	87	$1,858

e. Table 6-5 summarizes National Economic Development (NED) benefits accruing to permanent recreational craft for selected years. The assumption was made that one-half of the first year users of the proposed facility would be new boatowners. Because these users do not currently own and operate recreational craft, they would receive 100 percent of potential benefits attributable to the East Bay project. The remaining one-half of first-year users were assumed to be transfers from other marinas or boatowners who currently trailer their boats or use dryland storage. Because they already own and operate their craft, these users would receive benefits from boat ownership with or without the proposed project. Project benefits to these users were reduced to 40 percent of potential benefits to reflect current boat ownership. Benefits to these users would remain at 40 percent of potential benefits throughout project life. Overall benefits to first-year users were weighted at 70 percent of potential benefits.[1/] Beyond 1983, all subsequent users of permanent moorage facilities were assumed to be new boatowners who will realize 100 percent of potential benefits. Average annual benefits to permanent recreational craft amount to $1,415,000.

6-5. Benefits to Temporary Recreational Craft.

a. Benefits to temporary recreational craft were estimated for summer (mid-April to mid-September) and winter (mid-September to mid-April) use. Temporary moorage demand for Thurston County in 1978 was obtained from the 1980 PS&AW Moorage Study and was estimated at 1,199 boats staying an average of 13 days during the summer and 799 boats staying an average of 14 days during the winter. Using the moorage study ratio of one moorage for 10 temporary boats, 120 temporary

1/ (.50 x .40) + (.50 x 1.00) = 70

moorages were required in 1978 for summer use and 80 for winter use. This quantity of temporary space demanded was estimated to grow at an average annual rate of 3.9 percent between 1978 and 1980, 2.8 percent between 1980 and 1990, and 2.4 percent between 1990 and 2033. As temporary demand comes from throughout Puget Sound, growth rates were based on current population projections for the entire Puget Sound and Adjacent Waters region plus one-half the projected growth rate for per capita real income. By project year one (1983), 141 temporary moorages would be required for summer use and 93 for winter use.

TABLE 6-5

PERMANENT CRAFT BENEFITS
1983-2033

Year	Total	Inboards	Outboards	Auxiliary Sailboats	Annual Benefits
1983	366	220	37	109	$675,200
1987	513	308	51	154	1,062,600
1990	637	382	64	191	1,389,400
1994	777	466	78	233	1,758,400
1995-2033	800	480	80	240	1,819,000
Average Annual Benefits (50-year life, Discounted at 7-3/8 percent)					$1,415,000

b. Temporary moorage supply was estimated at 110 moorages, leaving a deficit in 1983 of 31 moorages during the summer and a surplus of moorages during the winter. East Bay will provide 23 moorages, or 75 percent, of the 31 summer temporary moorages required. As moorage demand for winter temporary space continues to increase, a deficit of three moorages occurs by 1990. East Bay will provide two, or 75 percent, of these requirements. Because of leasing priority given to permanent craft, no temporary moorage was anticipated at East Bay beyond 1994 during the summer or winter. For purposes of benefit evaluation, each boat requiring temporary moorage was equivalent to 0.0356 permanently moored boats (13 days ÷ 365 days) during the summer and 0.0384 permanently moored boats (14 days ÷ 365 days) during the winter. Average annual benefits to temporary craft over the 50-year project life amount to $21,900 for summer temporary craft and $1,200 for winter temporary craft.

6-6. Benefits to Transient Recreational Craft.

a. As with temporary craft, benefits to transient recreational boats were calculated for summer and winter use. The 1980 PS&AW Moorage Study was again used as the source for the 1978 estimate of 1,598 boats

seeking summer transient moorage in Thurston County and 1,199 boats seeking winter moorage. The average stay for transient craft was 3 days during the summer and 3 days during the winter. Using the moorage study ratio of 1 moorage for 10 transient craft, 160 transient moorages were required in 1978 for summer use and 120 for winter use. This quantity was expected to increase in the future at the same rates projected for temporary craft. By 1983, the first year of project operation, 188 transient moorages would be required for summer use and 141 for winter use.

b. With the supply of transient moorage in Thurston County estimated at 110 slips, a deficit in 1983 of 78 moorages would be expected during the summer and 31 moorages during the winter. The proposed East Bay Marina will provide a maximum of 75 percent of these requirements or 58 summer moorages and 23 winter moorages. Because of leasing priority given to permanent craft, no transient moorage was anticipated at East Bay beyond 1993 during the summer and beyond 1994 during the winter. For purposes of benefit evaluation, each boat requiring transient moorage was equivalent to 0.0082 permanently moored boats (3 days ÷ 365 days) during the summer and winter. Average annual benefits to transient craft over the 50-year project life amount to $8,700 for summer transient craft and $4,900 for winter transient craft.

607. Summary of Recreational Craft Benefits. The distribution of projected use of East Bay Marina by moorage type is shown for selected years in table 6-6. The 800-boat marina would be fully utilized by 1991 during the summer and by year 1993 during the winter. Undiscounted recreational benefits accruing to permanent, temporary, and transient craft are displayed for selected years in table 6-7. Average annual equivalent discounted benefits are also shown by boat type in table 6-7.

TABLE 6-6

PROJECTED MOORAGE DISTRIBUTION
EAST BAY MARINA, 1983-2033

	Summer				Winter			
Year	Permanent	Temporary	Transient	Total	Permanent	Temporary	Transient	Total
1983	366	23	58	447	366	0	23	389
1985	437	29	67	533	437	0	29	466
1987	513	35	75	623	513	0	35	548
1989	594	42	84	720	594	0	42	636
1990	637	46	88	771	637	2	46	685
1991	671	49	80	800	671	4	49	724
1993	741	56	3	800	741	8	51	800
1994	777	23	0	800	777	10	13	800
1995-2033	800	0	0	800	800	0	0	800

TABLE 6-7

UNDISCOUNTED AND DISCOUNTED AVERAGE ANNUAL
RECREATIONAL BOATING BENEFITS - $1,000
1983-2033

Year	Permanent	Summer		Winter		Total Benefits
		Temporary	Transient	Temporary	Transient	
1983	$675.2	$23.7	$13.8	$0	$5.5	$718.2
1985	862.3	29.9	15.9	0	6.9	915.0
1987	1,062.6	36.1	17.8	0	8.3	1,124.8
1989	1,276.1	43.3	20.0	0	10.0	1,349.4
1990	1,389.4	47.5	20.9	2.?	10.9	1,470.9
1991	1,479.0	50.5	19.0	4.5	11.6	1,564.6
1993	1,663.5	57.8	.7	8.9	12.1	1,743.0
1994	1,758.4	23.7	0	11.1	3.1	1,796.3
1995-2033	1,819.0	0	0	0	0	1,819.0
50-Year Life[1/]	$1,415.0	$21.9	$8.7	$1.2	$4.9	$1,451.7

1/Discounted at 7-3/8 percent interest.

6-8. Harbor of Refuge Benefits. Southern Puget Sound contains many small harbors and bays which provide ample temporary protection from local storms and rough water. Harbor of refuge benefits were not included in the East Bay Marina economic analysis.

6-9. Commercial Fishing Craft Benefits. Commercial fishing boats were not expected to utilize the proposed facility.

6-10. Land Enhancement Benefits. Land enhancement benefits were determined as prescribed by EM 1120-2-113, "Benefit Evaluation and Cost-Sharing for Small Boat Harbor Projects" (11 June 1959), which specifies that benefits to lands filled by Federal dredged material would be based on the increased value of the filled land or the cost of providing fill by the cheapest alternative means, whichever is less. Under the proposed plan, 32 acres of land would be filled with material dredged from the Federal portion of the project. The 1980 appraised value before filling was $720,000 and, after filling, was $3,475,000 for an enhanced value of $2,755,000. Filling this land from the nearest upland borrow source would require 700,000 cubic yards of material at $3.50 per cubic yard for a total cost of $2,450,000. Filling the land with material dredged from the proposed project would require 700,000 cubic yards at an estimated $1.70 per cubic yard or $1,190,000. Accordingly, the least-cost method for project benefits from land

enhancement is filling with project dredged material, giving total land enhancement benefits of $1,190,000. Average annual land enhancement benefits, based on 7-3/8 percent rate of return, would be $90,000.

6-11. National Economic Development (NED) Employment Benefits. As of September 1980, Thurston County was not listed as an area of substantial and persistent unemployment by the Economic Development Administration, U.S. Department of Commerce. Accordingly, NED employment benefits were not estimated for the proposed project.

6-12. Recreational Benefits - Floating Breakwater. An analysis of breakwater recreational benefits is presented in appendix C. Average annual benefits were estimated at $25,000.

6-13. Average Annual Benefits - Summary. A summary of average annual benefits which would accrue to the proposed project is presented in table 6-8.

TABLE 6-8

SUMMARY OF AVERAGE ANNUAL BENEFITS
1983-2033

Recreational Boating	$1,452,000
Land Enhancement	90,000
Breakwater Recreational Facilities	25,000
TOTAL BENEFITS	$1,567,000

6-14. Benefit-to-Cost Analysis. Estimated average annual benefits, first cost, average annual costs, and benefit-to-cost ratio are shown in table 6-9.

TABLE 6-9

BENEFIT-TO-COST ANALYSIS[1/]

Average Annual Benefits	$1,567,000
First Cost	$3,531,000
Average Annual First Cost	268,000
Average Annual Maintenance Cost	27,000
Total Average Annual Costs	$295,000
Net Average Annual Benefits	$1,272,000
Benefit-to-Cost Ratio	5.3 to 2

1/Based on October 1980 price level, 7-3/8 percent interest rate, and 50-year (1983-2033) project life.

6-15. Project Maximization. In selecting a marina plan, maximum moorage capacity was governed by these factors: The financial capability of the Port of Olympia to provide moorages and support facilities, space limitations at the selected site, and the desire of environmental agencies to limit the size of the proposed project. Although larger projects would be required to meet the entire demand for small boat moorages, complete economic analysis was undertaken only for a limited range of marina sizes and configurations. Of these, the 800-berth size makes most effective use of the land and water resources under the above constraints.

SECTION 7. PLAN EFFECTS

PLAN ACCOMPLISHMENTS

7-1. The major benefits that will result from the proposed plan of improvement are:

- o provide 800 of the needed pleasure boat moorages in southern Puget Sound,
- o provide land enhancement from dredged material filling of the area for development,
- o provide shoreside facilities for transient boaters now using and projected to use the area,
- o provide a public landing dock and fuel dock for transient boaters,
- o provide a public launching ramp for trailered boats and parking space for the cars and trailers, and
- o provide facilities for recreational fishing and sightseeing from the floating breakwater.

EFFECT OF PLAN ON THE ENVIRONMENT

7-2. The effects of the proposed project on the local environment are identified as follows:

- o Additional floats, breakwaters, and pilings for the floats would provide increased habitat for attached marine organisms.
- o Expansion of the cargo handling area would reduce double handling of cargo now stored at the city airport prior to water shipment.
- o The filled area would replace productive intertidal wetlands and submerged lands with level, port-oriented industrial lands, improved roads, and sanitary and access facilities with a graded, developed, and maintained shoreline.
- o Marina development would displace avian populations to an unknown extent.
- o Filling would remove about 52.4 acres of productive tidelands and submerged lands from the marine ecosystem.

- o Dredging would change about 56.8 acres of tidelands and shallow subtidal lands to a deepwater (-10 to -15 feet MLLW) marine habitat.

- o By providing increased habitat for attached and marine and plagic species and increasing aquatic habitat for phytoplankton, marina development will likely cause a larger number of marine organisms to perish during the periodic dissolved oxygen (DO) sag than perish at present.

- o Air polluton and noise levels due to increased boat and vehicular traffic would increase.

- o A localized and temporary increase in suspended and dissolved solids in project waters during construction.

SOCIOECONOMIC EFFECTS

7-3. General. The primary social and economic effects of the proposed marina were determined by a socioeconomic impact analysis. Each effect that was considered significant, or was specifically mentioned for consideration in Section 122 of the River and Harbor Flood Control Act of 1970 (Public Law 91-611), is described in the following paragraphs.

7-4. Residential Impact. The proposed marina development would lie entirely within an existing commercial-industrial area. The nearest residential neighborhood is located on East Bay Drive along the east edge of Olympia Harbor. No neighborhood disruptions would occur, and no displacement of people would be required because of access and locations. Noise from the marina and traffic during peak activity hours would not disturb the overlooking neighborhood. The proposed marina may enhance land values along East Bay. Marina development is unlikely to significantly affect community or regional growth because the construction work force would be small and temporary, and most permanent marina users would be local residents.

7-5. Business and Industrial Activities. New businesses expected in the area include marine-related specialty shops, a marine service station, a boat repair facility, and a restaurant. Existing retail establishments in the immediate vicinity of the harbor would increase sales. Dredged materials from basin development would expand cargo area for the Port of Olympia for deepwater commerce operations. This additional cargo area is vital to the long-run economic viability of the Port.

7-6. Employment. Project implementation would enhance employment in Olympia, including activities by the Federal Government, Port of Olympia, and new businesses attracted to the project area. Federal involvement would be limited to supervisory construction and dredging operations. Construction would be performed by private contractors.

Construction would last about 1 year and employ at any one time an average of about 10 workers during the year, including dredge, crane, tugboat, and heavy equipment operators and surveyors. The Federal portion of the project would not have a significant effect on employment in Washington State or Thurston County.

7-7. Operation and maintenance of the proposed project, a Port activity, may have more effect on employment levels in Thurston County.

7-8. Relocation and Congestion. The proposed project access road would serve commercial truck traffic to the Port area as well as the marina. The existing traffic pattern requires trucks to pass through downtown Olympia via heavily traveled city arterials, resulting in severe congestion during business hours. The proposed access route would bypass most of the downtown area. No serious conflict is foreseen between marina and truck traffic. The access road and proposed parking facilities have been coordinated with appropriate agencies for minimum community impact.

7-9. Property Values. The proposed facility may have a measurable impact on residential property values, especially along East Bay Drive and the higher elevations of adjacent land with a veiw of the water. As the view of the project site changes from the existing mudflats and exposed pilings to a variety of boats and associated marina structures, appreciation of property values can be expected. Impact of the project on commercial property west of the proposed basin is expected to be minimal. The marina would be a buffer between the East Bay Drive residential area and the Port industrial area.

7-10. Tax Revenues. Project induced increases in residential property value would increase tax collections. Business and occupation tax revenues, as well as commercial property tax revenues, would increase from additional marina-related commercial enterprises. Thurston County taxes pleasure craft as personal property, and the large number of additional vessels in the marina may have a significant impact on this category of tax income.

7-11. Lesiure and Recreational Opportunities. The project would enhance recreational opportunities by providing moorage for small recreational craft and recreational fishing and sightseeing from the breakwater.

7-12. Local Cost Contribution. Non-Federal costs will be contributed by the Port of Olympia. The Port has analyzed the financial aspects of marina construction repayment, and has indicated full acceptance of local contribution.

EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS

7-13. Intertidal, nonvegetated (by macroscopic species) areas are defined as "wetlands" by Executive Order 11990, Protection of Wetlands. This report classified all intertidal areas to be affected by dredging or filling as intertidal wetlands. No extensive salt marshes or eelgrass beds occur at the selected site. Detailed analysis is provided by Section 4.5.4 of the EIS.

7-14. Under the selected plan (plan 4a), a total of 43.7 acres (17.8 ha) of tidelands would be affected by dredging and filling. In addition, another 65.5 acres (26.3 ha) of submerged lands would be affected by dredging and filling. Of the total, about 15.2 acreas (6.1 ha) of tidelands and 8.0 acres (3.2 ha) of submerged lands would be filled to provide the Port of Olympia with additional cargo storage areas. The above cargo area is a disposal site for dredged material. East Bay sediments were analyzed in 1974 and found to not meet then current EPA criteria for open water disposal. Agency preference was confined disposal of East Bay sediments over open water disposal. At that time, it was anticipated that some East Bay sediments would have to be disposed of in open water and that some, undetermined volume would be acceptable. Subsequent analysis by the Corps showed that plan 4a would have the capacity to contain all dredged material. Plans 4b and 4c would require some open water disposal. Criteria for open water disposal have changed, but agency concerns have been repeated (appendix H).

7-15. Cargo area is limited on the port peninsula, and the Port is forced to use vacant lands for cargo storage at the Olympia Airport 7 miles (11 km) distant from the waterfront. This necessitates double handling of cargoes, an inefficient and expensive practice from both a cargo handling and energy consumption view. The development proposed by the Port for both the cargo handling fill and the fill for marina support facilities are both clearly water dependent. Siting the marina at another location would require duplication of certain facilities and thus spread wetland alterations over a greater area.

7-16. Alteration of 43.7-acre portion (17.8 ha) of the intertidal lands at East Bay would reduce the acreage of the nation's wetlands and result in a loss of biological productivity to the entire Budd Inlet ecosystem. The effects of this loss could be spread throughout southern Puget Sound by food chain transference. However, the wetlands of East Bay have been degraded by past industrial activities and by chronic water quality problems. The most productive areas in Olympia Harbor are found elsewhere, and would remain unaffected by the project. The biological losses are, therefore, judged to be small and acceptable in light of the social and economic benefits to be derived. Development of the area was foreseen and approved under the State Costal Zone

Management Plan and the State Shoreline Management Act (SMA) through the Master Program for Thurston County. Furthermore, the dredge and fill operation would be designed to minimize effects on the adjacent intertidal lands and would be monitored during construction. Therefore, in accordance with Section 2a of Executive Order 11990, it is determined that no practicable alternative to the proposed alteration exists, and that the selected plan includes all practicable measures to minimize losses to wetlands as a result of construction.

COASTAL ZONE MANAGEMENT

7-17. The National Coastal Zone Management Act of 1972 encourages effective management, protection, and development of national coastal resources. The project area is classified as Urban Environment, permitting development of a water-dependent, cargo handling area and a marina with support facilities. Under provisions of the SMA, as amended, a permit for marina development (Substantial Shoreline Development Permit) was issued to the Port of Olympia by the city of Olympia on 30 April 1976. The city's actions was appealed, but on 21 January 1977, the Shorelines Hearing Board and the Pollution Control Hearing Board upheld the issuance of the permit. Accordingly, the proposed action is consistent with the existing State Shoreline Master Program and the Coastal Zone Management Act.

EXECUTIVE ORDER 11988, EFFECTS ON THE FLOOD PLAIN

7-18. Executive Order 11988 and related regulations define the base flood elevation, for this purpose, as the elevation of the 100-year recurrence interval in this project area, 18.2 feet above MLLW.

7-19. About 14.0 acres of tidelands and 42.8 acres of submerged lands, totaling 56.8 acres, will be dredged for the entrance and access channels and for the moorage area, altering the productivity of this acreage. Neither the filling nor the dredging would have any influence on the base flood elevation of the adjacent areas. As the elevation of all filled areas would exceed the base flood elevation, such areas would be unaffected by the 100-year frequency flood. Natural and beneficial resources in the "without project" flood plain lost as a direct result of project implementation would be the productivity of 29.7 acres of intertidal lands and 22.7 acres of submerged land to the estuary system.

7-20. Recreational boating is a direct water-dependent function, and moorages must be constructed in the base flood plain. As floating structures, they would incur no damage from flooding. The area to be filled would be above the base flood elevation and no damage would be incurred as a result of the 100-year frequency of occurrence.

7-21. The major project benefits are recreational benefits accruing to recreational craft owners. Lesser benefits accrue from recreational fishing and sightseeing from the breakwater, from increased land values

resulting from deposition of dredged material on land that could not be developed without filling, and benefits in increased employment during construction. Indirect benefits accrue to ancillary services.

7-22. The selected plan for improvement lies entirely within the area of tidal influence. Riverine effects do not influence the base flood elevation While not directly a part of this plan of development for a small boat marina, about 15.2 acres of tidelands, 8.0 acres of submerged lands, and 1.0 acre of upland, above mean higher high water (MHHW) but below the base flood elevation, totaling 24.2 acres, will be filled with material dredged from the small boat marina to provide cargo handling space for expanded deep-draft shipping activites of the Port of Olympia, and is a part of their overall plan of development. This cargo area may be filled with or without the marina project, and provides an area for deposition of the marina dredged material. An additional 12.4 acres of tidelands and 14.2 acres of submerged lands, totaling 26.6 acres, will be filled with dredged material for marina support services, vehicle parking, and access roads, and 2.1 acres of tidelands and 0.5 acre of submerged lands will be filled with dredged material for landscaping and drainage. All areas will be filled to 20 feet above MLLW, about 1.8 feet above the base flood elevation.

7-23. During the planning process for the proposed project, Federal, state, and local agencies, organizations, and the public have been kept informed of the proposed action, including the dredged material disposal plan, through a series of interagency meetings, workshops, news releases, and public brochures or newsletters. The environmental impacts of all phases of the proposed action, including the dredged material disposal plan, have been presented in the environmental impact statement for this project on file with the Environmental Protection Agency. No practical alternative exists for the proposed action. This conforms to the requirements of the decisionmaking process of Executive Order 11988.

SECTION 8. DIVISION OF PLAN RESPONSIBILITIES

8-1. Federal particiption is limited to construction, maintenance, and periodic rehabilitation of the general navigation facilities and construction of the breakwater recreational facilities of the proposed plan. The general navigation facilities include a breakwater, an entrance channel, and two access channels. The cost apportionment is based on Federal legislation and administrative policies governing small recreational boat marina projects. The basis for apportioning the costs are described in the following paragraphs.

8-2. The Federal Government would design and prepare detailed plans and specifications, and would construct the general navigation facilities after authorization and funding and after receipt of the non-Federal cash contribution.

8-3. The detailed plans will include local interest dredging of the moorage area and recreational facilities on the floating breakwater. Also incorporated into the breakwater design would be an attachment for installation of a navigation light by the U.S. Coast Guard and the local interests' facilities for temporary tieup and servicing of boats on the marina side, such facilities to include the timber bumpers, a waterline, and electrical service described in section 5 of this report. Design of these water and electrical facilities will extend from the shoreward end of the breakwater access ramp to the outer end of the breakwater. Local interests will be responsible for design and connection of these facilities to their shoreside source. Design of the local interest items will be coordinated with the local sponsor, the Port of Olympia.

8-4. The Federal Government would assume a portion of the first cost of the water quality aeration system allocated to the general navigation facilities (portable aeration units). The basis for apportioning this cost is the same as for general navigation features. Local interests will be responsible for design of the aeration system which will be mounted on marina floats (see appendix D).

BENEFIT DISTRIBUTION

8-5. Navigation project benefits are classified as general or national benefits and special or local benefits. Benefits accruing to recreational boating are considered 50 percent national and 50 percent local. For the proposed project, benefits accrue to recreational boating and to land enhancement. Land enhancement, resulting from deposition of material dredged from project areas, is a special benefit to the landowner. Therefore, land enhancement benefits are considered local benefits.

COST APPORTIONMENT

8-6. First Cost. Federal interests would assume 47 percent of the portion of the first cost of the general navigation facilities. Federal interests would also assume 50 percent of the first cost of recreational facilities on, and access to, the floating breakwater. Non-Federal interests would be required to make a cash contribution equal to 50 percent of the portion of the first cost of the general navigation facilities attributed to benefits derived from recreational boating and 100 percent of the first cost attributed to benefits from land enhancement, as determined by the analysis in this report. Non-Federal interests would also be required to make a cash contribution equal to 50 percent of the first cost of recreational facilities on, and access to, the floating breakwater, and 100 percent of the first cost of the facilities for temporary tieup and servicing of boats on the marina side of the breakwater, as described in this report. Section 107 of the 1960 River and Harbor Act, as amended, limits Federal participtiion in the first cost of the general navigation facilities to $2 million. Accordingly, non-Federal interests would assume full responsibility for the Federal portion of the first cost of the general navigation facilities in excess of the $2 million Federal limitation. This limitation includes preauthorization study costs. Additionally, non-Federal interests would be required to furnish all lands, easements, and rights-of-way, including relocations for construction and subsequent maintenance required by the plan.

8-7. Recreational boating and land enhancement benefits, detailed in section 6, the first cost of the general navigation facilities outlined in section 5, and Federal and local apportionment of their costs are shown in table 8-1 below. The costs of diking the disposal area for dredged material from the Federal portion of the proposed project is a local cost. The cost of aids to navigation is borne by the U.S. Coast Guard and is not subject to cost sharing.

OPERATION

8-8. Once construction is completed, the marina project, water quality aeration system, and recreational facilities on the breakwater would be operated by the local sponsor, the Port of Olympia, under the guidelines set forth in this report and according to applicable Federal, state, and local laws, regulations, and established Federal policy.

MAINTENANCE

8-9. The Federal Government would assume costs of subsequent dredging of the entrance and access channels to maintain project depths. The Federal Government would also assume the cost of periodic inspection, repair, and/or replacement of the floating breakwater and anchors when required. Annual maintenance of the aids to navigation would be the responsibility of the U.S. Coast Guard. Costs of these annual and periodic maintenance features are outlined in table 5-2 of this report.

TABLE 8-1

APPORTIONMENT OF ESTIMATED FIRST COSTS[1/]

1. BENEFITS	Total
a. Recreational Boating	$1,452,000
b. Land Enhancement	90,000
c. Subtotal	1,542,000
d. Breakwater Recreation	25,000
TOTAL	$1,567,000

2. COSTS			
a. First Cost - General Navigation Facilities	$2,778,000	$1,306,000	$1,472,000
b. Land, Easements, and Rights-of-Way	40,000	0	40,000
c. Dikes for Dredged Material Disposal Area	578,000[2/]	0	578,000
d. Aids to Navigation U.S. Coast Guard	45,000	45,000	0
Subtotal	$3,441,000	$1,351,000	$2,090,111
e. Recreation Facilities on Floating Breakwater	90,000	45,000	45,000
Subtotal	$3,531,000	$1,396,000	$2,135,000
f. Provisions for Temporary Tieup of Boats on Floating Breakwater	53,000	0	53,000
TOTAL	$3,584,000[3/]	$1,396,000	$2,188,000

1/Numbers rounded. October 1980 price level.

2/Local interest estimate. Does not include portion of dike for local interest dredged material from moorage area. Includes contingencies, E&D, and S&A.

3/Does not include $329,000 preauthorization study costs.

8-10. Local interests would assume costs of the maintenance dredging of the moorage area to maintain project depths and would maintain the access roads, shoreside facilities, launching ramps, parks, and other recreational facilities, as well as floats, docks, and piers for boat moorages, including the recreational facilities on the floating breakwater and access thereto, the facilities for temporary tieup and servicing of boats on the marina side of the breakwater, and the water quality areation system.

CONSTRUCTION

8-11. The dikes, shown on plate 2b, for retaining material dredged from the moorage area (local dredging) and from the entrance and access channels (Federal dredging) would be designed and constructed by local interests before Federal construction begins. Local interests would also be responsible for maintenance of the dikes during Federal dredging operations. Current plans call for a single dredging contract supevised by the Corps of Engineers and including both local dredging of the moorage area and Federal dredging of the entrance and access channels. Dredging will be coordinated with resource agencies to minimize adverse impacts on fisheries as shown on the Shoreline Management Permit and 404 certification. The construction schedule is shown on plate 12.

ENVIRONMENTAL MONITORING

8-12. The cost of fish and water quality monitoring during construction has been included in the general navigation facilities construction costs. Cost of water quality monitoring subsequent to construction has been included in the annual operation and maintenance costs.

REAL ESTATE

8-13. The tidelands and submerged lands required for the entrance channel and the access channels have been designated a "Government Waterway" by the State Department of Natural Resources and are classified as navigable waters of the United States. The Port of Olympia owns the tidelands and submerged lands required for dredging the moorage area, the access channel to the launching ramp, and underneath the floating breakwater, including the anchoring system. The Port owns the dredged material disposal areas for the cargo handling area, access roads, parking, and marina support and service facilities, including the launching ramp. The Port also owns the lands required for access to the Federal project for inspection, maintenance, and replacement.

8-14. Requirements of relocation and advisory service assistance have been reviewed by the staff of the Port of Olympia and the present plan does not require the relocation of any persons or businesses because of the Federal project. The Port of Olympia would not compel any persons or enterprises to leave their present location because of any changes in the proposed Federal project without compliance with the requirements of Public Law 91-646.

8-15. A relocation plan would be prepared by the Port of Olympia and reviewed by the Seattle District, Real Estate Division, Corps of Engineers, would be kept current by the Port at all times throughout the design and construction of the project, and would not become "final" until such time as the project is complete and given over to the local sponsor for operation and maintenance of the applicable features. A relocation plan would be required even if it results in only a negative declaration.

OTHER LOCAL ASSURANCES

8-16. The Port of Olympia, as local sponsor of the proposed project, would also furnish assurance that they possess the authority and capability, under the Washington State Constitution and other laws, to assume the non-Federal responsibilities for the proposed East Bay Marina project.

8-17. The Port of Olympia would also be required to provide written assurances that they are financially able and willing to provide and maintain the berthing areas, piers, floats, docks, slips, or wharves; the recreation facilities on the floating breakwater and access thereto; the facilities for temporary tieup and servicing of boats along the marina side of the breakwater; the necessary shoreside services and facilities to meet the requirements of local sponsorship as determined by applicable laws and administrative policy governing Federal participation in the construction of small boat facilities; and the mitigation measures required for the project including the water quality aeration system for the marina.

8-18. Improvements of general navigation may be undertaken independently of providing recreational or tieup and servicing facilities, whenever the required local cooperation for navigtion has been furnished.

SECTION 9. LOCAL COOPERATION AND AGENCY COORDINATION

LOCAL SPONSORSHIP

9-1. By letter dated 2 December 1980, the Board of Commissioners of the Port of Olympia agreed to furnish the items of local cooperation listed in paragraph 10-3 of this report. A copy of the letter is included in Appendix A, Pertinent Correspondence.

PUBLIC INVOLVEMENT

9-2. A newsletter was mailed to agencies, organizations, and interested persons on 13 February 1979. Presentation of alternative sites and plans considered was made at a Port Commission public meeting on 21 February 1979. No adverse comments for the proposed plan of action were expressed at that meeting. Thirty-seven persons attended and 14 spoke, all in favor of the project. A public meeting notice was mailed 5 September 1980 informing the public of the results of studies conducted in 1979 and 1980, and announcing the pending public meeting. A final public meeting was held by the Port of Olympia with a presentation by the Corps of Engineers on 16 September 1980. Findings and tentative conclusions were discussed with the public given an opportunity for questions and comments.

AGENCY COORDINATION

9-3. Fish and Wildlife Service. The Fish and Wildlife Coordination Report, prepared by the FWS, is included in appendix F as is a supplemental letter dated 12 September 1979. The FWS expressed concern over the filling of tidelands for the cargo handling area, and the possibility of attracting juvenile salmonids into East Bay via the entrance and access channels of the proposed marina where they could be affected by the low DO conditions. The Service recognized the need for additional moorages in southern Puget Sound, and expressed the opinion that if a marina is to be built in the area, the East Bay site is probably the least damaging from an environmental standpoint. In their Report, FWS recommended the size of tideland fill and other features of the proposed marina be reduced or altered. A list of the FWS concerns and/or recommendations contained in their report, together with the Corps responses to these concerns and recommendations, are presented in paragraph 5.1.1, of the accompanying EIS. Coordination undertaken subsequent to public review of the draft DPR/EIS has resolved concerns of the FWS. The Port of Olympia and FWS have recently signed a protective covenant to retain the West Bay lagoon in its present, undisturbed condition, and will pursue feasibility investigations of other potential wildlife mitigation actions in East Bay (see appendix A for NPSEN-PL-NC letter dated 13 November 1980). FWS approval for the project is given in letters dated 21 October and 18 November 1980 (reproduced in appendix G).

9-4. Department of Transportation, U.S. Coast Guard. The USCG has the responsibility for installing and maintaining aids to navigation for the East Bay Marina project. During the study, coordination has taken place with the USCG regarding these aids. As a result of this interaction, the USCG has recommended the placement of several aids to mark the new entrance channel and the outer end of the breakwater. Pertinent USCG correspondence is included in appendixes G-H.

9-5. Review by Federal, State, and Local Agencies. Review comments on the draft DPR/EIS and general comments on the proposed East Bay Marina have been received from the following agencies, whose location of correspondence within the report is shown herein:

Federal Agencies

- U.S. Department of Agriculture, Forest Service (appendix H, part 2)
- U.S. Department of Agriculture, Soil Conservation Service (appendix H, part 2)
- U.S. Department of Commerce, Regional Representative to the Secretary (appendix H, part 2)
- U.S. Department of Navy, Thirteenth Naval District (appendix H, part 2)
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration (appendix H, part 2)
- U.S. Department of Energy, Region X (appendix H, part 2)
- U.S. Department of Housing and Urban Development, Region X (appendix H, part 2)
- U.S. Department of the Interior, Fish and Wildlife Service (appendixes F, G and H)
- Department of Transportation, U.S. Coast Guard (appendixes G, part 3; H, part 2)
- Environmental Protection Agency, Region X (appendix G, part 3 and appendix H, part 2)

State of Washington

- Office of Archaeology and Historic Preservation (appendix H, part 2)

- Department of Ecology (appendix G, part 3 and appendix H, part 2)
- Department of Game (appendix H, part 2)
- Department of Fisheries (appendix G, part 3 and appendix H, part 2)
- Department of Transportation (appendix H, part 2)

Port of Olympia. Appendix A contains pertinent local sponsor correspondence.

Local Agencies

- City of Olympia (appendix H, part 3)
- Olympia Planning Department (appendix H, part 2)
- City of Tumwater (appendix H, part 2 and part 3)
- City of Lacey (appendix H, part 3)

9-6. Review by Organizations and Individuals

- Capital Development Company (appendix H, part 2)
- Olympia R/UDAT (appendix H, part 2)
- League of Women Voters (appendix H, part 2 and 3)
- Olympia Area Chamber of Commerce (appendix H, part 2 and 3)
- Olympia Area Visitor and Convention Bureau (appendix H, part 3)
- Black Hills Audubon Society (appendix H, part 2)
- Olympia Salmon Club (appendix H, part 2)
- Michael and Raymona Redman, Gregory and Susan PaHillo (appendix H, part 2 and 3)
- Gary Rothwell (appendix H, part 3)
- Congressman Don Bonker (appendix H, part 3)
- State Senator Del Bausch (appendix H, part 3)
- State Representative Mike Kreidler (appendix H, part 3)
- State Representative Ron Keller (appendix H, part 3)

SECTION 10. RECOMMENDATIONS

10-1. I recommend construction of a small boat harbor at Olympia, Washington, consisting of entrance and access channels, a floating breakwater incorporating recreational use facilities, and a water quality aeration system, all generally in accordance with plan 4a presented in this report, at an estimated total first cost. exclusive of aids to navigation, of $3,486,000 for construction and $23,000 annually for maintenance, provided that prior to construction local interests agree to:

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

b. accomplish without cost to the United States all alterations and relocations as required of buildings, roads, utilities, and other structures and improvements;

c. hold and save the United States free from damages due to the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors;

d. provide and maintain without cost to the United States adequate berthing areas and local access channels with depths commensurate with those in the Federal improvements, and necessary mooring facilities, utilities, a public landing with suitable water supply and essential sanitary facilities, a boat launching ramp, parking area, and access roads open to all on equal terms;

e. provide a cash contribution equal to 50 percent of the final project costs allocated to general navigation;

f. provide a cash contribution equal to 50 percent of the final cost of construction of recreational facilities on the floating breakwater and the access facilities thereto and 100 percent of the final cost of construction of tieup servicing facilities on the floating breakwater;

g. maintain without cost to the United States all recreational and tieup and servicing facilities associated with the floating breakwater;

h. provide a cash contribution of 100 percent of costs allocated to land enhancement;

i. operate and maintain without cost to the United States all mitigation features required for the project, including performing water quality monitoring of the boat basin;

j. pay all project costs in excess of the Federal cost limitation of $2 million as provided in Public Law 86-645, as amended; and

provided that the improvement for navigation may be undertaken independently of providing public recreational facilities whenever the required cooperation for navigation has been furnished.

The Port further agrees to:

a. comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) that no person shall be excluded from participation in, denied the benefits of, or be subjected to discrimination in connection with the project on the grounds of race, color, or national origin, and

b. comply with Sections 210 and 305 of Public Law 92-464, approved 2 January 1971, and entitled the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970."

The net cost to the Federal Government for the recommended improvement, exclusive of aids to navigation, is estimated at $1,351,000 for construction and $17,000 annually for maintenance.

Date: 5 Dec 1980

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer

FINAL

ENVIRONMENTAL IMPACT STATEMENT

EAST BAY MARINA
OLYMPIA, WASHINGTON

U.S. ARMY CORPS OF ENGINEERS
SEATTLE DISTRICT, WASHINGTON

F I N A L

ENVIRONMENTAL IMPACT STATEMENT
EAST BAY MARINA, SECTION 107
OLYMPIA, WASHINGTON

ABSTRACT

Section 107 action proposing construction of an 800 moorage, small boat marina in East Bay at Olympia, Washington, with recreational facilities on the floating breakwater. Included with the proposed marina is provision of 24.2 acres of cargo handling area for the Port of Olympia. This document analyzes 10 different marina sites and five marina plans at the selected site in addition to no action and dryland storage. The selected plan makes the greatest contribution to National Economic Development objective and is acceptable to the local sponsor. The plan includes an aeration system to mitigate potential water quality problems and provides for fish and water quality monitoring during construction and water quality monitoring during critical months during project operation.

Additional information may be obtained by contacting:

John Malek, Environmental Coordinator
Environmental Resources Section

SEATTLE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
POST OFFICE BOX C-3755
SEATTLE, WASHINGTON 98124 (206) 764-3624

LIST OF PREPARERS

The environmental impact statement is a staff document that has been coordinated and reviewed by the appropriate offices of the Seattle District, U.S. Army Corps of Engineers, and by the North Pacific Division personnel.

The following persons are primarily responsible for preparation of this environmental impact statement:

Name	Qualifications
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SUMMARY

EAST BAY MARINA, SECTION 107
OLYMPIA HARBOR, WASHINGTON

( ) Draft (X) Final Environmental Impact Statement

Responsible Office: Colonel Leon K. Moraski
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1. Name of Action. (X) Administrative ( ) Legislative

2. Introduction. This environmental impact statement (EIS) is prepared under authority of Section 107 of the 1960 River and Harbor Act, as amended, and the National Environmental Policy Act of 1969, as amended. The report presents the results of investigations to determine the feasibility and environmental consequences of Federal participation in constructing the proposed East Bay Marina at Olympia Harbor, Washington, to provide 800 small boat moorages in southern Puget Sound.

3. Problems and Needs. The need for additional pleasure boat moorages in southern Puget Sound was outlined in the report, "Pleasure Boating Study, Puget Sound and Adjacent Waters, State of Washington," November 1968; this report was updated in 1980 and titled "Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters." Few public moorages are available in southern Puget Sound and growth in pleasure boat activity in the Olympia area has been hampered by lack of available moorages. Federal, state, and local agencies; state, county, and municipal entities; and business, industry, and concerned citizens are aware of the situation. Resource agencies recognize the need for additional moorages, but are concerned over environmental effects.

4. Affected Environment. The city of Olympia, the capital of the State of Washington, is located on the extreme southern end of Puget Sound in Budd Inlet. A peninsula, locally known as the "Port Peninsula," divides Budd Inlet into the Deschutes (West) Waterway and the East Waterway (East Bay), the proposed marina site. The peninsula is occupied by light-to-heavy industry and by deep-draft shipping wharves on the west shore; it is owned by the Port of Olympia, the local sponsor of the proposed marina.

Southern Puget Sound is a rich and diverse system providing critical habitat for a variety of plant and animal species. In the past, intensive industrialization has occurred in the more northerly sections of the sound, at Seattle and Tacoma, leaving southern Puget Sound as a

resource producer (timber, commercial fishing, aquaculture) and as a recreational playland. Many of the state's unspoiled and productive shorelines are found in this area.

Budd Inlet is the most developed estuary in southern Puget Sound, but human use is largely confined to the Olympia area, with much of the inlet's shoreline still in a relatively undisturbed state.

5. Selection of Proposed Action. A three-stage planning approach was used in determining the selected plan. Alternatives formulated at the first stage included:

- o no-action,
- o dryland storage, and
- o wetland moorages.

In the second stage, 10 different marina sites in the southern Puget Sound area were identified and evaluated for environmental, economic, and social factors included in the planning objectives and criteria. The East Bay site (site 4) was selected as the preferred marina site based on land use, environmental, and social considerations.

In the third stage, five alternative plans were formulated and evaluated with the no-action alternative for the East Bay site. The relationship of alternatives to environmental requirements, protection statutes and other environmental requirements is shown in table 1. Based on evaluation by the Seattle District, and the desires of the local sponsor, plan 4a was selected as the preferred plan (see DPR). The plan results in a total land alteration of 110.2 acres (44.6 ha), including 43.7 acres (17.7 ha) of intertidal wetlands, 65.5 acres (26.5 ha) of shallow subtidal lands, and one acre of upland.

During spring and summer 1980, in response to issues raised during public review of the draft documents, additional study was undertaken to clarify the effect of the selected plan on water quality and to reevaluate the comparison of plans 4a and 4e. Based on results of computer modeling studies undertaken by the Seattle District with EPA, plan 4a was reconfirmed as the preferred plan and a mitigation plan developed to maintain water quality in East Bay.

The Federal Government would maintain the general navigation facilities in accordance with existing laws, regulations, and administrative policy. The aids to navigation would be maintained by the U.S. Coast Guard.

Total first cost is $3,531,000 which includes $45,000 for aids to navigation by the U.S. Coast Guard. Average annual costs are $295,000, and

Table 1
RELATIONSHIP OF ALTERNATIVES TO ENVIRONMENTAL REQUIREMENTS
PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS
FOR EAST BAY MARINA

FEDERAL STATUTES	No Action	Plan 4a	Plan 4b	Plan 4c	Plan 4d	Plan 4e
Archeological and Historic Preservation Act, as amended, 16 U.S.C. 469 et. seq.	Full	Full	Full	Full	Full	Full
Clean Air Act, as amended, 42 U.S.C. 7401 et. seq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Clean Water Act, as amended, (Federal Water Pollution Control Act). 33 U.S.C. 1251 et. seq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Coastal Zone Management Act, as amended, 16 U.S.C. 1451 et. seq.	Full	Full	Full	Full	Full	Full
Endangered Species Act, as amended, 16 U.S.C. 1531 et. seq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Estuary Protection Act 16 U.S.C 1221 et. eq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*

*Full compliance with final approval of this document.

Table 1 (con.)

FEDERAL STATUTES	No Action	Plan 4a	Plan 4b	Plan 4c	Plan 4d	Plan 4e
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12). et. seq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Fish and Wildlife Coordination Act, as amended, U.S.C. 661 et. seq.	Full	Full	Full	Full	Full	Full
Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601-4601-11 et. seq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Marine Protection Research and Sanctuaries Act, 22 U.S.C. 1401 et. seq.	N/A	N/A	N/A	N/A	N/A	N/A
National Environmental Policy Act, as amended, 42 U.S.C. 4321 et. seq.	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Rivers and Harbors Act, 33 U.S.C. 401 et. seq.	Full	Full	Full	Full	Full	Full
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et. seq.	N/A	N/A	N/A	N/A	N/A	N/A

*Full compliance with final approval of this document.

Table 1 (con.)

FEDERAL STATUTES	No Action	Plan 4a	Plan 4b	Plan 4c	Plan 4d	Plan 4e
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 et. seq.	N/A	N/A	N/A	N/A	N/A	N/A
Executive Orders, Memoranda:						
Floodplain Management 11988	Full	Full	Full	Full	Full	Full
Protection of Wetlands 11990	Full	Full	Full	Full	Full	Full
Environmental Effects Abroad of Major Federal Actions 12114	N/A	N/A	N/A	N/A	N/A	N/A
Executive Memorandum Analysis of Impacts on Prime and Unique Farmlands in EIS, CEQ Memorandum, 30 August 1976.	N/A	N/A	N/A	N/A	N/A	N/A
STATE AND LOCAL POLICIES						
Washington State Constitution Article XV. Harbors and Tide Waters	Full	Full	Full	Full	Full	Full
Article XVII. Tidelands	Full	Full	Full	Full	Full	Full
Multiple Use Concept in Management and Administration of State Owned Lands (RCW 79.68.060).	Full	Full	Full	Full	Full	Full
State Environmental Policy Act of 1971 (RCW 43.21)	Full	Partial*	Partial*	Partial*	Partial*	Partial*

*Full compliance with final approval of this document.

Table 1 (con.)

FEDERAL STATUTES	No Action	Plan 4a	Plan 4b	Plan 4c	Plan 4d	Plan 4e
Water Resources Act of 1971 (RCW 90.54)	N/A	N/A	N/A	N/A	N/A	N/A
Shoreline Management Act of 1971 (RCW 90.58) and Thurston County Shoreline Master Program	Full	Full	Full	Full	Full	Full
Water Pollution Control Act (RCW 90.48)	Full	Partial*	Partial*	Partial*	Partial*	Partial*
Permits Required:						
- Shoreline Substantial Development Permit	No	Yes(Has)	Yes	Yes	Yes	Yes
- Shoreline Conditional Use Permit	No	No	No	No	No	No
- Washington Department of Natural Resources Lease of Tidelands	No	Yes(Has)	Yes(Has)	Yes(Has)	Yes(Has)	Yes
- Washington Department of Ecology Water Quality Certification	No	Yes(Has)	Yes	Yes	Yes	Yes

NOTES: The compliance categories used in this table were assigned based on the following definitions:

a. Full Compliance - All the requirements of the statute, executive order, and related regulations have been met.

b. Partial Compliance - Some requirements of the statute, executive order, or other policy and related regulations remain to be met.

c. Noncompliance - None of the requirements of the statute, executive order, or other policy and related regulations have been met.

d. Not Applicable (N/A) - Statute, executive order, or other policy not applicable.

average annual benefits are $1,567,000. The benefit-to-cost ratio is 5.3 to 1. The Federal portion of the first cost of construction is estimated at $1,396,000, which includes the cost of aids to navigation by the U.S. Coast Guard but not $329,000 preauthorization costs.

6. Consequences of the Proposed Action. The 800 spaces to be provided by construction of the proposed marina would provide some of the needed moorages in southern Puget Sound.

The principal concern associated with siting a marina in Olympia Harbor is the harbor's poor water quality with the periodic sag in dissolved oxygen experienced in late summers. Olympia Harbor, including East Bay, has been severely stressed by past industrial use. Biological productivity at the East Bay site is relatively low in comparison to other areas of Puget Sound and to the other alternative sites evaluated. The major environmental consequence of an East Bay Marina is a potential for higher mortality of organisms (including juvenile salmonids) during those periodic dissolved oxygen sags. Aquatic fauna will be present at all tidal stages and their exposure time to depressed oxygen levels increased. Fish kills were observed in 1973 and 1977 during low oxygen conditions. The recommended plan includes an aeration system to mitigate this problem.

An additional concern involves fill of intertidal wetlands. The total fill involves 53.4 acres (21.6 ha) of subtidal, intertidal, and low-lying uplands to provide 26.6 acres (10.7 ha) for marina support facilities and 2.6 acres (1 ha) of miscellaneous lands. In addition, the selected plan provides a 24.2 acre (9.8 ha) cargo handling area requested by the Port of Olympia. The cargo handling area is not directly tied to construction of the marina other than as a potential dredged material disposal site; however, its effects were evaluated for compliance with the Chief of Engineers' wetlands policy, 404(b) criteria, and compliance with Executive Orders 11988 and 11990. The selected plan, including the total fill, was determined to be an appropriate, water dependent use of intertidal wetlands and flood plain; the loss of wetlands is judged to be acceptable in light of the social and economic benefits derived. The action reduces the acreage of the nation's wetlands and results in a minor loss of productivity to the Budd Inlet ecosystem. Agreement was reached between the local sponsor and U.S. Fish and Wildlife Service to mitigate for this loss.

A final concern involves adverse effects on significant numbers and species of waterfowl and other waterbirds through loss of East Bay as wintering, feeding, and sheltered resting habitat. Some replacement of pilings is planned to provide shelter and food source. The local sponsor and FWS are continuing separate investigations into the feasibility of other mitigation measures.

The selected plan has the support of the local sponsor and is consistent with local land-use plans, the Coastal Zone Management Act, and the State Coastal Zone Management Program and Shoreline Management Act.

The selected plan will not affect any threatened or endangered species, prime and unique farmlands, or Native American fishing rights.

7. Unresolved Problems In Draft. In their Fish and Wildlife Coordination Act (FWCA) Report on this action, the FWS provided 12 recommendations. Detailed response to each recommendation is provided in chapter 5. The principal disagreement concerned FWS preference of plan 4b, because of the lesser tideland fill involved, over the recommended plan 4a. The FWCA Report is attached as appendix F. Subsequent coordination with the FWS has resolved this concern. FWS letter approving the issuance of permits for the recommended plan is reproduced in appendix G.

8. Coordination. During the planning process, Federal, state, and local agencies, organizations, and the public were kept informed of the action, including the dredge and fill of intertidal wetlands, through interagency meetings, correspondence, workshops, news releases, study-grams, and a public meeting. A notice of intent to prepare an EIS appeared in the Federal Register on 16 May 1979. Copies of the draft EIS have been provided to those agencies, groups, and individuals named in chapter 5. Copies were provided to others who requested them. Copies of this final document will be provided to those agencies, organizations, and individuals who received the draft DPR/EIS. A limited number of additional copies will be held at the Seattle District office and will be available for public inspection.

9. Draft EIS filed with EPA - December 10, 1979.
   Final EIS filed with EPA.

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(Following the EIS)

APPENDIXES
(Bound Following Plates)

1. PURPOSE AND NEED

1.1 Authority. Section 107 of the 1960 River and Harbor Act, as amended, provides authority for the U.S. Army Corps of Engineers to develop, construct, and maintain small navigation projects not specifically authorized by Congress when, in the opinion of the Chief of Engineers, such work is advisable. Each project must be economically justified, complete in itself, not unduly detrimental to the environment, and limited to a Federal cost of not more than $2 million.

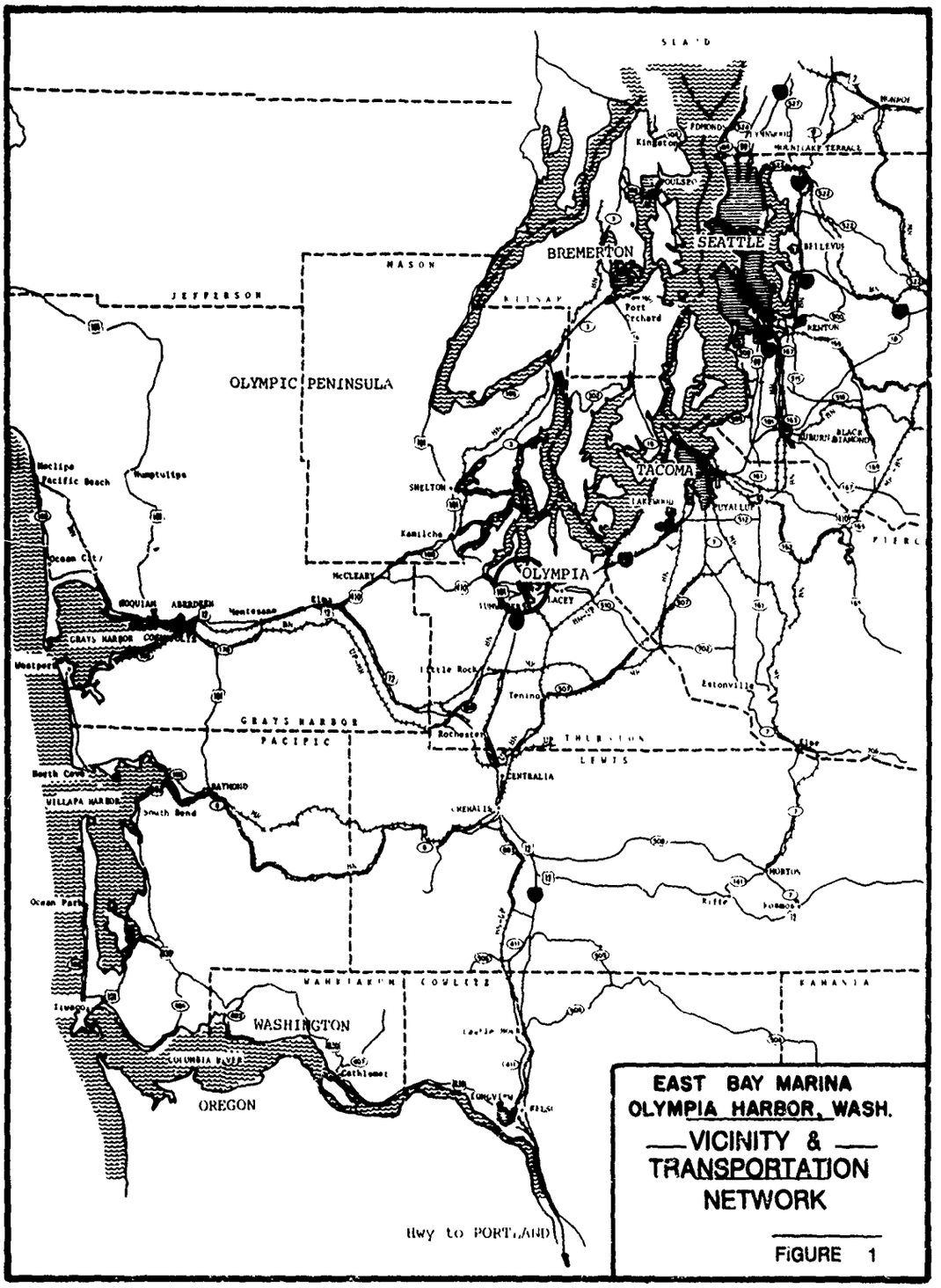
By letter dated 5 April 1974, the Port of Olympia requested Federal assistance in constructing a small boat marina in Olympia, Washington. The Port has additionally requested providing temporary tieup and recreational facilities at the marina and additional cargo handling area. The nature of the proposed action necessitated the preparation of an environmental impact statement (EIS) as required by Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality (CEQ) Regulations on Implementing NEPA Procedures (43 FR 55990).

The requirements of Section 404(b)(1) of the Clean Water Act of 1977 (Public Law 95-215); Executive Order 11990, Protection of Wetlands; and Executive Order 11988, Flood Plain Management, were considered during the planning of this project and are incorporated in appropriate sections of this document.

1.1.1 Jurisdiction. Federal and local participations and responsibilities for the selected plan are described in the Detailed Project Report (DPR). The EIS will consider the environmental consequences of the total construction effort whether it is a Federal or a local action.

1.2 Background. The city of Olympia, capital of the State of Washington and county seat of Thurston County, is located at the extreme southern end of Puget Sound in Budd Inlet (figure 1 and plate 1). Olympia Harbor encompasses the southern end of Budd Inlet and abuts the city's business district, with residential uplands ringing the harbor east and west. The harbor is divided into West and East Bays by a port peninsula created with dredged material obtained by deepening West Bay. Much of West Bay has been developed for port terminals and other commercial enterprises. East Bay was used extensively in the past for rafting logs, but is largely vacant today save for old pilings.

The Port of Olympia is the southernmost ocean terminal in Puget Sound serving southwestern Washington, principally Thurston, Mason, and Lewis Counties. Traditionally, the Port has subsisted on export of forest products, either raw or finished.


BREMERTON
SEATTLE
TACOMA
OLYMPIA
OLYMPIC PENINSULA
MASON
JEFFERSON
KITSAP
PACIFIC
GRAYS HARBOR
LEWIS
THURSTON
WASHINGTON
OREGON
COLUMBIA RIVER
Hwy to PORTLAND
EAST BAY MARINA
OLYMPIA HARBOR, WASH.
VICINITY & TRANSPORTATION NETWORK
FIGURE 1

1.3 Problems and Needs.

1.3.1 Moorage. In November 1968, a report was published entitled "Pleasure Boating Study, Puget Sound and Adjacent Waters, State of Washington." This was a cooperative effort involving several agencies, including the Seattle District. The report projected the need for additional moorages over actual 1966 moorages. Growth of pleasure boating in the Olympia area has been hampered by lack of available moorages; however, demand for moorage has increased substantially since 1966.

In 1979-1980, the 1968 Pleasure Boating Study was updated and published as the Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters (RMS) in October 1980. The RMS (1980) assessed existing moorage demand, supply, and need for the 12 counties contiguous to Puget Sound and adjacent waters. Moorage need was projected to year 2000. Puget Sound region was divided into three divisions; Thurston, Mason, Clallum and Jefferson counties constituted the western division. Thurston County was considered the primary recreational boating market for the East Bay proposal, although moorage demand may come from other areas in Puget Sound or northwestern Oregon.

Analysis of the need for additional moorages relied on RMS (1980) data, supplemented by interviews with Port of Olympia staff and local marina operators.

The RMS (1980) showed a 1978 year round permanent demand for 1,137 moorages in Thurston County. Future increases in the quantity of permanent moorage spaces demanded per year at East Bay was assumed to increase at the same rate as pleasure boat ownership. The most likely scenario of future pleasure boat ownership growth was based on projected population growth, plus one-half the projected growth rate per capita real income. The quantity of permanent moorage demanded at East Bay was based on current population and per capita income projections for the western division. An average annual growth rate of 4.4 percent between 1978 and 1980, 3.4 percent between 1980 and 1990, and 2.6 percent between 1990 and 2033 was used to project permanent moorage demand.

Within Thurston County, 1,103 wet moorage and dry storage slips were identified in 1978 (RMS, 1980). Based on current local moorage patterns, an estimated 80 percent, or 882, of these moorage spaces were designated for permanent craft.

During the summer and winter boating seasons, 10 percent, or 110 moorages, were assumed to be reserved for temporary craft, while the remaining 10 percent (110 moorage spaces) would be reserved for transient craft. The proposed East Bay small boat marina (800 berths) will provide a maximum of 75 percent of all new permanent, temporary, and

transient moorage requirements. Because of leasing priority given to permanent tenants, the percent of temporary and transient moorages supplied by East Bay will decline throughout project life (1983-2033).

Permanent moorage demand and needs that could be satisfied by East Bay Marina for selected years are presented in table 2. The 1978 quantity of 1,137 permanent spaces demanded will grow to 5,220 spaces by the year 2033. In the absence of additions to, or construction of, alternative moorage facilities, permanent moorage usage at East Bay would increase from 191 in 1978 to 366 in 1983 (project year one) and continue to increase to 800 in year 1995.

TABLE 2

PERMANENT MOORAGE REQUIREMENTS
THURSTON COUNTY, 1978-2033

Year	Projected Demand	Existing Moorage Spaces	Permanent Moorage Requirements	Requirements Satisfied by East Bay
1978	1,137	882	255	
1983	1,370	882	448	366
1990	1,731	882	849	637
1995	1,968	882	1,086	800
2033	5,220	882	4,338	800

Presently, seven marinas or moorage facilities furnish wet moorages in Thurston County. These facilities vary from 10 to 410 spaces and total about 1,000 spaces. The largest facility, a yacht club, furnishes 240 moorages to members only. A dock, owned by the city of Olympia and operated by the City Parks and Recreation Commission, provides 25 transient moorages; there is a time limit of 3 days for any one stay.

The remaining marinas are all filled to capacity. Some have launching ramps, although few provide fuel facilities. Shoreside facilities range from nonexistent to barely adequate, and few provide potable water and/or electricity dockside. None has sanitary pump out facilities. One marina offers dryland storage for 30 craft under 20 feet (6 m) in length. Some of these marinas anticipate modest expansion in the future, but none to an extent that would obviate the need for additional moorages in the area.

Consideration of a new marina in the Olympia area has been ongoing for several years. Generally, there is agreement among the various governmental agencies, businesses, and individuals that additional moorages are needed.

1.3.2 Cargo Handling Area. In addition to the proposed marina, the Port of Olympia desires additional cargo handling area that would support their ocean terminals on the western side of the port peninsula. Presently, they are limited to 36.2 acres (14.6 ha) of backup land on the peninsula to accommodate three deep-draft berths, and, therefore, must use vacant land at the Olympia Airport 7 miles (11 km) away. This necessitates double handling of cargoes (principally logs) and transportation of these cargoes, via truck, through downtown Olympia streets to the terminal area. The port proposes to create their needed lands by filling 24.2 acres (9.8 ha) of tidelands and low uplands behind the marina with material dredged from the marina basin, and entrance and access channels.

In 1977, the Port of Olympia commissioned an overview and evaluation of their East Bay Harbor project by J. Eldon Opheim, a former General Manager of the Port of Seattle, and an economic assessment of their proposed expansion of cargo area by Dr. Philip J. Bourque, Professor of Business Economics at the University of Washington. The reports are on file at the Seattle District office and were used in our analysis.

The cargo handling area is part of a potential dredged material disposal site. This EIS evaluates the effects of such a fill for the purpose of creating additional cargo handling area.

1.4 Planning Objectives. Planning objectives for small boat marinas are usually limited in scope and number. Once the need for additional moorage is determined, addressing that need becomes the primary planning objective. For this study, the following specific planning objectives were formulated and considered throughout this exercise:

o To provide additional moorages in southern Puget Sound that, to the maximum extent practicable, avoids development in natural areas in favor of development in areas already degraded by human or other activities.

o To provide recreational facilities utilizing the breakwaters required for protection of small boat moorages.

o To efficiently utilize water and land resources to improve the quality of life by contributing to the objectives of national economic development (NED) and environmental quality (EQ) as set forth in the Water Resource Council's Principles and Standards for Planning Water and Related Land Resources.

o To select a specific plan based on technical, economic, environmental, and social well-being criteria that will permit a fair and objective appraisal of the consequences and feasibility of the various alternative plans.

Several courses of action, including the no action alternative, dryland storage alternative, and several alternative locations for wet moorages, are possible. These are examined in the following chapter.

2. ALTERNATIVES

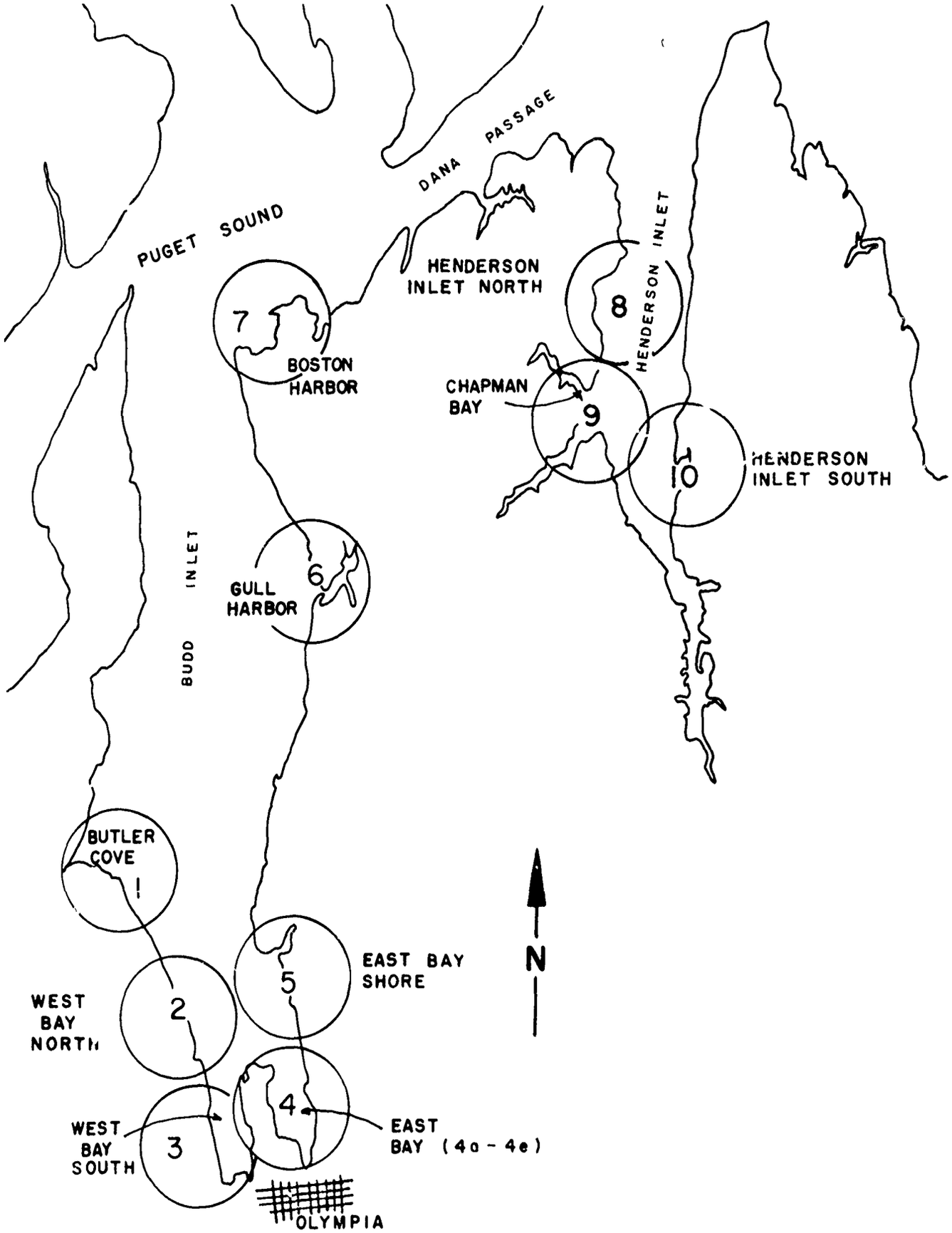
2.1 General. Alternative measures to address the primary planning objective were formulated and evaluated in three stages, giving consideration to sound engineering principles, projected needs for additional small boat moorages, desires of local interests, environmental and socio-economic effects, and financial ability of the local sponsor, Port of Olympia. Alternatives formulated at the first stage were the no action alternative, dryland storage, and wetland moorages. In the second stage, 10 different marina sites in the southern Puget Sound area were evaluated (figure 2). Finally, five alternative plans at one site were formulated and evaluated (plate 2c).

2.2 Preliminary Evaluation.

2.2.1 Alternative 1 - No Action. Under this alternative, the Corps of Engineers would take no action to assist in providing additional moorages in the Olympia area. The State of Washington, the Port of Olympia or other private or public enterprises could pursue marina development on their own, but based on past occurrences, this is not considered likely. Conditions are expected to remain as they exist today, subject to existing and projected trends in all sectors. With none of the demand for additional moorages met, existing moorages will acquire a higher premium. Boat owners who wish to enjoy the water recreation opportunities of southern Puget Sound will be limited to trailerable craft that can be handled by conventional launching methods (ramps or hoists), will acquire membership in existing or new yacht clubs which might be induced to expand or spring up due to membership demands, or will be forced to moor their craft at other marinas in Puget Sound should space be available. Most likely, a combination of these and other unforeseen options would result.

In any event, boating traffic will continue to increase as it has to date. An increase in trailerable craft will require additional boat launch facilities and parking for vehicles and trailers. Launched boats must be temporarily moored while the vehicle and trailer are removed to or brought from the parking area. During peak traffic, the duration of these temporary tieups may be considerable while boaters await their turns to launch or remove boats. Wind-wave protection for the launching ramps and tieup floats or docks is necessary. As larger boats are not readily trailerable, this option limits the size of boats to about 27 feet (8 m). Such development would be a local responsibility. None of the needs or problems associated with small boat moorages would be met nor would the planning objective be addressed.

As not everyone will be able to afford club memberships, the other option to boatowners of large craft is to find moorage space elsewhere in Puget Sound. Marinas throughout Puget Sound are generally at capacity now and are facing similar needs to expand moorages.



ALTERNATIVE SITES

FIG. 2

Therefore, looking elsewhere for space only compounds the problem. Further, even if moorage were found at other Puget Sound marinas, distances from the Olympia area and prime recreational waters in southern Puget Sound would be increased substantially, thereby increasing both travel time to and from these locations and consumption of fuel resources.

While adverse environmental effects associated with marina development would be foregone, this does not preclude future development of the sites identified in this EIS for purposes which might be less esthetically desirable or more environmentally damaging than a marina. The no action alternative remains a viable alternative, but will not be pursued to any greater level of detail.

2.2.2 Alternative 2 - Dryland Storage. Federal law, policies, and regulations do not permit the Corps of Engineers to participate in planning or construction of dryland storage; hence, the alternative is entirely a local option. If pursued by local interests, the alternative requires additional boat launching ramps, piers, docks, or floats for tying up boats launched or waiting to be taken out of the water, some type of breakwater protection, and other facilities like those described under the no action alternative. Boats using the facilities generally are limited to about 27 feet (8 m).

Dryland storage also requires extensive level backup land in relatively close proximity to the waterfront. An examination of Olympia Harbor did not reveal any vacant lands large enough to accommodate a major facility. The harbor shorelands are either already extensively developed or the topography is too steep for development of a dryland storage facility. Residential or industrial lands could be acquired and cleared for this purpose, although this option is expensive.

One solution is to fill most or all of East Bay and develop the area as a dryland storage facility. From a water quality perspective, this will greatly reduce potential water quality problems associated with a marina; however, it is unlikely that this option would be environmentally acceptable.

This alternative does meet the primary planning objective of providing additional moorage/storage for small boats; however, based on the other considerations noted, dryland storage was dropped as an alternative.

2.2.3 Alternative 3 - Wet Moorages. Evaluation of the no action and dryland storage alternatives indicate that providing wet moorages would be the best means to satisfy the planning objective of providing some of the needed small boat moorages in southern Puget Sound. The next stage was to identify and evaluate potential marina sites.

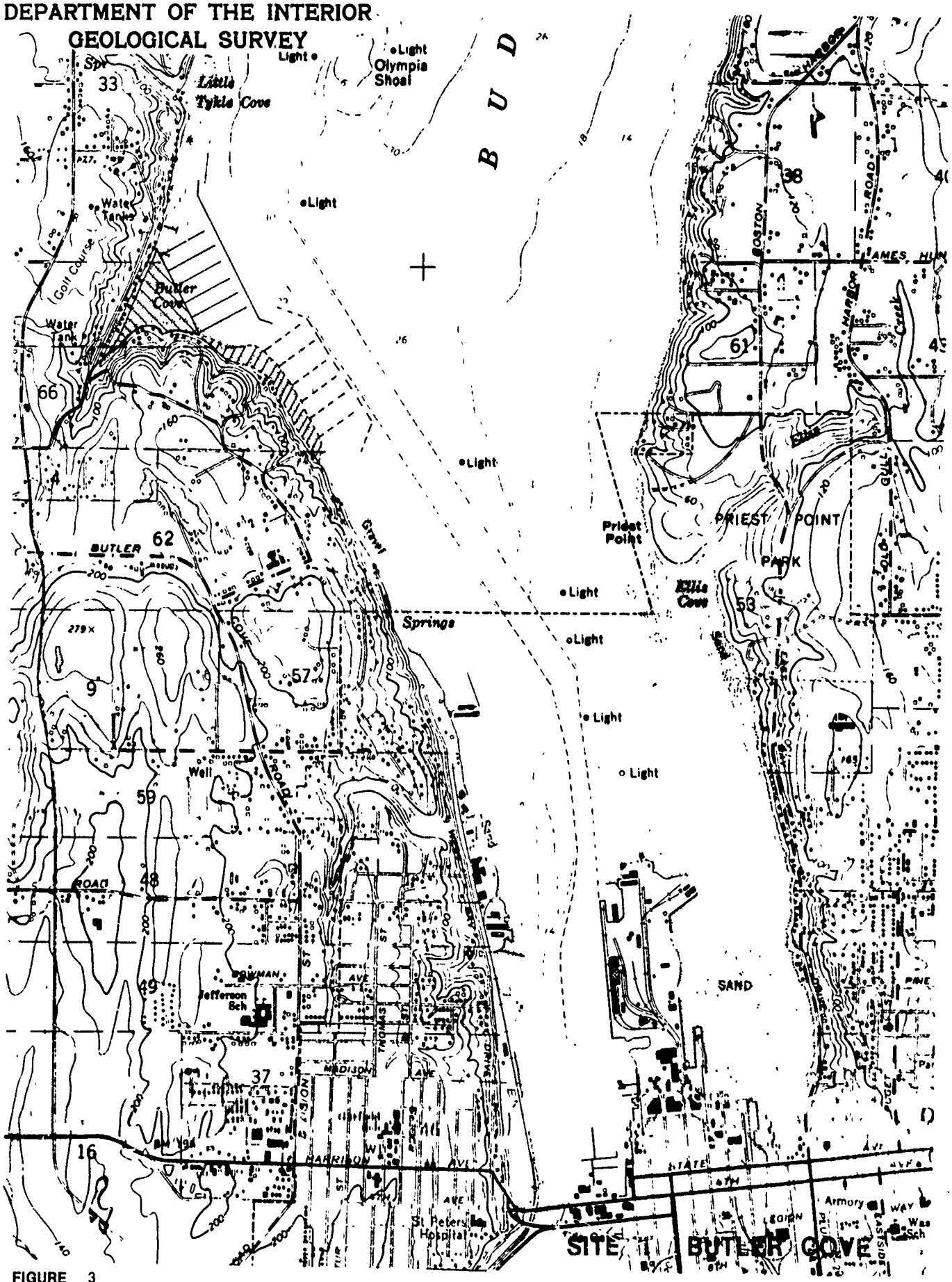

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Light
Olympia Shoal
Little Tykle Cove
Water Tanks
Golf Course
Butler Cove
Water tank
BUTLER
Springs
Well
ROAD
Jefferson Sch
BOWMAN
MADISON
HARRISON
St Peters Hospital
Pridet Point
PRIEST POINT
PARK
Ellis Cove
SAND
STATE
Armory
Wash Sch
SITE 1 BUTLER COVE
1959
PHOTOREVISED 1968 AND 1973

FIGURE 3

2.3 Second-Stage Evaluation - Site Selection. Ten sites (figure 2) were investigated and evaluated. A description of the site and details of the analysis are provided. All sites were evaluated for their maximum moorage capacity. Conditions described in Chapter 3, Affected Environment, are generally applicable to each site.

2.3.1 Site 1 - Butler Cove.

2.3.1.1 Description. The Butler Cove site is located approximately 3 miles (4.8 km) north of Olympia on the western shore of Budd Inlet. The site is outside the Olympia city limits. Consideration was given to siting an optimum 1,300 moorage marina at this location (figure 3). The solid lines indicate an initial 700-800 berth marina with future expansion (broken lines) to maximum. Total land required is 69 acres (27.9 ha), of which 25 acres (10.1 ha) are intertidal and 44 acres (17.8 ha) are subtidal. A total of 360,000 cubic yards (270,000 m^3) will be dredged for the moorage area; no dredging is necessary for entrance or access channels due to proximity to deep water. A 5,000-foot (1,524 m) timber pile breakwater will protect the marina from storm winds and waves. A total of 25 acres (10 ha) would be filled to provide marina support and parking; breakdown on the fill is 6 acres (2.4 ha) subtidal and 19 acres (7.7 ha) intertidal.

2.3.1.2 Environmental Conditions and Considerations. Butler Cove is heavily used by waterfowl and other water birds. Harbor seals are occasionally observed in the area. The cove's beach is predominantly gravel with some sand, and is sparsely vegetated along the lower tidelines. The cove is expected to be important to outmigrating juvenile salmonids and is used by spawning surf smelt. Environmental effects from marina construction are expected to be severe.

2.3.1.3 Other Considerations. The moderately sloped uplands have been developed as a high quality residential area known locally as "The Country Club" (photo 1). Houses in the Butler Cove area are expensive and well kept. Due to the topography, marina construction would require most of Butler Cove be filled to provide level land for marina support facilities and parking. At the minimum, this would deprive approximately 40 homes of traditional waterfront access and might require expensive acquisitions. It is unlikely that local landowners would find the proposal acceptable. In addition, marina operation could be a continuing neighborhood disruption.

The water area of Butler Cove is classified "conservancy" and the land "rural" in the Thurston County Shoreline Master Program (SMP) for the state's Shoreline Management Act of 1971 (SMA) and Coastal Zone Management Program (CZMP). Extensive marina development at this location would conflict with those designations.

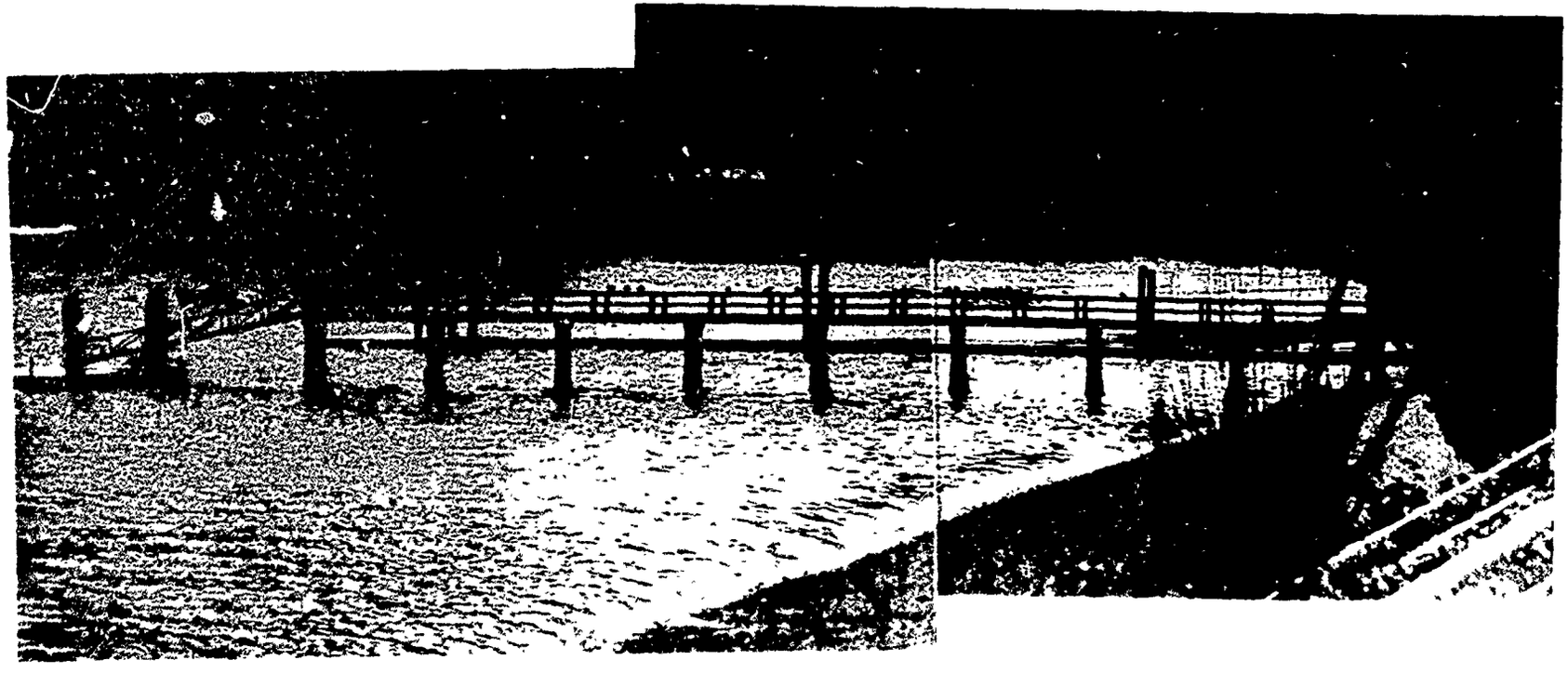


PHOTO 1. Site 1 - Butler Cove: Looking south from the Country Club. (COE Photo, 1979)

As envisioned, the marina will be very close to the seaward end of the commercial navigation channel. There could be some conflicts between recreational and oceangoing craft, especially if the marina were expanded to its full 1,300 moorage capacity. Existing streets are narrow and uneven, entirely inadequate to handle expected traffic loads. Significant upgrading of roadways will be necessary and this could require additional land purchases.

There are no existing facilities nearby capable of servicing the marina. Sewage disposal could be a significant problem.

2.3.1.4 Analysis. As a potential marina site, Butler Cove has several major problems. Disadvantages clearly overshadow advantages.

2.3.2 Site 2 - West Bay North.

2.3.2.1 Description. This site is located approximately 1.5 miles (2.4 km) north of Olympia on the western shore of Budd Inlet directly across from Priest Point Park. The site straddles the boundary between the city of Olympia and Thurston County. Construction of a maximum 1,500 moorage marina was considered (figure 4). The marina requires 4,600 feet (1,402 m) of breakwater protection, 4,000 feet (1,219 m) of floating breakwater and 600 feet (183 m) of timber pile. Approximately 1,435,000 cubic yards (1,076,000 m^3) of material must be dredged, and 90 acres (36.4 ha) of land are required. Total lands affected are 74 acres (30 ha) subtidal, 11 acres (4.4 ha) intertidal, and 5 acres (2 ha) uplands. A 23-acre (9.2 ha) fill would provide land for marina support facilities and parking, 11 acres (4.4 ha) are tidal, 7 acres (2.8 ha) subtidal, and 5 acres (2 ha) low uplands. Filling of the cargo handling area in East Bay could be an option if there is surplus dredged material.

2.3.2.2 Environmental Conditions and Considerations. The site encompasses existing West Bay Marina, a privately owned and operated facility, and two wood products industries (photos 2 and 3). Water quality is somewhat better at this site than deeper inside West Bay or in East Bay; however, a major marina at this site may interfere with outmigrating juvenile salmon released from Capitol Lake. As the surrounding area is already used for log rafting, loss of benthic productivity is not likely to be significant; the marina would provide additional habitat for attached organisms and commensal species. With the exception of potential interference with juvenile salmon migrations, environmental consequences do not appear severe.

2.3.2.3 Other Considerations. The proposed site is in a predominantly industrial area (photo 3). The site's advantages are that it is relatively close to the main population center and to city of Olympia services and utilities. The existing marina is sandwiched between two wood products industries, whose lands must be acquired or the industries relocated. This results in a less intensive use of the area, and

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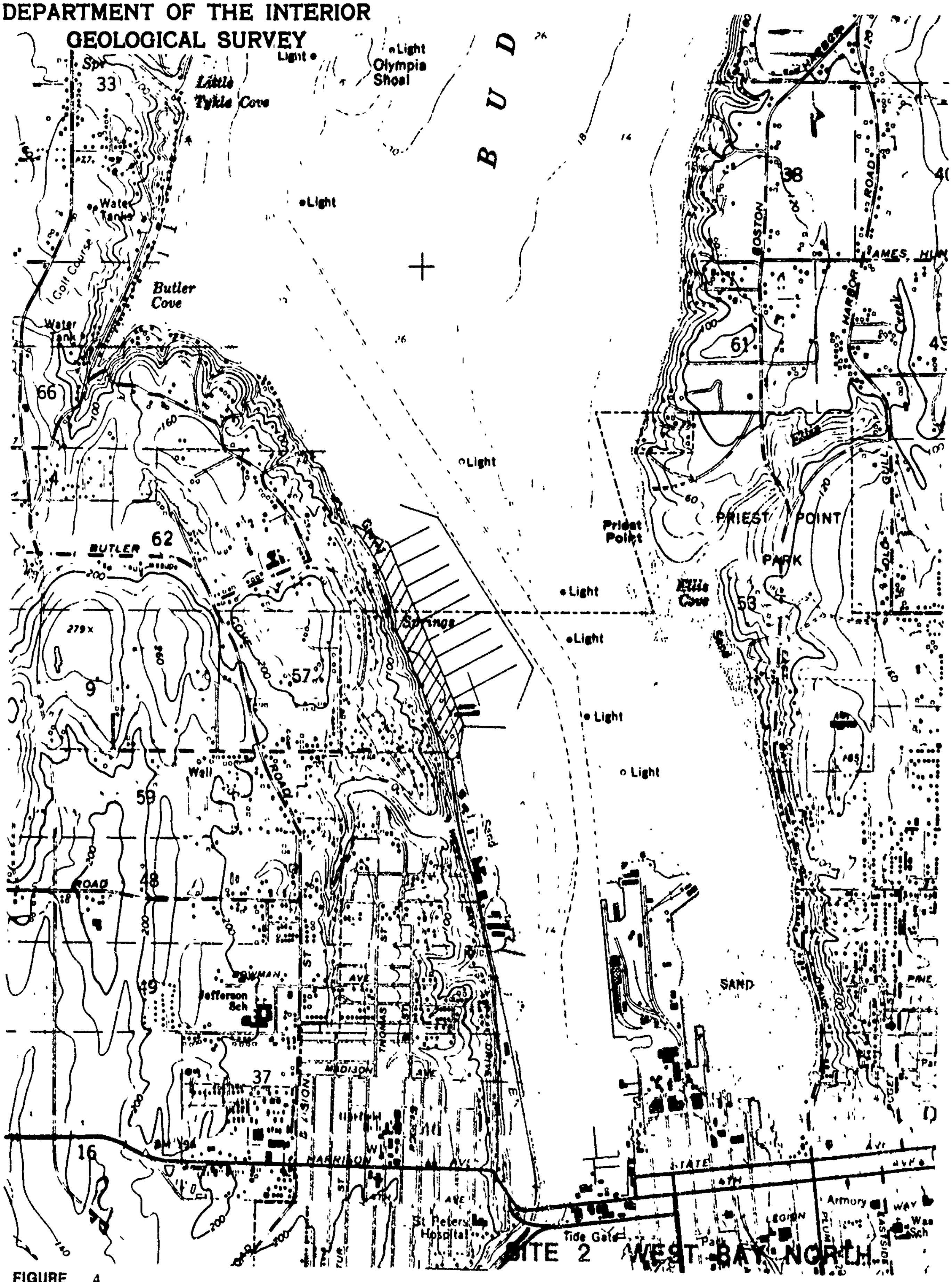

FIGURE 4

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PHOTOREVISED 1968 AND 1973

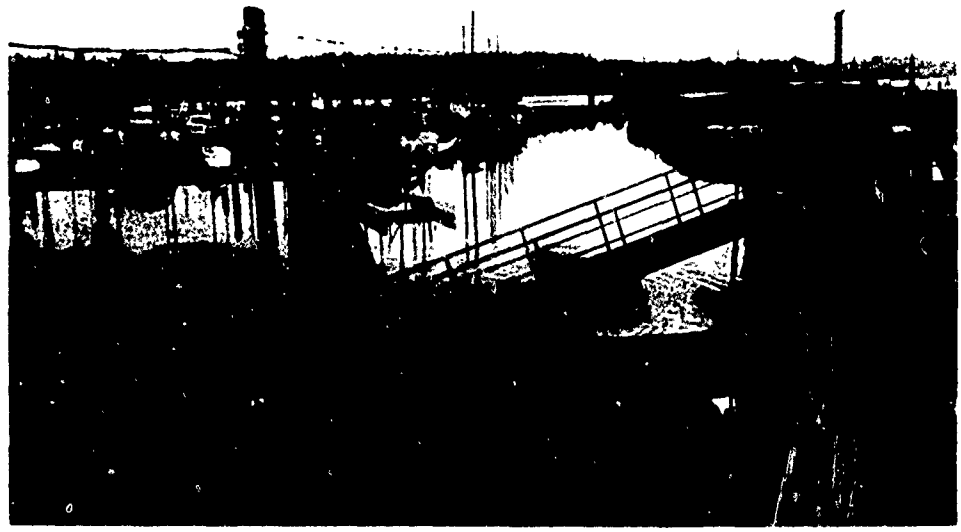


PHOTO 2. Site 2 - West Bay North: West Bay Marina. (COE Photo, 1979)

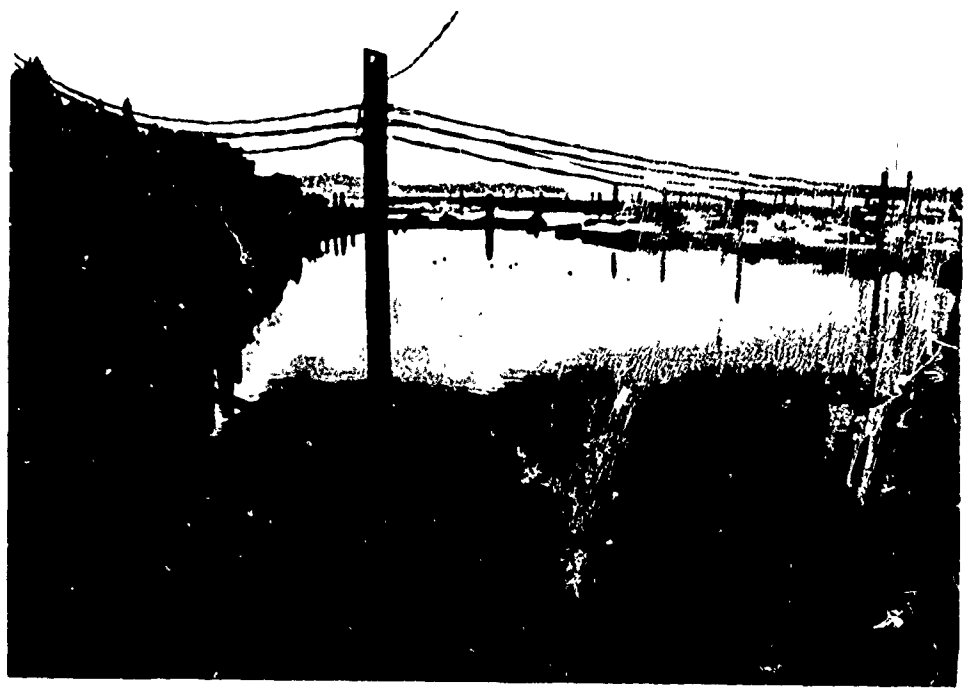


PHOTO 3. Site 2 - West Bay North: Looking north from the marina. Wood products industry in background would be encompassed by marina proposal. (COE Photo, 1979)

perhaps a more esthetically pleasing one. However, the site is severely cramped between the commercial navigation channel and steep uplands, resulting in large landfill requirements and potential commercial-recreational craft conflicts. In straddling the city-county boundary, the site straddles the "urban-conservancy" (water) and "urban-rural" (land) designation under the county SMP and CZMP. This does not preclude marina development, but may require revision of the SMP.

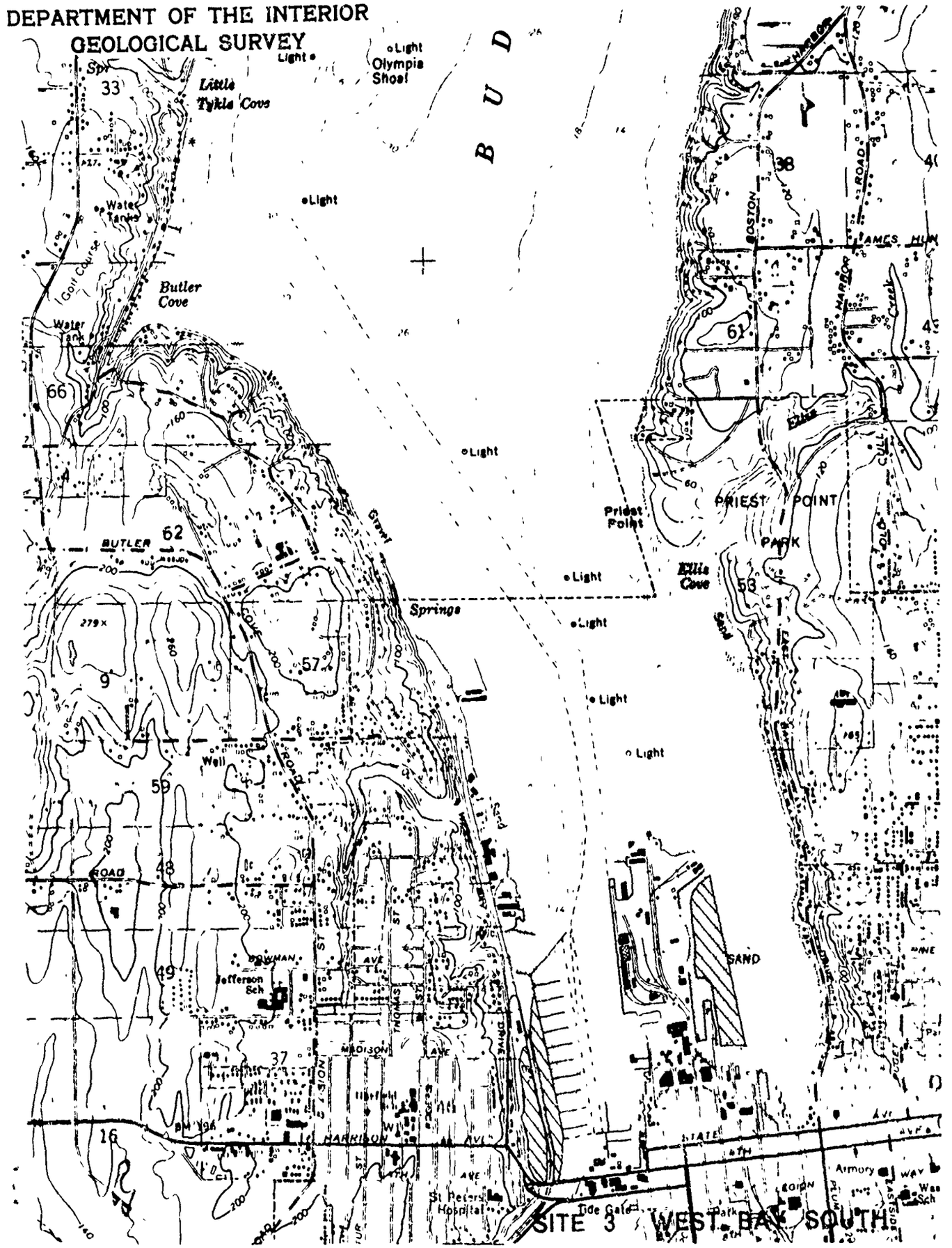
Access also presents a problem despite the site's proximity to downtown Olympia. It is too far out to walk to and from the city center and so downtown merchants would not benefit from marina traffic. Although West Bay Drive appears adequate for current traffic levels, upgrading is necessary to handle traffic levels expected following marina construction. The existing service road to the wood products industries and West Bay Marina requires upgrading and the problem of limited land availability for parking resurfaces. The costs associated with roadway upgrading were not calculated.

2.3.2.4 Analysis. The West Bay north site has several serious problems which limit its usefulness as a major marina site. In addition, much of West Bay has been developed for industry and marina construction will significantly change existing land-use patterns by displacing those industries. It is not apparent that this conversion of industrial lands to recreation use is warranted. The site's main advantage, its close proximity to the downtown area, is not overwhelming in comparison to disadvantages.

2.3.3 Site 3 - West Bay South.

2.3.3.1 Description. The West Bay south site is located deep within West Bay at the head of Budd Inlet, immediately adjacent to downtown Olympia (photo 4). The site is owned by the Port of Olympia. A 1,500 moorage marina was considered (figure 5). The marina requires a 1,000-foot (305 m) floating breakwater for protection against waves. A total dredging effort of 1,300,000 cubic yards (975,000 m^3) is involved and a total of 94 acres (38 ha) of land is affected. Approximately 45 acres (18 ha) of intertidal, 44 acres (18 ha) of subtidal, and 5 acres (2 ha) of low uplands are involved. A total of 30 acres (12.3 ha) would be filled to provide land for marina support facilities and parking; 16 acres (7 ha) tidelands, 9 acres (3.6 ha) subtidal, and 5 acres (2 ha) low uplands. Filling of the cargo-handling area in East Bay is possible under this alternative using excess dredged material.

2.3.3.2 Environmental Conditions and Considerations. The site is undeveloped and consists of a large, tidal backwater separated from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Springs
BUTLER ROAD
Well
Jefferson Sch
HARRISON AVE
ADAMS ST
THOMAS ST
DIVISION ST
BOSTON HARBOR ROAD
JAMES HILL
HARBOR Creek
SAND
St Peters Hospital
Tide Gate
Armory
SITE 3 WEST BAY SOUTH
1959
PHOTOREVISED 1968 AND 1973

FIGURE

West Bay proper by the Burlington Northern Railroad causeway (photo 5). Due to its proximity to Capitol Lake, the site is undoubtedly used by juvenile salmon released from the hatchery upriver. The backwater area and a large, intertidal bar in front of the site are heavily used by water birds, especially waterfowl, during migrations and overwintering periods. Development of the site eliminates it as important habitat for fish and avian species. The site experiences the periodic dissolved oxygen (DO) sag noted in chapters 3 and 4; therefore, effects of marina construction and operations on the water quality are difficult to predict. Environmental consequences of siting a marina here are judged to be significant.

2.3.3.3 Other Considerations. This site has many of the same advantages and disadvantages of the West Bay north site. The site is totally within the "urban" designation of the SMP and is within walking distance of downtown Olympia. Consequently, provision of services and utilities can be easily accommodated and marina traffic is expected to use and benefit downtown businesses. Currently, the site is zoned "light industrial" by the city; construction and operation of a marina is a less intensive use than commercial development. However, similar to the West Bay north site, a marina could cause recreational-commercial vessel conflicts as well as conflict with yacht club traffic directly across the bay. During peak boating times, the West Waterway could become quite crowded. As the site is wedged between steep uplands and the water, its flexibility is limited. Also, the proposed moorage area is directly in the outflow from Capitol Lake, which could be a problem during high runoff periods. As the site is owned by the Port of Olympia, no major land purchases are necessary. A significant amount of dredging is required to remove the intertidal bar, increasing costs if open-water disposal becomes necessary. One option would be to use any excess dredged material to fill the proposed cargo handling area in East Bay. Breakwater requirements are small.

2.3.3.4 Analysis. Although there are locational advantages to the site, environmental considerations and potential recreational-industrial use conflicts render this an undesirable site.

2.3.4 Site 4 - East Bay.

2.3.4.1 Description. The East Bay site is located in Olympia Harbor on the east side of the manmade port peninsula, immediately adjacent to the city of Olympia. The site is owned by the Port of Olympia and has been used for industry and log storage in the past (photo 6). The site's maximum capacity is about 1,500 moorages, with varying volumes of dredging and filling required depending on actual siting (plate 2c).

PHOTO 4. Site 3 - West Bay South: Looking southeast over the site and into downtown Olympia. (COE Photo, 1979)

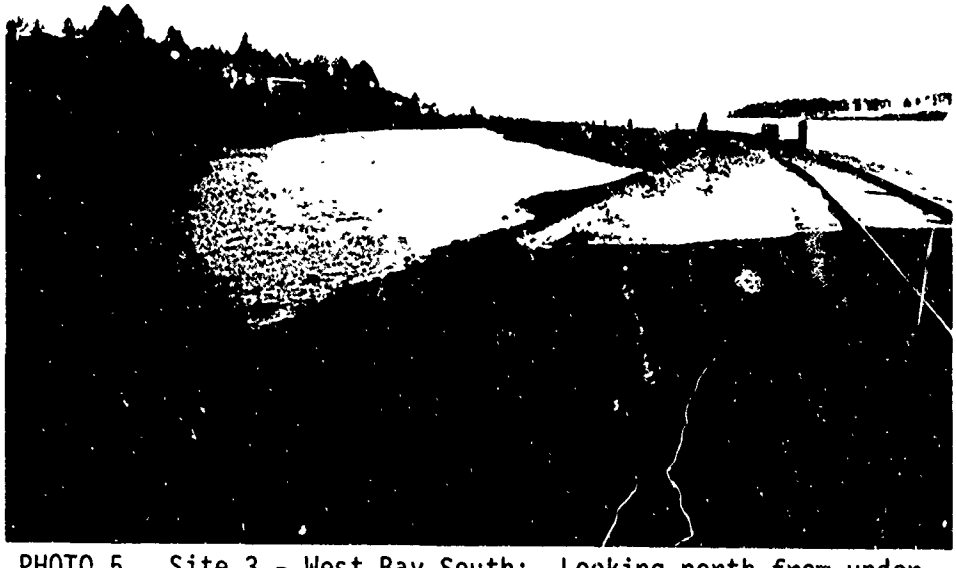

PHOTO 5. Site 3 - West Bay South: Looking north from under highway bridge. The lagoon (left) would be filled. (COE Photo, 1979)

2.3.4.2 Enviromental Conditions and Considerations. The head of Budd Inlet has been considerably altered by urban development over the past 100 years (photo 7). To date, most development along the Olympia waterfront has occurred on the western side of the port peninsula, along West Bay. However, past activities on East Bay are still evident by the industrial refuse and wood debris on the bay's tidelands at low tide. Despite past abuse to the area, East Bay continues to be heavily used by waterfowl and other water birds, especially during migration and wintering. Invertebrate species have a low diversity, but are numerous and serve as a food source to shore birds, some water birds, and probably some fish species. Utilization of the bay by fishes is poorly known, but juvenile salmonids released by the Washington Department of Fisheries through Capitol Lake are presumed to enter the bay in unknown numbers during their outmigration. Other marine and game fish species are known to enter the bay. Like all of lower Budd Inlet, East Bay suffers from regularly depressed DO levels each year. However, values for East Bay appear to be the lowest in Budd Inlet; fish mortalities have been observed in 1973 and 1977. Due to water quality and other environmental conditions, productivity and value of fish and wildlife habitat, with the exception of avian use, appear to be lowest at this site. Therefore, impacts on biological resources, while not inconsequential, appear to be less severe at this site than at the other sites investigated.

2.3.4.3 Other Considerations. The Olympia shoreline is the only reach of shoreline designated "urban" under the county's SMP. Marina development at East Bay, therefore, conforms to all Federal, state, and local land-use plans. The site is close to the main population center and city of Olympia services and utilities could be provided at a minimum cost. Access is not a problem and the site is close enough to downtown businesses to provide spinoff economic benefits. In addition, construction provides the opportunity to create additional cargo handling lands requested by the local sponsor and to provide a new access road to the port peninsula thereby reducing downtown congestion. Principal disadvantage is that, although the site is close to the population center, it is relatively distant from the more preferred boating areas in southern Puget Sound.

2.3.4.4 Analysis. Based only on land-use considerations, East Bay is an ideal location for a major marina. The ecosystem of the bay has been severely stressed in the past by industry; in comparison to other sites, productivity in East Bay is low. The area of highest productivity, along the East Shore Drive shoreline, will not be affected by development. The principal disadvantage of this site is the poor water quality and periodic DO sag. The principal environmental consequence that is anticipated is increased exposure time of marine organisms (including juvenile salmonids) to low DO conditions. In summary, although environmental effects (actual or potential) are not inconsequential, the overall advantages of East Bay outweigh disadvantages.

PHOTO 6. Site 4 - East Bay: Looking north from Moxlie Creek. Intertidal island (foreground) will be filled for new roadway. Marina will lie at about end of warehouse (left center) and northward. (COE Photo, 1977)

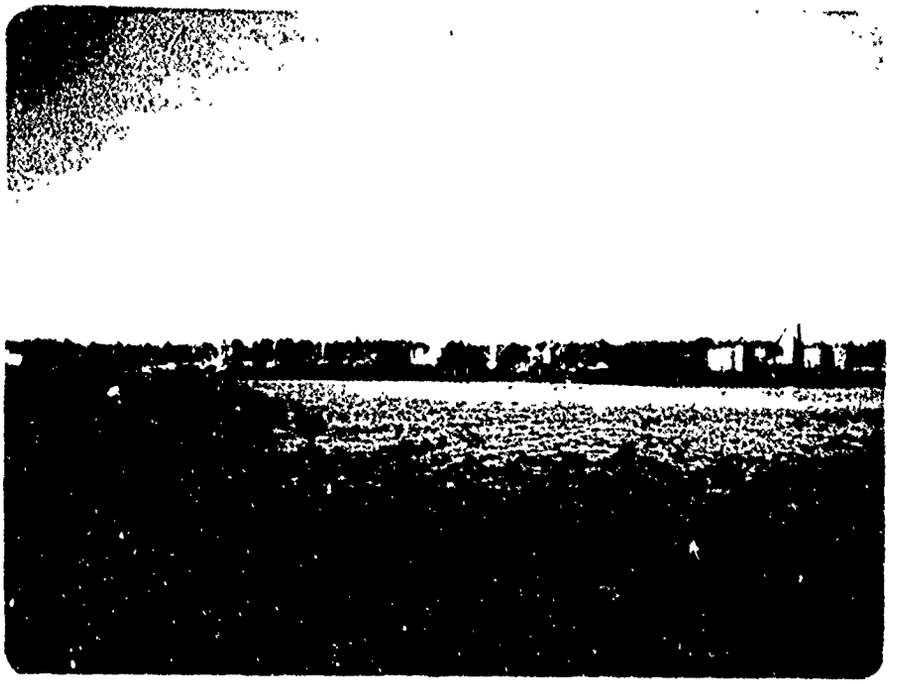

PHOTO 7. Site 4 - East Bay: Looking southwest at port peninsula. Marina and fill will occupy about 80 percent of shoreline in photo. (COE Photo, 1977)

2.3.5 Site 5 - East Bay Shore.

2.3.5.1 Description. The East Bay shore site is located north of downtown Olympia at Ellis Cove in Priest Point Park. The site is within the Olympia city limits. Construction of a 1,500 moorage marina was evaluated (figure 6). Such construction requires a total of about 2,500,000 cubic yards (1,875,000 m^3) of dredging and a total land alteration of 103 acres (41.7 ha), of which 33 acres (13.3 ha) are intertidal wetlands and 70 acres (28.3 ha) are shallow subtidal. About 19 acres (7.7 ha) of shoreline, principally tidal sand and mudflats, will be filled to provide land for marina support facilities and parking. Use of the site requires displacement and disruption of an existing residential area and city park frontage (photo 8). The beach is unprotected from prevailing winds and wave action; therefore, a 3,400-foot (1,036 m) floating breakwater is necessary.

2.3.5.2 Environmental Conditions and Considerations. Past environmental disturbances in East Bay have been extensive, although the effects were more severe in the inner portions of the Bay and less pronounced in the area along the East Bay shore where this alternate site is located. This area is presently used as a feeding area by fishes and birds. During adverse weather conditions birds take refuge in Ellis Cove, inner East Bay, and inland. Water quality at this location is better than locations in inner East and West Bays, probably due to improved circulation and flushing caused by its close proximity to deep water. Current recreational use of the city park frontage will be altered to marina oriented activities. This is not inconsistent with the function of a park, but in this event means sacrificing a natural area near an urban environment. Other undeveloped shorelines exist within the SMP "urban" designation, but development pressures are likely to result in their alteration in the future. Although the city park designation does not automatically preclude future shoreline development, it makes the occurrence less likely. Public acceptance of such a change is unlikely.

2.3.5.3 Other Considerations. The East Bay shore site lies within the SMP's "urban" designation, although the shoreline itself is classified "natural" because of the park. Therefore, there is some conflict with existing land-use plans. East Shore Drive would provide adequate access to the site with only minimal alteration. City of Olympia services and utilities are also readily available, although the site is not as advantageously located to the downtown area as are sites 3 and 4. The need to displace existing residences south of the park is also a disadvantage and might not be viewed favorably by the public.

2.3.5.4 Analysis. From a land-use perspective, the East Bay shore is an excellent location for a marina. The site would have less severe water quality problems than the other Olympia Harbor sites and

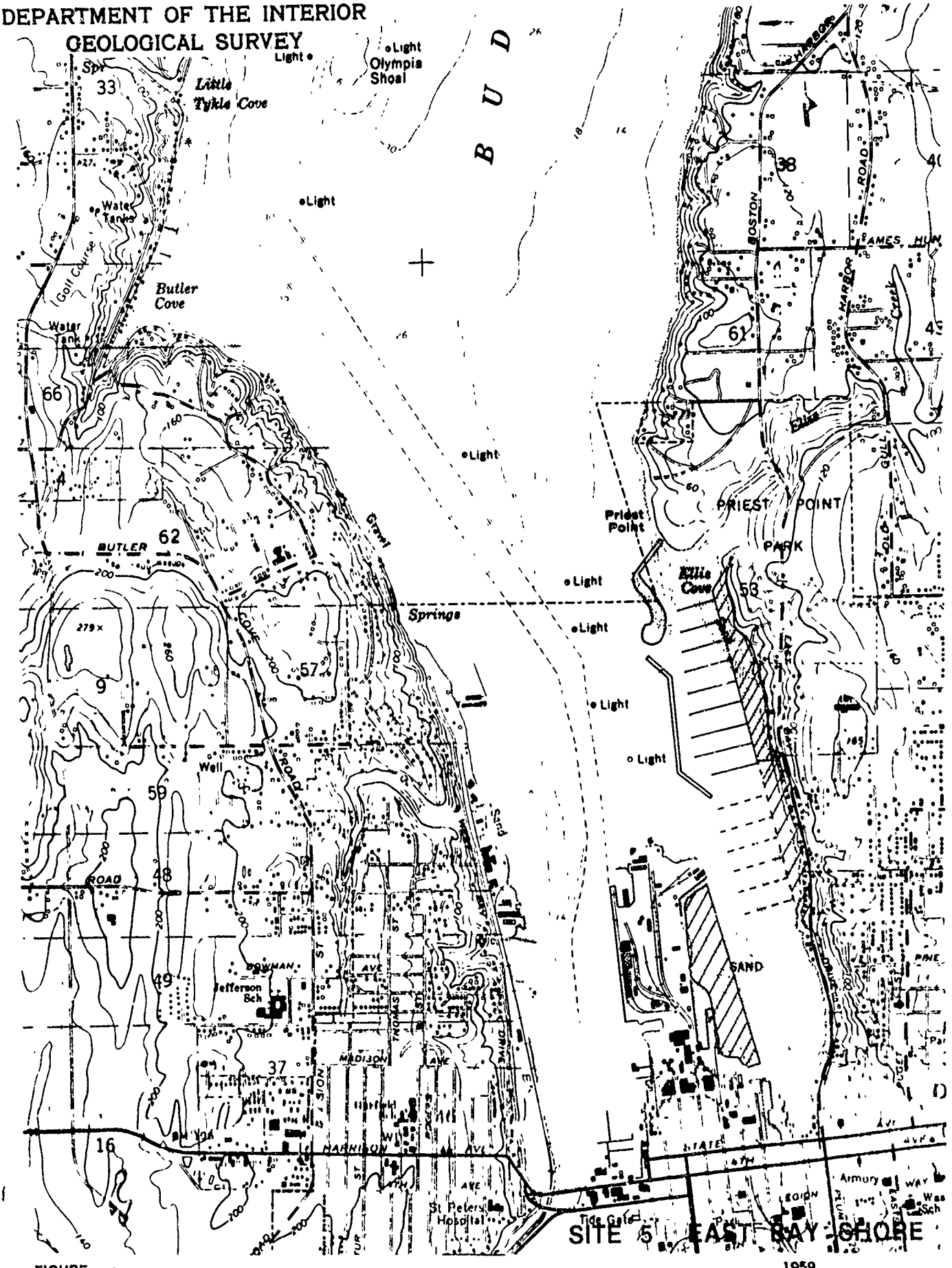
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Little Tykle Cove
Light
Olympia Shoal
BUD
Water Tanks
Golf Course
Butler Cove
Water Tank
BUTLER
Springs
Well
ROAD
Jefferson Sch
BOWMAN
MADISON
HARRISON
St Peters Hospital
Tide Gate
Pridet Point
PRIEST POINT
PARK
Ellis Cove
Ellis
GULL
BOSTON
HARBOR
Creek
SAND
DRIVE
PINE
STATE
Armory
WAY
SITE 5 EAST BAY SHORE
1959
PHOTOREVISED 1968 AND 1973

FIGURE 6

PHOTO 8. Site 5 - East Bay Shore: Looking east from uplands behind West Bay Marina. Priest Point Park starts just north of existing residences (right) and extends beyond picture. Ellis Cove is directly behind tug in harbor. (COE Photo, 1979)

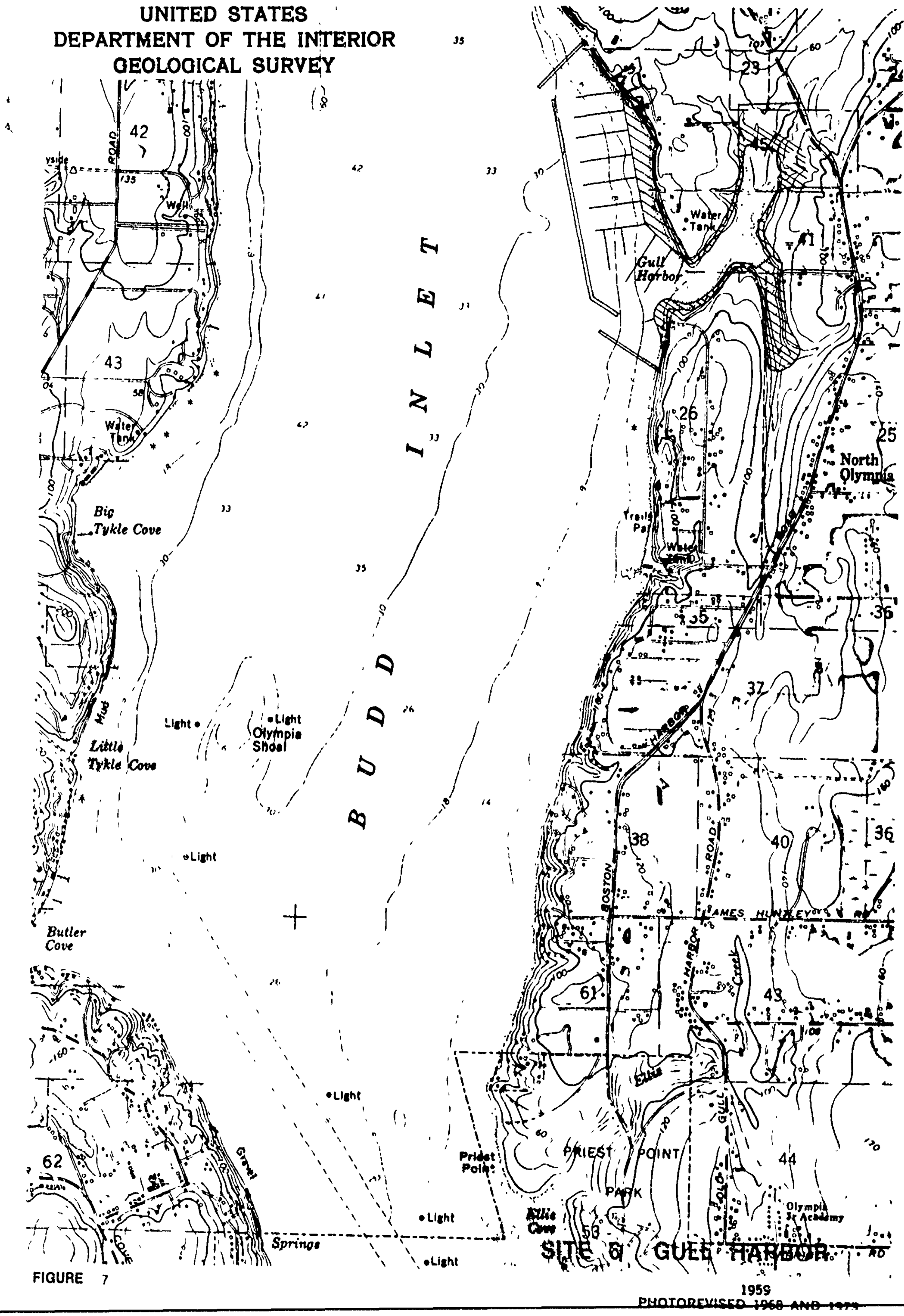
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BUDD INLET
Gull Harbor
Water Tank
North Olympia
Big Tykle Cove
Little Tykle Cove
Butler Cove
Olympia Shoal
Light
Mud
Priest Point
PRIEST POINT PARK
Ellis Cove
Springs
BOSTON
HARBOR
ROAD
AMES HUXLEY
Olympia Jr Academy
SITE 6 GULL HARBOR
1959
PHOTOREVISED 1968 AND 1973

FIGURE 7

PHOTO 9. Site 6 - Gull Harbor: Looking south at entrance. (COE Photo, 1979)

has the advantages of good proximity to the downtown area, very good access, and would be sufficiently removed from the commercial waterfront area to avoid recreational-industrial use conflicts. The site's principal disadvantage is that to optimize moorages (1,500), those shoreline residences south of Priest Point Park would have to be acquired or relocated. Conversion of the park shoreline from an urban natural area to a marina waterfront is another loss. Disadvantages and advantages are rated as equal.

2.3.6 Site 6 - Gull Harbor.

2.3.6.1 Description. The Gull Harbor site is located approximately 4 miles (6.5 km) from the city of Olympia on the eastern shore of Budd Inlet in Thurston County. The shorelines and uplands surrounding Gull Harbor are relatively unpopulated. A 1,500 moorage marina was considered for this site (figure 7). Because of the site's exposure, 3,800 feet (1,158 m) of floating breakwater and 2,400 feet (7.31 m) of timber pile are required. Approximately 2,400,000 cubic yards (1,800,000 m^3) of material will be dredged and 215 acres (87 ha) affected, including 71 acres (28.8 ha) of subtidal, 29 acres (11.7 ha) of intertidal, and 115 acres (46 ha) of uplands. Because of the topography, 115 acres (46 ha) of low uplands require filling; 10 acres (4 ha) of tidal and 6 acres (2 ha) of subtidal lands will also be filled. These filled lands will be used for marina support facilities and parking.

2.3.6.2 Environmental Conditions and Considerations. Gull Harbor is a shallow, picturesque inlet still in an essentially pristine state (photo 9). Water quality is excellent. Invertebrate production is high and it is heavily used by avian fauna and marine mammals. Consequently, environmental consequences are judged to be severe and significant.

2.3.6.3 Other Considerations. Gull Harbor is classified "natural" by the SMP; development would clearly be in conflict. Access could be provided from any of several points on the Boston Harbor Road. This could disrupt the few existing residences and would likely encourage further development. In addition, the site is extremely exposed and requires an extensive breakwater system.

2.3.6.4 Analysis. Disadvantages clearly and overwhelmingly outweigh advantages.

2.3.7 Site 7 - Boston Harbor.

2.3.7.1 Description. Boston Harbor is a residential community located 8 miles (13 km) from Olympia at the mouth of Budd Inlet (figure 2). A small private marina already exists at this location (photo 10). The site is extremely exposed and moorage capabilities are quite limited.

A 900 moorage marina was considered (figure 8). Only 800,000 cubic yards (600,000 m^3) of dredging would be required, all to construct the moorage area. Land requirements are also small, involving a total of 56 acres (23 ha), including 28 acres (11 ha) of subtidal, 18 acres (8 ha) of intertidal lands, and 10 acres (4 ha) of uplands. Approximately 18 acres (7.3 ha) of tidelands must be filled to provide lands for marina support facilities. However, due to the exposed location, a substantial breakwater would be required. Although only 2,000 feet (609 m) of length would be involved, 21-foot-wide (6.4 m) sections would be required rather than the 12- or 16-foot (4 to 5 m) sections proposed at other locations.

2 3.7.2 Environmental Conditions and Considerations. Boston Harbor is a small bay between Doffermyer Point and Dover Point consisting of about 36 acres (15 ha) of water surface area. The bay itself is sufficiently deep to accommodate small boats even at extreme low tide. Water quality is excellent, although occasional localized pollution from failing septic systems has been noted (Boston Harbor EIS). The area abounds with a variety of marine life including various crabs, waterfowl, shore birds, various fishes, and marine mammals. In addition to the existing marina, several residences and some undeveloped lands occupy the shoreline and immediate uplands (photo 11). Those uplands are gently sloped, although the soils have only limited ability to handle septic systems. Consequences of siting a major marina here would be severe. Esthetics would be impacted to an unquantifiable degree, both through direct development effects and from secondary development which can be expected to follow marina construction. As there is no sewer collection system, development could result in overloading of the area's waste assimilation capacity unless a sewage collection and treatment system is provided. Other important impacts are an increased incidence of fuel or oil spills from boats; an increase in noise, light, and glare; and a significant increase in vehicular traffic to, about, and from the harbor. Environmental consequences are, therefore, judged to be significant.

2.3.7.3 Other Considerations. The harbor area is designated "rural" (land) and "conservancy" (water) according to the county SMP. Siting of a major marina is not precluded by these designations, but is a significantly more intensive land use than those considered "normal" for these designations. In order to provide adequate land for marina support facilities and parking, all of the harbor shoreline would have to be acquired, displacing the entire community. Utilities and services are inadequate for a large marina and must be brought in from elsewhere. The site's exposed location and limited moorage capacity are other negative factors. The site's relative distance from the main population center is partially offset by the excellent access and the fact that the site is close to the most desirable recreation waters.

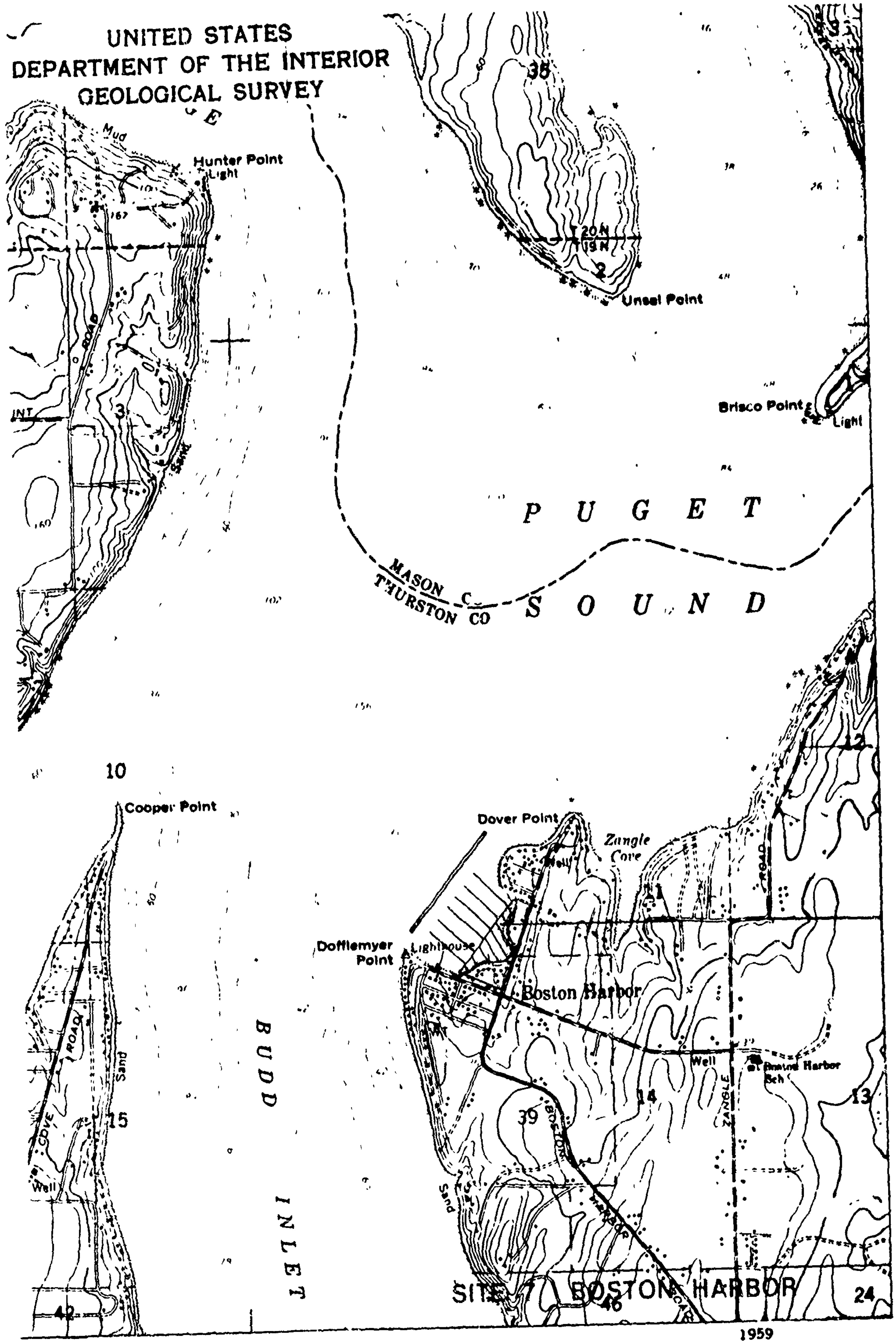
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Hunter Point
Light
Unsel Point
Brisco Point
Light
PUGET
SOUND
MASON CO
THURSTON CO
Cooper Point
Dover Point
Zangle Cove
Dofflemyer Point
Lighthouse
Boston Harbor
BUDD INLET
SITE 7 BOSTON HARBOR
1959
PHOTOREVISED 1968

FIGURE 8

PHOTO 10. Site 7 - Boston Harbor: Looking north into Puget Sound. (COE Photo, 1979)

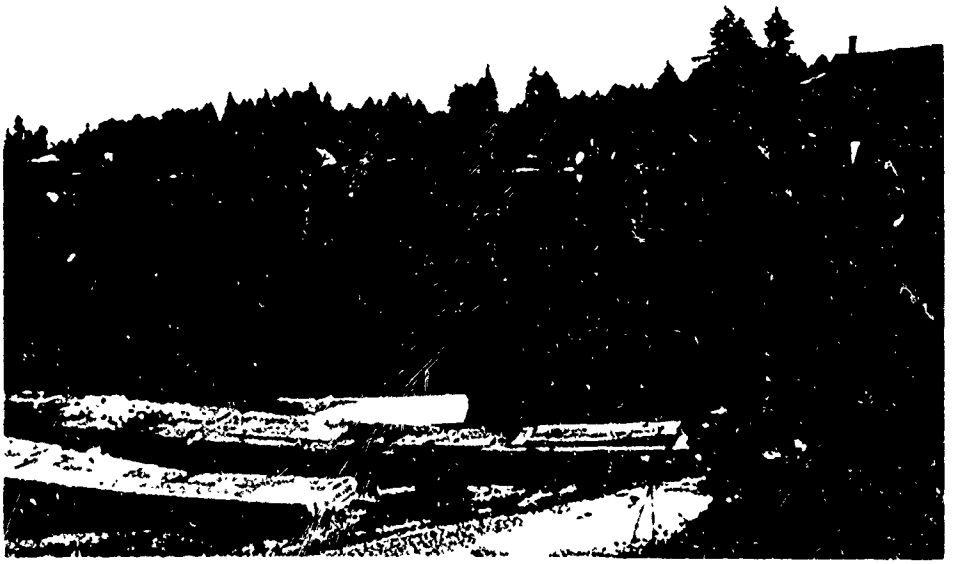

PHOTO 11. Site 7 - Boston Harbor: Looking east at community from existing marina. (COE Photo, 1979)

2.3.7.4 Analysis. Marina development will entail virtual destruction of the present Boston Harbor community. Potentially adverse secondary effects are also a major concern. Disadvantages are judged to overshadow advantages.

2.3.8 Site 8 - Henderson Inlet North.

2.3.8.1 Description. Henderson Inlet is located in northeastern Thurston County just beyond Dana Passage. The north site is approximately 6.5 miles (10.5 km) from the city of Olympia at Cliff Point. A 1,300 moorage marina was considered (Figure 9). Such construction involves providing a 600-foot (183 m) timber pile breakwater, dredging 800,000 cubic yards (600,000 m^3) of material, and an alteration of 70 acres (28 ha), including 48 acres (19 ha) of subtidal and 22 acres (9 ha) of intertidal lands. Approximately 25 acres (10 ha) will be filled to provide marina support facilities and parking; 18 acres (7.2 ha) would be intertidal and 7 acres (7.8 ha) subtidal.

2.3.8.2 Environmental Conditions and Considerations. Henderson Inlet is a long, narrow inlet east of Budd Inlet. In comparison to Budd Inlet, Henderson Inlet is still undeveloped; only a few scattered residences occupy the shoreline and the Weyerhaeuser Company rafts logs at Chapman and Woodard Bays (photos 12 and 13). The inlet is shallower than Budd Inlet, and much of lower Henderson Inlet is exposed at low tides. Herring and smelt spawn in the inlet, and it is considered very good shellfish habitat, producing clams and oysters. Harbor seals and rafts of sea birds also use the inlet regularly. Water quality is generally excellent, although occasional localized pollution due to septic failure can be expected. The shoreline is moderately to steeply sloped with a gently sloping sand, silt, or gravel beach which will be filled to provide adequate backup lands. Although not pristine, the inlet still retains a sense of being unspoiled. Environmental consequences of a marina would be significant and severe. Still, of the three sites investigated in Henderson Inlet, the north site appears to have the fewest environmental problems.

2.3.8.3 Other Considerations. The north site, tucked behind Cliff Point, is well sheltered and requires only a 600-foot (183 m) timber pile breakwater for protection. Also, this site is close to deep water, making dredging volumes low. Construction of a marina at this site could disrupt an existing neighborhood on the adjacent uplands, although only a few residences may be directly affected. There is also the potential for disrupting Weyerhaeuser's log rafting operations to the south; although no relocations are required. Development of a marina is a significant change from present use of the area. The water area and shoreline of Henderson Inlet is designated "conservancy" under the SMP. In addition, the site is distant from the main population center, the road system that provides access requires upgrading, and utilities and services must be provided.

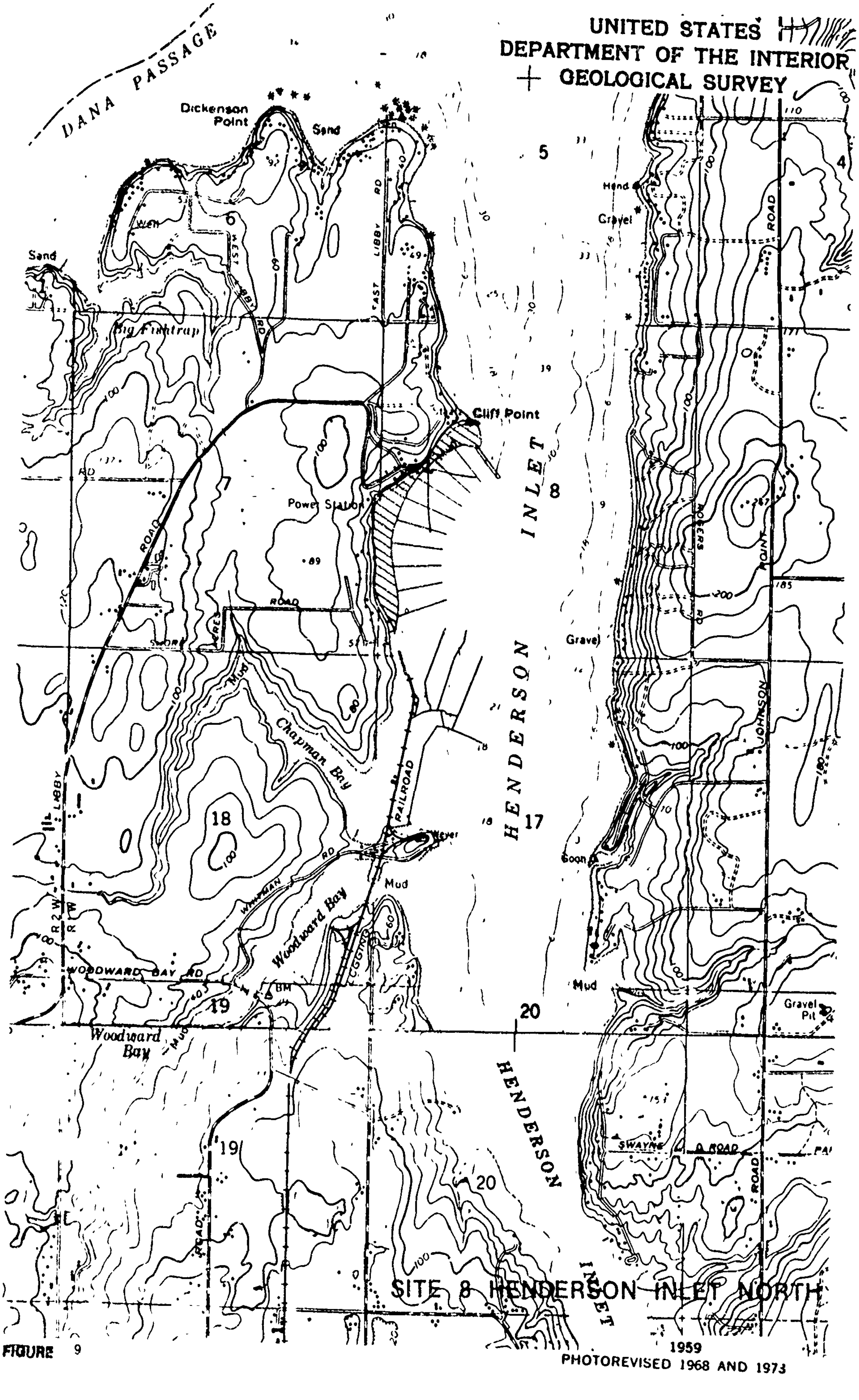
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
DANA PASSAGE
Dickenson Point
Sand
Big Fishtrap
Cliff Point
Power Station
Chapman Bay
Woodward Bay
WOODWARD BAY RD
HENDERSON INLET
Gravel
Gravel Pit
Mud
ROAD
RAILROAD
JOHNSON
POINT
SWAYNE ROAD
SITE 8 HENDERSON INLET NORTH
1959
PHOTOREVISED 1968 AND 1973

FIGURE 9

PHOTO 12. Site 8 - Henderson Inlet North: Looking northeast along Cliff Point. (COE Photo, 1979)

PHOTO 13. Site 8 - Henderson Inlet North: Looking south toward Weyerhaeuser log storage facility (center). (COE Photo, 1979)

2.3.8.4 Analysis. Although the best of the Henderson Inlet sites, the environmental consequences are significant. Coupled with the potential disruption of an existing neighborhood and industry, and other less than desirable considerations, disadvantages outweigh advantages.

2.3.9 Site 9 - Chapman Bay.

2.3.9.1 Description. The Chapman Bay site is located on the western side of Henderson Inlet approximately 6 miles (9.6 km) from Olympia. A 1,100 moorage marina was considered for this location (figure 10). The site requires a 1,400-foot (426 m) rubblemound breakwater, a total dredging effort of 1,300,000 cubic yards (975,000 m^3), and alteration of 54 acres (22 ha), including 46.6 acres (18.9 ha) of subtidal and 7.4 acres (3 ha) of intertidal lands. Provision of marina support facilities and parking requires a 13-acre (5.2 ha) fill, 6.5 acres (2.6 ha) each of subtidal and intertidal lands.

2.3.9.2 Environmental Conditions and Considerations. Conditions noted for the north site are equally applicable to Chapman Bay (photos 14 and 15). Although impacted by Weyerhaeuser's log rafting facility, environmental consequences resulting from filling for backup lands and the other disturbances which go with constructing a marina would be significant and severe. Potential exists to disrupt anadromous fish passage (adult and juvenile) to Woodard and Chapman Creeks and to disturb an existing great blue heron rookery at Chapman Bay. Despite, or because of, the log rafting operation, human activity in the area is light and disturbances low. Flushing could be a problem due to configuration of the inlet, but, since water quality is generally good no significant, adverse, effect on water conditions are expected to result from marina construction.

2.3.9.3 Other Considerations. The Chapman Bay site is in single ownership by the Weyerhaeuser Company and is used for rafting logs. There is no established residential area in the vicinity that would be affected by marina construction; otherwise, considerations are the same as the north site. Chapman Bay is slightly more exposed than the north site, and, therefore, a larger breakwater would be required. The entire area is designated "conservancy," however, and marina construction conflicts with that designation.

2.3.9.4 Analysis. Like the north site, environmental consequences of siting a marina at Chapman Bay would be significant. Coupled with the other considerations noted, disadvantages clearly outweigh advantages.

2.3.10 Site 10 - Henderson Inlet South.

2.3.10.1 Description. The south site is located south of the Chapman and Woodard Bays area on the eastern shore of Henderson Inlet approximately 7 miles (11 km) from Olympia. A 1,200 moorage marina was envisioned (figure 11). The site is relatively exposed; therefore, 1,400

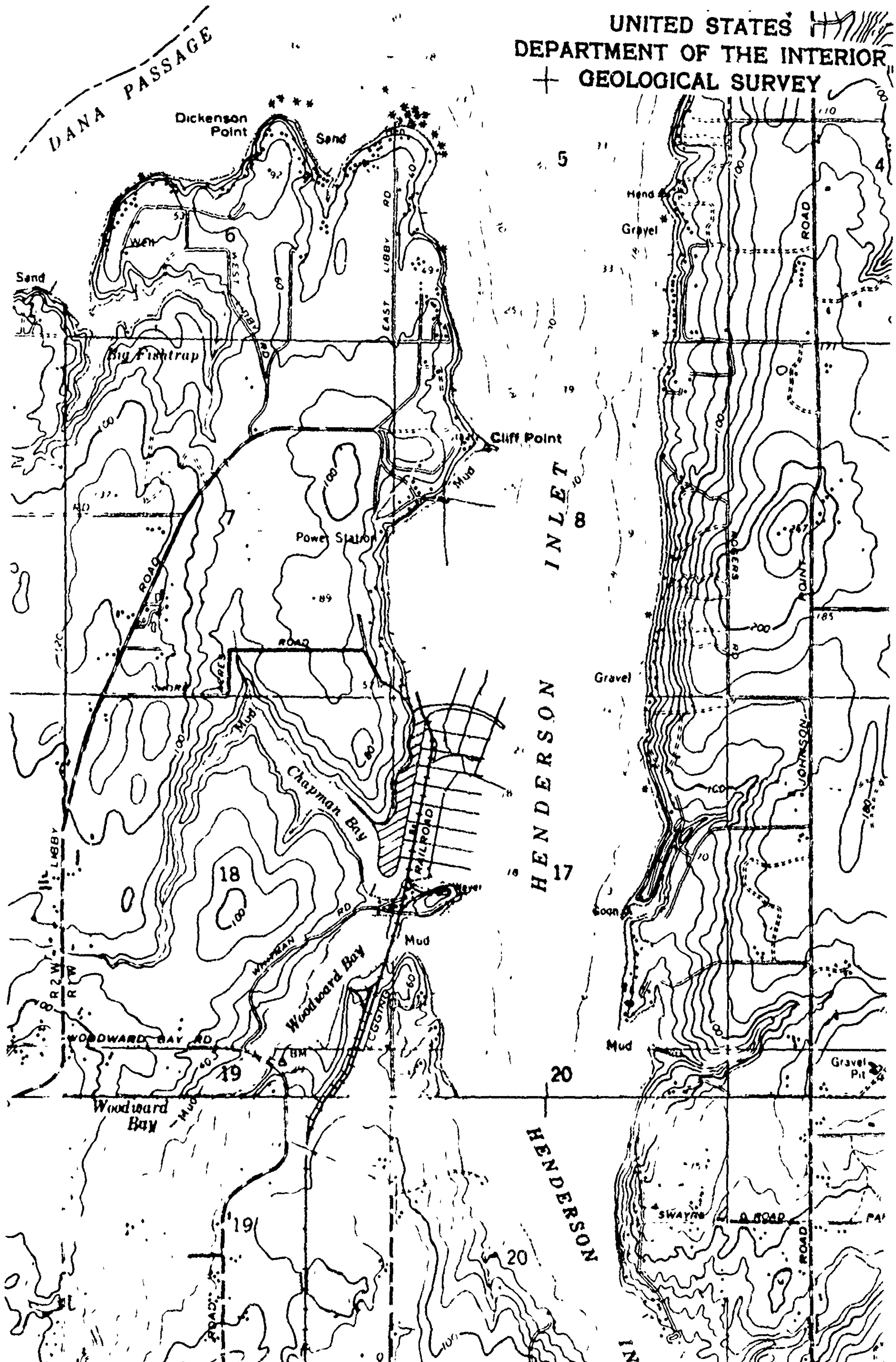
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
DANA PASSAGE
Dickenson Point
Sand
Big Fishtrap
Cliff Point
Power Station
HENDERSON INLET
Chapman Bay
Woodward Bay
WOODWARD BAY RD
RAILROAD
Mud
Gravel
JOHNSON
ROAD
R 2 W
R 1 W
LIBBY
Gravel Pit
SWAYNE ROAD
HENDERSON
INLET
CHAPMAN BAY
1959
PHOTOREVISED 1968 AND 1973

FIGURE 10

PHOTO 14. Site 9 - Chapman Bay: Looking north at Weyerhaeuser facility. Cliff Point appears to left of end of pier. (COE Photo, 1979)

PHOTO 15. Site 9 - Chapman Bay: Looking northwest up Chapman Bay. Weyerhaeuser facility is beyond picture to right. (COE Photo, 1979)

feet (426 m) of 21-foot-wide (6.4 m) floating breakwater (like that proposed for Boston Harbor) is necessary. Because lower Henderson Inlet is shallow, extensive dredging is necessary. A total of 1,360,000 cubic yards (1,020,000 m^3) must be dredged, 960,000 cubic yards (720,000 m^3) for the moorage area and 400,000 cubic yards (300,000 m^3) for an entrance channel. Land requirements amount to 49 acres (20 ha), of which 27 acres (11 ha) are subtidal and 22 acres (9 ha) intertidal. Nine acres (3.6 ha) of tidelands will be filled to provide land for marina support facilities and parking.

2.3.10.2 Environmental Conditions and Considerations. Again, the description provided for Henderson Inlet is applicable to the south site (photo 16). The site is principally intertidal and biological productivity is very high. Development will adversely affect avian and fish populations. Environmental consequences are significant.

2.3.10.3 Other Considerations. Considerations are essentially the same as those for the north site, although there are fewer residences disrupted. Secondary impacts through increased development are expected. The site is exposed and requires a substantial breakwater to protect a relatively small number of moorages. The SMP classifies the site as "conservancy," so development clearly is in conflict.

2.3.10.4 Analysis. As is the case with Gull Harbor, the site offers no advantages.

2.3.11 Analysis of Alternative Sites. The 10 sites described were analyzed based on several factors, including desires of local interests, financial capability of the local sponsor, and socioeconomic and environmental effects. Table 3 highlights several key factors.

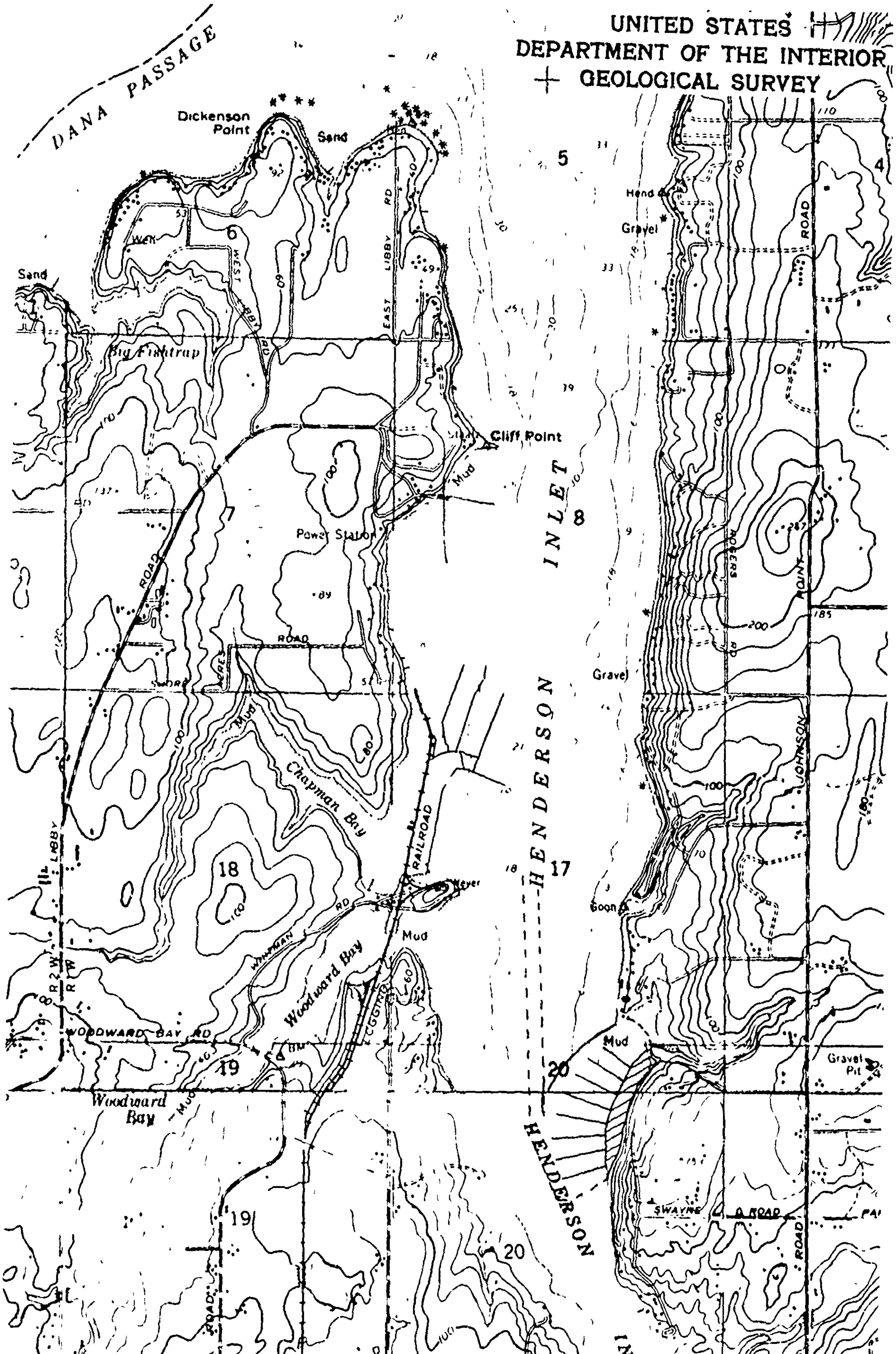
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
DANA PASSAGE
Dickenson Point
Sand
Big Fishtrap
Cliff Point
Power Station
Mud
Chapman Bay
Woodward Bay
WOODWARD BAY RD
RAILROAD
HENDERSON INLET
Gravel
Gravel Pit
ROGERS
JOHNSON POINT ROAD
SWAYNE
SITE 10 - HENDERSON INLET SOUTH
1959
PHOTOREVISED 1968 AND 1973

FIGURE 11

PHOTO 16. Site 10 - Henderson Inlet South: Looking south along shore from north side of cove. (COE Photo, 1979)

TABLE 3
KEY SITE SELECTION FACTORS

Factors	Sites									
	1	2	3	4	5	6	7	8	9	10
Requires extensive land acquisitions/relocations	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	No
Results in unacceptable socioeconomic effects	Yes	Yes	No	No	Yes	No	Yes	No	Yes	No
Complies with existing land-use designations	No	Part	Yes	Yes	Part	No	Yes	No	No	No
Water quality concerns	No	Yes	Yes	Yes	Yes	No	No	No	No	No
Close to main population center	No	Yes	Yes	Yes	Yes	No	No	No	No	No
Results in unacceptable environmental consequences	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Of the 10 sites examined, only sites 2, 3, and 4 are designated "urban" under the SMP; the shoreline of site 5 is designated "natural" although it is within the "urban" water space. Water areas at other sites are either under "conservancy" or "conservancy natural" designation which does not preclude selection, but argues against selection if alternative sites exist. The shoreline at site 7 is designated "rural," which also does not preclude marina development; however, other considerations recommend against its selection. Of the four remaining sites, problems associated with sites 2 and 3 appear to outweigh advantages. In particular, environmental consequences and potential conflicts between small boats and oceangoing ships in a restricted area render these sites less desirable for a marina. Additionally, the area is already committed to industrial development, and marina development will conflict with this established use. With regard to sites 4 and 5, site 5 is the better site based solely on water quality concerns; however, when considering all the various factors, including benthic productivity and importance to wildlife, less severe impacts result from locating the marina at site 4 than site 5. Accordingly, site 4, East Bay, was selected as the preferred site for marina development and detailed plans were formulated.

2.3.12 Selected Site Alternatives. Five alternative plans for the East Bay site were examined, each with varying amounts of filling and different marina locations on the site (plate 2c). Initially, alternative plans 4a through 4d were considered, and the principal conflicts centered on the amount of area to be filled and justification of the cargo storage area requested by the Port of Olympia. As a result of data from Corps of Engineers and Washington Department of Ecology (WDE) sampling, water quality in East Bay became a primary concern, and plan 4e was developed and evaluated. All the plans include a new access road to the Port area and proposed marina, thereby allowing Port-bound traffic to bypass downtown streets.

2.3.12.1 Plan 4a.

2.3.12.1.1 Description. This plan provides 800 moorages and involves a total of 110.2 acres (44.6 ha), including 43.7 acres (17.7 ha) of tidelands, 65.5 acres (26.5 ha) of shallow subtidal lands, and 1.0 acre (.4 ha) of uplands. Dredging 31.3 acres (12.6 ha) for the moorage area and 25.5 acres (10.3 ha) for the entrance and access channels totals 1.175 million cubic yards (899,000 m^3). The dredge material will be used to fill 24.2 acres (9.8 ha) for the port's proposed cargo handling area; 26.6 acres (10.7 ha) for local interest development of marina support facilities, access roads, and parking; and 2.6 acres (1 ha) of miscellaneous areas to provide proper surface drainage. The moorage area and access channel would be protected from northwest winds by a 700-foot (215 m), 16-foot-wide (4.9 m) floating breakwater (plates 2a, 2b, and 3). The plan had a 2.3 to 1 benefit/cost ratio in the 1979 draft; current benefit/cost ratio is 5.3 to 1 (see Section 5, DPR.). (See appendix B.)

2.3.12.1.2 Plan Effects. The plan meets the principal planning objective and provides the Port of Olympia with some of the additional cargo handling lands they desire to back up their commercial terminals in West Bay. Environmental concerns center on potential water quality effects, loss of intertidal wetlands and their associated productivity, and use of the area as habitat for migrating and wintering waterfowl. However, the action leaves the more productive intertidal wetlands along East Shore Drive intact, although there are still some questions as to whether there is sufficient "buffer" between the marina and the tideflats so that water birds will continue to utilize the area in their present numbers. The action also destroys, by filling, a small intertidal island used by birds at the mouth of Moxlie Creek. Effects of marina construction and operation on the bay's water quality are not expected to be significant as mitigation is provided for. However, as previously suggested, the effects on the biological resources may be significant. Provision for the additional cargo handling lands would allow the port greater flexibility with their cargo handling and relieve some of the environmental and economic effects of double handling and trucking freight from the airport to the port area. (See appendix D.)

The plan benefits, and has the support of, the Port of Olympia because the additional cargo handling area improves its competitive chances against other Puget Sound ports. This plan is designated the NED plan.

2.3.12.2 Plan 4b.

2.3.12.2.1 Description. This plan provides 800 moorages and involves a total alteration of 89 acres (36 ha), including 35 acres (14 ha) of intertidal wetlands and 54 acres (22 ha) of subtidal lands. Dredging 1,230,000 cubic yards (922,500 m^3) of material is required from the 31 acres (12.5 ha) for the moorage area and 28 acres (11.3 ha) for entrance and access channels. Filling is restricted to 27 acres (11 ha) for marina support facilities, access roads, parking, and 2.6 acres (1 ha) of miscellaneous area fill. Surplus dredge material will be disposed of in the state approved deepwater disposal site in Dana Passage with associated effects (reference WDF Technical Report No. 15, 1975). The moorage area and access channel will be protected by a 250-foot (76 m) floating breakwater. The marina design is that of plan 4a, but moved westward about 300 feet (91.4 m). The plan has a 2.2 to 1 benefit/cost ratio (based on April 1979 price level and 6-7/8 percent interest rate).

2.3.12.2.2 Plan Effects. The plan does not provide the Port of Olympia with any additional cargo handling lands and is not acceptable to the local sponsor. Biological productivity as well as important avian habitat is lost by filling of intertidal wetlands; however, under this alternative, the least amount of fill would occur and, consequently, the least direct environmental impact. The plan was recommended by the U.S. Fish and Wildlife Service (FWS) (appendix F). Because of the site's topography, more dredging is required under this alternative than for plan 4a, and open-water disposal is required, thereby increasing costs ($561,000 over plan 4a). Excess dredged material will be deposited in the state-approved deepwater disposal site at Dana Passage. Open-water disposal raises bottom elevations, creates a short-term turbidity plume, and material deposited is lost to future use, but normally causes no significant adverse effects (WDF Technical Report No. 15, 1975). In this instance, agency concerns have been expressed regarding open water disposal of East Bay sediments.

This plan satisfies the principal planning objective: makes the most significant contribution toward preserving, enhancing, maintaining, or restoring the cultural and natural resources of the study area; and results in the least environmental damage. However, although plan 4b addresses the planning objectives in a way that emphasizes, more than any other plan, esthetic, ecological, and cultural contributions, uncertainty about the marina's effect, combined with the periodic DO sag in Olympia Harbor, makes it difficult to predict whether the plan provides a net positive contribution to the EQ account. Detailed evaluation of open water disposal was also not made due to apparent preference for containment of East Bay sediments. Therefore, plan 4b is designated as the least environmentally damaging (LED), rather than the EQ plan.

2.3.12.3 Plan 4c.

2.3.12.3.1 Description. This plan provides 800 moorages and involves altering a total of 97 acres (39.3 ha). Dredging 1.1 million cubic yards (825,000 m^3) of material is required from 32 acres (12.9 ha) of moorage area and 28 acres (11.3 ha) of entrance and access channels. The dredged material will be used to fill 26.6 acres (10.8 ha) for marina support facilities, access roads, and parking; 7.4 acres (3 ha) for cargo handling area; and 2.6 acres (1 ha) of miscellaneous fill area. Approximately 500,000 cubic yards (382,300 m^3) of dredged material will be disposed of in deep water, at an additional cost of $425,000 over land disposal proposed in plan 4a. The moorage area and access channel require a 400-foot (122 m) floating breakwater. The plan has a 2.3 to 1 benefit/cost ratio.

2.3.12.3.2 Plan Effects. The plan meets the principal planning objective and provides some additional cargo handling area, but is not acceptable to the local sponsor. Environmental consequences differ from those for plans 4a and 4b only in the amount of fill involved. As in the case of plan 4b, deepwater disposal of excess dredged material would be necessary. Because of the amount of intertidal wetlands affected, loss of productivity and disturbance of waterfowl are expected to be somewhat greater for this plan than for the LED plan, but less than for the NED plan.

2.3.12.4 Plan 4d.

2.3.12.4.1 Description. This plan provides 500 moorages and involves a total of 89.6 acres (36.3 ha). Dredging 1.1 million cubic yards (825,000 m^3) of material is required from the 15 acres (6 ha) of moorage area and the 24 acres (9.7 ha) of entrance and access channels. Dredge material will be used to fill 26 acres (10.5 ha) for marina support facilities, access roads, and parking; 22 acres (9 ha) for cargo handling area; and 2.6 acres (1 ha) of miscellaneous fill area. Approximately 370,000 cubic yards (283,000 m^3) of dredged material would be disposed of in deep water at an additional cost of $315,000 over the tideland disposal proposed in plan 4a. The moorage area and access channel would be protected by a 900-foot (274 m) floating breakwater. The plan has a 1.2 to 1 benefit/cost ratio.

2.3.12.4.2 Plan Effects. The plan does not meet the principal planning objective in that it provides fewer of the projected moorages needed than the other plans. Additional moorages will have to be provided in the future, presumably through further expansion of the marina. Ultimately then, environmental consequences approach those of plan 4a or plan 4e, depending on the direction of expansion. Initially, effects parallel those for plan 4c.

The plan provides the Port of Olympia almost as much cargo handling area as plan 4a. However, since the principal planning objective is to

address the need for additional moorages in southern Puget Sound rather than to provide additional cargo lands, it is inappropriate to trade off moorages for cargo handling lands. The plan is not acceptable to the local sponsor.

2.3.12.5 Plan 4e.

2.3.12.5.1 Description. This plan provides for 700 moorages and involves a total of 87.6 acres (35.4 ha). Dredging 1 million cubic yards (750,000 m^3) is required from the 27.5 acres (11 ha) of moorage area and 23.1 acres (9.4 ha) of entrance and access channels. Dredge material will be used to fill 10.2 acres (4 ha) for marina support area access roads and parking; 24.2 acres (9.8 ha) for cargo handling area; and 2.6 acres (1 ha) of miscellaneous fill area. Approximately 550,000 cubic yards (421,000 m^3) of dredged material would be disposed of in deep water at an additional cost of $468,000 over land disposal in plan 4a. The moorage area and access channel will be protected by a 1,600-foot (488 m) floating breakwater. This plan differs considerably from the other site 4 plans by locating the marina at the tip of the port peninsula. The plan has a 1.2 to 1 benefit/cost ratio. (Note: As a result of comments received on the draft DPR/EIS, a modified plan 4e was developed and evaluated. The modification increased the number of moorages and size of fill to eliminate the need for open water disposal. See appendixes D, G, and H.)

2.3.12.5.2 Plan Effects. Evaluation of this plan was requested by representatives of Environmental Protection Agency (EPA) Region 10 as a possible solution to East Bay's water quality problem. The plan meets the principal planning objective and gives the Port of Olympia the additional cargo handling area they desire. However, locating the marina at the tip of the peninsula increases the marina's exposure to wave action and, therefore, necessitates a considerably larger floating breakwater. Additionally, the tip of the port peninsula (KGY tidelands) is a relatively more productive intertidal area than inner East Bay. Environmental consequences are more severe at this site than deeper inside East Bay. Moreover, the plan does not improve the water quality situation over what can be expected inside East Bay itself (section 4.1.3.2). The size and length of breakwater make it the most expensive of all site 4 plans. For these reasons, it is not favored by the Corps and it does not have the support of the local sponsor.

2.3.13 Selection of Preferred Plan. In selecting a preferred plan, consideration was given to the planning objectives, desires, and financial capability of the local sponsor, and environmental effects and economics. Table 4 is a condensation of several key selection factors. Readers are referred to table 1 in the exhibit section.

TABLE 4
KEY PLAN SELECTION FACTORS

Factors	Plans 4a	4b	4c	4d	4e
Total Acres Affected	110.2	89	97	89.6	87.6
Acres Filled	53.4	30	37	50.6	37
Volumes Dredged (Million Cubic Yards)	1.175	1.23	1.1	1.1	1.0
Requires Open Water Disposal	No	Yes	Yes	No	No (after modification)
Meets Principal Planning Objective	Yes	Yes	Yes	No	Yes
Has Local Sponsor Support	Yes	No	No	No	No
Average Annual Benefits 1/					
Recreational Boating	$357,000	$357,000	$357,000	$223,000	$312,000
Land Enhancement	72,000	26,000	38,000	45,000	28,000
NED Employment	6,000	6,000	6,000	6,000	6,000
Breakwater Recreation	25,000	25,000	25,000	25,000	25,000
Total	$460,000	$414,000	$426,000	$299,000	$371,000
Average Annual Costs 1/					
Construction 2/ 3/	$186,000	$176,000	$176,000	$239,000	$276,000
Maintenance 2/	18,000	10,000	10,000	20,000	30,000
Major Rehabilitation	N/A	N/A	N/A	N/A	N/A
Total	$204,000	$186,000	$186,000	$259,000	$306,000
Benefit/Cost Ratio 1/	2.3	2.2	2.3	1.2	1.2

1/Taken from DPR, based on April 1979 price level at 6-7/8 percent interest rate.
2/Includes Coast Guard aids to navigation.
3/Does not include moorage area dredging and disposal costs.

Plan 4d does not satisfy the principal planning objective; the marina would have to be expanded at some date in the future. Also, Plan 4d does not significantly lessen environmental consequences that would justify its selection as a preferred plan.

Early in the planning process, preference was stated for confined disposal of East Bay sediments over open water disposal. This preference has been corroborated by recent agency correspondence (appendix H). Although some of the sediments dredged from East Bay have been presumed acceptable for open water disposal, no recent testing has been done to determine volumes or locations of acceptable sediments. In addition, construction costs would be increased. Plans 4b and 4c require open water disposal. Originally 4e also required open water disposal but it was subsequently modified to take the total volume dredged material (see appendix D).

Implementing plan 4e (original or modified) involves high economic costs and environmental losses (water quality aside) in comparison to other plans, and the plan is not acceptable to the local sponsor. Plans 4b and 4c are not acceptable to the local sponsor, since they do not provide the additional cargo handling lands. The port provided consultants' reports which examined the existing facilities and their proposal to fill the area. The Corps of Engineers has examined these consultants' reports and agreed with the findings. In the course of analysis, it was apparent that future Port development will occur and is appropriate. The present necessity to store cargoes at the airport is inefficient from an operational and energy consumption standpoint. Due to the limitations of available land on the port peninsula, it is obvious that some cargo will continue to be stored at the airport. The alternative is large-scale filling of East Bay to provide the additional lands required, an economical and expedient, but not an environmentally sound, solution. East Bay has been degraded by past industrial actions and productivity is low relative to other southern Puget Sound shorelines (section 4.17). The judgment here is that, in this instance, economic and social benefits gained are greater than the biological losses engendered by the fill of intertidal wetlands. Such potential was foreseen by the SMP for Thurston County which designates East Bay as "urban." The option of completely separating marina development from the cargo area fill through separate 404 action was considered. This is judged to be inefficient as the area was needed for disposal of dredged material; hence, the effects and evaluations were included in this document. For these reasons, neither plan 4b, the LED plan, and 4c were selected as the preferred plan. Such a tradeoff is appropriate under NEPA, Executive Order 11990, and Corps of Engineers regulations.

Accordingly, 4a is selected as the preferred plan. Because of the uncertainty associated with potential water quality changes and effects on biota, an aeration system and a water quality monitoring program was designed and incorporated into the selected plan. Specific details of the selected plan are provided by the DPR and appendixes B and D.

3. AFFECTED ENVIRONMENT

3.1 Natural Systems and Resources.

3.1.1 Atmospheric Conditions.

3.1.1.1 Climate and Weather. The climate of lower Puget Sound is mild and marine, with warm summers and mild, wet winters. Average temperatures range from 34° F (1° C) in January to 64° F (18° C) in August. Average annual rainfall totals approximately 44 inches (112 cm). Prevailing winds are from south to southwest, although major storms periodically blow in from north to northeast.

3.1.1.2 Air Quality. Air quality in Thurston County is monitored by the Olympic Air Pollution Control Authority (OAPCA), a six-county regional agency. Air quality within the authority's region is good; this is a class II area under the Prevention of Significant Deterioration Policy (Federal). Prevailing weather conditions continuously flush air contaminants eastward. During inversion, the entire land mass between the Olympics and the Cascades is affected by atmospheric wastes; however, such inversions are rare (OAPCA, 1977).

3.1.2 Physical Conditions.

3.1.2.1 Geology. Olympia lies in the southern Puget lowlands, which were subjected to multiple glaciations during the Pleistocene. This resulted in the present subdued and streamlined topography and a thick accumulation of glacial drift over Tertiary bedrock. East Bay is underlain by a sequence of recent bay muds, fine grained glacial outwash, and lake sediments to depths beyond -129 feet (-39 m) mean lower low water (MLLW), the maximum penetration of exploration. Bottom contours and a geologic section are shown on plates 4 and 5.

The outwash consists of upper and lower layers of sand and silty sand which are medium-dense to dense with the upper layer being slightly less dense. Thickness of the upper unit varies from 2 feet (.6 m) to over 60 feet (18.3 m); the thicker portions occur generally under the west and south portions of East Bay. The bottom of the lower sand layer was not penetrated in drilling. Interfingered with the outwash are gray, glaciolacustrine silts containing some sandy lenses. The material is soft to medium stiff, and thickness varies from less than 15 feet (4.6 m) to over 60 feet (18.3 m). Within the silts is an irregular bed of clean sand, which carries ground water under artesian pressure. This aquifer generally slopes to the northwest with observed elevations ranging from -13 feet (-4 m) to a maximum -108 feet (-33 m).

Except for the head of Budd Inlet, surrounding slopes are moderate to very steep. The eastern shore of the inlet near its mouth has only gentle slopes.

3.1.2.2 Sediment Analysis. According to soils investigations performed by Dames and Moore for the Port of Olympia (1972-1973) and Corps investigations (1964), the upper layer in East Bay consists of a soft silt with varying amounts of fine sand, shells, and organic material. The layer appears to have been deposited in recent geologic time and varies in thickness from less than 10 feet (3 m) to over 30 feet (9 m). It is very soft, possesses a high water content, low density, and low shear strength. These bay muds are continuously replenished by sediments from the Deschutes River and from decomposition of organisms which live in the present estuarine environment. The uppermost surface of this layer is littered with sunken logs, the remains of tires, and other debris which have accumulated during years of use as a log storage area. Denser materials are encountered below this upper silt layer. There is a sharp demarcation between the upper soft material and the denser, underlying material.

The results of chemical tests of the bottom sediments performed by Dames and Moore were compared with then current EPA open-water dredged material disposal criteria (40 CFR 230). By these criteria, the top sediments in East Bay are unacceptable for open-water disposal. The tests showed values for total volatile solids, chemical oxygen demand, and Kjeldahl nitrogen that far exceeded the criteria. Values for other substances (oil and grease, mercury, lead, zinc sulfide, and settleability) also exceeded the set criteria by various margins.

However, these numerical criteria are not presently applied in determining whether dredged material is acceptable for open-water disposal. Instead, a series of subjective and objective tests which may be used to make an ecological evaluation of dredged material disposal has been published as a regulation (33 CFR 230) by EPA. Those sediment characteristics which indicate relatively high organic content (e.g., volatile solids, COD) are generally not considered to produce long term or severe ecological impacts at high energy, deep disposal sites (such as at Dana Pass). On the other hand, an indication of sediment toxicity (e.g., trace metal content or organohaline compounds) would make sediments unacceptable for open-water disposal. It is probable that some of the surface sediments, and much of the deeper sediments in the basin area, are acceptable for open-water disposal.

3.1.3 Water Conditions.

3.1.3.1 Hydrology. The surface area of Budd Inlet is 7.6 square miles (19.7 m^2) at mean higher high water (MHHW) and 6.2 square miles (16 m^2) at MLLW. Tidal extremes in Olympia Harbor range from +18.2 feet (5.5 m) MHHW to extreme low water at -4.7 feet (1.4 m) MLLW; mean tidal range is 10.5 feet (3.2 m).

Water source to Budd Inlet is Puget Sound proper through the Tacoma Narrows and Dana Passage. These waters are nutrient rich, highly saline, and have a temperature range of 8° to 18° C (University of Washington, 1954).

Budd Inlet flushing rate is relatively fast compared to other bays and inlets in the vicinity. The faster flushing rate may be attributed to: (1) lack of an entrance sill, (2) a wide-mouth opening directly to a relatively large, well mixed, tidal channel, and (3) lack of turbulent mixing within the inlet proper, thus allowing runoff to escape in the surface layer (Olcay, 1959). Duxbury, et al. (1972) reports that the tidal flushing in Budd Inlet is about 2.8 cycles, reasonably good compared to other areas in Puget Sound.

3.1.3.2 Groundwater. In the course of performing geotechnical investigations in East Bay, Dames and Moore encountered artesian water in two borings (1968) along East Shore Drive, one boring (1972) for the port's Berth 2, and one boring (1978) in conjunction with the proposed marina. Dames and Moore (1978) suggests that the sand layer in which the water is encountered is continuous between the borings. Source of the flow is thought to be infiltration on higher ground east of the bay. Flow rates and pressures encountered appeared low.

The top of the artesian zone is approximately 30 feet (9 m) below the maximum depth of dredging at the closest point. During periods of low tide, the artesian head may be nearly equal to the weight of overlying soil. There is some chance of instability in this area as a result of dredging; however, the hazard is believed to be relatively small, and chances of wholesale failure of the aquaclude into the dredged channel appear remote. Exploratory borings already penetrating the aquifer have provided some relief to artesian pressures. In addition, an examination of water well logs in the East Bay area reveals that water levels in many of them, while reflecting artesian conditions, vary with the tide. This observation indicates that the artisian aquifer is already locally vented into tidal waters.

3.1.3.3 Water Quality. Budd Inlet is a very productive area having about the same salinity, nutrients, and turbidity as the other bays of southern Puget Sound. As in Eld and Totten Inlets, phytoplankton production and standing crops in Budd Inlet increase greatly in late summer. In these estuaries, fluctuations in phytoplankton production and abundance are contributing factors to seasonal changes observed in ammonia, biological oxygen demand, DO, phosphates, suspended solids, and turbidity of the water. Olympia Harbor has greater turbidity and nutrient concentrations and lower salinity and DO concentrations than Budd Inlet as a whole (Westley, et al, 1975). The harbor also exhibits relatively high coliforms; lower Budd Inlet (Priest Point south) is decertified for commercial shellfish harvest by the Washington Department of Social and Health Services.

The WDE has classified outer Budd Inlet as class "A" (very good) waters and lower Budd Inlet including Olympia Harbor as class "B" (good) waters. Recent studies by the Corps of Engineers (1977, unpublished) and WDE (1977-1978, unpublished) indicate that class "B" criteria are not always met in lower Budd Inlet due to a sag in DO during late August/early September. This sag develops fairly rapidly with DO levels

in 1977 dropping to 1-2 milligrams per liter (mg/l) in inner West Bay (WDE, 1977-1978) and 0-1 mg/l in East Bay (Corps, 1977). Deceased adult salmon were observed in East Bay most recently in August 1977.

This condition persisted for 2 to 4 weeks, and then DO slowly returned to acceptable levels (about 5-6 mg/l). The sag appears regularly each year at about the same time, although not always to the same degree. The period monitored (1977-1978) was a very low water year and, therefore, probably represents a worst case. DO levels are normally much lower in lower Budd Inlet (Priest Point south) as compared to the outer inlet (Boston Harbor).

Based on existing information, phytoplankton blooms (Certatium sp.) are a major contributor to the DO sag. The deep navigation channel and turning basin in West Bay are also major influences. Seasonal flushing discharges from Capitol Lake also appear to have some influence; however, nothing definite can be postulated. In previous years, the injection of primary treated effluent into Olympia Harbor (and especially into East Bay via prevailing currents) was thought to be a major contributor to the problem. It was, therefore, expected that conversion to secondary treatment, scheduled to begin in 1981, would relieve the problem and, to this end, conditions were imposed on the port's Substantial Development Permit (SDP) by the various agencies (appendix E and section 4.1.3.2). However, injection of primary treated effluent does not appear to correlate with timing of the sag, and, therefore, secondary treatment is unlikely to completely ameliorate the DO problem, although some reduction of its incidence and severity should result.

3.1.4 Vegetation.

3.1.4.1 Terrestrial. Lower West Bay and the port peninsula are sparsely vegetated due to their history of industrial use. Species present include grasses, weeds, and other disturbance tolerant plants. The East Bay shoreline along the east side is more richly vegetated due to its residential and park use history. Present along the eastern shore, north of Pine Avenue, are Douglas fir (Pseudotsuga menziesii), western red cedar (Thuja plicata), big leaf maple (Acer macrophyllum), and red alder (Alnus rubra), with cultivated lawns and shrubbery in the residential areas northward to Priest Point Park. The Henderson Inlet sites are lushly vegetated by typical lowland second-growth conifer and deciduous forests and understory.

3.1.4.2 Aquatic and Wetland. Macroscopic vegetation is sparse in Olympia Harbor and confined to upper limits of tidal influence. Small patches of pickleweed (Salicornia spp.) occur in the Moxlie Creek area and along the north shoreline by the KGY radio station at the tip of the port peninsula. Seaweed (Ulva or Monostroma sp. and Enteromorpha sp.) were found at many places in the port area. Rockweed (Fucus sp.) occurs in heavy concentrations on riprap and along East Bay tidelands at the northern tip of the peninsula. Most mudflats were observed to be coated by a mat-like, brownish, microscopic algae. Gull Harbor and the

Henderson Inlet sites contain more diverse and profuse vegetation; however, none of the sites contains any major salt marsh or eelgrass beds.

3.1.5 Marine Invertebrates. Many marine invertebrate species characteristic of beaches in southern Puget Sound are present in Olympia Harbor. Shoreline fauna are few in some places, notably at the southern end of East Bay and along shorelines that have been affected by recent landfill and industrial activities, including the railroad causeway and northern shoreline of West Bay and the port peninsula shoreline. Fauna in the Port area have a low diversity, but not necessarily low population densities characteristic of a stressed environment.

3.1.5.1 Shoreline. In East Bay, acorn barnacles (Balanus glandula), bay mussels (Mytilus edulis), and shore crabs (Hemigrapsus oregonensis) have the most generalized distributions. Mytilus tended to be sparse in numbers and small in size going from south East Bay to the more developed north East Bay. Clams, polycheate worms, and burrowing crustaceans inhabit much of East Bay. Soft-shelled clams (Mya arenaria) and pink or white clams (Macoma inconspicua) are abundant and widely distributed. Littleneck clams (Protothaca staminea) and manilla clams (Venerupis japonica) were found mainly in the northern part of East Bay, along the East Bay peninsula shoreline, and in West Bay.

Ghost shrimp (Callianassa californiensis), mud shrimp (Upogebia pugettensis), and the tube-building amphipod (Corophium sp.) were found to be abundant and widely distributed. The mud shrimp, in particular, was found only in East Bay. (Taylor, et al., 1974.)

3.1.5.2 Bottomlands and Lower Tidelands. Corophium were found to be abundant and widely distributed in the lower tidelands. Macoma was found in many of the tideland stations, but was found in greatest numbers in north East Bay tidelands only 1 foot below MLLW. Mysella tumida occurred in some subtidal areas overlapping with Corophium. The "lean dog whelk" snail (Nassarius mendicus) was prevalent in the northern approaches to the port.

Between 50 and 60 species of polycheate and other orders of worms were identified in various samples. Most worms were identified as belonging to the families Glyceridae and Spionidae.

Long-armed brittlestars (Amphiodia occidentalis) and short-armed brittlestars (A. squamata) were found either in the East Bay approach or the East Bay channel. (Taylor, et al., 1974.)

3.1.6 Fishes. Most species of anadromous and marine species in Puget Sound could be expected to occur in Budd Inlet. Five species of salmonidae are known to spawn in the Deschutes Basin. In addition to natural production upriver, the Washington Department of Fisheries (WDF) manages a highly successful salmon propagation program at Percival Cove in Capitol Lake. Salmon returns to the Deschutes system averaged 21,200 fish (all species) for the years 1969 through 1971 (WDF, 1975). As indicated

by table 5, outmigration by juvenile salmonid occurs in spring to early summer months for all species except for fall chinook (Oncorhynchus tshawytscha), whose outmigration can extend to mid-September. This schedule suggests few juveniles are present during the DO sag described previously. However, adult chinook and searun cutthroat would be present in some numbers. Marine species found in Olympia Harbor include pile perch (Rhacuchilas vacca), dogfish (Squalus sp.), starry flounder (Platichthys stellatus), herring (Clupea harengus), sculpin, and stickleback. (Also see appendix F.)

3.1.7 Avian Fauna. Water birds are represented by a diversity of species and are numerous through the winter months. The productive areas of the port area are principally tidelands; eastern East Bay, north of the KGY radio station, the West Bay lagoon, and West Bay outside of the lagoon are tidelands most frequented by bottom feeding and shore birds. The tidelands of the port peninsula deep in East Bay and along the northern West Bay shoreline appear less productive of both bird and marine life (Taylor, et al., 1974). East Bay appears to serve as a refuge for water birds during storms. Rafts of canvasback ducks have also been observed regularly wintering in the area; the species has been declining nationally (FWS, 1979). Olympia Harbor also supports a large concentration of wintering Barrow's goldeneye.

Inside East Bay, scaup are the most numerous species. Analysis of stomach contents found algae with small benthic harpacticoid copepods (Taylor, et al., 1974). Other waterfowl observed include canvasback, ruddy duck, and goldeneye. Bonaparte gulls were observed spinning around in the shallows, then stabbing at the surface, apparently eating animals they had stirred up. Floating logs were used for resting. North of the KGY tidelands, species composition shifted. Scoters became dominant, with fewer scaup and ruddy ducks seen. (See also appendix F.)

3.1.8 Mammalian Fauna. Owing to the urbanized nature of Olympia, terrestrial mammals are confined to smaller species, principally rodents (mice and rats), moles (Scapanus sp.), perhaps gophers (Thomomys sp.), and a few predators: shrews, feral cats, etc. Due to the lack of habitat, populations are expected to be small. As most would be nocturnal, presence and numbers are not readily evident. The rural areas of the county would have a greater diversity of the larger mammals. Marine mammals are known to utilize Budd Inlet; however, their occurrence in Olympia Harbor is infrequent. Harbor seals (Phoca vitulina richardi) are observed regularly along the undisturbed shorelines and in outer Budd Inlet.

3.1.9 Endangered Species. No flora or fauna under consideration for endangered or threatened status or so designated, as published in the 20 May 1980 Federal Register (50 CFR 17), are known to occur in the project area.

TABLE 5

Timing of salmon and searun trout activity in Deschutes Basin[1]

SPICIES	FRESH-WATER LIFE PHASE	MONTH J	F	M	A	M	J	J	A	S	O	N	D
FALL CHINOCK	Upstream migration												
	Spawning												
	Intragravel develop.												
	Juvenile rearing												
	Juv. out migration												
COHO	Upstream migration												
	Spawning												
	Intragravel develop.												
	Juvenile rearing												
	Juv. out migration												
CHUM	Upstream migration												
	Spawning												
	Intragravel develop.												
	Juvenile rearing												
	Juv. out migration												
WINTER STEELHEAD	Upstream migration												
	Spawning												
	Intragravel develop.												
	Juvenile rearing 2/												
	Juv. out migration												
SEARUN CUTTHROAT	Upstream migration												
	Spawning												
	Intragravel develop.												
	Juvenile rearing 2/												
	Juv. out migration												

1/ Data supplied by Washington State Department of Fisheries
2/ Normally extends over a two year period.

Source: State of Washington, Capital Lake Restoration and Recreation Plan: Final EIS March 1977

3.2 Human Use of Natural Resources.

3.2.1 Cultural Resources. Review of the National Register of Historic Places, the Washington State Register of Historic Places, and archeological records at the University of Washington, Department of Anthropology, indicates that no known historic or prehistoric sites exist within the project area.

3.2.2 Forestry. The forest industry is the most important extractive industry in Thurston County. Lumber production in 1975 was 119 million board feet from 12,000 acres. This represents a gain of 43 million board feet over 1970, although down from a 1972 peak of 130 million board feet. Lumber and wood products industries are the fourth largest employers in Thurston County. Almost all of the shipping of wood products or logs occurs through the Port of Olympia.

3.2.3 Fisheries, Recreation and Tourism. Commercial and sport fisheries occur throughout southern Puget Sound. Commercial fishing is restricted from Budd Inlet and Henderson Inlet; however, these are "usual and accustomed places" under the Treaty of Medicine Creek, principally for the Squaxin Island Tribe, which has a net fishery in Budd Inlet. Sport salmon fishing in southern Puget Sound is a popular recreational pastime, especially during the summer. Bottom fish are caught throughout the year, both incidentally to salmon fishing and boating and as a primary recreational activity. In Olympia Harbor, sports salmon angling occurs in West Bay and by senior citizens only at the Fourth Avenue Bridge. Boat fishing for sea-run cutthroat trout occurs near the entrance to East Bay, near Priest Point Park, and northward. East Bay is also a popular fishing spot for Olympia area residents for marine and bottom fishes, with as many as 50 persons observed during the spring and summer mouths. Poor access probably restricts recreational opportunities. (FWS, 1979.)

Budd Inlet, with connections to southern Puget Sound, provides numerous recreational opportunities. Travelers stop in Olympia to visit the State Capitol and other state facilities, including the campus of Evergreen State College. The rural areas of the county offer opportunities for camping and lake and river oriented recreation. Boating and fishing are available in Puget Sound to the north, and many miles of beaches offer crabs, clams, and oysters.

Priest Point Park, Olympia's major park, is located within the project area. This part of the shoreline remains in its natural state and features public picnic areas, play areas, trails, shelters, loop roadways, and beach area.

3.2.4 Wetlands. Under existing Corps of Engineers' definitions and regulations, vegetated intertidal areas are considered "wetlands" and, therefore, require application of the Chief of Engineers' wetland policy. Intertidal, but nonvegetated (by macroscopic species) areas, while not defined as "wetlands" by Corps of Engineers' policy, are so defined in the 404(b) guidelines promulgated by EPA for evaluation of

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the discharge of dredged or fill material in navigable waters (40 CFR 230) by Executive Order 11990, Protection of Wetlands, and by the FWS. In evaluating for these criteria, this document considers intertidal areas to be affected by dredging or filling as intertidal wetlands without discrimination.

The entire port peninsula, and some of the city of Olympia shoreline, was created by the filling of tidal and subtidal lands in the past (figure 12). This action created separate East and West Bays, contributing significantly to existing environmental conditions. Other past uses of intertidal lands include fills along East Bay Drive (roadway) and occasionally isolated landfills on the peninsula and along West Bay. The port peninsula along West Bay has been committed to commercial port activities. East Bay, although not subjected to dredging in the past, has been extensively used for community waste disposal and log raft storage. Remnants from industrial usage still are evident in East Bay. No major eelgrass beds or stands of salt marsh exist in the project area. See section 3.1.4.2.

3.2.5 Land Use. Thurston County covers 714 square miles (1,849 km^2). It is mostly flat, except for hilly areas in the south and west, with peaks rising to 3,000 feet (915 m). Urban/industrial development is concentrated in the northern end of the county in the Tumwater-Olympia-Lacey area and along the I-5 corridor. Land immediately to the west of site 4 is in port terminal and commercial uses. The shoreline to the east of the basin is developed residential, roadway (East Shore Drive), or in its natural state (Priest Point Park). With the exceptions of sites, 2, 3, 5, and 9, lands around the other marina sites are principally in rural, residential use. Site 7, Boston Harbor, also has a small, private marina.

3.2.6 Shipping. Until the mid-1960's, principal cargoes of the Port of Olympia were lumber, petroleum, and small amounts of general cargo. In recent years, log exports to Japanese markets provided a new outlet for log exports. This peaked in 1970 and has slowly declined, principally due to increased competitiveness of the Port of Tacoma and other major ports for modern cargo shipments and vessels. In 1975, approximately 460,000 tons (417,000 metric tons) of cargo passed through the port, of which 86 percent was logs, timber, and other wood products. Cargo tonnages for 1979 are expected to surpass the 1975 figure by about 25 percent (Malin, personal communication, 1979).

3.3 Human Systems and Resources.

3.3.1 Population. Thurston County population was estimated at 107,000 persons in April 1978, an increase of 30,100 over 1970, reflecting an average annual growth rate of 4.2 percent, well above the average annual growth rate of 1.3 percent for the State of Washington for the same period. Net immigration between 1970 and 1977 was 24,432, or 22.8 percent of 1978 population. The 1978 population was 96.1 percent white, 1.0 percent black, 0.9 percent Spanish-surnamed, 0.8 percent American Indian,

and 1.2 percent other racial groups. According to 1970 census data, the population was 56.4 percent urban. Median education for persons over 25 years old was 12.4 years for both Thurston County and the state.

Population estimates for April 1978 and projections from various sources are presented in table 6. As shown, the 1978 county population exceeded 1980 projections made by three sources. This is due to an unexpectedly rapid population growth in 1975 and 1976; county population rose from 85,900 in 1975 to 107,000 in 1978, an average annual growth rate of 7.6 percent during the 3-year period. It is unlikely this short-run rate will be sustained, and the long-run projections have been retained for comparison (table 7).

TABLE 6
POPULATION ESTIMATES AND PROJECTIONS
STATE OF WASHINGTON AND THURSTON COUNTY

	1970	1978	Average Annual Percent Change
Washington	3,413,250	3,774,300	1.3
Thurston County	76,894	107,000	4.2

TABLE 7
PROJECTIONS FOR THURSTON COUNTY
1980-2000

Source	1980	1985	1990	1995	2000	Average Annual Percent Change[1/]
BPA	98,600	111,600	125,300	138,700	--	1.5
PNW Bell	95,200	105,000	115,000	--	--	0.6
County	114,700	130,000	160,000	--	--	3.4
State	95,800	106,800	118,000	128,900	139,700	1.2
OBERS	102,000	106,000	111,000	--	119,000	0.5

1/Applied to 1978 base of 107,000.

3.3.2 Employment and Labor Force. Average monthly covered employment in Thurston County in 1975 totaled 27,911 (table 8). This represented an increase of 30.8 percent over 1971, compared with 21.7 percent over the same period for the State of Washington. The only sectors of major employment to show declines were construction and finance. Insurance, real estate, and the services sector showed the largest percentage gain in employment. Because Olympia is the state capital, the government sector (40.2 percent of 1975 labor force) is the largest employer in Thurston County. Within the manufacturing sector, the largest employer

is the lumber and wood products industry. Average annual 1978 unemployment rate was 6.4 percent compared with 6.8 percent statewide.

3.3.3 Income. Personal income in Thurston County rose from $424 million in 1969 to $581 million in 1975 (in 1975 dollars). This represents an average annual growth rate of 5.4 percent over this period, significantly above the statewide rate of 2.4 percent. Income estimates for the state and Thurston County are presented in table 9.

3.3.4 Transportation Services. Thurston County is served by all major forms of transportation. The Burlington Northern, Union Pacific, and Milwaukee Road Railroads provide rail access to the area. A network of state, county, and local roads complement Interstate 5, the major north-south highway in the state. Olympia lies at the junction of Interstate 5 (I-5) and U.S. Highway 101, a major access route to the Washington coast and Olympic Peninsula. Regional and intercounty drayage and bus services are provided by several lines. Air service, both scheduled and chartered, is available at Olympia Airport with connections to other areas via Portland and Seattle-Tacoma International Airports. The Port of Olympia offers deep-draft shipping facilities.

TABLE 8
AVERAGE MONTHLY COVERED EMPLOYMENT
THURSTON COUNTY, 1971 and 1975

Industry Division	1971	1975	Percent Change 1971 - 1975	Total Wages Paid 1975
Total	22,871	27,911	30.8	$290,537,981
Agricultural, Forestry, Fishing, and Misc.	95	134	41.0	890,388
Mining	22	16	-27.3	157,894
Construction	1,350	1,014	-24.9	12,267,923
Manufacturing	2,679	2,932	9.4	35,762,529
Food and Kindred Products	745	852	13.0	12,755,989
Lumber and Wood Products	823	1,095	33.0	11,579,084
Paper and Allied Products	274	261	-4.7	3,434,638
Printing and Publishing	152	197	29.6	1,838,708
Rubber and Misc. Plastic Products	74	117	58.1	848,973
Fabricated Metal Products	272	199	-26.8	3,206,899
Transportation Equipment	209	48	-77.0	381,627
Other Manufacturing	130	163	25.4	1,716,611
Transportation and Public Utilities	1,300	1,022	1.9	13,231,149
Wholesale and Retail Trade	4,730	5,460	15.4	41,108,873
Finance, Insurance, and Real Estate	1,144	1,203	5.2	10,511,116
Services	2,238	4,120	80.4	30,063,519
Government	10,102	12,033	18.8	146,544,590

TABLE 9
PER CAPITA PERSONAL INCOME
WASHINGTON STATE AND THURSTON COUNTY
1969 and 1975
(1975 dollars)

	1969	1975	Average Annual Percent Change
Personal Income ($1,000)			
Washington State	$19,394,000	22,299,000	2.4
Thurston County	424,000	581,000	5.4
Per Capita Personal Income			
Washington State	5,801	6,284	1.3
Thurston County	5,627	6,229	1.7
Thurston County as Percent of Washington	97%	99%	-

Source: Survey of Current Business, U.S. Department of Commerce (April 1977). Data for 1969 adjusted to 1975 dollars by Gross National Product Implicity Price Deflater, Economic Report of the President, table B-3 (January 1976).

3.3.5 Other Community Services. Police and fire protection is provided to the port area by the city of Olympia. Water is available to the Olympia-Lacey-Tumwater urban area from an abundant ground water supply. Municipal and industrial sewage service in the Olympia area is provided by the Olympia Sewage Treatment Plant. Electric power, telephone service, and natural gas are provided by private utilities.

3.3.6 Future Development. Although population projections vary somewhat, it appears that the area will continue to grow at a moderate rate through 1995 as presented in table 10. Projected growth in employment exceeds expected growth in population because increased participation of women in the labor force is expected. Manufacturing and agricultural sectors will continue to decline in relative importance, while service and Government sectors will employ increasing shares of the labor force. Increased productivity and technological change, which increases output for a given labor force, may offset some of the relative decline in the manufacturing and agricultural sectors. Service oriented sectors are the least amenable to productivity improvements, and so may require a larger growth in employment to meet increasing demand than other industries. Still, the pattern of Thurston County development through the end of this century seems to be one of healt growth, with rising income and employment and an economy increasingl, based on services and Government employment.

TABLE 10
EMPLOYMENT PROJECTIONS
THURSTON COUNTY
1975, 1985, and 1995

	1975		1985		1995	
	No.	%	No.	%	No.	%
Total Employment	36,500	-	51,100	-	66,300	-
Total Nonagricultural Employment	31,500	86.3	45,050	88.2	59,500	89.7
Mining	25	0.1	25	1/	25	1/
Construction	950	2.6	1,350	2.6	1,750	2.6
Manufacturing	3,000	8.2	3,525	6.9	3,975	6.0
Food and Kindred Products	800	2.2	875	1.7	950	1.4
Lumber and Wood Products	1,000	2.7	925	1.8	775	1.2
Paper and Allied Products	300	0.8	350	0.7	400	0.6
Primary Metals	--	--	--	--	25	1/
Transportation Equipment	125	0.3	225	0.4	300	0.5
Transportation and Public Utilities	1,100	3.0	1,275	2.5	1,275	2.1
Wholesale and Retail Trade	5,375	14.7	7,325	14.3	9,525	14.4
Finance, Insurance, and Real Estate	1,325	3.6	1,875	3.7	2,500	3.8
Services	4,675	12.8	8,475	16.6	12,750	19.2
Government	15,050	41.2	21,200	39.9	26,550	40.0

1/Less than 0.1 percent.

Source: Population, Employment, and Housing Units Projected to 1995 - Washington, Bonneville Power Administration, U.S. Department of Interior (1976).

4. ENVIRONMENTAL CONSEQUENCES

4.1 Natural Resources and Systems.

4.1.1 No Significant Effects. No significant effects are anticipated for the following categories should any of the alternatives, including the no action alternative, be implemented:

- o Climate and Weather - No effect.
- o Air Quality - Long term: Minor degradation by fuel emissions; condition will be moderated by prevailing winds.
- o Noise - Temporary: Some increase during construction.
- o Geology - No effect.
- o Ground water - No effect.
- o Endangered Species - No effect: No species present in project area.

Additionally, the no action alternative and marina construction and operation at sites 2, 3, 4 and 7 will have no significant effects on terrestrial vegetation and mammalian fauna. A marina at site 1 will have no significant effect on mammalian fauna.

4.1.2 Physical Conditions. Dredging alters the estuary bottom, which sedimentation tends to restore, over time, to predredged conditions; this necessitates periodic maintenance dredging. Filling of tidelands and shallow subtidal lands, which would occur for all but the no action alternative, changes topography and replaces water area or a land/water interface with uplands. Timber pile breakwaters (sites 1, 2, 6, and 8) and the rubblemound breakwater (site 9) represent changes from existing conditions and result in minor changes to current and sedimentation patterns. These same structures also represent potential habitat for attached marine organisms.

Soils and sediments vary depending on the site, but generally consist of relatively clean sands, gravels, silts and various gradations. Only sites 2, 3, and 4 might contain isolated patches of polluted sediments due to their industrial/urban histories. Materials to be dredged at site 4 consist predominantly of very soft to soft organic silts and sands, with a few zones of medium-dense sands as shown on plate 5 (also see section 3.1.2.2). Dredged slopes are planned at 1 vertical on 4 horizontal. Some chemical analyses were made of sediments from East Bay, the selected site (Dames and More, 1974). Further details are provided in section 4.5.1.1, which discusses Section 404(b) considerations and appendix G.

Effects of filling on the flood plain are discussed under Section 4.5.3, Executive Order 11988, Flood Plain Management. Creation of a broad expanse of uplands changes drainage patterns. For the East Bay site, the Port of Olympia has agreed to provide a storm runoff collection system that will ultimately discharge into West Bay. This will result in a minor improvement of water quality in East Bay, and a correspondingly minor, temporary degradation in West Bay.

4.1.3 Water Conditions. Water conditions are virtually unchanged by the no action alternative. Marina construction necessarily alters water conditions, although such changes are normally within acceptable limits and many are only temporary.

4.1.3.1 Hydraulics. A hydraulic model study was done by the University of Washington's Harris Hydraulic Laboratory for the Port of Olympia and used as a design guide and evaluation tool in developing an optimum layout for site A, choosing among alternative plans, and as a comparison with studies of a similar nature undertaken for other small boat basins in the Puget Sound region. Results of model studies allowed an assessment of the rate of exchange and of circulation patterns within the marina.

The hydraulic characteristics of a marina, as relating to water quality, have three major interdependent components; the tidal prism ratio (a measure of the potential exchange of basin water with each tide); the exchange coefficient to quantify the actual exchange with each tide; and mixing which applies to the internal circulation of the basin. The area included in the model was arrived at through a tradeoff between workable scale ratios and prototype features. Scales of 1:480 horizontal and 1:48 vertical dimensions, nonsaline water, and mean tides were used for the East Bay model studies. Drogue and dye measurements were used to verify currents and exchange ratios in the model. The model successfully represents tidal circulation effects, but features like point source pollutants, water density stratification, and wind stress were not included in the model. Hydraulic model studies of the proposed small boat basin concluded that the disadvantages that ordinarily would be associated with a relatively long and narrow basin are largely compensated for by a high tidal prism ratio and a geometry which causes relatively good mixing. These two factors result in exchange coefficients comparable to model data for other Puget Sound marinas.

While the model test indicated that the basin will exchange with waters in the lower end of Budd Inlet, it did not reflect either the chemistry or quality aspects of these waters. Omitting stratification (density) effects from the model is believed to result in conservative estimates of exchange coefficients. Detailed information on the model test is published in University of Washington Technical Report No. 50, "Flushing and Mixing Characteristics - East Bay Small Boat Basin," July 1977.

4.1.3.2 Water Quality. Of the alternative sites examined, the East Bay site possesses the worst water quality encountered. Marina construction at any of the other sites is an improvement from a water quality perspective, save perhaps site 2, West Bay South, which is very near to the navigation channel turning basin. Inner Olympia Harbor, with its annual DO sags, presents a special circumstance where critically low levels are reached. The effect then becomes one of duration; the low DO condition might persist some days longer or require a longer time to return to levels that would meet class "B" criteria. A water quality monitoring program and aeration are included in the preferred plan (section 4.9 and appendix D).

The principal effect of marina construction is to deepen the basin area, converting previously intertidal lands to subtidal. Thus, aquatic fauna will be inundated at all tidal stages and their exposure time and exposure potential to adverse water quality conditions is increased. Additionally, the marina will enhance habitat for attached organisms and, by clearing the marina floor of the accumulated industrial litter and organic material, will temporarily enhance habitat for mobile and attached benthic species. This increased productivity and deepwater habitat could attract juvenile salmonids into the marina. Any reduction in dissolved oxygen (DO) will result in a larger number of organisms perishing than likely occurs at present. Secondary effects of the increased productivity are a reaccumulation of decaying organic material in bottom sediments and the nonesthetic consequences of noxious odors. Thus, the changes induced by the modification of the topography of East Bay will result in a degradation of water quality.

The most direct indicator of water quality degradation is the change in DO. A water quality model developed by J. Yearsley (EPA) was used to estimate the rate of change of DO in East Bay. The Corps of Engineers' (COE) data from our 1977 study of East Bay, including chlorophyll a, in situ DO, salinity, and temperature, were used as baseline conditions. Average exchange coefficients calculated by COE from tidal prism ratios and UW model were used as the best approximation of the flushing dynamics in East Bay.

The following assumptions were made in applying Yearsley's model to East Bay:

a. the waters of Budd Inlet and East Bay are completely mixed,

b. oxygen utilization occurs at a constant rate,

c. COE in situ chlorophyll observations are an accurate measure of the biochemical oxygen demand, and

d. marina construction would result in a decrease in the rate of tidal exchange between East Bay and Budd Inlet.

Results of model runs indicate that as the exchange rate is reduced the concentration of DO is reduced. The length of time that the DO is reduced is also increased. (Details of the model are presented in appendix D).

Numerical analyses of environmental systems are constrained by the data input. In this case data were limited in kind and quantity Further, data were limited by the lack of information on benthic respiration and sediment oxygen demand. In addition, biochemical oxygen demand had to be approximated with chlorophyll a measurements. Only seven observations made by COE in 1977 were used to predict the oxygen change.

Due to these limitations, the model did not accurately predict the actual drop in DO which was observed in the 1977 study. However, the model is the best available estimate of the effects of reducing the exchange coefficient on water quality in East Bay.

To improve understanding of water quality and to alleviate potential and existing problems, a water quality monitoring program and aeration system plan are proposed for postconstruction (section 4.9 and appendix D).

Effects of dredging and open-water disposal of dredged material on water quality are provided by the Washington Department of Fisheries Technical Report No. 15, "Evaluation of Effects of Channel Maintenance, Dredging and Disposal in the Marine Environment in Southern Puget Sound, Washington," (WDF Technical Report No. 15) June 1975, which is incorporated by reference. Generally, significant environmental effects are not anticipated. East Bay sediments were not tested for acceptability for open water disposal. Preference is for confined disposal of dredged material from East Bay rather than open-water disposal due to the sediments high organic content and composition. See Sections 3.1.2.2 and 4.1.2.

4.1.4 Vegetation.

4.1.4.1 Terrestrial. Effects on terrestrial vegetation vary depending on the site. No major changes are anticipated at sites 2, 3, 4 and 7; however, some alterations from existing conditions are expected due to tertiary effects. Such effects, especially residential development, are expected for the Henderson Inlet sites (8, 9, 10) and at Gull Harbor (site 6). Effects on site 5 are difficult to predict. In the past, the park has been managed as a natural area. Siting of the marina at this location could encourage a different management philosophy for the park. In any event, the park would presumably receive greater visitation, which would impact vegetation.

4.1.4.2 Aquatic and Wetland. Only the no action alternative results in no adverse effect on aquatic or wetland vegetation. Generally, the greater the area dredged and filled, the greater the damage to aquatic

and wetland vegetation. No major eelgrass beds or salt marshes would be affected by marina construction at any of the sites examined, although some sparse beds and small stands will be affected, particularly at the more undisturbed marina sites (sites 6, 8, 9, and 10). Productivity at these less disturbed sites is expected to be greater than the Olympia Harbor sites. East Bay, because of the poor sediments, past industrial activity, and water quality problems, appears to be less productive than the other Olympia Harbor sites. The dredged areas will reestablish fairly rapidly; although the moorage floats and boats will shade the bottom and thereby inhibit regrowth. If dredging exposes a different substrate, then recruitment could be slowed. At East Bay, this latter situation is somewhat reversed as dredging will remove the industrial and log storage litter and other organic silts and expose cleaner sediment layers. In East Bay, productivity may improve temporarily, although water quality and natural turbidity will continue to be inhibiting factors.

4.1.5 Terrestrial and Marine Ecology. The primary direct impact of both dredging and disposal activities is disruption of habitat and loss of species members. Those organisms associated with the areas to be filled or dredged will be lost. Assimilation of displaced species into other areas stresses both displaced species and residents with subsequent loss of the weaker individuals. Organisms adapted to life in deepwater areas will begin to repopulate soon after dredging, and many will reach maturity the first year following dredging.

Attached organisms which can utilize the new breakwaters and floats will increase their populations due to increased habitat availability. Population levels of some species may surpass current levels. Organisms associated with the tidelands to be filled will be lost, however. Loss of these areas could impact outmigrating juvenile salmonids to an unknown extent through food web effects and increased predation. Sloping of the face of the fill will provide some protection for juveniles, but this will not approach the degree of protection currently afforded.

Still, apart from the filling of intertidal wetlands, marina construction will provide a net increase in available habitat for attached marine organisms. Colonization of this habitat (e.g., pilings, breakwater) will attract, in turn, other marine species, including commercially and recreationally important fishes, to take advantage of new habitats. This could result in enhanced sport fishing opportunities in the marina vicinity.

Although marina construction may benefit certain species, the wetland fills reduce estuarine productivity through loss of habitat, algal species, benthic invertebrates, and by increasing utilization of estuarine and Puget Sound fisheries resources. This is a complex impact which cannot be easily estimated quantitatively; however, some reduction in populations of birds, fish, shellfish, and other faunal species may be expected to occur. Such reduction cannot be accurately quantified.

Increased human use of the estuary and Sound through increased boating and harvest of fisheries resources is a tertiary effect of expansion which could disrupt existing fish, marine mammal, and bird populations.

4.1.6 Marine Invertebrates. The analysis presented for the previous section generally applies to invertebrate populations for all sites. All of the potential sites are noted as being important for waterbirds and shorebirds. Generally this is due to the invertebrate populations on which various avian species feed. In the Olympia area, sites 3 and 5 were noted by Taylor, et al. (1975) as being productive areas that are important to avian fauna. Sites 2 and 4 were noted as appearing to be somewhat less important. The more undisturbed sites could be expected to be even more productive, especially the Henderson Inlet sites and Gull Harbor, which is used as a Pacific oyster (Crassostrea gigas) culture area (DNR, 1977). In this regard, sites 2 and 4 appear to suffer the least adverse effects, with some potential for enhancing attached organism populations.

The benthic community inhabiting the tidelands to be filled in East Bay has been documented by Badger et al. (1974). They sampled subtidally with a Van Veen grab (.03 m^2 in area) and intertidally by digging a hole with a shovel (.09 m^2 in area). The majority of the samples collected from areas to be filled contained less than 10 species and less than 20 individual organisms.

The results of Badger et al. (1974) survey indicate that the area to be filled in East Bay is a poor habitat for benthic invertebrates. Benthic communities reflect the "water quality" at the time of sampling and, depending upon the life cycles and motility of the various species present, for some period prior to sampling. While moderately polluted areas often contain benthic communities consisting of many individuals of a few tolerant species, grossly degraded habitats contain very few individuals and species of benthic organisms. The area to be filled in East Bay appears grossly degraded to casual observers, the invertebrate biologists, and water quality technicians.

4.1.7 Fishes. No important spawning grounds will be affected by marina construction although sites 1, 2, and 3 could interfere with in- and out-migrating salmonids from the Deschutes Basin. Marina construction at any of the sites will eliminate shallows which serve as nursery areas for juvenile salmonids and other species. Again, acres of fill and dredging serve as a general guide on the severity of impacts. Dredging will be conducted as specified by the port's SDP and the water quality certification (appendix G). However, based on general and concentrated fishing areas (DNR, 1977) along the west side of Budd Inlet, sites 1, 2, and 3 appear to be on the most direct salmonid migration route. Sea-run cutthroat trout and various marine species occur throughout Budd and Henderson Inlets.

Kaczyuski et al. (1973) indicate that beaches, tidal creeks, and mudflats are vitally important to juvenile chum and pink salmon. However, pink salmon runs do not exist and chum salmon populations are small in Budd Inlet. Thus, East Bay is not presently important to these species, although a portion of the diet of chinook and coho salmon consists of organisms which partially originate from intertidal areas (FWS, 1979). By dredging and filling of intertidal wetlands, some loss of biological productivity is anticipated. However, the areas of greatest biological importance will not be affected by marina construction. Accordingly, no significant loss of salmonids is anticipated due to loss of tideland production. More serious effects because of the periodic DO sag are possible as described in section 4.1.3.2, but are unquantifiable with any confidence.

Marina construction will benefit many nonsalmonid species. The relatively sheltered, deepwater habitat created by the marina provides habitat for attached organisms, which, in turn, attract other mobile organisms which find shelter or live in a symbiotic relationship with other animals. Some of these species prey upon juvenile salmonids, however.

The existing complex of old pilings in East Bay offers habitat for attached marine species and associated fishes (FWS, 1979). Many of these pilings will be removed during construction. Some replacement will occur because of pilings used in constructing the marina. The placing of additional pilings outside of the marina to provide additional habitat will partially mitigate these losses. Colonization of the new pilings by marine invertebrates could occur within a year of placement and, in turn, would provide habitat for marine and game fish.

At sites 1, 5, 6, 8, 9, and 10, the tradeoff of existing habitats and productivity for habitat and productivity associated with a marina is probably a net loss. At sites 2 and 3, the tradeoff might be equal. At site 4, the tradeoff appears equal or possibly a positive contribution, but is complicated by the water quality problem.

4.1.8 Avian Fauna. Marina construction at any of the sites examined will affect avian use of the area and reduce avian populations. The more important areas for water birds are those with a high invertebrate and vegetation production. However, sheltered locations are used by waterbirds as harbors of refuge; East Bay is one such area. Elimination of habitat through dredging and filling will result in loss of individual birds. The greater the area affected, the greater the loss, although losses of highly productive areas would be most keenly felt through the system. The productive area along East Shore Drive will not be affected. Whether there will be sufficient buffer between the marina and these tidelands is uncertain. An important intertidal island at the mouth of Moxlie Creek will be lost due to the road fill.

4.1.9 Mammalian Fauna. Mammalian fauna are not expected to be directly affected by marina construction. Secondary and tertiary effects, especially at the less developed sites 6, 8, 9, and 10, affect terrestrial mammal populations in that locality through loss of available habitat; similarly, marine mammals will be affected. However, increased boat traffic and human disturbance are probably greater threats to marine mammals in southern Puget Sound than marina construction.

4.2 Human Use of Natural Resources.

4.2.1 No Significant Effects. No significant effects are anticipated for the categories noted should the alternatives cited be implemented:

o Cultural Resources - No effect: No action and sites 1, 2, 3, 4 and 7.

o Forestry - No effect: All alternatives.

o Wetlands - No effect: No action.

o Land Use - No effect: No action.

o Shipping - No effect: All alternatives that do not include fill for cargo storage area. Because the Port of Olympia has not had the additional lands in the past, alternatives that do not provide the desired lands cannot be considered to significantly effect current shipping. Except for plans 4b and 4c, the Port of Olympia maintains the option of seeking the appropriate permits to fill for the desired lands. Implementation of plans 4b and 4c would forego this action.

4.2.2 Cultural Resources. No cultural reconnaissance of the proposed marina or disposal sites has been made, but review of the National Register of Historic Places, the Washington State Register of Historic Places, and archeological records at the University of Washington, Department of Anthropology, indicates no known historic or archeological sites that would be impacted by marina construction. Sites 1, 2, 3, 4, and 7 have been disturbed by past activity; no significant cultural resources are expected to be disturbed by construction at those locations. A cultural resource reconnaissance will be conducted on all lands that will be affected by construction. Letter received, dated 19 December 1979, from the State Historic Preservation Officer substantiating concurrence with this measurement (appendix H).

4.2.3 Fisheries, Recreation, and Tourism. Impact of the proposed expansion on fisheries is complex and unclear. The marina itself will provide additional sports fishing opportunities at the site. The additional berths expand the sports fishery incidental to recreational boating throughout southern Puget Sound; however, recreational boating is already on the rise in Puget Sound. By providing increased opportunity

for recreational boating, this will increase sports fishing opportunities in southern Puget Sound for harvest of both salmonid and nonsalmonid species. There are few management efforts aimed at increasing stocks of marine and bottom fish. In most areas, these bottom fish could presently stand more fishing pressure. It is unlikely that salmon runs in the Deschutes system can presently stand significantly greater fishing pressure (FWS, 1979). The state plans to increase chinook salmon plantings in the 1980's; there are no plans to increase coho salmon production in the Deschutes system. However, responsible management agencies will prevent overharvest of these resources. To some extent, the increase in boating numbers might affect the quality of the boating experience and could strain county resources through increased tourism. More boats will increase marine traffic (especially in the immediate marina vicinity) and add pressures on marine resources in southern Puget Sound.

The Squaxin Island Indian Tribe is located on the Squaxin Island Reservation north of Budd Inlet. The Tribe's "usual and accustomed" fishing places include the shallow bays, inlets, estuaries, and open waters of southern Puget Sound and the freshwater streams and creeks draining into those outlets. Marina construction is not expected to affect tribal fisheries. The Tribe's opportunity to harvest their share of the resource is assured. As the supply decreases or increases, it is assumed their catch will likewise fluctuate. Recent upholding of the Boldt Decision by the United States Supreme Court is expected to begin a normalization of the fisheries issue.

The no action alternative would likely have the most significant effects upon the environmental and socioeconomic sectors. The availability of wet moorages is a limitation, but it is not a controlling factor in the number of boat ownerships and to recreational boating generally in Puget Sound. Wet moorages have been in very short supply in Puget Sound for some years, and, as a result, moorage fees have increased. However, boat ownership and the number of recreational outings on Puget Sound also have increased considerably. Crowding is occurring in some areas and is expected to continue. Reasons for this increase are probably attributable to the increased affluence of the general population, production methods which make boat ownership more financially feasible for the average person, and the tremendous esthetic qualities and proximity of Puget Sound. As stated in section 2.2.1, Alternative 1 - No Action, the current boating trend is seen to continue, with a limited number of options open to would be boat owners.

4.2.4 Wetlands. No major salt marshes or eelgrass beds will be affected by any of the alternatives; however, sparse or isolated stands or beds could be affected at the less disturbed sites (1, 6, 8, 9, and 10).

Under existing Corps of Engineers' definitions and regulations, only vegetated intertidal and shallow subtidal areas are considered "wetlands" and, therefore, require application of the Chief of Engineers'

wetland policy; in this case none occur. Intertidal, nonvegetated (by macroscopic species) areas, while not defined as "wetlands" by Corps of Engineers' policy, are so defined in the 404(b) guidelines promulgated by EPA for evaluation of the disposal of dredged or fill material in navigable waters (40 CFR 230), by Executive Order 11990, Protection of Wetlands, and by the FWS. In evaluating for these criteria, this document has considered intertidal areas to be affected by dredging or filling as intertidal wetlands without discrimination. Table 11 presents a breakdown of intertidal acreages that would be affected by dredging and filling at each site. Shallow subtidal (below MLLW) lands are not included.

TABLE 11
INTERTIDAL WETLANDS AFFECTED
Acres/Hectares

Site	Dredging	Filling	Total
1. Butler Cove	6/2.4	19/7.7	25/10.1
2. West Bay North	-	11/4.5	11/4.5
3. West Bay South	29/11.7	16/6.5	45/18.2
4. East Bay (Plan 4a)	14/5.7	29.7/12.0	43.7/17.7
5. East Bay Shore	14/5.7	19/7.7	33/13.4
6. Gull Harbor	19/7.7	10/4	29/11.7
7. Boston Harbor	10/4	8/3.2	18/7.2
8. Henderson Inlet North	4/1.6	18/7.3	22/8.9
9. Chapman Bay	1/.4	6.5/2.6	7.5/3
10. Henderson Inlet South	13/5.2	9/3.7	22/8.9

Plan 4a, site 4, would require the second highest acreage of intertidal wetland alteration of all the alternative sites. However, site 9, Chapman Bay, and site 10, Henderson Inlet South, are in relatively shallow areas and, although only exposed at extreme low tides, those shallow subtidal lands are highly productive areas equal to adjacent tidelands. Log rafts at Chapman Bay probably inhibit benthic production by shading the bottom; however, the influence of inflow from Woodard and Chapman Creeks (both are tidal) would provide additional detritus and nutrients to the system.

Analysis of wetland alteration in accordance with Executive Order 11990, Protection of Wetlands, is provided in section 4.5.4.

4.2.5 Land Use. Construction and operation of a marina at any of the alternative sites evaluated involves a change in existing uses of land, separate from SMP or CZMP planning designations. Effects of alteration would be more severe at sites 1, 5, 6, 8, 9, and 10 than at sites 2, 3, 4 and 7, due to the former sites' previous development or lack of development (Henderson Inlet and Gull Harbor). Site 7, Boston Harbor, is already a marina so the land use change is merely one of degree and intensity; however, the harbor is ringed by residences that would be displaced by the proposed marina. Site 3, West Bay North, also is already occupied by a marina and two wood products industries. Again, the degree of use is altered in this case from a fairly intensive industrial use to a more moderate recreational use. The merits of such a change are dubious however. Industrial waterfront land is limited in Olympia Harbor, and it is not obvious that displacing existing industries from a traditionally industrial area for recreational purposes is in the public interest. Site 2, West Bay South, is vacant at present and would require extensive filling and dredging to accommodate a water dependent industry or marina. Current land use is recreational in nature: bird-watching, walking along the railroad causeway, and fishing. The city of Olympia is presently considering developing the right-of-way under the overpass as a recreational greenbelt (Malin, personal communication, 1979). Site 4, East Bay, is also vacant at present and most often used for recreation, although it was used in the past by industry whose remnants still litter the area.

4.2.6 Shipping. Because existing conditions would not be altered, the no action alternative and marina construction that does not include fill for cargo handling area will not significantly affect port activities. The port retains the option of acquiring permits to fill the area. Should plan 4b or 4c be implemented, however, such action would be precluded and the port would be forced to look elsewhere in Olympia Harbor for cargo handling land or continue their current practice of shuttling excess cargoes to the Olympic Airport.

Provision of additional cargo area (plans 4a and 4e and perhaps site 2), in addition to expected biological impacts, allows the port to operate more efficiently within the port area. Backup lands will still be limited; therefore, some use of lands at Olympic Airport for cargo storage will continue. However, the amount of cargo stored and, therefore, the amount of land at the airport used for storage, should decrease. With somewhat lower storage requirements at the airport, other industrial, but nonwater related industries, could be located there rather than in downtown or along the West Bay shoreline. This would benefit the Port of Olympia, the city of Olympia, and Thurston County.

4.3 Human Systems and Resources.

4.3.1 No Significant Effect. No significant effects are expected for any of the following categories should any of the alternatives be implemented:

o Population - No effect. Population is expected to increase at about the same rate whether or not a marina is constructed.

o Employment - Minor effect. All construction would be performed under contract with a private construction firm. The construction phase would last about 1 year and employ an average of about 10 workers during the year. The Federal portion of the project would not have a significant effect on employment levels in Thurston County.

After completion of the Federal portion, the Port of Olympia would construct, operate, and maintain berthing areas, floats, and retaining dikes. Other port activities would include provision of potable water, sanitary facilities, sewage systems, parking areas, and access road improvements. With respect to these port activities, the project could have a larger, but not a significant, effect on employment as described under future development. Marina operation will provide a few permanent full- and part-time jobs, but not a statistically significant number. Secondary employment in marina support services may occur, but it also is not likely to affect the employment picture significantly.

o Income - No effect: All alternatives.

o Transportation - Minor effect; although siting a marina in West Bay could conflict with oceangoing craft. The selected plan includes an access road to serve commercial truck traffic to and from the port area as well as marina traffic; this enables port traffic to bypass most of the downtown area.

o Community Services - Minor effects. Community services appear adequate to support marina operation; although this precludes their use elsewhere. Siting the marina further from the central downtown area increases costs of providing services and increases effects on the environment. This was taken into consideration in evaluating marina sites.

o Future Development - Minor effect. Marina ancillary services would be necessary at all site locations. New businesses expected include a variety of marine related specialty shops, a marine service station, a boat repair facility, and a restaurant. For those sites close to Olympia, existing retail establishments in the immediate vicinity will likely see some increased sales. Expansion of cargo area for the Port of Olympia will provide important backup land for deepwater commerce operations of the port.

4.4 Relationship to Existing Land Use Plans.

4.4.1 Coastal Zone Management. The National Coastal Zone Management Act (Public Law 92-583: 86 Stat. 1280), passed by the United States Congress in 1972, promotes effective management, protection, and development of national coastal resources.

The basis for coastal zone management in the State of Washington is the comprehensive program initiated under the SMA of 1971. As passed by the State Legislature, SMA provides "for the management of Washington's shorelines by planning and fostering all reasonable and appropriate uses" (RCW 90.58). SMA is implemented through detailed planning efforts at the local level with state review and certification by the WDE. These planning efforts culminate in SMP for large municipalities and the counties.

The CZMP was approved in June 1976 as the first coastal program in the nation to receive Coastal Zone Management funding. Consistency with the SMA and CZMP satisfies consistency with state and national coastal zone management dictates.

4.4.2. Local Shoreline Master Programs. Pursuant to requirements of the SMA, a SMP for the shorelines of Thurston County, including the Olympia Harbor shoreline, was formulated, reviewed and accepted by the local governments of Thurston County, including the county, and approved by WDE in 1976. In 1977, the SMP was revised and language clarified. The 1977 edition of the county's SMP was consulted during this evaluation.

With regard to marinas, the SMP articulates policies guiding development and construction. Policy No. 2 is of particular pertinence; it states:

> Marinas and high-intensity public boat launching facilities should be located in environments accommodating other high-intensity uses. (Thurston County Master Program, 1977, p. 23).

The majority of the Thurston County shoreline is classified "rural," "conservancy," or "conservancy-natural." Although marinas are not categorically prohibited from "conservancy" or "rural" designated areas, sound planning discourages such sitings if alternative sites are available which are more in keeping with policy No. 2. Only sites 2, 3, and 4 are designated "urban" and site 2 overlaps a "conservancy" shore. Site 5 at Priest Point Park overlaps the "natural" designation of the park shoreline and the "urban" designation of the abutting residential area. Although the concept of a marina is not inconsistent with the philosophy of a park, in this case, where the park shore has been maintained in a natural condition, such a use is inadvisable if other alternatives exist.

4.4.3 Olympia Harbor Plan. The current plan was updated in 1975 from a 1944 plan. The plan sets the limits of future development and the permitted uses within those development limits to provide compatibility between commercial, industrial, residential, and recreational uses. Provision of a small boat marina at East Bay is one segment of that overall plan.

4.4.4 Overview and Analysis. Existing land use plans were considered in evaluation of the various marina sites. Based, in part, on these considerations, Olympia Harbor was determined to be the most appropriate location, and site 4, East Bay, was determined to be the most appropriate site in Olympia Harbor. The Port of Olympia has applied for and received the appropriate state and local permits required, subject to conditions imposed, under ECPA Master Application 74-0050 (appendix E), including the SDP required by SMA and the state CZMP.

4.5 Consideration and Compliance with Pertinent Federal Legislations and Executive Orders.

4.5.1 Clean Water Act of 1977 (Public Law 95-217).

4.5.1.1 Section 404(b) Guidelines. Originally promulgated under the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), the requirements have been revised and supplemented under current legislation. The effects of discharge of dredged or fill material into waters of the United States must be evaluated for a number of factors. This document has considered all the factors pertinent to this action and analysis is detailed in appropriate sections of this document. The 404(b)(1) Evaluation is provided as appendix G, part 1.

4.5.1.2 Water Quality Certification. Pursuant to Public Law 95-217 and implementing Corps regulation, application was made to the WDE for appropriate certification of water quality. The draft EIS accompanied the application. A copy of certification is attached to this document.

4.5.2 Water Resources Development Act (Public Law 94-587). Section 150(b) requires that whenever the Secretary of the Army, acting through the Chief of Engineers, submits a report on a water resource development project to Congress, such report shall include, where appropriate, consideration of the establishment of wetlands. Section 107 reports are not submitted to Congress for authorization and, therefore, are not qualified for Section 150 funding. However, in the course of evaluation, consideration was given to establishment of wetlands in the vicinity of Priest Point Park using dredged material. The principal problem encountered was that much of the material to be dredged consists of fine silts high in organics. Unless an extensive and expensive retaining dike was constructed, there was no assurance that the material placed would remain there given the wave climate and extreme tidal variation. In addition, it was found that the extreme tidal range (14 feet/4.3 m) would require placement of more dredged material than would be available

from project dredging. Although wetland establishment was found to be a conceptually sound means of environmental enhancement or mitigation, construction was not economical or feasible within project limits. Accordingly, wetland establishment was dropped from consideration. However, the feasibility of placing a small amount of dredged material by clamshell east of the southern end of the marina is being examined.

4.5.3 Executive Order 11988, Flood Plain Management. The following paragraphs outline the effects of the selected plan (plan 4a) on the flood plain in compliance with Executive Order 11988. This Executive Order and regulations define the base flood elevation for this purpose as the elevation of the 100-year recurrence interval, in this project area, 18.2 feet (5.55 m) above MLLW.

The selected plan for improvement lies entirely within the area of tidal influence. Riverine effects do not influence the base flood elevation.

The proposed marina is a recreational navigation project and is expected to cause some increase in waterborne activity which will result in additional water dependent support facilities. However, the proposed project is not expected to significantly alter the area's growth pattern.

About 14.0 acres (5.7 ha) of tidelands and 42.8 acres (17.3 ha) of submerged lands, totaling 56.8 acres (23 ha) will be dredged for the entrance and access channels and for the moorage area. Another 29.7 acres (12.0 ha) of tidelands and 22.7 acres (9.2 ha) of submerged lands will be filled to provide cargo handling, marina support area, and miscellaneous fill for landscaping and drainage. This brings the total tidelands and submerged lands affected by dredging or filling to 108.7 acres (44.0 ha). Neither filling nor dredging will influence the base flood elevation of adjacent areas. As all filled areas will be filled to +20 feet (6.1 m) MLLW, an elevation above the base flood elevation, such areas will be unaffected in the future by the 100-year frequency of occurrence. Biological productivity of a total of 43.7 acres (17.7 ha) of tidelands and 65.5 acres (26.5 ha) of submerged lands will be lost as a direct result of project implementation.

Recreational boating and sport fishing are direct water dependent functions. Moorages for recreational and fishing craft which cannot be trailered and dryland stored must be constructed in the base flood plain. Ingress and egress to the moorages must be provided and the moorages protected from storms and waves. The protective barriers must also be constructed within the base flood plain. Ancillary services for these craft and industries are required and must be constructed adjacent to the moorages to avoid excess costs of transporting craft for repairs and for supplies and equipment. The area to be filled will be above the base flood elevation and no damage will be incurred as a result of the 100-year frequency of occurrence. No practical alternative exists for the flood plain alteration.

Major project benefits are recreational benefits accruing to recreational craft owners. Lesser benefits accrue from increased land values resulting from deposition of dredged material on land that could not be developed without filling Indirect benefits accrue to recreational boaters by furnishing modern moorage facilities with potable water, electricity, and ancillary services together with space for boat maintenance.

Deep-draft shipping is directly water oriented. Cargo handling and storage areas adjacent to the deep-draft piers are necessary to support this water oriented activity. While not directly a part of this plan of marina development, 23.2 acres (9.4 ha) will be filled with material dredged from the marina basin to provide additional space for expanded deep-draft shipping activities of the Port of Olympia. This cargo area may be filled with or without the marina project, and provides an area for deposition of the marina dredged material. An additional 1.0 acre of uplands, above MHHW, but below the base flood elevation, will be filled for the cargo handling area. All areas filled will be about 1.8 feet (.55 m) above the base flood elevation.

During the planning process for the proposed project, Federal, state and local agencies; organizations; and the public have been kept informed of the proposed action, including the dredge disposal plan, through a series of interagency meetings, workshops, news releases, and public brochures or studygrams. Environmental effects of the proposed action, including the dredge disposal plan, are presented in this EIS. This will conform to requirements of the decisionmaking process of Executive Order 11988.

4.5.4 Executive Order 11990, Protection of Wetlands. The following paragraphs analyze the effects of plan 4a on wetlands in compliance with Executive Order 11990.

This document considered intertidal areas to be affected by dredging or filling as intertidal wetlands without discrimination. No extensive salt marshes or eelgrass beds occur at the selected site.

Under the selected plan, a total of 41.6 acres (16.8 ha) of intertidal wetlands will be dredged or filled. In addition, another 65 acres (26.3 ha) of shallow subtidal lands will be dredged or filled. Of the total, about 15.2 acres (6.1 ha) of tidelands and 8.0 acres (3.2 ha) of subtidal lands will be filled which will be used by the Port of Olympia as a cargo handling area. This EIS evaluates the effects of the fill for the purpose of creating additional cargo handling area in following paragraphs. A primary purpose of this fill is for containment of material dredged from the entrance and access channels and moorage basin for the marina.

East Bay sediments were analyzed in the past (Dames and Moore, 1974) and determined would not meet then-current EPA criteria for open water disposal. See also section 3.1.2.2 of the EIS. Early in the planning for this project, preference was expressed by resource agency personnel for confined disposal of East Bay sediments over open water at Dana Passage. No practicable upland disposal sites were identified. At that time, some, unquantified volume of East Bay sediments were expected would have to be disposed of in open water, and there was general agreement that at least some portion of deeper East Bay sediments could reasonably be expected to be acceptable for open water disposal. Subsequent analysis by the Corps showed that all East Bay dredged material could be contained by plans 4a and 4d. Plans 4b and 4c would have required some open water disposal. Criteria for acceptability for open water disposal have changed, but recent agency concerns with the open water disposal option have corroborated earlier discussions (appendix H). Although from a standpoint of wetlands fill, plans 4b and 4c appear to be practicable, less impacting alternatives, the consequences associated with open water disposal may, in fact, suggest otherwise. From a standpoint of disposal of dredged material from East Bay, and economics, plans 4b and 4c are determined not to be practicable alternatives.

As stated in section 1.3.2, cargo area is limited on the port peninsula and the port is forced to use vacant lands for cargo storage at the Olympic Airport 7 miles (11 km) distant from the waterfront. This necessitates double handling of cargoes, transportation to and from the airport, and is generally inefficient and expensive from both a cargo handling and energy consumption view. Provision of additional cargo lands is noted in the port's comprehensive Olympia Harbor Plan and is supported by an overview and evaluation of the East Bay Harbor project and an economic assessment of the need for additional area prepared for the port.

The Corps of Engineers has reviewed these documents and agrees with the findings. The development proposed by the port for both the cargo storage fill and the fill for marina support facilities is clearly water-dependent, for reasons expressed in Section 4.5.3, Flood Plain Management. Siting the marina at other locations was determined inadvisable due to adverse environmental effects (including wetland alterations) and economic, social and engineering considerations.

Although down from a peak of about 1 million tons (907,000 metric tons) of cargo shipped in 1970, recent tonnages are climbing. Continued growth by the port is anticipated, although it is unlikely that tonnages will closely approach the 1970 peak. Benefits seen to result from the additional cargo storage area include more efficient and less expensive handling costs and greater opportunity for the port to expand its deep-draft shipping activities. In addition, the high energy consumption, traffic congestion, and fuel emissions currently attributable to double handling and transporting cargoes through downtown Olympia streets would be relieved, although not eliminated. Even with the proposed fill, it

is apparent that some cargo will continue to be stored at the airport due to the limitations of storage lands on the port peninsula.

The value of wetlands is acknowledged; however, those of East Bay have been degraded by past industrial activities and by the chronic water quality problems elaborated on elsewhere in this document (see particularly section 4.1.6). The more productive areas in Olympia Harbor will not be affected by the selected plan (see sections 4.1.4.2, 4.1.6, and 4.2.4). Alteration of the 43.7 acres (11.7 ha) of intertidal wetlands reduces the acreage of the nation's wetlands and results in a loss of biological productivity to the entire Budd Inlet ecosystem. The effects could be spread throughout southern Puget Sound by food chain transference. However, in this instance, the biological losses are judged to be small and the losses acceptable in light of the social and economic benefits derived. The potential development of the area was foreseen and approved under coastal zone management and the state SMA through the Thurston County SMP. Therefore, based on the previous analysis made in accordance with section 2a of this Executive Order, it is determined that no practicable alternative to the proposed alteration exists, and that the selected plan includes all practicable measures to minimize losses to wetlands as a result of construction.

4.6 Irreversible and Irretrievable Commitments of Resources.

4.6.1 General. The labor and capital necessary to construct and maintain the marina are committed irreversibly and irretrievably. This includes the capital for dredging equipment, administrative personnel, operational labor, and petroleum products used. The relocation of materials dredged from the harbor to the intertidal disposal site represents an irretrievable and irreversible commitment of resources. While not irreversibly committed, in that removal of the material is possible with proper equipment, the lands have been committed to uses that may be very costly to reverse. It cannot be said whether, in the long term, other uses are absolutely precluded. There is no practical way or need to restore the dredged material to their original locations. Additionally, sand and gravel and other aggregate used in marina construction is similarly committed. Although such materials are locally abundant, economically accessible sources are diminishing.

The lands filled for the purposes of development are irreversibly and irretrievably lost as habitat. Plants and animals killed in the dredging operation are lost, and likewise, individual flora and fauna associated with the fill sites are irretrievably lost.

The project affects the current economic base, particularly the Port of Olympia Harbor and city of Olympia; economic growth unrelated to this project will affect population growth and distribution and the rate of land development much more significantly than will the proposed action.

Protection against environmental degradation typically is provided through pollution control monitoring, enforcement action, and coordinated land-use planning.

Depending upon economic conditions, further commitment of socioeconomic and environmental resources could be made in the future at the option of private enterprise and the Port of Olympia Harbor, if such commitment appeared desirable.

Market forces, such as the development of new substitute products or means of transportation or cost saving technology, could alter at any time the existing types of employment and the industrial economic base of the area. Thus, the types of employment and the industrial economic base of the areas cannot be considered committed in an irreversible and irretrievable manner.

4.6.2 Energy Commitments. Commitments of nonrenewable energy products due directly or indirectly to construction and maintenance of this project are diverse, considerable, and not easily quantifiable. Energy commitments by dredging depend on the type of dredging employed, distance to disposal sites, and a variety of other factors. For the East Bay site, a combination of clamshell dredging (to construct the retaining dike) and pipeline dredging (to dredge the moorage area and access channel) is likely. Sediments are mainly loose silts and sands. Based on calculations made for small (10 inch/25.4 cm) pipeline dredges operating in Grays Harbor, direct energy consumption would be about 1.497×10^4 Btu per cubic yard. Using calculations made for clamshell dredge with a small bucket (5 cubic yards 3.75 m^3) an energy consumption figure of 7.484×10^4 Btu per cubic yard is arrived at. Open-water disposal at Dana Passage consumes more energy than does onsite disposal.

Such figures are only marginally useful in determining direct and indirect energy commitments resulting from the project, however. Fuel consumed by small boats which will use the new marina also represent energy commitments, but cannot be reasonably calculated due to the variety of craft and unknown frequency of use of each. An additional factor is energy consumed by automobiles transporting persons from their residences to the marina. By siting the marina close to the main population center, less energy will be consumed by automobiles than had the marina been located further away although energy consumption by boats may be increased, depending on where the prime recreational waters are. The effect of increasing fuel prices will have a moderating effect on energy consumption, but is an unquantifiable factor. It is safe to presume that marina construction, directly and indirectly, involves a potentially large energy commitment in the future.

4.7 Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity. Natural characteristics of the estuary have been substantially altered in the

past 100 years due to settlement and expansion of Euro-American populations. Landfills in the lower estuary have contributed to loss of wetlands and have impacted to an unknown extent the biological resources of the estuary. These past actions and developments have contributed significantly to conditions which exist today. These actions generally have been beneficial to the Euro-American socioeconomic system, although at the expense of the biological productivity of Olympia Harbor. Exploitation of the region's abundant resources has enhanced and resulted in development and maintenance of stable urban communities. Both beneficial and adverse effects have resulted from these developments.

Construction of the marina is a local use of the environment. The increased moorage capacity provides some direct benefits to the Port of Olympia Harbor and the general populace and results in some positive economic spinoffs, principally to the city of Olympia of Thurston County. Long-term productivity of the estuary is neither enhanced nor maintained by the action from a biological point of view, although attached marina populations are enhanced. Conceivably, future knowledge and increased environmental sensitivity and vigilance could result in enhancing long-term productivity.

As 41.6 acres (16.8 ha) of intertidal wetlands will be destroyed through dredging or disposal of dredged material, long-term productivity is directly impacted. The effect of the dredging and fill on total estuarine and marine productivity is judged to be acceptable in this instance. Water quality effects during construction are temporary and are not expected to have lasting effects on productivity. Water quality effects from marina construction should be minor, but the current water quality situation complicates the analysis. Consequently, a water quality monitoring program will be carried out during and after construction to determine if additional action is warranted.

For the near and forseeable future, the socioeconomic conditions of the city appear preeminently dependent upon government, commercial, and sport fisheries; shipping; and tourism and recreation and attendant businesses. While some growth could occur, the extent of influence on the local economy will be small as a direct result of this action.

Thus, the action, by itself, is unlikely to significantly affect the productivity of man's environment on a regional basis.

4.8 Any Probably Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented.

4.8.1 Dredging Effects. Approximately 14 acres (5.7 ha) of productive intertidal wetlands will be dredged. Dredging will remove sessile and perhaps some motile organisms inhabiting the area. These losses are temporary as populations should rebuild. Habitat and organisms contiguous to the construction areas will likely be affected by the immediate

changes in the local environment, although the extent of disturbance impact is unknown. Construction activities will contribute to temporary increases in local noise and emission levels. Periodic maintenance dredging will cause similar disruption and losses to marine organisms.

4.8.2 Disposal Effects. Approximately 29.7 acres (12.0 ha) of productive intertidal wetlands will be filled for commercial development, with attendant loss of natural functions. This action reduces total biological productivity at basic levels with subsequent "ripple" impacts occurring throughout the food web. Some short-term and long-term water quality degradation is likely. Filling for commercial cargo storage precludes return of the site to biological production in the foreseeable future. Disposal of maintenance dredged material in the state approved disposal site in Dana Passage should not result in significant adverse effects.

4.8.3 Marina Operation. Operation of the marina will result in small increases in noise, dust, and vehicle emissions. These effects should be essentially confined to the port peninsula. The potential for introduction of pollutants (notably petroleum products, paints, detergents, etc.) into the water through runoff or accidental spills also is increased, although the port has committed itself to a vigorous nonpollution enforcement program that will help prevent such occurrences.

4.9 Mitigation and Amelioration of Adverse Effects.

The selected plan is the result of thorough analysis and evaluation of various practicable alternative courses of action to achieve the planning objectives. One of the principal tasks of planning is to develop and refine plans that minimize environmental consequences; this was considered during site selection as noted in chapter 2. The East Bay Marina proposal has undergone considerable refinement through state and Federal processings. Under provisions of the state's SMA, a SDP for marine development was applied for and issued to the Port of Olympia on 30 April 1976. The SDP was subject to a number of conditions imposed to ameliorate marina effects. (Final ECPA decisions are reproduced as appendix E and modified as necessary by appendix G.) These conditions must be complied with by the Port of Olympia.

Other efforts to ameliorate environmental effects include design of a floating breakwater to maximize flushing and circulation. In addition, the moorage area would be "stepped," from the southwestern portion of the basin to the northern portion (appendix B). This dredging design will improve flushing characteristics of the basin and reduce the amount of dredging and the associated amount of fill together with an associated cost decrease.

Operational efforts to ameliorate environmental consequences will largely be the responsibility of the Port of Olympia. The Port has agreed to construct a surface runoff collection and retention system that would discharge the runoff into West Bay and to rigidly enforce regulations prohibiting pollution of the marina basin. Inwater boat repairs and painting of hulls will not be allowed in the basin. The Port will also require all marina tenants to comply with all local, state, and Federal regulations regarding discharge of waste materials. The port will provide pump out facilities and refuse containers.

Model and computer studies indicated a probable reduction in East Bay dissolved oxygen levels related to a projected related reduction in water exchange. As a condition of project approval, EPA required that an aeration system be installed to maintain Class B water quality standards within the marina (see appendix G). Accordingly, an aeration system is provided as a mitigation feature of the Federal project with 33 aeration units to be located throughout the marina (see appendix D). In addition, monitoring for fish and water quality will be undertaken:

o Fish Monitoring: Depending upon the timing of the dike construction and dredging operations during the construction of the East Bay Marina, a monitoring program may be necessary to determine whether or not large concentrations of fish, mainly smelt and herring, are present in the construction area (see WDF letter, appendix G). This monitoring program will be coordinated with, and approved by, the WDF. Details of this program will be determined during the plans and specifications stages of this project.

o Water Quality Monitoring:

a. During Construction. Water quality will be monitored in East Bay during dike construction and during dredging operations. Design of this monitoring program will be coordinated with and approved by WDE and EPA. Parameters normally measured during monitoring programs of this type include dissolved oxygen (DO) concentrations, turbidity, salinity, pH, and temperature. Details of this monitoring program will be determined during the plans and specifications stage of this project.

b. Post Construction. A water quality monitoring program will be necessary after East Bay Marina has been constructed. Continuous monitoring of DO is essential during the critical summer months for operation of the aeration system. Results of this program will indicate when the aeration system for East Bay should be put into action. The program will also include collection of some additional data to check conclusions reached through use of the EPA model (section 4.1.3.2). Details of this monitoring program will be determined during the plans and specifications stage of this project.

The Port of Olympia and FWS have signed a protective covenant to maintain the West Bay lagoon site in a natural, undeveloped condition as mitigation for habitat lost by the fill of intertidal wetlands. In addition, the Port and FWS will evaluate the feasibility of constructing one or more islands in East Bay to offset loss of waterfowl and waterbird loafing and feeding habitat. If FWS determines the concept is feasible, the Port will construct the island(s). Other actions to be undertaken by the Port include construction of an artificial reef for public fishing (if determined useful by WDF) and retention and replacement of piling in the project area for wildlife habitat. These and other actions are in FWS letter dated 21 October 1980 reproduced in appendix G. Seattle District has agreed to provide technical assistance for the island creation proposal if requested (see NPSEN-PL-NC letter dated 13 November 1980 - appendix A).

5. COORDINATION AND COMMENTS

5.1 Coordination with Government Agencies. Federal agencies most involved with the proposed marina include the Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (FWS), and the National Marine Fisheries Service (NMFS). State agencies include the Washington Department of Ecology (WDE), Washington Department of Fisheries (WDF), and Washington Department of Game (WDG). Engineering and environmental data were furnished these agencies as it became available.

As a result of comments received on the draft DPR/EIS (see appendix H), additional study was undertaken to attempt to clarify potential water quality effect resulting from the East Bay Marina proposal and to reevaluate comparison of plans 4a and 4e. This effort was coordinated closely with EPA, FWS, WDE, and WDF.

The reevaluation confirmed plan 4a as the preferred plan; however, results from a joint EPA-Corps water quality modeling study confirmed previous concerns that reductions in dissolved oxygen concentrations due to marina construction would occur (see section 4.1.3.2 and EPA letter appendix H). An aeration system was designed for the recommended plan (appendix D) which will maintain Class B water quality standards within the marina. Water quality and fish monitoring were agreed to be necessary and these programs will be designed in coordination with the appropriate resource agencies during preparation of plans and specifications (see section 4.9 and appendixes G and H).

5.1.1 Fish and Wildlife Coordination Act Report. In accordance with the Fish and Wildlife Coordination Act (FWCA) of 1958 (Public Law 85-624), as amended, a final FWCA Report on this Section 107 project, dated 18 July 1979, was prepared by the Olympia office of the FWS and provided to the Corps. The draft report was reviewed and substantially concurred in by the WDG and the NMFS. The WDF also reviewed the draft FWCA Report but, by letter dated 18 July 1978, indicated that they could not concur with all statements in the draft report due to a differing of opinion between the WDF and FWS.

Following a series of meetings with WDF, the FWS provided a letter, dated 28 August 1978, amending their 18 July FWCA Report. By letter dated 25 September 1979, the WDF concurred with the amended FWCA Report. The report and correspondence received pertaining to it are reproduced as appendix F. Elements of the FWCA Report have been incorporated into the EIS text: (FWS, 1979). The FWCA Report provided 12 recommendations with regard to the East Bay Marina project. These

recommendations are reproduced below with a response by the Seattle District, U.S. Army Corps of Engineers, immediately following:

a. That the landfill area of the project be reduced by approximately 50 percent in accordance with alternative 4b (Corps of Engineers planning data of 25 May 1977 and letter of 4 October 1977) to serve only direct marina support needs and thereby minimize direct impact to fish and wildlife resources.

Response: We do not concur with this recommendation. Justification for selection of plan 4a over plan 4b is contained in Sections 2.3.13, Selection of Preferred Plan, and 4.5.4, Executive Order 11990, Protection of Wetlands. (Concern has been resolved; see appendix G.)

b. That project construction not be commenced until detailed design plans are approved by the WDF and WDG and certification is made by those agencies or the WDE that achievement of secondary treatment is expected within 12 months, in accordance with the letter of 1 December 1977, from the Directors of Fisheries and Game to the Port of Olympia.

Response: This recommendation is already effective as part of the Port of Olympia's SDP for the East Bay Marina (see Section 4.1.3.2, Water Quality, and appendix B). The WDE, WDG, and WDF will receive copies of this EIS and the DPR containing detailed design of the proposed marina. (See appendix G.)

c. That marine pumpout facilities to accomodate boat generated sewage be required for protection of water quality.

Response: We concur with this recommendation. This is the responsibility of the local sponsor who has agreed to provide such facilities. See Section 4.9, Mitigation and Amelioration of Adverse Effects, and appendix A.

d. That dredging work be conducted only during the period of 15 October to 15 February or as otherwise stipulated by the WDF and WDG.

Response: We concur with this recommendation. See Section 4.1.7, Fishes. This item was further coordinated with the EPA, FWS, WDE, WDF, and WDG during the 404 public review: see appendix G.

e. That a short, solid breakwater be constructed at the north end of the marina instead of the planned floating breakwater to improve water circulation by deflection of currents to the marina interior.

Response: We do not concur with this recommendation. Model studies indicate that the floating breakwater will result in fewer water quality and circulation problems than would a solid breakwater. In addition, it appears that the bed material will not support a timber pile or rubble-mound breakwater. See Section 4.9, Mitigation and Amelioration of Adverse Effects, and appendix A. Apparently, this recommendation is tied to FWS's recommendation for plan 4b, which would require a shorter breakwater. At the time, consideration was given to a solid breakwater or extended fill to eliminate the need for a breakwater. Consideration was dropped when plan 4a was selected as the preferred plan.

f. That storm drainage from the marina facility be directed into West Bay and not into East Bay.

Response: We concur with this recommendation. This is a local responsibility, which has been incorporated in the marina design. See Section 4.1.2, Physical Conditions, and Section 4.9, Mitigation and Amelioration of Adverse Effects.

g. That a general cleanup and beautification of East Bay tidelands be conducted in conjunction with the marina project.

Response: We generally support this recommendation. The Port plans to landscape and improve the fill site and along the access road leading to the marina and Port area, as well as clean up the accumulated litter elsewhere in East Bay. Due to their ecological values, as many standing pilings as possible will be retained. Fallen piles will be removed. In addition, consideration will be given to driving new piles at selected sites in the mouth of the bay for wildlife habitat. See appendix G.

h. That adequate, all tide, public boat launch capability be provided at nominal fee at the marina or in the Olympia Harbor vicinity and maintained by the project sponsor for the life of this project.

Response: We concur with this recommendation. This is a local responsibility and is included in the overall marina plan. See appendix G.

i. That a public fishing jetty or pier be constructed on Port of Olympia or Washington State property in East Bay.

Response: We are in general agreement with this recommendation. Construction of the marina will substantially increase public access along the western shore of East Bay. A boat lauch facility is included in the marina plan and will provide public access to the floating breakwater for birdwatching, fishing, and other public uses (excluding swimming). See appendixes C and G.

j. That one or more dredge islands totaling up to an acre in size be constructed for a bird resting and feeding area within East Bay near the southeast shore to replace the present island which would be destroyed by the Olympia Avenue access road.

Response: We are in general concurrance with this recommendation (see Section 4.5.2). During the planning process, we investigated the feasibility of island creation in the area of Priest Point Park, but concluded that it was infeasibile. By locating the island(s) back inside East Bay, the marina and port peninsula may offer sufficient protection to justify attempting island creation. FWS and the Port have agreed to investigate creating intertidal islands east of the southern end of the marina as a separate action to this project (see appendix G). If requested, the Seattle District will provide technical assistance for this effort. If found feasible, site selection and design will be coordinated with interested resource agencies.

k. That a small salmon run be reestablished in Ellis Creek at Priest Point Park by means of a "Netarts Box" as mitigation for fish habitat loss in East Bay. This project is to be coordinated with the WDG, and WDF, and FWS and the Fish and Wildlife Service and be initiated and maintained concurrently with the marina project.

Response: This recommendation was withdrawn by FWS by their letter of 28 August 1979.

l. That capital, operation, maintenance, and replacement costs of any potential mitigation measures be treated as other project joint costs and allocated among the beneficial purposes of the project.

Response: Where the costs are a Federal cost and eligible for cost sharing, the costs are included as project costs. Where the costs are a local cost and not eligible for cost sharing, then they are not considered project costs.

5.2 Public Coordination. A newsletter was mailed to 150 interested agencies, organizations, industries, and individuals on 13 February 1979. The Port of Olympia held a public meeting on the proposed marina on 21 February 1979, where the study manager presented the status of the studies to date. A final public meeting was held by the local sponsor with a presentation by the Seattle District on 16 September 1980 to inform the public of the results of 1979 and 1980 studies. Findings and conclusions were discussed with the public and opportunity given for comments and questions. Public involvement in the early stages of planning, prior to Corps involvement, consisted of public meetings for

the Port of Olympia's application for a SDP from the State of Washington (appendix E). Public hearings were also held by the State Shorelines Hearing Board when granting of the permit was challenged by concerned citizens.

5.3 Coordination of Draft Environmental Impact Statement. A news release was issued to announce the availability of the draft statement to the public for review and comment. Initially, 86 agencies, groups, and individuals were mailed review copies of this document and their comments requested. Review copies were furnished to interested parties who requested them during the 45-day review period.

5.3.1 The following agencies, groups, and individuals received review copies of this statement but did not comment:

FEDERAL:

Advisory Council on Historic Preservation, Washington, D.C.
Community Service Administration, Seattle, Washington
Department of Agriculture, Washington, D.C.
Department of Commerce, Washington, D.C.
National Marine Fisheries Service, Portland, Oregon
Department of Energy, Washington, D.C.
Department of Health, Education, and Welfare, Washington, D.C.;
Seattle, Washington
Department of Transportation, Seattle, Washington
Federal Highway Administration, Portland, Oregon
Federal Energy Administration, Washington, D.C.
Heritage Conservation and Recreation Services, Seattle, Washington

STATE AND LOCAL:

Thurston County Regional Planning Commission
Thurston County
City of Lacey
Port of Olympia
Olympic Air Pollution Control Authority

OTHERS:

Squaxin Island Indian Tribes
Washington Public Ports Association
Puget Sound Governmental Conference
Seattle Public Library

Olympia Public Library
Lacey Public Library
Tumwater Public Library
University of Washington
University of Colorado
University of Puget Sound
Center for Urban Affairs, Northwestern University
Huxley College, Western Washington University
The Evergreen State College
Lewis and Clark College
American Institute of Merchant Shipping
Foundation for Future Studies
Small Towns Institute
Western Environmental Trade Association of Washington
Washington State Canal Commission
Audubon Society, Seattle and Tahoma Chapters
Columbia-Pacific Resources Conservation and Development
Friends of the Earth
Izaak Walton League
Northwest Steelheaders Trout Unlimited
Sierra Club
Washington Environmental Council
Washington State Ecological Commission
Nature Conservancy, Natural Heritage Program
Mrs. Stanley Engle
Ms. Liz Greenhagen
Mr. Elvin Ottey
Mr. John W. Slipp
Ms. Nancy Thomas
Mr. Lionel Zamore
Ms. Benella Caminiti
Dr. George Waring
Mr. Ed Delanty
Mr. Maurice Methven
Mr. Paul J. Barek
Conservation of Natural Resources Association
Wisley and Ham, Inc.
Envirosphere Company
Montague and Associates
Pilas-Schmidt Westerdahl Company
Herner and Company
TAMS
Environmental Consulting Services
Dr. David D. Smith and Associates
Oceanographic Institute of Washington

West Bay Marina
Puget Marina
Fiddlehead Marina
Zittel's Marina, Inc.
Federation of Western Outdoor Clubs
PROW
Inland Boatman's Union
Puget Sound Pilots
Olympia Yacht Club

5.3.2 Comments Received. The following agencies, groups, and individuals provided a letter of no comment or commented on the DPR/EIS. Appendix H, part 1, contains a summary of their comments and Corps responses. The letters themselves are reproduced as Appendix H, part 2.

FEDERAL:

Department of Agriculture
  Forest Service, Portland, Oregon
  Soil Conservation Service, Spokane, Washington
Department of Commerce, Seattle, Washington
Department of Energy, Seattle, Washington
Department of Housing and Urban Development, Seattle, Washington
Department of the Interior, Portland, Oregon
Department of Transportation, U.S. Coast Guard, Seattle,
  Washington
Environmental Protection Agency, Seattle, Washington

STATE AND LOCAL

State of Washington
City of Olympia
City of Tumwater

OTHERS:

Capital Development Company
Olympia R/UDAT
League of Women Voters
Olympia Area Chamber of Commerce
Olympia Area Visitor - Convention Bureau
Audubon Society, Black Hills Chapter
Olympia Salmon Club, Inc.
Michael and Raymona Redman, Gregory and Susan PaHillo, Harold and
  Ester Knecht, Lois Parks, and Thomas Allen

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INDEX

EAST BAY MARINA
SECTION 107

EXHIBITS

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
PLAN DATA					
Moorages	800	800	800	500	700
Breakwaters	16 feet 700 feet Floating	16 feet 250 feet Floating	16 feet 400 feet Floating	16 feet 900 feet Floating	16 feet 1,600 feet Floating
Moorage Area (Acres)					
Submerged Lands	25.2	23.0	26.0	11	22.0
Tidelands	6.1	8.0	6.0	4	5.5
Uplands	0.0	0.0	0.0	0	0.0
Total	31.3	31.0	32.0	15	27.5
Entrance and Access Channels (Acres)					
Submerged Lands	17.6	27	25	18	23.1
Tidelands	7.9	1	3	6	0.0
Uplands	0.0	0	0	0	0.0
Total	25.5	28	28	24	23.1
Cargo Area Fill to +20 Feet (Acres)1/					
Submerged Lands	8.0	0			8.0
Tidelands	15.2		NYD	NYD	15.2
Uplands	1.0				1.0
Total	24.2	0	7.4	22	24.2

1/Three acres to be used for ponding surface runoff prior to discharg to West Bay.

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Marina Support and Parking Fill (Acres)					
Submerged Lands	14.2				2.1
Tidelands	12.4	NYD	NYD	NYD	8.1
Uplands	0.0	—	—	—	0.0
Total	26.6	27.0	26.6	26	10.2
Miscellaneous Fill (Acres)					
Submerged Lands	0.5	0.5	0.5	0.5	0.5
Tidelands	2.1	2.1	2.1	2.1	2.1
Uplands	0.0	0.0	0.0	0.0	0.0
Total	2.6	2.6	2.6	2.6	2.6
Total Land Required (Acres)					
Submerged Lands	65.5	54	59	47.6	55.7
Tidelands	43.7	35	38	42	30.9
Uplands	1.0	0	—	—	1.0
Total	110.2	89	97	89.6	87.6
Dredging (Cubic Yards)					
Moorage Area	475,000	700,000	600,000	600,000	600,000
Entrance and Access Channels	700,000	530,000	500,000	500,000	400,000
Total	1,175,000	1,230,000	1,100,000	1,100,000	1,000,000

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Marina Support and Parking Fill (Acres)					
Submerged Lands	14.2				2.1
Tidelands	12.4	NYD	NYD	NYD	8.1
Uplands	0.0	—	—	—	0.0
Total	26.6	27.0	26.6	26	10.2
Miscellaneous Fill (Acres)					
Submerged Lands	0.5	0.5	0.5	0.5	0.5
Tidelands	2.1	2.1	2.1	2.1	2.1
Uplands	0.0	0.0	0.0	0.0	0.0
Total	2.6	2.6	2.6	2.6	2.6
Total Land Required (Acres)					
Submerged Lands	65.5	54	59	47.6	55.7
Tidelands	43.7	35	38	42	30.9
Uplands	1.0	0	—	—	1.0
Total	110.2	89	97	89.6	87.6
Dredging (Cubic Yards)					
Moorage Area	475,000	700,000	600,000	600,000	600,000
Entrance and Access Channels	700,000	530,000	500,000	500,000	400,000
Total	1,175,000	1,230,000	1,100,000	1,100,000	1,000,000

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Fill Capacity to +20 Feet (Cubic Yards)					
Cargo Area[1]	470,000	0	150,000	500,000	470,000
Marina Support and Parking	920,000	520,000	700,000	500,000	115,000
Miscellanoues	50,000	50,000	50,000	50,000	55,000
Total	1,440,000	570,000	900,000	1,050,000	640,000
Bulkheads or Dikes to Retain Fill	Yes	Yes	Yes	Yes	Yes
Marine Support Facilities, Include Access Road, Parking Area, Launch Ramp, Etc.	Yes	Yes	Yes	Yes	Yes
Utilities	All nearby All available	All nearby All available	All nearby All available	All nearby All available	All nearby All available
NATIONAL ECONOMIC DEVELOPMENT					
Implementation Costs[3/5]					
Federal[2]	899,000	696,000	696,000	957,000	1,305,000
Non-Federal[4]	1,711,000	1,767,000	1,767,000	2,394,000	2,565,000
Total	2,610,000	2,463,000	2,463,000	3,351,000	3,870,000

1/Three acres to be used for ponding surface runoff prior to discharge into West Bay.
2/Includes U.S. Coast Guard aids to navigation.
3/Does not include moorage area dredging and disposal costs.
4/Includes local cost of diking disposal area.
5/Includes cost of recreational facilities on floating breakwater.

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Average Annual Benefits					
Recreational Boating	357,000	357,000	357,000	223,000	312,000
Land Enhancement	72,000	26,000	38,000	45,000	28,000
NED Employment	6,000	6,000	6,000	6,000	6,000
Breakwater Recreation	25,000	25,000	25,000	25,000	25,000
Total	460,000	414,000	426,000	299,000	371,000
Average Annual Costs					
Construction[1/2/]	186,000	176,000	176,000	239,000	276,000
Maintenance[1/]	18,000	10,000	10,000	20,000	30,000
Major Rehabilitation	N/A	N/A	N/A	N/A	N/A
Total	204,000	186,000	186,000	259,000	306,000
Benefit/Cost Ratio	2.3	2.2	2.3	1.2	1.2
ENVIRONMENTAL QUALITY					
Water Quality					
Toxic Substances Released	No	No	No	No	No
Dissolved Oxygen Reduced	Yes	Yes	Yes	Yes	Yes

1/Includes U.S. Coast Guard aids to navigation.
2/Does not include moorage area dredging and disposal costs.
3/April 1979 price level, 6-7/8 percent interest rate.

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Water Quality (con.)					
pH Changed	No	No	No	No	No
Increased Turbidity During Construction	Yes	Yes	Yes	Yes	Yes
Coliforms Increased	No	No	No	No	No
Inorganic Nutrients Increased	Yes	Yes	Yes	Yes	Yes
Basin Flushing Efficiency Decreased	Yes	Yes	Yes	Yes	Yes
Temperature Changed (Decreased)	Yes	Yes	Yes	Yes	Yes
Air Quality					
Increased Fuel Emissions From Recreational Boats	Yes	Yes	Yes	Yes	Yes
Short-term Dust Conditions From Land Disposal Areas	Yes	Yes	Yes	Yes	Yes
Dust and Noise from Construction and Dredging Activities	Yes	Yes	Yes	Yes	Yes
Dust and Noise From Marina Operation	Yes	Yes	Yes	Yes	Yes
Dust and Noise From Cargo Area	Yes	Yes	Yes	Yes	Yes
Land Use					
Intertidal Wetlands Lost	High	Moderate	Moderate	High	High
Disruption of Land-Water interface	4,800 feet	4,800 feet	4,800 feet	3,500 feet	6,000 feet
Sufficient Uplands for Marina Development	No	No	No	No	No

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Land Use (con.)					
Change in Upland Land Use (Forest to Marina, Etc.)	Commercial to Marina	Commercial to Marina	Commercial to Marina	Commercial to Marina	Commercial to Marina
Consistent With Coastal Zone Management Program	Yes	Yes	Yes	Yes	Yes
Urban Beach Use Lost	No	No	No	No	No
Plants					
Upland Vegetation Removed	Yes	Yes	Yes	Yes	Yes
Tideland Vegetation Removed	Yes	Yes	Yes	Yes	Yes
Rare and Endangered Species Impacted	No	No	No	No	No
Animals					
Wildlife Displaced or Destroyed	Low	Low	Low	Low	Low
Waterfowl and Shorebirds Permanently Lost	Moderate	Moderate	Moderate	Moderate	High
Benthic Fauna Lost	Moderate	Low	Moderate	Moderate	High
Permanently Disrupts Fish Habitat	High	Low	Low	High	High
Rare and Endangered Species Impacted	No	No	No	No	No
Visual Appearance					
Increased Recreational Boating Activity	Yes	Yes	Yes	Yes	Yes

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
Visual Appearance (con.)					
Increased Recreational Boating Activity	Yes	Yes	Yes	Yes	Yes
Increased Port Activities	Yes	Yes	Yes	Yes	Yes
Construction Activity	Yes	Yes	Yes	Yes	Yes
Land Fill Necessary	Yes	Yes	Yes	Yes	Yes
Increased Vehicle Activity	Yes	Yes	Yes	Yes	Yes
Concentrates Moorages in Industrial Setting	Yes	Yes	Yes	Yes	Yes
Concentrates Moorages in Residential or Rural Setting	No	No	No	No	No
Buffers Residential Views of Industrial Area	Yes	Yes	Yes	Yes	Yes
Disrupts Bird Watching Activity	High	Moderate	Moderate	High	High
SOCIAL WELL BEING					
Location Desirable to Boaters	Yes	Yes	Yes	Yes	Yes
Location Desirable to Business	Yes	Yes	Yes	Yes	Yes
Residential Relocation Necessary	No	No	No	No	No
Disrupts Commercial Business Enterprise	No	No	No	No	No
Disrupts Vehicular Traffic	Yes	Yes	Yes	Yes	Yes
Community Disruption	Yes	Yes	Yes	Yes	Yes
Cargo Area and Marina Would Increase Tax Revenues	Yes	Yes	Yes	Yes	Yes
Burdens Tax Base of Port of Olympia	Yes	Yes	Yes	Yes	Yes
Reduces Wildlife Hunting and Fishing Opportunities	Some	Some	Some	Some	Some

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
SOCIAL WELL BEING (con.)					
Supplies Part of the Demand for Moorages in Southern Puget Sound	Yes	Yes	Yes	Yes	Yes
Fire and Police Services Burdened	Yes	Yes	Yes	Yes	Yes
Loss of Pastoral Scene	No	No	No	No	No
Development Partially Financed by Taxes	Yes	Yes	Yes	Yes	Yes
Marina Development Employment Primarily for Skilled Workers	Yes	Yes	Yes	Yes	Yes
Concentration of Heavy Equipment During Construction Increases Potential Hazzard to Health and Safety	Yes	Yes	Yes	Yes	Yes
Industrial and Commercial Business Relocation Necessary	No	No	No	No	No
REGIONAL DEVELOPMENT					
Growth of Commercial Business Activity	Yes	Yes	Yes	Yes	Yes
Majority of Construction Labor Hired Locally	Yes	Yes	Yes	Yes	No
Construction Expenditures Would Increase Local Income Through Secondary and Subsequent Expenditures and Induces Economic Activity	Yes	Yes	Yes	Yes	Yes

NOTES: NYD = Not Yet Determined
N/A = Not Applicable
ND = Not Determined

Table 1 (con.)

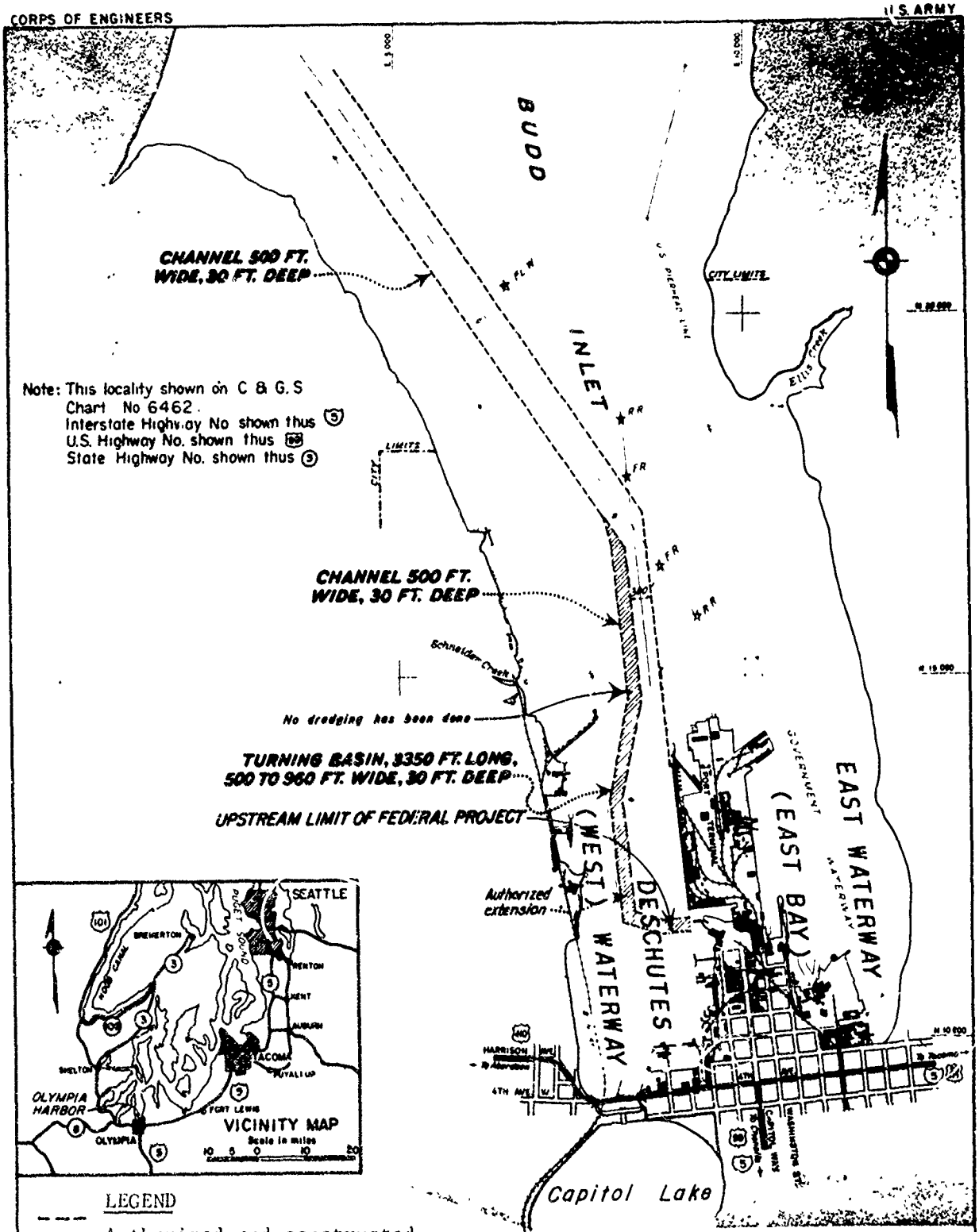
DISPLAY OF ALTERNATE SITE EFFECTS

	SITE 4				
	Plan 4A	Plan 4B	Plan 4C	Plan 4D	Plan 4E
REGIONAL DEVELOPMENT (con.)					
Non-Federal Government Funds Required for Implementing Portion of Development	Yes	Yes	Yes	Yes	Yes
Provides Opportunity for Increased Waterborne Commerce in Olympia	Yes	No	Some	Yes	Yes
OTHER EVALUATION CRITERIA					
Achieves Safe Moorages in a Central Location in Southern Puget Sound	Yes	Yes	Yes	Yes	Yes
Minimizes Adverse Social Effects	Yes	Yes	Yes	Yes	Yes
Minimizes Environmental Effects	Yes	Yes	Yes	Yes	Yes
Increases Fuel Energy Requirements	Yes	Yes	yes	Yes	No
Plan is Acceptable to Local Government Agencies	Yes	No	No	No	No
Interfaces with Deep-Draft Navigation	No	No	No	No	No
Navigation Benefits Exceed Costs	Yes	Yes	Yes	Yes	Yes
Revenues Exceed Costs	Yes	NYD	NYD	NYD	NYD
Area Could be Easily Restored to Existing Conditions After Plan is Implemented	No	No	No	No	No

PLATES

CORPS OF ENGINEERS

U.S. ARMY



LEGEND

Authorized and constructed

Authorized but not constructed

OLYMPIA HARBOR
WASHINGTON

EXISTING CORPS OF ENGINEERS' PROJECTS

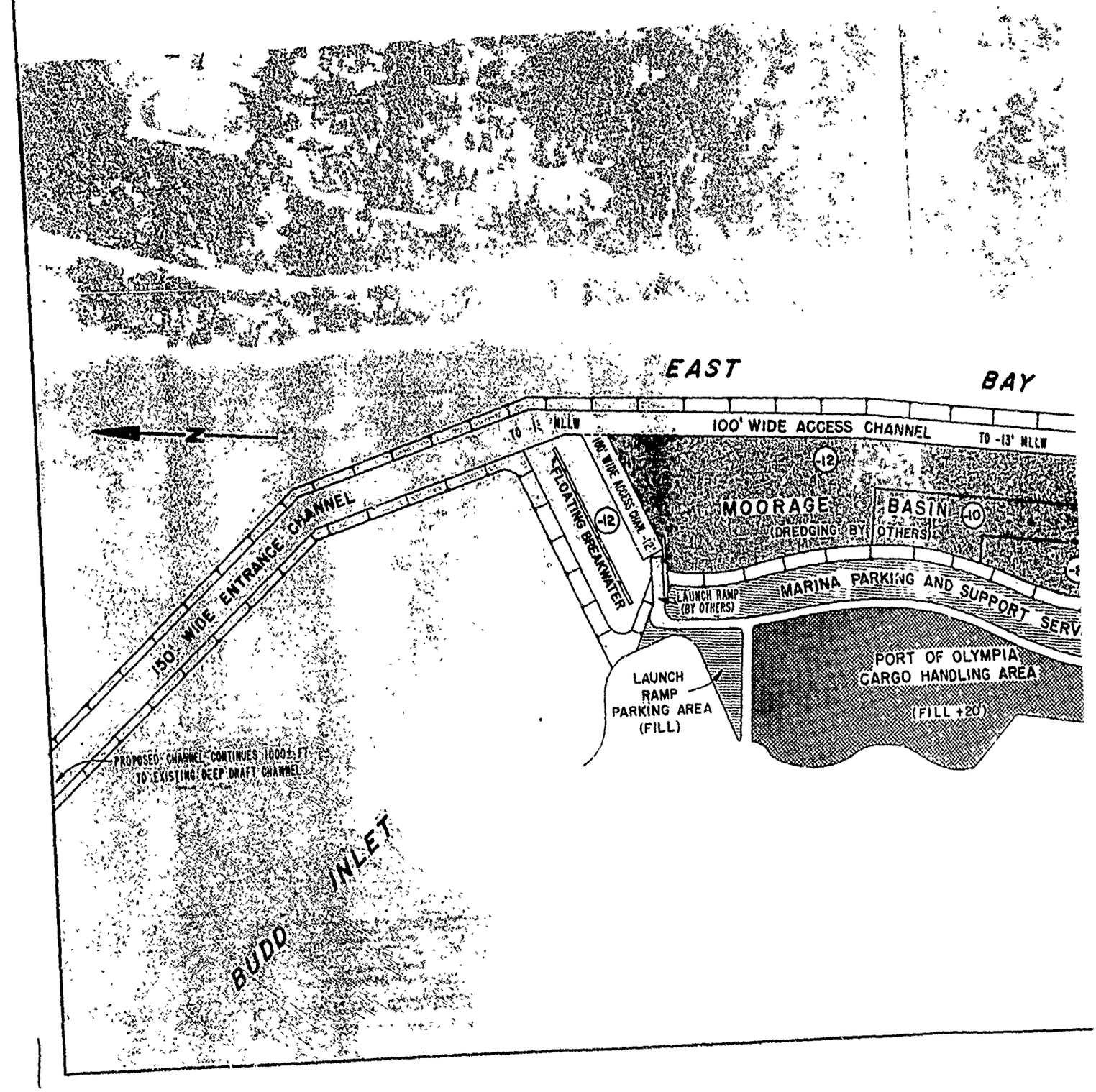
SCALE IN FEET

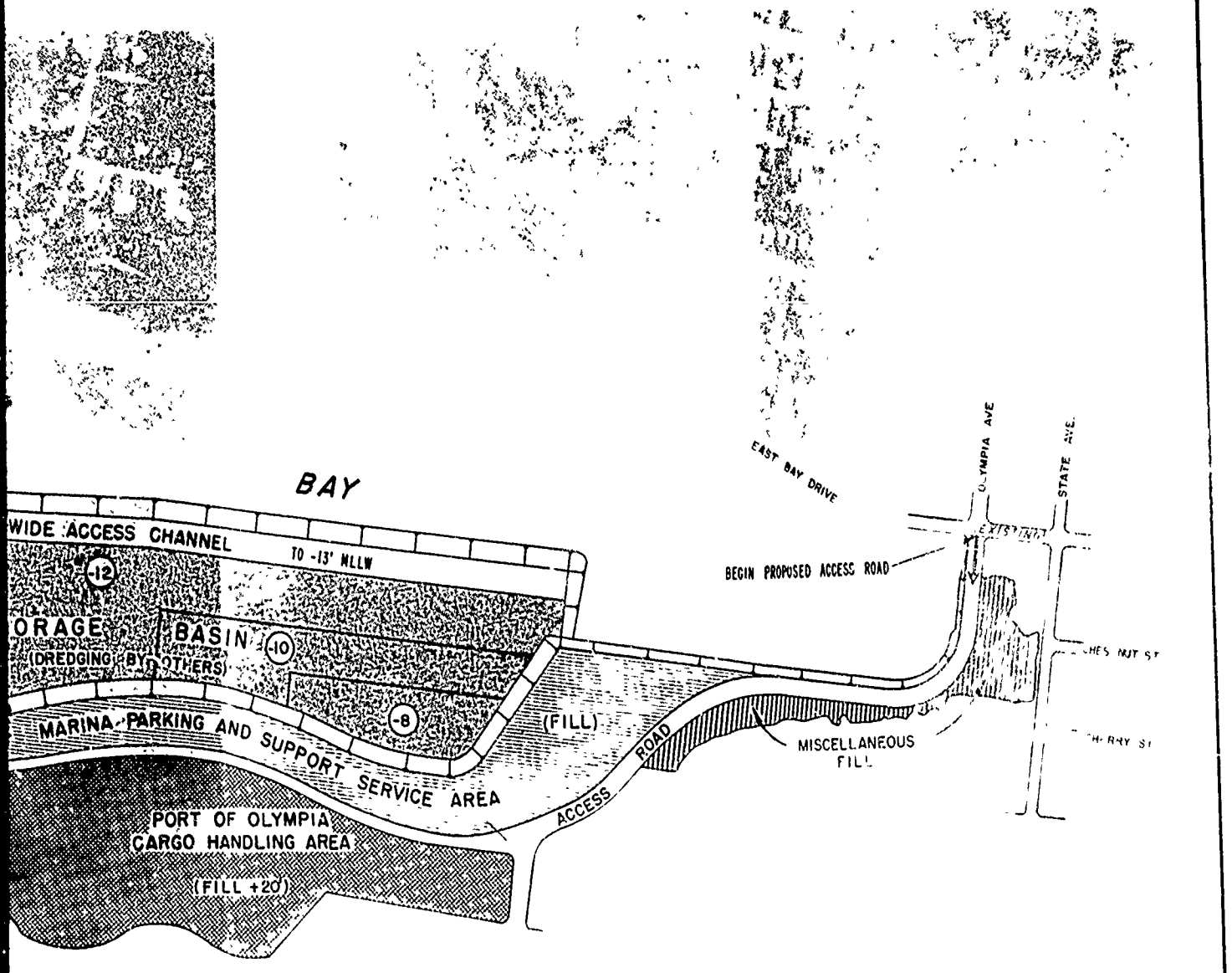
1000 0 2000 4000

U S Army Engineer District, Seattle, Washington

Revised September 1970

PLATE 1


EAST
BAY
N
TO -11' MLLW
100' WIDE ACCESS CHANNEL
TO -13' MLLW
150' WIDE ENTRANCE CHANNEL
100' WIDE ACCESS CHAN. -12'
FLOATING BREAKWATER
-12
MOORAGE BASIN
(DREDGING BY OTHERS)
-10
LAUNCH RAMP (BY OTHERS)
MARINA PARKING AND SUPPORT SERV
PORT OF OLYMPIA CARGO HANDLING AREA
(FILL +20')
LAUNCH RAMP PARKING AREA (FILL)
PROPOSED CHANNEL CONTINUES 1000± FT TO EXISTING DEEP DRAFT CHANNEL
BUDD INLET



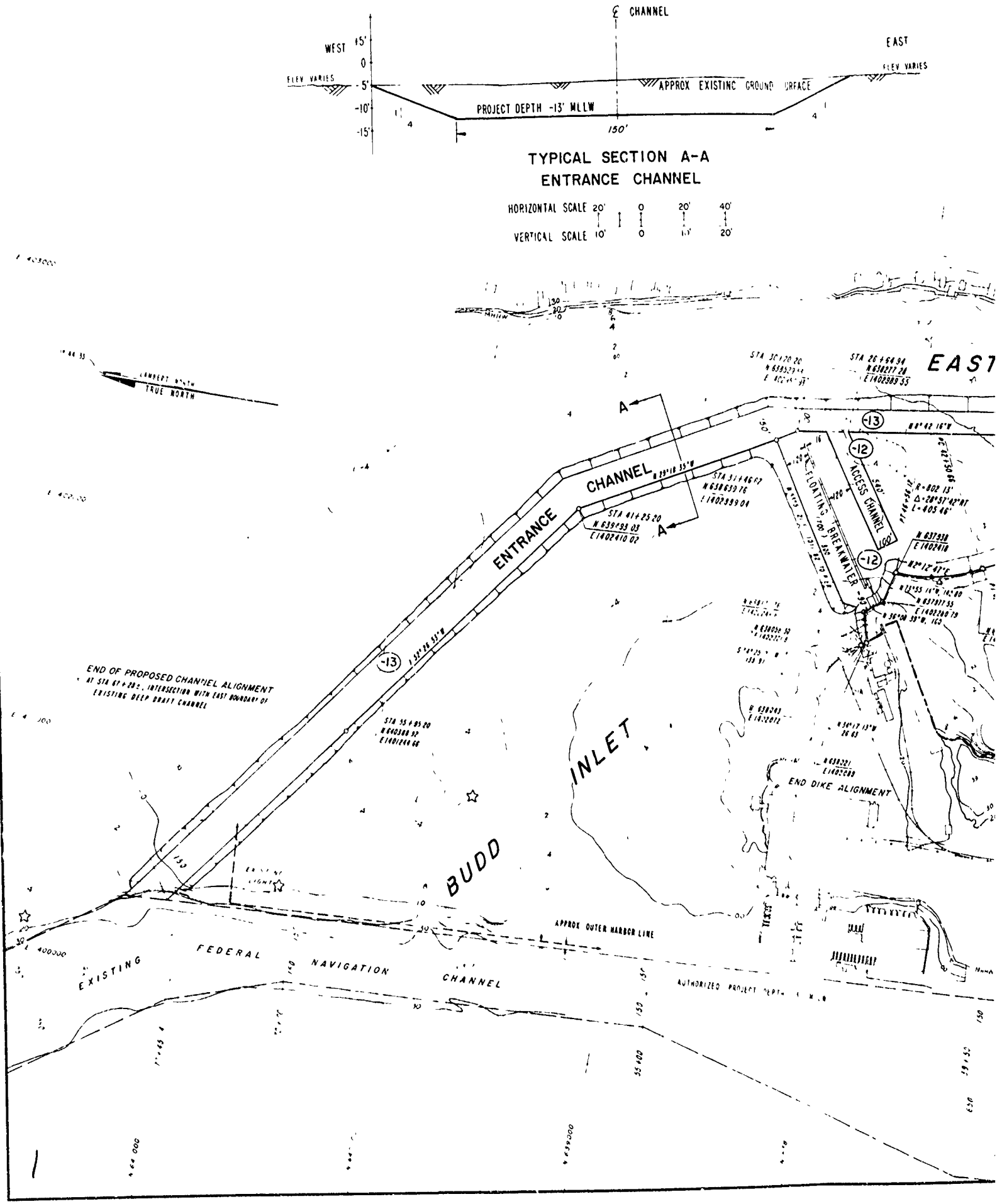
PLAN

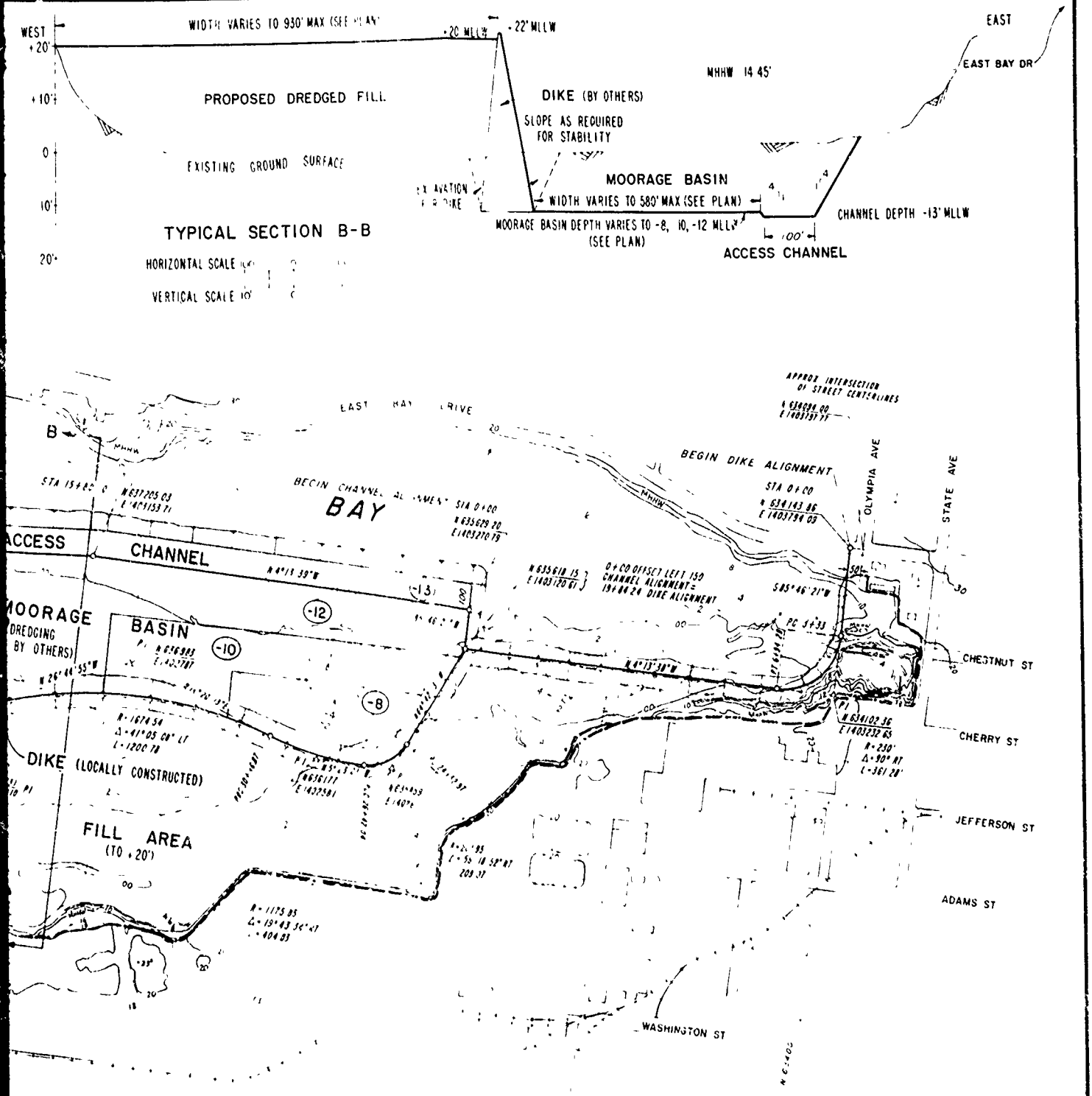
U S ARMY ENGINEER DISTRICT SEATTLE
CORPS OF ENGINEERS
SEATTLE WASHINGTON

EAST BAY MARINA
OLYMPIA HARBOR WASHINGTON

GENERAL LAYOUT

2-0


℄ CHANNEL
WEST
EAST
ELEV VARIES
ELEV VARIES
APPROX EXISTING GROUND SURFACE
PROJECT DEPTH -13' MLLW
150'
TYPICAL SECTION A-A
ENTRANCE CHANNEL
HORIZONTAL SCALE 20' 0 20' 40'
VERTICAL SCALE 10' 0 10' 20'
LAMBERT NORTH
TRUE NORTH
ENTRANCE CHANNEL
FLOATING BREAKWATER
ACCESS CHANNEL
END OF PROPOSED CHANNEL ALIGNMENT
END DIKE ALIGNMENT
BUDD INLET
APPROX OUTER HARBOR LINE
EXISTING FEDERAL NAVIGATION CHANNEL
AUTHORIZED PROJECT DEPTH
EAST



NOTES

1) BASE MAP PREPARED FROM A PHOTOGRAMMETRIC MAP FLIGHT DATE 15 AUG 1974. ELEVATIONS AND SOUNDINGS ARE IN FEET REFERRED TO MEAN LOWER LOW WATER DATUM: MEAN LOWER LOW WATER (MLLW); MEAN HIGHER HIGH WATER (MHHW).

2) CONTROL BASED ON LAMBERT GRID SOUTH ZONE. ALL COORDINATES OF P.I.'S ARE REFERRED TO ARMY AND DISTANCES ARE REFERRED TO GROUND. ALL ANGLES FIELD CHECKED.

PLAN

SCALE

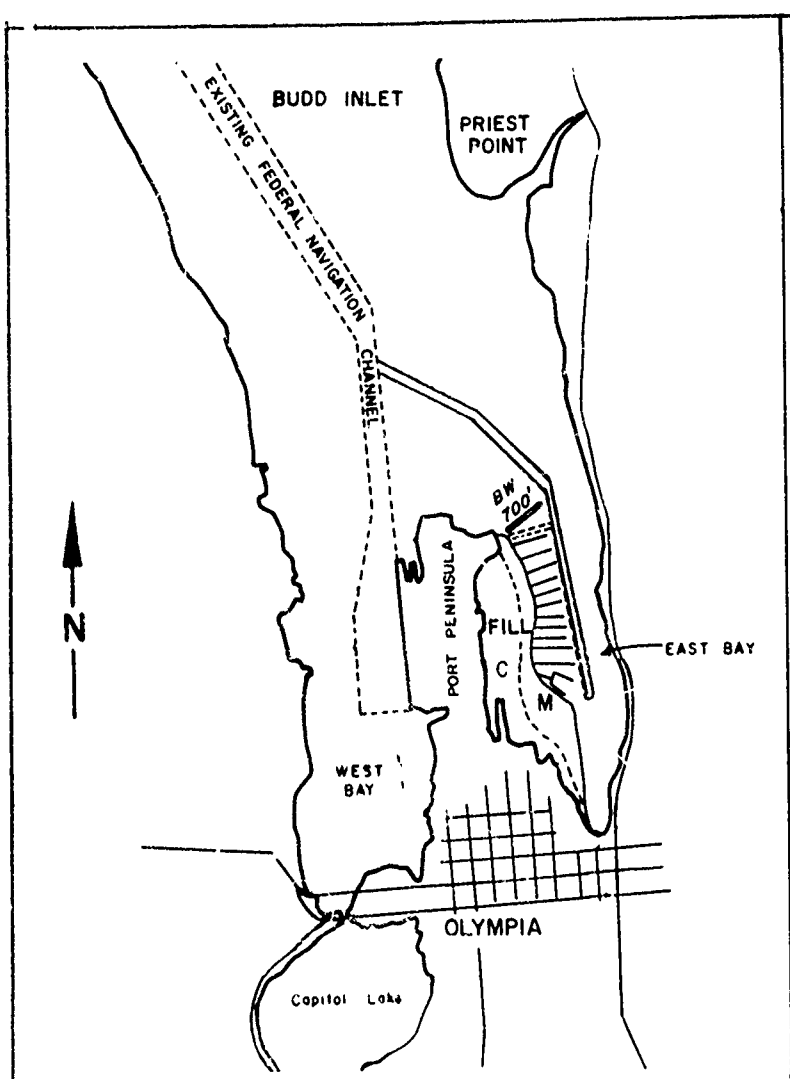
200' 0 200 400'

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

EAST BAY MARINA
OLYMPIA HARBOR, WASHINGTON

PLAN AND TYPICAL SECTIONS

DESIGNED	DRAWN	FILE NO	DATE	PLATE
				2-b
BOOK	CHK		SHEET	

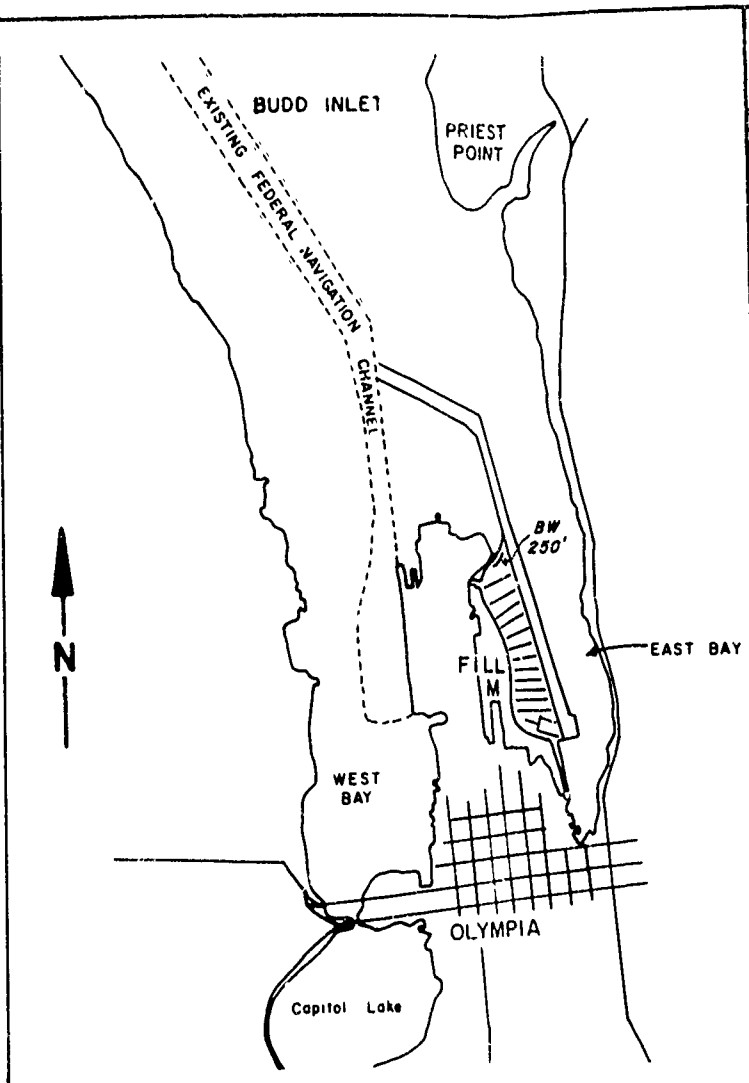


PLAN 4a

800 - BOAT CAPACITY

M = 26.6 ac

C = 24.2 ac

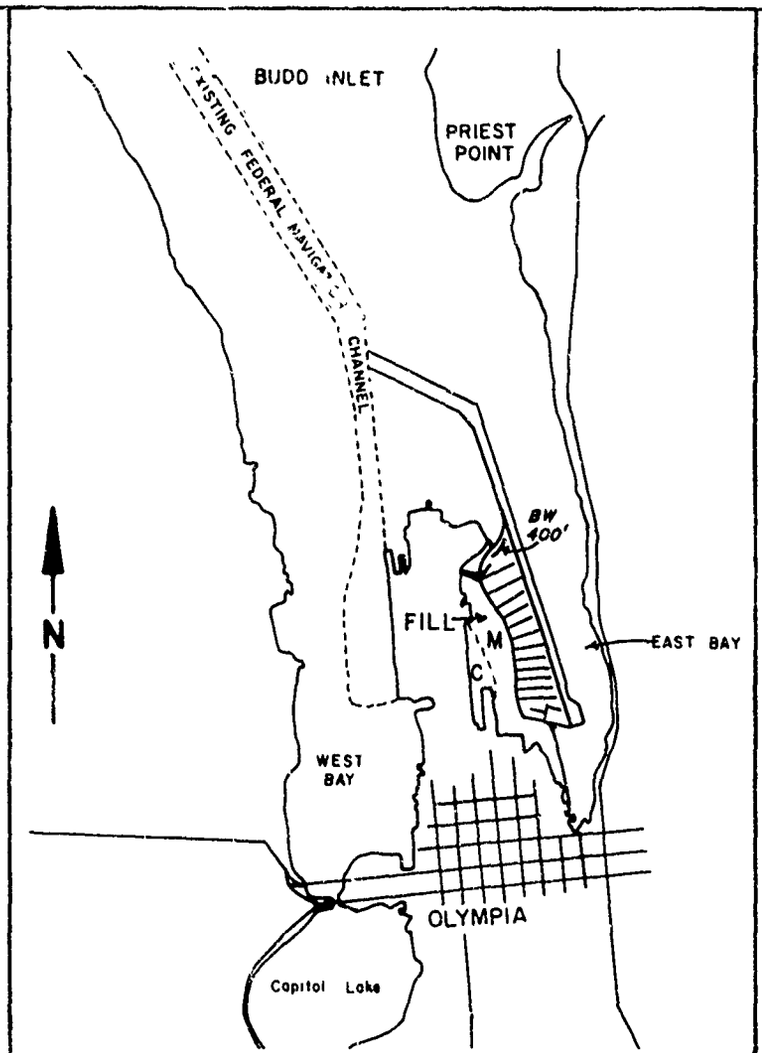


PLAN 4b

800 - BOAT CAPACITY

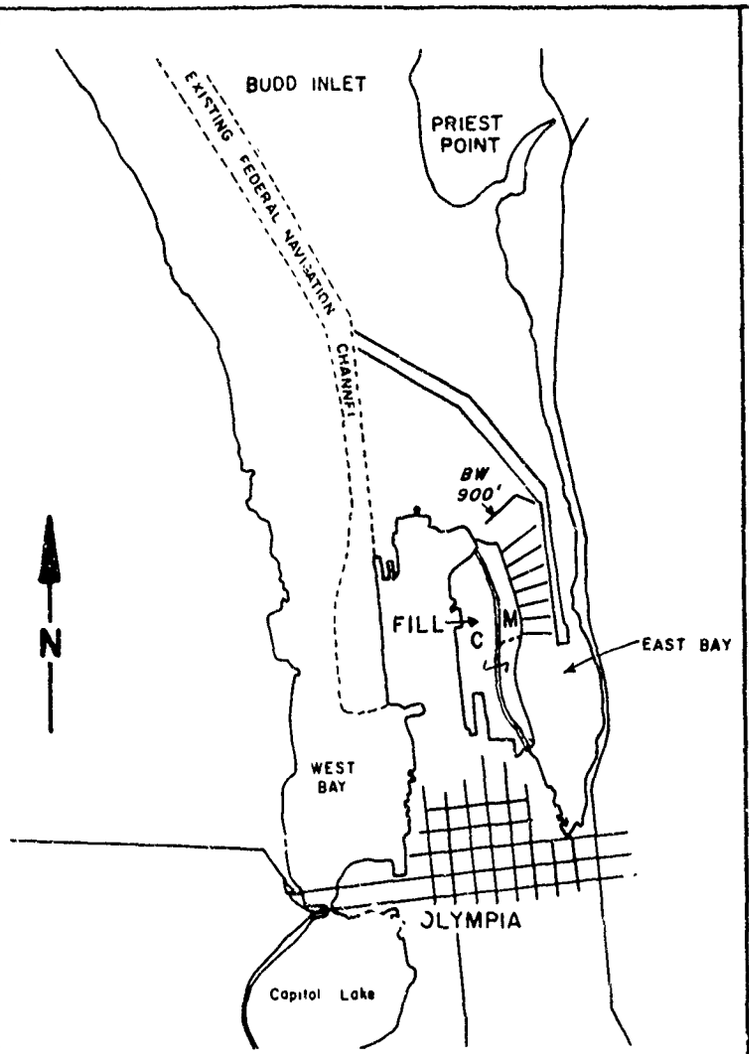
M = 27 ac

C = 0.0 ac



PLAN 4c — 800 - BOAT CAPACITY

M = 26.6 ac — C = 7.4 ac



PLAN 4d — 500 - BOAT CAPACITY

M = 26 ac — C = 22 ac

LEGEND:

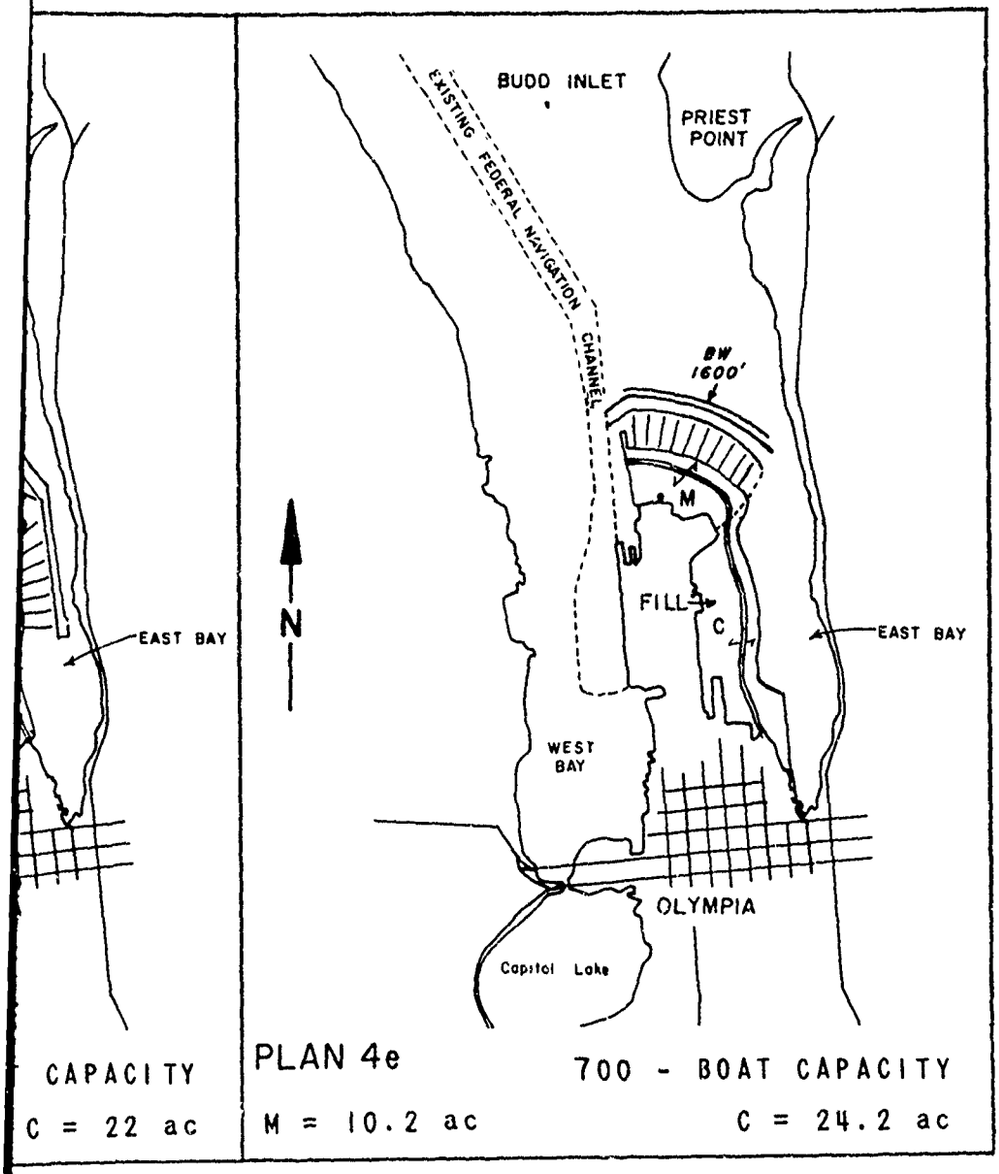
BW - FLOATING BREAKWATER

M - FILL AREA, MARINA SUPPORT SERVICES

C - FILL AREA, CARGO HANDLING ACTIVITIES

SCALE: 2000' 0 1000' 2000'

2



CAPACITY
C = 22 ac

PLAN 4e
M = 10.2 ac

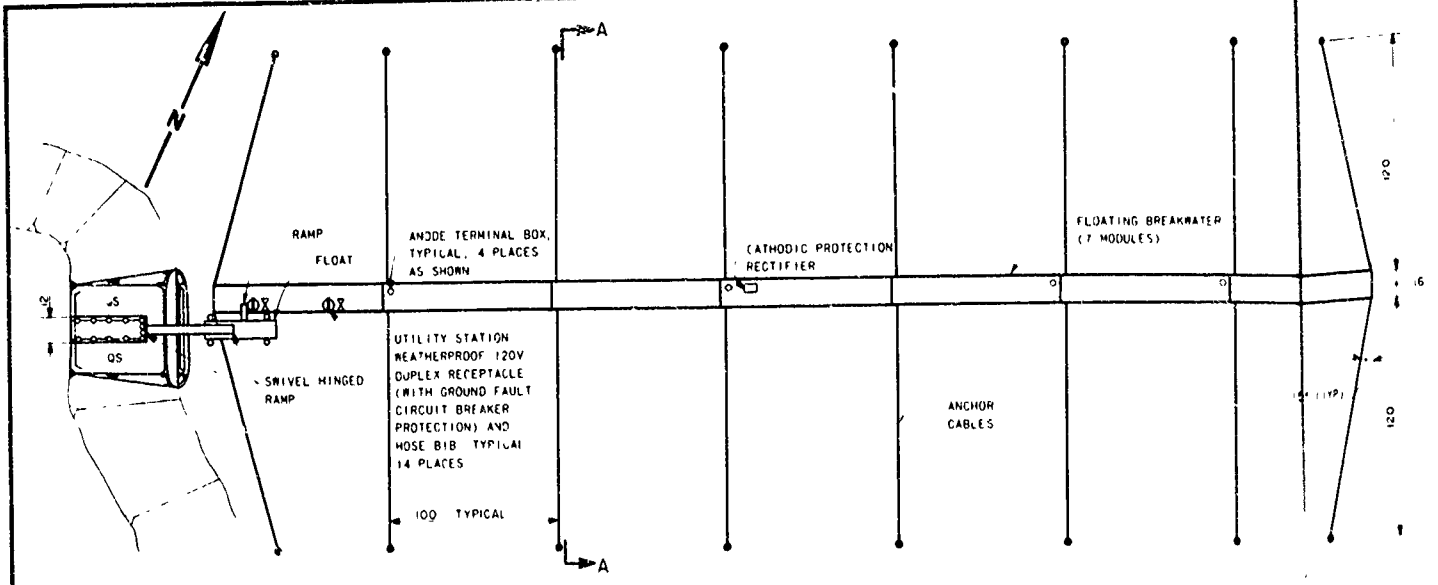
700 - BOAT CAPACITY
C = 24.2 ac

RT SERVICES
NG ACTIVITIES

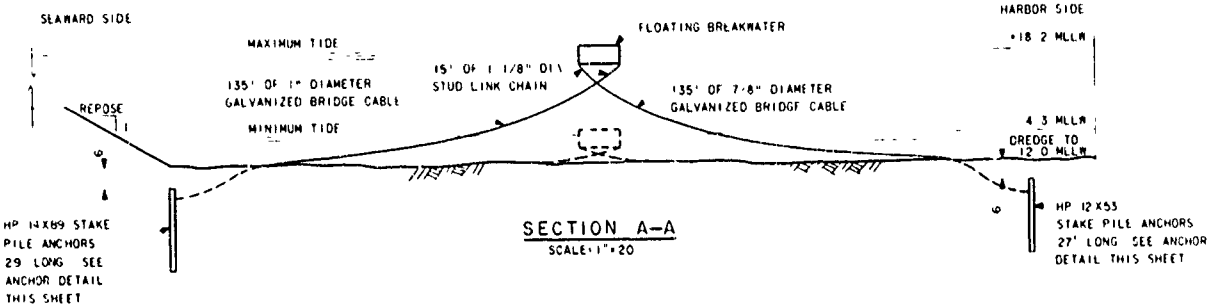
ALTERNATIVE PLANS

EAST BAY SITE

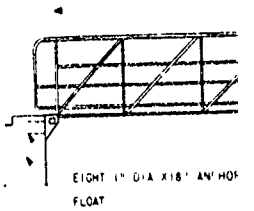
PLATE 2c



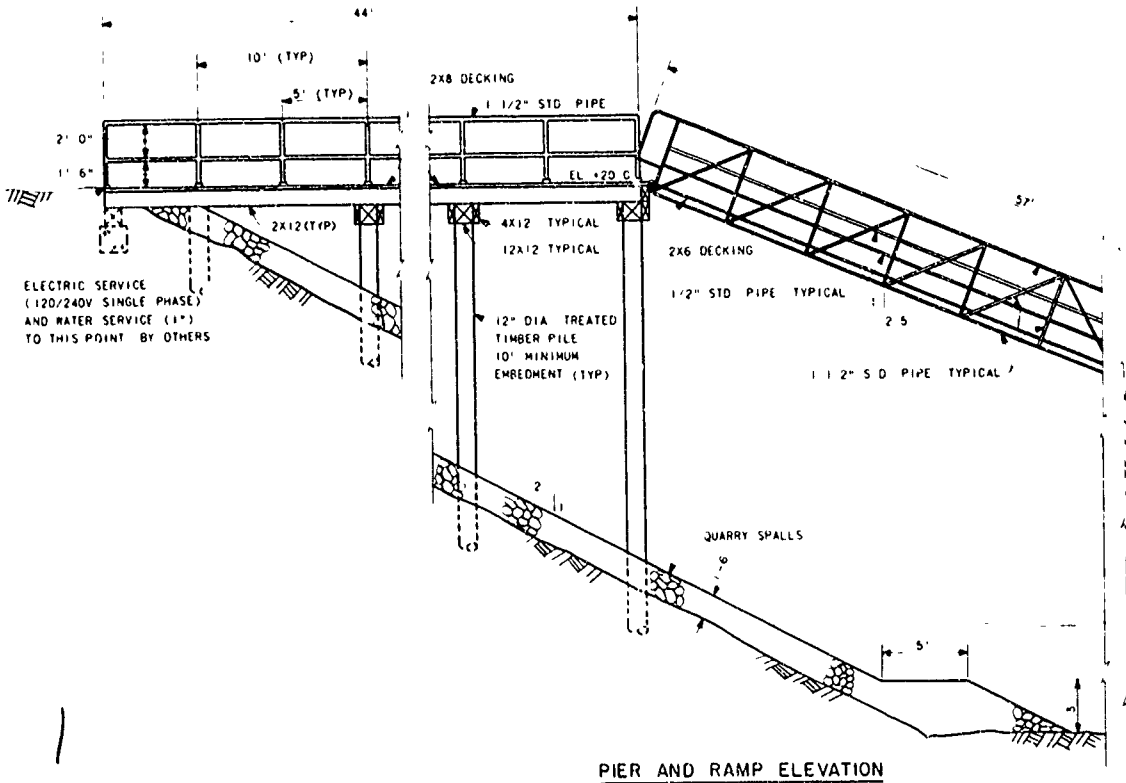
PLAN
SCALE: 1" = 40'

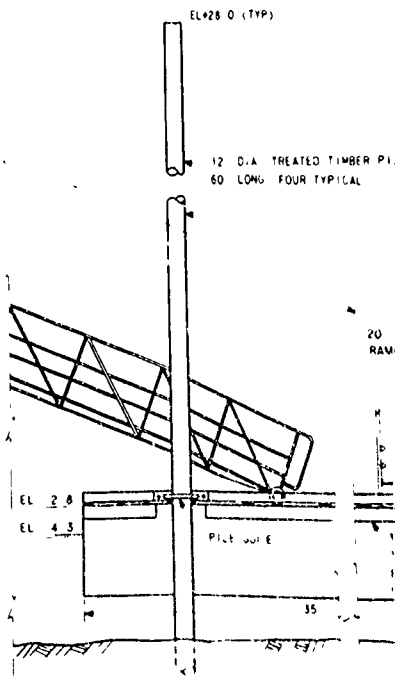


SECTION A–A
SCALE: 1" = 20'

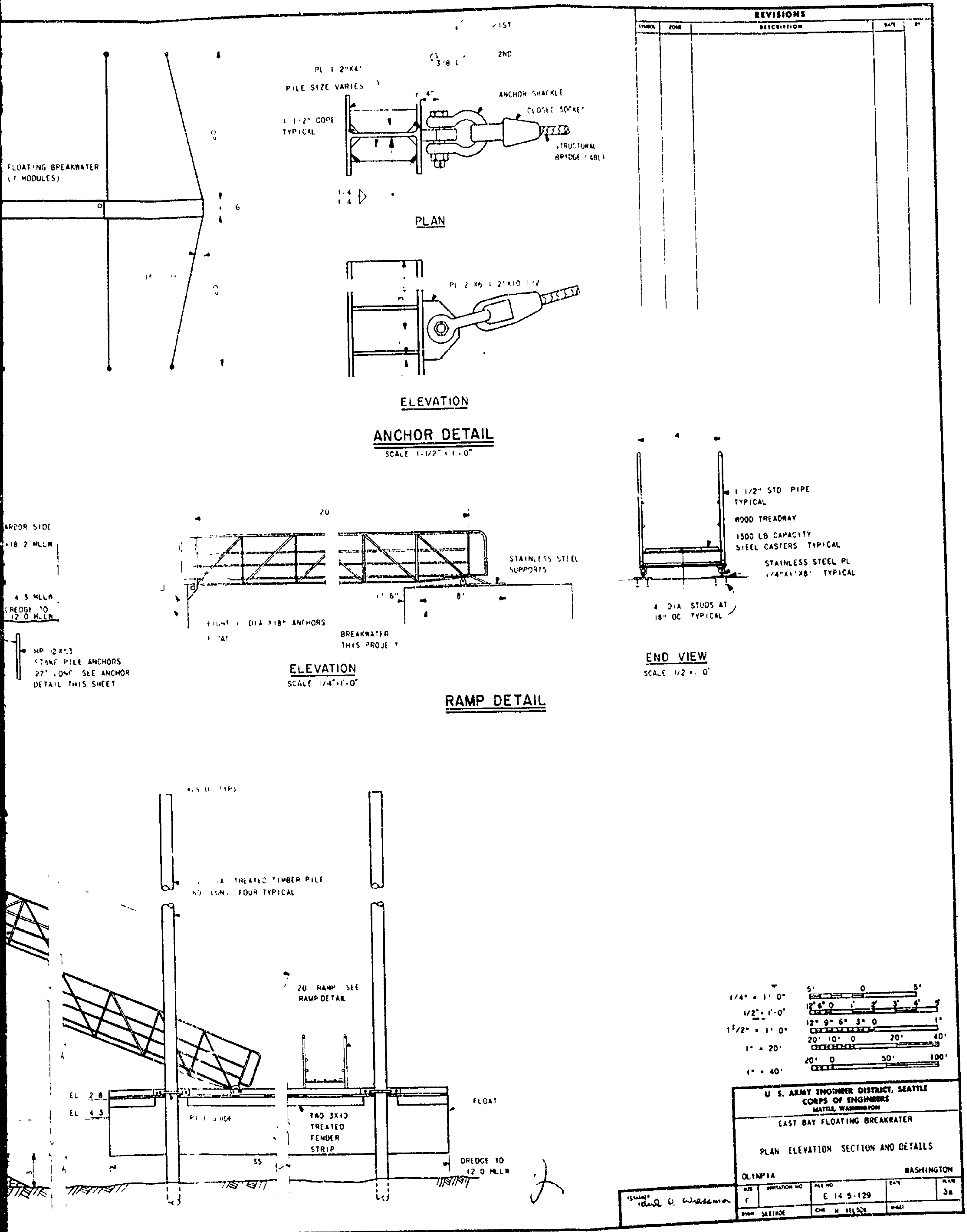


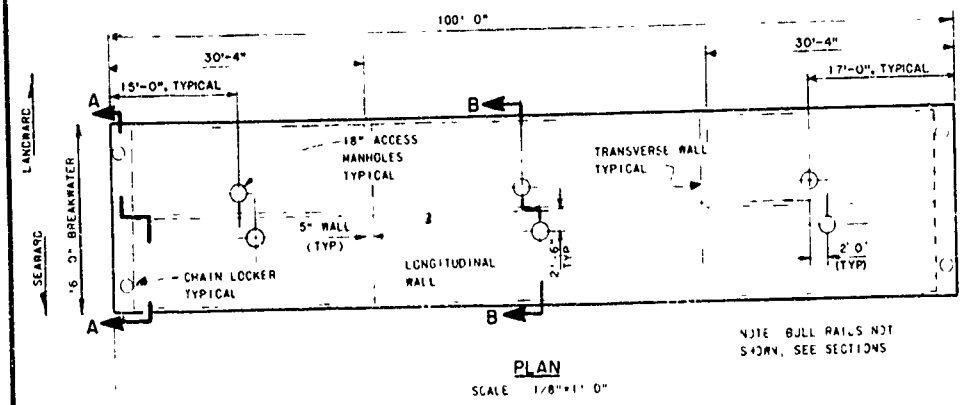
ELEV
SCALE





PIER AND RAMP ELEVATION
SCALE: 1/4" = 1'-0"

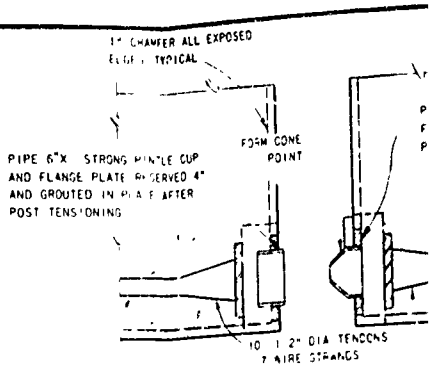

REVISIONS
SYMBOL
ZONE
DESCRIPTION
DATE
BY
FLOATING BREAKWATER
(7 MODULES)
1ST
2ND
PL 1 2"X4'
PILE SIZE VARIES
1 1/2" COPE
TYPICAL
ANCHOR SHACKLE
CLOSED SOCKET
STRUCTURAL
BRIDGE CABLE
PLAN
PL 2 X6 1 2'X10 1/2
ELEVATION
ANCHOR DETAIL
SCALE 1-1/2" = 1'-0"
HARBOR SIDE
+18 2 MLLW
4 3 MLLW
DREDGE TO
12 0 MLLW
HP 12X53
STAKE PILE ANCHORS
27' LONG SEE ANCHOR
DETAIL THIS SHEET
20
STAINLESS STEEL
SUPPORTS
1' 6"
8'
EIGHT 1 DIA X18" ANCHORS
BREAKWATER
THIS PROJECT
ELEVATION
SCALE 1/4"=1'-0"
4
1 1/2" STD PIPE
TYPICAL
WOOD TREADWAY
1500 LB CAPACITY
STEEL CASTERS TYPICAL
STAINLESS STEEL PL
1/4"X1'X8' TYPICAL
4 DIA STUDS AT
18" OC TYPICAL
END VIEW
SCALE 1/2"=1'-0"
RAMP DETAIL
TREATED TIMBER PILE
LONG FOUR TYPICAL
20 RAMP SEE
RAMP DETAIL
EL 2.8
EL 4.3
FLOAT
TWO 3X10
TREATED
FENDER
STRIP
35
DREDGE TO
12 0 MLLW
1/4" = 1' 0"
1/2" = 1'-0"
1 1/2" = 1' 0"
1" = 20'
1" = 40'
U S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON
EAST BAY FLOATING BREAKWATER
PLAN ELEVATION SECTION AND DETAILS
OLYMPIA
WASHINGTON
E 14 5-129
3a



PLAN

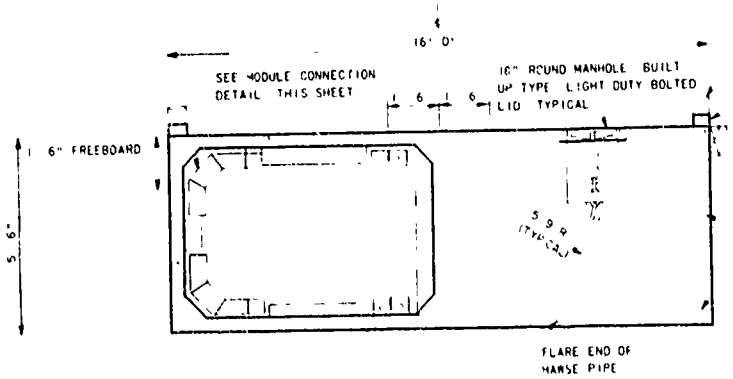
SCALE 1/8"=1' 0"

NOTE BULL RAILS NOT SHOWN, SEE SECTIONS



SECTIONAL END VIEW AT PRESTRES

SCALE 1 1/2"=1' 0"



6 x 6 TREATED BULL RAIL BOTH SIDES

4 x 6 1' 0" TREATED WOOD AT 5' 0" TYPICAL

2 3 x 10 TREATED FENDER STRIP LANDWARD SIDE ONLY

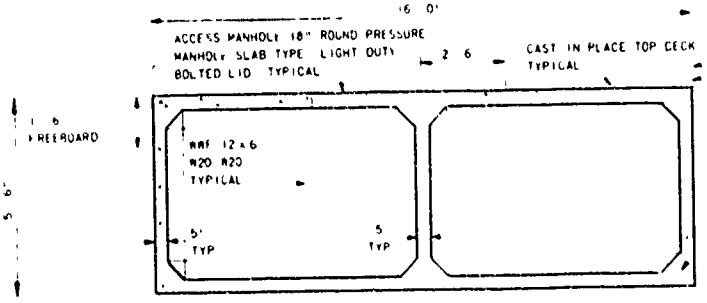
WS

WWF 12 x 6 x W20/W20

POST TENSION DUCTS (6) WITH 10 1/2" DIA TENDONS 7 WIRE STRANDS

SECTION A-A

SCALE 1 2 1 0



6 x 6 TREATED BULL RAIL BOTH SIDES

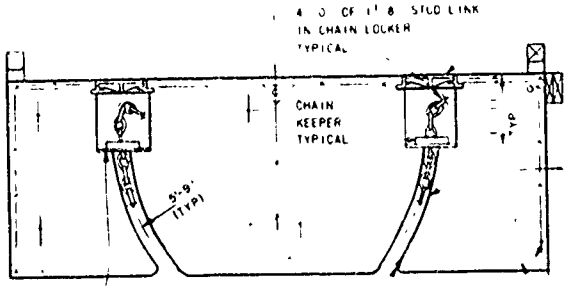
4 x 6 1' 0" TREATED WOOD AT 5' 0" TYPICAL

WS 2 3 x 10 TREATED FENDER STRIP LANDWARD SIDE ONLY

PL 7 TENSION DUCTS (6) WITH 10 1/2 D A TENDONS 7 WIRE STRANDS

SECTION B-B

SCALE 1 2"=1' 0

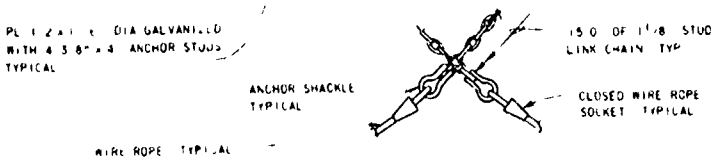


18" ROUND MANHOLE BUILT UP TYPE LIGHT DUTY BOLTED LID TYPICAL

HAWSE PIPE 6" PE 6 X STRONG TYPICAL

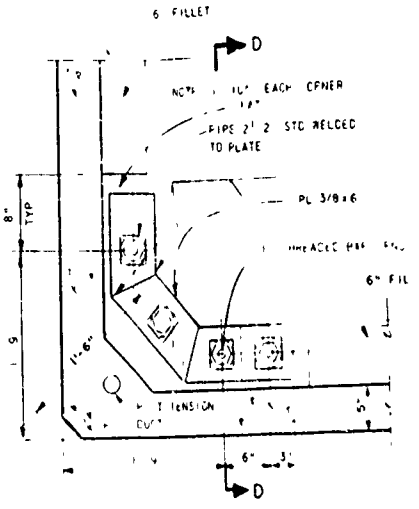
POST TENSION DUCTS (6) WITH 10 1 2 DIA TENDONS 7 WIRE STRANDS TYPICAL

WWF 7 x 6 W7 W7 TYPICAL THROUGHOUT



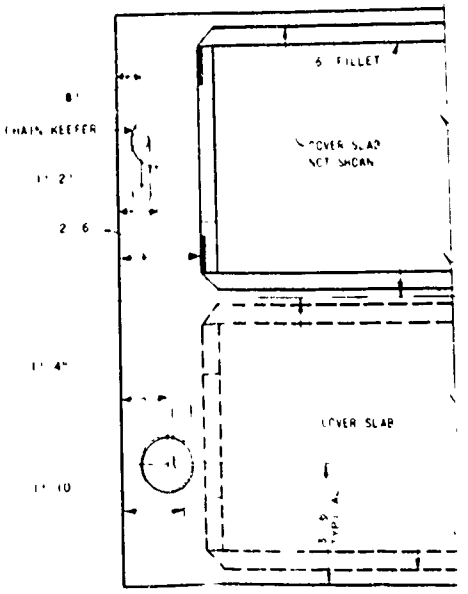
ANCHOR CONNECTION DETAIL

SCALE 1 2



MODULE CONNECTION DETAIL

SCALE 1' 2"=1' 0



PARTIAL PLAN

SCALE 1

PIPE 5" x STRONG PINTLE AND FLANGE PLATE GROUTED IN PLACE AFTER POST TENSIONING

6 (TYP.)

NOTE: TYPICAL EACH CORNER & AT CENTER TOP & BOTTOM

GROUT

MODULE CONNECTION AND GROUTING DIAGRAM

NOT TO SCALE

ESTRESS TENDONS

6 FILLET

PL 3 [illegible] TYPICAL

THREADED BAR TENDON

PLATE ANCHOR PL 1 1/4 x 5 x 5 1/2 TYPICAL

PIPE 2 1/2 STD WELDED TO PLATE

SECTION D

TAIL

BREAK

1. ALIGN MODULES A
2. ALIGN MODULES A [illegible] ONE ALONG
3. INSTALL AND INF [illegible] UPPER CORNERS E GASKETS ARE COM
4. UNSEAL BOTTOM [illegible] BOTTOM CORNER
5. ATTACH JACKET [illegible] HANG
6. THERMIT EXPANSIO [illegible]
7. RESTRESS THREAD [illegible]
8. POSITION BREAKW [illegible] PIPES ALIGNED

GENERAL NOTES

MODULES ARE CONNECTED WITH 4 THREADED TENDONS AT EACH CORNER AND 4 AT THE LONGITUDINAL DIAPHRAGM TOP AND BOTTOM

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE WASHINGTON

EAST BAY FLOATING BREAKWATER

PLANS SECTIONS AND DETAILS

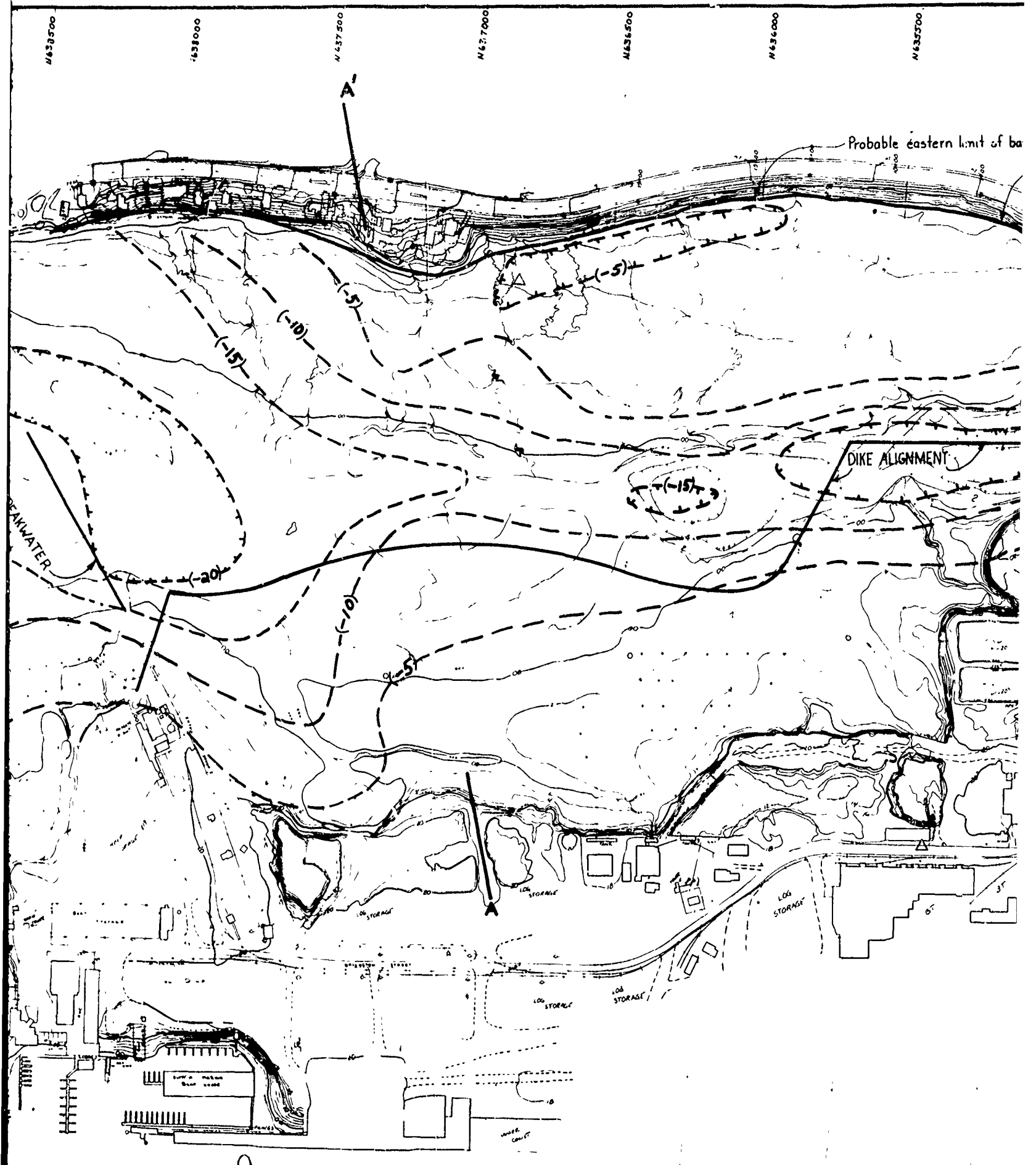
WASHINGTON

DES NO E 73 1 12

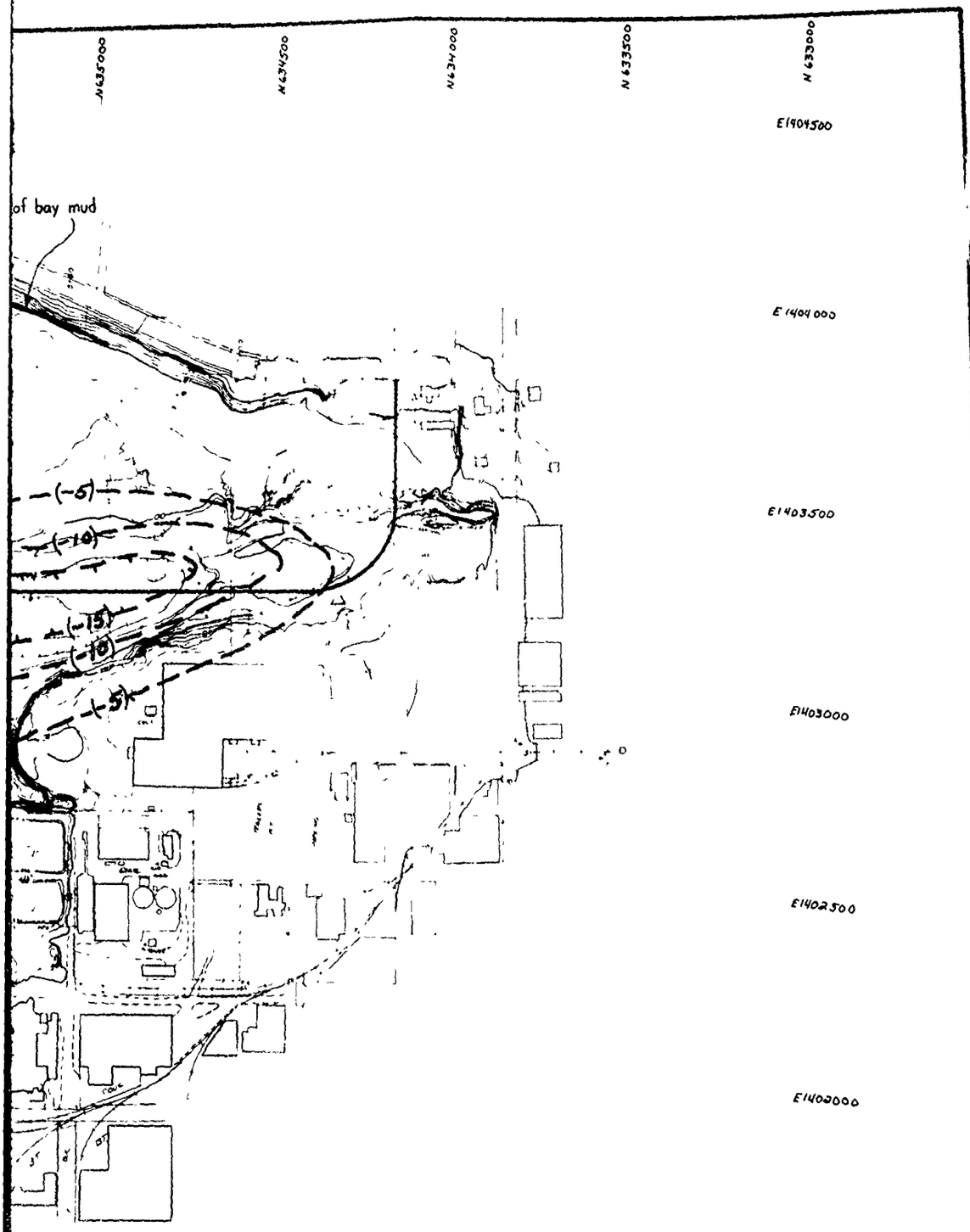
DATE

SHEET 31

N640300
N640000
N639300
N639000
N
(-20)
(-30)
(-15)
(-5)
(-10)
(-25)
BREAKW
10
20
30


N638500
N638000
N637500
N637000
N636500
N636000
N635500
A
A'
Probable eastern limit of ba
(-5)
(-10)
(-15)
(-20)
DIKE ALIGNMENT
BREAKWATER
LOG STORAGE

2



NOTE:
All contour elevations are in feet below MLLW.

200 0 200 400 600 800 1000 feet
SCALE

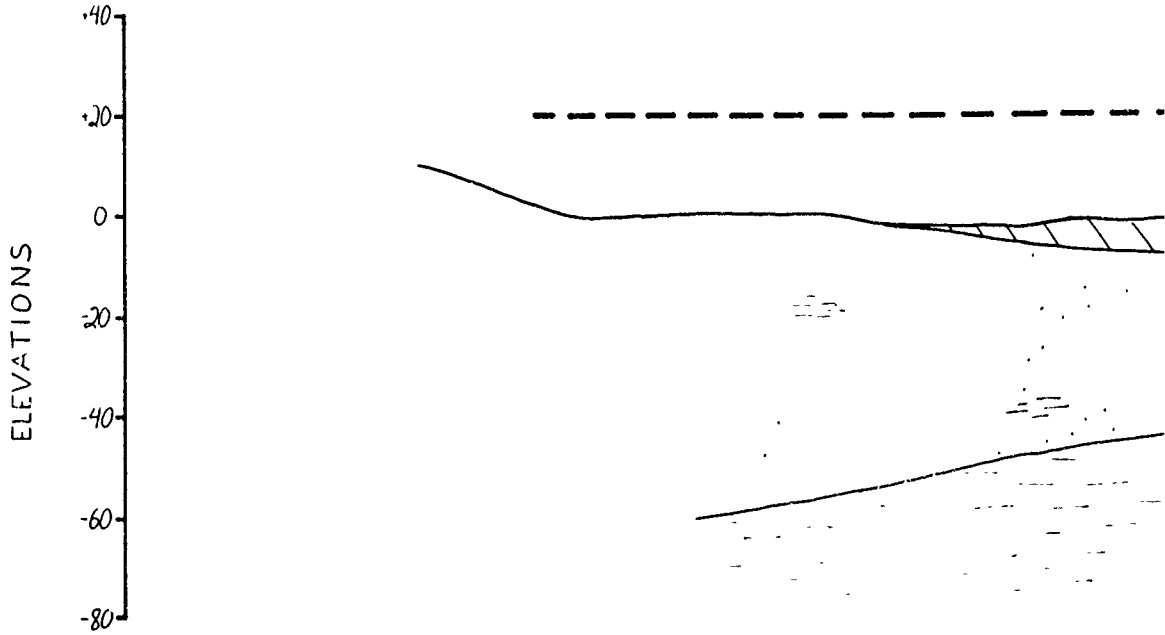
3

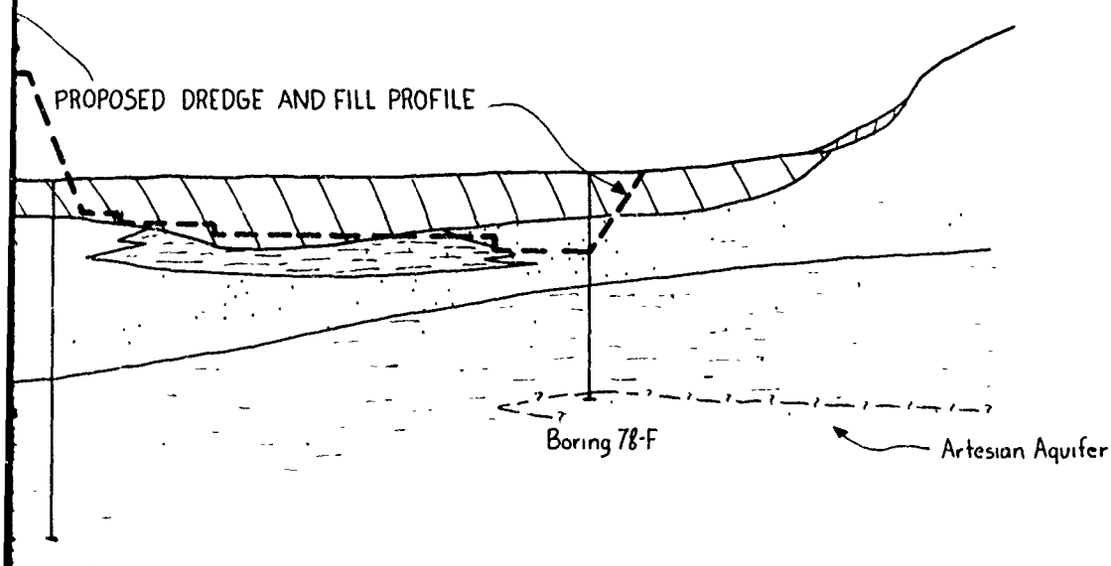
Dike Align Rev 28 May 79

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

OLYMPIA HARBOR
WASHINGTON
CONTOURS ON THE BOTTOM OF THE BAY MUDS

MEL	INVITATION NO	FILE NO	DATE	PLATE
			24 Mar 79	4
DSGN MCBANE		CHK GALSTER	SHEET	


+40
+20
0
-20
-40
-60
-80
ELEVATIONS



LEGEND

Alluvial Fa

Recent Bay

Silt

Sand

SECTION A-A'

View North

rizontal Scale :

50' 0 100' 200'

2

U. S.

OLY

GI

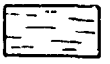
SIZE | INVITATIO

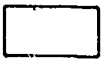
MCBAN

LEGEND


Alluvial Fan Deposit


Recent Bay Muds


Silt

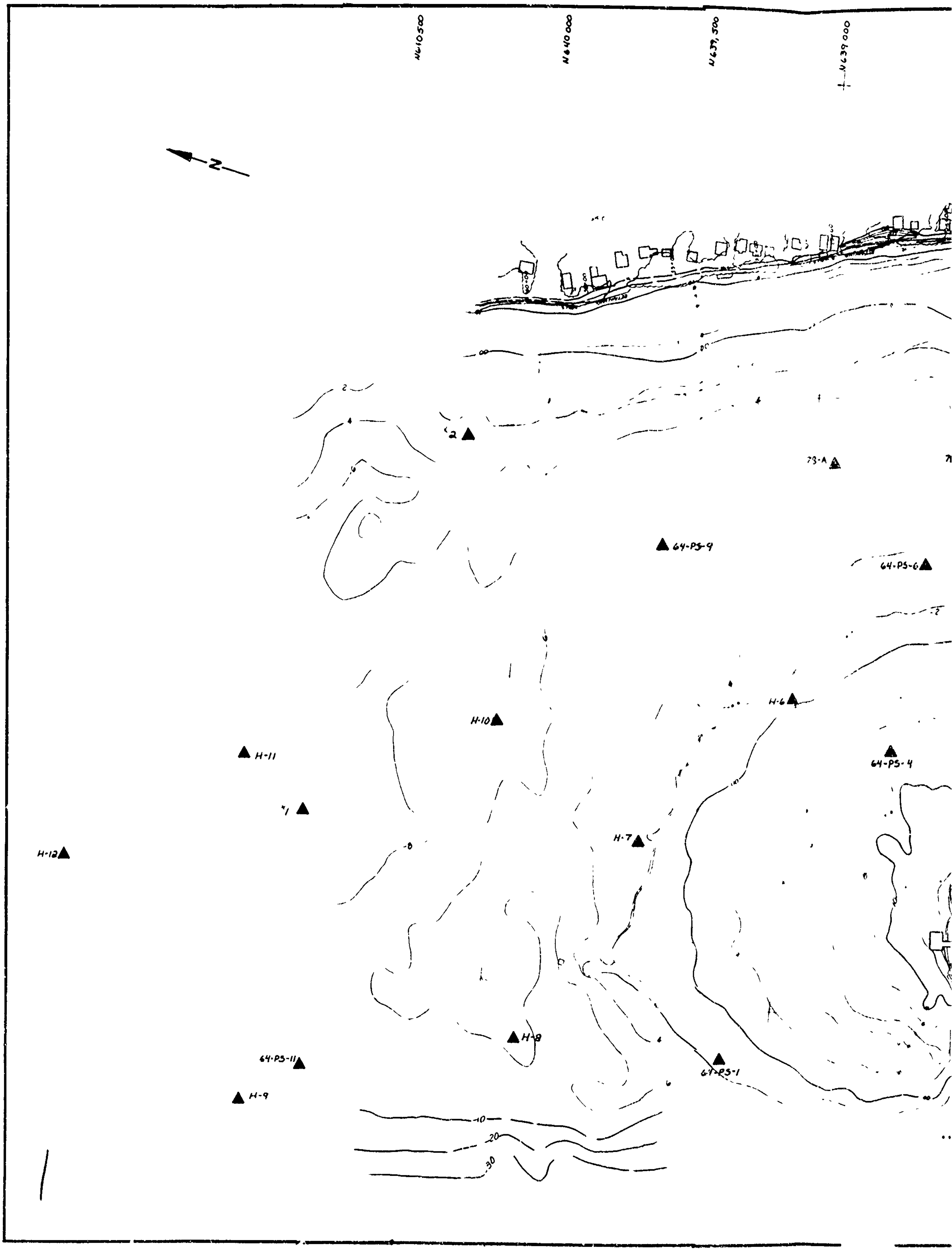

Sand

3

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

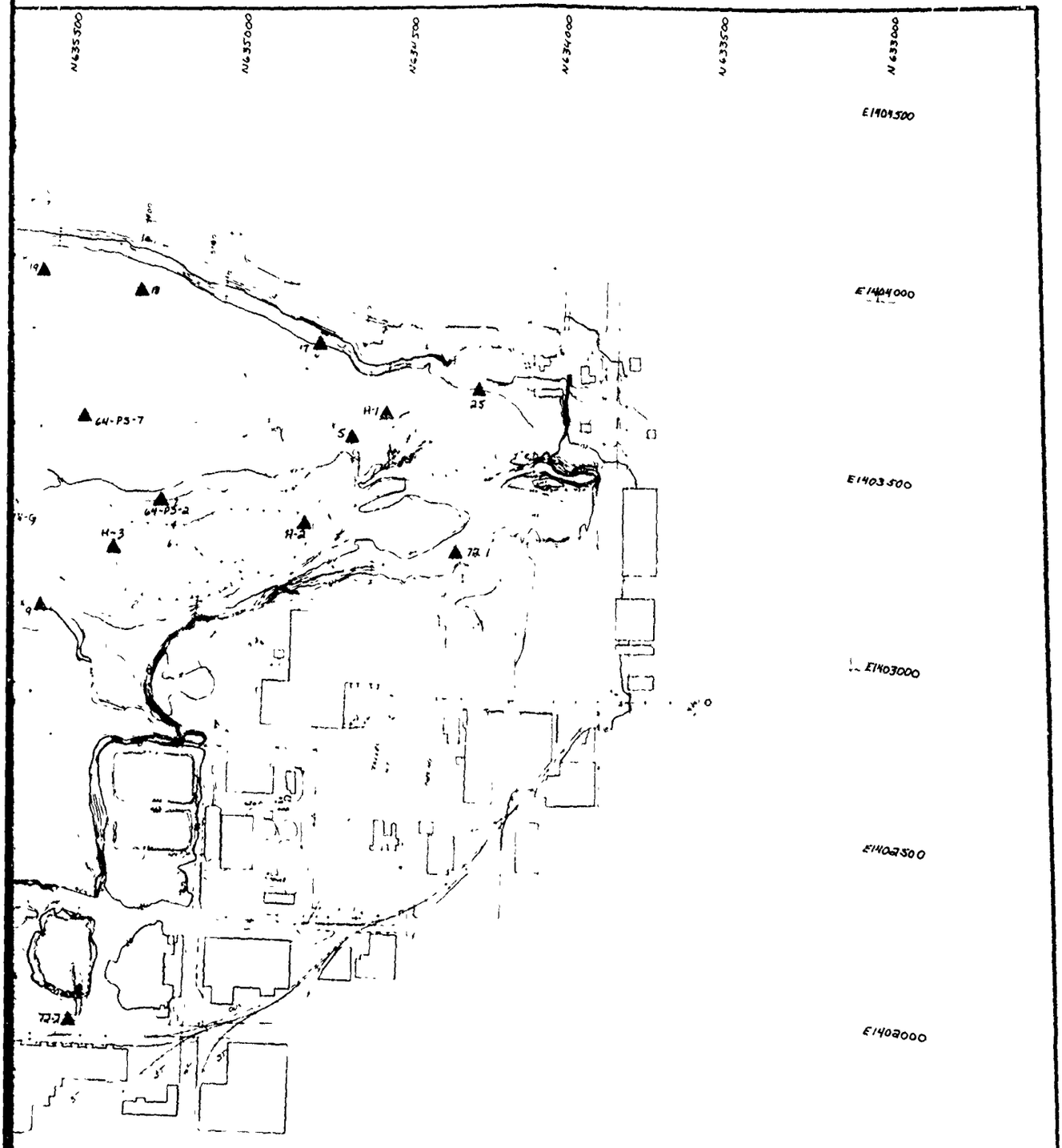
OLYMPIA HARBOR
WASHINGTON
GEOLOGIC SECTION

SIZE	INVITATION NO	FILE NO.	DATE	PLATE
			27 MAR 61	5


N640500
N640000
N639,500
N639000
N
2
73-A
64-PS-9
64-PS-6
H-6
H-10
H-11
64-PS-4
1
H-7
H-12
H-8
64-PS-11
64-PS-1
H-9
10
20
30


N638500
N638000
N637500
N637000
N636500
N636000
N635500
A'
A
78-A
78-B
78-C
78-D
78-E
78-F
78-G
78-H
78-I
78-K
78-L
64-PS-1
64-PS-2
64-PS-3
64-PS-4
64-PS-5
64-PS-7
64-PS-8
H-1
H-2
H-3
H-4
H-5
LOG STORAGE

2



NOTE

1) All boring locations are approximate
2) Borings 1 through 10 (Dames & Moore, 1967) are located in the hills to the east and are not shown on this map

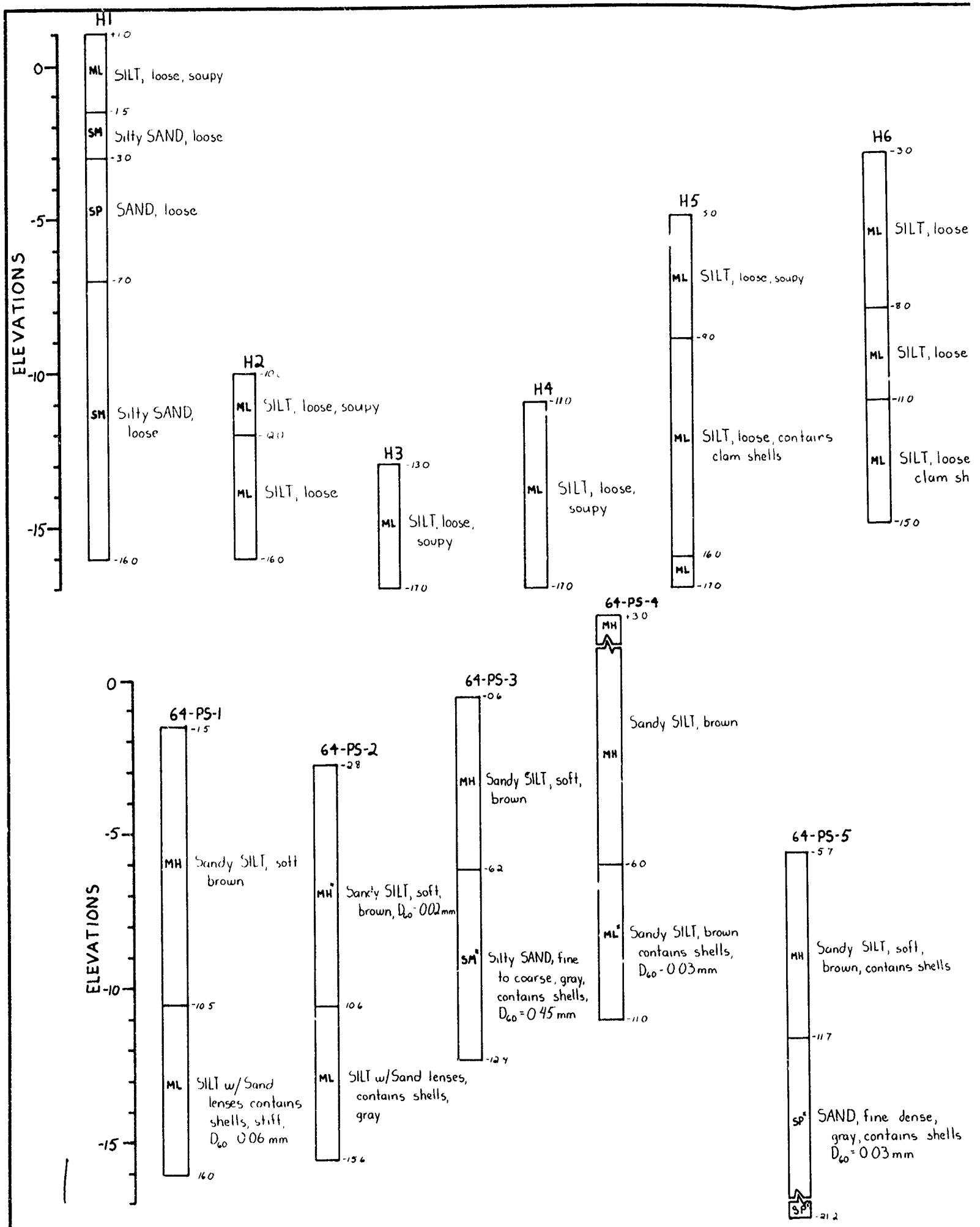
200 0 200 400 600 800 1000

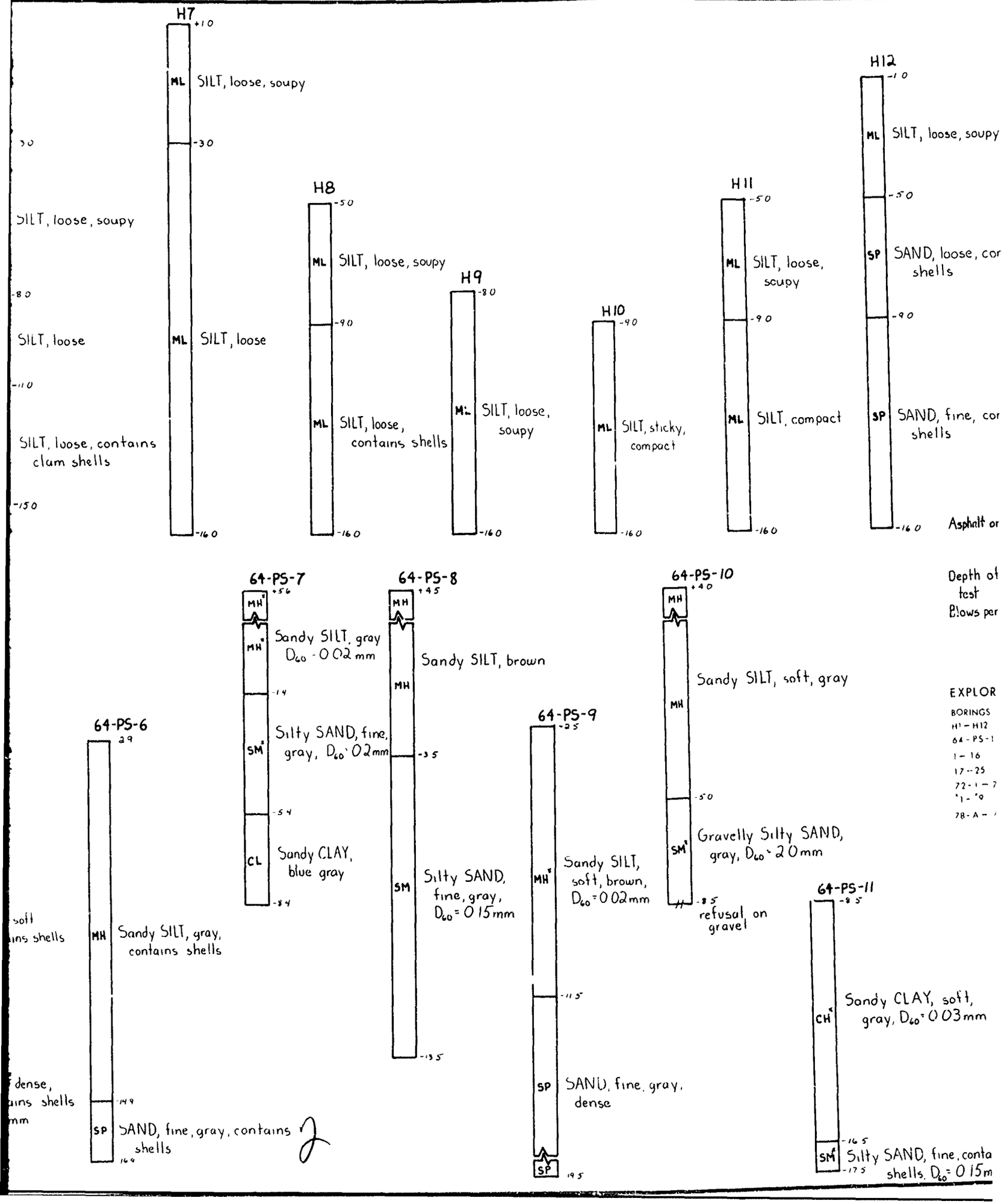
SCALE

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

OLYMPIA HARBOR
WASHINGTON
BORING LOCATIONS

SIZE	INVITATION NO	FILE NO	DATE	PLATE
			22 Mar 79	6
DSGN MCBANE		CHK GALSTER	SHEET	


H1
+1.0
ML SILT, loose, soupy
-1.5
SM Silty SAND, loose
-3.0
SP SAND, loose
-7.0
SM Silty SAND, loose
-16.0
H2
-10.0
ML SILT, loose, soupy
-12.0
ML SILT, loose
-16.0
H3
-13.0
ML SILT, loose, soupy
-17.0
H4
-11.0
ML SILT, loose, soupy
-17.0
H5
5.0
ML SILT, loose, soupy
-9.0
ML SILT, loose, contains clam shells
16.0
ML
-17.0
H6
-3.0
ML SILT, loose
-8.0
ML SILT, loose
-11.0
ML SILT, loose clam sh
-15.0
ELEVATIONS
0
-5
-10
-15
64-PS-1
-1.5
MH Sandy SILT, soft brown
-10.5
ML SILT w/ Sand lenses contains shells, stiff, D_{60} 0.06 mm
16.0
64-PS-2
-2.8
MH* Sandy SILT, soft, brown, D_{60} = .002mm
10.6
ML SILT w/Sand lenses, contains shells, gray
-15.6
64-PS-3
-0.6
MH Sandy SILT, soft, brown
-6.2
SM* Silty SAND, fine to coarse, gray, contains shells, D_{60} = 0.45 mm
-12.4
64-PS-4
+3.0
MH
Sandy SILT, brown
MH
-6.0
ML* Sandy SILT, brown contains shells, D_{60} - 0.03mm
-11.0
64-PS-5
-5.7
MH Sandy SILT, soft, brown, contains shells
-11.7
SP* SAND, fine dense, gray, contains shells D_{60} = 0.03mm
SP*
-21.2


H7
+10
ML SILT, loose, soupy
-30
ML SILT, loose
-160
-30
SILT, loose, soupy
-80
SILT, loose
-110
SILT, loose, contains clam shells
-150
H8
-50
ML SILT, loose, soupy
-90
ML SILT, loose, contains shells
-160
H9
-80
ML SILT, loose, soupy
-160
H10
-90
ML SILT, sticky, compact
-160
H11
-50
ML SILT, loose, soupy
-90
ML SILT, compact
-160
H12
-10
ML SILT, loose, soupy
-50
SP SAND, loose, cor shells
-90
SP SAND, fine, cor shells
-160
Asphalt or
Depth of test
Blows per
EXPLOR
BORINGS
H1 - H12
64-PS-1
1 - 16
17 - 25
72-1 - 7
*1 - *9
78-A -
64-PS-6
29
soft
ins shells
MH Sandy SILT, gray, contains shells
dense,
ins shells
mm
-149
SP SAND, fine, gray, contains shells
-169
64-PS-7
+56
MH*
MH* Sandy SILT, gray D60 = 0.02 mm
-14
SM* Silty SAND, fine, gray, D60 = 0.2 mm
-54
CL Sandy CLAY, blue gray
-84
64-PS-8
+45
MH
Sandy SILT, brown
MH
-35
SM Silty SAND, fine, gray, D60 = 0.15 mm
-135
64-PS-9
-25
MH* Sandy SILT, soft, brown, D60 = 0.02 mm
-115
SP SAND, fine, gray, dense
SP*
-195
64-PS-10
+40
MH
Sandy SILT, soft, gray
MH
-50
SM* Gravelly Silty SAND, gray, D60 = 2.0 mm
-85
refusal on gravel
64-PS-11
-85
CH* Sandy CLAY, soft, gray, D60 = 0.03 mm
-165
SM* Silty SAND, fine, conta shells, D60 = 0.15m
-175

H12

-1.0 ML SILT, loose, soupy

-5.0 SP SAND, loose, contains shells

-9.0 SP SAND, fine, contains shells

-16.0

H11

-5.0 ML SILT, loose, soupy

-9.0 ML SILT, compact

-16.0

...0

...dy SILT, soft, gray

...velly Silty SAND, ...ay, D_{60} = 20mm

...usal, on ...avel

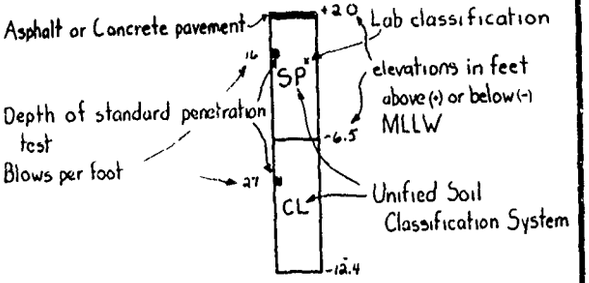
64-PS-11

-8.5 CH Sandy CLAY, soft, gray, D_{60} = 0.03mm

-16.5 SM Silty SAND, fine, contains shells, D_{60} = 0.15mm

-17.3

LEGEND:



EXPLORATION SUMMARY

BORINGS	YEAR	
H1 - H12	1948	C O E
64 PS-1 - 64-PS-11	1964	D&M
1 - 16	1967	D&M
17 - 25	1968	D&M
72-1 - 72-2	1972	D&M
1 - 9	1973	D&M
78-A - 78-L	1978	D&M

ALL EXPLORATIONS BY
CORPS OF ENGINEERS
DAMES AND MOORE

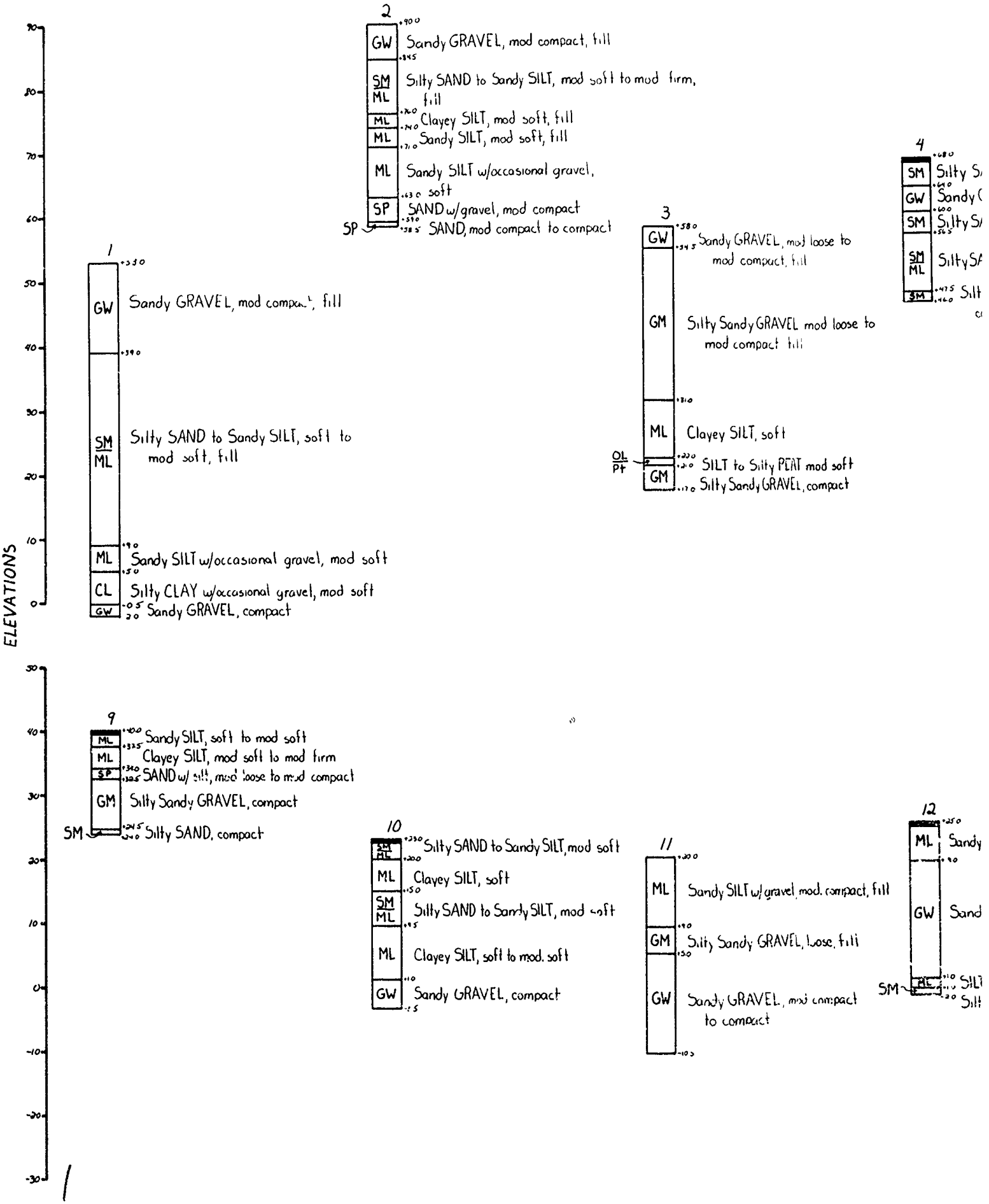
Refer to PLATE 6 for Boring Locations

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

OLYMPIA HARBOR
WASHINGTON
BORING LOGS

SIZE	INVITATION NO	FILE NO	DATE	PLATE
			19 Mar 1979	7
DSGN MCBANE		CHK GALSTER	SHEET	

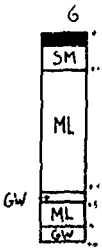
3


ELEVATIONS
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
1
+350
GW
Sandy GRAVEL, mod compact, fill
+99 0
SM ML
Silty SAND to Sandy SILT, soft to mod soft, fill
+9 0
ML
Sandy SILT w/occasional gravel, mod soft
+5 0
CL
Silty CLAY w/occasional gravel, mod soft
GW
+0 5
-2 0
Sandy GRAVEL, compact
2
+900
GW
Sandy GRAVEL, mod compact, fill
+84 5
SM ML
Silty SAND to Sandy SILT, mod soft to mod firm, fill
+76 0
ML
Clayey SILT, mod soft, fill
+74 0
ML
Sandy SILT, mod soft, fill
+71 0
ML
Sandy SILT w/occasional gravel, soft
+63 0
SP
SAND w/gravel, mod compact
+59 0
SP
+58 5
SAND, mod compact to compact
3
+58 0
GW
+34 5
Sandy GRAVEL, mod loose to mod compact, fill
GM
Silty Sandy GRAVEL mod loose to mod compact fill
+31 0
ML
Clayey SILT, soft
OL Pt
+22 0
+2 0
SILT to Silty PEAT mod soft
GM
+1 7 0
Silty Sandy GRAVEL, compact
4
+68 0
SM
Silty S
+64 0
GW
Sandy
+60 0
SM
Silty S
+56 5
SM ML
Silty SA
+47 5
SM
+46 0
Silt
9
+100
ML
+32 5
Sandy SILT, soft to mod soft
ML
Clayey SILT, mod soft to mod firm
+34 0
SP
+32 5
SAND w/ silt, mod loose to mod compact
GM
Silty Sandy GRAVEL, compact
+24 5
SM
+24 0
Silty SAND, compact
10
+23 0
SM ML
+20 0
Silty SAND to Sandy SILT, mod soft
ML
Clayey SILT, soft
+5 0
SM ML
Silty SAND to Sandy SILT, mod soft
+9 5
ML
Clayey SILT, soft to mod. soft
+1 0
GW
Sandy GRAVEL, compact
-2 5
11
+20 0
ML
Sandy SILT w/ gravel, mod. compact, fill
+9 0
GM
Silty Sandy GRAVEL, Loose, fill
+5 0
GW
Sandy GRAVEL, mod compact to compact
-10 5
12
+25 0
ML
Sandy
+9 0
GW
Sand
+1 0
ML
SM
SILT
-1 0
-2 0
Silt

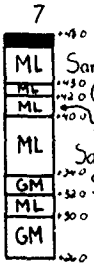
w/occasional gravel, soft
to CLAY, mod soft to mod firm
to Sandy SILT, firm

pact

6



7



ML Sandy SILT w/occasional gravel, soft
ML Clayey SILT, soft
ML Sandy SILT w/occasional gravel, soft
Sandy SILT, soft to mod soft
GM Silty Sandy GRAVEL
ML Sandy SILT w/occasional gravel, soft
GM Silty Sandy GRAVEL compact

8

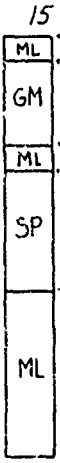
ML Sandy
soft
ML Claye
Sand
mod

hod soft
. compact

RAVEL, compact

14

15



ML Sandy SILT w/gravel and rubble, mod firm, fill
GM Silty Sandy GRAVEL, mod compact, fill
ML Sandy SILT w/gravel, soft
SP SAND, mod compact
ML Clayey SILT to SILT, soft

16

SM Silty
ML Claye
SP SANI

See PLATE 7 for legend.

U. S. AR

OLYM

SIZE | INVITATION NO

DSGN MCBANE

Sandy SILT w/occasional gravel, soft
Clayey SILT, soft
Sandy SILT w/occasional gravel, soft
Sandy SILT, soft to mod. soft
Silty Sandy GRAVEL
Sandy SILT w/occasional gravel, soft
Silty Sandy GRAVEL, compact

8

+450	ML	Sandy SILT w/occasional gravel, mod soft to mod firm
+410	ML	Clayey SILT, mod firm
+335	ML/SM	Sandy SILT to Silty SAND, loose to mod loose
+235		

Sandy SILT w/gravel and rubble, mod firm, fill
Silty Sandy GRAVEL, mod compact, fill
Sandy SILT w/gravel, soft

SAND, mod compact

Clayey SILT to SILT, soft

16

+200	SM	Silty SAND w/gravel, mod compact to compact, fill
+200	ML	Clayey SILT to SILT, soft
-20	SP/SM	SAND w/ sandy silt lenses, mod. loose
-80		

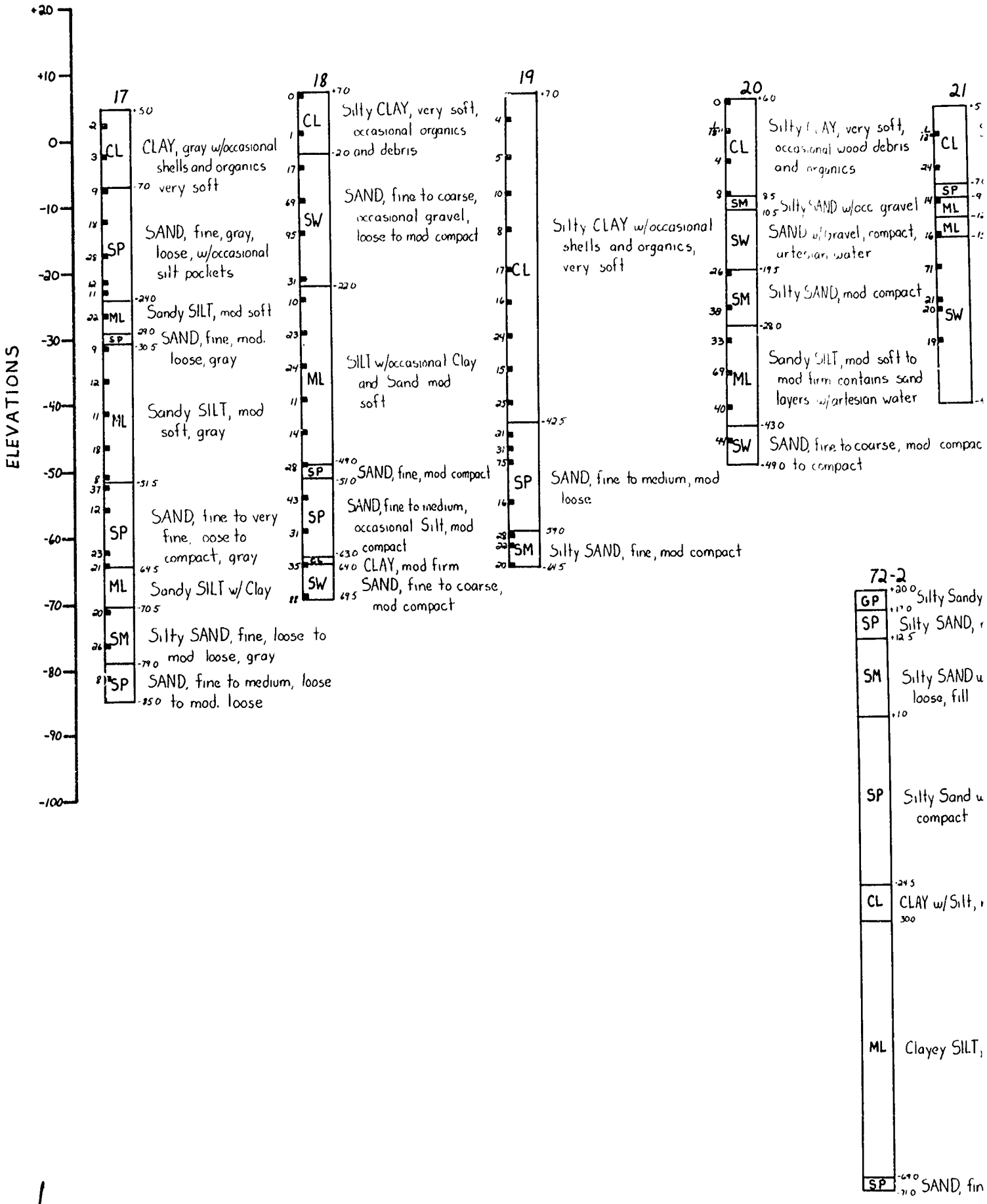
legend.

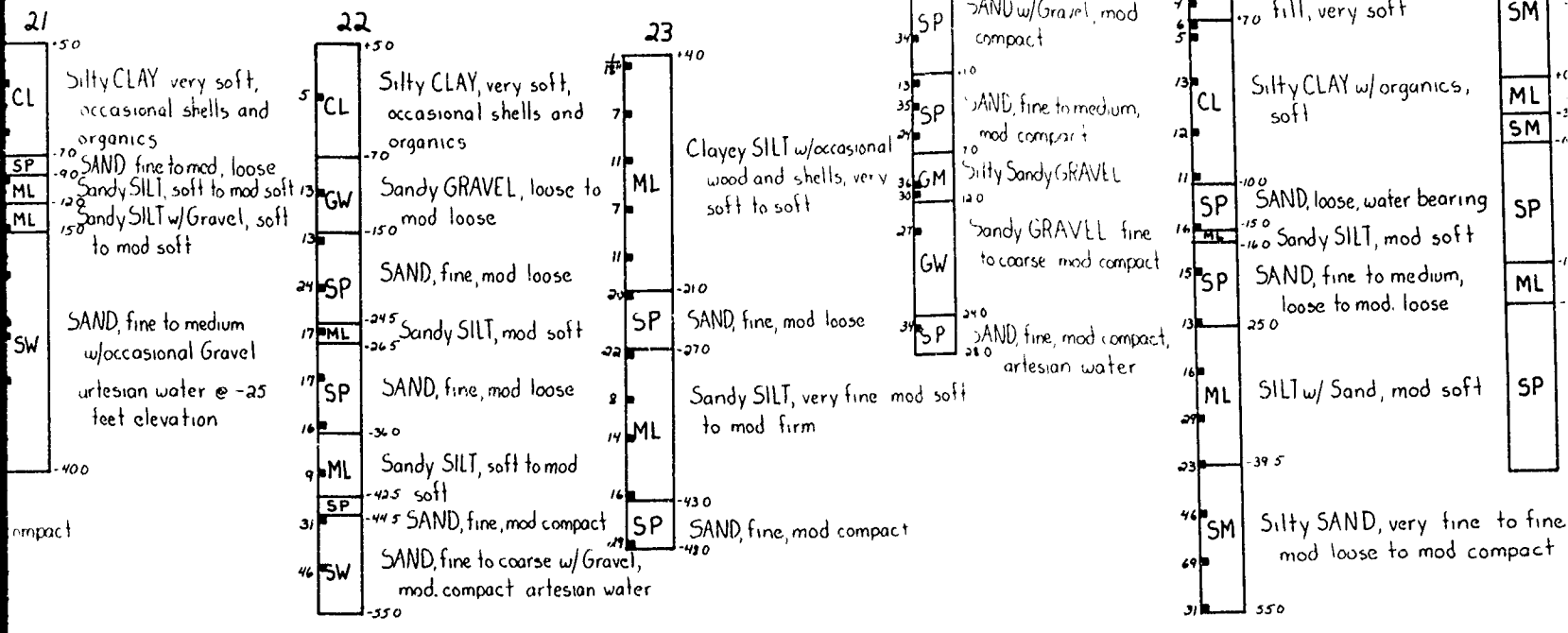
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

OLYMPIA HARBOR
WASHINGTON
BORING LOGS

SIZE	INVITATION NO	FILE NO	DATE	PLATE
			19 Mar 1979	8
DSGN MCBANE		CHK GALSTER	SHEET	

3


ELEVATIONS
+20
+10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
17
+50
CL
CLAY, gray w/occasional shells and organics
-70 very soft
SP
SAND, fine, gray, loose, w/occasional silt pockets
-240
ML
Sandy SILT, mod soft
-290
SP
-305
SAND, fine, mod. loose, gray
ML
Sandy SILT, mod soft, gray
-515
SP
SAND, fine to very fine, oose to compact, gray
-645
ML
Sandy SILT w/ Clay
-705
SM
Silty SAND, fine, loose to mod loose, gray
-790
SP
SAND, fine to medium, loose
-850 to mod. loose
18
+70
CL
Silty CLAY, very soft, occasional organics
-20 and debris
SW
SAND, fine to coarse, occasional gravel, loose to mod compact
-220
ML
SILT w/occasional Clay and Sand mod soft
-490
SP
-510
SAND, fine, mod compact
SP
SAND, fine to medium, occasional Silt, mod compact
-630
-640
CLAY, mod firm
SW
SAND, fine to coarse, mod compact
-695
19
+70
CL
Silty CLAY w/occasional shells and organics, very soft
-425
SP
SAND, fine to medium, mod loose
-590
SM
Silty SAND, fine, mod compact
-645
20
+60
CL
Silty CLAY, very soft, occasional wood debris and organics
-85
-105
SM
Silty SAND w/occ gravel
SW
SAND w/gravel, compact, artesian water
-195
SM
Silty SAND, mod compact
-280
ML
Sandy SILT, mod soft to mod firm contains sand layers w/artesian water
-430
SW
SAND, fine to coarse, mod compac
-490 to compact
21
CL
SP
ML
ML
SW
72-2
GP
+20.0
Silty Sandy
+17.0
SP
Silty SAND,
+12.5
SM
Silty SAND u
loose, fill
+1.0
SP
Silty Sand u
compact
-24.5
CL
CLAY w/ Silt,
-30.0
ML
Clayey SILT,
SP
-69.0
-71.0
SAND, fin



ompact

Sandy GRAVEL loose, fill

AND, mod loose, fill

AND w/occasional Gravel, till

and w/occasional Gravel act

ilt, mod firm

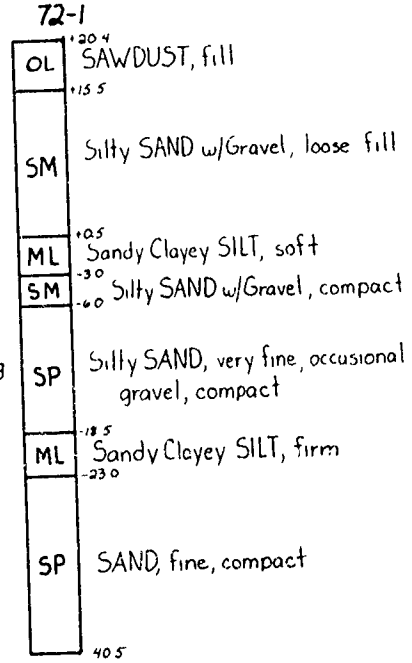
SILT, firm

D, fine, compact

2

See PLATE 7 for legend

72-1



rganic SILT and wood till, very soft

ilty CLAY w/ organics, soft

AND, loose, water bearing

Sandy SILT, mod soft

AND, fine to medium, loose to mod loose

0

ILT w/ Sand, mod soft

5

Silty SAND, very fine to fine, mod loose to mod compact

50

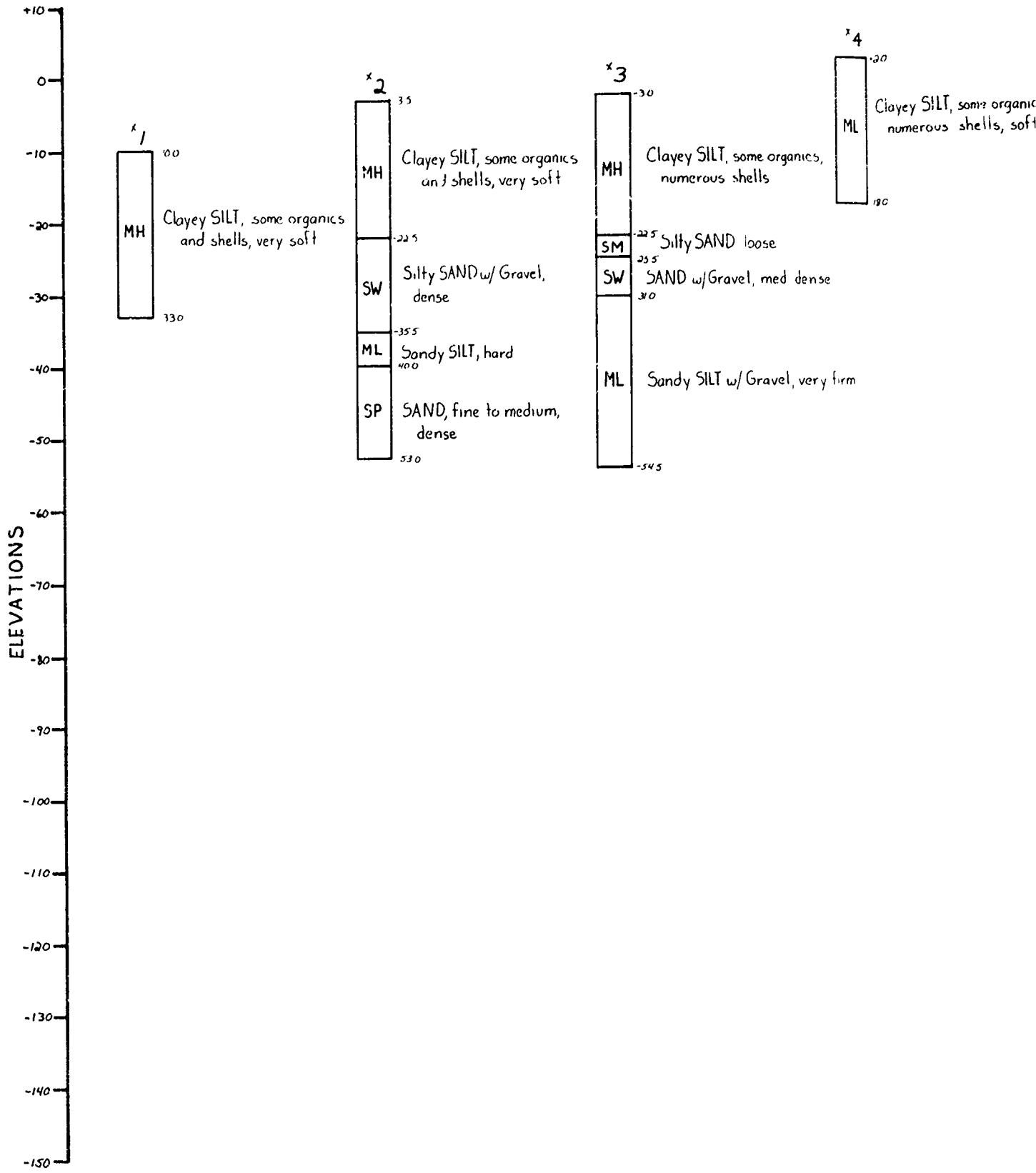
legend

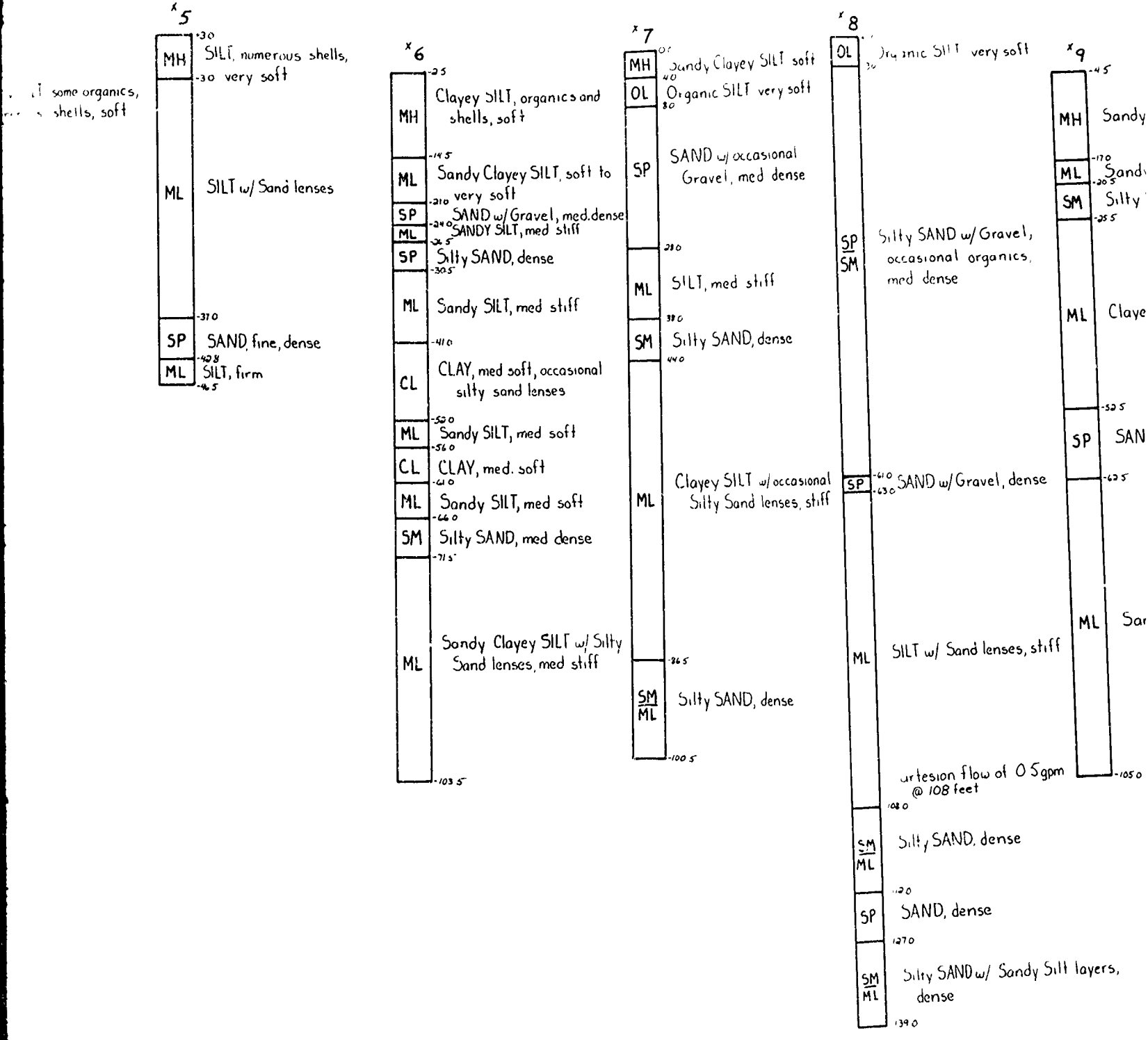
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

OLYMPIA HARBOR
WASHINGTON
BORING LOGS

SIZE	INVITATION NO	FILE NO	DATE	PLATE
			22 Mar 79	9
DSGN MCBANE	CHK GALSTER		SHEET	

3


ELEVATIONS
+10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
X1
MH
Clayey SILT, some organics and shells, very soft
10.0
33.0
X2
MH
Clayey SILT, some organics and shells, very soft
3.5
-22.5
SW
Silty SAND w/ Gravel, dense
-35.5
ML
Sandy SILT, hard
40.0
SP
SAND, fine to medium, dense
53.0
X3
MH
Clayey SILT, some organics, numerous shells
-3.0
-22.5
SM
Silty SAND loose
-25.5
SW
SAND w/Gravel, med dense
31.0
ML
Sandy SILT w/ Gravel, very firm
-54.5
X4
ML
Clayey SILT, some organic numerous shells, soft
-2.0
18.0



See PLATE 7 for legend

LT, very soft

D w/ Gravel,
al organics
be

Gravel, dense

and lenses, stiff

flow of 0.5 gpm
eet

ND, dense

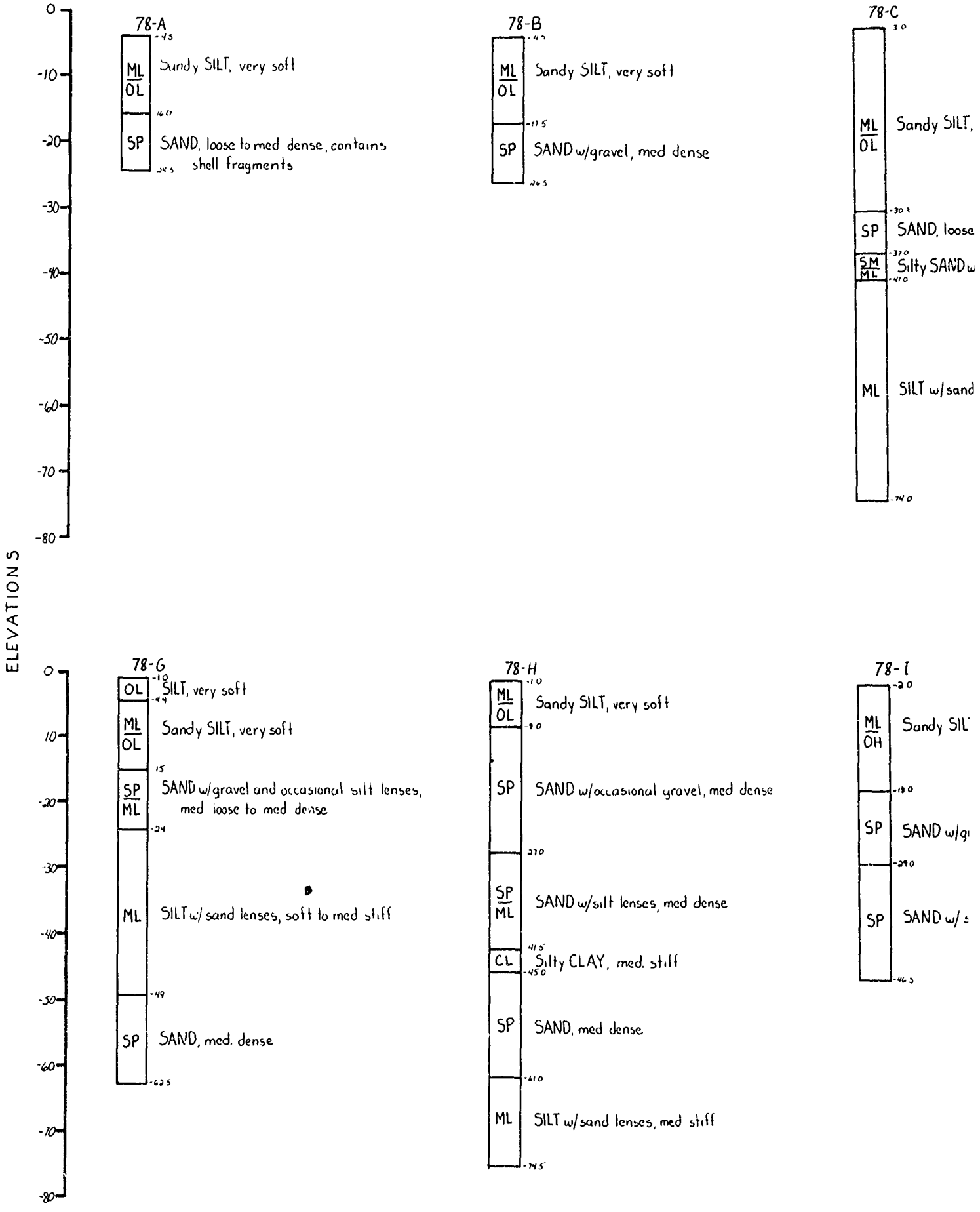
ense

ND w/ Sandy Silt layers,

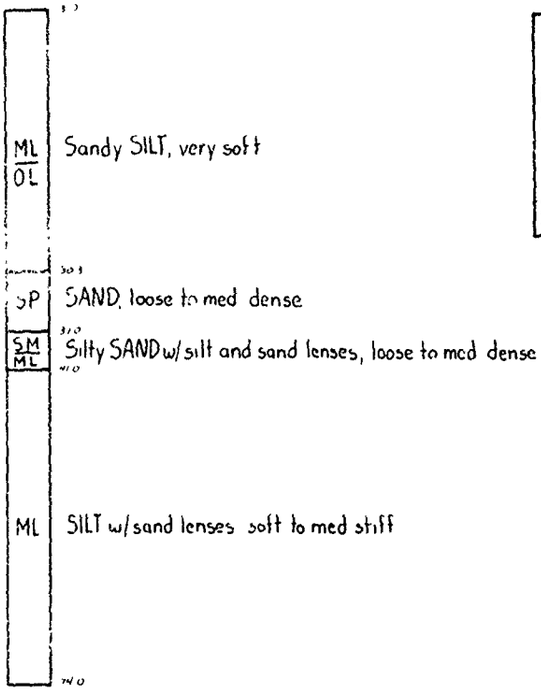
7 for legend

U. S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON				
OLYMPIA HARBOR WASHINGTON BORING LOGS				
SIZE	INVITATION NO	FILE NO	DATE 22 Mar 79	PLATE 10
DSGN MCBANE		CHK GALSTER	SHEET	

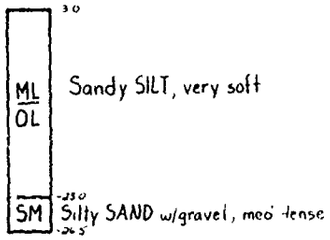
3


ELEVATIONS
0
-10
-20
-30
-40
-50
-60
-70
-80
78-A
-1.5
ML/OL
Sandy SILT, very soft
-16.0
SP
SAND, loose to med dense, contains shell fragments
-24.5
78-B
-11.5
ML/OL
Sandy SILT, very soft
-11.5
SP
SAND w/gravel, med dense
-26.5
78-C
3.0
ML/OL
Sandy SILT,
-30.3
SP
SAND, loose
-37.0
SM/ML
Silty SAND w
-41.0
ML
SILT w/sand
-74.0
78-G
-1.0
OL
SILT, very soft
-4.4
ML/OL
Sandy SILT, very soft
-15
SP/ML
SAND w/gravel and occasional silt lenses, med loose to med dense
-24
ML
SILT w/ sand lenses, soft to med stiff
-49
SP
SAND, med. dense
-62.5
78-H
-1.0
ML/OL
Sandy SILT, very soft
-9.0
SP
SAND w/occasional gravel, med dense
-27.0
SP/ML
SAND w/silt lenses, med dense
-41.5
CL
Silty CLAY, med. stiff
-45.0
SP
SAND, med dense
-61.0
ML
SILT w/sand lenses, med stiff
-74.5
78-I
-2.0
ML/OH
Sandy SIL
-19.0
SP
SAND w/g
-29.0
SP
SAND w/ s
-46.5

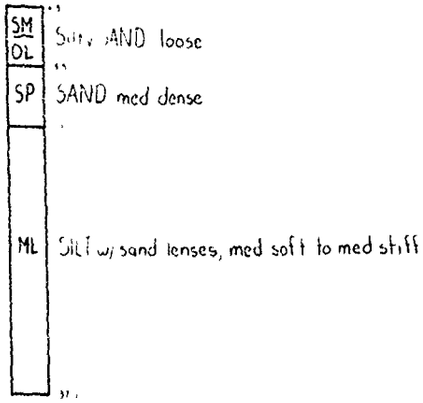
78-C



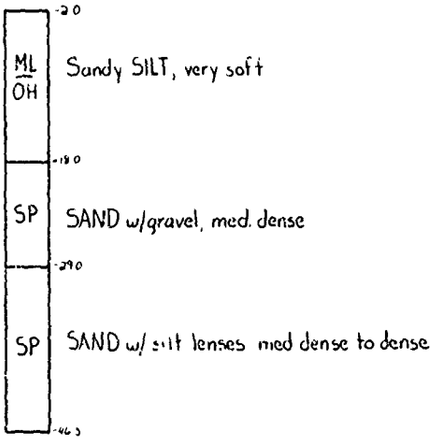
78-D



78-E



78-I



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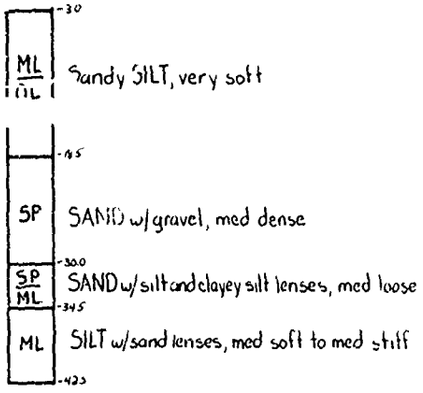
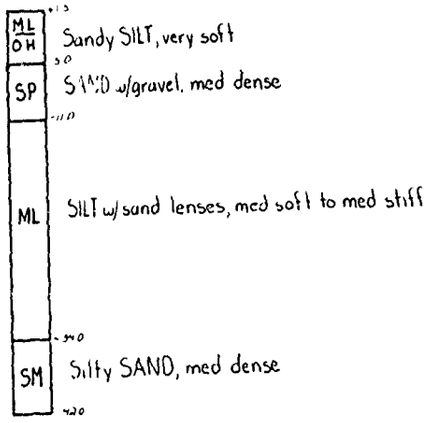


78-K



See PLATE 7 for legend.

2

78-F

+10	ML/OL	Sandy SILT, very soft
-50	SM/OL	Silty SAND, loose
-230	ML	SILT w/ sand lenses, soft
-410	SM	Silty SAND, med dense
-440		

med soft to med stiff

78-L

+50	OL	SILT, very soft
-73	SM/OL	Silty SAND, very soft
-105	SP	SAND w/gravel, med. loose
-180	SM/ML	Silty SAND w/ silt and sand lenses, loose
-230	ML	to med dense SILT w/sand lenses, med soft to med stiff
-410	SP	SAND, dense
-490		

t

dense

, med soft to med stiff

dense

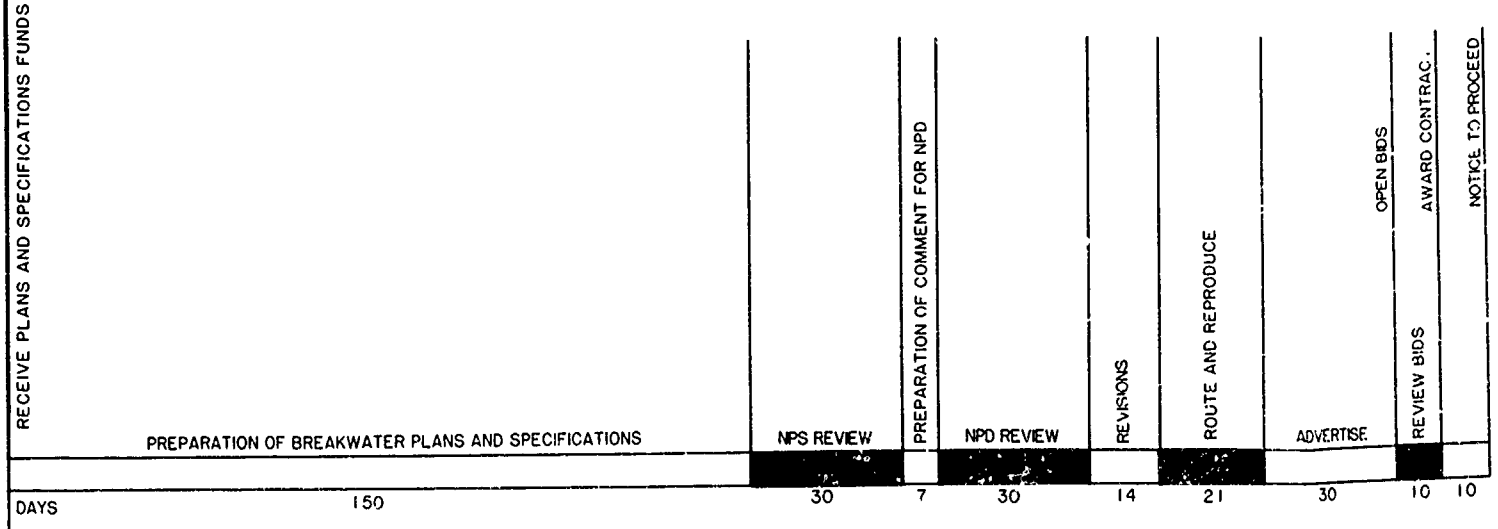
PLATE 7 for legend

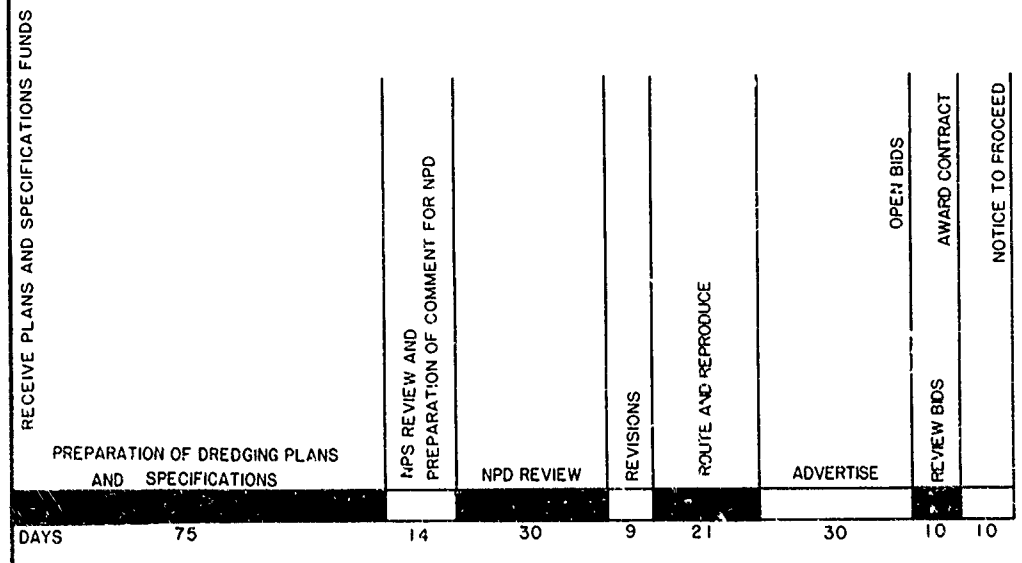
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

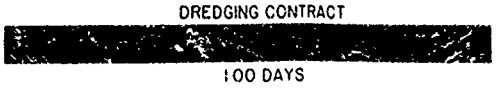
OLYMPIA HARBOR
WASHINGTON
BORING LOGS

SIZE	INVITATION NO	FILE NO	DATE	PLATE
			22 Mar 79	11
DSGN MCBANE		CHK CALSTER	SHEET	

3

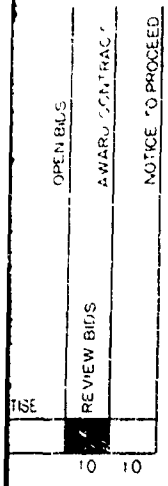


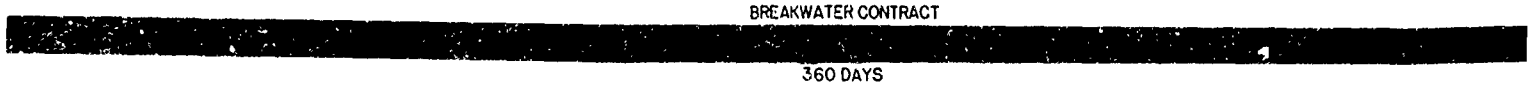




MONTHS

1	2	3	4	5	6	7	8	9	10





10	11	12	13	14	15	16	17	18	19	20

[redacted]

U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

EAST BAY MARINA

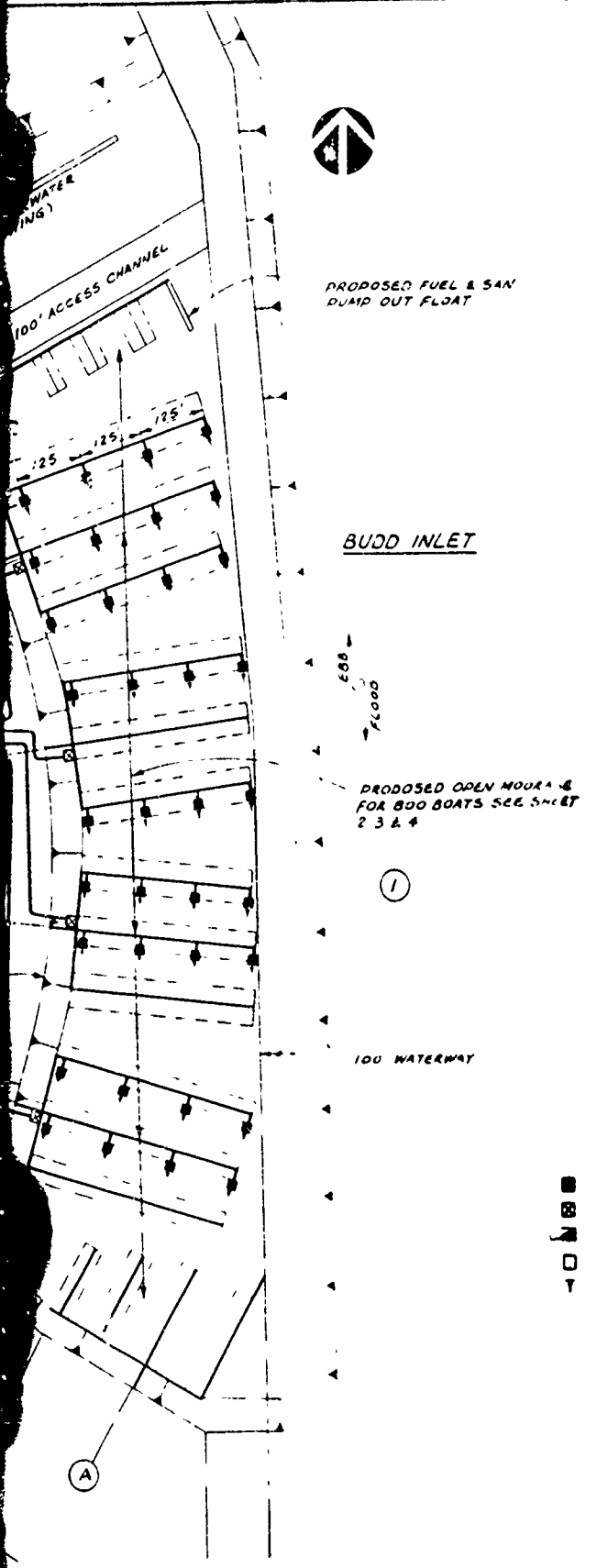
DESIGN AND CONSTRUCTION
SCHEDULE

OLYMPIA WASHINGTON

SIZE	INVITATION NO	FILE NO	DATE	PLATE
				12
DSGN		CHK		SHEET

3

20 21 22 23 24 25 26 27 28 29 30



LEGEND

- MOTOR STARTER
- 240 V SUB POWER PANEL
- 240 V MAIN POWER PANEL
- 250 KVA PAD MOUNTED TRANSFORMER
- AIRE-O2 AERATOR

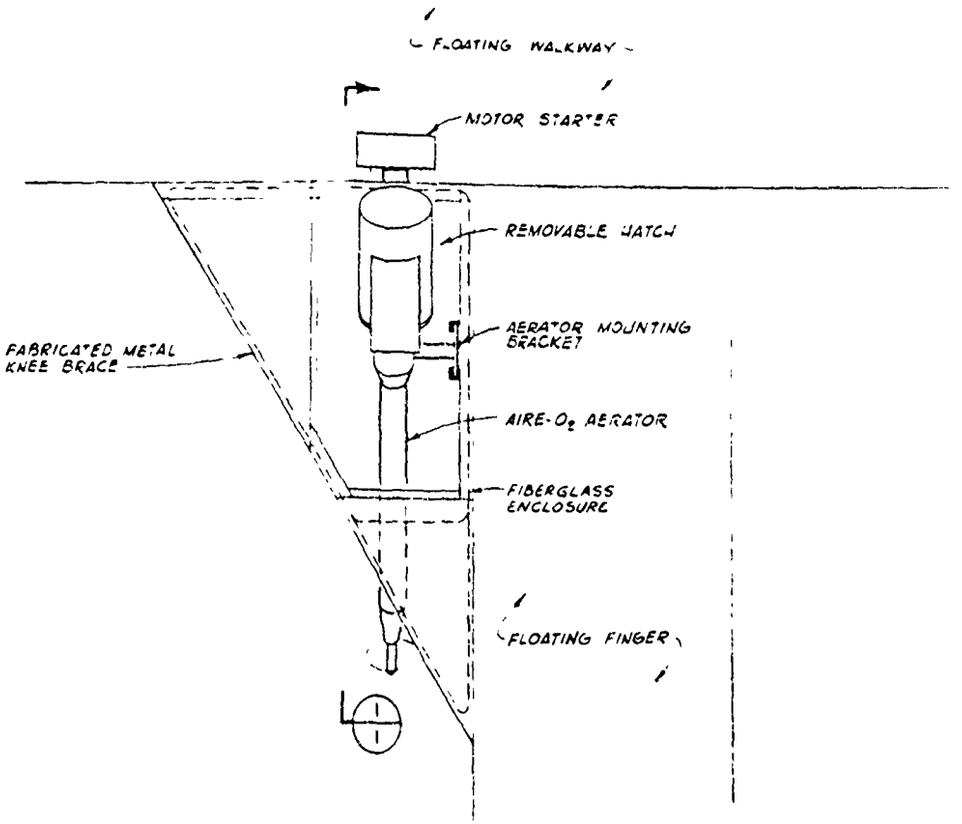
MOORAGE BASIN PLAN

SCALE 1" = 200'

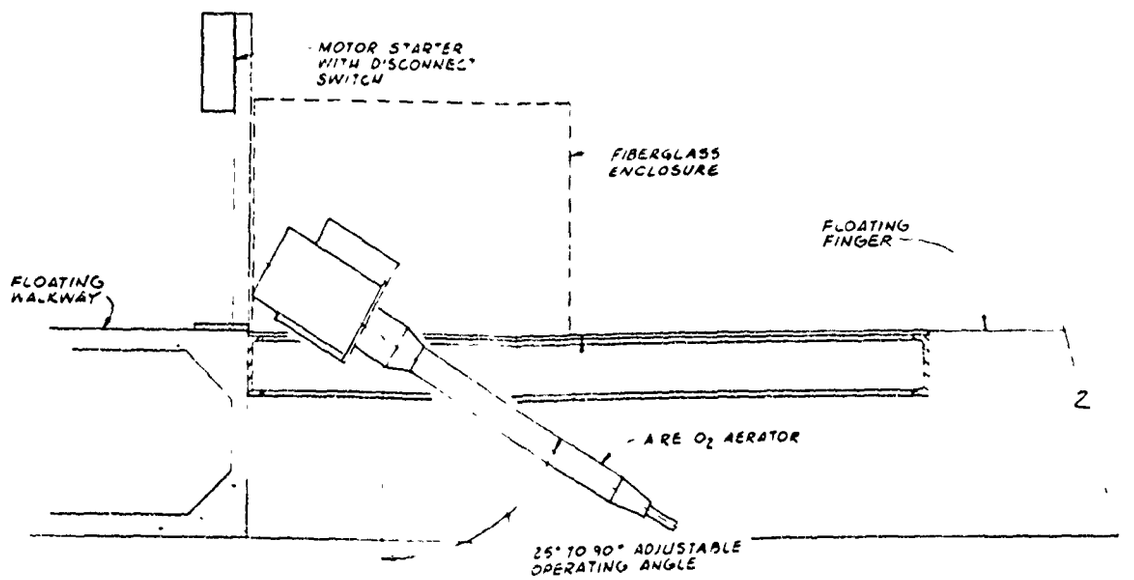
, Chin & Mayo, Inc.
ngineers, Architects, Applied S
enue Seattle Washington 9810
47-5300

Date	Designed ___
OCT 20-80	Drawn ___
Scale	Checked ___
NOTED	Approved by ___

Revisions



AERATOR INSTALLATION PLAN
NO SCALE



2

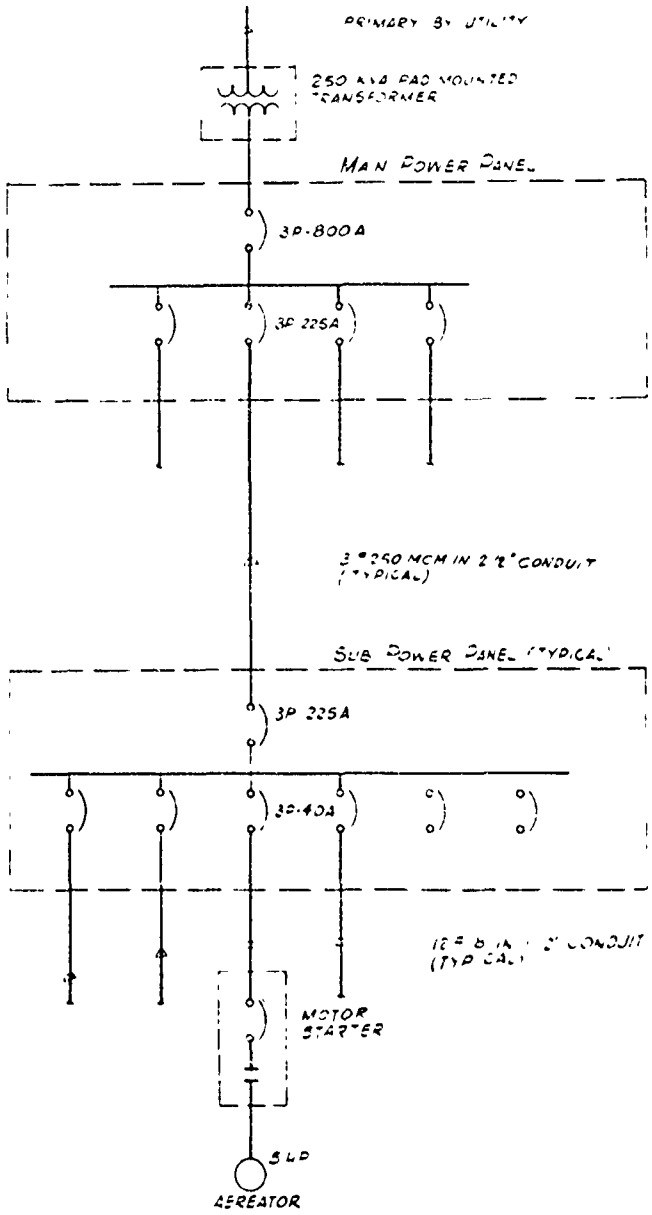
SECTION (1/1)
NO SCALE

PORT OF OLYMPIA, WASHINGTON

EAST BAY MARINA

PRELIMINARY DESIGN OF AERATION SYSTEM

PLATE 13



ONE LINE DIAGRAM

1

Kramer, Chin & Mayo, Inc.
Consulting Engineers Architects Applied Scientists
1917 First Avenue Seattle Washington 98101
Phone (206) 447-5300

Date	OCT 20 80
Scale	NOTED
Designed By	
Drawn By	
Checked By	
Approved By	

Revisions

DESIGN CRITERIA

MOORAGE BASIN	
AVERAGE LENGTH	2 500 FT
AVERAGE WIDTH	540 FT
WATER DEPTH	
MHHW	14 4 FT
MHW	13.5 FT
MLW	3 0 FT
MLLW	0 0 FT
MLLW AFTER DREDGING	11 0 FT
DESIGN WATER DEPTH	19 0 FT
AVERAGE (DESIGN) WATER VOLUME	25×10^6 FT^3
DISSOLVED OXYGEN DEPLETION RATE DURING AUGUST	
AVERAGE	0 5 MG L/DAY
MAXIMUM	2 6 MG/L/DAY
OXYGEN SUPPLY REQUIRED	
OXYGEN REQUIRED	
MAXIMUM	169 LB O_2/HR
AVERAGE	33 LB O_2/HR
*OXYGEN TRANSFER RATE	0 7 LB O_2 HR/HP
HORSEPOWER REQUIRED	
MAXIMUM	242 HP
AVERAGE	46 HP
MIXING REQUIREMENTS	
TOTAL FLOW ENTERING MOORAGE BASIN	2 436 CFS
MIXING CAPACITY	15 CFS/HP
HORSEPOWER	165 HP
RECOMMENDED NUMBER OF AERATION UNITS	33 @ 5 HP

*BASED ON AIRE O_2 AERATOR 0 7 LB/HR/HP AT INITIAL D O 2 MG/L SALINITY 27 0 00 AND TEMPERATURE 16° C

2

PORT OF OLYMPIA, WASHINGTON

EAST BAY MARINA

DESIGN CRITERIA
PLAN AND DIAGRAM

PLATE 14

APPENDIXES

APPENDIX A - PERTINENT CORRESPONDENCE

APPENDIX B - ANALYSIS OF DESIGN AND ESTIMATES OF COST

APPENDIX C - BREAKWATER RECREATION FACILITIES - COST AND BENEFIT ANALYSIS

APPENDIX D - WATER QUALITY AERATION SYSTEM

APPENDIX E - ECPA APPLICATION 74-0050

APPENDIX F - FISH AND WILDLIFE COORDINATION ACT REPORT

APPENDIX G - 404(b)(1) EVALUATION

APPENDIX H - PUBLIC AND AGENCY REVIEW COMMENTS ON THE DRAFT DETAILED PROJECT REPORT/ENVIRONMENTAL IMPACT STATEMENT, AND ON THE EAST BAY MARINA PROJECT IN GENERAL

APPENDIX A

PERTINENT CORRESPONDENCE

PORT OF OLYMPIA

915 NORTH WASHINGTON STREET • POST OFFICE BOX 827
OLYMPIA, WASHINGTON, 98507 U.S.A. • AREA CODE 206 357-4433

April 5, 1974

Colonel R. J. Eineigl
District Engineer
U.S. Corps of Engineers
Department of the Army
1519 Alaskan Way South
Seattle, Washington 98134

Re: Section 107 Study - Olympia Harbor

Dear Colonel Eineigl:

This letter is in response to recent conversations between Mr. Peter Denny of your staff and Mr. Malin of the Port of Olympia regarding the proposed East Bay Small Boat Basin.

The Port's original section 107 request was deferred in 1966, pending the completion of a comprehensive development plan by the Port of Olympia. The Port is now in the process of finalizing its' comprehensive development plan and is now ready to ask for the reactivation of your Section 107 study.

In the past months, the Port has worked actively with the City of Olympia, Thurston Regional Planning Council and the community in the development of the Port's land use plan, which will result in the incorporation of this plan into the City Comprehensive Plan now being developed.

Water Circulation studies of the proposed East Bay development conducted by the University of Washington and a biological assessment of the same area is also underway by The Evergreen State College. These studies, financed by the Port, will add significant information for the development of an Environmental Impact Assessment.

It is the Commission's request that you reactivate the Section 107 study through the undertaking of a reconiassance study for the construction of a floating breakwater and relocation and dredging of the waterway in East Bay.

Since several major elements of the small boat basin have changed since your original Section 107 study, we are attaching a copy of the proposed marina plan for your use.

The members of the Port Commission, and all of the Olympia community, will appreciate your assistance in this connection; and an indication from you at your earliest convenience of the possibility of your assisting us in this project.

Yours very truly,

PORT OF OLYMPIA

G. W. Sibold
Manager

GWS/j

enclosure – in Nav & Coastal Proj Sec

cc: Port Commission members
Thurston Regional Planning Council
City of Olympia Planning Commission

PORT OF OLYMPIA

915 NORTH WASHINGTON STREET • POST OFFICE BOX 827
OLYMPIA, WASHINGTON, 98507 U.S.A • AREA CODE 206 754-1650

June 7, 1979

District Engineer
Seattle District
U.S. Army Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Sir:

Reference is made to several conversations in recent months between Harry Disbrow of your office and Richard O. Malin of the Port of Olympia regarding recreational use facilities on the proposed floating breakwater for the East Bay Marina.

The Port of Olympia supports this concept of multiple use and requests that the Corps of Engineers make provision in their floating breakwater design for the following elements:

1. Temporary moorage along the marina side of the breakwater
2. Access structure and ramp between shore and breakwater
3. Access ramps connecting individual breakwater modules
4. Necessary safety features in connection with recreational use of breakwater
5. Water and electrical service for temporary moorages

All in accordance with previous discussions.

We understand that the temporary moorage facilities would be constructed and maintained at local expense.

We also understand that the access structure and ramp from shore to breakwater, ramps between breakwater modules and attendant safety features necessary to use the breakwater for recreational purposes would be added

to the cost of the breakwater on a 50/50 matching basis and that maintenance of these elements would be the responsibility of the Port of Olympia.

The Port agrees to these conditions and urges the Corps to include these elements into their scope of work.

Yours very truly,

PORT OF OLYMPIA

G. W. Sibold
Manager

GWS:hf

COPY

NPSEN-PL-NC 9 April 1980

Mr. Donald P. Dubois
Regional Administrator
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Don:

This is in response to your letter of 28 February 1980 and reflects subsequent discussions between us and our staffs. Based on these discussions, the studies outlined in this letter should provide us the necessary additional information for a decision on the proposed East Bay Marina by August 1980. I, like you, would like to resolve these concerns as soon as possible, and feel that the additional studies could be accomplished over the next three months.

Alternate 4e as presented in the Draft Detailed Project Report/Environmental Impact Statement (DPE/EIS) will be modified for a more direct comparison with the currently recommended Plan 4a. Alternative 4e will be expanded to 800 moorages, the same as Plan 4a. The breakwater and moorage area for Alternative 4e will be moved northward to allow sufficient tideland filling to provide approximately the same acreage as under Plan 4a for marina support facilities and for marina parking. Deepwater disposal of dredged material will be reduced or eliminated. The cargo handling area will be as now defined for Plan 4e. The studies and estimates of the modified Plan 4e will be limited to reconnaissance scope detail and accuracy; however, the resulting information will allow a general comparison with Plan 4a.

We propose that water quality studies of Plan 4a, Alternative 4e, and modified Alternative 4e be accomplished as a joint effort of our staffs using the mathematical model developed by your office. These studies along with a tentative schedule, are briefly outlined in the inclosure to this letter. The parameters for model input will be derived from existing Budd Inlet data and will be agreed upon by our respective staffs prior to input into the model. Similarly, when one phase of the water quality studies are completed, there must be agreement between our staffs as to the interpretation and adequacy of the data provided before the next phase is begun. Since these agreements are critical, I recommend that any disagreements concerning procedures or data be surfaced immediately and if necessary, to our level for decision. Results of the model would hopefully provide some quantitative measure of expected water quality as well as a basis for the design of water quality mitigation measures, if required.

NPSEN-PL-NC
Mr. Donald P. Dubois

A preliminary investigation of alternative mitigative measures for Plan 4a has been made by Kramer, Chin and Mayo, consulting engineers for the Port. As additional design work on these measures would be responding to data developed from the water quality studies, we feel it is essential that the consulting engineers be involved in the water quality studies. In addition their knowledge and data from past extensive work in the Olympia area should be helpful. I suggest that a meeting of our technical staffs and the Port's consultants be held by 15 April to discuss the water quality studies for the existing, with project, and with project/with mitigation conditions. At that time your staff could define the information needed for your evaluation of the mitigation measures, including cost effectiveness and energy consumption.

Mr. Harry Disbrow, who can be reached at (206) 764-3651, FTS 399-3651 will be coordinating these additional studies.

Since the State Department of Ecology has the responsibility under the Clean Water Act to issue the Water Quality certification for the East Bay Project, we feel they should be kept informed of these additional East Bay water quality studies. Accordingly, we will inform the Director of Department of Ecology of the proposed studies and will advise his staff of now information as the studies progress.

Again, we appreciate your comments and your willingness to work with us and the Port of Olympia to arrive at a mutually satisfactory solution to the Olympia area's needs for additional moorage facilities. We will proceed as soon as we have your agreement on the scope and tentative schedule of activities outlined in this letter.

Sincerely,

/s/

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copy furnished with inclosure:
Wilbur G. Hallauer, Director
Washington Department of Ecology
Olympia, Washington 98504

James D. Wright, Commissioner
Port of Olympia
Post Office Box 827
Olympia, Washington 98507

EAST BAY WATER QUALITY STUDY
SCOPE OF WORK AND DIVISION OF RESPONSIBILITY

Activity	Tentative Schedule Accomplish By
1. Technical staff level meeting of EPA, Corps and Kramer, Chin and Mayo (Port of Olympia Consultants) to discuss strategy for additional water quality studies of Plan 4a and alternative 4e; and to discuss required scope of studies of water quality mitigation measures for Plan 4a.	15 Apr
2. Corps review Department of Ecology (WDE) model and EPA's model developed by Mr. Yearsley, as well as existing Budd Inlet water quality data and make preliminary determination of whether use of WDE model is required to establish boundary conditions for input into Yearsley model. If required, the WDE will be asked to provide assistance in establishing boundary conditions from their model. Corps will prepare preliminary boundary conditions such as DO, BOD, Temperature, and Exchange Coefficients for existing East Bay conditions and for Alternatives 4a and 4e.	1 Jun
3. Corps/EPA technical staffs meet to discuss and review Corps proposed modeling approach and boundary conditions outlined in above paragraph 2. After EPA initial review, meet again as necessary to resolve any differences in modeling approach and boundary conditions.	13 Jun
4. After Corps/EPA technical staffs mutually agree to modeling approach and boundary conditions, the model would be run	

by EPA personnel at EPA facilities. Model results would be reviewed and discussed by Corps/EPA technical staffs; technical staffs would then make joint presentation of tentative findings to management level Corps/EPA/WDE. 8 Jul

5. Concurrent with Corps/EPA water quality modeling studies Kramer, Chin and Mayo will perform reconnaissance level studies of alternative water quality mitigation systems. Mitigation studies will use data obtained from Corps/EPA water-quality studies. F ndings will be presented to Corps/EPA/WDE. 22 Jul

INGTON
Ray

7272 [illegible] 98504 206 753-2353

1980

redge and Fill ection
Region X
6th Avenue
le, Washington

Mr. Lee:

having reviewed the various mitigating measures sed for the East Bay Marina project, we feel that se of the Hinde Aqua-Aeration System is the most ble of those presented. However, no specific eering data was given to show that this system is le of raising the oxygen levels to those used in odels. We are assuming the engineers are correct is assumption.

uld not support the use of the effluent from the ia STP as a source of oxygen nor would we support ractice of fish replacement as mitigating measures.

epartment has, as you know, signed off on this ct and so any final decision must be made by EPA.

rely,

Asselstine
al Manager

:dms

rank Urabeck,COE
ruce Cameron, DOE
ike Palko, DOE
arl Finn, DOF

COPY

NPSEN-PL-NC 13 Nov 1980

Joseph R. Blum, Area Manager
U.S. Fish and Wildlife Service
2625 Parkmont Lane
Olympia, Washington 98502

Dear Mr. Blum:

This letter is intended to confirm understandings reached during a meeting with you, Mr. Jim Bottorff, and Ms. Marge Kolar of your staff; Mr. Dick Malin, Port of Olympia; and Messrs. Warren Baxter and Frank Urabeck of Corps of Engineers, held on 7 November 1980. The meeting was in followup to your 21 October 1980 letter commenting on the East Bay Marina Project which is the subject of public notices numbered 071-0YB-1-006165 and NPSEN-PL-NC-79-1.

As explained by Mr. Baxter of our Regulatory Functions Branch (Permit Section), the nine conditions outlined in your letter do not lend themselves to being made special conditions in our permit form. However, some of the conditions have already been established as part of previous State of Washington permit actions for this project and others are elements of the recommended plan and/or reflected in the items of local cooperation which are binding on the local sponsor. Those that are not already covered will be dealt with by the Port of Olympia in cooperation with your office and other state and Federal agencies prior to our taking final action on this project.

In response to your request, a discussion of each of your conditions follows:

a. Condition. The protective covenant being developed by the Port of Olympia and the Fish and Wildlife Service (FWS) for maintaining the West Bay lagoon site in a natural undeveloped condition be signed by both parties.

Response. Protective covenant, which has been signed, will be noted in the final DPR/EIS.

b. Condition. Pump-out facilities for boats be implemented per U.S. Coast Guard requirements.

Response. This is an existing requirement of Washington Department of Ecology (WDE) condition No. 4 of Permit 74-0050, State of Washington Environmental Coordination Procedures Act (ECPA). Also, provision of sanitary facilities as an item of local cooperation (see item 10-3d of East Bay Marina Draft DPR/EIS dated December 1979). This will be noted in the final DPR/EIS.

c. Condition. Timing of construction activities be coordinated with and agreed to by the Washington Department of Fisheries (WDF).

Response. This is being done with a letter approving construction schedule relative to fisheries to be provided by WDF. Final DPR/EIS will reflect the approved schedule.

d. Condition. Storm water drainage facilities be developed that satisfy the requirements of the Department of Ecology.

Response. This is an existing requirement of WDE condition No. 2 of ECPA Permit 74-0050 and will be noted in the final DPR/EIS.

e. Condition. A cleanup and beautification plan be adopted in conjunction with the city of Olympia and those plan elements involving modifications to the intertidal and subtidal zone of East Bay be approved by the FWS to preserve the integrity and diversity of wildlife habitat in East Bay.

Response. As clarified at the 7 November meeting, FWS intends this condition to deal iwth removal and/or placement of piling in the project area. Accordingly, the Port of Olympia will review piling removal plan with FWS to identify piling that can and should be retained for wildlife habitat. Installation of replacement piling at new locations will require a Corps of Engineers Section 10 permit. Prior to final consideration with regard to issuance of permits referred to in the previous mentioned public notices, the Corps of Engineers will check with FWS area office to verify that reasonable progress has or is being made toward meeting this condition.

f. Condition. A public boat launch with trailer parking facilities be incorporated into the Port's marina plan. Applicant should show effort in obtaining necessary funding for development of free facilities.

Response. This is identified in city of Olympia Shoreline Permit SH-OCY-2-75. A public boat launch with trailer parking facilities is part of the recommended plan (see Plate 2a of December 1979 Draft DPR/EIS). As agreed at the 7 November 1980 meeting, the issue of user fees for the public launching ramp is a matter for the Port to deal with separately from project approval.

g. Condition. The floating breakwater be developed for public fishing access. If WDF determines that an artificial reef would enhance the sports fishery, the applicant will agree to its construction.

Response. Public fishing access to the floating breakwater is part of the recommended plan (see paragraph 7-11, page 7-3 of December 1979 Draft DPR/EIS). Creation of an artificial reef is dependent upon separate action and programs of the WDF and, therefore, need not be a condition for project approval.

NPSEN-PL-NC
Joseph R. Blum, Area Manager

h. Condition. The Port of Olympia agrees to evaluate with the FWS the feasibility of constructing one or more islands in East Bay to offset waterfowl and waterbird loafing and feeding habitat. If the FWS determines the island concept if feasible, the Port of Olympia agrees to construct the islands.

Response. Prior to final consideration with regard to issuance of permits referred to in the previous mentioned public notices, the Corps of Engineers will check with FWS area office to verify that reasonable progress has or is being made toward meeting this condition. This effort will be noted in the final DPR/EIS.

i. Condition. The filling of the southern end of East Bay and reconstruction of the Moxlie Creek outgall be implemented in such a manner so as not to preclude future potential rehabilitation of upper Moxlie Creek as a natural spawning area. Construction design to guarantee these conditions will be approved by the FWS and WDF.

Response. Port will provide an opportunity for FWS and WDF to review and approve plans and specifications for this part of project. Prior to final consideration with regard to issuance of permits referred to in the previous mentioned public notices, the Corps of Engineers will check with FWS area office to verify that reasonable progress has or is being made toward meeting this condition. Status of progress will be noted in the final DPR/EIS.

Please confirm by 19 November that you are in agreement with the above.

Sincerely,

/s/

WILLIAM B. WILLARD, JR.
Lt. Colonel, Corps of Engineers
Acting District Engineer

Copy furnished:
Mr. Dick Malin
Port of Olympia
Olympia, Washington 98502

PORT OF OLYMPIA

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December 2, 1980

Colonel Leon K. Moraski
District Engineer
Seattle District, U.S. Army Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Colonel:

This is to advise you that the Port of Olympia has reviewed the draft of the Local Cooperation Agreement for the East Bay Marina, Olympia Harbor, Washington, and assures its willingness to meet the following criteria:

a. Provide without cost to the United States all lands, easements, and right-of-way required for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of dredged material as well as the necessary retaining dikes, bulkheads, and embankments or the costs of such works.

b. Accomplish without cost to the United States all alterations and relocations as required of buildings, roads, utilities, and other structures and improvements.

c. Hold and save the United States free from damages due to the construction, operation, and maintenance of the project except for damages due to the fault or negligence of the United States or its contractors.

d. Provide and maintain without cost to the United States adequate berthing areas and local access channels with depths commensurate with those in the federal improvements, and necessary mooring facilities, utilities, a public landing with suitable water supply and essential sanitary facilities, a boat-launching ramp, parking area, and access roads open to all on equal terms.

e. Provide a cash contribution equal to 50% of the final project costs allocated to general navigation.

f. Provide a cash contribution equal to 50% of the final cost of construction of recreational facilities on the floating breakwater and the access facilities thereto, and 100% of the final cost of construction of tieup servicing facilities on the floating breakwater.

g. Maintain without cost to the United States all recreational and tieup and servicing facilities associated with the floating breakwater.

h. Provide a cash contribution of 100% of costs allocated to land enhancement.

i. Operate and maintain without cost to the United States all mitigation features required for the project, including performing water quality monitoring of the boat basin.

j. Pay all project costs in excess of the federal cost limitation of $2 million as provided in Public Law 86-645 as amended.

Provided that the improvement for navigation may be undertaken independently of providing public recreational facilities, whenever the required cooperation for navigation has been furnished.

The Port further agrees to:

a. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) that no person shall be excluded from participation in, denied the benefits of, or be subjected to discrimination in connection with the project on the grounds of race, color, or national origin; and

b. Comply with Section 210 and 305 of Public Law 92-464, approved January 2, 1971, and entitled the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970."

Port of Olympia, Washington, possesses the authority and capability, under the Washington State Constitution and other law, to furnish the non-federal cooperation required by the federal legislation that authorizes the project.

Yours very truly,

PORT OF OLYMPIA COMMISSION

H. V. Brewington, Commissioner

Coft A. Skinner, Commissioner

James D. Wright, Commissioner

hf

APPENDIX B

ANALYSIS OF DESIGN
AND
ESTIMATES OF COST

SECTION 107 DETAILED PROJECT REPORT
EAST BAY SMALL BOAT HARBOR,
OLYMPIA, WASHINGTON

APPENDIX B - ANALYSIS OF DESIGN AND
ESTIMATES OF COST

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EAST BAY MARINA
OLYMPIA HARBOR, WASHINGTON

APPENDIX B
ANALYSIS OF DESIGN
AND
ESTIMATES OF COST

B-1. Site Description. East Bay is located on the eastern side of the port peninsula and has remained essentially unimproved by dredging. On the easterly side of East Bay is a county road and shoreside residences. Moxlie Creek drains a city watershed from the south which empties into the head of East Bay through a culverted storm sewer. At mean lower low water (MLLW), much of East Bay is exposed tideflats with a maximum depth of only 8 feet below MLLW. The bottom sediments in East Bay have upper soils consisting of soft to very soft silt with varying amounts of fine sand, shells, and organic matter. The soils immediately underlying these sediments are more variable in composition and range from relatively clean sands to occasional silty sands and silts to depths well below planned dredging depths.

B-2. Tidal Variations. Tides in Olympia Harbor are typical of the Pacific coast of North America. Tides are of the mixed type with two unequal highs and lows each day. Tidal range datums for Olympia Harbor, as published by the National Ocean Survey, are as follows:

DATUM PLANE	ELEVATION REFERRED TO MLLW
Highest Tide (15 Dec 1977)	18.22
Mean Higher High Water	14.45
Mean High Water	13.51
Mean (Half) Tide Level	8.28
Mean Sea Level	7.73
Mean Low Water	3.04
Mean Lower Low Water	0.00
Lowest Tide (Est.)	-4.70

B-3. The Proposed Plan. The proposed plan, designated Plan 4a, is discussed in the main report and is shown on plate 2a. This plan provides about 800 moorage spaces, primarily for pleasure craft. Federal participation consists of construction and maintenance of a floating breakwater, including dredging beneath the breakwater and dredging of entrance and access channels. The floating breakwater would be 700 feet long, the entrance channel 3,700 feet long by 150 feet wide with project depth at -13 feet MLLW, and the main access channels 3,000 and 600 feet long by 100 feet wide with project depths of -13 and -12 feet MLLW, respectively.

B-4. Design Wave Analysis. The proposed marina site is exposed to wind waves generated from the northwest through northeast directions. Wind rose and maximum wind velocity-duration curves are shown on figures B-1 and B-2. Land masses protect the site from all other directions. Design deepwater wave attack at the proposed breakwater is a 2.0-foot significant wave with a period of 2.8 seconds out of the north-northwest. The wave will be a nonbreaking type. Studies show refraction and shoaling will be negligible for high tide conditions, but of significance for shallow water or low tide conditions, resulting in a less severe wave climate for low tide conditions. Deepwater wave heights were used for the design as they are the most critical condition. Deepwater design wave characteristics, including refraction and shoaling, were calculated by methods described in the "Shore Protection Manual (SPM)," 1977 edition and by methods included in the 13 July 1979 CERRO-CO letter "Field Guidances Letter on Wave Estimates Computed Using an Effective Fetch" and the 14 September 1979 working draft "Revised Formulae for Wave Estimation" prepared by C. L. Vincent, U.S. Army Coastal Engineering Research Center. The following tabulation shows maximum wave characteristics for the principal fetch lengths in the wave generating area at the proposed breakwater. Waves transmitted to the north end of the marina basin would be less than 1 foot for design wave conditions and would decrease progressively further into the interior basin.

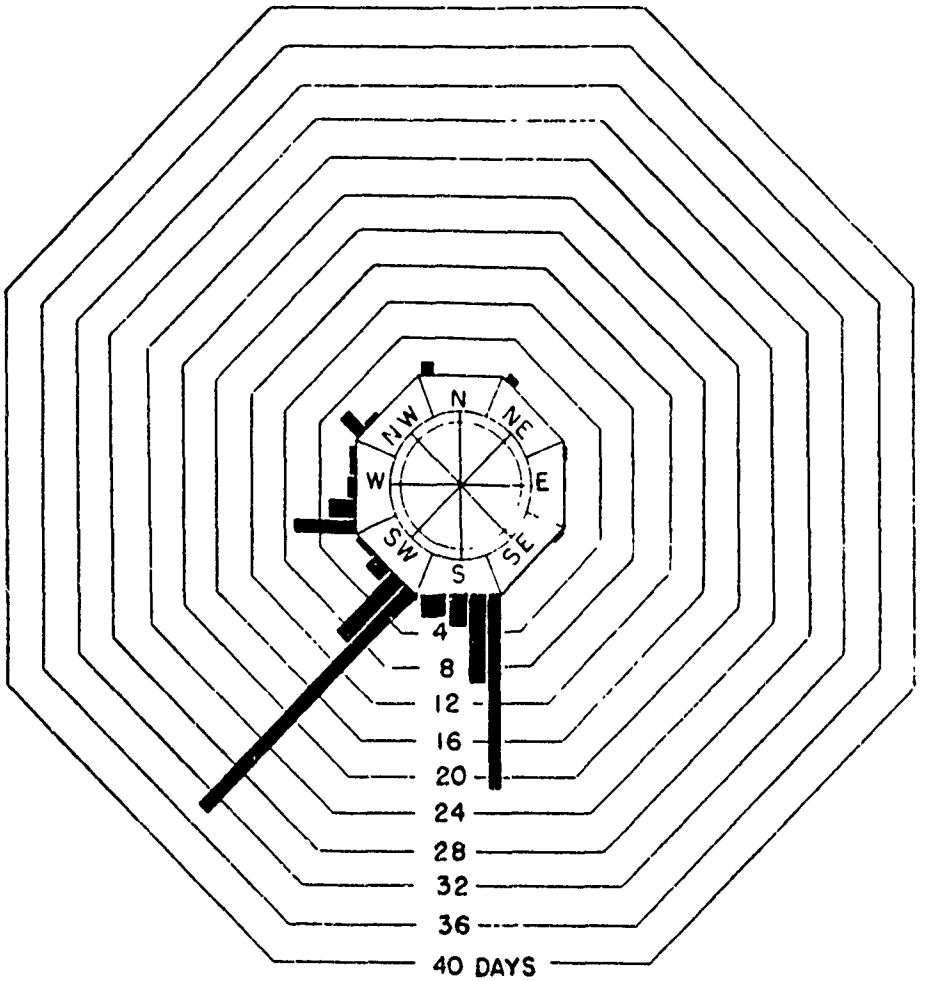
Direction Fetch	Effective Fetch Length (Stat. Mile)	Wind Velocity (mph)	Wind Duration (hours)	Wave Period (sec)	Deep Water Wave Length (ft)	Deep[1/] Water Wave Height (ft)
(N5°W)	[2/]	27	0.6	2.7	37	2.0
(N30°W)	[2/]	28	0.55	2.8	40	2.0

1/Significant wave heights based on hindcast methods.
2/Varies from 2.2 to 7.6 miles according to method used; i.e., SPM or "Field Guidance Letter on Wave Estimates Computed Using an Effective Fetch."

B-5. Soils and Foundation. There have been several generations of subsurface exploration in the area as follows:

a. Twelve shallow borings, H-1 through H-12, were drilled by the Corps of Engineers in 1948 to depths below approximate elevation -16 feet MLLW.

b. In 1964, borings 64PS-1 through 64PS-11 were drilled by the Corps of Engineers to depths ranging from 9 to 18 feet, with bottom elevations ranging from -8.4 feet to -19.5 feet.



LEGEND

VELOCITY RANGE M P H	
10 TO 15	
OVER 15 TO 20	
OVER 20 TO 25	
OVER 25	

SOURCE

Wind velocities of one minute duration recorded hourly on 1009's and filed at Weather Records Processing Center, Seattle, Washington.

NOTE:

All hourly observations recording velocities of 10 miles or over were used in computing this average Annual Wind Rose. Anemometer located at Olympia Airport; Elevation approximately 235 feet M.S.L.

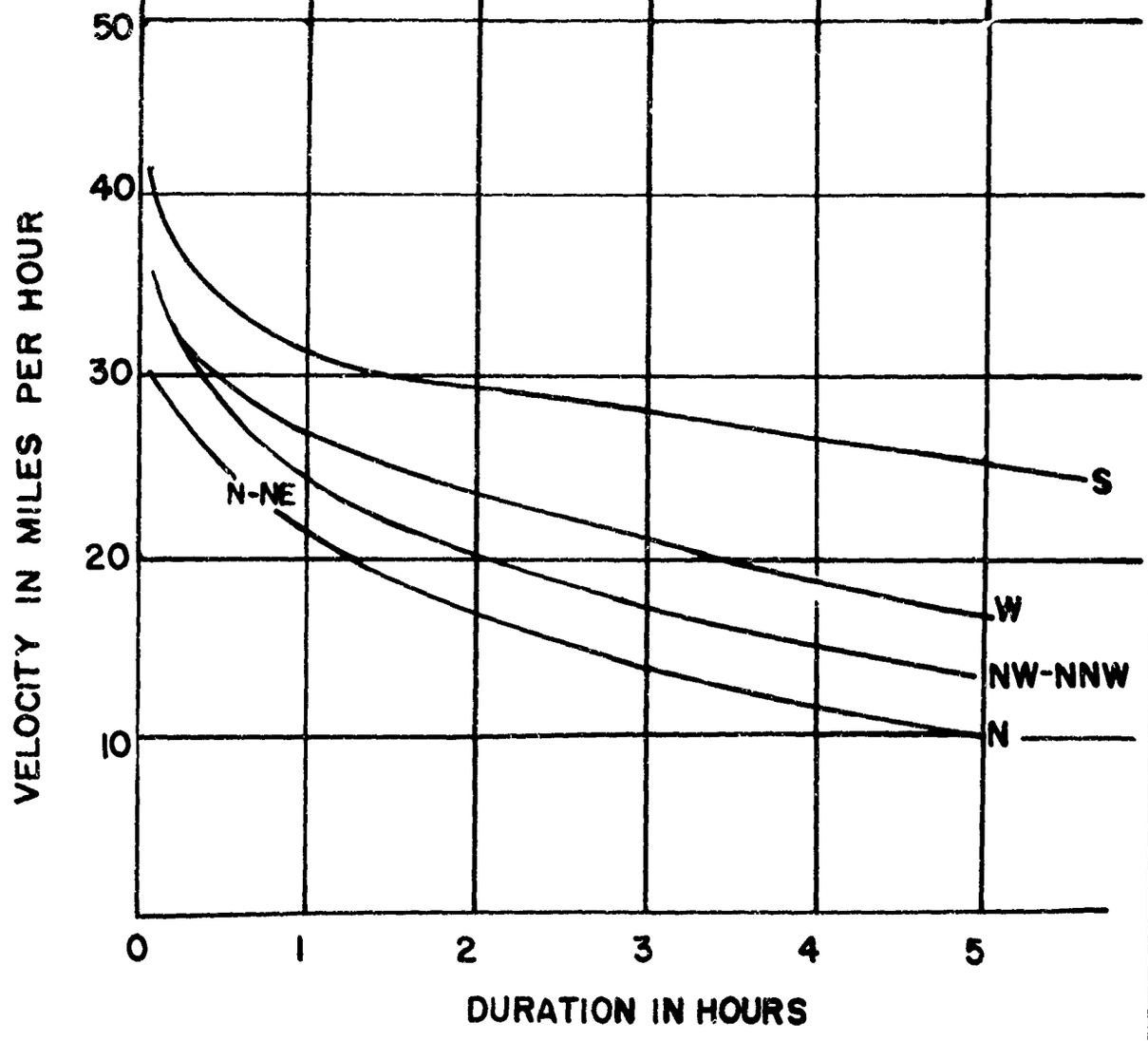
OLYMPIA
WASHINGTON

WIND ROSE

FROM 1941 TO 1948
Seattle District, Seattle, Washington

Comp N.J.M.
Drawn A.N.I
Checked. Date 2-2-49

FIGURE B-1



NOTE: CURVE BASED ON FASTEST MILE RECORD 1949-1959, AND RECORD OF VELOCITIES OF ONE MINUTE DURATION RECORDED HOURLY FOR PERIOD 1941-48. ALSO COMPARED WITH CURVES FOR SEATTLE, WASH.

CURVE FOR NW - NNW WINDS IS BASED ON PUBLISHED WIND RECORD FOR OLYMPIA AIRPORT 1957 - 76

OLYMPIA, WASH.
WIND VELOCITY
DURATION CURVE

☆U.S. GOVERNMENT PRINTING OFFICE: 1976—796-381

FIGURE B-2

c. More recently, borings 72-1, 72-2, 73-1 through 73-9, and 78-A through 78-L, with bottom elevations as deep as -129 feet, were drilled by Dames and Moore, Inc., in conjunction with their studies for the Port of Olympia. Their studies generally relate to development of design criteria and recommendations regarding dredging, disposal of dredged materials, and utilization of land areas created by disposal. Their findings are contained in their reports to the Port of Olympia dated 18 April 1973 and 19 August 1978, copies of which have been furnished to the Corps of Engineers. Soil conditions and boring logs are shown on plates 4 through 11.

B-6. Materials to be dredged by the Corps of Engineers will consist predominantly of very soft to soft organic silts and sands, with a few zones of medium-dense sands. With the exception of the broken piles, sunken logs, and other debris on the bay bottom, as reported by Dames and Moore, dredging is not expected to be unusually difficult. Dredged slopes are planned at 1 vertical to 4 horizontal and are based on Dames and Moore stability analysis.

B-7. Artesian water was encountered in boring 73-8 at approximate elevation -105 feet and in boring 78-F at approximately elevation -42 feet. In addition, artesian water was reported by Dames and Moore in two borings on dry land east of the project along East Bay Drive. Measurements in boring 78-F indicated head slightly above elevation 21 feet MLLW. The top of the artesian zone is approximately 30 feet below the maximum depth of dredging at the closest point. During periods of low tide, the artesian head may be nearly equal to the weight of overlying soil. Therefore, there is some chance of instability in this area as a result of dredging. The hazard is believed to be relatively small, but could result in a small increase in dredge quantities. Exploratory borings already penetrating the aquifer have provided some relief to the artesian pressures. In addition, an examination of water well logs in the East Bay area reveals that water levels in many of them, while reflecting artesian conditions, vary with the tide. This observation indicates that the artesian aquifer is already locally vented into the tidal waters.

B-8. Pile anchor analysis to retain the floating breakwater is based on the following soil conditions and on recent field tests of lateral pile pull tests.

Material	Unit Weight (lb/ft^3) Saturated	Buoyant	Shear Strength Ø	C
Soft Bay Muds	106	42	11° or 0	0 or 100 psf
Underlying Sands Below Bay Mud	122	59	30°	0

B-9. Alternative Breakwaters Considered. Construction of a rubblemound or timber pile breakwater, or no breakwater at all, was considered. If a breakwater were not provided, significant wave heights of 2 feet could be expected to enter the marina basin, damaging boats and moorage facilities within the basin. Preliminary investigations indicate soil conditions are inadequate to provide stable foundation or pile support for a rubblemound or timber pile breakwater. Either of these alternatives would require special foundation preparation for their construction, and costs of a rubblemound or timber pile structure would be comparable to or greater than a floating breakwater. A solid breakwater would reduce circulation within the basin, possibly complicating existing water quality problems. Also, future expansion involving movement of a breakwater could most easily be accomplished with a floating structure. Accordingly, wave protection to the basin would best be provided by a floating breakwater.

B-10. Floating Breakwater Model Tests. To provide information for the design of the floating breakwater, 1/10-scale model tests were conducted during the period October 1977 through September 1978 by the Hydraulics Laboratory at the U.S. Army Engineers Waterways Experiment Station (WES), Vicksburg, Mississippi (reference Technical Report HL-79-13, "Floating Breakwater Wave-Attenuation Tests for East Bay Marina, Olympia, Washington", August 1979). The study was conducted in two phases. In the first phase, the wave attenuating properties of three breakwater cross sections were determined. This was accomplished by two-dimensional (2-D) flume tests for a selected range of wave conditions. In the second phase of the study, 3-D tests investigated the combined effects of structure alinement to wave attack, wave transmission, and wave diffraction around the end of the breakwater system.

B-11. Two rectangular floats and one twin pontoon float were used in the 2-D tests. Plan 1 was a 12-foot by 96-foot rectangular float with a draft of 3.5 feet. The prototype structure would weigh 258,000 pounds with a unit weight of 44.8 pounds per cubic foot (PCF). Plan 2 was a 16-foot by 96-foot rectangular float with a draft of 3.5 feet. The prototype structure would weigh 344,000 pounds with a unit weight of 44.8 PCF. Both Plan 1 and Plan 2 are shown on figure B-3. Plan 3 was a twin pontoon float 21 feet wide by 120 feet long with a draft of 4.65 feet. The 381,226 pound prototype structure would have a unit weight of 49.6 PCF and is shown on figure B-4. In all tests, each of the breakwater's modules was anchored at all four corners and the modules were not connected to each other. Wave attenuation tests were conducted in prototype depths of 25 feet of water (representative of high tide), with wave periods of 2.5, 3.0, 3.5, 4.0, and 4.5 seconds. Test waves ranged in heights from 1.5 to 3.5 feet. In the 2-D testing of Plans 1 and 2, Plan 2 always yielded a somewhat lower transmitted wave height than Plan 1, and Plan 3 showed the best wave attenuation of all plans tested. Wave height transmission coefficients are plotted relative to the wave period on figure B-5. Based on results of the 2-D tests and relative

96'

PLAN 2

06' X 16' RECTANGULAR MODULE

96'

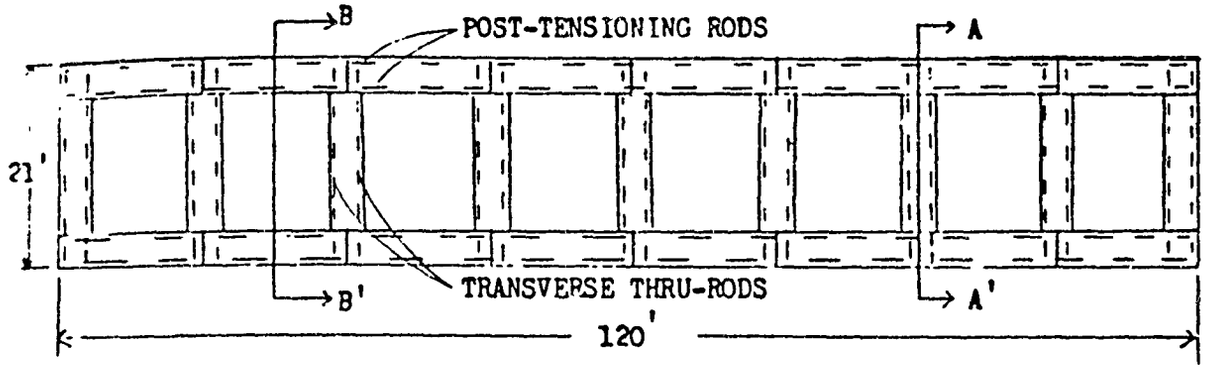
WEIGHTS AND UNIT WEIGHTS

CONFIGURATION	WEIGHT, LBS	UNIT WEIGHT, PCF
PLAN 1	258,000	44.8
PLAN 2	344,000	44.8

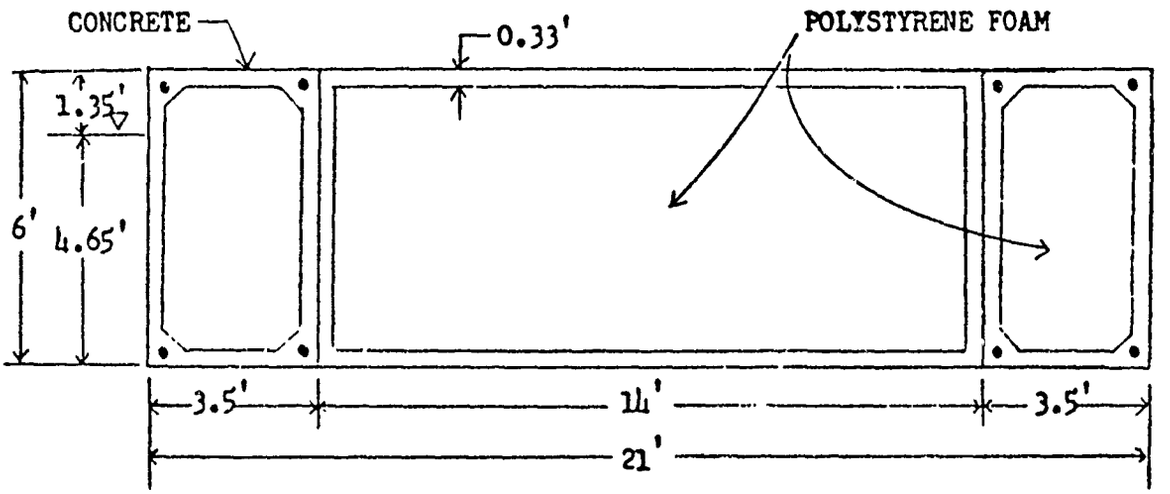
DETAILS OF PLANS 1 AND 2

FIGURE B-3

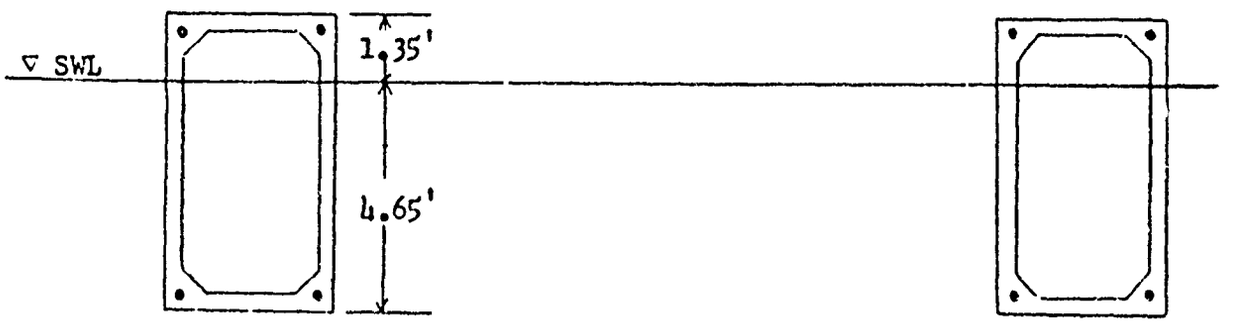
PLAN VIEW



SECTION A-A'



SECTION B-B'



WEIGHT = 381,226 LBS; UNIT WEIGHT = 49.6 PCF

DETAILS OF PLAN 3

FIGURE B-4

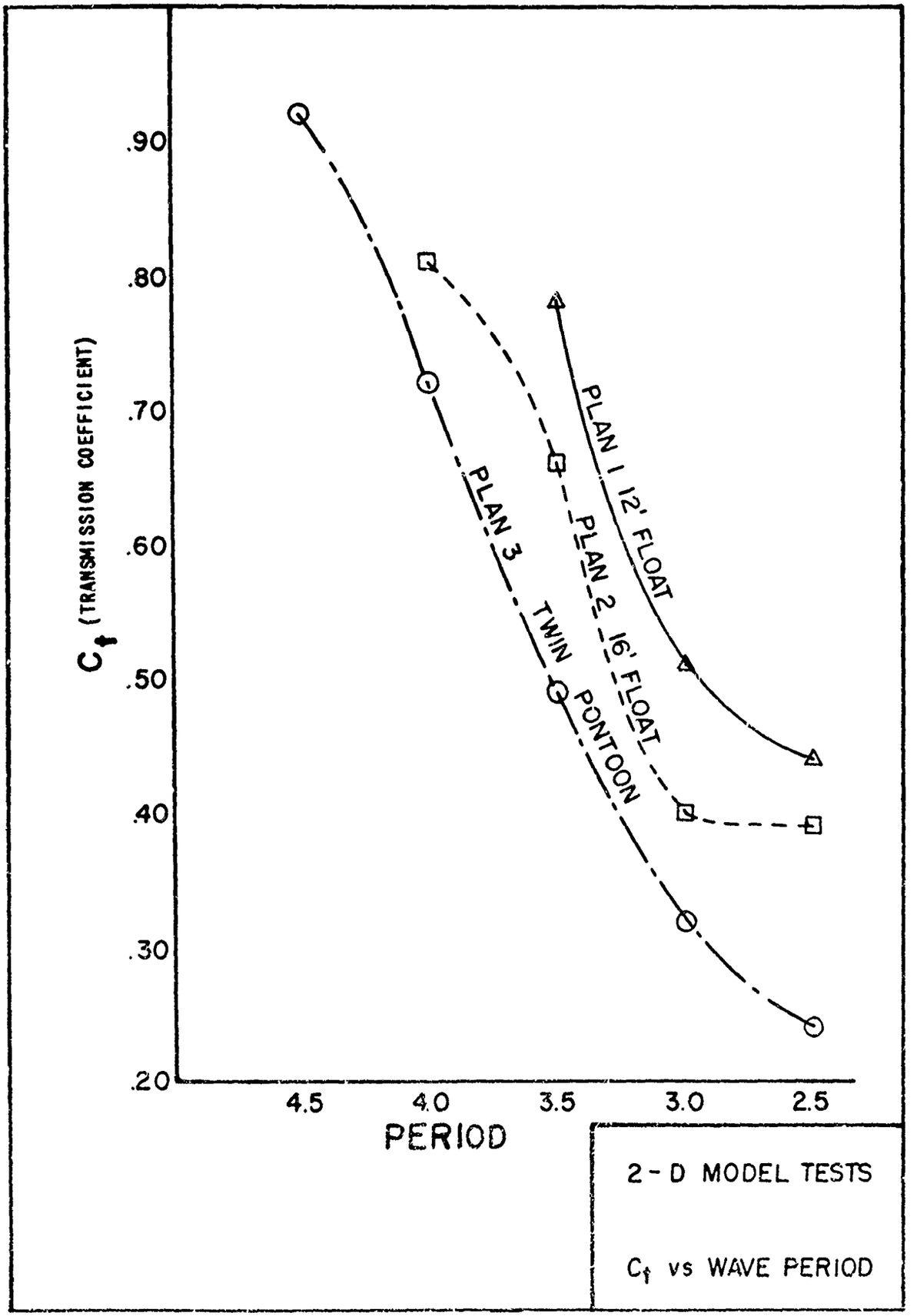

.90
.80
.70
.60
.50
.40
.30
.20
C_t (TRANSMISSION COEFFICIENT)
4.5
4.0
3.5
3.0
2.5
PERIOD
PLAN 1 12' FLOAT
PLAN 2 16' FLOAT
PLAN 3 TWIN PONTOON
2-D MODEL TESTS
C_t vs WAVE PERIOD

FIGURE B-5

costs of the plans investigated, it was felt that with proper alinement of the structures, adequate and economical protection could be provided by Plan 2, the 16-foot-wide by 3.5-foot draft structure.

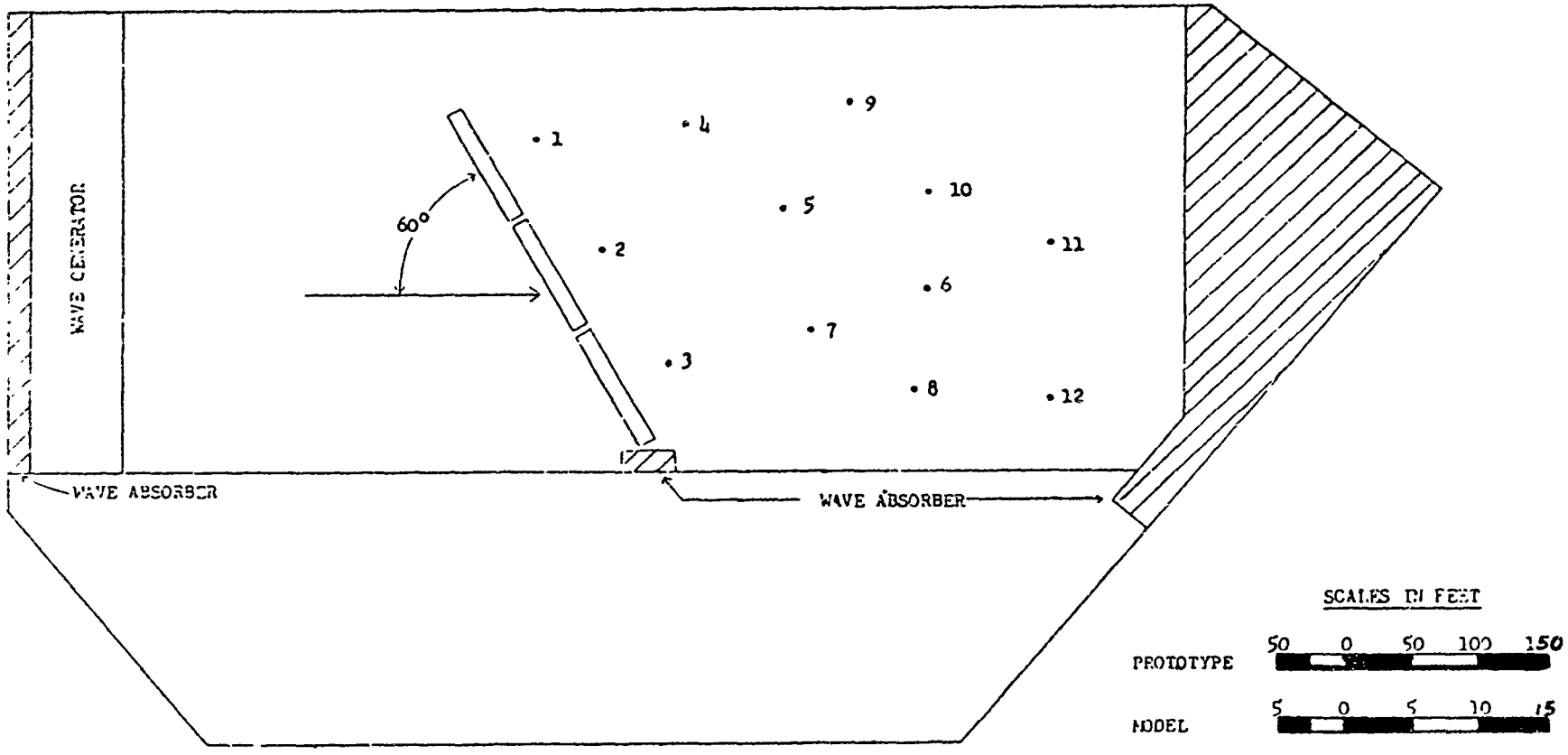
B-12. To investigate the combined effects of transmission and diffraction for various breakwater layouts, three-dimensional wave attenuation tests were conducted in a 40-foot-wide wave flume. Three modules of Plan 1 were arranged in the following configurations: 60-degree linear (figure B-6), 75-degree linear (figure B-7), concave (figure B-8), and convex (figure B-9). For all configurations, transmitted wave heights were measured by 12 gages placed at various locations behind the breakwaters. Transmission coefficients plotted against wave period for the 3-D testing at the 25-foot depth are shown on figure B-10.

B-13. Based on test results from the 25-foot depth, it was decided to test the 75-degree linear and convex configurations at a 10-foot depth, representative of low tide conditions. Compared to the 25-foot depth, these tests showed a general trend toward slightly lower transmitted heights.

B-14. Based on the test results and observed differences in transmission coefficient, C_t, for the various configurations, variations were not large enough to favor selection of any one of the configurations over the other four For East Bay design wave conditions C_t ranged between about 0.4 and 0.5 for the different configurations. Therefore, the most economical alinement (75-degree linear) was selected.

B-15. Water Quality. The Washington State Department of Ecology (WDE) has classified lower Budd Inlet as class B (good) waters. Recent studies by the Corps of Engineers (1977) and WDE (1977-1978, unpublished) indicate that a significant water quality problem exists in lower Budd Inlet and East Bay due to a sag in dissolved oxygen (DO) during late summer in some years. During this time, the DO sag develops fairly rapidly, with DO levels in 1977 dropping to 1-2 milligrams per liter (mg/l) in inner West Bay (WDE, 1977-1978) and 0-1 mg/l in East Bay (Corps 1977). This condition persists for 2 to 4 weeks, and then DO returns to normal levels (about 5-6 mg/l). The sag appears regularly each year at about the same time, although not always to the same extent. The period monitored (1977-1978) was a year of low amounts of freshwater inflow and therefore probably represents a worst case condition.

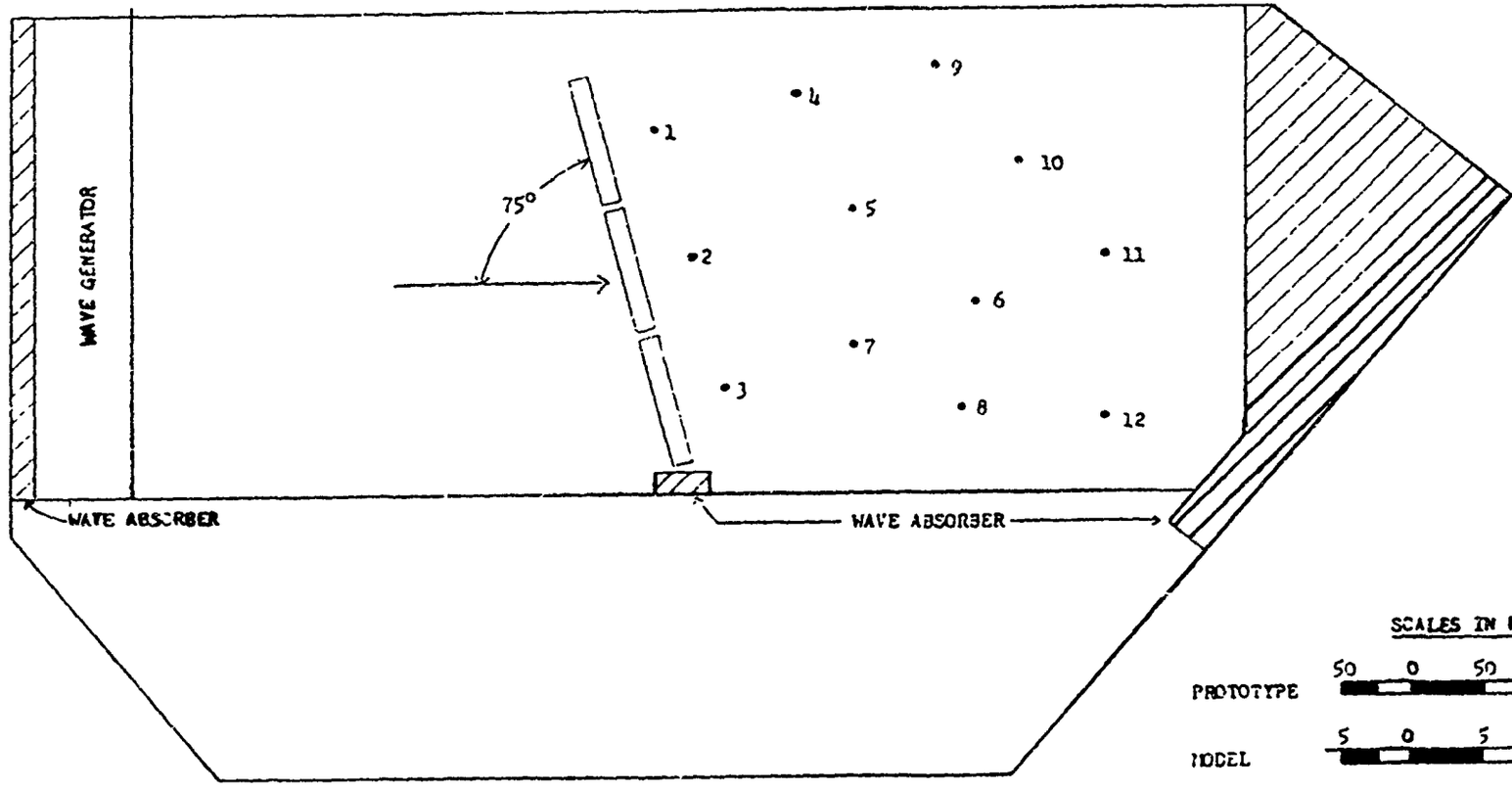
B-16. A hydraulic model study was conducted by the University of Washington's Harris Hydraulic Laboratory for the Port of Olympia. This study was used as a design guide and evaluation tool in developing an optimum basin layout. In addition, the results of this model were compared with field and model studies undertaken for other small boat basins in the Puget Sound region to assist in an assessment of the potential water quality within East Bay Marina. The area included in the model was arrived at through a tradeoff between workable scale



• INDICATES WAVE GAGE LOCATION

MODEL LAYOUT
60°-LINEAR CONFIGURATION

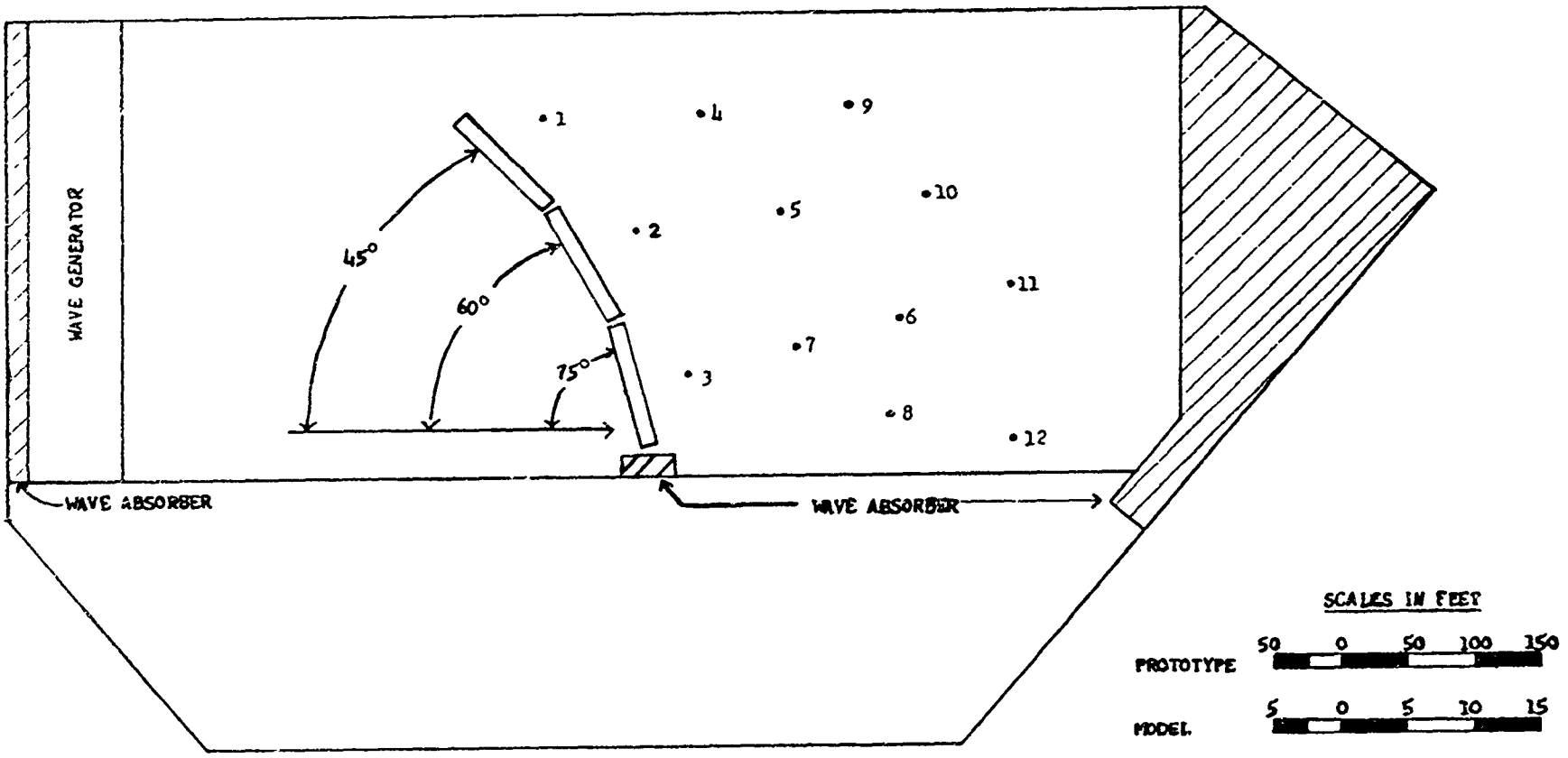
FIGURE B-6



• INDICATES WAVE GAGE LOCATION

MODEL LAYOUT
75°-LINEAR CONFIGURATION

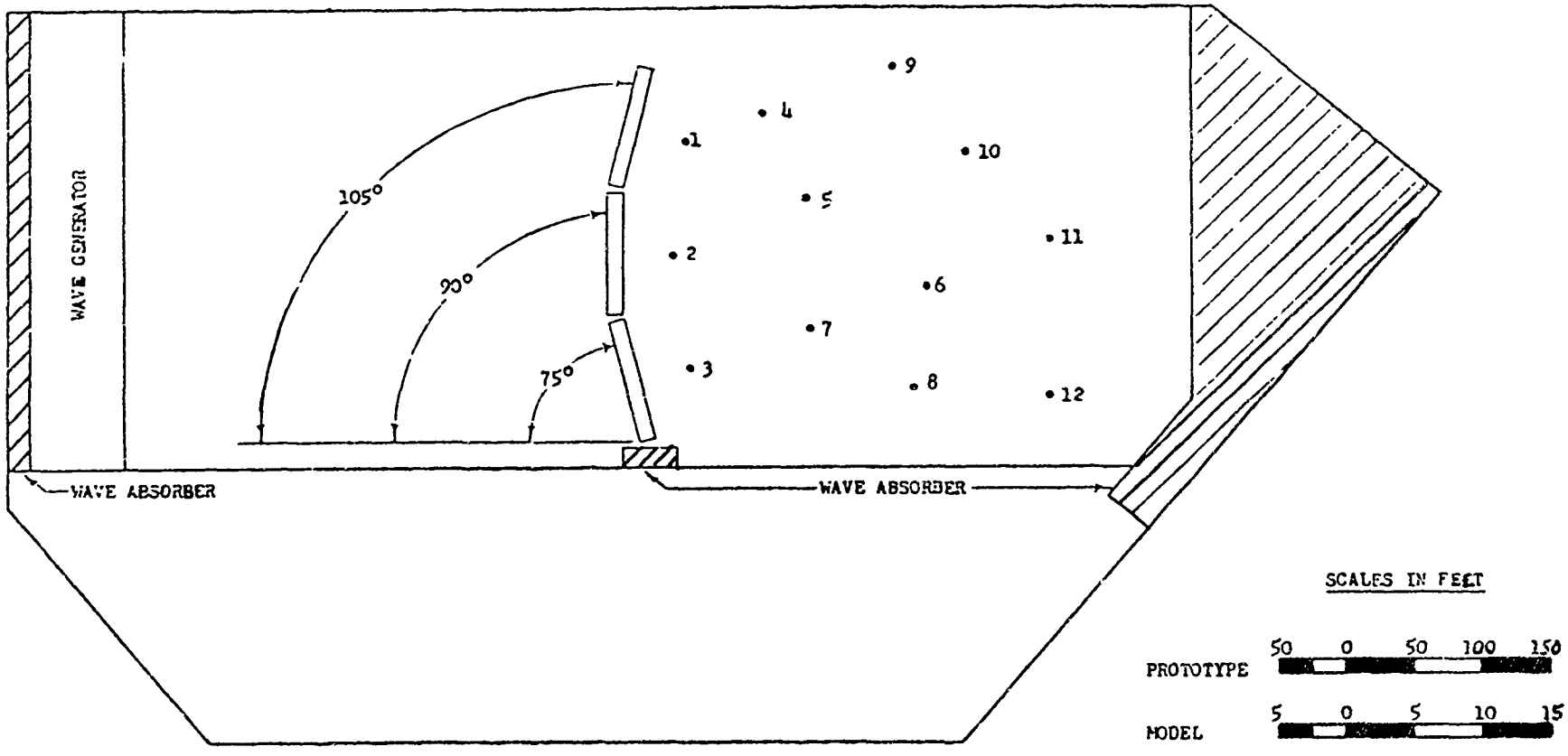
FIGURE B-7



* INDICATES WAVE GAGE LOCATION

FIGURE B-8

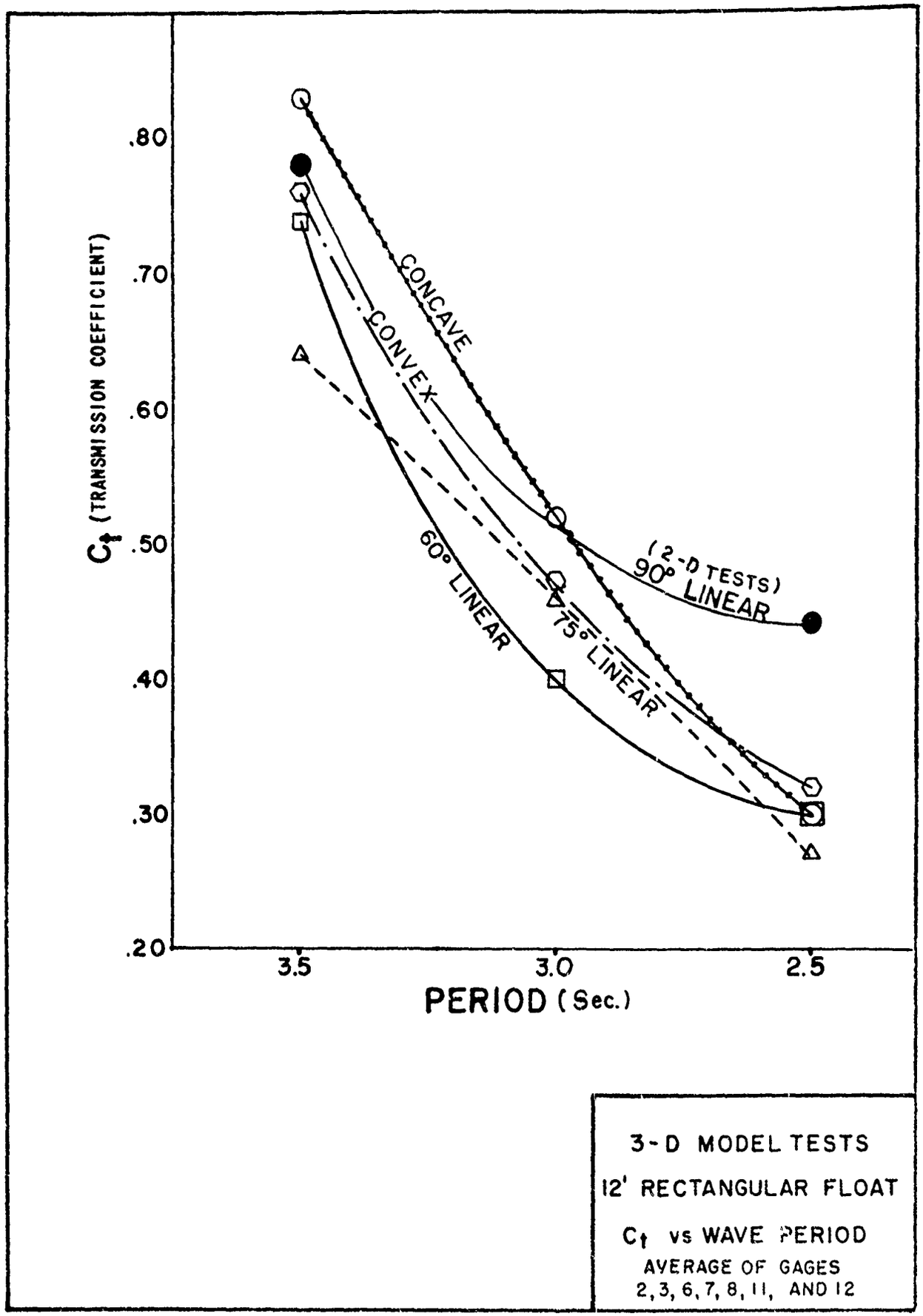
MODEL LAYOUT
CONCAVE CONFIGURATION



* INDICATES WAVE GAGE LOCATION

MODEL LAYOUT
CONVEX CONFIGURATION

FIGURE B-9



3-D MODEL TESTS

12' RECTANGULAR FLOAT

C_t vs WAVE PERIOD

AVERAGE OF GAGES
2, 3, 6, 7, 8, 11, AND 12

FIGURE B-10

ratios and prototype features. Scales of 1:480 horizontal and 1:48 vertical dimensions, nonsaline water, and mean tides were used for the East Bay model studies. Drogue and dye measurements were used to determine currents and exchange ratios in the model.

B-17. The hydraulic characteristics of a marina, as relating to water quality, have three major interdependent components: (1) the tidal prism ratio (a measure of the potential exchange of basin water with each tide), (2) the exchange coefficient to quantify the actual exchange with each tide, and (3) mixing, which applies to the internal circulation of the basin. A number of alternative layouts and different depths were tested, including both fixed and floating breakwater structures. These tests were utilized extensively in developing the plan to maximize water quality parameters of exchange and circulation within East Bay and the marina. The model successfully represents tidal circulation effects, but features such as point-source pollutants, water density stratification, and wind stress were not included in the model. Hydraulic model studies of the proposed small boat basin concluded that the disadvantages that ordinarily would be associated with a relatively long and narrow basin are largely compensated by a high tidal prism ratio and a geometry which causes relatively good mixing. These two factors result in exchange coefficients in line with model data for other regional marinas. While the model test indicated that the basin will exchange with waters in the lower end of Budd Inlet, it did not reflect either the chemistry or quality aspects of these waters. Omitting the stratification (density) effects from the model is believed to result in conservative estimates of exchange coefficients. Detailed information on the model test is published in University of Washington Technical Report No. 50, "Flushing and Mixing Characteristics - East Bay Small Boat Basin," July 1977.

B-18. Breakwater Design. The floating breakwater would consist of seven hollow concrete modules, 100 feet long by 16 feet wide by 5.5 feet deep. Details of these modules are shown on plate 3a. The module walls would be 5.0 inches thick with welded wire reinforcing and each module would be longitudinally posttensioned. The breakwater would be held inplace by anchor lines attached to steel piles driven to full embedment into the medium-dense sands below the bay muds as shown on plate 3a. Concrete block anchors were considered but are about $200,000 more costly than pile anchors. The anchor lines would consist of chain and bridge rope cable with impressed current cathodic protection to prevent corrosion. The anchor lines would be about 150 feet long and have about a scope of 5 at high tide. The modules would be connected by thread bar tendons (see plate 3b). Dredging will be required under the breakwater to a depth of -12 feet MLLW to prevent the structure from striking bottom at extreme low tides and to provide keel clearance for boats at or near the breakwater. Design and functional experience of existing floating breakwaters in Alaska, Rhode Island, California, and Washington, as well as model test results and calculated and measured wave loadings, were considered and/or used as a basis for design.

B-19. For design wave conditions of H_s = 2.0 feet and period, T, of up to 2.8 seconds, transmission coefficient of the breakwater is estimated between 0.4 and 0.5, allowing a maximum wave of up to 1 foot in the basin. This condition would persist only during extreme wind conditions occurring at high tides with only the outer floats in the moorage area subjected to this attack.

B-20. Recreational Facilities to be Provided. Facilities to be provided on the floating breakwater are shown on plate 3a and 3b. They include a pedestrian access pier, ramps, and float from the shore to the breakwater, quarry spall slope protection beneath the main access ramp, and low "bull rails" along each side of the breakwater. Vehicle access to the breakwater would be prohibited. Timber fenders would be provided along the marina side of the breakwater to protect boats from scraping the concrete breakwater. A 1-inch waterline for potable water with spigots or taps at about 50-foot intervals, and a 110-/220-volt electric line with weatherproof outlets at about 50-foot intervals will be provided along the marina side of the breakwater. Cleats for temporary tieup of pleasure craft may be installed on the bull rail along the marina side of the breakwater at the option of the local sponsor. The Federal Government would include the access pier, ramps, and float, slope protection, bull rails, boat fenders, and water and electrical lines in the design of the breakwater. Design of these facilities would be coordinated with the Port of Olympia, the local sponsor of the project.

B-21. Table B-2 shows the first costs of construction based on October 1980 price levels. The costs are separated; Federal costs which are eligible for cost sharing ($90,000) and local or self-liquidating costs ineligible for cost sharing ($53,000). The Port of Olympia would be responsible for design and construction for connecting the water and electrical service from the shoreside source to the breakwater. The Port of Olympia would be responsible for operation and maintenance of the recreational facility.

B-22. Federal Navigation Channels. The entrance channel would be approximately 500 feet west of the East Bay shoreline at the head of the marina and veer off to the northwest to join the existing West Bay Federal Navigation Channel. The entrance channel would be 3,700 feet long and 150 feet wide with a depth of 13 feet below MLLW. The main access channel would parallel the moorage area and is about 3,000 feet long and 100 feet wide with project depth of 13 feet below MLLW. A 600-foot-long access channel, 100 feet wide and with a project depth of 12 feet below MLLW, would be provided to the moorage area and boat ramp just inside the marina breakwater. These depths would provide for boat traffic at all tide stages. Dredge volumes for the entrance and access channels are estimated at 605,000 cubic yards, which includes 1 foot of overdepth and 1 foot of advance maintenance in the entrance channel and main access channel, and 1 foot of overdepth in the ramp access channel. Dredge quantities beneath the breakwater and out to the pile anchors are

estimated at 95,000 cubic yards. Quantities are based on sideslopes of 1 vertical to 4 horizontal and include a +10 percent contingency. Dredging is expected to be by hydraulic dredge with pipeline disposal.

B-23. Moorage Area. The moorage area of about 32 acres would be dredged to 8, 10, and 12 feet below MLLW as shown on plate 2a. An estimated 475,000 cubic yards, which includes 1 foot of overdepth allowance and a +10 percent quantity contingency, would be dredged from the berthing area. The depths were requested by local interests and are adequate for moorage of the type of craft expected for all tides.

B-24. Disposal Area. The dredge disposal area of about 53 acres and disposal dikes would be provided by the local sponsor. The designated area, next to the existing port peninsula, would be used for disposal of approximately 1.175 million cubic yards dredged from the Federal channels, from beneath the breakwater, and from the moorage basin. The area would be filled to an elevation of about +20 feet MLLW, providing a cargo handling area and marina support facilities. Part of the material to be dredged is of questionable suitability for deepwater disposal and would be more costly (by about 50 percent) than the proposed disposal method. Dikes, to be provided by the Port, would be required along the entire perimeter of the fill area. The estimated capacity of the fill area is approximately 1.5 million cubic yards, which is of sufficient volume to contain all the dredged material including swell of the material as a result of dredging.

B-25. Effects on Adjacent Shorelines. The East Bay project should not have any adverse effects on the adjacent shoreline. The predominant alongshore movement of littoral drift is in a southerly direction but of minor volume. No substantial blockage of this material should occur along the eastern shoreline. With a floating breakwater, only minor changes in water circulation would result. Preliminary boat wake studies were made using tables from Sorenson's "Water Waves Produced by Ships," May 1973. This report shows that the sailing distance from shore and boat speed directly affect boat wake heights which reach the shoreline. In East Bay, the proposed channel averages 500 feet from the eastern shoreline; 300 feet at its closest point. Using Sorenson's tables, at the 300-foot distance from shore, if pleasure craft speeds were kept at 5 knots or less, boat waves approaching the shoreline would be one-half foot or less in height. At low tide, boat wakes would be dissipated on the tide flats causing short-term resuspension of material at water's edge. Sailing distance from the channel to the moorage floats is only 100 feet, and boat speeds greater than 5 knots would cause wake problems to boats moored in the marina. Prudent navigation practices and regulations limiting speeds to 5 knots or less would reduce the chance of damage to moored boats and the possibility of shoreline erosion. Top of the channel-cut slope is greater than 250 feet from the nearest east shoreline structure and is not expected to cause stability problems to the structures ("Report of Supplementary Geotechnical Investigation, Proposed East Bay Development Program," Dames and Moore. 17 August 1978).

B-26. Maintenance. Breakwater maintenance is expected to include repair of spalled concrete and the cathodic protection system annually and replacement of the cathodic protection anodes every 25 years of the 50-year project life. Inspection below water would be made every 3 years; also, a periodic inspection above water would be made annually and/or following severe weather or unusual loading conditions.

B-27. Maintenance dredging during the project life is only expected in the entrance channel and possibly along the north side of the breakwater. Dredging, estimated at 50,000 cubic yards, is anticipated at about year 25 of the 50-year project life. Disposal of this material is expected to be at the designated deepwater disposal site in Dana Passage (figure B-11); however, because of possible changes in availability of disposal areas and changes in regulations during the next 25 years, approval for disposal would be secured at the time of maintenance. Significant shoaling in the access channels and moorage area is not expected during the project life based on the relatively low littoral and current forces at the site and on experience at other projects with similar conditions.

B-28. Estimate of Costs. Detailed breakdown of first costs and maintenance costs for the Federal project are shown on tables B-1 through B-4. Table B-5 shows the estimated local interest's construction cost of self-liquidating items. Table B-6 shows local interest's maintenance costs of recreational facilities on the floating breakwater. Quantities included in the first cost table, table B-1, do not include contingencies except for the dredging item which includes a +10 percent quantity contingency. Because of the precise nature of determining quantities for such items as concrete, styrofoam, connectors, etc., quantity contingencies have not been included for these materials. Project costs are based on October 1980 prices.

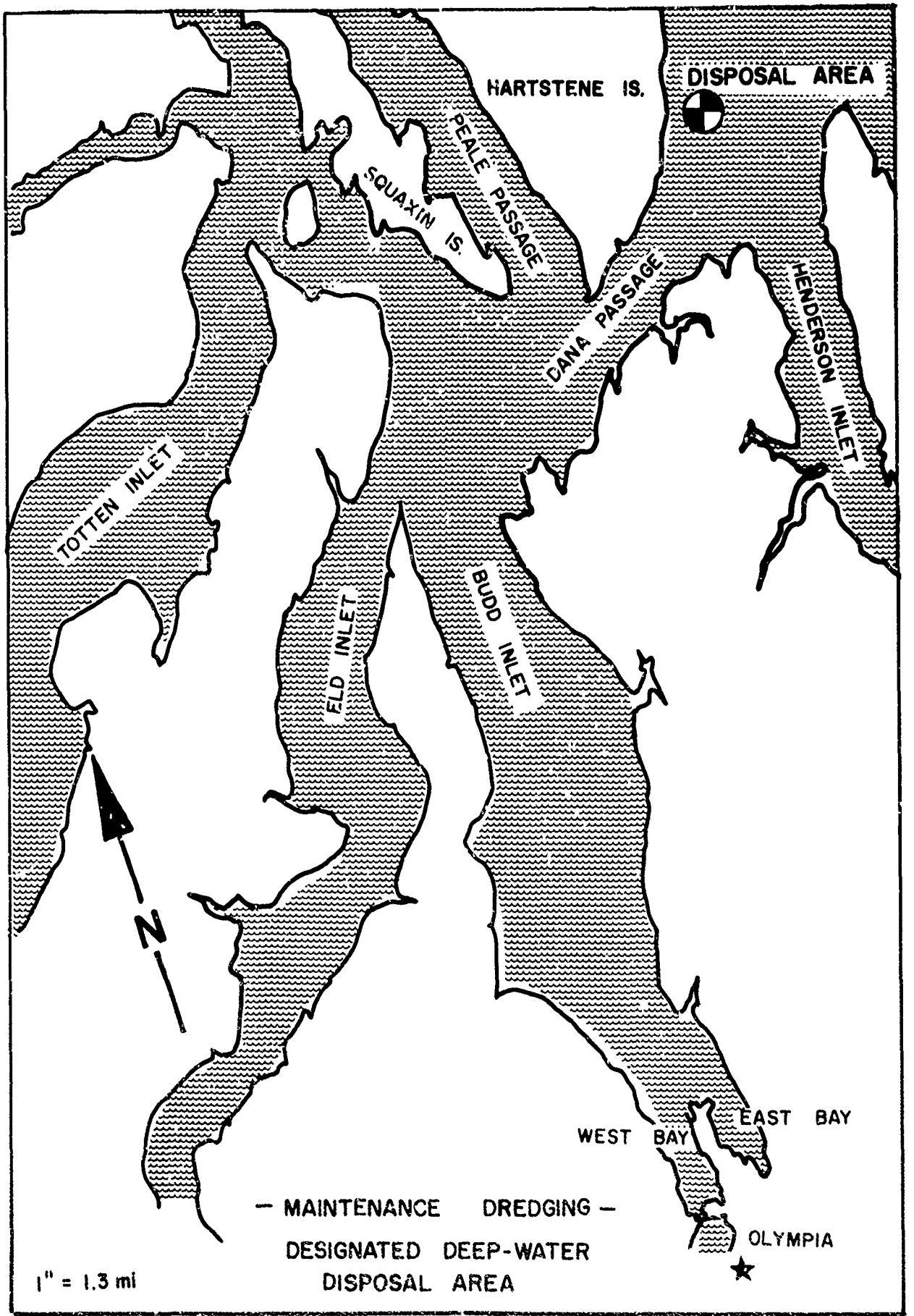

HARTSTENE IS.
DISPOSAL AREA
PEALE PASSAGE
SQUAXIN IS.
CANA PASSAGE
HENDERSON INLET
TOTTEN INLET
ELD INLET
BUDD INLET
N
WEST BAY
EAST BAY
OLYMPIA
— MAINTENANCE DREDGING —
DESIGNATED DEEP-WATER
DISPOSAL AREA
1" = 1.3 mi

FIGURE B-1

TABLE B-
ENERAL NAVIGATION ACILITIES
ESTIMATED FIRST COSTS
PROPOSED PLAN
CTOBER 1980 PRICE LEVEL

UNIT	QUANTITY	UNIT COST	TOTAL COST
by			
et deep			
for			
C.Y.	24	$185.00	$4,440
C.Y.	73	$115.00	8,395
S.F.	5,466	$3.75	20,498
S.F.	1,507	$8.50	12,810
LBS.	10,166	$0.45	4,575
EA.	6	$320.00	1,920
L.F.	600	$3.20	1,920
L.F.	600	$3.00	1,800
EA.	6	$1,600.00	9,600
EA.	6	$575.00	3,450
EA.	1	$11,000.00	11,000
			$80,408
			$562,856
L.F.	232	$160.00	$37,120
L.F.	216	$125.00	27,000
EA.	8	$32.00	256
EA.	8	$36.00	288
EA.	8	$90.00	720
EA.	8	$100.00	800
			$66,184
L.F.	1,080	$11.00	$11,880
L.F.	1,080	$12.00	12,960
			$24,840

TABLE B-1 (con.)

	UNIT	QUANTITY	UNIT COST	TOTAL COST
d. Anchor Connection To Module				
6" Dia. Pipe	L.F.	156	$21.00	$3,276
Misc. Metal	LBS.	2,829	$4.25	12,023
12" Manhole Covers	EA.	16	$175.00	2,800
1-1/8" Chain	L.F.	240	$26.50	6,360
1-1/2" Dia. Bolts by 9" long	EA.	32	$8.75	280
7/8" Anchor Sockets	EA.	8	$90.00	720
1" Anchor Sockets	EA.	8	$100.00	800
7/8" Anchor Shackles	EA.	8	$32.00	256
1" Anchor Shackles	EA.	8	$36.00	288
Subtotal				$26,803
e. Connections				
1" 0 by 6' Dywidags	EA.	144	$24.00	$3,456
Anchor Plates	LBS.	1,318	$4.25	5,602
Gaskets	EA.	144	$5.00	702
Tie Units Together	EA.	6	$4,200.00	25,200
Subtotal				$34,978
f. Cathodic Protection System				
Anode	EA.	8	$275.00	$2,200
Anode Terminal Boxes	EA.	4	$235.00	940
Rectifier	EA.	1	$2,000.00	2,000
#2 - CP Type Cable	L.F.	2,000	$1.50	3,000
Ground Clamps	EA.	16	$30.00	480
Connectors	EA.	16	$30.00	480
Conduit 1-1/4" PVC	L.F.	700	$1.50	1,050
Misc. Fittings	JOB	1	L.S.	4,000
Subtotal				$14,150
Subtotal Breakwater Costs				$729,811
			say	$730,000
2. DREDGING				
a. Access and Entrance Channels, Breakwater	C.Y.	700,000	$1.45	$1,015,000
b. Dike for Dredge Disposal Area (Federal Dredging Only)	JOB	1	L.S.	578,000 1/
Subtotal - Dredging				$1,593,000

1/Includes contingencies, F&D, and S&A.

TABLE B-1 (con.)

	UNIT	QUANTITY	UNIT COST	TOTAL COST
3. AERATION UNITS (Supply Contract)	EA.	33	$4,600.00	$152,000 2/
Subtotal				$2,475,000
4. CONTINGENCY				$475,000
Subtotal - Construction Cost				$2,950,000
5. ENGINEERING AND DESIGN				$241,000
6. SUPERVISION AND ADMINISTRATION				138,000
7. ENVIRONMENTAL MONITORING DURING CONSTRUCTION				27,000
8. LANDS FOR GENERAL NAVIGATION FACILITIES				40,000
Subtotal - First Costs				$3,396,000
9. AIDS TO NAVIGATION - U.S. COAST GUARD				$45,000
10. TOTAL FIRST COST - GENERAL NAVIGATION FACILITIES				$3,441,000

2/Includes cost for aeration unit, mounting bracket, and switch gear. E&D is allowed for in item 5.

APPROVED

DATE 5 Dec. 80

TABLE B-2
SUMMARY OF ESTIMATED FIRST COSTS
RECREATION FACILITIES ON FEDERAL FLOATING BREAKWATER
OCTOBER 1980 PRICE LEVEL

1.	Federal Cost	
	a. Access Ramp:	
	(1) Access Pier and Quarry Spalls	$28,500
	(2) Access Ramps	20,000
	(3) Float Piling	2,500
	(4) Ramp Float	6,000
	b. Bull Rail and Anchor Bolts	5,000
	c. Subtotal: Construction	$62,000
	d. Contingencies	$16,000
	e. Engineering and Design	6,000
	f. Supervision and Administration	6,000
	g. Total Federal First Cost	$90,000
2.	Local Costs	
	a. Bumpers and Anchors	$7,500
	b. Water System	5,100
	c. Electrical Power System	24,300
	d. Subtotal: Construction	$36,900
	e. Contingencies, E&D, S&A	$16,100
	f. Total Local First Cost	$53,000
3.	Total First Cost	$143,000

TABLE B-3
BREAKWATER REHABILITATION COSTS
OCTOBER 1980 PRICE LEVEL

Item	Total Cost
1. Above Water Inspection (Annually and After Storms)	$1,200/year
2. Below Water Inspection (Every 3rd Year)	$5,800/3 years
3. Repairs and Replacement:	
a. Repair Spalled Concrete (Annually)	$1,200/year
b. Replace 50 Percent of Access Piers, Float Pilings and Bull Rails (Every 25th Year)	$29,000/25 years
c. Repaint Access Ramp (Every 10th Year)	$600/10 years
e. Maintain Cathodic Protection System (Annually)	$1,200/year
f. Replace Anodes on Cathodic Protection System (Every 25th year)	$7,000/25 years

NOTE: Floating units, except as shown above, are assumed to have a 50-year life.

TABLE B-4
25-YEAR MAINTENANCE DREDGING COSTS
OCTOBER 1980 PRICE LEVEL

	Item	Unit	Quantity	Unit Cost	Total Cost
1.	Federal Channels	C.Y.	50,000	$2.40	$120,000
2.	Cost Contingencies				30,000
3.	E&D				12,000
4.	S&A				12,000
5.	Total Estimated Cost				$174,000

NOTES: 1. Dredging would probably be accomplished on a 25-year cycle.
2. Federal maintenance costs by the U.S. Coast Guard for navigation aids are estimated at $4,000 per year.

TABLE B-5
ESTIMATED FIRST COSTS
LOCAL INTEREST CONSTRUCTION SELF-LIQUIDATING ITEMS
OCTOBER 1980 PRICE LEVEL

Item		Total Cost
1.	SITE DEVELOPMENT - MARINA UPLANDS	
	a. Moorage Basin Dredging, 475,000 c.y.	$687,000
	b. Dikes for Local Dredge Disposal	578,000
	c. Dewatering and Compacting Dredge Fill	347,000
	d. Surface Fill	281,000
	e. Grading and Drainage	277,000
	f. Utilities	382,000
	g. Bulkhead	310,000
	h. Paving and Walkways	190,000
	i. Landscaping	116,000
	Subtotal	$3,168,000
2.	ACCESS ROAD	
	a. Landfill, Grading, and Drainage	$190.000
	b. Paving, Curbs, and Walks	433,000
	c. Lights, Signals, and Landscaping	162,000
	Subtotal	785,000
3.	MOORAGE FLOATS	
	a. Floats, Piling, and Gangways, 800 Berths	$2,812,000
	b. Utilities and Miscellaneous	277,000
	Subtotal	3,089,000
4.	RECREATION FACILITIES ON BREAKWATER	$53,000
5.	SUPPORT FACILITIES	
	a. Restrooms, Four Each	$231,000
	b. Fuel Float with Sanitary Pumpout	70,000
	c. Launch Ramp	58,000
	Subtotal	359,000
6.	SUBTOTAL, CONSTRUCTION	$7,454,000
7.	CONTINGENCIES (15% ±)	$1,056,000
8.	SUBTOTAL	$8,500,000
9.	ENGINEERING, LEGAL, ADMINISTRATIVE (6% ±)	$500,000
10.	TOTAL ESTIMATED COST, SELF-LIQUIDATING ITEMS	$9,000,000

TABLE B-6
ESTIMATED LOCAL INTERESTS' MAINTENANCE COSTS[1/]
RECREATION FACILITIES ON FEDERAL FLOATING BREAKWATER
(SELF-LIQUIDATING ITEMS)

	Costs[3/]	Average Annual Costs[2/]
1. Access Ramp		
a. Replace 50 Percent of Access Pier, Float Piling, and Bull Rails (Every 25th Year)	$29,000	$400
b. Repaint Access Ramp (Every 10th Year)	$600	40
Subtotal		$440
2. Contingencies		$160
3. Engineering and Design		200
4. Supervision and Administration		200
Total Maintenance Costs		$1,000[1/]

1/Maintenance costs for recreation facilities on Federal floating breakwater are local cost items.
2/Numbers rounded: 7-3/8 percent interest rate, 50-year project life.
3/Does not include contingencies, E&D, and S&A.

APPENDIX C

BREAKWATER RECREATIONAL FACILITIES COSTS AND BENEFITS

GENERAL

C-1. This appendix presents the results of studies for the feasibility of providing recreational facilities on the floating breakwater for the East Bay Marina, Olympia Harbor, Washington, as requested in the 7 June 1979 letter of the Port of Olympia, the local sponsor of the marina project (Appendix A, PERTINENT CORRESPONDENCE).

RECREATIONAL OPPORTUNITIES

C-2. Recreational opportunities desired for the floating breakwater include fishing, sightseeing, and temporary tieup of pleasure craft on the marina side of the breakwater. Swimming from the breakwater would be prohibited.

FACILITIES TO BE PROVIDED

C-3. Recreational facilities to be provided are shown on plates 3a and 3b. They include a pedestrian access ramp from the shore to a float, then from the float to the breakwater, and low "bull rails" along each side of the breakwater. Vehicle access to the breakwater would be prohibited. Timber fenders would be provided along the marina side of the breakwater to protect boats from scraping the concrete breakwater. A 1-inch waterline for potable water with spigots or taps at about 50-foot intervals, and a 110-/220-volt electric line with weatherproof outlets at about 50-foot intervals will be provided along the marina side of the breakwater. Cleats for temporary tieup of pleasure craft may be installed on the bull rail along the marina side of the breakwater at the option of the local sponsor.

COST AND BENEFIT APPORTIONMENT

C-4. General. Costs and benefits of the floating breakwater recreational facilities are not included in the economic analysis of the general navigation facilities, but are used only for determining the economic justification of the recreational facilities.

C-5. First Costs. Table B-2 shows the first costs of construction based on October 1980 price levels totaling $143,000 ($90,000 Federal costs eligible for cost sharing and $53,000 non-Federal self-liquidating costs).

C-6. Annual Costs. Table B-6 shows the annual maintenance, periodic replacement or repair, and average annual costs of the facilities that are eligible for cost sharing. Average annual costs of $1,000 were computed at a 7-3/8 percent interest rate with a 50-year project life.

C-7. Benefit. Benefits which would accrue from the recreational facilities on the floating breakwater would be fishing, sightseeing, and temporary tieup of pleasure boats to marina side. Temporary tieup of pleasure craft differs from temporary or transient moorage. These craft would moor a short time while occupants shop, visit restaurants, restrooms, or sightsee.

C-8. Benefits for recreational fishing from the breakwater were based on guidance contained in Appendix H, EC 1105-2-87. The methodology specifies multiplying the projected use by the value of each activity occasion, determining the present value of the total benefits amortized over the project life. The number of anglers per day projected to use the proposed East Bay facility was obtained from the Marine Fish Enhancement Unit of the Washington State Department of Fisheries. Methodology used was the number of anglers per day using a similar facility and assigning modification factors to each of four different criteria: ease of access, population density within 25 miles, availability of similar facilities nearby, and recreational appeal and potential for fishing success. Using 800 fishing activity occasions per day from a similar unit as a base and .06 as the product of the modifications factors, 48 fishing activity occasions per day wer projected for the East Bay Marina breakwater. With guidance from EC 1105-2-87, $1.40 was established as the value for each activity occassion. With this value and 48 activity occasions per day, the daily recreational benefits equal $67.20, and the yearly benefits total $24,528. Since the yearly benefits do not change over the project life, amortization of the present value of the benefits is not necessary.

C-9. Additional benefits could be derived from sightseeing and from temporary tieups of pleasure craft to the marina side of the breakwater. However, benefits for these recreational pursuits were not computed for this report as average annual benefits from fishing alone far exceeds the average annual cost of providing the facilities.

COST APPORTIONMENT

C-10. Benefits from recreational fishing and sightseeing are considered to be equally Federal and local. Accordingly, first costs of construction for providing these recreational facilities are 50 percent Federal and 50 percent local. However, maintenance of the recreational facilities are a local responsibility. For recreational fishing and sightseeing from the floating breakwater at the East Bay Marina, Olympia Harbor, Washington, these facilities are considered to be the pedestrian access pier, ramps, and float from the shore to the breakwater, and the bull rails along the outer and inner edge of the breakwater.

C-11. Benefits from recreational boating are also considered to be equally Federal and local. However, in providing facilities for recreational boating, piers, docks, floats, and services to the same are considered self-liquidating items and construction and maintenance are a local responsibility. Costs are not eligible for cost sharing. For this project, these self-liquidating items are considered to be the timber fenders on the breakwater to keep boats from scraping the concrete and the water and electrical lines along the marina side of the breakwater. Cost of these items are not included in the benefit/cost ratio for providing the recreational facilities. Table C-1 shows the total cost and allocation of cost, Federal and local.

TABLE C-1

COST APPORTIONMENT

	TOTAL	FEDERAL	LOCAL
FIRST COST:			
Access pier, ramps, float, and bull rails	$90,000	$45,000	$45,000
Bumpers - water and electrical systems	53,000	0	53,000
Total first cost	$143,000	$45,000	$98,000
AVERAGE ANNUAL MAINTENANCE COST:			
Access ramps and bull rails	$1,000	$0	$1,000

SUMMARY - AVERAGE ANNUAL BENEFITS AND COSTS, AND BENEFIT-TO-COST RATIO

C-12. Table C-2 summarizes the average annual benefits, first cost, average annual costs, and the benefit-to-cost ratio.

TABLE C-2

SUMMARY OF BENEFITS, COSTS, AND
BENEFIT TO COST RATIO
RECREATION FACILITIES ON FEDERAL FLOATING BREAKWATERS[1/]

1. AVERAGE ANNUAL BENEFITS	$25,000
2. FIRST COST[2/]	$90,000[1/]
3. AVERAGE ANNUAL COSTS:	
a. Average annual first cost	$6,800
b. Average annual maintenance cost	1,000
c. Total average annual costs	$7,800
4. BENEFIT-TO-COST RATIO	3.2 to 1

1/Numbers rounded.
2/Does not include self-liquidating items.

NOTE: Numbers rounded: 7-3/8 percent interest rate, 50-year project life.

DIVISION OF PLAN RESPONSIBILITIES

C-13. The Federal Government would include an access pier, ramps, float, bull rails, boat fenders, and water and electrical lines in the design of the breakwater. Design of these facilities would be coordinated with the port of Olympia, the local sponsor of the project. Cost sharing would be in the amounts specified in previous paragraphs, subject to changes in cost by actual construction. The Port of Olympia would be responsible for design and construction for connecting the water and electrical service from the shoreside source to the breakwater and a walkway to the access pier. The Port of Olympia would be responsible for operation of the recreational facility and for the cost of maintenance previously specified.

APPENDIX D

WATER QUALITY AERATION SYSTEM

GENERAL

D-1. This appendix provides background for the inclusion of a water quality mitigation system as part of the recommended plan. Basis of selection, design, and operational criteria are set forth along with other pertinent information.

BACKGROUND

D-2. Potential adverse water quality impacts resulting from the proposed project were recognized early in the studies leading to the draft detailed project report (DPR)/environmental impact statement (EIS) distributed for public review in December 1979. However, because of uncertainty over the severity of these impacts and the recognized probable high cost of mitigation measures, the draft DPR/EIS proposed water quality monitoring after project construction to determine if indeed an unacceptable water quality problem would occur. If a problem was found, then further action would have been necessary to insure maintenance of water quality in East Bay. By letter dated February 28, 1980, Environmental Protection Agency (EPA) requested additional analysis of the magnitude and duration of the water quality changes which would result from the construction and operation of the boat basin under the recommended and alternative plans (see appendix H). By letter dated 9 April 1980 (see appendix A), the Seattle District, Corps of Engineers (COE), agreed to further studies with the scope of these studies outlined.

D-3. The additional studies were conducted as a coordinated joint effort between EPA and COE over the period April through August 1980. A number of meetings were held involving representatives of the Washington Departments of Game (WDG), Fisheries (WDF), and Ecology (WDE); the Port of Olympia; and Fish and Wildlife Service (FWS) to discuss the analysis and data generated from computer studies using a mathematical model developed by EPA (see section 4.1.3.2 of the EIS). During the latter part of the studies, evaluations of alternative water quality mitigation measures were undertaken by a consultant to the Port of Olympia. The results of water quality impact and mitigation studies were presented during a meeting of the Regional Administration of EPA and the Seattle District Engineer held on 20 August 1980. As a follow up to the meeting, EPA indicated by letter dated 29 August 1980 (see appendix G) alternatve 4a would be acceptable if it included a properly designed, operated, and maintained aeration system which would maintain Class B water quality standards within the marina. Subsequently, further engineering studies were undertaken by the Corps of Engineers and the consultant to the Port of Olympia of alternative aeration systems. Informal coordination between the EPA and COE continued during these studies.

PROJECT CONDITIONS WITHOUT MITIGATION

D-4. Water quality modeling studies by COE indicated that construction of the project without mitigation would result in an average dissolved oxygen (DO) decrease of less than 1 milligram per liter (mg/l) from

ambient East Bay conditions. Individual locations may experience higher or lower reductions in DO. In addition, the period when DO was expected to be below Class B standards (less than 5 mg/l) would be extended. Limited water quality data for East Bay already indicate perodic violations of Class B standards during the critical, late summer period (reference COE, 1977; WDE, 1978; and Port of Olympia, 1980; sampling data). Construction of the project would further aggravate this condition.

PROJECT CONDITIONS WITH MITIGATION

D-5. Computer modeling by the COE using the EPA model indicates that with proposed mitigation the project will meet the Class B DO water quality standard of 5 mg/l under expected ambient DO concentrations and depletion rates.

D-6. The water quality data used in the computer model are based on observed DO concentrations and changes during a critical late summer period in 1977 at the proposed marina site (see section 3.1.3.3 of EIS).

AERATION ALTERNATIVES

D-7. Design conditions are summarized in table D-1.

TABLE D-1

DESIGN CONDITIONS

Moorage Basin

Average Length	2,500 feet
Average Width	540 feet
Water Depth:	
MHHW	+14.4 feet
MHW	+13.5 feet
MLW	+ 3.5 feet
MLLW	0 feet
After dredging	-11 feet
Design water depth	19 feet

Maximum (MHW) water volume 40 x 10^6 ft^3

Estimated Dissolved Oxygen Depletion Rate During August 1977

Average (estimated)	0.5 mg/l/day
Maximum (estimated)	2.6 mg/l/day

TABLE D-1 (con.)

Oxygen Supply Required

Oxygen demand:	
Average	33 lb O_2/hr
Maximum	169 lb O_2/hr

Oxygen transfer rate of system is estimated at 0.7 lb. O_2/hr/hp based on the following conditions:

Salinity	27 o/oo
Water temperature	16° C
Initial DO	2 mg/l

Tidal Flow Entering East Bay Proposed Marina Site approximates 2500 c.f.s. (COE).

D-8. Three major mitigation and compensation replacement concepts were considered: (1) aeration, (2) mixing, and (3) compensation for and/or replacement of fish killed during DO depletion event. Aeration alternatives are those devices designed primarily to effect direct air injection into the water column. Five different alternatives were evaluated: (1) fine bubble diffuser from tubes placed on bottom of basin, (2) air lift injection systems with air lift devices placed off marina floats, (3) mechanical surface aerator with draft tubes placed in berthing areas, (4) venturi/helix turbines placed on the bottom of the basin, and (5) direct air jet injection frm a motor driven propeller aspirator pump.

Two mixing alternatives were considered (1) utilizing and applying the above aeration alternatives to accomplish mixing and (2) mixing using high volume pumping devices.

Compensation for or replacement of fish killed was considered as an alternative to actually installing devices to prevent fish kills. Under this concept, fish losses would be compensated for by increasing hatchery production and releases of juvenile salmonids through funds provided to the WDF. This action would replace fish that might be expected to perish during low DO conditions in the marina.

D-9. Of the three mitigation concepts (aeration, mixing, and compensation and/or replacement), compensation and/or replacement was immediately rejected by environmental agencies (EPA, WDE, and WDF) as it would complicate administration of existing environmental laws, policies, and permitting processes. Of the remaining mitigation concepts (aeration and mixing), mixing alternatives were selected. COE modeling studies and analysis indicated that if complete mix were accomplished in the basin, sufficient aeration to meet standards could be achieved and distributed throughout the basin by reaeration from atmosphere and direct air injection from the aerators. COE analysis determined that

the most energy cost efficient method to achieve distributed mixing throughout the basin was via aeration for mixing rather than pumping. Therefore, use of pumps was deleted from further consideration. Each of the remaining viable alternatives for mitigation utilize the aeration alternatives for mixing. The primary design objectives for the mitigation device are: (1) complete mix, (2) maximum oxygen transfer, (3) minimum capital cost, (4) maximum salvage value, (5) minimum operation and maintenance costs, (6) maximum financing flexibility, (7) maximum portability, (8) favorable constructability (9) maximum durability, (10) maximum maintainability, (11) maximum reliability, (12) minimum adverse water quality impacts, (13) maximum energy efficiency/ minimum energy use, (14) minimum noise, (15) minimum miscellaneous undesirable environmental impact, (16) maximum flexibility of operation, (17) maximum public safety, (18) minimum hazard to navigation, (19) minimum vandalism potential, (20) maximum redundancy factor in case of equipment failure, and (21) maximum compliance with permits already being sought for project.

D-10. The five aerated/mixing alternatives are: (1) fine bubble diffuser using tubes placed on the bottom of the basin served by air feeder lines from a central compressor(s), (2) utilization of air lift pump attached to docks and by air feeder lines from a central compressor(s), (3) mechanical surface aerators with draft tubes, (4) venturi/ helix turbine aerators placed on the bottom of the basin served by air feeders lines from central compressor(s), and (5) direct jet air injection and mixing using motor driven aspirator pumps and attached to floating docks.

Fine bubble diffusers utilizing tubes placed on the bottom of the basin were deleted because a check with users of the system indicated the devices clogged very easily in a marine environment and would probably require annual removal from the basin for maintenance in order to maintain their effectiveness for mixing and aeration. Removal and replacement of the 95,000 feet of tubing required annually was judged infeasible. Air lift pumps were deleted from further consideration because of the inability of commercially available equipment to mix the deep basin. The three remaining mixing/aeration alternatives (mechanical surface aerators, venturi/helix turbines, and direct air jet injection and mixing using motor driven propeller aspirator pumps) were then submitted to final evaluation against the design objectives defined above are presented in table D-2. The selected system is a direct air jet injection mixing system using aspirator pumps. The alternative met all critical design objectives and, on balance, was the preferred alternative.

D-12. The preliminary design of the selected system is presented in table D-3. Estimated project and annual O&M costs are presented in tables D-4 and D-5.

TABLE D-2

RANKING[1/] OF EAST BAY SMALL BOAT BASIN AERATION ALTERNATIVES

	COSTS																	
Surface Aerator with Draft Tube	3	3	3	2	2	2	2	1.5	2	2.5	3	3	2	3	3	2	2	2
Aspirator Pumps	2	1	1	1	1	1	1	1.5	1	2.5	2	1	1	2	1	3	1	1
Static Tube Aerator	1	2	2	3	3	3	3	3	3	1	1	2	3	1	2	1	3	3

1/Lowest number is most desired, e.g., a rating of 1 is preferred over 2, and 2 is preferred over 3.

D-13. The aspirator pump system will be installed and operated typically during the critical late summer period. If DO levels in the basin at any depth approach 5 mg/l during monitoring, then units will be installed and operated. Further details of installation and operation plan will be developed during plans and specificatons phase. All 33 units can be installed and operating in an estimated 33 man-hours. In a critical situation, rapid DO depletion, and/or extremely low DO, port personnel can have all units installed and operating in 8 hours.

Energy consumption for the typical annual operation of the units, e.g., 15 days, 24 hrs/day, is about 45,000 to 50,000 kWh.

FEDERAL - NON-FEDERAL RESPONSIBILITIES

D-14. The Federal Government is responsible for sharing cost of aspirator pump purchase per general navigation facility cost sharing formula and for monitoring Port of Olympia (Port) performance in operation and maintenance of the aerators and conduct of the water quality monitoring system.

NON-FEDERAL RESPONSIBILITIES

D-15. The Port is responsible for financing, design, construction, operation, and maintenance of mooring floats, services, and electrical/mechanical support system for the aspirator pumps. The Port is responsible for monitoring and for operation and maintenance of aspirator pump system such that Class B State Water Quality DO standards are maintained. The Port is also responsible for its portion, per the general navigation facility cost sharing formula, of the purchase cost of the aspirator pumps.

TABLE D-3

DESIGN CRITERIA, REQUIREMENTS, AND RECOMMENDATIONS

A. Design Criteria

1. 0.7 pounds of O_2/hp/hour oxygen transfer for commercially available aspirator pumps.

2. Mixing capacity of commercially available aspirator pump system is 15-25 c.f.s./h.p.

3. Mixing influence area 75-100 feet along axis of jet.

B. Design Requirements

1. Horsepower required for oxygen transfer to equal respective DO depletion rates only (reference table D-1)

Average	46 hp
Maximum	242 hp

2. Horsepower required for complete mixing of basin volume at MHW and tidal inflow of 2,500 c.f.s. is 165 hp.

C. Preliminary Design Recommendations

1. It is recommended that mixing requirement be used to size the required horsepower. This recommendation is based on the following considerations:

a. The occurrence of maximum oxygen depletion is believed to be infrequent.

b. COE analysis indicates natural reaeration supplemented by direct air injection to overcome oxygen depletion when the entire moorage basin is completely mixed by the aerator/mixers.

2. The mixing requirement leads to the selection of 33 units of 5 hp aerators. The electrical system is designed for 36 units to allow operational flexibility. Preliminary design information is presented in plates 13 and 14.

TABLE D-4

ESTIMATED PROJECT COST OF PREFERRED MITIGATION SYSTEM

Aspirator Pump Units (installed)	$152,000
Electrical Service (installed)	185,000
E&D and S&A and Contingency	140,000
Total Estimated Project Cost	$477,000

Design life for system assumed to be 25 years for purposes of project economic analysis.

TABLE D-5

ESTIMATED ANNUAL O&M COST

Power (15 days/yr, 24 hr/day)	$2,000
Installation and Operation (From storage once/yr)	2,000
Removal (Clean, routine maintenance, and store once/yr)	2,000
TOTAL	$6,000 yr

APPENDIX E

ECPA APPLICATION 74-0050

May 4, 1976

State of Washington Department of Ecology

TO: Those Interested in the East Bay Project
(ECPA Application 74-0050)

Final ECPA decisions have been rendered on this application. They are as follows:

1. City of Olympia--Substantial Development Permit--Approved subject to conditions.

2. State Departments of Fisheries and Game -- Hydraulic Project Approval -- Approved subject to conditions.

3. State Department of Ecology--Sewage and Industrial Waste Treatment Facilities Approval, and Waste Discharge Permit--Approved subject to conditions.

4. State Parks and Recreation Commission -- Parks and Recreation Facilities -- Approved without conditions.

5. The State Department of Natural Resources and the Department of Social and Health Services decided that they had no jurisdiction.

Complete decisions may be inspected at my office at the Department of Ecology Headquarters on the Saint Martins College Campus (Phone: 753-6891). These final decisions are being transmitted on this date to the applicant (Port of Olympia). In accordance with ECPA, aggrieved parties have 30 days to appeal to the Pollution Control Hearings Board--#1 South Sound Center, Olympia, Washington 98504.

Sincerely,

T. L. ELWELL
East Bay ECPA Coordinator

TLE:cls

cc: Port of Olympia, Attn: Dick Malin
PCHB, Attn: Ellen Peterson

Daniel J. Evans, Governor John A. Biggs, Director Olympia, Washington 98504 Telephone (206) 753-2800

DATE April 30, 1976

T. L. Elwell
East Bay ECPA Coordinator

Subject: Final ECPA Decision on ECPA Application 74-0050
East Bay Project

Dear Sir:

The City of Olympia hereby makes the following Final ECPA decision relative to its statutory authority/jurisdiction described in WAC 173-08-030.

Authority: Substantial Development Permit (RCW 90.58.140)

_____ Approved without conditions.

_xx_ Approved subject to the attached conditions and/or permit or approval.

_____ Denied for the attached reasons.

_____ This agency has decided that it does not have jurisdiction in this matter.

No other of this agency's permits and/or environmental authorities cited in WAC 173-08-030 will be required.

This decision is based on and is restricted to the project as described in the attached project description.

Sincerely,

Richard A. O'Neal

City of Olympia

pb:041302
Attachment

SHORELINE MANAGEMENT ACT OF 1971

PERMIT FOR SHORELINE MANAGEMENT SUBSTANTIAL DEVELOPMENT.

APPLICATION NO. SH-OLY-2-75 DATE RECEIVED March 7, 1975 APPLICANT Port of Olympia FOR see attached E.C.P.A. Project Description

LOCATION Bordered on the north by the City limits, on the south by State Avenue and on the west by West Bay Drive

ADMINISTERING AGENCIES:

OLYMPIA PLANNING COMMISSION

HEARING DATES: April 1, 1976

ACTION approved SUBJECT TO FOLLOWING CONDITIONS: see attached

Richard A. O'Neal Director
(Signature and title of authorized local government official)

DATE: APR 30 1976

CITY COMMISSION

HEARING DATES: April 1, 1976

ACTION approved SUBJECT TO FOLLOWING CONDITIONS: see attached

APR, 30 1976 MAYOR
(Signature and Title of authorized local government official)

DATE: Leo Carsley

Development pursuant to this permit shall be undertaken pursuant to the following terms and conditions:

This permit is granted pursuant to the Shoreline Management Act of 1971 and nothing in this permit shall excuse the applicant from compliance with any other federal, state or local statutes, ordinances or regulations applicable to this project.

This permit may be rescinded pursuant to Section 14 (7) of the Shoreline Management Act of 1971 in the event the permittee fails to comply with any condition hereof.

CONSTRUCTION PURSUANT TO THIS PERMIT WILL NOT BEGIN OR IS NOT AUTHORIZED UNTIL FORTY-FIVE (45) DAYS FROM THE DATE OF FILING THE FINAL ORDER OF THE LOCAL GOVERNMENT WITH THE DEPARTMENT OF ECOLOGY OR ATTORNEY GENERAL WHICHEVER COMES FIRST; OR UNTIL ALL REVIEW PROCEEDINGS INITIATED WITHIN FORTY-FIVE DAYS FROM THE DATE OF SUCH FILING HAVE BEEN TERMINATED.

1. Compliance with the Shoreline Regulations for residential development.

2. Approval of detailed landscaping plans by the Planning and Building Departments.

3. Case: #353
Applicant: Richard Stanton
Request: Vacation of alley for personal use
Location: Between Chambers and Steele Streets north of Thurston Avenue and South of Prospect Avenue

The Planning Commission unanimously recommended approval of this case as submitted by the applicant.

4. Case: SH-OLY-2-75
Applicant: Port of Olympia
Request: Shoreline Management Substantial Development Permit for alteration by dredging and filling of East Bay tidelands
Location: On the east side of the Olympia Port area and west of West Bay Drive

The Planning Commission unanimously recommended approval of this case subject to the following conditions:

1. Final design approval by the U.S. Corps of Engineers and to granting of other applicable permits.

2. Sufficient areas must be set aside for expansion of the existing sewage plant, as determined by the City of Olympia and the Port officials. It is expected that the City would purchase the area in the future.

3. As suggested in the Dames and Moore Soils Report, protection for the cut and filled areas shall be placed as necessary. Full protection will not be required if the boat and speed limit is held at 4 m.p.h.

4. Detailed plans for each phase of construction regarding conformance to the Master Program and conformance with the approved shoreline permit.

5. The types of marina commerical services shall be limtied to those which are water-dependent or water-oriented shown on the attached plan.

6. All storm water run-off shall be handled in such a manner that all foreign materials will be removed prior to the water entering the bay

7. Rezoning consistent with the proposed uses of the project area be accomplished.

8. The existing platted channel and harbor lines be vacated and a water-way be established consistent with the finalized plan.

DATE April 29, 1976

T. L. Elwell
East Bay ECPA Coordinator

Subject: Final ECPA Decision on ECPA Application 74-0050
East Bay Project

Dear Sir:

The Department of Fisheries hereby makes the following Final ECPA decision relative to its statutory authority/jurisdiction described in WAC 173-08-030.

Authority: Hydraulic Project Approval (RCW 75.20.100)

____ Approved without conditions.

X Approved subject to the attached conditions and/or permit or approval.

____ Denied for the attached reasons.

____ This agency has decided that it does not have jurisdiction in this matter.

No other of this agency's permits and/or environmental authorities cited in WAC 173-08-030 will be required.

This decision is based on and is restricted to the project as described in the attached project description.

Sincerely,

Lloyd Rothfuss

State of Washington
Department of Fisheries

pb:041302
Attachment

DATE 4-30-76

T. L. Elwell
East Bay ECPA Coordinator

Subject: Final ECPA Decision on ECPA Application 74-0050
East Bay Project

Dear Sir:

The Department of Game hereby makes the following Final ECPA decision relative to its statutory authority/jurisdiction described in WAC 173-08-030.

Authority: Hydraulic Project Approval (RCW 75.20.100)

____ Approved without conditions.

__X__ Approved subject to the attached conditions and/or permit or approval.

____ Denied for the attached reasons.

____ This agency has decided that it does not have jurisdiction in this matter.

No other of this agency's permits and/or environmental authorities cited in WAC 173-08-030 will be required.

This decision is based on and is restricted to the project as described in the attached project description.

Sincerely,

John M Ward
State of Washington
Department of Game

pb:041302
Attachment

WASHINGTON
Department of
FISHERIES

NIEL J. EVANS
GOVERNOR

ROOM 115, GENERAL ADMINISTRATION BUILDING • PHONE 753-6600
OLYMPIA, WASHINGTON 98504

DONALD W MOOS
DIRECTOR

December 1, 1975

Mr. Gene Sibold, Port Manager
Port of Olympia
Post Office Box 827
Olympia, Washington 98507

Dear Mr. Sibold:

In your letter of November 18, 1975, you stated a need for our conceptual approval of a marina in the East Bay of Olympia Harbor "for local support and furtherance of federal participation". We believe federal participation is necessary and should include a model study of a revised marina configuration, including location and extent of intertidal fill, and comprehensive water quality studies in both the East and West bays of Olympia Harbor to accurately predict water exchange and future water quality in the proposed marina.

Our letter of July 7, 1975, indicated we would enthusiastically support a marina which met state, federal, and local water quality standards and regulations adopted to protect resources under our jurisdictions. This position of support remains unchanged. We also expressed grave concern for water quality in the proposed marina based on lack of flushing by the Deschutes River in East Bay, existing water quality in all of Olympia Harbor, inadequate water exchange in the original marina design, the proximity of the Olympia primary sewage treatment plant, and that Moxlie Creek entering the south end of the proposed marina reportedly contains raw sewage. This position of grave concern remains unchanged. However, we can now give conceptual approval under ECPA Master Application No. 74-0050, based on your letter indicating that construction can be timed "so that East Bay does not precede sewage treatment improvement" in order to expedite your efforts to obtain federal participation in solving all the water quality problems associated with the proposed marina listed above.

Since you have submitted no detailed plans on the present marina scheme, our conditional approval is subject to the following general provisions with the understanding we will have additional specific requirements after detailed plans are formulated:

(1) No dredging for the entrance channel or moorage area may occur unless assurances are made that all sewage entering Olympia Harbor is within 12 months of achieving

secondary treatment as shown on your attached bar graph. It would be highly desirable to all concerned if the period of major dredging be compressed to within 6 months of improved sewage treatment. We may pursue the 6-month goal as detailed plans for the marina become available.

a. The Port of Olympia will supply written status reports at 3-month intervals to these departments on the progress, or lack of, on the sewage treatment improvements.

b. All construction involving waterways in in East Bay shall immediately cease if any delays occur affecting the completion date for secondary sewage treatment.

(2) During the entire marina construction period, agreed on mechanical flushing devices shall be available to insure maintenance of water quality in East Bay acceptable to salmonid survival. In the event water quality deteriorates below that for salmonids to survive, the mechanical flushing devices will be operated and all work in the waterways in East Bay shall cease until conditions improve. These departments will determine the minimum water quality standards acceptable for salmonid survival.

(3) No boat moorage will be permitted prior to secondary sewage treatment completion.

(4) Permanent approved mechanical flushing devices shall be provided to exchange the entire volume of East Bay every tide cycle if water quality fails to meet Class B standards, or better, following completion of the marina and the secondary sewage treatment plant.

(5) Storm water runoff will be controlled to prevent any changes in water quality in East Bay.

(6) These departments reserve the right to make changes, deletions, or additions to these provisions as additional information dictates for protection of the resources under their jurisdictions.

You will need a Corps of Engineers permit for the proposed marina construction and as you have pointed out, state approval will still be required.

When we ultimately receive a revised Corps Public Notice our response will be decided on the results of model studies and water quality studies the Corps has indicated they will require. At that time and with detailed plans for the project, we will be able to better define our specific requirements for protection of the resources under our jurisdictions. Any future maintenance dredging will also require a Corps of Engineers permit and state approval.

We hope this letter will assist you in finding an environmentally sound solution to some of the problems confronting the proposed marina, and we would appreciate being kept informed of any planned studies and progress on the marina plan.

Sincerely,

Donald W. Moos, Director
Department of Fisheries

Carl N. Crouse, Director
Department of Game

DWM:CNC:ELF:bj
Attachments
cc: Ellen D Peterson
Mr. James Dolliver
Mr. Ernest L. Meyer
Mr. Robert V. Jensen
Mr. Herbert Fuller
Mr. John S. Lynch
Mr. Tom Elwell
Mr. Fred D. Gentry
Mr. William A. Bush
Mr. John H. Laubach
Mr. Lloyd Taylor
Mr. Richard A. O'Neal

DATE April 27, 1976

T. L. Elwell
East Bay ECPA Coordinator

Subject: Final ECPA Decision on ECPA Application 74-0050
East Bay Project

Dear Sir:

The Department of Ecology hereby makes the following Final ECPA decision relative to its statutory authority/jurisdiction described in WAC 173-08-030.

Authority: Sewage and Industrial Waste Treatment Facilities Approval RCW 90.48.110

____ Approved without conditions.

_X_ Approved subject to the attached conditions and/or permit or approval.

____ Denied for the attached reasons.

____ This agency has decided that it does not have jurisdiction in this matter.

Authority: Waste Discharge Permit (RCW 90.48.180)

____ Approved without conditions.

_X_ Approved subject to the attached conditions and/or permit or approval.

____ Denied for the attached reasons.

____ This agency has decided that it does not have jurisdiction in this matter.

No other of this agency's permits and/or environmental authorities cited in WAC 173-08-030 will be required.

This decision is based on and is restricted to the project as described in the attached project description.

Sincerely,

State of Washington
Department of Ecology

pb:041302
Attachment

MEMORANDUM

CHECK
INFORMATON____
FOR ACTION____
PERMIT____
OTHER____

TO: Tom Elwell

FROM: Stan Springer SS

SUBJECT: East Bay Marina

DATE April 27, 1976

State of Washington Department of Ecology

Attached is our final approval of the East Bay Marina Project. This approval is given subject to review and approval of the information listed in my letter to Richard O. Malin, dated June 24, 1975, a copy of which is attached, and to the actions proposed by the Port in response to those requirements in their letter of March 31, 1976, a copy of which is also attached.

In our tentative approval of February 25, 1976, we indicated that no waste discharge permit was required for the proposed project. Although no information available at present indicates that the project will result in a discharge of pollutants subject to state or federal permit requirements, it is possible that the storm water pollution controls, when they are finalized and approved, will result in such a discharge. Our approval of this project is therefore conditioned upon the application for and issuance of the necessary permits, should they be required upon review of the plans for storm drainage controls. I know of no prohibitive factor at this time in issuing these permits should they be required, and I feel that our regulations and requirements related to water pollution control could reasonably be met for the proposed project.

It should be noted that the above approvals are required under RCW 90.48.110, WAC 372-20-030 and -100, and under the general authority of RCW 90.48.080. In addition, Section 401 of FWPCA requires state water quality certification for a federal license or permit such as the Corps of Engineers Section X Permit. Since the permit involved in this case is a federal permit our certification will not be handled under ECPA.

It should also be noted that we concur with the concerns of the Departments of Fisheries and Game in their tentative approval of this project. We feel that the Corps of Engineers Section 107 Study and other information, to be developed at a later date, must adequately answer these concerns to meet this Department's final approval.

SMS:jr

Daniel J. Evans, *Governor* John A. Biggs, *Director* Olympia, Washington 98504 Telephone (206) 753-2800

June 27, 1975

Mr. Richard O. Malin
Port of Olympia
P. O. Box 827
Olympia, WA 98507

Dear Mr. Malin:

In response to your Environmental Coordination Procedures Act Master Application for the East Bay Marina, we indicated that plans and specifications for wastewater control facilities must be submitted to the department for approval.

As you know, this project also requires water quality certification under Section 401 of the FWPCA prior to issuance of the Corps of Engineers Section 10 permit. Submittal and approval of the following information will satisfy both requirements:

1. Plans for dredging operations (schedule, disposal area design, outlet weir, etc.);

2. Plans for parking lot storm drainage pollution control;

3. Plans for cargo yard storm drainage;

4. Plans for holding tank pumpout and sewer system;

5. Oil Spill Prevention, Control and Countermeasure plan;

6. The Corps study and related water quality information. Since most of this information has not yet been generated, we will not be able to grant final approval on the project until a later date. We plan, however, to approve the project if and when adequate plans for pollution controls noted above are submitted.

Since the existing fill area to the east of Graystone of Olympia is not covered in either the ECPA or Corps applications, I would like to clarify our concerns with that area at this time also.

The outlet to the diked area has not been sealed and is allowing concrete waste and wash water to escape into East Bay. This situation should be corrected immediately.

Concerning your proposal to fill part of this area with yard spoils, it was my understanding from our earlier discussions that the Port would apply for a revision to the Corps permit, as well as other appropriate permits. We would expect to certify this project subject to the conditions we discussed. We have received no notification of applications to date, however.

Please contact me if I can be of assistance.

Sincerely,

Stanley M. Springer
District Engineer

SMS:mw

cc: Graystone of Olympia
Tom Elwell, DOE

Concerning your proposal to fill part of this area with yard spoils, it was my understanding from our earlier discussions that the Port would apply for a revision to the Corps permit, as well as other appropriate permits. We would expect to certify this project subject to the conditions we discussed. We have received no notification of applications to date, however.

Please contact me if I can be of assistance.

Sincerely,

Stanley M. Springer
District Engineer

SMS:mw

cc: Graystone of Olympia
Tom Elwell, DOE

DATE April 21, 1976

T. L. Elwell
East Bay ECPA Coordinator

Subject: Final ECPA Decision on ECPA Application 74-0050
East Bay Project

Dear Sir:

The Parks and Recreation Commission hereby makes the following Final ECPA decision relative to its statutory authority/jurisdiction described in WAC 173-08-030.

Authority: Parks and Recreation Facilities (RCW 53.08.260)

X Approved without conditions.

____ Approved subject to the attached conditions and/or permit or approval.

____ Denied for the attached reasons.

____ This agency has decided that it does not have jurisdiction in this matter.

No other of this agency's permits and/or environmental authorities cited in WAC 173-08-030 will be required.

This decision is based on and is restricted to the project as described in the attached project description.

Sincerely,

W. A. Bush, Chief, Long Range Planning
State of Washington
Parks and Recreation Commission

pb:041302
Attachment

DATE 30 April 1976

T. L. Elwell
East Bay ECPA Coordinator

Subject: Final ECPA Decision on ECPA Application 74-0050
East Bay Project

Dear Sir:

The Department of Social and Health Services hereby makes the following Final ECPA decision relative to its statutory authority/jurisdiction described in WAC 173-08-030.

Authority: Public Water Supplies (WAC 248-54)

_____ Approved without conditions.

_____ Approved subject to the attached conditions and/or permit or approval.

_____ Denied for the attached reasons.

_X_ This agency has decided that it does not have jurisdiction in this matter.

No other of this agency's permits and/or environmental authorities cited in WAC 173-08-030 will be required.

This decision is based on and is restricted to the project as described in the attached project description.

Sincerely,

Washington State Department of
Social and Health Services

pb:041302
Attachment

ADDENDUM TO PROJECT DESCRIPTION

AGENCY CONDITIONS FOR FINAL PERMIT APPROVAL

Final approval of the following permits is subject to satisfactory compliance to the following conditions as listed by the issuing agency.

REVIEW & APPROVAL OF WASTE WATER FACILITIES--Department of Ecology:

1. Plans for dredging operations (schedule, disposal area design, outlet weir, etc.);
2. Plans for parking lot storm drainage pollution control;
3. Plans for cargo yard storm drainage;
4. Plans for holding tank pumpout and sewer system;
5. Oil Spill Prevention, Control and Countermeasure plan;
6. The Corps' study and related water quality information.

HYDRAULIC PROJECT APPROVAL - Departments of Fisheries & Game:

1. No dredging for the entrance channel or moorage area may occur unless assurances are made that all sewage entering Olympia Harbor is within 12 months of achieving secondary treatment as shown on your attached bar graph. It would be highly desirable to all concerned if the period of major dredging be compressed to within 6 months of improved sewage treatment. We may pursue the 6-month goal as detailed plans for the marina become available.
   a. The Port of Olympia will supply written status reports at 3-month intervals to these departments on the progress, or lack of, on the sewage treatment improvements.
   b. All construction involving waterways in East Bay shall immediately cease if any delays occur affecting the completion date for secondary sewage treatment.
2. During the entire marina construction period, agreed on mechanical flushing devices shall be available to insure maintenance of water quality in East Bay acceptable to salmonid survival. In the event water quality deteriorates below that for salmonids to survive, the mechanical flushing devices will be operated and all work in the waterways in East Bay shall cease until conditions improve. These departments will determine the minimum water quality standards acceptable for salmonid survival.
3. No boat moorage will be permitted prior to secondary sewage treatment completion.

4. Permanent approved mechanical flushing devices shall be provided to exchange the entire volume of East Bay every tide cycle if water quality fails to meet Class B standards, or better, following completion of the marina and the secondary sewage treatment plant.

5. Storm water runoff will be controlled to prevent any changes in water quality in East Bay.

6. These departments reserve the right to make changes, deletions, or additions to these provisions as additional information dictates for protection of the resources under their jurisdictions.

7. Results of the Corps' water quality and model studies along with detailed palns and specifications for the project.

APPENDIX F

FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Area Office
2625 Parkmont Lane
Olympia, Washington 98502

July 18, 1979

Lt. Colonel Maxey B. Carpenter, Jr.
Acting District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Carpenter:

This is our report on the effects the proposed East Bay Small Boat Basin, Olympia, Washington, would have on fish and wildlife resources. It has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The report is for inclusion in your detailed project report being prepared under authority of Section 107 of the River and Harbor Act of 1960, as amended. Our evaluation is based on project engineering data provided by your staff prior to February 7, 1979.

This report has been reviewed and substantially concurred in by the Washington Department of Game as indicated in the attached letter dated July 19, 1978. This report has also been reviewed by the National Marine Fisheries Service which is in general concurrence with its content. In a letter dated July 18, 1978, the Washington Department of Fisheries stated they could not concur with the draft report. We have not received concurrence for all statements from the Washington Department of Fisheries. There remains a differing of opinion on the value of wetlands and tidal flats to anadromous fish and shellfish between the two agencies.

Our report contains a "Summary of Environmental Considerations" for assistance in preparing a Draft Environmental Impact Statement for the proposed project. This summary does not constitute the review comments of the Department of Interior on the Draft Environmental Impact Statement as required under the provisions of the National Environmental Policy Act (Public Law 91-190).

Executive Order number 11990 (Protection of Wetlands) effective October 1, 1977, provides, in part, as follows:

> Section 1.(a) Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, [including mudflats] and to preserve and enhance the natural and

beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Section 2.(a) In furtherance of Section 101(b)(3) of the National Environmental Policy Act of 1969 (42 U.S.C. 4331 (b)(3)) to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors.

In the view of the U.S. Fish and Wildlife Service, the project as proposed may not be in compliance with Executive Order 11990 because it does not incorporate all practicable measures to minimize harm to wetlands. The alternative of deep water disposal of channel dredged materials together with a reduced fill area could minimize destruction of wetlands in the project area. This alternative is treated in the "Discussion" section of the report and is contrasted with the proposed project in the section on "Summary of Environmental Considerations".

DESCRIPTION OF THE AREA

The project area is in the southernmost end of Puget Sound, 62 miles south of Seattle at Olympia, Washington. East Bay is located within Olympia Harbor of Budd Inlet. It was formed partially by construction of the "Port Peninsula" on former tideflats of the Deschutes River delta (see Plate 1). Budd Inlet has a width of approximately 1 nautical mile, a length of 6 nautical miles, and a maximum depth of 36.6 meters.

The Deschutes River, with a mean annual discharge of 388 c.f.s., empties into West Bay at the head of Budd Inlet. Moxlie Creek (estimated discharge 20 c.f.s.) drains a city watershed from the south which empties into East Bay. Formerly Moxlie Creek supported anadromous fish runs but now functions as a culverted storm sewer.

The Port of Olympia ranks seventh or eighth in size among the eight major Puget Sound ports. The Port Peninsula, on which a 3-ship berthing facility is located, was created by gradual landfilling and divides East and West Bays. The Port is served from the south by railroads and several streets. Much of the west shore of West Bay is devoted to industrial activity, principally sawmills. A low dam constructed in 1951 at the present head of West Bay formed Capitol Lake, through which the Deschutes River flows. Three private marinas, a yacht club, and a public boat launch afford access to Puget Sound at West Bay.

East Bay (south of the peninsula tip) has a surface area of approximately 450 acres at mean higher high tide (+14.4 ft.). At mean lower low tide (0 ft.) East Bay is approximately three-quarters exposed tideflats with the natural channels being only about four feet deeper. A map of the Olympia Harbor vicinity is presented in Figure 1. It reveals that historical landfilling eliminated most of the original basin of East Bay which may have supported extensive marshes and associated wildlife. Remnants of salt marsh vegetation are found near the outlet of Moxlie Creek, to the north at Priest Point Park (near the mouth of Ellis Creek) and in patches at West Bay "lagoon". The bottom of East Bay and much of Budd Inlet is sand at depth, overlain by silty sand or mud.

The peninsula shoreline of East Bay was formerly in industrial use but is now largely vacant except for upland log storage, a pole creosoting plant, and a c· nt and gravel plant. A regional sewer treatment plant is located o.. this shore. Marina generated sewage waste would go to this plant. The waters of East Bay were formerly used for log storage. Old pilings and log debris litter much of the bottom. Commercial developments along State Avenue bound the south end.

The east shore of East Bay is largely undeveloped. Near the northeast shore of East Bay there are numerous residences extending to Priest Point Park. Much of the east shoreline was altered in 1972 by installation of a sewer trunk and widening of East Bay Drive. Trees lining the shore were removed and the road bank covered with rock rip-rap that extends onto the tidelands. The east shoreline is regarded as geologically unstable. Seepage from several springs crosses under East Bay Drive and courses over the tideflats in several places. Over the years East Bay has received considerable abuse from piecemeal landfilling, solid waste and garbage disposal, raw sewage overflow and septic tank drainage, log storage and industrial discharges.

According to a 1974 report prepared by Dames and Moore,[1] Consultant Engineers for the Port, the upper level of the substrate in East Bay is soft to very soft silt with varying amounts of fine sand, shells, and organic matter. The upper surface is covered with shell fragments, sunken logs, bark, and other forms of organic matter in many areas. Dames and

Moore stated that according to then current criteria of the U.S. Environmental Protection Agency, the sediments of East Bay are heavily polluted.

Olympia Harbor waters are classified as Class B "good" according to Washington State Water Quality Standards.[2] Present standards are: total coliform, median value 1000; dissolved oxygen, 5 mg/l; temperature 66°F (19°C); pH, 7.0 to 8.5; and turbidity, 10 JTU over background level. The Deschutes River flow is apparently critical to maintenance of sufficient dissolved oxygen in Olympia Harbor.[3]

Due to the shallowness, East Bay tideflats at times cause elevated water temperatures. Data from water quality tests conducted by the Corps of Engineers[4] during the period June 10, 1977 to October 13, 1977 indicate mean temperatures as high as 22 degrees Celsius. Data from the same tests indicate that mean dissolved oxygen (D.O.) levels at most stations dropped below 5 mg/l and down to zero in some cases during the hottest summer periods. The killing of an undisclosed number of adult fall chinook salmon in East Bay has been reported[5] for the summers of 1975 and 1977. The existence of polluted sediments and substandard water column conditions present potentially serious water quality problems for the construction and operation of the marina unless secondary treatment or higher water quality are achieved for Budd Inlet.

PROJECT DESCRIPTION

The purpose of the Corps of Engineers study is to determine the feasibility and extent of Federal participation in construction of a small boat harbor for various plans providing from 500 to 1,500 moorages. Local sponsor of the project is the Port of Olympia. The Port has announced long range plans for an ultimate 1500 moorage facility in East Bay and extending around the north end of the port peninsula.[6] An 800 moorage marina protected by a floating breakwater has been proposed (Plate 1) and is evaluated in this report.

The Federal portion of the proposed project would consist of an entrance channel (15 feet deep, 150 feet wide and approximately 3,200 feet in length); an access channel with turning basin (15 feet deep, 100 feet wide and about 2800 feet in length); and a floating breakwater structure (about 1,000 feet long). Entrance and access channel dredging would encompass 25.5 acres. The entrance channel would join the existing main shipping channel (authorized depth of 30 feet) about 2,000 feet north of the port peninsula.

These federally constructed navigation features would serve a 31.3 acre moorage basin, to be constructed by the Port, with covered and uncovered moorages, piers, boat launch, and boat lift. Probable depth of the

moorage basin would be from 9 to 13 feet below MLLW in graduated sections. Dredge materials from the moorage basin, along with material from the channels amounting to 1,000,000 cubic yards (1,400,000 after swelling), would be placed on tidelands adjoining the basin. This filling would raise the general land elevation to 20 feet above MLLW and create an area for marina support facilities, port cargo storage space, and commercial development of a diverse nature.[7] All together the filling would increase the total port-owned dry-land base on the peninsula by approximately 50 percent.

Usage of the landfill areas would be as follows:

Usage	Area	Percentage
Cargo Area	24.2 acres	45
Marina Support*	26.6 "	50
Miscellaneous	2.6 "	5
	53.4 acres	100

*(includes parking and commercial facilities, repair shop, etc.)

Part of the access road to the marina would consist of an extension of Olympia Avenue on landfill across the south end of East Bay one block north of State Avenue. Waterward faces of the access road and the moorage basin perimeter would be rip-rapped on a 2 to 1 slope. Moxlie Creek would be extended 350 feet by culvert under the landfilled area between State and Olympia Avenues. The eastern edge of the access channel would be dredged on a gradual slope to minimize possible sloughing and erosion.

FISH

Without the Project

Estuaries are among the most fertile and productive of natural areas. Whereas the Nisqually River delta (mean annual discharge 741 c.f.s.), also in southern Puget Sound, is commonly thought of as an estuary, the Deschutes River mouth usually is not. Due to severe alterations since the turn of the century by landfilling, industrial and port development, and the Capital Lake impoundment, the delta of the Deschutes River is scarcely recognizable as such. Though stressed, it is still an estuary. East Bay, however, is less estuarine in nature than West Bay, owing to its partial hydraulic isolation by the Port Peninsula. As noted in the Washington Department of Fisheries stream catalog for the Puget Sound region,[8] "--of great importance, particularly to anadromous species, are the estuarine

areas at the mouths of rivers. These semisalt- and semifresh-water areas provide the critical transition zone for juvenile and adult fishes as they transfer from one environment to another."

Budd Inlet formerly produced harvestable quantities of native or Olympia oysters (Ostrea lurida) as far south as the upper end of Capital Lake.[9] Indian shell middens are found near Tumwater Falls and at Priest Point Park. Area residents report harvesting clams near the present Fourth Street Dam and the predecessor to the famous Olympia Oyster House first gathered oysters throughout Olympia Harbor tideflats prior to dredging of the harbor.[10] Once widespread, the Olympia oyster is now grown at comparatively few locations, mainly in southern Puget Sound. Viable populations are still present in Gull Harbor of Budd Inlet, less than one mile north of East Bay. Pollution is the apparent cause of the Olympia oyster's general decline.[11] Oysters are almost totally absent from Olympia Harbor and its waters have been decertified for any shellfish harvesting. The waters are posted with a warning against shellfish consumption by the Thurston-Mason Health District. Though improvements to water quality can be expected following sewer treatment upgrading, it is not likely that shellfish can be safely harvested from Olympia Harbor for many years.

In contrast to the apparent historic abundance of shellfish, Budd Inlet and the Deschutes River Basin originally produced comparatively few anadromous fish. This was due to the high falls at Tumwater which obstructed natural runs, except in a few creeks tributary to the Inlet. In 1954 fish ladders were completed around these falls enabling introduced salmon and searun trout to utilize the extensive spawning and rearing habitat available in the main river and its numerous tributaries. In addition, one of the most successful salmon rearing projects ever undertaken has since been established in Capitol Lake.[12] From an average annual release of 3.4 million juvenile chinook salmon, over 63,000 adults are harvested and nearly 6,000 return to the egg taking station (see Table 1). Thus, even though degraded and greatly altered, the Deschutes River estuary has become more important to anadromous fish production than it apparently was originally.

Native runs of chinook, coho, and chum salmon, as well as steelhead and searun cutthroat trout, and probably Dolly Varden char occurred in Percival Creek, which is now tributary to Capitol Lake. In general these runs declined, however, there is an annual average return of 3,155 chinook salmon[8] and an estimated 2,000 to 2,500 coho salmon.[13] Good numbers of steelhead and cutthroat trout still use Percival Creek. Chum salmon were present in good numbers in Ellis Creek. That Creek, like other smaller streams in southern Budd Inlet, has been obstructed by a roadway fill project. Apparently some coho salmon still are able to get through the long culvert or else spawn in short tributaries below the road.[8]

In many parts of Puget Sound the beaches, tidal creeks, and mudflats are vitally important as feeding areas to chum and pink salmon which spend a considerable part of their early life feeding on small epi-benthic organisms produced only in these shallow water habitats.[14] Pink salmon runs do not exist and chum salmon populations are small in Budd Inlet tributaries. Thus East Bay is not presently important to these species although a portion of the diet of chinook and coho salmon consists of amphipods, copepods, and other crustaceans which partly originate from intertidal areas. Though it is not on a direct migration route of anadromous fishes, adult chinook and coho salmon and juveniles of these two species frequent East Bay. Probably some feeding by steelhead and searun cutthroat trout also takes place.[3] Since exact numbers are unknown, no direct dollar benefit is attributed to East Bay for anadromous fish.

For purposes of indicating the importance of Budd Inlet and the Deschutes River to anadromous fish which potentially could be affected by the project and by fishermen using the marina, figures are presented on the numbers and dollar values of the runs to the Deschutes River system. These figures are presented in Table 1 and include estimates or actual numbers of artificially propagated fish, catches and escapements attributable to commercial and sport fisheries. These figures are conservative for steelhead and cutthroat trout because essentially wild runs are now established in the Deschutes River and firm data are not available on these. In the 1976-77 season, the Deschutes River ranked number 21 in the State in angler success for steelheads with 856 catches.

The principal, direct fish use of East Bay is by marine and bottom fishes including sea perches and flounders. Schools of herring occur in West Bay and were commercially harvested in the early months of 1979. Silver smelt spawn on gravel beaches south of Priest Point Park. Table 2 lists the species of marine fish known or likely to occur in East Bay. No data are available on numbers or monetary values; however, their relative abundance is indicated.

Except for an Indian net fishery, there is no regular commercial fishery in Budd Inlet. Fish produced in the Deschutes system are commercially caught mainly in northern Puget Sound and the Pacific Ocean and landed at other ports. However, Olympia Harbor is a significant sport fishing area. Salmon fishing is more commonly conducted near Cooper Point and Johnson Point north of Budd Inlet. Boaters travel to fishing grounds from launches or marinas at Boston Harbor, Johnson Point, and West Bay. Sport salmon angling occurs in West Bay and at the Fourth Avenue Bridge (senior citizens only). Boat fishing for searun cutthroat trout occurs near the entrance to East Bay, near Priest Point Park, and northward.

East Bay is a popular fishing spot for Olympia area residents interested in catching marine and bottom fishes. Owing partly to a general lack of public beach access and fishing piers in Budd Inlet, as many as 50 persons may be found during the spring and summer months fishing for sea perch and flounders with small crabs or mussels near the northeast end of East Bay on Port property. Several waterfront residents also fish in East Bay from their own property. Also, up to 25 persons have been seen fishing from the railroad bridges at the West Bay lagoon.

Hardshell and softshell clams occur in good numbers in East Bay. Their distribution was surveyed in 1974 by Taylor et al.[15] Besides clams, East Bay is known to harbor squids, octopi, and several species of "shore" crabs. The tideflats teem with these small crabs which are a food source to various fish and water birds. The Dungeness crab is now uncommon in Budd Inlet, although long-time residents report they were common 20 or so years ago. Table 3 lists the species of shellfish and their abundance in East Bay.

With the Project

As stated on page 14 of the Washington Department of Fisheries' stream catalog[8], "The indiscriminant building of piers, wharves, and bulkheads associated with business and private residence construction generally results in losses of natural fish and shellfish areas." This observation frequently holds true for marinas and areas within developed ports.

The following observations relative to factors limiting fish resources were made in the 1970 Puget Sound and Adjacent Waters Study.[16]

> "Tideland Development (Deschutes Basin only) - In addition to contributing to poor water quality, rapid urbanization and expanded industrial development limit marine fish populations through attrition of natural production areas. Deposition of land excavation and dredged spoils, and construction of extensive landfills, large piers, and dikes are seldom compatible with fish needs, and are particularly detrimental to juvenile marine fishes.
>
> Principal factors influencing shellfish production include poor water quality, tideland development, and competition and predation---Poor water quality from industrial waste, sewage disposal, and disposal of toxic materials from local ship and barge traffic, is a prime limiting factor in Budd Inlet near Olympia."

Also in this study (page 11-19) it is stated that without water quality controls, drastic reductions in marine fish populations are foreseen.

Dredging of the entrance and access channels and moorage basin would alter 52.4 acres of intertidal and subtidal mudflat habitat utilized principally by marine and bottom fishes and shellfish that are both sessile (e.g., clams and mussels) and mobile (e.g., shore crabs and octopii). While the immediate impact will be drastic on these organisms and the changed depth will have some permanent effect on biological community composition and productivity, within one or two years the habitat should partially recover and the dredged bottom lands will be repopulated by some of the same or different species.[17] Maintenance dredging, while expected to be infrequent, would adversely affect the productivity and stability of the new biological community.

Disposal of the 1,000,000 cubic yards of dredge spoils generated and used for landfill would permanently eliminate over 50 acres of intertidal and subtidal mudflats used by marine and bottom fishes and shellfish. In addition it would permanently remove this area for photosynthetic activity involving primary production by mud algaes and phytoplankton. Although not obvious, this production is significant due to the high photosynthetic rate and turnover of mud algaes.[18] Particles of organic detritus are taken up by clams, crabs, and smaller invertebrates such as the abundant amphipod Corophium sp. and thus are a food chain base leading to the flounders, sea perches, and other fish feeding in East Bay. Table 4 lists many of the invertebrates (other than shellfish) in East Bay and indicates their relative abundance. A portion of the algal detritus is tidally exported to surrounding waters, thus contributing to the food chain of a wider area and to other species.[19] A more thorough discussion of the ecological role of mudflats, mudflat algal productivity, etc., is given in Appendix A.

While the dredging to an average of 10 feet below the present bottom would result in a net loss of habitat and production, this may be partially offset w[illegible] installation of new pilings. Within a year or two periphyton growth would appear on these structures (except under covered moorages). Subsequent growth of mussels, barnacles, pile worms, and other food organisms would attract sea perches, spider and red crabs, scavaging fishes (e.g., dog fish), predatory fishes, and game fishes (e.g., searun cutthroat trout). However, most old pilings which already serve to attract feeding fish would be removed in construction.

Public fishing, consistent with security constraints, would be permitted from certain piers within the marina. Presently there are no established criteria for placing a monetary value on the sport catch of marine and bottom fisheries, nor are there firm statistics on the number of fisherman days devoted to it. However, the Puget Sound and Adjacent Waters Study (cited above) gives a figure of 10,000 angler-days for southern Puget Sound in 1965. Thus, estimated benefits cannot be assigned to increased fishing, nor can costs be assigned to either short or long-term loss of production caused by the project.

The deeper waters created by channel and moorage basin dredging present a potential hazard for Deschutes River chinook and coho salmon juveniles while feeding or moving through the estuary. Juvenile chinook and coho salmon occur in large numbers (see Table 1). In contrast to the smaller-sized chum and pink salmon juveniles, they prefer somewhat deeper waters.[14] According to the Departments of Fisheries and Game,[3] these young fish could be attracted into the new channels and follow them back into the moorage basin where they might encounter a "pollution trap" caused by inadequate flushing, depressed levels of dissolved oxygen, and marina generated petroleum and sewage. Since the regional sewage treatment plant presently discharges primary treated effluents at the tip of the Port Peninsula, it is imperative that this effluent have at least secondary-equivalent treatment to reduce the biological oxygen demand (B.O.D.) load and meet other water quality criteria before the marina is built. The attached letter of July 19, 1978 from the Department of Game states the project should not be built until additional sewage treatment facilities planned are completed.

In a December 1, 1975 letter to the Port of Olympia, the Directors of the Washington Departments of Fisheries and Game wrote as follows concerning a State permit for an 800 boat marina in East Bay:

> "(1) No dredging for the entrance channel or moorage area may occur unless assurances are made that all sewage entering Olympia Harbor is within 12 months of achieving secondary treatment--"

Secondary treatment will not be achieved before 1981 and probably not before 1982. Certification as to the schedule of completion is to be made by the Washington Department of Ecology and time must be allowed for the plant operation to attain optimal treatment efficacy. Even then it is not yet determined that water quality criteria can be met within East Bay before or following marina construction.[20] It is reasonable to expect, however, that the national goal of "fishable and swimmable" waters by 1983 will be achieved pursuant to the Federal Water Pollution Control Act (P.L. 92-500).

Hydraulic testing and physical model studies of East Bay have been conducted by the University of Washington for the Corps of Engineers. Preliminary data indicates that dredging will increase the flushing time for East Bay.[21] While further testing and analysis may be required, the preliminary results suggest the marina design falls within an "acceptable" range for flushing and tidal exchange coefficients. This testing also indicates the more oxygenated waters from the Deschutes River have minimal influence on East Bay hydraulics. The main sewer line discharge to Olympia Harbor is about 500 yards west of the proposed marina entrance.

The filling of about 25 acres of East Bay submerged or tide lands for cargo area expansion would continue the piecemeal degradation trend (noted in the Puget Sound and Adjacent Waters Study) of fish and shellfish production loss in Budd Inlet. Even though it is unlikely that shellfish harvesting in East Bay will be permitted (due to unsafe coliform bacteria levels) for many years, the loss of present and potential shellfish production area to landfilling should still be considered. These areas are limited and provide nursery areas from which juveniles or "seed" move (or are carried by currents) to aid in propagation of distant habitats. The tideflat's invertebrate organisms also contribute directly to support of seaperch, flounders, and other fish populations of southern Puget Sound which feed or spawn in shallows. Forage fish such as herring and smelt derive a portion of their diet from tideflat production and are in turn eaten by the several species of salmon.

Studies in Oregon have shown that a majority of boat trips are for fishing.[22] With completion of the marina, access to southern Puget Sound would be increased and become more convenient. This should permit greater sport fishing opportunity for more people but would not necessarily translate into more fish caught. Fishing success is essentially independent of the project and will be determined more by future fisheries management programs. A variety of influences are involved including increased propagation in the Deschutes system and regulation of commercial fishing in northern Puget Sound and elsewhere. Initially, at least, increased numbers of fishing trips will exert greater pressure on anadromous and marine fish stocks and the total catch would probably increase, but the catch per unit effort should decline unless a greater allocation of fish is made for sport fishermen in South Puget Sound. Only a small fraction of boats expected to be moored at the marina would be commercial fishing vessels.

Aside from a limited artificial reef program by the Washington Department of Natural Resources, there are few management efforts aimed at increasing stocks of marine and bottom fishes. In most areas bottom fish could presently stand more fishing pressure. While there are good numbers of salmon returning to the Deschutes system, according to the Department of Fisheries[23] it is unlikely these runs can presently stand significantly greater fishing pressure.

It should be recognized that the Deschutes system supplies approximately a third of the total hatchery production of fall chinook salmon from Puget Sound.[24] Eggs taken from returning salmon are used to stock other river basins in the State. Thus, at present levels of returns, substantially increased catches in southern Puget Sound would mean fewer eggs available for hatching and stocking elsewhere. In the 1977-78 production year the Department of Fisheries planted 700,000 yearlings (saving a 5 percent survival rate to the fishery) and 4,000,000 fingerling chinook salmon (with 0.2 percent survival rate) to the Deschutes system. The State

enhancement plans calls for increasing this number in the 1980s to 1,100,000 yearlings and 12,000,000 fingerlings.[23] There are no current plans to increase coho salmon production in the Deschutes River system.

Planting rates for steelhead trout in the Deschutes system have fluctuated over the past 20 years from roughly 10,000 to 40,000 fish and there are no current plans by the Department of Game to increase the average planting amount. Searun cutthroat trout plantings in the past 10 years have ranged from 6,000 to 44,400 fish.[25] Cutthroats could probably withstand more fishing pressure at this time. With the project, it is expected that a sustainable increase of sport catches of searun cutthroat would occur; however, there is presently no assigned dollar value per fish for this species and no statistics on present fisherman-days expended. Thus, an estimate of benefits from this limited, increased fishery would mean little in terms of benefits attributable to the project.

WILDLIFE

Without the Project

A primary value of the project area and its associated littoral zone is as a wintering habitat and spring concentration area for numerous species of waterfowl, seabirds, and shorebirds. Several species of song birds associated with terrestrial habitats are also present, but in generally small numbers. Some of the more numerous and important waterfowl using East Bay are the canvasback, mallard, white-winged scoter, ruddy duck, and scaup. East Bay, generally eastward of mid-channel, is particularly important as a traditional wintering area for up to 200 canvasback ducks. In the recent past this species was at a low population level. Table 5 lists the 67 species of birds found in the project area, their seasons of occurrence and relative abundance.

As noted in the Department of Natural Resources Marine Atlas,[26] Budd Inlet is a major waterfowl area. East Bay itself provides sheltered waters and historically was probably surrounded by extensive marsh vegetation which would have made it very attractive to waterfowl. Although little marsh vegetation occurs today, the Bay nevertheless continues to receive surprisingly high use. As many as 750 ducks, coots, and grebes have been counted at one time on East Bay.[27] In addition, several semi-domestic ducks and a small flock of semi-domesticated Canada geese reside and reproduce year-round in the Olympia Harbor and Capital Lake area.

The explanation for this continued high use for six months of each year must be found largely in the food production capacity of the bay's mudflats. The channel area and tideflat habitats provide food in the form of small clams, crabs, amphipods, seaweeds, and limited marsh grasses for both diving and dabbling types of ducks as well as several species of grebes and other waterbirds. The aquatic plants of East Bay are the sea

lettuces, Ulva sp. and Monostroma sp., the brown rockweed, Fucus sp., green confetti, Enteromorpha sp., and pickleweed, Salicornia sp.

Hundreds of northwest fish crows, bonaparte gulls, and California gulls may be seen feeding on clams and carrion at certain times in East Bay. Flocks of sandpipers ranging from 200 to 800 are seen in East Bay. The presence of shallows and tideflats is absolutely necessary to their existance because they are unable to utilize any other type of habitat. Contrary to appearances, the availability of intertidal habitat along the migratory routes of shorebirds is critically limited. This factor has played a profound role in the birds' evolutionary adaptation as a result of intense inter-specific competition for the various types of food organisms available at different depths and in different substrates.[28]

Taylor, et al.[15] found that whereas subtidal areas had more species, the tidelands were favored feeding areas. They also found the small clams, Macoma inconspicua and Mysella tumida, and the tube-building amphipod, Corophium sp., to be abundant and important food organisms for waterfowl and shorebirds. These organisms are deposit and detrital filter feeders. Up to 3400 Corophium per square meter were found in East Bay down to extreme low tide level. Corophium has been found to be an important food item for gulls, mallards, dunlins, knots, and other sandpipers.[29] Taylor, et al.[15] speculate that brown algae produced on the mudflats is an important food source for dabbling ducks. Even scaups and canvasbacks, which are divers, were observed taking algae in dabbling fashion. More importantly, the mud algae and diatoms are components of the decayed organic matter which supports a myriad of primary consumers from protozoa, to polychaete and nereid worms, to mussels, clams, and crabs which are eaten in turn by fish and birds. These food sources may be critical during wintering and early spring when emergent plants are essentially absent in this region.

The high periods of waterfowl use are October through December and February through April. This pattern suggests a turnover of individual birds takes place around January with wintering birds departing for nesting grounds and being replaced by spring arrivals that are later migrants. Observations indicate the greatest water bird diversity (20 species) occurs in the Moxlie Creek area where there is a small grassy island. The east shore and mid-channel areas are comparable to one another in diversity (11 and 12 species) with more diving species at mid-channel. The west shore, along the port peninsula, receives comparatively less use (7 species). Taylor, et al.[15] noted an apparent correlation of low invertebrate production and low bird use in areas most recently filled or near industrial waste deposits.

Use of East Bay by mammals is negligible. The harbor seal (Phoca vitulina) is fairly common in Olympia Harbor, and the killer whale (Orcinus orca) frequents Budd Inlet, but does not enter East Bay.

Terrestrial habitats in the project area have been mostly eradicated by urban development. Only a few small animals such as voles and shrews are found along the east shoreline. A small grove of alder trees and blackberry vines exists near the southeast corner of the bay.

No hunting is allowed within Olympia Harbor, therefore no monetary benefits are directly attributable to wildlife use, although birds wintering here undoubtedly contribute to hunting elsewhere. Large numbers of people passing along East Bay Drive derive enjoyment from observing wildlife on the Bay. However, this cannot be reliably estimated. A few persons may be seen at times observing birds from the east shoreline. This non-consumptive use is estimated at 550 man-days per year. At a rate of $4.00 per observer-day,[30] the annual benefit attributable to non-consumptive wildlife use is $2,200. Another unmeasured and presently unquantifable benefit is the visual open space value presented by East Bay without the project.

We foresee no major changes in wildlife populations without the project. Future port-related development does, however, present a good prospect that this status could change.

With the Project

Construction of the marina would result in the permanent loss of 52 acres of tideland and bottomland habitat through filling. This habitat and the 56 acres of dredged bottom habitat that would be temporarily and recurrently disturbed, is occupied by many marine invertebrates and is used as a feeding and resting area by numerous waterfowl and other water-associated birds.

The facility construction would directly and permanently impact wildlife populations through loss of food producing areas and protected open waters. In addition, boat noise and increased human activity at roads, piers, and other marina-related facilities would cause harassment of most species, displacing them to other areas which may not be able to absorb additional animals. The available habitats can be presumed to be at or near maximum carrying capacity for wintering and spring congregation requirements. Thus mortalities can be expected, resulting in net population declines as a consequence of project-caused displacement. Other natural and unnatural decimating factors (e.g. disease, weather, destruction of nesting grounds, etc.) that may be more limiting are involved however. A reliable prediction cannot be made of the monetary costs of wildlife losses attributable to the project.

Terrestrial birds and mammals should be little impacted, provided the alder grove and grasses along the eastern shore are left undisturbed. However, the small marsh island near Moxlie Creek outlet, which serves as

a heavily used loafing area for waterfowl would be destroyed by the Olympia Avenue road extension and filling.

Taylor, et al.[15] noted that the project would result in substantial reduction of the bay itself and its tidelands, but would increase the area and depth of subtidal areas, which could favor diving ducks. However, it was speculated that the overall effect would be a reduction in waterfowl numbers. Also the narrowing of the bay was expected to result in frightening off shy species due to closer proximity of human activity.

To some degree the impact of boating harassment is minimized by the fact that peak waterfowl use occurs during the slack period of boating use. However, as designed, the marina would occupy so much of the East Bay water area that on low tides, and even during periods of low boating activity (October through April), most birds that might use the Bay are expected to be driven off. As a result of this disturbance and the approximately 20 percent permanent loss of habitat within the Bay, a decline in the quality and opportunities for wildlife observation will occur. Even though more people would visit the site, there would be substantially less diversity and numbers of wildlife to observe. This decline is estimated to be a loss of 400 man-days valued at $1,600 per year.

DISCUSSION

Olympia Harbor has experienced extensive development which has radically altered the original Deschutes River estuary, particularly its tidal flat and marsh habitats. In the past this development proceeded in piecemeal fashion with little regard for environmental concerns. Though reduced in area and quality, some shallow water habitats of value to fish and wildlife and which perform essential ecological functions remain. The tideland and shallow water habitats are essential to the survival of many types of fish and wildlife in Olympia Harbor. Lack of understanding of the functions and values of these areas contributes to the needless loss of critical and scarce littoral habitats in Puget Sound; often with the mistaken belief that they are worthless.

The upper end of Budd Inlet, near Tumwater Falls, is the site of the oldest settlement in Washington west and north of the Columbia River. Commercial use and filling of the inlet began very early.[15] Garbage and refuse was dumped directly in the bay for many years. As noted in the 1970 Puget Sound and Adjacent Waters Study (App. XI, p. 11-15) "Industrial and domestic effluents, plus introduction of other foreign materials from local shipping and barge traffic, each alters the natural water quality in the Deschutes Basin's estuarine and marine waters. Such conditions have occurred in Budd Inlet."

East Bay has experienced considerable abuse from solid waste and garbage disposal, sewage overflow, septic tank drainage, log rafting and industrial effluents. Fertilizers and pesticides associated with agriculture and silviculture reach the bay from the Deschutes River watershed. As noted in the Puget Sound Stream Catalog,[8] "Effluents from agricultural, industrial, and sewage disposal sources are particularly detrimental to aquatic forms".

While raw sewage and storm overflow reportedly no longer enter East Bay directly (except from Moxlie Creek), the proximity of the primary treatment discharge having a high BOD load, coupled with the accumulated waste and sludges on the Bay bottom could present problems for dredging and disposal work. Containment dikes and weirs will require careful review by environmental agencies in the detailed design stage. Upgrading of the regional sewer treatment plant is scheduled for 1981 to 1982. Marina project scheduling must be carefully coordinated with that of the treatment plant. The Washington Departments of Fisheries and Game stipulated that dredging for the marina not be initiated until the water quality is brought up to acceptable standards.

As has been noted in the Puget Sound Stream Catalog[8] "Implementation and enforcement of accepted standards (for water quality) must consider the total environment concept regarding fish and aquatic organisms and the complex interrelationship of land and water development on the fisheries resource." The same is true for wildlife resources. While East Bay itself presently has little value as a feeding or rearing area for anadromous fish and less than high value for marine fish and shellfish, there are contributions from mudflat algal productivity leading through the food chain to salmon and other fishes in Puget Sound. Taylor et al.[15] references Odum[19] in stating that "The growth of microscopic 'mud algae' on tideflats is a major contribution to the productivity of estuaries by the export of this organic material to the channels." Also, with the upgrading of water quality, the contribution to shellfish through detrital export could be very significant for future revival of oyster raising in Budd Inlet.

Assuming suitable water quality conditions can be established and maintained with the marina project, the most serious impact to fish and wildlife resources would be the irrevocable loss of tideland productivity and feeding and resting habitat for waterbirds. In addition, the proposed project would destroy the small (0.10 acre) marsh island at the south end of East Bay used by numerous birds. A new island could easily be created, however, further north in East Bay and either allowed to vegetate naturally or be planted with native salt grasses.

As previously mentioned, East Bay is a significant area for waterfowl, shorebirds, and other waterbirds; particularly those areas generally eastward of mid-channel for the length of the Bay. This area serves as an important wintering place for canvasback ducks. The mud algaes and secondary animal production which the algaes support are apparently the chief food items of birds using East Bay. To continue its usefulness for wildlife, the east shore of the Bay should be left in as near-natural condition as possible.

Approximately 35 percent of the total volume of Budd Inlet is intertidal (i.e., from MLLW to MHW). Except for the southern end of Budd Inlet, there are no extensive tideflats.[31] The unique and indispensible ecological roles of mudflats in waste assimilation and nutrient cycling, which are only now beginning to be appreciated, are discussed in Appendix A. Also discussed is the prospective value of East Bay mudflats in tertiary sewage treatment.

The proposed project would alter 110 acres of tideland and bottomland habitat needed by marine fishes and waterfowl in particular. Of this, 52 acres would be permanently destroyed without replacement or mitigation. In referring to this, Taylor et al.[15] stated, "A less easily observed effect of tideland elimination will be the reduction of total productive capacity of the southern end of Budd Inlet". Eventual recolonization of 56.8 acres of dredged bottomlands would occur, depending on the frequency of maintenance dredging and resultant water quality conditions.

Parking and launching areas and access roads for the marina will require about 15 acres and be constructed on landfill. These are not regarded as water dependent facilities. However, there are no practicable alternatives to providing parking at this general location without reducing the available land area presently devoted to cargo storage and other port activities. Some additional acreage is logically needed for facilities in direct support of boat launching and moorage and the ongoing sewer treatment plant expansion. In total, the actual land base requirement for the marina itself is about 27 acres.

In the view of the Fish and Wildlife Service, filling for added cargo space and nonwater-dependent commercial developments proposed by the Port is excessive to project requirements and purposes authorized under Section 107 of the 1960 Rivers and Harbors Act. This filling can be justified only if alternative means of dredge material disposal less detrimental to the natural environment are not feasible and fish and wildlife resource losses are mitigated.

Nevertheless, the Fish and Wildlife Service recognizes the need for expanded marine facilities, including public launching ramps and moorages, in the Olympia area. We do not have any recommendations for an

alternative site elsewhere in this vicinity. However, an acceptable alternative for development within East Bay has been proposed and does exist. It consists of an alternative marina design alignment within East Bay, previously labelled number 4b in planning correspondence. Essentially the marina would be shifted west about 800 feet on the north end and 200 feet on the south end. Dredge materials not suitable for open water disposal could be used as fill material for the marina support area and remaining materials would be taken to a designated deep water disposal site.

The recommended alternative project would provide essentially the same number of moorage spaces, yet require only half the area of the fill (25-30 acres) as the proposed project. In addition, this alternative has the following advantages:

a. The need for a floating breakwater is eliminated, resulting in a considerably reduced federal project cost.

b. Employment of a short, solid breakwater instead of a large floating structure would deflect water against the east shore, and thus help to prevent stagnant areas or pollution traps.

c. East Bay waterway would be less constricted, thus presenting better hydraulic conditions for adequate flushing.

d. An added margin of safety is provided with respect to prospective sloughing of the unstable east shoreline.

e. A higher level of wildlife use of the east shoreline would be possible because of the increased distance between the marina and more valuable wildlife areas.

f. A greater amount of productive tideflats would remain as fish and wildlife habitat and continue to perform vital functions of nutrient cycling and waste assimilation.

Other possible enhancement features associated with fish and wildlife resources could be to include a fishing jetty on the northeast shoreline of East Bay and a general clean-up and beautification effort in conjunction with the recommended alternative. While there is no hunting permitted at Olympia Harbor, significant potential exists for increased public use of East Bay in non-consumptive and passive recreational activity through improvement of the visual open-space and scenic vistas. By careful placement of small islands in East Bay, wildlife observation opportunities can be retained. Waterbirds could be a major attraction for visitors to the site with the suggested redesign.

The possibility of artificially establishing significant salt marshes on islands created from channel dredging materials was examined, but rejected because of the unsuitability of materials and volumes required to establish islands in the available locations north of East Bay. Material developed in the course of this study on marsh establishment is provided in Appendix B.

SUMMARY OF ENVIRONMENTAL CONSIDERATIONS

In keeping with the National Environmental Policy Act of 1969, the following comments constitute a summary of the environmental effects pertinent to this project. The project's impacts are described in two sections: (A) The environmental effects which would occur with the project if our recommendations are not included, and (B) the effects with incorporation of our Service's recommendations as part of the project.

A. Construction of the project without U.S. Fish and Wildlife Service Recommendations.

1. Environmental impacts of the proposed action.
The project would permanently destroy 52 acres of tideland and bottomland habitat of moderate importance used by several species of marine fish and wildlife. An additional 56 acres of these habitats would be adversely modified at least temporarily. Water quality may be somewhat degraded and tidal flushing prolonged, even though secondary treatment should be operational by 1982.

2. Adverse environmental effects which cannot be avoided.
A minimum of 25 acres of landfilling would be required for parking area and direct support facilities for a 700 to 800 boat marina. Increased flushing time and some marina-generated pollutants (e.g., oil and gas) are unavoidable.

3. Alternatives to the proposed action.
Several alternatives to the selected plan including alternate sites and designs have been considered. All of the alternative sites would appear to be more detrimental to fish and wildlife and the general environment. Generally these sites lack in-place utilities in close proximity. Several alternative designs have been proposed. None of these have incorporated dry storage facilities to increase the effective capacity of the project to accommodate boaters. Alternative 5 would encroach upon public beaches at Priest Point Park and waterfront residences to the south. Alternative 4e would be for 1500 boats and extend around the tip of the peninsula. The physical impacts on fish and wildlife habitats would be about doubled.

Alternative 4d involves three times the amount of landfill but would serve only 500 boats. It would cause greater loss of habitat and disturbance of wildlife. Alternative 4c would cost more than 4b, which the Fish and Wildlife Service recommends. It would involve slightly more filling for the same amount of moorages.

4. Relationship between local short-term use of man's environment and the maintenance and enhancement of long-term productivity. The proposed project would provide moorage for 800 boats and serve to meet a current and future demand for additional public moorage and launch facilities. A long-term adverse impact would be the unmitigated loss of a minimum of 52 acres of biological productivity associated with tideflats and a significant decrease in the natural waste assimilative capabilities of the limited intertidal areas of Budd Inlet. Increased fishing pressure would tend to overexploit existing anadromous fish stocks.

5. Irreversible and irretrievable commitments of resources. Approximately 52 acres of tideland and bottomland habitat in East Bay would be irreversibly and irretrievably committed to marina support, cargo storage, and commercial facilities. An additional 56 acres of dredged channels would be committed to pleasure craft navigation for the projected 50 year life of the project, unless a decision was made to change this use. The remainder of East Bay remains subject to possible intensive development.

B. Construction of the project with inclusion of U.S. Fish and Wildlife Service recommendations.

1. Environmental impacts of the proposed action. The Fish and Wildlife Service proposal would involve approximately a 50 per cent decrease in the amount of landfill and about the same area and dimensions for the moorage basin and entrance channels as the Corps' selected project. It would serve essentially the same number of boats. Included in the recommendations is a small, solid breakwater in place of the more costly floating breakwater planned. This should benefit water circulation in the moorage basin thereby minimizing pollution pocket risks.

2. Adverse environmental effects which cannot be avoided. Given the need for a sizable public moorage facility in the Olympia vicinity and the selection of East Bay as the logical site involving the least damage to present aquatic environments,

there would nevertheless be some unavoidable adverse impacts with this recommended alternative plan. About 27 acres of tidelands and bottomlands having the lowest wildlife value would be lost. Even given the solid breakwater to deflect interior currents, flushing time would be increased over present tidal conditions, possibly resulting in water quality below applicable state and federal standards.

3. Alternatives to the proposed action.
Alternatives would include all those previously examined by the Corps of Engineers. For reasons explained in A.3 (above) none of the other action alternatives are acceptable to the Fish and Wildlife Service. For practical and environmental reasons given, other sites outside of East Bay do not appear attractive by comparison. The "no-action" alternative would be less harmful to fish and wildlife. However, the environmental values involved are not high enough to obviate a marina as proposed by the Fish and Wildlife Service, especially if it includes mitigation features recommended in the next section of this report.

4. Relationship between local short-term use of man's environment and the maintenance and enhancement of long-term productivity.
This proposal would provide approximately 800 moorages to help meet a current and future demand for public boating facilities in the Olympia area. There would be a long-term loss of primary plant productivity, invertebrate food organisms, and wildlife use of about 25 acres.

5. Irreversible and irretrievable commitment of resources.
Approximately 25 acres of tideland habitat would be irretrievably and irreversibly committed by landfilling for construction of the marina and direct support facilities which cannot practicably be located on existing dry land of lower ecological value without hindering present port operational needs. An additional 38 acres of moorage basin and about 18 to 20 acres of dredged channel would be committed for the life of the project to pleasure craft navigation use. This use, however, could later be converted to other purposes. If recommended mitigation measures are incorporated with this alternative design plan, the fish and wildlife habitat losses would be partially offset.

RECOMMENDATIONS

1. That the landfill area of the project be reduced by approximately 50 per cent in accordance with alternative 4b (Corps of Engineers

planning data of May 25, 1977 and letter of October 4, 1977) to serve only direct marina-support needs and thereby minimize direct impact to fish and wildlife resources.

2. That project construction not be commenced until detailed design plans are approved by the Washington Departments of Fisheries and Game and certification is made by those agencies or the Washington Department of Ecology that achievement of secondary treatment is expected within 12 months, in accordance with the letter of December 1, 1977 from the Directors of Fisheries and Game to the Port of Olympia.

3. That marine pumpout facilities to accommodate boat-generated sewage be required for protection of water quality.

4. That dredging work be conducted only during the period of October 15 to February 15 or as otherwise stipulated by the Washington Departments of Fisheries and Game.

5. That a short, solid breakwater be constructed at the north end of the marina instead of the planned floating breakwater to improve water circulation by deflection of currents to the marina interior.

6. That storm drainage from the marina facility be directed into West Bay and not into East Bay.

7. That a general clean-up and beautification of East Bay tidelands be conducted in conjunction with the marina project.

8. That adequate, all-tide public boat launch capability be provided at nominal fee at the marina or in the Olympia Harbor vicinity and maintained by the project sponsor for the life of this project.

9. That a public fishing jetty be constructed on Port of Olympia or Washington State property along the northeast shore of East Bay.

10. That one or more dredge islands totaling up to an acre in size be constructed for a bird resting and feeding area within East Bay near the southeast shore to replace the present island which would be destroyed by the Olympia Avenue access road.

11. That a small salmon run be re-established in Ellis Creek at Priest Point Park by means of a "Netarts Box" as mitigation for fish habitat loss in East Bay. This project is to be coordinated with the Washington Departments of Game and Fisheries and the Fish and Wildlife Service and be initiated and maintained concurrently with the marina project.

12. That capital, operation, maintenance, and replacement costs of any potential mitigation measures be treated as other project joint costs and allocated among the beneficial purposes of the project.

We appreciate the cooperation shown by your staff during preparation of this report. Please notify us of your proposed actions regarding our recommendations. We would also appreciate notification of any changes or refinements in project plans so that we my revise or supplement this report as necessary.

Sincerely yours,

Joseph R. Blum
Area Manager

cc: RO
AM
WDG
WDF
DOE
EPA
NMFS

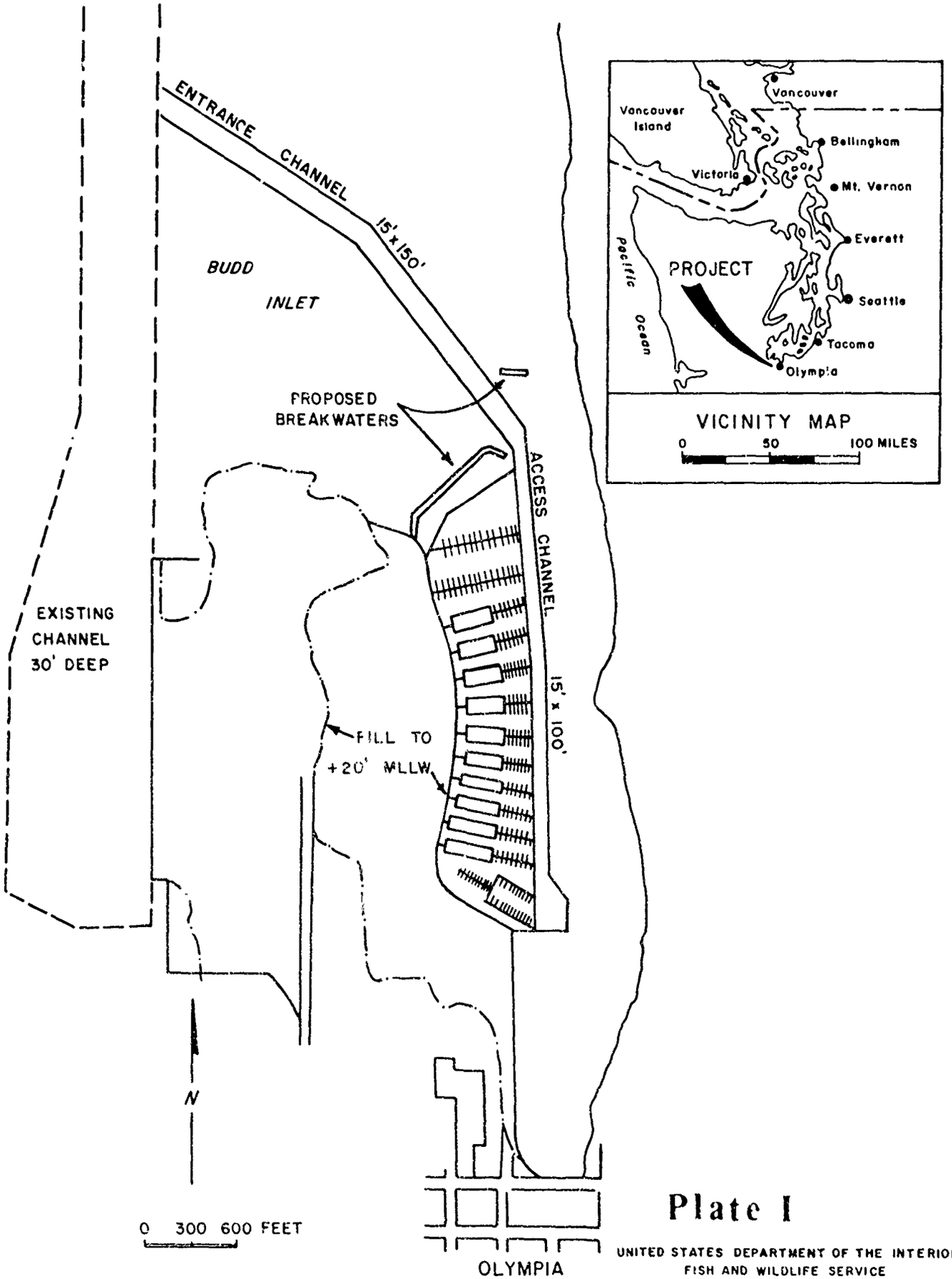


Plate I

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
GENERAL MAP
CORPS OF ENGINEERS
EAST BAY SMALL BOAT BASIN
THURSTON COUNTY WASHINGTON
MAY 1978

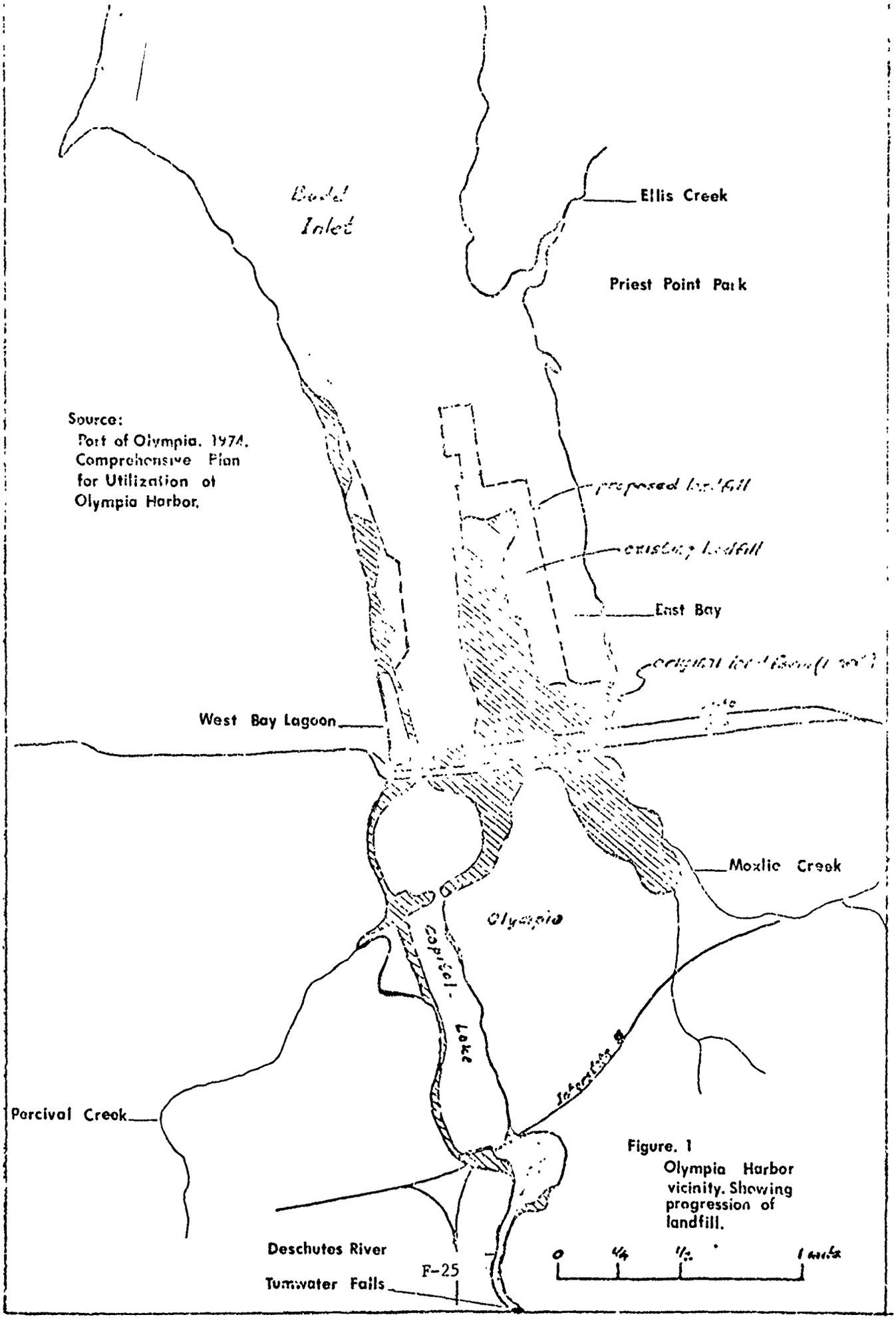


Figure. 1
Olympia Harbor vicinity. Showing progression of landfill.

Table 1. Production and Escapement Data and Catch Values for Deschutes River Anadromous Fish Runs[1]

Species	Natural Production[2]	Artificial Production[2] (juveniles released)	Escapement[2]	Catch[2]	Value per Fish[3]	Total Estimated Value[2]
Chinook Salmon, *Oncorhynchus tshawytscha*	3,155 adults to Percival Creek	3,403,798 (1961-1965)	5,984 (1948-1976)	63,480 (1961-1965)	$25	$1,587,000
Coho Salmon, *Oncorhynchus kisutch*	Some adults to Percival Creek, 1500 adults to Deschutes River	544,048 (1961-1965)	2,500 (1965-1976)	7,100 (1961-1965)	$10	$71,000
Chum Salmon, *Oncorhynchus keta*	few (Percival Creek)	none	less than 100 (Percival Ck)	unknown	$10	-
Steelhead Trout, *Salmo gairdneri gairdneri*	unknown but substantial	27,595 (1955-1977)	(unknown)	500 (1963-1973)	$115	$57,000
Searun Cutthroat Trout *Salmo clarkii clarkii*	Unknown but substantial	22,000 (1966-1977)	(unknown)	not recorded	not established	-
Dolly Varden Char *Solvelinus malma*	unknown not many	none	unknown	unknown	not established	-

[1] Data on salmon from Washington Department of Fisheries
Data on trout from Washington Department of Game
Additional data from Puget Sound and Adjacent Water Study, Appendix XI (1970)

[2] Numbers are presented as estimated annual averages over varying periods of computation.

[3] Values per fish are current (1978) values assigned by Departments of Fisheries and Game.

Table 2. Marine and Bottom Fishes of East Bay[1]

Surf smelt Hypomesus pretiosus	Occasional
Pacific herring Clupea harengus pallasi	Occasional
*Starry flounder Platichthys stellus	Abundant
Striped seaperch Embiotoca lateralis	Common
*Pile perch Phacochilus vacca	Abundant
*Shiner perch Cymatogaster aggregata	Abundant
*Spiny-dogfish Squalus acanthias	Abundant
*Pacific staghorn sculpin Leptocottus armatus	Abundant
*Buffalo sculpin Enophrys bison	Occasional

[1]Sources: Dames and Moore Consultant Engineers in "Report of Bottom Sediment Sampling and Analyses: Proposed East Bay Dredging and Landfilling", 1974.

U.S. Fish and Wildlife Service from fyke net sampling in East Bay*

Note: Also found in Budd Inlet are various cods, soles, and rockfishes. Probably they enter East Bay but were not seen or sampled.

Table 3. Sessile and Mobile Shellfish of East Bay[1]

Blue mussel	Mytilus edulis	Abundant
Eastern softshell clam	Mya arenaria	Abundant
Clam (small)	Mysella tumida	Common
Cockle	Clinocardium nuttalli	Common
Horse calm	Tresus capox	Sparce
Butter clam	Saxidomus nuttali	Sparce
Inconspicuous macoma	Macoma inconspicua	Abundant
Littleneck clam	Protothaca stamina	Sparce
Manilla clam	Venerupis japonica	Sparce
Pacific oyster	Crassostrea gigas	Sparce
Olympia oyster	Ostrea lurida	Sparce
Dogwelk snail	Nassarius mendicus	Common
Periwinkle snail	Littorina scutulata	Sparce
Oyster drill	Thais emarginata	Sparce
Native Oyster drill	Thais lamellosa	Sparce
Mud shrimp	Urogebia pugettensis	Common
Ghost shrimp	Callianassa californiensis	Common
Euphausid shrimp	Euphausia sp.	Occasional
Octopus	Octopus dofleini	Occasional
Squid	Rossia pacifica	Occasional
Hermit crab	Pagurus sp.	Common
Kelp crab	Pugettia producta	Common
Red crab	Cancer productus	Common
Shore crab	Hemigrapsus oregonensis	Abundant
Purple beach crab	Hemigrapsus nudus	Common

[1]Sources: Taylor et al. (TESC), Environmental Assessment Study, Port of Olympia, 1974.

Dames and Moore Consultant Engineers, Sediment Analyses, East Bay, 1974

Table 4. Benthic Invertebrates Other Than Shellfish in East Bay[1]

Tube amphipods	*Corophium* sp.	Abundant
Sea urchin	*Strongylocentrotus purpuratus*	Sparce
Sea cucumbers	*Eupentaca* sp.	Sparce
Brittlestars	*Amphioda* sp.	Common
Spionid Worms	*Prionospio* sp.	Sparce
Mysid shrimp	*Mysis* sp.	Common
Marine worms	*Glycinda* sp.	Abundant
Pile worm	*Nereis procera*	Common
Clam worm	*Nereis virens*	Common
Lug worm	*Abarenicola claparedii*	Common
Starfishes	*Solaster* sp.	Common
Sand dollar	*Dendraster excentris*	Sparce
Acorn barnacle	*Balanus glandula*	Abundant
barnacle	*Chthamolus dalli*	Sparce
limpet	*Acmaea persona*	Sparce

[1]Sources: Taylor et al. (TESC), Environmental Analysis Study of the Port of Olympia, 1974.

Dames and Moore, Consultant Engineers in "Report of Bottom Sediment Sampling Analyses: Proposed East Bay Dredging and Landfilling", 1974.

Table 5. Water-Associated and Terrestrial Birds of East Bay[1]

Common Name	Scientific Name	Season[2] and Abundance[3]			
		S	S	F	W
Common loon	Gavia immer	C		C	C
Red-throated loon	Gavia stellata	U		U	U
Western grebe	Aechmorphorus occidentalis	C		C	C
Horned grebe	Podiceps auritus	C	C	C	C
Eared grebe	Podiceps nigricollus	U		U	U
Pied-billed grebe	Podilymbus podiceps	R			R
Double-crested cormorant	Phalacrocorax auritus	C	C	C	C
Pelagic cormorant	Phalacrocorax pelagicus	C	C	C	C
Whistling Swan	Olor columbianus	U			U
Canada goose	Branta canadensis	Semi-domestic resident			
Mallard	Anas platyrhynchos	C	C	C	C
Pintail	Anas acuta	C		C	C
Gadwall	Anas strepera	U		U	U
Green-winged teal	Anas carolinensis	U		U	U
American wigeon	Anas americana	C		C	C
Canvasback	Aythya valisineria	C		C	C
Greater scaup	Aythys marila	C		C	C
Lesser scaup	Aythya affinis	U		U	U
Common goldeneye	Bucephala clangula	C		C	C
Barrow's goldeneye	Bucephala islandica	C		C	C
Bufflehead	Bucephala albeola	C	O	C	C
Black scoter	Melanitta nigra	C		C	C
White-winged scoter	Melanitta deglandi	C		C	C
Surf scoter	Melanitta perspicillata	C		C	C
Ruddy duck	Oxyura jamaicensis	C		C	C
Red-breasted merganser	Mergus serrator	C		C	C
Hooded merganser	Lophodytes cucullatus	U	U	U	U
Great blue heron	Ardea herondias	C	C	C	C
Green heron	Butorides virescens	U	U	U	U
American coot	Fulica americana	A	O	O	A
Killdeer	Charadrius vociferus	C	C	C	C
Spotted sandpiper	Actitis macularia	U		U	U
Least sandpiper	Calidris minutilla	C		C	C
Dunlin	Calidris alpina	A		A	A
Western sandpiper	Ereunetes mavri	C		C	C

Table 5. (continued)

		S	S	F	W
Herring gull	Larus argentatus	U		U	U
California gull	Larus californicus	C	C	C	C
Bonapartes gull	Larus philadelphia	U		C	C
Common tern	Sterna hirundo	R			
Pigeon guillemot	Cepphus columba	U			U
Belted kingfisher	Megaceryla alcyon	C	C	C	C
Northern bald eagle	Haliaeetus leucocephalus alaskanus	U			U
Barn swallow	Hirundo rustica	C	C		
Cliff swallow	Petrochelidon pynhonota	C	C		
Violet-Green swallow	Tachycineta thalassina	C	C		
Tree swallow	Iridoprocne bicolor	C	C		
Rough-winged swallow	Stelgidopteryx ruficollis	C	C		
Purple martin	Progne subis	U	U		
Northwestern crow	Corvus caurinus	A	A	A	A
Band-tailed pigeon	Columba fasciata	C	C	C	
American goldfinch	Spinus tristus	C	C	C	
Pine siskin	Spinus pinus	C	C	C	
House finch	Carpodacus purpureus	C	C	C	
American robin	Turdis migratorius	A	A	A	A
Rufous-sided towhee	Pipilo erythrophthalmus	C	C	C	C
Song sparrow	Melospriza melodia	C	C	C	C
House sparrow	Passer domesticus	A	A	A	A
Starling	Sturnis vulgaris	C	C	C	C

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[1]Sources: Taylor et al. (TESC), Environmental Assessment Study of the Port of Olympia, 1974.

U.S. Fish and Wildlife Service censuses

Black Hills Audubon Society

[2]Seasons: Spring is March-May; Summer is June-August; Fall is September-November; Winter is December-February

[3]Abundance: A=Abundant; C=Common; U=Uncommon; O=Occasional; R=Rare

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STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way/Olympia, Washington 98504 206/753 5700

July 19, 1978

Joseph R. Blum, Area Manager
Fish and Wildlife Service
2625 Parkmont Lane S.W., Bldg. B-3
Olympia, Washington 98502

Mr. Blum:

We have reviewed your proposed report on East Bay Small Boat Basin, Olympia, Washington, as you requested. We concur with the content of the report.

We would also stress again our position that the project should not be constructed until additional treatment facilities planned are completed.

Thank you for the opportunity to review and comment on your report.

Yours very truly,

THE DEPARTMENT OF GAME

John Douglas

John Douglas, Assistant Director

JD:db

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington 98504 206/753 6600

July 18, 1978

Mr. Joseph Blum, Area Manager
United States Department of
the Interior
Fish and Wildlife Service
Ecological Services
2625 Parkmont Lane, S.W.
Building B-3
Olympia, Wasnington 98502

Dear Mr. Blum:

We received a copy of the proposed USFWS report on the East Bay Small Boat Basin, Olympia, Washington, on June 30, 1978. The cover letter signed by Charles M. Chambers, Acting Field Supervisor, asked for a letter of concurrence and comment on the report from this Department by July 15, 1978.

The Department of Fisheries cannot concur with the report because we have found statements and concepts in the body of the report which in our opinion necessitate major revision. Further, we cannot concur with some of the present recommendations in the report.

The Department of Fisheries and the Department of Game approved the marina in the present proposed location. That approval subsequently was upheld by the Pollution Control Hearings Board in January, 1977. The approval was written after numerous meetings with the project sponsors to develop a marina plan that was compatible with the fisheries resources. Our decision was based on the best available biological data and in our opinion the provisions of the approval will provide protection to the fisheries resources under our jurisdiction. The approval represents the official position of the Washington Department of Fisheries and we see no reason to alter our decision at this time.

We would be pleased to meet with you to discuss your report. Items to be discussed in particular would include the value of the presently polluted tide flats, the proposed public fishing area in the marina, the comments on shellfish and marinefish resources, the proposed spoil islands in lower Budd Inlet, and especially the new marina design plan proposed in your report and its potential impacts on the highly significant salmon resources of Budd Inlet.

We will need to receive additional copies of the report to supply to our shellfish and marinefish programs for their review and comments. Prior to any further review of the report, the reference numbers in the text should be corrected and exhibit A included so we can review a complete report.

Sincerely,

Gordon Sandison
Director

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cc: Ralph Larson, Director, WDG

APPENDIX A

ECOLOGICAL VALUES OF MUDFLATS AND MARSHES

The purpose of this appendix is to explore in a general way the ecological functions and values of estuarine mudflats in nutrient cycling, waste assimilation, and primary production in comparison to the functions and values of salt marshes. In addition, the utility of East Bay mudflats as habitat for fish and wildlife compared to artificially created marsh habitat is discussed. Appendix B discusses factors involved in establishment of marsh habitat using dredge materials.

Environmental and ecological values are not calculated in customary economic analyses, partly due to lack of quantification methodology. Ecologists, including Howard T. Odum, Eugene P. Odum, and others, have developed a system of valuation based on energy budgets where the Calorie (Kcal.) is a common currency in both ecological and economic systems.[1] In 1977, 25,000 calories were equated to one dollar.[2]

PRIMARY PRODUCTIVITY VALUE

E. P. Odum[3] has surveyed the literature to construct a picture of worldwide gross primary production, upon which all life is dependent. The total production of the earth's biosphere is estimated at 10^{18} Kcal per year. A high proportion of the earth's major ecosystems fall into a low-production category. Accordingly, the production of the world's deserts (less than 500 Kcal./m^2/yr.) is comparable to that of the open oceans (less than 1,000 Kcal./m^2/yr.). Next in productivity are the grasslands, deep lakes, mountain forests, and some unmechanized forms of agriculture which range from 500 to 3,000 Kcal./m^2/yr. This range is exactly comparable to the productivity of the continental shelf and coastal zone marine waters.

More productive still (3,000 to 10,000 Kcal./m^2/yr.) are moist forests and secondary (regrowth) communities, shallow lakes, moist grasslands, and most forms of agriculture practiced in the world today. However, the most outstanding gross primary production takes place on a small amount of area comprising some estuaries, springs, coral reefs, terrestrial communities of alluvial plains, and intensive agriculture. The range here is 10,000 to 25,000 Kcal./m^2/yr.

Thus, while the open ocean (characterized by phytoplankton primary production) occupies over 65 percent of the world's surface (exclusive of the polar ice caps), its total contribution is only 32.6 percent of the world's productivity. By contrast, estuaries and reefs comprise only 0.4 percent of the world's surface but contribute 4.0 percent of the gross primary production. They are thus on the order of 20 times more

productive than the open oceans. While wet tropical and sub-tropical forests have a comparable rate of gross primary production and contribute 29 percent of the total (due to a larger area of coverage), they have a low net productivity. Thus, estuaries emerge as clearly among the most productive of ecosystems on an acre-for-acre basis. Their productivity, on half the area, is equivalent to that of fuel-subsidized agriculture (4.8 percent of all gross primary production). However, a greater portion of food energy (about one third of gross production) reach humans directly as food from this agriculture.

E. P. Odum[3] stated the main reasons for the high productivity of estuaries are as follows:

1) An estuary is a nutrient trap that is partly physical and partly biological. Nutrients are regenerated, recycled, and stored in estuaries.

2) Estuaries benefit from a diversity of producer types "programmed" for virtually year-round photosynthesis. They often have all three types of producers that power our world, namely, macrophytes (seaweeds, seagrasses, and marsh grasses), benthic microphytes, and phytoplankton.

3) Tidal action creates a "subsidized" fluctuating water-level ecosystem. The tides perform much work in removing wastes and transporting food and nutrients to sessile organisms. In general, the higher the tidal amplitude the greater the production potential.

Estuaries can be divided into marsh, mudflat, subtidal and other component biological communities (subsystems) for separate analyses. Also they exhibit great variability in hydrologic and hydraulic regimes, climate, latitude, flora, and other factors that would affect primary productivity from various sources and the relative importance of these system components.[4] Little information exists for comparing northwest estuaries to those surveyed by Odum for others parts of the United States and elsewhere. Researchers, who have noted this lack of data,[5] have however made some preliminary estimates of salt marsh productivity in northwest waters. Their estimates are presented later.

The importance of salt marshes in the detrital food chain of estuaries and as feeding, breeding, and nursery grounds is generally well recognized by ecologists. However, in their publication titled The Value of the Tidal Marsh,[6] Gosselink, Odum, and Pope found that commercial and sport fisheries and hunting yielded a per-acre value of only $100 a year. Using the energy/money equivalency approach, oyster aquaculture potential was estimated at $630 and $1,575 under moderate and intensive cultivation

levels respectively. However, the potential for waste assimilation performed by a marsh-estuary was put at $280 for secondary treatment, $950 for phosphorous removal, and $2,500 for tertiary treatment (adjusted) on an annual per-acre basis.

Under the energy/money equivalency system, a maximum non-competitive summation of fisheries with tertiary treatment equals $2,600 and intensive oyster culture with tertiary treatment equals $4,075 for the marsh acre value. A "total life-support" value for the estuary as a functioning whole was figured at $4,100 per-acre. The latter value was then income-capitalized at a 5 percent interest rate yielding $82,000 per-acre.

A direct comparison cannot be made to East Bay mudflat values based on the above marsh values, for several reasons. If there once were extensive tidal marshes in Olympia Harbor performing these functions, they are no longer available to do so, nor are marshes likely to develop naturally. Nevertheless, an estimate can be calculated using these figures as a reference and contrasting the relative ecological significance of mudflats with marshes and open water (marine) areas. Mudflats, even when degraded and stressed, perform similar roles to marshes. A comparision of relative functions in production, assimilation, etc. should permit estimation of a per-acre dollar value of mudflats.

The value of estuarine marsh productivity is based on mean values for measures made in a number of geographical areas on different ecosystem subsystems. The measurements frequently have been made in different terms and units (i.e., by weight, calories, net, gross, etc.) which require conversion to a common unit for comparison. For conversion purposes we can use the formula of 1 gram carbon equals 2 grams dry plant matter. Either of these equals 4 kilocalories[7] (the range actually extends from 4 to 8+ Kilocalories, but is typically from 4 to 5). Net production is approximately 75 percent of gross production.[8]

Gosselink, et al.[6] found that Louisiana salt marshes had a mean annual net productivity of 1,544 g. dry wt./m^2/yr. and Georgia salt marshes produced 1,875 grams. At the latitude of New Jersey, average net marsh production was measured at only 325 g. dry wt./m^2/yr.[9] Eilers[10] at Newhalem Bay in Oregon obtained a value of 1,388 grams. Leon, et al.[11] in a "non-estuarine" salt marsh at Hood Canal in Washington obtained a measurement of 762 grams which they deemed conservative and which (evidently) did not contain a detrital export correction factor. Burg, et al.[12] at Nisqually Delta in Washington obtained a figure of 750 grams which did not include an export factor. Teal[13] has suggested that export may total 45 to 55 percent of net production; thus, the 750 grams at Nisqually could reasonably be doubled to 1,500 g. dry wt./m^2/yr. Converted, this would give a figure of 6,000 Kcal/m^2/yr. in south Puget Sound salt marshes. These figures suggest that salt marsh productivity in

the Northwest and in Puget Sound is very comparable to that of estuaries on the southeastern coasts of the United States. Teal[13] measured net production of Spartina alterniflora in Georgia to be 6,580 Kcal/m^2/yr. (converted) and mud algae production in the same marsh to be 1,620 Kcal/m^2/yr. This is a ratio of about 4 to 1 salt marsh macrophyte to algal microphyte productivity.

E. P. Odum[14] noted in 1961 that "...in classical limnology and oceanography all the emphasis is on phytoplankton." It has often been presumed that marine and estuarine productivity (food sources) along the Northwest coast is almost exclusively attributable to nutrient upwelling and phytoplankton production in near-surface waters.

Westlake[15] has estimated mean phytoplankton net production at 800 Kcal/m^2/yr. (converted) compared to 12,000 Kcal for salt marshes. At other North American coastal locations open water phytoplankton production has been compared to that of mud algaes. In Rhode Island and Chesapeake Bay,[16] where phytoplankton production was not high, benthic microflora production was found to be about double that of phytoplankton or about 100 g. carbon/m^2/yr. (converts to 200 g. dry wt./m^2/yr. or 800 Kcal/m^2/yr). A figure of 200 g. c/m^2/yr. (or 1,600 Kcal/m^2/yr.) was obtained for intertidal microalgae in a Florida marsh (Boca Ciega Bay) by Pomeroy.[17] In Georgia[18] almost the same production rate (180 g. c/m^2/yr.) was found at Sapelo Island estuary.

Winter, et al.[19] estimated net productivity of phytoplankton in southern Puget Sound at about 275 g. c/m^2/yr. or 1,100 Kcal/m^2/yr. This figure might be low since phytoplankton productivity fluctuates seasonally and is difficult to measure. In their study of Nisqually Delta salt marshes, Burg, et al.[12] noted large algal blooms throughout the summer months with extensive mats over the mudflats and lower marsh associations. They speculated that the contribution of benthic algae to the estuary's productivity was significant; however, no quantitative measurements were made. We found no figures on mud algae production in northwest marine or estuarine waters. Production is probably lower here than in southern latitudes since it would not be as constant year-round due to seasonal tide patterns and cloud coverage.

Studies in Georgia by Ragotzkie[20] (1959) found that in well-mixed, turbid waters, plankton spend most of their time in the dark with the result being a net primary productivity of zero. Nevertheless, the importance of phytoplankton in the food chain of small fishes is well recognized.[21] Teal[13] and Phillips[22] have suggested that even the phytoplankton are nourished by nutrients and particles of marsh grass, mud algae, and sea grass detritus and their associated bacteria.

of marsh detritus in the food chain of pink and chum salmon[23] and that their diet as young fish in Puget Sound can be as high as 95 percent copepods, amphipods, and other epibenthic fauna produced only in shallow, salt waters.[24]

In a study of fish diets in the Snohomish estuary,[25] amphipods (Gammarids and Corophium) produced on mudflats were found to be approximately 25 percent of the diet (by weight) of coho, chinook, and chum salmon. While the juveniles of other salmon species prevalent in the Deschutes River system are evidently not nearly so dependent (in a direct fashion) on epibenthic fauna and shallows as are pink and chum salmon, a significant portion of the diets of coho and chinook salmon is amphipods, copepods, and euphausiids.[26] In addition there are some other important values of marshes which may well warrant artificial marsh establishment in Olympia Harbor. Marsh habitat establishment is discussed in Appendix B.

WASTE ASSIMILATION AND NUTRIENT CYCLING VALUE

As pointed out in the main text, Olympia Harbor formerly supported large numbers of Olympia oysters and clams. To restore harvestable shellfish production to Olympia Harbor in accordance with national water pollution control goals will require better than secondary treatment and considerable recovery time. Tertiary treatment performed by artificial facilities is energy intensive and extremely costly. The upgrading of secondarily treated effluents to tertiary level processing by natural marshes and mudflats is performed as the "free work of nature," where sufficient marsh and mudflat areas exist to handle the daily discharge volume.[6]

Swamps and wetlands have been called the "livers of the world"[27] for their role in filtering the wastes of nature and human societies. Far from being "wastelands" themselves they perform a unique function of elemental assimilation of wastes which is not generally realized. Wetlands thus have a global value far out of proportion to the small space they occupy. Microbial organisms operating in the unique oxidation-reduction environment of mudflats are able to break down toxic nitrogen, sulfur, and carbon compounds into volatile and exportable components for mineral cycling throughout the biosphere. This process even affects the production balance of the ozone layer. In addition, wetlands have a large capacity for uptake of phosphates. For these reasons, ecologist, Edward S. Deevey, Jr. suggests in his paper "In Defense of Mud"[28] that the management of mud is equally important to that for water.

Estuarine mudflats operate as both a source and sink of nutrients and act as a buffering zone for the regulated release and uptake of nutrients in estuarine systems.[21] Large numbers of marine worms and other burrowing organisms, such as mud shrimps, aid in the physical mixing of nutrients and wastes within the mud layers.

FOOD CHAIN VALUE TO FISH AND WILDLIFE

In a classic paper "The Role of Tidal Marshes in Estuarine Productivity,"[14] Eugene Odum states that Pomeroy's work showed the order of importance of food makers in Georgia's marshes is the cord grasses followed by mud algaes, and finally the phytoplankton. However, the importance of phytoplankton increased in deeper waters. In shallows, mud algae and turtle grasses (Thalassia) were equally productive. In this same paper Odum states:

> This mud algae business illustrates another ecological principle which we often call the "inverse size-metabolism" law. This is to say that small organisms often have a higher rate of living and production per gram of standing crop than large organisms. One pound of mud algae may produce as much food as many pounds of grass. We say that algae "turn-over" more often than the grass. ...Thus, the thin film of algae in and on the mud doesn't look like anything; only when we measure rate of gas exchange do we find out its true value. ...We suspect that in each tidal cycle some of the algae are washed into the water or "exported" and thus temporarily become a component of the plankton where they are available to filter-feeders, such as oysters, throughout the estuary. It may just be that alot of the green stuff found in the stomachs of oysters and other filter and deposit feeders is benthic in origin and not planktonic. ... Bottom-produced algae as well as organic detritus-bacterial particles are undoubtedly more important than formerly thought.

Also, according to Odum in Fundamentals of Ecology,[3] page 358, "The importance of the small benthic algae, which grow not only on the macrophytes and sessile animals, but on, or in, all kinds of bottoms (rock, sand, mud), is often overlooked. For example, Pomeroy (1959) estimated that the "mud algae" in the Georgia estuaries account for as much as a third of the total annual primary production."

William E. Odum[21] has observed from work on the Atlantic Coast that most detritus consumers also require algae in their diet and typically include 10 to 20 percent fresh algal cells. Further, the destruction of detritus producing areas limits the number of primary consumers (shrimp, amphipods, mysids, and small crabs) which in turn limits the next tropic level. This eventually shows up in the form of depleted stocks of game fish, commercial fish, crustaceans and molluscs. William Odum thus advocates protection of microflora as well as for marsh emergents and eelgrass beds.

It may well be that algal detritus from the narrow and limited beaches and mudflats of Puget Sound was, or would be, quite important to oyster culture in bays such as Budd Inlet. Evidently, however, marsh grass detritus (in combination with algaes) would be potentially 4 to 8 times more valuable in the food chain. Recent studies have shown the importance

The following excerpts from The Value of the Tidal Marsh[6] best describe marsh and mudflat functions referred to above:

> "Perhaps the most important--role of the marsh (is) in global cycles of nitrogen and sulfur. The continuing normal function of the biosphere depends on the chemical reduction of carbon, nitrogen and sulfur, which are incorporated into all living tissues. While carbon reduction occurs through photosynthesis in oxidizing atmosphere, completion of the cycle of the other two elements depends on microbial action in a reducing environment ...This microbial process requires the close proximity of oxidized and reduced zones. Nitrogen of biological origin is oxidized to nitrate in the oxidized layer, diffuses into the reduced zone and is reduced to nitrogen gas, escaping to the atmosphere. Tidal marshes are ideally suited for this function. ...The lack of widespread accumulation of sulfuric acid is evidence of the efficiency of the sulfate reduction system in anaerobic muds."
>
> "Detailed analysis of waste assimilation shows that marshes and estuaries are not very effective--for secondary treatment of municipal wastes, but they have a tremendous capacity for tertiary treatment of nutrients, especially phosphorus. Since secondary treatment is relatively inexpensive if done by man in artificial systems, it is clear that the large BOD loading now borne by many estuaries should be greatly reduced by organic matter digestion in man's treatment plants in order that the natural systems can effectively carry out tertiary treatment and maintain a water quality that preserves or even increases seafood production, recreation, and other by-product uses.

Clean estuarine waters are important for esthetic, health, and recreational uses irrespective of fish and wildlife utilization. Marsh reeds and other plants perform a water cooling and cleansing function in trapping insoluable pollutants and absorbing nitrates, phosphates, metals, and compounds such as phenols. In addition they provide a growing medium for bacteria and other organisms that break down pollutants and possibly destroy pathogens.[29] However, it is clear that much of the assimilation work is performed in the mud and does not require the presence of marsh reeds or other emergent plants. The role of tidal flats and burrowing organisms in estuarine water quality analysis for northwest coastal areas has been examined by David A. Bella (1975).[30]

Clearly, the capacity of mudflats to perform this cleansing role can be overtaxed, as the East Bay tideflats probably are now. However, the East Bay mudflats will function much more effectively following the planned upgrading to secondary treatment, and could be the determining factor on whether or not tertiary treatment by artificial means will thereafter be

necessary. No calculations have been made as to the amount of mudflats or marshlands that would be needed to fully handle planned secondary discharges at Olympia Harbor. However, preservation of a maximum area of the remaining mudflats and the establishment of marsh habitat areas could well spare the tremendous expense necessary to reach this next step of treatment.

In The Value of the Tidal Marsh[6] an annual value of $950 was attributed to a marsh-estuary for phosphate removal work and $2,500 for adjusted tertiary treatment. A value of $250 was attributed to the marsh-estuary for secondary equivalent treatment. If we assume that mudflats alone perform half of this work and that estuarine and mudflat functions and rates are comparable to those measured in Georgia, an annual value of $125 per acre could be attributed to East Bay mudflats, as they presently exist, for this function solely. Since the project would permanently eliminate 55 acres, a minimum annual value of $6,875 can be attributed to the project as a cost. A fifty year, project life cost would come to $343,750 without income-capitalization.

Since achievement of secondary treatment is to be concomittant with the project, a cost of tertiary treatment capacity (for which mudflats are much more efficient) and nutrient removal can be calculated. Again, assuming only half capability by mudflats alone, an annual value per acre would be $1,250. For 55 acres the annual value becomes $62,500. For a 50 year period the total cost attributable to the project as a result of tideland filling would be $3,125,000 without income-capitalization being applied in the calculation.

The above costs could be lowered with reduction in the tideflat area to be filled and/or by creation of marshlands which would raise the per acre natural treatment efficiency. Assuming that marshes are twice as efficient for waste treatment (but four or more times as productive) creation of approximately 40 acres of marsh would entirely offset the loss of 55 acres of mudflats. If the fill area were reduced by half, 20 acres of marsh could offset the loss. Some additional subtidal habitat loss would occur with associated "island" creation for wetlands establishment, but these losses would be more than compensated for by long-term biological gains made possible by placing islands in subtidal waters.

In order to be successful as wildlife replacement habitat, marsh creation would have to meet the folowing criteria: a) fully replaces amount or quality of lost habitat, b) replaces amount of productivity lost to the ecosystem, c) restores or improves the original amount and variety of wildlife use in the project area, and d) provides for continuous protection and management of the created habitat and fish and wildlife resources for the life of the project.

In a U.S. Fish and Wildlife Service Technical Paper on "Ecological Effects of Dredging and Dredge Spoil Disposal," Morton[2] stated:

> "A ...land disposal method commonly used until recently was that of filling in marsh areas. ...The use of dredged materials to create new marsh areas and spoil islands suitable as wildlife habitat is potentially a much more feasible alternative spoils disposal method. The new areas would not only help restore a scarce resource, but would also create a demand for large volumes of spoil which otherwise are unsuitable for other productive uses because they are contaminated and have poor engineering properties..."

Since the early 1970s marsh establishment has been attempted in over a hundred instances, mostly on the Atlantic and Gulf Coasts.[3] Most of these projects were deemed successful. The Corps of Engineers has undertaken a major study program of dredging effects and disposal alternatives,[4] centered at the Waterways Experiment Station at Vicksburg, Mississippi. Carmmen, Seneca, and Copeland[5] reported in 1974 on a study of animal colonization of dredge spoil marshes in North Carolina and found that this would vary according to the nature of the surrounding vegetative communities and substrate elevation and composition. They predicted on the basis of organic carbon content in dredged spoils that artificial marshes come to resemble natural marshes in abundance and diversity of fauna within 4 to 25 years. Usually a planted marsh will superficially resemble the vegetative cover of a natural marsh by the second growing season.[6]

The Corps developed a set of site selection criteria to identify areas for experimental marsh creation.[7] Grays Harbor was among those selected as candidate areas, but was later deferred.[8] Marsh establishment studies have recently been reinitated for Grays Harbor[9] and this work could provide a valuable information base for a project at Olympia Harbor as well.

A set of guidelines has been developed by the Corps[10] for determining whether to establish wetlands in a given situation, where to place them, and standard procedures on how to construct them in relation to engineering constraints and requirements and the marsh plant growing parameters. Presumably these guidelines would be followed in considering

APPENDIX B

MARSH HABITAT ESTABLISHMENT

In appendix A it was noted that marsh grass detritus in combination with algaes is potentially 4 to 8 times more valuable than mud algaes alone in terms of primary productivity and utilization in estuarine food chains. Several other important ecological functions of mudflats and marshes were examined and it was suggested that losses of mudflat areas should and could be replaced with the creation of marsh habitat nearby. Marsh detritus has been found to be important in the diet of juveniles of some species of salmon. While prospects of appreciably aiding salmon with marsh establishment are limited in this case, marsh establishment could be very important for any future revival of commercial oyster production in upper Budd Inlet. The benefits of marsh creation for waterfowl and other wildlife would be substantial. Together these benefits would seem to warrant a marsh/wetland establishment project in conjunction with the East Bay Small Boat Basin development.

The purpose of this appendix is to explore the desirability, feasibility, and techniques of a marsh/wetland establishment project north of East Bay and west of Priest Point Park as an alternate adjunct to the East Bay Small Boat Basin project.

Wetland establishment may be undertaken as a project mitigation measure for fish and wildlife habitat losses suffered with dredging projects. Depending on the success and extent of marshlands created those losses might be fully compensated in terms of bringing the resultant biological production up to that which originally existed, or equivalent to it in amounts and kinds of wildlife and fish. Over and above possible waste assimilation benefits (in lieu of artificial tertiary treatment) the proposed marshes could even provide enhancement to fish and wildlife through improved ecosystem functioning, restored habitat diversity, and increased biological carrying capacity for Olympia Harbor. The increased detrital production and export may contribute significantly to the food of marine fish, salmonids, and shellfish in Puget Sound, beyond Olympia Harbor.

While it is possible that primary productivity could be increased and fish and wildlife losses mitigated alternatively by the establishment of eel grass beds, water conditions do not appear to be suitable here. Significant stands of eel grass do not now occur in Budd Inlet. However, Phillips and associates have developed methods for artificial propagation of eel grass.[1] Subtidal propagation could be investigated in connection with this project and considered at some future point to augment marsh establishment around artificially created islands.

a marsh establishment project in connection with the East Bay marina project. If it is decided to proceed with marsh establishment at a given site, additional expert assistance would need to be obtained by the Corps.

We propose wetland establishment by island creation and planting of shallows slopes with plant species native to Puget Sound. The proposed site is north of the planned entrance channel and would parallel it. Water depths range from -5 to -8 feet below MLLW. To construct the islands requires that there be sufficient excess material from project dredging (or another source) to construct islands and create suitable substrates for vegetative plantings at appropriate depths. Islands can be constructed within convenient reach of conventional dredging equipment used for marinas. They can be placed to serve as breakwaters for the marina entrance as well as out-of-water bases for navigational aid fixtures.

Practical guidelines were also developed by the Corps[3] for site preparation, plant establishment and management, and maintenance of sites. Two of the most important factors in site preparation were found to be surface slopes and elevations. It was recommended that surface slopes in the intertidal zone be developed to exhibit reasonable stability in the absence of vegetative cover. Surface elevations must be carefully planned in relation to the various zones of regional (indigenous) marsh types. Surface elevations are critical and have stringet tolerances, especially in areas of small tidal amplitude.

In the previously cited guidelines on material placement it is stated that elevations are principally determined by biological preferences and factors of spoil settlement and by operational considerations. Elevation can be chosen chiefly to maximize net production, but other factors of total biological production, habitat value, and species diversity were identified for consideration. Soil type, substrate composition, saturability, and organic content are also major biological determinants.

In numerous instances spoil islands have become unintentional nesting sites for colonial birds and other wildlife.[11] A notable case in Washington was the increase in glaucous-winged gulls at Padilla Bay.[12] While this is a possibility at Olympia Harbor it is not likely that the islands would be used for colonial nesting; rather the intent here is to increase the area of submersible shallows for aquatic plant production and attraction of waterfowl and shorebirds "displaced" by loss of habitat and disturbance from the marina. Thus, only narrow bands of exposed land are needed or desired with the marshes. While herring and other forage fishes may spawn in the marsh channels, significant increases of fish spawning are not expected. Shellfish and some finfishes should benefit from the increased detritus production.

To maximize the shoreline-to-water ratio for waterfowl attraction and to provide calm water areas for growing plants, islands should be made in "U" or "W" shapes (broken circles or figure eight cells) with the open side preferably leeward of the longest fetches and prevailing winds. Other factors such as shoreside and navigation channel disturbances would also influence orientation of islands.

The full diurnal tide range for Olympia Harbor is 22.5 feet. Using MLLW as the zero datum plane, the other tide planes are as follows: MHHW is 14.40; MHW is 13.50; MTL (MSL) is 8.25; and MLW is 3.00. The lowest observed tide was -4.7 feet. Predominant winds in the October to March period are from the south and southwest at 10 to 20 m.p.h. about 15 percent of the time. In April and May it shifts to the west, southwest, and northwest at the same force about 20 percent of the time. From June to September winds are calm. Salinity is an important determinant on marsh plant species. Salinities range from 19 to 20 parts per thousand.[13]

Selected points in the proposed island locations were sampled in October, 1977 by Fish and Wildlife Service personnel. The superficial bottom sediments were found to consist of mud or silt and fine sand. In 1972 and 1973 an area further northwest near Priest Point was sampled and surveyed by the Washington Department of Fisheries prior to and following an experimental spoil disposal project by the Corps.[14] Pipeline and clam shell/barge dredged materials were disposed at depths ranging from -6 to -30 feet. Diver surveys and core samples two feet into the substrate were made. Benthic organisms were identified and quantified. The substrate was found to be surface silt over dark gooey mud. Most common organisms were the bent-nose, milky Pacific venus, and ringed lucina clams in low densities and also occasional basket snails, brittle stars, and sea whips. This indicates bottom muds in the vicinity are not unusually productive and do not contain significant clam beds or eelgrass stands.

In comparing pipeline and barge disposal sites, the Department of Fisheries found that pipeline discharged material settled rapidly to the bottom but flowed or dispersed over a broad area rather than remain at the disposal site. Barge dumped material, on the other hand, went primarily to the bottom and did not disperse, but was confined primarily to the disposal zone. A decrease in abundance and diversity of macroscopic benthic organisms was observed only at the barge disposal site.

The Department of Fisheries research indicates that clamshell/barge operations would have to be combined with pipeline disposal in order to prevent dispersal of discharged materials. Construction of dikes is normally required with new marsh establishment[10] and would appear to be needed here. Containment cells, utilizing coarse sand material whereever available, is recommended in the Corps' material placement guidelines. Silt curtains can be employed to minimize dispersal and turbidity.

Jefferson.[17] The elevation range of particular species in relation to MLLW is given for those Oregon marshes. Studies by Mason et al.,[18] students at The Evergreen State College (TESC), in 1974 documented the elevations of dominant species in the Nisqually estuary in relation to mean sea level or MTL. They found saltgrass Distichlis spicata ranging from +8.3 to +9.6 MTL (level of dikes); pickleweed (Salicornia virginica) at +7.7 to +9.6 MTL; and gum weed (Spergularia conodensis and marina) at +7.4 MTL. Their report also gives the general elevation of another dozen salt marsh species. In addition, TESC has information on the biota of Eld Inlet. Examination of the plant species and communities at these two nearby locations would give an indication of suitable species for artificial introduction to Olympia Harbor. Expert advice on species and elevations should be sought from TESC or botanical consultants in this vicinity.

Salt marsh plant species are grown in at least one nursery on the Atlantic Coast[3] for marsh establishment projects. To our knowledge none exist on the Pacific Coast. Thus, transplanting of plants from the Nisqually marshes or other locations nearby in southern Puget Sound would appear to be the only source of plant stock. Corps sponsored experiments reveal that seeding is the least expensive technique and works well for sheltered waters. However, transplants bring quicker establishment and are more tolerant of stressful conditions, more vigorous, and tend to give more permanent results.[19]

Whereas saltgrass and pickleweed are extensively used by waterfowl, this use is principally limited to the scaup, redhead, pintail, gadwall, shoveller, and teals, plus the snow goose and canada goose. Consideration should be given to introducing widgeongrass (Ruppia maritima) which is used by 20 duck species found on the Pacific Coast.[20] Widgeongrass occurs in Willapa Bay and Grays Harbor in sizable stands and may also occur in southern Puget Sound. It requires relatively low-salinity waters.[21] Widgeongrass is one of the few salt marsh plants utilized in quantity by the canvasback, which should be given special consideration in any marsh establishment project for Olympia Harbor.

The establishment of new marsh habitat would help restore portions of previously destroyed estuarine habitats and should compensate for wildlife "displacement" caused by the marina. However, provisions would also be required to assure the long-term protection of this habitat from development and intrusions. Special ordinances, posting and other measures should be taken to minimize disturbance from passing boats and from people landing on the islands.

Riprapping of the dike face might be needed to prevent erosion. Once established, vegetation would tend to stabilize the dikes and submerged material.

Olympia Harbor sediments were categorized by the Department of Fisheries as moderate to low in toxicity. Their observations indicated no water quality effect from barge dumping and a slight decrease in D.O. with an increase in B.O.D. associated with pipeline disposal. The spoil materials in that case came from West Bay whereas spoils for the proposed marsh establishment would come from East Bay, most logically from the entrance channel. Approximately 43 percent of the total dredge material would come from the entrance and access channels. Depending on results of sediment analyses and water column conditions, the upper layers of spoil might be disposed on land to satisfy water quality criteria for disposal in water. Corps of Engineers and Environmental Protection Agency procedures[15] should be followed. Restrictions on the timing of dredging activity would also probably be necessary for the protection of fish runs.

Other possible physical and chemicals limitations which could preclude island construction and marsh establishment include inability of the bottom to support the weight of deposited spoils, an unsuitable growing substrate, nutrient deficiencies, pollutants, excessive water depths, and strong or stressful currents and wave regimes. Further coordination on the location, size, and configuration of islands and shallows will depend on a determination of available spoil material volumes, compressibility, and other engineering and economic considerations.

Numerous investigations have been made on the feasibility, problems, and techniques of artificial marsh plant establishment. A survey of both induced and natural establishment techniques was conducted in 1974 for the Corps of Engineers.[16] As soon as possible after construction of islands and establishment of proper slopes and elevations, marsh plantings should be introduced for the next growing season to provide vegetative stability against erosion and sloughing and to begin marsh system development. Careful placement of maintenance spoils can be made for elevation corrections and to compensate for subsidence, etc. In areas having abundant marshes nearby, rapid natural plant colonization could be expected, resulting in dense stands within two growing seasons.[6] However, only remnant marshes are to be found at the south end of East Bay, at Priest Point Park beaches, and in small patches at the West Bay Lagoon. Only a few species are present with pickleweed (Salicornia sp.) saltmarsh bulbrush (Scirpus robustus) and saltgrass (Distichlis spicata) predominate.

Most salt marshes are in the intertidal zone.[10] On the Pacific Coast, marshes are mainly above mean tide level. Extensive studies have been made on plant communities and zonation of coastal marshes in Oregon by

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2625 Parkmont Lane, S.W.
Olympia, Washington 98502

September 12, 1979

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C3755
Seattle, Washington 98124

Dear Colonel Moraski:

Please reference our report of July 18, 1979 regarding the proposed East Bay Small Boat Basin at Olympia, Washington.

The report contained a statement that the Department of Fisheries did not concur in our draft report and that we had not received concurrence on all statements in the report. The principle reason for this is a difference of view on the value of wetlands and tidal flats to anadromous fish and shellfish. Since forwarding our report, we have met twice with Fisheries Department representatives to discuss these differences and to determine where word changes might be made which would permit the Department of Fisheries to concur. The Department of Game was also represented at the first meeting.

Reporting schedules of your office do not permit time for revision of our report, even assuming that all differences were resolved. Unfortunately, not all the differences have been resolved at this date. In the interest of time, the Departments of Fisheries and Game will be sent copies of this letter for review and response directly to you. Their letters should indicate mutual agreement to the changed statements or information as well as to areas remaining unresolved. You may wish to append those letters (with this one) to our July 18 report for clarification on specific points of difference with the report.

In general terms, the Department of Fisheries view is that ecological research findings on the East Coast regarding primary production of various estuarine components, and other functions performed by wetlands and mudflats elsewhere, cannot be applied to the Northwest Coast and to Puget Sound because of very different conditions here. The basis for this view is that Puget Sound, for instance, is a nutrient-rich estuary due to mid-level ocean upwelling of nutrients that support a very high production

of phytoplankton. Accordingly, this phytoplankton production is so predominant that it supports virtually the entire food web of shellfish and off-shore species within Puget Sound. Thus, any contribution of primary production (in the form of plant detritus) from saltmarshes or mud algae is inconsequential or superfluous to the water column. The Department of Fisheries also points out that a few, very recent East Coast studies indicate that detritus from marshes and mudflats does not get carried into the estuarine water basin to contribute to the larger system. Also, because of a surfeit of nutrients in most Puget Sound waters, there is no appreciable flux of nutrients between the mudflats and waters or significant assimilation of wastes in marshes and mudflats of East Bay. The Department of Fisheries further maintains that the value of vegetated intertidal areas must be established on a site by site basis and cannot be assumed based on general productivity. The value to fish resources of areas which do not receive direct use by these species is unsubstantiated in Puget Sound.

Briefly, our response is that the few primary productivity measurements made for saltmarshes in Washington and Oregon indicate that it is comparable to high values obtained on the Atlantic and Gulf Coasts. Productivity of mud algaes has not been measured in Northwest estuaries to our knowledge. Detrital export appears to be variable with locales. Measurements of phytoplankton net productivity are difficult to make or interpret. We are uncertain at this time that the limited figures we have seen for Puget Sound can be extrapolated to annual average rates and be converted to units that will permit comparison to the primary production of the other estuarine components. The Fish and Wildlife Service maintains, as a matter of national policy, that marshes and other kinds of wetlands have high biological and environmental value and warrant protection, even though specific sites have not been conclusively shown to have direct or indirect to fish and wildlife. The burden of importance or unimportance of these habitats should be established by those who propose to alter them.

The agencies are in agreement that intertidal areas and tidal channels within marshes provide important rearing areas for juvenile salmon and other fish. There are information gaps on the specific contribution of marsh detritus through the food chain to fish. The Department of Game and Fish and Wildlife Service recognize saltmarshes as having high value to wildlife. The Department of Fisheries has not observed significant use of extensive, high elevation mudflats by salmon juveniles or adults during extensive observations by them. Intensive feeding over submerged "marsh flats" has been observed in recent studies by the University of Washington Cooperative Fisheries Unit on the Skagit Delta.

More specifically, with regard to East Bay, the Department of Fisheries feels that, in spite of stated qualifications in the report, the implied importance to fish (especially salmon) and shellfish is misleading or erroneous. In addition, more recent preliminary statistics have been compiled by the Department of Fisheries which show Deschutes River salmon

runs to be more important than our report indicates. This could have bearing on the marina project from the standpoint of potential fish losses if water quality conditions are inadequate following construction. Also, more salmon should be available to sport fishing trips originating from the marina. It is mainly in these respects that the attached changes should be made in the report and its recommendations.

Some of the suggested changes by the Department of Fisheries which have not been agreed to by us are discussed below.

Page 5, last para. - "Estuaries are among the most fertile and productive of natural areas." WDF suggested "Estuaries can be..." WDF concurs that estuaries (in the oceanographic sense) can be exceedingly productive on the whole and that Puget Sound is one of the most productive. Although the Deschutes River mouth and East Bay may not be especially productive under present or original conditions, our general statement remains valid and is supported by numerous publications.

Page 8, indented para. - "Tideland Development--near Olympia." WDF does not think this quoted statement is relevant to current fisheries management or the proposed project and that primarily sewage disposal and ship disposal remain factors of concern for shellfish and fish production. We think the statement is true of historic impacts that construction has had and construction will further adversely impact marine fish habitat and populations.

Page 9, second para. - "In addition--other species." WDF doubts there is significant contribution of mud algae to fish or that it is exported to surrounding waters. This has not been measured at this site. However, there appears to be an important contribution at least to the diets of waterfowl and we strongly suspect many invertebrates do eat these algae and in turn are eaten by waterfowl and some marine fish species within East Bay.

Page 15, third full para. - "Though reduced--remain." WDF suggested deletion of reference to shallow water habitats performing essential ecological functions. We think the East Bay tideflats provide important feeding areas for waterbirds and some marine fishes known to occur there. They may be functioning to assimilate sulfates and nitrates from domestic and industrial pollution.

Page 16, third para. - "While East Bay--to the channels." WDF suggested deletion of these sentences. We have not stated that the mudflat algal productivity of East Bay is highly important to fish or shellfish. As cited, there is evidence that it is important in estuarine food chains in other regions. Marine and forage fish that move in and out of East Bay or the entrance channel area to feed are eaten by adult salmon, steelhead, and searun cutthroat trout that occur in Budd Inlet.

Page 17, third para. - "In referring--of Budd Inlet." WDF suggested deletion of this sentence. WDF data taken in 1972 indicated high phytoplankton productivity in Budd Inlet. However, at times these blooms were toxic. The seasonal timing of component productivity may be significant in sustaining estuarine food webs. Benthic invertebrates and waterfowl in the shallows of East Bay and Budd Inlet may be selecting particulate plant matter from benthic algae production in preference to phytoplankton.

With respect to Appendices A and B, the Department of Fisheries thinks these represent good literature reviews on the general subjects of ecological values of mudflats and marshes and marsh habitat establishment. However, recent papers assessing marsh detritus export (see Correll, D. L., 1978. BioScience, Vol. 28, No. 10) were overlooked. Also, WDF feels these appendices present only a hypothesis concerning these subjects. However, WDF suggests a cautionary note that the information pertains mainly to East Coast situations and observations which cannot be extrapolated to the West Coast in a straight line manner due to very different oceanographic conditions found here. Also, the material on marsh establishment should not be regarded as a general endorsement of the practice since important fish and shellfish grounds could be sacrificed. Marsh establishment is no longer being considered or recommended for this project. However, the study information is being furnished as requested by the Corps of Engineers.

We feel that the importance of all the component sources of primary productivity should be examined for their contributions locally and to the entire ecosystem. We point out that some work on measuring primary productivity, and on waste assimilation processes, has been done in Northwest estuaries and is referenced in the appendices. While we can concur with inclusion of cautionary notes, we believe these qualifications and cautions are already contained in the appendices and should be apparent to readers, as long as statements are not taken out of context.

Sincerely,

Joseph R. Blum
Area Manager

Attachment

cc: Washington Department of Fisheries
Washington Department of Game
Fisheries Assistance Office
Ecological Services
Regional Office (AE)

Attachment to East Bay Small Boat Basin Report

Report Changes

Page 2, first full para. - "The alternative of deep water disposal of channel dredged materials together with a reduced fill area could minimize destruction of wetlands in the project area."

Change to read: "The potential alternative..."

Explanation: WDF finds the Dana Pass disposal site to be unsuitable because of loss to geoduck clams. However, some areas within Budd Inlet are acceptable to WDF for deep water disposal.

Page 3, fourth para. - "The east shoreline is regarded as geologically unstable."

Note: This statement should be supported by reference to the 1973 Dames and Moore report, "Report of Soils Investigation: Proposed East Bay Development Program, Port of Olympia, Washington." Also, testimony of Janet Cullen, Natural Hazards Specialist at April 24, 1975 ECPA hearing in Olympia.

Page 4, second full para. - "The Deschutes River flow is apparently critical to maintenance of sufficient dissolved oxygen in Olympia Harbor."

Change to read: "The--sufficient dissolved oxygen in the West Bay of Olympia Harbor."

Explanation: Deschutes River waters probably have little influence on water quality in East Bay.

Page 5, last sentence - "As noted in the Washington Department of Fisheries stream catalog for the Puget Sound region, --of great importance, particularly to anadromous species, are the estuarine areas at the mouths of rivers. These semisalt-and semifresh-water areas provide the critical transition zone for juvenile and adult fishes as they transfer from one environment to another."

Change: delete

Explanation: This statement applies to areas such as the Skagit River mouth, but not to the Deschutes because the change from fresh to salt (or semisalt) water is abrupt and the main fish of interest is the artificially reared chinook salmon which is released at a stage when the transition to saltwater is not critical.

Page 6, first full para - "Budd Inlet formerly produced harvestable quantities of native or Olympia oysters..."

Change: delete "harvestable quantities."

Explanation: The implication is that Budd Inlet native oyster populations once could support a sustainable yield at commercial levels, which WDF doubts. WDF believes Budd Inlet flushes too rapidly to permit setting of oysters in commercially harvestable quantitites. However, this does not fully explain why they are totally absent today.

Page 6, same para. - "Viable populations are still present in Gull Harbor of Budd Inlet..."

Change to read: "Stable populations are still..."

Explanation: "Viable" is an inappropriate word to convey the meaning that more than a remnant population exists.

Page 6, same para. - "Pollution is the apparent cause of the Olympia oyster's general decline."

Change to read: "Pulp mill pollution was the apparent cause in some areas..."

Explanation: Pulp mill effluent is the strongly suspected cause and there is no solid evidence that other pollutants were responsible.

Page 6, same para. - "Oysters are almost totally absent from Olympia Harbor and its waters have been decertified for any shellfish harvesting."

Change to read: "Oysters--decertified for commercial shellfish harvesting."

Explanation: Decertification applies only to commercial harvesting or use.

Page 6, second full para. - "In contrast to the apparent historic abundance of shellfish, Budd Inlet and the Deschutes River Basin originally produced comparatively few anadromous fish."

Change to read: "Budd Inlet and the Deschutes River Basin originally produced few anadromous fish."

Explanation: Dames and Moore reported "large numbers of shell fragments" in East Bay bottom sediments; however, oysters were probably never abundant in Budd Inlet compared to other southern Puget Sound inlets because its more rapid flushing time did not allow much setting of larvae, according to WDF.

Page 6, same para. - "In 1954 fish ladders--numerous tributaries."

Change: delete "numerous."

Explanation: The Deschutes River has only three tributaries with significant spawning grounds.

Page 6, same para. - "From an average annual release--taking station (see Table 1).

Change to read: "From a five year average release of 27,476 pounds of fingerlings and 114,300 pounds of yearling chinook salmon released from 1974 through 1978, an estimated average annual catch of 83,637 fish valued at $2,127,725 was harvested. For the same period an average annual coho smolt production of 146,500 brought an average catch of 8,790 fish valued at $81,395."

Explanation: Table 1 should be revised to reflect preliminary data in the attached Tables 1A and 1B.

Page 6, same para. - "Thus, even though degraded and greatly altered, the Deschutes River estuary has become more important to anadromous fish production than it apparently was originally."

Change to read: "The Deschutes River basin has become much more important to anadromous fish production as a result of fish laddering and lake rearing than it originally was."

Explanation: Whether or not there is a distinct Deschutes River estuary, its past or present condition and alterations has relatively little bearing on past salmon runs or the success of recent propagation efforts, although native runs in smaller streams tributary to upper Budd Inlet have been affected by physical alterations.

Page 6, last para. - "In general these runs declined, however--coho salmon."

Change to read: "Presently there is an annual average return of about 3,155 chinook salmon and 2,600 coho salmon (650 escapement, 1,950 catch) to Percival Creek. Also, the introduced run of coho salmon in the Deschutes River is now a "wild spawning run."

Explanation: The size of former native runs is unknown. New information on coho runs has been compiled by WDF.

Page 6, same para. - "That creek, like other smaller streams in southern Budd Inlet has been obstructed by a roadway fill project."

Change to read: "That creek has been partially obstructed by a roadway fill project."

Explanation: Ellis Creek is not totally obstructed. The impression that all or most streams in the region are obstructed would be incorrect.

Page 7, first para. - "In many parts of Puget Sound the beaches; tidal creeks, and mudflats are vitally important as feeding areas to chum and pink salmon which spend a considerable part of their early life feeding on small epi-benthic organisms produced only in these shallow water habitats."

Change: delete "and mudflats"; change "a considerable" to "an important."

Explanation: Salmon use of mudflats is not well documented. The time spent by juveniles in beach and tidal creek areas is relatively short.

Page 7, same para. - "Thus East Bay is not presently important to these species--also takes place."

Change: delete

Explanation: This paragraph implies salmon somehow make significant use of invertebrate organisms growing in East Bay. Adult salmon probably enter East Bay only rarely and cited references to steelhead and searun cutthroat trout use referred to West Bay instead of East Bay.

Page 7, para. 3 - "The principal, direct use of East Bay is by marine and bottom fishes including sea perches and flounders."

Change: insert "a few" before "marine and bottom fish."

Explanation: Table 2 indicates the relative abundance of some of these fish; however, in absolute terms the numbers are not large.

Page 7, last para. - "Except--northward."

Change: delete "northern" in second sentence; add "and near Anderson Island" after "Budd Inlet." Add "Luhr Beach" after "Johnson Point." Add "and in Capitol Lake" after "(senior citizens only)."

Explanation: WDF requested these fishing use areas be added.

Page 8, second para. - "Hardshell and softshell clams occur in good numbers in East Bay."

Change: delete "good numbers"

Explanation: Good numbers of clams implies sport or commercially harvestable quantities.

Page 8, same para. - "The Dungeness crab is now uncommon--years ago."

Change: delete

Explanation: It is doubtful that the Dungeness crab was ever common south of Tacoma Narrows, according to WDF.

Page 8, third para. - "As stated--developed ports."

Change: delete

Explanation: The quoted sentence is from the introductory section of the WDF Stream Catalog, which WDF feel does not apply in the particular case of Olympia Harbor.

Page 9, first para. - "While the immediate impact--different species."

Change: insert the phrase "in dredged areas" after "these organisms."

Explanation: clarifies organisms referred to.

Page 9, second para. - "Disposal of the 100,000 cubic yards of dredge spoils generated and used for landfill would permanently eliminate over 50 acres of intertidal and subtidal mudflats used by marine and bottom fishes and shellfish."

Change: insert "to some extent" after "used."

Explanation: This avoids implying high numbers of fish and shellfish use the site.

Page 10, first para. - "According to the Departments of Fisheries and Game, these young fish could be attracted into the new channels and follow them back into the moorage basin where they might encounter a 'pollution trap' caused by inadequate flushing, depressed levels of dissolved oxygen, and marina generated petroleum and sewage."

Change to read: "According to the Departments of Fisheries and Game, these fish could be attracted into new channels and "be subjected to stress caused by inadequate flushing and particularly depressed levels of dissolved oxygen."

Explanation: This more accurately states what WDF and WDG wrote. We inferred that a pollution trap situation in the moorage basin would be

encountered under those circumstances. Also, we added that petroleum and sewage would be encountered because these forms of pollution exist at most marinas.

Page 10, last para. - "Preliminary data indicates that dredging will increase the flushing time for East Bay."

Note: This statement is based on a presentation by Dr. E. P. Richey on February 1, 1978 in your offices. The amount of increased time was not recorded. We have not received final model test data that would supply these figures.

Page 10, same para. - "While further--exchange coefficients."

Change: add the following sentence. "However, the 'acceptability' of these design coefficients must be viewed in light of existing and expected water quality conditions of upper Budd Inlet."

Explanation: As pointed out during Dr. Richey's presentation, the "acceptable" range of exchange coefficients presumes acceptable quality waters outside the marina and does not mean that water quality criteria would in fact be met in East Bay following construction of the marina.

Page 11, first para. - "The filling--species of salmon."

Change: delete paragraph and replace with following: "The filling of about 25 acres of East Bay submerged or tidelands for cargo area expansion would result in loss of habitat for shore crabs, clams, and other invertebrate organisms that contribute to support of sea perch, flounders, and other fish populations which feed in East Bay." "This is seen as an unnecessary and avoidable loss by the Fish and Wildlife Service."

Explanation: Since economically important populations of fish and shellfish were evidently not originally important in Olympia Harbor, neither declines or increases of those populations are attributable to development of the Harbor. Potential shellfish production in upper Budd Inlet, even under clean water conditions, apparently is limited, due to other factors. At least for the near future, shellfish "seed" is regarded as abundant. It is not known if herring and smelt forage appreciably in East Bay, although herring do elsewhere in Budd Inlet and persumably in the area of the proposed entrance channel.

Page 11, second para. - "This should--in South Puget Sound."

Change to read: "This should permit greater sport salmon fishing opportunity for more people in South Puget Sound. Because of planned propagation increases in the Deschutes River system by the Department of Fisheries, the increase in fishing is not expected to result in smaller catches per fisherman."

Explanation: The Department of Fisheries has recently increased salmon propagation and plans further increases partly to meet expected sport fishing needs.

Page 11, third para. - "Aside from--bottom fishes."

Change: add after "Department of Natural Resources," "and Department of Fisheries."

Explanation: WDF has an extensive artificial reef program underway. DNR has built an underwater reef a few miles north of Olympia.

Page 11, same para. - "While there are--fishing pressure."

Change: Delete "While," and delete "it is unlikely that these runs can presently stand significantly greater fishing pressure."

Explanation: WDF has recently increased salmon propagation and plans further increases partly to meet expected sport fishing needs.

Page 13, second full para. - "More importantly--by fish and birds."

Change: delete words "mussels" and "clams."

Explanation: The Department of Fisheries doubts that mussels and clams feed appreciably on mud algae detritus.

Page 15, third full para. - "Though reduced in area and quality, some shallow water habitats of value to fish and wildlife and which perform essential ecological functions remain. The tideland and shallow water habitats are essential to the survival of many types of fish and wildlife in Olympia Harbor."

Change: delete words "fish and" in both sentences; add to end of paragraph, "The project would also entail a limited loss of fish and shellfish habitat. In addition, a potential serious loss of juvenile salmon could occur unless satisfactory water quality is achieved and maintained in East Bay."

Explanation: The original wording overstates the value of present East Bay habitat to fish resources. A more important consideration is the potential loss of salmon that may be attracted into the marina after dredging and could encounter deleterious water conditions because of inadequate flushing or other factors.

Page 16, third para. - "Also, with the upgrading of water quality, the contribution to shellfish through detrital export could be very significant for future revival of oyster raising in Budd Inlet."

Change: delete sentence.

Explanation: Oyster raising was not done commercially and probably can never be in Budd Inlet. Marsh and mud algal detritus may not be a significant component of the food of oysters.

Page 16, last para. - "Assuming--for waterbirds."

Change: delete words "fish and."

Explanation: The sentence implies a serious loss to fish resources, which was not the intended meaning.

Page 17, second para. - "The unique and indispensible--in Appendix A."

Change: delete the words, "unique and indispensible."

Explanation: While the waste assimilation and nutrient cycling roles of mudflats have been shown to be important in East Coast estuaries and in Oregon, they have not been demonstrated in Puget Sound and would be greatly impaired in East Bay.

Page 17, same para. - "Also discussed--treatment. "

Change: delete sentence.

Explanation: Mudflats in East Bay and Puget Sound may not experience a flux of nutrients because of ubiquitously high nutrients in the water column. The statement implies assimilation is known to occur here.

Page 17, third para. - "The proposed project would alter 110 acres of tidelands and bottomland habitat needed by marine fishes and waterfowl in particular."

Change: replace "needed" with "used."

Explanation: The word "needed" implies a complete dependence on habitats in East Bay or on these types of habitats elsewhere.

Page 18, top of page - "However, an acceptable alternative for development within East Bay has been proposed and does exist."

Change: delete word "acceptable" and insert "by the Fish and Wildife Service" after "proposed."

Explanation: The Department of Fisheries would not accept the alternative unless flushing is modeled previously or verified by well-known experts in the field.

Page 18, item f. - "A greater amount of productive tideflats would remain as fish and wildlife habitat and continue to perform vital functions of nutrient cycling and waste assimilation."

Change: delete "fish and"; delete all words after "habitat."

Explanation: The tideflats have limited value to fish resources. East Bay nutrient cycling and waste assimilation is not presently significant and may not become significant after installation of secondary sewage treatment.

Page 19, item A.1. - "The project--species of marine fish and wildlife."

Change: delete words "marine fish"; add sentence, "These habitats also have a limited value for various marine fishes."

Explanation: The use of the fill area by wildlife is moderate, but would be limited or low for marine fish species.

Page 20, item 4 - "A long time--fish stocks."

Change: delete all words after "tideflats."

Explanation: Fish values lost would be limited and over exploitation is not expected to occur. Waste assimilative capabilities of East Bay are not known.

Page 21, item 3 - "Alternatives--this report."

Change: add to end of paragraph, "However, the extremely high value of the Capitol Lake salmon run requires careful attention be given to marina design and construction relative to water quality considerations."

Explanation: The Department of Fisheries has given conditional approval to the proposed project and may require flushing and aeration devices. The alternative design may be inferior from a flushing standpoint. Model studies should be made of alternative designs.

Page 21, item 9 - "That a public fishing jetty be constructed on Port of Olympia or Washington State property along the northeast shore of East Bay.

Change: insert "or pier" after jetty; delete "along the northeast shore"; change "of" to "in."

Explanation: A pier with artificial reef would also provide for fishing and could be located with the marina, provided fishermen would have convienent access and not interfere with marina operation.

Page 21, item 11 - "That a small salmon run--project."

Change: delete this paragraph.

Explanation: The recommendation to establish a salmon run in Ellis Creek as project mitigation would not be very workable because of harvest management complications and inability of returning spawners to get beyond a culvert into the creek. Also fish losses (unquantified) attributable to the project are expected to involve different species than are propagated by the "Netarts Box" method.

Table 1A. Estimated Resulting Catch Values of Chinook Planted in the Deschutes River System During the Period 1974 to 1978

Year of Release	Pounds of Chinook Planted		Estimated Catch		Total Estimated Value of Catch 3/
	Fingerling	Yearling	Fingerling 1/	Yearling 2/	
1974	45,957	108,244	15,625	70,359	$ 2,187,432
1975	59,429	79,743	20,206	51,833	1,832,672
1976	0	131,345	0	85,374	2,171,915
1977	15,950	147,568	5,423	95,919	2,578,140
1978	16,046	104,600	5,456	67,990	1,868,466
TOTAL	137,382	571,500	46,710	371,475	$10,638,625
5 Year Average	27,476	114,300	9,342	74,295	$ 2,127,725

1/ Estimated Total Catch (Fingerling Release) = .34 x Total lbs. Fish Released

2/ Estimated Total Catch (Yearling Release) = .65 x Total lbs. Fish Released

3/ Estimated Value of Catch = 25.44 x Estimated Total Catch
$25.44 = 1975 Estimated Commercial Value and 1977 Estimated Sport Value

Table 18. Estimated Resulting Catch Values of Coho Smolt Production in the Deschutes River System for Brood Years 1974 to 1978

Brood Year	Escapement		Estimated Resulting Smolt Production 1/		Estimated Total Catch 2/		
	Deschutes	Percival Creek	Deschutes	Percival Creek	Deschutes	Percival Creek	Total Estimated Value of Catch 4/
1974	2,000	211	100,000	10,550	6,000	633	$ 61,421.58
1975	3,000	76	150,000	3,800	9,000	228	85,451.28
1976	2,000	106	100,000 3/	5,300	6,000	318	58,504.68
1977	5,000	151	250,000	7,550	15,000	453	143,094.78
1978	2,000	106	100,000	5,300	6,000	318	58.504.68
TOTAL	14,000	650	700,000	32,500	42.000	1,950	$406,977.00
5 Year Average	2,800	130	140,000	6,500	8,400	390	$ 81,395.40

1/ Estimated Total Smolt Production = Escapement Estimate x 50

2/ Estimated Total Catch - Assume a 3:1; catch:escapement ratio

3/ Does not include a 1974 brood yearling plant of 164,500 coho.

4/ Total Estimated Value of Catch = 9.26 x Estimated Total Catch
$9.26 = 1976 Estimated Commercial Value and 1977 Estimated Sport Value

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington 98504 206/753 6600

September 25, 1979

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

The Department of Fisheries (WDF) has reviewed the July 18, 1979 U.S. Fish and Wildlife Service (USFWS) Report on the East Bay Small Boat Basin, Olympia, Washington. We have also met three times with the USFWS to discuss necessary modifications to the contents and resolve or define basic differences related to foodfish and shellfish resources under WDF jurisdiction in order to concur with their report. Their September 12, 1979 letter to you, which we assume will be appended to the original report, is the result of these discussions.

We believe the USFWS is to be highly commended on their desire to accurately evaluate potential impacts of the East Bay proposal and sincerely appreciate their efforts during this recent review period. Not all differences were resolved in the ensuing dialogue; however, the USFWS has correctly identified the more important differences which remain. Their letter has also done an excellent job on outlining the many areas where both agencies agree that changes are in order in the East Bay Report and the reasons why these changes are justified.

We find that we can now concur with the USFWS report, as modified by their September 12, 1979 letter outlining changes in the East Bay Report and the few areas of disagreement which remained after our meetings. We deeply appreciate the effort the USFWS has put into the coordination and are pleased with the amount which has been resolved through this process. We look forward to continuing coordination and dialogue with the USFWS to achieve the most effective protection possible for the resources under the jurisdiction of the Department of Fisheries.

The Department plans an in-depth review of the Draft NEPA Environmental Impact Statement for the proposed marina. When in receipt of the document, we will be in a far better position to supply vital input to this proposal for the protection of the fishery resources of substantive value in Budd Inlet.

Sincerely,

Ray C. Johnson for

Gordon Sandison,
Director

mr

cc: Eugene Dziedzic-Game
Joseph Blum-USFWS

F-73

APPENDIX G

404(b)(1) EVALUATION FOR CONSTRUCTION OF EAST BAY MARINA

PART 1 - 404(b)(1) EVALUATION

PART 2 - PUBLIC NOTICES

PART 3 - PUBLIC AND AGENCY COMMENTS
ON PUBLIC NOTICES AND CORPS RESPONSES

PART 4 - U.S. FISH AND WILDLIFE SERVICE/PORT OF
OLYMPIA AGREEMENT

APPENDIX G, PART 1

404(b)(1) EVALUATION FOR CONSTRUCTION OF EAST BAY MARINA

The proposed project is construction of an 800 moorage marina in the East Bay of Budd Inlet at Olympia, Washington. This appendix displays the evaluation of the effects of placement of dredged material into waters of the United States using guidelines promulgated pursuant to Section 404 of the Clean Water Act (40 CFR 230).

The factors, considerations, and analyses contained in Section 404 guidelines are evaluated following and in referenced paragraphs of the environmental impact statement (EIS) and detailed project report (DPR) for the East Bay Marina Project.

Full compliance with the provisions of Section 404 of the Clean Water Act will be met by obtaining a water quality certificate from the State of Washington.

EAST BAY MARINA
PART 1 - SECTION 404(b)(1) EVALUATION

1.0 Project Description. The proposed East Bay Marina is situated in the east bay of Olympia Harbor in southern Budd Inlet. Project details are discussed in the detailed project report (DPR) and environmental impact statement (EIS) and appendixes; references will be made to sections of these documents, as appropriate, throughout this evaluation.

Plan 4a was selected as the plan of improvement (DPR/EIS); layout of the proposed marina is shown on plates 2a, 2b, and 3. Included in the proposed project are an entrance channel, access channel, moorage area with piers and floats, public boat launch, and floating breakwater to protect the moorage area and access channel. Material dredged from the entrance channel, access channel, and moorage area will be placed onsite behind a locally constructed containment dike for the cargo handling area, marina commercial area, access roads, and marina parking.

The intertidal and shallow submerged lands consist of soft silty sands, silts, and bay muds containing wood and other debris from past industrial operations. Thickness of this soft material varies throughout the bay (see EIS sections 3.1.2.1 and 3.1.2.2). Construction of the east side of the containment dike (which completely encircles the disposal area) will require predredging of the soft surface material by clamshell dredge, sidecasting the material onto the tidelands within the proposed fill area, and backfilling using clean sand and gravel from upland sources transported to site by truck and/or barge. Filling of the southern end of the bay for access roads will involve placement of clean sand and gravel from upland sources directly on the soft material without predredging. Work will be from the outer face filling landward. Finally, the existing Moxlie Creek outfall will be extended into East Bay. A toe of native material will initially be left along the outside face of the dike. This "toe" will later be removed by dragline after the fill has consolidated.

1.1 Description of the Proposed Discharge of Dredged or Fill Materials.

1.1.1 General Characteristics of Material. See section 3.1.2.2 of the EIS.

1.1.2 Quantity of Material. Initially, between 160,000 and 200,000 cubic yards (c.y.) of material will be predredged to allow placement of the containment dike. Approximately 400,000 c.y. of clean sand and gravel will be required for construction of the containment dike. Approximately 1.75 million c.y. of material dredged via hydraulic dredge from the entrance and access channels and moorage area will be placed behind the dike as fill.

1.1.3 Source of Material. All of the material used as fill for the northern portion of the site will be dredged from the marina basin or

from the access channel that will lead from Budd Inlet to the marina site. The southern neck and Olympia Avenue extension will be filled using clean sand and gravel from local upland sources. Source of material has not been selected.

1.2 Description of the Proposed Disposal Site for Dredged or Fill Material.

1.2.1 Location. The proposed fill would occupy the area indicated on plate 2a. The fill encompasses 53.4 acres.

1.2.2 Type of Disposal Site. Initially, the proposed site would be temporarily used as an unconfined disposal site for sidecasting of material predredged for the containment dike. The great majority of disposal would be as a confined fill site during actual marina construction.

1.2.3 Method of Discharge. During initial unconfined disposal, clamshell dredging techniques will be used. During the major dredging and disposal operations, hydraulic pipeline discharge will be used. After the dike and fill have consolidated, a dragline will be used to remove a "toe" of material left along the outer face of the dike to aid stability of the dike. In the southern portion of the site, fill will be placed either by clamshell or by direct dumping and compacted and rehandled by dozer. Outer face of the fill will be sloped to 1 to 2 horizontal from the toe of the fill to the top. Generally, the slope within the marina will be allowed to form its own self protective riprap blanket. Riprap will be used to protect the spur dike projecting north of the disposal area. See section 3.1 of this analysis.

1.2.4 When Will Disposal Occur. Coordination with resource agencies indicates that dredging may being on 15 June 1981 and be completed by 15 March 1982. Conditions to protect aquatic resources and water quality were stipulated which may further restrict dredging and disposal. Work beyond 15 March 1982 will require review and approval by the appropriate agencies. See appendix G, part 3.

1.2.5 Projected Life of Disposal Site. This disposal site will be used only for this project.

1.2.6 Bathymetry. Not applicable.

2.0 Physical Effects.

2.1 Potential Destruction of Wetlands. (See sections 2.3.4, 3.2.4, 4.2.4, and 4.5.4 of the EIS.)

2.1.1 Food Chain Production. The initial disposal will increase turbidity, which will bring about a reduction in light transmission and a reduction in the rate of photosynthetic production for the disposal site. The confined fill will bury and remove from production about 53.4 acres of subtidal and intertidal land.

2.1.2 General Habitat. The disposal and fill operations will permanently remove from production about 53.4 acres of subtidal and intertidal land.

2.1.3 Nesting, Spawning, Rearing, and Resting Sites. The disposal area is primarily shallow water area that is used by juvenile salmonids for resting, rearing, and feeding for portions of the year. The disposal area supports few or no fish during the annual dissolved oxygen (DO) sag that occurs during late August and early September. The quality of this area as habitat and its carrying capacity are expected to be low. This area is also used by migrating and wintering waterfowl as a harbor of refuge during storms. There is some feeding by the resting waterfowl, mostly along the east shore of East Bay. There will be little direct impact on the feeding area along the east shore. Some of the avian resting area will be destroyed, but the major use areas along the east shore and at the head of the bay will not be directly impacted. Secondary impacts are anticipated, but cannot be quantified.

2.1.4 Sanctuaries or Refuges. No scientific study areas, sanctuaries, or refuges will be affected by this project.

2.1.5 Natural Drainage Characteristics. The surface of the fill will be sculptured so as to maintain the same drainage characteristics as the present site, although the actual pattern of drainage may be slightly altered. Three acres of the fill will be used to pond storm runoff which will be discharged into West Bay (see section 4.1.2 of the EIS).

2.1.6 Sedimentation Patterns. Sedimentation patterns are expected to alter slightly since the disposal area will no longer be available as a potential sedimentation site. No significant change in the overall sedimentation pattern of Budd Inlet is expected.

2.1.7 Salinity Distribution. No change in salinity distribution is expected.

2.1.8 Flushing Characteristics. Flushing characteristics of East Bay are presently very poor. The completion of this fill will reduce, but is not expected to significantly degrade these characteristics (see section 4.1.3.1 of the EIS).

2.1.9 Current Patterns. The currents in East Bay are presently very weak. The proposed fill will have little or no effects on the strength or direction of these currents.

2.1.10 Wave Action, Erosion, or Storm Damage Protection. No effect is expected.

2.1.11 Storage Areas for Storm and Floodwaters. Not applicable.

2.1.12 Prime Natural Recharge Areas. Not applicable.

2.2 Impact on Water Column.

2.2.1 Reduction in Light Transmission. The disposal of the material initially dredged for the placement of the confining dike will affect the turbidity of the area. Disposal of the material in the confined fill will have only minor effect on turbidity. These turbidity increases will reduce the transmission of light in the water column, which will cause the death of an undetermined number of photosynthetic planktonic organisms and a corresponding decline in the DO levels (see section 4.1.3.2 of the EIS).

2.2.2 Esthetic Values. The project area currently is of questionable esthetic value. Filling of the East Bay site will have a transient effect on the esthetic value of the site during construction. The brief increase in turbidity is likely to be noticed by residents and boaters. This impact, however, will be brief in duration and of less degree than storm discharges from the Deschutes River.

2.2.3 Direct Destruction of Nektonic and Planktonic Populations. The fill will isolate and directly destroy a small portion of the existing planktonic and nektonic populations of East Bay. The impact on these populations will be too small to adversely affect the future levels of these populations.

2.3 Covering of Benthic Communities.

2.3.1 Actual Covering of Benthic Communities. The filling of 53.4 acres of intertidal and subtidal lands will bury existing benthic communities. This conversion of subtidal and intertidal land to upland will permanently remove the area from aquatic production.

2.3.2 Changes in Community Structure or Function. The communities occupying the disposal area will be destroyed. These communities will be replaced in part by a new community that will inhabit the rock riprap habitat expected on the face of the new fill. Dredging of the bottom of the moorage basin is expected to immediately expose relatively cleaner sediments than presently exist. However, over the long term, the bottom will be recovered by sediments from East Bay and be colonized by similar deepwater communities.

2.4 Other Effects.

2.4.1 Changes in Bottom Geometry and Substrate Composition. Not applicable.

2.4.2 Water Circulation. Not applicable.

2.4.3 Salinity Gradients. No effect is expected.

2.4.4 Exchange of Constituents Between Sediments and Overlying Water. Not applicable.

3.0 Chemical-Biological Interactive Effects.

3.1 Does the Material Meet the Exclusion Criteria? There will be four separate disposal actions needed to complete the proposed fill. These are: (1) preexcavation and side casting to form a solid base for the confining dike, (2) confining dike construction, (3) dredged material disposal, and (4) shoreline fill. The material preexcavated for the base of the dike may meet the exclusion criteria listed in 40 CFR 230.4(b)(1)(iii). The material to be preexcavated is identical to the substrate of the disposal site, the material to be deposited was analyzed and found to contain no significant concentration of toxins (see table 1), and adequate conditions will be imposed on the material to minimize its transportation by currents after disposal. This material has a relatively high biological oxygen demand because of the organic material in the sediments. The material that will be used to construct the confining dike will be clean large grained material that will meet the exclusion criteria of 40 CFR 230.4(b)(1)(i). The material to be used during the confined fill will essentially be the same as the material that will be preexcavated, and may or may not meet the exclusion criteria. Based on the results of the sediment analysis performed on this material, it appears that the effluent water returning from the disposal site will contain very low concentrations of toxic materials or metals. It will be very low in DO due to the organic material in the sediments. Material to be used for dike construction and shoreline fill will be clean sand and gravel from upland sources.

3.2 Water Column Effects of Chemical Constituents. No significant concentrations of toxic materials were detected in the sediments, and no toxic reactions or releases are expected. There may be a temporary reduction in the DO levels caused by resuspension of organic material presently in the sediments.

3.3 Effects of Chemical Constituents on Benthos. The temporary reduction in DO levels may cause the death of some individual members of the benthic community.

4.0 Description of Site Comparison.

4.1 Total Sediment Analysis. A bulk sediment analysis was performed by Dames and Moore and is summarized in table 1. This analysis detected very low levels of toxic metals and no other toxic substances. The analysis did show relatively high levels of unoxidized organic material. Concentrations of organic material are identical between the dredge site and the disposal site.

4.2 Biological Community Structure Analysis. See sections 3.1.4, 3.1.5, 3.1.6, 3.1.7, 3.1.8, and 3.1.9 of the EIS for discussions of the plants and animals that utilize the dredge and disposal sites.

5.0 Review Applicable Water Quality Standards.

5.1 Compare Constituent Concentrations. Concentration of contaminants at the dredge site and the disposal site are essentially identical.

5.2 Consider Mixing Zone. Construction will be designed and scheduled to minimize impacts on water quality. Specific timing, details of construction methods, and mixing zone size and shape were based on coordination with resource and water quality agencies (see appendix G, part 3).

5.3 Will Disposal Operation be in Conformance with Applicable Standards? Section 4.4 of the EIS discusses coastal zone management programs and other Federal and state laws concerning water quality standards which could be affected by the proposed fill. The proposed action does not conflict with any of these programs or laws.

6.0 Selection of Disposal Sites for Dredged or Fill Material.

6.1 Need for the Proposed Activity. Section 1.3 of the EIS discusses the needs and problems associated with this action. With increased boating activity in Puget Sound, demand for moorage space has also increased. Examination of marina waiting lists and interviews with locals, public officials, organizations, and boat and marina supplies indicated a need for additional boat moorage in the Olympia area. In addition to the proposed marina, the Port of Olympia wishes additional cargo handling area which would provide facility support for their ocean terminals on the western side of the port peninsula. The cargo storage area is not directly tied to construction of the marina, but serves as a dredged material disposal site.

6.2 Alternatives Considered. Section 2.3 of the EIS considers alternative site locations and alternative methods for developing the selected site. No upland disposal sites are available in the immediate area. Open-water disposal was considered early in the planning process, but dropped principally due to water quality concerns and economics.

6.3 Objectives to be Considered in Discharge Determination.

6.3.1 Impacts on Chemical, Physical, and Biological Integrity of Aquatic Ecosystem. See section 2.0 (Physical Effects) and section 3.0 (Chemical/Biological Interactive Effects).

6.3.2 Impact on Food Chain. See section 2.1.1.

6.3.3 Impact on Diversity of Plant and Animal Species. The proposed disposal of dredged materials will cause the destruction of most of the animals and plants inhabiting the disposal area. The placement of the floating breakwater and moorage floats will supply potential substrate for growth of marine organisms. Initially, there will probably be a reduction in the diversity of plant and animal species in the project

area. The long-term effects on diversity are difficult to predict due to the conflicting influences.

6.3.4 Impact on Movement Into and Out of Feeding, Spawning, Breeding, and Nursery Areas. The use of the disposal site will permanently exclude all aquatic organisms and waterfowl from the area. See section 2.1.3 for present use of the area.

6.3.5 Impacts on Wetlands Having Significant Functions of Water Quality Maintenance. The role of mudflats in pollution assimilation and nutrient storage has not been estimated in East Bay.

6.3.6 Impact on Areas That Serve to Retain Natural High Waters or Floods. Not applicable.

6.3.7 Methods to Minimize Turbidity. During the initial dredging of the confining dike base, the material side cast will be placed so as to minimize turbidity. The first buckets of dredged material will be placed landward of the excavation to form a berm, and subsequent material will be placed behind this partial dike to help minimize turbidity and turbidity currents.

6.3.8 Methods to Minimize Degradation of Esthetic, Recreational, and Economical Values. No special methods will be used. It is expected that the project will have a positive effect on economic and recreational values of the area, and an undetermined effect on the esthetic value of the area.

6.3.9 Threatened and Endangered Species. No known threatened or endangered species utilize the project area.

6.3.10 Investigate Other Measures That Avoid Degradation of Esthetic, Economic, and Recreational Values. No major degradation of esthetic, economic, or recreational values will occur, so no action was taken.

6.4 Impacts on Water Uses at Proposed Disposal Site.

6.4.1 Municipal Water Supply Intakes. No municipal water supply intakes will be affected.

6.4.2 Shellfish. No commercially or recreationally important shellfish beds will be affected.

6.4.3 Fisheries. Dredging and disposal is scheduled so as not to interfere with anadromous fish migration. No important commercial or recreational fish populations will be affected.

6.4.4 Wildlife. Fill of the disposal site will eliminate 53.4 acres of waterfowl and other waterbirds' wintering, resting, and feeding habitat.

6.4.5 Recreational Activities. Recreational boating and associated fishing will increase as a result of the overall proposal. Fishing opportunities from the breakwater will be provided as well as bird watching opportunities enhanced. No other recreational activities will be affected.

6.4.6 Threatened and Endangered Species. No effect. See section 6.3.9.

6.4.7 Benthic Life. The benthic life inhabiting the disposal site will be destroyed.

6.4.8 Wetlands. There are no significant wetlands in the disposal area. The minor wetland communities that are present will be destroyed.

6.4.9 Submerged Vegetation. All submerged vegetation at the disposal site will be destroyed.

6.4.10 Size of Disposal Site. The disposal site covers 53.4 acres of intertidal and subtidal land.

6.4.11 Coastal Zone Management Programs. See section 5.3 of this analysis and section 4.4 of the EIS.

6.5 Considerations to Minimize Harmful Effects.

6.5.1 Water Quality Criteria. See section 3.1.3.3 of the EIS for present water quality information concerning the disposal site. Section 4.1.3.2 of the EIS describes potential water quality impacts of the proposed project. During preexcavation and confined fill, the water quality may temporarily fall below the criteria established by the State of Washington for Class "B" waters. Water quality monitoring will be conducted during construction (see EIS section 4.9).

6.5.2 Investigate Alternatives to Open-Water Disposal. Not applicable.

6.5.3 Investigate Physical Characteristics of Alternative Disposal Sites. All practical alternative disposal sites are located in East Bay and have similar physical characteristics.

6.5.4 Ocean Dump. Not applicable.

6.5.5 Investigate Covering Contaminated Sediment with Clean Material. Not applicable.

6.5.6 Investigate Methods to Minimize Effect of Runoff from Confined Areas. Runoff from confined areas is expected to contain little contamination due to the lack of toxic materials in the sediments. In addition, confined areas will be designed to retain runoff to allow for the settling of suspended materials.

6.5.7 Coordinate Potential Monitoring Activities with Environmental Protection Agency (EPA). An ongoing monitoring program will be designed in coordination with the EPA and other resource agencies (see appendix G, part 3).

7.0 Statement as to Contamination of Fill Material if from a Land Source. The material used to construct the confining dike and shoreline fill will be from an upland source and will consist of clean sand, gravel, and rock taken from an unspecified site.

8.0 Determine Mixing Zone. See section 5.2.

9.0 Conclusions and Determinations.

9.1 Conclusions. The proposed fill of 53.4 acres of subtidal and intertidal land in East Bay near Olympia, Washington, will have a minor detrimental effect on the local environment. The principal effects will be short-term reduction in the DO levels and the destruction of benthic life in the fill area.

9.2 Determinations. An ecological evaluation has been made as part of the work done for the EIS following the guidance of 40 CFR 230.4 and 40 CFR 230.5. As part of this evaluation, appropriate measures have been identified and incorporated to minimize adverse effects on the aquatic environment as a result of the discharge. It was determined that dredging would occur during periods of minimum fish usage of the area when water quality was at its best. Also considered were the need for the activity and the availability of alternative sites and methods of disposal that are less damaging to the environment. It was determined that although certain alternatives were less damaging to certain specific parameters, the preferred alternative site had the least overall impact. The selected plan minimizes, to the extent possible, environmental impacts. The impact of this proposal on wetlands was also considered. It was determined no other sites were practical for the construction of this project. Although other plans exist which involve less fill of wetlands and, hence, less overall impact, economic and social benefits were determined to outweigh biological losses. It was also determined that the area filled would be used primarily for water dependent uses, and other fill or disposal sites were not practical for disposal of this material.

9.3 Findings. The discharge sites for the East Bay Marina have been specified through the application of the Section 404(b)(1) guidelines.

TABLE 1

SEDIMENT QUALITY TEST RESULTS

	Sediment Core Number						
	#1	#2	#3	#4	#5	#6	#7
Total Solids, %	45.1	46.6	44.8	43.9	51.1	45.5	51.5
Volatile Solids, % Dry Wt.	10.7	10.8	9.5	9.5	9.7	12.9	7.7
Chemical Oxygen Demand, % Dry Wt.	13.9	8.4	9.9	9.7	7.6	14.4	6.6
Kjeldahl Nitrogen, % Dry Wt.	0.20	0.18	0.23	0.14	0.12	0.20	0.13
Oil and Grease, % Dry Wt.	0.09	0.11	0.14	0.03	0.26	0.20	0.19
Mercury, % Dry Wt.	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Lead, % Dry Wt.	0.002	0.002	0.002	0.002	0.007	0.004	0.004
Zinc, % Dry Wt.	0.011	0.009	0.007	0.005	0.005	0.005	0.049
Sulfide, calculated as S, % Dry Wt.	0.107	0.121	0.107	0.056	0.120	0.004	0.028
Settleability, JTU							
Turbidity after 1 hour	230	130	280	300	460	340	240
after 6 hours	120	85	140	140	130	100	70
after 24 hours	40	35	55	50	40	30	25
Phenols, % Dry Wt.	---	---	0.001	---	---	---	---

TABLE 1 con.

SEDIMENT QUALITY TEST RESULTS

			Sediment Core Number						
#8	#9(Shallow)	#9(Deep)	#10	#11	#12	#13	#14	#15	#16
54.9	36.1	44.4	38.7	54.5	46.6	51.3	47.5	61.6	67.1
10.8	13.0	13.3	18.1	12.6	13.3	11.1	9.6	6.1	7.8
11.7	14.4	13.3	17.3	12.0	11.4	13.4	11.1	6.2	12.5
0.18	0.32	0.28	0.30	0.16	0.19	0.21	0.01	0.11	0.09
0.31	0.46	0.21	0.35	0.25	0.22	0.17	0.14	0.18	0.08
0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
0.008	0.006	0.005	0.005	0.002	0.005	0.002	0.002	0.002	0.001
0.18	0.012	0.045	0.009	0.004	0.004	0.004	0.002	0.003	0.003
0.003	0.059	0.011	0.017	0.001	0.012	0.042	0.001	0.001	0.001
180	250	240	250	170	360	260	150	260	270
95	150	150	140	110	190	150	120	90	160
35	35	45	45	40	75	60	50	30	70
---	---	---	---	---	---	---	0.001	---	---

APPENDIX G, PART 2

PUBLIC NOTICES

NPSEN-PL-NC
071-OYB-1-006165

Seattle District, Corps of Engineers
Port of Olympia

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-NC

28 December 1979

PUBLIC NOTICE

Reference: NPSEN-PL-NC-79-1
Seattle District
Corps of Engineers

The Seattle District, Corps of Engineers, P.O. Box C-3755, Seattle, Washington 98124, proposes to undertake a Federal Navigational Project; the construction of a small boat marina in East Bay, Budd Inlet, Puget Sound at Olympia, Washington, in accordance with Section 404 of the Clean Water Act; 33 CFR 209.145 and under authority of Section 107 of the 1960 River and Harbor Act, as amended. As part of this project, the Port of Olympia proposes to perform related non-Federal work in accordance with provisions of Section 404 of the Clean Water Act, and Section 10 of the River and Harbor Act of March 3, 1899. The Federal portion of the project consists of dredging, placing fill, constructing a floating breakwater with access pier and ramp, and providing rock slope protection at the breakwater access. The non-Federal portion of the project consists of dredging, placing fill, constructing a berm for retaining the dredged material, and constructing a boat launching ramp. It is planned to combine the Federal project and the non-Federal dredging, with the exception of marina facilities and dredging required for the retaining berm, into one Federally managed contract. The Port of Olympia permit application for marina facilities will be subject of a separate public notice numbered 071-OYB-1-006165.

PROPOSED WORK:

a. Location: In Budd Inlet, Puget Sound at Olympia, Washington.

b. Physical Character: Dredge approximately 1,175,000 cubic yards of organic silt and sand, and place behind retaining berm. Place 440,000 cubic yards of imported granular material as topping fill, and 500 tons of quarry spalls as slope protection. Construct a breakwater and access pier.

c. Purpose (as explained by the applicant): Breakwater provides protection for an 800-boat public moorage and support facility; dredging provides adequate depth of water for boat movement within the marina, and to and from an existing navigation channel; fill to provide area for cargo handling, parking, and marina support facilities.

The evaluation of the impact of the activity on the public interest will include application of the Environmental Protection Agency's guidelines published under authority of Section 404(b) of the Clean Water Act. (40 CFR Part 230)

A draft detailed project report (DDPR) and a draft environmental impact statement (DEIS) covering the proposed work, titled "East Bay Marina," has been prepared by the Seattle District, Corps of Engineers and is available for review. The document was filed with the Environmental Protection Agency in December 1979. A copy may be obtained by calling John Malek, Corps Environmental Coordinator, telephone (206) 764-3624. The DEIS contains a Preliminary Section 404(b)(1) Evaluation as Appendix C.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the material matters at issue in this public notice. The request must specifically state the reasons for requesting a public hearing.

If open water disposal is required, a chemical analysis of any material to be so disposed will be made to determine project effects on the receiving water. This requirement may be waived by the Environmental Protection Agency.

Presently unknown archeological, scientific, prehistorical or historical data may be lost or destroyed by the work proposed. The work is not located on a property registered in the National Register of Historic Places.

The decision whether to perform this work will be based on an evaluation of the probable impact of the proposed work on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered; among those are conservation, economics, esthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. The work will not be performed unless found to be in the public interest.

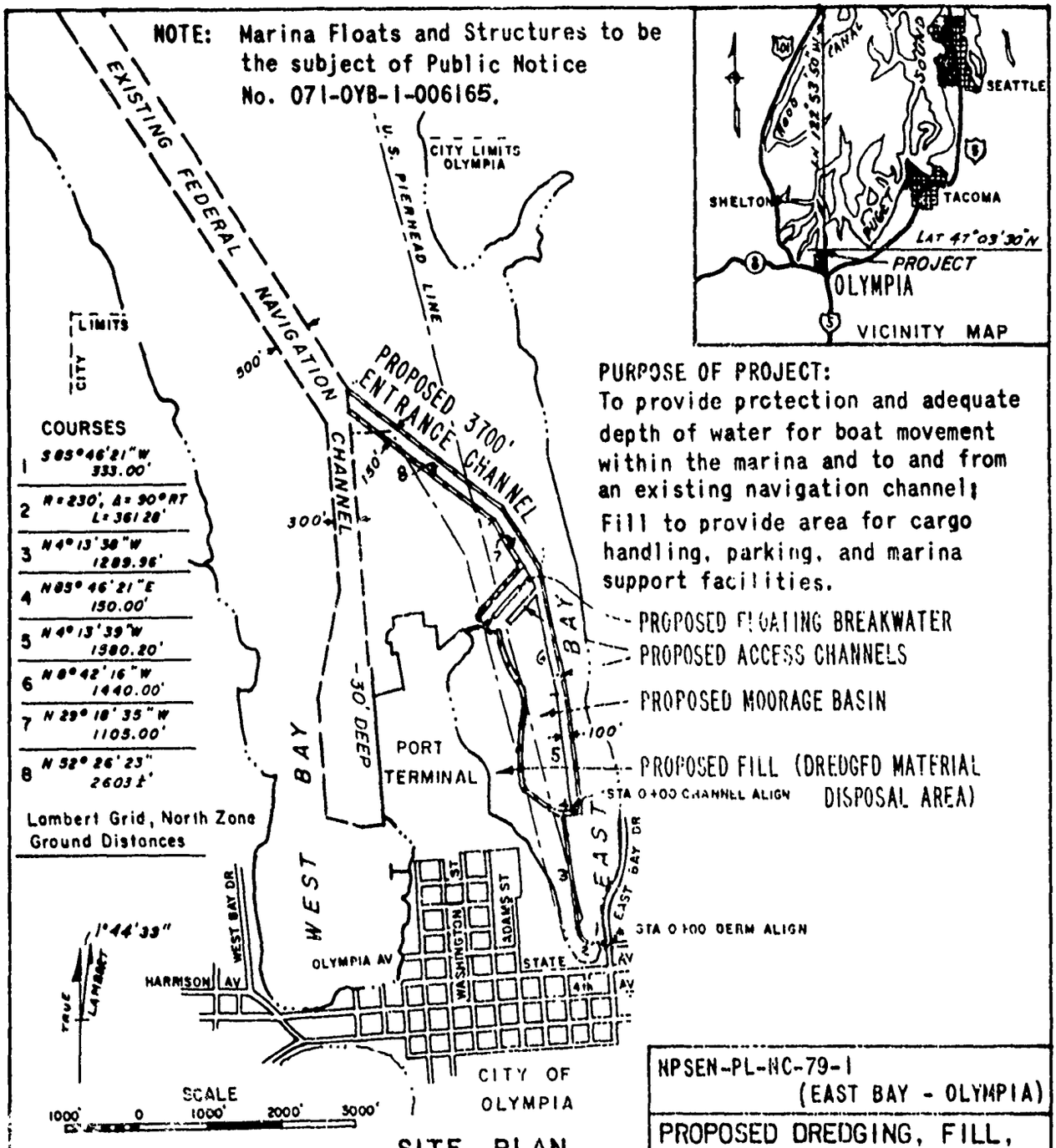
Preliminary determinations indicate that the proposed activity will not affect an endangered species, or their critical habitat, designated as endangered or threatened pursuant to the Endangered Species Act of 1973

NPSEN-PL-NC-79-1

(87 Stat. 844). Formal consultation pursuant to Section 7 of the Act with the Department of the Interior will not be required for this proposed activity.

Comments on these factors will be accepted and made part of the record and will be considered in determining whether it would be in the best public interest to perform the work. Please call Harry C. Disbrow, P.E., telephone (206) 764-3651, or John Malek, Environmental Coordinator, telephone (206) 764-3624. Comments should refer to the reference number and reach this office not later than 28 January 1980 to insure consideration.

1 Incl
Prints (10)



PURPOSE OF PROJECT:
To provide prctection and adequate depth of water for boat movement within the marina and to and from an existing navigation channel; Fill to provide area for cargo handling, parking, and marina support facilities.

SITE PLAN

DATUM:
Mean Lower Low Water (MLLW) = 0.0 Ft. N.O.S.
Mean High Water (MHW) = 13.5 Ft.
Mean Higher High Water (MHHW) = 14.4 ft.
Soundings and elevations in Feet.
ADJACENT PROPERTY OWNERS: See Sheets 8-10
Federal Harbor Lines Established

NPSEN-PL-NC-79-1
(EAST BAY - OLYMPIA)

PROPOSED DREDGING, FILL, BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

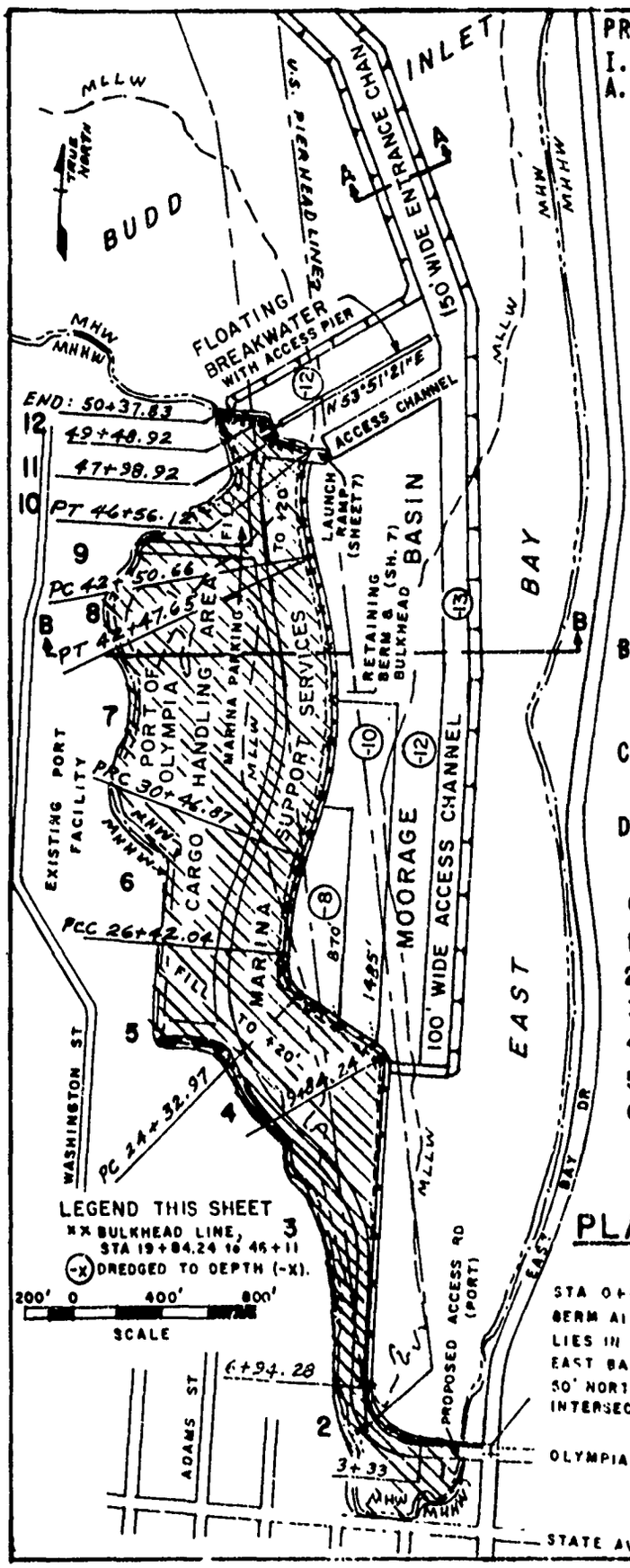
In: BUDD INLET, PUGET SOUND

At: OLYMPIA

County: THURSTON

State: WASHINGTON

SHEET 1 of 10



PLAN

PROPOSED WORK

I. FEDERAL:

A. By hydraulic pipeline and clamshell dredge, remove approx. 700,000 cu yds of organic silt and sand from 25.5 ac submerged lands and tidelands and deposit behind a retaining berm as fill for the marina services and Port of Olympia cargo handling area;

1) Entrance Channel - 150 ft wide 3500 ft long, dredged to -13 ft.

2) Moorage Access Channel -100 ft wide, 3000 ft long, dredged to -13 ft.

3) Launch Ramp Access Channel - 100 ft wide, 600 ft long, dredged to -12 ft.

4) Breakwater Area - 800 ft x 250 ft, dredged to -12 ft.

B. Construct floating breakwater (7 concrete modules 100 ft x 16 ft x 5 ft high with pile anchors) and access pier with ramp.

C Provide slope protection for retaining berm at breakwater access ramp.

D. Provide aids to navigation (Coast Guard).

(Cont. on sheet 3)

COURSES

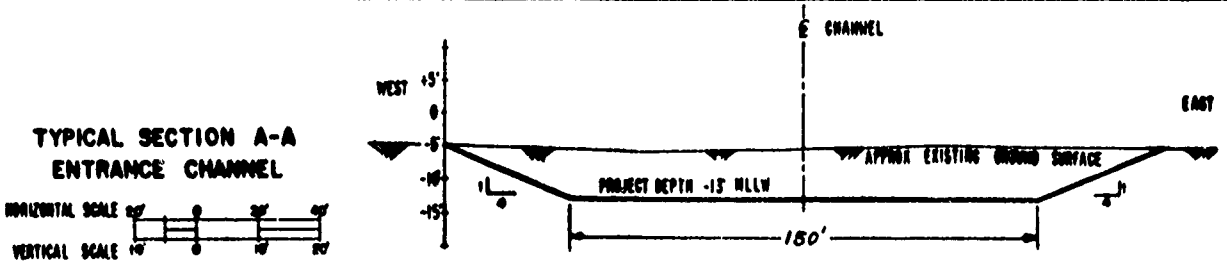
1 S 85°46'21"W	7 R=1674.54', Δ=41°05'08"
2 R=230', Δ=90°	8 N 26°44'55"W
3 N 4°13'38"W	9 R=802.13', Δ=28°57'42"
4 N 64°42'13"W	10 S 73°55'14"E
5 R=201.35', Δ=59°18'52"	11 N 36°08'39"W
6 R=1178.45', Δ=19°43'34"	12 S 74°25'21"W

NPSEN-PL-NC-79-1
(EAST BAY-OLYMPIA)

PROPOSED DREDGING, FILL, BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

SHEET 2 of 10



(cont. from sheet 2)

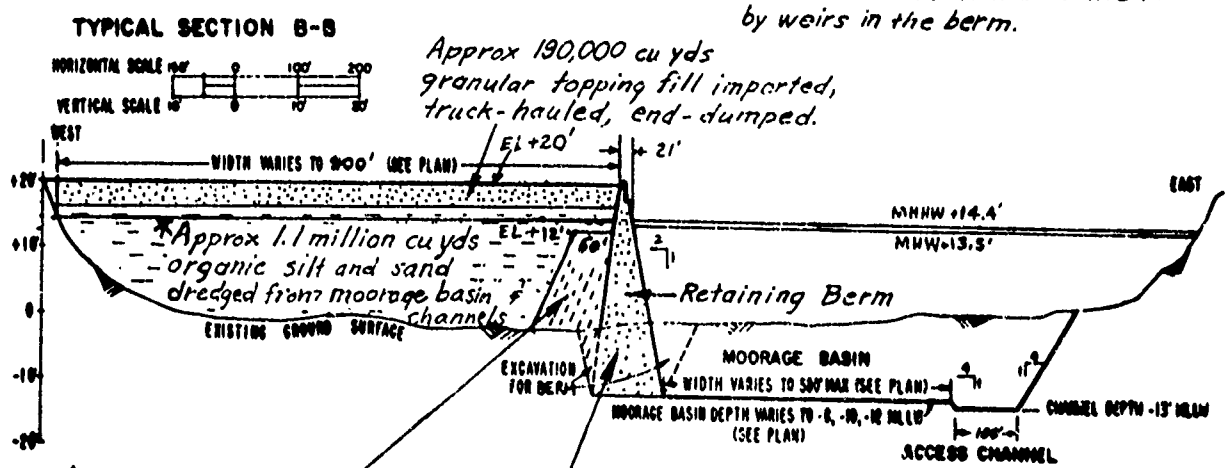
II. NON-FEDERAL:

A. Construct berm for retention of dredged material and imported fill for a 26.6 ac tract for marina support facilities and parking and 24.2 ac for cargo handling area for Port activities.

B. By hydraulic pipeline or clamshell dredge, remove approx. 475,000 cu yds of organic silt and sand from the 31.3 ac moorage basin and deposit behind the retaining berm.

C. Construct a public boat launching ramp and boat hoist.

* *Dredged material will be placed behind berm by hydraulic pipeline and clamshell dredge. Return waters will be controlled by weirs in the berm.*



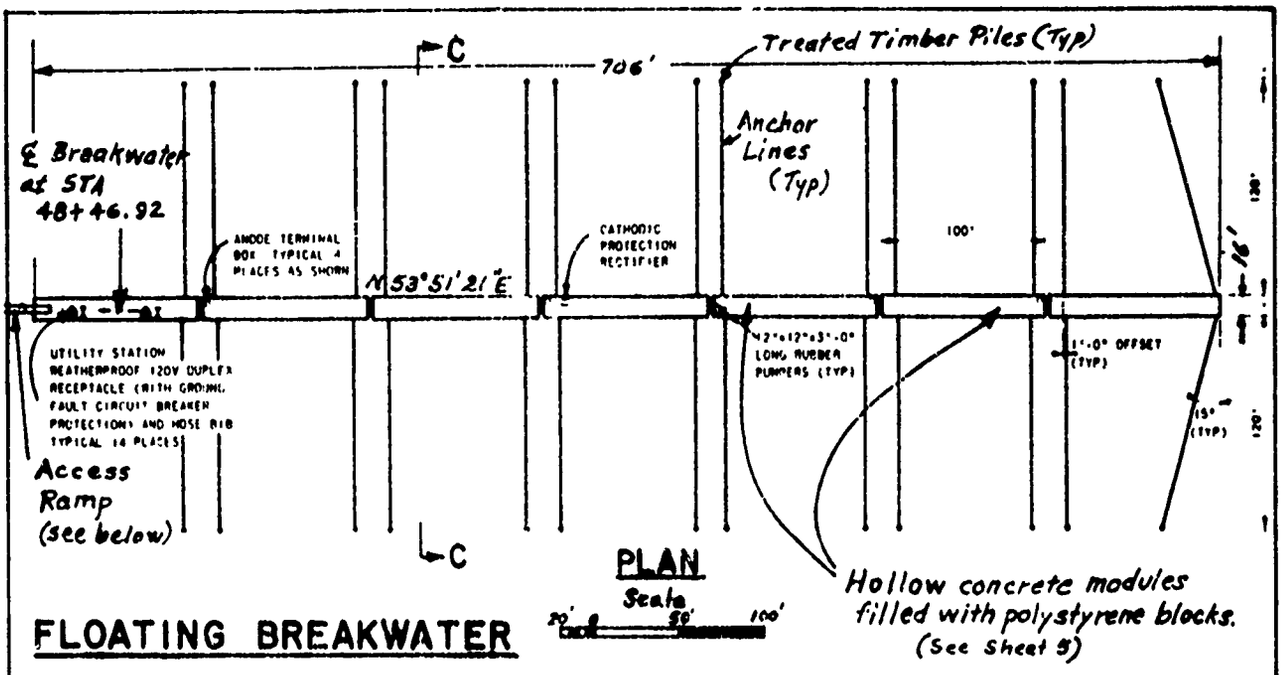
Approx. 180,000 cu yds organic sand and silt preexcavated by clamshell dredge from the berm design line, sidecast into disposal area and deposited along berm.

Approx. 250,000 cu yds pit-run granular fill imported from upland sources, truck-hauled, end-dumped.

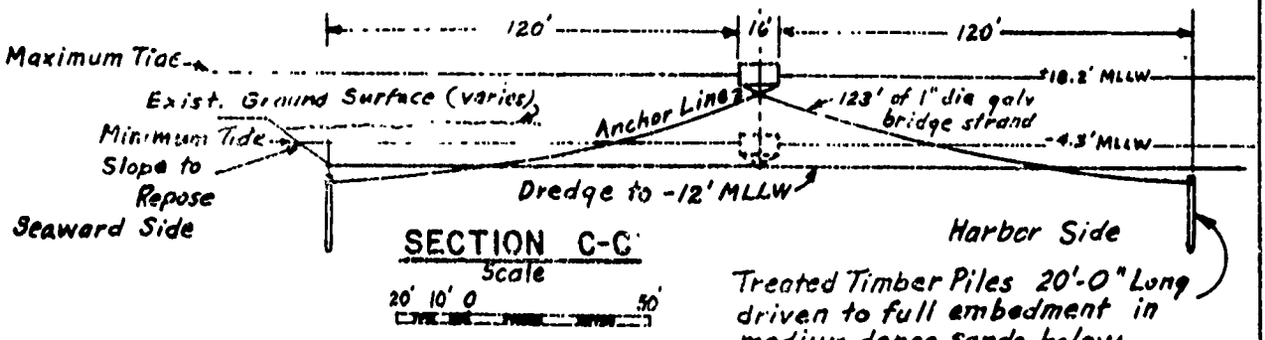
NPSEN-PL-79-1 (EAST BAY-OLYMPIA)

PROPOSED DREDGING, FILL BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

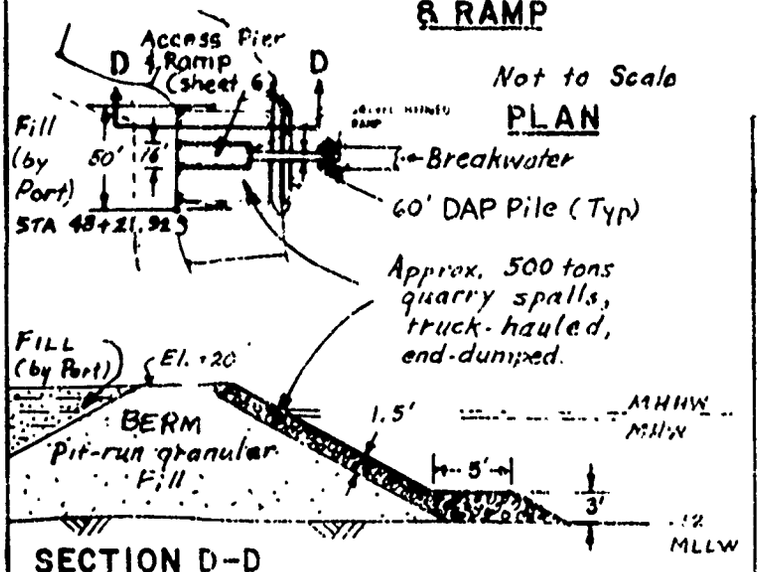
SHEET 3 of 10



FLOATING BREAKWATER



RETAINING BERM SLOPE PROTECTION AT BREAKWATER ACCESS PIER & RAMP



NPSEN-PL-NC-79-1

(East Bay-Olympia)

PROPOSED DREDGING, FILL BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

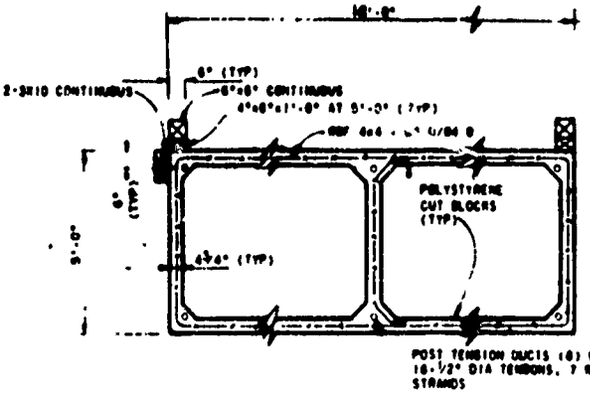
In: BUDD INLET, PUGET SOUND

At: OLYMPIA

County: THURSTON

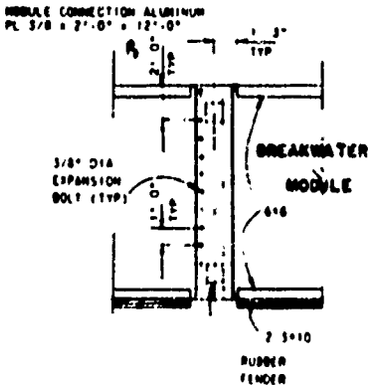
State: WASHINGTON

SHEET 4 of 10



MODULE CROSS SECTION

SCALE

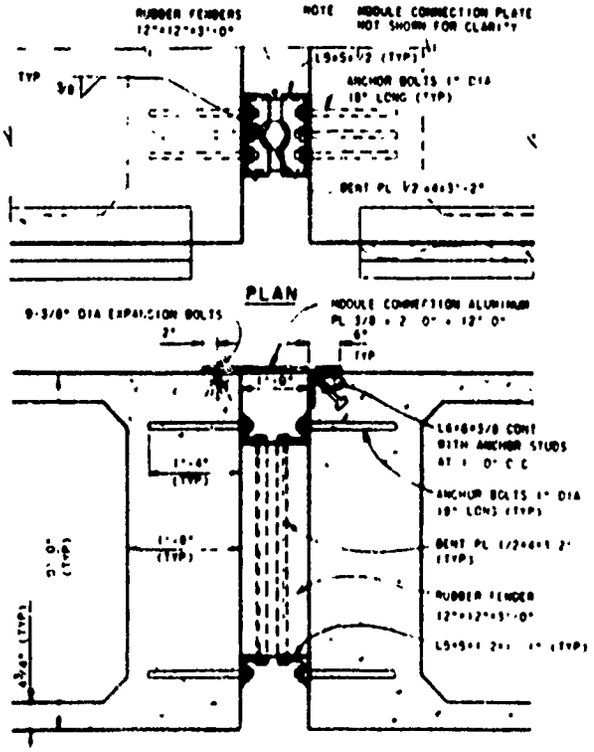


(TYPICAL FOR EACH FLOAT)

NOT TO SCALE

PLAN

MODULE CONNECTION PLATE



SECTIONAL ELEVATION

CONNECTION DETAIL

SCALE

FLOATING BREAKWATER DETAILS

NPSEN-PL-NC-79-1
(EAST BAY-OLYMPIA)

PROPOSED DREDGING, FILL BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

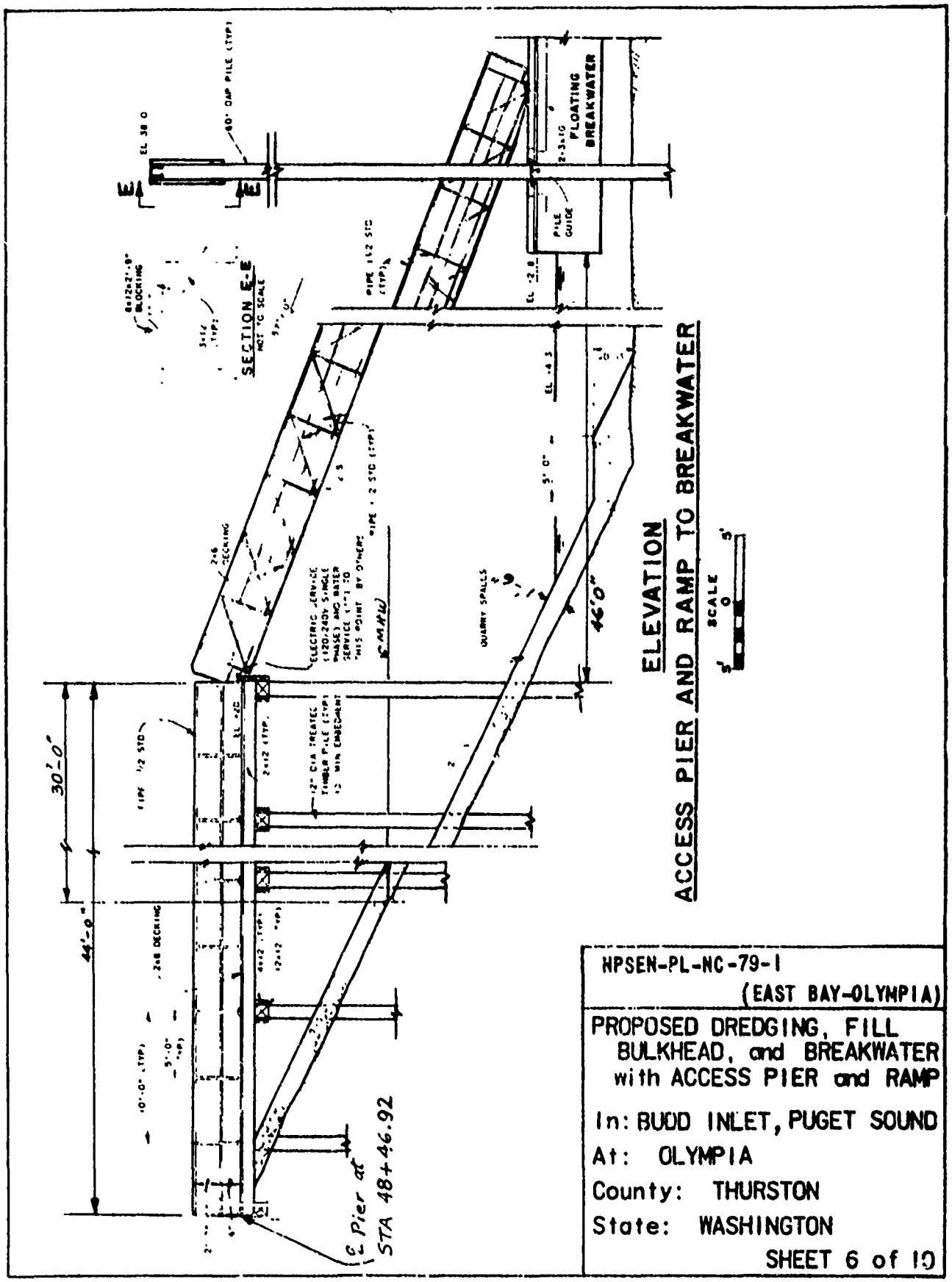
In: BUDD INLET, PUGET SOUND

AT: OLYMPIA

County: THURSTON

State: WASHINGTON

SHEET 5 of 10



NPSEN-PL-NC-79-1
(EAST BAY-OLYMPIA)

PROPOSED DREDGING, FILL BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

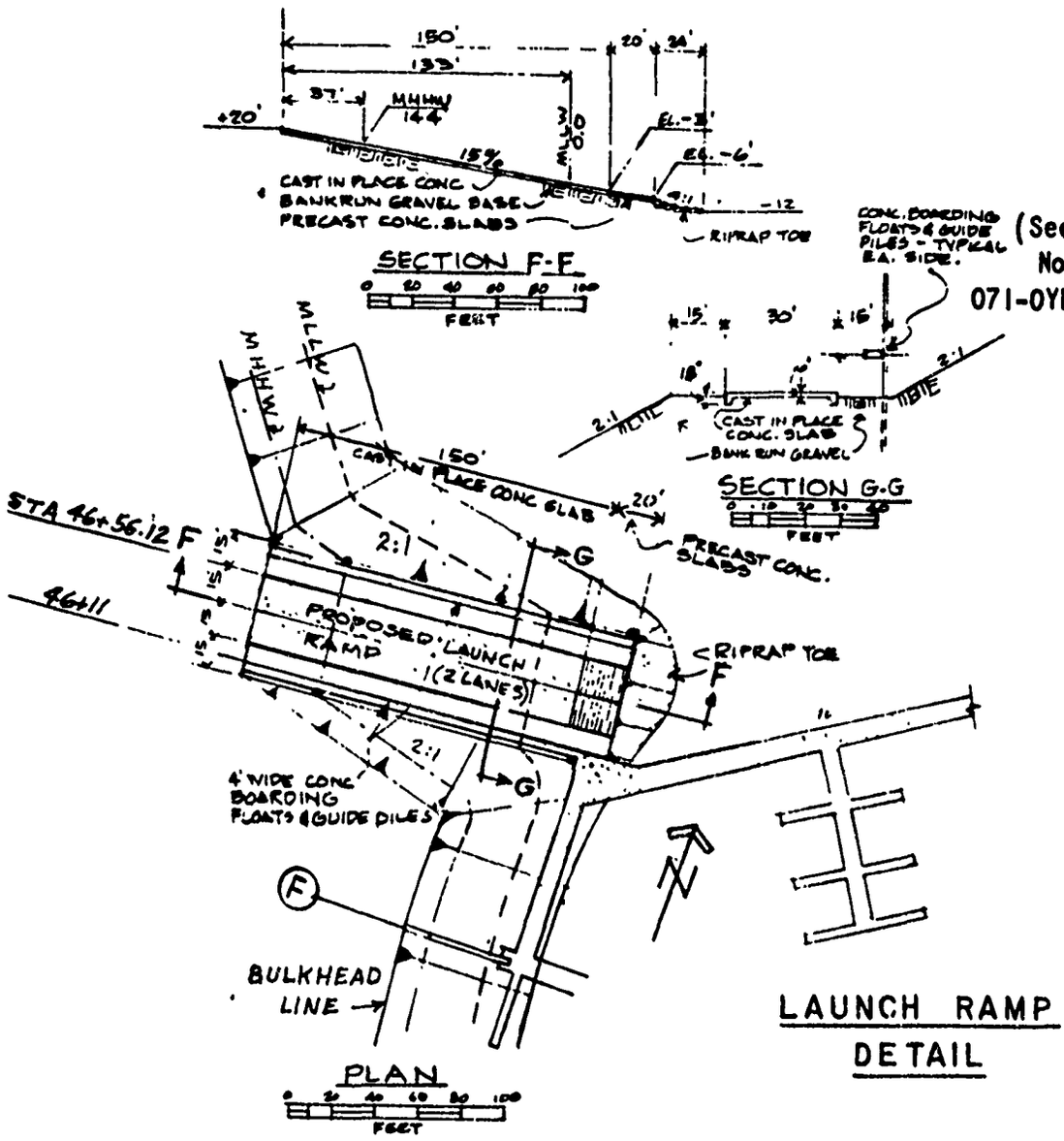
In: BUDD INLET, PUGET SOUND

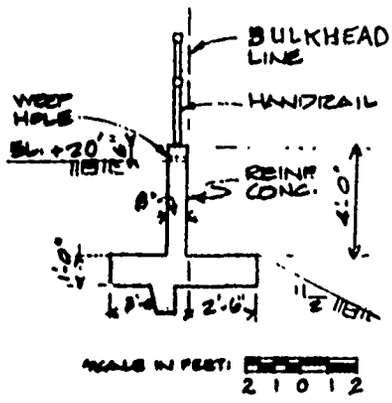
At: OLYMPIA

County: THURSTON

State: WASHINGTON

SHEET 6 of 10





BULKHEAD SECTION

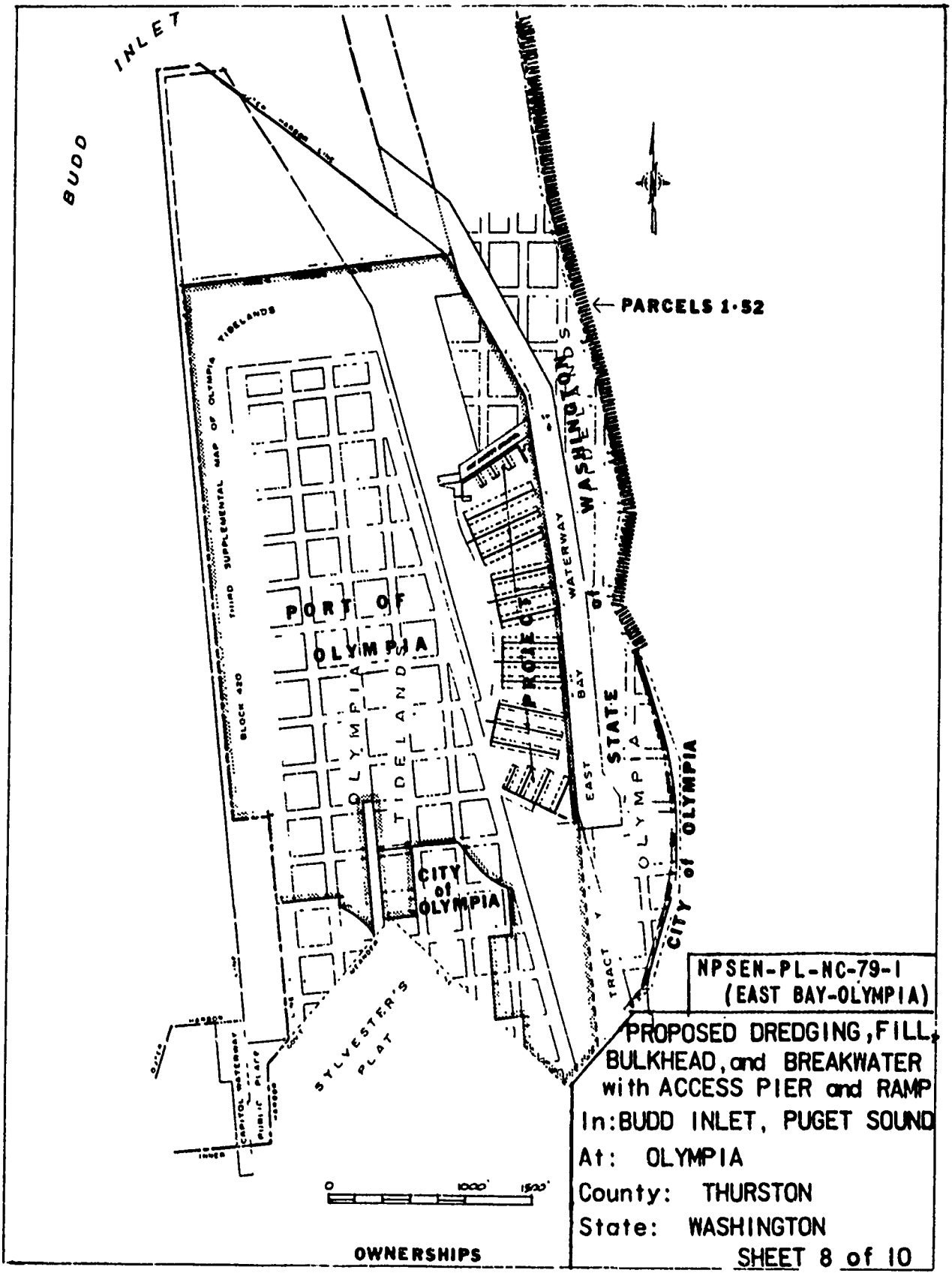
BULKHEAD TO BE CONSTRUCTED FROM STA 19+84.24 TO STA 46+11.

NPSEN-PL-NC-79-1
(EAST BAY - OLYMPIA)

PROPOSED DREDGING, FILL, BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

SHEET 7 of 10


BUDD INLET
PARCELS 1-52
TIDELANDS
THIRD SUPPLEMENTAL MAP OF OLYMPIA
BLOCK 430
PORT OF OLYMPIA
OLYMPIA TIDELANDS
PROPOSED WATERWAY
WASHINGTON ST
EAST BAY
STATE TRACT
CITY of OLYMPIA
CITY of OLYMPIA
SYLVESTER'S PLAT
CAPITOL WATERWAY
PUBLIC PLAT
0
1000'
1500'
OWNERSHIPS
NPSEN-PL-NC-79-1
(EAST BAY-OLYMPIA)
PROPOSED DREDGING, FILL, BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON
SHEET 8 of 10

Port of Olympia
EAST BAY PROJECT
Adjoining Ownerships

5/18/79

Parcel No.	Description	Name	Address
SUNSET BEACH ADDITION - BLK 1			
1	Lot 1	Long, Sam O.	3417 122nd NE, Bellevue, WA 98005
2	L 2	Morgan, Helen H.	2147 E. Bay Drive, Olympia, WA 98506
3	L 3	Vantine, Ernest L.	2143 E. Bay Drive, Olympia, WA 98506
4	L 4	Allen, Thomas J.	2139 E. Bay Drive, Olympia, WA 98506
5	L 5	Lawrence, Richard S.	2119 E. Bay Drive, Olympia, WA 98506
6	L 6	Garland, Stewart M.	2111 E. Bay Drive, Olympia, WA 98506
7	L 7	Odegaard, Chas. H.	2109 E. Bay Drive, Olympia, WA 98506
8	L 8, 9	Kent, Chrystel G.	2061 E. Bay Drive, Olympia, WA 98506
9	L 10	Redman, Michael	3202 Ida Jane Way, Olympia, WA
10	L 11	Parks, Lois A.	
11	L 12	Knecht, Harold	2039 E. Bay Drive, Olympia, WA 98506
12	L 13	Patillo, Gregory L.	2029 E. Bay Drive, Olympia, WA 98506
13	L 14	Sutton, James D.	Box 841, Olympia, WA 98501
14	L 15	DeForest, Russell D.	2015 E. Bay Drive, Olympia, WA 98506
15	L 16	Zellner, Robert A.	1627 E. Bay Drive, Olympia, WA 98506
GALLIHER'S ADDITION - BLK 6			
16	L 1, N ½ L 2, + N 78' L 11 & L 12	Parker, Wallace D.	1929 E. Bay Drive, Olympia, WA 98506
17	S ½ L 2, L 3, L 10, & S 32' L 11	Schoch, Marvin N.	1919 E. Bay Drive, Olympia, WA 98506
18	L 4, L 9	Parker, Wallace	1929 E. Bay Drive, Olympia, WA 98506
19	L 5, L 8	Devoe, Daniel L.	1090 E. Bay Drive, Olympia, WA 98506
20	L 6, L 7	Bechtel, Harvey M.	1907 E. Bay Drive, Olympia, WA 98506
BLK 7			
21	L 1, N 50' L 12, L2	Bath, Roger H.	1823 E. Bay Drive, Olympia, WA 98506
22	L 3	Lindstrom, John L.	1817 E. Bay Drive, Olympia, WA 98506
23	L 4, L 5, L 6	Edgewater East Dev. Co.	Interlaaken Dr. SW, Tacoma, WA 98498
BLK 17			
24	L 1, L 2	City of Olympia	
25	L 7, L 8, L 9	Afdem, Charles	2106 Harbor View Dr., Olympia, WA 98502

BLK 19			
26	L 1, L 12	Zellner, Robert A.	1627 E. Bay Drive, Olympia, WA 98506
27	L 2, L 11	Thompson, Roger W.	1123 W. 6th, Olympia, WA 98502
28	L 3, L 10, L 4	Kay, Donald F. & Esther	1611 E. Bay Drive, Olympia, WA 98506
29	L 5, L 8	Walker, J.	Rt. 9, Box 254, Clympia, WA 98501
30	L 6, L 7	Ruppert, Karl D.	108 W. 22nd, Olympia, WA 98501
31	L 9	Fenske, Hugo	920 Fenske Dr., Olympia, WA 98501
BLK 28			
32	L 1, L 2	Temple, Robert T.	1507 E. Bay Drive, Olympia, WA 98506
33	L 3	Reeves, Robert E.	1503 E. Bay Drive, Olympia, WA 98506
SEBREE'S SUBDIVISION BLOCK C - BLK 1			
34	L 1, L 2	Bradley, Samuel R.	111 W. 21st #4, Olympia, WA 98501
35	L 3, L 4, L 5	Shadle, S. Blair	1405 E. Bay Drive, Olympia, WA 98506
36	W 20' L 6-10	Moody, Jack L.	810 San Francisco, Olympia, WA 98506
37	E 80' L 6-10	Blensley, Kay	5700 Turf Lane, Olympia, WA 98503
SEBREE'S SUBDIVISION BLOCK B - BLK 3			
38	L 1-3, S16.27' L 4	Kluh, F. T.	Rt. 3, Box 501, Olympia, WA 98501
39	N 8.73' L 4, L 5, L 6	Nichols, Bernice & Jas.	1911 Arietta Ave. SE, Olympia, WA 98501
40	L 7, L 8	Kallenberg, Gordon G.	112 Glendora Ave., Long Beach, CA 90803
41	L 9-11	Backman, Evida C.	1323 E. Bay Drive, Olympia, WA 98506
42	L 12-15	Steidel, Chas. W.	4211 188th Place SW, Lynnwood, WA 98036
43	L 16-17	Leland, Omund	423 N. 3rd, Tumwater, WA
44	L 18-19	Martin, Brian H.	2941 85th Ave. SW, Olympia, WA 98502
45	L 20	Granacki, Ruby E.	614 Linwood Ave., Tumwater, WA 98501
SIMENSON'S SUBDIVISION - BLK 1			
46	L 1, L 2, L 3	City of Olympia	
47	L 4	Six, Myrtle E.	3808 Country Club Dr., Olympia, WA 98502
48	L 5, L 6, L 7	Six, Myrtle E.	3808 Country Club Dr., Olympia, WA 98502
49	L 8, L 9, L 10	Peckham, William H.	1221 E. Bay Drive., Olympia, WA 98506
SWAN'S ADDITION - BLK 11			
50	L 4, L 5	Turnbow, Winston	3006 Gull Harbor Rd. NE, Olympia, WA 98506
51	L 6, L 7, L 8	Safe-Lite Industries	P. O. Box 1879, Wichita, Kansas 67201
52	L 9, L 10	Safe-Lite Industries	P. O. Box 1879, Wichita, Kansas 67201

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753 2800

28 December 1979

Notice of Application for Water Quality Certification

Notice is hereby given that a request is being filed with the Department of Ecology for certification, as provided in Section 401 of the Federal Water Pollution Control Act (PL-92-500), as amended by the Clean Water Act of 1977 (PL-95-217), that a proposed discharge to navigable waters, resulting from the project described in the Corps of Engineers Public Notice No. NPSEN-PL-NC-79-1 will comply with the applicable provisions of the Federal Water Pollution Control Act as amended and other state laws.

Any person desiring to present views on the request in relation to water pollution considerations pertaining to the project may do so by providing the same in writing to the Department of Ecology, Office of Field Operations, Olympia, Washington 98504 within 20 days of publication of this notice.

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSOP-RF

28 December 1979

PUBLIC NOTICE

Reference: 071-OYB-1-006165
Olympia, Port of

Application has been received from the Port of Olympia, P.O. Box 827, Olympia, Washington 98507 (ATTN: Richard O. Malin, Port Engineer, telephone (206) 754-1659) for Department of the Army permit in accordance with Section 10 of the River and Harbor Act of March 3, 1899 for certain work described below and shown on the inclosed prints. Federal and non-Federal dredging, filling, floating breakwater with access pier and ramp, and boat launching ramp are subject of a separate public notice numbered NPSEN-PL-NC-79-1.

PROPOSED WORK:

a. Location: In Budd Inlet, Puget Sound at Olympia, Washington.

b. Physical Character: Construct marina facilities, boat hoist, and install floats.

c. Purpose (as explained by the applicant): Provide recreational boat moorage and launching facilities; fuel and sewage pumpout facilities.

A draft detailed project report (DDPR) and a draft environmental impact statement (DEIS) covering the proposed work, titled "East Bay Marina," has been prepared by the Seattle District, Corps of Engineers and is available for review. The document was filed with the Environmental Protection Agency in December 1979. A copy may be obtained by calling John Malek, Corps Environmental Coordinator, telephone (206) 764-3624. The DEIS contains a Preliminary Section 404(b)(1) Evaluation as Appendix C.

The State of Washington is reviewing this work for consistency with the approved Washington Coastal Zone Management Program.

Preliminary determinations indicate that the activity will not affect endangered species, or their critical habitat, designated as endangered or threatened pursuant to the Endangered Species Act of 1973 (87 Stat. 844). Formal consultation pursuant to Section 7 of the Act with the Department of the Interior is not required for this activity.

071-OYB-1-006165

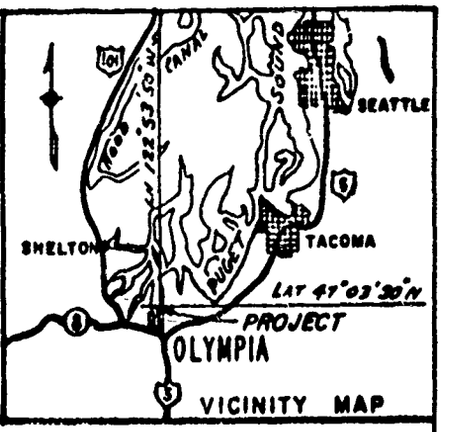
Presently unknown archeological, scientific, prehistorical or historical data may be lost or destroyed by work to be accomplished under the requested permit. The work is not located on a property registered in the National Register of Historic Places.

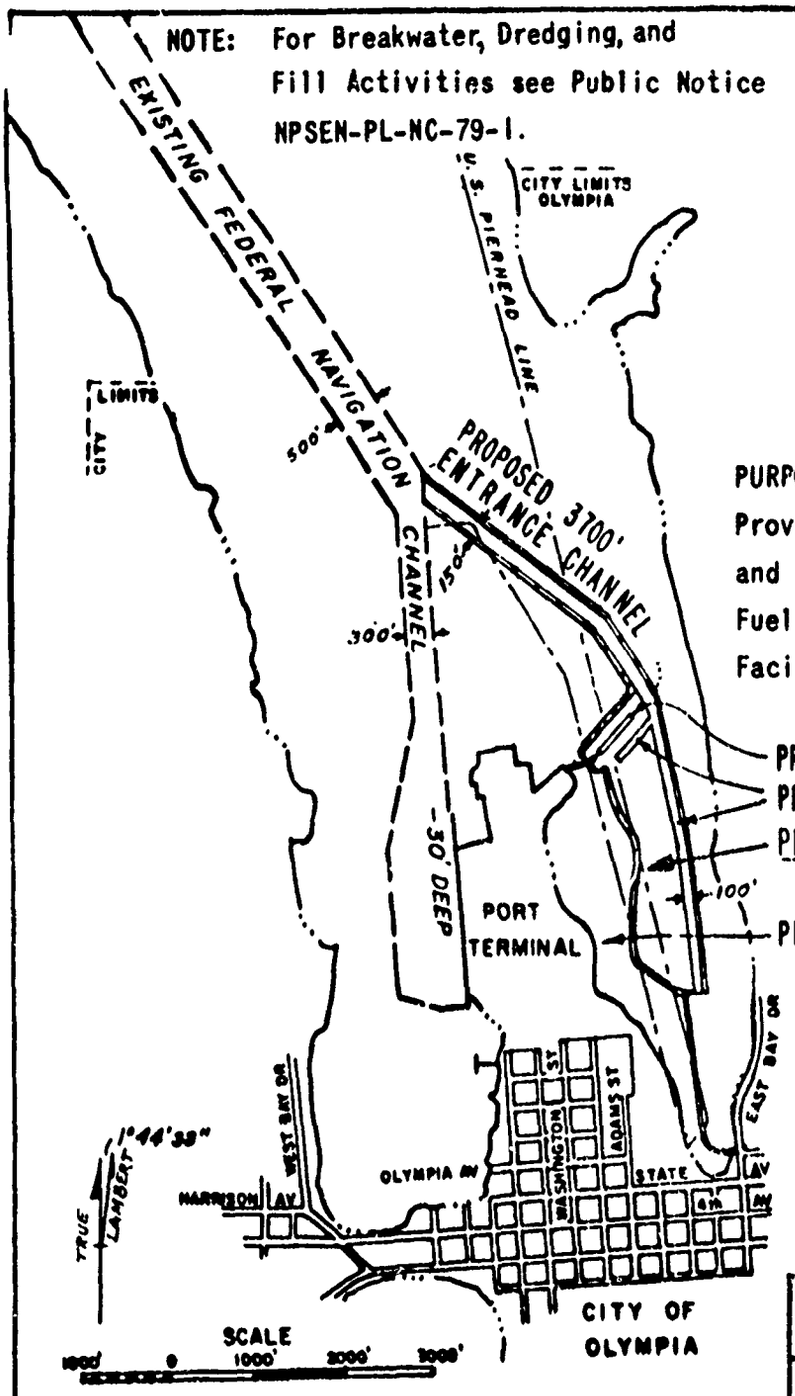
The decision whether to issue a permit will be based on an evaluation of the probable impact of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered; among those are conservation, economics, esthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

Comments on these factors will be accepted and made part of the record and will be considered in determining whether it would be in the best public interest to grant a permit. Comments should refer to the reference number shown above and reach this office, Attn: Permit Section, not later than 28 January 1980 to insure consideration.

1 Incl
Prints (11)

NOTE: For Breakwater, Dredging, and Fill Activities see Public Notice NPSEN-PL-NC-79-1.



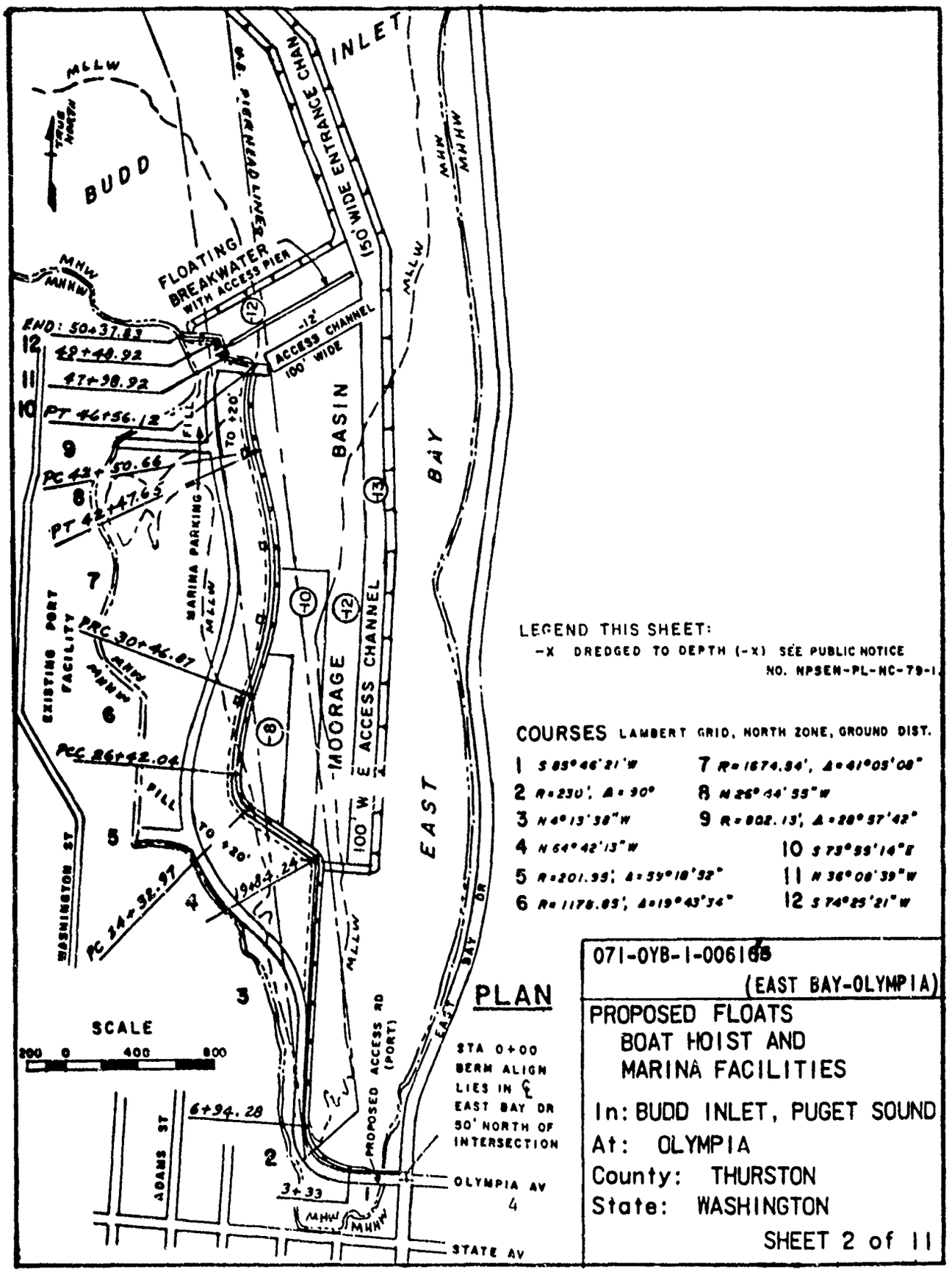


PURPOSE OF PROJECT:
Provide recreational boat moorage and launching facilities; Fuel and Sewage and Pumpout Facilities.

DATUM:
Mean Lower Low Water (MLLW) = 0.0 Ft. N.O.S.
Mean High Water (MHW) = 13.5 Ft.
Mean Higher High Water (MHHW) = 14.4 Ft.
Soundings and elevations in Feet.
ADJACENT PROPERTY OWNERS: See Sheets 9-11
Federal Harbor Lines Established

071-0YB-1-006165
(EAST BAY - OLYMPIA)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON
SHEET 1 of 11

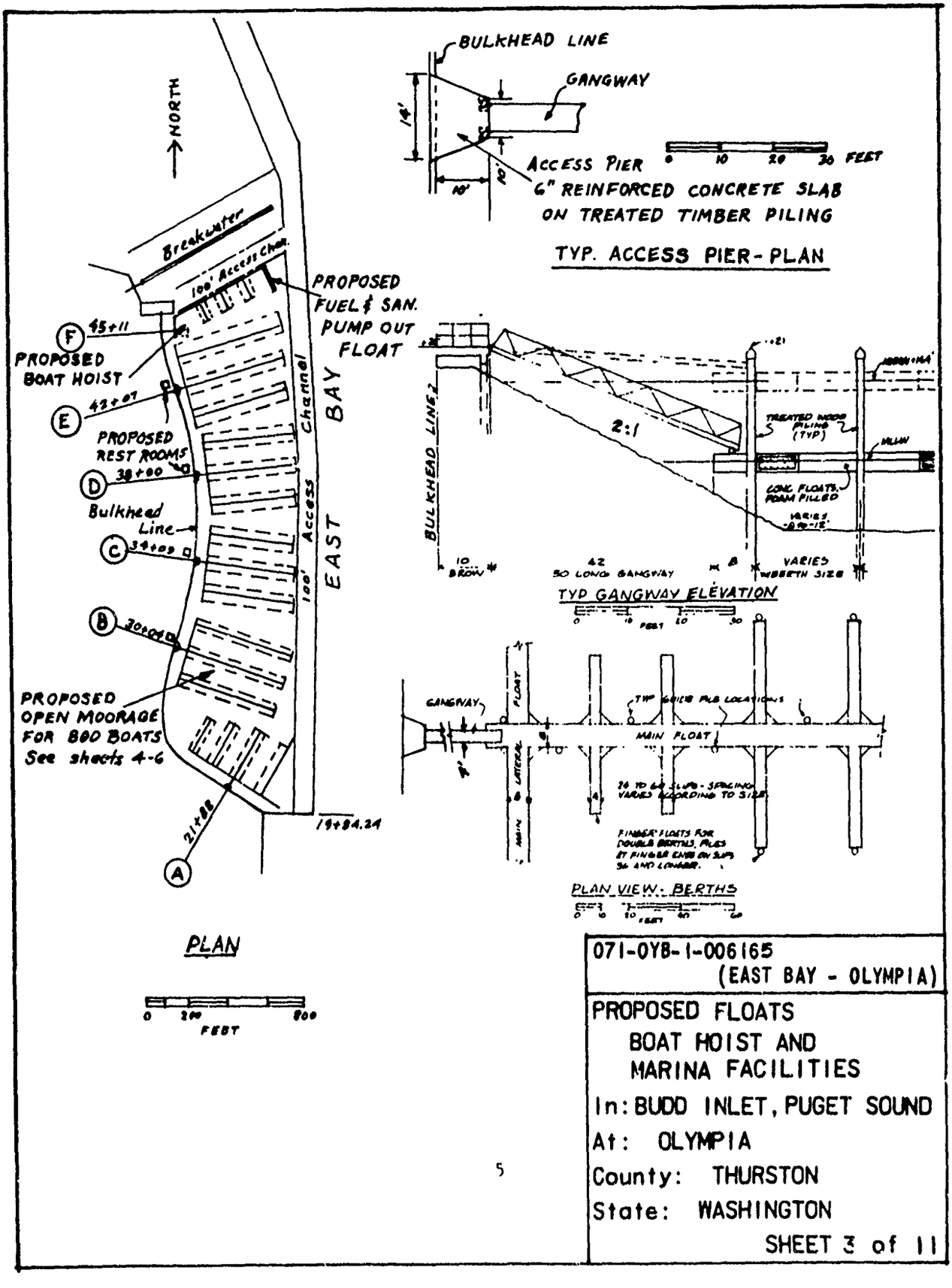


071-0YB-1-006165
(EAST BAY-OLYMPIA)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES

In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

SHEET 2 of 11



071-0Y8-1-006165
(EAST BAY - OLYMPIA)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES

In: BUDD INLET, PUGET SOUND

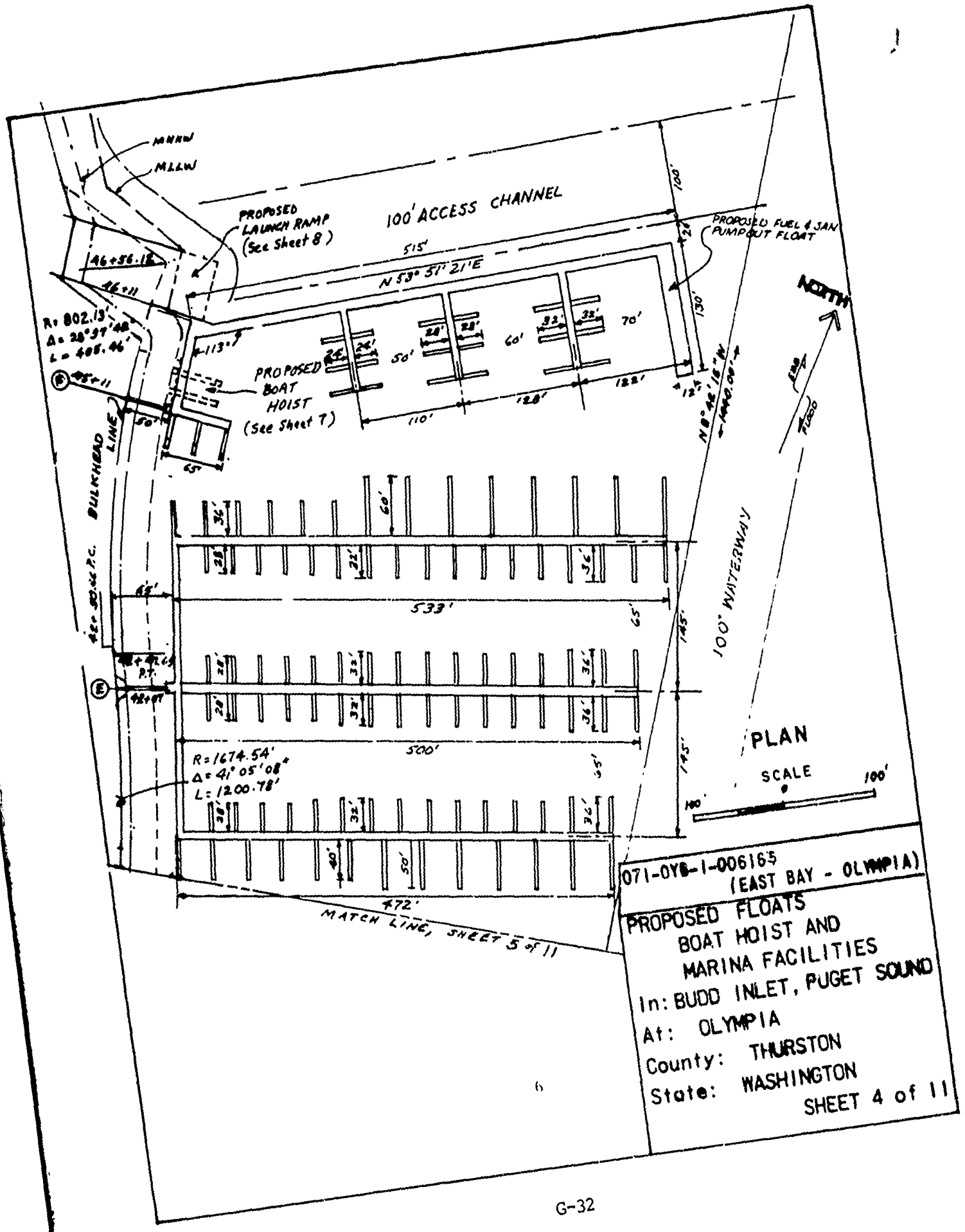
At: OLYMPIA

County: THURSTON

State: WASHINGTON

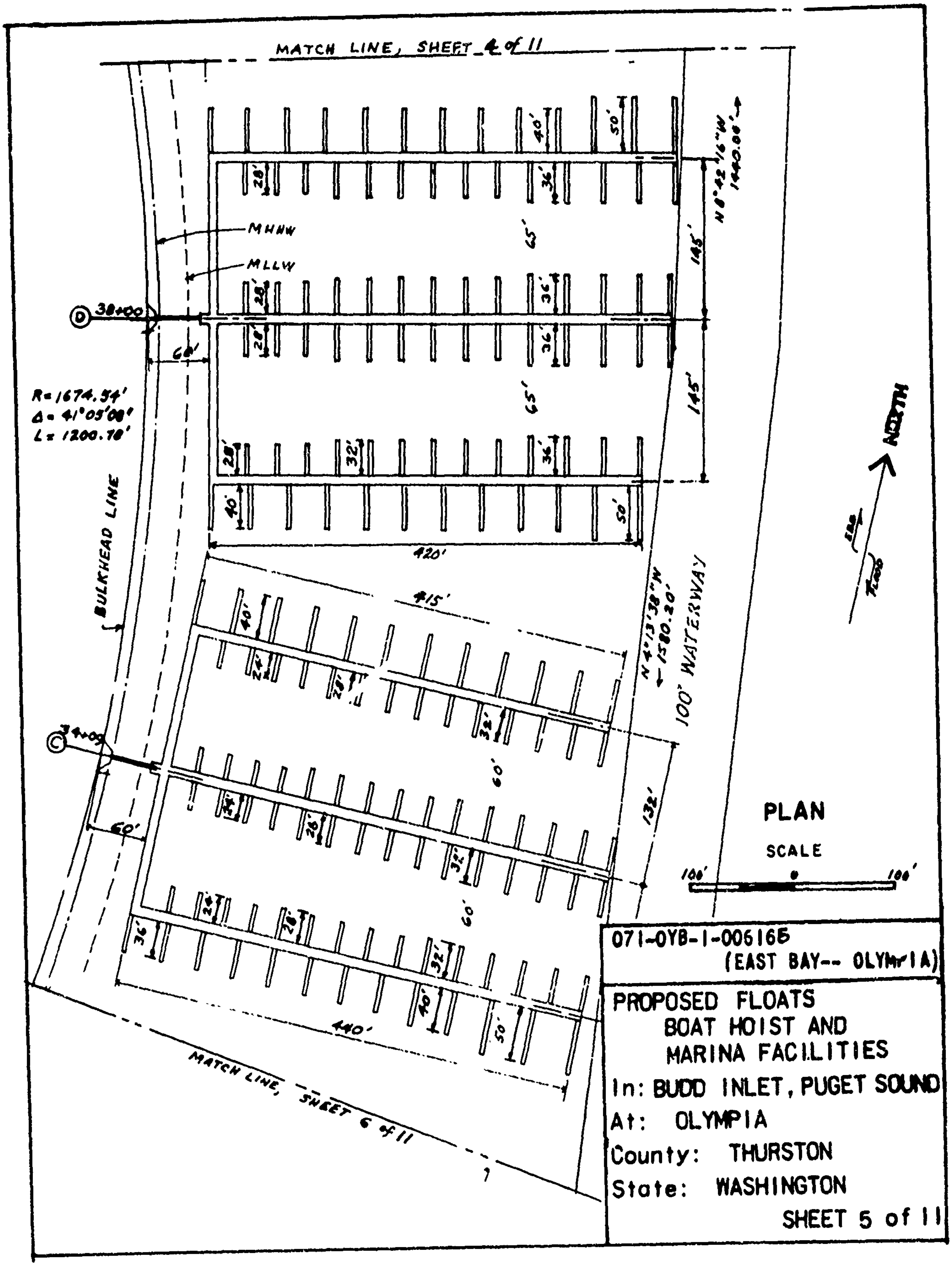
SHEET 3 of 11

5



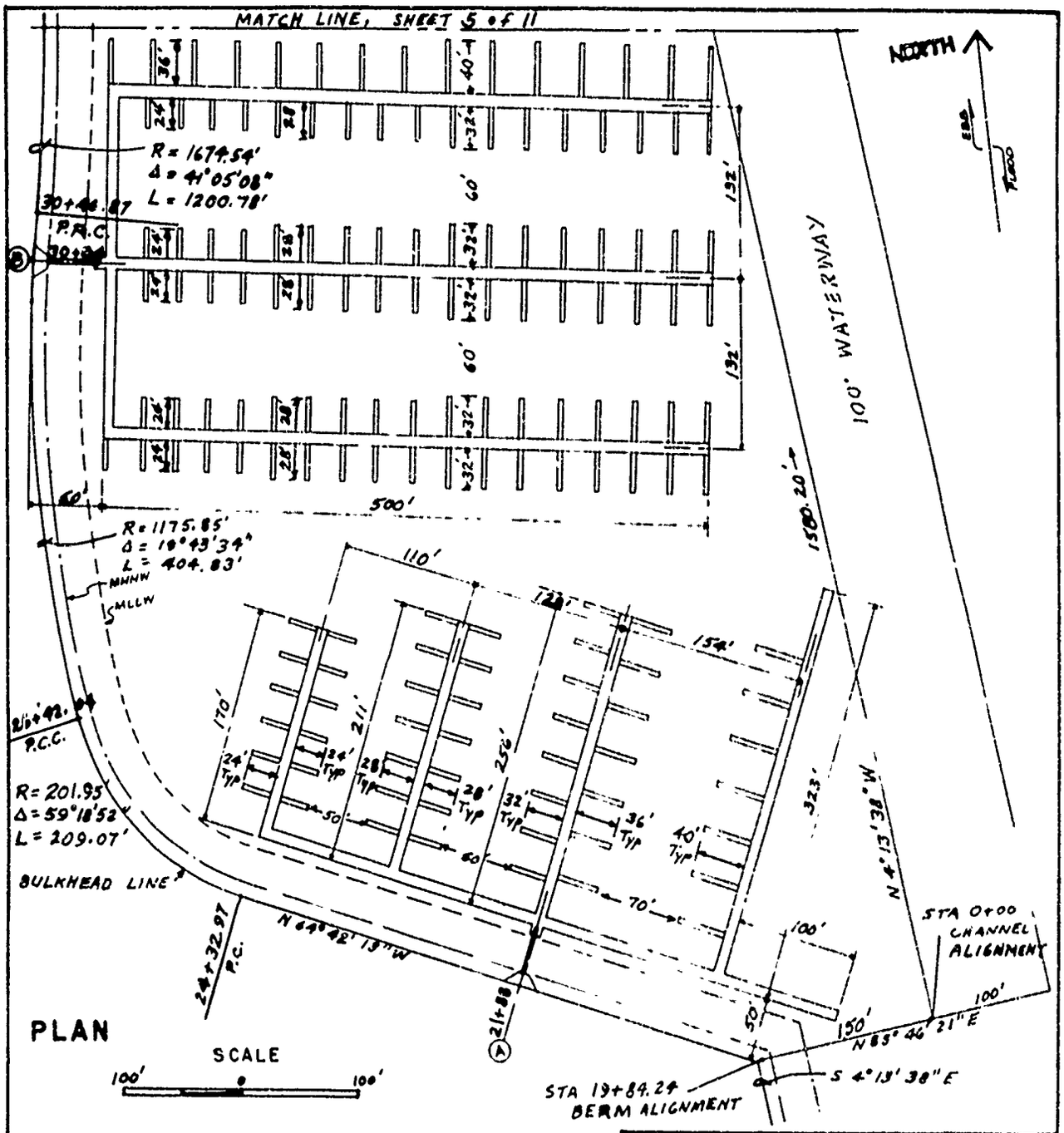
071-0YB-1-006165
(EAST BAY - OLYMPIA)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON
SHEET 4 of 11



071-OYB-1-006165
(EAST BAY-- OLYMPIA)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON
SHEET 5 of 11

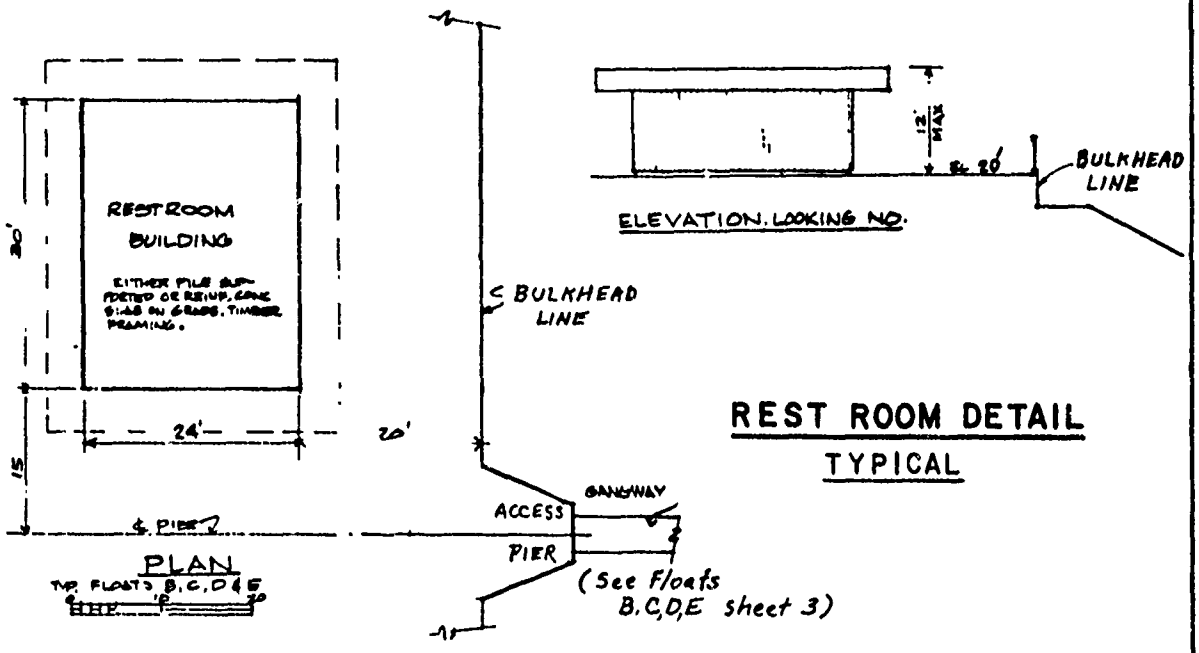


071-0YB-1-006165 (EAST BAY-OLYMPIA)

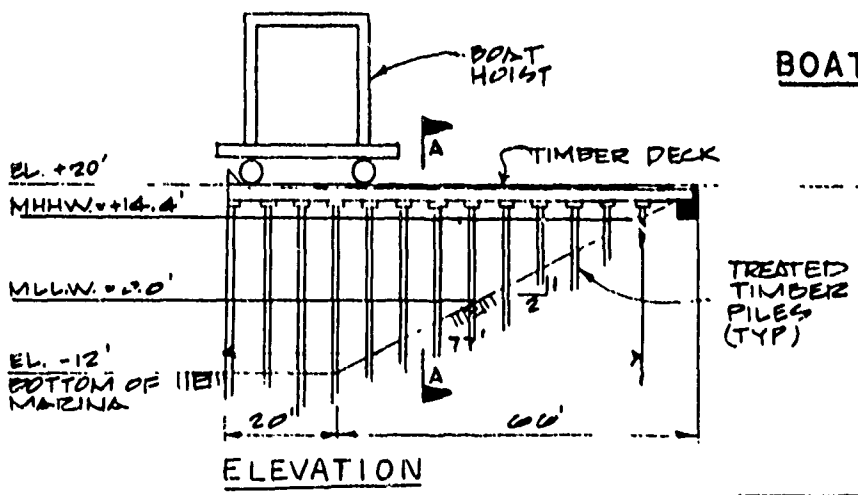
PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

SHEET 6 of 11

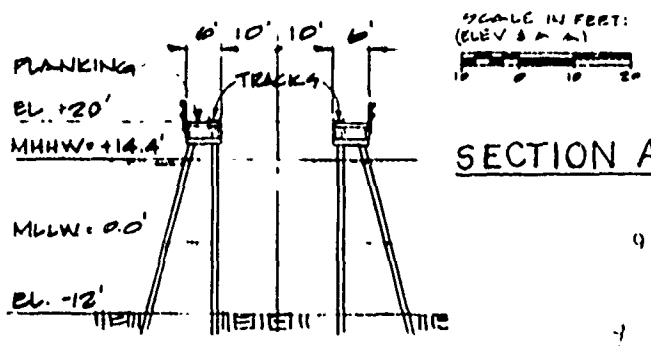
8



REST ROOM DETAIL
TYPICAL



BOAT HOIST DETAIL

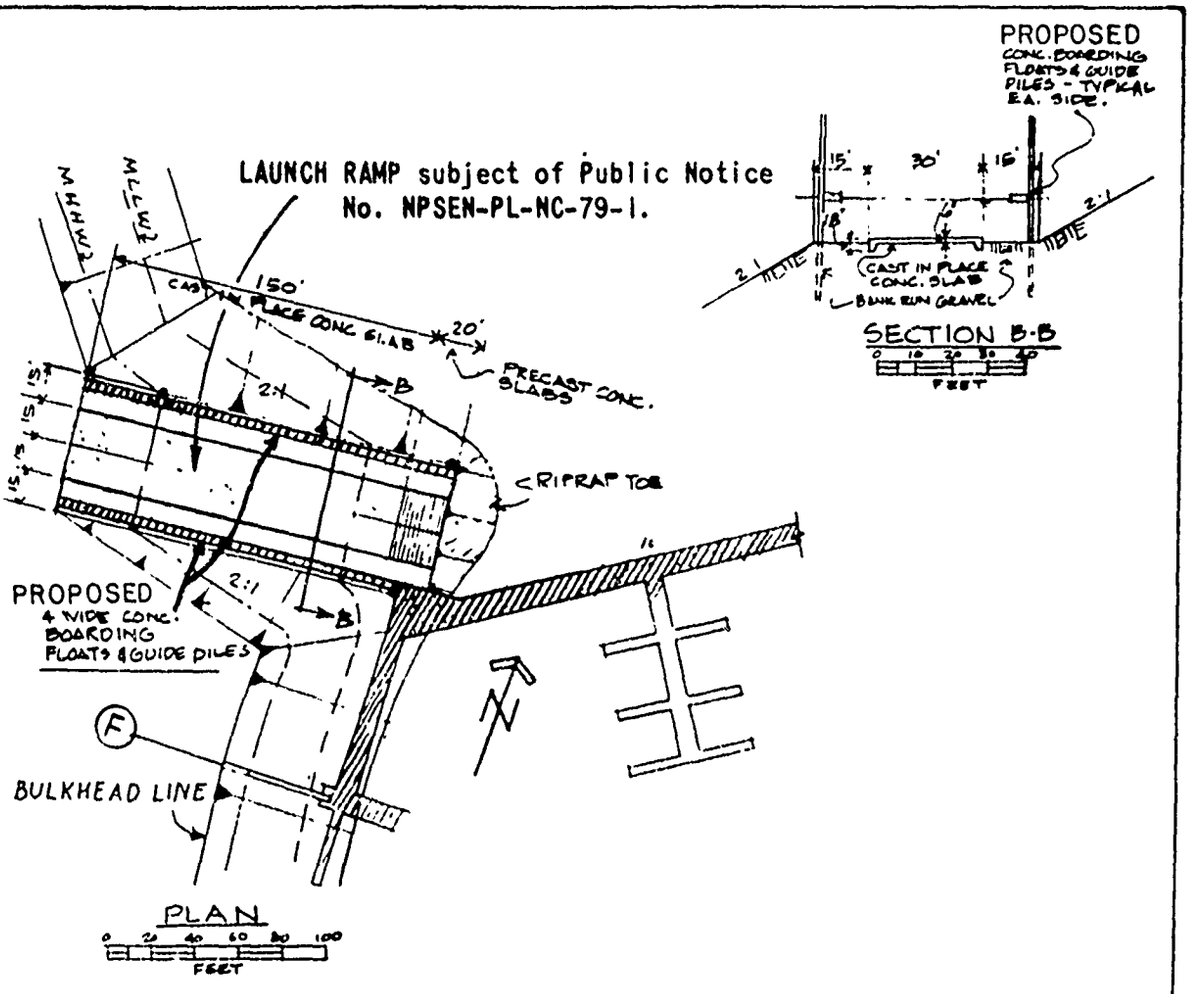


071-0YB-1-006165
(EAST BAY-OLYMPIA)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES

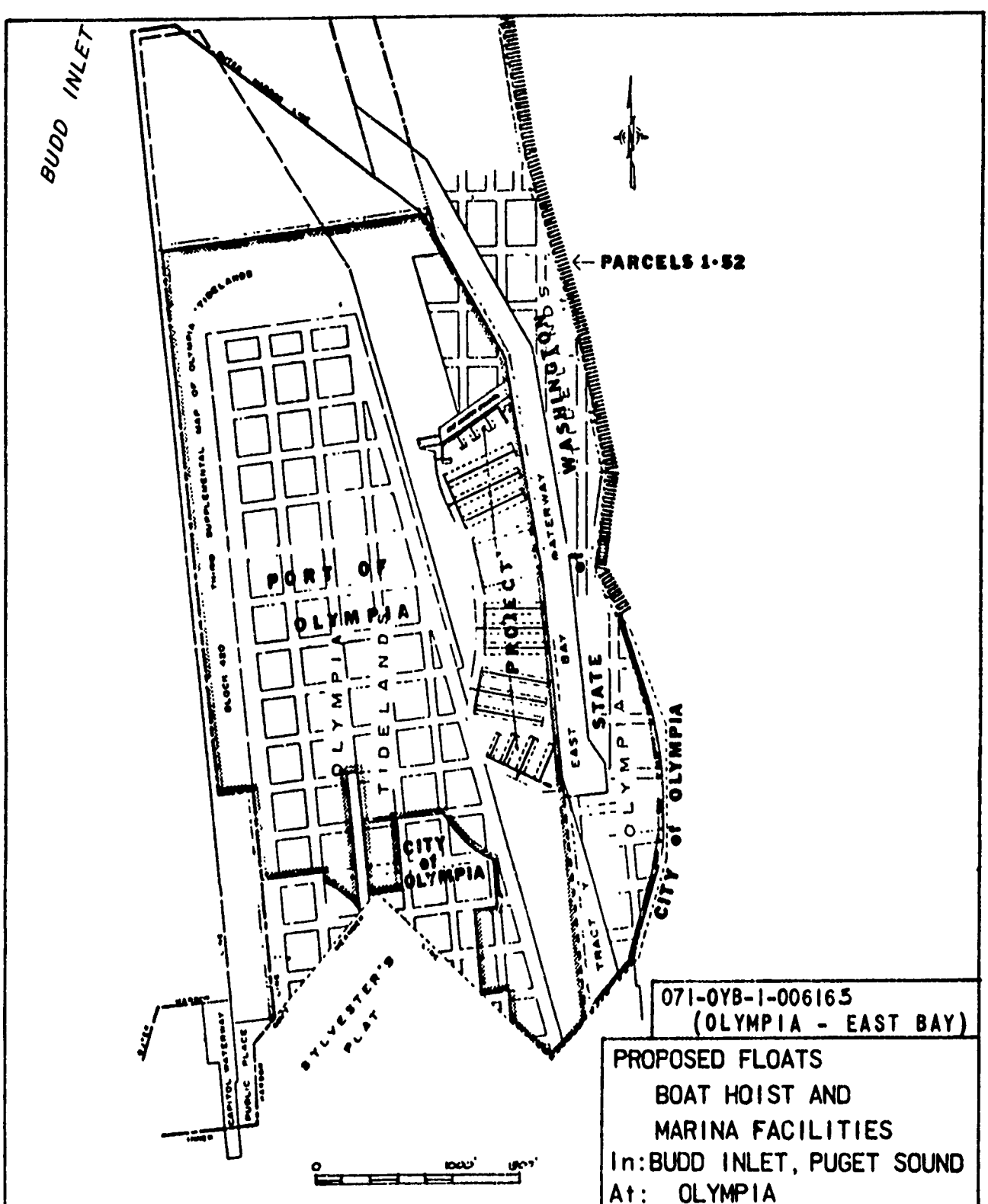
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

SHEET 7 of 11



GUIDE PILES and BOARDING FLOATS

071-0YB-1-006165 (EAST BAY-OLYMPIA)
PROPOSED FLOATS BOAT HOIST AND MARINA FACILITIES In: BUDD INLET, PUGET SOUND At: OLYMPIA County: THURSTON State: WASHINGTON SHEET 8 of 11



071-0YB-1-006165
(OLYMPIA - EAST BAY)

PROPOSED FLOATS
BOAT HOIST AND
MARINA FACILITIES
In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

SHEET 9 of 11

Port of Olympia
EAST BAY PROJECT
Adjoining Ownerships

5/18/79

Parcel No.	Description	Name	Address
SUNSET BEACH ADDITION - BLK 1			
1	Lot 1	Long, Sam O.	3417 122nd NE, Bellevue, WA 98005
2	L 2	Morgan, Helen H.	2147 E. Bay Drive, Olympia, WA 98506
3	L 3	Vantine, Ernest L.	2143 E. Bay Drive, Olympia, WA 98506
4	L 4	Allen, Thomas J.	2139 E. Bay Drive, Olympia, WA 98506
5	L 5	Lawrence, Richard S.	2119 E. Bay Drive, Olympia, WA 98506
6	L 6	Garland, Stewart M.	2111 E. Bay Drive, Olympia, WA 98506
7	L 7	Odegaard, Chas. H.	2109 E. Bay Drive, Olympia, WA 98506
8	L 8, 9	Kent, Chrystel G.	2061 E. Bay Drive, Olympia, WA 98506
9	L 10	Redman, Michael	3202 Ida Jane Way, Olympia, WA
10	L 11	Parks, Lois A.	
11	L 12	Knecht, Harold	2039 E. Bay Drive, Olympia, WA 98506
12	L 13	Patillo, Gregory L.	2029 E. Bay Drive, Olympia, WA 98506
13	L 14	Sutton, James D.	Box 841, Olympia, WA 98501
14	L 15	DeForest, Russell D.	2015 E. Bay Drive, Olympia, WA 98506
15	L 16	Zellner, Robert A.	1627 E. Bay Drive, Olympia, WA 98506
GALLIHER'S ADDITION - BLK 6			
16	L 1, N ½ L 2, + N 78' L 11 & L 12	Parker, Wallace D.	1929 E. Bay Drive, Olympia, WA 98506
17	S ½ L 2, L 3, L 10, & S 32' L 11	Schoch, Marvin N.	1919 E. Bay Drive, Olympia, WA 98506
18	L 4, L 9	Parker, Wallace	1929 E. Bay Drive, Olympia, WA 98506
19	L 5, L 8	Devoe, Daniel L.	1090 E. Bay Drive, Olympia, WA 98506
20	L 6, L 7	Bechtel, Harvey M.	1907 E. Bay Drive, Olympia, WA 98506
BLK 7			
21	L 1, N 50' L 12, L2	Bath, Roger H.	1823 E. Bay Drive, Olympia, WA 98506
22	L 3	Lindstrom, John L.	1817 E. Bay Drive, Olympia, WA 98506
23	L 4, L 5, L 6	Edgewater East Dev. Co.	Interlaaken Dr. SW, Tacoma, WA 98498
BLK 17			
24	L 1, L 2	City of Olympia	
25	L 7, L 8, L 9	Afdem, Charles	2106 Harbor View Dr., Olympia, WA 98502

G-38

071-0YB-1-006165 (East Bay - Olympia)
SHEET 10 of 11

BLK 19			
26	L 1, L 12	Zellner, Robert A.	1627 E. Bay Drive, Olympia, WA 98506
27	L 2, L 11	Thompson, Roger W.	1123 W. 6th, Olympia, WA 98502
28	L 3, L 10, L 4	Kay, Donald F. & Esther	1611 E. Bay Drive, Olympia, WA 98506
29	L 5, L 8	Walker, J.	Rt. 9, Box 254, Olympia, WA 98501
30	L 6, L 7	Ruppert, Karl D.	108 W. 22nd, Olympia, WA 98501
31	L 9	Fenske, Hugo	920 Fenske Dr., Olympia, WA 98501
BLK 28			
32	L 1, L 2	Temple, Robert T.	1507 E. Bay Drive, Olympia, WA 98506
33	L 3	Reeves, Robert E.	1503 E. Bay Drive, Olympia, WA 98506
SEBREE'S SUBDIVISION BLOCK C - BLK 1			
34	L 1, L 2	Bradley, Samuel R.	111 W. 21st #4, Olympia, WA 98501
35	L 3, L 4, L 5	Shadle, S. Blair	1405 E. Bay Drive, Olympia, WA 98506
36	W 20' L 6-10	Moody, Jack E.	810 San Francisco, Olympia, WA 98506
37	E 80' L 6-10	Blensley, Kay	5700 Turf Lane, Olympia, WA 98503
SEBREE'S SUBDIVISION BLOCK B - BLK 3			
38	L 1-3, S16.27' L 4	Kluh, F. T.	Rt. 3, Box 501, Olympia, WA 98501
39	N 8.73' L 4, L 5, L 6	Nichols, Bernice & Jas.	1911 Arietta Ave. SE, Olympia, WA 98501
40	L 7, L 8	Kallenberg, Gordon G.	112 Glendora Ave., Long Beach, CA 90803
41	L 9-11	Backman, Evida C.	1323 E. Bay Drive, Olympia, WA 98506
42	L 12-15	Steidel, Chas. W.	4211 188th Place SW, Lynnwood, WA 98036
43	L 16-17	Leland, Omund	423 N. 3rd, Tumwater, WA
44	L 18-19	Martin, Brian H.	2941 85th Ave. SW, Olympia, WA 98502
45	L 20	Granacki, Ruby E.	614 Linwood Ave., Tumwater, WA 98501
SIMENSON'S SUBDIVISION - BLK 1			
46	L 1, L 2, L 3	City of Olympia	
47	L 4	Six, Myrtle E.	3808 Country Club Dr., Olympia, WA 98502
48	L 5, L 6, L 7	Six, Myrtle E.	3808 Country Club Dr., Olympia, WA 98502
49	L 8, L 9, L 10	Peckham, William H.	1221 E. Bay Drive., Olympia, WA 98506
SWAN'S ADDITION - BLK 11			
50	L 4, L 5	Turnbow, Winston	3006 Gull Harbor Rd. NE, Olympia, WA 98506
51	L 6, L 7, L 8	Safe-Lite Industries	P. O. Box 1879, Wichita, Kansas 67201
52	L 9, L 10	Safe-Lite Industries	P. O. Box 1879, Wichita, Kansas 67201

STATE OF WASHINGTON
Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753 2800
Mail Stop PV-11

28 DECEMBER 1979

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Notice of Application for
Water Quality Certification
and for
Certification of Consistency with the
Washington Coastal Zone Management Program

Notice is hereby given that a request is being filed with the Department of Ecology for certification, as provided in Section 401 of the Federal Water Pollution Control Act, that a proposed discharge to navigable waters, resulting from the project described in the Corps of Engineers Public Notice No. 071-OYB-1-006165, will comply with the applicable provisions of the Federal Water Pollution Control Act.

Notice is also given that a request is being filed with the Department of Ecology for concurrence, as provided in Section 307(c)(3) of the Coastal Zone Management Act of 1972, as amended (P.L. 94-370; 90 Stat. 1013; 16 U.S.C. 1456(c)(3)), that the above described project will comply with the Washington Coastal Zone Management Program and that the project will be conducted in a manner consistent with that Program.

Any person desiring to present views on either or both (1) water pollution considerations pertaining to the project or (2) considerations pertaining to the project's compliance or consistency with the Washington Coastal Zone Management Program may do so by providing his views in writing to the Department of Ecology, ATTN: Interagency Operations Section, Olympia, Washington 98504, within 20 days of publication of this notice.

APPENDIX G, PART 3

PUBLIC AND AGENCY COMMENTS ON PUBLIC NOTICES AND CORPS RESPONSES

APPENDIX G, PART 3

PUBLIC AND AGENCY COMMENTS ON PUBLIC NOTICES AND CORPS RESPONSES

Public and agency comments on the public notices and Corps responses are provided following. Letters of correspondence are reproduced immediately following the comment and response section.

The draft DPR/EIS was distributed for public and agency review on 10 December 1979, while the public notices (appendix G, part 2) were distributed on 28 December 1979. Originally the closing date for comments on the public notices and the draft DPR/EIS was 28 January 1980. As a result of comments received from agencies and the public, additional studies on projected water quality effects and comparison of plans 4a and 4e were undertaken and the comments period left open. Coordination with state and Federal agencies, in particular Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (FWS), and the Washington Department of Fisheries (WDF), continued through 1980 to resolve concerns associated with the East Bay Marina proposal. The following comments were received on the public notices:

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), 29 AUGUST 1980.

1. Comment. As stated in previous correspondence, our primary concern with this project has been the high potential for reduction in water quality, particularly dissolved oxygen concentration in the marina basin. With this exception, the project is in general accordance with other environmental factors we use in evaluating marina projects. Although we continue to support alternative 4e as a cost effective preferred alternative, selection of alternative 4a would be acceptable to EPA if it includes a properly designed and maintained aeration system which will maintain Class B water quality standards within the marina.

Response. Acknowledged. Discussion of the aeration system is contained elsewhere in the DPR/EIS and presented in some detail in appendix D.

2. Comment. This is the first time we have approved an aeration system to mitigation reduction in water quality and our approval is specific to the unique circumstances of the East Bay project. As a matter of policy, EPA does not generally support the use of an aeration system as a solution to probably water quality problems in marinas.

Response. Acknowledged.

DEPARTMENT OF TRANSPORTATION, UNITED STATES COAST GUARD (USCG), 20 FEBRUARY 1980

3. Comment. We have no objection to this proposed project. The Coast Guard is working with the Seattle District to establish aids to navigation that may be required for the Federal portion of this project. Comments on the non-Federal portion of the project will be forwarded by separate correspondence.

Response. Noted.

U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE (FWS), 26 FEBRUARY 1980, 21 OCTOBER AND 18 NOVEMBER 1980

4. Comment. Our first review and comments on the public notices were provided by our 26 February 1980 letter. We recommended denial at that time and requested that consideration be given to alternative plan because of impacts. We have subsequently worked closely with your agency and others in resolving these issues. Various meeting have been held with general "good faith" agreements made that would allow construction as planned with acceptable mitigation measures to protect public resource values in East Bay. We will not further oppose the issuance of the permits.

Response. Noted.

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY, 22 FEBRUARY 1980

5. Comment. We have evaluated and considered the comments and concerns presented by other state agencies. On behalf of the State of Washington, the Department of Ecology, as coordinating agency, approves this project. This project is in the coastal zone and appears to be consistent with the Washington State Coastal Zone Management Program.

Response. Noted.

6. Comment. Currently, the Department of Ecology is expediting processing of the Water Quality Certification and issuance is forthcoming. Also, presently the exchange of land deeds between the Port of Olympia and the Department of Natural Resources has not been completed.

Response. Since receipt of this letter, the exchange of land deeds has been completed.

7. Comment. Please note this letter does not exempt the applicant from compliance with other requirements of Federal, state, and local agencies.

Response. Acknowledged.

STATE OF WASHINGTON, DEPARTMENTS OF GAME AND FISHERIES, 19 NOVEMBER 1980

8. Comment. Letter approves marina, modifies an earlier hydraulics permit (1 December 1975), and adds several conditions for construction.

Response. Approval is noted. Stated conditions will be complied with.

U.S. DEPARTMENT OF COMMERCE, NATIONAL MARINE FISHERIES SERVICE, 4 MARCH 1980 and 3 December 1980

9. Comment. We have completed review of the public notices. We will not oppose issuance of the permit provided the conditions documented in the FWS letter of 21 October 1980 and yours of 13 November 1980 are conditions of the permit.

Response. As noted in the FWS letter of 18 November 1980 (reproduced in this appendix), agreements stated in Corps' 13 November 1980 letter (reproduced in appendix A) were confirmed. We assume this is acceptable.

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

1200 SIXTH AVENUE

SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: MS 521

AUG 29 1980

Colonel Leon K. Moraski
District Engineer
Seattle District, C/E
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

This letter will provide our final comments on the East Bay Marina project referenced by Public Notices NPSEN-PL-NC-79-1 and 071-OYB-1-006165.

As stated in previous correspondence, our primary concern with this project has been the high potential for a reduction in water quality, particularly dissolved oxygen concentration in the marina basin. With this exception, the project is in general accordance with other environmental factors we use in evaluating marina projects. These factors include consideration for minimizing adverse impacts on wetlands, shellfish beds and fishery areas, wildlife, and recreation areas.

The results of additional water quality model studies conducted jointly by the Corps and EPA have been reviewed and, in our opinion, demonstrate a correlation between a reduction in water exchange and reduced dissolved oxygen levels. Use of an aeration system within the marina, however, will negate anticipated reductions in dissolved oxygen. Although we continue to support Alternative 4e as a cost effective preferred alternative, selection of Alternative 4a would be acceptable to EPA if it includes a properly designed and maintained aeration system which will maintain Class B water quality standards within the marina.

This is the first time we have approved of an aeration system to mitigate reduction in water quality and our approval is specific to the unique circumstances of the East Bay project. As a matter of policy EPA does not generally support the use of an aeration system as a solution to probable water quality problems in marinas, particularly when design modifications or alternative site locations with improved natural tidal exchange would eliminate the need for long-term energy requiring mitigation systems.

We appreciate the opportunity to provide additional comments and recommendations on this project. Questions on this matter may be directed to Ron Lee, at (206) 442-1352.

Sincerely,

Donald R. Dubois
Regional Administrator

cc: USFWS - Olympia
NMFS
WDE
WDF

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
COMMANDER (dpl)
THIRTEENTH COAST GUARD DISTRICT
915 SECOND AVE
SEATTLE, WASH. 98174
PHONE 206 442-7523

16452
DPL79-1323

20 FEB 1980

Colonel Leon K. Moraski, USA
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Colonel Moraski:

We have reviewed your Public Notice NPSEN-PL-NC-79-1, of 28 December 1979, addressing a Federal Navigational Project to be undertaken by the Seattle District, Corps of Engineers. The associated non-Federal portion of this project is to construct a small boat marina in East Bay, Budd Inlet, Puget Sound at Olympia, Washington and is addressed in Public Notice number 071-OYB-1-006165, of 28 December 1979.

The Coast Guard is working with the Seattle District, Corps of Engineers to establish aids to navigation that may be required, and no other Coast Guard comments are addressable to the Federal portion of this project. We do have comment on the non-Federal portion of this project and will forward those comments by separate correspondence.

We have no objection to this proposed project. Thank you for the opportunity to review this notice.

Sincerely,

Richard F. Malm

RICHARD F. MALM
Captain, U.S. Coast Guard
Chief of Staff
13th Coast Guard District

Copy: Coast Guard Captain of the Port, Seattle, WA

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2625 Parkmont Lane
Olympia, WA 98502

February 26, 1980

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Re: 071-OYB-1-006165, NPSEN-PL-NC-79-1, Budd Inlet, Port of Olympia

Dear Colonel Moraski:

We have reviewed the subject applications to dredge entrance channels and moorage basin, fill, riprap, construct a breakwater, install floats, pier, and other facilities for a marina and cargo storage area in East Bay of Budd Inlet at Olympia, Washington. The Fish and Wildlife Service has investigated the site and extensively reviewed and analyzed the proposed project

These comments have been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and other authorities mandating Department of Interior concern for environmental values. They are also consistent with the intent of the National Environmental Policy Act.

The proposed project is essentially the same as previously advertised in public notice 071-OYB-1-002537 dated April 28, 1975. Our comments of June 9, 1975 recommended denial of that permit. We have not been informed of the action taken on the previous application.

An extensive description of fish and wildlife resources of East Bay and anticipated impacts of the project is contained in the Fish and Wildlife Service's Coordination Act Report of July 18, 1979 and supplemental letter of September 12, 1979. Views of the Department of the Interior are contained in a letter of February 22, 1980 responding to the draft Environmental Impact Statement and Detailed Project Report.

In summary, the East Bay tideflats and aquatic areas provide important habitats for high numbers of waterfowl and other waterbirds and to a lesser degree for marine fishes. Construction of the proposed project

with cargo storage area would cause an excessive loss of these habitats and resources. Those losses could be significantly reduced with our previously recommended alternative eliminating the cargo storage area and non water-dependent commercial uses and employing open water disposal of any excess dredge materials. Studies and reports of the Corps of Engineers indicate such an alternative would have less adverse environmental impact and also have approximately the same benefit to cost ratio as the proposed project.

As stated in a letter of September 7, 1978 to your office, the Fish and Wildlife Service supports the concept of a marina in East Bay, provided that persistent water quality problems would not result and that landfilling can be limited to the extent actually required for physical support of the marina. However, the Service can not support any plan which worsens present water conditions or does not comply with State and Federal water quality laws or criteria. Information supplied in Corps reports indicate presently poor water conditions will persist even after the construction of the new secondary sewage treatment plant scheduled to begin operation in 1983. It is our contention that the proposed project is not in compliance with Executive Order 11990 since all practicable measures to minimize wetland losses would not be taken. Elimination of the cargo fill area is practicable and would reduce losses by 50 percent. Information recently received from the Washington Department of Fisheries indicates their firm belief that significant numbers of chinook salmon released from the Percival Cove salmon rearing facility, and possibly large schools of herring and smelt, will be attracted into the marina with the likelihood of increased fish kills due to anticipated dissolved oxygen sags. This presumably would occur under any marina design which entails dredging of East Bay proper. In view of this, we recommend the permit for the project, as proposed, be denied.

As a possible alternative, we suggest further consideration of a 700 moorage marina facility at the north end of the Port peninsula where water quality conditions may be suitable. Such an alternative is displayed in the draft EIS. If this alternative is pursued, we urge that non-essential filling proposed within East Bay proper be eliminated from the plans and no subsequent dredging of East Bay proper be considered until conclusive water quality studies have been made and suitable mitigation for any losses to wildlife and fish resources has been developed and agreed upon.

The above views and recommendations constitute the report of the Department of the Interior on the subject public notice.

Sincerely,

Joseph R. Blum
Area Manager

cc: RD (AE) NMFS BIA WDE
EPA WDF WDG WDNR

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2625 Parkmont Lane
Olympia, WA 98502

October 21, 1980

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Re: 071-OYB-1-006165, Port of Olympia; NPSEN-PL-NC-79-1, Corps of Engineers

Dear Colonel Moraski:

We have completed our review of the subject applications to dredge entrance channels and moorage basin, fill, riprap, construct a breakwater, install floats, pier, and other facilities for a marina and cargo storage area in East Bay of Budd Inlet at Olympia, Washington.

These comments have been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and other authorities mandating Department of Interior concern for environmental values. They are also consistent with the intent of the National Environmental Policy Act.

We recommended denial on June 9, 1975 of a similar project proposal advertised in public notice 071-OYB-1-002537 dated April 28, 1975 because of anticipated extensive losses of fish and wildlife resources associated with various elements contained in the proposal. A variety of modifications and alternative proposals have been developed since that time culminating in the development of a draft environmental impact statement and the subject public notice for a revised project. We issued a Fish and Wildlife Coordination Act report on July 18, 1979 and a supplement to that report on September 12, 1979 that described fish and wildlife resources of East Bay and the anticipated impacts of the various alternatives. Twelve recommendations were listed in the report that, if implemented, would mitigate the project induced impacts. Views of the Department of Interior are contained in a letter of February 22, 1980 responding to the draft Environmental Impact Statement and Detailed Project Report. We understand your comments on our review will be listed in the Final Environmental Impact Statement. Our first review and comments on the subject permit applications were issued on February 26, 1980. We recommended denial at that time and requested that consideration be given to alternative plans (specifically plan 4.b.) because of the above referenced impacts.

We have subsequently worked closely with your agency, the Port of Olympia, Environmental Protection Agency, the Washington Departments of Fisheries and Game, and the Department of Ecology in resolving these issues. Various meetings have been held with general "good faith" agreements made that would allow construction as planned with acceptable mitigation measures to protect public resource values in East Bay. To insure that these agreeements are further refined, adopted, and implemented so as to accomplish the goals of all affected agencies, we recommend that the subject permit applications be conditioned as follows:

1. The protective covenant being developed by the Port of Olympia and the Fish and Wildlife Service for maintaining the West Bay lagoon site in a natural undeveloped condition be signed by both parties.

2. Pump-out facilities for boats be implemented per United States Coast Guard requirements.

3. Timing of construction activities be coordinated with and agreed to by the Washington Department of Fisheries.

4. Storm water drainage facilities be developed that satisfy the requirements of the Department of Ecology.

5. A cleanup and beautification plan be adopted in conjunction with the City of Olympia and those plan elements involving modifications to the intertidal and subtidal zone of East Bay be approved by the Fish and Wildlife Service to preserve the integrity and diversity of wildlife habitat in East Bay.

. A public boat launch with trailer parking facilities be incorporated into the Port's marina plan. Applicant should show effort in obtaining necessary funding for development of free facilities.

7. The floating breakwater be developed for public fishing access. If the Washington Department of Fisheries determines that an artificial reef would enhance the sports fishery, the applicant will agree to its construction.

8. The Port of Olympia agrees to evaluate with the Fish and Wildlife Service the feasibility of constructing one or more islands in East Bay to offset waterfowl and waterbird loafing and feeding habitat. If the FWS determines the island concept is feasible, the Port of Olympia agrees to construct the islands.

9. The filling of the southern end of East Bay and reconstruction of the Moxlie Creek outfall be implemented in such a manner so as not to preclude future potential rehabilitation of upper Moxlie Creek as a natural spawning area. Construction design to guarantee these conditions will be approved by the Fish and Wildlife Service and Washington Department of Fisheries.

We will not further oppose the issuance of the subject permits providing the above identified requirements of the Service are included as conditions to the permits. It is our understanding that the construction of islands and an artificial reef will require a separate permit.

Sincerely,

Joseph R. Blum
Area Manager

cc: WDG
WDF
WDE
EPA
NMFS
BIA
RO (AE)
WDNR
Nisqually Tribe
Liz Greenhagen
Friends of the Earth (Attn: Dave Ortman)
WEC
Port of Olympia (Attn: Dick Malin)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2625 Parkmont Lane
Olympia, Washington 98502

November 18, 1980

LTC William B. Willard, Jr.
Acting District Engineer
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Willard:

This will serve as confirmation that your letter of November 13, 1980 substantially represents the agreements made during a November 7, 1980 meeting with members of your staff, the Port of Olympia, and the U. S. Fish and Wildlife Service. Although we do not foresee any problems working with the Port of Olympia, we are confident that the Corps of Engineers will be responsive to our concerns on Conditions "e, h and i" should the need arise.

We look forward to continuing cooperation on the East Bay Marine Project.

Sincerely,

Joseph R. Blum
Area Manager

jlr

cc: Dick Malin
Port of Olympia

STATE OF WASHINGTON
Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753 2240
Wilbur G. Hallauer, Director

February 22, 1980

District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Attention: Chief, Regulatory Functions Branch

Gentlemen:

Public Notice No: NPSEN-PL-NC-79-1, Seattle District Corps of Engineers
071-OYB-1-006165, Port of Olympia

We have reviewed the above referenced public notices for construction of the East Bay Marina facilities proposed in Budd Inlet.

We have evaluated and considered the comments and concerns presented by other state agencies. On behalf of the State of Washington, the Department of Ecology, as coordinating agency, approves this project. This project is in the coastal zone and appears to be consistent with the Washington State Coastal Zone Management Program.

Currently, the Department of Ecology is expediting processing of the Water Quality Certification and issuance is forthcoming. Also, presently the exchange of land deeds between the Port of Olympia and the Department of Natural Resources has not been completed.

Please note this letter does not exempt the applicant from compliance with other requirements of federal, state, and local agencies.

Yours truly,

Wilbur G. Hallauer
Director

cc: Applicant
Fisheries
Game
Natural Resources
DOE, S.W. Region
File

STATE OF WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington 98504

and

DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 Olympia, Washington 98504

November 19, 1980

Mr. Dick Malin
Port of Olympia
P.O. Box 827
Olympia, Washington 98507

Colonel Leon Moraski
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Attention Mr. Alan Coburn

Gentlemen:

East Bay Marina Budd Inlet
Various Sections, Township 18 North,
Range 2 West, W.M., in Thurston County
PN-NPSEN-PL-NC 79-1 and
PN-071-OYB-1-006165 WRIA C-13

We are pleased to receive a copy of the August 29, 1980 letter from the Environmental Protection Agency (EPA) to Colonel Moraski giving conditional approval to the project. The significant provision was the inclusion of a "properly designed and maintained aeration system which will maintain Class B water quality standards within the marina". Therefore, we are now modifying our December 1, 1975 letter of approval for the project as follows:

1. Delete general Provision (1) as it is no longer applicable because of the assurance that Class B water quality standards for dissolved oxygen will be maintained within the marina.

2. General Provision (2) requiring on-site mechanical flushing devices during construction is deleted since specific timing provisions are included below for the protection of fish runs.

3. General Provision (4) requiring mechanical flushing devices after construction is changed to read: Applicable State Class B water quality standards should be maintained within the marina basin at all times to preclude fish kills. We believe this will require installation of the properly designed and maintained aeration system referenced in the letter from EPA.

The December 1, 1975 approval also indicated that we would have additional specific condition requirements once studies and plans were completed. These specific provisions are as follows:

a. Time Limitation: Work activities may begin on June 15, 1981 and shall be completed by March 15, 1982 unless the juvenile chinook in Percival Cove have to be released prematurely. Commencement of dredging for the berm may begin on June 15, 1981 provided the results of a fish monitoring program indicate the absence of juvenile salmonids within the area and shall be completed by July 30, 1981. Hydraulic dredging of the entrance channel and the marina basin may begin as early as September 15, 1981 if it is determined that the dissolved oxygen levels of lower Budd Inlet meet Department of Ecology Water Quality Criteria for Class B waters (Interstate) and indications are that they will remain above that level. It should be noted that operations may be suspended if large numbers of herring and smelt enter and reside in Olympia Harbor as they have the last two years. During 1979 they were reported throughout Budd Inlet from January to mid-March but may have been present earlier. Dredging operations may be suspended until such time as the herring and smelt have vacated the area. The project sponsors should conduct a monitoring program approved by the Department of Fisheries to determine the presence or absence of baitfish. Because of the possibility of herring and smelt residing in Budd Inlet for a period of time and the chance of an early release of juvenile chinook from Percival Cove, we strongly recommend condensing the dredging and filling into as short a time period as possible. A time extension for any work beyond March 15, 1982 will be reviewed on a case-by-case basis.

b. A dissolved oxygen monitoring program should be conducted during any on-going dredging operations between June 15 and November 1. The following is the recommendation for dissolved oxygen:

Allowable dredging	5.0 mg/l DO or over
Cease dredging	under 5.0 mg/l DO

c. If at any time there should be fish in distress, a fish kill, or water quality problems as a result of this project, the operations shall be stopped immediately.

d. Dredging operations shall be conducted at all times in such a manner as to cause little or no disturbance or siltation to the adjacent waters.

e. A hydraulic dredge may be used to dredge the entrance channel and the marina basin. The hydraulic dredge is to be operated with the intake on or below the surface of the material being removed during all periods of the operation. Reverse purging of the hydraulic dredge intake line shall be held to an absolute minimum. Should purging become necessary, the intake end is not to be raised more than three feet (3') above the bed material.

f. A floating clamshell may be used for dredging the trench for the berm. Each pass of the clamshell bucket shall be complete, and the dredge spoils may be sidecast into the disposal area along the berm alignment.

g. The berm should be constructed in such a manner as to avoid the entrapment of fish. In addition, appropriate steps shall be taken prior to closing the diked area off from the remainder of East Bay to insure that there are no fish stranded within the diked area.

h. The waterward slope of the east berm should be sloped no steeper than 1 foot vertical to each 1.5 feet horizontal.

i. Forms for the concrete boat ramp shall be poured at low tide when the area is dewatered, and shall be allowed a minimum curing time of two (2) hours prior to coming in contact with state waters. Forms for the boat ramp shall be constructed in such a way to prevent leaching of wet concrete into state waters. Immediately after pouring the concrete, plastic or polyethylene sheeting shall be placed over any exposed concrete not lined with the wooden forms. The forms and sheeting shall remain secured for a minimum of seven (7) days.

j. No deleterious materials shall be allowed to enter state waters as a result of this project.

k. Any debris resulting from this construction project shall be removed from the water and disposed of or placed in such a manner to prevent its being washed back into the water by high water or wave action.

l. Water quality is not to be degraded to the detriment of fish life as a result of this project. Compliance with the quality limits set forth in the Washington State Water Quality Regulations shall be maintained throughout the life of the project.

m. These provisions should be closely followed by the contractor(s) and the equipment operator(s) and should be on the job site at all times.

SEPA: Final EIS 1975.

This letter does not obviate the requirement to obtain approval from all other state, federal or local agencies for the activity authorized herein.

The Department of Fisheries and the Department of Game reserve the right to make further restrictions if deemed necessary for the protection of fish life. This letter is written in the interest of fishery protection only, and these departments cannot be held liable for any property damage which might occur as a result of this project.

We appreciate your cooperation in our collective efforts to protect, perpetuate and manage the fishery resources of the State of Washington. If you have any questions or need additional information, please contact Curtis Dahlgren at (206) 753-2908.

Sincerely,

Gordon Sandison, Director
DEPARTMENT OF FISHERIES

Jack Wayland, Interim Director
DEPARTMENT OF GAME

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 Olympia, WA 98504 206/753-5700

The Department of Game wishes to add as a further condition of approval the following provision to protect fish and wildlife:

1. Mitigation of shallow water and wildlife losses, as agreed to by the U. S. Fish and Wildlife Service and the Port of Olympia, shall be implemented.

Chris Dirdahl for
Jack Wayland, Interim Director
THE DEPARTMENT OF GAME

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
P.O. Box 4332, Portland, OR 97208

March 4, 1980 F/NWR5:CES

Colonel Leon K. Moraski
District Engineer, Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Re: NPSEN-PL-NC-79-1, Seattle District Corps of Engineers (12-28-79)
071-OYB-1-006165, Port of Olympia (12-28-79)

Dear Colonel Moraski:

We have reviewed the information contained in the referenced notices, have visited the site, and have discussed the projects with other agencies. In addition we have reviewed the draft detailed project report and a draft environmental impact statement for the proposed work. The review period for comments on both drafts recently expired. We therefore request that deadlines for comment on these public notices be extended to 30 days following publication of the final detailed project report and environmental impact statement.

Sincerely yours,

Dale R. Evans
Division Chief

cc: Washington Department of Fisheries
Washington Department of Game
Department of Ecology - Shara Stelling
Environmental Protection Agency - Seattle, MS-521
Fish and Wildlife Service, ES-Olympia
Port of Olympia, Richard O. Malin

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
P. O. Box 4332, Portland, Oregon 97208

December 3, 1980 F/NWR5:JRB

Colonel Leon K. Moraski
District Engineer, Seattle District
Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Re: P.N. 071-OYB-1-006165, Port of Olympia (12/28/79) & NPSEN-PL-NC-79-1

Dear Colonel Moraski:

We have completed our review of the above referenced public notice to provide recreational boat moorage and launching facilities and fuel and sewage pumpout facilities. Our earlier response of March 4, 1980, requested the permit be held in abeyance. Since then, we recognize that much discussion between the applicant and resource agencies has resulted in conditions and construction plans that address the concerns we had with the permit.

We will not oppose issuance of the permit to construct a floating breakwater, construct a pier, floats, and other facilities and to dredge a mooring basin and entrance channel, provided the conditions documented in the U.S. Fish and Wildlife Service's letter of October 21, 1980, and yours of November 13, 1980, are conditions of the permit.

Sincerely yours,

Dale R. Evans

Dale R. Evans
Division Chief

cc: Washington Dept. of Fisheries
Washington Dept. of Game
Environmental Protection Agency, M.S. 521
Port of Olympia, Attn: Richard O. Malin

APPENDIX G - PART 4

U.S. FISH AND WILDLIFE SERVICE/PORT OF OLYMPIA AGREEMENT

US FISH AND WILDLIFE SERVICE/PORT OF OLYMPIA
AGREEMENT RESTRICTING USE OF LAND

THIS AGREEMENT is entered into by and between THE UNITED STATES OF AMERICA, acting by and through the Fish and Wildlife Service, United States Department of the Interior, hereinafter referred to as the "SERVICE", and THE PORT OF OLYMPIA, a municipal corporation of the State of Washington, hereinafter referred to as the "PORT".

W I T N E S S E T H:

WHEREAS the PORT is the legal owner of certain tracts of land located within the corporate boundaries and harbor area of the City of Olympia in Thurston County, Washington, designated as "Exhibit A" on the map attached hereto, which is made a part hereof and is hereinafter referred to as Tract I, said land being described as follows:

> Those portions of Blocks 343, 345, 348 and Lots 1 and 2, Block 349, Olympia Tide Lands, lying westerly of the Burlington Northern Railroad right-of-way, together with abutting vacated streets;
>
> Also Blocks C and D, Woodruff's Addition to Olympia as recorded in Volume 3 , Page 40 , records of the Thurston County Auditor, together with abutting vacated streets and alleys.
>
> Excepting and reserving therefrom all minerals, gas, oil and other hydrocarbon substances underlying said property; and

WHEREAS the lands in Tract I are unimproved and lie immediately to the west of an extension of the Burlington Northern Railway line and north of the West 4th Street bridge in the City of Olympia, Thurston County, Washington, and are subject to the ebb and flow of the tides of Puget Sound; and

WHEREAS the PORT is also the legal owner of a certain tract of land located within the corporate boundaries and harbor area of the City of Olympia, Thurston County, Washington, which is subject to the ebb and flow of the tides of Puget Sound, designated as "Exhibit B" on the map attached hereto, which is made a part

of and is hereinafter referred to as Tract II, said land being described as follows:

> Those blocks, portions of blocks, vacated alleys, streets and harbor areas as set forth in Fourth Supplemental Map of replat of a portion of Olympia Tidelands and harbor area on file in the office of the Commissioner of Public Lands at Olympia, Washington, lying east of the line of mean higher high water along the westerly shore of East Bay, north of State Avenue, south of the new inner harbor line as delineated on said Fourth Supplemental Map, and west of the westerly line of East Bay Waterway and its southerly extension of Olympia Avenue; and

WHEREAS the lands described as Tract II are required by the PORT for purposes of industrial development; and

WHEREAS in their present state both of these parcels provide suitable habitat for the propagation and protection of fish and wildlife; and

WHEREAS the PORT proposes to conduct dredging operations in navigable waters within and near Tract II and to discharge ... dredged material in the water adjacent to Tract II and as fill on portions of Tract II to develop the land for industrial purposes, and also to develop and maintain a marina on a portion of said land; and

WHEREAS Section 404 of the Water Pollution Control Act (33 U.S.C. 1344 (1976)) requires persons proposing to discharge dredged or fill material taken from navigable waters onto any defined disposal site to obtain a permit to do so from the Chief of Engineers of the U. S. Army and authorizes a denial or restricted use of the disposal site when it is determined that the discharge of such materials into such area will have an unacceptable adverse effect on fishery areas (including spawning and breeding areas) or wildlife areas; and

WHEREAS the SERVICE has determined that the discharge of dredged material on and within Tract II will have an unacceptable adverse effect on fish and wildlife and their habitat in this area and that this land should be retained and maintained in its present undeveloped state in perpetuity to provide adequate protection of the fish and wildlife in their habitat and resources within the corporate limits and harbor area of the City of Olympia; and

WHEREAS Region I of the SERVICE has previously advised the PORT that it had determined any dredging or placing of fill material on or within the area referred to as Tract II would have an unacceptable adverse effect upon the wildlife resources in the area,

NOW, THEREFORE, for and in consideration of the mutual terms and provisions hereinafter set forth, it is hereby agreed as follows:

1. The SERVICE hereby consents of the PORT's dredging and placing fill dirt on the land and area herein described as Tract II to develop the land for industrial purposes and portions thereof as a marina, provided, however, that such consent is conditioned upon this agreement's becoming fully operative.
2. In consideration of the consent granted by the SERVICE, the PORT agrees:
   (a) That it will not dredge within the waters of or place any fill dirt on or within the area of land herein described as Tract I.
   (b) That the use of the land herein described as Tract I shall be restricted in accordance with the following:

RESTRICTIVE COVENANT

1. The area herein described as Tract I shall be kept in its present undeveloped state in perpetuity and its present natural characteristics shall not be altered or changed without the prior written consent of the SERVICE being obtained, provided, however, that this restrictive covenant shall not prohibit the City of Olympia, Washington, or the State of Washington from constructing and/or maintaining public streets or roadways across the said tract provided no fill dirt resulting from such construction shall be placed on said land. The plans and design

for any proposed street or roadway must be reviewed and approved in writing by the SERVICE before any construction is commenced.

2. The PORT, its grantees, successors, assigns, lessees, or any person claiming any interest in said land by, through or under the PORT agree:

(a) They shall not:

(1) Use or authorize the land to be used by others for any purpose that would change the present uses of the property or interfere with its use as a wildlife habitat without first obtaining the express written authorization of the SERVICE.

(2) Grant additional easements, right-of-way, to or other interests in the aforesaid lands without the express written authorization of the SERVICE.

(3) Apply chemicals of any kind to the lands.

(4) Erect any structures, permanent or temporary, on the lands or over any waters.

(b) They shall cooperate in the maintenance of the aforesaid tract of land and water in its natural underdeveloped state for wildlife habitat.

The PORT further agrees that the breach of any of the above restrictive covenants will cause irreparable harm for which damages would be inadequate.

This restrictive covenant shall run with the land and be included in the grant or conveyance of any interest in the land to others.

3. This agreement shall be ~~executed~~ effective contemporaneously with issuance of the permits for the East Bay Marina required by Section 10, The Rivers and Harbors Act of 1899 (33 U.S.C. Section 403) Permit (071-OYB-1-006165) and Section 404 of the Federal Water Pollution Control Act (33 U.S.C. 1344 (1976)) (NPSEN-PL-79-1) being issued to the PORT.

4. The agreement shall not be binding upon the United States until an authorized representative of the SERVICE has accepted and executed the same and notified the PORT thereof by mailing a fully executed copy to the PORT at P. O. Box 827, Olympia, Washington 98507, by certified mail.

IN WITNESS WHEREOF the parties have caused this agreement to be executed the day and year set forth opposite these signatures.

FISH AND WILDLIFE SERVICE

Dated 10-28-80 By _____

PORT OF OLYMPIA

Dated October 8, 1980 By _____
President

By _____
Secretary

STATE OF WASHINGTON)
) ss.
County of Thurston)

On this 26th day of October, 1980, before me, a Notary Public for said State, duly commissioned and sworn, personally appeared Joseph R. Blum, known to me to be the Area Manager, Fish and Wildlife Service, United States Department of the Interior, and known to me to be the person who executed the within instrument on behalf of the Fish and Wildlife Service and acknowledged said instrument to be the free and voluntary act and deed of said agency, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year in this acknowledgment first above written.

(SEAL)

Helen A Coleman
Notary Public for Washington
residing at Olympia

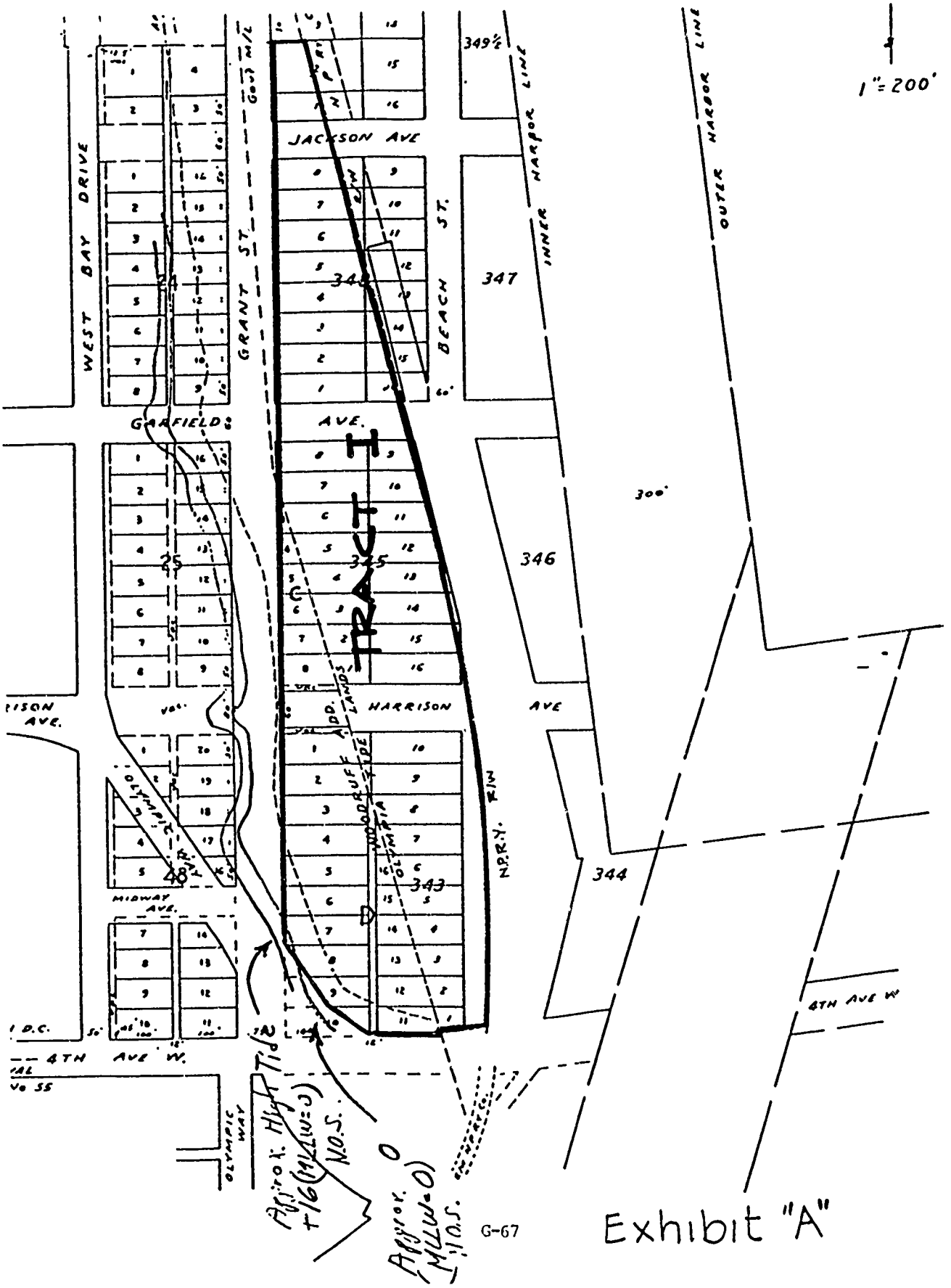
STATE OF WASHINGTON)
) ss.
County of Thurston)

On this 8th day of October, 1980, before me, a Notary Public for said State, duly commissioned and sworn, personally appeared H. V. BREWINGTON and JAMES D. WRIGHT, known to me to be the President and Secretary, respectively, of the Port Commission of the Port of Olympia, a municipal corporation of the State of Washington and known to me to be the persons who executed the within instrument on behalf of the Port of Olympia and acknowledged said instrument to be the free and voluntary act and deed of said agency, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year in this acknowledgment first above written.

(SEAL)

Hope R. Fulwiler
Notary Public for Washington
residing at Olympia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WEST BAY DRIVE
GRANT ST.
JACKSON AVE
BEACH ST.
INNER HARBOR LINE
OUTER HARBOR LINE
GARFIELD AVE.
HARRISON AVE
MIDWAY AVE.
4TH AVE W.
4TH AVE W
OLYMPIC WAY
N.P.R.Y. R/W
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349½
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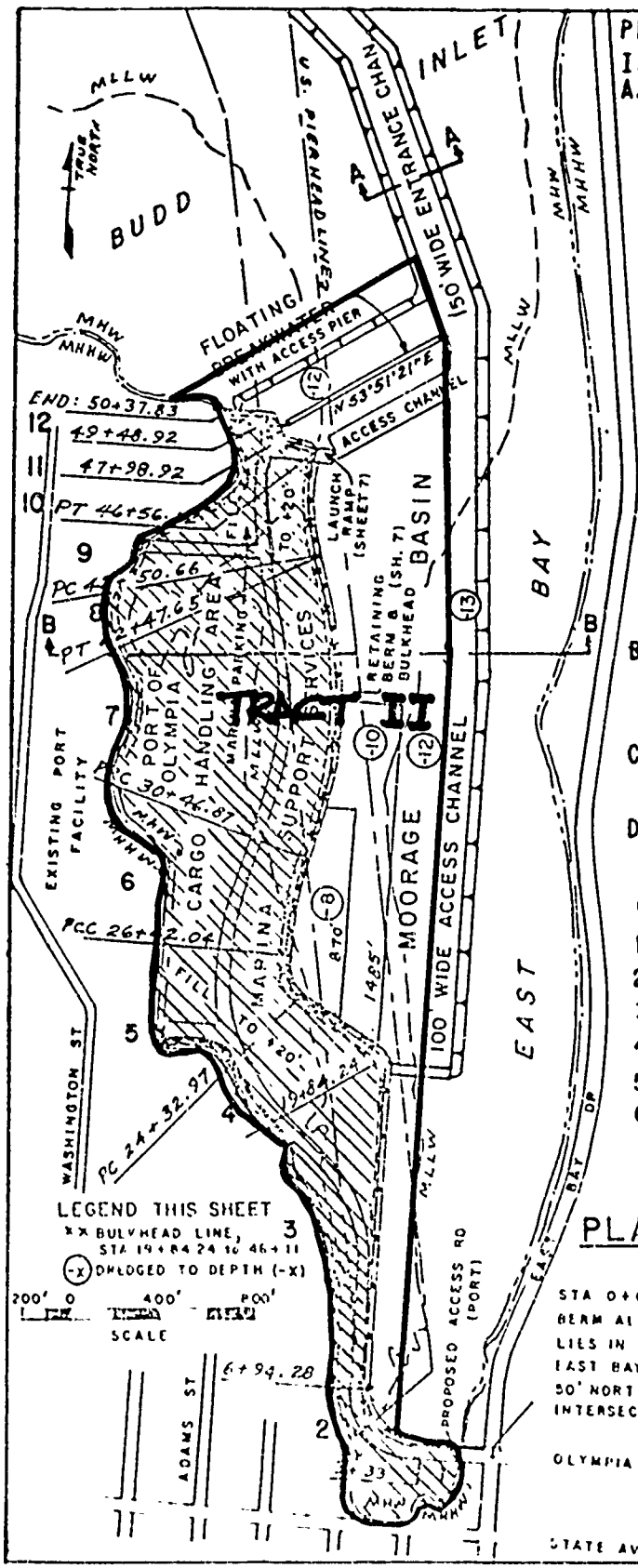
343
300'
Approx. High T'd +16 (MLLW=0) U.O.S.
Approx. 0 MLLW=0) U.O.S.

Exhibit "A"



PROPOSED WORK

I. FEDERAL:

A. By hydraulic pipeline and clamshell dredge, remove approx. 700,000 cu yds of organic silt and sand from 25.5 ac submerged lands and tidelands and deposit behind a retaining berm as fill for the marina services and Port of Olympia cargo handling area;

1) Entrance Channel - 150 ft wide 3500 ft long, dredged to -13 ft.

2) Moorage Access Channel -100 ft wide, 3000 ft long, dredged to -13 ft.

3) Launch Ramp Access Channel - 100 ft wide, 600 ft long, dredged to -12 ft.

4) Breakwater Area - 800 ft x 250 ft, dredged to -12 ft.

B. Construct floating breakwater (7 concrete modules 100 ft x 16 ft x 5 ft high with pile anchors) and access pier with ramp.

C Provide slope protection for retaining berm at breakwater access ramp.

D. Provide aids to navigation (Coast Guard). (Cont. on sheet 3)

COURSES

1	S 85°46'21"W	7	R=1674.54', Δ=41°05'08"
2	R=230', Δ=90°	8	N 26°44'55"W
3	N4°13'38"W	9	R=802.13', Δ=28°57'42"
4	N 64°42'13"W	10	S 73°55'14"E
5	R=201.35', Δ=59°18'52"	11	N 36°08'39"W
6	R=1178.85', Δ=19°43'34"	12	S 74°25'21"W

NPSEN-PL-NC-79-1
(EAST BAY-OLYMPIA)

PROPOSED DREDGING, FILL, BULKHEAD, and BREAKWATER with ACCESS PIER and RAMP

In: BUDD INLET, PUGET SOUND
At: OLYMPIA
County: THURSTON
State: WASHINGTON

EXHIBIT "B"

APPENDIX H

PUBLIC AND AGENCY REVIEW COMMENTS ON THE DRAFT DETAILED PROJECT REPORT/ ENVIRONMENTAL IMPACT STATEMENT, AND ON THE EAST BAY MARINA PROJECT IN GENERAL

APPENDIX H

PUBLIC AND AGENCY REVIEW

PART 1 - SUMMARY OF COMMENTS ON DRAFT DETAILED PROJECT REPORT AND ENVIRONMENTAL IMPACT STATEMENT (DRAFT DPR/EIS) AND CORPS RESPONSES

PART 2 - LETTERS OF COMMENT

PART 3 - COMMENTS ON THE PROJECT IN GENERAL AND CORPS RESPONSES

APPENDIX H

PUBLIC AND AGENCY REVIEW

Part 1 - Comments on the Draft Detailed Project Report and Environmental Impact Statement (Draft DPR/EIS) and Corps Responses

On 6 December 1979, the draft DPR and EIS for the East Bay Marina Study were forwarded to the Environmental Protection Agency (EPA) for filing and distributed for public and agency review. The document was listed in the Federal Register 21 December 1980. The 45-day review period ended 28 January 1980; letters of comment were received. Responses to the comments are presented in this appendix. The letters of comment are reproduced as part 2, following this comment and response section. Where appropriate, the DPR and EIS were revised in response to comments.

U.S. DEPARTMENT OF COMMERCE, OFFICE OF THE SECRETARY, 28 DECEMBER 1979.

1. Comment. I have no comments to offer with regard to the draft DPR/EIS. This office will rely on scrutiny by its line agencies, which were listed as recipients of the draft.

Response. Acknowledged.

DEPARTMENT OF THE NAVY, COMMANDANT 13TH NAVAL DISTRICT, 3 JANUARY 1980.

2. Comment. The Navy has no direct or indirect involvement in the East Bay area of Olympia Harbor. Therefore, I offer no comments on the draft DPR/EIS.

Response. Noted.

U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE, REGION 6, 4 JANUARY 1980.

3. Comment. We have no substantive comments to offer in our area of expertise or jurisdiction.

Response. Noted.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, REGION X, 24 JANUARY 1980.

4. Comment. We concur that the project would not have a significant impact on employment, would not impact housing needs, and would not result in relocation of business or residents.

Response. Acknowledged.

5. Comment. One area which does not appear to be covered in our area of concern is noise impacts on existing residences and on sites zoned residential. The final statement should indicate what increased levels of noise would be expected along the East Bay shoreline from boating activities in the proposed marina. Our general policy is to discourage housing construction on sites with noise levels in access of 65 Ldn.

Response. Some increase in noise levels in East Bay, attributable to the proposed marina are anticipated. Residences along East Bay Drive, directly eastward of the proposed marina, are generally set back some distance from the water and should not be adversely affected. New construction along the shoreline is not anticipated due to environmental and geologic conditions (see sections 3.1.2.1 and 3.1.3.2 of the EIS). Distances between the proposed marina and existing residences are approximately 350 feet. It is anticipated that the greatest noise levels will occur in association with dredging of the proposed marina during initial construction and during maintenance dredging if required. These levels are not expected to exacerbate industrial noises generated on the port peninsula and downtown area currently.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE (SCS), 25 JANUARY 1980.

6. Comment. This agency has reviewed your draft EIS and find that the concerns of the SCS appear to have been addressed.

Response. Acknowledged.

DEPARTMENT OF ENERGY, REGION X, 30 JANUARY 1980.

7. Comment. We found that the project description does not contain sufficient information for this Office to prepare an analysis of the initial energy investment for construction of such a project or its alternatives. However, there are some general conservation measures that we feel should be addressed in your study:

(1) The reduction of fossil fuel used in construction equipment.

(2) The requirement for high loading efficiencies for earth moving equipment.

(3) The utilization of standardized and repetitive dimensions to permit maximum re-use of forms.

(4) Indicate consideration of and/or the potential for alternative dredging techniques and procedures which could reduce the energy consumed both initially in the project and later on during maintenance.

Also, alternate construction materials should be investigated for the proposal and its alternative along with alternate construction techniques and procedures.

Response. Dredging will be by the most cost effective, environmentally acceptable means, which normally precludes excessive or unnecessary fuel consumption. Conservation measures regarding alternate construction materials are not applicable to the proposed project.

8. Comment. We point out that there are unavoidable adverse impacts caused by marina generated low level polutants (e.g., oil and gas). This should be discussed in greater detail in the final EIS.

Response. Discussion is contained in section 4.8.3 of the EIS.

DEPARTMENT OF TRANSPORTATION, U.S. COAST GUARD, 20 FEBRUARY 1980.

9. Comment. The project will require the establishment of several aids to navigation to mark the new entrance channel and the outer end of the floating breakwater. These requirements have previously been reported to the Corps of Engineers and a Coast Guard Aids to Navigation project pends development concurrent with the Corps project.

Response. Noted.

10. Comment. The Olympia area is not patrolled by Coast Guard vessels operating from a Coast Guard station in Tacoma. The area is patrolled on the basis of need and as our resources are available. Our projections indicate a substantial increase in the number of search and rescue cases in the surrounding area if this proposed marina is constructed.

Response. Noted. The DPR and the EIS have been revised to reflect this information.

11. Comment. The Coast Guard's position has been and continues to be that state/local authorities will assume recreational boating safety and law enforcement responsibility; however, the Coast Guard does provide minimal patrols to supplement the state/local authorities since there is concurrent jurisdiction.

Response. Noted.

12. Comment. If the marina includes provision for a fuel facility that transfers to or from a vessel with a capacity of 250 or more barrels of that product, Title 33, Code of Federal Regulations Parts 154 and 156, will apply to the facility. The operator of a facility subject to these regulations shall submit a letter of intent to operate the facility to the U.S. Coast Guard Captain of the Port not less than 60 days before the intended operation (33 CFR 154.110).

Response. Noted. A copy of your letter has been furnished to the Port of Olympia.

13. Comment. We have no objection to this proposed project.

Response. Acknowledged.

U.S. DEPARTMENT OF THE INTERIOR, OFFICE OF THE SECRETARY, PACIFIC NORTHWEST REGION, 22 FEBRUARY 1980.

14. Comment. Pages 5-1 (Draft DPR) and 49 (Draft EIS). The report and draft statement assert that exploratory borings penetrating the shallow artesian aquifer have provided some relief to artesian pressures. It should be explained whether this means that the testholes have been allowed to flow unchecked or merely that the small amount of pressure within the drillhole has been relieved. If uncontrolled flows have been allowed, their impacts should be assessed and appropriate mitigation described.

Response. The exploratory borings were undertaken by engineering consultants for the Port of Olympia. As far as can be determined, no special efforts were made to seal the borings. However, given silt/

clay bottom material some sealing may or may not have taken place. No uncontrolled flows are known to be occurring.

15. Comment. Pages 5-2, 5-3 (Draft DPR) and 49 (Draft EIS). The report and statement maintain that the fluctuations of artesian head with the tide indicate that the artesian aquifer is already locally vented into the tidal waters. The probability of effects of tidal loading and unloading should also be considered as a plausible explanation. To a certain extent, indeed, the efficiency of an artesian aquifer in reflecting the effects of tidal loading indicates the integrity and efficiency of the aquaclude. Such tidal efficiencies of the aquifer can be used to calculate the coefficient of transmissivity.

Response. Noted.

16. Comment. Page B-5, paragraph B-6 (Draft DPR). Consideration should be given to measures such as silt curtains to minimize adverse effects on water quality that may result from the migration of resuspended very soft and soft organic silts during dredging.

Response. Appropriate measures will be taken to insure compliance with state and Federal water quality regulations (see appendix G).

17. Comment. The draft EIS is inadequate in its discussion of historic and archeological resources in the project area and potential impacts on those resources. The draft EIS should document completed or intended compliance with 36 CFR 800, as amended, in regard to required consultation with the State Historic Preservation Officer.

Response. The draft DPR/EIS was reviewed by the Washington State Office of Archaeology and Historic Preservation. Their letter, dated 19 December 1979, documenting consultation is printed elsewhere in this appendix. See comment 75.

18. Comment. Although a number of alternative marina sites and designs are presented and discussed, it is apparent that project designs causing less environmental damage, but not the first choice of the sponsor, where not considered as viable alternatives. Thus, they were effectively eliminated before vigorous and objective consideration of alternatives had been made. Indeed, this aspect of Section 107 projects serves to thwart the essential purpose of NEPA.

Response. We do not concur with this assessment of the situation. The selected plan best meets the planning objectives outlined in section 4, Plan Formulation (DPR) and section 1.4 (EIS). It also provides the maximum net benefits of the alternative plans evaluated. The East Bay site was selected because there are relatively fewer and lesser adverse environmental and social effects than are associated with marina development at other locations. Justification for selection of

plan 4a as the preferred plan given in section 2.3.13 recognizes that the desires of the local sponsor were given strong consideration. Environmental consequences were not ignored as is reflected in the fish and water quality monitoring and mitigation measures adopted as part of the recommended plan.

19. Comment. Table 4, page 47 of the DEIS showing key plan selection factors does not indicate the requirements of the FWCA, NEPA, or the executive order on wetlands were met, since apparently environmental aspects were not given the equal or special considerations mandated in these directives.

Response. We do not concur, please see sections 1.1, 4.5, and 5.1.

20. Comment. The Port of Olympia previously applied for a permit (1975) for essentially this same project. Since recent permit applications (1979) apply to only one of the alternatives and were made before public or agency response to the DEIS or DPR, it would appear again that other alternatives were discarded somewhat prematurely.

Response. It is Corps policy to circulate public notices for comment by the public and agencies concurrent with circulation of the DEIS and DPR. Coordination with Federal and state resource agencies has been continuous throughout the conduct of this study. Public meetings have been held and public brochures have been circulated. We have received both formal and informal comments on marina development in the Olympia area. All comments received were considered by the decisionmaker in selection of a preferred alternative.

21. Comment. The FWS will make a separate evaluation of the referenced permit applications pursuant to provisions of the FWCA. In 1975, the FWS recommended denial of a permit which covered a plan very similar to 4a. We anticipate a similar action on these permits since an alternative exists (plan 4b) which fulfills project objectives, minimizes environmental damages, and is lower in cost.

Response. By letters dated 21 October and 18 November 1980, FWS indicated that their opposition to this project has been removed. The letters are reproduced in appendix G.

22. Comment. The subsection on "Consequences of the Proposed Action" in the DEIS summary should contain a brief discussion on probable adverse impacts on significant numbers and kinds of waterfowl and other water birds which use East Bay as a wintering, feeding, and sheltered resting area.

Response. Noted. Brief discussion has been added.

23. Comment. We do not agree that the total fill, especially those portions to be devoted to cargo handling and storage area and to certain commercial uses, is an appropriate water dependent use of intertidal wetlands which should be judged acceptable.

Response. Noted, see response to comment 21 and appendix G.

24. Comment. A map of Olympia Harbor which delineates East Bay should be added. Also, an acreage figure for East Bay should be given.

Response. Several figures in the EIS provide such illustration. Total acreage of East Bay presently is approximately 165 acres.

25. Comment. The discussion of moorage demand could be clarified by indicating whether it includes or is an addition to existing moorage (supply) as of 1966, 1968, 1980, etc.

Response. Moorage demand discussions in both the DPR and EIS have been revised to reflect recently completed "Puget Sound and Adjacent Waters Recreational Small Boat Moorage Study" (1980).

26. Comment. The EIS should state how soon an 800 moorage facility would be filled, assuming no other moorages are provided at other locations in the Olympia vicinity. The future date and moorage supply level, the Corps marina facility planning aims for, should be stated, as well as the proportion of that need which can be expected to be supplied by non-Federal projects and the proportion which could be met by dry storage. For planning purposes, the EIS and DPR should state whether the East Bay marina is intended to supply moorage needs of all southern Puget Sound or only the "Olympia area," and delineate what that area is.

Response. The DPR/EIS has been revised to clarify assumptions made with regard to service area. See specifically section 6 of the DPR and section 1.3.1 of the EIS. In theory, non-Federal projects and dryland storage could meet all future needs; although in fact this has not proven to be the case.

27. Comment. According to Port figures, the total uplands on the peninsula is approximately 100 acres, with 87 acres allotted to terminal use and 13 acres to industrial use. The optimal backup acreage per berth is 29 acres, according to the Port. Thus, the required backup area to serve 3 berths is 87 acres, which is what the Port now has. Relocation of nonwater dependent commercial and industrial uses to the airport industrial park could supply the needed waterfront backup space to serve water/land transfer facilities.

Response. The additional cargo-handling area to be provided as a result of this project (24.2 acres) is less than the 36 additional acres projected to be needed by 1990. As discussed in section 2.3.13 of the EIS, double handling of cargoes that must be stored at the airport

industrial park is inefficient. This additional cargo-handling area does not eliminate cargo storage at the airport, but does allow the Port greater flexibility in servicing vessels which call at their terminal facilities on West Bay.

28. Comment. We note that the Port commissioned an economic assessment of their "proposed expansion of cargo storage area." There is a critical distinction between legitimate cargo handling and terminal operating room and general storage areas. Development of upland storage areas would be preferable to the destructive filling of wetlands.

Response. Acknowledged. However, the use of the filled area would be for cargo handling. Your quote from the draft EIS was a typo. However, as explained in the DPR (section 4) and EIS (section 2.3.13), economic and social benefits are judged, in this instance, to be greater than biological losses engendered by the fill. See also, section 4.5.4 of the EIS.

29. Comment. Under the "No Action" there is an inference that wet moorage demand cannot otherwise be satisfied without a Federal project. There should be a discussion of the prospect that private or other public marinas may be built to satisfy the demand for both trailerable and nontrailerable boats through year 2020.

Response. No inferance was intended. However, most, if not all, sites in Thurston County that lend themselves to marina development by the private sector have been developed. Alternative marina sites were evaluated during the early stages of this study and were discarded. Most commentors seem to agree that the Olympia Harbor area is the environmentally preferable location (see other comments, this appendix). Still, some developments of additional moorages was anticipated in the moorage demand analysis for this project (see section 6 of the DPR). In the future, private or other public entities may elect to address the shortage of wet moorages; this has not occurred to date. For the present, the East Bay Marina would add 800 wet moorages in southern Puget Sound. This does not remedy current or projected needs, but does offer some relief.

30. Comment. We suggest renaming site 5 as "Priest Point" to avoid confusion of the name of site 4.

Response. We have had no problem with confusion of the two sites.

31. Comment. Suitable sites for dryland storage are probably not available at Olympia Harbor without filling of tidelands for space. However, the idea of totally filling East Bay for dryland storage is not an acceptable solution. We also do not believe that total filling is a solution to water quality problems or that they presently warrant such a drastic measure.

Response. Concur. This was our implication in the EIS.

32. Comment. In conjunction with dryland storage, the EIS should address the prospects of Federal participation in supplying additional public boat launching areas to partially relieve moorage demand pressures.

Response. As stated in the DPR/EIS, the Corps of Engineers has no authority to participate in planning or construction of dryland storage and/or public boat launch facilities that are not an integral part of Federal projects.

33. Comment. We generally concur in the assessment of wet moorage sites presented in pages 13-42. Of all the sites outside East Bay, site 2 most merits further consideration from the standpoint of minimizing water quality concerns and impacts on fish and wildlife.

Response. Noted. However, further analysis of site 2 was not made.

34. Comment. The EIS should explain the statement that an "optimum" capacity for East Bay is 1,500 moorages.

Response. Simply, that a marina of about 1,500 moorages could efficiently be located on that site from an engineering standpoint. A marina larger than this "optimum" size would not be possible. This does not imply that a marina of that size is desirable in East Bay, only that it is possible. To eliminate confusion, the word "optimum" has been changed to "maximum" in the DPR/EIS.

35. Comment. After stating on page 22 (EIS) that East Bay is heavily used by waterfowl and other water birds, the EIS goes on to virtually dismiss the admittedly adverse impact which the proposed project would have on those wildlife resources. We do not accept this evaluation, particularly in the absense of meaningful mitigation commitments to help offset the habitat losses.

Response. We disagree. The potential adverse impacts are acknowledged. The Port of Olympia and FWS have completed protective covenant to retain the West Bay Lagoon area (site 3) in its current condition for wildlife. Additional coordination is occurring to determine if meaningful opportunities to provide further mitigation in East Bay exist (see appendix C). The Corps will provide technical assistance to the Port and FWS in the effort, if requested.

36. Comment. Photograph 6 is apparently intended to show the small island referenced on page 43 and in the FWCA report. The island, however, is located on the opposite side of Moxlie Creek to the right.

Response. No, photograph 6 was intended to show a view of the proposed marina location from the southern end of East Bay, indicating past industrial use. Island location is acknowledged.

37. Comment. Page 43 (EIS): Under the subsection on selected site alternatives, the first paragraph implies that plan 4e was eliminated because water quality sampling indicated the site was unsuitable.

Response. "Eliminated" was a typo. Text has been corrected.

38. Comment. More explanation of the known or probable nature of marina support facilities to be developed by local interests on filled areas and a possible impact should be provided. We define marina support facilities as those structures necessary to the operation of a marina and without which it cannot physically operate.

Response. Design and construction of shoreside facilities is the responsibility of the Port. Marina support facilities are reflected in appendix B. Utilities, including storm drainage facilities, are provided in conformance with local and state requirements to protect public welfare.

39. Comment. Page 43: Reference is made to an area of 2.6 acres being used to provide proper surface drainage. The EIS should explain where it would be located, how it would operate, discharge, and be maintained.

Response. This is a detail of final site development to be dealt with during final project design. Provision of satisfactory storm drainage is an existing requirement of state permits granted for this project (see appendix E).

40. Comment. Statement is made under "plan effects" that plan 4a would leave the more productive intertidal wetlands intact, but would destroy a small island at the mouth of Moxlie Creek used by water birds. While this is essentially true, other plans would leave even more wetlands intact, would spare the island, and provide a greater "buffer" of space between the moorage basin and major bird use areas.

Response. Other plans would leave more wetlands intact; however, since those plans also include the fill at the southern end of East Bay for the access road, the island would be lost in any case. Also, it is not clear to what extent wintering waterfowl and other water birds would be disturbed by the marina operation. It is hoped that sufficient buffer will remain for wintering birds to continue to use the area. The Port and FWS intend to monitor bird use of the bay following construction to determine if other meaningful mitigation may be feasible (see appendix G).

41. Comment. Page 44: We note that deep-water disposal would be required for a portion of the dredged material for plan 4b. This would also be true for plans 4c, 4d, and 4e. In preliminary planning, deep-water disposal at Dana Pass was anticipated for plan 4a; it was also previously expected that dredged materials would prove too polluted for deep-water disposal. No data are supplied on the suitability of East Bay's dredged material for open water disposal.

Response. As noted, deepwater disposal is not now anticipated for plan 4a. Accordingly, a detailed analysis of East Bay dredged material suitability for open-water disposal was not made. See comment 59 and section 4.5.4 of the EIS.

42. Comment. The EIS labels plan 4b the least environmentally damaging (LED) plan. Hydraulic model tests were not performed on plan 4b. Thus, there are no data to indicate that resultant water quality would be better or worse in relation to plan 4a or presently existing conditions.

Response. From hydraulic and other computer studies completed in 1980 on plan 4a, which has nearly the same marina and access and entrance channel layout at 4b, it appears that water quality conditions would be somewhat worse than existing conditions. Becuase plan 4b would involve less constriction in the bay than plan 4a. The exchange coefficient should be somewhat better. However, the problem with the dissolved oxygen sag is not entirely dependent upon exchange rates (see section 4.1.3.2). Thus, water quality effects for plans 4a, 4b, 4c, and 4d should be similar.

43. Comment. With reference to plan 4d, we do not see how any interests are benefited in relation to other plans, since only 500 moorages would be provided and nearly as much filling is involved as with plan 4a. However, we point out that we do not see a "tradeoff" of moorages or cargo area as less inappropriate than the tradeoff of cargo area for fish and wildlife habitat.

Response. Noted.

44. Comment. Table 4 compares the site 4 alternatives and is a condensed version of exhibit 1 in the DPR. The table indicates that plans 4a, 4b, and 4c are very similar in nearly all key selection factors. Benefit/cost ratios of the three plans are high and nearly identical. The only clear contrast is that none of the plans, except 4a, has local sponsor support.

Response. Noted.

45. Comment. Exhibit 1 of the DPR provides a more comprehensive basis for site selection and could be revised to provide an even better display of comparative merits. Environmental quality factors (beginning page 4 of exhibit 1) fail to make essential qualitative distinctions.

Response. Table 1 was revised to reflect FWS input.

46. Comment. Plan 4a rates low in minimizing environmental effects compared to plan 4b and 4c, which would rate significantly higher provided water quality is suitable for all three plans. To state that plans for 4b and 4c are unacceptable to local government agencies is misleading and requires clarification and explanation. We note that plan acceptability to water quality agencies and fish and wildlife agencies is not included as a factor, although this is implicit for water quality certification.

Response. Acknowledged. However, coordination with these agencies is a normal and vital part of the planning process. Plan acceptability by these agencies is provided by their letters of comment on the DPR/EIS and 404 public notices, and by the State of Washington via WDE water quality certification. Thus, it is not a "key selection factor," but a requirement for project approval and construction. In this instance, water quality concerns and mitigation for potential adverse impacts were addressed through intensive, coordinated studies conducted in 1980. The recommended plan, with mitigation, has been accepted by water quality and fish and wildlife agencies (see appendixes D and G).

47. Comment. The EIS states economic and social gains are judged greater than the biological losses from filling of wetlands and, therefore, plan 4b was not selected as the preferred plan. No rationale is given for not selecting plan 4c, except it is not acceptable to the local sponsor and loss of productivity and disturbance of waterfowl would be somewhat greater than for plan 4b.

Response. Rationale for not selecting plan 4c is provided in section 2.3.13 of the EIS.

48. Comment. The social and economic gains of plan 4a over 4c appear to be limited to increased cargo storage area for the Port and land enhancement values that would be derived in large part from nonwater dependent commercial development on newly created uplands. The EIS says "such a tradeoff is appropriate under NEPA, Executive Order 11990, and Corps of Engineers regulations." We do not believe any of these documents indicate that it is appropriate to destroy wetlands to locate nonwater dependent developments in waterfront locations.

Response. We do not concur with your assessment that land enhancement values would be derived in large part from nonwater dependent development. The filled lands will be used for marina support facilities, marina parking, and increased cargo-handling areas as stated throughout the DPR/EIS. Past Port proposals for the site have included several nonwater dependent elements. These have been eliminated from the current proposal.

49. Comment. Under avian fauna, it should be noted that observations of waterfowl distributions by Taylor, et al, were based on fieldwork over just a 2-month period in the spring. Censusing by the Fish and Wildlife Service was conducted at approximately weekly intervals over a 4-year period. These data were supplied with a FWS planning aid letter dated 23 November 1976.

Response. Acknowledged.

50. Comment. Page 57 (EIS): The first paragraph indicates that all Puget Sound beaches are open to the public for shellfishing. Actually, over half are privately owned.

Response. Acknowledged.

51. Comment. Page 57 (EIS): Under wetlands (see also page 74), we note that wetlands have been defined to include nonvegetated intertidal areas. The current National Wetlands Inventory by the FWS includes intertidal flats, reefs, beaches, bars, and rocky shores, as well as subtidal areas.

Response. Noted.

52. Comment. Page 67 (EIS): Under water quality, we note that compared to background, DO levels may be reduced by as much as 1 milligram per liter within the proposed marina. This is actually a significant reduction in a marginal DO situation which occurs during August and September. This subsection should include a discussion of impacts from petroleum spills and sewage generated within the marina.

Response. Discussion of water quality has been revised. See also appendix D. Significant impacts resulting from incidental petroleum spills and sewage within the marina are not anticipated.

53. Comment. There is no mention of borrow pit sites or the environmental impacts on terrestrial wildlife from quarrying sand and gravel to construct fill dikes. Proposed or potential sites should be identified and impacts, including transport to the project area, discussed.

Response. The material could come from a number of existing borrow sources. Actual sources will not be determined until construction.

54. Comment. Page 72 (EIS): The second paragraph discusses the tradeoff of existing habitat and productivity with the creation of new types of habitat by marine construction. In East Bay there is said to be an equal tradeoff or a net positive contribution from the marina. Undoubtedably a different composition of prey and predator species would

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occur, but we question that a net benefit would occur for nonsalmonid fishes, particularly in the case of plan 4a.

Response. Noted.

55. Comment. Page 78 (EIS): Under "local shoreline master programs," we point out that Thurston County has no marine shorelines designated "natural" and thus potentially all saltwater shorelines of the county would be available to marina development under the master program. Therefore the statement that the only shoreline reach designated urban in SMP is at Olympia and thus the marina conforms to all Federal, state, and local land-use plans is also misleading. Marina development is not confined to the urban shoreline, nor does the fact of such designation automatically mean that marina development is appropriate for a given site.

Response. Your point is acknowledged. However, while not confined to "urban" shoreline, marina development is considered to be more appropriate in this location than at other more environmentally sensitive sites. Site 2, located in West Bay, is also designated urban under SMP; however, it is our judgment that due to the industrial nature of the location, siting of a major marina facility in this area would be inappropriate. The paragraph cited acknowledges that marinas are not catagorically prohibited from "conservancy" or "rural" designated area. However, it goes on to state that "sound planning discourages such sitings if alternative sites are available which are more in keeping with policy number 2."

56. Comment. Section 4.4.3, Olympia Harbor Plan: To our knowledge this plan was developed unilaterally and without opportunity for natural resource and environmental agencies or the general public to review it.

Response. The plan was developed by the Port of Olympia as a guide to their future development. The plan was provided to the Corps as input to our planning process. We noted that provision of a marina at East Bay is one segment of that overall plan. We do not suggest that this plan has been agreed to by all Federal, state, and local agencies.

57. Comment. Section 4.5.4, Executive Order 11990: We note that the terms "cargo handling area" and "cargo storage area" are used interchangeably. There is a difference between those areas needed for cargo handling and those areas needed for storage of materials brought in by ship.

Response. Terminology has been clarified.

58. Comment. While the Port's plans may call for additional land to be created by filling of public navigable waters, this is not binding on Federal agencies who are charged by the President to avoid wetland

destruction. Where reasonable alternatives exist, the sacrifice of wetlands to nonwater dependent uses is directly contrary to Executive Order 11990.

Response. Acknowledged. See comment 48 and section 4.5.4 of the EIS.

59. Comment. We point out that the alternative section in the EIS did not find plans 4b and 4c to be impracticable or economically unjustifiable. If plan 4a is in compliance with Executive Order 11990, plan 4b and plan 4c are even more so. Thus all practicable measures to minimize losses to wetlands would not be taken under plan 4a, even when economic and social factors are considered.

Response. Your point is well taken. However, in this instance, the fill site serves as a dredged material disposal site for the project rather than a fill for the purposes of providing additional cargo-handling area for the Port. In that regard, plan 4a allows all the dredged material to be placed onsite; plans 4b and 4c do not. Open-water disposal was not preferred due to increased costs and agency water quality concerns (see EPA and WDF letters, appendix H). Although open-water disposal at a DNR approved disposal site is generally regarded as being environmentally acceptable provided sediments to be disposed are not contaminated, East Bay sediments contain a high percentage of fine silts and organics which make their disposal in Dana Passage less desirable. Detailed testing was not conducted; however, the consensus observed early in the planning process was that confined disposal of East Bay sediments was preferable to open-water disposal, although it was suspected that some percentage of the sediments would be acceptable for open-water disposal if necessary.

60. Comment. Section 4.6 (EIS), Irreversible and Irretrievable Commitments of Resources: Any demand for local resources of stone, or sand and gravel, such as aggregate for the concrete breakwater sections should be acknowledged here. Assurance should be given that the project will not significantly deplete local resources of these materials. Although sand and gravel deposits are locally abundant, economically accessible sources are diminishing near population centers.

Response. Section 4.6 has been revised.

61. Comment. Section 4.9 (EIS), Mitigation and Amelioration of Adverse Affects: We believe there should be a reference to mitigation features requested in the offical FWCA report. The final EIS should contain a discussion of specific mitigation measures which the Corps and sponsor will be committed to carry out.

Response. FWCA report recommendations are discussed elsewhere in the EIS. The discussion of mitigation features has been expanded. See also appendix D.

62. Comment. FWS mitigation recommedation I is that public fishing jetty or pier be constructed along the northeast shore of East Bay. We continue to request this because fishing from the purposed floating breakwater is likely to be unproductive since there will be no artifical reef and few pilings to attract fish. A small jetty or pier on the northeast shore would be more accessible for neighborhood fishermen and would not conflict with marina operations.

Response. This concern has been resolved (appendix G). Consideration is being given to creating an artificial reef by FWS and Port as a separate action to this marina project.

63. Comment. FWS mitigation recommendation J is for one or more small islands to be constructed for waterfowl attraction and resting in East Bay. An alternative would be to construct small log rafts between pairs of pilings which would rise and fall with the tides. Also, if plan 4a is to be implemented, we would request the sponsor convey or dedicate West Bay lagoon to a nondevelopment use. If plan 4c is to be implemented, we would request additional small islands be created with dredged material at suitable locations along the west shore of West Bay. We believe this can be done at low cost and without interference to boating or other activities.

Response. Construction of dredge islands in East Bay may not be a feasible prospect due to a variety of factors, including poor foundation and materials, the high tidal range, etc. Import of clean building material to construct such islands would be expensive and is not recommended in this report but may be viable. The Port has agreed to study the feasibility of island creation, in cooperation with the FWS, and to construct the islands if found feasible (see appendix G). The Port and FWS have already signed a protective covenant for the West Bay lagoon.

64. Comment. Page C-6: Paragraph 6.3.4 is incorrect. Removal of habitat in a proposed disposal area will permanently exclude it from waterfowl use. Paragraph 6.3.5 should state that the role of mud flats (wetlands) in pollution assimilation and nutrient storage has not been determined in East Bay.

Response. The 404(b)(1) evaluation has been revised.

65. Comment. Page C-7: Paragraph 6.4.4 is misleading because it states the proposal would have little affect on wildlife. Waterfowl as well as other birds are classified as wildlife. Paragraph 6.4.8 states there are no significant wetlands in the disposal area. This statement disregards the Corps definition of intertidal areas as wetlands.

Response. We disagree. See previous response.

66. Comment. Page C-8: Paragraph 6.5.2 should be rewritten to state that upland sites for spoil disposal are not available. The alternative to open-water disposal is tideland disposal.

Response. No, since open-water disposal is not being proposed or evaluated in this instance, the section is correct as stands. See comment 64.

67. Comment. Under conclusions and determinations, we do not concur in the statements that the proposed filling will have only a minor effect; or that the preferred plan has the least overall impact; or that the filled area would be used primarily for water dependent uses; or that other fill or disposal sites are not practicable. Our reasons have been previously stated on each of these points.

Response. Noted. See previous responses and appendix G.

68. Comment. Draft DPR. Under "Wildlife Resources" (page 2-4), the statement concerning declining populations of canvasback ducks is contained in the FWCA report. Reference to personal communication should be deleted.

Response. This has been done.

69. Comment. Draft DPR. The photograph (page 5-2) depiction of the proposed project does not match plates 2a and 2b in some respects. A note to this effect should be added.

Response. This has been done.

70. Comment. Draft DPR. The last three listed effects of the plan concerning wetlands and waterfowl (page 7-1) are so worded that the impression is given that no significant losses would occur.

Response. Noted.

U.S. ENVIRONMENTAL PROTECTION AGENCY, 28 FEBRUARY 1980.

71. Letter by EPA raised major concerns that plans 4a through 4d may not be environmentally acceptable due to their potential adverse consequences for water quality and aquatic resources. EPA recommended that more detailed evaluation be made of environmental impacts and that the project be held in abeyance until the information is available and the EIS process could be completed. During the remainder of 1980, the Corps and EPA worked jointly to model water quality effects in East Bay. Coordination also occurred with other state and Federal agencies, notably the FWS, WDE, and WDF. Results of these studies and coordinations have been included in this revised, final document. By letter dated 19 August 1980 (reproduced in appendix G), EPA provided final comments on the East Bay Marina project. Although EPA continued to support plan 4e as a cost effective, preferred alternative, selection of plan 4a was acceptable if it included "a properly designed and maintained aeration system which will maintain Class B water quality standards within the marina." Appendix D discusses the aeration system

proposed for the East Bay Marina. Fish and water quality monitoring programs will be designed during preparation of plans and specifications in coordination with appropriate state and Federal agencies.

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY (WDE), 11 FEBRUARY 1980.

72. Comment. On 4 May 1976, WDE gave approval of this project through the state's Environmental Coordination Procedures Act (ECPA) subject to the resolution of certain water quality problems. Since that time WDE has determined that although the water quality is poor and will remain poor with the project, the project will not have a significant effect on this situation and should not be delayed because of it. Therefore, the Department approves of the proposal (alternative 4a) with the provision that good engineering practices be employed during both construction and operation.

Response. Acknowledged.

73. Comment. WDG feels that the additional landfill required (23.4 acres) to accommodate the preferred plan (4a) would likely result in negative environmental effects. Elimination of feeding and resting areas would affect waterfowl and shorebirds of Budd Inlet and Pacific flyway.

Response. Noted.

74. A letter dated 13 February 1980 from WDF raised numerous concerns regarding affects to water quality and aquatic resources. By supplemental letter dated 26 February 1980, WDF substantively approved the marina plan and offered to work with the Corps and local sponsor to prevent or mitigate any fish losses. During the remainder of 1980, WDF and WDG was coordinated with closely on project designs and construction schedules. By letter dated 19 November 1980 (reproduced in appendix G), WDF approved the marina project and provided specific conditions which will be complied with.

STATE OF WASHINGTON, OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION, 19 DECEMBER 1979.

75. Comment. A staff review has been completed on your draft DPR and draft EIS. We concur with measures proposed in the draft EIS to identify the cultural resources which may be present. In the event that such resources are disclosed through survey or site preparation, please notify this office. We will be pleased to assist in the development of measures to mitigate anticipated impacts.

Response. Acknowledged.

OLYMPIA PLANNING DEPARTMENT, 9 JANUARY 1980.

76. Comment. The city of Olympia wholeheartedly supports the Port of Olympia plan for development of the East Bay channel which would include a small boat marina and other support developments. The city of Olympia lends its indorsement to this project for three major reasons: it will provide a needed increase in moorage for marina watercraft, it will enhance the visual appearance of the downtown waterfront, and finally it will help revitalize the city's Corps area.

Response. Acknowledged.

77. Comment. The Olympia Planning Department has reviewed the draft EIS and commends the Corps of Engineers for the accurate and illustrative assessment of impacts and alternatives. We feel that the East Bay location is the best project considering both environmental and economic concerns.

Response. Acknowledged.

CITY OF TUMWATER, MAYOR'S OFFICE, 25 JANUARY 1980.

78. Comment. Time constraints have not allowed us to carefully review the draft EIS. For that reason, my comments should not be considered to address the adequacy or accuracy of the EIS, but only to support the need for the project in general. On 22 March 1979, I addressed a letter in support of the project to Colonel J. Poteat. Rather than repeat items mentioned in that letter, I'd prefer to refer you to it and simply state that I continue to be in strong support of the project.

Response. Noted.

CAPITAL DEVELOPMENT COMPANY, 18 JANUARY 1980.

79. Comment. In response to the EIS, I would like to suggest that this is an extremely worthwhile and much needed and much delayed project and that I would urge all of the agencies involved at the earliest possible date to enable this to proceed.

Response. Noted.

OLYMPIA R/UDAT, 21 JANUARY 1980.

80. Comment. We feel that the report adequately deals with the environmental as well as the socioeconomic impacts of the project. If there is any shortcoming at all to the report, it is that it does not fully emphasize the benefit of this project to the downtown Olympia area. We feel that in addition to the "overall development of water-

front activities," the secondary impact of this project would be to boost the existing retail center and provide a general increase in the local economy.

Response. Noted.

81. Comment. We intend to continue our working relationship with the Port of Olympia to provide visual and pedestrian links between the East Bay facility and other waterfront activities and with the existing downtown employment and retail centers. We urge that you finalize the EIS and begin construction as rapidly as possible so as to better coordinate with the city's other development projects.

Response. Noted.

LEAGUE OF WOMEN VOTERS OF THURSTON COUNTY, 24 JANUARY 1980.

81. Comment. The League endorses the plan for the East Bay Marina generally. We do have several concerns however. The league believes there is too much dredging and filling being done under the guise of building a much needed marina. Dredging is necessary to build the marina and the League makes no objection to using dredged material to fill the east side of the Port peninsula for water dependent projects. But motels, shops, and access roads are not water dependent. This is why the League of Women Voters of Thurston County objects to a portion of the plan.

Response. See comment 48. Provision of the access road allows industrial traffic to bypass the busy downtown area, thereby reducing traffic congestion and associated auto emissions.

80. Comment. The League of Women Voters of Thurston County has proposed in the past, and continues to recommend, that a water related park be established at the southern part of East Bay to benefit the boaters as well as the citizens of Thurston County. A park would fit in with redevelopment of downtown Olympia. A maritime museum would also be suitable next to a marina. Basically we recommend less filling in of the Port peninsula for nonwater related projects, recommend establishing a park at the southern end of the East Bay, and recommend establishing a maritime museum in the area.

Respose. A copy of your letter has been provided to the local sponsor. Your recommendations are noted.

OLYMPIA AREA VISITOR - CONVENTION BUREAU, 24 JANUARY 1980.

84. Comment. We wish to express our support of the proposed East Bay Harbor project by the Port of Olympia. We feel the utilization of this now unsightly and unused area by a project that combines commercial

use in addition to recreation is an asset to the hospitality industry and contributes to our community, both by its esthetic attributes and its diverse economic benefits.

Response. Acknowledged.

OLYMPIA AREA CHAMBER OF COMMERCE, 24 JANUARY 1980.

85. Comment. I would again emphasize our continued support of the Port of Olympia and urge that you finalize the East Bay Marina EIS so that the project may begin as soon as possible.

Response. Noted.

BLACK HILLS AUDUBON SOCIETY, 27 JANUARY 1980.

86. Comment. We agree that additional wet moorage space is needed in south Puget Sound. Of the 10 sites examined, the East Bay location is the preferable, indeed the only acceptable, location. Our major concern is the inevitable negative impact on the bird life of the Port area.

Response. Acknowledged.

87. Comment. Mention has been made in the DEIS of the significance of the canvasback population wintering in the area. It should also be mentioned that the Port of Olympia supports what is probably the largest wintering concentration of Burrows' goldeneyes in Washington State and one of the largest anywhere in its wintering range.

Response. Noted. A statement has been added.

88. Comment. The Port of Olympia is one of only 20 or so nesting areas for the purple martin in western Washington. While some elimination of bird life is inevitable if the marina is constructed, we think that some inexpensive mitigation measures could help offset that loss. We agree with the FWS suggestions concerning piling, habitat, and dredged spoil islands. Piling habitat destroyed by the marina should be replaced and maintained elsewhere in East Bay, with the Port providing occasional boat access for placement and cleaning of Martin nest boxes. Construction of one or more dredged spoil islands for water bird usage is an excellent idea. They should probably not be riprapped as that would make the islands less useful for water birds. They should be posted with signs to discourage human intrusion.

Response. As is stated in our response to recommendations by the FWS, consideration will be given to driving new piles at selected sites in the bay for wildlife habitat. Specific sites for such habitat creation will be determined in consultation with the FWS and Washington Department of Game prior to construction. Concerning creation of one or

more dredge islands for the water bird usage, please see comment 63. Such construction has been deleted as a part of this Federal project; however, the Port and FWS are jointly pursuing such island construction as part of local construction.

89. Comment. We regard the proposal to fill an additional 24.2 acres of tidelands to support log storage and the proposal to place the Olympia Avenue extension on solid fill with some apprehension. The EIS does not mention the possibility of constructing the Olympia Avenue extension as a causeway/bridge, thereby leaving the Moxlie Creek tidelands unfilled. This seems to be a reasonable alternative that should be discussed in the final EIS. Economic justifications for the additional fill for cargo handling could have been discussed more completely. If this fill is allowed, we suggest as partial mitigation that no further filling occur on the west shoreline of West Bay, including the West Bay lagoon area.

Response. The Port has agreed to involve the FWS and WDF in the design of the causeway to insure that the Moxlie Creek outfall is so constructed to avoid preclusion of future potential rehabilitation of upper Moxlie Creek for fisheries. Additionally, the Port and FWS have recently signed a protective covenant for the West Bay Lagoon (see appendix G).

90. Comment. We commend the Port of Olympia and the Seattle District Corps of Engineers for the excellent studies they have supported in connection with this project. We appreciate the environmental safeguards already incorporated and suggest that the mitigation measures we and others have proposed be incorporated into the final document.

Response. Noted. Thank you.

OLYMPIA SALMON CLUB, INCORPORATED, 22 FEBRUARY 1980

91. Comment. The Olympia Salmon Club is very much interested in the East Bay Marina and completely supportive of the project. We believe firmly that it will not interfere with the salmon runs in the Deschutes River and Percival Creek, while it will make a real contribution to the entire Olympia area.

Response. Noted.

92. Comment. We have reviewed the plans for the East Bay marina and because of the benefits of the project, we strongly urge its approval.

Response. Noted.

MICHAEL AND RAYMONA REDMOND, GREGORY AND SUSAN PATTILLO, HAROLD AND ESTHER KNECHT, LOIS PARKS, AND THOMAS ALLEN, 23 JANUARY 1980.

93. Comment. We support the project because of the economic and recreational benefits it will bring to our fellow citizens of the Olympia area and the public need for moorage. We are prepared to endure an increase in air pollution and noise level, but would like to know if there are any projections of magnitude and if the Port of Olympia or Thurston County Sheriff's office is ready or able to enforce speed limits or noise violations.

Response. Operation of the marina is the responsibility of the Port of Olympia. A copy of your letter has been provided to them. Some increases in noise is expected during construction from operation of the dredges. Current noise levels are not expected to be significantly increased by marina operation.

94. Comment. Has the magnitude of the tax burden from project induced increases in residential value been calculated.

Response. No, however little or no effect is anticipated on the tax burden of area residents due to project attributable changes in property values. The presense of a marina in East Bay is not expected to significantly change property values outside the port area.

95. Comment. The statement that "occurrence (of seals) in Olympia Harbor is unlikely" is in gross error. In July 1979, six individual seals were observed. A speed limit on boats, which is enforced, will minimize the probability that these friendly creatures will be maimed, killed, or driven from the area.

Response. Statement regarding seals has been revised.

96. Comment. Our most serious concerns are that dredging contemplated and the marina wakes of boats using the facility will result in the erosion of our beaches and the destruction of existing bulkheads.

Response. The DPR addresses boat induced wave activity (see appendix B). Based upon accepted professional practice (Reference: Water Waves Produced by Ships, Sorenson, 1973) vessels complying with the 5 knot per hour boat basin speed limit would cause waves of less than 0.5 foot to reach the shoreline at high tides and it is very unlikely that waves of this magnitude would cause problems to properly designed, constructed, and maintained bulkheads. Of course at low tides the waves would be attenuated by the exposed, intervening mudflats.

Also, soil borings along the east shoreline indicate soil materials in this area are glacial sediments and are firmer than the recent near surface bay sediments. (Reference: Supplementary Geotechnical Investigation: Proposed East Bay Development Program, Dames and Moore, 1978, p. 14.) The report goes on to say, "Stability problems associated with

structures founded on these glacial sediments or fill placed above these materials are very unlikely to be affected by the proposed construction." The report also indicates that the dredged slope for the access channel will encroach toward the east shoreline, but it is unlikely that the encroachment will extend more than about 50 feet, thus leaving more than adequate separation between the dredged slope and the structures along East Bay Drive. The nearest structure is 250 feet from the top of the dredged channel slope so a very adequate, 200 feet, buffer will remain between the channel and shoreline structures under the most adverse conditions probable.

APPENDIX H - PART 2

LETTERS OF COMMENT

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Secretary
Federal Region X
Federal Building, Room 3206
915 Second Avenue
Seattle, Washington 98174

December 28, 1979

Colonel Leon K. Moraski
Corps of Engineers
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

This will acknowledge receipt of one copy of the draft detailed project report/draft environmental impact statement (DPR/EIS), dated December 1979, for the East Bay Marina, Olympia Harbor, Washington.

I have no comments to offer with regard to the drafts. The Office of the Secretary will rely on scrutiny by its line agencies, which were listed by you as recipients of the drafts.

Sincerely,

Leonard W. Saari
Regional Representative
of the Secretary

DEPARTMENT OF THE NAVY
COMMANDANT
THIRTEENTH NAVAL DISTRICT
SEATTLE, WASHINGTON 98115

Code N351:RDP:pr
11010
Ser N351/01
3 Jan 1980

Colonel Leon K. Moraski
District Engineer
Seattle District, Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

Thank you for the opportunity to comment on the draft detailed project report/draft environmental impact statement for the East Bay Marina, Olympia Harbor, Washington.

The Navy has no direct or indirect involvement in the East Bay area of Olympia Harbor. Therefore, I offer no comments on the draft report/environmental impact statement.

Sincerely,

WILLIAM A. WILLIAMS III
Rear Admiral, U.S. Navy
Commandant
Thirteenth Naval District

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Region 6
P.O. Box 3623, Portland, Oregon 97208

1950

January 4, 1980

Colonel Leon K. Moraski
District Engineer
Seattle District, U.S. Army Corps of Engineers
Post Office Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

Thank you for the opportunity to review the Draft Project Report/ Draft Statement for the East Bay Marina Project.

We have no substantive comments to offer in our area of expertise or jurisdiction.

Sincerely,

for R. E. WORTHINGTON
Regional Forester

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
REGIONAL OFFICE
ARCADE PLAZA BUILDING, 1321 SECOND AVENUE
SEATTLE, WASHINGTON 98101

January 24, 1980

REGION X

IN REPLY REFER TO:

Office of Community Planning
and Development

10C

Leon K. Moraski, Colonel
Corps of Engineers
District Engineer
Department of the Army
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

Re: East Bay Marina - Draft E.I.S.
Olympia Harbor, Washington

We have reviewed the detailed project report and the draft impact statement submitted with your December 7, 1979 letter.

We have no comments on your detailed report. On your impact statement we concur with you that the project would not have a significant impact on employment, would not impact housing needs and would not result in relocation of businesses or residents. The one area which does not appear to be covered and is in our area of concern is the noise impacts on existing residences and on sites zoned residential. There appears to be residences along East Bay Drive which is to the east of the proposed project. We would like to see the final statement indicate what increased levels of noise would be expected along the East Bay shoreline from the boating activities from the proposed marina. Our general policy is to discourage housing construction on sites with noise levels in excess of 65 Ldn.

It appears that the most significant impact would be on water quality. We defer comment on this to other agencies with greater expertise.

Thank you for the opportunity to comment.

Sincerely,

for Robert C. Scalia
Director
Regional Office of CPD

cc: Ed Moger/HUD
Dick Moore/HUD

United States Department of Agriculture
Soil Conservation Service
Room 360
U.S. Courthouse
Spokane, Washington 99201

January 25, 1980

Sidney Knutson, P.E.
Asst. Chief, Engineering Division
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Sir:

The Soil Conservation Service has reviewed your draft environmental impact statement for East Bay Marina and find that the concerns of the SCS appear to have been addressed.

Thank you for the opportunity to look over your report and draft.

Sincerely,

LYNN A. BROWN
State Conservationist

Department of Energy
Region X
1992 Federal Building
915 Second Avenue
Seattle, Washington 98174
(206) 442-7285

January 30, 1980

Mr. Leon Moraski
Department of the Army
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Moraski:

The Department of Energy (DOE) appreciates the opportunity to comment on the Draft Environmental Impact Statement (EIS) for the East Bay Marina in Olympia, Washington.

Three of the responsibilities assigned to the DOE when Congress enacted the DOE Organization Act (42 USC 7101) were:

(1) To promote efficiencies in the use of energy resources (15 USC 764(b)(7));

(2) To place major emphasis on the development and commercial use of solar, geothermal, recycling and other technologies utilizing renewable energy resources (42 USC 7112(6)); and,

(3) To provide for the cooperation of Federal, state, and local governments in the development and implementation of national energy policies and programs (42 USC 7112 (11)) (emphasis added).

When reviewing a project proposal, this Office assesses not only the specific impact of the alternative on energy consumption, but also: (1) the adequacy of the report's broad consideration of energy use, (2) the type and nature of energy use, and (3) the consideration given to energy conservation/efficiency and renewable energy measures.

We found that the project description does not contain sufficient information for this Office to prepare an analysis of the initial energy investment for construction of such a project or its alternatives. However, there are some general conservation measures that we feel should be addressed in your study:

(1) The reduction of fossil fuel used in construction equipment.

(2) The requirement for high loading efficiencies for earth moving equipment.

(3) The utilization of standardized and repetitive dimensions to permit maximum re-use of forms.

(4) Indicate consideration of and/or the potential for alternative dredging techniques and procedures which could reduce the energy consumed both initially in the project and later on during maintenance.

Also, alternate construction materials should be investigated for the proposal and its alternative along with alternate construction techniques and procedures.

Finally, we point out that there are unavoidable adverse impacts caused by marina-generated low-level pollutants (e.g., oil and gas). This should be discussed in greater detail in the final EIS.

This Office again thanks you for the opportunity to comment in the initial stage of your study process. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Nan Evans
Environmental Programs Coordinator
Office of Assessment & Integration

cc:
Lee Johnson, Director, External Affairs Staff, Region X, DOE

Dr. Robert Stern, Director, Division of NEPA Affairs, Office of the Assistant Secretary for Environment, NDOE

F.A. Leone, Director, Division of NEPA Affairs, Office of the Assistant Secretary for Enviroment, NDOE

Paul Brumby, Director, Federal Programs Office, Office of the Assistant Secretary for Conservation and Solar Applications, NDOE

Stan Springer, Environmental Review Section, Washington State Department of Ecology, Olympia, Washington

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
COMMANDER (dpl)
THIRTEENTH COAST GUARD DISTRICT
915 SECOND AVE
SEATTLE, WASH 98174
PHONE 206 442-7523

16476
DPL79-1265

20 FEB 80

Colonel Leon K. Moraski, USA
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Colonel Moraski:

We have reviewed your draft detailed project report/draft environmental impact statement of 7 December 1979, addressing the proposed East Bay marina, Olympia Harbor, Washington. The remarks within this letter are specifically addressed to that document. However, we have by separate correspondence commented on your public notices addressing the Federal portion of this project (P/N No. NPSEN-PL-NC-79-1, of 28 December 1979), and the non-Federal portion of the project (P/N No. 071-OYB-1-006165, of 28 December 1979). Our comments on the public notices are likewise applicable here; therefore, copies of those letters have been included for your information.

The following are our comments on this draft EIS:

The project will require the establishment of several aids to navigation to mark the new entrance channel and the outer end of the floating breakwater. These requirements have previously been reported to the Corps of Engineers and a Coast Guard Aids-to-Navigation project pends development concurrent with the Corps project.

Page 5-5, Operations, number 5-19. The Olympia area is not patrolled by Coast Guard vessels operating from a Coast Guard Station in Tacoma. The area is patrolled on the basis of need and as our resources are available. Furthermore, the statement indicating that this proposed marina will have little impact on the Coast Guard is in error. Our projections indicate a substantial increase in the number of search and rescue cases in the surrounding area if this proposed marina is constructed.

16452
DPL79-1265

20 FEB 1980

The Coast Guard's position has been and continues to be that State/local authorities will assume recreational boating safety and law enforcement responsibility; however, the Coast Guard does provide minimal patrols to supplement the State/local authorities since there is concurrent jurisdiction. Care should taken in assuming that the Coast Guard will supply patrols as other mission considerations and the availability of Coast Guard resources may preclude such patrols from taking place.

If the marina includes provision for a fuel facility that transfers to or from a vessel with a capacity of 250 or more barrels of that product, Title 33 Code of Federal Regulations Part 154 and 156 will apply to the facility. The operator of a facility subject to these regulations shall submit a letter of intent to operate the facility to the U. S. Coast Guard Captain of the Port not less than 60 days before the intended operation (33 CFR 154.110).

We have no objection to this proposed project. Thank you for the opportunity to review this document.

Sincerely,

Richard F. Malm

RICHARD F. MALM
Captain, U.S. Coast Guard
Chief of Staff
13th Coast Guard District

Encl: (1) CCGD13(dpl) ltr 16452, Ser DPL79-1323 of 20 FEB 1980
(2) CCGD13(dpl) ltr 16452, Ser DPL79-1329 of 20 FEB 1980

Copy: Coast Guard Captain of the Port, Seattle, WA
(w/o encl.)

United States Department of the Interior

OFFICE OF THE SECRETARY

PACIFIC NORTHWEST REGION

500 N.E. Multnomah Street, Suite 1692, Portland, Oregon 97232

February 22, 1980

Colonel Leon K. Moraski, Dist. Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

The Department of the Interior has reviewed the Draft Detailed Project Report and Draft Environmental Impact Statement, (DDPR/DEIS), East Bay Marina, Olympia Harbor, Washington (ER-80/40) and offer the following comments.

General Comments

The draft statement is inadequate in its discussion of historic and archeological resources in the project area and potential impacts on those resources. Although the document states on pages 2-4 that the National Register of Historic Places and archeological records at the University of Washington have been reviewed, we found no evidence in the draft statement that the Washington State Historic Preservation Officer has been consulted.

The draft statement should document completed or intended compliance with 36 C.R.F. 800, as amended (Federal Register January 30, 1979) in regard to required consultation with the State Historic Preservation Officer. These requirements include consultation on: the need for and types of surveys to identify eligible historic and archeological properties, survey boundaries, application of National Register criteria to identified properties, determination of effect of the proposals on National Register or eligible properties and other 36 C.F.R. 800.4 procedures if such properties will be affected.

Although a number of alternative marina sites and designs are presented and discussed, it is apparent that project designs causing less environmental damage, but not the first choice of the sponsor, were not considered as viable alternatives. Thus, they were effectively eliminated before a

vigorous and objective consideration of alternatives had been made. Indeed, this aspect of Section 107 projects; i.e. selecting only that project favored (and frequently predetermined) by the local sponsor, serves to thwart the essential purpose of NEPA; i.e., to avoid or minimize adverse environmental actions through identification and assessment of reasonable alternatives.

Table 4, Page 47 of the DEIS showing key plan selection factors does not indicate that requirements of the Fish & Wildlife Coordination Act, National Environmental Policy Act or the Executive Order on Wetlands were met since apparently, environmental aspects were not given the equal or special considerations mandated in these directives.

The Port of Olympia and Corps of Engineers have recently applied for permits under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act for dredging, filling, and construction of the proposed cargo area, marina and floating breakwater. Those applications are numbered 071-OYB-1-006165 and NPSEN-PL-NC-79-1 respectively. The Port of Olympia previously applied for a permit (Public Notice 071-OYB-1-002537 dated April 28, 1975) for essentially this same project. Since the recent permit applications apply to only one of the alternatives and were made before public or agency response to the DEIS or DPR, it would appear again that other alternatives were discarded somewhat prematurely.

The Fish and Wildlife Service of the Department of the Interior expects to make a separate evaluation of the proposed facility in connection with the above referenced permits pursuant to provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.). This separate review will include recommendations on whether the permits should be issued, conditioned, or denied, depending on probable impacts to fish and wildlife resources. In 1975, the FWS recommended denial of a permit which covered a plan very similar to Plan 4a. We anticipate a similar action on permits for Plan 4a since an alternative exists (Plan 4b) which fulfills project objectives, minimizes environmental damages and is lower in cost.

Specific Comments

The project document consists of a draft Detailed Project Report (DPR) and draft Environmental Impact Statement (EIS). Our comments will generally follow the order of the EIS with intermittent references to related segments of the DPR.

D.P.R. Pages 5-1 and 49. The report and draft statement assert that exploratory borings penetrating the shallow artesian aquifer have provided some relief to artesian pressures. It should be explained whether this means that the testholes have been allowed to flow unchecked or merely that the small amount of pressure within the drillhole has been relieved. If uncontrolled flows have been allowed, their impacts should be assessed and appropriate mitigation described.

D.P.R. Pages 5-2, 5-3, and 49. The report and statement maintain that the fluctuations of artesian head with the tide indicate that the artesian aquifer is already locally vented into the tidal waters. The probability of effects of tidal loading and unloading should also be considered as a plausible explanation. To a certain extent, indeed, the efficiency of an artesian aquifer in reflecting the effects of tidal loading indicates the integrity and efficiency of the aquaclude. Such tidal efficiencies of the aquifer can be used to calculate the coefficient of transmissivity.

D.P.R. Pag B-5, paragraph B-6. Consideration should be given to measures such as silt curtains to minimize adverse effects on water quality that may result from the migration of resuspended very soft and soft organic silts during dredging.

D.E.I.S. Summary

Page iii: The subsection on "Consequences of the Proposed Action" should contain a brief discussion on probable adverse impacts of the project on significant numbers and kinds of waterfowl and other waterbirds which use East Bay as a wintering, feeding, and sheltered resting area (see page 20). Impacts would be associated primarily with loss of tideflats and open water through filling, which causes permanent loss of food organisms and disturbance from boats and other activity.

Page iii: As will be discussed further, we do not agree that the total fill, especially those portions to be devoted to a cargo handling and storage area and to certain commercial uses, is an appropriate water dependent use of intertidal wetlands which should be judged acceptable.

D.E.I.S. - Purpose and Need

Page 1: Under the subsection on "Background," the discussion of Olympia Harbor and West and East Bays would be aided by including a map figure of Olympia Harbor which delineates East Bay, since the text is ambiguous as to whether areas north of the Port Peninsula and as far north as Priest Point Park are being considered as within East Bay. An acreage figure for East Bay should also be given to relate the proportion proposed for alteration by dredging, filling, etc.

Page 3: The discussion of moorage demand could be clarified by indicating whether it includes, or is in addition to, existing moorage (supply) as of 1966, 1968, 1980, etc. The proposed recreational development conforms to, and is in accordance with the Washington Statewide Outdoor Recreation Plan, 1979. Specifically, Planning District 5, in which the East Bay Marina would be located, shows a substantial need for additional launch lanes and moorages. This need is expected to double by the year 2000. If the current deficit is 250 moorages, the EIS should state how soon an 800 moorage facility would be

filled, assuming no other moorages are provided at other locations in the Olympia vicinity. Short fuel supplies, high fuel prices, and possible gas rationing could be a factor. The future date and moorage supply level the Corps marina facility planning aims for should be stated, as well as the proportion of that need which can be expected to be supplied by nonfederal projects and the proportion which could be met by dry moorage. For planning purposes, the EIS and DPR should state whether the East Bay marina is intended to supply moorage needs of all of southern Puget Sound or only the "Olympia area," and delineate what that area is.

Page 6: Under the subsection on cargo handling area, we note that the Port presently has 36 acres of "backup" land on the peninsula and uses the Olympia airport for cargo storage. According to Port figures, the total uplands on the peninsula is approximately 100 acres with 87 acres allotted to terminal use and 13 acres to industrial use. The optimal backup acreage per berth is 29 acres, according to the Port. Thus, the required backup area to serve 3 berths is 87 acres, which is what the Port now has. Relocation of nonwater-dependent commercial and industrial uses (now occupying 21 acres) to the airport industrial park could supply the needed waterfront backup space to serve water/land transfer facilities.

We note in the second paragraph of this subsection that the Port commissioned an economic assessment of their "proposed expansion of cargo storage area." There is a critical distinction which the Corps' DPR and the EIS failed to make between the legitimate cargo handling and terminal operating room (without which the shipping facility could not function at full or partial capacity) and general storage areas which can be satisfied on nearby uplands. Development of upland storage areas would be preferable to the destructive filling of tidelands which is discouraged by numerous federal regulations, orders, and policy guidelines respecting protection of wetlands.

Page 9: Under the "No Action" subsection there is an inference that wet moorage demand cannot otherwise be satisfied without a federal project. There should be a discussion of the prospect that private or other public marinas may be built to satisfy the demand for both trailerable and nontrailerable boats through 2020.

Page 10: We suggest renaming site 5 (in figure 2) as Priest Point to avoid confusion with the name of site 4, since this seemingly lies outside East Bay in Budd Inlet proper.

Page 11: Suitable sites for dryland storage (or "moorage") are probably not available at Olympia Harbor without filling of tidelands for space. However, the idea of totally filling East Bay for dryland storage is not an acceptable solution, since a principle environmental advantage of dry storage is avoidance of major dredging and filling impacts. We also do not believe that total filling is a solution to water quality problems or that they presently warrant such a drastic measure.

In conjunction with dryland storage, the EIS should address the prospects of federal participation in supplying additional public boat launching areas to partially relieve moorage demand pressures.

Pages 13 to 42: We generally concur in the assessment of wet moorage sites presented in the subsection on site selection (pages 13-42). Of all the sites outside East Bay, site 2 (page 15) most merits further consideration from the standpoint of minimizing water quality concerns and impacts on fish and wildlife. Site 3 (page 18) would entail destruction of West Bay Lagoon (page 21) which is important to waterfowl and shorebirds and presently is a favorite local fishing area.

The EIS should explain the statement on page 20 that an "optimum" capacity for East Bay is 1,500 moorages. After stating on page 22 that East Bay is heavily used by waterfowl and other water birds, the EIS then goes on to virtually dismiss the admittedly adverse impact which the proposed project (plan 4a) would have on those wildlife resources. We do not accept this evaluation, particularly in the absence of meaningful mitigation commitments to help offset the habitat losses.

Page 23: Photo 6 is apparently intended to show the small island referenced on page 43 and in the Fish and Wildlife Coordination Report (see page D-14) which, however, is located on the opposite side of Moxlie Creek, to the right.

Page 43: Under the subsection on "Selected Site Alternatives," the first paragraph mistakenly implies that plan 4e was eliminated because water quality sampling indicated the site was unsuitable; whereas it may in fact, be more suitable than the site of plan designs 4a, b, c, and d.

Page 43: Under the subsection titled "Plan 4a, Description," reference is made to "marina support facilities" to be developed by local interests on filled areas. More explanation of the known or probable nature of such facilities and their possible impacts should be provided. We define marina support facilities as those structures necessary to the operation of a marina and without which it cannot physically operate. It does not include such features as restaurants, import shops, motels, and office buildings which have appeared in Port plans for this site (see also DPR, page 7-2) and which can and should be located on available uplands.

Page 43: Reference is made to an area of 2.6 acres being used to provide proper surface drainage. We presume this area would serve to pond and filter storm water and parking lot runoff. The EIS should explain where it would be located, how it would operate, discharge, and be maintained.

Page 43: Under "Plan Effects," the statement is made that plan 4a would leave the more productive intertidal wetlands intact but would destroy a small island at the mouth of Moxlie Creek used by waterbirds. While this is essentially true, other plans (4b and 4c) would leave even more wetlands intact, would spare the island, and provide a greater "buffer" of space between the moorage basin and major bird use areas.

Page 44: Under the subsection on plan 4b, we note that deepwater disposal would be required for a portion of the dredged material. This would also be true for plans 4c, 4d, and 4e. In preliminary planning, deepwater disposal at Dana Pass was also anticipated for plan 4a, but is not now required (see DPR, page 4-7). It was also previously expected that dredged materials would prove too polluted for deepwater disposal, but the EIS states, "Open-water disposal--causes no significant adverse effects." No data are supplied on the suitability of East Bay spoils for open-water disposal. The Department of Fisheries has some concerns about impact on geoduck clam beds in Dana Pass if these spoils are unsuitable.

Page 44: The bottom paragraph states that plan 4b satisfies the principal planning objective (i.e., providing public boat moorage) and emphasizes, more than any other plan, the esthetic, ecological, and cultural contributions, (also see DPR, page 4-7) but may not provide a net positive contribution to the Environmental Quality (EQ) account because of uncertainty about the marina's effect in relation to periodic DO sags in East Bay waters. Nevertheless, the EIS labels plan 4b the least environmentally damaging (LED) plan. Hydraulic model tests were not performed on plan 4b. Thus, there are no data to indicate that resultant water quality would be better or worse in relation to plan 4a or presently existing conditions.

Pages 45 and 46: With reference to plan 4d, we do not see how any interests are benefitted in relation to other plans, since only 500 moorages would be provided and nearly as much filling is involved as with plan 4a. However, we would point out that we do not see a "tradeoff" of moorages for cargo area as less inappropriate than the tradeoff of cargo area for fish and wildlife habitat, as is suggested on pages 48 and 82 and in the DPR, page 7-4.

Page 47: Table 4 compares the site 4 alternatives and is a condensed version of Exhibit 1 in the DPR (follows page 10-2). It contains an error in that no deepwater disposal is indicated under 4d, whereas page 45 states 370,000 cubic yards would be disposed in deepwater. Table 4 indicates that plans 4a, 4b, and 4c are very similar in nearly all key selection factors, except that 4a involves significantly greater acres filled, greater land enhancement value and somewhat greater construction and maintenance costs. The benefit/cost ratios of the three plans are high and nearly identical. The only clear contrast is that none of the plans, except 4a, has local sponsor support.

Exhibit 1 in the DPR provides a more comprehensive basis for site selection and could be revised to provide an even better display of comparative merits. For instance, all three plans (excluding 4d) provide 800 moorages. The breakwater for 4b is 250 feet (much less costly) and for 4a is 700 feet, while 4c is intermediate at 400 feet. Cargo area for 4a is 24.2 acres; for 4c it is 7.4 acres; and for 4b it is zero. Fill for marina support is nearly identical for the three plans. Marina support facilities and utilities are provided under all three. The Federal costs of 4b and 4c are the same and $200,000 less than 4a. Average annual benefits after costs are very comparable for 4c and 4a.

The environmental quality factors (beginning page 4 of Exhibit 1) fail to make essential qualitative distinctions. For instance, all plans would reduce dissolved oxygen, but the chart does not indicate which would cause the highest and lowest reductions. The same is true for basin flushing efficiency. Under "land use," comparisons can readily be made for intertidal wetlands lost; i.e., 4a high; 4b moderate; 4c moderate. Under "Animals," wildlife (mammals) displaced or destroyed would be low for all three. However, waterfowl and shorebirds lost would be high for 4a and moderate for 4b and 4c. Benthic fauna lost would be the same. Disruption of fish habitat under 4a would be moderate, but 4b and 4c would be less by comparison. Disruption of bird watching would be high for 4a and moderate for 4b and 4c.

Similarly, increased waterborne commerce for 4a might be high, whereas 4c might be moderate. Plan 4a rates low in minimizing environmental effects compared to 4b and 4c which would rate significantly higher, provided water quality is suitable for all three plans. To state that plans for 4b and 4c are unacceptable to local government agencies (whereas 4a is acceptable) is misleading and requires clarification and explanation. We note that plan acceptability to water quality agencies and fish and wildlife agencies is not included as a factor, although this is implicit for water quality certification (see page 79).

Page 48: The EIS states economic and social gains are judged greater than the biological losses from filling of wetlands and therefore plan 4b was not selected as the preferred plan. No rationale is given for not selecting plan 4c, except it is not acceptable to the local sponsor (page 45) and loss of productivity and disturbance of waterfowl would be somewhat greater than for plan 4b.

The social and economic gains of plan 4a over 4c appear to be limited to increased cargo storage area for the Port and land enhancement values that would be derived in large part from nonwater-dependent commercial developments on newly created uplands. The EIS says, "Such a tradeoff is appropriate under NEPA, Executive Order 11990, and Corps of Engineers regulations." We do not believe any of these documents indicate that it is appropriate to destroy wetlands to locate non-water dependent developments in waterfront locations.

Page 54: Under "Avian Fauna," it should be noted that observations of waterfowl distribution by Taylor, et al. were based on field work over just a two month period in the spring. Censusing by the Fish and Wildlife Service was conducted at approximately weekly intervals over a full year. Data on bird distribution within Olympia Harbor were supplied with a FWS planning aid letter dated November 23, 1976.

Page 56: Under "Fisheries, Recreation, and Tourism" the species of fish caught in East Bay include starry flounders,striped seaperch, pile perch, shiner perch, and sea-run cutthroat trout (near the bay entrance).

Page 57: The first paragraph implies that all Puget Sound beaches are open to the public for shellfishing. Actually over half are privately owned.

Page 57: Under "Wetlands" (see also page 74), we note that wetlands have been defined to include nonvegetated intertidal areas. The current national wetlands inventory by the FWS includes intertidal flats, reefs, beaches, bars and rocky shores as well as subtidal areas.

Page 67: Under "Water Quality" we note that compared to background, DO levels may be reduced by as much as 1 milligram per liter within the proposed marina. This is actually a significant reduction in a marginal DO situation which occurs during August and September. This subsection should include a discussion of impacts from petroleum spills and sewage generated within the marina (refer to page 86, top).

Page 69: Under "Terrestrial and Marine Ecology" there is no mention of borrow pit sites or the environmental impacts on terrestrial wildlife from quarrying sand and gravel to construct fill dikes. Proposed or potential sites should be identifed and impacts including transport to the project area discussed.

Page 72: The second paragraph discusses a tradeoff of existing habitat and productivity with the creation of new types of habitat by marina construction. In East Bay there is said to be an equal tradeoff or a net positive contribution from the marina. Undoubtedly a different composition of prey and predator species would occur, but we question that a net benefit would occur for nonsalmonid fishes (page 70), particularly in the case of plan 4a which would remove a greater area of water column and benthic production presently receiving substantial use by wildlife and nonsalmonid fish (as discussed on pages D-9 and D-13).

Page 78: Under "Local Shoreline Master Programs," we point out that Thurston County has no marine (saltwater) shorelines designated "Natural, and thus potentially all saltwater shorelines of the County would be available to marina development under the master program. Therefore, the statement on page 22 (under "Other Considerations") that the only shoreline reach designated urban in SMP is at Olympia and thus the marina conforms to all Federal, state, and local land use plans is also misleading. Marina development is not confined to the urban shoreline, nor does the fact of such designation automatically mean that marina development is appropriate for a given site. Contrary to the impression given on page 7-4 of the DPR, adoption of the Master Program did not foresee or approve this particular project or mandate its approval. We are aware of no adopted Federal or state land use plan for this area, unless the CZM Program is to be regarded as a land use plan.

Page 78: An "Olympia Harbor Plan" of 1975 is mentioned near the bottom of the page. To our knowledge, this plan was developed unilaterally and without opportunity for natural resource and environmental agencies or the general public to review it.

Pages 81 and 82: Under the subsection on "Executive Order 11990, Protection of Wetlands," we note that the terms "cargo handling area" and "cargo storage area" are used interchangably. There is a difference between those areas needed for cargo handling and those areas needed for storage of materials brought in by ship. The report is not persuasive that much of the storage need cannot be provided at upland sites. Direct handling of cargoes, on and off ships, is obviously water dependent, but storage, processing, sales, etc., can be done elsewhere. The storage presently done at the airport clearly demonstrates this.

While the Port's plans may call for additional land to be created by filling in public navigable waters, this is not binding on Federal agencies who are charged by the President to avoid wetlands destruction. Where reasonable alternatives exist, the sacrifice of wetlands to non-water dependent uses is directly contrary to Executive Order 11990.

Page 82: In the bottom paragraph, the EIS states that biological losses incurred from the proposed project (plan 4a) are judged to be small and acceptable in light of social and economic benefits derived. It further states that no practicable alternative to the proposed alteration exists, and that the selected plan includes all practicable measures to minimize losses to wetlands in compliance with Executive Order 11990. We point out that the "Alternatives" section did not find plans 4b and 4c to be impracticable nor economically unjustifiable, (or even significantly inferior) to plan 4a. If plan 4a is in compliance with E.O. 11990, the least environmentally damaging plan (4b) and next least (4c) are even more so. Thus all practicable measures to minimize losses to wetlands would not be taken under 4a, even when economic and social factors are considered.

According to the DPR (page 4-1), "While not a part of the marina project, the cargo fill area is reviewed in this report because it is a disposal site for dredged material from the project and because it is a part of the overall plan of development by the port." These are the only apparent reasons to prefer plan 4a over plans 4b and 4c. Disposal would be less convenient under plans 4b and 4c and the port would not obtain its desired additional cargo storage area, although plan 4c would provide almost a third of the cargo storage that 4a would provide. Evidently, provision of a feature which is "...not directly a part of this Section 107 project..." (see DPR page 7-4) has taken precedence over the Presidential directive to "...take action to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands ..." as stated in section 1(a) of E.O. 11990.

Page 83: Any demand for local resources of stone, or sand and gravel, such as aggregate for the concrete breakwater sections, should be acknowledged under "Irreversible and Irretrievable Commitments of Resources." Assurance should be given that the project will not significantly deplete local resources of these materials. Although sand and gravel deposits are locally abundant, economically accessible resources are diminishing near population centers.

Page 86: Under "Mitigation and Amelioration of Adverse Effects," we believe there should be a reference to mitigation features requested in the Fish and Wildlife Coordination report. The final EIS should contain a discussion of the specific fish and wildlife mitigation measures which the Corps and sponsor will be committed to carry out under whichever marina plan is finally selected. We do not consider that the measures alluded to in this subsection are sufficient.

Page 89: FWS mitigation recommendation (i) is that a public fishing jetty or pier be constructed along the northeast shore of East Bay. We continue to request this because fishing from the proposed floating breakwater is likely to be unproductive since there will be no artificial reef and few pilings to attract fish. A small jetty or pier on the northeast shore would be more accessible for neighborhood fishermen and not conflict with marina operation.

Page 89: FWS mitigation recommendation (j) is for one or more small islands to be constructed for waterfowl attraction and resting in East Bay. The EIS does not indicate a firm commitment to provide these. If they are not feasible in suitable locations, an alternative would be to construct small log rafts between pairs of pilings which would rise and fall with the tides. Also, if plan 4a is to be implemented, we would request the sponsor convey or dedicate West Bay Lagoon to a nondevelopment use. If plan 4c is to be implemented, we would request additional small islands be created with dredged material at suitable locations along the west shore of West Bay. We believe this can be done at low cost and without interference to boating or other activities.

Page C-6: Paragraph 6.3.4 is incorrect. Removal of habitat in the proposed disposal area will permanently exclude it from waterfowl use. Paragraph 6.3.5 should state that the role of mudflats (wetlands) in pollution assimilation and nutrient storage has not been determined in East Bay.

Page C-7: Paragraph 6.4.4 "Wildlife" is misleading because it states the proposal would have little effect on wildlife. Waterfowl as well as other birds are classified as wildlife. Except for possible impacts at the sand and gravel borrow site, mammals, reptiles, and amphibians do not occur in significant numbers to be of concern. Paragraph 6.4.8 states there are no significant wetlands in the disposal area. This statement disregards the Corps' definition of intertidal areas as wetlands (page 57).

Page C-8: Paragraph 6.5.2 should be rewritten to state that upland sites for spoil disposal are not available. The alternative to open-water disposal (partial under plans 4b and 4c) is tideland disposal.

Page C-8 and C-9: Under "Conclusions and Determinations," we do not concur in the statements that the proposed filling will have only a minor effect; or that the preferred plan (alternative 4a) has the least overall impact; or that the filled area would be used primarily for water dependent uses; or that other fill or disposal sites are not practicable. Our reasons have been previously stated on each of these points.

Minor Errors in DPR

DPR, page 2-4: Under "Wildlife Resources," the statement concerning declining populations of canvasback ducks is contained in the Fish and Wildlife Coordination Report (page D-12). Reference to the personal communication should be deleted.

Page 5-2: The photograph and depiction of the proposed project does not match plates 2a and 2b in some respects. A note to this effect should be added.

Page 7-1: The last three listed effects of the plan concerning wetlands and waterfowl are so worded that the impression is given that no significant losses would occur.

Summary

The expressed concern of the Port of Olympia is that they will not get their share of any increases in water borne commerce without additional cargo handling space. While this is not ostensibly the main purpose of this project, it has resulted in the selection of a plan 4a, which will destroy 51 acres of wetlands.

Neither the DPR or the EIS faces squarely the question whether limiting present space on the peninsula to direct water-dependent cargo handling would not in fact provide all the necessary back-up land for existing berths. All materials shipped at Olympia do not have to be stored, processed, sold, etc., in a waterfront location. Upland sites are available for non-water dependent activities.

A less costly plan, 4b, is available which still results in a serious loss of 27 acres of wetlands but which meets directly water-dependent moorage needs. To quote the DPR on plan 4b ..."This plan has a benefit cost ratio of 2.2 to 1 ...This is a plan which satisfies the planning objectives, makes the most significant contribution towards preserving, enhancing and maintaining or restoring the cultural and natural resources of the study area; and causes the least environmental impact while addressing the planning objectives."

We must therefore, recommend against plan 4a and support plan 4b. We must also recommend denial of Section 10/404 permits for 4a since this plan involves avoidable destruction of wetlands for non-water dependent purposes and is directly contrary to the President's Executive Order 11990.

We would be happy to discuss plan selection further including plan 4c, modifications of plan 4e, or other approaches which do not degrade water quality in East Bay and which do not trade wetlands for non-water dependent uses of filled lands.

We would ask that the Corps and Port of Olympia contact Mr. Joseph Blum, the U.S. Fish and Wildlife Service Area Manager in Olympia with a view to arriving at a plan which reduces wetlands losses.

Sincerely,

Charles S. Polityka
Regional Environmental Officer

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

1200 SIXTH AVENUE

SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: Mail Stop 443

FEB 28 1980

Colonel Leon K. Moraski
District Engineer, Seattle District
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

We have completed our review of the draft Environmental Impact Statement (DEIS) on the East Bay Marina project at Olympia, Washington. Overall, the DEIS does a good job of following the spirit and goals of the Council on Environmental Quality regulations implementing NEPA. We also appreciate the meeting in your office on February 11 to discuss this project. Information presented there helped answer some of the questions we had on the DEIS. However, we do not believe that the information presented in the statement supports the Corps of Engineers' conclusion that the development and operations of the marina as currently proposed with Plan 4a will not result in unacceptable environmental consequences.

We believe that alternative plans 4a through 4d may not be environmentally acceptable due to their potential adverse consequences for water quality and aquatic resources. Our evaluation of the modeling studies for the proposed marina indicates that any marina development within East Bay proper will reduce the water exchange in the Bay. The consequent increase in flushing times for the East Bay basin would probably result in extremely poor water quality conditions. However, the analyses available to date do not allow one to reach firm conclusions regarding the magnitude of the potential water quality impacts. Such information is essential in order to determine whether, in fact, each of these questionable alternatives would be environmentally unacceptable. Therefore we urge that the Final Environmental Impact Statement provide a more thorough quantitative analysis of the magnitude and duration of the water quality changes which would result from the construction and operation of these alternative boat basins.

This potential degradation of water quality in East Bay would, at times, cause more severe losses of aquatic resources of commercial and recreational importance. As reported in the statement, fish kills of adult salmon have already been observed in lower Budd Inlet, due to the

not uncommon extremely low dissolved oxygen (as low as 0.0 mg/l) and elevated water temperatures (in excess of 22 degrees centigrade) in late summer and early fall. The potentially reduced water exchange, and hence water quality, that would be caused by the marina development is highly significant since the ambient conditions are already at times quite marginal and barely support aquatic life.

There are nearby alternative sites which may not have as severe impacts. We believe that site 2 and alternative 4e should be further evaluated as both would appear to have significantly greater potential for water exchange and lesser potential conflicts with aquatic resources when compared to a basin inside East Bay. A larger marina support facility area which eliminated the need for open water disposal could make 4e a more competitive option. Either of these alternatives may be less environmentally damaging; however, further, more detailed evaluation of both will be required before they can be determined to be environmentally acceptable. In both cases, the Port's proposed fill for additional cargo handling and storage should be evaluated on its own merit and impacts in the EIS.

We have reviewed Public Notices 071-0YB-1-006165 and NPDEN-PL-NC-79-1 regarding Section 10 and Section 404 permits for the proposed marina. We are unable to provide meaningful comments on these permits until there is a better definition of the environmental impacts. Accordingly we request those permits be held in abeyance until such information is available and the EIS process is completed.

From the standpoint of the Environmental Protection Agency's area of concern and expertise, we are rating this statement EU-2 (Environmentally Unsatisfactory, Insufficient Information). This rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, as amended. As noted above our environmental concerns are that each of the alternative boat basin's in East Bay proper have the potential to result in significant water quality degradation and the draft environmental impact statement does not adequately analyze either potential mitigation measures, such as mechanical flushing assistance, or alternative sites which appear to be environmentally preferable.

In the absence of a substantially revised and improved environmental analysis and the selection of a basin site and basin design which protect water quality we will be compelled to rate the proposed project as environmentally unacceptable pursuant to the requirements of Section 309 of the Clean Air Act. In such an event we would be required to refer the matter to the Council on Environmental Quality for arbitration in accordance with the procedures specified in 40 CFR 1504.3 et. seq.

We appreciated the opportunity to review this draft environmental impact statement and to meet with you to discuss it. Please do not hesitate to contact me or Duane Karna and John Yearsley of my staff should you have questions regarding our comments. Messrs. Karna and Yearsley's respective telephone numbers are (206) 442-1352 and (206) 442-1296.

Sincerely,

Donald P. Dubois
Regional Administrator

Attachment

ATTACHMENT

Water Quality Impacts

1. Documentation of significantly reduced water exchange.

There are a number of indications that the dredging, which will change 56.8 acres of tidelands and shallow subtidal lands to a deep water environment, will produce a basin with significantly reduced water exchange as compared to the existing conditions. Without dredging, more than one-half of the surface area of East Bay is above the level of mean lower water (MLLW) and nearly all of the area is above the -4 MLLW contour. Under these conditions the bay will nearly completely flush under +10.5-foot mean tide conditions. With the proposed alternative 4a, nearly one-half of the narrowed bay would be at -8 feet or deeper. The result is that the proposed basin significantly increases the water volume below MLLW in East Bay, while significantly decreasing the flushing.

The results of the modeling by the University of Washington, which was for a basin similar to the one currently proposed, clearly show the decreased water exchange characteristics for the dredged East Bay. For example, the distal (southern) approximately one-quarter of the basin has exchange characteristics which are 77, 41 and 38 percent worse than the northern one-half of the basin for neap, mean and spring tides, respectively.

The statement treats all options of alternative 4 as if they had equal water exchange characteristics. Clearly this is not the case. As shown by the University of Washington hydraulic model study, the further the basin extends into East Bay the poorer the flushing will be. Using this information, alternative 4e would have the most favorable water exchange of all of the other options under alternative 4.

2. The relationship (correlation) between reduced water exchange and degradation of water quality.

The EIS does not evaluate the significance of the increased water volume nor the decreased water exchange with increasing distance into East Bay. Existing studies lend support to our belief that there is a direct relationship between increased water exchange time and decreased water quality conditions in marinas, though the details have not been clearly defined. Some examples of water quality impacts in marinas include:

a. Skyline Marina

In the University of Washington, Washington Department of Fisheries and EPA studies at Skyline Marina, a close relationship between reduced exchange coefficients and elevated water temperatures was observed.

b. Lagoon Point Marina

Water quality and water exchange information exists for the Lagoon Point Marina. Water quality outside the basin (Admiralty Inlet) is normally excellent while on the inside of this basin dissolved oxygen as low as 2 mg/l in the poorly flushed distal end was found. Chlorophyll concentrations were also reported for this marina.

c. Edmonds and Port Townsend Marinas

Contrary to the Corps' statement (page 67) that the water quality data for Edmonds and Port Townsend marinas indicate no difference between conditions inside and outside of the basin area, EPA's raw data shows higher water temperature and lower dissolved oxygen concentration on the inside of these basins.

Edmonds, Kingston and Port Townsend marinas are not good comparisons for the proposed East Bay Marina (DEIS page 67) because they are located in areas where ambient water quality is significantly better, and on shorelines with stronger longshore water currents which result in improved internal mixing within the marinas.

Since the marina may have significant impacts upon water quality, the EIS should include an analysis of their magnitude and duration. We believe that the methods used by the Department of Ecology in Budd Inlet in conjunction with methods developed by EPA Region 10 for small embayments with known characteristics, can provide estimates of marina-related changes in temperature and dissolved oxygen. We recommend that the Corps use these, or other appropriate methods, to develop quanitative estimates of the severity of the water quality impacts. These estimates and their development should be subject to review by concerned agencies before incorporation into the EIS. In particular, we are willing to assist the Corps in developing the methodology for the analyses.

We believe it is likely that given the slight degradation in water quality found in the marinas mentioned above, alternatives 4a, b, c, and d will result in significantly greater water quality reductions.

3. Significance of reduced water quality.

The reduction in water quality that would be caused by a marina in East Bay is highly significant since the ambient conditions are already at times quite marginal and barely support aquatic life.

As you are aware, recent studies by your agency and the Washington Department of Ecology clearly indicate that lower Budd Inlet, including East Bay, does not always meet water quality standards for dissolved oxygen and temperature. Dissolved oxygen as low as 0.0 mg/l and water temperatures in excess of 22 degrees centigrade are not uncommon for this area in late summer or early fall. Fish kills of adult salmon have been observed in lower Budd Inlet.

The quanitative analysis requested by EPA should provide an estimate of the potential severity and duration of water quality problems aggravated by any marina in East Bay proper (Plan, 4a b, c, and d). Marina related water quality problems are critical since the deeper waters provided by the marina will likely attract additional adult salmonids and juvenile fall chinook that are in lower Budd Inlet. The susceptibility of these fish to the late August/early September DO sag (described on page 52) would be increased and may result in unacceptable losses of these species. It appears likely that if this marina is constructed, larger fish kills over longer time periods will occur. Even the DEIS suggests (page 43) that the effects on the biological resources may be significant. These fish are aquatic resources of commercial and recreational importance.

Therefore, we believe that due to Alternate 4e's more favorable water exchange, and hence water quality, of all Alternative 4's, Alternative 4e is the only one that should be seriously considered for development.

4. Water quality impacts due to dredging.

The DEIS does not evaluate the potential water quality impacts that can occur during the dredge disposal operations from a dredging project in East Bay. Due to the high organic accumulations that are very likely present in the sediments from past log processing and handling operations in East Bay, the effluent from the hydraulic dredging operations has the potential for causing serious water quality problems in Lower Budd Inlet. The statement should provide information on how dredging and disposal operations will be controlled to minimize these potential impacts, both to water quality and aquatic resources.

Expanded Evaluation of Alternatives

We feel that the impacts listed for site 2 (pages 15, 18 and 42) are not sufficient to rule out detailed evaluation. Water quality impacts should not be significant at this site. This alternative should be scaled down to site 4a size--an 800 boat capacity. This will reduce the quantity of material to be dredged, parking requirements, potential conflicts with the navigation channel, and construction costs. More information is needed on how the "flow through" design will interfere with out migrating juvenile salmon. This type of design is recommended by the Washington Department of Fisheries' 1971 Marina Design Criteria.

For alternative 4e, the DEIS (page 43) indicates that this plan was eliminated due to water quality concerns and that (page 46) the intertidal area at this site is one of the more productive intertidal areas in Olympia Harbor. Information substantiating these claims, which we disagree with, is not contained in the statement.

Also, there is a definite need to further evaluate a proposal at the 4e location that has a marina support facility area comparable in size to the other options of alternative 4. Such an enlarged support area could accomodate all of the proposed dredged material as is the case in the other options of alternative 4, thereby eliminating the need and cost of

open water disposal. Further, the statement should more closely evaluate the volume of dredged material originating from a 4e proposal, particularly if the breakwater and basin are positioned northward in deeper water to 1) provide for a larger fill area, and 2) increase the size of the marina to 800 slips. On gross inspection of this proposed revision to 4e, we believe that less material would have to be dredged, particularly since a long entrance channel is not required as is the case with the other options of alternative 4. If the assumptions used in costing out Alternative 4e were consistent with those used for the other alternatives it is likely 4e would emerge as a more competitive option than as now presented.

For both of these alternatives, the water quality and aquatic resource impacts should be examined in depth. Additional modeling and sampling may be needed to bring the level of quantitative analysis up to the detail of Alternative 4a.

For all alternatives, the Port's proposed fill for additional cargo handling and storage should be evaluated on its own merits and impacts within the EIS. More information from the reports on cargo area needs prepared by the Port's consultants should be presented and discussed.

A benefit/cost and environmental impact analysis for all alternatives (DEIS pages 9-11) would be interesting. Such an analysis should include greater consideration of more boat launching ramps, trailers, and some dryland storage.

More detailed information should be included on the reason for selecting a floating rather than a solid breakwater. A summary of the wave analysis, water circulation and flushing studies would be useful in supporting your decision to plan for a floating structure.

As mentioned in the DEIS (page 86), the Substantial Development Permit specified the availability of a mechanical flushing devise to ensure that water quality in East Bay will be acceptable for salmonid survival. The EIS should include a review of appropriate designs for flushing devices, estimates of capital cost and energy consumption, and an evaluation of how effective such devises will be in satisfying the Department of Fisheries water quality goals.

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753-2800
Mail Stop PV-11

February 11, 1980

Colonel Leon K. Moraski
District Engineer
Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

Thank you for the opportunity to comment on the draft environmental impact statement for the "East Bay Marina," Olympia Harbor, Washington. We have coordinated the review of this EIS with the other state agencies and the following is a summary of the comments received. Please refer to the attached letters for complete comments. The extension of the review period is also greatly appreciated.

Department of Ecology

On May 4, 1976, the department gave approval of this project through the state's Environmental Coordination Procedures Act (ECPA) subject to the resolution of certain water quality problems. Since that time, the department has determined that, although the water quality is poor and will remain poor with the project, the project will not have a significant effect on this situation and should not be delayed because of it.

Therefore, the department approves of the proposal (alternative 4a) with the provision that good engineering practices be employed during both construction and operation.

Department of Game

The Department of Game feels that the additional landfill required (23.4 acres) to accommodate the preferred plan (4a) would likely result in negative environmental impacts. The elimination of feeding and resting areas would affect waterfowl and shorebirds of Budd Inlet and the Pacific Flyway.

Department of Fisheries

Comments not received by final review date.
(Comments will be coming)

Parks and Recreation Commission

No comments to offer.

Interagency Committee for Outdoor Recreation

No comments to offer.

Thank you for the opportunity to comment. If you have any questions, please contact the appropriate state agency or Jerry Thielen of our Environmental Review Section (206) 753-2806.

Sincerely,

Elmer C. Vogel
Deputy Director

ECV:me

Enclosures

cc: Mark Grandstaff, Department of Game
Jerry Thielen, Department of Ecology
Mike Palko, Department of Ecology
Earl Fi..., Department of Fisheries

STATE OF WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753 2800

M E M O R A N D U M

February 11, 1980

TO: Elmer C. Vogel, Deputy Director

FROM: Mike Palko, Office of Operations MP
Greg Sorlie, Environmental Review GS

SUBJECT: East Bay Marina Project

Department of Ecology staff have reviewed the Corps draft EIS for this proposal and offer the following comments:

1. This project was processed through the Environmental Coordination Procedures Act (ECPA) in the mid-1970s. On May 4, 1976, all state agencies approved the proposal subject to several conditions. The major condition was that a satisfactory resolution be found to solve water quality issues.

2. Since then, we have determined that during construction, water quality can be maintained to reasonable standards through the use of good engineering practices. This will be assured through a conditional water quality certification issued under Section 401 of the Federal Clean Water Act. The conditions will address water quality monitoring and operational controls, possible chemical treatment, and review and approval of the design of the dredging. After the construction of the marina is completed, there still may be uncertainties regarding the effect of the marina on long term water quality. On the balance, the water quality should not be significantly reduced due to the construction of the marina at the proposed East Bay location.

3. In conclusion, we see no reason to object to the project as approved in the ECPA process.

MP:GS:me

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way, GJ 11 Olympia, WA 98504 206/753 5700

January 15, 1980

Colonel Leon K. Moraski
Corps of Engineers, Seattle District
Post Office Box C-3755
Seattle, Washington 98124

DRAFT ENVIRONMENTAL IMPACT STATEMENT
AND DRAFT DETAILED PROJECT REPORT:
East Bay Marina, Olympia, Thurston County

Dear Colonel Moraski:

Your documents have been reviewed by our staff as requested; comments follow.

Although we recognize the need for additional small boat moorages in southern Puget Sound, we feel these moorages should be designed and built in a manner which guarantees few deleterious environmental impacts will occur. It appears the East Bay site would be one of the least environmentally damaging locations for the marina. In accordance with our philosophy of assuring maximum protection for fish and wildlife habitat, we recommend you adopt alternative 4b. This provides 800 small boat moorages while only filling 30 acres of tidelands. By limiting any excessive fill, you avoid setting a precedent for future piecemeal fill activities on the port peninsula in Budd Inlet. Since this is already a highly stressed environment, creating land for cargo storage by filling tidelands does not seem to be in character with the best and most appropriate use of our limited shoreline resource.

Marina development will likely have negative impacts on waterfowl and shorebirds of Budd Inlet and the Pacific Flyway. Filling 53 acres of tidelands and bottomlands without replacement or mitigation will not only eliminate feeding and resting areas, but the close proximity of development and reduced water surface area between the marina and East Bay Drive may further reduce the desirability of remaining habitat for waterfowl use. All but the most tolerant species may find the area unacceptable. Wetland and island establishment, replacing existing pilings, and reduction of proposed fill would help mitigate impacts on waterfowl and shorebirds to some extent and should be included in the final design of the project.

Water quality deterioration in Budd Inlet may occur as a result of this proposal. To help reduce impacts on water quality of East Bay, stormwater runoff should be routed to West Bay and oil and grease separators should be installed and maintained. Even though present analyses suggest that the inload of effluent does not appear to be a controlling factor in low DO conditions and that phytoplankton blooms are important in influencing water quality, secondary treatment should be considered an integral link in overall water quality of East Bay. As stipulated in

Port of Olympia's Substantial Development Permit (ECPA application 74-0050), no dredging may occur unless assurances are made that all sewage entering Olympia Harbor is within 12 months of achieving secondary treatment. All possible protective measures should be implemented to insure that Washington Department of Ecology water quality standards are maintained. Periodic monitoring of water quality should be required and, if standards are exceeded, work should be temporarily discontinued until standards can be met.

We suggest that recommendations of the Fish and Wildlife Coordination Act Report, especially those involving reduced fill, the establishment of islands and wetland habitat in the remaining portions of East Bay, marine pump-out facilities, stormwater drainage, cleanup and beautification of East Bay tidelands, and public fishing and launch facilities, be required as part of any permit conditions for this project.

Thank you for the opportunity to review your document. We hope you find our comments helpful.

Sincerely,

THE DEPARTMENT OF GAME

Mark H. Grandstaff

Mark H. Grandstaff, Applied Ecologist
Environmental Affairs Program
Habitat Management Division

MHG:cv
cc: Agencies
Regional Manager

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane, Olympia, Washington 98504 **M.S. KY-11** 206/753-5755

December 11, 1979

35-2650-1820
DEIS - East Bay Marina
(E-1832)

Mr. John Malek, Environmental Coordinator
Department of the Army
Seattle District, Corps of Engineers
P.O. Boc C-3755
Seattle, Washington 98124

Dear Mr. Malek:

The staff of the Washington State Parks and Recreation Commission has reviewed the above-noted document and does not wish to make any comment.

Thank you for the opportunity to review and comment.

Sincerely,

David W. Heiser

David W. Heiser, E.P., Chief
Environmental Coordination

DWH/PJP:jh

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane, Olympia, Washington 98504
206/753-5755

December 13, 1979

MEMORANDUM

TO: Barbara Ritchie, Environmental Review
Department of Ecology

FROM: David W. Heiser, E.P., Chief
Environmental Coordination

SUBJECT: Draft Environmental Impact Statement - East Bay Marina

We received the above-noted document from the Corps of Engineers December 10, 1979. We had already responded to them when we received another copy of the EIS from you. Attached is a copy of our response to the Corps.

If you have any questions feel free to call me at 753-2016.

jh

Attachment

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF TRANSPORTATION KF-01
Highway Administration Building, Olympia, Washington 98504 206/753-6005

December 24, 1979

Mr. John Malek, Environmental Coordinator
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C - 3755
Seattle, Washington 98124

U. S. Army Corps of Engineers
East Bay Marina: Olympia Harbor
Draft Environmental Impact Statement

Dear Mr. Malek:

We have reviewed the subject document and have no comments to offer regarding the proposal.

Thank you for the opportunity to review this information.

Sincerely,

ROBERT S. NIELSEN
Assistant Secretary for
Public Transportation and Planning

By: WM. P. ALBOHN
Environmental Planner

RSN:yw
WPA:WBH

cc: Environmental Section
R. Albert

STATE OF WASHINGTON

Dixy Lee Ray
Governor

OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 West Twenty First Avenue, Olympia, Washington 98504 206/753-4011

December 19, 1979

Leon K. Moraski
Colonel, Corps of Engineers
Department of the Army
Seattle District, COE
P.O. Box C-3755
Seattle, WA 98124

RE: 101-F-COE-S-07
East Bay Marina

Dear Colonel Moraski:

A staff review has been completed of your draft detailed project report and draft environmental impact statement. We concur with measures proposed in the draft EIS to identify cultural resources which may be present. In the event that such resources are disclosed through survey or site preparation, please notify this office. We will be pleased to assist in the development of measures to mitigate anticipated impacts.

Thank you for this opportunity to comment.

Sincerely,

JEANNE M. WELCH, Deputy State
Historic Preservation Officer

Sheila Stump, Archaeologist

md

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington 98504 206/753 6600

February 13, 1980

Ms. Barbara Ritchie
Environmental Review
Department of Ecology
Lacey, Washington 98504

Dear Ms. Ritchie:

The Washington Department of Fisheries (WDF) has reviewed the draft detailed project report/draft environmental impact statement (DPR/EIS), dated December 1979, for the proposed East Bay Marina, Olympia Harbor, Washington. As you are probably aware, we have been deeply involved in this proposal since about 1974. Our involvement has included comments on the state EIS, public hearing statements, meetings with the local sponsor, and ultimately defending our permit actions before the Washington Pollution Control Hearings Board. Our permit action at that time was conceptural in nature with the understanding that final approval would be contingent on the results of Corps of Engineers water quality studies and hydraulic model studies. The conceptual approval was also based on the written assurance of the local sponsor that the marina construction would "not precede sewage treatment improvement" and that WDF would "still have veto power under the federal U.S. Corps permit system" (Memorandum dated November 18, 1975 to the departments of Fisheries and Game from G. W. Sibold, Manager, Port of Olympia).

The Department of Fisheries is responsible for the preservation, protection, perpetuation, and management of the food fish and shellfish resources in the waters of the State of Washington. In performing these functions locally, we have gained considerable experience and knowledge of existing, physical, chemical and biological conditions in Budd Inlet, the West Bay of Olympia Harbor, Capitol Lake and the Deschutes River. We have also conducted a monumental chinook salmon rearing program in the Deschutes River - Capitol Lake system for almost 30 years since the Deschutes River fishways and adult salmon holding ponds were built by the Department of Fisheries at considerable public expense. The 1980 production level represents a value to the combined sport, commercial, and Indian fisheries in the millions of dollars annually.

The projected 1980 releases of chinook salmon from Percival Cove are 1,150,000 yearlings in March and 8,000,000 fingerlings in May. Table 1, attached, shows a minimum catch value of nearly 4 million dollars to the fisheries from the 1980 releases alone. If the 1976 dollar values suggested by Higgs were applied to the catch figures on Table 1, then the total catch value would exceed 7 million dollars for the 1980 releases. In addition, these releases contribute very heavily to Salmon Punch Card Area 13 (South Sound). In 1977 there were 212,699 marine angler trips in Area 13 which was only exceeded State wide by Area 2 (Westport-Ocean Shores). The educational, economic and recreational

values of salmon run to the local community are impossible to assess, as are the sport fishing benefits to many of the 19,499 sport salmon fishermen residing in Thurston County who represented 19.3% of the total population in 1973. In summary, the salmon rearing program is of enormous value to state and local residents. Large numbers of Pacific herring and surf smelt are also found in Olympia Harbor at certain times based on recent information.

Our detailed comments and questions on the DPR/EIS are as follows. We request this entire letter be sent to the Corps of Engineers as part of the State of Washington's coordinated letter of comment.

Comments on the Detailed Project Report

AFFECTED ENVIRONMENT

2-10 Phytoplankton Blooms (Certatium sp). This section indicates conversion of the sewage treatment plant is scheduled to begin in 1981. We suggest adding the completion date which we understand is in April, 1983.

2-14 Fisheries Resources. We suggest updating the figures on adult salmon returns or referring to tables supplied by WDF showing catch and values.

SELECTING A PLAN

4-17 Based on the Corps' prediction of poor water quality, we do not agree with the indication that plan 4a will minimize environmental damage. We also disagree that plan 4b comes closer to meeting the Corps' environmental Quality Plan than any of the five plans evaluated as discussed under plan 4e below.

4-19 Site 4, East Bay. We concur that East Bay tidelands have very little productivity for fishery resources.

4-21 Site 4, Plan 4b. We disagree as this is the least environmentally damaging plan when considering the Corps' predicted prolonged DO sags and fish kills.

4-24 Site 4, Plan 4e. Based on the Corps of Engineers' conclusions, we believe a modification of this plan, that of finding another site for disposal of 550,000 cubic yards of spoil material at Dana Pass, could be a solution to preclude the predicted fish losses and poor water quality.

VIII DIVISION OF PLAN RESPONSIBILITIES

Costs and a detailed proposed plan for corrective action should be included if predicted water quality impacts and/or fish kills result if the project is approved.

VII PLAN EFFECTS

EFFECT OF PLAN ON THE ENVIRONMENT

7.2 We again note the prediction that marina development will likely cause a larger number of marine organisms (we assume salmon and other fish) to perish than perish at present. How does the Corps consider these predicted losses to Indian, non Indian commercial, and sport fisheries in the

following section SOCIOECONOMIC EFFECTS?

X CONCLUSIONS AND TENTATIVE RECOMMENDATIONS

The tentative recommendation is for Federal participation in this project. A better justification should be provided in light of predicted poor water quality and fish kills.

APPENDIX D

FACILITIES TO BE PROVIDED

Safety railings must be provided on the breakwater if it is to be used for recreational fishing. The "bull rails" shown on Plate 3 of Appendix A and the Corps Public Notice would probably not meet safety and building codes.

SUMMARY

6. Consequences of the Proposed Action. We note the document predicts higher mortality to juvenile salmonids. Does the Corps also anticipate mortality to adult salmonids and baitfish which may enter the marina? This should be quantified. How will the Corps and local sponsor make up the predicted loss of production to the various sport, Indian, and commercial fisheries in the State?

ALTERNATIVES

2.2.2 Alternative 2 - Dryland Storage.

We note with interest a suggestion to fill portions of East Bay for a dryland storage facility. Also that this would greatly reduce potential water quality problems but it is unlikely that this option would be environmentally acceptable. We suggest expanding on the term "environmentally acceptable". In a strict sense, foodfish and shellfish resources would not be impacted by this proposal, however, the proposal might be of concern to other agencies depending on the extent of fill.

2.2.3 Alternative 3 - Wet Moorages

2.3.1.2 Site 1 - Butler Cove Surf Smelt (Hypomesus pretiosus) spawn at this location.

2.3.2 Site 2 - West Bay North.

We suggest more study of this site because of better water quality conditions. In addition, outmigrating juvenile salmonids from Capitol Lake are mostly large, artificially produced smolts and we have no evidence that a marina as suggested would interfere with the outmigration. We do, however, suggest the Corps contact Indian commercial fishermen for comment on fishing activities. There is also some surfsmelt spawning immediately north of the site but if spawning substrate was protected during construction, there should be no long term impact to this species. The 600 feet of timber pile bulkhead might be of concern for outmigrating salmon but could probably be resolved in the design stage.

2.3.3 Site 3 - West Bay South. The Washington Department of Fisheries has no evidence that the area is of any importance to the large size outmigrating chinook from Capitol Lake. We are aware that adult chinook and adult coho were killed from lack of dissolved oxygen behind the railroad fill in 1973 when the outflow from Capitol Lake was shut off for refilling operations. These salmon may have been trapped behind the railroad fill during the DO sag caused by lack of flushing from Capitol Lake. This site may merit further analysis.

2.3.4 Site 4 - East Bay. We note with extreme interest that this site and others are projecting a need for up to 1500 boats. (Plate 2C). Close examination of the plate illustrates that Plan 4e would have to be built at some time in order to supply the 1500 boat capacity in addition to one of the other plans 4a through 4d.

2.3.4.2 Environmental Conditions and Considerations (Site 4 - East Bay)

The Washington Department of Fisheries has stated repeatedly that the presently shallow tideflats of East Bay are probably not utilized by the large salmon migrants released from Capitol Lake and small pink and chum are not found in lower Budd Inlet. "Based on our observations in Puget Sound, juvenile chinook salmon of the relatively large size presently released from Capitol Lake are not dependent on shallow tide flats like those of the East Bay of Olympia Harbor but prefer deeper water. Juvenile pink and chum salmon are dependent on shallow beaches for food and shelter but their occurence in Budd Inlet is rare. Once the area is deepened by dredging, we believe that significant numbers of chinook will enter the marina." (ECPA Public Hearing, April 24, 1975).

We agree the site has little value for fish life but disagree to the suggestion that impacts to biological resources would be less severe at this site than the other sites investigated because of the value of the salmon to Indian, commercial, and sport fishermen since the Corps predicts salmon kills following development. Current minimum values of the Capitol Lake chinook releases alone exceed 4 million dollars annually. The department also plans to greatly increase this production now that Capitol Lake has been dredged. This increased production will begin this spring with 8 million 1979 brood chinook being released in late May, 1980.

2.3.4.4 Analysis (Site 4 - East Bay)

The Corps' favorable analysis is based on a comparison between land use considerations only and increased exposure time of marine organisms (including juvenile salmonids) to low DO conditions. We see no quantifications in the draft EIS or Detailed Project Report to substantiate the conclusion that "the overall advantages of East Bay outweigh disadvantages".

2.3.5 Through 2.3.10 Sites 5 through 10. We defer comment at this time except that the resource information is not completely correct. If one of the sites becomes an active proposal, we will comment further at that time.

2.3.11 Analysis of Alternative Sites. Table 3 should be corrected, under unacceptable environmental consequences, to more closely reflect our previous comments. Specifically, based on present knowledge, site 1 should be Yes (surf smelt and other uses), Site 3 should be No (?), site 4 should be Yes (predicted loss of Capitol Lake salmonids plus possible herring and surf smelt losses).

2.3.12 Selected Site Alternatives. This paragraph is unclear and should be rewritten. Water quality in East Bay is of primary concern but plan 4e may not have a significant impact on this parameter while all other plans will.

2.3.12.1.2 Plan Effects (Plan 4a)

We suggest deleting "loss of intertidal wetlands and their associated productivity" if this pertains to food fish or shellfish productivity. Also, we question the philosophy of the statement, "Effects of marina construction and operation on the Bay's water quality are not expected to be significant as water quality is already poor". We interpret the prediction on water quality to mean water quality (DO) will not be sufficient to support fish life over an increased period of time if Plan 4a is accomplished.

2.3.12.1 Plan 4b. We are alarmed about the disposal of surplus dredged materials at Dana Pass. Potential impacts should be defined especially to state-owned geoduck stocks. How much material is involved and what are its characteristics? We cannot concur that biological production, related to fish and shellfish only, will be lost due to fills in East Bay. We do, however, recognize the concerns of other agencies. In addition, this and all other plans except 4a and 4e would require hydraulic model studies or confirmation from Drs. Richey or Nece that flushing and circulation would at least meet those of plan 4a to be acceptable to Washington Department of Fisheries. We do not agree plan 4b is the least environmentally damaging plan to salmonids and baitfish for reasons cited throughout this letter.

2.3.12.3 and 2.3.12.4 Plan 4c and Plan 4d. Previous concerns for disposal of 500,000 cubic yards of spoil in Dana Pass and fish kills in East Bay apply to these plans. Please refer to paragraph 2, attachment, USFWS letter, September 12, 1979.

2.3.12.5 Plan 4e. We strongly recommend greatly expanding this section and modifying Plan 4e as the recommended plan. However, the modification must preclude the deep-water disposal at Dana Pass. The following statement needs enlargement, "additionally, the tip of the Port peninsula (KGY tidelands) is one of the more productive intertidal areas in Olympia Harbor." What does it produce for fish life when the significant species in Budd Inlet are large salmonids and baitfish? If there is a possibility of any fish production, how will this contribute to a fishery if some of the fish produced are killed from lack of DO within East Bay?

We disagree with the statement, "Moreover, the plan does not improve the water quality situation over what can be expected inside East Bay itself (section 4.1.3.2)." This section implies that by increasing the volume of East Bay and reducing the exchange coefficient that there will be further degradation of ambient water quality. Plan 4e does neither and by being located on the Port peninsula would allow a better escape route for fish than any disign inside East Bay. In addition, Plan 4e may benefit from the flushing action of the Deschutes River while plans a through 4d will not. The Washington Department of Fisheries information substantiates that flushing from the Deschutes River is essential to prevent fish kills in West Bay most years. Please review paragraph 4, attachment, USFWS letter September 12, 1979. It is true plan 4e will not improve ambient water quality but neither should it significantly degrade water quality (DO) or prolong the time period of poor water quality as the other plans probably will.

4.1.3.2 Water Quality. Increased cost of the breakwater should not be an issue because Plan 4e must be built to meet the 1,500 boat need. We also note the plan is not favored by the Corps or have the Port's support. The Washington Department of Fisheries sees the following advantages of plan 4e to the Corps, Port and local area.

1. In our comment on Section 2.3.4, we demonstrated that Plan e, or a modification, will have to be built at some time to satisfy the need for 1,500 boats. Our recommendation for Plan 4e now only reverses Phase 1 and Phase 2, assuming post sewage treatment improvement studies indicate significantly better water quality than is presently predicted.

2. Plan 4e should preclude additional fish kills.

3. Plan 4e might speed up actual construction because the terms of the 1975 Hydraulic Permit and conditions upheld by the Pollution Control Commission (ECPA No. 5) tie marina construction, within East Bay to completion of the Olympia sewage treatment plant now scheduled for April 1983.

4. Once the treatment plant goes on line, then additional water quality studies could be conducted to prove or disprove the present theoretical prediction of prolonged DO sag from phytoplankton once the domestic and industrial BOD is greatly reduced. When these studies are complete, decisions on the additional wet moorages or additional dry moorage within the area could be made based on solid data following sewage treatment improvement in 1983.

AFFECTED ENVIRONMENT

3.1.3.3 Water Quality

We note reference to dead adult salmon observed in East Bay in 1977. Is it possible that the fish were killed somewhere in West Bay (Capitol Lake Dam) and drifted into East Bay? What other dead fish were observed?

3.1.6 Fishes We suggest rewriting the section dealing with salmon with the attached material. In addition, Table 5 in this EIS is for the fresh water life history phases of salmonid fishes and cannot be used to totally establish presence or absence of juvenile chinook in Olympia Harbor related to the DO sag Also the enormous numbers of Pacific herring and surf smelt recently found in lower Olympia Harbor should be added to this section. This section should be corrected with information contained in USFWS letter of September 12, 1979.

ENVIRONMENTAL CONSEQUENCES

4.1.3.2 Water Quality Our comments on water quality throughout this letter generally concur with conclusions in this Section with one notable exception. We firmly believe fish kills from low DO are greatly minimized in West Bay because of the inflow of DO saturated water from the Deschutes River. Adult chinook and coho crowd this area in August and September annually. We have documented that closing off the Capitol Lake outfall for an extended period will result in large reduction in DO in West Bay and subsequent kills of adult chinook and coho will result. We also firmly believe that conditions are worse in East Bay because it does not benefit from the flushing action

of DO saturated water from Capitol Lake and the Deschutes River.

The statements relating to the ECPA application 74-0050 are inaccurate and misleading in a legal sense. The Corps' legal staff should review Findings of Fact, Conclusions of Law and Order (PCHB No. 1032 and ECPA No. 5) available at the Pollution Control Hearings Board office in Lacey, Washington (206) 753-3025.

The last paragraph in this section is also misleading. Washington Department of Fisheries Technical Report No.15 reported results from dredging West Bay and lower Budd Inlet sediments from the navigation channel. Sediments in East Bay may be considerably different and the conclusion of no significant environmental effects during dredging and dredge disposal may not be correct.

4.1.5 Terrestrial and Marine Ecology. The Corps should strike the comments that loss of tidelands in East Bay could impact outmigrating juvenile salmonids through food web effects and increased predation. Also refer to USFWS letter dated September 12, 1979. As repeatedly stated, we do not believe East Bay is presently utilized to any extent by the large outmigrants from this system. They may, however, be attracted into the area if it is deepened. The Corps should also strike any reference to fish and shellfish in the next to the last paragraph in the section and refer to the USFWS letter cited above.

4.1.6 Marine Invertebrates. The Corps should strike references to Oyster Culture in Budd Inlet and refer to USFWS letter cited above.

4.1.7 Fishes. Surf smelt spawning should be added to Site 1 and all references striken relating loss of fish or shellfish production from filling of the tidelands in question. (USFWS letter cited above)

4.2.3 Fishes, Recreation and Tourism. The Corps should correct the statement on "fishing pressure (FWS, 1979)" and refer to their letter of September 12, 1979. Dredging is proposed during the winter. Have impacts been considered to the large numbers of Pacific herring and surf smelt recently found in Olympia Harbor?

4.4.4 Overview and Analysis. Please refer to PCHB No. 1032 and ECPA-5 cited previously.

4.8.2 Disposal Effects. See comments on Disposal of Materials in Dana Pass.

4.9 Mitigation and Amelioration of Adverse Effects. Please note the Washington Department of Fisheries-Washington Department of Game approval was conceptual and ultimately to be based on results of model studies and Corps water quality studies presented in the draft EIS. Do the project sponsors have detailed plans to solve the problems of predicted increased poor water quality and predicted increased fish kills?

5.1.1 Fish and Wildlife Coordination Act Report. We are concerned of the Corps' references to the FWS letter dated August 18, 1979. Perhaps this explains errors in the draft EIS relating to productivity and fisheries resources. This was a draft that was considerably changed in the September 12, 1979 letter to the Corps from the USFWS. This latter document was the only one receiving concurrence by Washington Department of Fisheries.

APPENDIX D

We suggest the Corps deleting Appendix A of the report for reasons stated in the next to the last paragraph of the USFWS letter dated September 12, 1979.

Thank you for the opportunity to comment on these documents. We sincerely hope our comments and recommendations will lead to an acceptable solution to the boating needs of the local area while maintaining the present and future very significant level of fisheries production.

Sincerely,

William Reed

Gordon Sandison
Director

kn

cc: Colonel Leon K. Moraski
COE, Seattle
Mr. Gene Sibold, Manager, Port of Olympia
Mr. Donald Dubois, EPA
Congressman Don Bonker, 3rd District
Mr. Ralph Larsen, WDG

Attachment

Table 1. Estimated Catch and Value of Projected 1980 Chinook Releases from Percival Cove

	Troll	Washington Sport	Net	Other U.S.	Canada B.C.	Escapement	Total
Yearling Chinook							
Estimated Catch	1241	116,058	13,387	X	3,863	3,588	138,137
Estimated Value	$41,440	$1,896,257	$505,443	X			$2,443,140
	$33.39/fish	$16.34/fish	$37.76/fish				
Fingerling Chinook							
Estimated Catch	7,682	21,504	16,708	382	36,676	13,153	96,105
Estimated Value	$198,599	$531,316	$739,330	X	X	X	$1,469,245
	$25.85/fish	$24.71/fish	$44.25/fish				
Total							
Estimated Catch	8,923	137,562	30,095	382	40,539	16,741	234,242
Estimated Value	$240,039	$2,427,573	$1,244,773	X			$3,912,385

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington 98504 206-753-6600

February 26, 1980

Ms. Shara Stelling, Permit Coordinator
Department of Ecology
Olympia, Washington 98504 PV-11

Dear Ms. Stelling:

This letter is intended to clarify our current position on the proposed East Bay Marina located in Olympia Harbor.

Since the Department of Ecology, as State Clearing House, has approved this U. S. Army Corps of Engineers project for the State of Washington, we will modify our original Hydraulic Approval for conceptual design submitted December 1, 1975. The sponsors of the project should contact the Department of Fisheries as soon as possible so that details for modification of the Hydraulic Approval can be worked out.

As has been the case from the beginning, we do recognize the need for a marina in this area to improve public access to Puget Sound and its fisheries resources. Although, as we have previously stated, we perceive shortcomings in the project as located, on balance it appears beneficial.

We stand ready to assist your agency and the project sponsors in working on modifications or other methods to prevent or mitigate any losses of fish resulting from the new marina.

Sincerely,

Gordon Sandison
Director

GS:jes

cc: Wilbur G. Hallauer, Director
Department of Ecology

Colonel Leon K. Moraski, District Engineer
U. S. Army Corps of Engineers

OLYMPIA PLANNING DEPARTMENT

BUILDING NO. 1
ADMINISTRATION
2000 LAKERIDGE DR. S.W.
OLYMPIA, WA 98502
206 753-8131

January 9, 1980

Mr. John Malek
Environmental Coordinator
Department of Army
Seattle District Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Mr. Malek:

RE: The Draft Detailed Project Report and Draft Environmental Impact Statement for the East Bay Marina

The City of Olympia wholeheartedly supports the Port of Olympia Plan for development of the East Bay Channel which would include a small boat marina and other support developments. The City of Olympia lends its endorsement to this project for three major reasons: it will provide a needed increase in moorage for marina watercraft, it will enhance the visual appearance of the downtown waterfront and finally it will help revitalize the City's core area.

The City Commission recently reaffirmed their support by passing a one-year extension for the Shoreline Substantial Development Permit based on the following conditions:

1. Final design approval by the U.S. Corps of Engineers and to granting of other applicable permits.
2. Sufficient areas must be set aside for expansion of the existing sewage plant, as determined by the City of Olympia and the Port officials. It is expected that the City would purchase this area in the future.
3. As suggested in the Dames and Moore Soils Report, protection for the cut and filled areas shall be placed as necessary. Full protection will not be required if the boat speed limit is held to four M.P.H.
4. Detailed plans for each phase of construction shall be submitted to the Planning Department for approval regarding conformance to the Master Program and conformance with the approved shoreline permit.
5. The types of marina commercial services shall be limited to those which are water-dependent or water-oriented shown on the attached plan.
6. All storm water runoff shall be handled in such a manner that all foreign materials will be removed prior to the water entering the bay.
7. Rezoning consistent with the proposed uses of the project area be accomplished.

8. The existing platted channel and harbor lines be vacated and a waterway be established consistent with the finalized plan.
9. Additional fill and dredging are permitted at the south end of the project (north of Olympia Avenue) but shall not exceed 10 acres and any uses, other than for park activities, shall be required to get a separate Shoreline Permit.
10. The Port of Olympia is to require in its leases for moorage slips that any boat therein must be in conformity with the U.S. Coast Guard and Environmental Protection Agency and Department of Ecology rules with respect to waste disposal facilities.

The Olympia Planning Department has reviewed the Draft Environmental Impact Statement, and commends the Corps of Engineers for the accurate and illustrative assessment of impacts and alternatives. We feel that the East Bay location is the best project considering both environmental and economic concerns.

If you have any questions or comments, please call us at 753-8131.

Sincerely,

Mayor Lyle Watson

ldm

WESLEY L. BARCLIFT
MAYOR

CITY OF TUMWATER
WASHINGTON

OFFICE OF THE MAYOR

January 25, 1980

Colonel Leon K. Moraski, District Engineer
Seattle District
U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Moraski

Thank you for the opportunity to respond to the draft "Detailed Project Report"/ draft "Environmental Impact Statement" for the proposed East Bay Marina Project in Olympia Harbor.

Unfortunately, time constraints have not allowed us to carefully review the proposed Draft Impact Statement. For that reason, my comments should not be considered to address the adequacy or accuracy of the Draft Impact Statement, but only to support the need for the project in general.

As you may recall, on March 22, 1979 I addressed a letter in support of the project to Colonel J. Poteat. Rather than repeat the items mentioned in that letter, I would prefer to refer you to it, and simply state that I continue to be in strong support of the project.

If you desire additional comments, please feel free to contact me.

Sincerely

Wesley L. Barclift
Mayor

WLB:cll

CAPITAL
DEVELOPMENT
COMPANY
SUITE FOUR SOUTH SOUND CENTER
P O. BOX 3487
LACEY, WASHINGTON 98503
AREA 206 491-6850

January 18, 1980

District Corp of Engineers
Department of the Army
PO Box C 37755
Seattle, WA 98124

RE: East Bay Project

Gentlemen:

This letter is to advise you that I have had the opportunity to review the Environmental Impact Statement for the proposed East Bay rennovation being conducted by the Port of Olympia.

In response to the EIS, I would like to suggest that this is an extremely worthwhile and much-needed and much-delayed project and that I would urge all of the agencies involved at the earliest possible date to enable this to proceed.

Very truly yours,

John Donaldson
Vice President

JD:ss

Olympia R/UDAT

211 N. Capitol Way
Olympia WA 98501
(206) 753-8183

January 21, 1980

Mr. John Malek, Environmental Coordinator
Department of the Army
Seattle District Corps of Engineers
P. O. Box C-3755
Seattle WA 98124

Dear Sir:

We have reviewed the DPR/DEIS, dated December 1979, for the East Bay Marina, Olympia Harbor, Washington. We feel that the report adequately deals with the environmental as well as the socio-economic impacts of the project. If there is any shortcoming at all to the report it is that it does not fully emphasize the benefit of this project to the entire downtown Olympia area. The Olympia R/UDAT Report, a study adopted by the city commission as a guide for downtown development, states that:

> "Waterfront commercial and recreational opportunities are important elements in the development of this community. Future developments of the waterfront areas will be characterized by varied and multiple uses covering closely adjoining land and water areas. This fact makes it essential to vigorously pursue interaction between the recreational retail, and industrial components of the waterfront."

It further states that:

> "The East Bay area currently presents one of the most significant opportunities in terms of overall development of waterfront activities in the Olympia area."

We feel that in addition to the "overall development of waterfront activities" the secondary impact of this project will be to boost the existing retail center and provide a general increase in the local economy. We intend to continue our working relationship with the Port of Olympia to provide visual

Co-Chairmen:
Stephen A. Masini, AIA, P.O. Box 1241, Olympia, Wa. 98507; 943-6774
Franklin J. Densmore, AIA, 320 West Bay Drive, Olympia, Wa. 98502; 943-4650

and pedestrian links between the East Bay facility and the other waterfront activities and with the existing downtown employment and retail centers. We are aided in this activity by a grant from the Office of Coastal Zone Management as well as a grant for downtown economic development through the Economic Development Administration. We urge that you finalize the EIS and begin construction as rapidly as possible so as to better coordinate with the city's other development projects.

Sincerely,

Ron Arens
Director, Olympia Downtown Development Program

RA:vc
cc: Port of Olympia

1063 S. Capital Way
Olympia, Wash. 98501
January 24, 1980

STATEMENT ON THE EAST BAY MARINA PROJECT

The League of Women Voters of Thurston County endorses the plan for the East Bay Marina generally. We do have several concerns.

The league members believe there is too much dredging and filling being done under the guise of building a much-needed marina. The port is using the marina, which is needed in this area, to gain land for commercial uses.

A curving access road is being built across tideflats where the plan calls for the area to be filled.

Miscellaneous fill of up to 2.6 acres behind the access road is just that--filling in an area for miscellaneous commercial uses.

Several alternatives have been considered but Plan 4A is the one most possible now. Plans 4A and 4D are the only alternatives that show the new waterway created for this project. In February, 1978, the old government waterway was eliminated and relocated eastward by the state to allow for Plan 4A. The Corps of Engineers agreed with this decision to relocate the waterway. Besides realigning the waterway in that action, the state exchanged tidelands, portions of the old waterway, some harbor area lands, and some uplands to make the marina possible for Plan 4A. Now that the waterway has been relocated, it is possible to almost double the present acreage of the port peninsula. Hopefully, this was done for water dependent uses.

Dredging is necessary to build the marina. And the league makes no objection to using the dredged materials to fill the east side of the port peninsula for water-dependent projects. But motels, shops, and access roads are not water dependent. This is why the League of Women Voters of Thurston County objects to a portion of the plan.

The access road is being used to gain acreage for a motel, shops, and office buildings. These uses are not water dependent and seem to be unnecessary to the main purpose of this project.

Miscellaneous fill behind the access road provides room for non-water dependent growth on the port peninsula. The shoreline of southern Puget Sound has been altered over the years by filling in of the shoreline for many acres, as is illustrated in the photograph of Olympia shown as Figure 1, page D-25 of the DEIS. It should not be necessary to continue to fill for non-water dependent projects.

The League of Women Voters of Thurston County has proposed in the past and continues to recommend that a water-related park be established at the southern part of the East Bay, to benefit the boaters as well as the citizens of Thurston County. A park would fit in with redevelopment of downtown Olympia. A maritime museum would also be suitable next to a marina.

Basically, the League of Women Voters of Thurston County:

1. Recommends less filling in of the port peninsula for non-water related projects.

2. Recommends establishing a park at the southern part of the East Bay, and

3. Recommends establishing a maritime museum in the area.

Kathleen Baker, President

League of Women Voters of Thurston County
January 24, 1980

olympia AREA VISITOR - CONVENTION BUREAU
P.O. BOX 1427, OLYMPIA, WASHINGTON 98507 • PHONE (206) 357-3370

January 24, 1980

Sidney Knutson, Assistant Chief,
Engineering Division
Department of the Army
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Mr. Knutson,

Re: East Bay Harbor Project, Olympia, Washington

The Olympia Area Visitor-Convention Bureau wishes to express our support of the proposed East Bay Harbor project by the Port of Olympia.

We feel the utilization of this now unsightly and unused area by a project that combines commercial use in addition to recreation is an asset to the hospitality industry and contributes to our community, both by its aesthetic attributes and its diverse economic benefits.

Sincerely,

Judith Tennant

Judith Tennant, manager

JT/me

cc: Gene Sibold, Port of Olympia

H-80

Olympia Area CHAMBER OF COMMERCE

OLYMPIA, WASHINGTON
P.O. BOX 1427 - 98507
DIAL 357-3362
AREA CODE 206

January 24, 1980

Mr. John Malek, Environmental Coordinator
Department of the Army
Seattle District Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Malek:

The Board of Trustees of the Olympia Area Chamber of Commerce supported the reconstruction of Berth #1 and sent a Resolution dated May 11, 1979 so stating.

Since then, the Olympia R/UDAT Committee has studied and adopted a guide for development of the downtown Olympia area and stated in that report that the "Waterfront commercial and recreational opportunities are important elements in the development of this community." The Chamber supports R/UDAT in its efforts for downtown and waterfront development.

I would again emphasize our continued support of the Port of Olympia and urge that you finalize the East Bay Marine EIS so this project may begin as soon as possible

Sincerely,.

DALE A. VINCENT
President
Olympia Area Chamber of Commerce

DAV:ga

BLACK HILLS AUDUBON SOCIETY

A Washington State Chapter of the National Audubon Society

Office: Suite 12, 108 W. 22nd Ave., Olympia, WA. • Mailing Address: P.O. Box 2524, Olympia, WA. 98507

Phone (206) 357-4664

27 January 1980

John Malek, Environmental Coordinator
Environmental Resources Section
Seattle District, U.S. Army Corps of Engineers
Post Office Box C-3755
Seattle, Washington 98124

Dear Mr. Malek:

We have reviewed the Draft Environmental Impact Statement for the East Bay Marina project at Olympia, Washington and we offer the following considerations.

We agree that additional wet moorage space is needed in south Puget Sound. Of the ten sites examined, the East Bay location (#4) is the preferable, indeed the only acceptable, location. Our major concern with construction of the marina is the inevitable negative impact on the bird life of the port area. The lower Budd Inlet - Capitol Lake area supports an unusually large and varied population of wintering waterbirds for an industrialized port area. For instance, a census taken by Black Hills Audubon members of the port area on 22 December 1979 totalled 3670 individuals of 35 species of waterbirds. Mention has already been made in the DEIS of the significance of the Canvasback population wintering in the area. It should also be mentioned that the Port of Olympia supports what is probably the largest wintering concentration of Barrow's Goldeneyes in Washington state, and one of the largest anywhere in its wintering range. Numbers of up to 1600 have been recorded annually in the Port area. The Purple Martin, a species of swallow that nests on pilings over water in our region, has

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A Washington State Chapter of the National Audubon Society

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Phone (206) 357-4664

suffered a severe population decline in recent years. Members of Black Hills Audubon have helped stop this decline in the Olympia area by placing nest boxes for martins on pilings in the port area. The Port of Olympia is one of only 20 or so known nesting areas for this species in western Washington. While some elimination of bird life is inevitable if the marina is constructed, we think that some inexpensive mitigation measures could help offset that loss, especially if the present water quality in the project area can be maintained or improved. We agree with the USFWS suggestions in their FWCA Report concerning piling habitat and dredge spoil islands. Piling habitat destroyed by the marina should be replaced and maintained elsewhere in East Bay, with the port providing occasional boat access for placement and cleaning of martin nest boxes. Construction of one or more dredge spoil islands for waterbird usage is an excellent idea. They should probably not be riprapped as that would eliminate tidal habitat making the islands less useful for waterbirds. They should be posted with signs to discourage human intrusion.

We regard the proposal to fill an additional 24.2 acres of tidelands to support log storage and the proposal to place the Olympia Avenue extension on solid fill with some apprehension. The DEIS is not nearly as thorough in its discussion of alternatives

BLACK HILLS AUDUBON SOCIETY

A Washington State Chapter of the National Audubon Society

Office: Suite 12, 108 W. 22nd Ave., Olympia, WA. • Mailing Address: P.O. Box 2524, Olympia, WA. 98507

Phone (206) 357-4664

to these portions of the project as it is on other facets. It does not mention the possibility of constructing the Olympia Ave. extension as a causeway/bridge, and leaving the Moxlie Creek tidelands unfilled. This seems to be a reasonable alternative, it should be discussed as such in the Final EIS. The economic justifications for the additional fill for cargo handling could have been discussed more completely. If this additional fill is allowed, we suggest as a partial mitigation that no further filling occurr on the west shoreline of West Bay. This would include the West Bay lagoon area.

We commend the Port of Olympia and the Seattle District, Corps of Engineers for the excellent studies they have supported on marine invertebrates, waterbirds and hydraulics modeling in connection with this project. We appreciate the environmental safeguards already incorporated into the Draft DPR, and we suggest that the mitigation measures that we and others have proposed be incorporated into the Final DPR and the Final EIS. Thank you for this opportunity to present our comments and concerns.

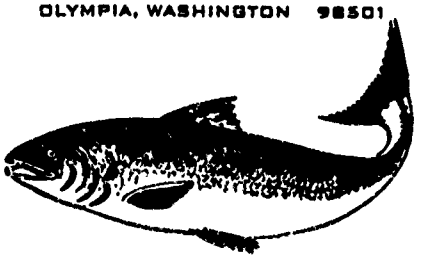
Sincerly,

Bill Harrington-Tweit

Bill Harrington-Tweit

President

Olympia Salmon Club, Inc.
P. O. BOX 501
OLYMPIA, WASHINGTON 98501



February 22, 1980

Mr. John Malek, Environmental Coordinator
Seattle District Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Re: East Bay Marina, Olympia Harbor, Olympia, Washington
Detailed Project Report/Environmental Impact Statement

Dear Mr. Malek:

The Olympia Salmon Club is very much interested in the East Bay Marina and completely supportive of the project. We believe firmly that it will not interfere with the salmon runs in the Deschutes River and Percival Creek, while it will make a real contribution to the entire Olympia area.

The Salmon Club is concerned with the environment and with conservation. We are interested in the preservation of salmon runs and we have promoted the establishment and maintenance of these runs.

To illustrate our concern, we open each of our meetings with the following pledge:

> "I give my pledge as an American to save and faithfully defend from waste the natural resources of my country, its air, soil and minerals, its forests, water and wildlife, so help me God."

The Olympia Salmon Club was the organization that was primarily responsible for encouraging the Department of Fisheries to put in the salmon ladders that made the Deschutes River run possible. Entirely on its own, the Salmon Club built ladders in Percival Creek to help maintain the salmon and steelhead runs in that creek. The Salmon Club supports the Washington State Department of Fisheries in what may be the most successful salmon-rearing project in the country at Percival Cove. We do this by feeding the young salmon on weekends and holidays when the Fisheries personnel are not working. We have worked with the Department of Fisheries on other projects to enhance salmon production in Puget Sound.

With the foregoing description of our interest, you can understand that the Olympia Salmon Club does have a real stake in what happens to the salmon fishery in this area. We have reviewed the plans for the East Bay Marina and we are convinced that this project will not be detrimental to the salmon runs through Olympia Harbor and into the Deschutes River and Percival Creek. Because of the benefits of this project, we strongly urge the approval of the project.

Sincerely yours,

H. J. Mikalowski

H. J. Mikalowski, President

cc: Dept. of Fisheries

January 23, 1980

Army Corps of Engineers
Department of the Army, Seattle District
East Bay Marina
4735 East Marginal Way
Seattle, WA

RE: Draft Detailed Project Report and Draft Environmental Impact Statement

Dear Sirs:

We are writing to comment upon the East Bay Marina Project and the captioned reports. We are residents of East Bay Drive, have no present plans to relocate in the foreseeable future and feel that several points of concern to us are either not addressed or are inadequately considered in the drafts.

Let it be known, at the outset that we support the project because of the economic and recreational benefits it will bring to our fellow citizens of the Olympia area and the public need for moorage. We are prepared to endure an increase in air pollution and noise levels (mentioned in paragraph DR7-2) but would like to know if (a) there are any projections of magnitude and (b) if the Port of Olympia or the Thurston County Sheriff's office is ready or able to enforce speed limits or noise violations.

The suggestion in paragraph DR7-10 that "project-induced increases in residential value would increase tax collections" gives us scant comfort since we purchased our residences as homes, plan to occupy them indefinitely, and apparrently must pay higher taxes because our fellow citizens want and need a moorage to be built with public funds upon public lands. Has the magnitude of the tax burden each of us must bear for the satisfaction of their needs been calculated?

The comment in paragraph DR2-16 that "occurrence (of seals) in Olympia Harbor is unlikely" is in gross error. In July of 1979 one of the undersigned, in a half hour row, saw six individual seals within 150 feet of the boat. A speed limit on boats which is enforced will minimize the probablility that these friendly creatures will be maimed, killed or driven from the area.

Our most serious concerns, frankly, are that the dredging contemplated and the marine wakes of boats using the facility will result in the erosion of our beaches and the destruction of existing bulkheads. Our fears on this score are supported by the comment in DR5-3 that there is "some chance of instability in this area as a result of dredging" and our inability to locate any reference to the possibilities and magnitude of effects from erosion caused by vessel wake. We make the following requests based upon these concerns.

First, that the Corps utilize its expertise and experience in other developments, in conjunction with and analysis of the status quo here formulate an estimate as to the extent of (a) beach and bank erosion from (i) dredging and (ii) boat wake resulting from the project and (b) the impact of boat wake upon existing bulkheads.

Second, if there is a significant likelihood of harm of this sort we would like to know what preventive measures can be taken and whether the cost of such measures will be borne by the Corps or the Port of Olympia. If there is not a significant likelihood of harm we would like assurances that the Corps or the Port will assume responsibility for necessary repair and restoration if the unexpected does, in fact, occur.

Finally, we would like to reiterate that none of the foregoing is intended as criticism of the efforts undertaken by the Corps or the Port to make this project a reality nor as opposition to the project itself.

Very truly yours,

Michael and Raymona Redman
2053 East Bay Drive
Michael Redman Raymona Redman

Gregory and Susan Pattillo
2029 East Bay Drive
Gregory L. Pattillo Susan K Pattillo

Gerald Knecht Esther L. Knecht
2039 East Bay Drive

Jas C. Parks
2045 East Bay Dr.

Thomas J. Allen
2139 East Bay Drive

DON BONKER
THIRD CONGRESSIONAL DISTRICT
STATE OF WASHINGTON

COMMITTEES

MERCHANT MARINE AND FISHERIES

INTERNATIONAL RELATIONS

SELECT COMMITTEE ON AGING

Congress of the United States
House of Representatives
Washington, D.C. 20515

1529 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-3536

DISTRICT OFFICES:
209 FEDERAL BUILDING
OLYMPIA, WASHINGTON 98501
(206) 753-9528

U.S. POST OFFICE
LONGVIEW, WASHINGTON 98632
(206) 636-5260

104 N. LAUREL STREET
PORT ANGELES, WASHINGTON 98362
(206) 457-0215

March 22, 1979

Col. John A. Poteat
Seattle District Engineer
c/o Port of Olympia
Post Office Box 827
Olympia, Washington 98507

Dear John:

I am pleased that the East Bay Marina project in Olympia has progressed to the point that you are now completing your draft "Detail Project Report."

I fully support the project as vital to the future of Olympia, and intend to use all my influence to assure funding is available.

If I can be of assistance in timely development of the next phase of the project, please advise.

Sincerely,

Don Bonker
Member of Congress

SENATOR
DEL BAUSCH
TWENTY SECOND DISTRICT
P O BOX 1546
OLYMPIA WASHINGTON 98504
BUS TEL 357 8855
LEG TEL 753 7642

COMMITTEES

FINANCIAL INSTITUTIONS & INSURANCE, CHAIRMAN
PARKS AND RECREATION
WAYS AND MEANS

Washington State Senate

March 13, 1979

Col. John A. Poteat
Seattle District Engineer

re: East Bay Marina

I am writing to encourage the implementation of the plans for the East Bay Marina Development.

The close working relationship between federal, state and local agencies should ensure a compatible development of needed recreational facilities as outlined in the March 6th mailing concerning the project. I am in complete agreement with the overall goals as described by the Port Commission.

Lower Puget Sound has long awaited the development of such a plan involving the improvement of our waterways, the updating of services and the installation of public parks and facilities for recreational purposes.

I respectfully urge the adoption of the recommendations outlined in the project report, and look forward to the realization of this worthy project.

My best wishes go to the associated officials in their endeavors towards this end.

Sincerely,

Del Bausch

SENATOR DEL BAUSCH
22nd District

DB:sw

MIKE KREIDLER
TWENTY SECOND DISTRICT

	BUSINESS	RESIDENCE
IA	700 N. LILLY RD	129 SAN MAR DRIVE N E.
L O	OLYMPIA 98506	OLYMPIA 98506
IA 98..	206-456-1700	206-456-8458
3-7818		

3

House of Representatives
STATE OF WASHINGTON
OLYMPIA

March 28, 1979

Col. John A. Poteat
Seattle District Engineer
Corps of Engineers
Seattle, Washington

RE: East Bay Marina

Dear Col. Poteat:

I am writing to express my strong support of the Olympia East Bay Marina Development project. As a former member of the Thurston Regional Planning Council, and now as a State Representative, I have been aware of this proposal since its inception. Completion of this project is very necessary to the Olympia community and Thurston County.

The East Bay Marina will enhance the recreational boating opportunities in our area. It will become a major factor in encouraging the renewal of downtown Olympia and renovation of Olympia's harbor area. All together, I look forward to this development with a great deal of anticipation.

I urge your support of the Olympia East Bay Marina Development.

Sincerely yours,

MIKE KREIDLER
State Representative

MK/cc

cc: Mr. G.W. Sibold

RON KELLER
FORTY SECOND DISTRICT
9 DICKINSON
OLYMPIA, WA 98502
RES TEL 352 3191
LEG TEL: 753-7886

State of Washington
House of Representatives

FORTY-FIFTH LEGISLATURE
1977-79
COMMITTEES
APPROPRIATIONS
INSURANCE
LOCAL GOVERNMENT

March 11, 1979

Col. John A. Poteat
Seattle District Engineer
Corps of Engineers
Seattle, Wa.

Dear Col. Poteat:

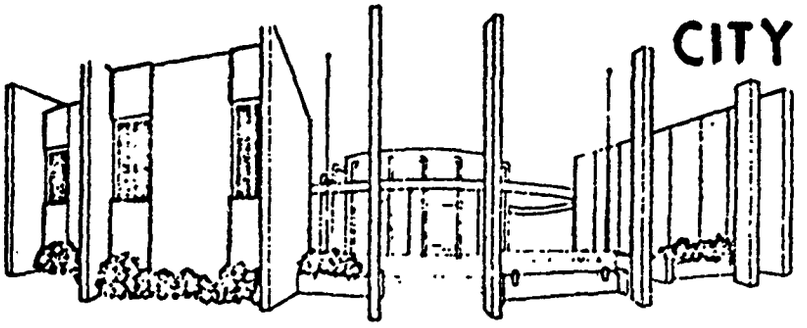
As a life long resident of Olympia, I am fully aware of Olympia's planned East Bay Marina and its history. The site was once the location of a dilapidated saw mill and city raw sewage outfall. The proposed marina will be a mojor improvement ot the harbor area and an obvious benefit to the community.

I urge your agency's favorable position on this much needed facility.

Sincerely,

Ron Keller
State Representative

RK/jsn



CITY OF OLYMPIA

8th and PLUM
OLYMPIA, WASHINGTON 98501

3

March 12, 1979

Col. John A. Poteat
Seattle District Engineer
P. O. Box C-3755
Seattle, WA 98124

Dear Col. Poteat:

The Olympia City Commission emphatically endorses the Port of Olympia Plan for the development of the "East Bay Channel" which would include a small boat marina and other supportive developments.

Our Central Business District area is now involved in a positive program for redevelopment. The Port of Olympia plans are an integral part of this development, and any delay encountered by the Port will seriously hamper our redevelopment programs.

The City of Olympia has recently completed a waterfront park project on the West Bay inlet known as Percival Landing. This addition to our community has again focused attention on a resource that has been sadly neglected -- the use of our shorelines for boaters and viewers.

Olympia is the southernmost point of Puget Sound, and as such has attracted boats from as far south as the Portland area. Current facilities are inadequate to satisfy even local demand. The new facility will satisfy that demand and provide an economic boost to the entire area.

The Port's program of a new access road from East Bay Drive to the Port area will be of great assistance in the elimination of truck traffic through our downtown area. This is a real problem at present, as the large trucks add greatly to the traffic congestion in downtown Olympia. Congestion of this type discourages people to visit our downtown and only adds to the decline of business and property values.

The Port of Olympia Marina will enhance the general livability of our area by adding a new dimension of activity in what is now described as a sterile area. The spin-off of this development is an integral part of our future plans.

The City of Olympia would like the East Bay Marina to be in operation today.

Sincerely,

The Olympia City Commission
City of Olympia, Washington

Lyle T. Watson
Mayor

Ron Ranes
Commissioner of Finance

William C. Jacobs
Commissioner of Public Works

ct

WESLEY L. BARCLIFT
MAYOR

CITY OF TUMWATER
WASHINGTON

OFFICE OF THE MAYOR

March 22, 1979

Colonel John A. Poteat
Seattle District Engineer
U.S. Army Corps of Engineers

Dear Colonel Poteat

By this letter, I would like to express my strong support on behalf of the City of Tumwater for the Port of Olympia's proposed East Bay Marina Project. I have been interested in, and followed this project from its initial stages, because I believe it can have a significant beneficial impact on the entire urban area of Thurston County. Among those benefits as I see them are:

1. Enhanced recreational opportunities for both active and passive participants;
2. Maintenance and enhancement of the "quality of life" for this area as it applies to water-related activities;
3. Enhance tourism and with it, bring mostly positive impacts in the form of economic benefits;
4. Improved aesthetics as compared to the area as it exists now;
5. Help to spur the improvement and revitalization of Downtown Olympia by making the City a more pleasant and interesting place in which to work, live and play, which directly influences the surrounding areas in a positive way.

In short, I feel that this proposed project is a worthwhile one, and I look forward to it being made available to us. If you would like additional expressions of support, please do not hesitate to contact me.

Very truly yours

Wesley L. Barclift
Mayor

WLB:cll

cc: Gene Sibold, Port of Olympia

City of Lacey

PEOPLE WORKING FOR
A UNITED COMMUNITY

PHONE 491-3210

POST OFFICE DRAWER "B"
LACEY, WASHINGTON 98503

March 30, 1979

Mr. Gene W. Sibold
Manager
Port of Olympia
P.O. Box 827
Olympia, Washington 98507

Dear Mr. Sibold:

This is to reiterate the support of the City of Lacey for the Olympia East Bay port project. We are a participant of the Overall Economic Development Planning Board. That body, after careful deliberation, agreed that this project should be top priority for economic development funds. We concur with this prioritization.

The project continues to be needed to serve the rapidly growing Thurston area. Additional accomodations for shipping and especially additional accomodations for recreational boaters are greatly needed. I urge you to continue to pursue this project. If I can provide additional information or assistance, please let me know.

Sincerely,

LACEY CITY COUNCIL

Karen R. Fraser
Mayor

KRF:bdm

PUBLIC MEETING - ATTENDANCE LIST

PORT COMMISSION - PORT OF OLYMPIA

21 February 1979

EAST BAY MARINA

OLYMPIA HARBOR, WASHINGTON

Port of Olympia:
- H. V. Brewington - Commissioner
- Cort Skinner - Commissioner
- Wendell H. McCroskey - Commissioner
- Gene Sibold - Port Manager
- Dick Malin - Port Engineer
- Jack Lynch - Port Attorney

Seattle District, Corps of Engineers:
- Peter P. Denny
- Fred C. Weinmann
- Harry C. Disbrow

Name	Address	Representing
Del Bauch	PO Box 1546, Olympia	State Senator
Ron Rants	3901 Blvd. Rd, Olympia	City of Olympia
Ron Arens	2000 Lakeridge Dr Bldg #1, Olympia	Thurston Reg.Plng Coun.
Howard Heiner	3520 Martin Way, Olympia	Olympia C of C
Paul Olson	5120 24th SE, Lacey	Lacey Area C of C
Hugh Miller	1702 Camden Park Dr, Olympia	Olympia C of C
Calvin Lockwood	515 Floravista Ave, Olympia	Board Mbr-Maritime Assn
Irene Christy	3120 Hawthorne Pl, Olympia	League of Women Voters
Sharon Carrier	6003 Margo Pl, Tumwater	League of Women Voters
Karl R. Probst	4505 Montclair Dr, Lacey	SeaFirst Nat Bank
H.A. Long, Jr.	7719 Bobcat Dr SE, Olympia	H.A. Long Boat Works
D.A. Skramstad	1820 Thornton St NW, Olympia	H.A. Long Boat Works
Ron G. Rowe	419 N Lybarger Olympia	self
Roger Bath	1823 East Bay Dr, Olympia	self
Glys B. Roberts	606 S Thomas St, Olympia	self
Elden W. Roberts	606 S Thomas St, Olympia	self
Jim McCullough	4722 Edgeworth Drive SE, Olympia	self
Dan Grimes	3230 Wilderness Dr SE, Olympia	self
Darlene Grimes	3230 Wilderness Dr SE, Olympia	self

OLYMPIA PORT COMMIS N PUBLIC MEETING

21 Feburary 1979

Name	Address	Representing
Mary McCullough	4722 Edgewater Dr SE, Olympia	self
Patricia Burger	7415 Fairview St SW #31, Olympia	self
Doug Burger	7415 Fairview St SW #31, Olympia	self
Joanne Coultard	East Bay Harbor Condo, 900 E Bay Dr	self
Merle Kehn	12542 Champion Dr, Olympia	self
Christina Jallings	Rt 14, Box 68, Olympia	self
Franz Schtostmann	4928-4 Cooper Pt Rd NW, Olympia	self
Albert W. Giles	406 Giles Rd NE, Olympia	self
Robert Turpin	905 N Quince, Olympia	self
Will Wolf	2101 N. Berry St, Olympia	self
Syl Fulurler	1508 Briarwood Ct NW, Olympia	self

PUBLIC MEETING

PORT COMMISSION - PORT OF OLYMPIA
21 February 1979

EAST BAY MARINA
OLYMPIA HARBOR, WASHINGTON

COPY COPY

I am Sharon Carrier of the League of Women Voters of Thurston County.

The League of Women Voters of Thurston County has been concerned about the development of the port peninsula and the East Bay Marina project.

The Port of Olympia has been responsive to some of our concerns expressed at various public meetings. The configuration of the marina has been changed from a straight line to an "S" curve to help with water circulation. The channel to be dredged in the newly created waterway was moved 50 feet from the bank along East Bay Drive to help prevent sloughing of the shoreline. Two blocks of proposed filling was omitted in the final design.

We still have two concerns that we believe represent the public interest in this development.

1. The logging road should not be built. Olympia Avenue should not cross the tidelands. Other roads can contine to carry the logging trucks. The East Bay is set aside for recreational uses. Not only would the proposed road cut through a recreational area; it would also interfere with the view of the marina, the bay, and the mountains for Olympians and tourists alike. The view is a valuable asset to downtown Olympia and the view corridor along the East Bay should be retained for aesthetic reasons as well as sound business practices.

2. A small park is needed for visual access to the southernmost part of Puget Sound. The capital city should be proud of its location on the waterfront and not let the port block its view just for an unnecessary logging road.

The League of Women Voters appreciates having the opportunity to comment on this issue.

Olympia Area CHAMBER OF COMMERCE

OLYMPIA, WASHINGTON
P.O. BOX 1427 - 98507
DIAL 357-3362
AREA CODE 206

A

RESOLUTION

of the

OLYMPIA AREA CHAMBER OF COMMERCE

SUPPORTIVE OF THE EAST BAY HARBOR DEVELOPMENT

WHEREAS, the members of the Olympia Area Chamber of Commerce have informed themselves of the development and use proposed by the Port of Olympia Commission for the East Bay of Olympia Harbor; and

WHEREAS, such proposed use is consistent with the current "Comprehensive Plan of Utilization for Olympia Harbor" which plan we have reviewed and approve; and

WHEREAS, the proposed public recreational boating marina and related commercial facilities will create a very desirable physical improvement in Olympia Harbor and for the Olympia area satisfying a long existing unsatisfied demand for moorage capacity; and

WHEREAS, the proposed development for improved vehicular traffic routing for a more productive ocean terminal, along with the marina development, will also provide a needed economic improvement in Olympia and the area.

NOW, THEREFORE, BE IT RESOLVED by members of the Olympia Area Chamber of Commerce:

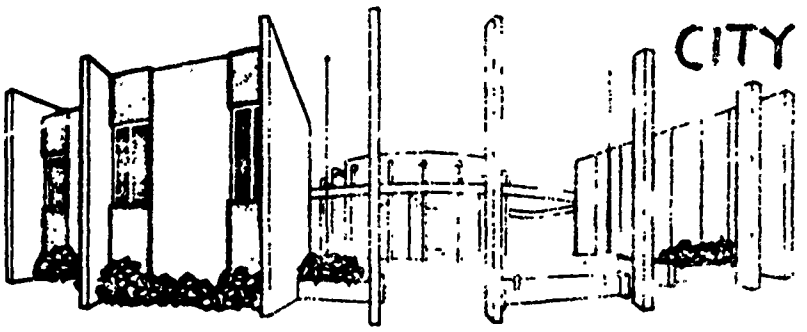
That the Port of Olympia Commission is urged to proceed toward prompt accomplishment of their proposed East Bay development as planned, and

Further, that federal, state and local authorities are urged to promptly approve permit requests for such development.

UNANIMOUSLY APPROVED AND ADOPTED by the Olympia Area Chamber of Commerce this 11th day of April, 1975.

OLYMPIA AREA CHAMBER OF COMMERCE

By Harold A. Youngblood



CITY OF OLYMPIA

3

8th and PLUM
OLYMPIA, WASHINGTON 98501

February 21, 1979

My name is Ron Rants, 3901 Boulevard Road S.E., Olympia, Washington.

I am the Commissioner of Finance for the City of Olympia and have been authorized to speak for the Olympia City Commission.

The Olympia City Commission emphatically endorses the Port of Olympia Plan for the development of the "East Bay Channel" which would include a small boat marina and other supportive developments.

Our Central Business District area is now involved in a positive program for redevelopment. The Port of Olympia plans are an integral part of this development, and any delay encountered by the Port will seriously hamper our redevelopment programs.

The City of Olympia has recently completed a waterfront park project on the West Bay inlet known as Percival Landing. This addition to our community has again focused attention on a resource that has been sadly neglected -- the use of our shorelines for boaters and viewers.

Olympia is the southernmost point of Puget Sound, and as such has attracted boats from as far south as the Portland area. Current facilities are inadequate to satisfy even local demand. The new facility will satisfy that demand and provide an economic boost to the entire area.

The Port's program of a new access road from East Bay Drive to the Port area will be of great assistance in the elimination of truck traffic through our downtown area. This is a real problem at present, as the large trucks add greatly to the traffic congestion in downtown Olympia. Congestion of this type discourages people to visit our downtown and only adds to the decline of business and property values.

The Port of Olympia Marina will enhance the general livability of our area by adding a new dimension of activity in what is now described as a sterile area. The spinoff of this development is an integral part of our future plans.

The City of Olympia would like the East Bay Marina to be in operation today.

)

Sept. 17, 1980

Dear Mr Hiatock,

I attended the public meeting on September 16, 1980 concerning the East Bay Small Boat Basin Project. The meeting was interesting, very professional and I left pretty much agreeing with your proposal, except for one thing. I'm a little doubtful about the concept of aerating East Bay. I understand that aeration was probably a concession to EPA to allow them a small victory. I can't believe the system can be operated for any period of time without repeated breakdowns and complaints about the odor the bubbles give off in the basin itself!

If you must put in an aeration system why don't you stretch a flexible, weighted hose with appropriate diffuser holes across the mouth of the harbor, perhaps in the area of the floating breakwater. This would appear to have several benefits over your current plan.

1. Assuming it's possible to supply the necessary oxygen transfer to meet your goals, it should be cheaper than the other elaborate structure you designed.
2. If arranged and constructed properly it could provide a substantial "air bubble curtain" that would prevent migratory fish from entering the low D.O. danger area. I suppose it could even be turned off when no fish are in the area.

3. If there were ever gas facilities in the area I suppose there might be some chance of an oil spill. If the bubbling effect from the "air curtain/oxygenator acts the way I visualize it, it would cause a slight barrier that MIGHT contain the oil in the spill area.

This idea may not be feasable from an engeneering perspective but I at least wanted you to consider it. If there is any cost savings associated with the idea I am not opposed to the accepting of money. Seriously, thank you for your time the other night and please help get the facility built quickly and well; Olympia deserves such a facility.

Mary Rothwell
3314 Quince St.
Olympia, Wa 98501

APPENDIX H - PART 3

COMMENTS ON THE PROJECT IN GENERAL AND CORPS RESPONSES

GARY ROTHWELL, 17 SEPTEMBER 1980

1. Comment. Suggested consideration of an alternative to Hinde aeration system presented at 16 September 1980 public meeting involving use of a flexible, weighted hose with appropriate diffusion holes across the mouth of the harbor. Also "air bubble curtain" would prevent migratory fish from entering the low dissolved oxygen danger area and act as a containment barrier for marina oil spills.

Response. Hinde system was rejected by Corps and Port of Olympia after further studies due to cost and uncertainty over maintenance problems. Recommended plan calls for use of Aire-O_2 system (see appendix D) which is less expensive, more flexible, and provides higher degree of confidence in long-term reliability in operation and maintenance. Alternative suggested by Mr. Rothwell, while an interesting concept, would not necessarily accomplish one of the intended objectives, i.e., keep dissolved oxygen levels above 5 miligrams per liter. Also the barrier would have to extend clear across East Bay to avoid fish bypassing along the east shoreline. While the curtain could help contain an oil spill it might only result in dispersion of the oil as tidal currents could override the curtain effect with oil leaving the bay into Budd Inlet.

NPSEN-PL-NC

20 OCT 1980

Mr. Michael C. Redman
2053 East Bay Drive
Olympia, Washington

Dear Mr. Redman:

This letter responds to your questions raised at the Olympia East Bay Small Boat Basin Public Meeting Tuesday evening, 16 September 1980.

Your first question dealt with increased boat induced wave activity and the possible consequent beach erosion and undermining of bulkheads. The East Bay Draft Detailed Project Report, paragraph B-26 directly addresses your concern regarding boat induced wave activity. Based upon accepted professional practice (Reference: Water Waves Produced by Ships, Sorenson, 1973) vessels complying with the 5 knot per hour boat basin speed limit would cause waves of less than 0.5 foot to reach the shoreline at high tides and it is very unlikely that waves of this magnitude would cause problems to properly designed, constructed, and maintained bulkheads. Of course at low tides the waves would be attenuated by the exposed, intervening mud flats.

Also, soil borings along the east shoreline indicate soil materials in this area are glacial sediments and are firmer than the recent near surface bay sediments. (Reference: Supplementary Geotechnical Investigation: Proposed East Bay Development Program, Dames and Moore, 1973, p. 14). The report goes on to say, "Stability problems associated with structures founded on these glacial sediments or fill placed above these materials are very unlikely to be affected by the proposed construction." The report also indicates that the dredged slope for the access channel will encroach toward the east shoreline but it is unlikely that the encroachment will extend more than about 50 feet, thus leaving more that adequate separation between the dredge slope and the structures along East Bay Drive. The nearest structure is 250 feet from the top of the dredged channel slope so a very adequate, 200 feet, buffer will remain between the channel and shoreline structures under the most adverse conditions probably.

Your second major concern was the potential conflict between present recreation use of the bay by children and boats entering or exiting the marina at high speeds. Although both parties in this type of conflict are quite unpredictable, a number of conditions exist to discourage or otherwise diminish the chance of conflict. First, channel spped limits will be posted and enforced. Second, the channel will be clearly delineated, thus each party to

NPSEN-PL-NC
Mr. Michael C. Redman

potential conflict will know the boundaries, and third, vessels will be discouraged from venturing outside of the delineated channel because of the clear navigation hazard of shallow water.

Your third major concern was vessel fires. This is a local sponsor responsibility and one that is normally coordinated very closely with the jurisdiction presently providing fire protection service. Your concern is being forwarded to the Port of Olympia, the local sponsor, via a copy of this letter.

You also indicated seals frequent the bay contrary to statements in the EIS. Your comment has been noted and the EIS will be revised accordingly.

Thank you for your interest and comments. If you have any further comments, questions, or suggestions, please contact Alan Coburn, East Bay Study Manager, at (206) 764-3651, or John Malek, East Bay Environmental Coordinator, at (206) 764-3624.

Sincerely,

FRANK J. URABECK, P.E.
Chief, Navigation and Coastal Planning Section

Copy furnished:
Port Of Olympia
915 North Washington Street
Post Office Box 827
Olympia, Washington 98507

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