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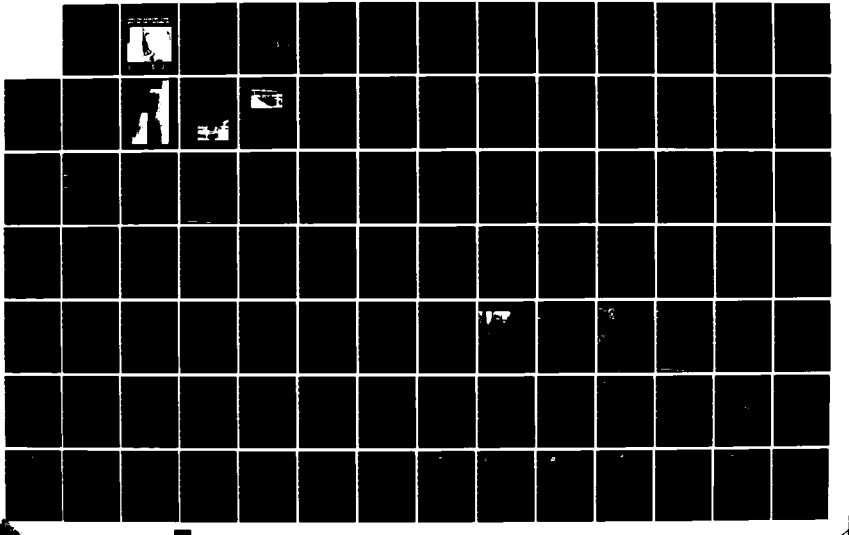
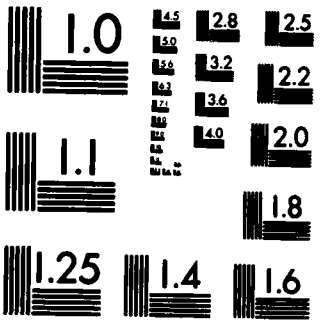
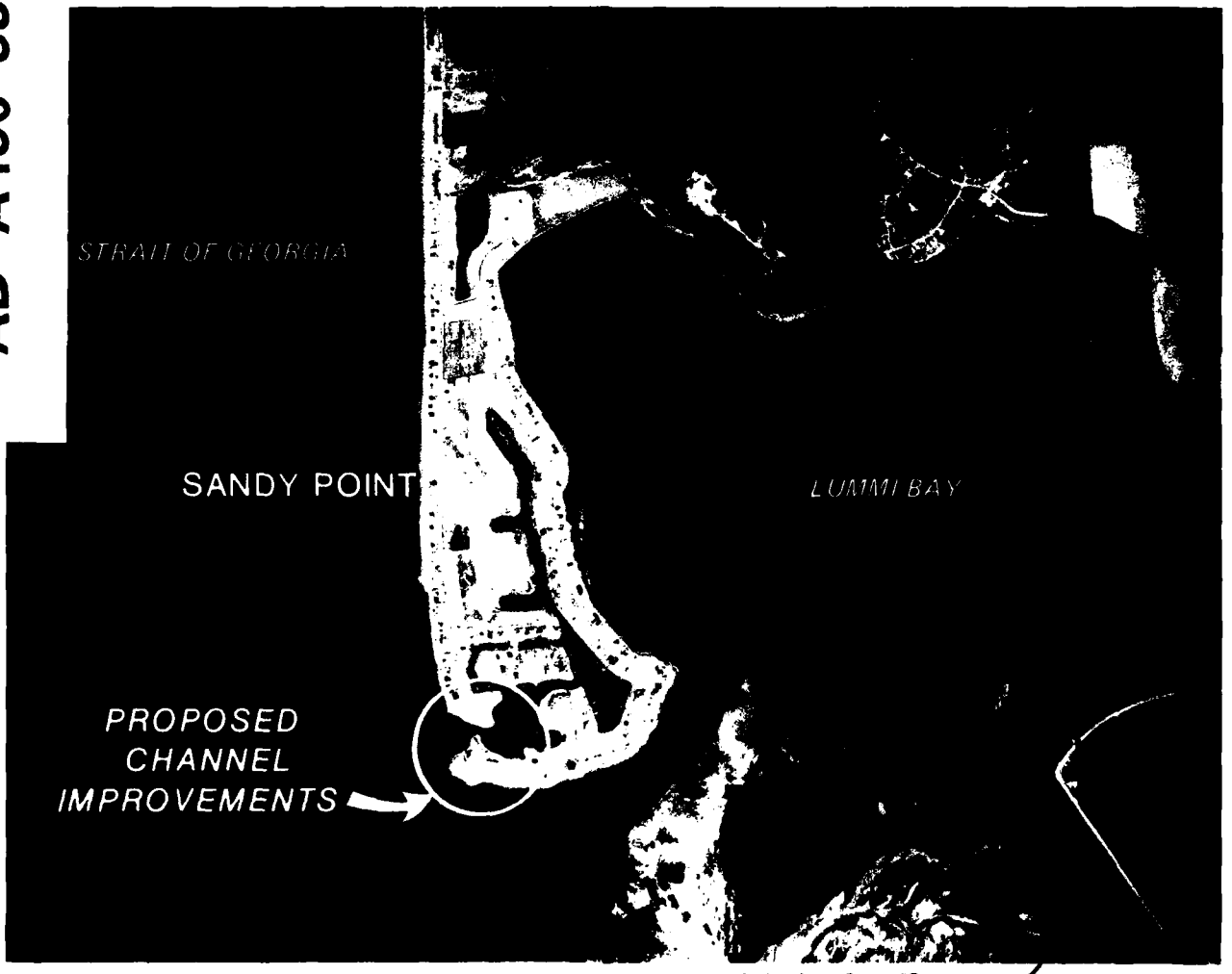




DRAFT DETAILED PROJECT REPORT AND DRAFT ENVIRONMENTAL ASSESSMENT

SANDY POINT NAVIGATION CHANNEL WHATCOM COUNTY, WASHINGTON



US Army Corps of Engineers
Seattle District

NOVEMBER 1984

THIS DOCUMENT CONTAINS:

DRAFT DETAILED PROJECT REPORT

DRAFT ENVIRONMENTAL ASSESSMENT

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Draft Detailed Project Report and Environmental Assessment, Sandy Point Navigation Channel, Whatcom County, Washington		5. TYPE OF REPORT & PERIOD COVERED Draft 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Corps of Engineers, Seattle District P.O. Box C-3755, 4735 East Marginal Way South Seattle, Washington 98124		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE November 1984 13. NUMBER OF PAGES 240
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Sandy Point, small boat harbor, marina, Strait of Georgia, recreational boating, channel improvements, navigation improvements

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Conducted under Section 107 of the 1960 River and Harbor Act, as amended, the Corps of Engineers study determined the feasibility of federal involvement in navigation improvements at the entrance to Sandy Point harbor on the Strait of Georgia in northwestern Washington. The project would reduce coastal shoaling and provide wave protection for recreational boats and commercial fishing boats navigating the entrance. The principal features of the tentatively recommended plan are channel enlargement to 1,200 feet long by 75-100 feet wide by 10 feet deep

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at mean lower low water; 2 rock breakwaters for deflection of sediments away from the channel and for protection of boats and shoreline properties from wave action; a rock revetment to prevent erosion at the channel entrance; advance maintenance areas to trap sediments and reduce frequency of channel maintenance dredging; initial dredging of approximately 60,000 cubic yards of sediments and disposal at the Department of Natural Resource-managed open water disposal site in Bellingham Bay; and mitigation for project-related impacts by transplanting of displaced eelgrass, clamshell dredging, and timing of dredging to minimize impacts to fishery resources.

First cost of the project is estimated at $1,348,000 (October 1983 price levels) with $226,000 allocated to the federal government and $1,122,000 allocated to local interests, based on distribution of benefits as national vs. local in nature. Whatcom County is the local sponsor.

DRAFT DETAILED PROJECT REPORT
AND
DRAFT ENVIRONMENTAL ASSESSMENT

SANDY POINT NAVIGATION CHANNEL, WHATCOM COUNTY, WASHINGTON

ABSTRACT: The responsible lead agency is the U.S. Army Corps of Engineers, Seattle District. Sandy Point is a naturally formed land spit located on the Lummi Indian Reservation in Whatcom County, and situated adjacent to the northwest portion of Lummi Bay and the southeasterly portion of the Strait of Georgia. The spit was dredged during 1958 and the 1960's to create a channel entrance and associated inner harbor canals providing boater access to a boat launch ramp, two marinas, and residential waterfront docks. Coastal shoaling within the inadequately sized harbor entrance has hindered the safe navigation of commercial fishing and recreational pleasure boats using the channel. The restricted entrance channel has resulted in vessel grounding and delays while awaiting favorable tides. In 1981, Whatcom County approached the Corps of Engineers to study the feasibility, under Section 107 of the 1960 River and Harbor Act, of Federal involvement to alleviate the coastal shoaling problem at Sandy Point. In response to this request, the Seattle District has now conducted reconnaissance and subsequent detailed feasibility studies for a potential Federal navigation project. This detailed project report (DPR) and environmental assessment (EA) reflect the results of the feasibility studies. Structural and nonstructural alternatives to alleviate the navigation problem were considered. In the absence of structural solutions, the shoaling problem will be exacerbated, resulting in closure of the entrance channel to the majority of vessel traffic by 1986 when the channel is expected to shoal to about 0 feet at mean lower low water (MLLW). As a result, over 370 boats presently using Sandy Point for wet moorage or for water access through the entrance channel at Sandy Point from the existing launch ramp or boat hoist would have to be relocated. In addition, vessels with shallower drafts remaining at Sandy Point would sustain structural damage due to periodic groundings. Without channel improvements, Sandy Point property values are predicted to decline, thus affecting tax revenues to an already economically depressed county. The tentatively recommended structural solution includes dredging of a new entrance channel from deep water in the Strait of Georgia into the inner harbor at Sandy Point and construction of three rock breakwaters and one stretch of shoreline rock revetment to protect the inner harbor shoreline from wave induced erosion. U.S. Coast Guard navigation aids will mark the channel and breakwaters. The non-Federal portion of the project involves provision and maintenance of a public boat launch ramp and waterfront moorage facilities at Sandy Point, and the provision of necessary lands, easements, and rights-of-way associated with construction and maintenance of the Federal navigation project.

The plan also reflects various environmental design considerations, and incorporates several mitigation items. The navigation improvement plan was selected based on its fulfillment of the DPR study planning objective and planning criteria. If you would like further information please contact:

Frank Urabeck, Chief
Navigation and Water Resources
Section

U.S. Army Corps of Engineers
Seattle District
Post Office Box C-3755
Seattle, Washington 98124
Commercial Telephone (206) 764-3708
FTS Telephone 399-3708

PLEASE SEND YOUR REVIEW COMMENTS ON THE DRAFT REPORT TO THE DISTRICT ENGINEER BY DECEMBER 31, 1984.

DETAILED PROJECT REPORT

EXECUTIVE SUMMARY
DETAILED PROJECT REPORT (DPR)

The study for a new public navigation channel at the entrance to Sandy Point, in Western Whatcom County and in the southeastern portion of the Strait of Georgia, was conducted at the request of Whatcom County, Washington, DPR study local sponsor. The DPR study was also conducted under the authority of Section 107 of the 1960 River and Harbor Act as amended. Section 107 authorizes the Secretary of the Army to plan, design, and construct small navigation projects when, in the opinion of the Chief of Engineers, such work is advisable. The purpose of this DPR study was (1) to document the need for and feasibility of providing a small navigation project at Sandy Point consisting of a new public navigation channel, with ancillary coastal shoaling protection measures and (2) to determine if a Federal interest exists in project development.

Sandy Point is located on a portion of the Lummi Indian Reservation on the Strait of Georgia and Lummi Bay (see plate 1). It is owned primarily by non-Indians. In 1958, for purposes of extracting gravel for a project elsewhere, local interests dredged an opening into the Sandy Point spit from the Strait of Georgia. In the 1960's canals were excavated to provide water access to residential properties and wet moorage and boat launch facilities were constructed. The original entrance was reported to be about 400 feet wide with depths in excess of -12 feet MLLW. Constant littoral drift shoaling has effectively narrowed the entrance to 50 feet wide at MLLW, with depths less than -5 feet MLLW. Studies have projected that unless corrective action is taken the entrance will further shoal to 0 MLLW by 1986.

More than 200 small boats presently have permanent moorages at Sandy Point while another 200 use the boat launch facilities for access at least once a year. The narrow entrance and channel shoaling have caused small boat groundings and delays while awaiting favorable tides.

The DPR study found that continued shoaling will effectively close the entrance channel to the majority of small boats within 3 years. Without navigation improvements, over 85 percent of the boats presently using the entrance would be forced to seek moorage and launch facilities elsewhere. The shallower draft boats would continue to be subject to a high risk of delays, and possible injury and loss of life to boat occupants. Continued shoaling within the entrance will also result in an estimated $8 million decrease in Sandy Point property values. Conversely, improved navigation conditions would allow safe, unobstructed boater navigation, maintain (and possibly enhance) residential property values, and remove navigation constrictions which have resulted in vessel delays and groundings. Other economic benefits are discussed in this DPR.

During the DPR study, alternative concepts were considered in response to the need for a safe entrance channel that could be maintained at least cost. These concepts included no action, channel improvement alone, and channel improvement

with shore protection structures. A number of variations on the last concept were formulated with input from environmental resource agencies and the local sponsor. Structural plan components included U.S. Coast Guard (USCG) navigation aids. Channel improvement alone was dropped from further consideration early in the study because this alternative would not meet the planning objective. In screening the variations of channel improvement with protection structures alternative, legal; financial; policy; social; economic; environmental; and engineering criteria were considered, in addition to public and agency concerns. The variations were periodicaly revised and improved to reflect these criteria and agency input; and a tentatively recommended plan formulated which best satisfied the planning objective of providing a safe and economically efficient entrance channel to Sandy Point Harbor while being responsive to environmental concerns and local sponsor preferences. This tentatively recommended plan was also evaluated against the no-action concept, to provide a sound rationale for project feasibility.

Technical studies and agency input indicate that the public interest would best be served by a navigation improvement plan for a new and protected navigation channel at Sandy Point involving the following major features:

o Construction of a navigation entrance channel approximately 1,200 feet long by 100 to 75 feet wide by 10 feet deep at MLLW, providing small boat access from deep water in the Strait of Georgia into Sandy Point harbor and interior canals, and moorage and launch facilities (see plates 1 and 2). Channel construction would entail clamshell dredging of approximately 60,000 cubic yards of a fine sandy material, with subsequent open water disposal in an approved site within Bellingham Bay (see plate 1).

o Construction of three rock breakwaters to provide wave protection for moored boats and the inner harbor shoreline and, in the case of the north outer breakwater, to also deflect littoral drift material into the designated advance maintenance dredging area adjacent to the navigation channel. Breakwaters would have a maximum top elevation of +16 feet MLLW, with side slopes of 2 horizontal (H) to 1 vertical (V) with transition sections to 1.5H to 1V. The length and location are the principal breakwater design differences: (1) the north outer breakwater, situated immediately north of the entrance to the navigation channel, would be approximately 300 feet long, the north inner breakwater would be 200 feet long, located on the north side of the entrance channel within the harbor area, and (3) the existing south breakwater, situated on the south side of the channel would be rehabilitated for 150 feet of length (see plate 2).

o Construction of approximately 200 lineal feet of rock reinforced shoreline revetment, connecting the landward ends of the two north breakwaters, and providing erosion protection. This shoreline protection is necessary to compensate for widening of the entrance for the proposed navigation channel (see plate 2).

o U.S. Coast Guard (USCG) navigation aids to mark the channel (see plate 1).

o Mitigation measures to compensate for project induced losses associated with (1) removal of herring spawning habitat (a few patches of eelgrass) underlying the accretion area north of the proposed north outer breakwater, and (2) potential project construction impacts upon the area's Dungeness crab and juvenile salmon. Mitigation measures include eelgrass transplanting and a dredging/disposal time restriction, and local sponsor provision and maintenance of a public boat launch ramp at Sandy Point.

The tentatively recommended plan would:

o Remove coastal shoaling constrictions to navigation within the entrance to Sandy Point.

o Provide appropriate breakwater protection to moored and transiting boats, and to interior shoreline properties.

o Reduce boat operating costs resulting from the anticipated relocation of Sandy Point boats in the absence of a project.

o Prevent boat damages due to groundings and boater delays incurred while waiting for more convenient tides.

o Reduce the risk to boaters using the channel of capsizing and injury or loss of life.

o Maintain and possibly enhance Sandy Point residential property values.

o Continue to provide a harbor of refuge for shallow draft pleasure craft and sport and commercial fishing vessels navigating the Strait of Georgia during heavy storms.

o Mitigate for adverse environmental impacts.

o Provide employment opportunities for unemployed or underemployed persons on the Lummi Indian Reservation.

Federal responsibilities include construction and maintenance of the Federal project (channel breakwaters and shoreline revetment features). The local sponsor is responsible for providing all lands, easements, and rights-of-way associated with the Federal project, providing a publicly accessible boat launch (the non-Federal project feature), mitigation features, and other miscellaneous local sponsor legal and administrative items.

Total first (construction) costs of the recommended plan, based on October 1983 prices, is $1,348,000,1/. The following apportionment of project first costs reflects current Federal cost sharing limitations under the Section 107 authority and is also based upon the distribution of project benefits (national versus local in nature):

1/Excludes preauthorization or DPR study costs ($262,000), and economic costs reflecting interest during construction.

o Federal share - $226,000 or 17 percent of total cost (includes $57,000 in USCG navigation aids).

o Non-Federal share - $1,122,000 or 83 percent of total cost.

Cost details are discussed in the DPR. Average annual costs over the project life, including average annual maintenance and interest during construction, are estimated at $155,000. Average annual benefits would be $765,400 with the resulting benefit-to-cost ratio of 4.9 to 1.

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APPENDIXES

SECTION 1. BACKGROUND

1.01 Study Authority. This detailed project report (DPR) is submitted in accordance with provisions of Section 107 of the 1960 River and Harbor Act, as amended. Section 107 authorizes the Secretary of the Army to allocate funds for planning, design, construction, and maintenance of small navigation projects (such as proposed for Sandy Point) when, in the opinion of the Chief of Engineers, such work is advisable. Not more than $2 million of Federal funds can be allocated under the authority for planning, design, and construction of any one project. Additional Section 107 program details are available from the Navigation and Coastal Planning Section of the Seattle District, U.S. Army Corps of Engineers.

1.02 Type of Study. The DPR presents the results of a study to identify the feasibility of Federal participation in construction and maintenance of a new navigation channel and associated improvements to alleviate a shoaling problem at the entrance to an existing man-made harbor at Sandy Point in Whatcom County, Washington. The study was conducted by the Seattle District, U.S. Army Corps of Engineers (hereafter referred to as the Corps of Engineers), under the Section 107 authority, and in response to a written request from the study local sponsor, Whatcom County, Washington.[1] The accompanying EA addresses the environmental setting and effects of the proposed project.

1.03 Location and Description of Study Area. Sandy Point is located on the western shore of Whatcom County, Washington, approximately 100 miles northwest of Seattle, 40 miles south of Vancouver, British Columbia, and 8 miles northwest of Bellingham, Washington (see vicinity map, plate 1). Sandy Point is a spit formed mainly by littoral drift sediments moving southerly along shore in the Strait of Georgia. Primarily owned in fee by non-Indians, Sandy Point is situated on a portion of the Lummi Indian Reservation northwest of Lummi Bay. In 1958, extensive dredging was done at the spit to obtain sand and gravel for construction of the Tsawwassen Ferry Terminal in British Columbia, Canada. This use of Sandy Point as a borrow source resulted in the main interior harbor basin and the entrance channel which is the subject of this DPR.

Interior waterway excavation began in 1958. In 1961 some canals were dredged and in 1964 there was further excavation to obtain material to build a large aluminum plant 5 miles north of Sandy Point. In 1965 the main north-south canal was dredged. Local interests subsequently constructed adjacent navigation improvements, extending interior canals providing boat access to residential waterfront docks, a boat launch ramp, two marinas (one public and one private), a boat hoist, fuel dock, and public anchorage area, and two small rock breakwaters at the harbor entrance (see plate 1 and figures 1-1, 1-2, and 1-3).

1.04 Problems and Needs. By letter dated 2 September 1981 to the Seattle District engineer (appendix B), Whatcom County, Washington, requested Federal assistance through the Corps of Engineers in dredging and construction of entrance protection at Sandy Point. The obstructed existing entrance poses boater navigation hazards during low tide or inclement weather. As a result,

1/Pertinent correspondence is reproduced in appendix B.

FIGURE 1-1. Existing Entrance Channel.

LEFT: View looking southwesterly through existing entrance channel into inner harbor.

BELOW: View from south showing Strait of Georgia on left, entrance channel in center, and inner harbor on right. Note existing rock breakwaters and bulkheads.

numerous groundings and associated structural damages have occurred, in addition to boater delays while awaiting favorable tides. Without channel dredging and attendant improvements in the near future, continued littoral drift shoaling at the harbor entrance at Sandy Point will severly restrict safe vessel navigation, and increase the hazards to people and property.

1.05 The harbor and entrance to Sandy Point originally dredged by local interests was approximately 400 feet in width at MLLW (elevation 0.00 feet), with depths of -12 feet MLLW. Since its construction, the entrance channel has intercepted and collected littoral drift sediments flowing south along the spit. The present entrance is approximately 50 feet wide and 5 feet deep at MLLW. Tidal hydraulic studies indicate that without further corrective action, the channel will likely shoal to a depth of 0 feet at MLLW by 1986 (see appendix C) As the entrance becomes more constricted, navigation will become increasingly difficult and dangerous. Without entrance improvements, approximately 85 percent of commercial and recreational boaters using Sandy Point will seek to moor or launch their craft at other county locations. Shallower-draft boats expected to remain at Sandy Point will incur the risk of damage when navigating the shallow entrance. A further complication resulting from the shoaling problem will be an anticipated decrease in the market value of land and structures at Sandy Point. Based upon independent property appraisals for the Corps of Engineers, Sandy Point properties could incur a loss in market value ranging from 50 to 60 percent. This property value reduction would result in lower property tax revenues to the county. (Refer to appendix D for the project economic evaluation.) As a consequence of this serious navigation problem, local property owners, boaters, and others requested Corps of Engineers assistance through Whatcom County.

1.06 Pertinent References. Pertinent references applicable to the socio-economic, engineering and design, and environmental aspects of this feasibility study are listed in the appropriate appendixes.

FIGURE 1-2

Existing Public Marina North of Entrance Channel.

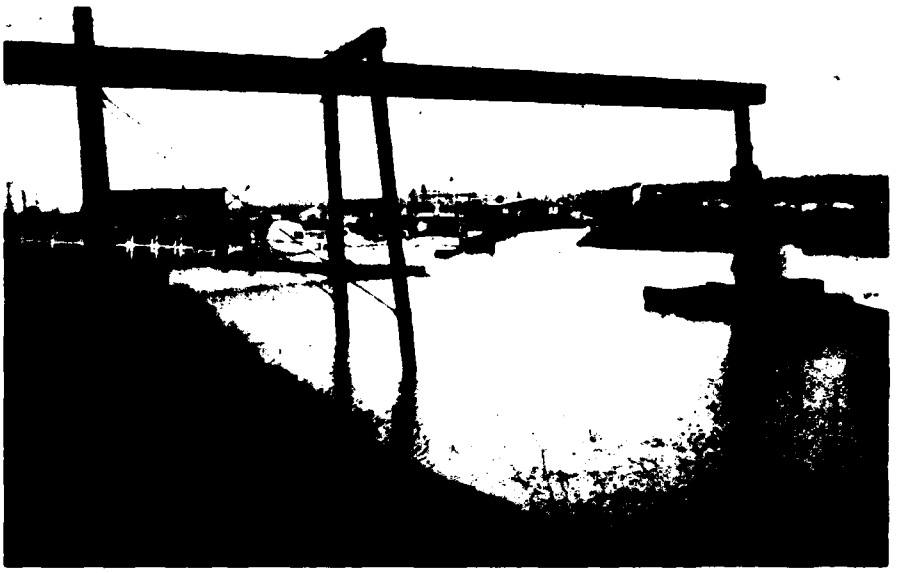


FIGURE 1-3. Existing Public Boat Hoist. Private docks along interior canal shown in background.

SECTION 2. PLANNING OBJECTIVE AND CRITERIA

2.01 Planning Objective. The planning objective for this study is to provide a safe and economically efficient entrance to Sandy Point harbor.

2.02 Planning Criteria.

a. General. In formulating plans to meet the planning objective, a wide range of planning criteria was considered. These criteria were used to screen and evaluate alternative plans and to measure each plan's contribution to the National Economic Development (NED), Environmental Quality (EQ), Regional Development (RD), and Other Social Effects (OSE) planning categories of the Water Resources Council's Principles and Guidelines. The comparative evaluation of alternative plans developed during initial plan formulation is presented in Section 3. The criteria considered include identified outputs, factors such as conditions which impose constraints and limitations on the planning process (e.g., local sponsor's capability to finance the non-Federal share of project costs), and rules and guidelines for evaluation of the plans. The criteria also include other needs, opportunities, and concerns in addition to the primary planning objective. Not all the criteria are compatible, and no plan could fully satisfy all of them. However, the tentatively recommended plan (see Section 4) comes the closest to satisfying the criteria. Applicable planning criteria for the study are presented in the following paragraphs under the account to which they are primarily related.

b. NED Criteria. The NED criteria are used to guide the formulation of alternative plans to meet the objective of developing maximum net benefits to the nation. The pertinent NED criteria are as follows:

- Provide safe, unobstructed navigation channel at entrance to the Sandy Point harbor.

- Provide appropriate wave and erosion protection at the Sandy Point harbor entrance to both moored and transiting boats and to interior canal shoreline property.

- Reduce boat damage, resulting from boat groundings.

- Eliminate operating costs resulting from relocation of boats to other moorage facilities in the absence of a navigation improvement project at Sandy Point.

- Increase employment opportunities for unemployed or underemployed individuals.

- Provide annual plan benefits which exceed annual costs, considering environmental effects.

o Provide a public boat landing and anchorage area and all other Federal and non-Federal features associated with a navigation project constructed under Section 107 of the 1960 River and Harbor Act and required to achieve project economic benefits.

o Use the current Federal discount rate of 8-1/8 percent in determining annual costs and in discounting future benefits.

o Use a 50-year project economic life to plan economic analysis.

o Include in average annual cost estimates; interest and amortization of construction costs; and provision for annual maintenance, operation, and major component replacement.

o Insure that plans are implementable within a range of likely future economic conditions.

o Avoid property value degradation due to the lack of navigation improvements.

c. EQ Criteria. The EQ criteria which follow consist of specific environmental resource related concerns, constraints, and opportunities. These include criteria imposed by Federal, state, and local regulations and those uniquely related to the Sandy Point project area. The environmental resources of this area are described in the environmental assessment (EA). EO criteria include the following:

o Preserve the natural and beneficial values of the developed and underdeveloped portions of the saltwater flood plain in the study area in conformance with Executive Order (EO) 11988. The requirements of EO 11988 are presented in more detail in Section 9 of the accompanying EA.

o Preserve the wetlands in the study area in conformance with EO 11990. The requirements of EO 11990 are presented in more detail in Section 10 of the EA.

o Preserve the shore zone habitat critical to fish and wildlife, including shallow water areas.

o Preserve or salvage any significant (as determined by National Register of Historic Places criteria) historic and prehistoric cultural resource sites affected by potential project construction or effects in accordance with the authorities contained in existing legislation and EO's, including the National Historic Preservation Act of 1966; the Reservoir Salvage Act of 1960, as amended by Public Law 93-291; and EO 11593.

o Compliance with the Federal Coastal Zone Management Act (CZMA) is not required for that part of the project lying on tidelands held in Federal trust for the Lummi Indian Tribe. However, the Lummi Indian Tribe has adopted

an ordinance implementing a Lummi Tribe Coastal Zone Management Plan which delineates allowable uses in specified areas. For the remaining project lands lying above and below Lummi tidelands, the proposed project will comply with CZMA.

o Comply with applicable land use plans of the Lummi Indian Reservation and Whatcom County.

o Protect any threatened or endangered species in the study area and their critical habitat.

o Protect Indian and non-Indian commercial fishery operations in the study area.

o Preserve or enhance water quality in the study area in conformance with Section 404 of the Clean Water Act of 1977 (Public Law 92-500), as amended.

o Avoid decreasing existing air quality in the study area.

d. RD Criteria. The RD criteria consist of opportunities related to increased economic efficiency within the Sandy Point study area that do not necessarily provide increases in NED. This list also includes areas of concern listed in Section 122 of Public Law 91-611. Regional development criteria include the following:

o Increase employment in Whatcom County and on the Lummi Indian Reservation during plan implementation.

o Contribute to county and reservation development and growth by reducing constraints to boating and related economic activity.

o Increase net income to county and reservation businesses during plan implementation.

o Encourage local expenditures for improvement of community facilities (e.g., schools and utilities).

o Maintain property values within the study area, which would decrease in the absence of a project.

o Increase tax revenues within the study area.

e. Other Social Effects (OSE) Criteria. The OSE criteria listed below include those engineering policy standards that were applied to all alternatives to assure the maintenance of public health and safety and those opportunities and constraints related to the social well-being of people. This list also includes area of concern listed in Section 122 of Public Law 91-611. OSE criteria include the following:

- Increase community cohesion within Sandy Point, Whatcom County, and the Lummi Indian Reservation.

- Avoid the relocation of residential properties.

- Avoid the relocation of public facilities and properties, and the resulting inconvenience to residents during construction.

- Avoid increased noise levels in the study area.

- Preserve the esthetic values along the Lummi Bay shoreline.

- Provide vehicular access to the marina public boat launch ramp.

SECTION 3. FORMULATION AND EVALUATION OF ALTERNATIVES

3.01 Plan Formulation Approach. The plan formulation process began with the identification of the planning objective and the planning criteria. Structural and nonstructural alternatives were then identified to address the planning objective. Alternatives which satisfied the planning objective emerged from the preliminary screening and were further evaluated and refined. Refinements were based on the results of additional technical studies and an extensive program of interagency and local sponsor coordination to formulate realistic alternatives. Final alternatives were evaluated against the planning criteria, and a detailed system of accounts was developed to measure their contribution to the NED, EQ, RD, and the OSE accounts of the Water Resources Council's Principles and Guidelines. Based on the results of this analysis, the alternative that resulted in maximum net economic return, consistent with protecting environmental quality, was designated as the tentatively recommended plan.

3.02 Preliminary Analysis and Screening of Alternative Concepts. The following three alternative concepts were formulated in response to the coastal shoaling problems. Table 3-1 presents a summary comparison of the "no action" and tentatively recommended "channel improvement with protection" alternative concepts.

- o No Action
- o Channel Improvement Only
- o Channel Improvement With Protection Structures

3.03 Alternative 1 - No Action. The concept of no action reflects the "without" plan condition and provides the basis for comparison of the other concepts and the tentatively recommended plan. The no-action alternative was carried into the final analysis as the nonstructural alternative in accordance with the Water Resources Council's Principles and Guidelines.

3.04 Alternative 2 - Channel Improvements Only. The channel improvement only concept, i.e., dredging the channel without additional breakwaters, was briefly considered during early stages of the study. This alternative would have a very low initial construction cost and would have the added advantage of not requiring the rubblemound breakwaters with their maintenance requirements and potential for environmental damage. However, two major problems exist for this alternative: (1) unacceptable, excessive wave action would occur in the harbor and (2) maintenance dredging of the entrance would be required on a yearly basis and possibly more often.

3.05 Dredging of a 75-foot wide channel 10 feet deep through the entrance area would increase the effective wave transmission cross-sectional area by about three times over the present area. Wave heights of over 5 feet could occur in the basin and 2- to 3-foot high waves would be common. Extensive

TABLE 3-1
SUMMARY COMPARISON OF FINAL ALTERNATIVES

ITEM	ALTERNATIVE 1 NO ACTION (NONSTRUCTURAL PLAN)	ALTERNATIVE 3 CHANNEL IMPROVEMENT WITH PROTECTION NED/TENTATIVELY RECOMMENDED PLAN
a. Plan Description		
1. Structural Measures	None	-Channel Dredging/open-water disposal -Rock breakwater and inner harbor shoreline revetment protection -Public boat launch ramp (inner harbor)[1/]
2. Nonstructural Measures	None	-Lands, easements, and rights-of-way
3. Fish and Wildlife Mitigation	None	-Dredging timing to avoid interference to salmon migration -Transplanting several patches of eelgrass which would be covered up by development of the accretion beach behind the north outer breakwater
b. Construction Investment Costs		
1. Federal Cost Share	None	$226,000[2/]
2. Non-Federal Cost Share	None	$1,122,000
Total Construction	None	$1,348,000
Interest During Construction	None	55,000
Total Investment Cost	None	$1,403,000

1/Existing boat launch ramp.
2/Cost estimate reflects October 1983 price levels and includes engineering and design, supervision and administration, contingencies and construction costs of general navigation facilities (including USCG costs for navigation aids) in light of the distribution of project economic benefits. Estimate excludes preauthorization (DPR) study costs.

TABLE 3-1 (con.)
SUMMARY COMPARISON OF FINAL ALTERNATIVES

ITEM	ALTERNATIVE 1 NO ACTION (NONSTRUCTURAL PLAN)	ALTERNATIVE 2 CHANNEL IMPROVEMENT WITH PROTECTION (NED TENTATIVELY RECOMMENDED PLAN)
c. Response to Planning Criteria		
1. National Economic Development		
a. Savings in boater operation costs due to reduced running time between relocated moorage and Sandy Point	No Change	Cost Savings
b. Savings in vessel damages due to unimproved entrance at Sandy Point	Increased Vessel Damage	Cost Savings
c. Project-related Employment Opportunities for unemployed or underemployed persons.	Increased Unemployment	Employment Opportunities
d. Total Average Annual Benefits	None	$765,400
e. Total Average Annual Costs	None	155,000
f. Benefit-to-Cost Ratio	N/A	4.9 to 1
Planning Objective		
Provide safe and economically efficient entrance to Sandy Point harbor.	Nonresponsive	Yes
2. Environmental Quality (to be completed)		

TABLE 3-1 (con.)
SUMMARY COMPARISON OF FINAL ALTERNATIVES

ITEM	ALTERNATIVE 1 NO ACTION (NONSTRUCTURAL PLAN)	ALTERNATIVE 2 CHANNEL IMPROVEMENT WITH PROTECTION (NED TENTATIVELY RECOMMENDED PLAN)
3. Regional Development		
a. Construction Employment	None	Temporary increase
b. Property Values	Significant decrease in Value	Maintain and potentially increase property value
c. Tax Revenues	Decrease in Revenue to Whatcom County	Maintain and potentially increase tax revenue
4. Other Social Effects		
a. Life, Health, and Safety	Long-Term Adverse	Long-Term Beneficial
b. Community Cohesion	Long-Term Adverse	Long-Term Beneficial
c. Relocation of Public and Residential Properties	None Required	None Required
d. Aesthetics	Possible Long-Term Adverse	Potential long-term and beneficial or negative changes (depending upon individual values)
e. Noise levels	Reduction due to decrease in boater activity	Temporary increase due to project construction and periodic maintenance

erosion damage would occur to all shorelines in the main harbor basin and moored vessels and docks would sustain severe damage under these conditions. Also, safety would be a concern for those mooring inside the harbor entrance and those owning shoreline properties affected by the more severe wave action.

3.06 Estimated longshore littoral drift is about 3,500 cubic yards per year in a southerly direction. This material is transported southerly along the entrance area shoreline and deposited in the navigation channel. While it is difficult to predict precise deposition patterns of this material, experience from other projects and historical shoal patterns at Sandy Point from 1958 to present indicate the majority of material would be deposited in a relatively short reach of the entrance channel. Based on the estimated 3,500 cubic yard per year littoral drift, an estimated 1/3 to 1/2 of the channel width would be infilled each year. This agrees closely with past aerial photograph data which showed a channel infill rate of 200 feet during a 7 year period, or an average of about 30 feet per year. An advance maintenance area would be required to attain channel project dimensions between dredge cycles. The minimum width would be 30 feet, but 50 feet would be a more reasonable width, for a 1-year dredge cycle maintenance plan. With this additional widening, the harbor would be even more exposed to the wave action discussed above and additional uplands would be dredged. Unit dredging costs for maintenance would be very high for this alternative because mobilization of marine dredging equipment would remain constant whether a large or small volume of material is removed, and preparation of contract documents and inspection are also essentially fixed whether for a large or small dredge volume.

3.07 For the above reasons this alternative does not meet the planning objective of providing a safe and economically efficient entrance and the planning criterion of providing appropriate wave protection to the harbor and, therefore, it was dropped from further consideration.

3.08 Alternative 3 - Channel Improvement with Protection. A number of variations of the channel improvement with protection alternative were evaluated in light of the planning objective criteria, interagency comments and local sponsor acceptability. These variations included different channel, breakwater, and inner harbor revetment protection configurations. Of these structural variations, one emerged as being most responsive to the planning criteria. This variation was refined and developed into the tentatively recommended plan. The following discussion summarizes the results of plan formulation of the structural variations.

3.09 Six variations of the channel improvement with protection alternative were developed early in the planning process. Figure 3-1 conceptually portrays the general navigation project features of each variation. Preliminary project costs and the benefit-to-cost ratios of each variation were developed and discussed during interagency plan formulation meetings.

The variations differed in the channel alinement and associated dredging quantities and the configurations of breakwater and revetment protection. Each of these variations assumed disposal of material dredged to construct the entrance channel in a Bellingham Bay open-water site managed by the State Department of Natural Resources (see plate 1 for disposal site location).

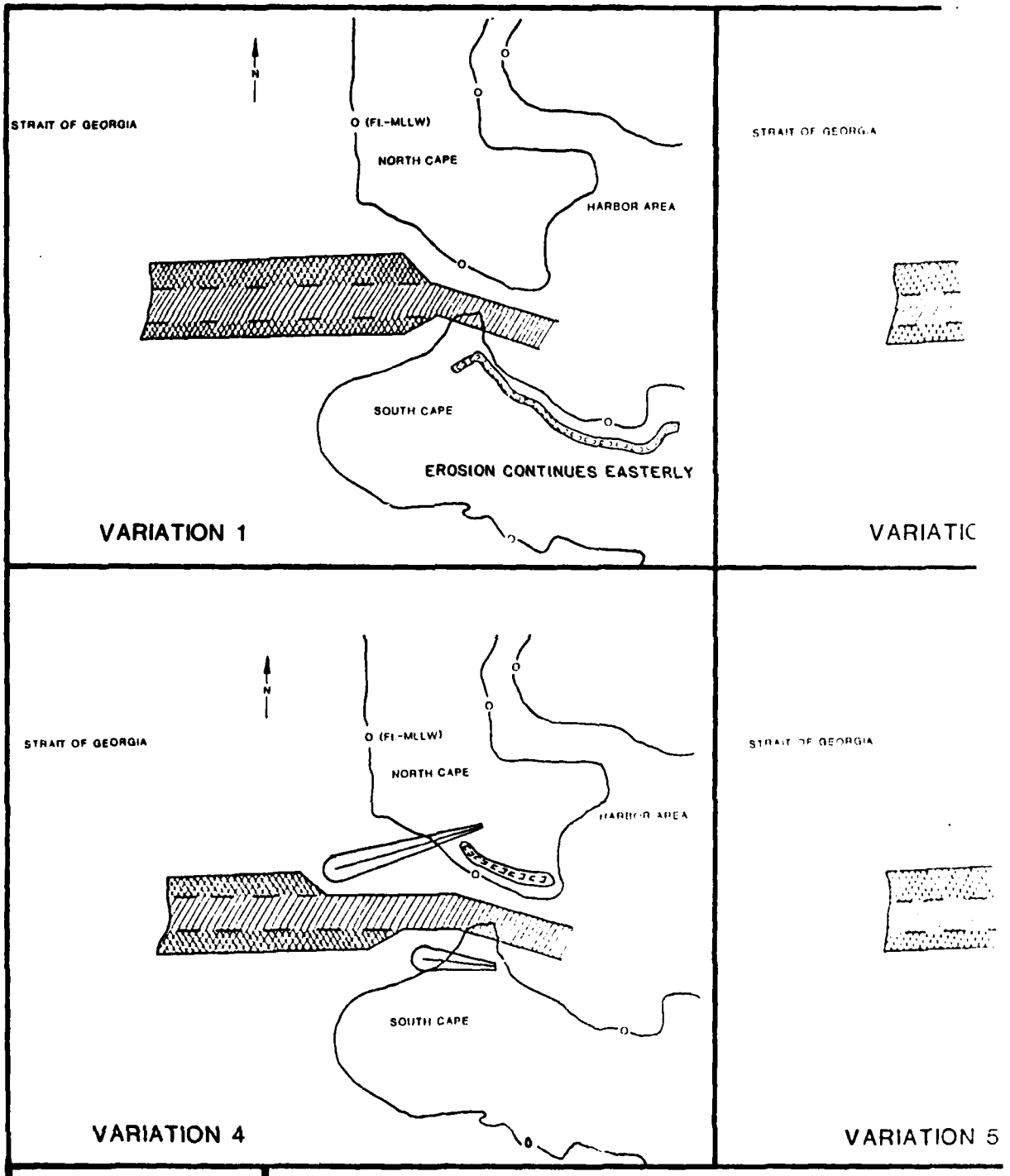
3.10 Potential disposal concepts evaluated during the study included:

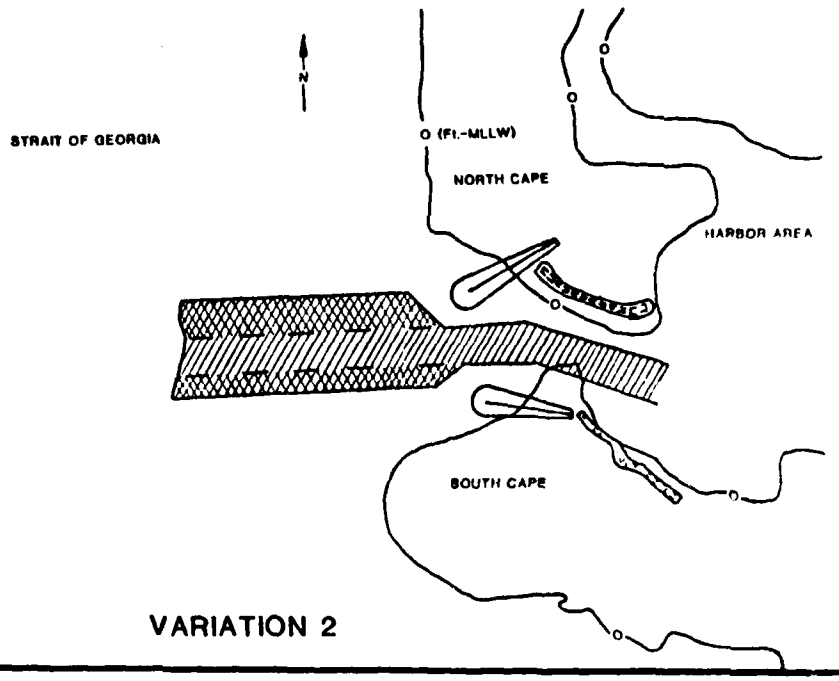
a. Clamshell dredge with open-water disposal (Bellingham Bay).

b. Hydraulic dredge with pipeline disposal to a nearby confined upland site.

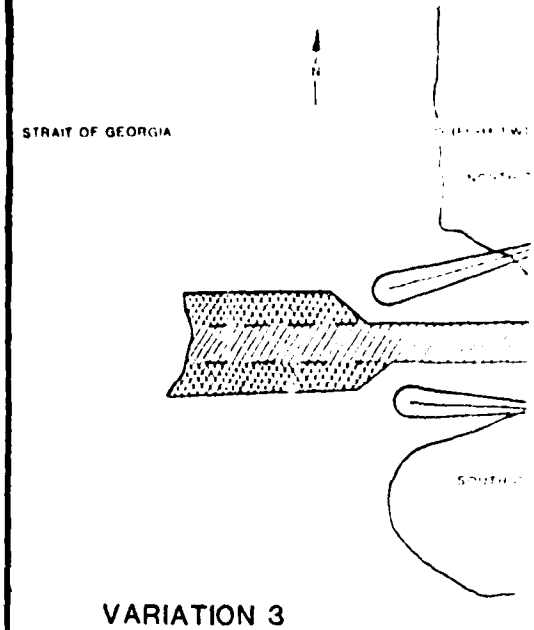
Hydraulic dredging and pipeline disposal was considered, but discarded when no nearby upland site could be assured. In comparison to clamshell dredging with open-water disposal, hydraulic dredging with potential upland disposal was more costly due to the necessity to construct dikes for containment of this fine material. Shoreline disposal of dredged material adjacent to the entrance channel was briefly considered; however, this concept was dismissed because the material to be dredged is easily erodable fine sand and would be unsuitable for beach nourishment. Clamshell dredging and open-water disposal was preferred by environmental resource agencies, and was included in the tentatively recommended plan. See Section 5.3.2 of the EA for a discussion of the environmental effects of clamshell dredging, and paragraph 5.4.2 for a discussion of the dredged material suitability for shoreline disposal.

3.11 Plan Formulation Results. The six conceptual channel improvement with protection variations were formulated to determine local sponsor and agency general preferences. Engineering studies indicated that, once a wider channel opened up wave transmission into the inner harbor, additional protection (e.g., interior shoreline revetment and breakwater protection) would be required regardless of the initial variation selected. Of the six variations, local interests initially expressed preference for variation 4, which would provide the most wave protection to properties inside the harbor entrance. During subsequent coordination, resource agencies expressed opposition to the local sponsor's preferred variation 4 due to: (1) the breakwater interruption of juvenile salmonid migration route; and (2) the potential for net loss of herring spawning and crab rearing habitat associated with placement of the breakwaters and the resulting accretion beach behind the north outer breakwater. Further agency and local sponsor coordination and site visits were conducted and plans refined in an attempt to reach a mutually acceptable solution. See Section 4.3.1 of the EA for the results of a May 1984 underwater site survey which confirmed that adverse project impacts upon juvenile salmon, crab habitat, and herring spawning habitat would not be significant. The tentatively recommended plan is a modification of variation 4 reflecting a compromise that meets the planning objective with the least possible adverse environmental impacts.





VARIATION 2



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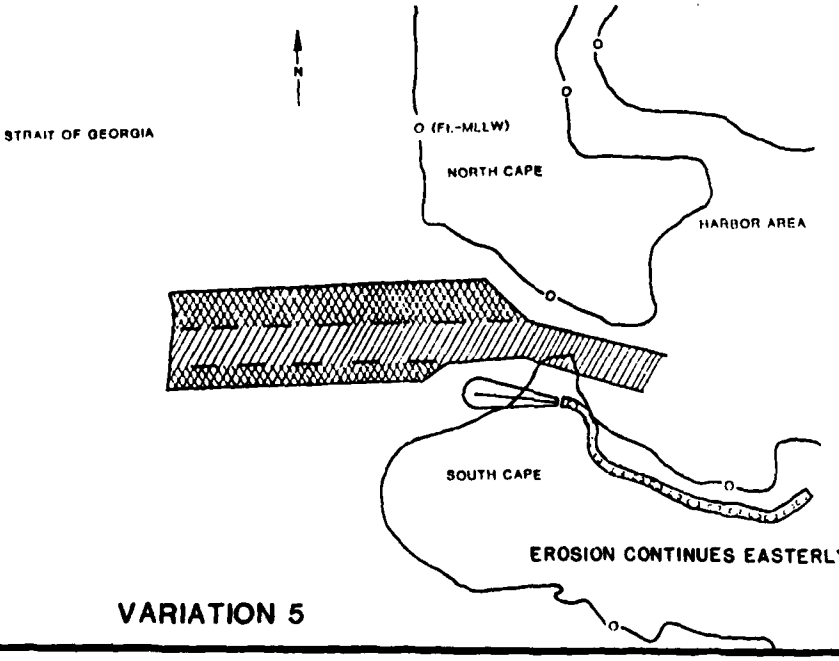

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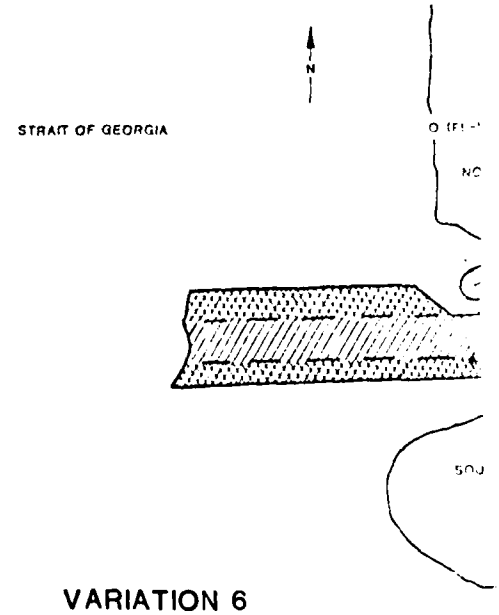


VARIATION 6

LEGEND

TECTION

ADVANCE MAINTENANCE AREA

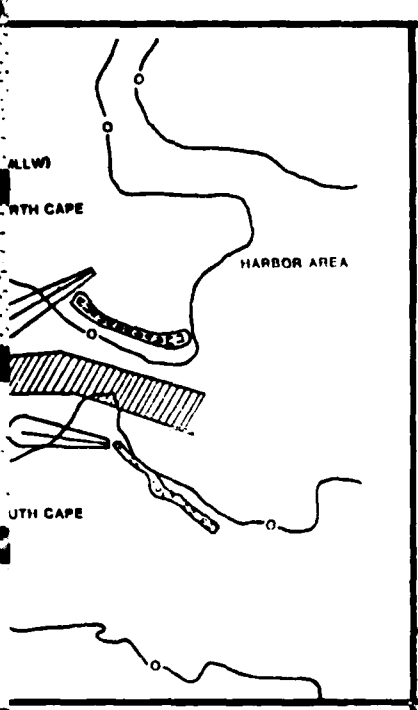
BREAKWATER PROTECTION

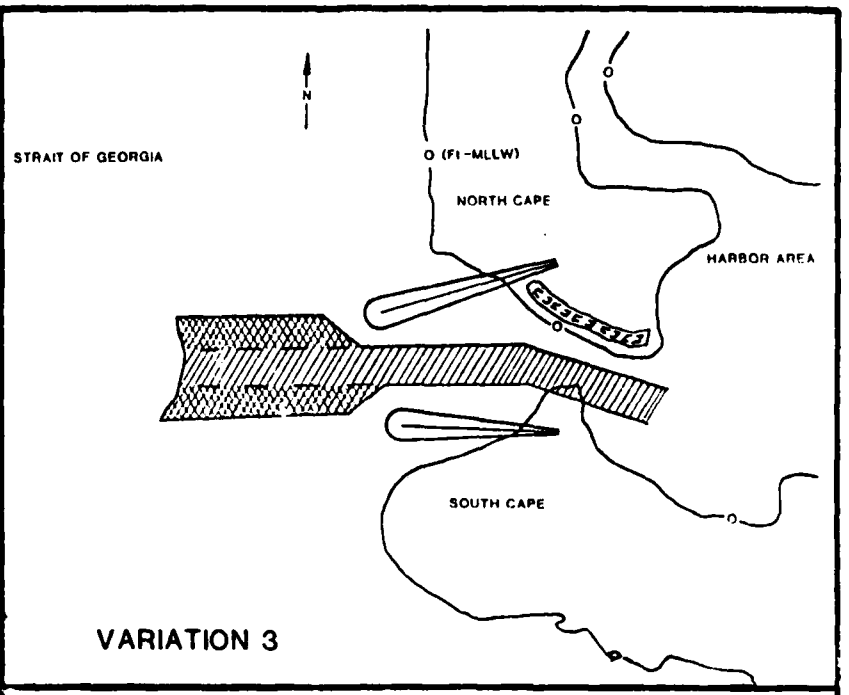
SANDY POINT NA

VARIATIONS OF STRU

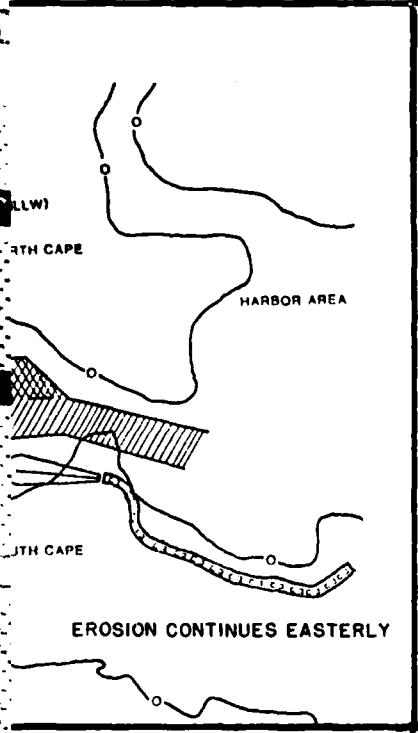
ALTERNATIVE

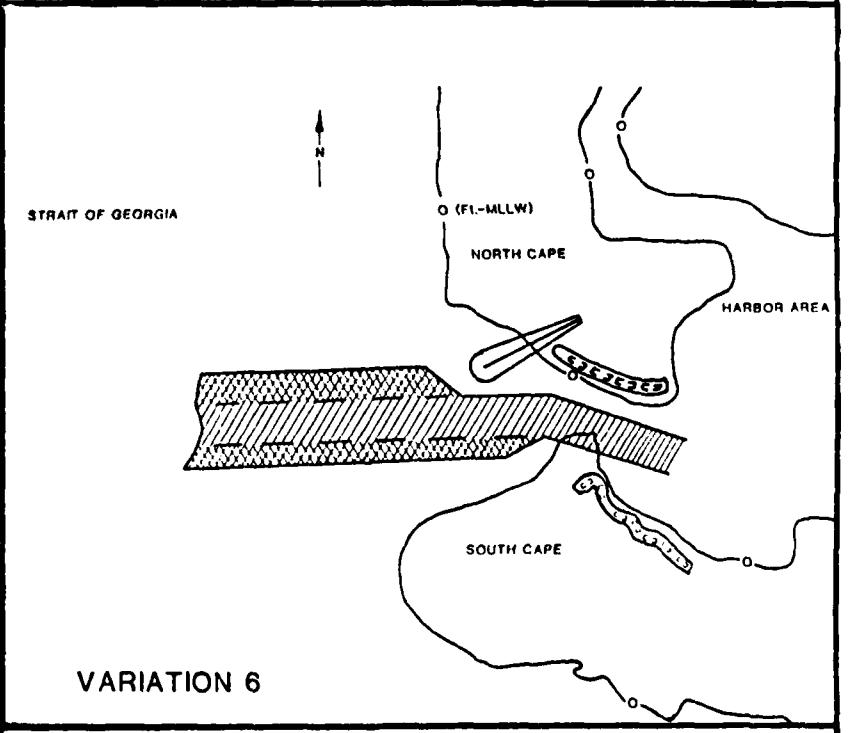
WHATCOM COUNTY





VARIATION 3





VARIATION 6

NTENANCE AREA

PROTECTION

SANDY POINT NAVIGATION CHANNEL

VARIATIONS OF STRUCTURAL ALTERNATIVE

WHATCOM COUNTY WASHINGTON

FIGURE 3-1

3

SECTION 4. THE RECOMMENDED PLAN

4.01 Project Description. This section of the report discusses the setting and characteristics of the tentatively recommended plan. The recommended project is shown on plates 1 and 2. Table 4-1 identifies the general navigation features.

TABLE 4-1

GENERAL NAVIGATION FEATURES

Federal[1/ 2/]	Non-Federal[3/]
Entrance Channel	Public Boat Launch Ramp
Rock Breakwaters	Lands for General Navigation Facilities
Shoreline Revetment	
Mitigation[2/]	
Navigation Aids	

1/With the exception of USCG navigation aids, construction of these features is cost shared between the Federal Government and the local sponsor based upon the distribution of project benefits which are either national or local in scope (see appendix D for benefit evaluation).

2/Maintenance of these features is a Federal responsibility. However, no maintenance of the mitigation feature (transplanting of eelgrass), is anticipated because the eelgrass will be self-sustaining.

3/Construction and maintenance of these features are local sponsor responsibilities.

4.02 Navigation Conditions. The proposed entrance channel and adjacent protective works were designed to alleviate coastal shoaling impediments to boater navigation and safety and to minimize: (1) disruption of herring spawning and crab habitat and (2) adverse impacts on migratory salmon. Rock breakwaters and a stretch of shoreline rock revetment provide wave protection to Sandy Point harbor shorelines and moored boats.

4.03 Tides and Currents. Tides in the vicinity of Sandy Point are typical of the Pacific coast of North America, with two unequal highs and two unequal lows each day. Extreme tidal elevations range from -4.5 feet MLLW to +12 feet MLLW. Currents in the Strait of Georgia, adjacent to Sandy Point, are in a northerly direction during flood stage and in a southerly direction during the ebb phase.

4.04 Winds. Prevailing summer winds in the Sandy Point area are predominantly from the south and southeast. Winter storms occasionally produce winds in excess of 50 miles per hour from the north and south. Wind characteristics are discussed in appendix C.

4.05 Waves. The proposed project site is exposed to wind generated waves from the south and, westerly, to the north with effective fetch lengths extending to 43 miles. Waves generated by vessels using the navigation channel range in height from 1/2 to 1-1/2 feet. Wave characteristics are discussed in detail in appendix C.

4.06 Geotechnical. Exploratory drill borings were made along portions of the proposed navigation channel and north outer breakwater alinement at the locations shown on plate 2. Additional borings will be conducted prior to preparation of plans and specifications. Detailed boring logs are shown on plate 3. Laboratory tests were made on representative soil samples to determine the properties of the materials to be dredged from the channel and materials underlying the proposed north outer breakwater. Materials under the north outer breakwater consist of about 10 feet of loose, fine, silty sand with gravels and organic debris underlain by 5- to greater than 15 feet of soft, peaty bog mud. Foundation conditions beneath the north inner breakwater have not been determined, but are expected to be similar. The channel will be excavated partly in soft to loose mixtures of sand, silt, clay, and organic debris which have infilled the old channel, peaty and silty bog mud, and sand and gravel. Based upon the results of settlement and stability analyses, additional breakwater rock has been added to compensate for anticipated underlying soils consolidation. Cut slopes of 5 horizontal (H) to 1 vertical (V) are appropriate for channel excavation. A more detailed discussion of project related geotechnical design is presented in appendix C.

4.07 Design Criteria. Primary design considerations included selecting project features to: (1) enhance navigation safety and maneuverability, (2) provide adequate wave protection to the inner harbor, (3) reduce expected maintenance requirements, (4) minimize adverse environmental impacts, e.g., impacts to herring spawning and crab habitat, and (5) provide an economically efficient design. Basic design parameters and criteria as well as other factors affecting project features are presented in appendix C. Six variations of the channel improvement with protection alternative were examined (see figure 3-1). The variations differed principally in the location and length of breakwaters and revetments. The tentatively recommended plan is the lowest cost plan that provides adequate navigation safety and wave protection to the inner harbor, thus maximizing net benefits, as well as providing an efficient maintenance plan and minimizing adverse environmental impacts.

4.08 Structural Features (Construction and Maintenance). The structural features of the navigation improvement plan are shown on plates 1 and 2 and described in detail in appendix C. Apportionment of project costs is shown in table 4-1 of this DPR. The entrance channel, breakwaters, and revetment are general navigation facilities. Remaining project features, including the public anchorage area and the public boat launch ramp, are considered self liquidating non-Federal items not eligible for Federal cost sharing under the Section 107 program. The USCG has a separate Federal program for installation and maintenance of navigation aids. The following paragraphs discuss construction and maintenance features.

a. General Navigation Features.

(1) Entrance Channel.

(a) Construction. An entrance channel 1,200 feet long by 100 feet reducing to 75 feet wide[1]/ by 10 feet deep (at MLLW) would be constructed from the Strait of Georgia into the Sandy Point harbor. Vessel drafts plus an appropriate added depth for underkeel clearance was the basis for selection of channel depth. The 10-foot channel depth is the minimum allowable. The entrance channel would encompass approximately 2.5 acres and entail clamshell dredging of 40,000 cubic yards (c.y.) of material, with subsequent open-water disposal in a Washington Department of Natural Resources' (DNR) designated site in Bellingham Bay (see location map on plate 1). To reduce the frequency of channel maintenance dredging, two sediment settling areas (advance maintenance areas) on both the north and south sides of the entrance channel would be dredged during initial project construction and thereafter as needed during scheduled maintenance dredging cycles. Advance maintenance areas are identified on plates 1 and 2. The north advance maintenance area would occupy approximately 2 acres of sea floor, while the south maintenance area would cover less than 1/2 acre. These two areas will require initial dredging of 20,000 c.y. of material. Dredging would be done between 1 December and 15 March to minimize impacts to herring, crabs, and salmon.

(b) Maintenance. Maintenance dredging of the entrance channel and accompanying advance maintenance areas is scheduled to occur at year 5 following project construction and every 3 years thereafter. Approximately 10,000 c.y. of material will be dredged by clamshell during each maintenance cycle and barged to a DNR designated site in Bellingham Bay for open-water disposal.

(2) Breakwaters.

(a) Construction. Three separate rock breakwaters would be constructed to reduce wave action inside the entrance to Sandy Point harbor. Breakwater protection is required because the current 50-foot-wide entrance opening will be enlarged to approximately 200 feet wide to accommodate the proposed new entrance channel and its side slopes, thus exposing the interior shorelines to wave action. The 300-foot-long north outer breakwater on the north side of the channel would: (1) reduce westerly and northwesterly wave transmission into the Sandy Point harbor and (2) direct littoral drift into the designated advance maintenance area (thus reducing the frequency of maintenance dredging in the absence of this breakwater). The 200-foot-long north inner breakwater and the 150-foot-long south breakwater would protect the interior shorelines from westerly and southwesterly wave transmission. The maximum top elevation of the breakwaters would be +16 feet MLLW with side slopes of 2H to 1V and 1-1/2H to 1V with short transition sections between. The breakwaters will contain exterior armor rock ranging from 1,000 to 4,000 pounds (depending upon the specific breakwater) with lesser size (50 to

1/Channel width varies, as shown in plate 2, to minimize amount of shoreline to be removed to establish harbor entrance.

500 pounds/piece) core and toe rock. Refer to plate 2 for cross sections. Each breakwater contains quarry spall toe protection to prevent wave undermining or to prevent erosion of entrance channel side slopes. The north outer breakwater contains approximately 6,500 tons of armor rock and 10,300 tons of core and toe rock; the north inner breakwater contains 2,900 tons of armor rock and 5,000 tons of core and toe rock; while the south breakwater contains 750 tons of armor rock and 350 tons of core and toe rock. For cost estimating purposes, it was assumed that the source of rock material is an operating quarry at Mats Mats Bay near Port Ludlow, Washington, a one-way haul distance of approximately 70 nautical miles. Closer quarry sites will be evaluated for the quantity and quality of rock prior to preparation of plans and specifications.

(b) Maintenance. The rock breakwaters will require major rehabilitation of selected portions of armor and toe protection at project years 15 and 30.

(3) Revetment.

(a) Construction. A 200-foot-long rock revetment would be constructed along the north shore of the entrance channel between the north inner and north outer breakwaters. The revetment is required to make up for exposure to waves as a result of widening the entrance channel and the loss of accreted material cut off by construction of the north outer breakwater across the line of littoral drift. Without this revetment, the north shore would be subject to erosion from both southwest wind waves (principal wave attack) and boat generated waves (lesser wave attack). The revetment would have a top elevation of +16 feet MLLW, with a surface slope of 2H to 1V. The revetment, which would occupy less than 1/4 acre, would include 2,500 tons of armor rock and 1,700 tons of core and toe rock (see plate 2 for cross section).

(b) Maintenance. Portions of the revetment would require rehabilitation at project years 15 and 30.

(4) Navigation Aids. The USCG would install and maintain navigation aids at full Federal expense.

(a) Construction. By their letter dated 24 February 1984 (appendix B), the USCG would install two lighted, five-pile wood dolphins to mark the channel and two aluminum towers to mark the breakwater locations. The location of these aids is shown on plate 1 and the estimated cost is identified in table 4-2 and in table C-2 of appendix C.

(b) Maintenance. The USCG would replace light beacon batteries annually and replace the wood dolphins and aluminum towers at year 25.

b. Non-Federal Features. This portion of the report identifies the non-Federal features which must be included as part of the navigation project in order to claim project benefits.

(1) Boat Launch Ramp and Lot Access Road and Parking.

(a) Construction. As shown in appendix D, table 2-2, over 200 trailerable boats are launched from the existing private boat ramp at Sandy Point per year. Whatcom County would provide a public boat ramp facility as part of the standard local sponsor requirements associated with a Corps of Engineers Section 107 program. A public launch ramp is required to provide small boat access to and from the mainland through the harbor entrance. The local sponsor has indicated that the existing launch ramp would be made available for public use at Sandy Point to satisfy these requirements, along with sufficient public access and parking facilities. If this site proves unavailable, a nearby site will be developed by local interests.

(b) Maintenance. Whatcom County would maintain the public launch ramp and associated parking lot and provide assurances that all other marina facilities within Sandy Point would be maintained for the use of the proposed Federal project by present boaters. See paragraph 4.18 and Section 6 for additional local sponsor requirements.

4.09 Real Estate Requirements. The local sponsor provides all lands, easements, and rights-of-way necessary for construction and maintenance of the project. In the Strait of Georgia, the State of Washington owns submerged lands from extreme low tide (elevation -4.5 MLLW) to deep water. At Sandy Point, the Lummi Indian Tribe owns reservation lands above elevation -4.5 feet to the mean high water line (elevation +7.80 feet MLLW). The United States claims navigation servitude jurisdiction from mean high water (i.e., +7.8 feet MLLW at Sandy Point) to United States coastal waters. See 31 May 1984 letter from the Lummi Indian Business Council and Corps of Engineers response to comment 2 in appendix B, part 4b for further information on this issue.

(a) Real Estate Required for Federal Project Features. The project areas designated for the entrance channel and advance maintenance areas require no Washington State lease since Federal navigation projects may be constructed in navigable waters without compensation to the owners. On the other hand, the local sponsor would have to secure approximately 1 acre in easements for construction and maintenance of the breakwaters and revetment on lands above mean high water presently owned by private individuals.

(b) Real Estate Required for Non-Federal Features. The local sponsor would be required to secure necessary real estate for non-Federal construction and maintenance of the boat ramp and parking facilities.

(c) Cost Estimate. The estimated cost of the 1 acre easement on lands above mean high water is $5,000.

4.10 Environmental Effects of the Recommended Plan.

a. General. The tentatively recommended plan of improvement is responsive to environmental concerns, including those expressed by resource agencies and local interests, through design modifications within planning objective constraints and the financial capability of the local sponsor. A number of environmental measures have been included in project design to reduce adverse environmental effects, and where appropriate, to enhance the project area environment. Where project construction and maintenance has removed or permanently adversely altered important environmental features, specific mitigation proposals have been identified. These two environmental aspects are addressed in the following discussion; additional discussion is contained in the EA. Refer to appendix B for early resource agency plan formulation coordination correspondence.

b. Environmental Considerations. The breakwater and channel dimensions and alinement, method of dredging, and disposal have been selected to minimize removal of productive herring spawning and crab habitat. A May agency site visit and underwater survey confirmed this statement (see paragraph 4.3 of EA). The improved navigation channel is expected to not only reduce the chance for water quality problems in the harbor due to a reduction in tidal exchange, but it should enhance existing inner harbor water quality as a result of improved tidal exchange. Shallow (1.5 to 1) north outer breakwater slopes would provide a shallow water passageway along which juvenile salmonids can progress seaward while avoiding deeper water predators. Construction and maintenance dredging would be scheduled to minimize adverse impacts to migratory salmon and commercial fishing activities.

c. Summary of Project Environmental Effects. The following summary is drawn from Section 6 of the EA:

(1) Air Quality and Noise. Short-term localized air quality impact and acceptable noise impacts due to project construction.

(2) Water Quality. Short-term localized and temporary impact caused by dredging and disposal induced water turbidity. Breakwater and revetment construction would have minor impacts on water quality.

(3) Fish. Placement of north outer and north inner rock breakwaters would remove approximately 0.7 acres of rocky shore/sandy bottom habitat. The accretion beach north of the northwest breakwater would convert approximately 0.9 acres of similar habitat to uplands. However, different benthic communities will colonize on these new surfaces, providing food organisms for fish. The shallow breakwater slopes provide a shallow water passageway for juvenile salmon, and, as a result, predation opportunities will be reduced.

(4) Benthic Invertebrates (e.g., Crabs). The project area supports only a sparse benthic habitat. Dredging would be restricted from 1 December to 15 March to minimize impacts upon Dungeness crab molting, mating, and major harvesting activities. Dredged disposal impacts at the designated open-water disposal site are not considered significant. Removal of crab foraging habitat by breakwater and accretion beach construction is not considered significant. These structures offer opportunities for organism recolonization.

(5) Macroflora (Plants). Dredging will have minimal adverse impacts. The north outer and north inner breakwaters would not impact eelgrass habitat. The accretion beach would result in the loss of a few patches of eelgrass, but would avoid substantial eelgrass beds adjacent to the accretion area.

(6) Marine Mammals. No significant project induced impacts on marine mammals are anticipated.

(7) Avian Fauna. No significant impacts on birds are foreseen.

(8) Endangered/Threatened Species. A biological assessment (BA) (see appendix B, part 2) prepared on project impacts on bald eagle and peregrine falcon concludes that the project would not impact either species. However, from 1 September until 31 March, an experienced observer will be present to determine whether construction activities are impacting the peregrine falcon. If so, construction activities would be modified to avoid impacts. See appendix B, part 2, for 15 August 1984 letter from the U.S. Fish and Wildlife Service concurring with these findings. No significant impacts to whales or other endangered/threatened marine mammals are foreseen. The BA on these animals is in appendix B, part 2.

4.11 Mitigation. To mitigate for the removal of several patches of eelgrass to be lost by development of the north outer breakwater accretion beach, transplanting of these plants is proposed to adjacent areas which contain no eelgrass. No maintenance is planned because the eelgrass is expected to be self-maintaining. As mentioned in paragraph 1.10b, dredging and disposal operations are restricted to 1 December through 15 March to minimize crab impacts.

4.12 Cultural Resources. Archaeologic deposits were found in Sandy Point vicinity during a 1981 reconnaissance by other interests. However, no finds were recovered in the immediate project area (see correspondence in appendix B from Washington State Office of Archeology and Historic Preservation (SHPO)).

In the event that previously unrecognized sites are encountered or unanticipated cultural resources impacts occur during project construction, an evaluation of the resource would be undertaken in cooperation with the SHPO, the Lummi Indian Tribe, the local sponsor (representing local interests), and the Advisory Council on Historic Preservation (ACHP).

4.13 Recreational Provisions. As a requirement of sponsoring a Federal small boat harbor navigation project, the local sponsor is responsible for public

recreation and access amenities. For the proposed Sandy Point navigation entrance improvement project, the local sponsor would provide a public boat launch ramp, shoreside parking for car and boat trailer combinations, a road providing ramp access from the nearest public road, necessary utilities, suitable water supply, and essential sanitary facilities. The ramp would be designed to permit use during both low and high tides and would permit launching of trailerable recreational pleasure boats and commercial fishing boats (principally small gillnetters and skiffs). The local sponsor has provided assurance that either the existing boat ramp at the northern end of the main canal will be converted over to public use (see plate 1) or an alternative site nearby will be developed.

4.14 Project Costs. Estimated project construction and maintenance costs (including mitigation costs) are summarized in tables 4-2 and 4-3, respectively, with detailed cost estimates presented in appendix C (tables C-2 through C-5). Table 4-2 also reflects the required cost sharing of the construction costs in light of the distribution of project related economic benefits.

TABLE 4-2

ESTIMATED PROJECT FIRST COSTS
(October 1983 Price Level)

Responsibility	Feature or Item	First Cost
Federal (General Navigation Facilities)		
	1. Mob and Demob	$100,000
	2. Breakwaters	525,000
	3. Revetment	93,000
	4. Dredging[1/]	180,000
	5. Mitigation	10,000
	Subtotal	$908,000
	6. Contingency (±20%)	182,000
	Subtotal	$1,090,000
	7. Engineering & Design (±10%)	109,000
	8. Supervision & Administration (±8%)	87,000
	Subtotal	$1,286,000
	9. Lands for General Navigation Facilities	5,000
	10. USCG Navigation Aids	$57,000
	Total Federal First Cost (General Navigation Facilities)	$1,348,000

1/Includes advance maintenance dredging having a first cost of $60,000 (see table C-3, appendix C).

TABLE 4-3

ESTIMATED PROJECT OPERATION AND MAINTENANCE COSTS
(October 1983 Price Level)

Responsibility	Feature or Item	First Cost[1]/	Average Annual Cost[3]/
Federal (General Navigation Facilities)			
	1. Maintenance Dredging & Disposal (year 5 followed by every 3 years)	$100,000	
	2. Breakwater and Revetment Rehab (years 15 and 30)	250,000	
	3. USCG Navigation Aids:		
	a. Inspection and Maintenance (annual)	1,000	
	b. Replacement (year 25)	57,000	
	Total Federal Annual O&M Costs		$37,000

Non-Federal (Associated Facilities)	First Cost[2]/	Average Annual Cost
1. Launch Ramp Maintenance (annual)	$700	$700
2. Local Docks and Miscellaneous Moorage Facility Maintenance (annual)	1,300	1,300
Total Non-Federal Annual O&M Costs		$2,000
Total Federal and Non-Federal Annual O&M Costs		$39,000

1/Includes costs associated with contingency, engineering and design, and supervision and administration.
2/Includes costs associated with contingency, planning, legal fees, etc.
3/Reflects 50-year economic life, 8-1/8 percent interest rate.

4.15 Design and Construction Schedule. The planning, design, and construction schedule for the Federal or general navigation project features, assuming funding availability, is summarized below and shown on plate 4. Subject to higher authority approval and availability of funds, the Federal project would be completed by May 1987 assuming the following schedule is maintained.

Submit Final DPR to NPD	Mar 85
Initiate Plans and Specifications	May 85
Advertise Construction	May 86
Notice to Proceed	Jul 86
Complete Construction of Federal (General) Navigation Facilities	May 87

4.16 Economics of the Tentatively Recommended Plan.

a. Methodology. The economic justification of the tentatively recommended plan is determined by comparing the average annual costs with average annual NED benefits which would be realized from the plan. A 50-year period of economic analysis was selected in analyzing the recommended project. Benefits and costs were based on October 1983 price levels. Project costs which would accrue at differenct periods of time were made comparable by conversion to an average annual equivalent cost using the current 8-1/8 percent interest rate for Federal water resource projects. Additional information on the economic analysis for project benefits is presented in appendix D. The following project benefit categories were identified for this project:

(1) Vessel Operating Cost Savings. This category of benefits assumed a savings in operating costs to recreational pleasure vessels which, in the absence of a project at Sandy Point, would have to relocate to the nearest available marina with moorage space, or in the case of trailerable boats, for launch elsewhere. The operating costs saved are those which would have to be incurred by the relocated boat due to increased traveltime between the new moorage or launch site and Sandy Point.

(2) Reduced Vessel Damage. This benefit category assumed the alleviation of vessel damages incurred in navigating the inadequate and unsafe entrance channel at Sandy Point (recreational pleasure boats), or in the case of commercial fishing boats, reducing damages to these boats due to the necessity to raft at the nearest available marina facility.

(3) Land Enhancement. This category assumed that Sandy Point property market values would be lowered in the absence of the project. The benefit is therefore the difference in property values with and without a navigation improvement project.

(4) Employment. In this category, benefits are estimated for those unemployed or underemployed individuals who would be employed with Federal and associated non-Federal project construction activities. The Lummi Indian Reservation has been designated as economically depressed by the Economic Development Administration and, therefore, satisfies the criteria for the benefit category.

b. Average Annual Benefits. Table 4-4 identifies the project benefits, and their distribution used in determining project construction cost sharing. Federal project maintenance costs are the responsibility of the Federal Government and are therefore not cost shared.

TABLE 4-4

ESTIMATED AVERAGE ANNUAL BENEFITS

Category	Total (%)	Distribution for Cost Sharing1/ General (%)	Local (%)
Recreational Vessel Operating Cost Savings	$86,000 (100)	$43,000 (50)	$43,000 (50)
Reduced Commercial Boat Damage	7,500 (100)	7,500 (100)	0 (0)
Reduced Recreational Boat Damage	3,400 (100)	1,700 (50)	1,700 (50)
Land Enhancement	663,000 (100)	0 (0)	663,000 (100)
Employment	5,500 (100)	N/A2/	N/A2/
Total Average Annual Benefits	$765,400	----	----
Total Average Annual Benefits for Cost Sharing Apportionment	$759,900 (100)	$52,200 (7)	$707,700 (93)

1/For Federal and non-Federal cost sharing of Federal General Navigation Facilities portion of project (excludes USCG navigation aids costs) under Section 107 program.
2/Not included in derivation of cost apportionment per Corps of Engineers regulations.

c. Average Annual Costs. Average annual costs include interest and amortization of $116,000 on the project investment of $1,403,000 plus annual operation and maintenance cost of $39,000, for a total annual cost of $155,000. Annual costs shown in table 4-5 were determined using a project interest rate of 8-1/8 percent and an economic life of 50 years. All costs were based on October 1983 price levels.

d. Benefit-to-Cost Ratio. The benefit-to-cost ratio for the tentatively recommended plan is 4.9 to 1 based upon average annual benefits of $765,400 and average annual costs of $155,000.

4.17 Cost Sharing Responsibilities. The extent of Federal participation in development of small navigation projects under the Section 107 program depends upon the extent project benefits are either general (national in scope) or local (benefiting soley Sandy Point community). The USCG would perform all

navigation aids installation and operation and maintenance. Table 4-6 displays the project cost sharing. The Federal authority to cost share in project improvements under the Section 107 program depends upon higher authority approval of the findings of this report, subsequent congressional funding of the Section 107 program and higher authority allocation of funds for this project. Following project approval, detailed plans and specifications would be prepared, and construction of the general navigation improvements undertaken subject to funding.

4.18 Local Sponsor Assurances. Required local sponsor assurances are listed in Section 6 of this DPR. Whatcom County, as local sponsor of the proposed project, has furnished informal assurance that they possess the legal and financial authority and capability, under applicable Federal authority and other laws, to assume the non-Federal responsibilities for the proposed Sandy Point project (see correspondence in appendix B). Formal assurance will be provided by the local sponsor prior to completion and processing of the final report.

TABLE 4-5

ESTIMATED AVERAGE ANNUAL COSTS
(October 1983 Price Level)

Project First Cost	$1,348,000
Interest During Construction	55,000
Investment Cost	$1,403,000
Average Annual Investment Cost	$116,000
Operation, Maintenance, and Replacement	39,000
Total Average Annual Costs	$155,000

TABLE 4-6

PROJECT COST SHARING

Allocation of Construction First Costs	Total Cost (%)	Federal Share (%)[3]	Non-Federal Share (%)[3]
General Navigation Facilities			
Section 107 (Corps of Engineers)[1]	$1,286,000 (100)	$169,000 (13)[4]	$1,117,000 (87)
Lands, Easements, Rights-of-Way	5,000 (100)	0	5,000 (100)
Navigation Aids (USCG)	57,000 (100)	57,000 (100)	0
Total Project First Cost Sharing	$1,348,000[2] (100)	$226,000 (17)	$1,122,000 (83)

1/From table 4-2, includes mitigation.
2/Excludes interest during construction economic costs.
3/Percentage rounded.
4/$1,286,000 - $85,000 (total cost of advance maintenance dredging including contingency and E&D and S&A allowances from table C-3, appendix C) X 0.07 (percentage derived from table 4-4) + $85,000.

SECTION 5. COORDINATION

5.01 Coordination Framework. Coordination was accomplished throughout the study with Federal, state, and local agencies through meetings and correspondence. This coordination was effective in resolving issues which surfaced during the planning process. In February 1983, at the outset of the study, Whatcom County (local sponsor) and the Seattle District Office of the Corps of Engineers jointly conducted an environmental resource agency field trip to the project site to identify preliminary project environmental concerns. Subsequent plan formulation focused on identifying channel and breakwater designs to accommodate these preliminary project concerns. On 7 November 1983, at the Seattle District office, an interagency plan formulation meeting was conducted to discuss project alternatives and the tentatively identified recommended project. In a 15 January 1984 Seattle District letter (appendix B) details of the recommended project plan were provided to these agencies for formal environmental impact comment. Agency comments and District responses are also included in appendix B. Informal agency communication occurred on an as needed basis. The recommended project design reflects the results of plan formulation coordination.

5.02 In addition to resource agency coordination, several separate meetings were held with the local sponsor (Whatcom County) and local Sandy Point interests, focusing upon project-related local sponsor requirements and responsibilities. A tentative project design was developed reflecting interagency input. A final public meeting was conducted by the local sponsor during the public review of the draft DPR/EA. The draft DPR/EA was distributed for agency and public review on 26 November 1984. The District Engineer's tentative conclusions and recommendations were presented by the Corps of Engineers at the final public meeting in the Ferndale High School on 12 December 1984 and attended by approximately ____ persons, with the public given the opportunity for questions
and comments.

5.03 Coordination with Key Agencies.

a. General. Ongoing coordination was maintained with the following principal agencies.

Federal Agencies	Concerns Expressed During Study
o U.S. Coast Guard (USCG)	Navigation Aids
o Environmental Protection Agency (EPA)	1/

1/These resource agencies have collectively expressed concerns over the following principal project induced resource impacts: (1) a loss of herring spawning habitat without demonstrated compensation, and (2) displacement of migrating juvenile salmonids to deepwater by breakwaters. Agency correspondence addressing project concerns along with Corps of Engineers responses is reproduced in appendix B.

Federal Agencies	Concerns Expressed During Study
o National Marine Fisheries Service (NMFS)	1/
o U.S. Fish and Wildlife Service (FWS)	1/
Washington State Agencies	
o Department of Ecology (WDE)	1/
o Department of Fisheries (WDF)	1/
o Department of Natural Resources (DNR)	1/
o Department of Game (WDG)	1/
Local Agencies	
o Lummi Indian Business Council	1/
o Whatcom County (feasibility study, local sponsor)	Locally Acceptable Project
Local Interests	
o Sandy Point Joint Entrance Committee	Locally Acceptable Project

b. Local Sponsor - Whatcom County. Whatcom County was an active participant throughout the study. By letter dated 18 April 1984, Whatcom County agreed to furnish the items of local cooperation listed in Section 6 of this report. A copy of this letter and other pertinent local sponsor correspondence are contained in appendix B. (Whatcom County will provide an updated sponsorship letter following public and agency review of the draft DPR/EA.

1/These resource agencies have collectively expressed concerns over the following principal project induced resource impacts: (1) a loss of herring spawning habitat without demonstrated compensation, and (2) displacement of migrating juvenile salmonids to deepwater by breakwaters. Agency correspondence addressing project concerns along with Corps of Engineers responses is reproduced in appendix B.

c. U.S. Fish and Wildlife Service (FWS). The Olympia office of the FWS was helpful in offering environmental input to the planning process. In accordance with the Fish and Wildlife Coordination Act (FWCA) of 1958 (Public Law 82-624), as amended, a final FWCA report on the proposed Section 107 project was prepared by the FWS (to be prepared following public and agency review comments on the draft DPR/EA). A draft FWCA report was included with the November 1984 draft DPR/EA for public and agency review (see appendix B, part 3). Draft FWCA report recommendations are reproduced here with Seattle District, Corps of Engineers responses.

FWS Recommendation. We recommend that the Corps continue to pursue project designs which eliminate the need for a jetty. Periodic maintenance dredging with overdredging to increase storage capacity may be acceptable alternatives. Eliminating the jetty will greatly reduce the potential adverse effects of the project. If a jetty is determined to be necessary, we recommend that the length not exceed 250 feet to minimize the exposure of juvenile salmon to predators.

Response. The project design is the minimum required to meet the planning objective of providing a safe and economically efficient entrance channel. See Sections 3.04 to 3.07 for reasons why the dredging only alternative was eliminated. Concerning breakwater lengths, see Section 6.3 of the EA for discussion of environmentally designed slopes and riprap that will minimize predation.

FWS Recommendation. Herring survey data from the spring of 1984 needs to be evaluated to more accurately determine the amount of herring spawning which occurs in the project area. The Lummi Tribe and WDF may be able to help with this analysis.

Response. The Corps of Engineers does not feel it is necessary to evaluate this data because very little herring spawning habitat would be eliminated by planned dredging or filling operations. The reconnaissance dive in May 1984 provided evidence that there are only very few eelgrass plants or macroalgae in the project area, including the dredged channel and the north outer breakwater.

FWS Recommendation. We recommend that dredging be done by clamshell to minimize damage to the Dungeness crab population.

Response. The tentatively recommended plan calls for clamshell dredging.

FWS Recommendation. We recommend that tracer studies be performed as suggested by Schwartz (1983) to more accurately determine the effect of tidal flushing on maintenance of the existing channel.

Response. We doubt a tracer study would be of sufficient quantitative benefit in determining the effects of tidal flushing on maintenance to merit such a time consuming and expensive study. Since the Schwartz study, we have investigated conditions at Lagoon Point on Whidbey Island which has tidal inlet

and sedimentation characteristics and problems similar to Sandy Point. The entrance to Lagoon Point became very meandering with a controlling depth of 0.0 feet MLLW prior to the construction of improvements at that project. We are quite confident the same general conditions will soon occur at Sandy Point.

FWS Recommendation. We recommend that all construction be limited to 1 December to 15 March to minimize adverse effects to herring, crabs, flounder, and salmon.

Response. Dredging and disposal operations would take place within the 1 December to 15 March time period.

FWS Recommendation. The dredged channel should be located to avoid the productive gravel/cobble area south of the channel.

Response. The proposed channel would lie to the north avoiding the gravel/cobble area.

d. Department of Transportation, U.S. Coast Guard (USCG). The USCG is responsible for identifying, installing, and maintaining project navigation aids. The USCG project recommendation for these aids is contained in their letter dated 24 February 1984 (see appendix B).

e. (Remainder of this section, summarizing agency comments on the project to be completed following receipt of public and agency comments on the draft DPR/EA.)

5.04 Final Public Meeting. (To be completed)

5.05 Coordination of Draft DPR/EA. The draft DPR/EA was distributed for review during the week of 26 November 1984, for the required 30-day review by appropriate Federal, state, and local agencies, and interested groups and individuals.

5.06 Coordination of the Public Notice. (To be completed)

SECTION 6. RECOMMENDATIONS

6.01 I recommend construction of small boat entrance channel improvements at Sandy Point, Washington, consisting of a navigation entrance channel, rock breakwaters, adjacent shoreline revetment, and miscellaneous additional features in accordance with the tentatively recommended plan presented in Section 4 of this DPR. Estimated total first cost of project features under the Section 107 study authority, exclusive of aids to navigation, is $1,291,000 for construction and $39,000 annually for maintenance, provided that prior to construction local interests agree to:

a. provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction and subsequent maintenance of the project and for aids to navigation;

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 launch ramp, parking areas, fuel station, and access roads open to all on equal terms;

e. provide a cash contribution of 100 percent of costs allocated to land enhancement, and provide the remaining non-Federal items discussed in Section 4 of this detailed project report necessary to achieve project benefits; and

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

Whatcom County, as local sponsor, would further agree 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.

b. comply with Sections 210 and 305 of Public Law 91-646, 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, and reflecting the distribution of project benefits is estimated at $169,000 for construction and $37,000 annually for maintenance.

(TO BE SIGNED FOR FINAL DPR/EA)

Date:_____

ROGER F. YANKOUPE
Colonel, Corps of Engineers
District Engineer

ENVIRONMENTAL ASSESSMENT

SANDY POINT NAVIGATION CHANNEL
WHATCOM COUNTY, WASHINGTON
DRAFT ENVIRONMENTAL ASSESSMENT

1.0 Project Description and Need. Sandy Point is a narrow peninsula, created mainly by the deposition of littoral drift sediments, located on the northwest side of Lummi Bay and bounded on the west by the Strait of Georgia. The Sandy Point channel, harbor, and canals were originally dredged between 1957 and 1964 to provide fill for the Tsawwassen ferry dock in British Columbia, and to create water access to residential lots. The entrance channel was originally 400 feet wide by 12 feet deep, and the upper canals were reportedly dredged to -7 feet, mean lower low water (MLLW). As the area has become developed, numerous private moorages have been built adjacent to residences on the waterways, and a private marina has been constructed at the northern end of the canal. Recreational boats are the primary users of the waterways, although a few resident-owned commercial fishing boats are moored there as well. Sandy Point is the only harbor of refuge on the east shore of the Strait of Georgia between Birch Bay and Bellingham Bay. See plate 1 for a map of Sandy Point and vicinity.

2.0 Need for Action. As a result of littoral drift, the Sandy Point entrance channel has shoaled to approximately 60 feet wide by 5 feet deep, since 1964. This shoaling has resulted in tidal delays for boats navigating the entrance and damage due to groundings. This project would deepen the channel to -10 feet (MLLW).

3.0 Recommended Plan. The proposed action consists of dredging a channel 75-100 feet wide to a depth of -10 feet, MLLW, extending from the inner harbor line to a point 1,000 feet seaward. Rock breakwaters would be placed on the north boundary of the channel inside and outside the harbor, connected by a rock revetment. The north outer breakwater would extend in a southwest direction 300 feet, from +10 feet (MLLW) to approximately -5 feet (MLLW). A 200-foot north inner breakwater would be situated at the east end of 200-foot shoreline revetment. An existing south rock breakwater would be rehabilitated with additional rock armoring. The north outer breakwater would serve both the functions of wave protection and sediment deflection/trapping. The north inner breakwater, revetment, and south breakwater would provide protection from wave erosion. The channel dredging plan includes advance maintenance areas on either side of the channel to a depth of -12 feet MLLW (authorized depth -10 feet MLLW) to trap sediments and thereby reduce the frequency of maintenance dredging. The maintenance dredging would begin 5 years after construction, and then every 3 years thereafter. A plan of dredging and construction is attached as plate 2.

4.0 Affected Environment. The affected environment for this project includes: (a) the intertidal and subtidal bottom areas that would be dredged or filled, (b) the physical and chemical characteristics of the water column in or nearby the project area, and (c) the fish and wildlife resources that utilize the project area. For a comprehensive treatment of the environment of the project vicinity, the reader is referred to the Lummi Bay Marina, Whatcom County, Washington Draft Detailed Project Report, and Draft Environmental Impact Statement (DEIS), prepared by Seattle District, Army Corps of Engineers, December 1983.

4.1 Bottom Sediments. Sediment that would be dredged from the channel consists of soft to loose mixtures of sand, silt, clay and organic debris which have infilled the existing channel, and silty bay mud and sand and gravel. The Environmental Protection Agency has concluded that the sediment is acceptable for open-water disposal (see 14 February 1983 letter from EPA in appendix B, part 2). Sediment in the area of the northwest breakwater placement and calculated accretion area consists of loose, fine, silty sand with gravels and cobbles and organic debris from MHHW to -2 feet (MLLW). From -2 feet (MLLW) and seaward the substrate is generally medium to coarse sand. The substrate in the area of the north inner breakwater placement consists of fine and coarse sand.

4.2 Water Quality. The Washington Department of Ecology has classified the water of the Strait of Georgia as Class AA. It is likely that the water quality in the immediate project area would also meet the criteria for Class AA waters.

4.3 Biological Characteristics.

4.3.1 Fish. The intertidal and subtidal areas in which the breakwaters would be constructed provide habitat for a wide variety of salmonids and marine fish. The intertidal area serves as a shallow corridor for juvenile salmon outmigrants where the juveniles are protected from predation and have the opportunity to consume food organisms. Salmonid species using the area are chinook, silver, pink, chum, and sockeye salmon, and steelhead trout. For a detailed description of salmon in the project vicinity (Sandy Point, Lummi Bay, and immediate environs), refer to the Lummi Bay Draft Environmental Impact Statement, prepared by Seattle District, December, 1983. In addition to salmonids, several species of marine fishes rear and/or live in the project vicinity (Sandy Point, Lummi Bay, and immediate environs). The more important of these species are described in the above referenced Lummi Bay Environmental Impact Statement. Of special importance, from an economic and food-web standpoint, is the Pacific herring. According to the Washington State Department of Fisheries, the area from Sandy Point to Point Whitehorn is one of the most important spawning areas for this species in the state. The Department of the Interior, Fish and Wildlife Service, rates this area and its associated herring resource as "Resource Category 1," their highest resource ranking. The economic importance of the herring stems from the fact that this species supports two fisheries, the sacroe and the bait fisheries. Herring spawn (deposit their fertilized eggs) on submerged structures, most notably plants, such as eelgrass and kelp. Herring are also an important link in the food web as they provide a key food resource for higher trophic level vertebrates, most notably, salmonids, which in themselves are obviously an important economic resource.

An underwater survey of the project on 3 May 1984, by personnel of Department of the Interior, (Fish and Wildlife Service), Washington State Department of Fisheries, and the Corps of Engineers revealed the following information:

a. An absence of eelgrass or other macrofauna in the areas on which the breakwaters would be constructed.

b. Sparse scattered clumps of eelgrass in the area north of the north outer breakwater in which gradual accretion of littoral drift materials is expected.

c. Large population of eelgrass plants north and west of the anticipated accretion area (outside of the project area).

d. No eelgrass in the area where the north inner breakwater would be constructed.

Based on this survey, it is logical to assume that the project area does not support significant herring spawning habitat.

4.3.2 Marine Mammals. Marine mammals present at various times of the year in the project vicinity include harbor seals, killer whales, and porpoises. Discussions of these mammals can be found in the Lummi Bay DEIS.

4.3.3 Avian Fauna. The project area is used extensively by various shore birds and waterfowl, the latter including the black brant, which has been observed graveling on the south shore of the south cape of Sandy Point (Anderson, Bud, personal communication, 1984). The bald eagle and peregrine falcon have also been observed in the area (see paragraph 4.3.6). A detailed description of avian fauna known to occur in the project vicinity is provided in the Lummi Bay DEIS.

4.3.4 Benthic invertebrates. The Strait of Georgia, including Sandy Point, is known to be very productive for Dungeness crab, based on sport and commercial landing data. The 3 May 1984 survey described in Section 4.3.1, and earlier dives by resource agency personnel have confirmed the presence of immature Dungeness crabs in the proposed north outer breakwater/accretion area (below -2 feet, MLLW). The area of the proposed north outer breakwater does not appear to provide good crab rearing habitat because of tidal currents associated with the existing navigation inlet. Similarly, few crabs would be expected in the channel proper, or in the area where the north inner breakwater would be constructed. During the 3 May 1984 survey, no other mobile epifauna were observed. Infauna consist primarily of tubed polychaete worms and occasional softshell clams.

4.3.5 Macroflora. Eelgrass (Zostera marina) and kelp are important marine plants and perform important biological functions, highlighted by the following: (a) high net productivity, (b) provision of food and detrital material to food web organisms, (c) provision of a nursery ground for juveniles of finfish and shellfish of economic and recreational importance, (d) stabilization of sediments, and (e) provision of organic matter for the sediments and maintenance of an active environment for nutrient recycling.

The 3 May 1984 survey indicated that there were no eelgrass plants in any of the areas where the breakwaters would be constructed and only a few scattered groupings of plants in the accretion area north of the north outer breakwater. Significant eelgrass beds occur just west and north of the accretion area. No eelgrass exists in the entrance channel area or in the area in which advance maintenance dredging would occur.

4.3.6 Endangered Species. Relative to endangered species, bald eagles and peregrine falcons have been observed in the Sandy Point area. A BA of these species and the potential impacts from the project on them appears in appendix B, part 2 along with another BA prepared for seven whale species and the Pacific leatherback sea turtle. The reader is referred to the Lummi Bay DEIS for more information on endangered species in the project vicinity.

5.0 Alternative Actions and Impacts

5.1 No Action. If no action is taken to deepen and maintain the Sandy Point entrance channel, it is anticipated that it would shoal to MLLW within 3 years (Schwartz, 1983). If this occurs, the channel will be reduced to a shallow, meandering tidal creek. The Sandy Point harbor and canals would thus be "landlocked" and boats presently moored there would have to be moored in other areas. Project impacts described elsewhere in this document would not occur.

5.2 Channel Improvement Only. A widened and deepened channel (see the DPR for particulars) without breakwater protection would return to its present condition within 5 years due to large quantities of sediment carried from the north by littoral drift, and from the southwest by storm waves. Increasing the cross-sectional area of the channel would also result in increased wave action in the harbor, particularly during westerly storms, which would increase bank erosion in the harbor and pose a hazard to moored boats. Refer to the DPR, Section 3, for details of the various project alternatives considered.

5.3 Dredging Alternatives

5.3.1 Pipeline Dredging. Pipeline dredging, to be economically feasible, requires the use of a nearby upland disposal site. No such site is available in the vicinity of the proposed project.

5.3.2 Clamshell Dredging. This is included in the tentatively recommended plan. A clamshell dredge would remove sediment from the channel bottom and place it into a barge for open water disposal. Clamshell dredging results in increased turbidity due to disturbance of the bottom sediments and spillage of sediment from the bucket. These effects are localized and temporary. Clamshell dredging would minimize damage to crabs and fish.

5.4 Disposal Alternatives

5.4.1 Upland Disposal. No practical site for upland disposal of dredged material has been identified in the project vicinity. Transportation of dredged material by truck to remote sites would result in a substantial expense due to material rehandling. Upland disposal would avoid most adverse impacts on aquatic resources that accrue from open-water disposal but would require the construction of dikes to contain the fine material expected to be dredged and is, therefore, more costly than open-water disposal.

5.4.2 Beach Nourishment. The south shore of Sandy Point has been eroding due to wave action and the interruption of littoral drift by the existing Sandy Point channel. One method of dredged material disposal could be to place it on this shore to replace eroded material; however, the material to be dredged from the channel consists of fine sands (plate 3). As a result, confinement dikes would be necessary to place the material on the beach, and this material would erode quickly, thus not providing the desired beach nourishment and potentially impacting local water quality and the local benthic environment due to turbidity and siltation. Refer to appendix C for further details on the beach material.

5.4.3 Open-Water Disposal. The nearest DNR open-water disposal site is located in Bellingham Bay, 14 nautical miles from Sandy Point (see plate 1). Dredged material from Sandy Point channel has been approved by the Environmental Protection Agency (EPA) for open-water disposal (see appendix B, part 2).

6.0 Environmental Consequences of the Proposed Action

6.1 Air Quality and Noise. The dredge operation would create a short-term, localized impact on air quality, and there would be some increase in ambient noise levels in the vicinity of operating machinery, but not to an extent that would exceed regulatory limits. Air quality and noise impacts would not be significant. Transportation to disposal sites would add the emissions of tug operations to the overall impact of the proposed action, but this effect would be minimal and temporary (during construction). Equipment used for breakwater construction would contribute to other air quality impacts of the proposed project, but overall effects would be short-term and minimal.

6.2 Water Quality. Use of a clamshell dredge would cause an increase in turbidity over ambient conditions at the dredge site due to suspension of fine particles stirred up by the dredge. This effect would be localized and temporary. There would be a short-term increase in turbidity at the open-water disposal site. Consequent to this would be local decreases in dissolved oxygen and increases in biological oxygen demand. Breakwater construction would only have minor and short-term impacts on water quality, including increased suspended solids and turbidity (localized). Materials used for construction would be from sources that would not be expected to contain contaminants of concern.

6.3 Fish. Placement of the north outer and north inner breakwaters would reduce rocky shore/sandy bottom habitat by approximately 0.7 acres. The accumulation of littoral beach material north of the north outer breakwater would convert approximately 0.85 acres of the same habitat type to upland. These activities/processes would result in loss of fish food production in these areas. A different community would develop on the breakwaters composed of those vertebrates and macroalgae that typically colonize breakwater habitats. The breakwater community will also provide food organisms for juvenile salmonids and marine fish. As the breakwater will be constructed on a 1.5 to 1 slope, it will also provide shallow water habitat for juvenile salmonids and marine fishes. The north outer breakwater will extend seaward of the MHHW line by about 320 feet and juvenile salmonids will need to swim that distance away from shore during their inshore seaward migration. Without the protection

of shallow water, juveniles passing around this structure westward to breakwater toe would be subject to markedly increased predation. However, the riprapped faces of the breakwater will be constructed at a 1.5 to 1 slope, which will provide a shallow water passageway along which the juveniles can progress with greatly more protection from predators. The State of Washington's requirement is that any structure will not extend seaward more than 200 feet from the MHHW line. The length of the north outer breakwater will exceed this criterion by about 120 feet. It is not the purpose of this EA to debate the WAC. However, it is the view of the Corps of Engineers that the extra 120 feet extension to 320 feet will not result in significantly increased mortalities due to predation.

Project breakwaters and associated accretion processes are not expected to significantly impact marine fishes that either regularly or occasionally occupy the project area. The loss of approximately 0.7 acres of sandy bottom habitat from inner and outer breakwater construction and 0.85 acres of rocky shore habitat for the accretion beach will be replaced by about 1.0 acre of riprap breakwater habitat. Bottom fishes will lose the 0.7 acre of sandy bottom area that provides resting and foraging habitat. This loss is not considered significant in view of the large expanse of sandy bottom habitat in the Sandy Point-Point Whitehorn region. Other marine fishes will lose an additional 0.9 acres of rocky shore habitat but will gain rock riprap habitat on the breakwater side slopes.

Breakwater construction impacts on juvenile salmon (for example, suspended solids, turbidity, etc.) would be minimal as dredging and disposal operations would occur only between 1 December and 15 March. Restriction of activities to this dredging "window" will also minimize adverse construction impacts on herring spawning and adult salmon harvesting.

6.4 Benthic Invertebrates. Dredging operations would remove the existing benthic infauna in the channel area. However, populations are sparse in this area due to the relatively severe habitat resulting from the rapid scouring effects of water exiting the Sandy Point channel. The loss of benthic habitat due to dredging (including advanced maintenance dredging) is not considered significant. Indirect effects of dredging, i.e., siltation and turbidity, will have only localized, short-term impact on adjacent productive areas, both north and south of the channel area. Construction and dredging will occur between 1 December and 15 March. Dredging should not impact juvenile Dungeness crabs.

Disposal of the dredged material at a deepwater site will result in direct loss of the benthic community in the immediate disposal area. In the short-term, siltation could affect benthic organisms in adjacent areas. This effect would be minor. After disposal, it is probable that benthic organisms from

adjacent areas will colonize the disposal area and begin the establishment of a new benthic community. Also, some migration of tolerant forms up through the disposal area could occur if the disposal layers were not too thick or accumulated at a relatively slow rate. Significant disposal impacts on the various life stages of recreationally or commercially important invertebrates would not be expected.

The placement of the north outer breakwater and subsequent accretion of beach materials north of the north outer breakwater would remove about 0.7 acres of Dungeness crab foraging and rearing habitat. Most of the crab species would likely escape the direct placement area and would either adjust to the new accretion area or relocate to an adjacent area where their survival and growth could be in jeopardy depending on that area's carrying capacity. Benthic invertebrate production in this area, limited primarily to sparse populations of marine polychaetes and small soft-shell clams, would be lost. These losses are not considered significant. The north outer breakwater and accretion area would cover about 0.65 acres of rocky shore habitat (cobble/pebble shield over sand/gravel) and result in destruction of benthic invertebrates in that habitat. The benthic community is sparse, however, in this region as exposure to high energy waves allows only organisms that can exist under such a condition to survive. The impact on project area food production is considered nonsignificant.

Placement of the north inner breakwater in 0.2 acre sandy intertidal habitat in the main channel would not have a significant biological impact. This is because the invertebrate populations are very sparse (almost exclusively a small population of polychaete worms) in a highly scoured bottom area littered with debris. A positive impact would be the establishment of about 0.5 acres of solid intertidal substrate in the form of rock riprap. This will be colonized by organisms in the general region adapted for life in rock riprap environments. The new community would provide food resources for salmon, marine fishes, numerous invertebrates, and shorebirds.

6.5 Macroflora. Dredging of the main channel and advanced maintenance dredging area will only have minimal, short-term impacts on macroflora in adjacent areas. This will occur due to fine suspended material settling on the plants and interfering with photosynthesis. Following dredging, the flora would be expected to recover a few months after dredging cessation. No significant impacts on Bellingham Bay macroflora are expected to occur as a result of disposal of the dredged material at the Bellingham Bay disposal site.

Placement of the northwest and northeast breakwaters would not impact eelgrass habitat. The accretion of sand behind the northwest breakwater would result in the loss of a few isolated patches of eelgrass (3 to 4 feet wide patches) but would avoid the substantial beds located seaward of the calculated accretion area.

6.6 Marine Mammals. Dredging operations are not expected to significantly impact marine mammals that may or periodically use the project vicinity. Disposal operations are not expected to significantly impact marine mammals that

may or periodically use the project vicinity. Breakwater placements would not be expected to significantly impact marine mammals that would occasionally inhabitat the project vicinity.

6.7 Avian Fauna. Dredging operations may affect the black brant feeding area on the south shore area of Sandy Point. The degree of impact is unknown but is not expected to be significant. No major impacts on avian fauna, other than endangered or threatened species are expected. Minor impacts are anticipated (noise). Disposal impacts on shorebirds and waterfowl in the project vicinity are expected to be minimal. Breakwater placements would not be expected to significantly impact avian fauna that would utilize the project vicinity for feeding, rearing, or resting purposes. By interrupting sediment transport along the shore of Sandy Point, changes would occur in shoreline substrate along the south cape that could make it unsuitable for use as a graveling site by black brant.

6.8 Endangered/Threatened Species. Impacts on threatened or endangered species that may utilize the project vicinity are described in two BA's (appendix B, part 2). The first BA evaluates project impacts on the bald eagle and peregrine falcon. The second BA addresses project impacts on marine mammals. Conclusions on these BA's are as follows:

a. The proposed Sandy Point project could cause a direct disturbance to a primary peregrine falcon feeding perch through noise and human activities during September. From 1 September until 31 March, an experienced observer will be present during dredging and breakwater placement to observe and report if the peregrines are impacted by construction activities. If such is the case, the observer would notify the Corps of Engineers for remedial action. Such action could include modification of construction methods to eliminate impacts to peregrines.

b. The proposed project would not impact bald eagles.

See 15 August 1984 letter from the U.S. Fish and Wildlife Service concurring with these assessments (appendix B, part 2).

c. Because of the rarity of the eight listed marine animals in Washington's inside waters, and because Lummi Bay and Sandy Point are poor habitats for any of these species, construction of the Sandy Point Navigation Channel would not be expected to result in impacts to any of these species.

6.9 Visual Quality and Esthetics. Impacts on visual quality and esthetics of the project area would result from the presence of dredge equipment and increased turbidity coincident with this operation. These impacts would terminate with the completion of dredging operations. Disposal operations will result in temporary visual and esthetic impacts due to the presence of the tug and barges used for handling dredged material. The breakwaters should not have a significant impact on project area visual quality or esthetics.

6.10 Cultural Resources. There are no known cultural resources in the area that would be impacted by the dredging operations or breakwater placement. Disposal operations should not have any impact on cultural resources because the dredged material is being discharged at an open-water site in Bellingham Bay. Breakwater placement and its associated accretion would not be expected

to impact cultural resources because none are recorded in the project area. In the unlikely event that something of cultural resource value were discovered in the course of construction, a Corps of Engineers cultural resources specialist and the State Historic Preservation Officer (SHPO) would be immediately contacted to evaluate the find. An effort to avoid further damage to the resource would be made pending the evaluation and development of an appropriate plan to deal with the discovery.

6.11 Navigation and Recreation. There should be no long-term adverse impacts to navigation or recreation. At times during dredging, the channel may be obstructed by the dredge equipment, causing delays for recreational boaters, but such interference wuld terminate at the end of dredging operations. The proposed action would result in improved navigation and recreation access to the Sandy Point waterways. There would be no expected long-term adverse impacts to navigation or recreation in the project vicinity. Transportation of dredged material to the disposal site would create minor, short-term interference with commercial and recreational boat traffic. The dredging and disposal schedule avoids the peak recreational boating season. Breakwaters at the entrance to the harbor would provide more protected moorage in the harbor and would protect the entrance channel from shoaling, thus enhancing navigation and recreation. Boats cruising in nearshore waters would become accustomed to detouring around the new breakwaters.

6.12 South Sandy Point Private Property Shoreline. The south shore of Sandy Point would continue to be subject to erosion with the channel improvement project due to the trapping of littoral drift by the channel and consequent reduction of nourishment to the south shoreline. Bulkheading for lot development is already required along this shore. The proposed project, when compared to existing conditions, would not result in any significant change to the littoral drift and erosion processes along South Cape. See Section 2.25 of appendix C for discussion of effects on shorelines.

7.0 Mitigation. Various mitigation measures for the identified impacts are currently being studied for practicality and feasibility and have been briefly mentioned in this assessment. One mitigation measure that would be implemented is the dredging/disposal time restriction. Dredging and disposal operations would be scheduled between 1 December and 15 March to avoid/minimize impacts (primarily due to turbidity, suspended solids, reduced dissolved oxygen) to juvenile salmon, herring spawning, Dungeness crab molting, mating, and major rearing, and adult salmon harvesting. However, such timing could impact peregrine falcons. To avoid impacts during dredging as well as during breakwater construction, an experienced observer will be present from 1 September through 31 March to identity whether construction activities impact the falcon. If such is the case, construction will be modified to avoid impacting falcons. No mitigation measures would be required.

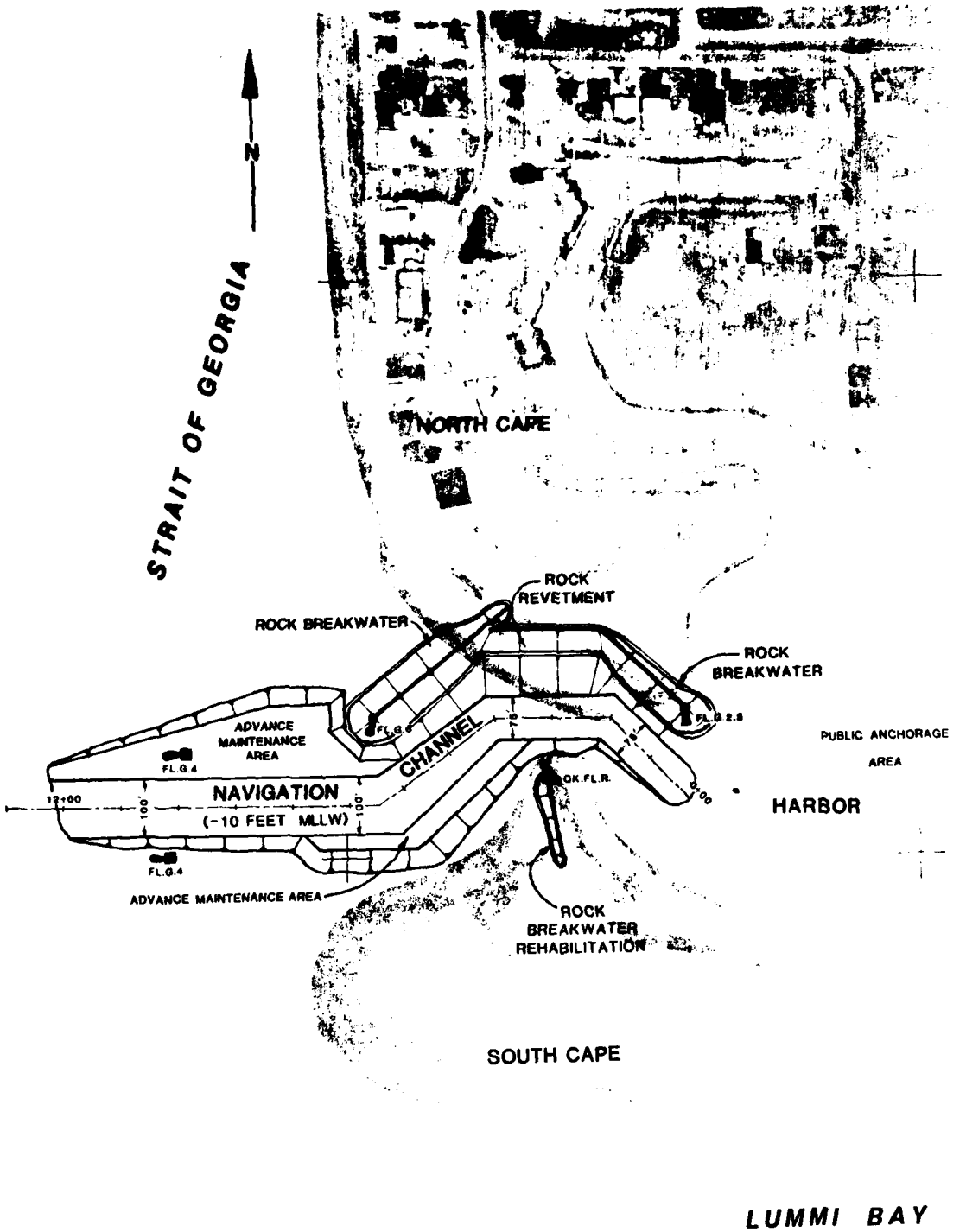
To further mitigate for potential crab losses, a clamshell dredge will be used. Relative to the eelgrass that would be impacted by the accretion of beach materials north of the breakwater, we are proposing to transplant the few eelgrass patches found in the calculated accretion area to adjacent areas that contain no eelgrass.

8.0 Coordination with Others. As part of the planning process for the Sandy Point navigation improvement project, some meetings with several agencies were held to identify environmental concerns and develop mitigation concepts. Attending these meetings were the Washington State Departments of Fisheries, Ecology, Game, and Natural Resources; the U.S. Fish and Wildlife Service; the EPA; the National Marine Fisheries Service; the Lummi Indian Tribe; Whatcom County Planning Department; and the Sandy Point Joint Entrance Committee. The U.S. Fish and Wildlife Service provided a Fish and Wildife Coordination Act (FWCA) report which supplied some of the resource information in this assessment. Maurice L. Schwartz, of Coastal Consultants, Inc., provided a report on shoaling at Sandy Point which was also used in developing this assessment. The Corps of Engineers requested mitigation suggestions from resource agencies (see appendix B, part 4). Agency responses implied that the impacts would be difficult to mitigate. Subsequent coordination involved a field trip to inspect the intertidal/subtidal area that would be impacted by the proposed north outer breakwater and associated littoral drift accretion area behind the breakwater. The inspection was performed primarily to determine if there was eelgrass in this area and to determine what other important biological resources occurred in the areas affected by the project. The results of that field trip (3 May 1984) are discussed and incorporated in this EA. The memorandum documenting the field trip is attached in appendix B. The revised FWCA report (see appendix B, part 3) was modified to reflect the results of the field trip. At this writing, the other resource agencies have not provided any revised comments.

9.0 Executive Order 11988, Flood Plain Management. This project will have no known effect on the flood plain or base flood elevation in the project vicinity.

10.0 Executive Order 11990, Protection of Wetlands. The intent of Executive Order (EO) 11990 is to protect wetlands because of their high value to biological productivity. Although plans for channel improvement would cause destruction of wetlands (intertidal/subtidal sandy areas), this would be mitigated by transplanting the sparsely occurring eelgrass plants from on site to adjacent areas. However, there would still be a net loss of wetland habitat as defined in this EO. Nevertheless, based on the EA and Section 404(b) Evaluation for this project and in accordance with Section 2a of this EO it is determined that no practicable alternative to the proposed project exists, and that the tentatively recommended plan includes all practicable measures to minimize losses to wetlands as a result of construction. Readers are referred to Sections 4 and 6 of the EA and the draft Fish and Wildlife Coordination Act Report for detailed alternative evaluations and discussion of methods to minimize impacts on wetlands.

PLATES



PROJECT LAYOUT

SCALE IN FEET

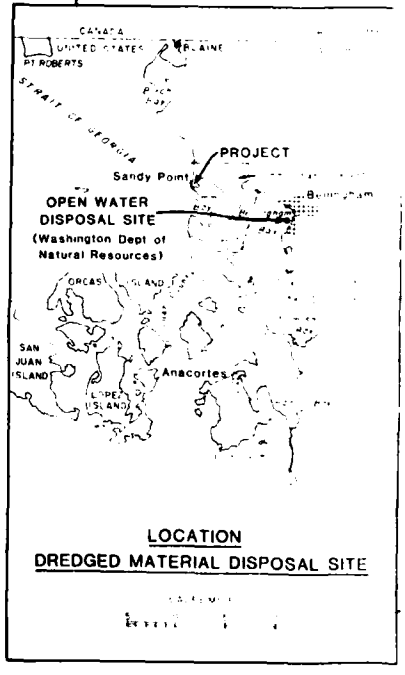
100' 50' 0 100' 200'

REVISIONS		
SYMBOL	ZONE	DESCRIPTION

LOCATION MAP

SCALE: FEET
500 0 500 1000

VICINITY MAP



LOCATION
DREDGED MATERIAL DISPOSAL SITE

LEGEND

FL G 4
USCG WOOD DOLPHIN LIGHT
USCG ALUMINUM JETTY LIGHT

VERTICAL DATUM BASED ON M.O.S. M.L.L.W.
AERIAL PHOTOGRAPHY FLOWN 21 JUNE 1982.

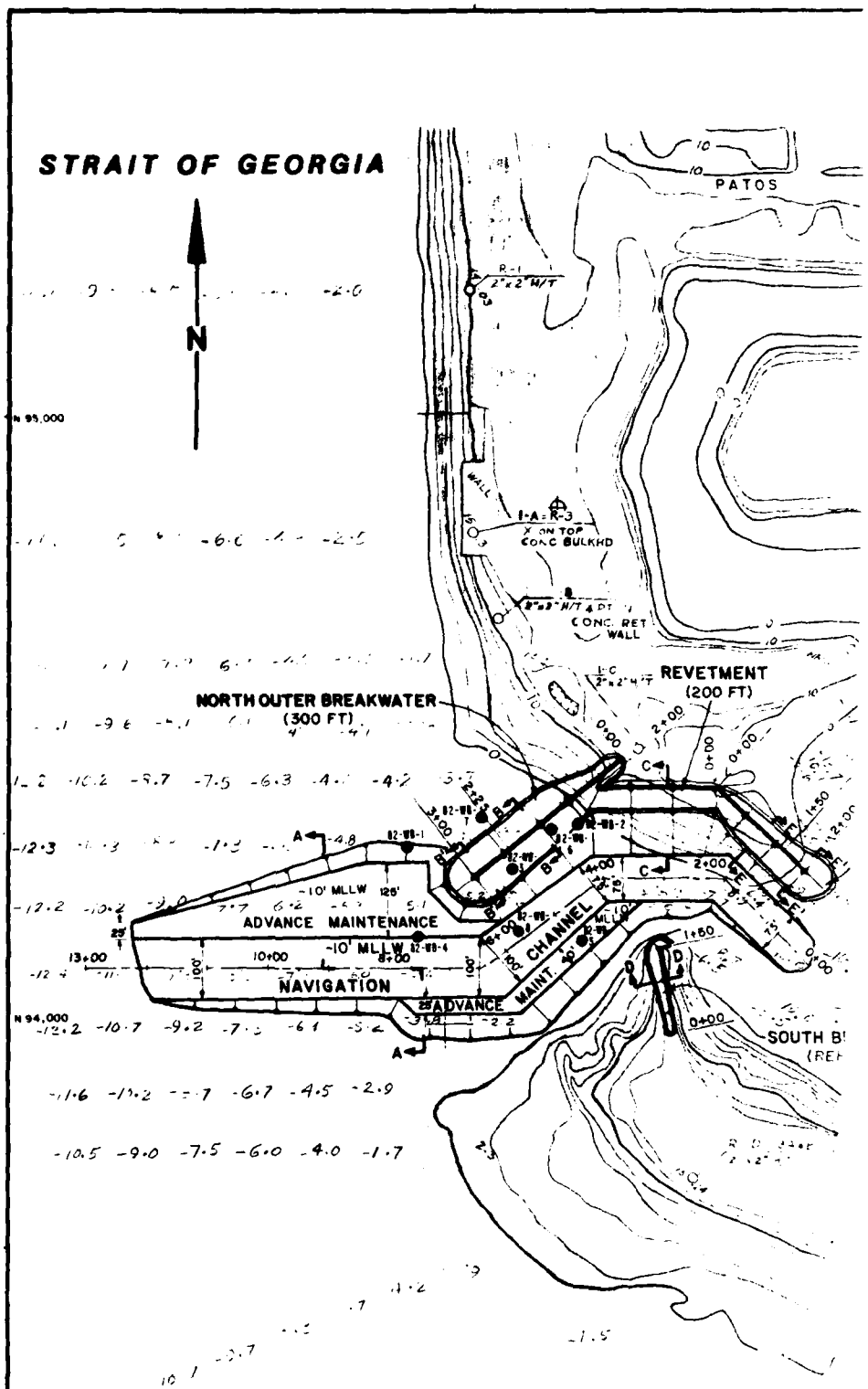
U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE WASHINGTON

SANDY POINT NAVIGATION CHANNEL

GENERAL LAYOUT

WHATCOM COUNTY WASHINGTON

PREPARED			
CHIEF PLANNING	SIZE F		84 JUL 10
	DRAWN ADS/AM	CHKD JMG	

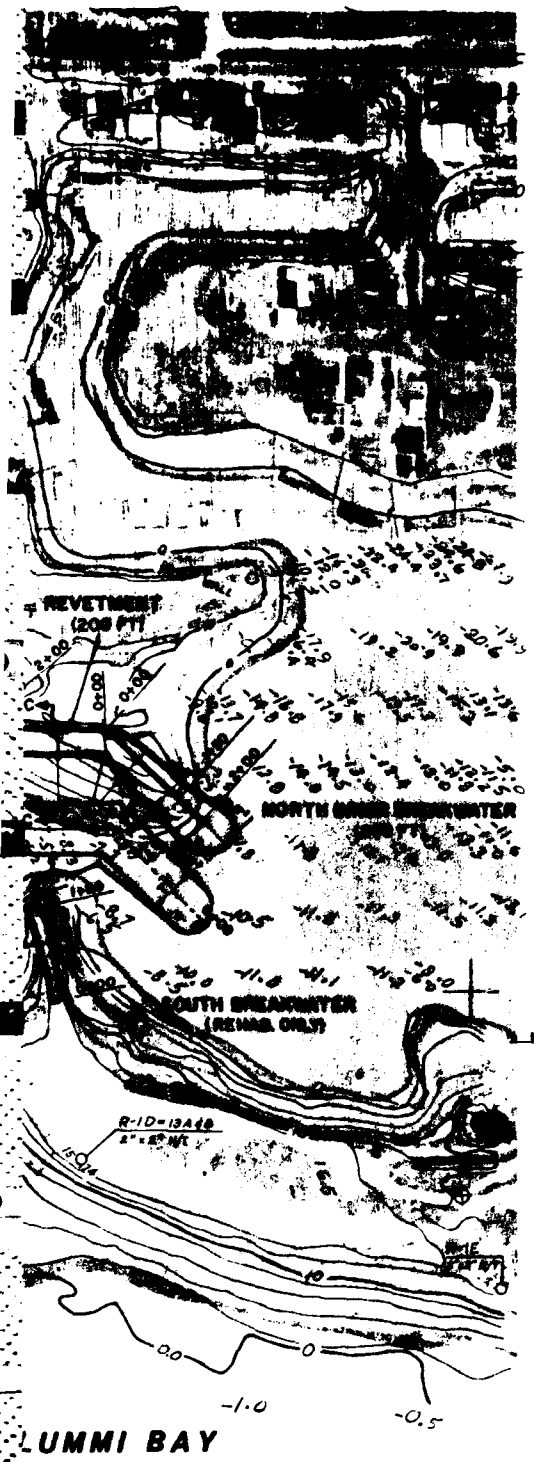


STATION	BEARING	COORD. OF STA. 0+00
NAVIGATION CHANNEL		
0+00 to 2+00	N 45° 00' W	N 94,095 E 43,600
2+00 to 4+00	N 90° 00' W	
4+00 to 6+50	S 53° 30' W	
6+50 to 13+00	N 90° 00' W	
NORTHWEST BREAKWATER		
0+00 to 3+00	S 51° 30' W	N 94,435 E 43,290
REVETMENT		
0+00 to 2+00	N 90° 00' W	N 94,390 E 43,445
NORTHEAST BREAKWATER		
0+00 to 2+00	S 47° 00' E	N 94,390 E 43,445
SOUTH BREAKWATER		
0+00 to 1+50	N 10° 00' W	N 93,985 E 43,380

LUMMI BAY

CHANNEL, REVETMENT A

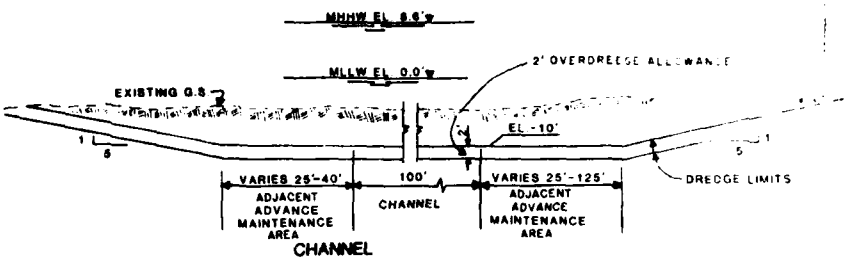
PLAN



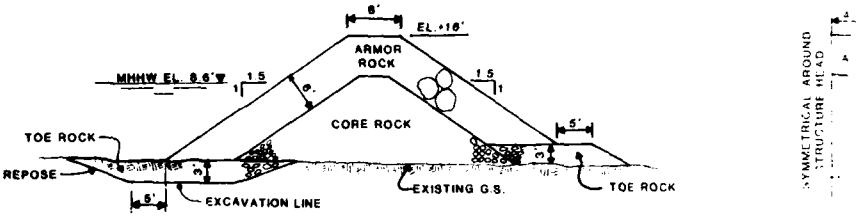
LUMMI BAY

HANNEL, REVETMENT, AND BREAKWATERS

PLAN 100' 50' 0 100' 200'



CHANNEL
SECTION A-A

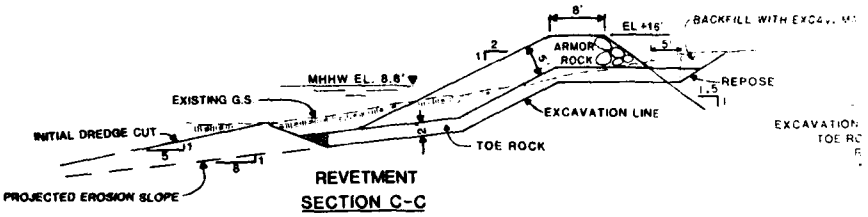


NORTH OUTER BREAKWATER

SECTION B-B

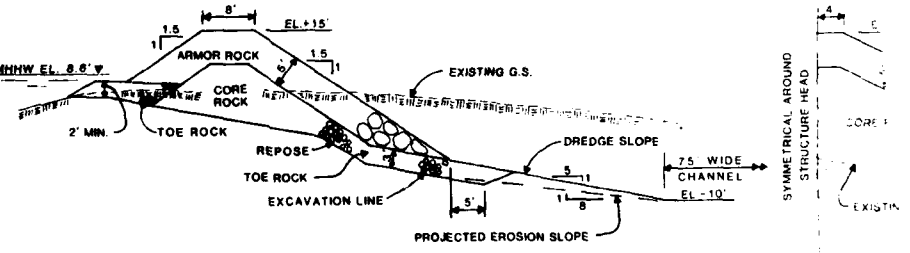
(STA 0+00-2+25)

(25' TRANSITION TO STA. 2+50)



REVETMENT

SECTION C-C



NORTH INNER BREAKWATER

SECTION E-E

(STA 0+00-1+50)

(25' TRANSITION TO STA. 1+75)

CHANNEL, REVETMENT, AND BREAKWATERS

TYPICAL CROSS-SECTIONS

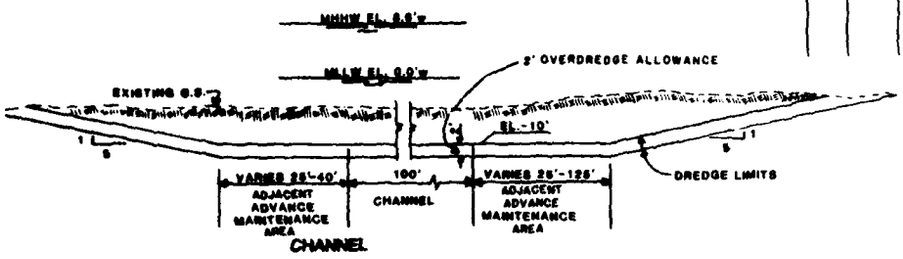
HORIZONTAL AND VERTICAL SCALE 10 5 0 10 20'

LEGEND

E44,000

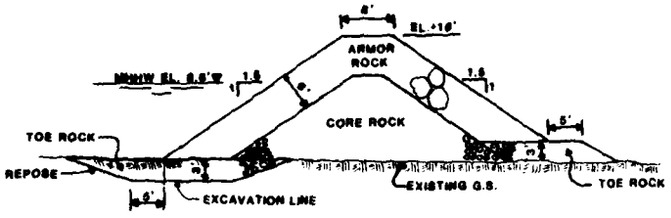
2

REVISIONS			
SYMBOL	ZONE	DESCRIPTION	DATE



CHANNEL

SECTION A-A

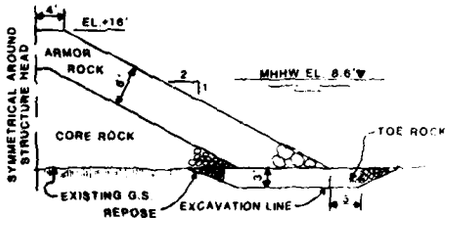


NORTH OUTER BREAKWATER

SECTION B-B

(STA 0+00-2+25)

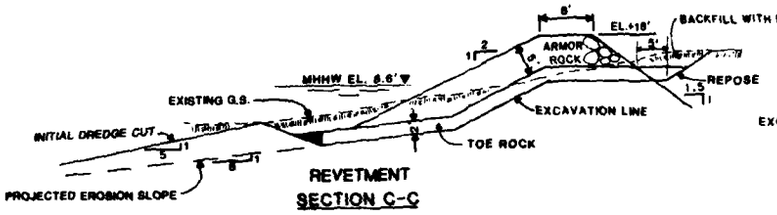
(25' TRANSITION TO STA. 2+50)



NORTH OUTER BREAKWATER

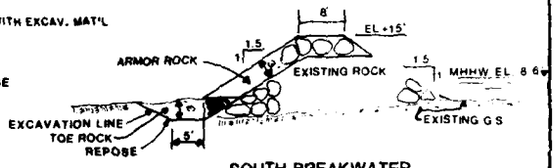
SECTION B'-B'

(STA 2+50-3+00)



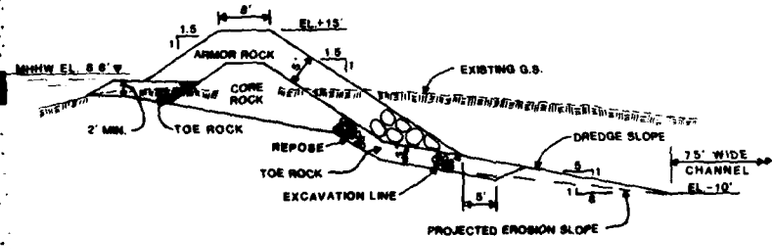
REVETMENT

SECTION C-C



SOUTH BREAKWATER

SECTION D-D

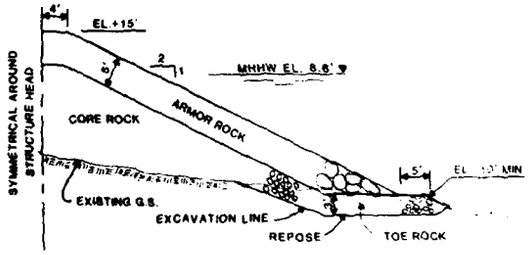


NORTH INNER BREAKWATER

SECTION E-E

(STA 0+00-1+50)

(25' TRANSITION TO STA. 1+75)



NORTH INNER BREAKWATER

SECTION E'-E'

(STA 1+75-2+00)

CHANNEL, REVETMENT, AND BREAKWATERS
TYPICAL CROSS-SECTIONS

HORIZONTAL AND VERTICAL SCALE 10' 5' 0 10' 20'

NOTES

1. MAP COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 21 JUNE 1982 AND SUPPLEMENTED BY FIELD SURVEYS PERFORMED ON 15, 16, 17, 18, 23, 25, 29, 30 & 31 MARCH 1983.
2. HORIZONTAL CONTROL IS BASED ON LOCAL ASSUMED GRID.
3. SEE PLATE 1 FOR NAVIGATION AIDS.

LEGEND

● B2-NB-1 BORING HOLE AND NUMBER. SEE PLATE 3 FOR BORING HOLE LOGS.

VERTICAL DATUM BASED ON M.L.L.W.

SOUNDINGS IN FEET.

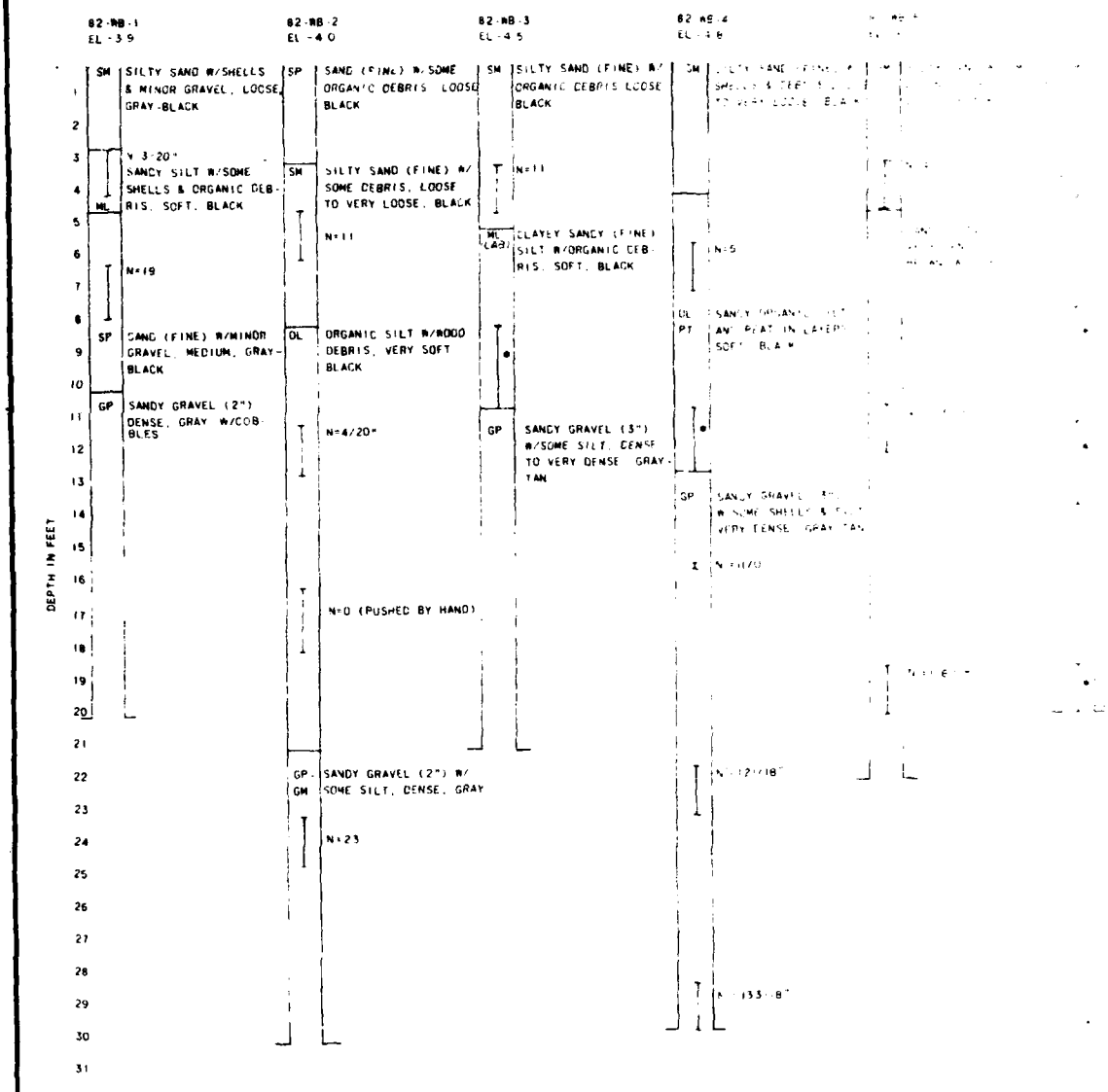
Reviewed: CHIEF, NAVIGATION & COASTAL PLANS SECTION

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

SANDY POINT NAVIGATION CHANNEL
CHANNEL, REVETMENT, AND BREAKWATERS
PLAN & CROSS SECTIONS

WHATCOM COUNTY WASHINGTON

DES	SUBMITTED	FILE NO	DATE	SHEET
			84 JUL 10	2
DRAWN ADS	CHK JNG/MPA			



82-WB-6 EL-40	82-WB-7 EL-40	82-WB-8 EL-46
SILTY SAND (FINE) W/ SHELLS, LOOSE, BLACK	SM SILTY SAND (FINE) W/ SHELLS & SOME ORGANIC DEBRIS, LOOSE TO VERY LOOSE, BLACK	SM SILTY SAND (FINE) W/ ORGANIC DEBRIS, LOOSE BLACK
		OL PT ORGANIC SILT & PEAT IN LAYERS, VERY SOFT, BLACK
CLAYEY SILTY SAND (FINE) W/ORGANIC DEBRIS, SOFT TO VERY SOFT, BLACK		
		GRAVEL CONTACT SURFACE
TORVANE=600PSF LL=94 PL=44 (LAB) PI=50	OL PT ORGANIC SILT & PEAT IN LAYERS, VERY SOFT, BLACK	
	GRAVEL CONTACT SURFACE	
GRAVEL CONTACT SURFACE		

LEGEND

SM	POORLY GRADED SILTY SAND
MI	INORGANIC SILT
SP	POORLY GRADED SAND
GP	POORLY GRADED GRAVEL
OL	ORGANIC SILT
GP GM	POORLY GRADED GRAVEL WITH SILT
PT	PEAT
N=11	SAMPLE TAKEN WITH 2-INCH OD SPLIT SPOON SAMPLER WITH A 140-LB HAMMER DROPPED 30 INCHES (STANDARD PENETRATION TEST), NUMBER OF BLOWS PER FOOT UNLESS OTHERWISE NOTED
	BOTTOM OF BORING
(LAB)	LABORATORY CLASSIFICATION
82 WB 1	WASH BORING HOLE AND NUMBER
LL	LIQUID LIMIT
PL	PLASTIC LIMIT
PI	PLASTIC INDEX
N=12/7/8"	SAMPLE TAKEN WITH 3-INCH ID SPLIT BARREL SAMPLER WITH A 300-LB HAMMER DROPPED 30 INCHES, N = NUMBER OF BLOWS FOR PENETRATION INDICATED
	SAMPLE TAKEN WITH 3 INCH DIAMETER STEEL TUBE SAMPLER

NOTES

1. SOILS VISUALLY CLASSIFIED (EXCEPT WHERE NOTED) PER U.S. ARMY "UNIFIED SOIL CLASSIFICATION SYSTEM"
2. FOR LOCATIONS OF BORINGS, SEE PLATE 2
3. ELEVATIONS FROM TOPOGRAPHY

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

SANDY POINT NAVIGATION CHANNEL

EXPLORATION BORING LOGS

WHATCOM COUNTY WASHINGTON

84 MAR 16

PLATE 4

DESIGN AND CONSTRUCTION SCHEDULE

For general schedule, see page 26 of main report.
Plate 4 is being prepared for final report.

APPENDIXES

APPENDIX A

PART 1 - PRELIMINARY SECTION 404(b)(1) EVALUATION

PART 2 - PUBLIC NOTICE

APPENDIX A, PART 1

PRELIMINARY SECTION 404(b)(1) EVALUATION

APPENDIX A, PART 1

PRELIMINARY 404(b)(1) EVALUATION FOR CONSTRUCTION OF SANDY POINT ENTRANCE CHANNEL NAVIGATION IMPROVEMENTS

1. Introduction. The proposed project is dredging of a new entrance channel and construction of adjacent rock breakwater and shoreline revetment protection in Whatcom County at Sandy Point, Washington. This appendix discusses the evaluation of the effects of placement of breakwaters and dredged material into waters of the United States using guidelines promulagated pursuant to Section 404 of the Clean Water Act (40 CFR 230).

The factors, considerations, and analyses contained in Section 404 guidelines are evaluated in the following, and in referenced paragraphs of the EA and DPR for the Sandy Point Navigation Project.

Full compliance with the provisions of Section 404 of the Clean Water Act will be met by finalizing this evaluation and obtaining a water quality certificate from the State of Washington.

2. Project Description. Refer to the DPR and Sections 1.01, 1.1, 1.14, 1.15, 1.16, 1.17, 2.06, 2.18 through 2.25 of appendix C.

2.1 Need for the Discharge. Refer to Section 1.04 of the DPR.

2.2 Location. Refer to Section 1.03, DPR.

2.3 Description of Discharge Site. Breakwater placement sites are described in Sections 1.01, 1.06, 1.07, 1.16, 2.18, and 2.23 of appendix C.

2.4 Method of Discharge. Refer to Section 4.08 of the DPR and Sections 2.18 and 2.23 of appendix C.

2.5 Timing of Discharge. Refer to the EA, Sections 6.3 through 6.4.

2.6 General Characteristics of Material. Refer to Sections 1.14, 1.15, and 2.23 of appendix C, and Section 4.06 of the DPR.

2.7 Quantity of Material. Refer to Section 2.23 of appendix C.

2.8 Source of Material. Refer to Section 2.6 above.

2.9 Project Life of Disposal Site. For the breakwaters/revetment: permanent. For the Washington State Department of Natural Resources disposal sites: the longevity of these sites are determined by that agency.

3. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem.

3.1 Substrate. Breakwater placement will affect the substrate of the placement area by permanently covering it. Disposal of dredged materials at the

DNR Bellingham Bay disposal site will modify the bottom character of the site. The modified substrate composition and extent of this modification cannot be precisely determined, but the modifications are not expected to be significant from an ecosystem perspective.

3.2 Suspended Particulates (Turbidity). Refer to the EA, Section 6.2.

3.3 Water Quality. Refer to the EA, Sections 5.4.3 and 6.2. Samples from project area sediments (North Beach and Navigation Channel) indicated total organic carbon loads of 0.12 to 0.17 percent. These results indicate the proposed dredge material is suitable for in-water disposal at the Bellingham DNR site. The Environmental Protection Agency (EPA), in correspondence with Seattle District on 14 February 1983 concurs with this conclusion (see appendix B, part 2). Thus, disposal of these materials is not expected to significantly impact Bellingham Bay water quality.

3.4 Chemical Patterns and Water Circulation. Refer to the DPR, Section 2.12, appendix C.

3.5 Normal Water Fluctuations. The project will have no significant impacts on daily, seasonal, and annual tidal fluctuations in water level.

3.6 Salinity Gradients. The project will have no anticipated significant impacts on formation, location, or movement of salinity gradients.

4.0 Potential Impacts on Biological Characteristics of the Aquatic Ecosystem.

4.1 Threatened and Endangered Species. Refer to appendix B, part 2 for Biological Assessments on the bald eagle and peregrine falcon and on marine mammals. Temporary impacts to the peregrine falcon from noise and human activity would be avoided through monitoring by a trained observer from 1 September through 31 March. No significant impact on bald eagles or marine mammals is foreseen. See appendix B, part 2, for the 15 August 1984 letter from the U.S. Fish and Wildlife Service concurring with the findings of no effect for bald eagle and peregrine falcon, provided construction activities are monitored for the falcon.

4.2 Aquatic Food Web. Refer to the EA, Sections 6.3 to 6.7.

4.3 Wildlife. Refer to the same references in Section 4.2 above.

5. Potential Impacts on Special Aquatic Sites.

5.1 Sanctuaries and Refuges. Not applicable.

5.2 Wetlands. Not applicable.

5.3 Mudflats. Not applicable.

5.4 Vegetated Shallows. Refer to the EA, Sections 6.4 to 6.5.

5.5 Coral Reefs. Not applicable.

5.6 Riffle and Pool Complexes. Not applicable.

6.0 Potential Effects on Human Use Characteristics.

6.1 Municipal and Private Water Supplies. Not applicable.

6.2 Recreational and Commercial Fisheries. Refer to the EA, Sections 6.3 and 6.4.

6.3 Water Related Recreation. The proposed breakwaters would enhance water related recreation by (a) providing for safe passage of small boat traffic into and out of Sandy Point, and (b) aiding in the removal of navigation constrictions that have resulted in vessel delays and groundings. The disposal of dredged material at the approved Bellingham DNR site should not impact water related recreation.

6.4 Esthetics. Refer to the EA, Section 6.9.

6.5 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. Not applicable.

7.0 Evaluation and Testing of Discharge Material.

7.1 General Evaluation of Dredged or Fill Material. Material to be dredged from the channel is primarily silty sands, but also consists of coarse sand and gravels, peat, and organic sandy silts. This material has been tested on a limited scale and found to be acceptable for deep-water disposal (see Section 3.3 of this evaluation). The rock for breakwater construction will be from established quarries. Matts Matts quarry and Mount Baker quarry are established quarries providing clean, satisfactory rock for similar projects. Seattle District considers that rocks from these quarries are not "carriers" of contaminants to any meaningful degree.

7.2 Evaluation of Chemical-Biological Interactive Effects.

7.2.1 Exclusion of Material from Testing. The dredged and fill (breakwater) material is considered excluded from the evaluation procedures in 230.61 (b)(2) and (3) of the EPA 404(b) Guidelines as it has been determined that the likelihood of contamination by contaminants is acceptably low. The EPA concurs that further testing of the materials to be dredged is not necessary and they are acceptable for disposal in Bellingham Bay.

7.2.2 Water Column Effects. Not applicable.

7.2.3 Effects on Benthos. Not applicable.

7.3 Comparison of Excavation and Discharge Sites.

7.3.1 Total Sediment Chemical Analyses. An inventory of total concentration of contaminants would not be of value in comparing the discharge materials to the sediments at the disposal sites.

7.3.2 Biological Community Structure Analysis. A comparison between biological communities at the dredge site/quarry sites and the discharge/breakwater sites is not considered necessary in assessing environmental impacts of the discharge. The dredge area is not a productive biological community in Bellingham Bay. The disposed material would be populated by only a sparse community immediately following the disposal but would be colonized rapidly by organisms from adjacent areas that could live in the more sandy sediment material. Species diversity would possibly be lower than that existing now at the disposal site. Species abundance could be higher.

7.4 Physical Tests and Evaluation. Physical substrate tests were not considered necessary for this evaluation.

8.0 Factual Determinations.

8.1 Physical Substrate Determinations. Refer to Section 3.1 of this evaluation.

8.2 Water Circulation, Fluctuation, and Salinity Determinations. Refer to Sections 3.4 through 3.6 of this evaluation.

8.3 Suspended Particulate/Turbidity Determinations. Refer to Section 3.2 of this evaluation.

8.4 Contaminant Determinations. Refer to Section 3.3 of this evaluation.

8.5 Aquatic Ecosystem and Organism Determination. Refer to Sections 4.2 and 4.3 of this evaluation.

8.6 Proposed Disposal Site Mixing Zone Determinations. The discharge mixing zone (Bellingham Bay DNR site) will be confined to the smallest practicable zone which is consistent with the type of dispersion that will produce the lowest potential for adverse environmental effects. The EPA has approved open-water disposal in Bellingham Bay for this project.

8.7 Determination of Cumulative Effects on the Aquatic Ecosystem. Based on the information in the EA for this project, it is expected that the proposed discharge will not contribute significantly to cumulative impacts on the aquatic ecosystem. This includes the Bellingham Bay open-water disposal and the placement of breakwaters in the project area.

8.8 Determination of Secondary Effects on the Aquatic Ecosystem. The proposed discharges are not expected to have significant indirect or secondary effects on the ecosystem.

9.0 Proposed and Alternative Actions to Minimize Adverse Effects.

9.1 Actions Concerning the Location of the Discharge. Refer to the DPR, Sections 3.02 to 3.06; and the EA, Section 5.0.

9.2 Actions Concerning the Material to be Discharged. Not applicable.

9.3 Actions Controlling the Material After Discharge. Not applicable.

9.4 Actions Affecting the Method of Dispersion. Not applicable.

9.5 Actions Related to Technology. Not applicable.

9.6 Actions Affecting Plant and Animal Populations. Refer to Section 7.0 of the EA.

9.7 Actions Affecting Human Use. Not applicable.

10. Analysis of Practicable Alternatives.

10.1 Identification and Evaluation of Practicable Alternatives. Refer to the EA, Section 5.4, Disposal Alternatives, and the DPR, Section 3.07. Refer also to the FWCA Report, p. 7-8.

10.2 Evaluation of Alternatives to Discharge in Special Aquatic Sites. The activity associated with the proposed discharge is water dependent. There are no practicable alternatives that do not involve special aquatic sites. Refer to the DPR, Section 3, and the EA, Section 5.4.

11. Review of Conditions for Complaince.

11.1 Availability of Practicable Alternatives. There are no practicable alternatives to the proposed discharges that would have less adverse impact on the aquatic ecosystem.

11.2 Compliance with Pertinent Legislation. The proposed discharge is in compliance with the requirements of: (a) Section 307 of the Clean Water Act and (b) Endangered Species Act of 1973.

11.3 Potential for Significant Degration of Water as a Result of the Discharge of Polluted Material. The proposed discharge will not result in the release of pollutants that will have significant adverse effects on human health or welfare, the aquatic ecosystem, and wildlife dependent on this ecosystem, and recreational, esthetic, and economic values.

11.4 Steps to Minimize Potential Adverse Impacts on the Aquatic Ecosystem. All appropriate and practicable measures have been planned to minimize potential adverse discharge effects on the aquatic ecosystem.

12. Findings. Based on the preceding paragraphs, it has been determined that the proposed discharges comply with the requirements of the guidelines by inclusion of the planned measures to minimize adverse impacts.

APPENDIX A, PART 2

PUBLIC NOTICE

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124-2255

PUBLIC NOTICE

Public Notice Date: 26 November 1984
Expiration Date: 31 December 1984
Reference: NPSEN-PL-NC-84-4
Name: Seattle District, Corps of Engineers

The Seattle District, Corps of Engineers, proposes to undertake a Federal navigational project, which is a navigation channel and breakwaters giving access to Sandy Point Harbor, Strait of Georgia near Bellingham, Whatcom County, Washington. The Federal project consists of dredging, constructing rock breakwaters, and open-water disposal.

The proposed work described below and shown on the inclosed drawings will be performed in accordance with provisions of Section 10 of the River and Harbor Act of March 3, 1899, Section 404 of the Clean Water Act, 33 CFR 209.145, and Section 107 of the 1960 River and Harbor Act, as amended.

LOCATION - In Strait of Georgia near Bellingham, Whatcom County, Washington.

WORK - By clamshell, dredge 60,000 cubic yards (c.y.) of sand, silt, and clay with some bay muds to enlarge existing entrance channel and provide advance maintenance sediment trap and dump at the Department of Natural Resources-managed open-water disposal site in Bellingham Bay. Excavate 5,150 c.y. of above material from proposed breakwater toes and place 17,350 tons of core and toe rock and 12,650 tons of armor rock, all from upland sources.

PURPOSE - To provide a safe and efficiently maintained channel for recreation boats and some fishing boats to access the inner harbor at Sandy Point; to prevent shoreline erosion at the channel entrance and reduce wave transmission into the inner harbor.

ENDANGERED SPECIES - Biological assessments have been prepared and have identified no impacts to the bald eagle, seven species of whales, and the Pacific leatherback sea turtle from the proposed project. Noise and human activities during construction of the project could directly impact an important peregrine falcon feeding perch. Therefore, an experienced observer will be present during dredging and breakwater construction to determine whether peregrine falcons are affected. If effects are noted, construction would be halted until solutions can be found that would allow construction without impacting the peregrine falcons.

CULTURAL RESOURCES - There are no known cultural resources in the area that would be impacted by the dredging operations or breakwater placement. The work is not located on a property registered in the National Register of

Historic Places. Presently unknown archeological, scientific, prehistorical or historical data may be lost or destroyed by work to be accomplished under the requested permit.

PUBLIC HEARING - Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing.

ENVIRONMENTAL DOCUMENTS - A draft detailed project report (DDPR) and a draft Environmental Assessment (DEA) covering the proposed work, titled "Sandy Point Navigation Channel, Whatcom County, Washington," has been prepared by the Seattle District, Corps of Engineers, and is being distributed for public and agency review. A copy may be obtained free of charge by calling Frank Urabeck, Chief, Navigation and Water Resources Section, telephone (206) 764-3708. The DEA contains a Preliminary Section 401(b)(1) Evaluation as Appendix A, Part 1. A public meeting to discuss the findings of the DDPR and DEA will be held 12 December 1984 at 7 p.m. at Ferndale High School auditorium, 5830 Golden Eagle Drive, Ferndale, Washington.

ADDITIONAL INFORMATION - The evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator, EPA, under authority of Section 404(b) of the Clean Water Act.

EVALUATION - The decision whether to perform this work will be based on an evaluation of the probable impact, including cumulative impacts 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, including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

COMMENT AND REVIEW PERIOD - 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. Comments should refer to the reference number shown above and reach this office, ATTN: Frank Urabeck, NPSEN-PL-NC, telephone (206) 764-3708, not later than the expiration date of this public notice to insure consideration.

1 Incl
Prints (2)

Purpose of Project:

To provide adequate depth of water and width of channel for recreational boats and some commercial fishing boats;

To reduce frequency of maintenance dredging by construction of advance maintenance sediment trap;

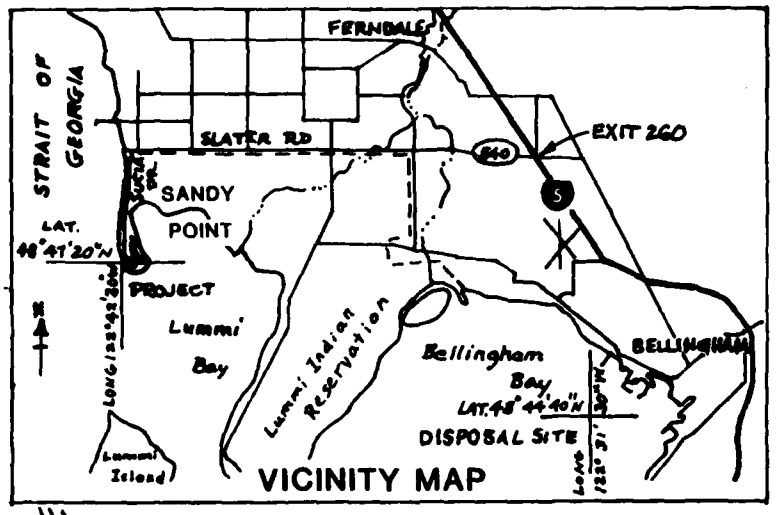
To reduce wave transmission into the inner harbor by use of breakwaters and angled channel alinement;

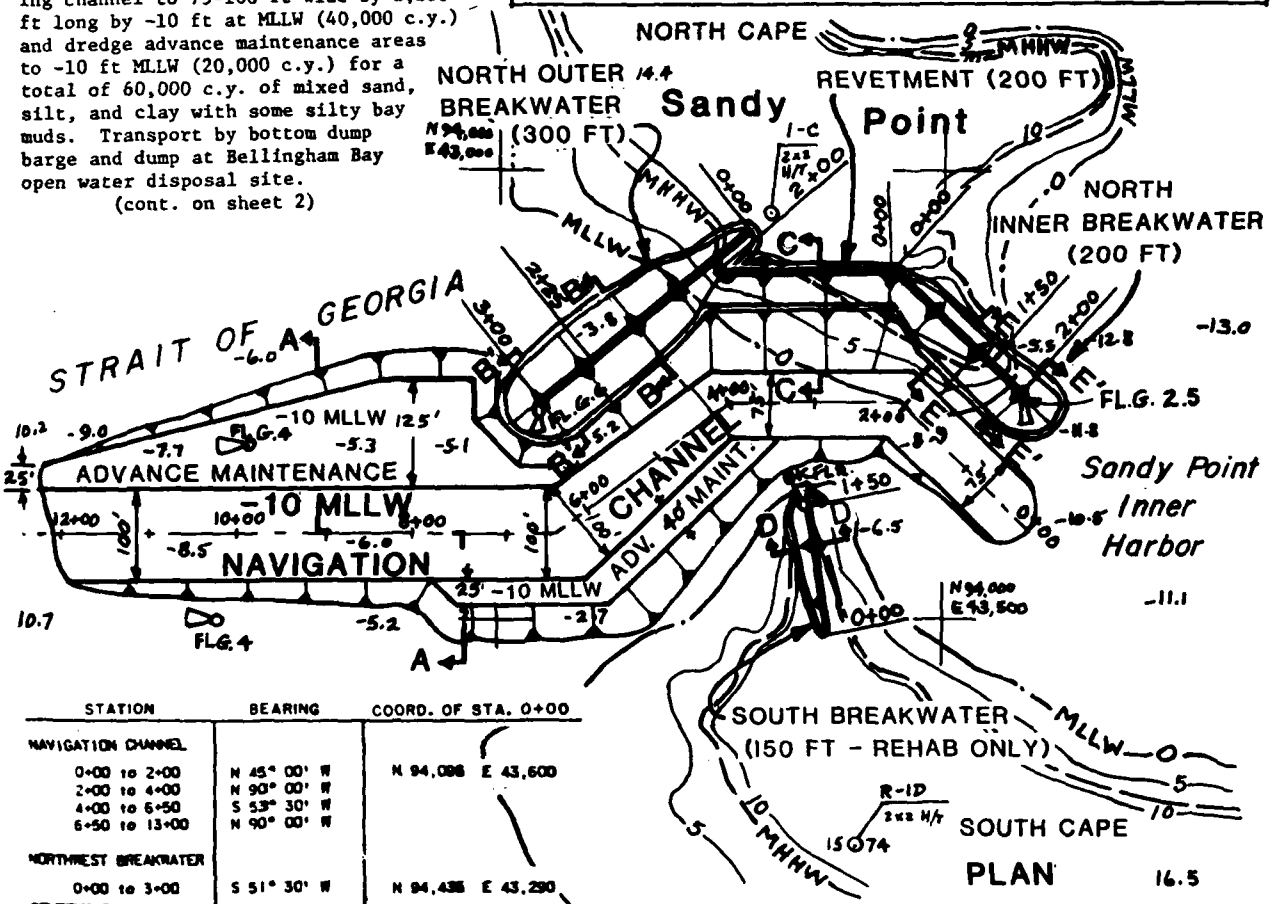
To reduce shoreline erosion by use of revetment.

Proposed Work:

1. By clamshell dredge enlarge existing channel to 75-100 ft wide by 1,200 ft long by -10 ft at MLLW (40,000 c.y.) and dredge advance maintenance areas to -10 ft MLLW (20,000 c.y.) for a total of 60,000 c.y. of mixed sand, silt, and clay with some silty bay muds. Transport by bottom dump barge and dump at Bellingham Bay open water disposal site.

(cont. on sheet 2)





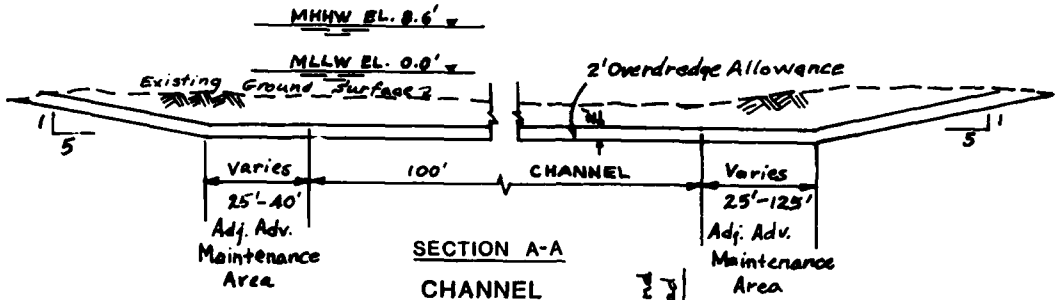
STATION	BEARING	COORD. OF STA. 0+00
NAVIGATION CHANNEL		
0+00 to 2+00	N 45° 00' W	N 94,096 E 43,600
2+00 to 4+00	N 90° 00' W	
4+00 to 6+50	S 53° 30' W	
6+50 to 13+00	N 90° 00' W	
NORTHWEST BREAKWATER		
0+00 to 3+00	S 51° 30' W	N 94,435 E 43,290
REVETMENT		
0+00 to 2+00	N 90° 00' W	N 94,390 E 43,445
NORTHEAST BREAKWATER		
0+00 to 2+00	S 47° 00' E	N 94,390 E 43,445
SOUTH BREAKWATER		
0+00 to 1+50	S 10° 00' W	N 93,986 E 43,390

Datum: NOS MLLW=0 ft
Soundings in feet.
Horizontal control based on local grid.

SCALE
100' 50' 0 100' 200'

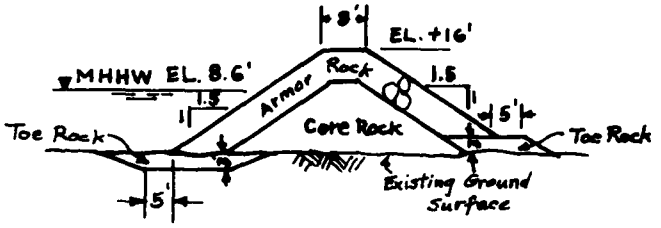
NPSEN-PL-NC-84-4

PROPOSED CHANNEL DREDGING, ROCK BREAKWATERS, ROCK REVETMENT, and OPENWATER DISPOSAL of DREDGED MATERIAL
IN: Strait of Georgia
NEAR Ferndale
COUNTY: Whatcom
STATE: Washington

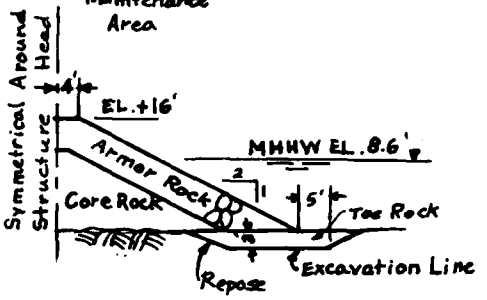


SECTION A-A

CHANNEL

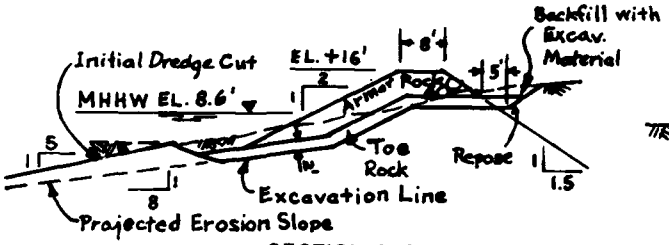


SECTION B-B



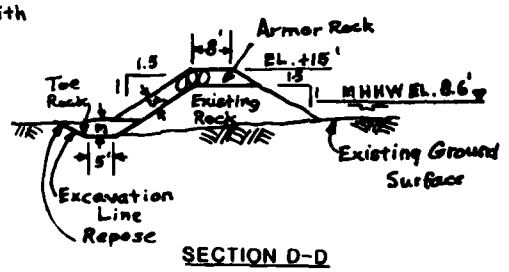
SECTION B'-B'

NORTH OUTER BREAKWATER



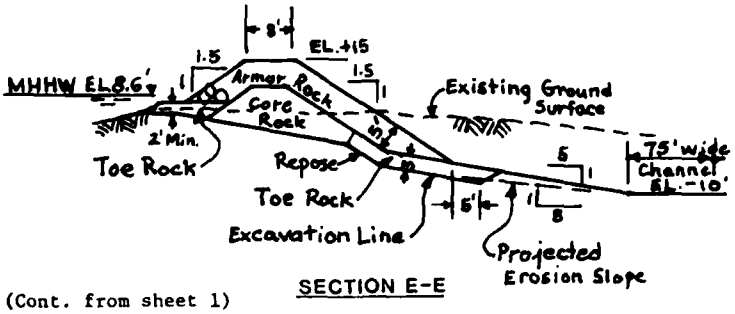
SECTION C-C

REVETMENT

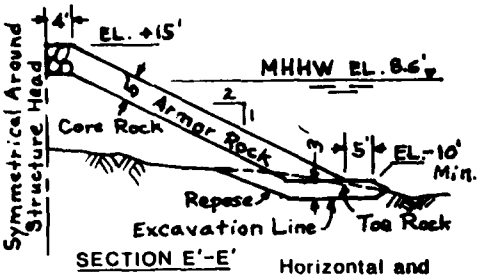


SECTION D-D

SOUTH BREAKWATER



SECTION E-E



SECTION E'-E'

NORTH INNER BREAKWATER

Horizontal and Vertical Scale

10' 5' 0' 10' 20'

(Cont. from sheet 1)

2. Excavate 5,150 c.y. of above material for toe of breakwaters. Place 17,350 tons of core and toe rock size 50-500 lbs and 12,650 tons of armor rock size 2,000-4,000 lbs. Rock is from an upland source.

3. Place navigation aids: 2 dolphin lights and 3 breakwater lights.

WORK IS ENTIRELY FEDERAL.

Adjacent Property Owners

This public notice has been mailed to 900 lot owners in the Sandy Point vicinity. Mailing list was supplied by the Sandy Point Joint Entrance Committee, 4038 Mayne Lane #12, Ferndale, Washington 98248, and is available for inspection at the Seattle District Office of the Corps of Engineers.

NPSEN-PL-NC-84-4

PROPOSED CHANNEL DREDGING, ROCK BREAKWATERS, ROCK REVETMENT, and OPENWATER DISPOSAL of DREDGED MATERIAL

IN: Strait of Georgia
NEAR Ferndale
COUNTY: Whatcom
STATE: Washington

JOHN SPELLMAN
Governor

DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504 • (206) 753-2800

NOVEMBER 26, 1984

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Notice of Application for
Water Quality Certification

Notice is hereby given that a request is being filed with the Department of Ecology for certification, that a proposed discharge resulting from the project described in the Corps of Engineers Public Notice No. NPSEN-PL-NC-84-4 will comply with the applicable provisions of State and Federal Water Pollution Laws.

Any person desiring to present views on the project pertaining to water pollution may do so by providing written comments to the Department of Ecology, Inter-Agency Operations Section, Mail Stop PV-11, Olympia, Washington 98504.

Please note, state regulation requires a minimum of 20 days of public notice. The comment period will begin NOVEMBER 26, 1984 (date of publication) and run until final comments are received from reviewing state agencies and the local government(s).

APPENDIX B

STUDY COORDINATION AND PUBLIC INVOLVEMENT

PART 1 - COORDINATION AND PUBLIC INVOLVEMENT

PART 2 - COORDINATION LETTERS

PART 3 - DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

PART 4 - COMMENTS AND RESPONSES

APPENDIX B, PART 1

COORDINATION AND PUBLIC INVOLVEMENT

APPENDIX B, PART 1
COORDINATION AND PUBLIC INVOLVEMENT

1. Coordination and public involvement have been maintained throughout the study and planning process using a public meeting, newsletter, agency meetings, and correspondence.

During the DPR study, coordination was conducted with:

- o U.S. Department of Transportation - U.S. Coast Guard
- o U.S. Department of the Interior - Office of the Secretary
- o U.S. Department of the Interior - Fish and Wildlife Service
- o U.S. Environmental Protection Agency - Region X
- o U.S. Department of Agriculture - Soil Conservation Service
- o U.S. Department of Commerce - National Marine Fisheries Service
- o U.S. Department of Commerce - Economic Development Administration
- o Washington State Department of Ecology
- o Washington State Department of Fisheries
- o Washington State Department of Game
- o Washington State Department of Transportation
- o Washington State Department of Natural Resources
- o Washington State Department of Recreation Commission
- o Washington State Office of Archaeology and Historic Preservation
- o Whatcom County (local sponsor)
- o Friends of the Earth
- o Sierra Club
- o Audubon Society
- o Port of Bellingham
- o Lummi Indian Tribe
- o Nooksack Indian Tribe

2. Comments and Responses. The draft DPR/draft EA was distibuted for public and agency review on 26 November 1984. Comments on the draft DPR/draft EA and as a result of the public meeting were made by (to be completed after public/ agency review). The initial draft DPR/draft EA mailing list contained 1,100 organizations or individuals. 1,100 notices of the public meeting were mailed prior to the 12 December 1984 public meeting. Copies of these mailing lists are on file in the Seattle District office. Reports were sent to Federal, state, and local governmental agencies, public libraries, private organizations, and concerned individuals (to be completed).

3. Final Public Meeting. The Corps of Engineers conducted a public meeting on 12 December 1984 to present the District Engineer's findings and tentative recommendations and to receive public comment. The meeting was held in the Ferndale High School. Those attending were: (to be completed after public meeting).

APPENDIX B, PART 2

COORDINATION LETTERS

APPENDIX B, PART 2
COORDINATION LETTERS
TABLE OF CONTENTS

TABLE OF CONTENTS (con.)

Phone 676-6717
384-1403
Whatcom County
Courthouse, Bellingham, Washington 98225

COUNTY EXECUTIVE
JOHN LOUWS

September 2, 1981

Department of the Army
Seattle District Corps of Engineers
PO Box C-3755
Seattle, WA 98124

Attention: Col. Leon K. Moraski

re: Dredging & Entrance Protection
Sandy Point Harbor
Whatcom County, Washington

Gentlepersons:

Whatcom County hereby requests federal assistance in the dredging and construction of entrance protection at Sandy Point Harbor as set forth in Section 107 of the 1960 River and Harbor Act as amended.

At this time, the County is requesting a detailed project report or D.P.R. Following the disposition of such report (if approved) it is the intent of the County to provide the appropriate assurance as required under Section 107 of the River and Harbor Act of 1960 as amended by Section 310 of the River and Harbor Act of 1965; by Section 112 of the River and Harbor Act of 1970; and by Section 133 of the Water Resource Development Act of 1976. However, apart from furnishing general assistance in the preparation of the D.P.R., it is the understanding of the County that this request does not obligate the County financially, administratively or otherwise to participate in the project. Rather, this letter is a preliminary step necessary to begin investigation of the project in order to make that determination.

The coordination of this project will rest with the Department of Public Works, Mr. Paul F. Rushing, Director. For further details or information regarding this matter, Mr. Rushing can be reached at 676-6692, 401 Grand Avenue, Bellingham, Washington 98225.

Respectfully,

John Louws

JOHN LOUWS
County Executive

cc. Paul F. Rushing.

B2-1

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 423

14 FEB 1983

Carl Menconi
Environmental Resources Section
U. S. Army Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

RE: Sandy Point Navigation Channel

Dear Carl:

We have reviewed the chemical analyses of the Sandy Point Channel sediments which you provided us. The results indicate that the proposed dredge material is suitable for in-water disposal at an approved open water disposal site.

Sincerely,

Ronald A. Lee

Ronald A. Lee
Water Resources Assessment Team

U.S. Department of Transportation
United States Coast Guard

Commander
Thirteenth Coast Guard District

915 Second Avenue
Seattle, WA 98174
Staff Symbol: (oan)
Phone: (206) 442-5864

16500/4
24 February 1984

From: Commander, Thirteenth Coast Guard District
To: District Engineer, Seattle District, Corps of Engineers

Subj: Proposed Sandy Point Harbor Project

Ref: (a) Your ltr NPSEN-PL-NC dtd 27 Jan '84

1. If the project is developed as indicated in your letter we would propose to establish and maintain aids to navigation as follows:

Initial Cost

2 ea	5-Pile wood structures @ 18K	$36,000
3 ea	Aluminum jetty light structure @ 7K	21,000
	TOTAL INITIAL COST	$57,000

Annual Cost

Batteries for 5 lights @ $250/yr	$ 1,250
Struct amortiz @ 8% for 25 yrs. (.09367) (57,000)	5,350
TOTAL ANNUAL COST	$ 6,600

T. M. NUTTING
By direction

JOHN SPELLMAN
Governor

JACOB THOMAS
Director

STATE OF WASHINGTON
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 West Twenty-First Avenue, KL-11 • Olympia, Washington 98504 • (206) 753-4011

January 5, 1983

Col. Norman C. Hintz
District Engineer
Seattle Dist., Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Log Reference: 364-F-COE-S-02

Re: Sandy Point Harbor Navigation
Channel Improvements Project

Dear Colonel Hintz:

A staff review has been completed of your Section 107 Reconnaissance Report, Sandy Point Navigation Channel. Previous research in the area indicates archaeological deposits are located on Sandy Point. We recommend cultural resource concerns be given prominent consideration in your detailed project report.

Sincerely,

Robert G. Whitlam, Ph.D.
Archaeologist

dj

315 No Stadium Way
Tacoma,
Washington
98403
(206) 593-2830

THE WASHINGTON STATE HISTORICAL SOCIETY

January 6, 1983

Mr. Andy Maser, Water Resources Planner
Navigation and Coastal Planning Section
Seattle District, Corps of Engineers
4735 East Marginal Way South
Seattle, Washington 98134

Dear Mr. Maser:

We are always pleased to have an opportunity to comment on such studies as the Sandy Point Harbor navigation channel.

It is our concern that no historic sites be damaged in such projects. According to our listing for Whatcom County there is nothing of this nature that would be affected.

If there is anything further we can do in the way of advising on matters of historic preservation please let us know.

Sincerely,

Frank L. Green

Frank L. Green
Librarian

Phone 676-6717
384-1403
Whatcom County
Courthouse, Bellingham, Washington 98225

COUNTY EXECUTIVE
JOHN LOUWS

May 20, 1982

Colonel NormanC. Hintz
District Engineer
Department of the Army
Seattle District
P.O. Box C-3755
Seattle, WA. 98124

RE: SANDY POINT, Whatcom County, Washington

Dear Colonel Hintz:

Whatcom County has been requested to serve as sponsor of a project to be located at Sandy Point Harbor. The project consists of the improvement of a navigation channel at the entrance to the harbor, appropriate jetties and breakwaters. In addition, the project would provide the following amenities which would be open and available to all members of the public: A boat launch ramp; parking facilities; fuel station; and anchorage.

The purpose of this letter is to inform you that, based upon information received to date, it appears that there is a sufficient basis for detailed project studies to be commenced. Whatcom County, therefore, requests that the Corps undertake such studies at your earliest convenience.

You should also be advised that the County's continued participation in the project is contingent upon successful resolution of certain matters presently under discussion. These matters are being reviewed by the County, various private proponents of the project, and the Lummi Indian Tribe. The subjects under discussion include the following:

(1) Determination of the method of local financing. It is our understanding that the estimated cost of the project is $1,000,000.00, of which the local share would be $500,000.00. The local share will be funded entirely by the private proponents of the project. They are in the process of reviewing distribution of this responsiblity and are optimistic of reaching an agreement in the near future.

(2) Renewal of tidelands lease. The Lummi Indian Tribe leases the tidelands at the harbor entrance to certain of the private proponents. The leases extend until 1988. However, in light of the project proposal, the leases are presently under renegotiation. Satisfactory resolution of this issue will be required by Whatcom County.

(3) Public access. The critical concern of the County is that public access to the various facilities be assured. The specific manner in which public access will be guaranteed remains to be determined.

While the foregoing matters do not constitute the sole concerns of Whatcom County, it is anticipated that other pertinent concerns - such as environmental impacts - will be adequately addressed in the course of the detailed project studies.

Whatcom County is aware that there are significant responsibilities in connection with this project should a final determination to proceed be made. These include the following:

(a) Provide, without cost to the United States, all land, easements and right-of-ways required for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers.

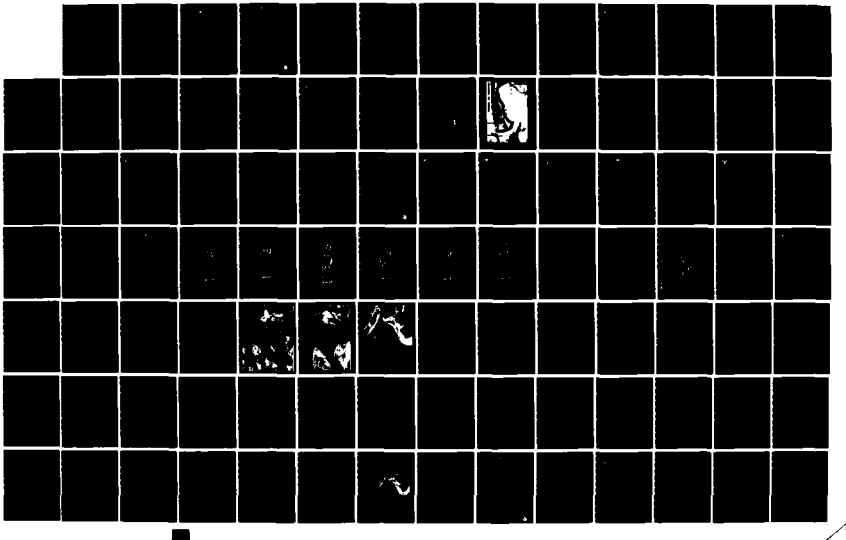
(b) Accomplish, without cost to the United States, all alterations and relocations as required of buildings, roads, utilities and other structures and improvements.

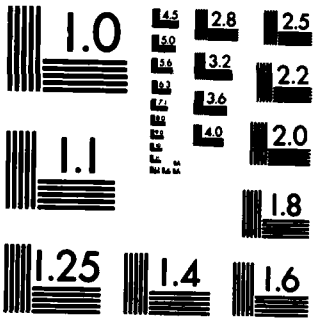
(c) Hold and save the United States free from damages due to the construction, operation and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors.

(d) Provide and maintain, without cost to the United States, adequate berthing areas and local access channels with depths commensurate with those in the project improvements, and necessary mooring facilities, including designated anchorage, utilities, a public landing with suitable water supply and essential sanitary facilities, boat launch ramp, parking areas, fuel station, and access roads open to all on equal terms.

AD-A150 592 DRAFT DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT SANDY POINT NA..(U) CORPS OF ENGINEERS SEATTLE WA SEATTLE DISTRICT NOV 84 2/3

UNCLASSIFIED F/G 13/2 NL





Whatcom County would further agree to comply with:

(a) 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 a federal project on the grounds of race, color or national origin; and,

(b) Sections 210 and 305 of Public Law 92-646, approved January 2, 1978, and entitled the "Uniform Relocation Assistance and Property Acquisition Policies Act of 1970".

I trust the foregoing will be of assistance to you and sufficient for purposes of initiating the detailed project report studies of this project. In the event that you should have any questions or comments in regard to this matter, would you please direct your inquiries to Paul Rushing, Director of Public Works, 401 Grand Avenue, Bellingham, Washington, 98225 (676-6907).

Very truly yours,

John Louws

JOHN LOUWS,
County Executive,
Whatcom County, Washington

JL:db

cc: Paul Rushing,
Director, Public Works

Robert Tull,
Attorney at Law

Bruce L. Disend,
Deputy Prosecuting Attorney

Harry L. Johnson
Attorney at Law

Larry Daugert,
Attorney at Law

John Cadigan,
Attorney at Law

Whatcom County

DEPARTMENT OF PUBLIC WORKS
Paul F. Rushing, Director
Courthouse, Bellingham, WA 98225
(206) 676-6692

Edwin R. Henken, County Engineer
BUREAU OF ENGINEERING
Courthouse, Bellingham, WA 98225
County 398-1310 City 676-6730

Donovan F. Kehrer, Deputy Administrator
BUREAU of BUILDINGS and CODE ADMINISTRATION
401 Grand Avenue, Bellingham, WA 98225
County 398-1310 City 676-6907

August 7, 1984

Colonel Roger F. Yankoupe
District Engineer
U.S. Army Corps of Engineers
Seattle District
Post Office Box C-3755
Seattle, Washington 98124

Dear Colonel Yankoupe:

In accordance with the terms hereafter set forth, and our previous letter of May 20, 1982, Whatcom County reaffirms its intent to serve as local sponsor of the proposed Sandy Point channel entrance improvement project. This statement of interest is based on our most recent review of the project features, current cost sharing estimates between the Federal Government and the non-Federal interests, and the assumption that environmental concerns previously raised by state and Federal agencies have been or will be resolved prior to project construction. It is further assumed that the Sandy Point community and the Lummi Tribe will renew the tidelands lease by the end of this year.

As your office is aware, the county is serving as project sponsor at the request of the Sandy Point community. The residents of the area are presently considering formation of a park and recreation district. This would allow an assessment of community property in order to raise the estimated $1,201,000 in local funds necessary for the completion of the project.

Subject to the foregoing considerations, public review of the draft detailed project report (currently scheduled for this fall), and the final planning and coordination with affected interests, we agree to the standard items of local cooperation as contained in our May 20, 1982 letter.

Sincerely,

Paul F. Rushing
Director of Public Works

PFR/er

copy to: B. Disend, Prosecuting Atty.
B. Tull, Atty.
S. VanZanten, County Executive

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E.
BIN C15700
Seattle, Washington 98115

F/NWR5:AG:1503-11-1

JAN 19 1983

Mr. George W. Ploudre, P.E.
Asst. Chief, Engineering Division
Seattle District, Corps of Engineers
Seattle, Washington 98124

Dear Mr. Ploudre:

In response to your letter of January 10, 1983 regarding the proposed navigation channel and jetty construction at Sandy Point, in Whatcom County, Washington; enclosed is a list of threatened and endangered species under jurisdiction of the National Marine Fisheries Service (NMFS) that may be present in the project vicinity.

There are no "candidate" species presently being considered by NMFS that may be present in the project area.

Sincerely,

Thomas E. Kruse

for H. A. Larkins
Regional Director

Attachment

REVIEW OF EASTERN NORTH PACIFIC MARINE ENDANGERED SPECIES

Marine animals which are found in the eastern North Pacific Ocean at some season of the year, which are listed as endangered under the Endangered Species Act of 1973, and which could conceivably enter the Strait of Juan de Fuca and the inside waters of Washington are:

Gray whale	(Eschrichtius robustus)
Blue Whale	(Balaenoptera musculus)
Humpback Whale	(Megaptera novaeangliae)
Right Whale	(Balaena glacialis)
Fin Whale	(Balaenoptera physalus)
Sei Whale	(Balaenoptera borealis)
Sperm Whale	(Physeter macrocephalus)
Leatherback sea turtle	(Dermochelys coriacea)

However, four of these endangered species have never been reported as occurring within the Strait of Juan de Fuca or other inside waters of Washington; they are:

Right Whale

Sei Whale

Sperm Whale

Leatherback sea turtle

The other four endangered species occur only rarely or occasionally within inside waters. The Blue Whale may have been sighted once and the Fin Whale only once or twice. A few individual Gray and Humpback Whales have been sighted almost every year. It is highly unlikely, however, that a significant number of any of these four species would enter and travel within the Strait of Juan de Fuca, the San Juan Islands area, Puget Sound or Hood Canal.

Accounts for each species are as follows: Additional information on the marine mammals of Washington can be found in "Northern Puget Sound Marine Mammals" by Everitt, Fiscus and DeLong (1980).

Gray Whale

The gray whale is primarily a coastal species. A few whales may stray annually into the inside waters of Washington. The eastern North Pacific stock of 16,500 whales passes along the Washington coast in late winter and spring (Mar-May) during its northbound migration and in winter (Nov-Jan) during its southbound migration. A few animals may be seen in coastal Washington waters during any month of the year. A summer population of 50 animals regularly occurs along the West Coast of Vancouver Island where they feed.

We have 17 observations of gray whales from the waters inside of Washington including the eastern Strait of Juan de Fuca, the San Juan Islands, Puget Sound, and Hood Canal in 1978-79. These were all solitary animals with two exceptions: A 6 May 1979 observation of a group in Hood Canal and a 9 May 1979 observation of 1-5 at Port Townsend which may have been the group sighted in Hood Canal 3 days earlier.

Gray whales could occur anywhere in the inside waters of Washington but the chance of more than a few stragglers occurring is slight.

Blue Whale

The blue whale is primarily an offshore species. In the eastern North Pacific it ranges from the Gulf of Alaska to central California during summer and in the eastern tropical Pacific during winter. A recent estimate of the North Pacific population is 1,700.

There are no verified sightings of this species from the Strait of Juan de Fuca or other inside waters of Washington, although there is speculation that the whale (identified as a Fin) which died in a log boom at Shelton, WA in August 1930 may have been a young blue whale.

The blue whale is an offshore species rarely venturing into shallow coastal or protected inside waters of Washington.

Humpback Whale

The humpback whale generally inhabits coastal and offshore waters but does enter protected inside waters on occasion. In the eastern North Pacific Ocean this species ranges from the arctic to southern California in summer and occupies tropical waters in winter. The North Pacific population is estimated to consist of about 1,000 animals.

During the first part of the 20th century this species was one of those most frequently sighted in the inside waters of Washington. Recent sightings of this species in Puget Sound were made off Seattle, WA in May 1976 (2 individuals) and in September 1978 (4 individuals).

Humpback whales could occur anywhere in the inside waters of Washington but the chance of more than a few stragglers occurring is slight.

Right Whale

The right whale occurs in both coastal and offshore waters. In the eastern North Pacific Ocean this species occurs north of Washington waters in summer and ranges from Washington south in winter. The North Pacific population is estimated to be about 220 individuals.

The most recent sighting of this species in Washington waters was made on 17 January 1967 when 3 were observed 15 miles WSW of Cape Flattery. The right whale has never been reported from the Strait of Juan de Fuca or other

INSIDE WATERS OF WASHINGTON.

Fin Whale

The fin whale is an offshore inhabitant. In the eastern North Pacific Ocean it ranges from the arctic south to California in summer and to tropical waters in winter. In the North Pacific this species is presently estimated to number about 17,000 animals. One fin whale was pursued in Puget Sound in 1915 and another in August 1930, although the 1930 specimen may have been a young blue whale, based on recent examination of photographs. No new sightings have been reported for this species in the Strait of Juan de Fuca or other inside waters of Washington.

Since it is an offshore species, the presence of a fin whale inside waters of Washington would certainly represent an accidental straying away from its normal range.

Sei Whale

The sei whale is an inhabitant of offshore waters. In the eastern North Pacific Ocean it ranges from the Gulf of Alaska south to California in summer and occurs in tropical waters in winter. The population in the North Pacific is presently estimated to be about 9,000 animals.

There are no records of this species from the Strait of Juan de Fuca or other inside waters of Washington.

Sperm Whale

The sperm whale is an inhabitant of offshore waters.

In the eastern North Pacific it ranges north to the Bering Sea in summer, with females and immature animals being found between 40° and 50° north latitude; it ranges south into tropical waters in winter. The current population estimate for the North Pacific is 376,000.

There are no records of this species occurring in the Strait of Juan de Fuca or the inside waters of Washington.

Leatherback Sea Turtle

The leatherback sea turtle is an inhabitant of offshore waters.

In the eastern North Pacific it ranges north to the Gulf of Alaska. There are two records from Alaska, one was taken in a salmon seiner's net about 1 September 1962 near Cordova, Prince William Sound, and one was taken near Craig, Southeastern Alaska, also in a seiner's net on 21 August 1978. Its population is unknown.

None have been reported from the Strait of Juan de Fuca or the inside waters of Washington.

National Marine Mammal Laboratory, NWAFC
7600 Sand Point Way N.E., Building 32
Seattle, Washington 98115

February 19, 1980

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Endangered Species
2625 Parkmont Lane S.W., B-2
Olympia, WA 98502

March 1, 1983

Mr. George W. Ploudre, P.E.
Assistant Chief, Engineering Division
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Refer to: 1-3-83-SP-117

Dear Mr. Ploudre:

As requested by your letter, dated January 10, 1983, I have attached a list of endangered and threatened species (Attachment A) that may be present in the area of the proposed navigation channel and jetty construction of Sandy Point, Whatcom County, Washington. The list fulfills the requirement of the Fish and Wildlife Service under Section 7(c) of the Endangered Species Act of 1973, 16 U.S.C. 1531, et seq. Your Endangered Species Act requirements are outlined in Attachment B.

Should your biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, your agency should request formal Section 7 consultation through this office.

Even if your biological assessment shows a "no effect" situation, we would appreciate receiving a copy of your assessment for our information. If you have any additional questions regarding your responsibilities under the Act, please contact Mr. Jim Bottorff, Endangered Species Team Leader, (206) 753-9444, FTS 434-9444 at the following address:

U.S Fish and Wildlife Service
Endangered Species Team
2625 Parkmont Lane S.W., Bldg. B-2
Olympia, WA 98502

Your interest in endangered species is appreciated.

Sincerely,

Jim A. Bottorff
Endangered Species Team Leader

Attachments

cc: RO (AFA/SE)
ES, Olympia
WDOG, Non-Game Program
WNHP
ODFW,
ONHP

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE PROPOSED NAVIGATION CHANNEL AND JETTY CONSTRUCTION, SANDY POINT, WHATCOM COUNTY, WASHINGTON
1-3-83-SP-117

LISTED:

Bald Eagle (Haliaeetus leucocephalus)

Wintering and summer resident feeding area in project vicinity.

Peregrine Falcon (Falco peregrinus anatum)

Wintering and migratory transients occur in the project vicinity. You may want to consider cumulative impacts of this project in conjunction with the proposed Lummi Bay Boat Basin.

PROPOSED:

None

CANDIDATE:

None

Attachment A

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a) - Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeoparize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c) - Biological Assessment for Construction Projects

Requires Federal agencies or their designees to prepare Biological Assessment (BA) for construction projects1/ only. The purpose of the BA is to identify any proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (List attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, please verify the accuracy of the list with our Service. No irreversible commitment of resources is to be made during the BA process which would result in violation of the requirements under Section 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevent information. Upon completion, the report should be forwarded to our Area Manager.

1/ "Construction Project" means any major Federal Action which significantly affects the quality of the human environment (requiring an EIS) designed primarily to result in the building or erection of man-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorization or approval which may result in construction.

11 JUL 1984

Planning Branch

H. A. Larkins, Regional Director
Pacific Northwest Region
National Marina Fisheries Service
7600 Sand Point Way Northeast
Bin C - 15700
Seattle, Washington 98115

Dear Mr. Larkins:

Enclosed for your information is the biological assessment (BA) evaluating the possible effects of construction of the Sandy Point Public Navigation Channel on seven species of endangered whales and an endangered sea turtle. The BA is in response to your letter of January 19, 1983 which provided us with a list of listed marine species that may be found in the proposed project area.

The BA concludes that the Sandy Point Public Navigation Channel, if constructed, would not impact any of the eight listed species. If you do not agree with this assessment, please inform me at the earliest date. Since more than 180 days have passed since the list was transmitted to us, please inform us whether any additional species under your jurisdiction have been added to the list since that time.

If you have any questions regarding this BA, please contact Mr. Ken Brunner of my staff at FTS 399-3624.

Sincerely,

George W. Ploudre, P.E.
Assistant Chief, Engineering Division

Enclosure

NPSEN-PL-ER 18 June 1984

SANDY POINT PUBLIC NAVIGATION CHANNEL
BIOLOGICAL ASSESSMENT ON IMPACTS TO MARINE MAMMALS

1. Introduction. Whatcom County, Washington, is proposing modification to a small navigation project at Sandy Point, Whatcom County, Washington. The Seattle District, U.S. Army Corps of Engineers, is conducting a study at the request of Whatcom County to identify the feasibility of Federal assistance in the project.

Seven species of endangered marine mammals and one species of endangered sea turtle have been observed in Washington waters and may be present in the vicinity of Lummi Bay. These are the sperm whale (Physeter macrocephalus), gray whale (Eschrichtius robustus), fin whale (Balaenoptera physalus), sei whale (B. borealis), blue whale (B. musculus), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), and leatherback sea turtle (Dermochelys coriacea). Section 7 of the Endangered Species Act of 1973, as amended (U.S.C. 1531 et seq.), requires Federal agencies to assess whether a proposed project may result in impacts (including secondary impacts) to listed species that occur in the project area.

2. Project Description.

a. History. During the 1960's and 1970's, local interests dredged an extensive channel and interior harbor and canals to provide water access to residential properties (figure 1). Wet moorage and boat launch facilities were subsequently constructed. The original entrance channel was reported to be about 400 feet wide, with depths in excess of -10 feet mean lower low water (MLLW). Continued littoral drift shoaling has now effectively narrowed the entrance to about 50 feet wide at MLLW and less than -5 feet deep at MLLW. The Sandy Point harbor and residential canals are used by about 400 boats at the present time. Studies show that within 3 years uninterrupted shoaling will effectively close the entrance channel to about 85 percent of the boats presently using the area.

b. Project Plans. Refer to figure 2. Major project features include a navigation channel 1,200 feet long by 100 to 75 feet wide and 10 feet deep at MLLW; moorage and public launch facilities; three rock breakwaters 300 feet, 200 feet, and 150 feet long, all with a top elevation of +16 feet MLLW, and with variable side slopes; 200-foot-long rock revetment; navigation aids; and mitigation of lost aquatic habitat.

Channel construction would entail clamshell dredging of approximately 60,000 cubic yards (c.y.) of fine sand (encompassing about 5 acres) with open-water disposal at the approved Washington Department of Natural Resources (DNR) disposal site within Bellingham Bay. Maintenance dredging would be expected to occur at year 5 following project construction and every 3 years thereafter. Approximately 10,000 c.y. of material would be dredged during each maintenance

Encl 1

cycle and disposed of in Bellingham Bay. In its economic analysis, the Seattle District determined that, following project completion, the stimulus to purchase the remaining unsold lots would be no greater than it is currently. Therefore, the project cannot be said to spur development of the Sandy Point residential area.

3. Methods. The author has visited the proposed project location on several occasions. Individuals knowledgeable about use of the project area by the listed species were contacted and interviewed. Available literature on the listed species was reviewed and pertinent information was used in this assessment. All persons contacted and literature reviewed are listed at the end of this BA.

4. Impacts of the Proposed Project on Marine Animals.

a. Description of the Environment. Lummi Bay is an extensive area of intertidal flats and a small amount of shallow subtidal habitat. The outer bay, which has extensive eelgrass beds, provides habitat for a wide variety of small marine animals which support juvenile and, possibly, adult Dungeness crabs. The eelgrass provides spawning habitat for a limited number of herring which are, in turn, a fishery and an important food base for salmon. Lummi Bay has moderate to high value for all species of waterfowl that utilize the bay, especially in winter and spring (Wahl, et al., 1981). Lummi Bay is considered to be especially important for black brant during their spring migration, at which time the bay supports 6 percent of the brant population in northern Washington waters (Wahl, et al., 1981). Lummi Bay is also considered to be "very important" to wintering birds, particularly diving and surface feeding ducks, gulls, and shorebirds (Wahl, et al, 1981). One major reason that Lummi Bay is attractive to waterfowl - its shallowness - is also a major reason why large marine animals will not utilize it. Lummi Bay is only about 10 feet deep at its deepest and averages only about 4-1/2 feet deep over the entire bay during high tide (Dunn, 1983). As a result, none of the listed species discussed herein have been observed in Lummi Bay.

To the west and north of Sandy Point the waters of the Strait of Georgia are deeper and more suitable for whales, except for the fact that the shoreline areas are not protected. For some reason, sightings of whales are rare from the southern portion of the Strait of Georgia (though relatively common in the northern Strait of Georgia). In fact, there are no recent sightings of any of the listed species from the Sandy Point area, with the exception of the gray whale.

b. Impacts of the Proposed Project on Listed Marine Animals, General. Of the eight species of listed marine animals discussed in this BA, the right, fin, sei, and sperm whales and the leatherback sea turtle have never been observed in the inside waters of Washington. The blue whale has never been verified from the inside waters, though it is speculated that a whale identified as a fin whale in 1930 in Shelton may actually have been a young blue whale (National Marine Mammal Laboratory, 1980). Thus, it is highly unlikely that these six species will be observed near Sandy Point, and they are not

expected to be impacted by the proposed project. They are not discussed further in this BA. Gray whales and humpback whales are not expected to enter the Sandy Point waterways, so the primary impact to these animals, should the dredging and disposal activities occur, would be from potentially increased boat use in the Strait of Georgia and Hale Passage. However, since these animals rarely enter these waters, encounters with boats would be rare. Dredging and disposal operations potentially could interfere with marine mammals, particularly in Bellingham Bay, where some species (gray whale in particular) have been seen with greater regularity. However, because of the extreme rarity of occurrence of even gray whales, encounters with the disposal barge and disposal activities are considered highly unlikely and of no consequence.

c. Species Accounts.

(1) Gray Whale. Sightings of gray whales in the inside waters of Washington are rare. According to Everitt, et al. (1979), gray whales have been sighted near Sandy Point on only three occasions since 1977: once in June 1978 near Viti Rock off the southwestern shore of Lummi Island, once in the Hale Passage in July 1978, and the other in December 1976 off Gooseberry Point and Lummi Point. All of these sightings were of a single individual. The fact that gray whales are so rarely encountered near Sandy Point is sufficient to predict that the project would have no impact on this species. This can be strengthened by the knowledge that gray whales prefer bays between 40 and 125 feet deep for feeding (Angell and Balcomb, 1982), and the channel in Sandy Point is and would be much less than this. Thus, gray whales would not be expected to utilize Sandy Point.

(2) Humpback Whale. This species used to be one of the most frequently observed in Washington's inside waters until commercial whaling dramatically reduced their numbers. Sightings of this species in the inside waters over the past few years have been rare. If the population can make a comeback, they could be expected to be seen in the inside waters again with regularity (Angell and Balcomb, 1982). This could be significant relative to the Sandy Point area since Lummi Bay is a herring spawning area, and herring constitute an important part of the humpback diet. At this time, however, such a postulation (e.g., population increase and regular use of inside waters) is conjecture and cannot be considered realistic for the near term. Therefore, no impacts to humpbacks from the proposed Sandy Point project are anticipated.

5. Conclusions. Because of the rarity of the eight listed marine animals in Washington's inside waters, and because Lummi Bay and Sandy Point are poor habitats for any of these species, construction of the Sandy Point Public Navigation Channel would not be expected to result in impacts to any of these species.

6. Sources of Information.

Balazs, George H., Personal Communication, University of Hawaii of Manoa, Kaneohe, Hawaii, 1978.

Burt, William Henry and Richard Philip Grossenheider, A Field Guide to the Mammals, Houghton Mifflin Company, Boston Massachusetts, 1964.

Daugherty, Anita E., Marine Mammals of California, University of California Sea Grant Marine Advisory Program and California Department of Fish and Game, 1979.

Everitt, Robert D., Clifford H. Fiscus, Robert L. DeLong, Marine Mammals of Northern Puget Sound and the Strait of Juan de Fuca, Marine Ecosystems Analysis Program, National Oceanic and Atmospheric Administration, January, 1979.

Everitt, Robert D., Clifford H. Fiscus, and Robert L. DeLong, Northern Puget Sound Marine Mammals, Marine Ecosystems Analysis Program, National Oceanic and Atmospheric Administration, February 1980.

Haley, Delphine, Editor, Marine Mammals of Eastern North Pacific and Arctic Waters, Pacific Search Press, Seattle, Washington, 1978.

Ingles, Loyd G., Mammals of the Pacific States, Stanford University Press, Stanford, California, 1965.

Larrison, Earl J., Washington Mammals, Their Habitats, Identification, and Distribution, Seattle Audubon Society, Seattle, Washington, 1970.

Simenstad, Charles A., Bruce S. Miller, Carl F. Nyblade, Kathleen Thornburgh, and Lewis J. Bledsoe, 1979. Food Web Relationships of Northern Puget Sound and the Strait of Juan de Fuca, Fisheries Research Institute, University of Washington, Seattle, Washington, under contract to Environmental Protection Agency, Washington, D.C.

Wahl, T., S. Speich, D. A. Manuwal, K. V. Hirsch, and C. Miller. 1981. Marine bird populations of the Strait of Juan de Fuca, Strait of Georgia, and Adjacent Waters in 1978 and 1979. U.S. Environmental Protection Agency, Washington, D.C. 125 pp.

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

REPLY TO ATTENTION OF
Planning Branch

July 13, 1984

Mr. James Bottorff
Endangered Species Team Leader
U.S. Fish and Wildlife Service
2625 Parkmont Lane Southwest,
Building B-2
Olympia, Washington 98502

Dear Mr. Bottorff:

Enclosed for your information is the biological assessment (BA) evaluating the possible effects of construction of the Sandy Point Public Navigation Channel on the American peregrine falcon (Falco peregrinus anatum) and the bald eagle (Haliaeetus leucocephalus) (enclosure 1). The BA is in response to your letter of March 1, 1983, which provided us with a list of species that may be found in the proposed project area.

The BA concludes that the Sandy Point Public Navigation Channel, if constructed, would not impact either the peregrine falcon or the bald eagle. If you do not agree with this assessment, please inform me at the earliest date. Since more than 180 days have passed since the list was transmitted to us, please inform us whether any additional species under your jurisdiction have been added to the list since that time.

If you have any questions regarding this BA, please contact Mr. Ken Brunner of my staff at FTS 399-3624.

Sincerely,

/S/ George W. Ploudre, P.E.
Asst Chief, Engineering Division

Enclosure

NPSEN-PL-ER 18 June 1984

SANDY POINT PUBLIC NAVIGATION CHANNEL
BIOLOGICAL ASSESSMENT - BALD EAGLE AND PEREGRINE FALCON

1. Introduction. Whatcom County, Washington, is proposing modification to a small navigation project at Sandy Point, Whatcom County, Washington. The Seattle District, U.S. Army Corps of Engineers, is conducting a study at the request of Whatcom County to identify the feasibility of Federal assistance in the project.

The American peregrine falcon (Falco peregrinus anatum) and the bald eagle (Haliaeetus leucocephalus) have been identified in the study area. The peregrine falcon is listed as endangered and the bald eagle as threatened on the Federal list of endangered and threatened wildlife and plants. Section 7 of the Endangered Species Act of 1973, as amended (U.S.C. 1531, et seq.), requires Federal construction agencies to assess whether a proposed project may result in impacts (including secondary and cumulative impacts) to listed species that occur in the project area. This biological assessment (BA) addresses impacts that occur to the peregrine falcon and bald eagle if the proposed navigation channel is constructed at Sandy Point.

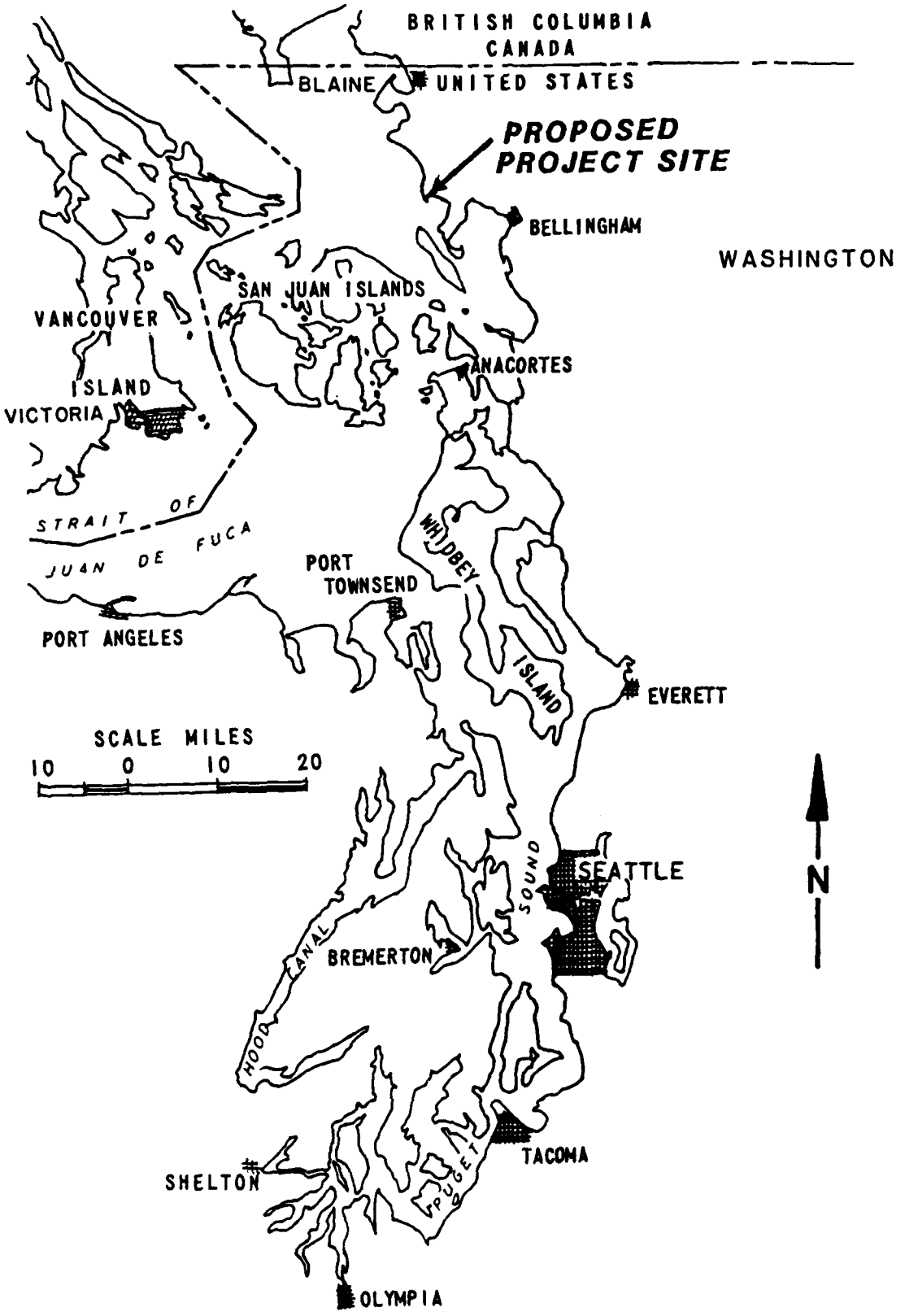
2. Project Description.

a. History. During the 1960's and 1970's, local interests dredged an extensive channel and interior harbor and canals to provide water access to residential properties (figure 1). Wet moorage and boat launch facilities were subsequently constructed. The original entrance channel was reported to be about 400 feet wide, with depths in excess of -10 feet mean lower low water (MLLW). Continued littoral drift shoaling has now effectively narrowed the entrance to about 50 feet wide at MLLW, and less than -5 feet deep at MLLW. The Sandy Point harbor and residential canals are used by about 400 boats at the present time. Studies show that within 3 years, uninterrupted shoaling will effectively close the entrance channel to about 85 percent of the boats presently using the area.

b. Project Plans. Refer to figure 2. Major project features include a navigation channel 1,200 feet long by 100 to 75 feet wide and 10 feet deep at MLLW; moorage and public launch facilities; three rock breakwaters 300 feet, 200 feet, and 150 feet long, all with a top elevation of +16 feet MLLW, and with variable side slopes; 200-foot-long rock revetment; navigation aides; and mitigation of lost aquatic habitat.

Channel construction would entail clamshell dredging of approximately 60,000 cubic yards (c.y.) of fine sand (encompassing about 5 acres), with open-water disposal at the approved Washington Department of Natural Resources (DNR) disposal site within Bellingham Bay. Maintenance dredging would be expected to occur at year 5 following project construction and every 3 years thereafter. Approximately 10,000 c.y. of material would be dredged during each

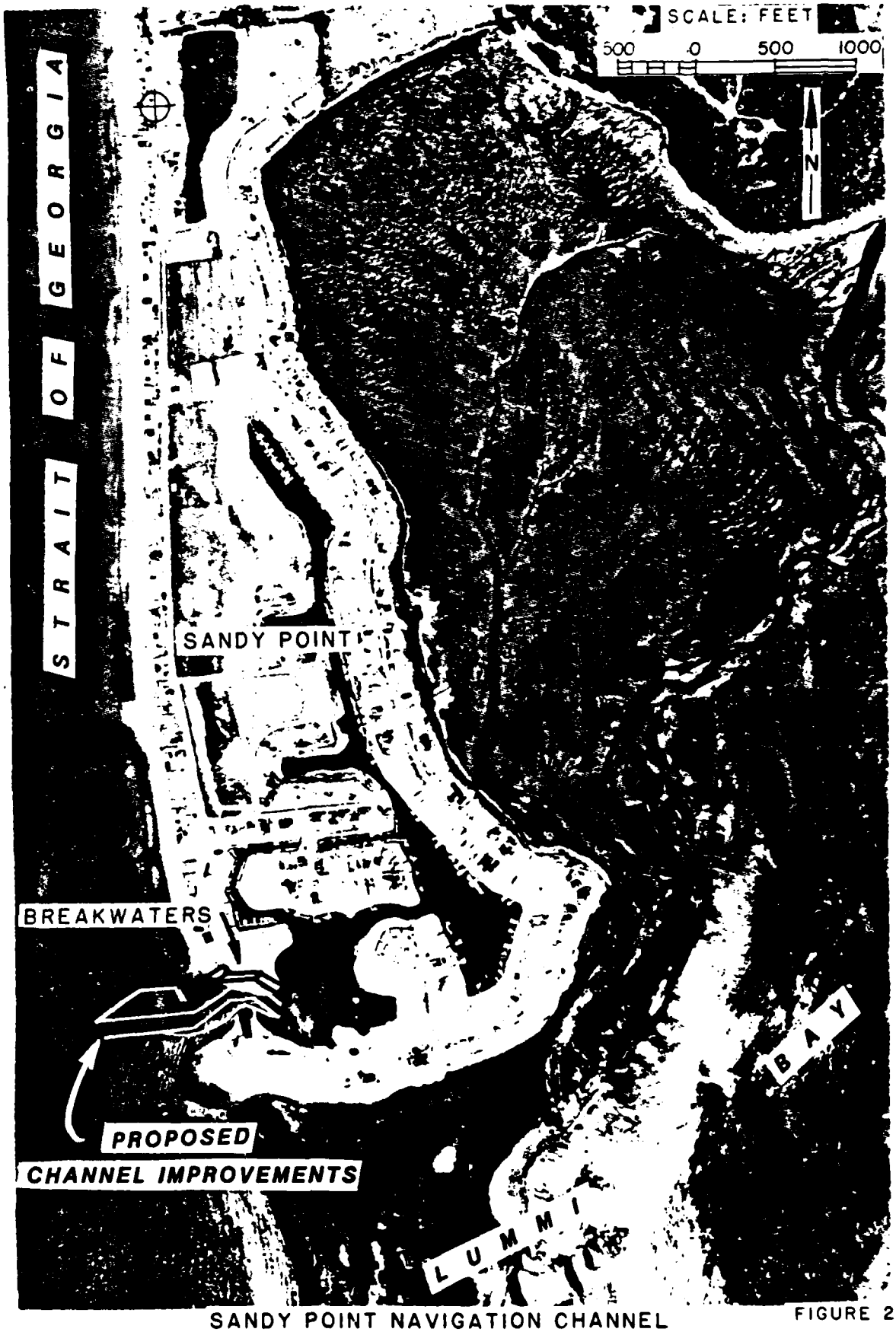
Encl 1



VICINITY MAP

SANDY POINT NAVIGATION CHANNEL
B2-27

FIGURE 1



SANDY POINT NAVIGATION CHANNEL

FIGURE 2

maintenance cycle and disposed of in Bellingham Bay. In its economic analysis, the Seattle District determined that, following project completion, the stimulus to purchase the remaining unsold lots would be no greater than it is currently. Therefore, the project cannot be said to spur development of the Sandy Point residential area.

3. Methods Used in Preparation of BA. An intensive 3-month study of peregrine falcon use of Lummi Bay and vicinity (including Sandy Point) was conducted between 2 October and 31 December 1983 by Mr. Clifford Anderson under contract to the Seattle District, Corps of Engineers. His final report is attached as Appendix A. Prior to this study, no other study of peregrine falcons had ever been conducted at or near Lummi Bay. Accordingly, Mr. Anderson's report is the primary source of local (i.e., site specific) information (for both peregrine falcon and bald eagle) utilized in this BA. Individuals knowledgeable about peregrine falcon and bald eagle use of the project area were contacted and interviewed. Available literature on the peregrine falcon and bald eagle was reviewed, and pertinent information was used in ths assessment. All persons contacted and literature reviewed are listed at the end of this BA.

4. Impacts of the Proposed Project on the Peregrine Falcon and Bald Eagle.

a. Description of the Environment. Sandy Point is a low-lying peninsula jutting southward into Lummi Bay, protecting the north part of the bay from storms. The peninsula was developed with a system of waterways and residential lots in the past 20 years, curtailing use by wildlife. Prior to development, Sandy Point was well known to ornithologists as a good wintering habitat for birds of prey such as northern harriers, rough-legged hawks, gyrfalcons, snowy owls, and short-eared owls. These birds are only occasionally seen there now. Sandy Point is not important for waterfowl or shorebirds, though the protected interior waters do provide a safe harbor during storms for small numbers of waterfowl and marine birds.

Lummi Bay consists of an extensive area of intertidal flats and a small amount of shallow subtidal habitat. The outer bay, which has extensive eelgrass beds, provides habitat for a wide variety of marine animals which support juvenile and, possibly, adult Dungeness crabs. Some of the eelgrass provides spawning habitat for Pacific herring which comprise a fishery and are an important food base for salmon and other fish. Lummi Bay has moderate to high value for all species of waterfowl that utilize the bay, especially in winter and spring (Wahl, et al., 1981). Lummi Bay is considered to be especially important for black brant during their spring migration, at which time the bay supports 6 percent of the brant population in northern Washington waters (Wahl, et al., 1981). Lummi Bay is also considered to be "very important" to wintering birds, particularly diving and surface feeding ducks, gulls, and shorebirds (Wahl, et al., 1981). The sea pond was created about 10 years ago as an aquaculture facility for raising oysters and pan-sized salmon. It was formed by the construction of a dike on intertidal flats and encompasses about 760 acres. Water exchange between the sea pond and Lummi Bay is relatively restricted despite tide gates that connect the two water bodies at several

locations along the dike. The restriction in water exchange and the shallow depth of the sea pond have resulted in high summer water temperatures in the sea pond which limit salmon rearing. Despite this limited use of the sea pond for raising salmon, it appears this diked-off area may also have produced unexpected benefits to waterfowl. Rafts of several thousand ducks are now regularly observed in the sea pond during the fall and winter (Anderson, et al., 1984). The dike surrounding the sea pond appears to provide a wind break, thus making the sea pond a calm area of refuge during storms. The dike also serves the same function for the northern portion of Lummi Bay, making it calmer during storms originating from the southwest than it was prior to constructon of the dike. The sea pond is not only important to waterfowl during storms but also at other times as a place to feed and rest (Anderson, et al., 1984).

b. Peregrine Falcon Use of the Project Area. The Lummi Bay area appears to be a major fall and winter habitat for peregrine falcons. As many as six peregrines were seen in one day during Anderson's study. A minimum of 15 individual peregrines were sighted during the course of his 3-month study. Of these 15 birds, at least three were believed to have established fall residency in the Lummi Bay area based on multiple sightings of these three birds. These are surprisingly large numbers of falcons for an area as small as Lummi Bay and the surrounding lands. In fact, the area is believed to support the highest density of wintering raptors in western Washington (Anderson, et al., 1984).

Probably the primary reason the vicinity of Lummi Bay is so attractive to raptors, and peregrine falcons in particular, is the juxtaposition of varied habitats within a relatively small area isolated from similar favorable habitats. The key features are a sheltered saltwater bay and tideflat attractive to large numbers of waterfowl and shorebirds; flat, treeless agricultural fields; and exposed perches for hunting and feeding. The presence of a consistently large, available prey base (i.e., waterfowl and shorebirds) is probably the strongest factor that attracts the peregrines to Lummi Bay. Wahl, et al. (1981), established that 10,000 to 20,000 ducks use Lummi Bay every winter. In addition, Anderson found approximately 8,000 dunlin inhabiting Lummi Bay in November and December. Waterfowl and shorebirds constitute the primary source of prey for peregrines migrating and wintering in western Washington (Anderson and DeBruyn, 1979). Also, out of 122 hunting flights of peregrines observed by Anderson, et al. (1984), 102 of the prey pursued by the falcons were waterfowl or shorebirds. Anderson, et al. (1984), observed 42 peregrine kills, of which 34 were either waterfowl or shorebirds, consisting of green-winged teal (31 percent of all kills), mallard, greater scaup, lesser scaup (unidentified ducks, 29 percent of kills), dunlin (12 percent of all kills), and American golden plover. The other prey items were one each of pied-billed grebe, horned grebe, ring-billed gull, red-winged blackbird, and four unidentified birds. Based on these observations, the peregrine appears to have a preference for small ducks and other small birds in Lummi Bay. This is consistent with the fact that peregrines at this bay carry their kills relatively large distances to find suitable perches on which to feed.

Most hunts by peregrine falcons (115 out of 153) occurred over Lummi Bay (104) or the sea pond (11) (Anderson, et al., 1984). The rest were over the agricultural lands of Lummi Flats (the flat, low lying lands immediately northeast of Lummi Bay). Probably this simply reflects that the prey animals are most commonly in Lummi Bay, though they (i.e., waterfowl) often feed on the uplands as well. An important finding of Anderson relating to the proposed Lummi Bay Marina project was that several thousand ducks were observed to frequently utilize the sea pond between October and December and represent a source of prey for peregrine falcons (Anderson, et al., 1984). The dike surrounding the sea pond apparently provides a barrier to winds and maintains relatively quiet water within the sea pond, thereby attracting waterfowl, particularly during stormy periods. Waterfowl also feed in the sea pond, but it is not certain to what extent. In addition, the sea pond is utilized by waterfowl during low tides when much of Lummi Bay is dewatered but the sea pond still has water. Anderson found that the dike surrounding the sea pond is important to peregrines as a feeding area; i.e., an area to which the falcons bring their fresh kills to eat. The dike is exposed, which is important as it allows the peregrines to keep an eye out for other raptors intent on obtaining an easy meal from the falcons. This is also important since it takes from 25 to 47 minutes to eat a duck, which gives another raptor ample time to attack and take the falcon's prey if it so chooses. This behavior (known as kleptoparasitism) is relatively common in areas with high densities of raptors. Generally, peregrines eat only one meal a day, and the process of capturing the prey can take a significant amount of energy. If the kill is taken from the falcon, then it must try again. Should this be a persistent problem, the peregrine would likely leave the area rather than using excessive energy trying to kill and eat a meal. Use of the western sea pond dike (far out into Lummi Bay) is an advantage to peregrines in that few other raptor species will venture that far out over water in search of prey. The portion of the dike most often used by peregrines is the northwestern corner in the vicinity of the proposed location of the access channel to the marina. Peregrines also use a group of pilings just off the southern tip of Sandy Point for feeding, as well as logs on mudflats, other pilings, the ground, and various other exposed perches with high visibility, though only some of all available perches are utilized. Anderson, et al. (1984), found that peregrines carried their prey to preferred perches (rather than eating their prey close to the kill site) far more frequently than had been observed in studies in other areas. Anderson deduced that this was primarily because the high density of raptors puts extreme pressure on any raptor that has successfully captured prey (e.g., because of kleptoparasitism) and also because suitable feeding perches are apparently scarce in Lummi Bay (only some of the available perch sites are known to be utilized), suggesting that the unutilized perches may not be suitable. Thus, feeding perches take on a special importance in Lummi Bay since only a few perches play a very important role in daily behavior of peregrines.

The group of pilings just to the south of the tip of Sandy Point provides an important perch of at least one peregrine falcon (Anderson, 1984). In fact, this perch was found to be the primary feeding perch for the dominant falcon

in Lummi Bay during the fall of 1983 (Anderson, 1984). Presently there are no structures located near the pilings and little human use exists in that portion of Sandy Point.

Perches from which to hunt are also important. It is advantageous for peregrines if such perches are high above the ground, with good visibility of the flocks of waterfowl and shorebirds and minimal disturbance from humans. Such perches are most ideally provided in the Lummi Bay vicinity by Douglas fir (Pseudotsuga menziesii) trees on the ridge at the north end of the bay, named "Peregrine Point" by Anderson (Anderson, et al., 1984). Other perches utilized by peregrines for hunting and perching include logs on mudflats and beaches, pilings, deciduous trees, and plowed or recently harvested agricultural lands (on the ground). Again, not all available perches are utilized.

The final component important to peregrines that spend the fall and winter in an area such as Lummi Bay is the availability of an overnight roost. A roost identified by Anderson, et al. (1984), utilized by peregrines feeding at Lummi Bay was on Orcas Island, approximately 11 miles southwest of Lummi Bay. This roost was used repeatedly by at least one peregrine, possibly several others (Anderson, et al., 1984). The roost is important as a sheltered place to rest and sleep at night, and also frequently serves as a convenient place to rest during the day (peregrines often spend several hours of daylight at the night roost).

Spring and summer use of the Lummi Bay vicinity by peregrine falcons has not been investigated. However, one active eyrie (cliff nest) is located within 10 miles of Lummi Bay. This nest has been observed for the past 3 years (1981-1983) and has fledged young 2 of the 3 years. Little is known of the activities of this pair of falcons. It is believed they use Lummi Bay only sparingly for foraging, though they potentially disperse there in late summer during the shorebird migration (Anderson, et al., 1984). Recent observations by Anderson (Spring 1984) verify that this pair ventures near Lummi Bay only rarely. They feed primarily on terrestrial birds such as band-tailed pigeons, rock doves, and passerines.

A spring migration of peregrine falcons has recently been documented for the Cape Flattery vicinity (Anderson, et al., 1983). Because northern Puget Sound has high shorebird numbers in spring and because peregrines winter in relatively large numbers in northern Puget Sound, Anderson believes there is likely a spring migration of peregrine falcons through Lummi Bay. This has not been studied however.

c. Bald Eagle Use of the Project Area. Bald eagles, though frequently observed by Anderson, et al., in and around Lummi Bay, were not reported by them from Sandy Point during their study in fall in 1983 (Anderson, et al., 1984). The closest nests are about 10 miles away, one near Cherry Point, the other along the Nooksack River near Ferndale. Bald eagles utilize the Lummi Bay region throughout the year, feeding primarily on waterfowl, but it appears from the lack of recent observations that Sandy Point is not an important habitat for them.

d. Impacts of the Proposed Project on Peregrine Falcons. Because of the disturbed nature of the Sandy Point environment, its lack of suitable perching trees, and lack of a consistently large prey base, the project area is not utilized by peregrine falcons, with one exception. The group of pilings south of Sandy Point was an important feeding perch for the dominant peregrine falcon in the Lummi Bay area during the fall of 1983 (Anderson, et al., 1984). Anderson found that he could approach the pilings in a vehicle only to within about 150 yards, at which point the peregrine, if perching there, would leave. Whenever other humans approached the perch near Sandy Point, the peregrine (if present) took flight (Anderson, 1984). Thus, a concern was that the Sandy Point project might spur development of the area near the perch and perhaps preclude use of the perch by the peregrine. However, as stated in paragraph 2b of this assessment, the proposed project is not expected to spur or accelerate development at Sandy Point. Therefore, it cannot be said that dredging of the Sandy Point waterways would impact peregrine falcons by spurring additional development. Because development is not expected to increase to a higher pace than currently exists, the dredging project is also not expected to increase boat traffic in and around Sandy Point. The addition of a public boat ramp is also not expected to result in a significant increase in boats in the area. Therefore, impacts to peregrines from boats are not expected.

It appears the only possible impact to peregrines from the proposed dredging project would be from construction noise and human activity. The noise of an operating clamshell dredge within 1,000 feet of the feeding perch may be disturbing to the peregrine. Construction of the breakwaters could also be quite noisy. The south breakwater could require movement of trucks along the southern tip of Sandy Point, close to the peregrine perch. Human activity may increase around the dredging operation, and perhaps near the feeding perch as well. Such activity may disturb a feeding peregrine from its perch. Since the perch is used primarily between September and March, it would be desirable to limit dredging and breakwater construction activities to between April 1 and September 1 to minimize the possibility of direct impacts to peregrines using the perch. The construction schedule has been established between December 1 and March 15 to avoid adverse fisheries impacts. However, through careful monitoring during construction by a qualified biologist, adverse effects can be avoided through modification of construction activities.

Disposal of dredged material would occur in Bellingham Bay at the designated DNR deep-water disposal site. This activity is not expected to impact peregrine falcons in any way. There are no known night roosts in the near vicinity of Lummi Bay and Sandy Point. In fact, trees that may provide for such roosts would not be affected by the proposed project; thus, it is predicted that the dredging and disposal would not impact any night roosts of peregrine falcons.

e. Impacts of the Proposed Project on Bald Eagles. Because bald eagles are not known to depend on any portion of Sandy Point for survival or daily activity, the proposed dredging project is not expected to impact bald eagles. As described for peregrine falcons (paragraph 4d) boat use is not expected to increase, and therefore, no impact to bald eagles are expected. Disposal operations will not impact bald eagles in any way.

f. Cumulative Impacts. BA's were prepared addressing impacts to peregrine falcons and bald eagles from the proposed Lummi Bay marina project. It was concluded that bald eagles would not be impacted by the marina. On the other hand, construction and use of the marina would impact peregrine falcons. The impacts would be primarily from loss of feeding and hunting perches, from human disturbance, and depletion of prey base. Because the Sandy Point project may result in a disturbance of a primary feeding perch, the combined effects of the two projects may appear to be worrisome. However, impacts to the Sandy Point feeding perch can be avoided by careful timing of the project, and thus no cumulative impacts would result.

5. Conclusions. The proposed Sandy Point dredging project could cause a direct disturbance to a primary peregrine falcon feeding perch through noise and human activity. This impact can be avoided by having a qualified observer identify if and when construction activities affect peregrines. The construction activity would be modified should they be found to affect peregrines. The proposed project would not impact bald eagles.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Endangered Species
2625 Parkmont Lane SW, B-2
Olympia, Washington 98502

August 15, 1984

Mr. George W. Ploudre, P.E.
Assistant Chief, Engineering Division
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124
ATTN: Planning Branch

Refer to: 1-3-84-I-448

Dear Mr. Ploudre:

This is in response to your letter of July 13, 1984 (received July 17, 1984) which contained your biological assessment for the Sandy Point Public Navigation Channel, Whatcom County, Washington. Your assessment addressed potential impacts of the project on the endangered American peregrine falcon (Falco peregrinus anatum) and threatened bald eagle (Haliaeetus leucocephalus). Your assessment and this response were prepared under the auspices of Section 7 of the Endangered Species Act of 1973, as amended (ESA).

We concur with your finding of no effect to the bald eagle.

We concur with your finding of no effect to the peregrine falcon providing that certain protective measures are implemented. As stated in your assessment, construction during winter months may affect falcons. Your present construction schedule is slated to occur from December 1 through March 15. This schedule was established to protect fishery resources. However, your agency (as stated in the assessment) intends to assign a qualified biologist to monitor the construction and modify construction activities should adverse effects be detected. Our concurrence is based on this project element.

In addition, we would request that a schedule of observation periods be developed for review by this Service. Furthermore, it should be understood that construction activities should halt immediately and consultation be initiated should adverse effects be observed. This would be necessary to assure compliance with Section 7(d) of the ESA. If these measures cannot be implemented, you should consider entering into formal consultation prior to construction.

We appreciate the effort and concern put forth by your agency on this project and look forward to our future coordination in meeting our joint responsibilities to the ESA.

Sincerely,

Jim A. Bottorff
Project Leader

cc: RO (AFA-SE
ES, Olympia
WDG (Nongame: Dobler)
WDG, Bothell (Leschner)

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-NC

Circa 10 Jan 1983

Dear Interested Party:

We have initiated a detailed project report (DPR) study to identify the feasibility of Federal involvement in dredging a new navigation channel and construction of adjacent jetties to alleviate a shoaling problem within the entrance to Sandy Point Harbor, Whatcom County, Washington. A conceptual project layout is attached as inclosure 1. The DPR study is being conducted under congressional authority of Section 107 of the 1960 River and Harbors Act, as amended, and at the request of the study local sponsor - Whatcom County, Washington. Project details are contained in our June 1982 reconnaissance report, attached as inclosure 2.

We would appreciate your participation in the planning process, including identification of your agency's preliminary environmental, economic, and/or engineering concerns. As we initiate the data collection phase of the DPR study, we will seek to evaluate applicable alternatives leading to identification of a preliminary project design and cost estimate, economic benefits, and environmental impacts by early March 1983.

We would appreciate a response indicating: (1) the extent of your participation in the study; (2) initial planning concerns which you feel should be addressed; and (3) identification of your staff contact person. Please note that we have made a preliminary determination that a Federal environmental impact statement will not be required for this project. Anticipating your interest in active study involvement, we will notify you of an onsite interagency site inspection scheduled for the earliest low tide day in mid-February 1983.

The following U.S. Army Corps of Engineers staff have been assigned to this DPR study:

NPSEN-PL-NC
Interested Party

Study Manager

Andy Maser, Water Resources Planner
Navigation and Coastal Planning Section
Seattle District, Corps of Engineers
4735 East Marginal Way South
Seattle, Washington 98134

Telephone: (206) 764-3651
FTS 399-3651

Environmental Coordinator

Peggy Watt, Biologist
Environmental Resources Section
Seattle District, Corps of Engineers
4735 East Marginal Way South
Seattle, Washington 98134

Telephone: (206) 764-3624
FTS 399-3646

Your response to this letter is requested by 20 January 1983 so that sufficient study time will be available for addressing all significant items. We look forward to working with you on this study.

Sincerely,

NORMAN C. HINTZ
Colonel, Corps of Engineers
District Engineer

2 Incl
As stated

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, THIRD FLOOR
PORTLAND, OREGON 97232
(503) 230-5400

January 20, 1983 F/NWR5:JRB

Colonel Norman C. Hintz
District Engineer, Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

Thank you for providing us an opportunity to participate in the planning process for the Sandy Point Harbor Federal project.

The site is located in an area that supports valuable commercial fisheries, namely crab, salmon, and herring. We believe the project must be designed with full consideration of these resources. Any disruption of the aquatic habitat, either permanent or temporary, that supports these fisheries must be minimized.

Although our participation may often be restricted by travel constraints, we look forward to working with you to identify an environmentally acceptable project. I have assigned Jim Bybee of my staff to the task.

Sincerely yours,

Dale R. Evans
Division Chief

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
2625 Parkmont Lane, S.W., Bldg. B-3
Olympia, Washington 98502

January 26, 1983

Colonel Norman C. Hintz
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Re: Sandy Point Navigation Project

Dear Colonel Hintz:

In your recent letter, you requested preliminary information from this office regarding the above-referenced project. We expect to be very involved with your staff during project planning and have assigned David Stout as primary contact person.

We have the following comments regarding environmental issues to be addressed:

1. Sandy Point is located in an area of concentrated herring spawning. We are very concerned about the effect of the proposed jetties on longshore drift and the potential impact on adjacent herring spawning habitat.

2. We are concerned about the potential impact of the jetties on migrating salmonids. The jetties may force juvenile salmonids to deeper water where they are more susceptible to predation.

3. The potential impact of the project on endangered species will need to be addressed.

4. Alternative jetty designs need to be evaluated to determine the least-impacting method of maintaining the channel.

5. We are very concerned about the long-term adequacy of the proposed sand bypass system.

We plan on meeting with your staff members in the near future to discuss this project, and are planning to attend the site visit on February 22.

Thank you for the opportunity to provide early comments on this project.

Sincerely,

Charles A. Dunn

Charles A. Dunn
Field Supervisor

United States Department of the Interior

NATIONAL PARK SERVICE

Pacific Northwest Region
Westin Building, Room 1920
2001 Sixth Avenue
Seattle, Washington 98121

IN REPLY REFER TO:

1202-03(PNR-RE)

January 17, 1983

Colonel Norman C. Hintz
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Hintz:

We have received your letter inviting our participation in the preparation of a detailed project report involving dredgeing and construction of jetties at Sandy Point Harbor, Whatcom County, Washington.

We concur with the need for and desirability of such a study. Unfortunately we are not able to take a participatory role in the study, because of budget and manpower limitations.

This agency's concerns are primarily cultural and recreational with regard to construction activities. Identification and protection of cultural and historic resources, and protection of existing recreation resources and opportunities, will be areas of the project report on which we will be happy to comment at the appropriate time.

Thank you for the invitation to participate in this study.

Sincerely,

Richard L Winters

Richard L. Winters
Associate Regional Director
Recreation Resources and
Professional Services

U.S. ENVI ONMENTAL PROTECTION . ENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 423

JAN 25 1983

Norman C. Hintz
Colonel, Corps of Engineers
District Engineer
P. O. Box C-3755
Seattle, Washington 98124

RE: Navigation Channel, Sandy Point Harbor

Dear Colonel Hintz:

We have reviewed the preliminary section 107 Reconnaissance Report for the Sandy Point Harbor Navigation Channel and have no comment to provide at this time.

We intend to participate in scoping meetings and field investigations of the project site.

For further coordination, please contact Carl Kassebaum at (206) 442-1447.

Sincerely,

Robert S. Burd
Director, Water Division

Whatcom County

DEPARTMENT OF PUBLIC WORKS
Paul F. Rushing, Director
Edwin R. Henken, Assistant Director

BUREAU of BUILDINGS and CODE ADMINISTRATION
Donovan F. Kehrer, Deputy Administrator
401 Grand Avenue, Bellingham, Washington 98225
City: 676-6907 County: 398-1310

January 20, 1983

Andy Maser, Water Resource Planner
Navigation and Coastal Planning Section
Seattle District, Corps of Engineers
4735 East Marginal Way South
Seattle, WA 98134

Re: Sandy Point Harbor, Whatcom County, Washington

Dear Mr. Maser,

In response to the letter from Colonel Hintz, which we received on January 4, 1983, we have the following comments:

1. It is the intention of Whatcom County to fully cooperate with the Corps of Engineers in your feasibility study for the improvement of the entrance to Sandy Point Marina. We have witnessed increasing evidence of the shoaling of the existing marina entrance and the associated starvation of the adjacent shoreline to the south. The starvation of beach materials at the south end of Sandy Point is a serious concern, and verifies that the marina entrance has interrupted the net littoral drift south that created and maintains Sandy Point. Shoaling of the marina entrance is a result of interferring with the transport of materials along the natural beach that previously existed. There is no profit in pointing out at this time that it may have been a poor location for a marina entrance; it does exist now and shoaling will continue to the detriment of safe navigation if corrective steps you have generally outlined in your preliminary plan are not taken.

2. If the marina entrance is to continue to exist in its present location, two high-priority elements of the corrective plan stand out. (1) Improve the navigation channel with sufficient depth and aids to navigation to ensure safe passage during normal operations and as a safe refuge for transient boats during storms, and (2) develop a beach material bypass plan that will ensure long-term continued nourishment of the beach to the south of the marina entrance.

In regard to the first element, we suggest your consideration of placing range markers on land beyond the marina entrance to aid in alignment with the dredged channel. In conditions of good weather and normal tides, visual reference with the rock jetties proposed is probably sufficient for safe passage in or out of the marina, but considering that approximately half the length of the channel extends seaward beyong the rock jetties, alignment aids would greatly reduce the hazard of running aground during conditions of severe north or south winds - particularly when a storm is combined with extremely low tides.

Regarding the second element, we are pleased to see that your plan includes a sand bypass system. However, we are concerned that an arbitrary schedule of ten years between channel maintenance dredgings and placement of sands on either side of the jetties may not be adequate to prevent future deterioration of the south cape. In fact, placing sand behind the north jetty may not be necessary at all if beach material naturally accumulates there as a result of net littoral drift to the south. We suggest that your feasibility study examine the question of net drift in order to anticipate accumulation of beach materials at the outside corners of the jetties and shoreline. With this information, it should be possible to formulate a plan of beach nourishment in response to the needs of the beach, rather than simply as a convenient place to dump the spoils of maintenance dredging. It is quite possible that the beach to the south will require all of the material dredged and at more frequent intervals than 10 years to maintain a more continuous bypass of materials. At this point, we would suggest that there be a maximum of five years between inspections of the adjacent beaches resulting in a bypass transfer of materials as the need dictates, even if it means transferring materials from the base of one jetty to the other regardless of the maintenance dredging schedule. The obious beach starvation south of the marina entrance at this time is a result of approximately 20 years of interrupted littoral drift, and we would like not only to halt the erosion, but to ensure that it does not repeat in cycles.

We might also add at this time that after an initial look at the proposal, County permits involved will include a Shoreline Substantial Development Permit and a Shoreline Conditional Use Permit. It is assumed that the SEPA process necessarily accompanying these permits will be the responsibility of Whatcom County. This will require that a SEPA Checklist be submitted with the applications for Shoreline Permits. The SEPA process is independent of the NEPA process, and your anticipation of not preparing an EIS for Federal permit purposes does not necessarily set a precedent for the threshold determination required under our SEPA Ordinance.

We thank you for the opportunity to participate in your DPR study and we look forward to the site inspection scheduled for mid-February. If we receive early enough notification of the exact date and time, we will give priority to that meeting. The contact person for Whatcom County will be myself; you may reach me at 676-6907.

Sincerely,

Jerry Mixon
Deputy SEPA Official for
Whatcom County

cc: John Louws, County Executive
Paul Rushing, Director of Public Works
Ann Wessel, Shoreline Technician

LUMMI INDIAN BUSINESS COUNCIL

2616 KWINA RD. • BELLINGHAM, WASHINGTON 98226-9298 • (206) 734-8180

DEPARTMENT: Fisheries & Natural Resources EXT. 237

January 19, 1982

Andy Maser, Water Resources Planner
Peggy Watt, Biologist
Seattle District, Army Corps of Engineers
4735 E Marginal Way S
Seattle, WA 98134

RE: Proposed Construction at Sandy Point Harbor, Whatcom Co.

Lummi Fisheries appreciates the opportunity to discuss planning concerns about this proposed project. We would be glad to provide the Corps with any information that we have available, and to review work in progress.

Since the project design is so preliminary, our comments are necessarily general. Two questions arise about the proposed dredging. The first is the location of the dredge spoil disposal. Another is the effect of the jetty construction on the beaches of Sandy Point south of the marina entrance. Does the Corps plan to route material around the jettys, and if so, how would that be accomplished? What would be the effect on the erosion patterns of the Sandy Point beaches, and on the biological resources of the beach area?

We are also interested in a short study of the biological resources which would be eliminated by the jettty construction. Of particular concern, also, is the possible increase of predation pressure on migrating juvenile salmonids which frequent this shoreline.

A last concern about this proposed construction is if any archaeological desposits would be eliminated, and if so, if any salvage work could be done before construction. Archaeological survey work for the Lummi Sewer Project came very close to the proposed construction site, and is certainly available for consultation.

Please feel free to contact Jean Caldwell at the Fisheries Office should any questions arise.

Sincerely,

B2-46

Jewell P.W. James
Director, Fisheries

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
2625 Parkmont Lane SW, Bldg. B-3
Olympia, Washington 98502

June 16, 1983

Colonel Norman C. Hintz
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98134

Dear Colonel Hintz:

The following information is submitted to assist your planning activities for the Sandy Point Small Boat Harbor Study. This project would alleviate a shoaling problem within the entrance to Sandy Point Harbor by dredging a new navigation channel and constructing the jetties.

This information is based upon preliminary plans we have received to date and does not constitute our report as required under the Fish and Wildlife Coordination Act.

1. General Summary of Proposed Project

The proposed project consists of the following:

a. A navigation channel 100 feet wide by 900 feet long by -12 feet MLLW deep. This channel would be dredged by clamshell and the 15,000 cubic yards of material would be disposed of at a deep water disposal site. The sediments are very fine and are not suitable for beach disposal.

b. Two rock jetties approximately 500 feet long. Side slopes will be 2:1 and the top elevation will vary between +14 and +5 MLLW. Fish passage breaks will not be provided because they would reduce the desired effect of the jetties.

c. A public anchorage area. The dimensions of this area have not been determined yet, so acreage and volume calculations are not available.

d. A sand bypass system to counteract the jetties' effect of interrupting littoral drift along the shoreline. This system would involve the movement of 10,000 cubic yards of sandy material at 10-year intervals to prevent starvation of adjacent beaches.

e. Maintenance dredging is expected to remove approximately 10,000 cubic yards every 10 years.

2. Environmental Resources of the Project Area

a. Herring - Sandy Point is located in an area of concentrated herring spawning. Herring are an extremely important food fish for salmon and protection of their spawning habitat is extremely important. Herring generally spawn on submerged aquatic vegetation, especially eelgrass and sea lettuce. Although herring would not be expected to spawn in the existing channel, adjacent areas do support vegetation upon which herring may spawn. These areas may be impacted by dredging the widened channel, by the placement of the jetties, or by changes in bottom elevation which result from changes in longshore drift. The Service will investigate the areal extent of potential disturbance during an upcoming dive. To do a full evaluation, however, we need the Corps to furnish detailed maps showing existing bottom contours and predicted contours following construction, and depicting new longshore drift patterns.

b. Salmon - Sandy Point is located in an area of tremendous salmon production. The nearby Skagit and Nooksack River systems together contribute over 1,068,000 salmon to sport and commercial fisheries. Annual escapement for the two rivers is approximately 355,000 salmon. The Fraser River, in southern British Columbia, also contributes a tremendous number of salmon to the fishery. Many of the outmigrating juvenile salmon from these rivers pass through the Sandy Point area. Shallow water areas are particularly important to chinook, pink and chum salmon, because these areas provide migration corridors, rearing areas, and safety from predators.

The proposed jetties pose two significant problems for outmigrating juvenile salmon. First, the jetties are a barrier which may delay or inhibit migration. Second, the jetties may divert the fish to deeper water where they are more susceptible to predation by other fish or birds. The Washington Department of Fisheries (WDF) generally recommends that jetties be constructed with openings to eliminate these two problems. The Corps has determined that openings are not practical at Sandy Point due to the large amount of longshore drift.

c. Dungeness Crabs - Dungeness crabs are known to use the project area. Adjacent areas support sport and commercial crab fisheries. Although dredging by clamshell should not cause a serious problem, the widened channel may cause a loss of crab habitat. In addition, the jetties may overcover valuable crab habitat. The Service will further evaluate the existing crab habitat in an upcoming dive.

d. Threatened and Endangered Species - The Corps is currently preparing biological assessments of the potential effect of this project on peregrine falcons and bald eagles.

e. Waterfowl - Waterfowl use of the project area is poorly documented. Due to the exposed location, however, waterfowl use is expected to be low. Eelgrass, herring roe, crabs, clams and snails are all found in the project area and are important to waterfowl. Therefore, adverse impacts to these species should be minimized. The greatest impacts are expected to occur from the loss of habitat which will result from construction of the jetties and the changes in longshore drift which will result from the jetties. These impacts will be further evaluated during an upcoming dive.

3. Construction Timing

Dredging and jetty construction would probably be limited to the period from December 1 to March 14 to protect salmonids, herring, and crabs.

4. Other Concerns and Recommendations

a. According to local residents, the entrance channel has not been dredged for over 15 years; and, although there is some restriction at the mouth of the harbor, it is by no means blocked. We understand that existing depths are -3 or -4 feet MLLW, rather than -1 foot, as we had previously thought. Because the jetties may cause unacceptable impacts to salmon, herring and crabs, we recommend that the Corps seriously consider a project that eliminates the jetties and only plans for periodic maintenance dredging. This dredging could be by agitation, clamshell or hydraulic methods.

b. We request that the Corps furnish detailed maps showing existing elevations and post-construction elevations and the effect of the jetties on the project area. This information will help us evaluate project impacts on fish and wildlife resources.

We are very concerned with the long-term adequacy of the sand bypass system and the potential for increased erosion and/or accretion which will adversely affect fish and wildlife habitat. We request that the Corps do a detailed evaluation of post-construction longshore drift patterns adjacent to the project site.

Thank you for the opportunity to comment on this project. We look forward to further coordination with you in the future.

Sincerely,

Charles A. Dunn

Charles A. Dunn
Field Supervisor

cc: WDE
WDG
WDF
NMFS
EPA
BIA
Lummi Tribe

JOHN SPELLMAN
Governor

WILLIAM R. WILKERSON
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN) 234-6600

December 9, 1983

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

Attention Mr. Carl Menconi

Gentlemen:

Attached are the alternative designs for the Sandy Point Navigation Project proposal that you made available to this department. These drawings illustrated the various jetty and navigation channel designs that are being considered.

Department biologists have marked on these drawings the locations where we have documented Pacific herring spawning activities. These drawings are being sent to you because of your request for this information.

Please note that this letter is not intended to evaluate the project-related impacts to the fisheries resources under our jurisdiction. Upon completing our review of the U.S. Fish and Wildlife Coordination Act report, we will provide you with comments regarding the fisheries impacts of this navigation project.

Should you have any questions, please contact Curtis Dahlgren at (206) 753-2908.

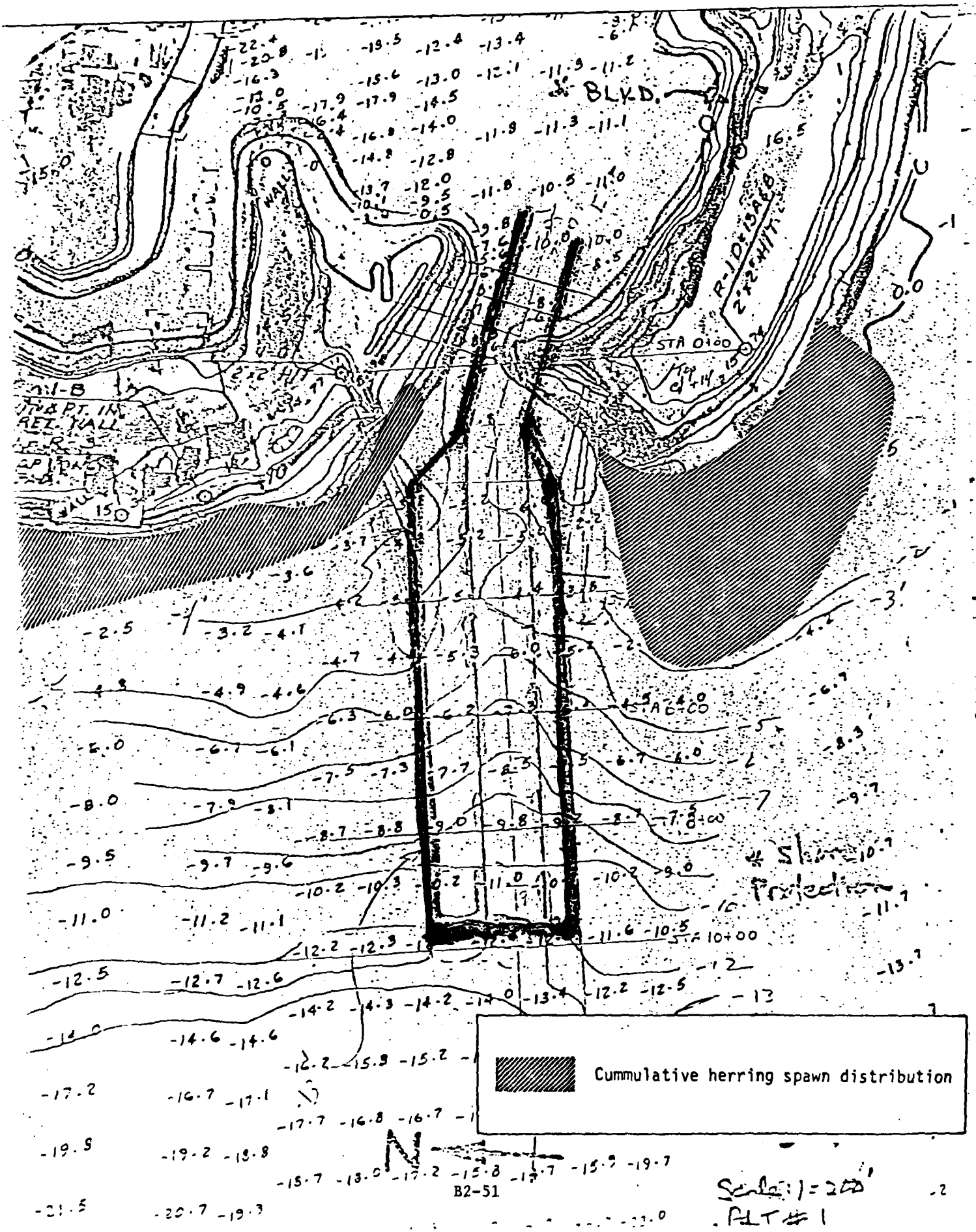
Sincerely,

Earl L. Finn /for

William R. Wilkerson,
Director

WRW:CD:sp

Attachment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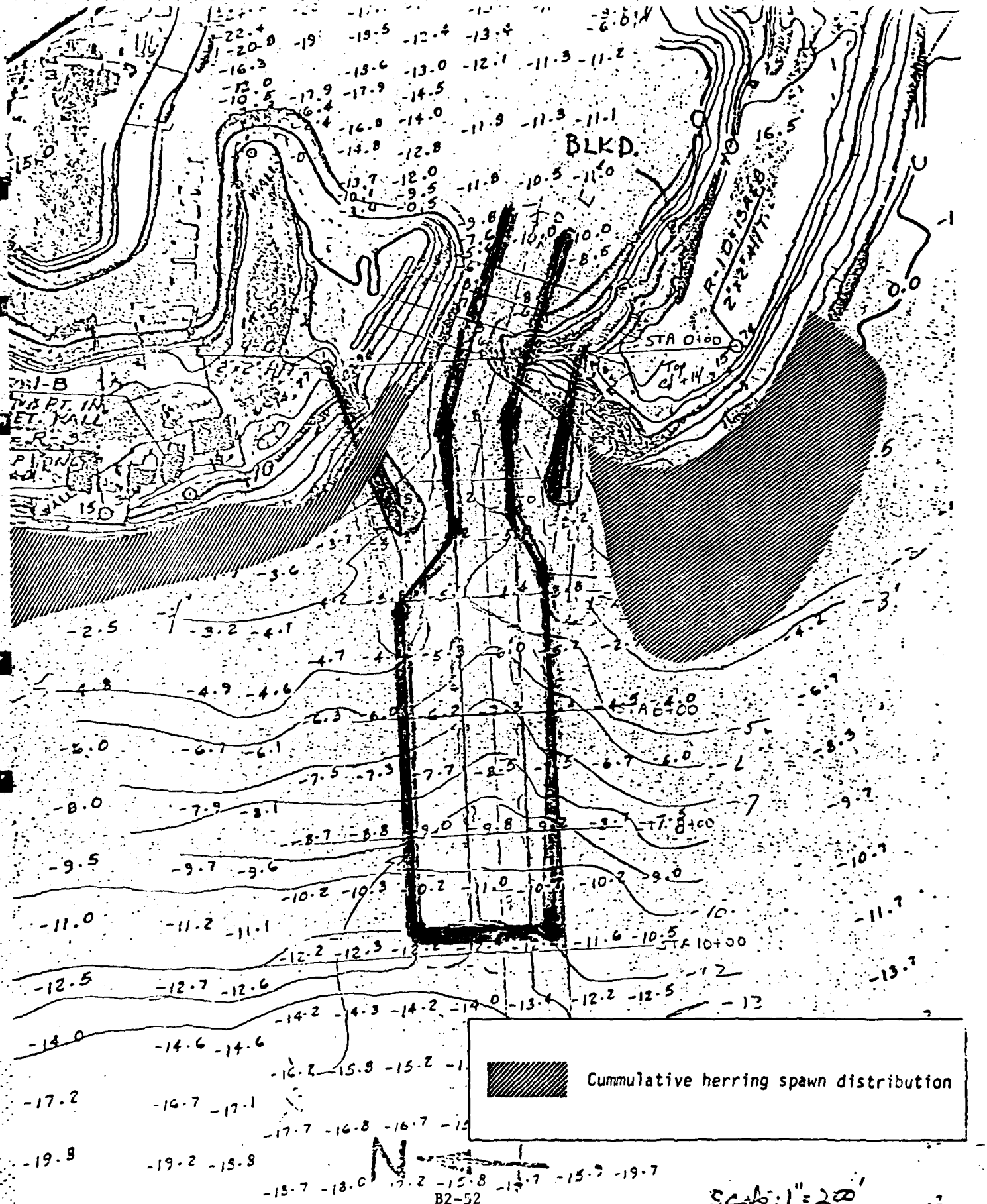
PLT # 1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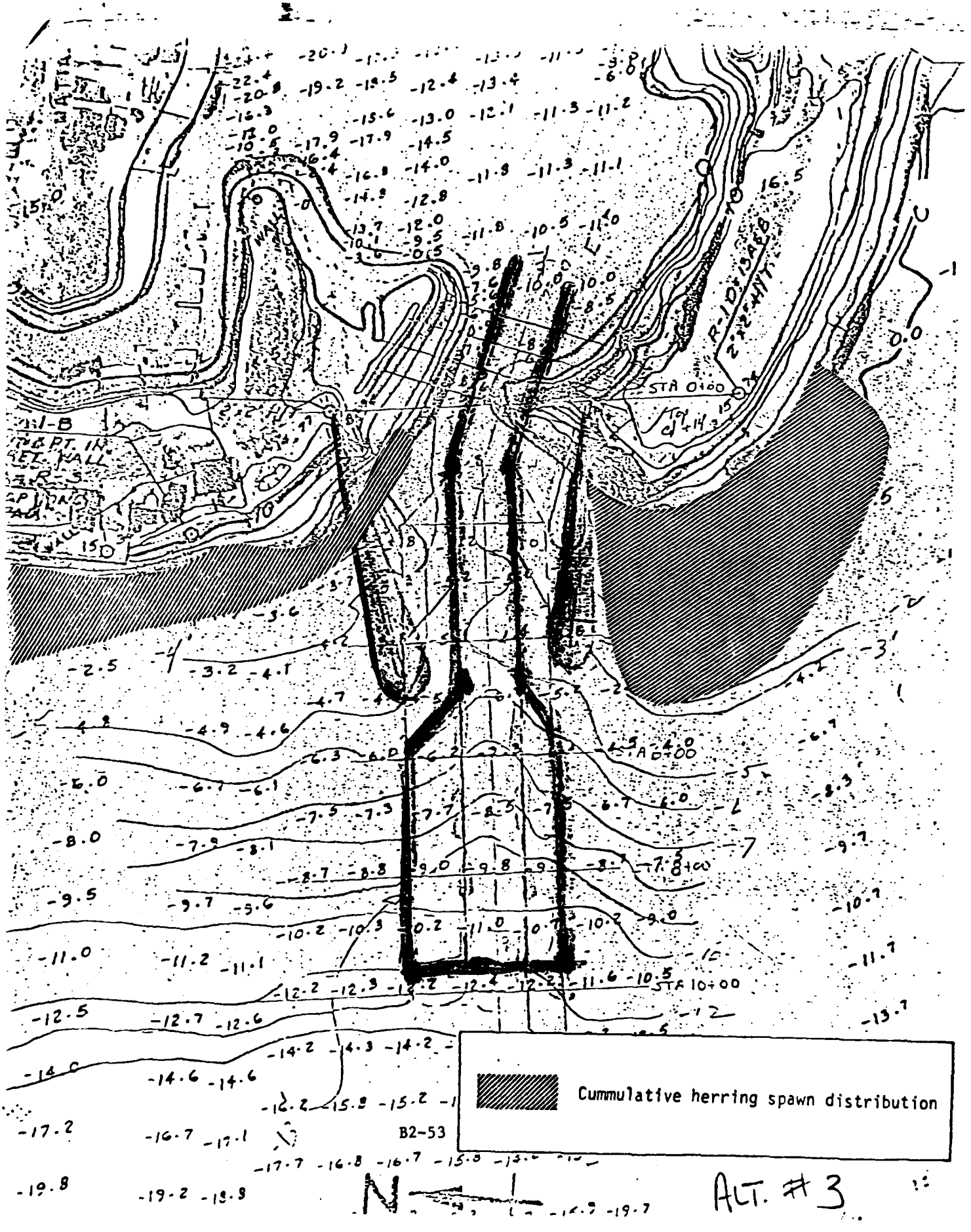
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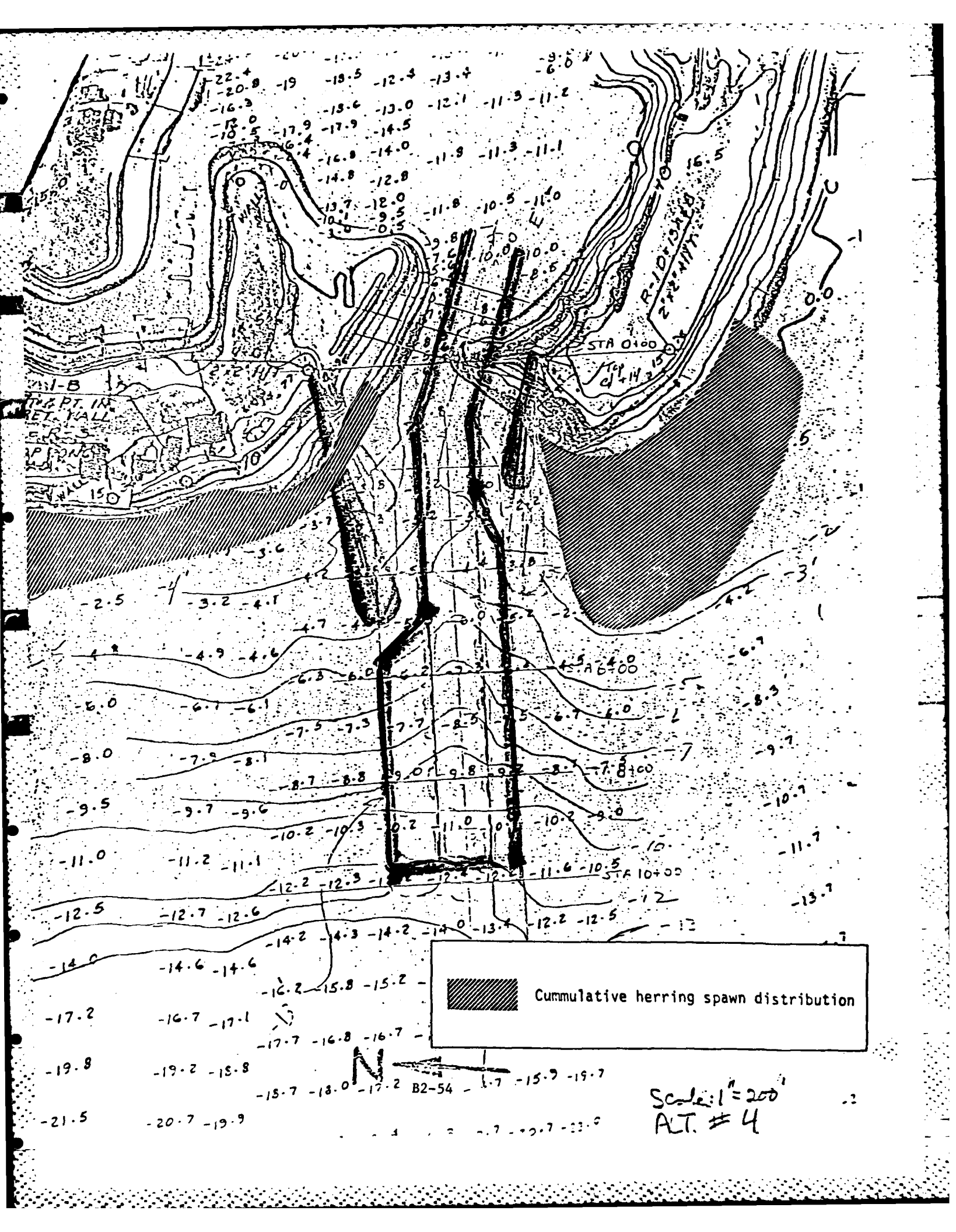
Cummulative herring spawn distribution
B2-53
ALT. #3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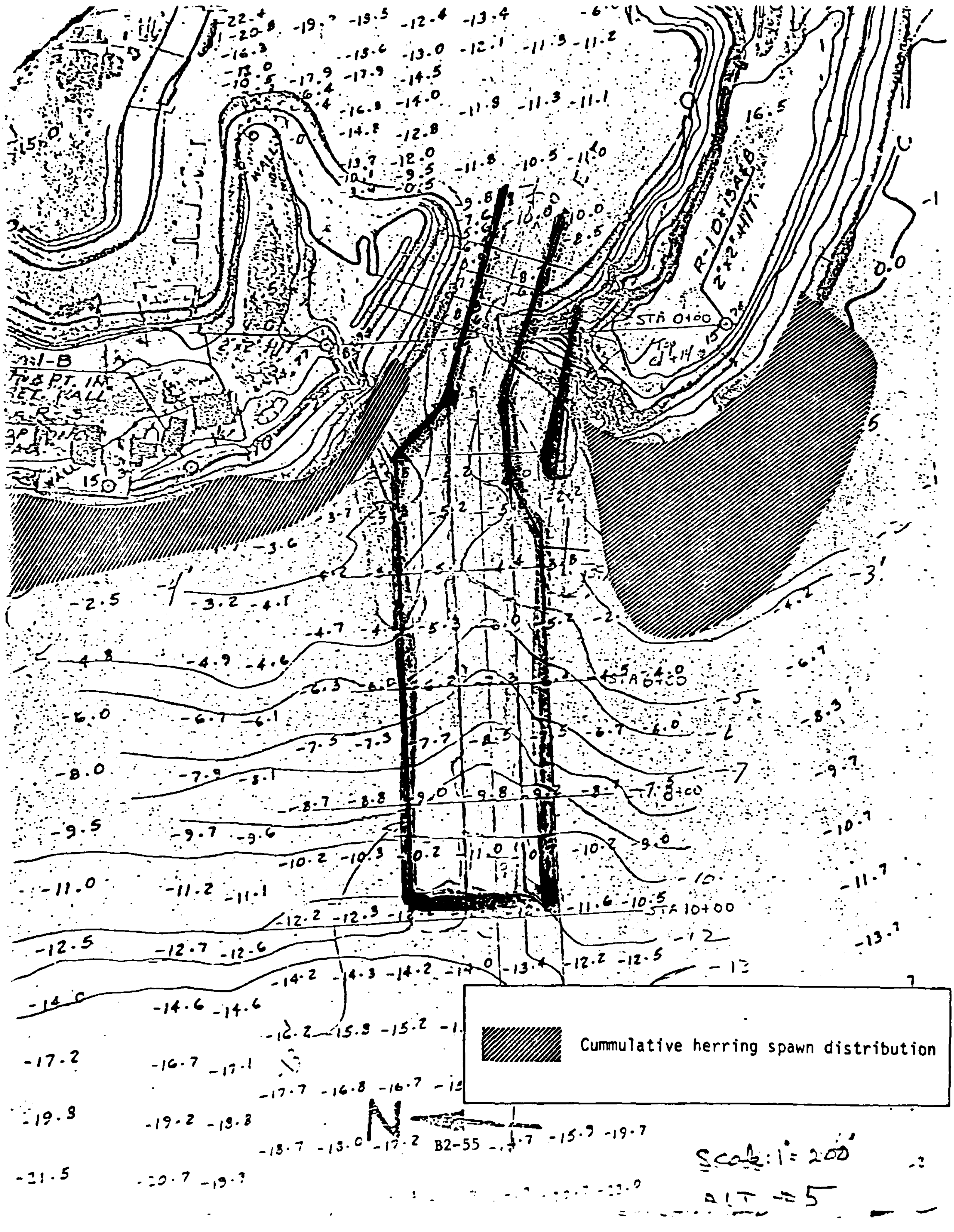
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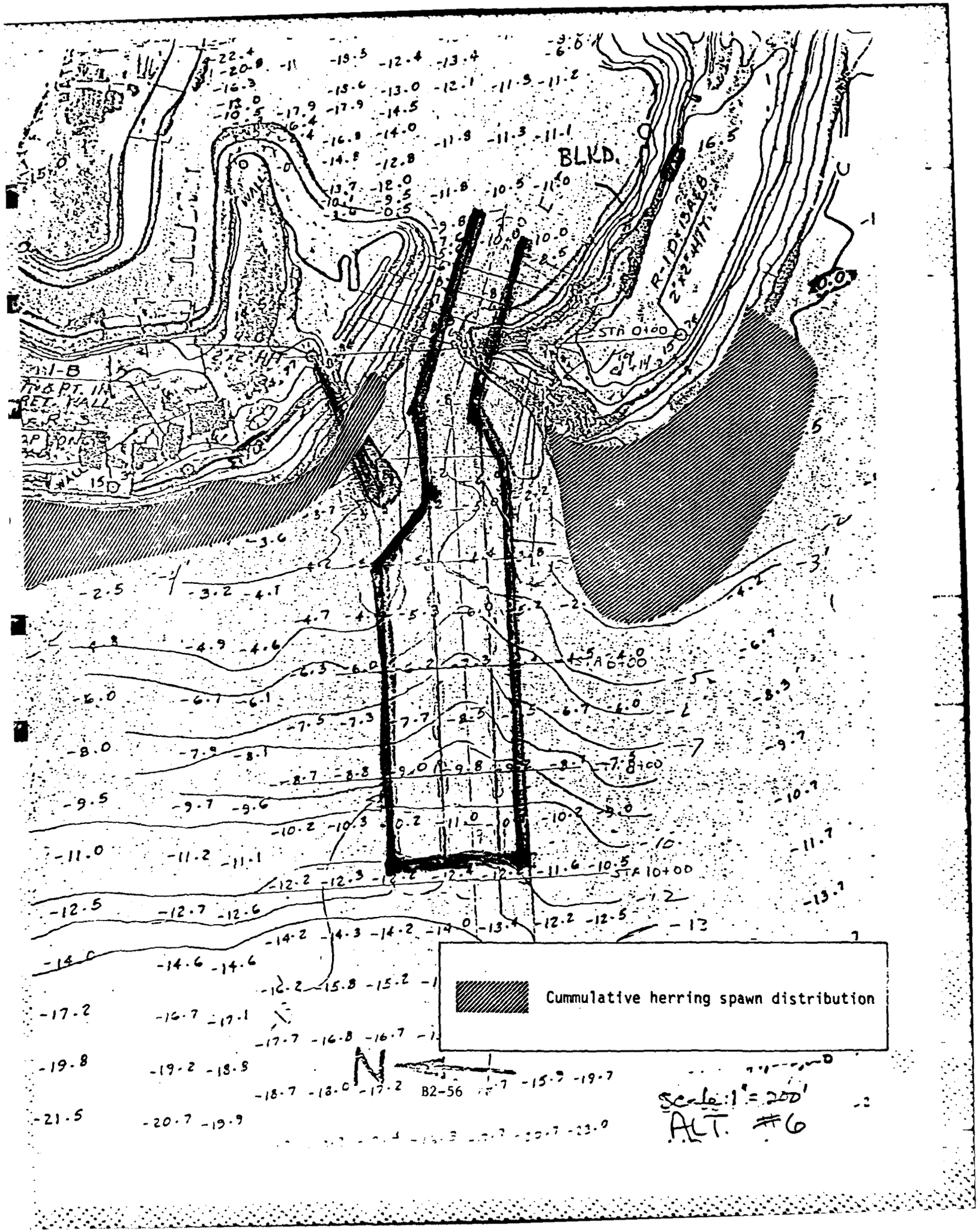
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Cummulative herring spawn distribution
N
Scale: 1" = 200'
ALT. #6

NPSEN-PL-ER 8 May 1984

MEMORANDUM FOR RECORD

SUBJECT: Sandy Point Tideland Reconnaissance

1. Purpose. To inspect the intertidal/subtidal area that would be impacted by the proposed northwest breakwater (would be located immediately north of the navigation channel) and associated littoral drift accretion area behind the breakwater. The inspection was performed primarily to determine if there was eelgrass (*Zostera marina*) in this area and to determine if there were any other important biological resources there, e.g., Dungeness crab (*Cancer magister*).

2. Date and Time of Reconnaissance. 3 May 1984, 1030 to 1400 hours.

3. Personnel.

Biologists:	Stephen Martin, Corps of Engineers David Stout, FWS Curtis Dahlgren, WDF
Surveyor:	Josnne Green, Corps of Engineers
Observers:	Joe Blum, FWS Chuck Dunn, FWS Lynn Childers, FWS

4. Methods. The study area was carefuly delineated by Josnne Green, NACP Section, using appropriate surveying equipment. The general reconnaissance area is shown in inclosure 1. The divers (Stout and Dahlgren) and snorkeler (Martin) determined a point 200 feet offshore from the -1.8-foot MLLW mark, lined up with the three stakes placed by Ms. Green, then dropped a marker buoy. The divers and snorkeler then swam shoreward in parallel transects, inspecting the entire area that would be impacted by the breakwater. After these transects were swam, the divers and snorkeler inspected the future accretion area (that had been earlier delineated by Ms. Green). The accretion area was then inspected by the divers/snorkeler.

5. Results.

a. Area of Proposed Breakwater. From the MHHW line to -2 feet (MLLW), the substrate consists of cobbles and pebbles overlying sand. This zone supports very limited biological production. From -2 feet and seaward, the

substrate is generally medium to coarse sand, obviously scoured by currents exiting Sandy Point Harbor (currents during the dive were considered fairly strong). Only a singular eelgrass plant was observed during the underwater reconnaissance in this area. Also observed were Dungeness crab (less than 10 were seen) and occassional kelp plants (Laminaria sp.) attached to large cobbles.

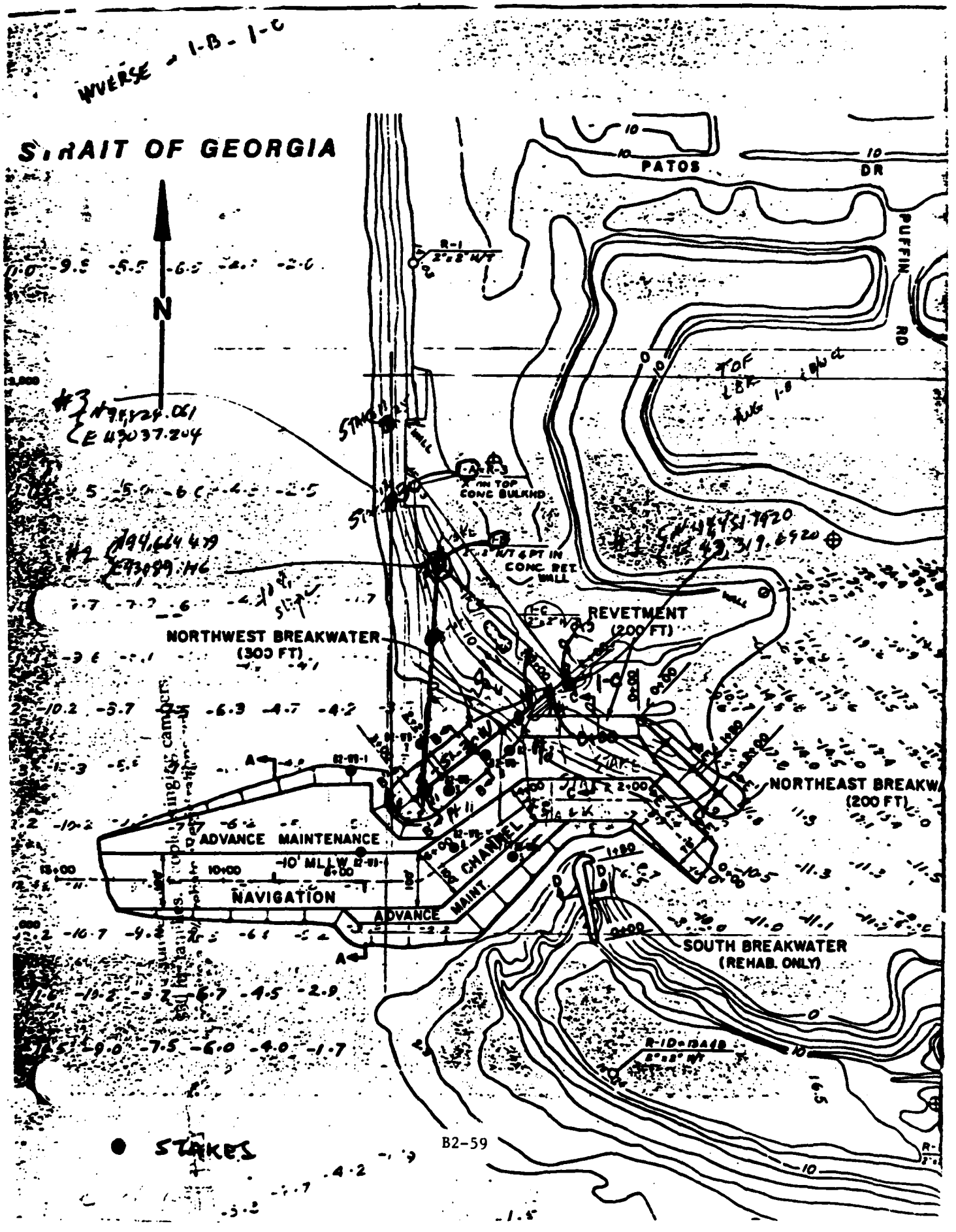
b. Calculated Accretion Area. Above -2 feet (MLLW) the substrate is identical to that described above for the breakwater area. Below -2 feet (MLLW) (the area swam) the area is somewhat removed from the main scour zone. Substrate is fine to medium sand. About four small (2- to 4-foot diameter) patches of eelgrass were observed in this area. Occasional Dungeness crab and kelp plants attached to cobbles were also observed.

c. Outside Accretion Area. North and west (seaward) of the calculated accretion area, large, healthy beds of eelgrass and several Dungeness crab were observed. These eelgrass beds and their communities would presumably not be seriously affected by the project.

d. Area of Northeast Breakwater. The area from MHHW to -2 feet (MLLW) was sandy substrate on a steep slope with no observed macrofauna. The area from -2 feet (MLLW) to -6 feet (MLLW) was a portion of the main navigation channel. The substrate was fine to medium sand plus debris. Live macrofauna consisted almost exclusively of marine polychaetes. Debris consisted of such items as decaying macroalgae, crab bodies, sea pens, and aluminum cans.

6. Conclusions. The placement of the proposed northwest and northeast breakwaters would not impact eelgrass habitat (the accretion area notwithstanding) but would, in the case of the northwest breakwater, remove some crab foraging habitat. The loss of the latter would not be considered significant. The accretion of sand behind the northwest breakwater would result in the loss of a few isolated patches of eelgrass but would avoid the substantial beds located seaward of the calculated accretion area. The accretion would remove a small area of crab foraging habitat. These losses would probably not be significant. A potential mitigation proposal could consist of transplanting the few eelgrass patches found in the calculated accretion area to adjacent areas that contain no eelgrass.

MARTIN


STRAIT OF GEORGIA
N
PATOS
DR
PUFFIN
RD
NORTHWEST BREAKWATER
(300 FT)
REVETMENT
(200 FT)
NORTHEAST BREAKW
(200 FT)
ADVANCE MAINTENANCE
-10' MLLW
NAVIGATION
CHANNEL
ADVANCE MAINT.
SOUTH BREAKWATER
(REHAB. ONLY)
TOP CONC BULKHD
CONC RET WALL
STAKES

APPENDIX B, PART 3

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
2625 Parkmont Lane SW, B-3
Olympia, Washington 98502

June 15, 1984

Colonel Roger F. Yankoupe
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98134

Dear Colonel Yankoupe:

Enclosed is our revised draft Fish and Wildlife Coordination Act Report on the effects of the proposed Sandy Point Small Boat Harbor Study on fish and wildlife resources. This project study is authorized under Section 107 of the 1960 River and Harbor Act, as amended. We have prepared this revision to reflect changes in the project plans which have occurred since the original draft report was prepared.

This revised draft report has been prepared under the authority of, and in accordance with, provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It is furnished to assist your agency in the preparation of a final feasibility report for the Sandy Point Small Boat Harbor Study.

We request that you consider each of our recommendations and notify us in writing of your approval or disapproval. This will ensure that the Service will have a clear understanding of your concerns, and will enable us to incorporate them into our final report. We will also incorporate the comments of the National Marine Fisheries Service and the Washington Departments of Fisheries and Game.

We appreciate the opportunity we have had to provide input to your planning on this project and look forward to continued coordination.

If you have any questions on this draft report, please contact either Lynn Childers or David Stout at FTS 434-9440.

Sincerely,

Charles A. Dunn

Charles A. Dunn
Field Supervisor

Enclosure

cc: WDE, NMFS, WDF, WDG, EPA, BIA, Lummi Tribe (MacKay), SE, Olympia, CE/ERS (Menconi)

REVISED DRAFT

FISH AND WILDLIFE COORDINATION ACT REPORT

U.S. Army Corps of Engineers
Seattle District

SANDY POINT SMALL BOAT HARBOR STUDY

Prepared by:

David J. Stout, Fish and Wildlife Biologist

U.S. Fish and Wildlife Service
Division of Ecological Services
Olympia, Washington

June 1984

TABLE OF CONTENTS

SANDY POINT SMALL BOAT HARBOR STUDY

INTRODUCTION

The purpose of the Sandy Point Small Boat Harbor (SPSBH) study is to determine the feasibility of alleviating a shoaling problem within the entrance to the Sandy Point Basin by dredging a new navigation channel and constructing one jetty. The study has been sponsored by Whatcom County, Washington.

Sandy Point is a long, low, naturally formed land spit located on the Lummi Indian Reservation in Whatcom County. It is on the southeasterly end of the Strait of Georgia, and the northwestern end of Lummi Bay and Hale Passage (Figure 1). The marina and canals were originally excavated in about 1960 to provide gravel for construction. Approximately 450 boats commonly moor at the two marinas, the public anchorage area, and private piers. The uplands are largely developed as a residential community.

Sandy Point was geologically formed by the deposition of littoral drift material. The unprotected harbor entrance is interrupting the southward transport of suspended beach sediment along the coastline. The dredged channel is located in a very dynamic area and has two associated problems: (1) the harbor entrance is restricted due to a growing sandbar, and (2) the southern tip of Sandy Point is eroding. The Corps has estimated that the channel will shoal to -1 foot below Mean Lower Low Water (MLLW) within 5 years.

DETAILED PROJECT DESCRIPTION

The proposed project would provide improved vessel access to the Sandy Point Marina for the 450 boats which use the basin on a permanent or transient basis.

The principal construction features are as follows:

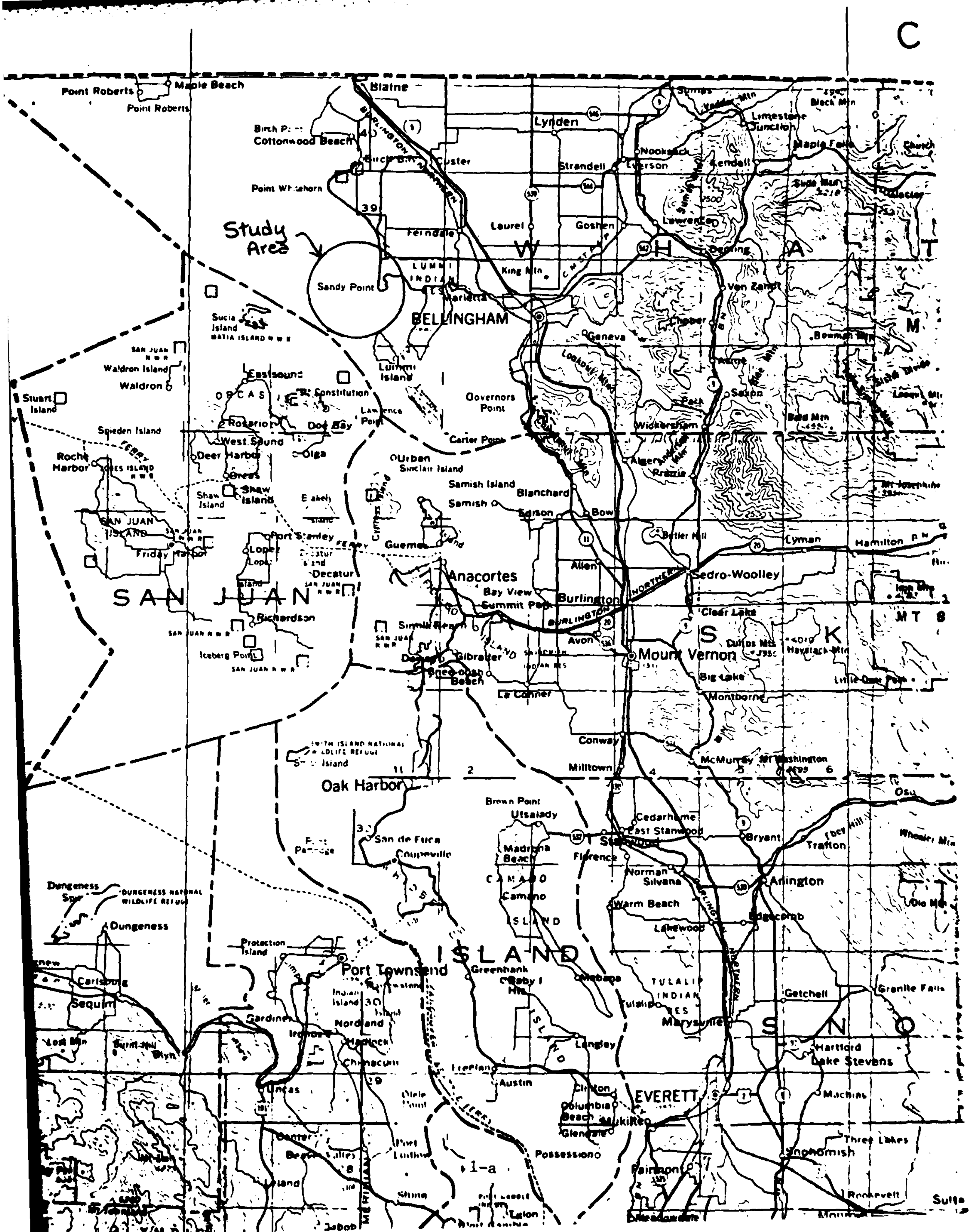
A. Navigation Channel

A navigation channel would be dredged 100 feet wide by 900 feet long by -12 feet MLLW deep. This channel would be dredged by clamshell and the 15,000 cubic yards of material would be disposed of at a Department of Natural Resources-approved deep water disposal site (probably Bellingham Bay). The sediments are very fine and are not suitable for beach disposal. Approximately 4.4 acres will be dredged for the outer channel and the advance maintenance area.

B. Rock Jetties

One rock jetty approximately 350 feet long (from +10 to -5 MLLW) would be built. The jetty will extend 310 feet from MHHW to the toe. Side slopes will be 2:1 and the top elevation will vary between +14 and +5 MLLW.

C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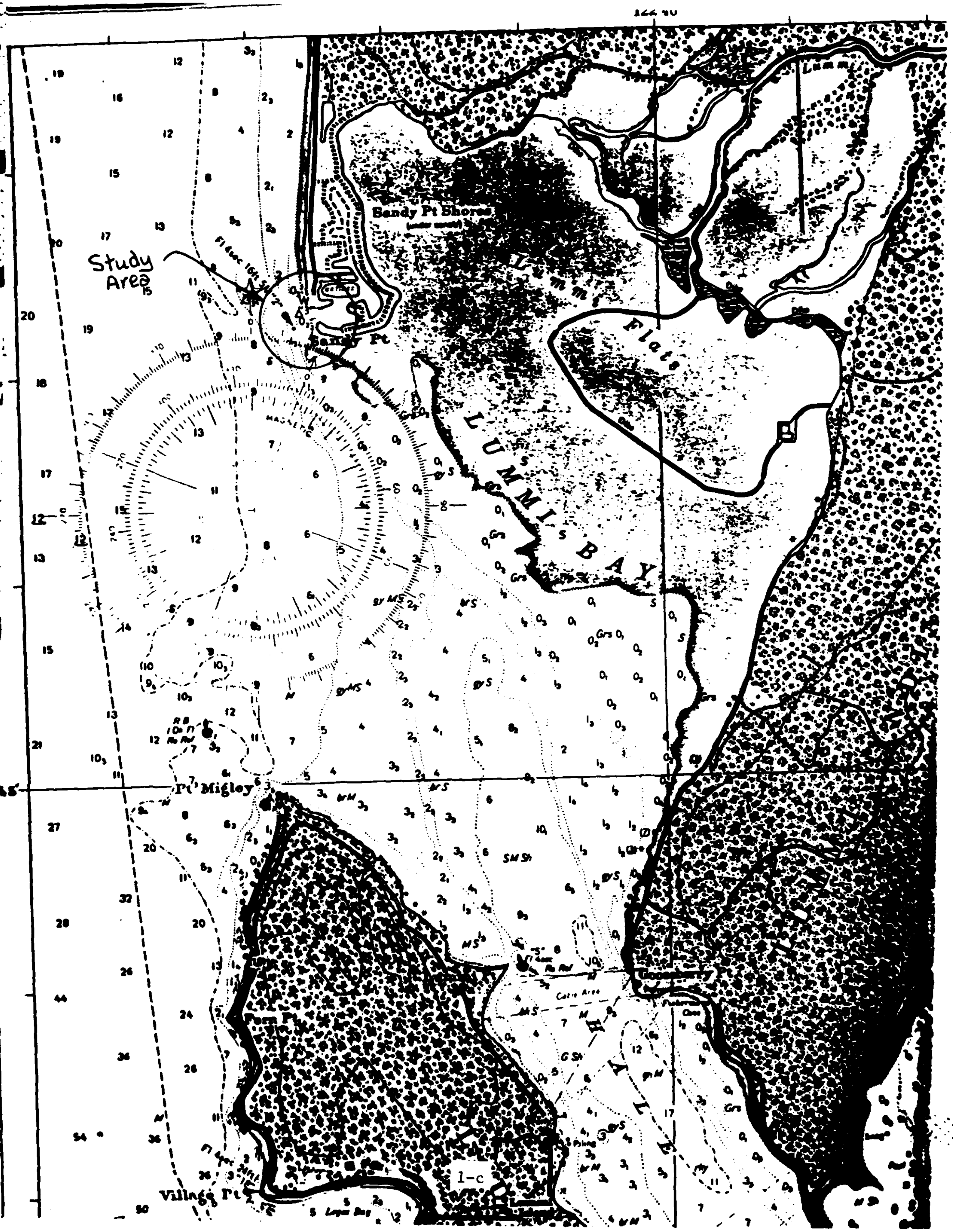
Sandy Point
Point Roberts
Maple Beach
Blaine
Birch Bay
Custer
Point Whitehorn
Ferndale
Lynden
Laurel
Goshen
Everson
Nooksack
Kendall
Sumas
Limestone Junction
Maple Falls
Strandell
Lawrence
Deming
Van Zandt
Marietta
BELLINGHAM
Geneva
Lummi Island
Sucia Island
Waldron Island
Waldron
Stuart Island
Eastsound
Mt Constitution
Rosario
Doe Bay
Olga
West Sound
Deer Harbor
Orcas
Shaw Island
Spieden Island
Roche Harbor
SAN JUAN ISLAND
Friday Harbor
Lopez
Port Stanley
Decatur
SAN JUAN
Richardson
Iceberg Point
Governors Point
Carter Point
Sinclair Island
Samish Island
Samish
Blanchard
Edison
Bow
Guemes
Anacortes
Bay View
Burlington
Sedro-Woolley
Cyman
Hamilton
Wickersham
Alger
Saxon
Acme
Clear Lake
Mount Vernon
Big Lake
Montborne
La Conner
Conway
Milltown
McMurray
Mt Washington
Oak Harbor
Brown Point
Utsalady
San de Fuca
Coupeville
Madrona Beach
Camano
CAMANO ISLAND
Stanwood
East Stanwood
Cedarhome
Bryant
Florence
Norman
Silvana
Warm Beach
Arlington
Lakewood
Edgecomb
ISLAND
Greenbank
Port Townsend
Protection Island
Dungeness Spit
Dungeness
Carlsborg
Sequim
Gardiner
Irondale
Nordland
Hadlock
Chimacum
Freeland
Langley
Austin
Clinton
Columbia Beach
Mukilteo
EVERETT
Glendale
Possession
Marysville
Tulalip
Getchell
Granite Falls
Hartford
Lake Stevens
Machias
Three Lakes
Snohomish
Roosevelt
Port Ludlow
Uncas
Blyn
1-a


Study Area
NW-10-1-1-1
Drayton Hbr
Birch Bay
Pt Whitehorn
Cherry Pt.
Lynden
Tenmile
Barrett Lake
Lummi River
Lummi Indian Reservation
Lummi Bay
Sandy Pt
Lummi Island
Lummi Rks
Matia I
Clark I
The Sisters
Eliza I
Pt Frances
Bellingham Bay
Samish Bay
RESTRICTED DUMPING GROUND
205 69 (see note B)
(use chart 6378)
(chart 6378)
(use chart 6376)
TOWER
BELL
AERO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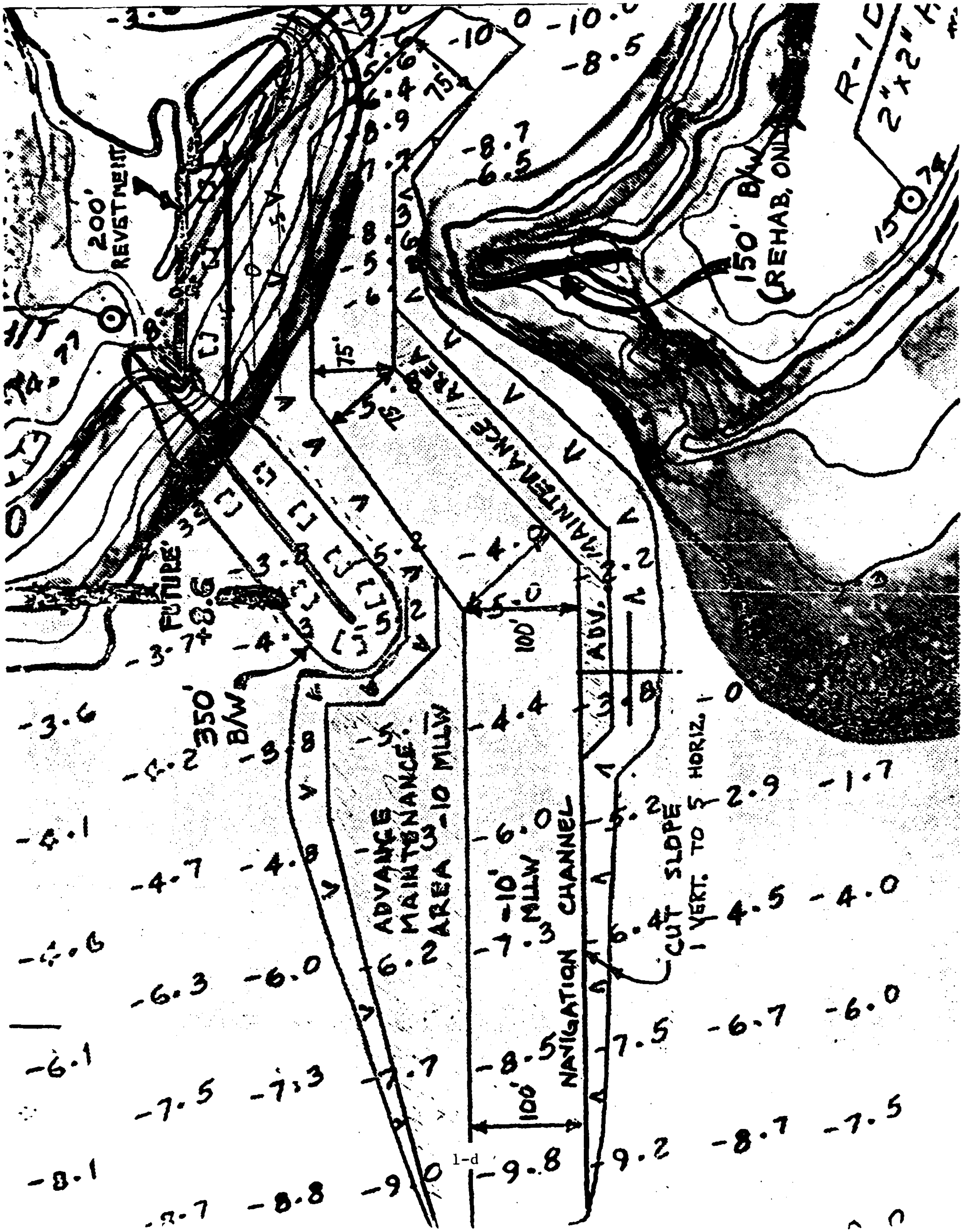
Sandy Pt Shores
Sandy Pt
Flats
LUMMI BAY
Pt Migley
Village Pt


200' REVETMENT
FUTURE
350' B/W
150' B/W REHAB. ONLY
MAINTENANCE AREA
ADV.
ADVANCE MAINTENANCE AREA -3-10 MLLW
-10' MLLW NAVIGATION CHANNEL
CUT SLOPE 1 VERT. TO 5 HORIZ.
75'
100'
R-1C
2"x2"

Fish passage breaks will not be provided because they would reduce the desired effect of the jetty. The jetty will cover approximately 0.54 acres of bottom.

C. Public Anchorage Area

Access to the public anchorage area would be improved by widening the access channel inside the boat basin. The anchorage is approximately 4 acres. Since existing depths are -10.5 to -14 feet MLLW, only about 2.1 acres of dredging would be required.

D. Maintenance Dredging

Approximately 10,000 cubic yards of dredged material will be removed at 10 year intervals for periodic channel maintenance. The material will be taken to an approved deep-water disposal site.

DESCRIPTION OF THE PLANNING AREA

A. Physical Features

Sandy Point is located between Lummi Bay and the Strait of Georgia. It was formed geologically by the southward transport of littoral drift material over the last 2,000 to 4,000 years. Schwartz (1983) estimated the volume of longshore transported materials to be approximately 3,000 cubic yards per year. Construction of the marina entrance channel in 1960 cut off most of this southward movement of material, resulting in erosion of the southern tip of the Point. About 28 feet of erosion has occurred southeast of the dredged channel in the last 15 years.

The marina basin is connected to various canals which provide water access to the residential community. The public anchorage immediately inside the entrance provides moorage for transient private and commercial vessels. The anchorage is an important harbor of refuge during storms.

The present marina entrance restricts boat access during extremely low tides. The Corps has predicted that the entrance will shoal to -1 foot MLLW in the next 5 years. Schwartz (1983) cautioned that tidal flushing of the marina is a factor in determining the ultimate configuration of the channel. He noted that "it is quite possible that the tidal current is presently keeping the inlet in its existing 5-foot depth condition. A tracer study, requiring several months, could assist in determining this."

B. Biological Features

Sandy Point is located in an area of high biological productivity. The State of Washington has declared this entire area a "shoreline of state-wide significance" and has thereby afforded it extraordinary protection. Lummi Bay on the east is predominantly intertidal and supports valuable eelgrass beds, several types of crabs (including commercially important Dungeness crabs), waterfowl (including black brant), herring spawning,

commercially harvested flounder, and rearing and feeding habitat for salmon. The Strait on the west and Hale Passage on the south are generally quite deep but the intertidal and shallow subtidal areas along the shoreline have biological values similar to Lummi Bay.

Scuba surveys were performed in August 1983 and May 1984 by divers from the U.S. Fish and Wildlife Service (FWS) and the Washington Department of Fisheries (WDF). Generally, the project site may be divided into three district areas. North of the channel the substrate is typical of a dynamic shoreline, with a predominantly sandy/silty bottom. Eelgrass, kelp and cobbles are present in small (25 sq. ft.) patches. Six to ten juvenile crabs, a scattering of clam siphons, and polychaete worms were observed.

The second area, the channel, appears to be a very dynamic area from the combined effects of longshore drift, tidal flushing of the marina, and boat prop disturbance. Few organisms were observed. The area south of the channel, however, is apparently not seriously effected by longshore drift, due to its interruption by the channel. The bottom is cobbles and gravel, and supports a rich and diverse community. The rocks are colonized by eelgrass (Zostera), sea lettuce (Ulva) and kelp (Laminaria). Organisms observed included several types of crabs (including Dungeness), shrimp, anenomes, tubeworms, sculpins, flounder and cockles.

The proposed location of the channel and jetty is in the high energy area of the existing channel. The May 1984 scuba survey thoroughly inspected this area, and the sediment accretion area on the north side of the proposed jetty. The substrate is primarily medium to coarse sand. A narrow band of cobbles is found high in the intertidal zone. Very few eelgrass plants were found, and only a couple of kelp or other algae plants were discovered. North of the accretion area (outside the scoured area) eelgrass beds became more numerous and dense.

Several wetland types are located in the project area. According to the classification system of Cowardin et al (1979), these wetlands include estuarine subtidal, with a mixture of unconsolidated bottom and aquatic bed, and estuarine intertidal with a mixture of aquatic bed, unconsolidated shore and a fringe around the uplands of persistent emergent wetlands.

A. Mitigation Policy Goal

The FWS in 1981 adopted a formal Mitigation Policy (FWS 1981) to help assure consistent and effective recommendations for the levels of mitigation needed and the various methods of accomplishing mitigation. The policy covers impacts to fish and wildlife populations, their habitat, and the human uses thereof. Four Resource Categories are used to indicate that the level of mitigation recommended will be consistent with the fish and wildlife resource values involved.

Sandy Point is located in an area through which millions of juvenile salmon pass after leaving their natal rivers on their way to the ocean.

Small juvenile salmon (particularly chum) are vitally dependent upon shallow shoreline areas for feeding and predator escape cover. Because of its significant location the project site must be considered Resource Category Two, which indicates that it is an area of high value to evaluation species (i.e. salmon). The Mitigation Goal for this category is no net loss of in-kind habitat value.

B. Herring

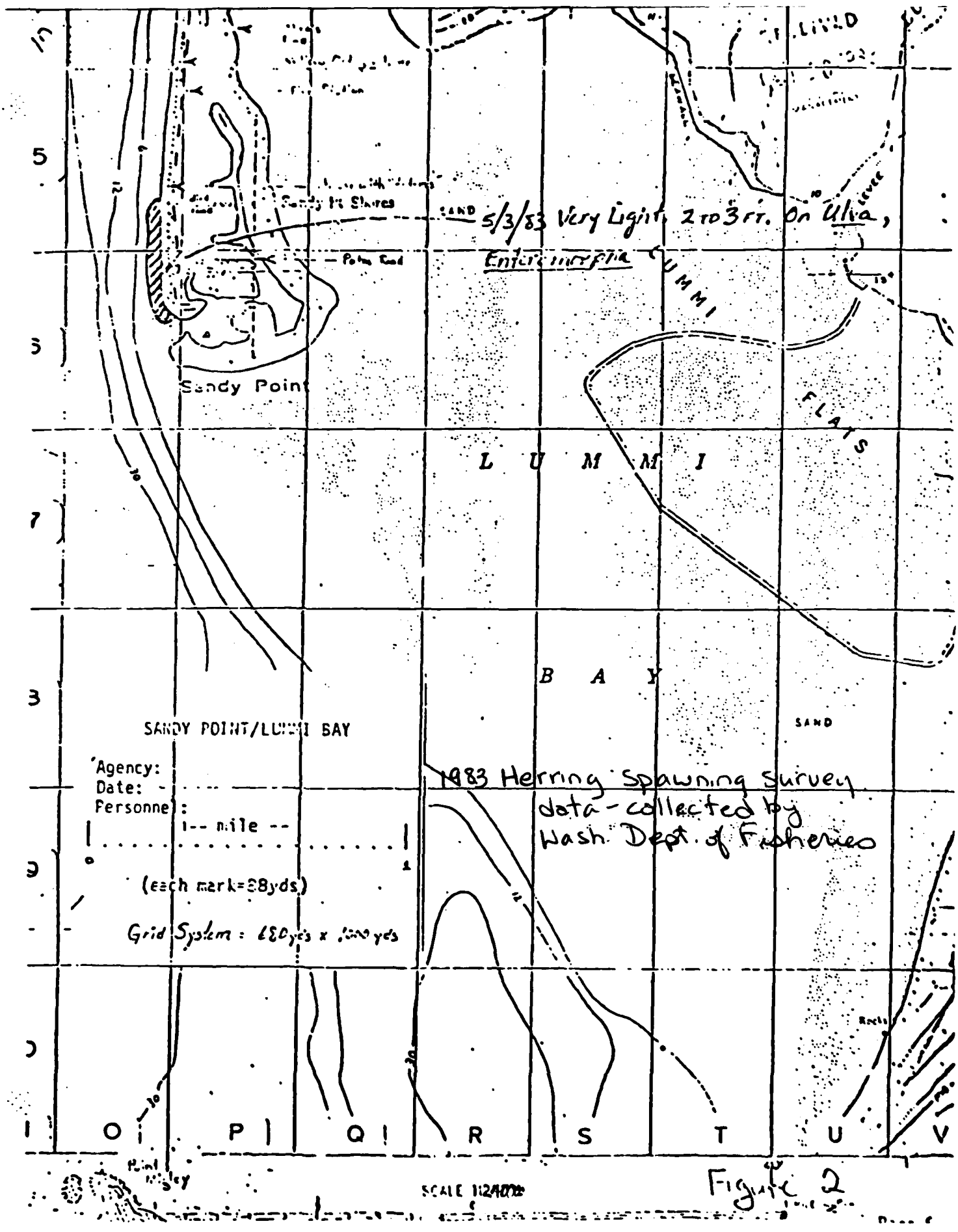
Sandy Point is located in an area of concentrated herring spawning. Herring are an extremely important food fish for salmon and protection of their spawning habitat is extremely important. Herring generally spawn on submerged aquatic vegetation, especially eelgrass, kelp and sea lettuce. Although herring would not be expected to spawn in the existing channel, adjacent areas do support vegetation upon which herring may spawn.

Sampling of the project area has been performed by WDF in the past. Figures 2-6 depict the location, date and intensity of herring spawning since 1980. According to Steve Burton, WDF (Personal communication 1983), sampling efforts have been sporadic due to manpower constraints and weather and logistic problems. Burton noted that the physical and biological characteristics of the area tend to promote good survival of spawned eggs. The area is well flushed, which provides adequate oxygen, and the patchiness of the spawning substrate discourages predators. The light and medium egg densities typical of the area tend to have higher survival rates than heavy spawning densities which often have high mortality due to suffocation and heavy predation. Lummi tribal biologists have recently documented herring spawning south and east of Sandy Point. Most of the spawning occurs from mid-April through mid-May. According to Burton, an early (February-March) spawning run is suspected in the project area but has been insufficiently documented.

C. Salmon

Sandy Point is located in an area of tremendous salmon production. The nearby Skagit and Nooksack River systems together contribute over 1,068,000 salmon to sport and commercial fisheries. Annual escapement for the two rivers is approximately 355,000 salmon (WDF 1975). The Fraser River in southern British Columbia also contributes a tremendous number of salmon to the fishery. Many of the outmigrating juvenile salmon from these rivers pass through the Sandy Point area. Shallow water areas are particularly important to chinook, pink and chum salmon, because these areas provide migration corridors, rearing areas, and safety from predators. Juvenile outmigration generally occurs from mid-March through mid-June.

A major source of juvenile salmon passing by Sandy Point is the Lummi Tribal Aquaculture facility. This facility, located inside the 760-acre seapond, typically releases 1-2 million coho, 1-2 million fall chinook, and 2-4 million chum salmon annually. The tribe traps returning adult salmon from late August until the end of December.


5/3/83 Very Light, 2 to 3 ft. on Ulva,
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L U M M I
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SANDY POINT/LUMMI BAY
Agency:
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Personnel:
1-- mile --
(each mark=88yds)
Grid System : 880yds x 1100 yds
1983 Herring Spawning Survey
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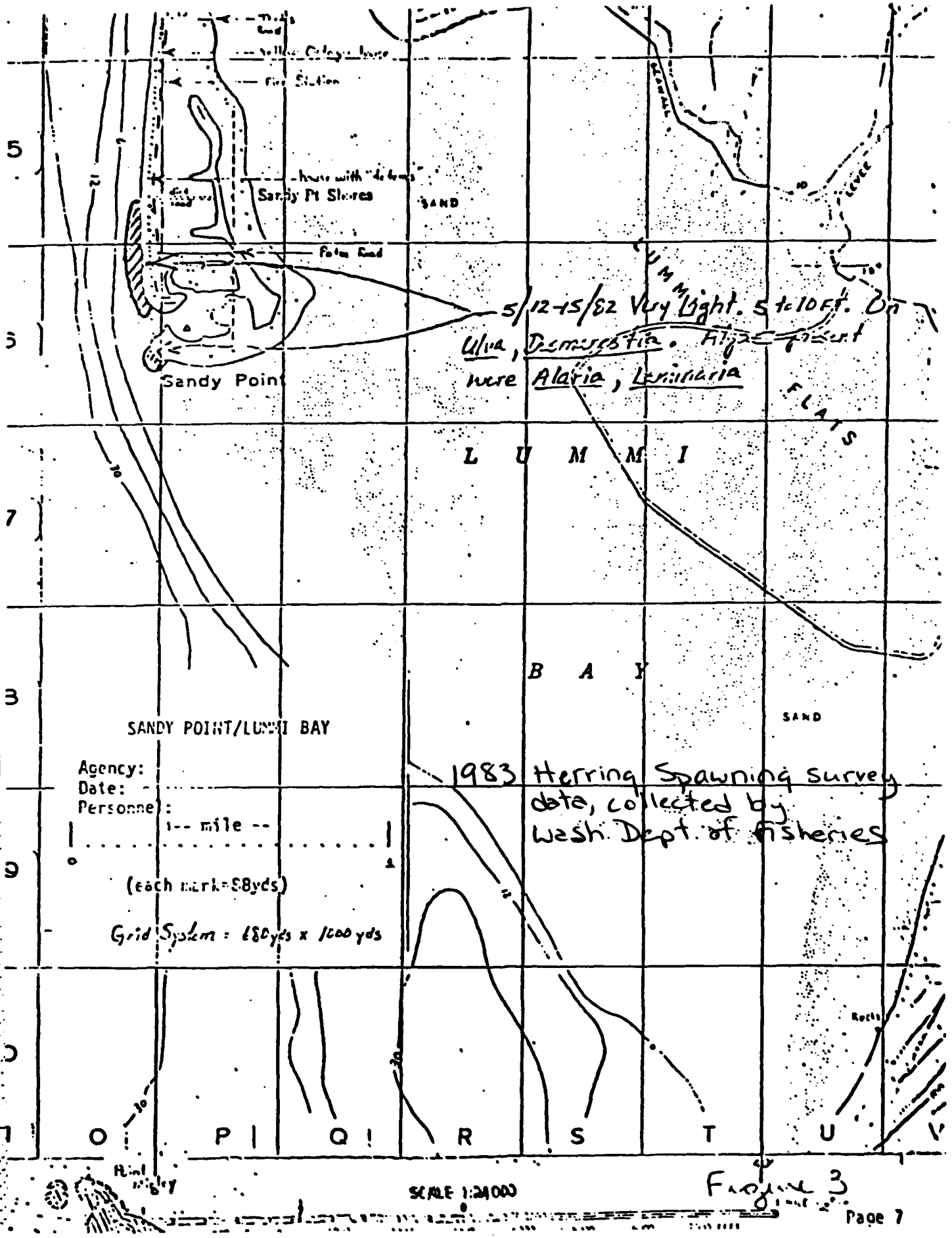
Figure 2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Ulva, Desmarestia. Higher Present
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1983 Herring Spawning Survey
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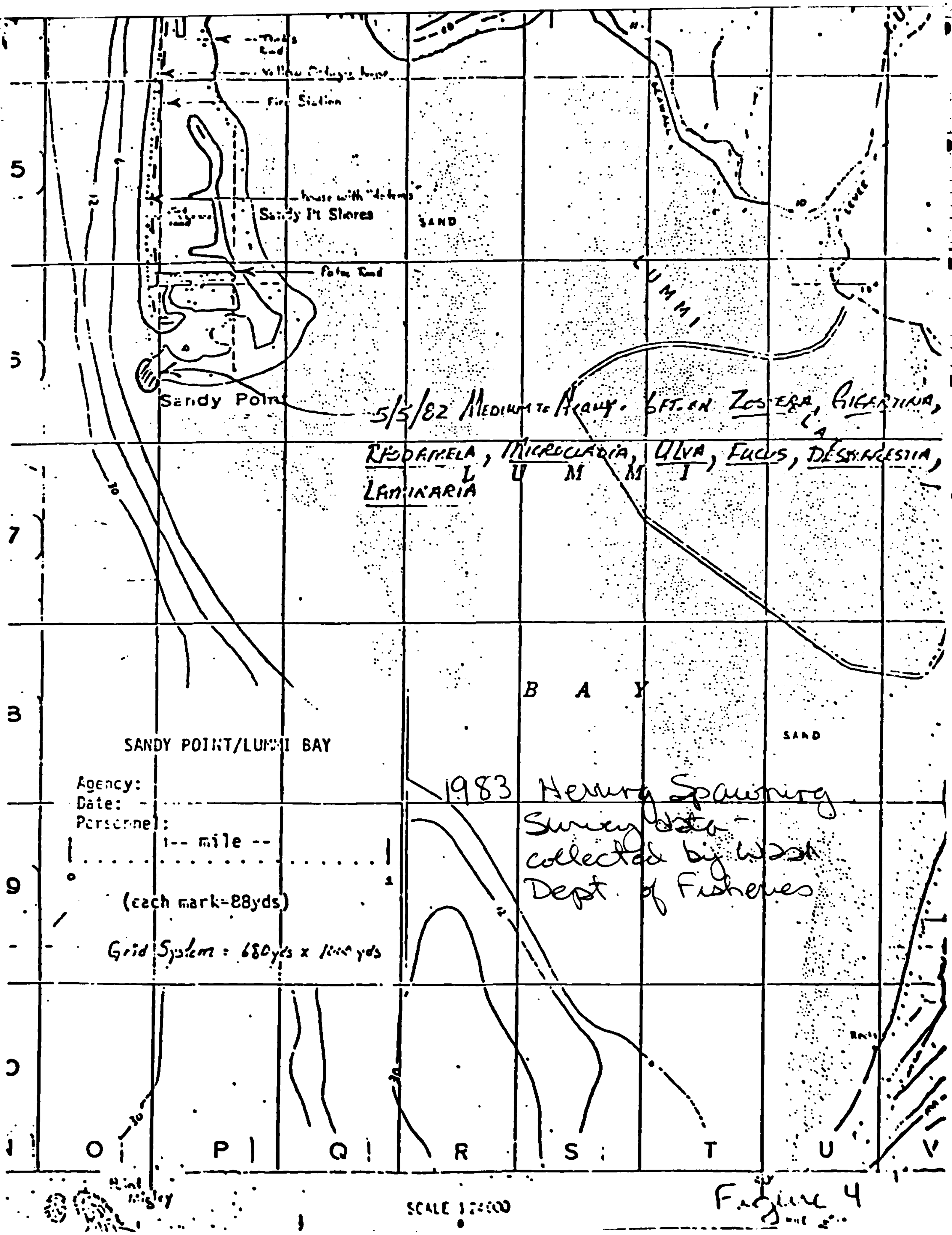
Figure 3


Fire Station
Sandy Pt Shores
SAND
LUMMI
Sandy Point
5/5/82 Medium to Heavy. 6FT. on Zostera, Gigartina, Rhodomela, Microcladia, Ulva, Fucus, Desmarestia, Laminaria
BAY
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SANDY POINT/LUMMI BAY
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(each mark=88yds)
Grid System = 680yds x 1000 yds
1983 Herring Spawning Survey data - collected by Wash Dept of Fisheries
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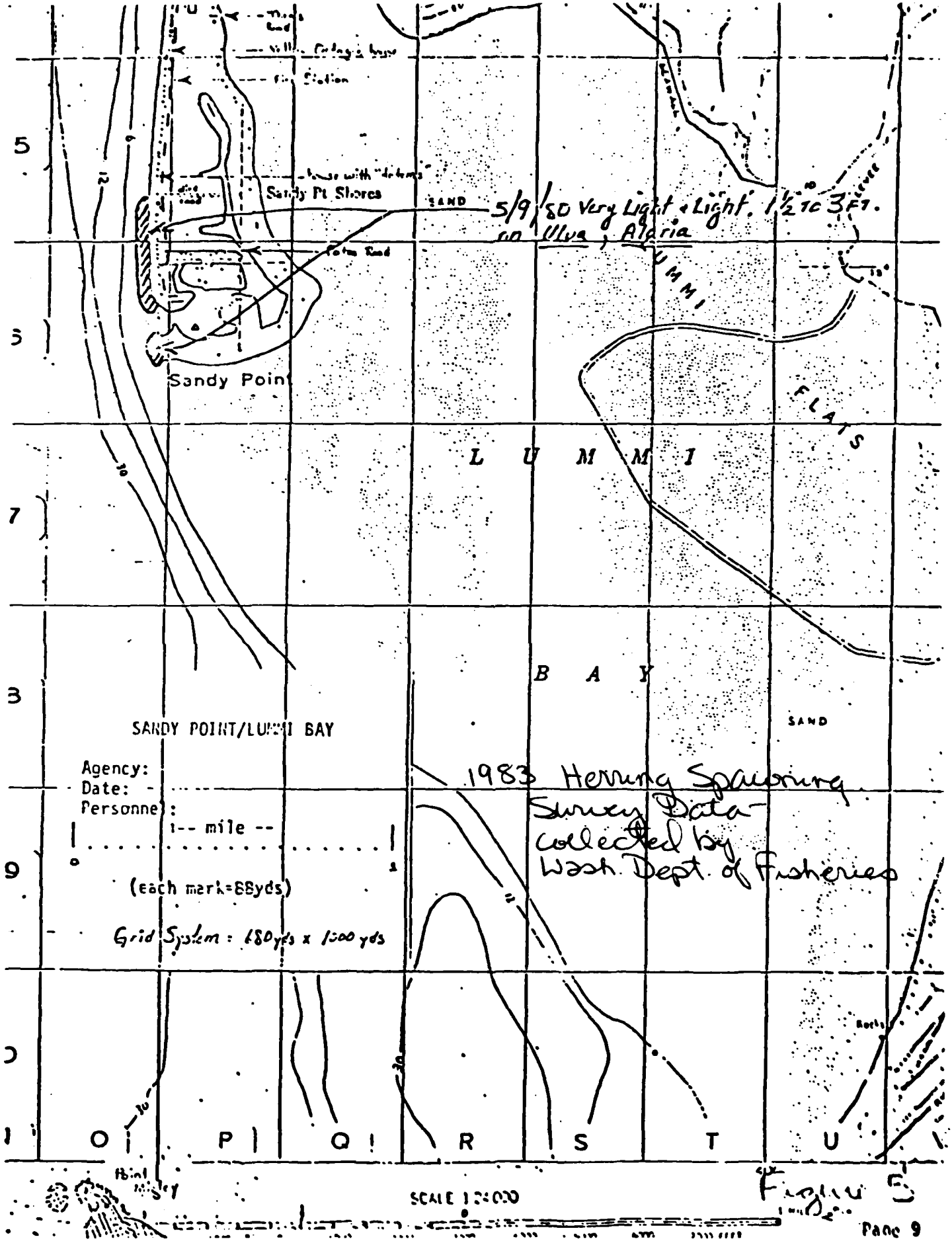
Figure 4


Sandy Pt Shores
SAND
5/9/80 Very Light + Light. 1½ to 3 Ft.
on Ulva ; Algaria
Sandy Point
L U M M I
FLATS
B A Y
SAND
SANDY POINT/LUMMI BAY
Agency:
Date:
Personnel:
-- mile --
(each mark=88yds)
Grid System : 480yds x 1000 yds
1983 Herring Spawning
Survey Data
collected by
Wash. Dept. of Fisheries
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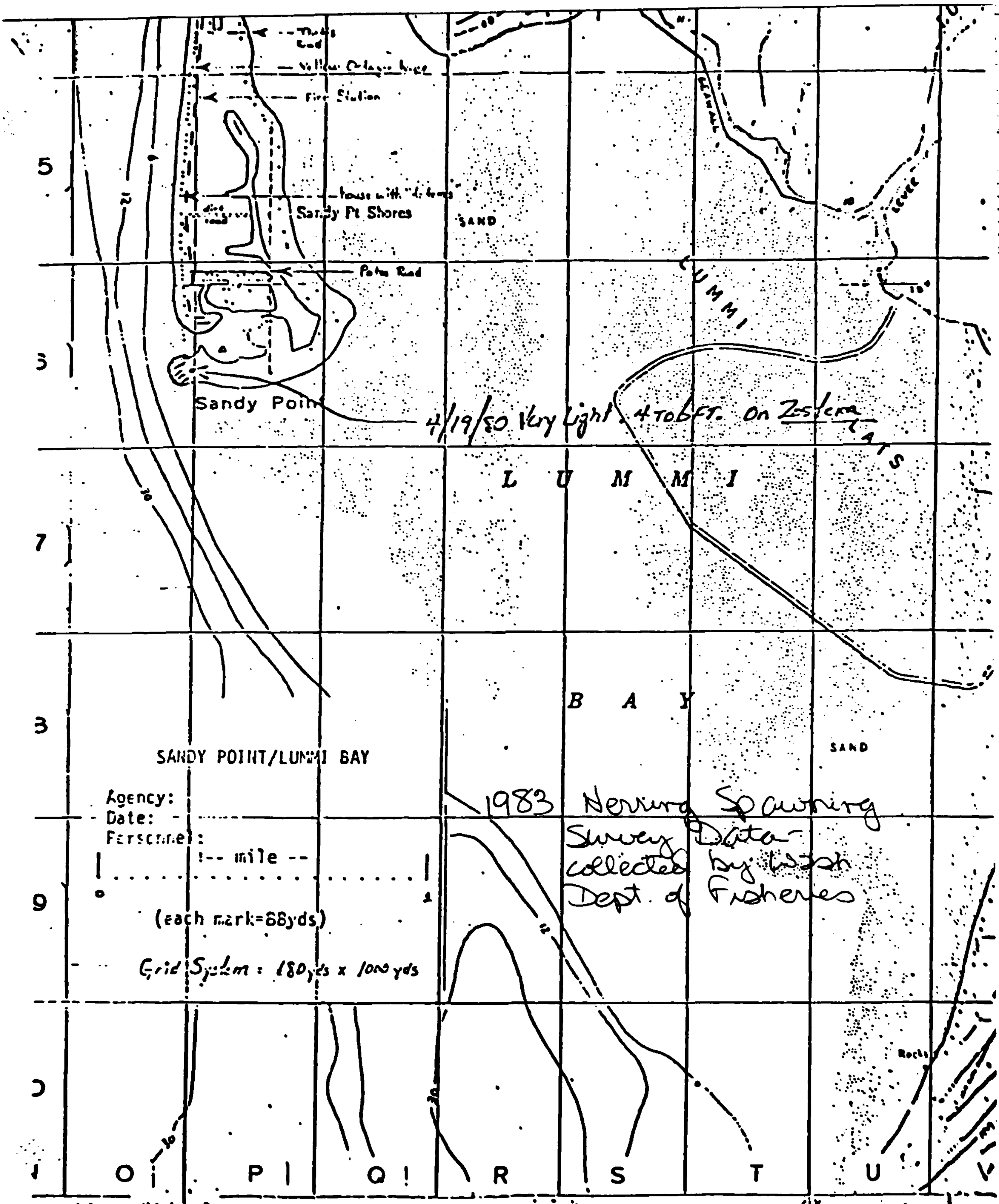
SCALE 1:5000

Figure 5


Fire Station
Sandy Pt Shores
SAND
Sandy Point
4/19/80 Very Light 4 TO 6 FT. On Zostera
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Personnel:
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(each mark=88yds)
Grid System: 180yds x 1000yds
1983 Herring Spawning
Survey Data
collected by Wash
Dept. of Fisheries
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Figure 4

D. Threatened and Endangered Species

The Corps of Engineers (CE) has been notified by the FWS that bald eagles and peregrine falcons occur in the project vicinity. The Corps is currently preparing a biological assessment of the potential effect of this project on these species. See Appendix B, Part 2 of Sandy Point Detailed Project Report.

E. Dungeness Crab

Dungeness crabs are known to use the project area for rearing. Adjacent areas support sport and commercial crab fisheries. Dungeness crabs are often associated with eelgrass beds and feed largely on small clams, and therefore are not expected to make much use of the existing channel; how ever, quite a few crabs were observed north and south of the channel during the scuba survey.

F. Migratory Birds

Waterfowl and shorebird use of the project site is poorly documented. Eelgrass, herring roe, crabs, clams and snails are all important to waterfowl and are found in the project area. Lummi Bay to the east supports extensive eelgrass beds which provide food for moderate numbers of waterfowl, particularly during spring and fall migration (FWS 1979).

G. Flounder

Starry flounder (Platichthys stellatus) are common in the project vicinity and were observed during the scuba survey. They spawn in shallow water from February through April, and feed on crabs, shrimp, worms, clams and clam siphons, and small fishes.

A small commercial trawl fishery harvests flounder in the Hale Passage/Lummi Bay from March through May. According to Mark Peterson of the WDF (personal communication), about eight or nine boats regularly fish the area and harvest approximately 10,000 pounds of flounder annually. The proposed project is not expected to interfere with the commercial fishery.

FUTURE WITHOUT THE PROJECT

If no project is constructed, the marina entrance channel will probably continue to shoal. The ultimate channel configuration is not known, however, since tidal flushing of the marina basin may be maintaining the present 5-foot depth configuration (Schwartz 1983). As shoaling proceeds, littoral drift materials will begin to pass more readily past the marina entrance. The gravel/cobble substrate south of the present channel would probably become partially buried by sand, which would likely reduce the current high productivity. In all other respects, resource values of the project area would be expected to remain essentially the same as they are now. Erosion of the southern tip of the point would be reduced because of the addition of longshore drift material.

FUTURE WITH THE PROJECT

The Sandy Point shoreline will be significantly altered by the proposed project. According to Schwartz (1983) the construction of jetties and an improved channel would prolong and/or exacerbate the erosion problem at the tip of Sandy Point. The jetty would also cover approximately 0.54 acres of intertidal and subtidal substrate. A one acre area north of the jetty would gradually become filled with trapped drift material.

The new entrance channel would be approximately 100 feet wide and 900 feet long and would encompass 2.0 acres of what is now subtidal and intertidal substrate. The advance maintenance area would encompass approximately 2.4 acres.

A. Salmon

The proposed riprap jetty will cover about 0.54 acres of substrate which is of fairly low value to juvenile salmon for feeding. Riprap has been shown to provide good juvenile salmon habitat when sloped at a 1½ :1 or shallower slope.

The most significant potential adverse effect from the jetty is increased predation upon the juvenile salmon by larger salmon and bottom fish. Heiser and Finn (1970) made observations of juvenile chum and pink salmon in marinas and bulkheaded areas. Fry in the 35-45 mm size range resisted movement into deeper water. They found that movement into deeper water resulted in an observed increase in predation by coho salmon smolts and cutthroat trout.

Because of these observed adverse affects of jetties on juvenile salmon, the Washington Department of Fisheries has recently adopted regulations regarding jetty construction. The regulation states that jetties should be no longer than 250 feet from MHHW to reduce the exposure of juveniles to predators.

Interestingly, once juvenile salmon are inside marinas they seem to be subject to less predation than on adjacent beaches. This may be a result of the presence of humans which scare off fish and bird predators (Heiser and Finn 1970).

According to Lummi tribal biologist Steve Seymour (personal communication), chum salmon fry released from the seapond would be about 2 inches (50 mm) long. These small fry may be susceptible to predation by larger fish, particularly yearling coho, as they are forced around the jetties. The natural, gradually sloped shoreline provides much better escape cover than do the relatively steeply sloped jetties.

Coho and chinook salmon are generally larger when they leave their natal rivers and are not as dependent upon shallow shoreline areas. Therefore, coho and chinook would be less affected by the jetties than chum salmon.

B. Herring

The proposed project appears to be located to minimize or perhaps eliminate adverse impacts to herring. Because of the high energy climate due to tidal flushing of the marina, little or perhaps no potential herring spawning habitat will be eliminated. Herring do spawn on vegetation and rocks immediately north of the project and so any encroachment to the north must be avoided.

C. Flounder

Flounder would be adversely affected by the covering of food organisms by the jetty, but may feed on organisms which colonize the jetty. The accumulation of drift material north of the jetty may also reduce productivity of benthic food organisms upon which flounder feed. The overall effect of the project on flounder should be minimal.

D. Dungeness Crabs

Crabs would be affected similarly to flounder. Food organisms would be lost as a result of dredging the channel, construction of the jetty, and the accumulation of littoral drift material. The jetty would provide some food organisms and cover for crabs, however.

E. Migratory Birds

Waterfowl and shorebirds would be adversely affected by the loss of food organisms resulting from dredging a wider access channel, placing the jetties and the accumulation of littoral drift materials. The effect of the project on migratory birds is not expected to be significant because use of the site is apparently fairly limited.

F. Threatened and Endangered Species

The Corps is presently preparing a Biological Assessment for the effect of the project on peregrine falcons and bald eagles.

ALTERNATIVES TO THE PROPOSED PROJECT

A. No Action.

If no federal action is taken to maintain the entrance channel, conditions are expected to be as described previously under "Future Without the Project." The possibility certainly exists, however, that another sponsor could propose to dredge the entrance channel and construct jetties. If that should be the case, the conditions would be similar to one of the following scenarios.

B. Construction of the New Dredged Channel But Elimination of the Jetties

Elimination of the jetty would reduce the adverse effects of the project. Salmon would benefit the most. Juvenile salmon would not be subject to

increased predation by being forced into deeper water. Periodic maintenance dredging would still be necessary and would temporarily disrupt the benthic community surrounding the channel and eliminate organisms which colonized the channel bottom.

C. Construction of a Shorter Jetty

The Corps evaluated the possibility of building a shorter jetty on the north side of the channel. Adverse effects on estuarine organisms may be reduced proportional to the reduction in the length of the jetty. That is, juvenile salmon would be pushed into less deep water and would be subject to a shorter period of increased susceptibility to predation. Crab, flounder, herring and migratory bird habitat would also be affected less by construction of shorter jetties.

D. Construct No or Shorter Jetties and Dredge a Larger Channel

Overdredging the channel would increase the maintenance dredging interval and may reduce the need for a jetty. A larger area of benthic habitat would be removed by dredging than would be removed by the narrower channel. Overdredging may provide the best opportunity for reducing overall project impact since the need for a jetty may be eliminated and the jetty appears to be the most damaging aspect of the proposed project.

RECOMMENDATIONS

1. We recommend that the Corps continue to pursue project designs which eliminate the need for a jetty. Periodic maintenance dredging with overdredging to increase storage capacity may be acceptable alternatives. Eliminating the jetty will greatly reduce the potential adverse effects of the project. If a jetty is determined to be necessary, we recommend that the length not exceed 250 feet to minimize the exposure of juvenile salmon to predators.

2. Herring survey data from the spring of 1984 needs to be evaluated to more accurately determine the amount of herring spawning which occurs in the project area. The Lummi Tribe and WDF may be able to help with this analysis.

3. We recommend that dredging be done by clamshell to minimize damage to the Dungeness crab population.

4. We recommend that tracer studies be performed as suggested by Schwartz (1983) to more accurately determine the effect of tidal flushing on maintenance of the existing channel.

5. We recommend that all construction be limited to December 1 to March 15 to minimize adverse effects to herring, crabs, flounder and salmon.

6. The dredged channel should be located to avoid the productive gravel/cobble area south of the channel.

REFERENCES

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Washington Department of Fisheries. 1975. A catalog of Washington streams and salmon utilization. Volume 1, Puget Sound Region. Olympia, WA.

APPENDIX B, PART 4

COMMENTS AND RESPONSES

Part 4a - Comments on the Draft Detailed Project Report and Draft Environmental Assessment and Corps Responses

Part 4b - Comments on the Sandy Point Navigation Project, in General, and Corps Responses

APPDENDIX B, PART 4a

Comments on the Draft Detailed Project Report and
Draft Environmental Assessment and Corps Responses

(To Be Completed After Public/Agency Review)

APPENDIX B, PART 4b

Comments on the Sandy Point Navigation Project, in General,
and Corps Responses

APPENDIX B, PART 4b
Comments on the Sandy Point Navigation Project, in General, and Corps of Engineers Responses

TABLE OF CONTENTS

1/This Corps letter presented information about and solicited formal review comments on the tentatively recommended project design. The project as then designed reflected a plan formulation compromise between engineering, environmental, and economic considerations.

4.0 Corps Response to Comments Received on Corps Plan Formulation Letter Dated 17 January 1984.

4.01 Federal Agencies.

U.S. DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL MARINE FISHERIES SERVICE (NMFS), 30 JANUARY 1984

Comment 1. We reviewed the information you provided that related to a proposed Federal navigation improvement project at Sandy Point, Washington. You also solicited our views regarding mitigation that may be appropriate to compensate for adverse impacts that would result from the construction of the project.

The project has been modified substantially from earlier designs which considered the construction of two jetties; a jetty would have been constructed on each side of the entrance channel. Now being considered are a single jetty on the outside of the harbor and on the north side of the channel and a smaller jetty on the inside of the harbor.

Response. Comment acknowledged.

Comment 2. The outside jetty would cover one acre of intertidal/subtidal habitat. In addition, south-bound littoral drift material would be trapped by the jetty; the material could cover and impact approximately 8 acres of intertidal/subtidal habitat north of the jetty. Although not discussed in this revised proposal, a sand bypass operation, or lack thereof, also could impact an undetermined amount of habitat south of the entrance channel.

Response. Correct acreage for intertidal/subtidal areas of "outside jetty" and entrapment zone north of the "jetty" are 0.50 and 0.85 acres, respectively. A sand bypass operation was considered but discarded. A very high percentage of the dredged material would consist of fine sand which would not be ideally suited for structural fill south of the entrance channel. The material, if placed here, would be subjected to commonly occurring southerly wave attack and would rapidly erode. Transport of this material into the Lummi tideflats could cause burying of valuable organisms and habitat.

Comment 3. It is well documented in the material you provided that Pacific herring spawn at and adjacent to the presently proposed outside jetty. The permanent loss of habitats that are suitable for herring spawning activities must be avoided or replaced. The importance of this habitat and the herring resource in this area is documented in the draft Fish and Wildlife Coordination Act Report prepared by the Fish and Wildlife Service for this project.

Response. Subsequent to receipt of this and other resource agency concerns over the potential for loss of herring spawning habitat due to placement of the proposed north outer breakwater, the adjacent accretion beach and

project dredging, a coordinated Corps/FWS/WDF underwater survey was conducted. Results from the survey indicated that no herring spawning habitat (i.e., eelgrass) is in the channel and breakwater areas, and a few patches of eelgrass 2 to 4 feet in diameter were found in the proposed accretion beach area. (These few patches of eelgrass will be relocated to nonvegetated areas as one component of project mitigation.) Accordingly, contrary to initial agency opinions, the project will not result in herring spawning habitat loss.

Comment 4. The following comments regarding mitigation for probable impacts that would occur to herring habitat are submitted for your consideration:

1. It may be possible to create habitat(s) that would be acceptable to herring for spawning. However, to our knowledge this type of mitigation has not been successfully demonstrated. Therefore, any effort to attempt this type of mitigation must be considered experimental.

2. A determined effort should be made to replace herring spawning habitat with a comfortable safety margin to assure the success of a no-net-loss of habitat. For example, you may wish to consider compensating for the loss of 1 acre of herring spawning habitat (jetty construction) by creating a cummulative total of 2 or 3 acres of habitat in several locations and by utilizing more than one mitigation concept.

3. Mitigation for the possible loss of 8 acres of habitat (sand and gravel accretion area) might be postponed until: (1) the amount of required mitigation would be determined and (2) the method of habitat creation that would have the greatest potential for success would be determined.

4. Should a determination be made that accretion of littoral drift on the north side of the breakwater would incur a significant impact on herring spawning habitat, it may be possible to intercept that drift material in an area that would be impacted to a lesser degree. If this would seem appropriate, then small rock groins or pile dikes might be considered. Subsequent bypass of accreted material to the erosion site south of the entrance channel would then have to be considered.

Response. See response to comment 3.

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION X, 31 JANUARY 1984

Comment 1. We are responding to your January 17, 1984, letter concerning proposed navigation improvements for the Sandy Point small boat harbor. In developing our response, we reviewed the draft U.S. Fish & Wildlife Coordination Act report and participated in interagency meetings on this project.

Response. Comment acknowledged.

Comment 2. As currently proposed, the project consists of dredging to increase the width and depth of the entrance navigation channel and construction of a breakwater to prevent storm waves from entering the small boat harbor. Currently, because of the small entrance channel, waves are naturally deflected. However, breakwater construction will be necessary if the entrance channel is substantially increased in size.

Response. Project design features are addressed in section 4 of the DPR.

Comment 3. We have the following environmental concerns with the project:

Construction of the jetty will result in the loss of about 1 acre of benthic habitat utilized by herring for spawning. To date mitigation to offset loss of herring spawning habitat has not been adequately demonstrated. Since herring spawn on a site specific basis, loss of this spawning area will result in a population reduction of the herring stock which utilize the affected area.

Response. The project will not result in significant habitat loss; see responses to comments 2 and 3 of NMFS letter dated 30 January 1984.

Comment 4. Construction of the jetty will force juvenile salmon, migrating adjacent to the shore, into deep water where they will be subject to increased predation by larger salmon and bottom fish.

Response. The jetty (north outer breakwater) length and alinement have been modified to the maximum extent possible (while still achieving the planning objective). Based upon the environmental assessment, the revised breakwater length will not cause significant adverse impacts to migrating juvenile salmon.

Comment 5. Material dredged from the navigation channel should be disposed of in an environmentally acceptable manner. Acceptable alternatives include; 1) upland disposal, 2) beach nourishment (using U.S. Fish and Wildlife criteria), and 3) in-water disposal at an approved disposal site. The nearest approved site is located in Bellingham Bay. Open-water disposal in an undesignated site is not an acceptable alternative.

Response. The tentatively recommended project plan includes disposal of dredged material in open water at the DNR approved site in Bellingham Bay.

Comment 6. Our primary concern with the project is construction of the jetty and its impact on herring spawning. The dredging which occurs predominantly on sand, away from spawning areas, is not considered to be a significant impact.

A scaled down project not requiring jetty construction can be designed. The boat harbor has been actively used since initial construction in the late 1950's without the aid of a breakwater. We also understand that maintenance

dredging has not been required since initial harbor construction. Adverse impacts associated with storm wave action in the inner harbor have been prevented by the existing small entrance channel opening. A modified design, which maintains a small opening, will continue to prevent adverse wave impacts.

We believe a project with the following elements is feasible:

1. Deepen the existing entrance channel only to the depth which is necessary for navigation. There should be little or no overdredging. The channel width should be maintained at or near its current width. Frequent maintenance dredging of small quantities of material will likely be required.

2. Overdredge in front of the entrance channel to provide a trap for sediments contained in the littoral current. This sediment trap should be dredged whenever it begins to fill and become ineffective.

We are concerned that destruction of herring spawning habitat, without proper mitigation, would be significant and establish a precedent for other construction in spawning areas. In this case, a smaller scale project with less dredging and no jetty fill would be a reasonable alternative and reduce adverse impacts on aquatic resources.

Response. In regard to channel design, see paragraphs 3.04 to 3.07 of the DPR for a discussion of why channel improvement only, as suggested above, would not provide needed wave protection to the inner harbor and would involve costly maintenance dredging at least once a year. In regard to herring spawning, project impacts on herring spawning have been determined to be minimal.

WASHINGTON STATE DEPARTMENT OF ECOLOGY, 28 FEBRUARY 1984

Comment 1. This letter is in resonse to your January 19 letter requesting our views on the Sandy Point channel improvement proposal. You specifically asked what mitigation might be possible to compensate for the anticipated herring spawning area loss and effects of the breakwater on migrating salmonids and crab habitat. We have deferred to the Department of Fisheries on these specific questions (see attached letter). Our comments follow:

The proposed project will be within shorelines of statewide significance wherever developments (dredging and breakwater) go below -4.5 feet (MLLW) tidal elevation. Because of this, any shoreline permit receives a more stringent review mandated by the Shoreline Management Act.

Response. Your comment about mitigation is acknowledged. Regarding shoreline permits, the Coastal Zone Management Act (CZMA) requires Federal agencies conducting activities directly affecting a state's coastal zone to comply to the maximum extent practicable with an approved state coastal zone management plan. The project as proposed will comply with the requirements of CZMA.

Comment 2. One of the major questions to be addressed is whether or not Sandy Point is an accretion shoreform. The Whatcom County Shoreline Master

Program prohibits dredging on accretion shoreforms and discourages breakwater construction. If Sandy Point is considered to be an "accretion shoreform," the project would require a revision to the Shoreline Master Program and the breakwater would require a shoreline conditional use permit.

Response. While we are not sure what constitutes an "accretion shoreform," following is a general description of shorelines that should provide you the information to determine whether it is or is not an "accretion shoreform." The entire Sandy Point spit was probably formed during the last 3,000 to 5,000 years as a result of littoral drift accretion. At present, the west shoreline is believed to be relatively stable in the near term (say, next 50 years) but undergoes severe erosion during major storms followed by a rapid rebuilding of the beach upon the return of average wave conditions. The south shoreline is relatively stable except that upland fill exposed to southerly wave attack is eroding at the rate of about 2 feet per year. The easterly shoreline probably is experiencing very minor erosion. Investigations of historic aerial photographs and maps indicate very minor accretion or erosion changes along any part of the entire Sandy Point spit. Accretion is very definitely occurring, of course, in the channel dredged in 1958.

WASHINGTON STATE DEPARTMENT OF FISHERIES, 27 FEBRUARY 1984

Comment 1. We have received a copy of the January 17, 1984 letter sent to you by the Corps of Engineers. This letter requested a State of Washington position regarding the Sandy Point channel improvement proposal.

Response. Comment acknowledged.

Comment 2. The Washington Department of Fisheries (WDF) has carefully reviewed the preferred design and the various alternatives that have been proposed by the Corps of Engineers. We recognize the need to provide boat access to the Sandy Point yacht basin. However, we must object to the preferred alternative that was illustrated in the January 17, 1984 correspondence from the Corps of Engineers for the following reasons.

As proposed, the placement of a 350-foot rock breakwater and adjacent beach accretion to the north would overcover Pacific herring spawning substrate and habitat utilized by Dungeness crab. Additionally, the breakwater design does not conform to WDF regulations which were established for the protection of outmigrating juvenile salmonids. These project related impacts have been elaborated upon in the Draft U.S. Fish and Wildlife Coordination Act Report concerning this proposal.

Response. Based on the results of the environmental assessment, no significant loss of herring spawning and crab habitat is foreseen. The breakwater slopes of 1.5 horizontal on 1 vertical would provide a shallow water passageway along which juvenile salmonids can progress with some protection from predators without being forced into deep water. WDF regulations have been complied with to the maximum extent permitted by Federal law.

Comment 3. Recognizing the need for navigation improvements at Sandy Point, WDF would not object to the Corps of Engineers performing maintenance dredging of the existing entrance channel to the yacht basin that was done in the late 1950's. For the protection of Pacific herring, Dungeness crab and outmigrating juvenile salmonids, the acceptable time period for dredging would be limited to December 1 to March 15. Dredging during this time period would avoid the peak crab molting period from sublegal to legal size as well as peak mating and harvesting times. To protect the Dungeness crab which may be found within the project site during this time period, dredging should be restricted to the use of a clamshell dredge.

Response. See Sections 3.04 to 3.07 of the DPR for reasons why dredging alone would not provide needed wave protection to the inner harbor and would require expensive yearly maintenance dredging. The dredging period would be from 1 December to 15 March. The tentatively recommended plan includes clamshell dredging.

LUMMI INDIAN TRIBE, 31 MAY 1984

Comment 1. The Lummi Indian Business Council has reviewed the latest Corps of Engineers plans for the Sandy Point Small Boat Harbor and have the following comments.

1. The Lummi Tribe and Santy Point Entrance Committee have been negotiating a revised lease for tidelands and the entrance channel over tidelands. At this point it appears that the various interests represented by the committee are fragmental and will have a difficult time getting together to negotiate an acceptable lease. The Tribe will oppose the project unless an acceptable lease is signed prior to submitting the DPR higher authority.

Response. Comment acknowledged. Local sponsor and local interests are aware of the Lummi Tribe's lease concerns and are attempting to resolve the issue to the satisfaction of all parties.

Comment 2. The Tribe does not recognize navigational servitude over Tribal lands including tidelands and accretion beaches, and will require a lease for all improvements including breakwaters, channels and navigation aids.

Response. Comment is acknowledged but the Corps nevertheless is of the legal opinion that navigation servitude does apply to all land below the mean high water line.

Comment 3. The local sponsor must comply with the Tribal permits process, including shoreline and land use permits.

Response. Comment is acknowledged and has been forwarded on to the local sponsor since this is a non-Federal issue.

Comment 4. The method of financing the lease must be acceptable to the Tribe.

Response. Comment is acknowledged and has been forwarded on to the local sponsor. This is a non-Federal issue; however, it is the Corps' understanding that local interests and the local sponsor have been coordinating with the Tribe to resolve their differences.

Comment 5. Environmental concerns expressed in a letter to you from the Lummi Fisheries dated 6 July 1983 must be resolved to the satisfaction of the Fisheries Director.

Response. Fishery director concerns have been resolved. See Corps response to Lummi letter dated 6 July 1983.

LUMMI INDIAN BUSINESS COUNCIL, 6 JULY 1983

Comment 1. This letter is in response to the planning assistance letter submitted to you by the US Fish & Wildlife Service regarding the proposed Sandy Point Small Boat Harbor Study. We are providing this for your planning information only, and will certainly remain involved in any further discussions.

Response. Comment acknowledged.

Comment 2. Lummi Fisheries generally agrees with the comments made by US Fish and Wildlife Service. We also recommend that the Corps seriously consider, as one of its planning options, a project that eliminates the proposed jetty construction at the harbor entrance, and consists of periodic maintenance dredging only. Environmental impacts from the addition of the jetties could outweigh the possible benefits of reducing the shoaling problem. Some of the more serious areas of concern are:

1. The possible displacement of juvenile salmonids from their normal migration routes into deeper water, where they may be subject to additional mortality.

Response. See paragraphs 3.04 to 3.07 for reasons why dredging only would not provide needed wave protection to the inner harbor and would require expensive yearly dredging. No significant adverse impacts to juvenile salmonid migration due to project breakwater length are foreseen.

Comment 3. 2. The interruption of the normal pattern of littoral drift along this high energy beach. The consequences, even with a bypass plan, might involve the removal or relocation of beach material capable of supporting algae that in the past have been used as a substrate for spawning herring. It is suspected that the natural drift processes that have formed Sandy Point have already been interrupted by riprapping at the Mobil and Intalco docks several miles to the north. This may have prevented the flow of beach material southward from the feeder bluffs at Cherry Point. This change may be evident from the proliferation of breakwaters at Sandy Point, to the North of the harbor

opening, and from the reports of erosion on the southern tip of Sandy Point. This may be partly due to the past dredging of the entrance channel, but there is growing evidence from aerial photos that the replacement of beach material forming Sandy Point has been slowed by past breakwater development.

Response. The effects of various structures on the littoral drift would be very difficult to assess, and perhaps impossible to accurately quantify. We believe, however, that the 1958 channel dredging has been by far the most important factor to the shoreline south of the entrance.

Comment 4. 3. The effects of reflecting waves off the proposed jetties may contribute to the littoral drift interruption. A magnification of wave action is likely to accelerate the the property damage which has already occurred nearby. This wave action from the north and westerly fetch, when reflected, could cause severe damage and may even accelerate the shoaling process.

Response. While the breakwaters will cause wave reflection, we do not foresee any adverse effects resulting. The shoreline north of the breakwater should accrete. That will provide more protection than presently exists. We do expect some greater wave activity between the outer and inner north breakwaters as a result of wave reflection during southerly wave attack. The tentatively recommended plan includes a revetment in this area to prevent upland erosion.

4.04 Comment Letters Received on the Corps Plan Formulation Letter dated 17 January 1984.

JAN 17 1984

Planning Branch

Donald W. Moos, Director
Washington Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504

Dear Mr. Moos:

The Seattle District is presently planning navigation improvements for the existing entrance channel to a marinade harbor located at Sandy Point, Washington, in Whatcom County. These improvements will include construction of rock breakwaters for wave protection and sediment deflection and dredging of a new entrance channel to the harbor which was created in the late 1960's. Without the breakwaters and channel improvement, shoaling is expected to close the harbor entrance within a few years. This will significantly affect the market value of numerous properties located at Sandy Point, including approximately 200 of which have waterfront access and individual boat slips. It is conservatively estimated that the value of Sandy Point properties would drop by as much as $8 million if the closure occurs. In addition, an important harbor of refuge would be lost to over 400 transient commercial and recreational pleasure craft which annually navigate through the existing entrance. Two marinas are located within Sandy Point as well as a boat launch ramp. Local interests are seeking our help in arriving at a solution to this problem under authority of Section 107 of the 1960 River and Harbor Act.

We have enclosed a drawing of a project design plan that is now being finalized (enclosure 1). This plan reflects considerable coordination and input from state and Federal resource agencies and local interests. The project design minimizes environmental impacts to the maximum extent practicable. During project formulation, particular attention was paid to reducing the size and length of the channel and breakwaters while ensuring necessary marina protection and feasibility of project maintenance. However, we do anticipate that some unavoidable adverse impacts will result. These include loss of a small amount (± 1 acre) of herring spawning habitat due to construction of the 350-foot-long breakwater that extends into the Strait of Georgia and adjacent beach accretion to the north of this breakwater. The breakwater will also cause a deviation in the normal migratory route of juvenile salmonids and will coverup intertidal areas that may be valuable crab habitat.

The purpose of this letter is to solicit your views regarding what, if any, mitigation might be possible to compensate for the anticipated herring spawning area loss and effects of the breakwater on migrating salmonids and crab habitat. Specific proposals are needed by February 1, 1984. Our schedule calls for completion of a draft feasibility report in March.

If you have any questions, please contact Carl Menconi, Environmental Coordinator of our Environmental Resources Section at telephone (206) 764-3624, and Andy Maser, Study Manager, Navigation and Coastal Planning Section, at telephone (206) 764-3651.

A similar letter has been furnished to those identified on enclosure 2.

Sincerely,

GEORGE W. PLOUDRE, P.E.
Asst. Chief, Engineering Division

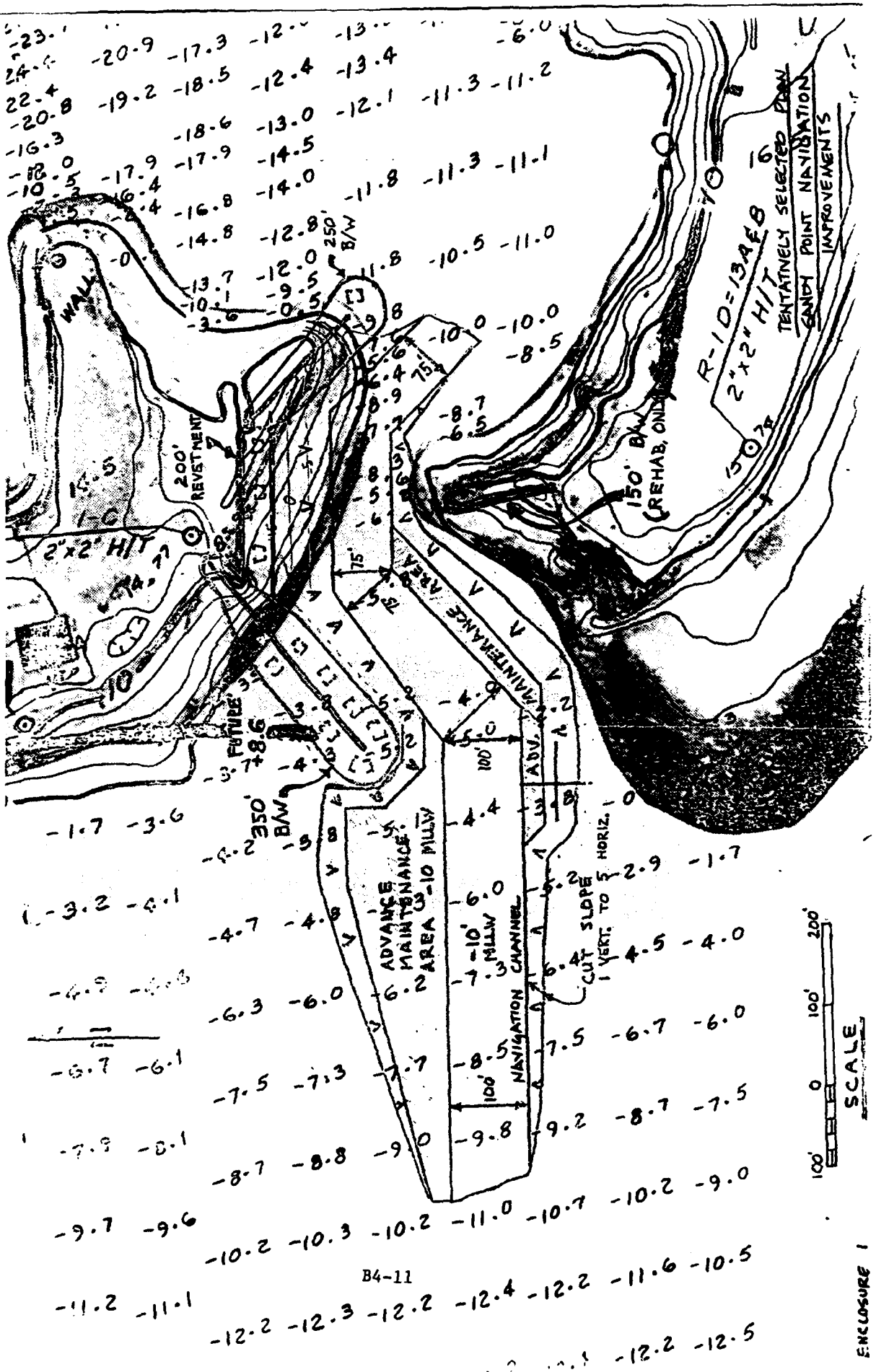
Enclosures

Copy Furnished:

Brian Boyle, Commissioner of Public Lands
Washington Department of Natural Resources
Mail Stop QW-21
Olympia, Washington 98504

Frank R. Lockard, Director
Washington Department of Game
600 North Capitol Way
Mail Stop GJ-11
Olympia, Washington 98504

William R. Wilkerson, Director
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504


TENTATIVELY SELECTED PLAN
CANDY POINT NAVIGATION IMPROVEMENTS
R-10=13AE8 16
2"x2" HIT
150' B/W
REHAB. ONLY
200' REVETMENT
WALL
14.5
1-C
2"x2" HIT
FUTURE 350' B/W
ADVANCE MAINTENANCE AREA -10 MLLW
MAINTENANCE AREA
NAVIGATION CHANNEL
-10' MLLW
CUT SLOPE 1 VERT. TO 5 HORIZ.
ADV.
100'
75'
250' B/W
SCALE
100' 0 100' 200'

ENCLOSURE 1

SAME CORRESPONDENCE SENT TO:

Donald W. Moos, Director
Washington Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504

COPIES FURNISHED:

Brian Boyle, Commissioner of Public Lands
Washington Department of Natural Resources
Mail Stop QW-21
Olympia, Washington 98504

Frank R. Lockard, Director
Washington Department of Game
600 North Capitol Way
Mail Stop GJ-11
Olympia, Washington 98504

William R. Wilkerson, Director
Washington Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

Dale Evans, Director
National Marine Fisheries Service
847 NE. 19th, Suite 350
Portland, Oregon 97232

Charles Dunn, Field Supervisor
U.S. Fish and Wildlife Service
2625 Parkmont Lane, Building B-3
Olympia, Washington 98502

Ernesta Barnes, Regional Administrator
Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Paul Rushing, Director
Whatcom County Department of Public Works
401 Grand Avenue
Bellingham, Washington 98225

Larry Kinley, Chairman
Lummi Indian Business Council
2616 Kwina Road
Bellingham, Washington 98226

DAN WALKER
4038 MAYNE LANE
FERNDALE, WA 98248

CURTIS DAHLGREN
WASH. DEPT OF FISHERIES
115 GENERAL ADMINISTRATION BLDG
OLYMPIA, WA 98504

DAVID STOUT
U.S. FISH AND WILDLIFE SERVICE
2625 PARKMONT LN BLDG B-3
OLYMPIA, WA 98502

JEAN CALDWELL
LUMMI INDIAN FISHERIES
2616 KWINA RD
BELLINGHAM, WA 98226

JIM THORNTON
WASH. DEPT OF ECOLOGY
PV-11
OLYMPIA, WA 98504

ENCLOSURE 2

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, SUITE 350
PORTLAND, OREGON 97232
(503) 230-5400

January 30, 1984 F/NWR5

Colonel Norman C. Hintz
District Engineer, Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Hintz:

We reviewed the information you provided that related to a proposed Federal navigation improvement project at Sandy Point, Washington. You also solicited our views regarding mitigation that may be appropriate to compensate for adverse impacts that would result from the construction of the project.

The project has been modified substantially from earlier designs which considered the construction of two jetties; a jetty would have been constructed on each side of the entrance channel. Now being considered are a single jetty on the outside of the harbor and on the north side of the channel and a smaller jetty on the inside of the harbor.

The outside jetty would cover one acre of intertidal/subtidal habitat. In addition, south-bound litteral drift material would be trapped by the jetty; the material could cover and impact approximately eight acres of intertidal/subtidal habitat north of the jetty. Although not discussed in this revised proposal, a sand bypass operation, or lack thereof, also could impact an undetermined amount of habitat south of the entrance channel.

It is well documented in the material you provided that Pacific herring spawn at and adjacent to the presently proposed outside jetty. The permanent loss of habitats that are suitable for herring spawning activities must be avoided or replaced. The importance of this habitat and the herring resource in this area is documented in the draft Fish and Wildlife Coordination Act Report prepared by the Fish and Wildlife Service for this project.

The following comments regarding mitigation for probable impacts that would occur to herring habitat are submitted for your consideration:

1. It may be possible to create habitat(s) that would be acceptable to herring for spawning. However, to our knowledge this type of mitigation has not been successfully demonstrated. Therefore any effort to attempt this type of mitigation must be considered experimental.

2. A determined effort should be made to replace herring spawning habitat with a comfortable safety margin to assure the success of a no-net-loss of habitat. For example, you may wish to consider compensating for the loss of one acre of herring spawning habitat (jetty construction) by creating a cummulative total of two or three acres of habitat in several locations and by utilizing more than one mitigation concept.

3. Mitigation for the possible loss of eight acres of habitat (sand and gravel accretion area) might be postponed until 1) the amount of required mitigation would be determined and 2) the method of habitat creation that would have the greatest potential for success would be determined.

4. Should a determination be made that acretion of litteral drift on the north side of the breakwater would incur a significant impact on herring spawning habitat, it may be possible to intercept that drift material in an area that would be impacted to a lesser degree. If this would seem appropriate, then small rock groins or pile dikes might be considered. Subsequent bypass of acreted material to the erosion site south of the entrance channel would then have to be considered.

Since a representative of this agency has not had an opportunity to inspect the site or participate in preproject planning sessions, the mitigation comments above are suggestive only and are not recommendations. Thank you for the opportunity to comment.

Sincerely yours,

Dale R. Evans
Division Chief

cc: Washington Dept. of Fisheries
Washington Dept. of Game
Fish and Wildlife Service, Olympia
Environmental Protection Agency
Department of Ecology

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 423

JAN 31 1984

Mr. George W. Ploudre, P.E.
Assistant Chief, Engineering Division
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Attn: Planning Branch

RE: Sandy Point Channel Improvement Project

Dear Mr. Ploudre:

We are responding to your January 17, 1984, letter concerning proposed navigation improvements for the Sandy Point small boat harbor. In developing our response, we reviewed the draft U.S. Fish & Wildlife Coordination Act report and participated in interagency meetings on this project.

As currently proposed, the project consists of dredging to increase the width and depth of the entrance navigation channel and construction of a breakwater to prevent storm waves from entering the small boat harbor. Currently, because of the small entrance channel, waves are naturally deflected. However, breakwater construction will be necessary if the entrance channel is substantially increased in size.

We have the following environmental concerns with the project:

1. Construction of the jetty will result in the loss of about one acre of benthic habitat utilized by herring for spawning. To date mitigation to offset loss of herring spawning habitat has not been adequately demonstrated. Since herring spawn on a site specific basis, loss of this spawning area will result in a population reduction of the herring stock which utilize the affected area.

2. Construction of the jetty will force juvenile salmon, migrating adjacent to the shore, into deep water where they will be subject to increased predation by larger salmon and bottom fish.

3. Material dredged from the navigation channel should be disposed of in an environmentally acceptable manner. Acceptable alternatives include; 1) upland disposal, 2) beach nourishment (using U.S. Fish and Wildlife criteria), and 3) in-water disposal at an approved disposal site. The nearest approved site is located in Bellingham Bay. Open-water disposal in an undesignated site is not an acceptable alternative.

Our primary concern with the project is construction of the jetty and its impact on herring spawning. The dredging which occurs predominately on sand, away from spawning areas, is not considered to be a significant impact.

A scaled down project not requiring jetty construction can be designed. The boat harbor has been actively used since initial construction in the late 1950's without the aid of a breakwater. We also understand that maintenance dredging has not been required since initial harbor construction. Adverse impacts associated with storm wave action in the inner harbor have been prevented by the existing small entrance channel opening. A modified design, which maintains a small opening, will continue to prevent adverse wave impacts.

We believe a project with the following elements is feasible:

1. Deepen the existing entrance channel only to the depth which is necessary for navigation. There should be little or no overdredging. The channel width should be maintained at or near its current width. Frequent maintenance dredging of small quantities of material will likely be required.

2. Overdredge in front of the entrance channel to provide a trap for sediments contained in the littoral current. This sediment trap should be dredged whenever it begins to fill and become ineffective.

We are concerned that destruction of herring spawning habitat, without proper mitigation, would be significant and establish a precedent for other construction in spawning areas. In this case, a smaller scale project with less dredging and no jetty fill would be a reasonable alternative and reduce adverse impacts on aquatic resources.

For further coordination on this project, please contact Carl Kassebaum of my staff at (206) 442-1447.

Sincerely,

Robert S. Burd
Director, Water Division

cc: USFWS (Olympia)
NMFS
WDE
WDF
WDG
WDNR

JOHN SPELLMAN
Governor

DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504 • (206) 459-6000

February 28, 1984

Geroge W. Ploudre
Dept. of the Army
Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Ploudre,

This letter is in response to your January 19, letter requesting our views on the Sandy Point channel improvement proposal. You specifically asked what mitigation might be possible to compensate for the anticipated herring spawning area loss and effects of the breakwater on migrating salmonoids and crab habitat. We have defered to the Department of Fisheries on these specific questions (see attached letter). Our comments follow:

The proposed project will be within shorelines of statewide significance wherever developments (dredging & breakwater) go below -4.5 feet (MLLW) tidal elevation. Because of this, any shoreline permit recieves a more stringent review mandated by the Shoreline Management Act.

One of the major questions to be addressed is whether or not Sandy Point is an accretion shoreform. The Whatcom County Shoreline Master Program prohibits dredging on accretion shoreforms and discourages breakwater construction. If Sandy Point is considered to be an "accretion shoreform, the project would require a revision to the Shoreline Master Program and the breakwater would require a shoreline conditional use permit.

We hope these comments are useful. As usual, this agency will coordinate the State response on the Corps Public Notice and NEPA document.

Sincerely,

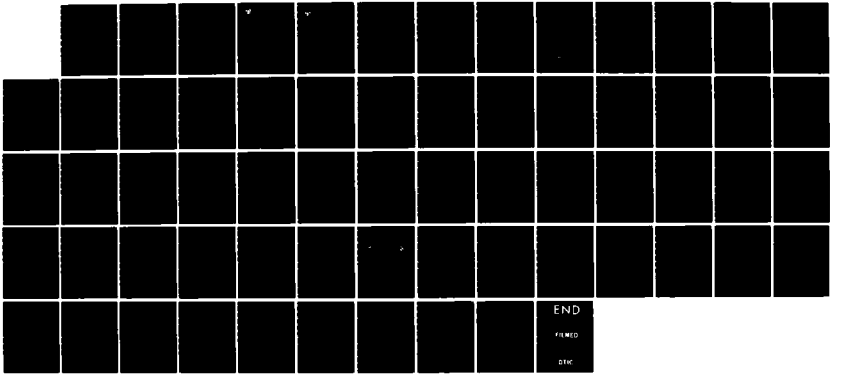
Dennis Lundblad
Assistant Director, Acting
Office of Operations and Enforcement

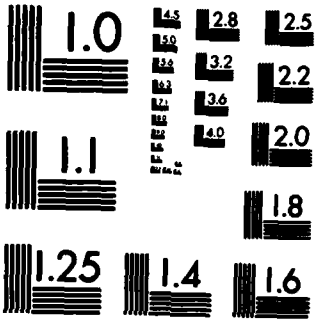
BC:lac

cc: Curt Dahlgren, DOF
Jim Thornton, DOE
Pat Bucknell, DOE
Greg Sorlie, DOE
Jamie Hartly, DOE

AD-A150 592 DRAFT DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT SANDY POINT NA..(U) CORPS OF ENGINEERS SEATTLE WA SEATTLE DISTRICT NOV 84 3/3

UNCLASSIFIED F/G 13/2 NL





JOHN SPELLMAN
Governor

WILLIAM R. WILKERSON
Director

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building • Olympia, Washington 98504 • (206) 753-6600 • (SCAN 234-6600)

February 27, 1984

Mr. Donald Moos, Director
Washington Department of Ecology
St. Martins Campus
Lacey, Washington 98504

Attention Mr. Greg Sorlie

Gentlemen:

We have received a copy of the January 17, 1984 letter sent to you by the Corps of Engineers. This letter requested a State of Washington position regarding the Sandy Point channel improvement proposal.

The Washington Department of Fisheries (WDF) has carefully reviewed the preferred design and the various alternatives that have been proposed by the Corps of Engineers. We recognize the need to provide boat access to the Sandy Point yacht basin. However, we must object to the preferred alternative that was illustrated in the January 17, 1984 correspondence from the Corps of Engineers for the following reasons.

As proposed, the placement of a 350-foot rock breakwater and adjacent beach accretion to the north would overcover Pacific herring spawning substrate and habitat utilized by Dungeness crab. Additionally, the breakwater design does not conform to WDF regulations which were established for the protection of outmigrating juvenile salmonids. These project related impacts have been elaborated upon in the Draft U.S. Fish and Wildlife Coordination Act Report concerning this proposal.

Recognizing the need for navigation improvements at Sandy Point, WDF would not object to the Corps of Engineers performing maintenance dredging of the existing entrance channel to the yacht basin that was done in the late 1950's. For the protection of Pacific herring, Dungeness crab and outmigrating juvenile salmonids, the acceptable time period for dredging would be limited to December 1 to March 15. Dredging during this time period would avoid the peak crab molting

period from sub-legal to legal size as well as peak mating and harvesting times. To protect the Dungeness crab which may be found within the project site during this time period, dredging should be restricted to the use of a clamshell dredge.

Please forward a copy of this letter to the Corps of Engineers as part of the State of Washington's position on this project.

Sincerely,

Leonard E. Kinney for

William R. Wilkerson,
Director

WRW:CD:sp

cc: USFWS

LUMMI INDIAN BUSINESS COUNCIL

2616 KWINA RD. • BELLINGHAM, WASHINGTON 98226-9298 • (206) 734-8180

DEPARTMENT: Administration Office EXT. 220

May 31, 1984

Col. Norman Hintz
District Engineer
U.S. Army Corp of Engineers
P.O. Box C-3575
Seattle, WA 98124

Dear Col. Hintz:

The Lummi Indian Business Council has reviewed the latest Corps of Engineers plans for the Sandy Point Small Boat Harbor and have the following comments.

1. The Lummi Tribe and Sandy Point Entrance Committee have been negotiating a revised lease for tidelands and the entrance channel over tidelands. At this point it appears that the various interests represented by the committee are fragmental and will have a difficult time getting together to negotiage an acceptable lease. The Tribe will oppose the project unless an acceptable lease is signed prior to submitting the DPR higher authority.

2. The Tribe does not recognize navigational servitude over Tribal lands including tidelands and accretion beaches, and will require a lease for all improvements including breakwaters, channels and navigation aids.

3. The local sponsor must comply with the Tribal permits process, including shoreline and land use permits.

4. The method of financing the lease must be acceptable to the Tribe.

5. Environmental concerns expressed in a letter to you from the Lummi Fisheries dated July 6, 1983 must be resolved to the satisfaction of the Fisheries Director.

If you have any questions, please feel free to contact this office.

Sincerely,

Fred F. Lane
Vice Chairman
LUMMI INDIAN BUSINESS COUNCIL

FFL:mlc
cc. Paul Rushing
Dan Walker

B4-21

LUMMI INDIAN BUSINESS COUNCIL
2616 KWINA RD. • BELLINGHAM, WASHINGTON 98226-9298 • (206) 734-8180

DEPARTMENT: Fisheries EXT. 237

Col. Norman C Hintz
District Engineer
US Army Corps of Engineers
4735 E Marginal Way S
Seattle WA 98134

July 6, 1983

Dear Col. Hintz;

This letter is in response to the planning assistance letter submitted to you by the US Fish & Wildlife Service regarding the proposed Sandy Point Small Boat Harbor Study. We are providing this for your planning information only, and will certainly remain involved in any further discussions.

Lummi Fisheries generally agrees with the comments made by USF&WS. We also recommend that the Corps seriously consider, as one of its planning options, a project that eliminates the proposed jetty construction at the harbor entrance, and consists of periodic maintainance dredging only. Environmental impacts from the addition of the jetties could outweigh the possible benefits of reducing the shoaling problem. Some of the more serious areas of concern are:

1. The possible displacement of juvenile salmonids from their normal migration routes into deeper water, where they may be subject to additional mortality.

2. The interruption of the normal pattern of littoral drift along this high energy beach. The consequences, even with a bypass plan, might involve the removal or relocation of beach material capable of supporting algaes that in the past have been used as a substrate for spawning herring. It is suspected that the natural drift processes that have formed Sandy Point have already been interrupted by riprapping at the Mobil and Intalco docks several miles to the north. This may have prevented the flow of beach material southward from the feeder bluffs at Cherry Point. This change may be evident from the proliferation of breakwaters at Sandy Point, to the North of the harbor opening, and from the reports of erosion on the southern tip of Sandy Point. This may be partly due to the past dredging of the entrance channel, but there is growing evidence from aerial photos that the replacement of beach material forming Sandy Point has been slowed by past breakwater development.

Letter to Col. Hintz, COE, July 6, 1983

3. The effects of reflecting waves off the proposed jetties may contribute to the littoral drift interruption. A magnification of wave action is likely to accelerate the the property damage which has already occurred nearby. This wave action from the north and westerly fetch, when reflected, could cause severe damage and may even accelerate the shoaling process.

Lummi Fisheries appreciates the opportunity to submit these comments. We will continue our co-ordination with your staff and USF&WS on this matter. Please feel free to contact Jean Caldwell of this office should any questions arise.

Sincerely,

Jewell P.W. James
Director. Lummi Indian Fisheries

cc: Charles A. Dunn, USF&WS

APPENDIX C

ENGINEERING, DESIGN, AND COST ESTIMATES

SECTION 1. DESIGN CONSIDERATIONS

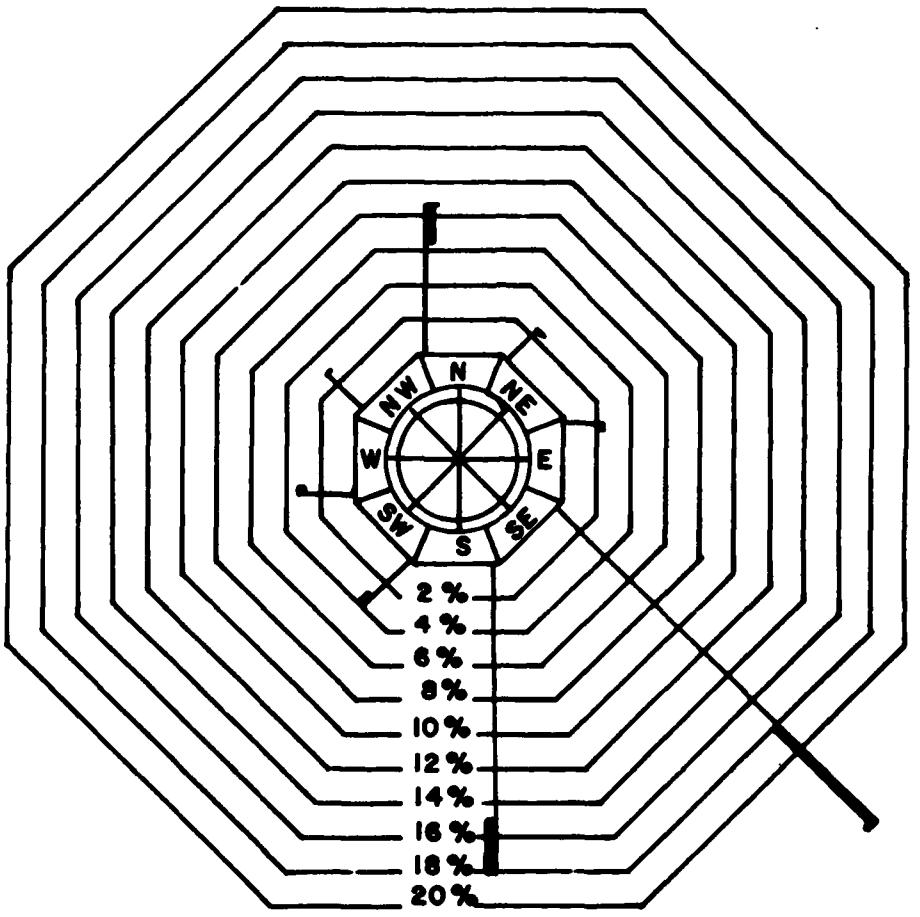
1.01 Site Description. Sandy Point is located on the northwestern side of Lummi Bay along the eastern side of the Strait of Georgia. The proposed project would consist of improving an existing entrance into Sandy Point harbor by dredging and the addition of breakwater protection. The existing marina development was begun in 1958 when the shoreline was breached and extensive dredging of the interior undertaken to provide a source of fill material for the Tsawwassen ferry terminal in British Columbia, Canada. Local improvements and dredging of many of the long, narrow canals took place during the 1960's and early 1970's. Initially the breach was reportedly about 400 feet wide with depths greater than -10 feet mean lower low water (MLLW). At present the entrance width is about 50 feet at MLLW with depths less than 5 feet at MLLW as a result of littoral drift shoaling. Continued littoral drift shoaling will further cause restrictions of the entrance channel.

1.02 Tides and Currents. Tides at Sandy Point are typical of the Pacific Coast of North America. Tides are of the mixed type with two unequal highs and lows each day. Tidal data near Sandy Point, published by the National Ocean Service, are as follows:

Datum Plane	Elevation in Feet Referred to MLLW Datum
Highest Estimated Tide	12.00 ± 0.5
Mean Higher High Water	8.60
Mean High Water	7.80
Mean (Half) Tide Level	5.15
Mean Low Water	2.50
Mean Lower Low Water	0.00
Lowest Estimated Tide	-4.50 ± 0.5

1.03 Currents in the Strait of Georgia are in a northerly direction during the flood phase and in a southerly direction during the ebb phase of the tide. Maximum currents during both flood and ebb are usually less than 1 knot just offshore of Sandy Point.

1.04 Winds. Wind data are available from Bellingham and Friday Harbor, Washington, and from Tsawwassen, British Columbia. Summer winds are predominantly from the south and southeast at Sandy Point. Wintertime storms, occasionally in excess of 50 miles per hour (m.p.h.), occur from both the south and north and with a westerly component at times. Northwest winds over the long, open fetch of the Strait of Georgia have generated severe wave conditions a number of times during the last 20 years, resulting in extensive property damage along the Sandy Point shoreline. Estimated wind frequency by direction and maximum wind velocities and duration curves, based on Bellingham and Friday Harbor data, are shown on figures C-1 and C-2. The less detailed Tsawwassen data generally shows a higher percent occurrence of northwest winds than that shown on figure C-1.



CALM 33 %

LEGEND

VELOCITY RANGE - M.P.H.

LESS THAN 4 - CALM

4 TO 12

13 TO 24

25 TO 38

OVER 38

SOURCE

Climatological Handbook,
Columbia Basin States
Published June 1968

BELLINGHAM WASH.
ANNUAL
WIND ROSE
FROM 1948 TO 1964
U.S. Army Engr. District, Seattle, Wash.
Comp: FLS
Drawn: FLS
Checked: NJM Date: 8/13/71

FIGURE C-1

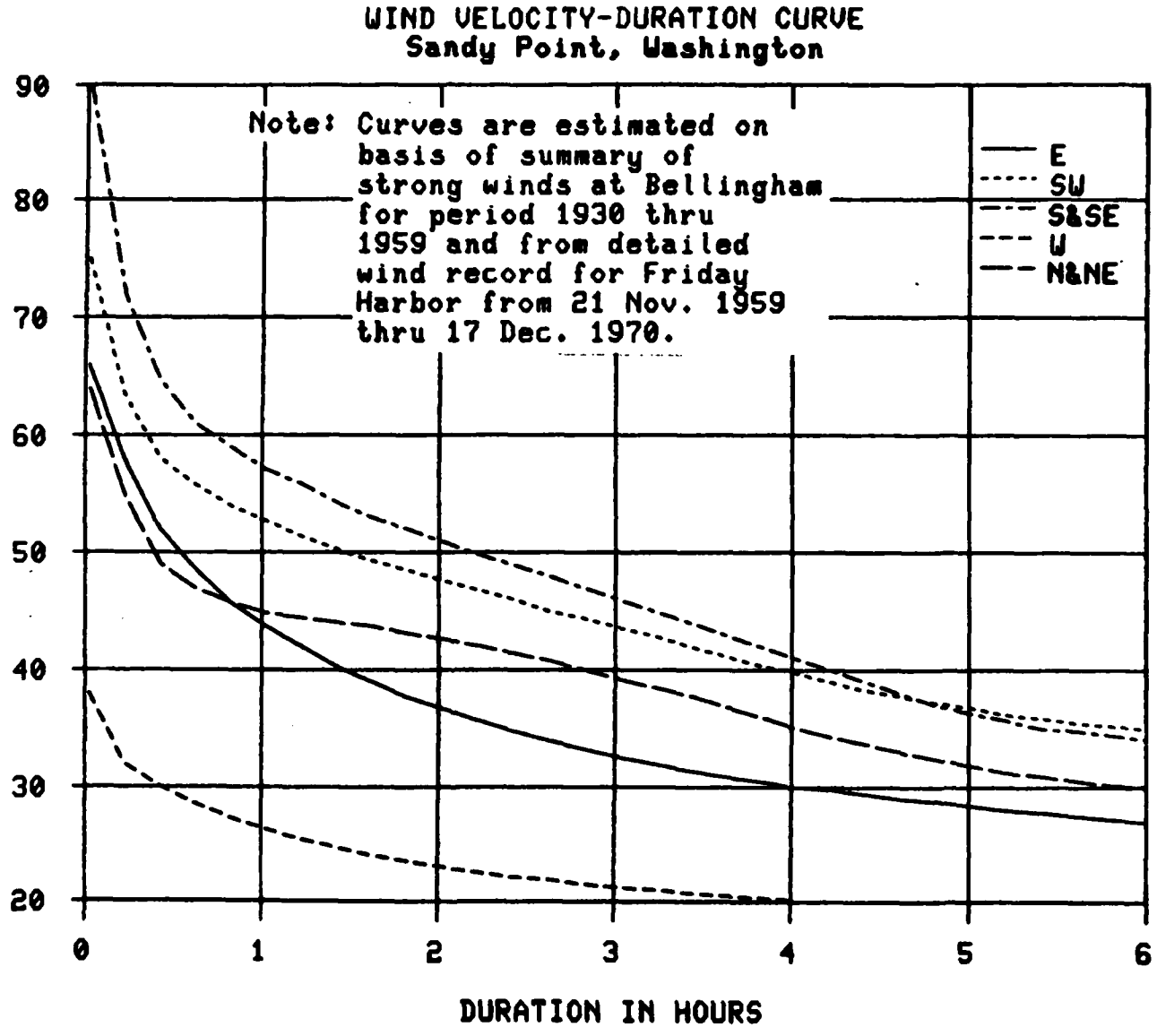

WIND VELOCITY-DURATION CURVE
Sandy Point, Washington
Note: Curves are estimated on basis of summary of strong winds at Bellingham for period 1930 thru 1959 and from detailed wind record for Friday Harbor from 21 Nov. 1959 thru 17 Dec. 1970.
E
SW
S&SE
W
N&NE
VELOCITY MPH
90
80
70
60
50
40
30
20
0
1
2
3
4
5
6
DURATION IN HOURS

FIGURE C-2

1.05 Waves.

a. Wind Generated Waves. The proposed entrance channel improvement project site is exposed to wind waves generated over open fetches from the south, westerly to the north. Land masses provide limited protection from the south, west, and from the north; the straight line exposed fetch to the northwest up the Strait of Georgia extends for about 100 miles. The longest effective fetch length extends about 43 miles up the Strait of Georgia. Deepwater design wave calculations were calculated by methods described in ETL 1110-2-305 dated 16 February 1984. The following tabulation shows maximum deepwater wave characteristics for the principal fetch lengths (see figure C-3) in the wave generating area at the proposed marina site. Wave refraction, shoaling, and diffraction at the entrance of the marina are discussed in paragraph 2.15 of this appendix.

Fetch (Azimuth)	Effective Fetch Length (Stat. Mile)	Wind Stress Factor (m.p.h.)	Duration (hours)	Wave Period (sec)	Deepwater Wave Length (feet)	Deepwater Wave Height (feet)
190°	6.0	96	1.4	4.7	113	7.1
215°	8.0	68	2.0	4.6	108	5.8
249°	11.0	68	2.0	5.1	138	6.8
270°	20.0	30	1.0	4.7	113	4.0
294°	43.0	40	6.7	6.7	230	7.9
320°	20.0	48	4.0	5.5	155	6.4

b. Vessel Generated Waves. Vessels using the navigation channel and harbor will be primarily pleasure craft but with some commercial fishing boats. Waves generated in the channel from these vessels will usually be on the order of 1/2 to 1 foot with maximums up to 1-1/2 feet for the larger vessels transiting the channel. Maximum vessel waves will be much less than wind generated waves in the entrance area. Vessel speed restrictions within the harbor should result in vessel waves comparable to those that presently occur.

1.06 Geologic Setting. Sandy Point is a geological ephemeral spit formed by southward migrating littoral drift. It lies along a portion of the outer edge of the Lummi River submarine delta immediately adjacent to a relatively steep marine slope which drops rapidly to the 10 fathom line in the Strait of Georgia. The sea cliffs and adjacent uplands to the north, which furnish detritus for natural maintenance of the spit, are composed of glacial and glacial-marine drift, largely sand, silt, and gravel. This source is reflected in the composition of the spit though the feature is underlain at shallow depth by peat and sandy, silty, bay muds which characterize the submarine delta.

1.07 Site Geology. In the immediate project area the littoral mantle generally varies from 2 to 10 feet thick and consists mainly of silty sand with broken shells which is, in places, mixed with organic debris. Gravel in

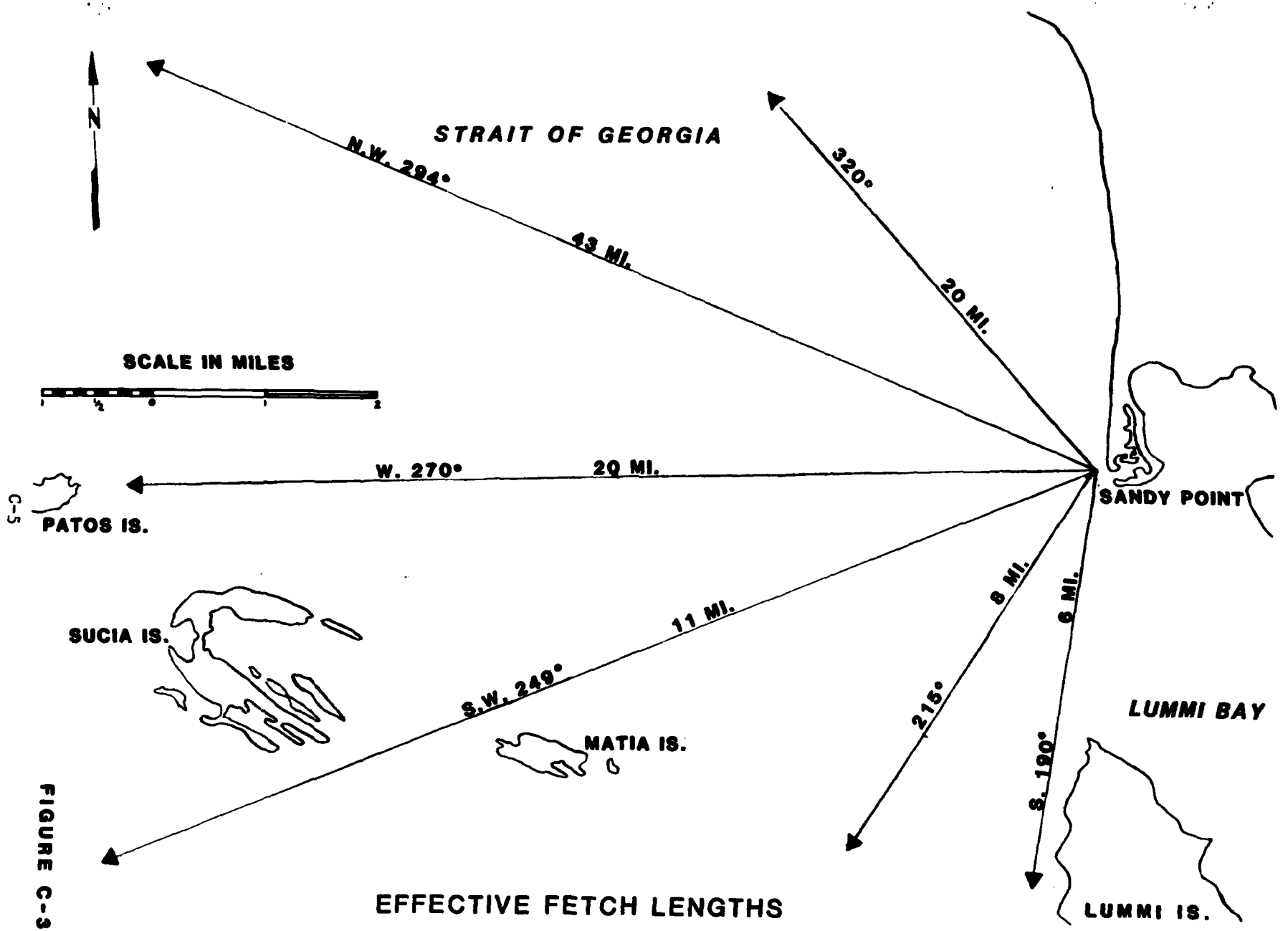


FIGURE C-3

EFFECTIVE FETCH LENGTHS

the littoral mantle appears restricted to the north and south sides of the present channel. The underlying peaty bay muds have known thicknesses up to 13 feet, but are locally absent with the littoral mantle resting directly on the underlying glacial drift. The natural surface of the overlying organic bay mud has been modified by dredging of the channel, and much of the channel has been filled by littoral process with a mixture of sand, silt, and organic muds and debris which is found in a very soft or very loose state with known thickness of 17 feet. The original surface of the bay mud in the investigated area slopes gently northward from the south side of the present channel at elevations -6 to -12 feet MLLW. Locally, on the south side of the channel and on the seaward side of the spit the bay mud is missing through erosion or a rise in the glacial drift surface above the bay mud depositional level. The surface of the glacial drift beneath the immediate project varies from elevation -9.5 feet to -25 feet MLLW and appears to deepen to the north. This unit consists of dense, locally silty, sandy gravel with cobbles which extends to depths below elevation -35 feet. Figure C-5 shows contours on top of the glacial drift and isopachs of the peat/organic silt-sand unit.

1.08 Subsurface Exploration. Eight wash borings were made to depths up to 30 feet outside the existing entrance channel at the locations shown on plate 2. Disturbed samples with blow counts from standard penetration tests and undisturbed 3-inch-diameter tubes were taken using an Osterberg sampler. Detailed drill logs are given on plate 3. Subsequent to field exploration, the breakwater-channel configuration was changed adding the north inner breakwater; thus, additional exploration will be required to determine foundation conditions for the north inner breakwater and character of material to be excavated along the north side of the channel between the breakwaters.

1.09 Laboratory Testing. The laboratory test program consisted of gradation, Atterberg limit, triaxial shear, and consolidation tests. Detailed test results are given on figures 4 through 17.

1.10 Breakwater Foundation Conditions. Two new rock breakwaters, located as shown on plate 2, are proposed to reduce wave heights in the entrance channel and boat basin and to control shoaling in the entrance channel. The north outer breakwater will extend 300 feet from shore while the north inner breakwater is 200 feet long. The ground surface at the landward end of the outer breakwater is about elevation +14, sloping in the first 150 feet to elevation 0, and from 0 to -4 in the outer 150 feet. Along the north outer breakwater alinement, the littoral drift material is a fine silty sand with small gravels and organic debris. This layer appears to be about 10 feet thick but is probably thicker at the shoreward end. In general, the materials underlying the littoral layer are soft peaty bay muds including organic silts, and channel fill consisting of sandy silts or silty sands containing peat and other organic materials. The bay mud varies in thickness from 5 feet at the seaward end of the north outer breakwater to greater than 15 feet at the landward end. The position and thickness is complex due to littoral infilling. Foundation conditions under the north inner breakwater location are not known. The landward 140 feet of the north inner breakwater will be constructed on what is believed to be a gravel fill having a top elevation of

+10 feet; however, the position and thickness of the underlying soft bay muds is critical with respect to the stability of this structure. The ground surface along the remaining 60 feet of this breakwater slopes steeply from +10 elevation to a -10 elevation in the boat basin. The breakwater section in this area will have a maximum height of about 25 feet, which is the maximum required for the project. The section and configuration shown are believed to be reasonable; however, the foundation will be explored and the section checked for stability and settlement during final design.

1.11 Entrance Channel Foundation Conditions. A 1,200-foot-long, 75- to 100-foot-wide channel dredged to -10 feet mean lower low water is proposed for access from the existing harbor to deep water in the Strait of Georgia. The existing harbor has been dredged to elevations ranging from -10 to -25 feet MLLW. The channel will be excavated partly in soft to loose mixtures of sand, silt, clay, and organic debris which has infilled the old channel, peaty and silty organic bay mud and littoral sand and gravel.

1.12 Settlement Analysis. A settlement study for the breakwater was made assuming the breakwater foundation consists of about 20 feet of loose sands and soft organic silts overlying incompressible gravels. For analysis purposes, this 20 feet of material was divided into the two 10-foot-thick layers with the shallower 10-foot layer represented by the consolidation test on sample 7A and the lower 10 feet by the test on sample 6B. Based on consolidation test data and conventional analyses, the total ultimate settlement due to primary consolidation was computed to be about 3 feet. Based on experience, the actual primary consolidation anticipated is on the order of 2/3 of the computed value. Therefore, 2 feet of primary settlement is anticipated, of which 1 foot will occur rather rapidly during construction. Besides the remaining 1 foot of primary consolidation, an additional 1/2 foot of long-term secondary consolidation is anticipated for a total postconstruction settlement of about 1-1/2 feet. The breakwater elevation immediately after construction should, therefore, be 1-1/2 feet above the design elevation. Breakwater quantity estimates include the total settlement of 2.5 feet.

1.13 Stability Analysis. Static stability studies were made of the proposed north outer breakwater and channel cross section. The breakwater will be constructed of rock materials having an assumed shear strength defined by an angle of internal friction, $\emptyset$, equal to 42 degrees and a cohesion, c, of zero. For analysis purposes, the surface zone of silty sand and the underlying soft organic silts were assumed to be a single unit. Based on unconsolidated, undrained (0) tests this unit was assigned a shear strength of $\emptyset = 0$ and $c = 500$ pounds per square foot (p.s.f.). Using these parameters, analysis of a breakwater section with a top elevation of +17.5 feet (design elevation +16 plus 1.5 feet of overbuild) gave minimum "end-of-construction" safety factor of 1.1. This safety factor is considered to be inadequate and stage construction will be required to maintain adequate stability. This can be accomplished without significant cost by simply requiring construction of the entire breakwater to a given elevation before proceeding with construction above that elevation. Stability studies indicate that breakwaters constructed

to a top elevation of +10 feet would have a minimum safety factor of 1.6. The intervening time period between initial construction of the breakwaters to elevation +10 feet followed by a second stage of construction to 17.5 feet will permit some consolidation of the foundation, accompanied by a strength increase in the foundation materials, before the full breakwater load is applied. The actual amount of strength increase is time dependent and is undeterminate. A very nominal strength increase from an initial strength of $\phi = 0$ and c = 500 p.s.f. to an intermediate value of $\phi = 5^{o}$ and c = 500 p.s.f. would result in minimum safety factor of about 1.3 which is acceptable. This minor strength increase between stages is considered reasonable and two-stage construction, as described above, is recommended.

1.14 Channel Slopes. The channel dredging will consist of the removal of 60,000 cubic yards (c.y.) of materials which range from sandy gravels with cobbles to silty sands, with some peat, and organic sandy silts. A review of the beach slopes at Sandy Point found that the existing slopes are generally about 8 horizontal on 1 vertical. Proposed channel slopes of 5 horizontal on 1 vertical are recommended for dredging. No rock protection is necessary for 5 horizontal on 1 vertical cut slopes, provided the channel side toe of the rock jetties is located outside of an 8 horizontal on 1 vertical slope projected from the channel bottom.

1.15 Rock Sources. Rock required for breakwater and revetment construction will be from established quarries. Mats Mats quarry, some 50 nautical miles by barge and Mount Baker quarry some 50 miles by truck haul are established quarries providing satisfactory rock for similar projects. In-place unit rock costs are comparable for both alternative sites.

1.16 Dredge Disposal Areas. The proposed disposal site is an established Washington State Department of Natural Resources (DNR) open-water disposal site in Bellingham Bay about 14 miles away by barge transport. Environmental agencies generally prefer clamshell dredging with disposal at Bellingham Bay to other alternative dredging methods and disposal locations.

1.17 Consideration was given to disposal of material along the eroding south shore of Sandy Point; however, foundation exploration data show the material to be dredged, except for a relatively small amount of gravels, is composed predominantly of fines. While disposal of material along this shoreline would mitigate the continued interruption of littoral drift feeding this shore in the past, rapid erosion of this fill would occur. Dispersion of much of this material unto the adjacent Lummi Bay tideflats is likely to cause environmental damage, possibly extensive, to eelgrass beds, etc., on the tideflats. If material were placed along this shoreline, placement could be done by truck haul requiring rehandling from clamshell filled barge or by hydraulic dredge and pipeline requiring at least some containment dikes along the shoreline. Either of these alternatives would be more costly, than the proposed clamshell dredge and barge disposal at Bellingham Bay.

1.18 Another potential disposal site is in the Strait of Georgia directly off the project site. Cost savings for the shorter barge distance compared to the Bellingham Bay site is about $.50 per c.y. However, a DNR disposal site is not designated for this area and this alternative was dropped from further consideration. During project maintenance a site in the Strait of Georgie can be considered further and if approved would result in project maintenance savings.

SECTION 2. DESIGN FEATURES OF THE RECOMMENDED PLAN

2.01 General. Main design features of the project include three breakwaters, a revetment section, and an entrance channel. An advance maintenance shoaling area is designated to reduce the frequency of maintenance dredging. Layout and design of the boat moorage basin, interior channels and turning basin was a combined effort by Federal and local interests. Major design considerations were: number, size and type of vessel to use the harbor and marina facilities; wave action; location of the channel relating to the existing land features and deep water of the Strait of Georgia; littoral drift; upland development; soil stability requirements for structures; and cut slopes, environment, etc.

2.02 In determining the channel design (and the adjacent designated advance maintenance areas), major considerations were those related channel dimensions (width and depth) and alinement which would afford safe and efficient vessel operation. The selection of channel depth was dependent upon the draft of expected vessels, squat or sinkage, trim, maneuverability, wave action, tides, and type of bottom. Factors considered in determining channel width were: size of vessels, existence of passing situation, vessel controllability, vessel speed relative to channel bottom, current velocity and direction, wave action and direction, and characteristics of channel banks. Factors considered in channel alinement were: alinement and depth of existing channel (hydrographic data); wave transmission into the marina; environmental considerations (e.g., eelgrass); vessel maneuverability; aids to navigation requirements; littoral drift volume and direction, including effects on adjacent shorelines; and expected maintenance requirements.

2.03 Design considerations for the breakwater and revetment sections consisted of: wave height and direction of approach, littoral drift volume and direction, wave transmission into the harbor, foundation conditions, presence of existing breakwaters, and environmental effects.

2.04 Alternatives Considered. With the present development that exists, alternative entrance channel locations to the existing Sandy Point harbor are not considered to be viable. Therefore, the present project location was the only site considered for the project.

2.05 Numerous entrance channel and breakwater layouts were considered, including:

a. longer and shorter breakwaters,

b. various breakwater placements,

c. straight entrance channel,

d. larger and smaller advance maintenance areas, and

e. various dredge and disposal plans, etc.

The proposed plan essentially: (1) provides the lowest cost plan that satisfies adequate navigation safety and wave protection to the inner harbor, (2) provides a reasonable maintenance dredging plan, (3) minimizes to the extent possible environmental damages, (4) optimizes use of existing structures and deeper waters to minimize costs and environmental damage, and (5) has similar effects to adjacent shorelines as other plans developed to meet the project purposes.

2.06 Project Description. The recommended plan provides for the following:

a. Federal construction and maintenance dredging of the navigation entrance channel from the Strait of Georgia into the Sandy Point harbor. Included in maintenance of the channel is establishment of advance maintenance areas (to be adjusted during the project life based on shoaling experience and needs). The entrance channel will be about 1,200 feet long with widths of 75-100 feet in the entrance area and 100 feet in the Strait of Georgia. Project depth of the channel is -10 feet MLLW.

b. Federal construction and maintenance of three rock breakwaters and a revetment section. The north outer breakwater will be 300 feet long, the north inner breakwater 200 feet, and the south rehabilitated breakwater 150 feet long. The south breakwater work consists primarily of reinforcement of an existing breakwater built by local forces. The revetment section will be about 200 feet long lying between the two north breakwaters.

c. Shared Federal and non-Federal construction of environmental mitigation features. Non-Federal interests would maintain these features.

d. Non-Federal construction and maintenance of a boat launch ramp and associated ancillary facilities.

2.07 The proposed project dimensions and general details are shown on plates 1 and 2. Additional local sponsor developed marina and support facility details are described in the main report and environmental assessment (EA). Project acreages are shown on table C-1.

2.08 Shoreline Processes. Littoral drift studies, including geomorphologic investigations of the project area, were conducted by Professor Maurice L. Schwartz, Coastal Consultants, Incorporated, under contract to the Seattle District (contract No. DACW67-M-0508, "Marina Inlet Shoaling at Sandy Point, Washington," 2 September 1983). His studies, plus experience at other projects, and engineering considerations serve as a basis for littoral drift analysis, project design, effects on adjacent shorelines, etc.

2.09 Sandy Point spit, about 1-1/2 miles long extends southerly unto the Lummi Bay embayment tideflats. Sandy Point began to develop between 2,000 to 4,000 years ago with the advent of sea level rise to its present elevation. Prior to about 1860 the Lummi River was a major distributary of the Nooksack River (which now discharges into Bellingham Bay) that formed the Lummi Bay tideflats which is the underlying foundation for Sandy Point. The Lummi Bay

TABLE C-1

ESTIMATED PROJECT ACREAGE

Project Area	Estimated Acreage
1. Entrance Channel	
Outer	1.36
Inner	1.07
2. Advance Maintenance Area	
North Side	2.06
South Side	0.34
3. Dredge Cut Slopes	
Outer North	0.72
Inner	1.02
4. North Outer Breakwater	0.54/0.50[1]/
5. North Inner Breakwater	0.37/0.20[1]/
6. South Breakwater	0.05/Neg.[1]/
7. North Revetment	0.20/Neg.[1]/
8. North Beach Accretion	1.00/0.85[1]/

[1]/Total project acres/total acres seaward of mean higher high water of +8.6.

foundation is composed of fine sands, fine silts, and clay and peat. The Sandy Point formation extends to a depth of about 15 feet MLLW and is generally composed of sand, gravel and small cobble. Source of Sandy Point materials are eroded cliff materials from the Point Whitehorn-Cherry Point-Neptune Beach shorelines north of Sandy Point and possibly to some extent from pre-1860's Lummi River sediments.

2.10 Schwartz utilized four methods of approach, differentiating between upper foreshore transport and offshore/nearshore transport, to determine sediment transport to Sandy Point. These are: the age and volume of the spit; progradation and erosion at the Mobil pier north of Sandy Point; foreshore progradation of material into the 1958 cut of the present Sandy Point entrance; and nearshore shoaling of the access channel dredged at that time extending to deep water of the Strait of Georgia. Summarizing results of all the methods of approach, all of which are in fair agreement with each other, yields an average upper foreshore southerly transport of about 500 cubic yards per year and an average nearshore southerly transport of 3,000 cubic yards per year. Beach inspection shows the forebeach material to be composed of coarse sand, gravel and cobbles. Low tide inspection, offshore foundation exploration and diver reports show nearshore materials to be predominately very fine sands in the 1958 dredged channel and to the north of the channel. Divers report the nearshore area south of the dredged channel is presently composed of a surface layer of coarse gravel and cobble - indicative that the 1958 dredged channel interrupted nearshore littoral drift followed by wave action winnowing out of fines from this area leaving the residual coarser materials.

2.11 The region south of the entrance, and around to the south beach extending easterly on the Lummi tideflats, is locally known as South Cape. Since dredging of the entrance channel in 1958, the majority of littoral drift previously fed to this shoreline has been interrupted. The proposed project would continue this littoral drift interruption. The uplands along South Cape shoreline have been raised for residential development purposes utilizing material dredged from the inner harbor. During high tide and southerly wave action, erosion of these uplands takes place. Along developed lots protective bulkheads have been constructed. At unbulkheaded portions of the shoreline, upland erosion has averaged about 2 feet of recession over the past 15 years. The upper forebeach area is composed of coarse gravels as a result of wave action. Erosion of fine materials from South Cape is rapid and materials are transported easterly along the shoreline and southerly unto the Lummi Bay tideflats. Since the interruption of littoral drift in 1958, the beach along South Cape has no doubt lowered and the process of flattening and winnowing out of fines leaving a more coarse beach composition has resulted in a more stable beach in the nearshore area. The proposed project, compared with existing conditions, would not result in any significant change to the littoral drift and erosion processes along South Cape. The major consequence of past and continued littoral drift interruption to this area is that erosion will continue requiring a substantial bulkhead or revetment for any structural development along this shoreline. (See also paragraph 2.25, Effects on Adjacent Shorelines.)

2.12 Circulation and Flushing. Marine waters off the project site are generally considered to be of excellent quality (see appendix EA for detailed description). Strait of Georgia marine waters are primarily influenced by tides, freshwater runoff, and winds. The Fraser River discharge some 25 miles north in British Columbia is the primary runoff source, causing some vertical salinity stratification near the project site. During the flood tide stage, Rosario Strait and Hale Passage waters are transported north to the project site to enter the marina basin. During ebb flow, discharge out of the harbor and adjacent Lummi flats are transported in a southerly direction away from the project site. At times, strong winds may cause surface flow reversals of these tidal flood and ebb flow directions.

2.13 The harbor area is a dredged development consisting of a large moorage basin just inside the entrance and a series of canals, or access channels, extending northward which service residential properties. The moorage basin occupies about 21 acres, and the canals occupy about 19 acres. Depths in the moorage basin range from about -10 to -25 feet MLLW with an average depth about -12 feet MLLW. Canal depths are reportedly -7 to -10 feet MLLW. The moorage basin was dredged in 1958. Materials dredged from the entire marina consisted primarily of sands and gravels indicating bottom conditions are of similar materials. At the beginning of flood tide, Strait of Georgia waters first enter the moorage basin, displacing basin water into the canals. As the flood cycle progresses, waters from the Strait of Georgia may also intrude into the canals, expecially along the bottom as a result of density flow. During ebb flow canal waters are directed through the moorage basin and out the harbor entrance. During the last hours of the ebb phase canal water transport would be only to the moorage basin. The mixed canal and moorage basin water would then be transported back to the canals during the following flood tide. Water quality within the harbor is judged by locals to be "very good" and "supports an abundant fish life." Scientific water quality measurements and analysis of these waters have not been made, however. Marine water quality is generally expected to undergo some improvement as a result of the project and water quality studies are not considered to be warranted.

2.14 The proposed project will widen and deepen the entrance to between 75 and 100 feet wide and ten feet deep at MLLW. The existing entrance is about 50 feet wide and 5 feet deep; however, future shoaling would further decrease the present entrance size if dredging is not undertaken. Dredging of the entrance channel is expected to result in minor increases in water quality in the harbor as a result of an increased transport of deeper, more dense, Strait of Georgia water into the harbor during flood tide. If allowed to shoal further, the entrance will hydraulically restrict the volume of water exchanging with the harbor during each tide cycle, probably causing a degradation of harbor waters over existing conditions. In summary, the proposed entrance channel enlargement is expected to have no adverse effects on existing harbor waters and should result in some improvement to existing conditions and prevent the potential for future degradation.

2.15 Design Wave Data. Deepwater design wave data off the project site are discussed in paragraph 1.05 of this appendix. Refraction, shoaling, diffraction, and wave breaking are all important wave transformations that occur as a result of nearshore bathymetry and proposed placement of structures. Analysis of these wave transformations was accomplished as outlined in Shore Protection Manual (SPM) and ETL 1110-2-305. The analysis included the effects of refraction, shoaling, breaking, and diffraction of deepwater waves from the various directions. The design wave analysis in the entrance is very complex, and due to uncertainties, the 10 percent (1.27 Hs) and Kd factors for breaking waves were used for determining the rock size.

2.16 A summary of design waves for each of the proposed structures are shown on table C-2 below. A more detailed discussion on design conditions is included in the following paragraphs.

TABLE C-2

CRITICAL DEEPWATER WAVES AND DESIGN WAVES

Structure	Deepwater Wave Characteristics (azimuth,	period,	height)	Design Wave Height	Remarks
North Outer BW	294°	6.7	7.9	5.8	Refraction and breaking limited.
North Inner BW	215°	4.6	5.8	5.0	Refraction and diffraction limited
North Revetment	215°	4.6	5.8	5.0	Refraction and breaking limited
South BW	249°	5.1	6.8	4.3	Refraction and breaking limited

2.17 Breakwaters and Revetment Designs. Primary purpose of the breakwaters is to reduce wave action in the harbor. With enlargement of the channel, wave transmission would significantly increase without breakwaters. General criteria used in the breakwaters layout was to provide comparable harbor wave action as presently exists with the constricted channel and breakwaters constructed by locals. Locals have, in the recent past, constructed short breakwaters at the north and south of the entrance to reduce transmission into the harbor. Minor erosion has been a problem in portions of the moorage basin, and along some developed lots, bulkheads have been constructed. Another important function, of the proposed north outer breakwater only, is to direct littoral drift into an area that provides a relatively high volume advance maintenance area; thus, reducing frequency of maintenance dredging cycles. Detailed design layout and cross sections are shown on plates 1 and 2.

2.18 Design of all the structures follows criteria of the SPM, but utilizes new wave analysis methodology and rock stability coefficients included in ETL 1110-2-292, dated 29 February 1984. In general, the structures include a two-layer armor rock cover, with a three-rock wide crest section, over a rock core section. Side slopes vary from 2 to 1 1/2 horizontal (H) to 1 vertical (V) depending on wave exposure and foundation stability. All the structures have a quarry spall toe protection section, in most cases buried, to prevent undermining during wave events or to protect against channel side slope erosion. In most cases, structures are set back 20 feet from the top of the dredged cut slope to provide initial foundation stability for the structure and to guard against side slope erosion. Armor rock sizes are based on:

$$W = \frac{Wr \quad H^3}{Kd \quad (Sr - 1)^3 \quad \cot \phi}$$

where: W = stable rock size in lbs.
Wr = unit weight of rock (165 lbs. per C.F. assumed)
H = design wave height (varies H_s = 4.3 to 5.8 feet)
Kd = rock stability coefficient (varies 1.6 to 1.9)
Ww = unit weight of water (64 lbs. per C.F.)
Sr = Wr/Ww (2.58)
ϕ = slope of structure (varies 1-1/2 to 2 H on 1)

Each of the structures are discussed below:

a. North Outer Breakwater. The 300-foot-long north outer breakwater is exposed to wave action from all directions. Critical wave for seaward side and structure head are the northwesterly waves. Along the seaward side of the trunk substantial littoral drift accretion is expected in a few years reducing wave action attack and potential for toe scour. The interior side of the breakwater trunk is exposed to southerly wave attack. The breakwater ties into a short, existing, locally-constructed breakwater at the shoreline and is sited to reduce westerly and northwesterly wave transmission into the basin and to direct littoral drift into the designated advance maintenance area. Completed top elevation will be +16 feet MLLW which will result in minor wave overtopping at times. Structure sideslopes will be 1-1/2 H to 1 V along the trunk and 2 H to 1 V at the outer 100 feet of the structure head.

b. North Inner Breakwater. This 200-foot-long breakwater is required to protect from westerly to southwesterly wave transmission into the harbor. The structure will be subjected to diffracted waves from either the northwest or south breakwaters and to reflected "mach-stem" waves off the adjacent revetment structure. Completed top elevation will be +15 feet MLLW, sideslopes will be 1-1/2 H to 1 V out to the structure head which will be constructed on a 2H to 1 V slope.

c. North Revetment. The 200-foot-long north revetment will prevent erosion of uplands and outflanking of the north outer and north inner breakwaters. At present the shoreline in this area is accreting; however, with construction of the north outer breakwater and maintenance dredging, source material to this shoreline will be eliminated and wave action, including reflected waves off the interior face of the north outer breakwater, will cause erosion of this shoreline unless protected. Top elevation of the proposed revetment will be +16 feet MLLW and slope of the structure face will be 2 H and 1 V and will be protected from erosion by the armor rock shown in cross section C-C on plate 2. Toe elevation of the structure is set to withstand flattening of the adjacent channel dredge slope to 8 H to 1 V.

d. South Breakwater. The south breakwater is 150 feet long and work consists of adding buried toe protection and a layer of armor rock on the seaward side and crest of an existing locally-built structure. The structure is exposed to southwesterly to westerly waves and diffracted waves from the northwest. Top elevation of the breakwater will be +15 feet MLLW and side slopes will about 1-1/2 H to 1 V.

2.19 Armor Rock Slope. Armor rock sizes are based on the W_{50} stability size and adjusted for SPM recommended minimum and maximum sizes of .75 and 1.25 times W_{50} and expected quarry yield. Tabulated below are the W_{50} and recommended gradations for each of the structures:

North Outer Breakwater: W_{50} = 2,900 lbs., gradation 2,000 to 4,000 lbs. with 50 percent greater than 3,000 lbs.

North Inner Breakwater: W_{50} = 1,900 lbs., gradation 1,500 to 3,000 lbs. with 50 percent greater than 2,000 lbs.

Revetment: W_{50} = 1,700 lbs., gradation 1,500 to 3,000 lbs. with 50 percent greater than 2,000 lbs.

South Breakwater: W_{50} = 1,200 lbs., gradation 1,000 to 2,000 lbs. with 50 percent greater than 1,500 lbs.

2.20 Core and Toe Rock. Core and toe or bedding rock will be well-graded 50 to 500 pound pieces with 50 percent of the rock by weight greater than 100 pound pieces. Minimum thickness of toe rock and core material will generally be 3 feet, or a layer about three rocks thick.

2.21 Federal Entrance Channel. The entrance channel is about 1,200 feet long with project depth at elevation -10 feet MLLW. Width of the channel is 100 feet in the Strait of Georgia portion of the channel and 100 feet narrowing to 75 feet wide in the inner part of the channel. Basin use is primarily by recreation vessels with drafts of less than six feet. Limited use of the basin by larger commercial fishing vessels of drafts up to 8 to 10 feet is also expected. Most of the commercial vessels will be able to transit the channel at all but extreme low tides, resulting in a few hours of tide delays at times. While the channel is a somewhat circuitous route and two-way traffic will occur, maneuverability of most vessels in the area will be quite good and the channel itself will be well defined by the presence of visible structures and navigation aids.

2.22 Advance Maintenance Area. To reduce dredge frequency, advance maintenance areas are designated as part of the initial project. While subject to revision, based on future project experience and needs, initially the proposed plan includes capacity for about 3 years of littoral drift volume. The first of the maintenance dredge cycles is not expected until about year 5 as a result of the initial north outer breakwater entrapment of littoral drift and the 3-year capacity of the advance maintenance area. Initial construction plans are for a 2.06-acre area on the north side of the channel and a 0.34-acre site on the south site. Volume of sites are based on an initial dredge depth comparable to that of the adjacent channel.

2.23 Dredge Volume and Disposal. Initial dredging of the -10-foot MLLW channel and advance maintenance area will include 2 feet allowance for contractor overdepth dredging allowance. Total initial dredging is estimated at 60,000 cubic yards, 40,000 cubic yards for the channel and 20,000 cubic yards for the advance maintenance areas. Quantities are based on average cut depth elevation of -12 feet MLLW, include about 20 percent quantity contingency, and assumes the channel and advance maintenance areas will shoal an additional 6,000 and 4,000 cubic yards, respectively, between the 1983 condition and condition at time of construction projected for 1987.

2.24 Dredging will be conducted by clamshell with barge disposal at the designated DNR open-water disposal site in Bellingham Bay, as discussed in paragraph 1.16, Dredge Disposal Areas, of this appendix. Dredge materials are considered to be of good quality, satisfactory for open-water disposal. See 14 February 1983 letter from EPA in appendix B, part 2.

2.25 Effects on Adjacent Shorelines. The existing shorelines adjacent to the project are exposed to relatively high wave activity. The entire Sandy Point shoreline north of the project entrance is threatened by erosion and wave runup inundation (including wave-tossed logs) during severe northwest wave activity. Structural damage to bulkheads and houses fronting the shoreline and wave inundation has occurred a number of times during the past 20 years. Wave erosion along the south shoreline of Sandy Point is causing about 2 feet of upland erosion each year, for unprotected properties. Most structures built along this shoreline have substantial bulkheads. Erosion problems stem from the interruption of littoral drift by the existing entrance channel and the simultaneous occurrence of high tide and southwesterly wave action. "With project" conditions will result in the continuing starvation of this shoreline as has occurred since the original shoreline breach in 1958. The proposed project, or "with project" condition, compared to existing conditions, would not result in any significant change to the littoral drift and erosion processes along South Cape and the Lummi Bay tideflats. Along the interior shoreline of the harbor minor erosion presently occurs from waves transmitted through the present entrance, wind waves in the harbor, and boat waves. Locals have built small breakwaters on both sides of the entrance to reduce wave transmission into the basin. With these breakwaters and the very narrow opening that presently exists, wave transmission into the harbor is not now a serious problem, although most developed properties have bulkhead protection works. A more detailed description of the littoral drift processes and how adjacent shorelines are affected is included in paragraphs 2.08 through 2.11 of this appendix.

The effects on the adjacent north shoreline, harbor shorelines, and the south shore are described below:

a. North Shoreline. The north outer breakwater will trap southbound littoral drift building the beach to the north of the breakwater. Because of the relatively short breakwater length the accretion zone is only expected to affect 300-500 feet of shoreline north of the breakwater. This accretion is considered a positive effect as it will reduce wave damage to structures along this reach of the shoreline. Shorelines north of this point should not undergo any changes as a result of the project.

b. South Shoreline. As mentioned, the project would continue to intercept littoral drift to this shoreline. The proposed project or "with project" condition, compared to existing conditions, would not result in any significant change to the littoral drift and erosion processes along South Cape and Lummi Bay tideflats. At present, bulkheading is required for all lot development for this area and would also be required even for the "without project" conditions.

c. Harbor Area. The breakwater protection afforded by the proposed breakwaters will provide comparable wave protection to interior shorelines as presently exists. Therefore, no increased adverse wave damage to harbor shorelines should occur.

SECTION 3. COST ESTIMATE AND SCHEDULE

3.01 Project Cost Estimate. Detailed breakdown of first costs and maintenance costs for the Federal participation items of the project are shown on tables C-3 and C-4. Table C-5 shows the estimated non-Federal maintenance costs of the associated harbor facilities. There is no non-Federal project associated first cost, as the local sponsor is not required to construct any non-Federal project features (complementing Federal project general navigation facilities) to claim project economic benefits. Equivalent annual costs for items shown on tables C-3 through C-5 are shown on table 4-5 of the main report. During preparation of the Federal plans and specifications (cost of which is included in Federal engineering and design cost estimate), additional foundation exploration and survey work will be undertaken. The foundation exploration is required to confirm stability of the north inner breakwater (or to modify the design to insure stability) and the surveys are required because shoaling between the March 1983 survey and the time of preparation of plans and specifications is expected to substantially revise bottom bathymetry in the entrance channel area. Results of either are not expected to increase project costs; a comparable cost breakwater is believed possible if the present design proves to be unstable, and project dredging costs include allowance for 10,000 c.y. of shoaling between March 1983 and time of construction.

3.02 Project first costs are shown in table C-3. Costs are based on recent construction activities of similar scope and discussion with local contractors.

3.03 Operation and Maintenance. Federal responsibility for maintenance would include breakwater and revetment repair (estimated to be required at years 15 and 30 of the project) and periodic dredging (estimated to be required at year 5 and then every 3 years thereafter). Each breakwater and revetment rehabilitation cost was based on replacing about 25 percent of the total armor rock and replenishing a 10-foot-wide toe section. Dredging quantities were based on littoral drift estimates described in paragraph 2.08 through 2.11, Shoreline Processes, of this appendix. Disposal of dredged material was assumed to be the existing DNR open-water disposal site in Bellingham Bay.

3.04 Local interest's responsibility would include maintenance of all harbor facilities; moorage, floats, access docks, wharfs, access ramps, and boat launch ramps; access roads; harbor parking; shoreside facilities; and other harbor support facilities. The estimated local interest's costs for maintenance of harbor features are shown on table C-5.

3.05 Design and Construction Schedule. The design and construction schedule of Federal (general navigation facility) project features is shown below. The schedule assumes project authorization and adequate funding. See plate 4 for a more detailed presentation of the schedule.

Submit Final Detailed Project Report	Mar 85
Initiate Plans and Specifications	May 85
Advertise Construction	May 86
Notice to Proceed	Jul 86
Complete Construction	May 87

3.06 The U.S. Coast Guard would install navigation aids immediately after project completion. For purposes of the DPR study and the project economic analysis, the first year of marina project benefits would be 1987-88.

TABLE C-3

DETAILED FEDERAL FIRST COSTS - GENERAL NAVIGATION FACILITIES
(October 1983 Price Level)

Feature or Item	Unit	Quantity	Price	Amount[1/]
1. Mobilization/Demobilization	JOB	1	LS	$100,000
2. North Outer Breakwater				
a. Armor Rock	TON	6,500	$23.00	$150,000
b. Core & Toe Rock	TON	10,300	18.00	185,000
c. Excavation	CY	1,900	2.00	4,000
		SUBTOTAL		$339,000
3. North Inner Breakwater				
a. Armor Rock	TON	2,900	23.00	$67,000
b. Core & Toe Rock	TON	5,000	18.00	90,000
c. Excavation	CY	1,300	2.00	3,000
		SUBTOTAL		$160,000
4. South Breakwater				
a. Armor Rock	TON	750	23.00	$17,000
b. Toe Rock	TON	350	18.00	6,000
c. Excavation	CY	250	2.00	1,000
		SUBTOTAL		$24,000
5. Revetment				
a. Armor Rock	TON	2,500	23.00	$58,000
b. Core & Toe Rock	TON	1,700	18.00	31,000
c. Excavation	CY	1,700	2.00	4,000
		SUBTOTAL		$93,000
6. Channel Dredging	CY	40,000[2/]	3.00	$120,000
7. Advance Maintenance Dredging	CY	20,000[3/]	3.00	60,000
8. Mitigation Features	JOB	1	LS	10,000[4/]
		SUBTOTALS		$906,000
		CONTINGENCY (20%)		184,000
		SUBTOTAL		$1,090,000

1/Costs rounded.
2/Includes 6,000 c.y. shoaling between 1983 surveys and construction.
3/Includes 4,000 c.y. shoaling between 1983 surveys and construction.
4/Preliminary estimate to be confirmed prior to finalization of DPR.

TABLE C-3 (con.)

Feature or Item	Unit	Quantity	Price	Amount[1/]
9. Engineering and Design (10%)				$109,000
10. Supervision and Administration (8%)				87,000
		SUBTOTAL		$1,286,000
11. Lands for General Navigation Facilities[2/]				$5,000
12. U.S Coast Guard Navigation Aids				57,000
TOTAL FEDERAL FIRST COST - GENERAL NAVIGATION FACILITIES				$1,348,000

1/Costs rounded.
2/Provision of lands, easements, and rights-of-way is a standard non-Federal responsibility.

TABLE C-4

DETAILED FEDERAL MAINTENANCE COSTS - GENERAL NAVIGATION FACILITIES
(October 1983 Price Level)

Feature or Item	Unit	Quantity	Unit Cost	Amount1/
1. Dredging (year 5 then every 3 years thereafter)				
a. Mobilization & Demobilization	JOB	1	LS	$30,000
b. Dredge & Disposal	10,000	CY	4.00	40,000
		SUBTOTAL		$70,000
c. Contingency, (20%)				14,000
d. Engineering and Design (14%)				10,000
e. Supervision and Administration (9%)				6,000
		TOTAL		$100,000
2. Breakwater & Revetment Rehab (years 15 and 30)				
a. Mobilization & Demobilization	JOB	1	LS	$75,000
b. Armor Rock	TON	3,500	23.00	80,000
c. Toe Rock	TON	1,500	18.00	27,000
		SUBTOTAL		$182,000
d. Contingency (20%)				36,000
e. Engineering and Design (10%)				19,000
f. Supervision and Administration (7%)				13,000
		TOTAL		$250,000
3. U.S. Coast Guard Navigation Aids				
a. Annual Inspection & Maintenance (per year)				$1,000 2/
b. Repair & Replace Structures (year 25)				$57,000 2/

1/Numbers rounded.
2/U.S. Coast Guard estimate, provided by their letter dated 24 February 1984 (see appendix B, part 2).

APPROVED
CHIEF, ESTIMATING
DATE 14 July 84

TABLE C-5

DETAILED NON-FEDERAL MAINTENANCE COSTS - ASSOCIATED PROJECT COSTS
(October 1983 Price Level)

Feature or Item[1]/	Amount
1. Replace/Repair Launch Ramp and Floats	$500/year
2. Replace/Repair Local Docks and Moorage Facilities	$1,000/year
3. Contingency, E&D, S&A, and Legal Fees	$500/year
TOTAL NON-FEDERAL MAINTENANCE COSTS	$2,000/year

1/Local sponsor assurance of local interest maintenance of these existing non-Federal features is required to claim project economic benefits.

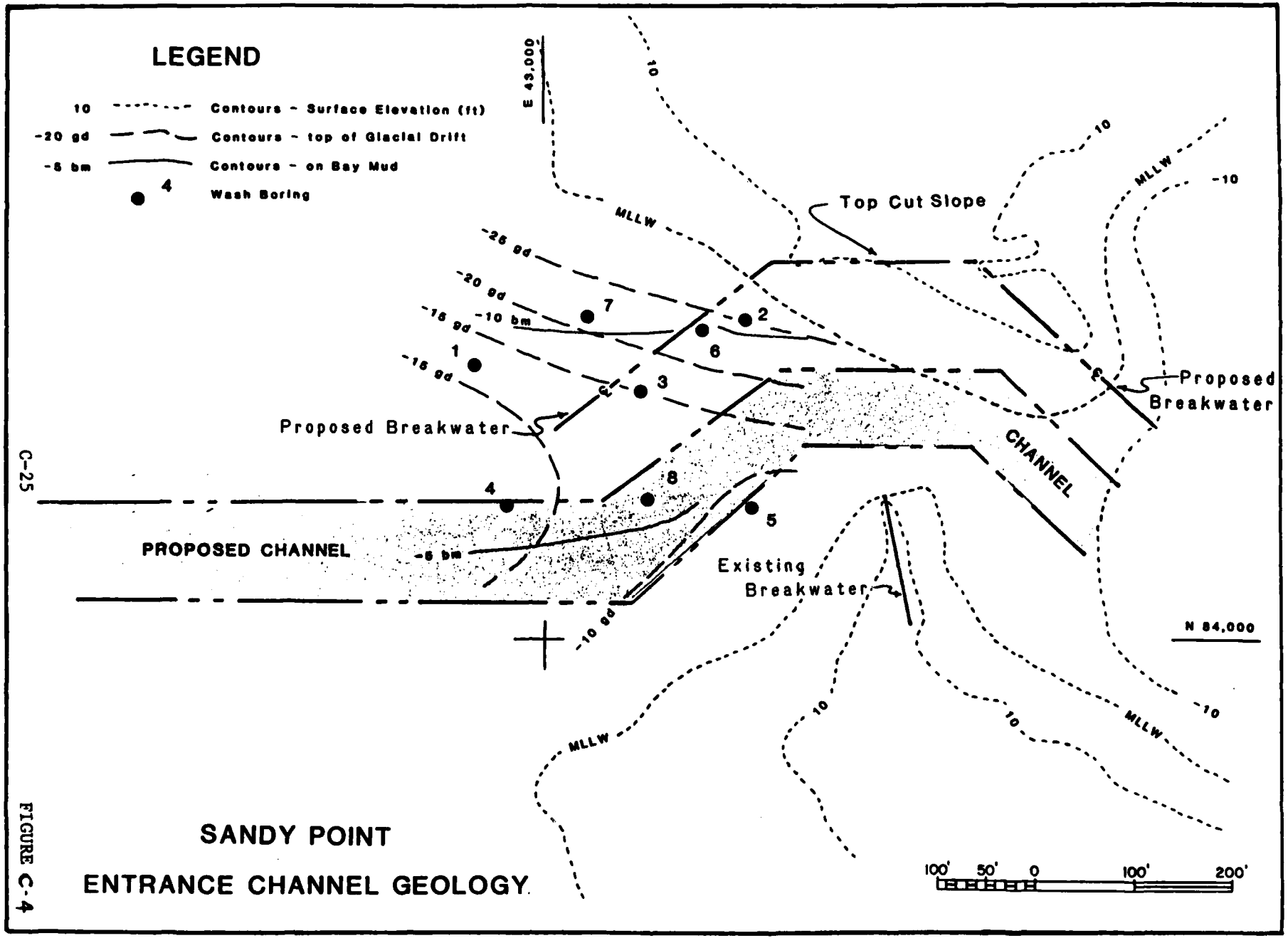
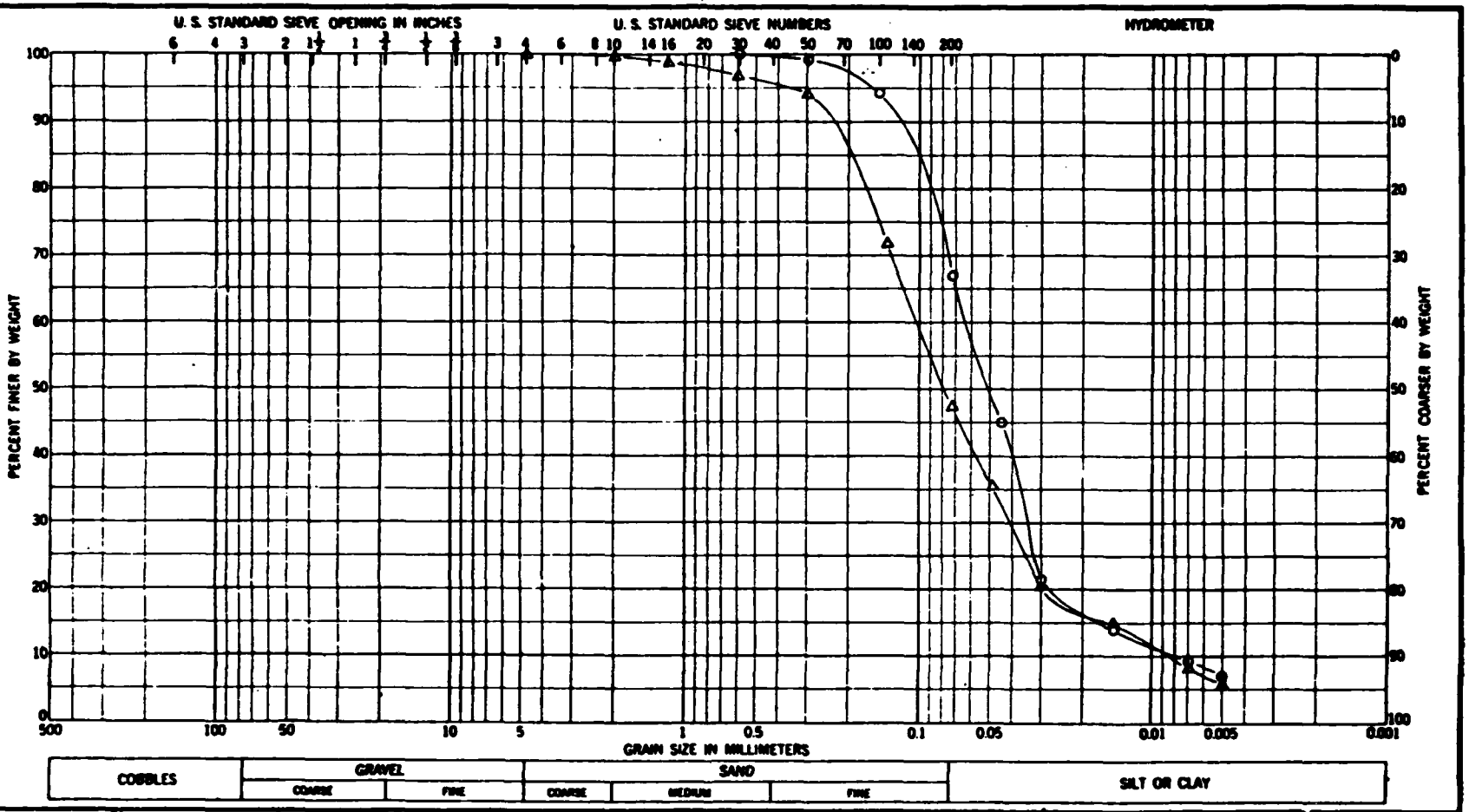


FIGURE C-4

SANDY POINT

ENTRANCE CHANNEL GEOLOGY



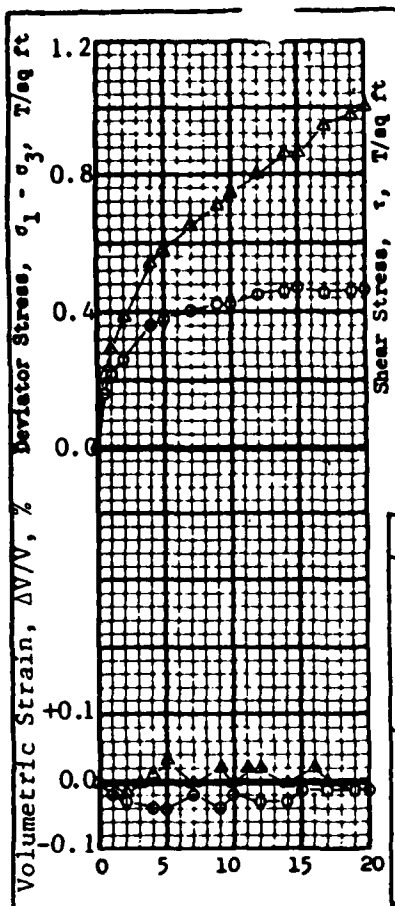
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
3B ○	8.0-10.5 ft	Clayey Fine Sandy SILT (ML)	-	-	-	-
6B △	11.0-13.7 ft	Clayey Silty Fine SAND (SM)	-	94	44	50

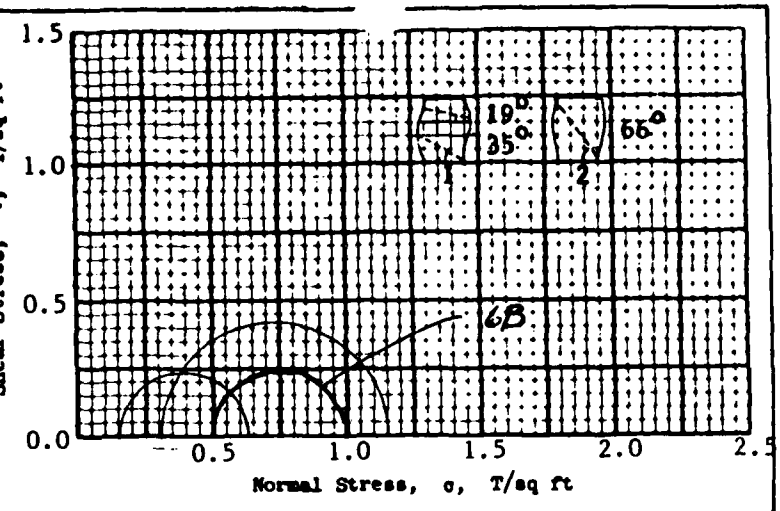
GRADATION CURVES NPD

Project SANDY POINT NAVIGATION CHANNEL
Breakwater Foundation
Area Watcom County, WA
Boring No. 82-WB
Date FEB 28 1983 (83-S-342)

ENG FORM 1 MAY 63 2087

FIGURE C-5





Shear Strength Parameters

ϕ = 34.4 °

tan ϕ = 0.685

c = 0.02 T/sq ft

Method of saturation
Back Pressure

☐ Controlled stress

☒ Controlled strain

Test No.			○ 1	△ 2		
Initial	Water content	w_o	45.1 %	38.1 %	%	
	Void ratio	e_o	1.328	1.140		
	Saturation	S_o	92.0 %	90.8 %	%	%
	Dry density, lb/cu ft	γ_d	72.6	79.0		
Before Shear	Water content	w_c	46.2 %	40.7 %	%	%
	Void ratio	e_c	1.306	1.102		
	Saturation	S_c	100 %	100 %	%	%
	Final back pressure, T/sq ft	u_o	2.16	2.16		
Final	Water content	w_f	46.1 %	40.7 %	%	%
	Void ratio	e_f	1.121	0.897		
Minor principal stress, T/sq ft		σ_3	0.15	0.30		
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.47	0.86		
Time to failure, min		t_f	31	32		
Rate of strain, percent/min			0.48	0.50		
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$		-	-		
Initial diameter, in.		D_o	2.83	2.83		
Initial height, in.		H_o	6.04	5.72		

Type of test Q-2 | Type of specimen Undisturbed

Classification Clayey Fine Sandy SILT (ML)

LL - | PL - | PI - | | G_s 2.71

Remarks

(83-S-342)

Project SANDY POINT NAVIGATION CHANNEL
Breakwater Foundation

Area Watcom County, WA

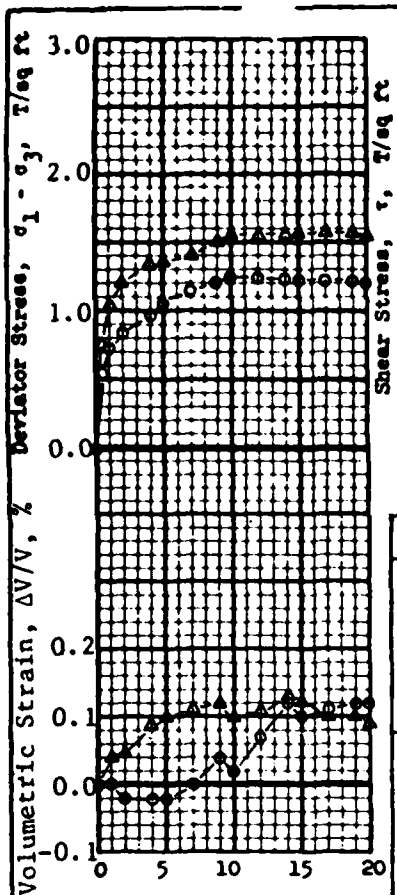
Boring No. 82-WB | Sample No. 3B

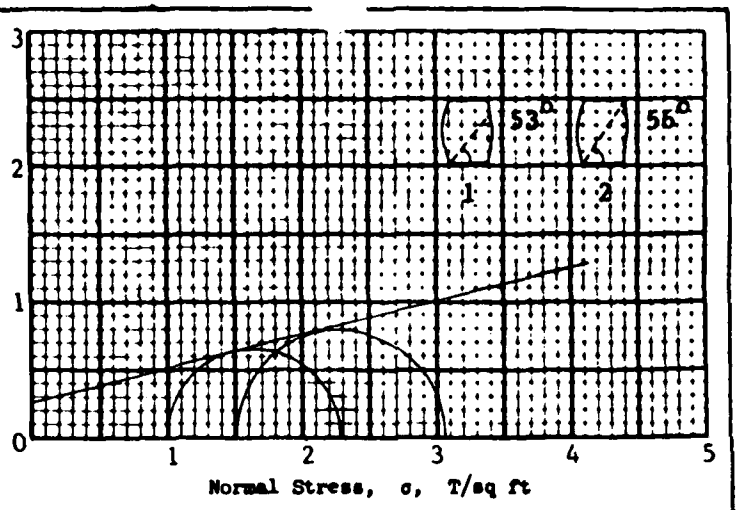
Depth / El 8.0-10.5 ft | Date FEB 28 1983

NPD TRIAXIAL COMPRESSION TEST REPORT

ENG FORM 1 JUN 85 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE

FIGURE C-6





Test No.			○ 1	△ 2		
Initial	Water content	w_o	59.0 %	65.1 %	%	%
	Void ratio	e_o	1.845	1.843		
	Saturation	S_o	86.0 %	95.0 %	%	%
	Dry density, lb/cu ft	γ_d	59.0	59.0		
Before Shear	Water content	w_c	57.0 %	53.8 %	%	%
	Void ratio	e_c	1.482	1.360		
	Saturation	S_c	100 %	100 %	%	%
	Final back pressure, T/sq ft	u_o	2.16	2.88		
Final	Water content	w_f	57.0 %	53.8 %	%	%
	Void ratio	e_f	1.374	1.360		
Minor principal stress, T/sq ft		σ_3	1.0	1.5		
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	1.27	1.58		
Time to failure, min		t_f	109	192		
Rate of strain, percent/min			0.10	0.09		
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$	1.20	1.56		
Initial diameter, in.		D_o	2.84	2.83		
Initial height, in.		H_o	6.12	6.15		

Shear Strength Parameters

ϕ = 13.7 °

tan ϕ = 0.244

c = 0.26 T/sq ft

Method of saturation

Back pressure

☐ Controlled stress

☒ Controlled strain

Type of test R-2 | Type of specimen Undisturbed

Classification _

LL _ | PL _ | PI _ | | G_s 2.69

Remarks

(83-S-342)

Project SANDY POINT NAVIGATION CHANNEL

Breakwater Foundation

Area Watcom County, WA

Boring No. 82-WB | Sample No. 6A

Depth El 7.5 - 10.2 ft | Date FEB 28 1983

NPD | TRIAXIAL COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE

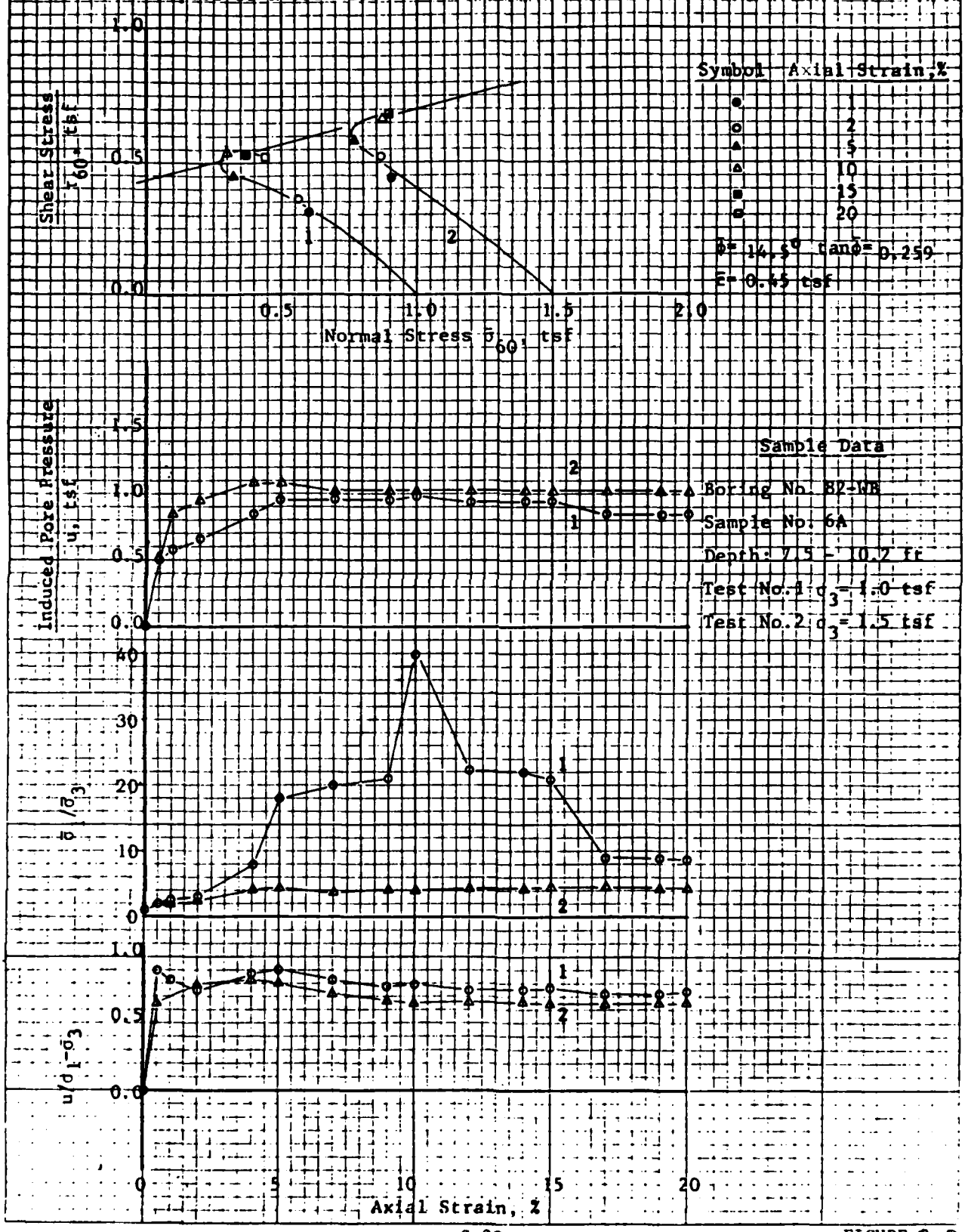
FIGURE C-7

WPDEN-GS-1 (83-S-342)

FEB 28 1983

SANDY POINT NAVIGATION CHANNEL

Report of R Triaxial Test Back Pressure/Pore Pressure Data



Sample Data

Boring No. BP-WB

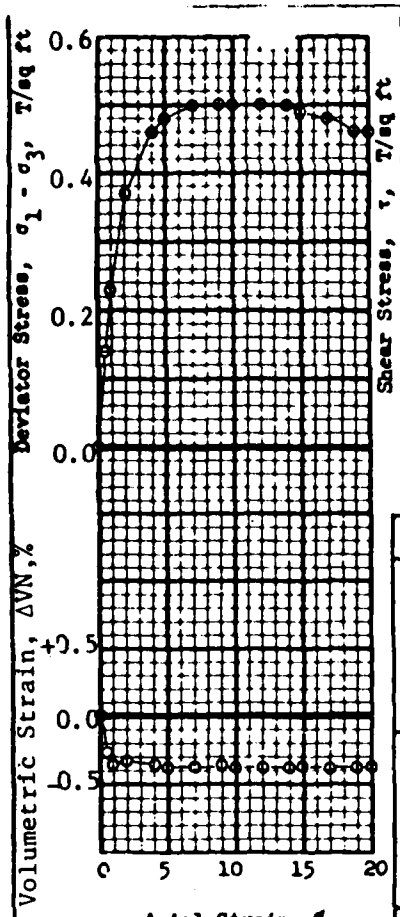
Sample No: 6A

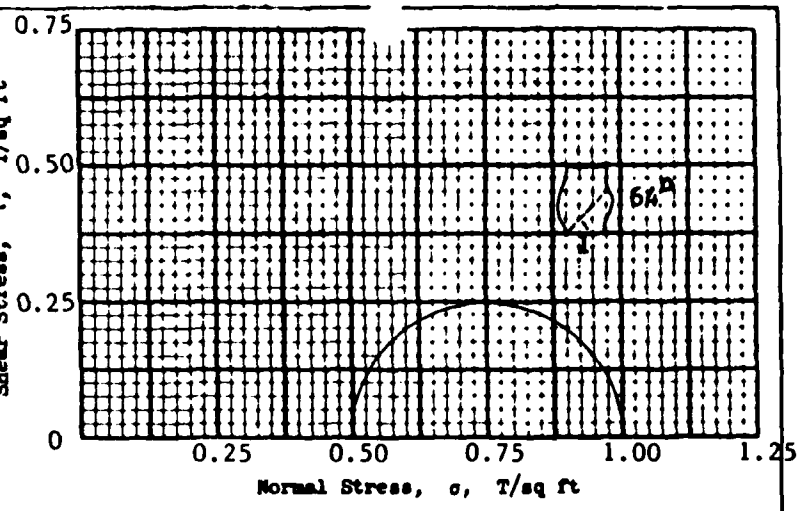
Depth: 7.5 - 10.2 ft

Test No.1 $\bar{\sigma}_3$= 1.0 tsf

Test No.2 $\bar{\sigma}_3$= 1.5 tsf

FIGURE C-8





Test No.			1			
Initial	Water content	w_o	95.1 %	%	%	%
	Void ratio	e_o	2.687			
	Saturation	S_o	93.5 %	%	%	%
	Dry density, lb/cu ft	γ_d	44.7			
Before Shear	Water content	w_c	96.5 %	%	%	%
	Void ratio	e_c	2.587			
	Saturation	S_c	100 %	%	%	%
	Final back pressure, T/sq ft	u_o	1.44			
Final	Water content	w_f	96.5 %	%	%	%
	Void ratio	e_f	2.217			
Minor principal stress, T/sq ft		σ_3	0.50			
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	0.50			
Time to failure, min		t_f	14			
Rate of strain, percent/min			0.50			
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$	0.46			
Initial diameter, in.		D_o	2.87			
Initial height, in.		H_o	6.20			

Shear Strength Parameters

ϕ = - °

tan ϕ = -

c = - T/sq ft

Method of saturation Back pressure

☐ Controlled stress

☒ Controlled strain

Type of test Q-2 | Type of specimen Undisturbed

Classification Clayey Silty Fine SAND (SM)

LL	PL	PI		G_s
94	44	50		2.64

Remarks

(83-S-342)

Project SANDY POINT NAVIGATION CHANNEL

Breakwater Foundation

Area Watcom County, WA

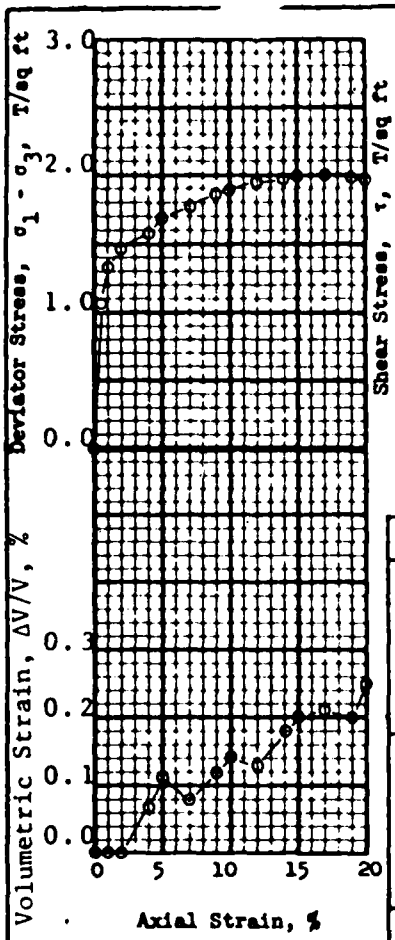
Boring No. 82-WB | Sample No. 6B

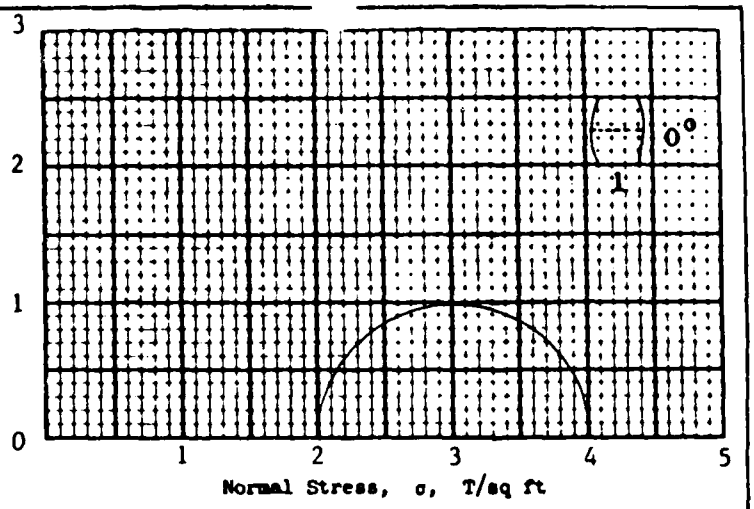
Depth El 11.0-13.7 ft | Date FEB 28 1983

NPD TRIAXIAL COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE

FIGURE C-9





Test No.			1			
Initial	Water content	w_o	57.3 %	%	%	%
	Void ratio	e_o	1.594			
	Saturation	S_o	96.0 %	%	%	%
	Dry density, lb/cu ft	γ_d	64.2			
Before Shear	Water content	w_c	46.5 %	%	%	%
	Void ratio	e_c	0.976			
	Saturation	S_c	100 %	%	%	%
	Final back pressure, T/sq ft	u_o	7.20			
Final	Water content	w_f	46.5 %	%	%	%
	Void ratio	e_f	1.001			
Minor principal stress, T/sq ft		σ_3	2.0			
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	2.00			
Time to failure, min		t_f	178			
Rate of strain, percent/min			0.10			
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$	1.98			
Initial diameter, in.		D_o	2.84			
Initial height, in.		H_o	5.54			

Shear Strength Parameters

ϕ = - °

tan ϕ = -

c = - T/sq ft

Method of saturation Back Pressure

☐ Controlled stress

☒ Controlled strain

Type of test R-2 | Type of specimen Undisturbed

Classification -

LL - | PL - | PI - | G_s 2.67

Remarks

Project SANDY POINT NAVIGATION CHANNEL

Breakwater Foundation

Area Watcom County, WA

Boring No. 82-WB | Sample No. 7A

Depth El 10.5 - 13.0 ft | Date FEB 28 1983

NPD

TRIAXIAL COMPRESSION TEST REPORT

(83-S-342)

ENG FORM 1 JUN 65 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE

FIGURE C-10

NPDEN-GS-1, XB3-S-342 0

FEB 28 1983

SANDY POINT NAVIGATION CHANNEL

Report of R Triaxial Test Back Pressure/Pore Pressure Data

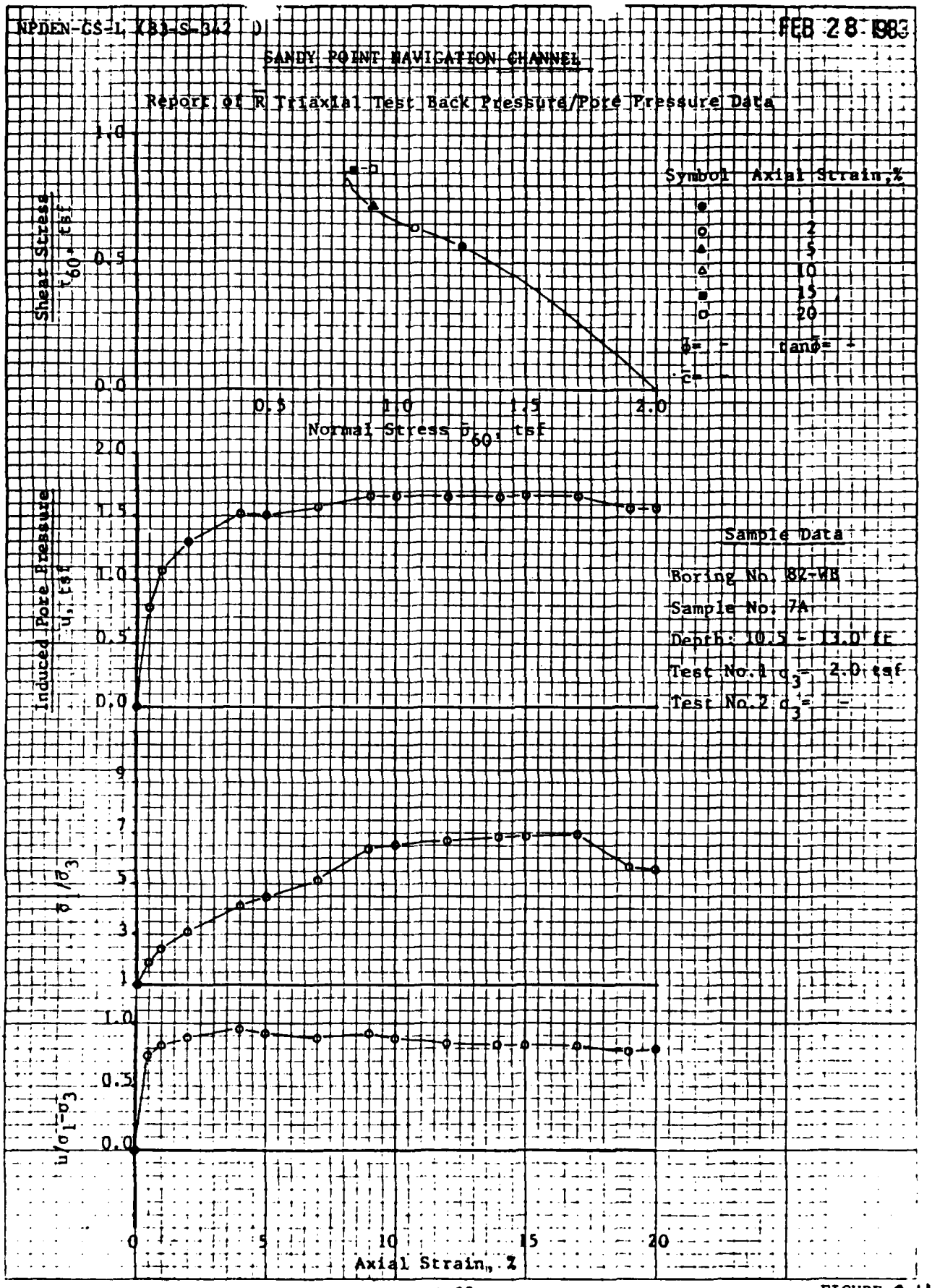
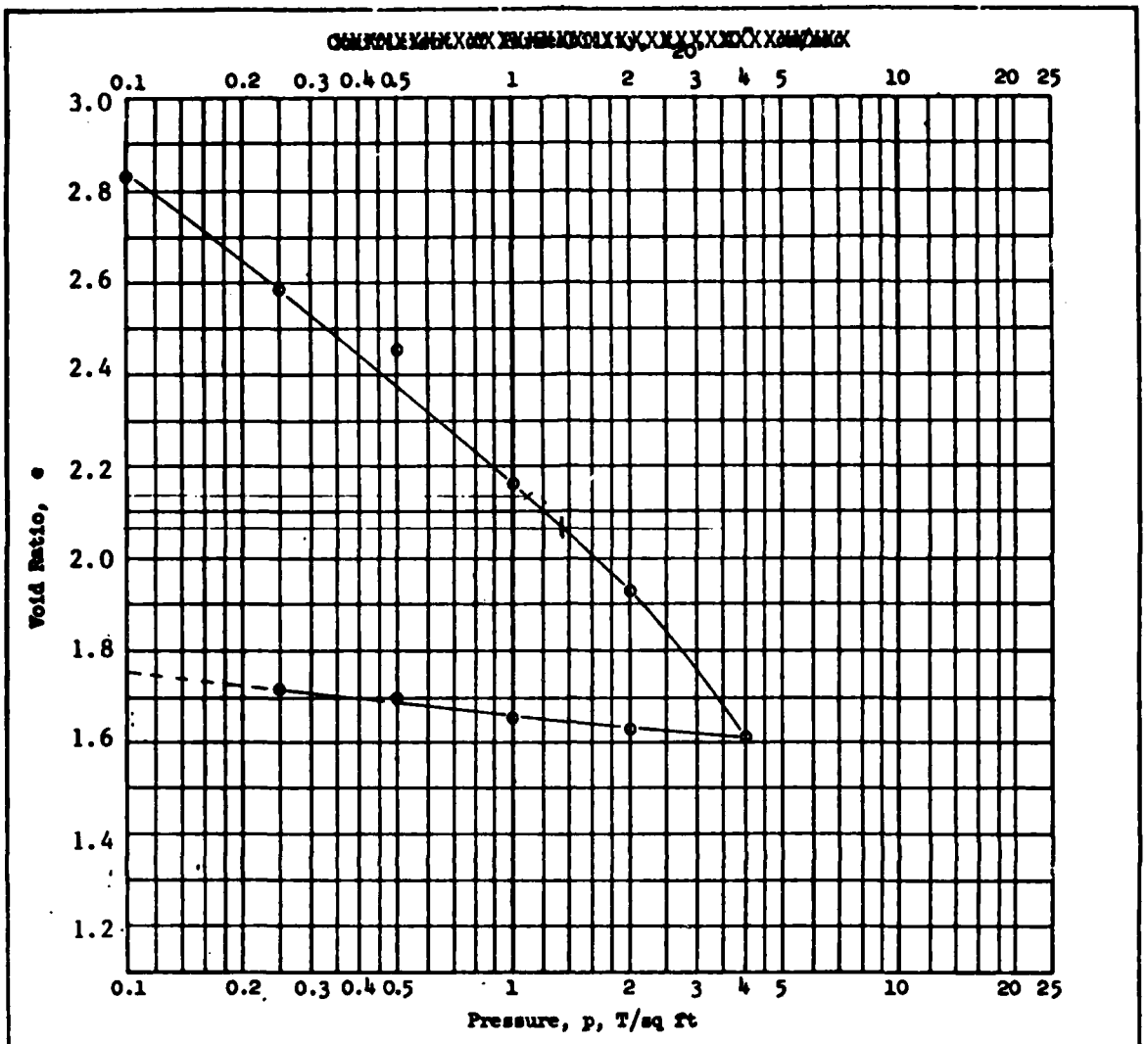


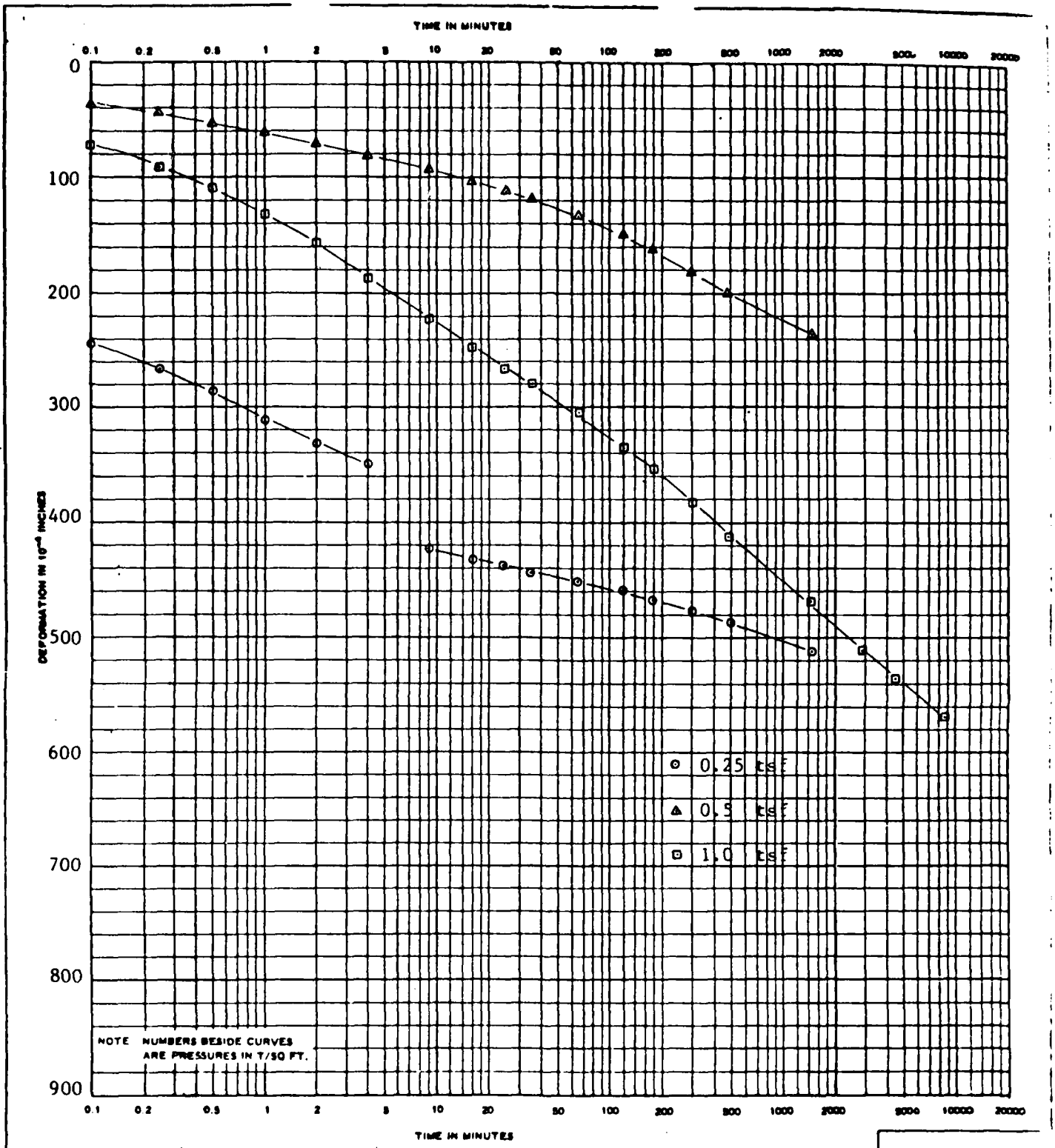
FIGURE C-11



Type of Specimen: Undisturbed		Before Test		After Test	
Diam 2.753 in.	Ht 0.763 in.	Water Content, w_o	97.9 %	w_f	67.4 %
Overburden Pressure, p_o - T/sq ft		Void Ratio, e_o	2.834	e_f	1.792
Pr consol. Pressure, p_c - T/sq ft		Saturation, S_o	91.1 %	S_f	99.3 %
Compression Index, C_c 0.925		Dry Density, γ_d	42.9 lb/ft^3	γ_d	59.0
Classification SM		k_{20} at e_o = -	x 10$^-$ cm/sec		
LL 94	G_s 2.64	Project SANDY POINT NAVIGATION CHANNEL			
PL 44	D_{10} 0.015 mm	Breakwater Foundation			
Remarks Black, soft, moist,		Area Watcom County, WA			
peaty fine sand.		Boring No. 82-WB		Sample No. 6B	
		Depth El 11.0-13.7 ft.		Date FEB 28 1983	
(83-S-342) NPD		CONSOLIDATION TEST REPORT			

ENG FORM 2090 1 MAY 63 PREVIOUS EDITIONS ARE OBSOLETE.

FIGURE C-12

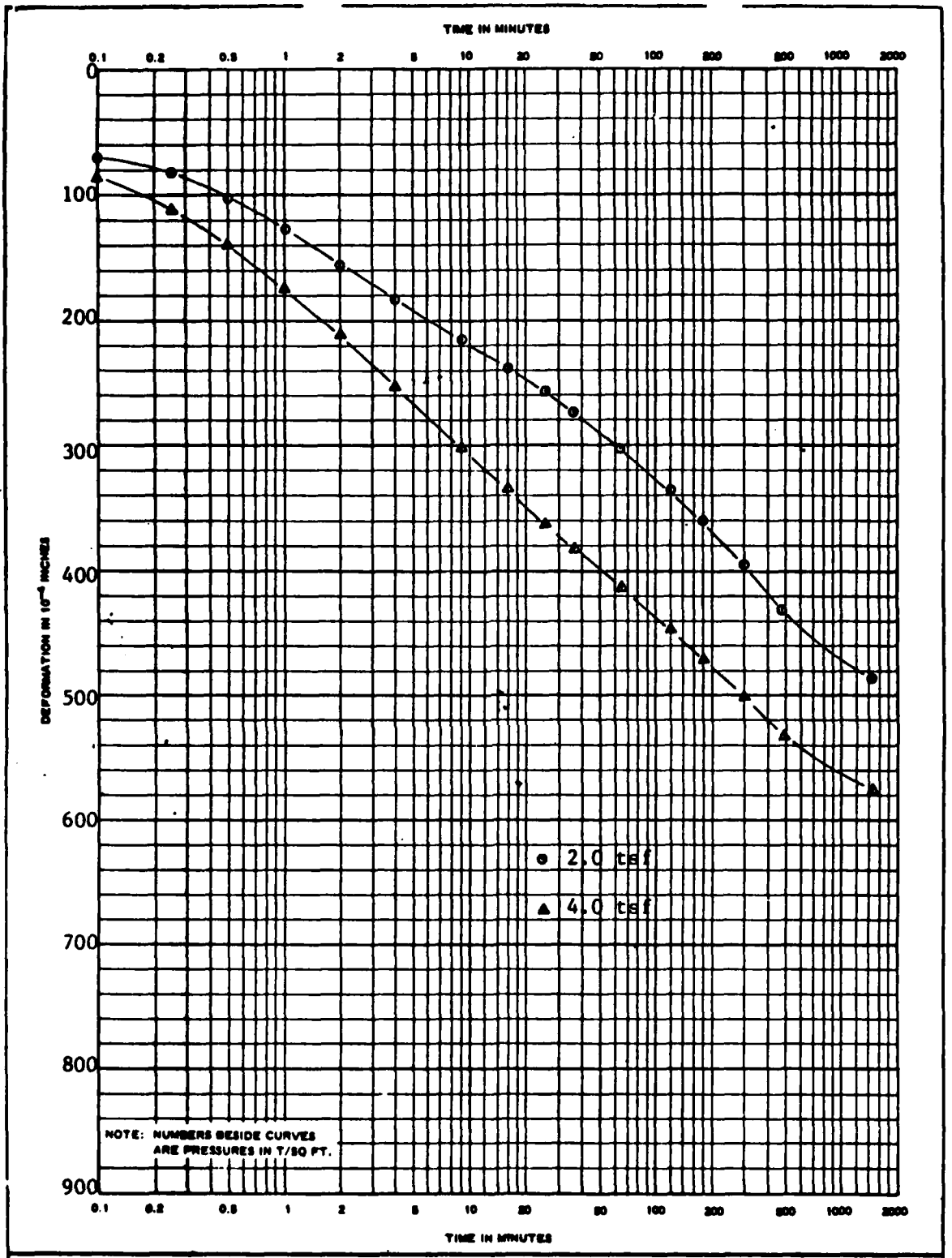


Project	SANDY POINT NAVIGATION CHANNEL-Breakwater Foundation			
Area	Watcom County, WA			
Boring No. 82-WB	Sample No. 6B	Depth El 11.0-13.7 ft.	Date FEB 28 1982	

ENG FORM 2088 MAY 81 PREVIOUS EDITIONS ARE OBSOLETE

CONSOLIDATION TEST--TIME CURVES NPD (TRANSLUCENT)

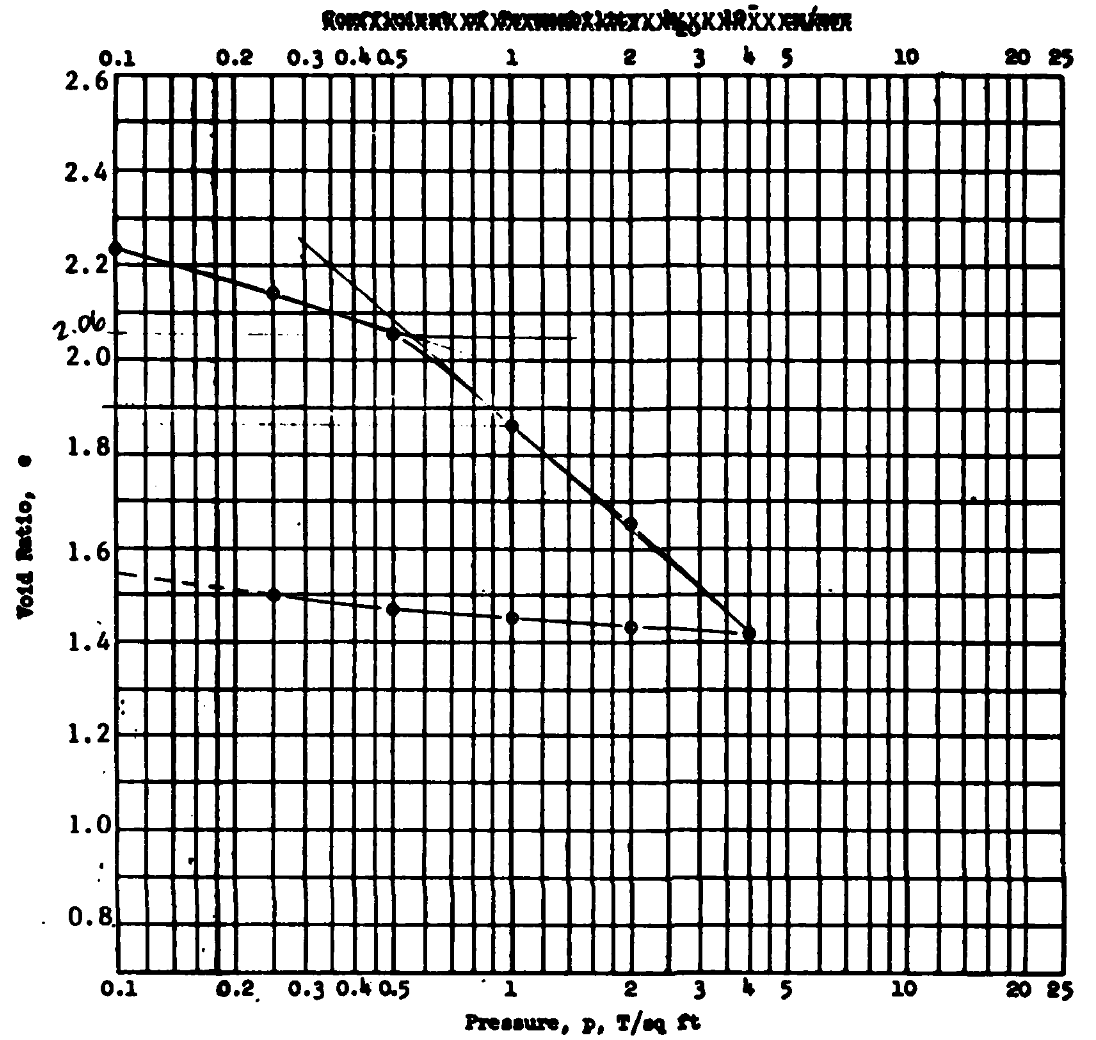
FIGURE C-13



Project	SANDY POINT NAVIGATION CHANNEL-Breakwater Foundation			
Area	Watcom County, WA			
Boring No. 82-WB	Sample No. 6B	Depth El 11.0-13.7 ft.	Date FEB 28 1983	
ENG FORM 2088 1 MAY 81 PREVIOUS EDITIONS ARE OBSOLETE.	**CONSOLIDATION TEST--TIME CURVES**	NPD	(TRANSLUCENT)	

C 3727

FIGURE C-14



Type of Specimen	Undisturbed	Before Test		After Test	
Diam in.	Ht in.	Water Content, w_o	81.7 %	w_f	58.2 %
Overburden Pressure, p_o	- T/sq ft	Void Ratio, e_o	2.255	e_f	1.588
Preconsol. Pressure, p_c	- T/sq ft	Saturation, S_o	96.8 %	S_f	97.8 %
Compression Index, C_c	0.741	Dry Density, γ_d	51.2 lb/ft^3	γ_d	64.4
Classification	-	k_{20} at e_o = - x 10$^-$ cm/sec			

LL -	G_s 2.67
PL -	D_{10} -

Remarks Brown to black, soft, moist, silty sand.

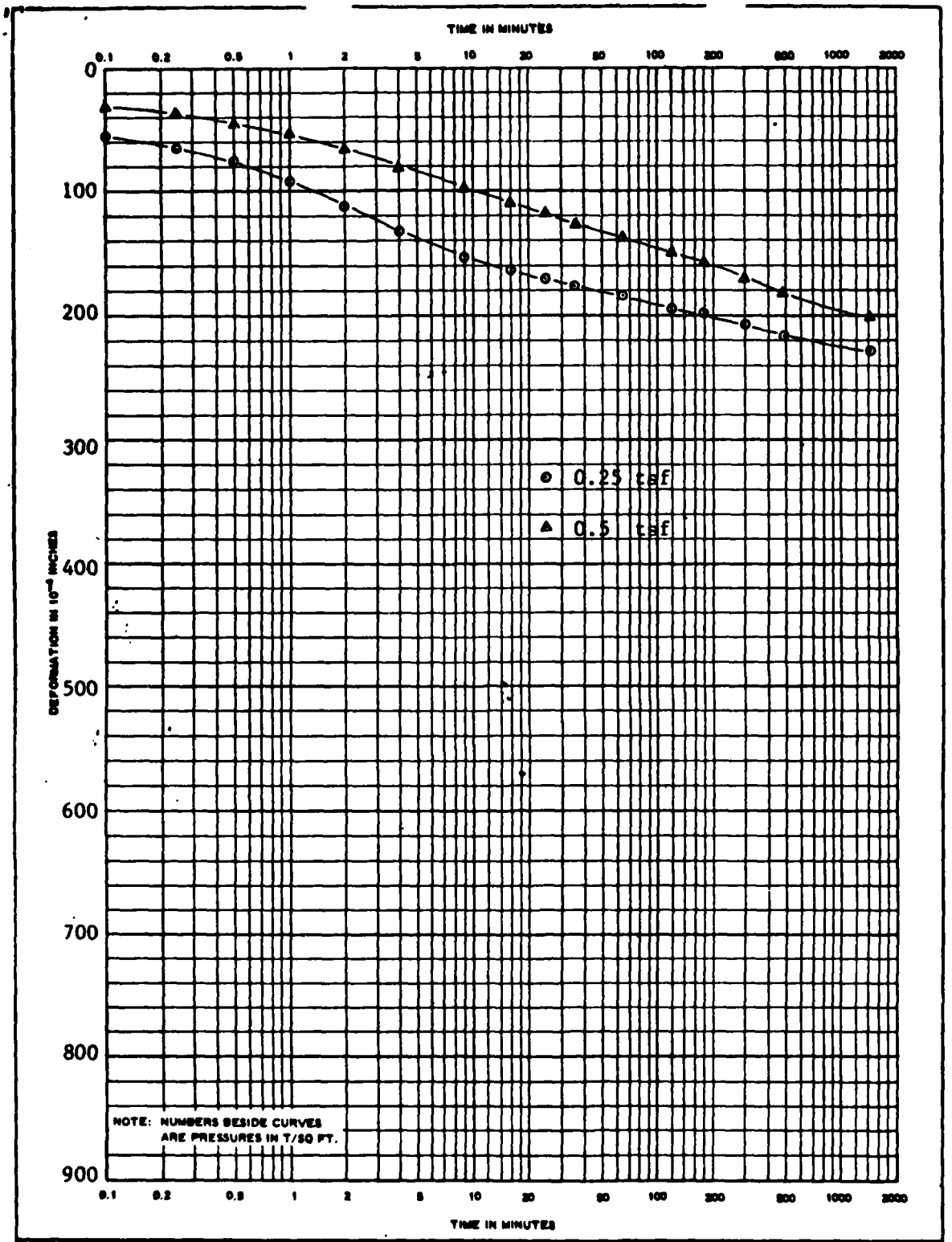
(83-S-342) NPD

Project SANDY POINT NAVIGATION CHANNEL Breakwater Foundation	
Area Watcom County, WA	
Boring No. 82-WB	Sample No. 7A
Depth El 10.5-13.0 ft.	Date FEB 28 1983

CONSOLIDATION TEST REPORT

ENG FORM 1 MAY 63 2090 PREVIOUS EDITIONS ARE OBSOLETE.

FIGURE C-15

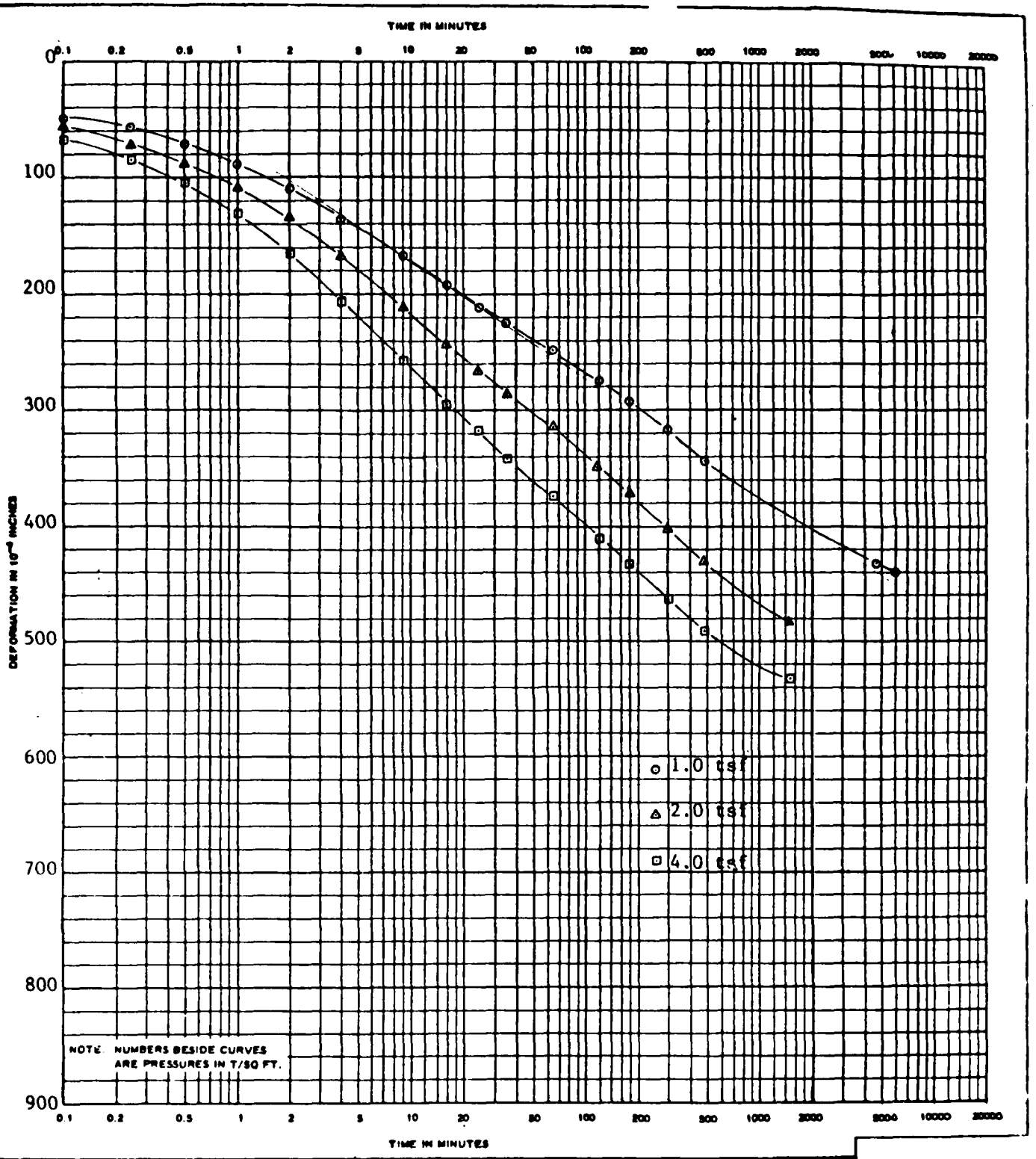


Project	SANDY POINT NAVIGATION CHANNEL-Breakwater Foundation				
Area	Watcom County, WA				
Boring No.	82-WB	Sample No.	7A	Depth El	10.5-13.0 ft.
Date	FEB 28 1983				

ENG FORM 2086 (1 MAY 81) PREVIOUS EDITIONS ARE OBSOLETE.

CONSOLIDATION TEST--TIME CURVES NPD (TRANSLUCENT)

FIGURE C-16



Project	SANDY POINT NAVIGATION CHANNEL - Breakwater Foundation			
Area	Watcom County, WA			
Boring No.	82-WB	Sample No. 7A	Depth El 10.5 - 13.0 ft	Date FEB 28 1983

ENG FORM 2088 (1 MAY 81) PREVIOUS EDITIONS ARE OBSOLETE

CONSOLIDATION TEST--TIME CURVES NPD (TRANSLUCENT)

FIGURE C-17

APPENDIX D

SOCIOECONOMIC ENVIRONMENT AND PROJECT ECONOMIC EVALUATION

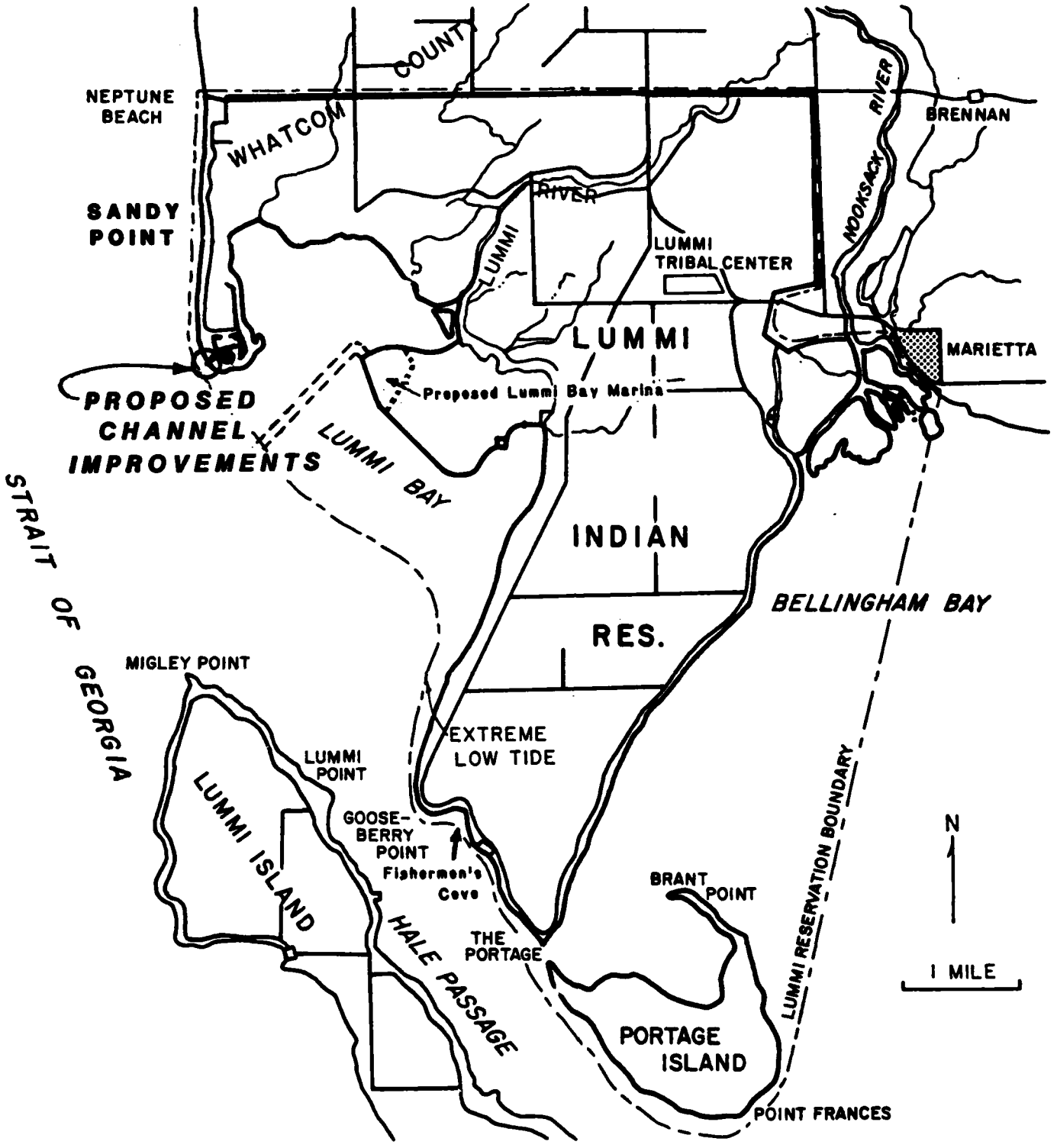
SECTION 1. SOCIOECONOMIC ENVIRONMENT

1.01 Purpose and Scope. Purpose of the study was to identify and describe the socioeconomic study area as well as evaluate economic benefits and social impacts resulting from the proposed dredging of the access channel.

1.02 Economic Study Area. The Lummi Indian Reservation was selected (see plate 1 and figure D-1) as the study area since most of the economic and social impact of the project will be on the reservation and Sandy Point is located within the boundaries of the reservation. Where reservation data was not available, county wide data was used.

1.03 Location and Project Description. Sandy Point is a naturally formed land spit about 1-mile in length located on the Lummi Indian Reservation, adjacent to the northwesterly portion of Lummi Bay and the southeasterly end of the Strait of Georgia, in west-central Whatcom County, Washington State. The Lummi Reservation is located approximately 100 miles north of Seattle, Washington; 40 miles south of Vancouver, British Columbia, Canada; and 8 miles northwest of Bellingham, Washington. It is a narrow peninsula consisting of about 5,400 acres of tidelands, 12,600 acres of upland interior basin, and 1,000 acres on Portage Island. The southern portion of the peninsula separates Bellingham Bay, located to the south, and Lummi Bay, located to the north. The upland portion of the reservation includes such public and commercial facilities as a county ferry boat landing for ferries operating between Lummi Island and the mainland, a boat launch hoist, and upland buildings housing boat sales, dry boat storage, and restaurant facilities. Sandy Point is a locally constructed harbor consisting of an entrance channel, a public anchorage area, and interior canals or waterways. The canals provide navigational access to and from two marinas (one public and one private), a boat launch ramp and dock, a boat hoist, as well as numerous waterfront docks adjacent to private residences. A U.S. Coast Guard (USCG) light beacon and a privately constructed channel marker are located at the harbor entrance. Sandy Point is favorably situated to the San Juan Islands for pleasure boating as well as to salmon and bottom fish fishing grounds. Over 240 recreational boats use this facility for permanent moorage while an additional 200 recreational boats utilize the launching facilities. Also, approximately 90 commercial fishing boats make use of Sandy Point for permanent or transient moorage. Transient boats commonly employ the harbor for refueling, offloading fish, or to gain refuge from rough water conditions in the Strait of Georgia.

1.04 Natural Resources. The Lummi Indian Reservation consists of 19,000 acres which are traversed by the Nooksack River. The Nooksack River drains 80 percent of the 1,000-square-mile Bellingham-Samish Bay drainage basin and approximately 2,500 acres of reservation land are located in the greater Nooksack flood plain. Topography is relatively gentle, rising to 200 feet in the area north of Lummi Bay, 100 feet on the peninsula, and 120 feet on Portage Island. Soils range from silty clay with poor drainage to gravel which provides excellent drainage. Land use is predominantly agriculture and forest.



LUMMI INDIAN RESERVATION FIGURE D-1

Waters off Sandy Point contain a wide variety of fishing resources. Large numbers of five salmon species pass near Sandy Point on their annual migration to freshwater rivers, including the Nooksack. Bottom fish, shellfish, crustaceans, and roe herring also abound in the highly productive waters around the San Juan Islands. The waters of the Strait of Georgia and the San Juan Islands, lying adjacent to Whatcom County, act as a catalyst for recreation and tourism. These waters are unsurpassed for boating and offer excellent salmon and bottom fishing.

The maritime climate of the area is typical of all western Washington; summers are warm, winters are cool and wet. Maximum daily temperatures occur in July and August and average 62° F. Minimum daily temperatures normally occur in January and average 36° F. Temperatures rarely exceed 86° F or fall below 10° F. Area precipitation averages about 33 inches per year, with 76 percent of the precipitation occurring during the wet season (October-April). Winds are often light and from a southerly direction in the summer. Winter winds are moderate to strong, with average velocities estimated at 9 knots and maximum velocities usually exceeding 50 knots.

1.05 Land Use. The largest managed land activity on the reservation is agriculture and totals approximately 3,500 acres. This use is confined primarily to intensive crop, hay, grass, and native pasture. Other crops include corn, peas, and potatoes. The reservation currently has about 4,000 acres of unmanaged timber, which includes several mixed stands of hardwoods, western redcedar, and smaller amounts of Sitka spruce, Douglas fir, and grand fir. Residential use is divided between Indian and non-Indian. The non-Indian community lies primarily along the shoreline areas of Gooseberry Point and Sandy Point. The Indian population is mostly located in the interior of the reservation and along the eastern shoreline of the peninsula. Commercial enterprises are casually located with no established commercial center on the reservation. Industrial land use consists primarily of a water-based aquaculture facility which was begun in 1969. This fish rearing area consists of a 700-acre impoundment, including a fish rearing pen, located in Lummi Bay. Other land uses consist of rivers, tidelands, beaches, public facilities, roads, meadow, and marsh.

1.06 Human Resources. The Lummi Reservation is comprised of two identifiable communities; Indian and non-Indian. The 1980 population of the reservation totaled 3,471 (3.2 percent of Whatcom County) and consisted of 1,871 Indians and 1,600 non-Indians. As shown in table 1-1, the age of the reservation Indian population is young, with 58 percent 24 years or under. After decades of slow growth, the reservation Indian population has been increasing at 3.5 percent per year. This relatively higher rate of population growth is attributed to relative improvements in health care, housing, and associated social services and to increased efforts to identify and enroll tribal members. This rate of growth is higher than Whatcom County, which grew at an average annual rate of 2.2 percent between 1960 and 1980 and the State of Washington which grew at 1.9 percent over the same period. Native Americans represent the largest single racial minority in the county, accounting for 56 percent of the non-White population.1/

1/Source: 1980 census data for Whatcom County. Includes people of Spanish origin which may be of any race.

TABLE 1-1

PERCENT OF POPULATION BY AGE AND SEX
LUMMI INDIAN

Age	Percent Female	Percent Male
0- 4	5.5	5.7
5-14	10.1	10.4
15-24	12.4	13.6
25-34	8.7	7.5
35-44	4.6	4.9
45-64	6.4	6.3
65-over	2.0	1.9
	49.7	50.3

The population of non-Indians on the reservation in significant numbers is a relatively recent and rapid occurrence. In 1960, non-Indians numbered 246, but by 1980 this population had increased to 1,600, an increase of 650 percent in just 20 years. Most of these people are recent arrivals and a considerable number are retired or second-home owners who have built on the reservation. In addition to those living on the reservation, there are transient visitors both on a seasonal and daily basis. The ferry, operating between Lummi Island and the reservation, generates 430 vehicle trips per day through the reservation, and during good weather or when fishing season is open, hundreds of non-Indians utilize the boat launch and restaurant facilities at Fisherman's Cove as well as the boat launch at Sandy Point.

Population projections indicate that the rate of growth of Whatcom County, which from 1975-1980 increased from 90,600 to 107,900, an average annual rate of 3.6 percent, will continue to grow at a rapid, though lower, rate of growth. Between 1980 and 2000, Whatcom County population is forecasted to grow at 2 percent per year,1/ which would result in a population of approximately 160,000 by year 2000. Based on continued improvements in economic and social conditions of the Lummi Indians, a similar growth pattern can be expected on the reservation.

1.07 Economy. The largest single employer on the reservation is the commercial fishing industry. There are 1,000 registered Lummi Indian fishermen, of which approximately 385 are full-time and 615 part-time. The Indian fishery consists primarily of salmon; however, in recent years other fisheries, such as ground fish, halibut, Dungeness crab, etc., have been playing an increasingly important part of both Indian and non-Indian catches.

1/Source: Economic Forecast for Washington State, Office of Financial Management, December 1979.

As shown in table 1-2, the value of the salmon catch appears to be cyclical in nature, ranging from a value of $9.6 million in 1976, up to $21.2 million in 1978, and back to $10.8 million in 1980. This cyclical occurrence is usually caused by the following factors: (1) survival rate of salmon entering Whatcom County waters, especially the higher valued sockeye and chinook species; (2) amount of the higher valued salmon caught in Whatcom County; (3) prices paid per pound for each species; and (4) closure of the pink salmon fishery in even numbered years. As shown in table 1-2, other fisheries in Whatcom County include ground fish, Dungeness crab, halibut, tuna, and dogfish. While poundage has remained virtually constant, these fisheries have increased from $4.3 million in value in 1976 to about $5.9 million in 1981, a 38 percent increase in 5 years. Roe herring, which was developed in 1973 in the Strait of Georgia, increased in value from $658,000 in 1976 to a peak of $2.5 million in 1979. Since 1981, however, this fishery has been virtually closed.

TABLE 1-2
LANDED VALUE AND POUNDAGE OF
COMMERCIAL FISHING IN WHATCOM COUNTY1/
(Value in 1,000 of Dollars - Poundage in 1,000 of Pounds)
($1,000 DOLLARS)

Fishery	1976	1977	1978	1979	1980	1981
Salmon:						
Chinook	$2,658	$3,248	$3,256	$2,144	$3,121	$2,334
Chum	2,142	528	4,944	399	2,513	865
Pink	--	2,879	--	4,270	--	5,347
Coho	1,425	2,232	3,152	2,564	3,354	1,358
Sockeye	3,357	6,997	9,866	8,759	1,758	6,508
Total Salmon Value	$9,582	$15,884	$21,218	$18,137	$10,746	$16,412
Total Salmon Poundage	--	--	14,464	19,204	8,921	19,185
Other Fisheries:						
Ground Fish	$3,085	$2,859	$1,616	$2,383	$2,525	$3,686
Dungeness Crab	623	998	1,318	893	857	893
Halibut	483	284	1,166	151	767	928
Tuna	37	144	17	43	16	115
Dogfish	32	97	195	297	255	263
Total Other Fisheries	$4,260	$4,382	$4,312	$3,767	$4,420	$5,885
Total Other Fisheries Poundage	--	--	26,644	26,498	26,383	26,503
Roe Herring Value	$658	$1,149	$1,901	$2,479	$1,038	$95
Roe Herring Poundage	--	--	4,392	3,557	3,945	929
Total Whatcom County:						
Fishery Value	$14,500	$21,415	$27,431	$24,383	$16,204	$22,392
Fishery Poundage	--	--	45,500	49,259	17,286	46,617

1/Source: Washington State Department of Fisheries, Resource Statistics. Ports include Bellingham, Blaine, Point Roberts, and Marietta.

Additional economic activity on the reservation includes forest harvesting, small store ownership, construction industry, seafood processing, fish hatchery, community services, and local government. In 1982 these activities employed about 330 persons.

1.08 Employment. Typically, an economy that is primarily reliant on resource-oriented activities which are seasonal in nature will contribute to a fluctuating unemployment rate. With the seasonal fishing industry the largest single employer on the reservation, coupled with other reservation employment opportunities that are seasonal in nature, the unemployment rate is extremely high. For example, during April of 1980 (an off season fishing month), out of a potential Indian labor force of 1,302, only 584 people were employed and 70 of these were earning less than $5,000 per year.1/ Unemployment rates often range from highs of 75-80 percent during the off season to around 25 percent during the fishing season. The Lummi Indian Reservation has been designated by the Department of Army as an area of substantial and persistent unemployment. In the future the Lummi Indian Tribe hopes to reduce their high unemployment rates by placing a higher emphasis on: (1) higher education of their populace, (2) increased economic development on the reservation, which will (3) provide a greater tax base, and (4) provide greater employment opportunities.

1.09 Government. The Lummi Indian Reservation is governed by an 11-member Lummi Business Council. Under the direction of this council, the Lummi Indian Tribal Enterprise was formed to manage the economic development of the reservation. The tribal council has also provided for, and oversees, such services to the community as education, housing, utilities, natural resources planning and management, economic planning, public safety, recreation, and health.

1.10 Community Cohesion. Community cohesion refers to social and psychological characteristics which contribute to community identity. Whatcom County is an area comprised of several diverse social and cultural communities. Among these communities are rural dwellers, city dwellers, college students, and American Indians. These communities are distinguished by attitudes, values, occupations, and in some cases, ethnic traditions. The communities within Whatcom County exist in relative harmony. The Lummi Indian community tends to be socially and culturally isolated from most other county communities.

1.11 Future Development. The economy of the Lummi Reservation will most likely derive an increasing portion of their income from fishing related industries. Future plans are to develop commercial fishing and support facilities on the upland portion of the proposed marina. These facilities include such items as a commercial fishing boat marina, fish processing plant, cold storage plant, webhouse and net repair area, marine repair, barge construction area, boat storage area, commercial marine sales, and miscellaneous small shops and stores. Careful planning by the Indian community will be required to maintain a desirable environment, especially land use planning and public services.

1/Source: Overall Economic Development Plan, Lummi Indian Tribe, 1980.

SECTION 2. ECONOMIC EVALUATION

2.01 General. The proposed project at Sandy Point consists of providing an unobstructed and safe navigation access channel for boaters using the Sandy Point moorage and launching facilities. Benefits produced by this project include vessel operation cost savings, reduced vessel damage, land enhancement, and employment. Benefits were computed in accordance with "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies," dated 10 March 1983.

2.02 Problems and Needs. Sandy Point is a naturally formed spit created by the deposit of littoral drift material primarily moving in a north to south direction along the Strait of Georgia shores of Whatcom County. The channel entrance to Sandy Point Harbor has interrupted this flow and is filling or shoaling in from the transport of this drift material into the channel (see appendix C for further information on shoaling).1/

The present entrance channel condition is hazardous to navigate during low tides or inclement weather. Numerous groundings, vessel structural damage, and delays have been experienced. As future shoaling decreases the channel depth and width, navigation will become increasingly more difficult and dangerous, compounding present problems and forcing most of the recreational and commercial boaters currently using Sandy Point to moor or launch boats at alternative sites elsewhere in Whatcom County.

The existing supply of recreational wet slips in Whatcom County total 1,406 (excluding Point Roberts). This total includes 685 slips at Squalicum Marina, 250 slips at Sandy Point, 212 slips at Blaine Marina, 251 at Semiahmoo Marina, and eight slips at Schotts Birch Bay. Future increases in the supply of slips is based on the expansion of Semiahmoo Marina (privately owned marina near Blaine which serves public in general) which is in the process of adding an additional 550 wet slips and Squalicum Marina which is currently (1983) adding 100 slips and has room and plans to add an additional 394 slips as demand increases. Existing demand is a function of existing use as well as boaters on waiting lists for moorage. During the summer of 1983, all slips were in use and there was a waiting list at area marinas (Squalicum and Semiahmoo) totaling 220. 1983 demand was estimated at 1,604 wet slips and includes 100 percent of existing slips (excluding Point Roberts) and 90 percent of boaters on waiting lists. Ten percent of persons on waiting lists were assumed to be on more than one list. Demand was forecasted to increase from 1,604 in 1983 to 2,510 wet slips in the year 2000. This reflects an average annual growth rate of 2.86 percent per year between 1983 and 1990 and 2.52 percent per year from 1990 to 2000. Growth rates are based on the "Recreational Boating Study," dated October 1980, Seattle District, Corps of Engineers. Table 2-1 shows the forecasted supply and summer demand as well as expected surplus and deficit of wet slips in Whatcom County for both with and without Sandy Point Marina.

1/"Marina Inlet Shoaling at Sandy Point, Washington," by Dr. Maurice Schwarz, September 1983.

TABLE 2-1

RECREATIONAL WET SLIPS
SUPPLY VERSUS DEMAND - SUMMER
WHATCOM COUNTY

Wet Slips	1983	1985	1990	2000
Supply	1,406[1]/	2,056[3]/	2,450[4]/	2,450
Demand	1,604[2]/	1,697	1,955	2,510
Surplus (Deficit)	(202)	359	495	(60)
Without Sandy Point Slips	(250)	(250)	(250)	(250)
Surplus (Deficit)	(452)	109	245	(310)

1/Includes 685 wet slips at Squalicum, 250 at Sandy Point, 212 at Blaine, eight at Schotts Birch Bay, and 251 at Semiahmoo. Excludes Point Roberts (1,026 slips). All slips are occupied.

2/Includes existing occupied slips plus 90 percent of 220 boats on waiting list. Growth in demand is based on "Recreational Small Boat Moorage Study," dated October 1980.

3/Includes construction of an additional 550 wet slips at Semiahmoo and 100 additional wet slips at Squalicum Marina.

4/Includes construction of an additional 394 wet slips at Squalicum Marina.

2.03 Project Benefits. The following subsections cover the major benefit categories produced as a result of the proposed project. Because supply exceeds demand for the next 10-15 years, neither the travel cost, contingent value, or unit day value benefits methodology was used to quantify the value of moorage and launching facilities at Sandy Point. Instead, recreational boating benefits were based on vessel operating cost savings and reduced vessel damage. Other project benefits include land enhancement and national economic development (NED) employment benefits.

a. Vessel Operating Cost Savings. Variables used in the computation of vessel operating cost savings were: (1) number of vessels accruing operation cost savings, (2) recreational trips taken per year, (3) vessel operating costs per hour (including real fuel cost escalation), and (4) hours of travel time saved per trip.

Recreationa boaters currently (1983) using Sandy Point Harbor include 22 vessels moored at the public marina, 69 vessels moored at the private marina, 151 boats moored at residential docks, and 200 vessels which utilize the boat launching facilities. Vessel lengths range from 16 feet to over 40 feet while drafts range from 2 feet to over 5 feet. A without project condition is based on the premise that Sandy Point access channel will shoal to 0 feet MLLW by 1986.

In order to avoid the increased vessel damage risk to personal safety and tidal delays which would occur while navigating the access channel under these conditions, many owners would move their vessels to other marinas or use other launching facilities in Whatcom County even though these alternative moorage/ launching facilities are located farther away from the boater's typical recreation areas. The move would result in boaters incurring additional vessel operating costs while navigating to their typical recreation area. A with project condition would allow these vessels to remain at Sandy Point thereby reducing vessel operating costs. Vessels which would move from Sandy Point to other marinas are primarily a function of channel depth and vessel draft. Given a without project channel depth of 0 feet MLLW, all vessels with a draft of over 2 feet were expected to moor or launch elsewhere. This includes all vessels with a length of 29 feet or greater, all sailboats, and 80-85 percent of moored and trailered vessels 16-28 feet in length. As shown in table 2-2, of the 242 recreational vessels currently moored at Sandy Point, a channel depth of 0 feet MLLW would result in an estimated 207 vessels moving to other Whatcom County marinas. The two closest alternative sites which have room to accommodate moorage of these recreational boats are Squalicum Marina in Bellingham, Washington, and Semiahmoo Marina in Blaine, Washington. Based on data supplied by Sandy Point representatives, an estimated 85 percent (or 175 vessels) would move to Squalicum Marina with the remaining 15 perent (or 32 vessels) moving to Semiahmoo Marina. Of the 200 boats launched at Sandy Point, 170 would be forced to use launching sites elsewhere. The most likely sites would be nearby at Bellingham, Birch Bay, Fisherman's Cove adjacent to Gooseberry Point, or the launch at the proposed Lummi Bay Marina. Based on the type of launch facility and its proximity to Sandy Point, it was estimated that 10 percent (20 vessels) would utilize Bellingham, 25 percent (40 vessels) Birch Bay, 15 percent (25 vessels) Fisherman's Cove, and 50 percent (85 vessels) Lummi Bay Marina (see table 2-2).

There are many recreational locations around the San Juan Islands and Strait of Georgia that are visited by the Sandy Point boaters during the year. Boaters from Sandy Point indicate, however, that a typical recreational boating trip consists of boating 10 miles from Sandy Point to Sucia Island in the San Juan Islands. Sandy Point boaters who have to move their vessels to either Squalicum or Semiahmoo Marinas will have to navigate an additional 11 miles per one-way trip or 22 miles per round trip to reach Sucia Island. Boats trailered to and launched at Birch Bay or Fisherman's Cove instead of Sandy Point will navigate an additional 2 miles per one-way trip. Boats launched at Lummi Bay will travel 3 additional miles, while boats launched at Bellingham will travel 11 additional miles to reach Sucia Island.

Based on boating information supplied by Sandy Point Marina representatives, the average number of trips per year per boat for moored vessels was estimated at 26 trips for inboard vessels and 24 trips for outboards and sailboats. Trips for trailered boat, all of which are outboards, were estimated at 20. Trips per year, by boat type, for moored and trailered boats are shown in table 2-3.

TABLE 2-2

WITH AND WITHOUT PROJECT RECREATIONAL VESSEL FLEET AT SANDY POINT

Vessel Size and Type	With Project	Without Project	
		Moved Elsewhere[1/]	Remain at Sandy Point
Moored Vessels			
16-28 Feet			
Inboard	126	102	24
Outboard	52	41	11
Sailboat	26	26	0
29-40 Feet			
Inboard	21	21	0
Outboard	0	0	0
Sailboat	13	13	0
Over 40 Feet			
Inboard	3	3	0
Sailboat	1	1	0
Subtotal	242	207	35
Trailered Vessels			
Outboard 16-28 Feet	200	170[2/]	30
TOTAL	442	377	65

1/85 percent to Squalicum Marina at Bellingham, Washington, and 15 percent to Semiahmoo Marina at Blaine, Washington.

2/10 Percent to Bellingham, Washington, 25 percent to Birch Bay, Washington, 15 percent to Fisherman's Cove, and 50 percent to the proposed Lummi Bay Marina.

TABLE 2-3

TRIPS PER YEAR

	Trips Per Year
Moored Vessels	
Inboard	26
Outboard	24
Sailboat	24
Trailered Vessels	
Outboards	20

Vessel operating costs include fuel, lubricants, maintenance, and repair. These costs, measured in 1983 dollars, total $9.89 per hour for power boats 16-28 feet in length, $20.57 per hour for power boats 29-40 feet in length, and $24.80 per hour for power boats over 40 feet.[1/] Sailboat costs, assuming use of a diesel engine 50 percent of the time were estimated of $2.70 per hour. Included in the fuel and lubricants component is an adjustment reflecting real fuel cost escalation. This adjustment is based on Data Resources Incorporated 1983 escalation rates for diesel/distillate fuel between 1983 and 2013 and has been discounted to project year 1 at 8-1/8 percent. Diesel/distillate fuel escalation rates are shown in table 2-4.

1/Source: Washington Sea Grant as developed in "Recreational Small Boat Moorage Study," Corps of Engineers, 1980.

TABLE 2-4

REAL FUEL COST ESCALATION RATES - DIESEL/DISTILLATE

1983-1990	1990-1995	1995-2000	2000-2013
3.88	3.26	2.78	1.33

Traveltime saved per recreational trip is a function of nautical miles saved per trip and vessel speed. Shown below in table 2-5 are the nautical miles saved per trip and vessel speed listed by vessel size and vessel type for moored vessels.

Recreational vessel operating cost savings are estimated at $86,000 per year. Computation of these benefits by vessel size and type for both moored and trailered vessels is shown in table 2-6.

TABLE 2-5

TRAVELTIME SAVED PER TRIP - MOORED VESSELS

Vessel Size and Type	Miles Saved Per Round Trip (Nautical Miles)	Vessel Speed (Knots)	Traveltime Saved Per Round Trip (Hours)
16-28 Feet			
Inboard	22	18	1.2
Outboard	22	20	1.1
Sailboat	22	6	3.7
29-40 Feet			
Inboard	22	15	1.5
Outboard	22	N/A	N/A
Sailboat	22	6	3.7
Over 40 Feet			
Inboard	22	12	1.8
Outboard	N/A	N/A	N/A
Sailboat	22	6	3.7

TABLE 2-6

OPERATING COST SAVINGS

Vessel Size and Type	Number of Vessels	Trips Per Year	Reduced Travel Time/Trip	Hours Saved Per Year	Operating Costs Per Per Hour	Operating Cost Savings
Moored Vessels						
16-28 Feet						
Inboard	102	26	1.2	3,182	9.89	31,470
Outboard	41	24	1.1	1,082	9.89	10,700
Sailboat	26	24	3.7	2,309	2.70	6,230
29-40 Feet						
Inboard	21	26	1.5	819	20.57	16,850
Outboard	0	N/A	N/A	N/A	N/A	N/A
Sailboat	13	24	3.7	1,154	2.70	3,120
Over 40 Feet						
Inboard	3	26	1.8	140	24.80	3,470
Sailboat	1	24	3.7	89	2.70	240
Subtotal - Moored	207					$72,080
Trailered Vessels1/						
16-28 Feet						
Birch Bay	40	20	1.2	960	9.89	9,500
Fisherman's Cove	25	20	.2	100	9.89	1,000
Bellingham	20	20	.2	80	9.89	800
Lummi Bay	85	20	.16	272	9.89	2,700
Subtotal - Trailered	170					$14,000
TOTAL OPERATING COST SAVINGS						$86,000

1/Assumes boat launch at proposed Lummi Bay Marina is constructed.

b. Reduced Vessel Damage.

(1) Recreational Vessels. As previously mentioned, the entrance channel at Sandy Point, if not dredged, will fill to MLLW by project year one (1986-87). It is expected that those vessels which remain at Sandy Point under these channel conditions, will run an increasingly higher risk of incurring some vessel damage navigating the shallow channel. Based on discussions with Sandy Point representatives, of the 24 recreational inboard vessels which would

remain at Sandy Point (see table 2-2) approximately 15 percent or 4 vessels per year would incur about $500 in damage per vessel. In addition, of the 41 recreational outboard boats (moored and trailered) which would remain at Sandy Point (see table 2-2) an estimated 15 percent or 7 vessels per year would incur about $200 in damage per vessel. Dredging of the channel would allow vessels to navigate the channel safely thereby eliminating these damages. Combination of reduced vessel damage attributed to recreational vessels is shown on table 2-7 and totals $3,400 per year.

TABLE 2-7

REDUCED VESSEL DAMAGE - RECREATIONAL VESSELS

Vessel Size and Type	Vessels Remaining	Vessels Damaged Per Year	Estimated Damage Per Vessel	Total Damage Reduction
Moored Vessels				
16-28 Feet				
Inboard	24	4	$500	$2,000
Outboard1/	41	7	200	1,400
TOTAL BENEFIT				$3,400

1/Includes 30 trailered and 11 moored vessels.

(2) Commercial Fishing Vessels. There presently exists a shortage of commercial fishing slips in Whatcom County. Construction of the proposed Lummi Bay commercial fishing marina, about 2 miles south of Sandy Point, will help alleviate this shortage of slips. However, even with the addition of Lummi Bay Marina, commercial fishing slips in the county are anticipated to be at capacity. In 1983, 90 commercial vessels were using Sandy Point as a moorage site. Construction of Lummi Bay Marina will attract an estimated 20 of these vessels even if Sandy Point is dredged. Of the 70 remaining vessels, an estimated 60 vessels would move to either Lummi Bay or Squalicum (located in Bellingham) marinas, if the channel is not dredged. Since these marinas are at capacity, these 60 commercial vessels would have to be rafted together. Each raft is usually formed by lashing two to five vessels together, which, during storms, subjects vessels to damage from their knocking into each other. Based on discussions with Port of Bellingham and fishermen representatives, average annual damages attributed to having to raft boats at Squalicum or Lummi Bay were estimated at $100 per boat. Dredging of Sandy Point would allow these vessels to remain at Sandy Point moorage facilities, thereby eliminating vessel damage due to rafting. Elimination of annual rafting damage to 60 commercial boats results in an estimated average annual benefit of $6,000. The 10 fishing

vessels which would remain at Sandy Point (primarily fishermen living at Sandy Point) will run a high risk of incurring some vessel damage navigating the shallow channel. It was estimated that 10 percent or 1 vessel would incur approximately $1,500 in damage each year. Dredging the channel to -10 MLLW will create a safe passage and eliminate vessel damages resulting in damage reduction benefits to their vessels of $1,500 per year. Damage reduction benefits including elimination of rafting damages and channel navigation damages total an estimated $7,500 per year.

c. Land Enhancement. Land enhancement benefits were computed as directed in "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" dated 10 March 1983. This directive states that if the market value of existing structures and land is lowered because of the without project condition, the enhancement benefit is measured by the difference in market values between the with and without project condition. Inherent in the existing or with project condition market value of land and structures at Sandy Point are the locational advantages of living on the salt water with immediate access to moorage/launching facilities providing quick and easy access to recreational boating activities found in the surrounding open waters. If the access channel to Sandy Point is not dredged, however, current moorage facilities will become virtually useless and most boaters will have to gain access to open water by mooring or launching their vessels elsewhere in Whatcom County. As a result, market values of land and property at Sandy Point will be impacted under without project conditions.

The level of impact on market values at Sandy Point was determined through an independent appraisal of land and property.1/ Primarily using comparable sales of land and structures at Sandy Point in the years 1980-1983 and an analysis to determine the amount of vacant land and improved land at Sandy Point (using assessor and sample data), the appraisal established the market value of land and structures under both with and without project conditions. The appraisal reflected the following without project impacts:

- o Lots (land) fronting on interior canals, east cove and the main basin area were affected the most dramatically. These lots would incur a 50 to 60 percent loss in value.

- o Lots fronting on the Strait of Georgia, Lummi Bay, and all upland nonwaterfront lots would suffer a 10 percent loss in value.

- o All individual docks and the two marinas would experience a 100 percent loss in value.

- o All structures (after subtracting dock values) would experience a 10 percent loss in value.

1/"Preliminary Valuation Study - Loss in Value, Sandy Point Property" Edward H. Miller and Company, October 28, 1983.

Results of the appraisal show a with project market value of land and structures at Sandy Point totaling $33,900,000 and a without project value of $25,900,000, a net change in value between the two project conditions of $8,000,000. Average annual land enhancement benefit levelized at the project interest rate of 8-1/8 percent over the 50-year project life is $663,000.

d. NED Employment Benefits. Criteria developed and formerly used by the Economic Development Administration in designating qualified areas under subsection 1 of Title II of the Public Works and Economic Development Act of 1965 (Public Law 89-136 as amended) was utilized by the Department of Army in designating the Lummi Indian Reservation as an area of "substantial and persistant" unemployment and thus eligible for National Economic Development (NED) employment benefits. NED employment benefits reflect the previously unemployed or underemployed labor resources which are employed as a result of the proposed project. Specifically, a reduction in reservation unemployment as a result of the proposed project constitutes a benefit to the local and national economies. Determination of this benefit included only the Federal cost of major navigation features and non-Federal associated costs. Computation of benefits was based on the following study results:

- Federal labor costs were estimated at 15 percent of total Federal construction costs exclusive of nonlabor items. Non-Federal labor costs were estimated at 60 percent of total non-Federal construction costs exclusive of nonlabor items.1/

- Skilled and unskilled labor was estimated at 55 and 45 percent, respectively.

- Based on the very high unemployment rate on the reservation (typically, in excess of 25 percent and often 75 to 80 percent) and a Lummi owned and operated construction company located on the reservation the expected proportion of labor from the local labor force was 50 percent for Federal construction and 50 percent non-Federal construction.

- Based on a reservation local hire rule, the proportion of local unemployed labor employed as a result of this project was 43 percent of the skilled labor and 58 percent of the unskilled labor.

Table 2-8 shows the computation of NED employment benefits of the proposed project. The average annual NED employment benefit levelized over the 50-year project life at 8-1/8 percent is $5,500 (67,000 x .0829186).

1/Source: Sandy Point Representative.

TABLE 2-8

NED EMPLOYMENT BENEFIT COMPUTATIONS[1]/

	Federal Project Costs
Total Construction Cost[2]/ Navigation Features	$1,348,000
Less: Lands, EDS&A, and Navigation Aids	258,000
Subtotal	$1,090,000
Amount Assigned to Labor	(25%)
Labor	$273,000

	Federal Project Costs	
	Skilled (55%)	Unskilled (45%)
Labor Categories	$150,000	$123,000
Local Contribution	(50%)	(50%)
Earned by Local Labor	$75,000	$61,500
Earned by Local Unemployed	(43%)	(58%)
Claimed as NED Employment	$32,000	$35,000
TOTAL	$67,000	

1/Numbers rounded.
2/Excludes interest during construction cost.

2.04 Summary of Benefits. A summary of average annual benefits which would accrue to the project is presented in table 2-9.

TABLE 2-9

SUMMARY OF AVERAGE ANNUAL BENEFITS

Benefit Category	Average Annual Benefits
Operating Cost Savings	$86,000
Recreational Vessels	
Moored	(72,000)
Trailored	(14,000)
Reduced Vessel Damage	10,900
Recreational Vessels	(3,400)
Commercial Vessels	(7,500)
Land Enhancement	663,000
Employment	5,500
TOTAL Benefits	$765,400

2.05 Project Investment Cost. Project investment costs consist of Federal and associated non-Federal construction cost plus interest during construction computed at the project interest rate of 8-1/8 percent and are shown in table 2-10.

TABLE 2-10

SUMMARY OF ESTIMATED FEDERAL AND ASSOCIATED NON-FEDERAL COSTS

Construction Costs:	
(General Navigation Facilities) Project Costs	$1,350,000 1/
Total First Cost	$1,350,000
Interest During Construction	55,000
Total Investment Cost	$1,405,000

1/Includes $2,000 of real fuel cost escalation to project year 1.

2.06 Economic Justification and Benefit-to-Cost Ratio. Benefits and costs, shown in table 2-11 are based on October 1983 prices. The fuel component of the project first cost as well as the fuel component of the operation and maintenance cost has been escalated in real terms using real fuel cost escalation rates shown on table 2-4. Costs and benefits have been discounted and annualized over the 50-year project life at the project discount rate of 8-1/8 percent. Benefit-cost ratio is 4.9 to 1, and net benefits total $608,400 per year.

TABLE 2-11

SUMMARY OF ECONOMIC ANALYSIS

Item	Average Annual Amount
Benefits:	
Operating Cost Savings	$86,000
Damage Reduction	10,900
Land Enhancement	663,000
Employment	5,500
Total Average Annual Benefits	$765,400
Costs:	
Interest and Amortization	$117,000
Operation, Maintenance, and Replacement	40,000 1/
Total Average Annual Costs	$157,000
Benefit-to-Cost Ratio	4.9 to 1
Net Benefits	$608,400

1/Includes $1,000 in average annual real fuel cost escalation over the 50-year project life.

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