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FRIDAY HARBOR MARINA EXPANSION STUDY--SAN JUAN ISLAND, WASHINGT--ETC(U)
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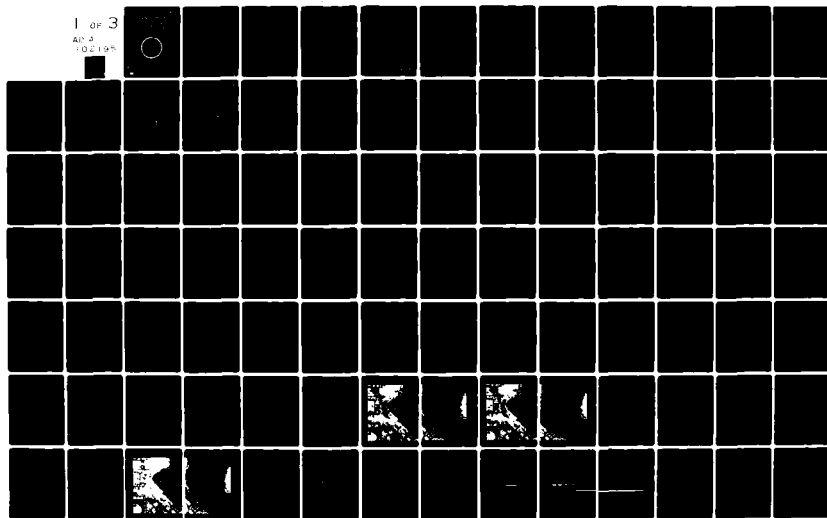
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FRIDAY HARBOR MARINA EXPANSION

FINAL DETAILED PROJECT REPORT AND FINAL ENVIRONMENTAL ASSESSMENT

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THIS DOCUMENT CONTAINS:

Detailed Project Report

Environmental Assessment

Finding of No Significant Impact

Plates

Appendixes

Appendix A - Study Coordination and Public Involvement

Appendix B - Economic and Social Evaluation

Appendix C - Engineering Design and Cost Estimates

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The study for expansion of the Friday Harbor Small Boat Marina was conducted at the request of the Port of Friday Harbor, under the authority 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 when, in the opinion of the Chief of Engineers, such work is advisable. The purposes of this study are to determine the need and feasibility of providing additional small boat moorages in the Friday Harbor area and to provide adequate wave protection for the existing and the expanded		

moorages.

The existing marina includes a structurally unsound floating breakwater which is inadequate for wave protection. Total failure would leave the 287 existing moorages unprotected. A range of nonstructural and structural alternatives were examined. Preliminary examination revealed only structural alternatives would address the objective of providing additional moorages and protection for an expanded marina. In analyzing and evaluating these alternatives, legal, financial, policy, social, economic, environmental, and design criteria were considered, as well as public and agency input. The conclusion of this analysis was that maximum limitations of the area would best serve the public interest and would provide 338 additional wet moorages and protection for the expanded marina. The principal environmental limitation was the environmentally sensitive tidelands to the northwest. Physical limitations were the developed shorelands to the west, north, and northeast; the Washington State ferry route to the east, southeast, and south; and the marine development to the south. The only nonstructural alternative considered was "no-action". This alternative would not satisfy the planning objective.

FRIDAY HARBOR MARINA EXPANSION
FRIDAY HARBOR - SAN JUAN ISLAND
WASHINGTON

FINAL
DETAILED PROJECT REPORT
AND
ENVIRONMENTAL ASSESSMENT

April
1981

DEPARTMENT OF THE ARMY
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FINAL DETAILED PROJECT REPORT
AND
FINAL ENVIRONMENTAL ASSESSMENT

FRIDAY HARBOR MARINA EXPANSION STUDY

ABSTRACT: The town of Friday Harbor is located on the eastern shore of San Juan Island, the largest of 170 islands in the San Juan Archipelago. The San Juan Archipelago is located off the northwest coast of the State of Washington, near Vancouver Island, Canada, in the State of Washington. San Juan Island is a popular tourist area containing many historical attractions. Access is by air (seaplane or light landplane) or by water. The existing marina has 190 permanent and 97 transient moorages and is owned and operated by the Port of Friday Harbor. The marina frequently accommodates over 1,000 craft during the summer months by tandem mooring, stacking, anchoring offshore, tying to the breakwater, and other makeshift means. The existing breakwater is inadequate and rapidly deteriorating. Extraordinary maintenance procedures are required to keep the breakwater afloat and provide wave protection to the moorage area. Without sufficient breakwater protection, the moored boats are susceptible to damage from northeast and southeast waves. At the request of the Port of Friday Harbor, the Seattle District investigated the feasibility of providing additional wet moorages at Friday Harbor. Studies indicated expansion of the existing facility by construction of a new breakwater seaward of the existing structure would serve the dual purpose of providing additional moorages and providing wave protection to the existing moorages and the expanded marina. Expanding the marina to its maximum practical limits would provide an additional 294 permanent and 44 additional transient moorages for a total of 484 permanent and 141 transient moorages. This plan was selected based on its fulfillment of the planning objective and planning criteria.

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EXECUTIVE SUMMARY

The study for expansion of the Friday Harbor Small Boat Marina was conducted at the request of the Port of Friday Harbor under the authority 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 when, in the opinion of the Chief of Engineers, such work is advisable. The purposes of this study are to determine the need and feasibility of providing additional small boat moorages in the Friday Harbor area and to provide adequate wave protection for the existing and the expanded moorages.

The existing marina includes a structurally unsound floating breakwater which is inadequate for wave protection. Total failure would leave the 287 existing moorages unprotected. A range of nonstructural and structural alternatives were examined. Preliminary examination revealed only structural alternatives would address the objective of providing additional moorages and protection for an expanded marina. In analyzing and evaluating these alternatives, legal, financial, policy, social, economic, environmental, and design criteria were considered, as well as public and agency input. The conclusion of this analysis was that maximum expansion of the existing marina within the environmental and physical limitations of the area would best serve the public interest and would provide 338 additional wet moorages and protection for the expanded marina. The principal environmental limitation was the environmentally sensitive tidelands to the northwest. Physical limitations were the developed shorelands to the west, north, and northeast; the Washington State ferry route to the east, southeast, and south; and the marine development to the south. The only nonstructural alternative considered was "no-action." This alternative would not satisfy the planning objective.

Water depths in excess of 50 feet below mean lower low water at the outer limits of the proposed marina expansion and the presence of soft foundation materials precluded consideration of rubblemound or combination timber pile and rubblemound construction breakwaters because of the excessive cost and construction and maintenance problems. The recommended plan involves construction of two floating breakwaters of rectangular concrete construction totaling 1,600 feet, both 5 feet deep, with about 1-1/2 feet of freeboard. The north breakwater will be 21 feet wide and 400 feet long. The east breakwater will be 1,200 feet long and consist of three legs. The east leg will be 600 feet long and 21 feet wide; the southeast and south legs will each be 300 feet long and 16 feet wide. The breakwaters will consist of 100-foot-long modules, fastened together by thread bar tendons. The three legs of the east breakwater are linked by extruded rubber connectors.

Access will be provided to both breakwaters. The north breakwater will provide anchorage for a seaplane float and facilities for the U.S. Customs Service for inspection of airplanes and boats entering United States waters. Recreation facilities will not be provided on this breakwater. Sport fishing and sightseeing will be allowed from the east breakwater. Temporary tieup of craft will be allowed along the marina side of the east breakwater with a potable water supply and an electrical supply provided. The breakwaters will be anchored by galvanized steel bridge rope from the corner of each module to steel H-beam piles driven into the bottom. Aids to navigation would be installed and maintained by the U.S. Coast Guard.

A finding of no significant impact has been issued. The recommended plan will not impact any intertidal wetlands. Since adequate water-depths exist, initial or maintenance dredging will not be required.

The first cost of the general navigation facilities, navigation aids, and the breakwater recreational facilities would total \$2,848,000. This includes \$2,740,000 for the breakwater; \$10,000 for locally provided lands, easements, and rights-of-way; \$10,000 for aids to navigation by the U.S. Coast Guard; and \$88,000 for breakwater recreational facilities.

The first cost to the Federal Government would be \$1,479,000, which includes the \$10,000 aids to navigation by the U.S. Coast Guard. Average annual costs would be \$235,000, and average annual benefits would be \$495,000. The benefit-to-cost ratio would be 2.1 to 1. The above costs do not include \$235,000 preauthorization study costs.

TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
	ABSTRACT	i
	EXECUTIVE SUMMARY	ii
	TABLE OF CONTENTS	iv
SECTION 1. BACKGROUND		
1.01	Study Authority	1-1
1.02	Type of Study	1-1
1.03	Location of Study Area	1-1
1.04	Needs	1-1
1.06	Pertinent References	1-1
SECTION 2. PLANNING OBJECTIVE AND CRITERIA		
2.01	Planning Objective	2-1
2.02	Planning Criteria	2-1
	a. General	2-1
	b. National Economic Development (NED) Criteria	2-1
	c. Environmental Quality (EQ) Criteria	2-2
	d. Regional Development (RD) Criteria	2-3
	e. Social Well-being (SWB) Criteria	2-3
SECTION 3. FORMULATION AND EVALUATION OF ALTERNATIVES		
3.01	Plan Formulation Approach	3-1
3.02	Preliminary Analysis and Screening of Alternatives	3-1
3.07	Alternative 1, No Action (Nonstructural Alternative)	3-2
	a. Description	3-2
	b. Evaluation With Key Criteria	3-2
	(1) National Economic Development (NED) Criteria	3-2
	(2) Environmental Quality (EQ) Criteria	3-2
	(3) Regional Development (RD) Criteria	3-8
	(4) Social Well-being (SWB) Criteria	3-8
3.08	Alternative 2, Dryland Storage	3-9
3.10	Alternative 3, Evaluation of Alternative Sites	3-9
3.11	Alternative 4, Breakwater Replacement (LED Plan)	3-9
	a. Description	3-9
	b. Evaluation With Key Criteria	3-10
	(1) National Economic Development (NED) Criteria	3-10
	(2) Environmental Quality (EQ) Criteria	3-10

TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
	(3) Regional Development (RD) Criteria	3-11
	(4) Social Well-being (SWB) Criteria	3-11
3.12	Alternative 5, Expansion of Existing Marina (NED Plan)	3-11
	a. Description	3-11
	b. Evaluation With Key Criteria	3-12
	(1) National Economic Development (NED) Criteria	3-12
	(2) Environmental Quality (EQ) Criteria	3-12
	(3) Regional Development (RD) Criteria	3-13
	(4) Social Well-being (SWB) Criteria	3-13
 SECTION 4. THE RECOMMENDED PLAN		
4.01	Plan Description	4-1
4.03	Navigation Conditions	4-1
4.04	Tides and Currents	4-1
4.05	Winds	4-1
4.06	Waves	4-2
4.07	Hydraulics	4-2
4.08	Geotechnical	4-2
4.09	Design Criteria	4-3
4.10	Structural Features	4-3
	a. Breakwater	4-3
	b. Anchors	4-3
4.11	Dredging	4-3
4.12	Miscellaneous Features	4-3
4.13	Aids to Navigation	4-4
4.14	Real Estate	4-4
4.15	Environmental Features	4-4
4.16	Cultural Resources	4-4
4.17	Recreation	4-4
4.18	Project Costs	4-4
4.19	Design and Construction Schedule	4-5
4.20	Operation, Maintenance, and Replacement	4-6
4.22	Economics of the Recommended Plan	4-8
	a. Methodology	4-8
	b. Pleasure Craft Benefits	4-8
	c. Commercial Fishing Benefits	4-8
	d. Breakwater Recreational Fishing Benefits	4-8
	e. Commercial Charter Boat Benefits	4-8
	f. Average Annual Benefits	4-8
	g. Average Annual Costs	4-9
	h. Economic Justification	4-9
4.23	Environmental Effects of the Recommended Plan	4-10

TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
4.24	Cost Sharing Responsibilities	4-10
	a. General	4-10
	b. Federal Authorities	4-10
	c. First Cost	4-10
	d. Cost Apportionment	4-13

SECTION 5. COORDINATION

5.01	Coordination Framework	5-1
5.02	Coordination With Key Agencies	5-1
	a. General	5-1
	b. Local Sponsor - the Port of Friday Harbor	5-1
	c. U.S. Fish and Wildlife Service	5-1
	d. Environmental Protection Agency (EPA)	5-2
	e. Department of Transportation, U.S. Coast Guard	5-2
	f. Department of the Treasury, U.S. Customs Service	5-2
	g. State of Washington, Department of Transportation	5-2
	h. Washington Department of Ecology	5-2
5.03	Coordination of Draft Report	5-3

SECTION 6. RECOMMENDATIONS	6-1
----------------------------	-----

TABLES

<u>Number</u>		<u>Page</u>
1-1	Pleasure Boat Rental Moorage Need for San Juan County, 1978	1-4
3-1	Impact Matrix for Friday Harbor Marina Expansion, National Economic Development Account	3-3
3-2	Impact Matrix for Friday Harbor Marina Expansion, Environmental Quality Account	3-4
3-3	Impact Matrix for Friday Harbor Marina Expansion, Regional Development Account	3-6
3-4	Impact Matrix for Friday Harbor Marina Expansion, Social Well-Being Account	3-7
4-1	Summary of Estimated Project Federal and Non-Federal First Costs	4-5

TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
4-2	Estimated Federal and Non-Federal Maintenance Costs	4-6
4-3	Average Annual Benefit	4-9
4-4	Federal Project Average Annual Costs	4-10
4-5	Compliance of Recommended Plan with WRC Designated Environmental Statutes	4-11
4-6	Effects of the Recommended Plan on Resources of Principal National Recognition	4-12
4-7	Apportionment of Estimated Project First Costs	4-13

FIGURES

1-1	Vicinity Map, Friday Harbor Marina	1-2
1-2	Project Location Map, Friday Harbor Marina	1-3

ENVIRONMENTAL ASSESSMENT	EA-1
--------------------------	------

FINDING OF NO SIGNIFICANT IMPACT	FONSI-1
----------------------------------	---------

PLATES

APPENDIXES

A	Study Coordination and Public Involvement
B	Economic and Social Evaluation
C	Engineering, Design, and Cost Estimates

DETAILED PROJECT REPORT

SECTION 1. BACKGROUND

1.01 Study Authority. This report 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 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 this authority for planning, design, and construction of any one project.

1.02 Type of Study. This detailed project report presents the results of a feasibility study for expansion of a small boat marina, undertaken by the Seattle District, U.S. Army Corps of Engineers, under the above authority in response to a request from the Port of Friday Harbor. The need for and desirability of undertaking a plan of improvement is presented with a discussion of the environmental impacts of the plan and alternatives.

1.03 Location of Study Area. Friday Harbor is located on the eastern shore of San Juan Island on the inland waters of northwestern Washington, about 28 nautical miles east of Victoria, British Columbia, and 60 nautical miles north of Seattle, Washington (figure 1-1). San Juan Island (figure 1-2) is one of over 170 islands in the San Juan Archipelago. Friday Harbor is the San Juan County seat and a United States Customs Port of Entry.

1.04 Needs. By letter dated 27 January 1977 (appendix A), the Port of Friday Harbor requested Federal assistance in construction of a breakwater seaward of the existing breakwater to protect the existing port facilities and to allow the port to provide additional protected moorages. The existing 904-foot-long, 25-foot-wide floating breakwater, constructed of a timber deck on water ballasted, plastic floatation chambers, is damaged and deteriorating. Wave protection is marginal and moored boats suffer wave damage during northeast storms. The breakwater is not expected to last beyond the 1982-1983 winter season unless future winters are unusually mild.

1.05 The need for additional pleasure boat moorages in San Juan County has been documented in the report, Recreational Small Boat Moorage Study: Puget Sound and Adjacent Waters, Seattle District, U.S. Army Corps of Engineers, October, 1980. Pleasure boat rental moorage need data from this study are presented in table 1-1.

1.06 Pertinent References. The Recreational Small Boat Moorage Study, documenting the need for additional moorages, is referenced above. Other pertinent references applicable to the social-economic, engineering and design, and environmental aspects of the study are listed in the appropriate appendixes.

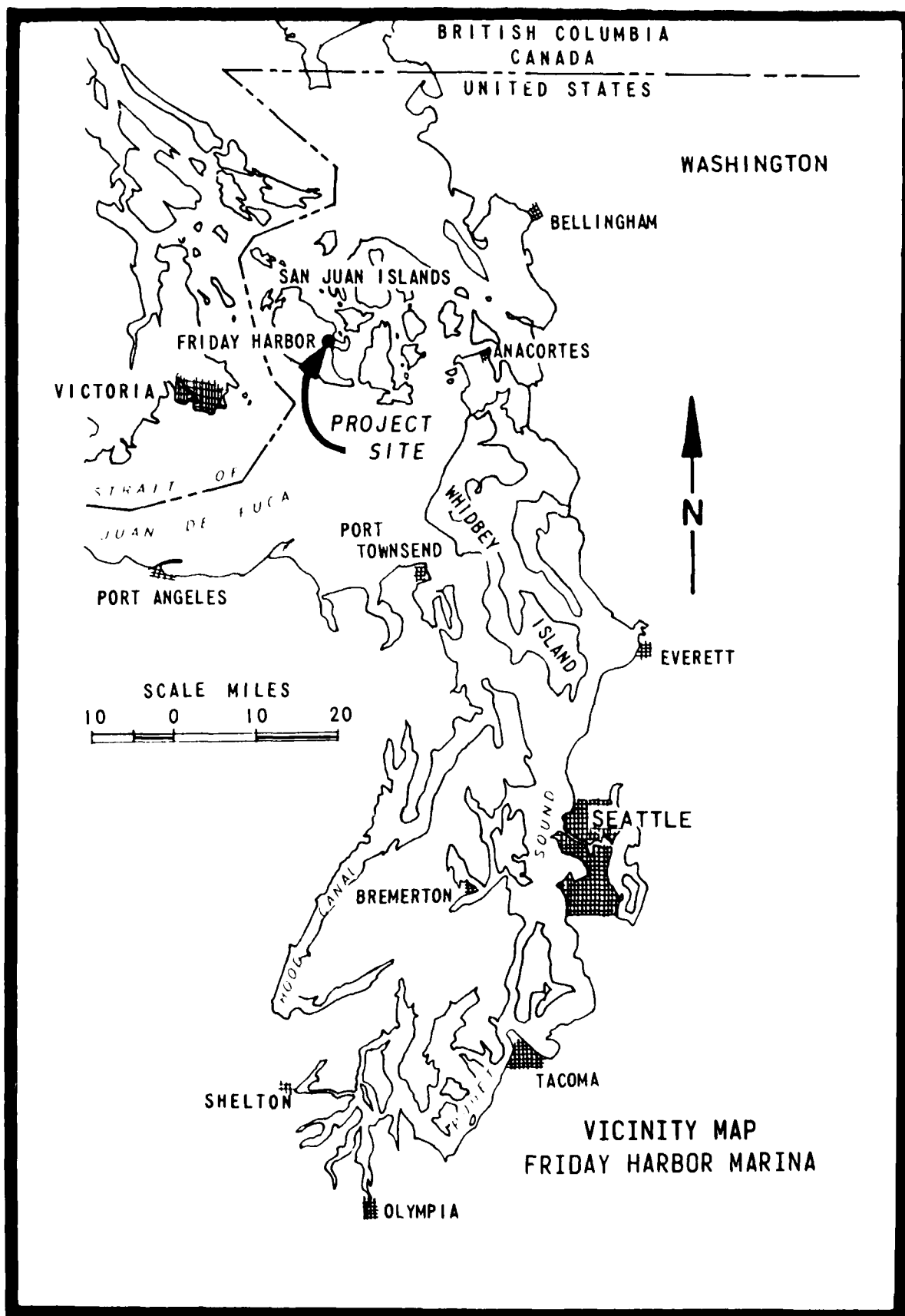


FIGURE 1-1

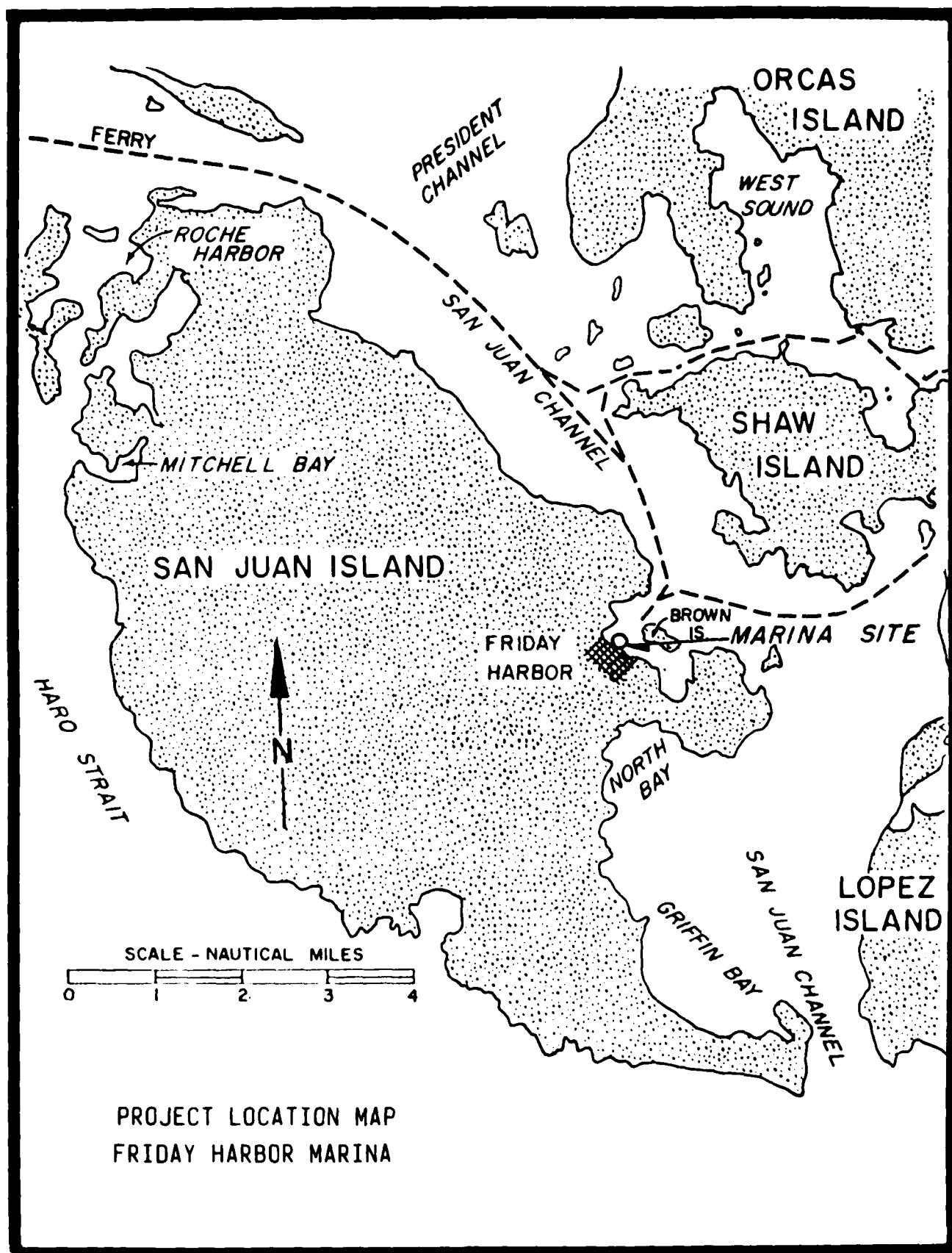


FIGURE 1-2

TABLE 1-1

PLEASURE BOAT RENTAL MOORAGE NEED
FOR SAN JUAN COUNTY - 1978^{1/}

Season	Permanent Demand	Temporary ^{2/} Demand (Permanent Equivalent)	Transient ^{2/} Demand (Permanent Equivalent)	Total Demand	Existing Moorage	Need
Summer	2,199	1,155	1,155	4,509	1,160	3,349
Winter	1,713	240	240	2,193	1,124	1,069

^{1/}Recreation Small Boat Moorage Study: Puget Sound and Adjacent Waters, Seattle District, U.S. Army Corps of Engineers, October 1980.

^{2/}Temporary and transient moorage demand for summer and winter facilities was converted to equivalent permanent demand by allowing one permanent moorage facility for 10 temporary or 10 transient rental moorage users.

SECTION 2. PLANNING OBJECTIVE AND CRITERIA

2.01 Planning Objective. The planning objective for this study is to satisfy a portion of the need for additional wet moorages in San Juan County, specifically at the Port of Friday Harbor, and to provide wave protection for the existing and new moorages in the Friday Harbor Marina.

2.02 Planning Criteria.

a. General. In formulating a plan to meet the planning objective, a number of planning criteria were 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 social well-being (SWB) accounts from the Water Resources Council's Principles and Standards. The comparative evaluation of alternative plans is presented in section 3. The criteria considered include legal, financial, policy, social, economic, and environmental factors and conditions which impose constraints on the planning process or provide rules and guidelines for evaluation of the plans. The criteria facilitate the evaluation of each alternative's desirability relative to needs met, opportunities taken, and concerns addressed, in addition to meeting the primary planning objective. Not all of the criteria are compatible, and no alternative could fully satisfy all of the criteria. All planning criteria used in the study are presented in the following paragraphs under the account to which they are primarily related.

b. National Economic Development (NED) Criteria. The NED criteria consist of needs addressed by the alternative plans that would result in NED benefits and the constraints that are applied to calculation of these benefits. The pertinent NED criteria and guidelines are the following:

- o Provide additional moorages at the Port of Friday Harbor.
- o Improve water-related recreation opportunities in the Puget Sound area, consistent with local and regional recreation needs.
- o Provide annual plan benefits which exceed annual plan costs, unless combined beneficial NED and EQ effects outweigh combined adverse NED and EQ effects.
- o Use an interest rate of 7-3/8 percent in plan economic analysis in determining annual costs and in discounting future benefits.
- o Use 50-year project economic life in plan economic analysis.
- o Insure that each separate unit or purpose of a plan provides benefits at least equal to its cost unless combined beneficial NED and EQ effects outweigh combined adverse NED and EQ effects.

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

- o Measure economic efficiency of alternative plans by net benefits, with the most efficient plan being that which maximizes net benefits.

- o Include all actions in each plan necessary to realize its economic benefits.

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

c. Environmental Quality (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 San Juan Island-Friday Harbor area. The environmental resources of this area are described in the environmental impact assessment. EQ criteria include the following:

- o Preserve the natural and beneficial values of the undeveloped 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 the environmental assessment.

- o Preserve the wetlands in the study area in conformance with EO 11990. The requirements of EO 11990 are presented in more detail in the environmental assessment.

- o Preserve the shore zone habitat critical to fish and wildlife, including shallow water areas and riparian zone, overstory, and wetlands vegetation.

- o Preserve or salvage significant (as determined by National Register of Historic Places criteria) historic and prehistoric cultural resources sites affected by potential project construction or effects in accordance with the authorities contained in existing legislation and executive orders, 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 Comply with the State of Washington Shoreline Management Program as administered by the town of Friday Harbor.

- o Comply with the land use plans of the town of Friday Harbor.

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

- o Preserve 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 Maintain existing air quality in the study area.

- d. Regional Development (RD) Criteria. The RD criteria consist of opportunities related to increased economic efficiency within the Friday Harbor 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 includes the following:

- o Increase employment in San Juan County during plan implementation.

- o Contribute to community development and growth by reducing constraints to boating-related economic activity.

- o Increase net income to businesses in Friday Harbor during plan implementation.

- o Encourage local expenditures for improvement of community facilities (streets, sidewalks, utilities, parks).

- o Increase property values within the study area.

- o Increase tax revenues within the study area.

- e. Social Well-being (SWB) Criteria. The SWB 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 areas of concern listed in Section 122 of Public Law 91-611. SWB criteria include the following:

- o Increase community cohesion within the city of Friday Harbor.

- o Avoid the relocation of residential properties.

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

- o Avoid increased noise levels in the study area.

- o Preserve the esthetic values along the Friday Harbor shoreline.

- o Maintain recreation access to the floating breakwater.

SECTION 3. FORMULATION AND EVALUATION OF ALTERNATIVES

3.01 Plan Formulation Approach. The plan formulation process begins with the identification of the planning objective and the planning criteria. A wide range of structural and nonstructural alternatives is then identified to address the planning objective. Each alternative is evaluated against the planning criteria using the system of accounts. Each alternative's contribution to the NED, EQ, RD and SWB accounts of the Water Resources Council's Principles and Standards is evaluated. The planning criteria form the basis of comparison of the plans and measurement of their contribution to each of the four accounts. Alternatives which meet the planning objective emerge from the preliminary screening and are further evaluated and refined. Refinements are based on the results of additional technical studies and an extensive program of interagency and local sponsor coordination to formulate final alternatives. The Water Resources Council's Principles and Standards (WRCPS) require that one of these final alternatives must be primarily nonstructural. These final alternatives are again thoroughly evaluated against the planning criteria, and a detailed system of accounts is developed to measure their contribution to the NED, EQ, RD, and SWB accounts. Based on the results of this analysis, an alternative that results in maximum net economic return (NED plan) and an alternative that makes a net contribution to environmental quality (EQ plan) or is least damaging to the environment (LED plan) is designated. The most effective alternative is selected as the recommended plan, when all responses to the planning objective and criteria are considered.

3.02 Preliminary Analysis and Screening of Alternatives. Conceptual alternatives formulated in response to the moorage and wave protection needs at Friday Harbor were:

- o no action (nonstructural alternative),
- o dryland storage,
- o evaluation of alternative sites,
- o breakwater replacement only, and
- o expanded small boat marina.

3.03 The no-action alternative was carried into the final analysis as the nonstructural alternative in accordance with WRCPS. However, dryland storage (alternative 2) and breakwater replacement (alternative 4) were dismissed after initial screening since both were unresponsive to the planning objective of providing needed additional wet moorages at Friday Harbor and providing wave protection to existing vessels moored at Friday Harbor.

3.04 Other sites for expansion were considered. The present facility at Friday Harbor is the only publicly owned boat basin within 20 navigable miles in the San Juan Island Archipelago. The site presently owned and used by the Port of Friday Harbor is the one site at which the local sponsor owns shoreside property, has access to existing public utilities and services with expansion capacity, and desires to provide expanded moorage service. Therefore, alternative sites for either new development or expansion were dismissed from further consideration.

3.05 When considering variations to the boat expansion, several factors dominated. First was the necessity of maintaining compatibility with existing marina facilities to avoid duplicating existing facilities which could be extended to the expanded moorage. Second were the physical restraints on expanding the present marina. Other factors were environmental, economic, and SWB considerations, as well as the desires of local interests and the financial capability of the local sponsor.

3.06 The contribution of each alternative relative to ambient (without project) conditions was assessed and compared using the system of accounts. A summary of this accounting is in tables 3-1, 3-2, 3-3, and 3-4.

3.07 Alternative 1, No Action (Nonstructural Alternative).

a. Description. This alternative would provide no additional moorage spaces at the Friday Harbor Marina (see plate 1) nor at any other land or water site in the area. The existing wood enclosed plastic flotation chambered breakwater would continue to deteriorate, resulting in a decrease in wave protection. At some point in time, boats presently moored at the Friday Harbor Marina would have to be relocated or risk damage from storms. Thus, the no-action alternative would worsen the existing shortage of moorage spaces in Puget Sound, and would not meet any part of the planning objective.

b. Evaluation With Key Criteria.

(1) National Economic Development Criteria.

o Craft which remain at the Friday Harbor Marina could incur damage during storms.

o Additional moorages would not be provided, therefore foregoing an increase in national benefits.

o There would be no improvement and possible loss of water related recreational opportunities.

(2) Environmental Quality Criteria.

o Existing values of undeveloped portions of the saltwater flood plain would be preserved.

TABLE 3-1

IMPACT MATRIX
FOR FRIDAY HARBOR MARINA EXPANSION

NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

	Alternative 1 No Action	Alternative 2 Dryland Storage ^{1/}	Alternative 3 Evaluation of Alternative Sites ^{1/}	Alternative 4 Breakwater Replacement ^{1/}	Alternative 5 Expansion of Existing Marina
<u>Value of Increased Output of Goods and Services</u>					
Recreational Craft	0	ND	ND	ND	\$364,000
Transient Craft	0	ND	ND	ND	82,000
Commercial Fishing	0	ND	ND	ND	20,000
Land Enhancement	0	ND	ND	ND	0
Breakwater Recreation Facilities	0	0	ND	ND	<u>29,000</u>
<u>Total Annual Benefits</u>	0	ND	ND	ND	\$495,000
<u>Total Annual Costs</u>	ND	ND	ND	ND	\$235,000
Benefit-to-Cost Ratio	N	ND	ND	ND	2.1:1

^{1/}Not evaluated since alternative does not accomplish project objectives.

Impact Key:

S = Substantial T = Temporary N = None
M = Minimal L = Long Term ND = Not Determined
B = Beneficial A = Adverse U = Unknown
SQ = Status Quo NE = Not Evaluated O = No Cost

TABLE 3-2

IMPACT MATRIX
FOR FRIDAY HARBOR MARINA EXPANSION

ENVIRONMENTAL QUALITY ACCOUNT

Project Objectives	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No Action	Dryland Storage ¹ / Expansion of Existing Marina	Evaluation of Alternative Sites ¹ / Replacement ¹ / Expansion of Existing Marina	Breakwater Replacement ¹ / Expansion of Existing Marina	Expansion of Existing Marina
Expand Existing Marina	No	No	No	No	Yes
Provide Wave Protection	No	No	No	Yes	Yes
- for Existing Marina	No	No	No	No	Yes
- for Existing and Expanded Marina	No	No	Yes	No	Yes
- Provide More Wet Moorage in Northern Puget Sound	No	No	NE	MTA	MTA and MLA
<u>Air Quality</u>					
Water Quality	N	NE	NE	TA	TA
Increased Turbidity	N	NE	NE	N	MLA
Increased Spills and Exhausts	TA	NE	NE	TA	TA and MLA
<u>Noise</u>	N	NE	NE	TA	TA and MLA

¹/Not evaluated since alternative does not accomplish project objectives.

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A = Adverse
NE = Not Evaluated
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ND = Not Determined
U = Unknown

TABLE 3-2 (con.)

	Alternative 1 No Action	Alternative 2 Dryland Storage ₁ /	Alternative 3 Evaluation of Alternative Sites ₁ /	Alternative 4 Breakwater Replacement ₁ /	Alternative 5 Expansion of Existing Marina
<u>Wildlife</u>					
Endangered Species	N	NE	NE	N	MLA
Benthic Fauna	N	NE	NE	TA	TA
Fish	N	NE	NE	TA	TA
Breakwater Fauna	N	NE	NE	TA	TA and LB
<u>Wetlands</u>	N	NE	NE	N	N
<u>Industry</u>	MLA	NE	NE	LB	LB
<u>Recreation</u>	MLA	NE	NE	LB	LB

₁/Not evaluated since alternative does not accomplish project objectives.

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N = None

ND = Not Determined

U = Unknown

TABLE 3-3

IMPACT MATRIX
FOR FRIDAY HARBOR MARINA EXPANSION

REGIONAL DEVELOPMENT ACCOUNT

	Alternative 1 No Action	Alternative 2 Dryland Storage	Alternative 3 Evaluation of Alternative Sites	Alternative 4 Breakwater Replacement	Alternative 5 Expansion of Existing Marina
Employment	MLA	TB	MLA	TB and SQ	LTB
Community Development and Growth	MLA	LB	MLA	SQ	LTB
Income	MLA	U	MLA	TB and SQ	LTB
Property Values	MLA	LA	MLA	SQ	LTB
Local Expenditures	MLA	U	MLA	SQ	LTB
Tax Revenues	MLA	U	MLA	SQ	LTB

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L = Long Term

A = Adverse

NE = Not Evaluated

N = None

ND = Not Determined

U = Unknown

TABLE 3-4
 IMPACT MATRIX
 FOR FRIDAY HARBOR MARINA EXPANSION
 SOCIAL WELL-BEING ACCOUNT

	Alternative 1 No Action	Alternative 2 Dryland Storage	Alternative 3 Evaluation of Alternative Sites	Alternative 4 Breakwater Replacement	Alternative 5 Expansion of Existing Marina
Life, Health, and Safety	LA	N	LB	LB	LB
Recreation Opportunity	LSA	SQ	LB	LB	LSB
Community Cohesion	U	U	U	LB	LB
Relocation of Public Facilities	LA	LA	LA	SQ	SQ
Relocation of Private Facilities	LA	U	U	SQ	SQ
Relocation of Residences	SQ	U	U	SQ	SQ
Noise Levels	LB	LA	LB	TA and SQ	T and LA
Esthetics	LA	LA	LA	SQ	SQ
Cultural Resources	LA	LA	LA	SQ	SQ

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TABLE 3-4
 IMPACT MATRIX
 FOR FRIDAY HARBOR MARINA EXPANSION
 SOCIAL WELL-BEING ACCOUNT

	Alternative 1 No Action	Alternative 2 Dryland Storage	Alternative 3 Evaluation of Alternative Sites	Alternative 4 Breakwater Replacement	Alternative 5 Expansion of Existing Marina
Life, Health, and Safety	LA	N	LB	LB	LB
Recreation Opportunity	LSA	SQ	LB	LB	LSB
Community Cohesion	U	U	U	LB	LB
Relocation of Public Facilities	LA	LA	LA	SQ	SQ
Relocation of Private Facilities	LA	U	U	SQ	SQ
Relocation of Residences	SQ	U	U	SQ	SQ
Noise Levels	LB	LA	LB	TA and SQ	T and LA
Esthetics	LA	LA	LA	SQ	SQ
Cultural Resources	LA	LA	LA	SQ	SQ

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- o Wetlands in the study area would be preserved.
- o Existing historic or prehistoric cultural resources would be preserved.
- o Existing water quality in the study area would not be changed.
- o State of Washington Shoreline Management Program as administered by town of Friday Harbor would be complied with.
- o Existing air quality in the study area would not be changed.
- o Alternative is consistent with Friday Harbor land use plan.
- o There would be no change regarding any threatened or endangered species and their habitat in the study area.

(3) Regional Development Criteria.

- o No increases in employment in San Juan County would result.
- o There is no contribution to community development and growth as a result of this alternative.
- o There would be no increase and possibly a loss of income to Friday Harbor businesses.
- o There would be no encouragement of local expenditures for community facility improvement.
- o No increase and possibly a loss in property values within the study area might result.
- o No increase and possibly a loss in tax revenues might result within the study area.

(4) Social Well-being Criteria.

- o No increase and possibly a decrease in community cohesion within the town of Friday Harbor might result.
- o Relocation of residential properties would be avoided. Economic dislocations might result from decreased moorage related business.
- o Relocation of public facilities and properties would be avoided.
- o Noise levels in the study area would probably not increase.

o Existing esthetic values along the Friday Harbor shoreline would be preserved. Eventual deterioration of breakwater may result in reduction of existing esthetic values, however.

o Recreational access to the existing breakwater would be lost as the breakwater further deteriorates and becomes unsafe.

3.08 Alternative 2, Dryland Storage. This plan would be a local option and would involve no participation by the Corps of Engineers under Section 107 of the 1960 River and Harbor Act, as amended. It would require a launching ramp with a secured upland area for storage of trailered boats, generally limited to those under 27 feet in length, or a tiered structure with provisions for removing the boats from the water and stacking them in tiers in the structure. Facilities of this type are generally limited to smaller boats.

3.09 This plan would not meet the planning objective. No upland areas are available for this plan in the vicinity of the existing marina or the town of Friday Harbor. The plan would require a launching ramp, a wharf with a hoist to remove boats from the water and place them on cradles or on a forklift for stacking the vessels, or a combination of both. This alternative was eliminated from further consideration early in the study as it did not meet any part of the planning objective.

3.10 Alternative 3, Evaluation of Alternate Sites. Developing moorages at sites other than the existing marina was considered, but discarded after initial evaluation. Development in other locations to serve area needs would involve disturbance of pristine upland, lowland, and marine areas, including upland development for parking, access roads, and other shoreside facilities. The opportunity to use existing community services would not be maintained, and sewer, water, and power services are not readily available outside of the community. Therefore, duplication of presently available shoreside and management facilities would be required.

3.11 Alternative 4, Breakwater Replacement (LED Plan).

a. Description. Failure of the plastic flotation chambers of the existing breakwater is primarily due to wave action. Both design and material problems are also evident. Continued replacement of these flotation chambers is expensive and difficult because the original manufacturer is out of business.

Various rehabilitation plans were considered, including replacement of these chambers with more durable and higher strength material and replacement of the anchor system. Without extensive prototype testing of the replacement material, the project life of the rehabilitated structure and design and material reliability would be difficult to assess.

The most effective plan for breakwater replacement would be removal of the existing breakwater. The existing breakwater could then be used as a moorage pier or float in a sheltered area where it would not be subjected to wave action as it is at present. The present breakwater would be replaced with a floating breakwater of rectangular concrete modules, 5 feet high, with about 1-1/2 feet of freeboard. The east leg would be 600 feet long and 21 feet wide. The south leg would be 300 feet long and 15 feet wide. The breakwater design and the anchoring system would be similar to that for alternative 5, shown on plates 6, 7, and 8.

Alternative 4, breakwater replacement without moorage expansion, is the LED plan since present activity and habitat are preserved, although interrupted. The no-action alternative, number 1, is not the LED plan since breakwater deterioration will result in eventual loss of existing habitat and, potentially, vessel damage and consequent debris and oil and fuel spills. Alternative 4, no expansion, does not meet the part of the planning objective of providing additional wet moorages but does meet the requirement for reliable wave protection for existing moorages. Alternative 4 was discarded because part of the planning objective was not met.

b. Evaluation With Key Criteria.

(1) National Economic Development Criteria.

- o No additional moorages would be made available to the Port of Friday Harbor.

- o Existing water related recreation opportunities in the Puget Sound area would be maintained.

(2) Environmental Quality Criteria.

- o Existing values of undeveloped portions of the saltwater flood plain in the study area would be maintained.

- o Existing wetlands in the study area would be preserved.

- o Existing historic or prehistoric cultural resources would be preserved.

- o The State of Washington Shoreline Management Program as administered by town of Friday Harbor would be complied with.

- o The land use plans of the town of Friday Harbor would be complied with.

- o The status quo regarding any threatened or endangered species in the study area and their critical habitat would be maintained.

- o Only temporary disturbance of the existing water quality would occur during construction. The plan would induce no conditions which would adversely affect water quality in the future.

- o Air quality would be temporarily disturbed during construction. Alternative 4 would induce no conditions which would adversely affect air quality in the future.

(3) Regional Development Criteria.

- o Employment in San Juan County would temporarily increase during construction.

- o Existing moorage related constraints to boating economic activity would not be reduced and therefore no contribution would be made to community development and growth.

- o A temporary increase in net income to businesses in Friday Harbor would probably occur during plan implementation.

- o No encouragement would be given for local expenditures for improvement of community facilities.

- o No increase in property values would occur.

- o No increase in tax revenues would occur.

(4) Social Well-being Criteria.

- o No effect would result on community cohesion within the city of Friday Harbor.

- o No relocation of residential properties would be caused.

- o No relocation of public facilities and property would result.

- o A temporarily increase in noise levels in the study area would occur during construction.

- o Recreation access to the floating breakwater would be maintained.

3.12 Alternative 5, Expansion of Existing Marina (NED Plan).

a. Description. The recommended alternative plan is shown on plate 2. The plan would provide 294 additional permanent moorage spaces and 44 additional transient spaces. The moorage area would be protected by 1,600 feet of concrete floating breakwaters. Access and recreation facilities would be provided for sport fishing and sightseeing on the

existing breakwater, as would facilities for temporary tieup of pleasure craft along the marina side of the breakwater. Entrance and access channels would be designated, although no initial or maintenance dredging would be required because of sufficient water depths. Designation of the channels is required to prevent obstruction to boat traffic.

The total breakwater project cost (Federal and non-Federal) of alternative 5 is estimated at \$2,964,000, including engineering, design, supervision, and administration.

Alternative 5 was selected as the recommended plan because it meets the planning objective and planning criteria. The local sponsor would be required to accomplish a number of items of local cooperation to insure that the project accomplishes its stated purpose. These include installing additional interior moorage floats, allowing recreation access to the east breakwater and policing the outer face of the east breakwater to prevent boat tieups which could interfere with Washington State ferry traffic. The seaward expansion of the marina is limited by the proximity of ferry traffic; however, the Washington State Department of Transportation, in a 19 August 1980 letter (appendix A), indicated a willingness to conduct those operational changes necessary to support the plan.

The plan is economically efficient, providing the maximum net benefits that can be achieved without dredging adjacent tidelands. By excluding dredging and using floating breakwaters, significant adverse environmental impacts are avoided.

b. Evaluation With Key Criteria.

(1) National Economic Development Criteria.

- o Additional moorages would be provided for the Port of Friday Harbor.

- o Based on a 50-year project life and an interest rate of 7-3/8 percent, the average annual benefits of \$495,000 exceed the average annual costs of \$235,000, including first cost of construction, annual maintenance, operation, and major replacement. The benefit-to-cost ratio for alternative 5 is 2.1 to 1.

- o Each separable unit or purpose of the plan provides benefits which exceed its cost.

- o This plan would be able to realize its economic benefits under a range of reasonable future economic conditions.

(2) Environmental Quality Criteria.

- o The existing values of the saltwater flood plain in the study area would be preserved.

- o Existing wetlands in the study area would be preserved.
- o Existing historic and prehistoric cultural resources would be preserved.
- o The State of Washington Shoreline Management Program, as administered by the town of Friday Harbor, would be complied with.
- o The land use plans of the town of Friday Harbor would be complied with.
- o The status quo regarding threatened or endangered species in the study area and their critical habitat would be maintained.
- o Only temporary disturbance of existing water quality would occur during construction. Long-term impacts on water quality are expected to be minor.
- o Air quality would be temporarily disturbed during construction. Any future impacts on air quality are expected to be minor.

(3) Regional Development Criteria.

- o Temporary increase in San Juan County employment would occur during construction with a permanent increase in the boating and tourist related services employment.
- o Community development and growth would occur from increased boating related economic activity.
- o Net business income would increase in Friday Harbor during construction and during the life of the project.
- o Local expenditure would be encouraged for improvement of community facilities because of increased tourism derived from increased boating activity.
- o No increase in property values would result.
- o An increase in tax revenues would occur within the study area because of local purchases of materials during construction, and boating related equipment and supplies during the life of the project.

(4) Social Well-being Criteria

- o A beneficial effect would result on community cohesion within the city of Friday Harbor.
- o No relocation of residential properties would be caused.

o No relocation of public facilities and property would be caused.

o An increase in noise levels in the study area would probably occur during construction and operation. These increases are expected to be minor.

o More boating visitors would be possible to Friday Harbor and surrounding area during the life of the project.

o Increased recreational use of the floating breakwater and marina would occur.

SECTION 4. THE RECOMMENDED PLAN

4.01 Plan Description. The general plan layout is shown on plate 2. The plan would consist of two breakwaters to protect the entrance channels, access channels, and the existing and expanded moorage area. The east breakwater will consist of three legs, a 600-foot-long east leg, and two 300-foot-long south legs, for a total of 1,200 feet. Access will be provided for recreational fishing, for sightseeing, and for temporary tieup of craft along the marina side (inside) of the breakwater. Moorage will not be allowed along the outer edge of the breakwater as moored craft would interfere with other craft entering and leaving the marina or would interfere with the Washington State ferries approaching or departing the Friday Harbor ferry terminal. The 400-foot-long north breakwater will accommodate the seaplane float and activities of the U.S. Customs Service. No recreational pursuits or other activities will be permitted on the north breakwater. Moorage of craft other than the seaplanes or craft for the U.S. Customs Service purposes would be prohibited on the north breakwater.

4.02 Federal entrance and access channels will be designated, although no initial or maintenance dredging will be required. Designation of these channels is required to prevent encroachment of moored or anchored craft and to allow unobstructed entrance and exit from the marina.

4.03 Navigation Conditions. The natural protection of the cove was utilized to minimize construction of protection for the expansion. Expansion to the southeast is limited by existing development, including a Washington State ferry system terminal and ferry approach. Expansion to the south, east, and northeast is limited by this ferry route and by maneuvering requirements of the ferries approaching the terminal. The ferry route to this terminal is restricted by a rock outcropping from Brown Island to the east of the marina. Expansion to the northwest would require dredging an environmentally sensitive tideland area and is also limited by a developed shoreline. Expansion to the north is also limited by the developed shoreline. The water depth in the vicinity of the proposed expansion and soft foundation materials precluded consideration of rubblemound or timber pile breakwaters. Since protected moorage expansion is to be accomplished by placing floating breakwaters further seaward in deeper water, navigation conditions remain excellent in the expanded protected moorage. No dredging is required.

4.04 Tides and Currents. Tides of Puget Sound are of the mixed type and have the diurnal inequality typical of the Pacific coast of North America. Extreme tidal elevations range from -3.0 feet to +11.0 feet mean lower low water (MLLW).

4.05 Winds. Prevailing winds in the San Juan Islands are light and from the south in summer. Winter storms frequently produce winds in

excess of 50 MPH from the north and east. Estimated maximum wind velocity-duration curves are shown on figure C-1 in appendix C.

4.06 Waves. The existing and proposed moorages are exposed to waves generated from two windows, one from the southeast between Brown Island and San Juan Island with a fetch of 1/2 mile, and one from the northeast with a fetch of 1 mile. The moorages are exposed to northeast wind waves and wash action due to the state ferries and other boats. The basin is also exposed to wind waves from the southeast direction. The maximum wave characteristics for the principal fetch lengths in the wave generating area of the proposed expansion are listed in appendix C.

4.07 Hydraulics. To provide information for design of a floating breakwater, one-tenth scale model tests were conducted by the Hydraulic Laboratory of the U.S. Army Corps of Engineers Waterways Experiment Station (WES), Vicksburg, Mississippi, from October 1977 through September 1978. The study was in two phases. First, the wave attenuating properties of three breakwater cross sections were determined using two-dimensional (2-D) flume tests. Secondly, three-dimensional (3-D) tests were used to evaluate wave attack, wave transmission, and wave diffraction around the end of the breakwater for various breakwater alignments. The existing breakwater at the Friday Harbor Marina was instrumented by the University of Washington Ocean Engineering Research Laboratory to measure performance characteristics. The results of these studies are discussed in appendix C.

4.08 Geotechnical. Foundation investigations included 30 borings. Boring locations are presented in plate 3. Boring logs are shown in plates 4 and 5. With the exception of the area at the north end of the project, the soil profile along the proposed pile anchorage alignment consists of a surface layer up to 8 feet thick of very soft silt (bay mud) overlying approximately 10 feet or more of relatively firm silts, sands, and clays. In some areas this firm material is underlain by soft silts and clays. Shallow bedrock is present at the north end of the project. Location and logs of borings are shown on plates 3 through 5, inclusive. For computation of allowable lateral loads on anchor piles, both the soft surface silts and the soft silts and clays underlying the consolidated material were assumed to provide no lateral support. Approximate contours on the top surface of firm materials and bedrock are shown on plate 3. Near the north end of the proposed expansion, bedrock is shallow and the overburden thickness is not adequate to permit use of driven piling for floating breakwater anchors. In addition, several borings in the vicinity showed the presence of dense gravels which may preclude driving or jetting piling. Therefore, where piles cannot be driven or jetted to the desired depth, appropriate anchorage would be installed by drilling a cased hole into the rock or dense gravels. More detailed discussion of geotechnical considerations is presented in appendix C.

4.09 Design Criteria. Primary design considerations are minimum environmental impact, maximum wave protection, and acceptable benefit-cost evaluation. Specifically, disruption, displacement, or destruction of shoreline, wetland, and marine habitat should be avoided wherever possible and minimized where unavoidable; vessels should be protected from extreme wave conditions; and benefits derived by constructing and operating the facility should significantly exceed costs. Basic design parameters and criteria as well as other factors affecting features and dimensions of the navigation project are presented in appendix C.

4.10 Structural Features. The structural features of the floating breakwater include the floating modules, anchoring system, access to and from recreational facilities on the breakwater, and facilities for temporary tieup of craft along the marina side of the breakwater. These facilities are shown in plates 2, 6, 7, and 8, and described in detail in appendix C.

a. Breakwater. The east breakwater will consist of three legs. The east leg will have six hollow concrete modules, each 100 feet long, 21 feet wide, and 5 feet deep. The remaining two legs will each have three hollow 100-foot-long concrete modules, 16 feet wide and 5 feet deep. The north breakwater will consist of four modules, each 100 feet long, 21 feet wide, and 5 feet deep. Freeboard will be about 1-1/2 feet with about 3-1/2 feet of draft. The modules connecting the east breakwater legs will be connected by extruded rubber fenders anchored in reinforced concrete at corner intersections. All other modules will be connected by threadbar tendons.

b. Anchors. The breakwaters will be anchored by galvanized steel bridge rope from the corners of each module to steel H-piles driven to the minimum embedments noted on plate 8. Clump weights will be attached to the bridge rope to minimize breakwater sway. The anchoring system will be provided with cathodic protection to prevent corrosion.

4.11 Dredging. No initial or maintenance dredging of the entrance or access channels is required as natural depths of the water are sufficient for the size craft expected to utilize the marina. No initial or maintenance dredging of the moorage area (local responsibility) or for the expanded moorages is required because of adequate natural water depths.

4.12 Miscellaneous Features. Although a self-liquidating, local interest item (not eligible for Federal cost sharing), facilities for temporary tieup of craft to the marina side of the breakwater will be incorporated into the design and construction since they must be consistent with the Federal breakwater design. These facilities will include fenders for the protection of moored craft, utility services, connections, potable water, and electrical service lines. Connection of these utilities from the shoreside end of the breakwater access ramp to shoreside supplies will be the responsibility of local interests.

4.13 Aids to Navigation. Final design of the concrete modules will incorporate attachments for installation of aids to navigation by the U.S. Coast Guard (see USCG letter dated 10 March 1981, appendix A).

4.14 Real Estate. Tidelands and submerged lands required for the moorage basin will be leased by the port from the State of Washington, Department of Natural Resources. Areas designated Federal entrance or access channels and turning basins, together with area for anchoring the breakwaters, require no lease since Federal navigation projects may be constructed in navigable waters without compensation to the owners.

4.15 Environmental Features. The floating breakwaters will have minimal or no impact on migrating juvenile fish and will provide increased habitat for attached organisms. The floating breakwater will minimize water quality and environmental impacts because circulation in the marina is not impeded. See the environmental assessment for additional information.

4.16 Cultural Resources. Coordination with the Washington State Office of Archaeology and Historic Preservation indicated that cultural resources were present in the area but would probably not be impacted by the project (see letter in appendix A).

4.17 Recreation. Access to the east breakwater and between breakwater modules for recreational fishing and sightseeing will be by the access ramp and steel plates between breakwater legs as shown on the drawings (plates 2, 6, and 8). Low 9-inch-high "bull rails" will be placed along each side of the breakwater module to assist in keeping people from slipping overboard and to provide facilities for temporary tieup of transient recreational craft along the marina side (inboard) of the breakwater. The local interest responsibility will include wooden bumpers, potable water supply, and electrical service. Cleats on the inner bull rail for attaching lines from the craft may be installed by local interests at their option.

4.18 Project Costs. Estimated project costs are summarized in table 4-1 with detailed cost estimates presented in appendix C. Submerged lands required for entrance and access channels will be undisturbed by the proposed expansion. Therefore, the value of these submerged lands is not a project cost. The submerged lands required for the breakwater anchors will be disturbed temporarily, returning to their original condition after construction. The value of these lands is therefore not a project cost. Although facilities for temporary tieup of craft on the floating breakwater are a self-liquidating, local interest cost item, they are included under first costs because they will require construction with the breakwater.

TABLE 4-1

SUMMARY OF ESTIMATED PROJECT FEDERAL
AND NON-FEDERAL FIRST COSTS^{1/}

Breakwater	\$2,740,000
Lands for General Navigation Facilities	10,000 ^{2/}
Aids to navigation - U.S. Coast Guard	<u>10,000</u>
Subtotal	\$2,760,000
Recreation Facilities on Floating Breakwater	<u>88,000</u>
TOTAL PROJECT FEDERAL AND NON-FEDERAL SHARED FIRST COSTS FOR BREAKWATER	\$2,848,000
Local Interest Cost of Facilities for Temporary Tieup of Craft on Floating Breakwater.	<u>116,000^{3/4/}</u>
TOTAL FEDERAL AND NON-FEDERAL FIRST COSTS FOR BREAKWATER	\$2,964,000

^{1/}Numbers rounded April 1981 price levels.

^{2/}Port of Friday Harbor estimate includes contingencies, engineering and design, and supervision and administration.

^{3/}Self-liquidating, local interest cost. Not eligible for cost sharing. Not included in B/C ratio.

^{4/}Does not include local costs for moorage floats and other related small boat basin facilities. See table C-4 in appendix C for these cost estimates.

4.19 Design and Construction Schedule. The tentative planning, design, and construction schedule, assuming adequate funding, is shown below:

Submit final Detailed Project Report	April 1981
Initiate plans and specifications	July 1981
Advertise construction	April 1982
Award contract	May 1982
Complete construction	April 1983

4.20 Operation, Maintenance, and Replacement. The concrete modules of the floating breakwater are designed for a 50-year life. However, Federal responsibilities include anticipated maintenance of the breakwater and anchor system. Above-water inspections of the breakwater will be made annually and after severe storms. Below-water inspections of the breakwater modules, anchor lines and connectors, and piles will be made by divers every 3 years. Annual repairs of concrete surfaces and maintenance of the cathodic protection system will be required. The anodes on the cathodic protection system will require replacement every 25 years. Rubber connectors will be replaced every 10 years.

4.21 Local interests are responsible for the maintenance of the recreation facilities on the floating breakwater. This is expected to involve replacement of 50 percent of the bull rails every 25 years and repair of access ramps every 10 years. A summary of these estimated maintenance costs is shown in table 4-2 and is detailed in appendix C.

TABLE 4-2

ESTIMATED FEDERAL AND NON-FEDERAL MAINTENANCE COSTS

	<u>Costs</u> ^{1/}	<u>Average Annual Costs</u> ^{1/2/}
FEDERAL COSTS		
Breakwater		
Above-Water Inspection (Annually and After Storms)	\$2,200	\$2,200
Below-Water Inspection (Every Third Year)	10,800	3,400
Repair and Replacement		
Spalling (Annually)	2,200	2,200
Maintain Cathodic Protection System (Annually)	2,200	2,200
Replace Rubber Connections (Every Tenth Year)	28,000	2,000

^{1/}Numbers rounded; April 1981 price levels.

^{2/}50-year project life, 7-3/8 percent interest rate

TABLE 4-2 (con.)

	<u>Costs</u> ^{1/}	<u>Average Annual Costs</u> ^{1/2/}
FEDERAL COSTS (con.)		
Replace Anodes on Cathodic Protection System (Every 25th Year)	\$8,100	<u>\$100</u>
Subtotal		\$12,100
Contingencies		2,900
Engineering and Design		1,300
Supervision and Administration		<u>1,300</u>
Total - Corps of Engineers		\$17,600
Aids to Navigation - U.S. Coast Guard	1,100	1,100
Subtotal Federal Responsibility (Applicable to Benefit-to-Cost Ratio)		\$18,700
NON-FEDERAL COSTS ^{3/}		
Replace 50 Percent of Bull Rails (every 25th year)	\$9,700	\$120
Repair Access Ramp (Every Tenth Year)	1,100	80
Contingencies, Engineering and Design, Supervision and Administration		<u>100</u>
Subtotal - Local responsibility for Maintenance of Recreation Facilities		<u>\$300</u>
TOTAL FEDERAL AND NON-FEDERAL BREAKWATER MAINTENANCE COSTS		\$19,000

^{1/}Numbers rounded; April 1981 price levels^{2/}50-year project life, 7-3/8 percent interest rate^{3/}Maintenance of recreation facilities on Federal floating breakwater

4.22 Economics of the Recommended Plan.

a. Methodology. The economic justification of the 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 April 1981 price levels. The first year of project operation was assumed to be 1983. Benefits would accrue from the first year of operation because the additional moorages are expected to be fully utilized during this first year. However, costs of the plan would accrue at different periods of time. They were made comparable by conversion to an average annual equivalent time basis using the current 7-3/8 percent interest rate for water resource projects. Additional information on the economic analysis for navigation and recreation benefits is presented in appendix B.

b. Pleasure Craft Benefits. Pleasure craft benefits were estimated in accordance with EM 1120-2-113, "Benefit Evaluation and Cost Sharing for Small Boat Harbor Projects," 11 June 1959. Benefits were based on the assumption that a reasonable estimate of recreational navigation benefits to a boat user is reflected in a rate of return the owner would receive if the owner operated the boat on a rental or charter basis. Benefits were estimated for permanently moored pleasure craft and for transient pleasure craft. Due to heavy demand for permanent moorage, no seasonal moorage is anticipated.

c. Commercial Fishing Benefits. The basis for commercial fishing benefits was the savings in operating costs due to reduced running time between home port and the fishing grounds.

d. Breakwater Recreational Fishing Benefits. Benefits of recreational fishing from the breakwater are based on guidance contained in subpart K of ER 1105-2-300. The procedure consists of multiplying the projected use (recreation days) by the value of each recreation day to determine the value of the total benefits.

e. Commercial Charter Boat Benefits. Commercial charter boat benefits, harbor of refuge benefits and NED employment benefits were not evaluated for this project.

f. Average Annual Benefits. Average annual project benefits are summarized in table 4-3.

TABLE 4-3

AVERAGE ANNUAL BENEFITS

<u>Types of Benefits</u>	<u>Total Average Annual Benefits</u>	<u>Benefit Distribution</u>	
		<u>General</u>	<u>Local</u>
<u>General Navigation</u>			
<u>Recreational Craft</u> ^{1/}			
Permanent	\$364,000	\$182,000	\$182,000
Transient	82,000	41,000	41,000
Commercial Fishing Craft	<u>20,000</u>	<u>20,000</u>	<u>0</u>
TOTAL (Dollars)	\$466,000	\$243,000	\$223,000
TOTAL (Percent)	(100)	(52)	(48)
<u>Breakwater Recreation</u>			
<u>Facilities</u>	<u>29,000</u>	<u>14,500</u>	<u>14,500</u>
TOTAL (Dollars)	\$495,000	\$257,500	\$237,500

^{1/}Benefits shown are only for boats that will be using the moorages of the marina additions. Benefits to craft from replacement of the inadequate existing breakwaters were not evaluated but would be additive to benefits shown in table 4-3.

g. Average Annual Costs. Average annual costs of \$235,000 include an average annual maintenance cost of \$19,000 and an average annual cost of \$216,000 for interest and amortization of the total Federal project first cost of \$2,848,000 for breakwater and breakwater recreation facilities. Annual costs shown in table 4-4 were determined using an interest rate of 7-3/8 percent and a project life of 50 years. All costs were based on April 1981 price levels. Estimated project construction time is less than 2 years, so interest during construction is not a project cost.

h. Economic Justification. A benefit-to-cost ratio of 2.1 to 1 was calculated using average annual benefits of \$495,000 and an average annual cost of \$235,000.

TABLE 4-4

**FEDERAL PROJECT
AVERAGE ANNUAL COSTS**
(April 1981 Prices and 7-3/8 Percent Interest)

	<u>Amount</u>
Interest and Amortization	\$216,000
Operation, Maintenance, and Replacement	<u>19,000</u>
Total Average Annual Costs	\$235,000

4.23 Environmental Effects of the Recommended Plan. No significant adverse impacts are expected as a result of recommended plan implementation. Adjacent wetlands and endangered species habitat in the area are unaffected by the plan. There is no change from existing conditions. Compliance of the recommended plan with U.S. Water Resources Council designated environmental statutes and effects of the recommended plan on resources of principal national recognition are summarized in tables 4-5 and 4-6 respectively. Displays shown in tables 3-1, 3-2, 3-3, 3-4 summarize the significant environmental effects of the recommended plan.

4.24 Cost Sharing Responsibilities.

a. General. Federal participation in planning, design, construction, and maintenance of small boat marinas is limited to the general navigation facilities, defined as breakwater protection for the moorage area, entrance and access channels, and turning basins. The amount of Federal participation depends on the extent benefits are either local or general in nature. Also, limited Federal participation in the construction of breakwater related recreation facilities is possible.

b. Federal Authorities. Section 107 of the 1960 River and Harbor Act, as amended, restricts Federal (Corps of Engineers) participation in the first cost of the general navigation facilities to \$2 million. Accordingly, non-Federal interests will assume full responsibility for the Federal portion of the first cost of the general navigation facilities in excess of the \$2 million Federal limitation. This limit includes preauthorization study costs. ER 1105-2-300 provides authority for Federal participation in limited recreation facilities on breakwaters on a 50-50 sharing basis.

c. First Cost. Non-Federal interests will assume 48 percent of the first cost of the general navigation facilities. This percentage is based on the benefit distribution shown in table 4-3. Non-Federal interests would also assume 50 percent of the first cost of the public recreational facilities on the floating breakwater, including access, and 100 percent of the first cost of the temporary tieup and service

facilities for craft on the marina side (inside) of the breakwater. Additionally, non-Federal interests would be required to furnish all lands, easements, and rights-of-way, including relocations, for construction and subsequent maintenance required by the plan. Improvements for navigation may be undertaken independently of providing recreational or tie-up and servicing facilities, whenever the required local cooperation for navigation has been furnished. The cost of aids to navigation will be borne by the U.S. Coast Guard and will be a Federal cost.

TABLE 4-5

COMPLIANCE OF RECOMMENDED PLAN WITH
WRC DESIGNATED ENVIRONMENTAL STATUTES

<u>Policy</u>	<u>Reference</u>	<u>Compliance</u>
Archeological and Historic Preservation Act	16 USC 469, et seq.	Full
Clean Air Act, as amended	42 USC 1857h-7, et seq.	Full
Clean Water Act	33 USC 1251, et seq.	Full
Coastal Zone Management Act ^{1/}	16 USC 1451, et seq.	Full
Endangered Species Act	16 USC 1531, et seq.	Full
Estuary Protection Act	16 USC 1221, et seq.	Full
Federal Water Project Recreation Act	16 USC 460-1(12), et seq.	Full
Fish and Wildlife Coordination Act	16 USC 661, et seq.	Full
Land and Water Conservation Fund Act	16 USC 460/-460/-11, et seq.	Full
Marine Protection Research and Sanctuary Act	33 USC 1401, et seq.	N/A
National Environmental Policy Act	42 USC 4231, et seq.	Full
National Historic Preservation Act	16 USC 470a, et seq.	N/A
Rivers and Harbors Act	33 USC 403, et seq.	Full
Watershed Protection and Flood Prevention Act	16 USC 1001, et seq.	N/A
Wild and Scenic Rivers Act	16 USC 1271, et seq.	N/A

NOTE: Compliance categories are defined as follows:

Full - All requirements of the statute and related regulations have been met.

Partial - Some requirements of the statute and related regulations remain to be met.

N/A (not applicable) - Statute or other policy not applicable.

^{1/}See Appendix A, page A2-22a for Washington Department of Ecology letter of 5 May 1981 and page A2-41 for town of Friday Harbor letter of 23 March 1981.

TABLE 4-6

EFFECTS OF THE RECOMMENDED PLAN ON RESOURCES OF PRINCIPAL NATIONAL RECOGNITION

<u>Types of Resources</u>	<u>Principal Sources of National Recognition</u>	<u>Measurement of Effects</u>
Air quality	Clean Air Act, as amended (42 USC 7401, et seq.)	No effect ^{1/}
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended (16 USC 1451, et seq.)	No effect ^{2/}
Endangered and threatened species critical habitat	Endangered Species Act of 1973, as amended (16 USC 1531, et seq.)	No effect ^{2/}
Fish and wildlife habitat	Fish and Wildlife Coordination Act (16 USC Sec 661, et seq.)	No effect ^{2/}
Flood plains	Executive Order 11988, Flood Plain Management	Not present
Historic and cultural properties	National Historic Preservation Act of 1966, as amended (16 USC Sec 470, et seq.)	No effect ^{1/}
Prime and unique farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act	Not present
Water quality	Clean Water Act of 1977 (33 USC 1251, et seq.)	No effect ^{1/}
Wetlands	Executive Order 11990, Protection of Wetlands Clean Water Act of 1977 (42 USC 1857h-7, et seq.)	No effect ^{2/}
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended (16 USC 1271, et seq.)	Not present

^{1/}No effect, by regulation, means no change in classification or affect category.

^{2/}No effect, by regulation, means no gain or loss.

d. Cost Apportionment. The apportionment of first cost is shown in table 4-7.

TABLE 4-7

APPORTIONMENT OF ESTIMATED PROJECT FIRST COSTS^{1/}

<u>First Cost Items</u>	<u>Total</u>	<u>Federal</u>	<u>Local</u>
First Cost - General Navigation Facilities (52% Federal, 48% Local)	\$2,740,000	\$1,425,000 ^{2/}	\$1,315,000
Lands for General Navigation Facilities	10,000 ^{3/}	0	10,000 ^{3/}
Aids to Navigation - U.S. Coast Guard	<u>10,000</u>	<u>10,000</u>	<u>0</u>
Subtotal	\$2,760,000	\$1,435,000	\$1,325,000
Recreation Facilities on Floating Breakwater	<u>88,000</u>	<u>44,000</u>	<u>44,000</u>
TOTAL FEDERAL PROJECT COSTS	\$2,848,000	\$1,479,000	\$1,369,000
Temporary Tieup Facilities on Floating Breakwater	<u>116,000</u>	<u>0</u>	<u>116,000</u>
TOTAL FIRST COSTS ^{3/}	\$2,964,000	\$1,479,000 ^{4/}	\$1,485,000

^{1/}April 1981 Price level; numbers rounded.

^{2/}Federal contribution for general navigation and recreation facilities is limited to a maximum of \$2 million, including Detailed Project Report study costs. These costs currently total \$1,704,000.

^{3/}Cost estimate by local sponsor, includes contingencies.

^{4/}Does not include \$235,000 preauthorization study costs.

SECTION 5. COORDINATION

5.01 Coordination Framework. A newsletter was mailed to over 500 interested agencies, organizations, and individuals on 22 March 1979 when the study began. The Port of Friday Harbor held a public meeting on the proposed marina expansion on 6 September 1979, attended by about 39 persons. Responses to the newsletter and comments at the meeting favored marina expansion. The final public meeting was held by the Port on 29 January 1981, during the review of the draft detailed project report/environmental assessment (DPR/EA). The draft DPR/EA was distributed for agency and public review on 30 December 1980. The District Engineer's tentative conclusions and recommendations were presented by the Corps of Engineers at the meeting, attended by about 60 persons, with the public given an opportunity for questions and comments. Coordination was accomplished throughout the study with Federal, state, and local agencies through meetings and correspondence. This coordination was very effective in resolving issues which surfaced during the planning process.

5.02 Coordination With Key Agencies.

a. **General.** As mentioned above, interagency coordination was accomplished throughout the study. No major areas of controversy or outstanding issues are known to remain. In addition to the Port of Friday Harbor, the U.S. Fish and Wildlife Service (FWS), Environmental Protection Agency (EPA), U.S. Coast Guard, U.S. Customs Service, and the Washington Departments of Transportation, (WDOT) and Ecology (WDE) were key participants in the study. Agency letters commenting on the draft DPR/EA and other pertinent coordination correspondence are contained in appendix A.

b. **Local Sponsor - Port of Friday Harbor.** The Port of Friday Harbor was an active and effective participant during the development of the recommended plan. The Port arranged for and conducted coordination and public meetings as well as assembled information for use by the Corps and other agencies. Also the Port anticipated the need for shore side public facilities, i.e., parking, showers, and restrooms associated with expansion of the marina. Accordingly, all of the shoreside facilities necessary to support the marina expansion are either in place or will be in place when the marina expansion is completed. By letter dated 27 March 1981, the Board of Commissioners of the Port of Friday Harbor agreed to furnish the items of local cooperation listed in section 6 of this report. A copy of the letter is in appendix A.

c. **U.S. Fish and Wildlife Service (FWS).** The FWS was helpful in inventorying the biota of the site and assessing potential project impacts. The FWS Coordination Report is included in appendix A. Report recommendations include: (1) coordination of construction schedule with

Washington Department of Fisheries (WDF) to avoid adverse impacts on migrating and juvenile salmon, (2) development of a public fishing program, and (3) the Port of Friday Harbor actively pursue litter management. The Corps and Port, in response to these recommendations, will coordinate project construction schedule with WDF, provide public access to the east and south breakwaters for fishing, and the Port of Friday Harbor will continue vigorous litter control activities.

d. Environmental Protection Agency (EPA). EPA recommended the port take steps to prevent and control oil spills and was concerned that there be adequate shoreside parking for new marina users. The Port has absorbent material on hand in case of accidental fuel or oil discharge, and port maintenance staff are trained in use of the material. Port staff are receiving additional training in oil/fuel spill prevention and clean up and will upgrade the cleanup contingency plan.

e. Department of Transportation, U.S. Coast Guard. The USCG has the responsibility for installing and maintaining aids to navigation for the Friday Harbor Marina project. During the study, coordination took place with the USCG regarding these aids, with the USCG agreeing to install obstruction lighting on the new breakwaters. The USCG expressed concern over possible fouling of pleasure craft anchors seaward of the marina and suggested a sign be installed to warn mariners of the hazard. Warning signs will be installed by the Corps on the breakwater. The signs will be similar to those on the present breakwater.

f. Department of the Treasury, U.S. Customs Service. The Customs Service was coordinate with in the development of the recommended plan, leading to the relocation of a Customs Service facility adjacent to the proposed north breakwater from their current location inside the harbor. The Port will place a float in the proximity of the north breakwater and provide water and power utilities for construction of a U.S. Customs shelter. Shelter construction will be done at Customs Service expense (per conversation and agreement 29 January 1981 among Fred Krabbe, Port of Friday Harbor Engineer; Max Montgomery, Port Director, U.S. Customs Service; Peter McCool U.S. Custom Service; Alan Coburn, U.S. Army Corps of Engineers).

g. State of Washington, Department of Transportation. The WDOT supports the proposed plan as a result of coordination during the study. Buoys were placed during the spring of 1979 along the proposed breakwater alignment. Ferry pilots were then interviewed and asked about any induced navigation problems. None were reported. The WDOT will pursue operational modifications if required.

h. Washington Department of Ecology (WDE). WDE requested as a provision for water quality certification the town of Friday Harbor primary wastewater treatment plant outfall be extended beyond the proposed breakwater to minimize the risk of human contact. The Port agreed with WDE that the extension was justified and will finance and construct

the extension as part of the project (see Port of Friday Harbor letter in appendix A). WDE also inspected sanitary (pumpout facilities) and solid waste facilities at the port and found them adequate to accommodate the increased use anticipated due to marina expansion (see WDE letter in appendix A).

5.03 Coordination of Draft Report. The draft DPR/EA was distributed on 30 December 1980 for review by all appropriate Federal, state, and local agencies and numerous private citizens. The draft report was available during a 45-day comment period at the Port office, San Juan County libraries, other regional libraries, and district Corps offices. Additional copies were available for public review at the 29 January 1981 public meeting. In general, most comments and responses to the review were in favor of the project. Numerous helpful suggestions were also received. Two inquiries requesting realignment of the breakwater to afford greater protection to adjacent leasees and landowners were received. In responding, the Corps explained the existing breakwater alignment could not be changed because: (1) Section 107 program authority is limited to protection of small boat basins and (2) realignment would create unacceptable constraints on Washington State ferry movements.

Copies of pertinent correspondence are contained in appendix A along with abstracted comments and Corps of Engineers responses.

SECTION 6. RECOMMENDATIONS

6.01 I recommend construction of a small boat harbor at Friday Harbor, Washington, consisting of a floating breakwater incorporating recreational facilities, generally in accordance with plan 5 presented in this report. Estimated total first cost, exclusive of aids to navigation, is \$2,838,000 for construction and \$17,900 annually for maintenance, provided that prior to construction local interest agree to:

a. provide without cost to the United States all lands, easements, and right-of-way required for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers;

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, parking area, and access roads open to all on equal terms;

e. provide a cash contribution equal to 48 percent of the final project costs allocated to general navigation;

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

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

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

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

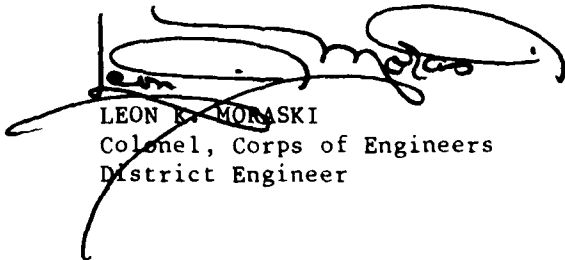
The Port further agrees to:

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

b. comply with Sections 210 and 305 of Public Law 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, is estimated at \$1,469,000 for construction and \$17,600 annually for maintenance.

Date: 17 APR 1981



LEON R. MORASKI
Colonel, Corps of Engineers
District Engineer

ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS
ENVIRONMENTAL ASSESSMENT

<u>Paragraph</u>		<u>Page</u>
1	Introduction	EA-1
2	Environmental Setting	EA-1
3	Alternative Actions	EA-6
4	Coordination and Comments	EA-14

TABLE

<u>Number</u>		<u>Page</u>
EA-1	Relationship of Alternatives to Environmental Requirements, Protection Statutes, and Other Environmental Requirements for Friday Harbor Marina Expansion	EA-7

FRIDAY HARBOR MARINA EXPANSION
ENVIRONMENTAL ASSESSMENT

1. Introduction.

a. General. This evaluation assesses the environmental impacts of installing a concrete floating breakwater at Friday Harbor on San Juan Island, Washington. The Port of Friday Harbor installed the existing floating breakwater in 1972. This breakwater is 904 feet long, 25 feet wide, and constructed of a timber deck supported by water-ballasted plastic floats. Problems associated with the existing breakwater include failure of the plastic floats at critical times, poor wave attenuation within the marina, and inability to obtain replacements for the damaged floats resulting in excessive maintenance costs to keep the present breakwater afloat. The Port of Friday Harbor has requested Federal assistance in providing a new floating breakwater seaward of the present breakwater to allow the Port to add 338 boat moorages and to provide protection to the entire moorage area.

b. Authorization. This project would be constructed under the authority of Section 107 of the River and Harbor Act of 1960, which allows the Corps of Engineers to plan and construct small navigation projects, including small boat marinas, without specific authorization by Congress.

c. Proposed Action. The proposed project includes building and installing 1,600 feet of concrete floating breakwater, made of 100-foot-long modules anchored to sunken steel "H" piles. The new breakwater would be anchored from 85 to 160 feet seaward of the existing breakwater, allowing part of the old breakwater to be used as a floating dock. This would enable the Port of Friday Harbor to expand its present facility by 294 permanent and 44 transient moorages.

2. Environmental Setting

a. Air Quality. The air quality in Friday Harbor is excellent. Currently, the major source of air pollution is exhaust gases from automotive and marine engines. The principal use of these vehicles is recreational, although there is a significant amount of commercial boat traffic. There is also an unquantified amount of dust generated by a gravel sorting plant at the south end of the harbor. There are no major sources of industrial air pollution on San Juan Island or on any of the neighboring islands.

b. Water Quality. The State of Washington Water Quality Standards rate the water quality of the San Juan Islands as "AA" (Extraordinary). The principle source of water pollution in Friday Harbor at this time is the town's sewage outfall that enters the harbor near the existing marina breakwater. The Port, as part of the local sponsor responsibilities, has agreed to extend the sewage outfall beyond the area of the

expanded marina before the new berths are occupied. Another source of pollution is the marina and the associated boat traffic in the harbor itself. One source of pollutants from the marina is the leaching of heavy metals and hydrocarbons from various antifouling paints used on boats. Contamination also occurs from spillage and leakage of fuels and oils, as well as from unburned fuel that is exhausted into the water. Dumping of untreated or poorly treated sewage and other waste material from boats into the harbor is another source of pollution. This problem should decrease with mandatory use of the pump-out facilities that have been installed at the Friday Harbor Marina. Storm runoff from the town's streets and parking lots, which carry lead and unburned hydrocarbons, is another source of contamination. All these sources of contamination have had little noticeable effect on the local water quality due to the excellent flushing characteristics of the harbor and the extraordinary quality of the surrounding water.

c. Noise Pollution. The major sources of noise in Friday Harbor are small boat and seaplane traffic. Boat traffic contributes to the background noise throughout the day but is almost nonexistent during the night. The seaplane noise is intermittent and very short lived but intense when it occurs.

d. Socioeconomic Profile. According to a special census taken in 1979, Friday Harbor has a population of 1,154. Retirees form a large portion of this population. By the year 2000, the population of Friday Harbor is expected to increase by 75 percent to 1,856.^{1/} During the summer months, the resident population of Friday Harbor increases by 30 percent, which reflects the recreational use of the area.

(1) Industry. The major industry in Friday Harbor is tourism and its related services. Man's impact on the San Juan Islands has been relatively recent and nonindustrial, so many people find the area esthetically pleasing. The islands' seasonal influx of tourists, primarily in the summer months, places a heavy demand on the town for housing and food services. Many tourists arrive by pleasure boat, placing a heavy demand on moorage and services in the marina and at the town, providing a major source of income for the area. One third of the Friday Harbor work force is employed by service industries. The retail trade, followed by the construction industry, employ the next two largest sections of the work force. Commercial fishing is another important activity in the area. Most commercial fishing boats are based in Seattle or Anacortes, but several boats stay at least part time in Friday Harbor and provide some revenue for the area. In addition, there is extensive recreational fishing and small-scale commercial fishing for the local market. These activities are expected to continue in the future.

(2) Recreation. Recreation is one of the major activities on San Juan Island. San Juan Island has two national historical parks, a national wildlife refuge, and an undeveloped state park. The island has been classified as a potential foot and horse trail corridor by the

^{1/}San Juan County 1979.

state, and the surrounding waters have been classified as a water trail corridor. Many of the 200,000 people the ferry brings to Friday Harbor each year come to enjoy the scenery and the diversity of wildlife. Recreational activities available to visitors include boating, fishing, hiking, clamming, bicycling, camping, and birdwatching. Future visitors will take advantage of these recreational opportunities.

e. Terrestrial Fauna. The U.S. Fish and Wildlife Service (FWS) identified two endangered species that may occur in the project area (FWS letter attached in appendix A). The bald eagle (Haliaeetus leucocephalus) nests and winters on San Juan Island, while the peregrine falcon (Falco peregrinus) is listed as possibly wintering in the area. In addition to these species listed as endangered, several other rare species occur on San Juan Island. Golden eagles (Aquila chrysaetos) and osprey (Pandion haliaetus) nest there, while the trumpeter swan (Olor buccinator) is a seasonal visitor or resident. River otter (Lutra canadensis), uncommon in other areas, are relatively common in the San Juan Island area.

There is local and state concern about the protection of the 99 known nests and nest sites of the bald eagle in the San Juan Archipelago. These nests are usually found in lightly populated areas on the islands, but a nest on Pearl Island at the mouth of Roche Harbor on San Juan Island has successfully endured a moderate number of residents and considerable boat activity for years. Currently, there are no known eagle nests within or in the immediate vicinity of (1 mile) any populated center in San Juan County (except for the Pearl Island nest, where the young fledge before the summer traffic becomes heavy).

Nine species of amphibians and reptiles occur in the islands; all are native. There are about 216 bird species that have been reported in the area. A few of these are direct local introductions such as California quail, Chinese pheasant, turkey, and Chilean tinamou. Others are accidental introductions such as the house (English) sparrow, the European starling, and the European skylark.

There are at least 17 species of mammals (excluding domestic and grazing stock) in San Juan County. Eight are natives while nine (53 percent) are introduced exotics. Two exotic species, the European rabbit and the black rat, have become economic, biologic, and social pests. A third, the red fox, also became a pest but appears to have been brought under control by periodic outbreaks of mange.

f. Terrestrial Flora. There are three basic vegetation cover-types within the islands: forest, brush, and grassland (agricultural fields are included in the latter). There are a number of subgroups including swamp, marshlands, wetlands, and open and closed forests. Although the numbers of species which combine to form these associations are low relative to comparable mainland areas (as expected in island biogeographic systems), a large variety of vegetation types exist. Vegetative

cover on the island is characterized by many small patches of cover types rather than larger, more homogeneous patches. The net result is a large amount of edge which is highly productive for vegetation and wildlife.

San Juan Island demonstrates a relatively high overall vegetative stability (defined as the ability to return to a normal state after a disturbance) due to complex factors (e.g., climate, humidity, high scavenger effect, lower interspecific competition). Exceptions occur where human and/or natural disturbances require extremely long time periods to recover; e.g., the Cattle Point area where deforestation followed by grazing has greatly accelerated erosion. Generally, forest areas have recovered more rapidly and naturally than have open spaces, although evidence of disturbance may survive indefinitely. Certain sensitive areas are inherently unstable and may never recover when disturbed (e.g., marsh or swamp). Many of these areas have been identified by Nature Conservancy and FWS. A number of these areas have been placed in a state of preservation/conservancy, such as small islands within the San Juan National Wildlife Refuge. There are no known unique floral species within the San Juan Archipelago.

g. Aquatic Resources. The waters of the San Juan Archipelago contain some of the most diverse areas of ocean life. All of the waters around the San Juans are part of the waters of San Juan County Marine Biological Preserve, and many parts of the San Juans are scientific study areas. The sea life in Friday Harbor is no less diverse than in any of the surrounding waters. A small change in location often results in a major change in the types of organisms found. The marine organisms of the harbor occupy five major habitat types: tidal sand areas, subtidal sand areas, rocky shores and shallower rocks, deep water, and floating structures (e.g., floating breakwaters and docks).

Because of the rockiness of the shore, the tidal sand areas are one of the least common habitats in the immediate vicinity of Friday Harbor. The only extensive area of this type near the town of Friday Harbor is along the shore just north and west of the Port of Friday Harbor offices. There are several smaller beaches of this type along the western edge of Brown Island, but they are not accessible from town except by boat.

The tidal sand areas in the project area are characterized by dense green algal growth, principally species of Ulva with growth of Enteromorpha intestinalis on the rockier portions. The algal growth is very dense and provides shelter for large numbers of juvenile crabs and other arthropods. The sand shelters populations of polychaete worms. There are also substantial populations of clams (mainly bent-nose clams) living in the sandy portions of the harbor.

The sandy subtidal areas are of two different types. In the area just west of the existing boat basin, the bottom is covered with algae of the genera Monostroma and Laminaria. These algae tend to cover the entire

bottom, effectively stopping competition for light. In addition, everything in the area is covered with a film of diatoms. The principal animal observed in this area is the red rock crab (Cancer productus).

The other type of sandy subtidal area is covered with eelgrass, which does not cover the bottom nearly as thoroughly as the areas of kelp. These eelgrass beds are principally in the less protected areas having faster tidal currents. There is little diatomaceous growth visible in the eelgrass beds, and few organisms could be seen by inspection from the surface although it is known that eelgrass beds are areas of high biological production.

The rocky areas in the project area are typical of rocky areas all along the northern Pacific coast. Most unprotected areas of rock have large populations of barnacles living on them. On many rocks there is a thin layer of the algae Enteromorpha along with extensive growths of the algae Fucus. The dense Fucus growths provide cover for a wide variety of organisms, including snails, crabs, and fish. Also found in this area are large numbers of small sculpins. In the calmer areas, the rocks also have a thick covering of diatoms.

The most diverse habitat in the study area is found on the floating docks and breakwaters. Floating docks and breakwaters provide a unique habitat that is seldom duplicated in nature, combining traits of tide-pools, deep water, and open ocean surface waters. The float maintains the same level of submergence at all times so that organisms using it as substrate are not subjected to tidal fluctuations in the water level. This means that organisms can grow very close to the surface of the water with little danger of exposure to the air, and the resulting dehydration. This zone close to the surface holds a much higher concentration of planktonic life, so there is more food available to the organisms living on the docks. Since docks are frequently in protected areas with slow currents and little wave action, it is much easier for delicate organisms to survive. Docks have a large surface area exposed to the water, so there is a high rate of exchange between the water near the dock and the surrounding water. This means that there is a new source of oxygen and food constantly arriving. Another characteristic of the floating habitat is that it is not part of the active geology of the ocean bottom, so there is very little chance of the organisms on the dock being covered by sand or being crushed by rock. Finally, the plants living on the dock are high in the photic zone, so they receive a great deal of radiant energy and can grow very fast.

All of these characteristics are present at the floating breakwater in Friday Harbor, with a resulting fauna and flora of remarkable diversity. The submerged portions of the docks and the cables that hold it are completely covered with sea life. There are many types of algae and kelp with Laminaria and Costaria being the most common. There are specimens of sponges, anemones, sea cucumbers, nudibranchs, mussels, chitons, limpets, barnacles, polychaetes, bryozoans, crabs, and shrimp on the floats in Friday Harbor.

In addition to the diverse life found growing on the floats, there are large numbers of organisms that live in the water close to the floats. These organisms are attracted by the shelter that the floats give and by the abundant food supply available near the floating docks. Many of these free-swimming organisms are larval stages of organisms (such as crab megalops) which hide in the algae on the dock or in the driftwood floating under the docks. There are also large numbers of small arthropods and protozoans living in the dense growth on the floats. All of these smaller organisms are food for fishes which come to feed near the dock because of the ready food supply. The smaller fish in turn attract larger fish. In effect, the installation of floating breakwater, such as the proposed project, is very similar to the construction of an artificial reef. It usually results in an increase in the diversity and number of marine organisms in the area.

3. Alternative Actions

a. Planning Objective. The alternative selected should satisfy a portion of the need for additional wet moorages in San Juan County, specifically, at the Port of Friday Harbor, and provide wave protection for the existing moorages at the Friday Harbor Marina.

b. Relationship of Alternatives to Environmental Protection Statute Requirements and Other Environmental Policies. The relationship of the five considered alternatives to environmental protection statutes and other environmental policies is summarized in table EA-1 below.

c. Alternative 1, No Action. Socioeconomic benefits of the proposed marina expansion (alternative 5) would not be realized by this alternative. Outside of this opportunity lost, this alternative has no negative environmental impacts. However, potential impacts to vessels may lead to short-term water quality degradation. This alternative would minimize impacts on wetlands and associated fauna and flora. However, this alternative foregoes increased habitat for attached organisms and does not meet the project planning objective.

d. Alternative 2, Dryland Storage. This alternative was eliminated from further consideration early in the study as it did not meet the planning objective. Consequently, environmental impacts of this alternative were not evaluated.

e. Alternative 3, Evaluation of Alternative Sites. Development of other sites would not meet the planning objective of expanding and providing wave protection for the existing marina. Development of a new site would also involve substantially more adverse environmental impacts than those associated with expanding an existing site which has already been altered from a natural state. For these reasons, other locations were not considered after this initial determination.

TABLE EA-1

RELATIONSHIP OF ALTERNATIVES TO ENVIRONMENTAL REQUIREMENTS
PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS
FOR FRIDAY HARBOR MARINA EXPANSION

FEDERAL STATUTES	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	No Action	Dryland Storage	Other Sites	Breakwater Replacement	Expand Existing Marina
Archeological and Historic Preservation Act, as amended, 16 USC 469, et seq.	Full ^{1/}	Partial	Partial	Full	Full
Clean Air Act, as amended, 42 USC 7401, et seq.	Full	Partial	Partial	Partial	Full
Clean Water Act, as amended, (Federal Water Pollution Control Act). 33 USC 1251, et seq.	Full	Partial	Partial	Partial	Full
Coastal Zone Management Act, as amended, 16 USC 1451, et seq.	Full	Partial	Partial	Partial	Full
Endangered Species Act, as amended, 16 USC 1531, et seq.	Full	Partial	Partial	Partial	Full
Estuary Protection Act, 16 USC 1221, et seq.	Full	Partial	Partial	Partial	Full

^{1/}See explanation in note at end of table.

TABLE EA-1 (con.)

FEDERAL STATUTES	Alternative 1 No Action	Alternative 2 Dryland Storage	Alternative 3 Other Sites	Alternative 4 Breakwater Replacement	Alternative 5 Expand Existing Marina
Federal Water Project Recreation Act, as amended, 16 USC 460-1(12), et seq.	Full ¹	Partial	Partial	Partial	Full
Fish and Wildlife Coordination Act, as amended, 16 USC 661, et seq.	Full	Partial	Partial	Partial	Full
Land and Water Conservation Fund Act, as amended, 16 USC 4601, et seq.	Full	Partial	Partial	Partial	Full
Marine Protection Research and Sanctuaries Act, 33 USC 1401, et seq.	N/A	N/A	N/A	N/A	N/A
National Environmental Policy Act, as amended, 42 USC 4321, et seq.	Full	Partial	Partial	Partial	Full
Rivers and Harbors Act, 33 USC 401, et seq.	Full	Full	Full	Full	Full
Watershed Protection and Flood Prevention Act, 16 USC 1001, et seq.	N/A	N/A	N/A	N/A	N/A

¹/See explanation in note at end of table.

TABLE EA-1 (con.)

FEDERAL STATUTES	Alternative 1 No Action	Alternative 2 Dryland Storage	Alternative 3 Other Sites	Alternative 4 Breakwater Replacement	Alternative 5 Expand Existing Marina
Wild and Scenic Rivers Act, as amended, 16 USC 1271, et seq.	N/A ¹	N/A	N/A	N/A	N/A
Executive Orders, Memoranda; Floodplain Management 11988	Full	Partial	Partial	Full	Full
Protection of Wetlands 11990	N/A	N/A	N/A	N/A	N/A
Environmental Effects Abroad of Major Federal Actions 12114	N/A	N/A	N/A	N/A	N/A
Executive Memorandum Analysis of Impacts on Prime and Unique Farmlands in EIS, CEQ Memorandum, 30 August 1976.	N/A	N/A	N/A	N/A	N/A
STATE AND LOCAL POLICIES					
Washington State Constitution Article XV. Harbors and Tide Waters.	Full	N/A	Full	Full	Full
Article XVII. Tidelands	Full	N/A	Full	Full	Full
Multiple Use Concept in Management and Administration of State Owned Lands (RCW 79.68.060).	Full	N/A	Full	Full	Full
State Environmental Policy Act of 1971 (RCW 43.21)	Full	Partial	Partial	Full	Full

¹/See explanation in note at end of table.

TABLE EA-1 (con.)

STATE AND LOCAL POLICIES	Alternative 1 No Action	Alternative 2 Dryland Storage	Alternative 3 Other Sites	Alternative 4 Breakwater Replacement	Alternative 5 Expand Existing Marine
Water Resources Act of 1971 (RCW 90.54)	N/A/	N/A	N/A	N/A	N/A
Shoreline Management Act of 1971 (RCW 90.58) and Town of Friday Harbor Shoreline Master Program	Full	Partial	Partial	Full	Full
Water Pollution Control Act (RCW 90.48)(Water Quality Certification)	Full	Partial	Partial	Partial	Full
Permits Required by Local Sponsor	No	Maybe	Maybe	No	Yes
- Shoreline Substantial Development Permit	No	Maybe	Maybe	No	N/A
- Shoreline Conditional Use Permit	No	No	Maybe	No	Yes
- Washington Department of Natural Resources Lease of Tidelands	No	No	Maybe	Yes	Yes
- Washington Department of Ecology Water Quality Certification	No	No	Maybe	Yes	Yes

1/NOTE: The compliance categories used in this table were assigned based on the following definitions:

- Full - All the requirements of the statute, executive order, or other policy and related regulations have been met.
- Partial - Some requirements of the statute, executive order, or other policy and related regulations remain to be met.
- No (noncompliance) - None of the requirements of the statute, executive order, or other policy and related regulations have been met.
- N/A (not applicable) - Statute, executive order, or other policy not applicable.

f. Alternative 4: Breakwater Replacement. Various rehabilitation schemes could be considered. All would require replacing the present anchor system, which would have a temporary (during construction) adverse impact on benthic fauna. Other impacts would include a temporary increase in turbidity and noise during construction. Fish would also migrate away from the area during construction disturbances, temporarily reducing local fish populations. Population levels would reach preconstruction levels soon after project completion. Organisms inhabiting replaced sections of the breakwater would be lost, but new sections would be recolonized fairly quickly. This alternative would provide wave protection for the existing marina, but it does fully not meet the planning objective. As a result, it was not considered in greater detail.

g. Alternative 5, Expansion of Existing Marina.

(1) Air Quality. The proposed breakwater would have few long-term effects on the air quality of Friday Harbor. The proposed expansion of mooring capacity, however, would initially allow the influx of about 100 percent more permanently moored small boats into the area. This would probably increase the amount of air pollution from internal combustion engines by a proportional amount. There would also be a minor short-term impact caused by exhausts from the machinery used in the actual construction. These impacts would probably have few long-term measurable effects.

(2) Water Quality. During construction there would be a short-term increase in the turbidity of the water near the project, due to the placement of the breakwater anchors and other construction activities. This condition would be temporary and should cause no significant impact on the water resources of the area. The large influx of additional boats would have a more permanent effect on the water quality. The proposed project would add 294 permanent moorage slips, an increase of about 100 percent. Pollution due to oil and fuel spills, exhaust particulates, paint leaching, and poor sewage handling or treatment would be likely to increase by a proportional amount. This would have little effect on the harbor as a whole, but it might lead to noticeable visual and olfactory impacts in the boat basin itself, due to the effectiveness of the floating breakwater in stopping wind and tidal generated surface currents. In the absence of surface currents, garbage and oils may collect beside the floating breakwater. The local sponsor is responsible for breakwater maintenance and debris cleanup.

(3) Noise. There would be a short-term increase in background noise during construction due to the operation of construction machinery. Long-term noise would increase also, due to the increase in small boat traffic. This increase would probably not affect the peak levels of noise (currently float plane takeoffs), but may intensify the background noise levels to some extent. The seaplane float would be relocated from

the shoreline, immediately adjacent to the city, to a float approximately 1/4 mile away. This should reduce the peak noise level experienced in the town.

(4) Wildlife. The proposed project should have little or no effect on the local wildlife. The animals and birds living in the area (including a bald eagle and river otters) have adjusted to living close to human activity and would experience only very minor changes in their environment due to the project. These changes should not cause them distress directly. However, increased density of humans and their associated activities would slowly increase the daily contact pressure on these animals. If this pressure eventually reaches an unacceptable level, the animals will migrate to less populated areas. However, some increased pressure can be expected with or without the marina expansion.

(a) Endangered Species. Two known threatened or endangered species use San Juan Island: the bald eagle (Haliaeetus leucocephalus) and the peregrine falcon (Falco peregrinus). The proposed project would not directly affect either species. The bald eagle nest closest to the Friday Harbor Marina lies well outside the primary and secondary protective zones of 330 feet and 660 feet (in radius), respectively, outlined in Bald Eagle Management Guidelines for Oregon-Washington published by the FWS. In addition, no in-water construction would take place during the fledgling season in the spring. If any long-term secondary effects on the bald eagle occur, they are expected to be minor. Because the peregrine falcon is intolerant of human contact, it does not commonly frequent the developed area of San Juan Island around the town of Friday Harbor and does not nest in the area, so negative impacts to the falcon from the increased boat traffic are not anticipated. This environmental assessment (EA) serves as a biologic assessment called for by the Endangered Species Act, as amended.

(b) Benthic Communities. A negative impact of this project would be the temporary destruction of small areas of habitat by the placement of the breakwater pile anchors. These anchors would be driven below the bottom and the area would be covered again with the habitat and organisms existing prior to construction.

(c) Fish. Local fish populations would migrate out of the disturbed area during construction activities. These fish should return soon after completion of the project.

(d) Breakwater Fauna. The proposed project would remove about 600 feet of the existing breakwater and install about 1,600 feet of new breakwater. The project would more than double the area available to the marine organisms as floating habitat and as shelter. The additional habitat should proportionately increase the number of organisms using the floats as a substrate. The added shelter would provide a larger nursery area for juvenile fish and crustaceans, which should increase their populations. A local ecosystem at least as diverse, and more stable than the existing system, should develop in the new breakwater.

(5) Wetlands. The subtidal lands in and near the Port of Friday Harbor are submerged algal beds with extensive growths of Monostrama and Laminaria species and occasional beds of eelgrass. The intertidal areas near the port support extensive growths of Fucus, Ulva, Enteromorpha species. The proposed project would not impact these subtidal and intertidal wetlands.

(6) Socioeconomic Impacts. The proposed project would stimulate business activity in Friday Harbor. Along with this positive impact, some negative impacts would occur. More trips to the solid waste incinerator would be needed to process the solid waste produced by the increased number of tourists. Responsibilities of the local volunteer fire department would increase, as would pedestrian congestion. Friday Harbor is already proficient at handling large crowds of visitors and should be able to accommodate these demands. The proposed project would increase moorage space for resident and visiting pleasure boats at Friday Harbor and would provide needed moorage in northern Puget Sound. Services provided for boaters as well as demand for food and shelter would increase. Fishing and sightseeing would be accommodated by the breakwater design. The project should complement the present recreational uses of the study area.

(7) Economic Benefits. Average annual navigation benefits attributable to increased pleasure boat usage amount to \$446,000. Commercial fishing benefits include savings in operating costs by reducing time between home port and fishing grounds. These benefits amount to \$20,000 annually. Annual benefits associated with recreation facilities on the breakwater come to \$29,000. Total average annual navigation benefits were calculated at \$495,000.

(8) Flood Plain Management. Executive Order 11988 and related regulations define the base flood elevation in this project area as the elevation of the highest tide, the approximate equivalent to the 100-year tide, which is +6.58 feet mean sea level or about 11.0 feet above mean lower low water.

The proposed expansion of the Friday Harbor Marina is a commercial recreational navigation project. The selected plan is not expected to significantly increase waterborne activity which would greatly add to water dependent support facilities. The project is not likely to significantly alter the area's growth pattern. The marina expansion is not likely to encourage shoreside development within the flood plain. The proposed marina expansion lies entirely within the area of tidal influence. Riverine effects do not influence the elevation of the highest tide. Project implementation would not affect the base flood elevation. No natural and beneficial resources in the "without project" tidal plain would be lost due to project implementation.

Commercial fishing and recreation boating are direct water dependent functions. Moorages for the fishing craft and the recreational craft must be constructed in the base flood plain. Entrance to and exit from

the moorages must be provided and protected from storms and waves. The protective barriers again, of necessity, must be constructed within the base flood plain. No practical alternative outside the flood plain exists for the proposed action.

4. Coordination and Comments.

a. Fish and Wildlife Coordination Act Report. In accordance with the Fish and Wildlife Coordination Act (FWCA), as amended, 16 USC 661, et seq., the Olympia office of the FWS provided the Corps with a final FWCA report dated 25 February 1981. This report is included in appendix A. Specific recommendations made in the FWCA Report are addressed in appendix A of this document.

b. Cultural Resources Coordination. Coordination with the State Office of Archaeology and Historic Preservation indicated that cultural resources were present in the area but would probably not be impacted by implementation of the proposed plan (letter in appendix A). Coordination with the Washington Archaeological Research Center indicated that at least one known archeological site was located in the study area (letter in appendix A). Further coordination has indicated that unless work takes place in the shore area of the existing marina, there will be no impact to known cultural resources. Accordingly, the beach area in and adjacent to the existing marina will not be utilized as a work area during construction.

c. Coordination with Others. Throughout the study, coordination has been maintained with a number of Federal, state, and local agencies, as well as a number of private individuals. Appendix A contains a list of the agencies coordinated with, along with a summary of major comments received and the Corps' response to these comments. Appendix A also contains a copy of all letters of comment received regarding the draft DPR/EA.

d. Public Meetings. On 6 September 1979, representatives of the Seattle District, U.S. Army Corps of Engineers presented the status of the study at a meeting of the Friday Harbor Port Commission. At this meeting, Corps representatives received input from members of the public. At a special meeting of the Friday Harbor Port Commission, held on 29 January 1981, during which the Corps presented the tentatively recommended plan, there was general support for the proposed marina expansion. A list of persons attending this meeting is included in appendix A.

e. Special Coordination. In addition to the coordination mentioned above, special coordination efforts have taken place with certain Government agencies. The Federal Aviation Administration was consulted regarding requirements for the new seaplane dock that will be located at the north breakwater. The Department of Natural Resources was contacted

about their concerns over public access to nearby tidelands. U.S. Customs Service was contacted regarding possible locations of the Customs' inspection stations.

f. Interagency Meetings. An informal interagency meeting was held on 25 August 1980. Representatives from the following agencies attended:

- U.S. National Marine Fisheries Service
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Coast Guard
- Washington State Department of Fisheries
- Washington State Department of Game
- Port of Friday Harbor, Friday Harbor, Washington

The Corps briefed the group on the project. Agency concerns were discussed and noted. The major objections concerned a proposed fill behind a commercial wharf. This item was dropped from the project, as the local sponsor could not supply sufficient justification for the wharf within the planning time frame.

The draft EA and preliminary FONSI were circulated with the draft DPR to appropriate agencies, environmental and recreational groups, and the general public for a 30-day review. Based on comments received during this review period, it was decided to finalize the EA and FONSI.

FINDING OF NO SIGNIFICANT IMPACT

17 April 1981

FINDING OF NO SIGNIFICANT IMPACT
MARINA EXPANSION, FRIDAY HARBOR, WASHINGTON

The existing marina located in Friday Harbor on the east coast of San Juan Island, Washington, was constructed by the Port of Friday Harbor in 1972 and is protected by a 25-foot-wide, 902-foot-long floating breakwater. The existing breakwater has failed repeatedly during severe storms and provides poor wave attenuation within the marina. Replacements for damaged floats are not available. As a result, the Port sustains excessive maintenance costs to keep the present breakwater afloat. The Port has requested Federal assistance in providing a new floating breakwater seaward of the present structure to allow the addition of about 338 small boat moorages and to provide protection to the existing moorage area. The studies and construction will be done under authority of Section 107 of the 1960 River and Harbor Act, as amended, which authorizes the Chief of Engineers to plan and construct small navigation projects without individual approval by Congress.

The proposed project involves construction of two floating breakwaters of rectangular concrete construction totaling 1,600 feet, both 5 feet deep, with about 1-1/2 feet of freeboard. The north breakwater will be 21 feet wide and 400 feet long. The east breakwater will be 1,200 feet long and consist of three legs. The east leg will be 600 feet long and 21 feet wide; the southeast and south legs will each be 300 feet long and 16 feet wide. The breakwaters will consist of 100-foot-long modules, fastened together by thread bar tendons. The breakwaters will be anchored by galvanized steel bridge rope from the corner of each module to steel H-beam piles driven into the bottom.

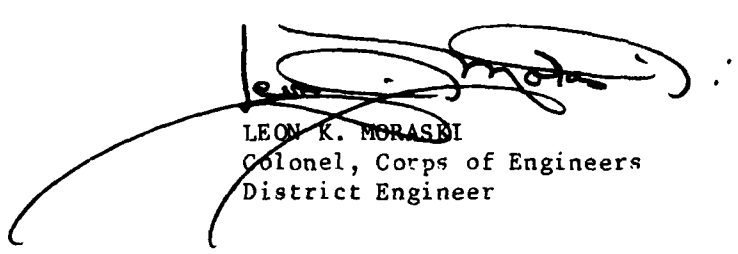
Negative environmental impacts of the proposed marina expansion will include a short-term increase in turbidity of the water in the project area, a short-term increase in background noise during construction, a small long-term increase in background noise due to increased small boat traffic, the destruction of small areas of benthic communities during placement of breakwater pile anchors, loss of aquatic organisms inhabiting existing breakwater modules removed by the project, and increased tourist demand for Friday Harbor public services.

Typical rocky habitat organisms will eventually cover benthic areas around the breakwater pile anchors. Aquatic organisms will quickly populate the new breakwater modules after construction. Friday Harbor, already proficient at handling large tourist crowds, should be able to meet the increased demands on public services.

The marina expansion will add 1,000 feet of floating breakwater habitat which will support an abundance of marine organisms. The breakwater

design will not interfere with the excellent flushing characteristics in the marina. The marina expansion at Friday Harbor will not significantly affect the quality of the human environment.

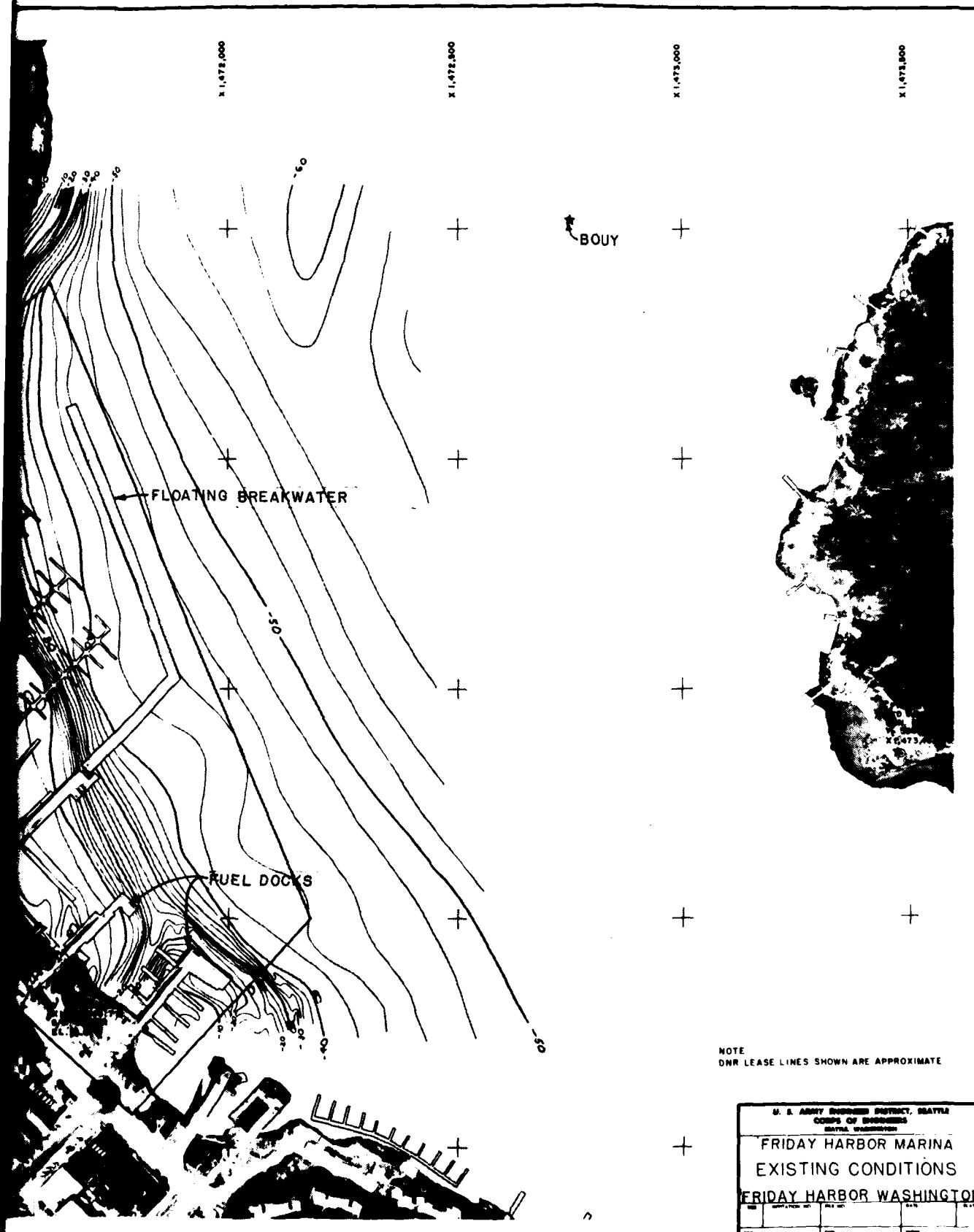
For the reasons described above, I have determined that the proposed marina expansion of Friday Harbor, San Juan County, Washington, will not result in significant adverse environmental impacts. The proposed action is not a major action and, therefore, does not require an environmental impact statement.



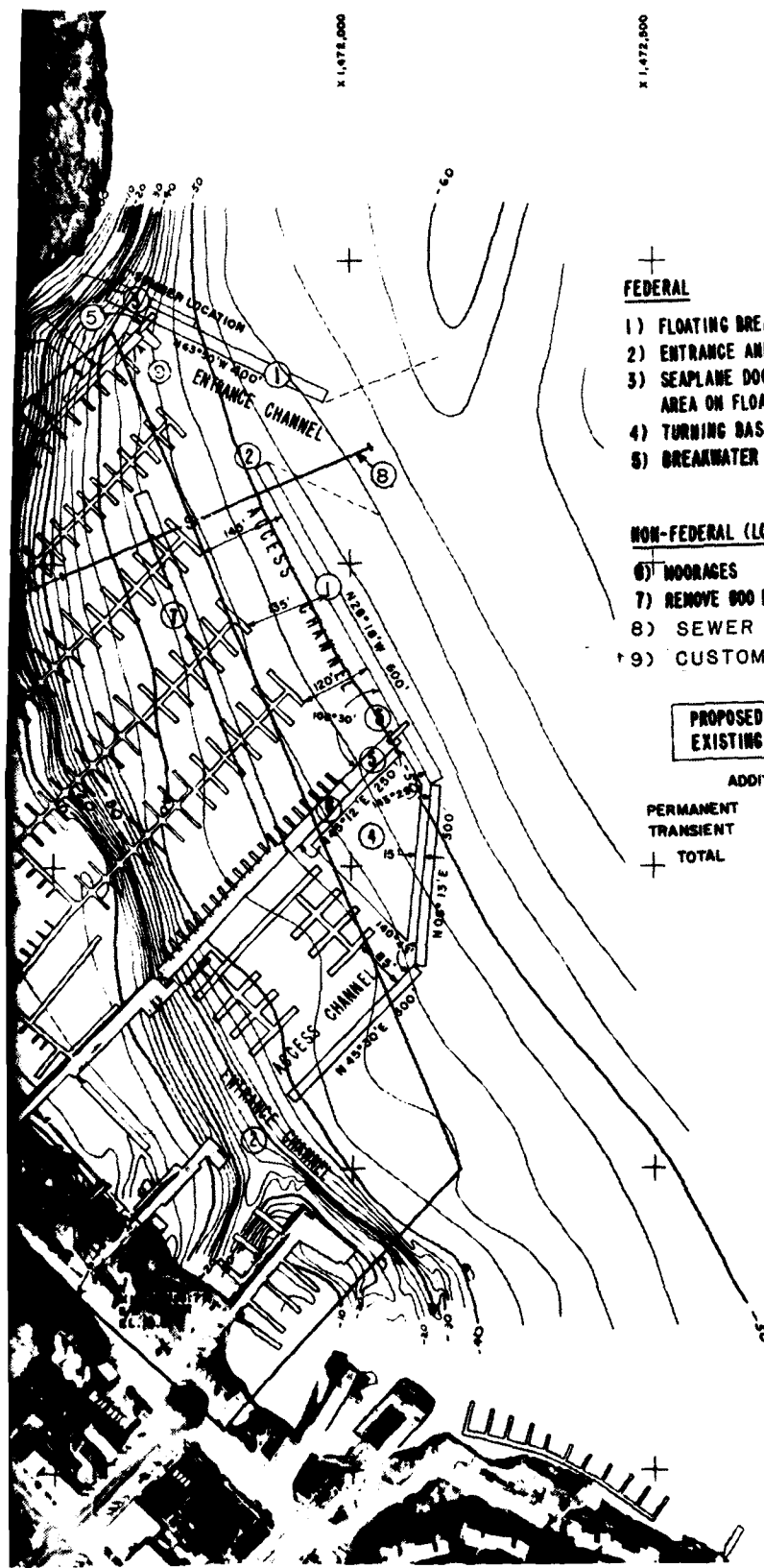
LEON K. MORASBI
Colonel, Corps of Engineers
District Engineer

PLATES









FEDERAL

- 1) FLOATING BREAKWATER
- 2) ENTRANCE AND ACCESS CHANNELS
- 3) SEAPLANE DOCK AND CUSTOM AREA ON FLOATING BREAKWATER
- 4) TURNING BASIN
- 5) BREAKWATER ACCESS

NON-FEDERAL (LOCAL)

- 6) MOORAGES
- 7) REMOVE 800 FT EXISTING BREAKWATER
- 8) SEWER OUTFALL EXTENSION
- 9) CUSTOMS INSPECTION FLOAT

PROPOSED FACILITIES
EXISTING FACILITIES

	ADDITIONAL MOORAGES	EXISTING MOORAGES
PERMANENT	294	190
TRANSIENT	44	97
TOTAL	338	287

NOTES:

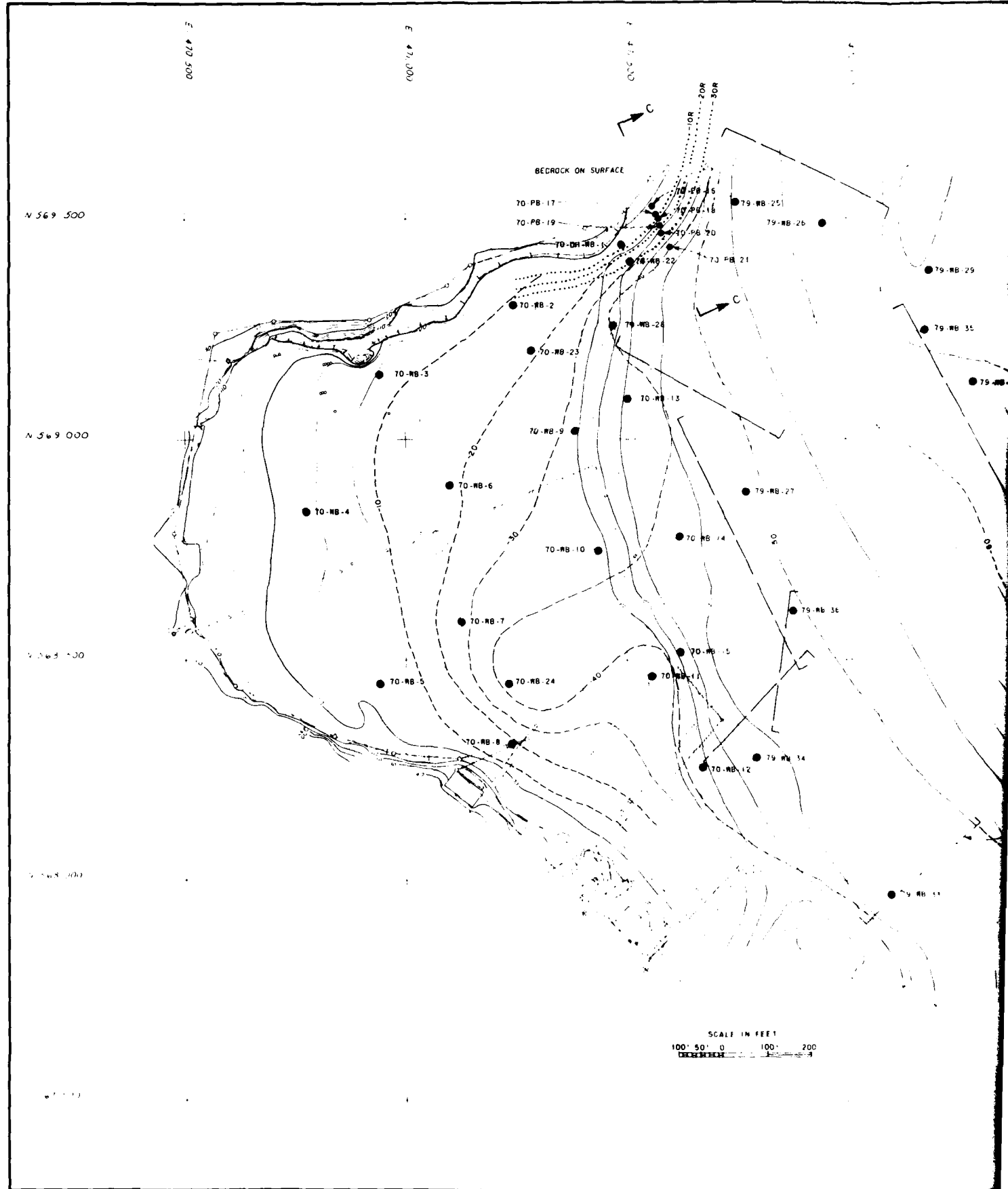
FOR BREAKWATER DETAILS, SEE PLATE NO. 7
FOR ANCHOR DETAILS, SEE PLATE NO. 8

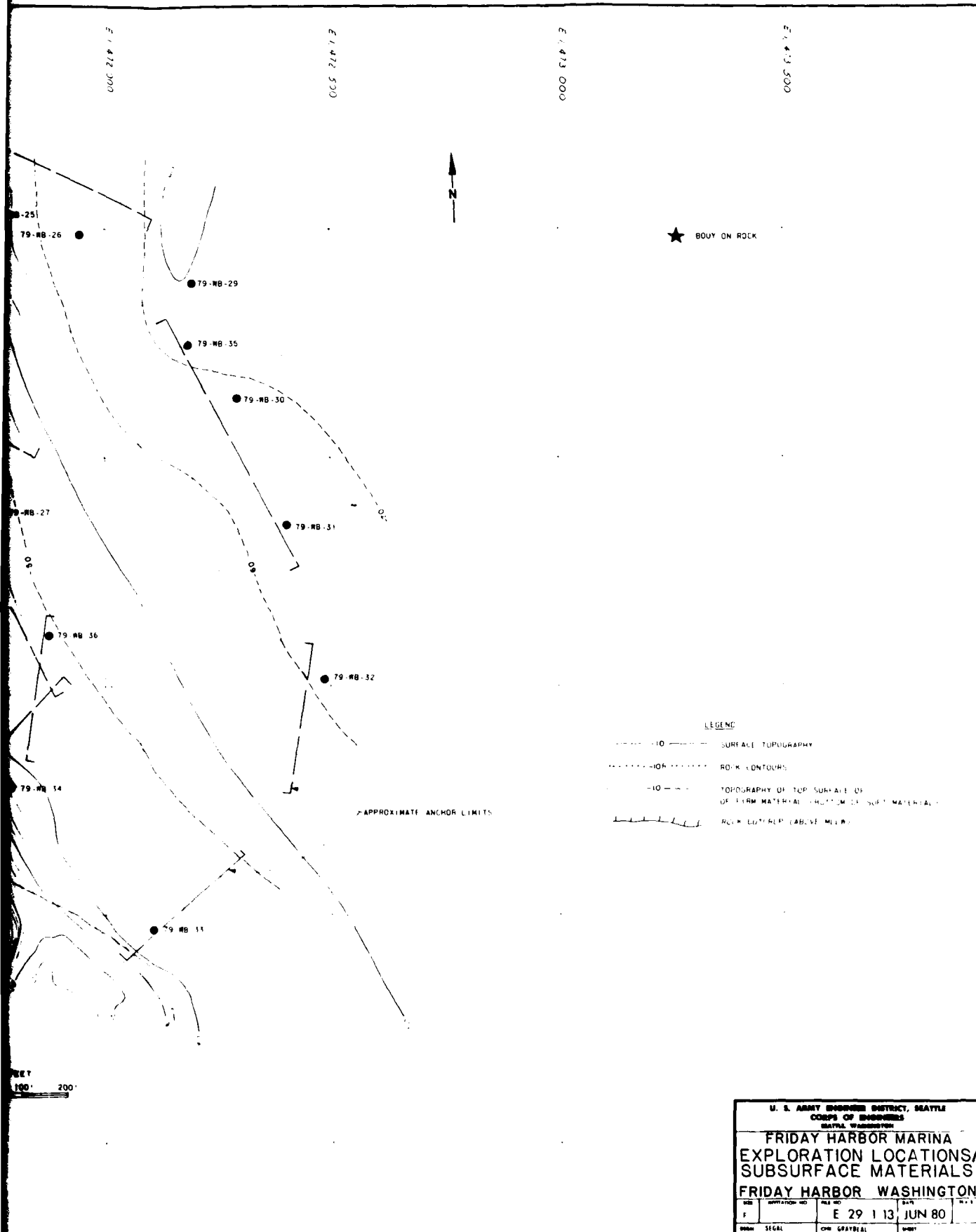
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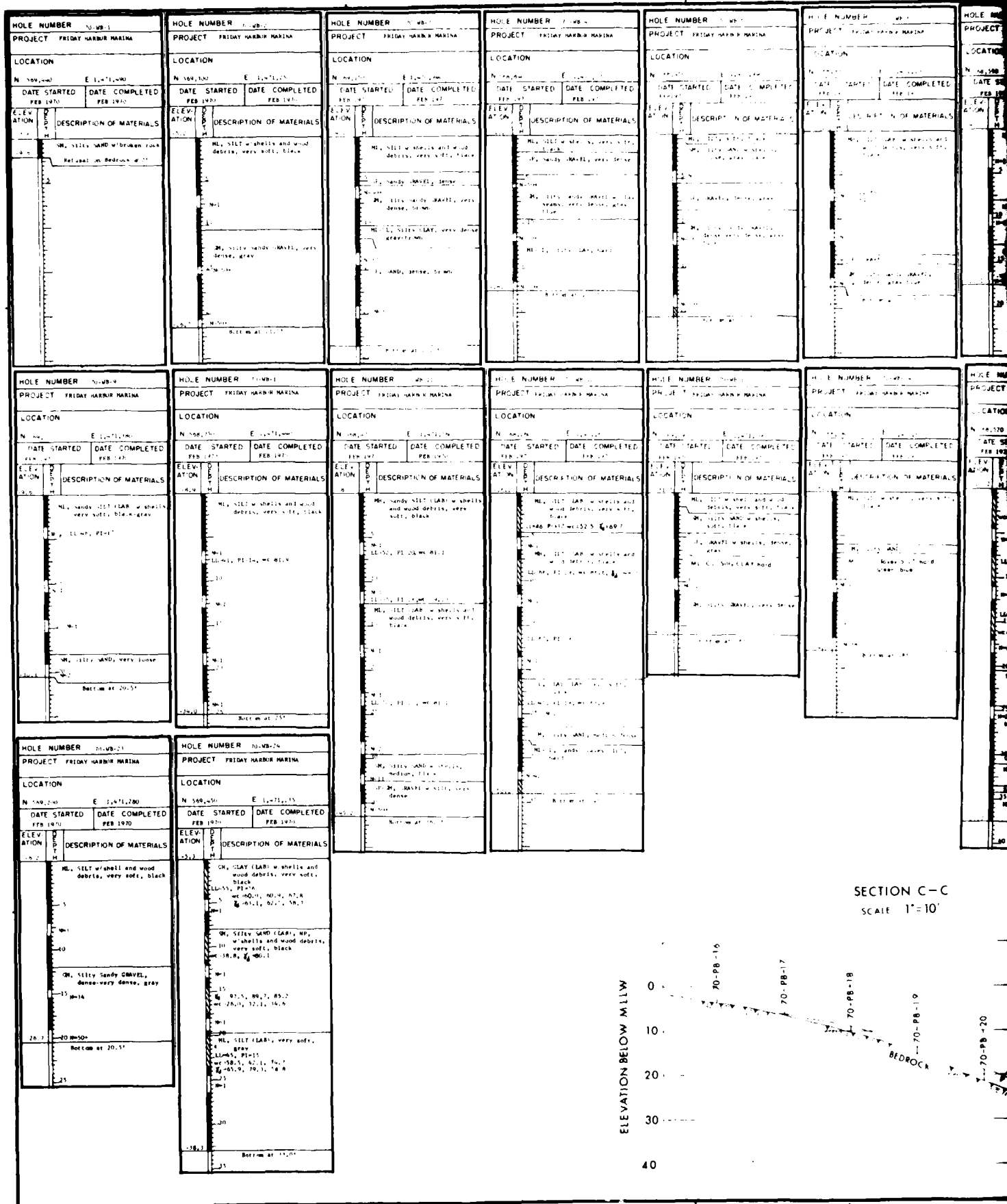
DSR scale times shown are approximate

Drawn by: J. Z.
Checked by: H. M.
Drawn date: 19 Jul 79
Flight date: 2 May 79

U. S. ARMY DISTRICT, SEATTLE			
CORPS OF ENGINEERS			
SEATTLE, WASHINGTON			
FRIDAY HARBOR MARINA			
PROPOSED IMPROVEMENTS			
FRIDAY HARBOR		WASHINGTON	
DATE	DESCRIPTION	BY	DATE







HOLE NUMBER	PROJECT	LOCATION	DATE STARTED	DATE COMPLETED	DESCRIPTION OF MATERIALS
70-PB-17	FRIDAY HARBOR MARINA				
70-PB-18	FRIDAY HARBOR MARINA				
70-PB-19	FRIDAY HARBOR MARINA				
70-PB-20	FRIDAY HARBOR MARINA				
70-PB-21	FRIDAY HARBOR MARINA				

REVISIONS		DATE	BY

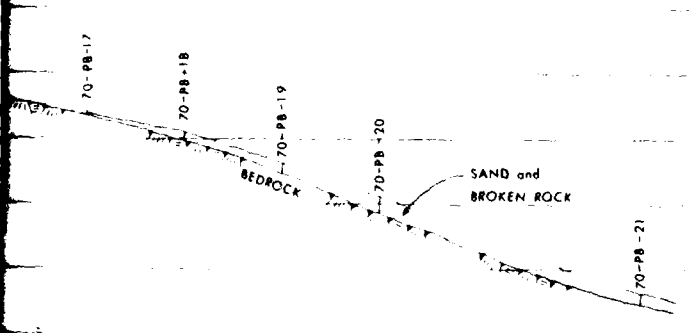
RELATIVE DENSITY OF SANDS AND GRAVELS, A DIVISION
OF THE U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C.

RELATIVE DENSITY	RELATIVE DENSITY
1.00	VERY LOOSE
1.10	LOOSE
1.20	MEDIUM
1.30	DENSE
1.40	VERY DENSE

NOTE: DENSITY OF SANDS AND GRAVELS, A DIVISION
OF THE U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C.

RELATIVE DENSITY	RELATIVE DENSITY
1.00	VERY LOOSE
1.10	LOOSE
1.20	MEDIUM
1.30	DENSE
1.40	VERY DENSE

SECTION C-C
SCALE 1"=10'

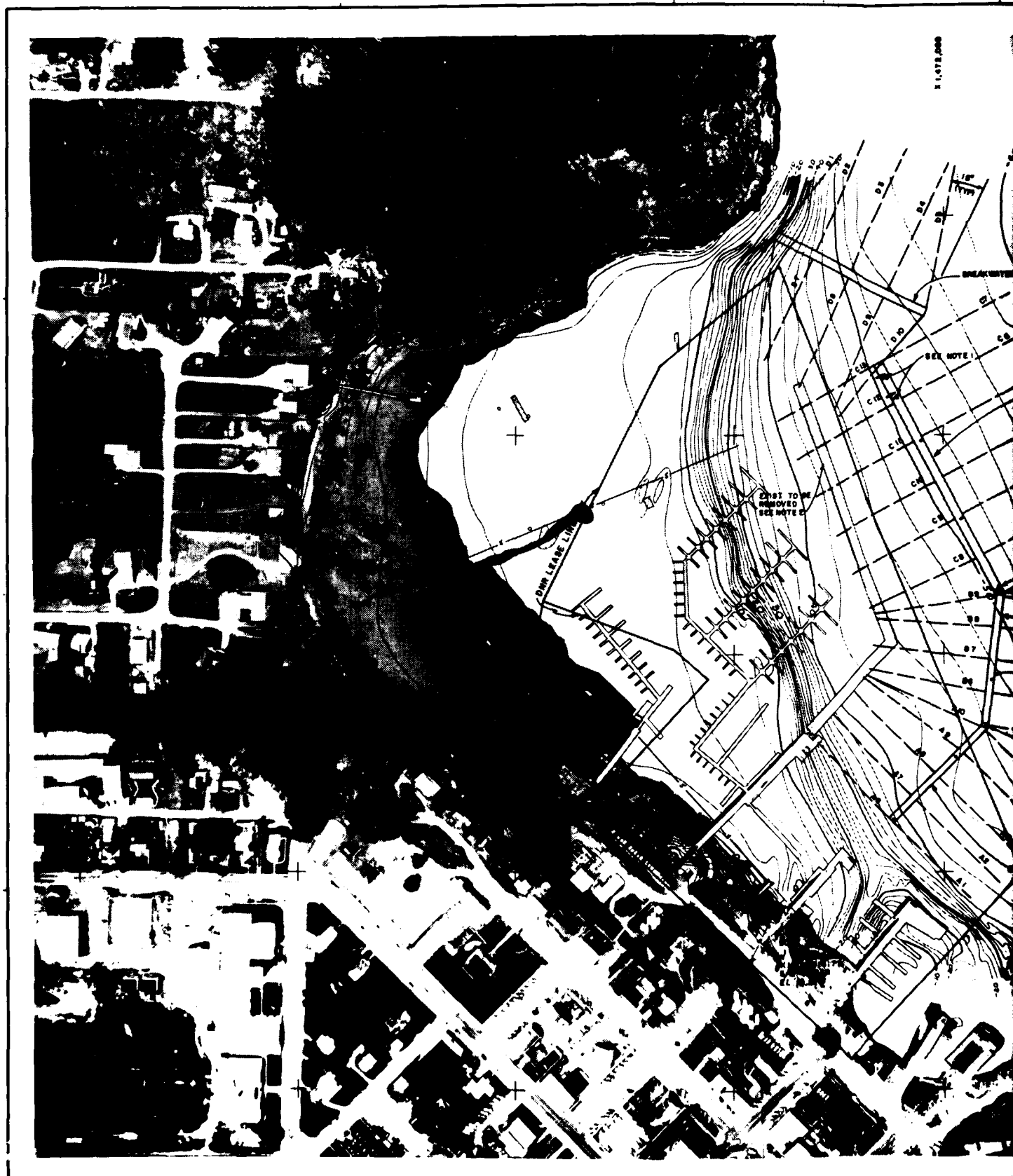


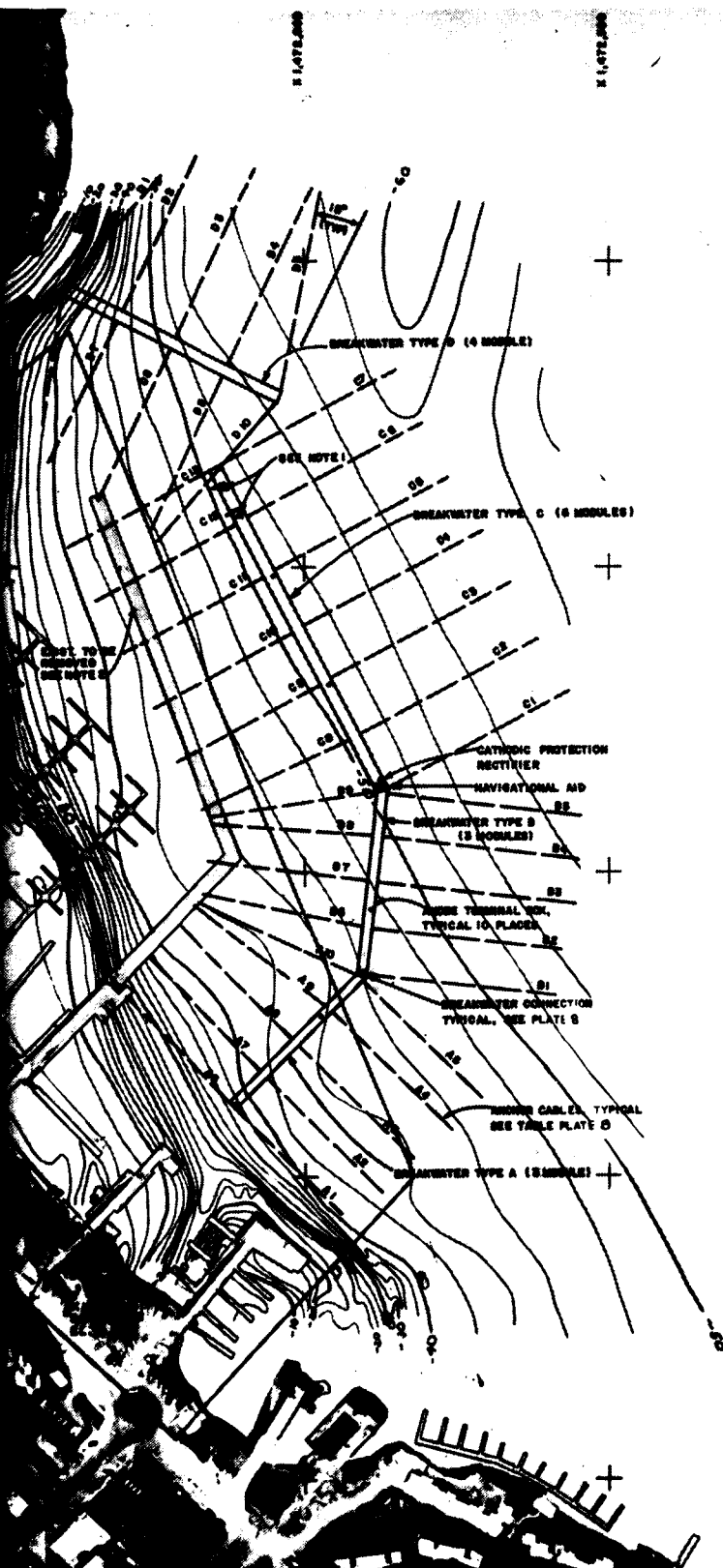
U. S. ARMY CORPS OF ENGINEERS	
FRIDAY HARBOR MARINA	
BORING LOGS	
FRIDAY HARBOR WASHINGTON	
DATE	E-29-1-18 JUN 80
BY	ONE GRAYMALL

PLATE 4

[illegible]

HOLE NUMBER	19-08-23	HOLE NUMBER	19-08-24	HOLE NUMBER	19-08-25	HOLE NUMBER	19-08-26
PROJECT	FRIDAY HARBOR BOAT BASIN EXPANSION	PROJECT	FRIDAY HARBOR BOAT BASIN EXPANSION	PROJECT	FRIDAY HARBOR BOAT BASIN EXPANSION	PROJECT	FRIDAY HARBOR BOAT BASIN EXPANSION
LOCATION		LOCATION		LOCATION		LOCATION	
N 106.970	E 1470.113	N 106.98	E 1470.100	N 106.970	E 1470.100	N 106.970	E 1470.100
DATE STARTED	21 Sep 1979	DATE STARTED	20 Sep 1979	DATE STARTED	20 Sep 1979	DATE STARTED	20 Sep 1979
DATE COMPLETED	21 Sep 1979	DATE COMPLETED	20 Sep 1979	DATE COMPLETED	20 Sep 1979	DATE COMPLETED	20 Sep 1979
DESCRIPTION	1. 0-1.0' - FINEST SAND MATERIAL 2. 1.0-1.5' - M. CLAY w/ shells 3. 1.5-2.0' - M. CLAY w/ shells and some multi-gravel, medium 4. 2.0-2.5' - Sands, CLAY, LAB 5. 2.5-3.0' - M. CLAY w/ shells 6. 3.0-3.5' - Sands, CLAY, LAB 7. 3.5-4.0' - M. CLAY w/ shells 8. 4.0-4.5' - Sands, CLAY, LAB 9. 4.5-5.0' - M. CLAY w/ shells 10. 5.0-5.5' - Sands, CLAY, LAB 11. 5.5-6.0' - M. CLAY w/ shells 12. 6.0-6.5' - Sands, CLAY, LAB 13. 6.5-7.0' - M. CLAY w/ shells 14. 7.0-7.5' - Sands, CLAY, LAB 15. 7.5-8.0' - M. CLAY w/ shells 16. 8.0-8.5' - Sands, CLAY, LAB 17. 8.5-9.0' - M. CLAY w/ shells 18. 9.0-9.5' - Sands, CLAY, LAB 19. 9.5-10.0' - M. CLAY w/ shells 20. 10.0-10.5' - Sands, CLAY, LAB 21. 10.5-11.0' - M. CLAY w/ shells 22. 11.0-11.5' - Sands, CLAY, LAB 23. 11.5-12.0' - M. CLAY w/ shells 24. 12.0-12.5' - Sands, CLAY, LAB 25. 12.5-13.0' - M. CLAY w/ shells 26. 13.0-13.5' - Sands, CLAY, LAB 27. 13.5-14.0' - M. CLAY w/ shells 28. 14.0-14.5' - Sands, CLAY, LAB 29. 14.5-15.0' - M. CLAY w/ shells 30. 15.0-15.5' - Sands, CLAY, LAB 31. 15.5-16.0' - M. CLAY w/ shells 32. 16.0-16.5' - Sands, CLAY, LAB 33. 16.5-17.0' - M. CLAY w/ shells 34. 17.0-17.5' - Sands, CLAY, LAB 35. 17.5-18.0' - M. CLAY w/ shells 36. 18.0-18.5' - Sands, CLAY, LAB 37. 18.5-19.0' - M. CLAY w/ shells 38. 19.0-19.5' - Sands, CLAY, LAB 39. 19.5-20.0' - M. CLAY w/ shells 40. 20.0-20.5' - Sands, CLAY, LAB 41. 20.5-21.0' - M. CLAY w/ shells 42. 21.0-21.5' - Sands, CLAY, LAB 43. 21.5-22.0' - M. CLAY w/ shells 44. 22.0-22.5' - Sands, CLAY, LAB 45. 22.5-23.0' - M. CLAY w/ shells 46. 23.0-23.5' - Sands, CLAY, LAB 47. 23.5-24.0' - M. CLAY w/ shells 48. 24.0-24.5' - Sands, CLAY, LAB 49. 24.5-25.0' - M. CLAY w/ shells 50. 25.0-25.5' - Sands, CLAY, LAB 51. 25.5-26.0' - M. CLAY w/ shells 52. 26.0-26.5' - Sands, CLAY, LAB 53. 26.5-27.0' - M. CLAY w/ shells 54. 27.0-27.5' - Sands, CLAY, LAB 55. 27.5-28.0' - M. CLAY w/ shells 56. 28.0-28.5' - Sands, CLAY, LAB 57. 28.5-29.0' - M. CLAY w/ shells 58. 29.0-29.5' - Sands, CLAY, LAB 59. 29.5-30.0' - M. CLAY w/ shells 60. 30.0-30.5' - Sands, CLAY, LAB 61. 30.5-31.0' - M. CLAY w/ shells 62. 31.0-31.5' - Sands, CLAY, LAB 63. 31.5-32.0' - M. CLAY w/ shells 64. 32.0-32.5' - Sands, CLAY, LAB 65. 32.5-33.0' - M. CLAY w/ shells 66. 33.0-33.5' - Sands, CLAY, LAB 67. 33.5-34.0' - M. CLAY w/ shells 68. 34.0-34.5' - Sands, CLAY, LAB 69. 34.5-35.0' - M. CLAY w/ shells 70. 35.0-35.5' - Sands, CLAY, LAB 71. 35.5-36.0' - M. CLAY w/ shells 72. 36.0-36.5' - Sands, CLAY, LAB 73. 36.5-37.0' - M. CLAY w/ shells 74. 37.0-37.5' - Sands, CLAY, LAB 75. 37.5-38.0' - M. CLAY w/ shells 76. 38.0-38.5' - Sands, CLAY, LAB 77. 38.5-39.0' - M. CLAY w/ shells 78. 39.0-39.5' - Sands, CLAY, LAB 79. 39.5-40.0' - M. CLAY w/ shells 80. 40.0-40.5' - Sands, CLAY, LAB 81. 40.5-41.0' - M. CLAY w/ shells 82. 41.0-41.5' - Sands, CLAY, LAB 83. 41.5-42.0' - M. CLAY w/ shells 84. 42.0-42.5' - Sands, CLAY, LAB 85. 42.5-43.0' - M. CLAY w/ shells 86. 43.0-43.5' - Sands, CLAY, LAB 87. 43.5-44.0' - M. CLAY w/ shells 88. 44.0-44.5' - Sands, CLAY, LAB 89. 44.5-45.0' - M. CLAY w/ shells 90. 45.0-45.5' - Sands, CLAY, LAB 91. 45.5-46.0' - M. CLAY w/ shells 92. 46.0-46.5' - Sands, CLAY, LAB 93. 46.5-47.0' - M. CLAY w/ shells 94. 47.0-47.5' - Sands, CLAY, LAB 95. 47.5-48.0' - M. CLAY w/ shells 96. 48.0-48.5' - Sands, CLAY, LAB 97. 48.5-49.0' - M. CLAY w/ shells 98. 49.0-49.5' - Sands, CLAY, LAB 99. 49.5-50.0' - M. CLAY w/ shells 100. 50.0-50.5' - Sands, CLAY, LAB 101. 50.5-51.0' - M. CLAY w/ shells 102. 51.0-51.5' - Sands, CLAY, LAB 103. 51.5-52.0' - M. CLAY w/ shells 104. 52.0-52.5' - Sands, CLAY, LAB 105. 52.5-53.0' - M. CLAY w/ shells 106. 53.0-53.5' - Sands, CLAY, LAB 107. 53.5-54.0' - M. CLAY w/ shells 108. 54.0-54.5' - Sands, CLAY, LAB 109. 54.5-55.0' - M. CLAY w/ shells 110. 55.0-55.5' - Sands, CLAY, LAB 111. 55.5-56.0' - M. CLAY w/ shells 112. 56.0-56.5' - Sands, CLAY, LAB 113. 56.5-57.0' - M. CLAY w/ shells 114. 57.0-57.5' - Sands, CLAY, LAB 115. 57.5-58.0' - M. CLAY w/ shells 116. 58.0-58.5' - Sands, CLAY, LAB 117. 58.5-59.0' - M. CLAY w/ shells 118. 59.0-59.5' - Sands, CLAY, LAB 119. 59.5-60.0' - M. CLAY w/ shells 120. 60.0-60.5' - Sands, CLAY, LAB 121. 60.5-61.0' - M. CLAY w/ shells 122. 61.0-61.5' - Sands, CLAY, LAB 123. 61.5-62.0' - M. CLAY w/ shells 124. 62.0-62.5' - Sands, CLAY, LAB 125. 62.5-63.0' - M. CLAY w/ shells 126. 63.0-63.5' - Sands, CLAY, LAB 127. 63.5-64.0' - M. CLAY w/ shells 128. 64.0-64.5' - Sands, CLAY, LAB 129. 64.5-65.0' - M. CLAY w/ shells 130. 65.0-65.5' - Sands, CLAY, LAB 131. 65.5-66.0' - M. CLAY w/ shells 132. 66.0-66.5' - Sands, CLAY, LAB 133. 66.5-67.0' - M. CLAY w/ shells 134. 67.0-67.5' - Sands, CLAY, LAB 135. 67.5-68.0' - M. CLAY w/ shells 136. 68.0-68.5' - Sands, CLAY, LAB 137. 68.5-69.0' - M. CLAY w/ shells 138. 69.0-69.5' - Sands, CLAY, LAB 139. 69.5-70.0' - M. CLAY w/ shells 140. 70.0-70.5' - Sands, CLAY, LAB 141. 70.5-71.0' - M. CLAY w/ shells 142. 71.0-71.5' - Sands, CLAY, LAB 143. 71.5-72.0' - M. CLAY w/ shells 144. 72.0-72.5' - Sands, CLAY, LAB 145. 72.5-73.0' - M. CLAY w/ shells 146. 73.0-73.5' - Sands, CLAY, LAB 147. 73.5-74.0' -						



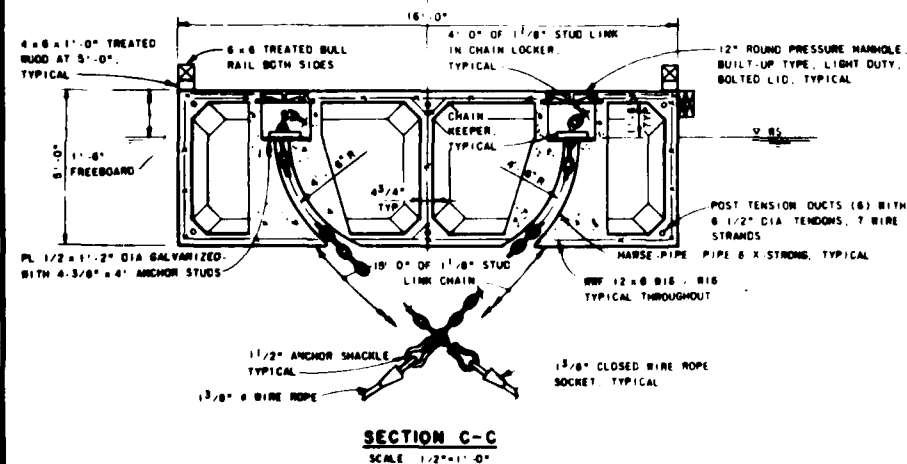
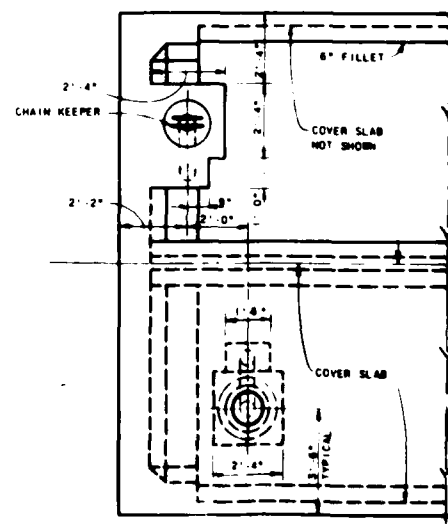
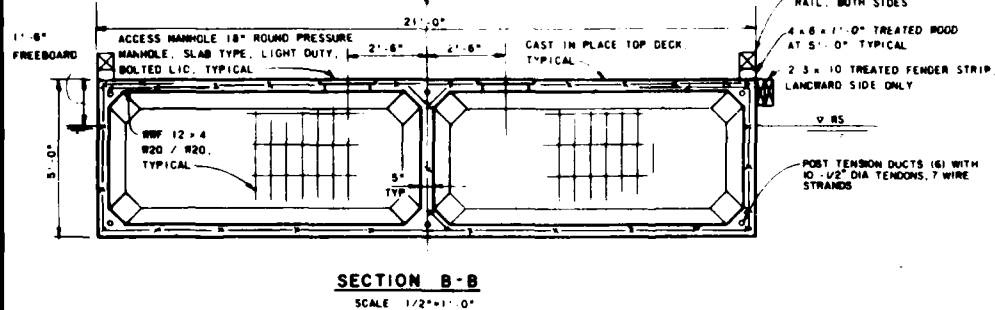
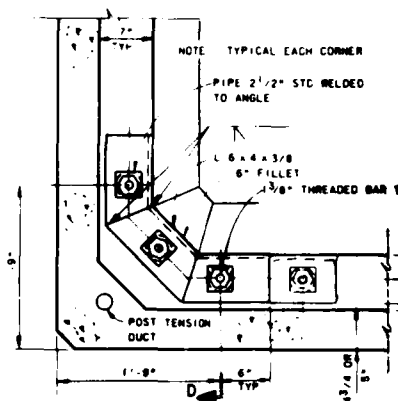
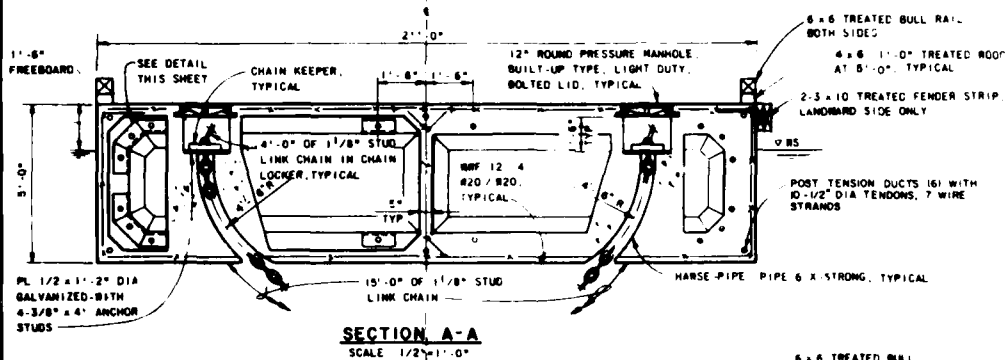
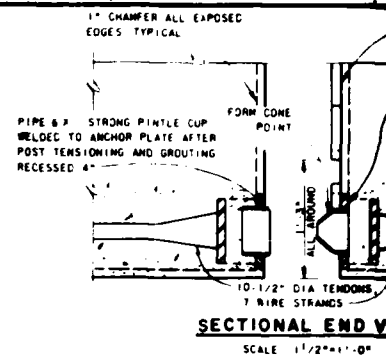
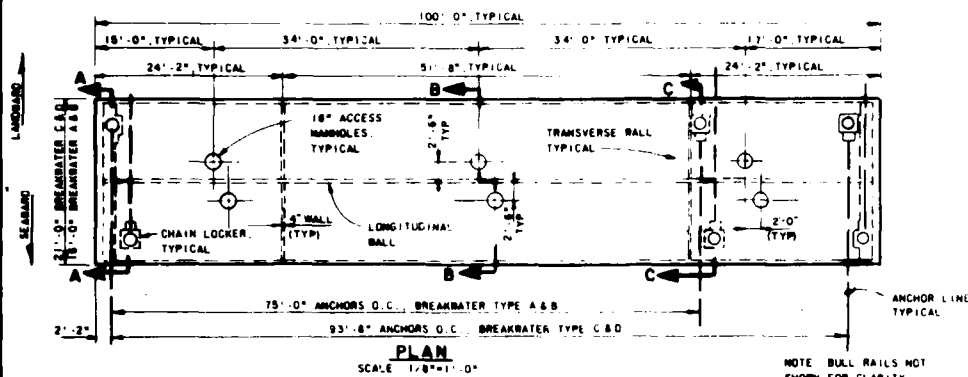


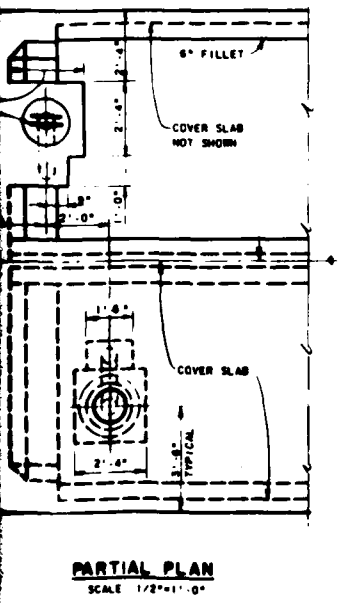
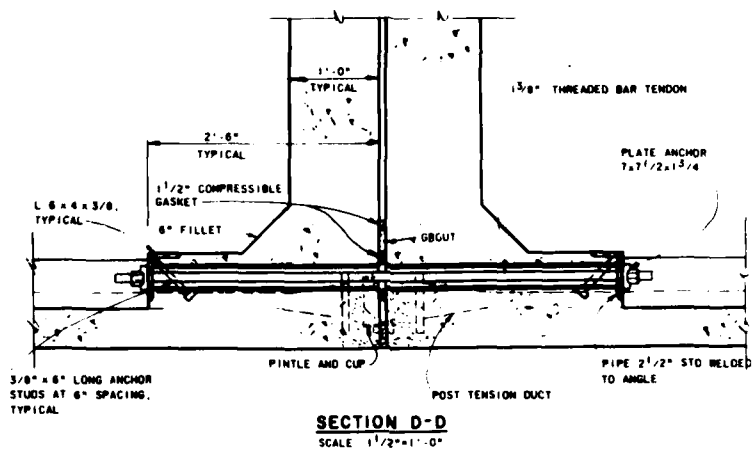
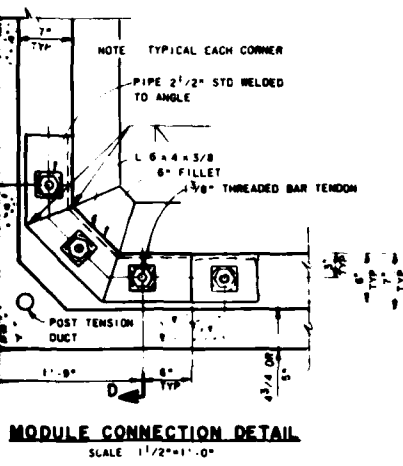
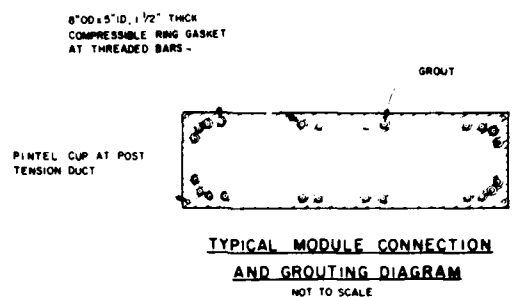
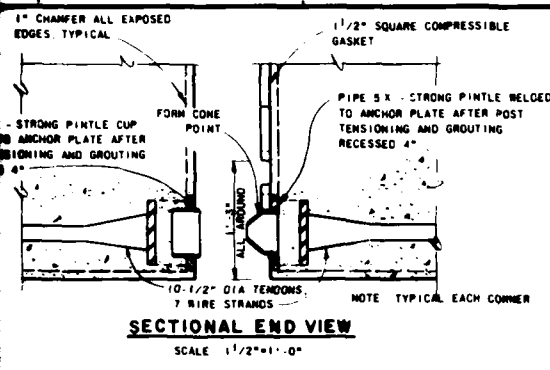
NOTES:

1. UTILITY STATION: ONE WEATHER PROOF DOCK POST & POWER OUTLET WITH TWO SINGLE RECEPTACLES. (WITH GROUND FAULT CIRCUIT BREAKER PROTECTION AND ONE MOORING BLS. TYPICAL 20 PLACES, SPACED ALONG 10 MODULES.
2. REMOVAL OF EXISTING STRUCTURES BY OTHERS.
3. SEE PLATE 5 FOR MODULE CONNECTION DETAILS.

NOTE
DNR LEASE LINES SHOWN ARE APPROXIMATE

U. S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON			
FRIDAY HARBOR FLOATING BREAKWATER-PROJECT PLAN			
FRIDAY HARBOR WASHINGTON			
DATE	BY	CHECKED	APPROVED



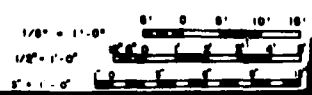


- BREAKWATER ASSEMBLY AT SITE**

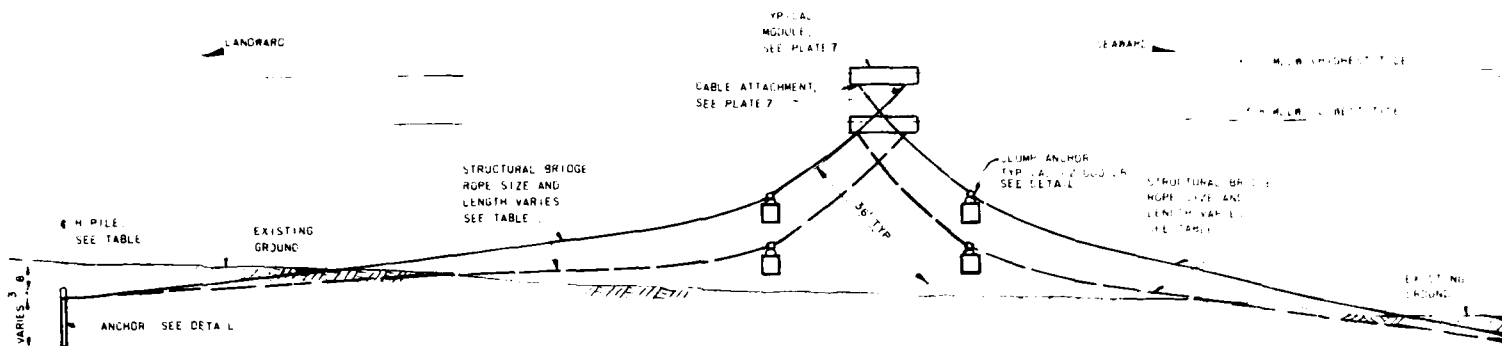
 1. LAUNCH MODULES AND TOR TO SITE
 2. ALIGN MODULES AT SITE USING PINTLE ASSEMBLIES AND CONE-ALONGS.
 3. INSTALL AND STRESS THREADBAR TENDONS IN UPPER CORNERS. BALLAST MODULES SO THAT THE BOTTOM GASKETS ARE COMPRESSED
 4. UNSEAL BOTTOM THREADBAR SLEEVES. INSTALL AND STRESS BOTTOM CORNER THREADBARS
 5. ATTACH JACKET FORM TO SEAL OUTSIDE PERIMETER OF GROUT BAND
 6. TREMIE EXPANSIVE CEMENT/SAND GROUT INTO GROUT BAND
 7. POSITION BREAKWATER, PULL ANCHOR LINES UP THRU HARSE PIPES. ADJUST TENSION, AND INSTALL CHAIN KEEPER

GENERAL NOTES

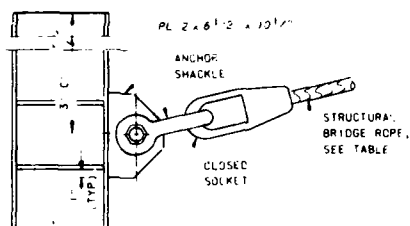
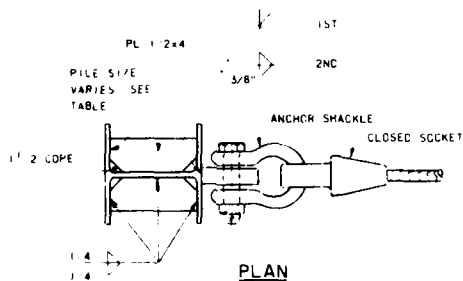
 1. ALL MODULES WILL BE ATTACHED WITH 24 THREADBAR TENDONS EXCEPT AT ANGLE POINTS BETWEEN BREAKWATER A, B, AND C
 2. LOCATION OF CHAIN LOCKER FOR MODULES A AND B VARIES
 3. MODULES ARE CONNECTED WITH THREADBAR TENDONS
 4. BEVEL MODULE ENDS BETWEEN BREAKWATERS A & B AND B & C



U. S. ARMY ENGINEER DISTRICT, DAYTON CORPS OF ENGINEERS ENGINEERING CENTER			
FRIDAY HARBOR FLOATING BREAKWATER			
PLANS, SECTIONS AND DETAILS			
FRIDAY HARBOR		WASHINGTON	
DESIGNED BY	DATE	SCALE	APP.
E-20-1-10			

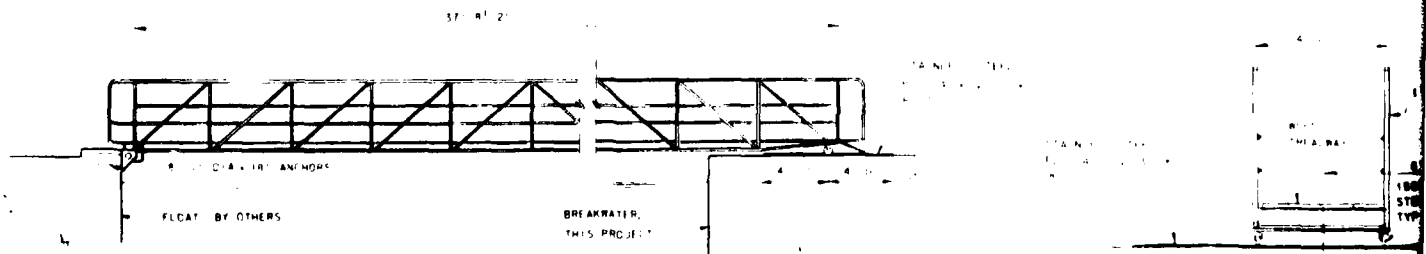


TYPICAL SECTION
NOT TO SCALE



ELEVATION
ANCHOR DETAIL
SCALE 1/4\"/>

BREAKWATER		CABLE		ANCHOR TABLE		ANCHORAGE		ADDITIONAL	
	CABLE	LENGTH		LANDWARD EMBEDMENT	SEAWARD EMBEDMENT	SIZE	SIZE		
A	1	247							
	2	264							
	3	267							
	4	272							
		276							
	6	247							
	7	264							
	8	267							
	9	272							
	10	276							
B	1	313							
		315							
	3	323							
	4	327							
	5	331							
	6	251							
	7	266							
	8	270							
		273							
C	SEAWARD ANCHOR	336							
D	1	214							
	2	284							
	3	305							
	4	313							
	5	317							
	6	214							
	7	260							
	8	278							
	9	286							
	10	290							



ELEVATION

RAMP DETAIL
SCALE 1/4\"/>

END VIEW

11 MLLW (HIGHEST TIDE)

3 B MLLW (LOWEST TIDE)

RIDGE

EXISTING GROUND

SOFT BOTTOM MATERIAL VARIES

EMBEDMENT LENGTH SEE TABLE

CABLE ATTACHMENT SEE ANCHOR DETAIL

1" DIA THREADED ANCHORS TYPICAL 18" LONG WITH 3" HOOK

6 H PILE SEE TABLE

3/4" BOLTS TYPICAL

1" DIA THREADED ANCHORS TYP 12" LONG WITH 3" HOOK

BUTYL RUBBER MARINE FENDER 4" X 12" LONG TYP

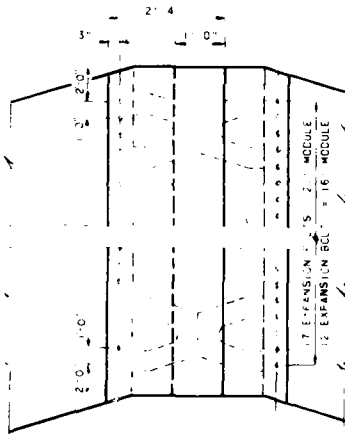
CIRCULAR KEEPER TYP

A BOLT WITH WASHER

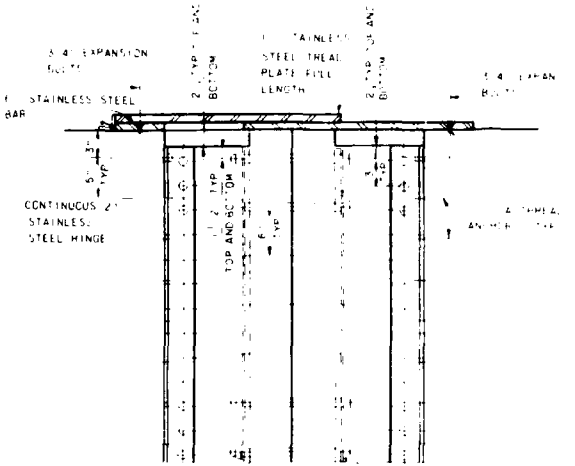
PLAN

NOTE: THREADED PLATE NOT SHOWN FOR CLAMP

SCALE 1/2" = 1'-0"



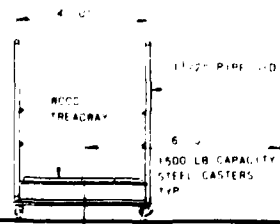
ATTACHMENT DETAIL - PLAN
NOT TO SCALE



ELEVATION

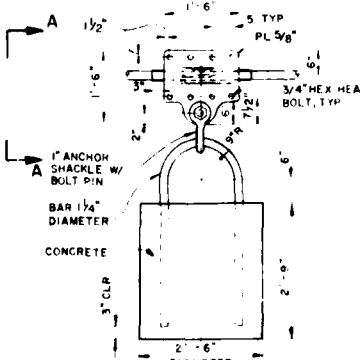
SCALE 1/2" = 1'-0"

BREAKWATER CONNECTION DETAIL



END VIEW

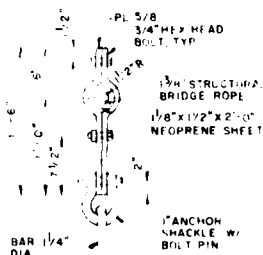
1/2" = 1'-0"
12" 9" 6" 3" 0



ELEVATION

SCALE 3/4" = 1'-0"

CLUMP ANCHOR DETAIL



SECTION A-A

SCALE 1/2" = 1'-0"

U. S. ARMY ENGINEER DISTRICT, SEATTLE	
CORPS OF ENGINEERS	
SEATTLE, WASHINGTON	
FRIDAY HARBOR FLOATING BREAKWATER	
SECTION DETAILS AND TABLE	
FRIDAY HARBOR	WASHINGTON
DATE: 11-29-15	BY: [Signature]
CHKD: [Signature]	APP: [Signature]
8	

PREPARE DRAFT DPR FOR AGENCY REVIEW

SUBMIT FINAL DPR TO NPD

RECEIVE PLANS AND SPECIFICATIONS FUNDS

COMPLETE AGENCY REVIEW OF DRAFT DPR

FINAL REVIEW AND APPROVAL OF DPR

PREPARATION OF BREAKWATER PLANS AND SPECIFICATIONS

DAYS

135

75

150

MONTHS

1

2

3

4

5

6

7

8

9

10

11

WATER PLANS AND SPECIFICATIONS	NPS REVIEW	PREPARATION OF COMMENT FOR NPD	NPD REVIEW	REVISIONS	ROUTE AND REPRODUCE	ADVERTISE	OPEN BIDS	REVIEW BIDS	AWARD CONTRACT	NOTICE TO PROCEED
150	30	7	30	14	21	30	10	10		

10	11	12	13	14	15	16	17	18	19	20	21	
----	----	----	----	----	----	----	----	----	----	----	----	--

BREAKWATER CONTRACT

360 DAYS

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

FRIDAY HARBOR MARINA

DESIGN AND CONSTRUCTION
SCHEDULE

FRIDAY HARBOR		WASHINGTON	
SIZE	UNIT	DATE	PLAN
			9
DSGN	CHKD	SHEET	

20	21	22	23	24	25	26	27	28	29	30
----	----	----	----	----	----	----	----	----	----	----

APPENDIX A

STUDY COORDINATION AND PUBLIC INVOLVEMENT

PART 1 - COORDINATION AND PUBLIC INVOLVEMENT

PART 2 - COORDINATION LETTERS

PART 3 - U.S. FISH AND WILDLIFE SERVICE REPORT

PART 4 - COMMENTS AND RESPONSES

APPENDIX A, PART 1
COORDINATION AND PUBLIC INVOLVEMENT

1. Coordination and public involvement have been maintained throughout the study and planning process using public meetings, newsletters, interagency coordination meetings, and Section 10 permitting procedures.

Coordination has been maintained with:

- o U.S. Department of Transportation - U.S. Coast Guard
- o U.S. Department of Transportation - Federal Aviation Administration
- 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 Treasury - U.S. Customs 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 Parks and Recreation Commission
- o Washington State Office of Archaeology and Historic Preservation
- o Washington State Interagency Committee for Outdoor Recreation
- o Washington Archaeological Research Center
- o San Juan County Planning Department
- o Friends of the Earth
- o Sierra Club
- o Audubon Society

AD-A102 195

CORPS OF ENGINEERS SEATTLE WASH SEATTLE DISTRICT
FRIDAY HARBOR MARINA EXPANSION STUDY--SAN JUAN ISLAND, WASHINGT--ETC(U)
APR 81

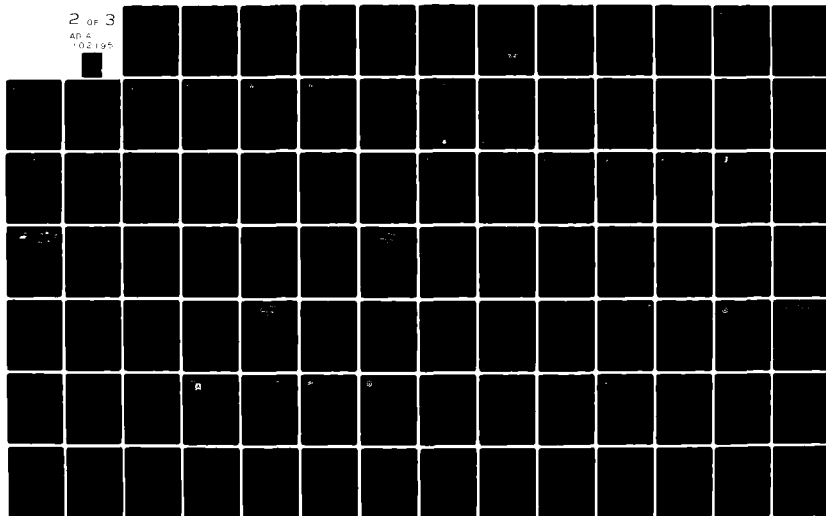
F/6 13/2

UNCLASSIFIED

NL

2 OF 3

AD-A
102195



- o Port of Friday Harbor
- o Friday Harbor Seaplane Owners Association
- o San Juan Island Yacht Club

2. Initial Public Meeting. An initial public meeting was held in September 1979 to identify community needs and concerns regarding the marina expansion. Needs and concerns were then addressed in the draft DPR/EA. The meeting notice and transcript are on file at the Seattle District office.

3. Comments and Responses. The draft DPR/draft EA was distributed for public and agency review on 30 December 1980. Comments on the draft DPR/draft EA and as a result of the public meeting were requested by 14 February 1981. The initial draft DPR/draft EA mailing list contained 161 organizations or individuals. Six hundred and nine notices of public meeting were mailed prior to the 29 January 1981 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, private organizations, and concerned individuals.

4. Late Stage Public Meeting. The Friday Harbor Port Commission held a public meeting on 29 January 1981 to present the District Engineer's findings, tentative recommendations, and to receive public comment. The meeting was held in the County Commissioners room of the San Juan County Annex Building at 7:30 p.m. Those attending were:

Port of Friday Harbor:

Charles H. Nash - Commissioner
 Linda Browne - Commissioner
 Richard Lawson - Commissioner
 Jack A. Fairweather - Port Manager
 Fred L. Krabbe - Port Engineer
 John C. Carlson - Port Attorney

Seattle District Corps of Engineers:

Lieutenant Colonel Willard - Deputy District Engineer
 Frank Urabeck - Chief, Navigation and Coastal Planning
 Alan Coburn - Study Manager, Navigation and Coastal Planning
 Andy Soule - Navigation and Coastal Planning
 Fred Weinmann - Environmental Resources Section

Concerned Citizens:

<u>Name</u>	<u>Representing</u>
Laura Arnold	San Juan County Planning Department
Jo Bailey	Friday Harbor Journal
Richard B. Barnes	Self

Concerned Citizens (con.):

<u>Name</u>	<u>Representing</u>
Jay R. Benford	Jay Benford Yacht Designs
Roger C. Bennett	Wester National Foods
G. William Bray	Self
Pat Brown	San Juan Marina Inc.
Don F. Brown	Self
Steve F. Brown	San Juan Marina Inc.
Thoms Chittenden	Self
Alex D. Crichton	Self
Alan Cummings	KGMI-Bellingham
Lois DiMarco	Island Artisans
Paul G. Dossett	Deputy Assessor
James R. Fox	Self
James L. Hensbow	Self
Yvette B. Jordan	Self
Beverly J. Krabbe	Self
David K. Landes	Foster and Marshall
Mark B. LaRiviere	University of Washington College of Fisheries Friday Harbor Labora- tories
Kathryn C. Lehoe	Self
Peter M. McCool	U.S. Customs Service
Donald A. McRae	Self
Beverly L. McRae	Self
George W. Martens	Self
Bill Maurer	San Juan Chamber of Commerce
Sally A. Merner	Self
David A. Merner	Self
Archie Merrifield	Interclub Boating Association of Washington
Max R. Montgomery	U.S. Customs Service
Carter T. Morgan	Mayor, Friday Harbor
Lou Myers	Self
David J. Picinich	Self
Wendy J. Picinich	Assistant Port Manager
Betty C. Nash	Self
Kathy Nelson	Self
Peter Risser	Self
Susan E. Risser	Self
Noble W. Starr	Self
Thomas C. Starr	Self
Corinne R. Towne	Self
Michael P. Vouri	Bellingham Marine Industries
June M. Vynne	Self
Eustace Vynne	State Parks and Recreation Commission
Brad C. Warren	Island Recorder

APPENDIX A, PART 2
COORDINATION LETTERS

CONTENTS OF PART 2
COORDINATION LETTERS

<u>Page</u>		<u>Date</u>
A2-1	Senator Slade Gorton	2 Feb 1981
A2-2	Congressman Al Swift	28 Jan 1981
A2-3	United States Coast Guard	10 Mar 1981
A2-4	United States Coast Guard	6 Feb 1981
A2-5	United States Coast Guard	7 Nov 1979
A2-6	Department of the Interior	24 Feb 1981
A2-7	Department of the Interior, Fish and Wildlife Service	13 Jan 1981
A2-8	Department of the Interior, Fish and Wildlife Service	3 Oct 1980
A2-10	Environmental Protection Agency	28 Jan 1981
A2-11	Soil Conservation Service	21 Jan 1981
A2-12	U.S. Customs Service	14 Jan 1981
A2-13	U.S. Customs Service	3 Dec 1979
A2-14	Federal Aviation Administration	12 Jan 1981
A2-15	National Marine Fisheries Service	22 Sep 1980
A2-21	Washington Department of Ecology	18 Mar 1981
A2-22	Washington Department of Ecology	10 Feb 1981
A2-22a	Washington Department of Ecology	5 May 1981
A2-23	Washington Departments of Fisheries and Game	30 Mar 1981
A2-25	Washington Department of Fisheries	27 Jan 1981
A2-26	Washington Department of Game	26 Jan 1981
A2-27	Washington Department of Transportation	26 Feb 1981
A2-28	Washington Department of Transportation	16 Jan 1981
A2-29	Washington Department of Transportation	19 Aug 1980

CONTENTS OF PART 2 (con.)

<u>Page</u>		<u>Date</u>
A2-30	Washington State Parks and Recreation Commission	8 Jan 1981
A2-31	Interagency Committee for Outdoor Recreation	4 Apr 1980
A2-32	Office of Archaeology and Historic Preservation	15 Nov 1979
A2-33	Archaeological Research Center	19 Feb 1981
A2-35	San Juan County Planning Department	29 Jan 1981
A2-37	Port of Friday Harbor	30 Mar 1981
A2-38	Port of Friday Harbor	27 Mar 1981
A2-40	Port of Friday Harbor	26 Mar 1981
A2-41	Town of Friday Harbor (with Shoreline Development Permit)	23 Mar 1981
A2-50	Port of Friday Harbor	9 Feb 1981
A2-51	Port of Friday Harbor	3 Feb 1981
A2-53	Town of Friday Harbor	26 Dec 1980
A2-55	Port of Friday Harbor	27 Jan 1977
A2-57	Clark Sherwood	5 Mar 1981
A2-58	C. J. Busch	3 Mar 1981
A2-59	Frederick Ellis	19 Feb 1981
A2-61	Corps of Engineers Letter - Mr. Ellis	2 Mar 1981
A2-62	Washington Tug and Barge Company	16 Jan 1981
A2-64	Port of Friday Harbor	23 Jan 1981
A2-65	Lee Campbell	26 Feb 1981
A2-66	Northwest Marine Trade Association	3 Feb 1981
A2-67	San Juan Island Chamber of Commerce	16 Jan 1981
A2-68	San Juan Island Yacht Club	8 Jan 1981
A2-69	Corps of Engineers Letter - Mr. Brown	24 Feb 1981

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EDWIN K. HALL, MINORITY GENERAL COUNSEL

United States Senate

COMMITTEE ON COMMERCE, SCIENCE,
AND TRANSPORTATION
WASHINGTON, D.C. 20510

February 2, 1981

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

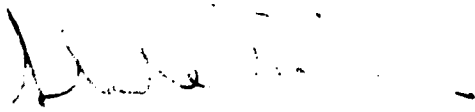
Dear Colonel Moraski:

It is my understanding that the Port of Friday Harbor has requested assistance from the U.S. Army Corps of Engineers to construct a new floating breakwater in order to expand the existing marina. I would appreciate it very much if every effort could be made to expedite this project.

The present breakwater, constructed in 1973, is now deteriorating and moored boats suffer wave damage during Northeast storms. A new breakwater would not only correct this situation but would also provide many benefits to the community by allowing the Port to add additional protected moorages.

Thank you for your consideration of this project.

Sincerely,


SLADE GORTON
United States Senator

SG:cav
cc: Charles Nash

AL SWIFT
2D DISTRICT, WASHINGTON

EVERETT OFFICE
201 FEDERAL BUILDING
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BELLINGHAM OFFICE
309 FEDERAL BUILDING
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Congress of the United States
House of Representatives
Washington, D.C. 20515

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COMMITTEE ON
INTERSTATE AND FOREIGN
COMMERCE

SUBCOMMITTEE ON
COMMUNICATIONS

SUBCOMMITTEE ON
ENERGY AND POWER

COMMITTEE ON
HOUSE ADMINISTRATIONS

January 28, 1981

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

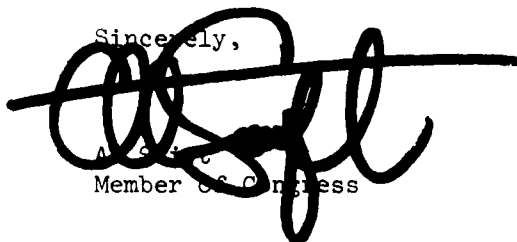
Dear Colonel Moraski:

I would like to express my support of the application submitted by the Port of Friday Harbor for Federal assistance in construction of a new breakwater to protect existing Port facilities.

I believe this is an excellent project and trust that it can be funded. The new breakwater requested by the Port of Friday Harbor would serve two important functions: First, it would insure that vessels moored in existing facilities would be protected from wave damage caused by northeast storms--protection not now provided by the existing breakwater. Second, it would provide additional moorage protection for vessels in the Port and throughout the county. I would point out the need for this additional space is well-documented in a recent report published by the Corps of Engineers titled Recreation Small Boat Moorage.

I will appreciate being kept informed of the decision the Corps makes regarding this project and hope that it will receive your favorable attention. Thank you for your assistance.

Sincerely,



Al Swift
Member of Congress

AS/hjc



**DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD**

MAILING ADDRESS
COMMANDER (dpl)
THIRTEENTH COAST GUARD DISTRICT
815 SECOND AVE
SEATTLE WASH 98174
PHONE 206 442-7523

16476
DPL80-1175
DPL81-012

Colonel Leon K. Moraski, USA
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Friday Harbor Report

Dear Colonel Moraski:

Our letter 16476, Serial DPL80-1175/DPL81-012 of 6 February 1981 advised you that the applicant would have to install Coast Guard permitted obstruction lighting on a proposed floating breaker. The documents addressing this project are your draft detailed project report/draft environmental assessment (DDPR/DEA), dated December 1980 and your Public Notice number 071-OYB-1-006938, dated 18 December 1980. The project involves marina expansion and a floating breakwater in Friday Harbor, Washington.

Amplifying information has revealed the Corps of Engineers is constructing the breakwater and the Coast Guard has previously made a commitment to provide the necessary lighting on that structure. We will honor our commitment and provide the obstruction lighting. Our concern regarding the anchor cables and placement of signs remain unchanged as expressed in the 6 February letter.

Sincerely,

RICHARD F. MALM
Captain, U.S. Coast Guard
Chief of Staff
13th Coast Guard District



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can live with.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
COMMANDER (dpl)
THIRTEENTH COAST GUARD DISTRICT
915 SECOND AVE
SEATTLE WASH 98174
PHONE

442-7523

16476
DPL80-1175
DPL81-012

Colonel Leon K. Moraski, USA
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Colonel Moraski:

We have reviewed your draft detailed project report/draft environmental assessment (DDPR/DEA), dated December 1980, for the Friday Harbor Marina Expansion, Friday Harbor, Washington. Furthermore, we have reviewed your Public Notice number 071-OYB-1-006938, dated 18 December 1980 that addresses the same project. The proposed activity is the construction of a marina expansion and floating breakwater in Friday Harbor by the Port of Friday Harbor.

Our review and comments are in keeping with parts 1508.15, 1508.26 and 1503.2 of the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act (40 CFR 1500-1508).

Pursuant to the Council's Regulations we have the following comments:

We do not concur with the issuance of the permit for the proposed expansion of the marina in Friday Harbor, unless the applicant installs Coast Guard permitted obstruction lighting to warn the mariner. The applicant will be contacted by my staff concerning this requirement. We will furnish you with copies of any correspondence that we have with the applicant.

The anchor cables extending seaward from the floating breakwater extend almost half way into the channel. With the large number of pleasure craft using Friday Harbor there is a possibility that some pleasure craft will anchor in the vicinity of the anchor cables. This could hazard the pleasure craft if their anchors fouled in the breakwater's anchor cables.

Measures to mitigate the cable hazard, perhaps posting signs on the floating breakwater to warn mariners that the anchor cables extend a certain distance into the channel, should be taken.

Sincerely,


R. S. MARK
Rear Admiral, USCG (Retired)
Commander, 13th Coast Guard District



It's a law we
can live with.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS (dp1)
COMMANDER
THIRTEENTH COAST GUARD DISTRICT
915 SECOND AVE
SEATTLE, WASH 98174
PHONE 206 442-7523

16452
DPL79-1098

18 MAR 1979

Colonel Leon K. Moraski, USA
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Colonel Moraski:

We have reviewed your draft environmental assessment on the floating breakwater at Friday Harbor, on San Juan Island, Washington.

We have no comments. Thank you for the opportunity to review this document.

Sincerely,

RICHARD F. MALM
Captain, U.S. Coast Guard
Chief of Staff
13th Coast Guard District



United States Department of the Interior

OFFICE OF THE SECRETARY

PACIFIC NORTHWEST REGION

500 N.E. Multnomah Street, Suite 1692, Portland, Oregon 97232

February 24, 1981

ER 81/100

Colonel Leon K. Moraski
District Engineer
Seattle District
Corps of Engineers
P.O. Box C 3755
Seattle, Washington 98124

Dear Colonel Moraski:

The Department of the Interior has reviewed the draft detailed project report/draft environmental assessment for the Friday Harbor Marina Extension, San Juan Island, San Juan County, Washington. We have one specific comment for your consideration.

On page 4-2, Recreational Facilities, we feel provisions should be made for sanitary waste disposal facilities for the boat holding-tanks, owing to the expanded moorage area and increased boating recreational facilities.

Thank you for the opportunity to comment.

Sincerely,

Charles S. Polityka
Regional Environmental Officer



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2625 Parkmont Lane
Olympia, Washington 98502

January 13, 1981

Mr. Sidney Knutson, P.E.
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

As requested by transmittal dated December 15, 1980, we have reviewed the Corps Environmental Assessment (EA) which served as the Biological Assessment for the proposed Friday Harbor Marina Expansion.

The assessment briefly discusses the species the Service listed on the species list request. We feel your report is deficient in that it doesn't identify the nearest known bald eagle nests in the area or develop a rationale as to why they would not be affected by the project. However, based on our own current bald eagle information, we believe a no effect situation does exist. In future Biological Assessments, specific details should be developed to show project affects on the species.

It is therefore our conclusion that Section 7 formal consultation will not be necessary at this time. Should future studies reveal the presence of other endangered or threatened species, or if other species occurring in the project area are listed as endangered or threatened in the future, we request that you reinitiate consultation with us.

Thank you for your cooperation and consideration regarding the project and formal Section 7 procedures.

Sincerely,

Joseph R. Blum
Area Manager

jlr

cc: RD (AFA-SE)
ES (Olympia)
WDG (Non-Game)



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2625 Parimont Lane
Olympia Washington 98502

October 3, 1980

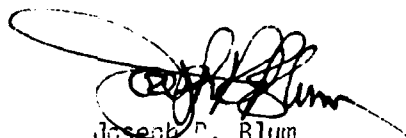
Sidney Knutson, P.E.
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

This is in response to your request of September 3, 1980, for information on threatened and endangered species in the area of the proposed expansion of the existing marina at Friday Harbor. The following listed species may occur in your area of concern. Field checks or surveys are necessary to confirm their occurrence and identify any impacts associated with the proposed project.

Your interest in endangered species is appreciated.

Sincerely,



Joseph R. Blum
Area Manager

jlr

Attachment:

cc: Regional Director (SE)
Area Manager - Boise
Rich Knight, MDG
Jim Bottorff - ES

LISTED AND PROPOSED ENDANGERED AND THREATENED
SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR
WITHIN THE AREA OF THE PROPOSED
EXPANSION OF THE EXISTING MARINA AT FRIDAY HARBOR
IN SAN JUAN COUNTY, WASHINGTON
NUMBER 1-3-80-1-200

LISTED

Bald Eagle (Haliaeetus leucoccephalus) Nesting and Wintering

Peregrine Falcon (Falco peregrinus) Possible Wintering

PROPOSED

None

CANDIDATE

None

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101



REPLY TO
ATTN OF: M/S 443

JAN 28 1981

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Subject: Draft Detailed Project Report and Draft Environmental
Assessment of the Friday Harbor Marina Expansion

Dear Colonel Moraski:

Thank you for sending us the above document on the proposed Friday Harbor Marina Expansion. We have no objection to the issuance of a Finding of No Significant Impact (FNSI) for the federal portion of this project as currently designed. However, we request that the following issues be resolved before the FNSI is signed.

1. Oil Spill Contingency Plans

With more vessels using the marina, the potential for oil and fuel spills will increase. The document does not identify oil spill contingency plans to either prevent or clean up potential oil or fuel spills from the fueling dock and vessels. We believe such plans should be outlined in the final document.

2. Parking Lot Impacts

The document does not mention automobile parking associated with the marina. Information should be presented on how much additional shoreside parking will be necessary to handle the increased number of vessels in the marina; where new parking lots will be located; and what the environmental impacts (including the impact of run-off on water quality) of this additional parking will be.

We appreciate the opportunity to review this document. If you have questions regarding our comments, please contact either myself or Judi Schwarz of my staff. We can be reached at (206) 442-1285 or (FTS 399-1285).

Sincerely yours,

Elizabeth Corbyn, Chief
Environmental Evaluation Branch



United States
Department of
Agriculture

Soil
Conservation
Service

Room 360
U.S. Courthouse
Spokane, Washington 99201

January 21, 1981

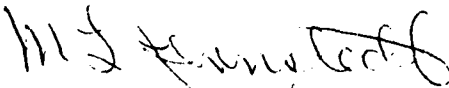
Leon K. Moraski
Colonel, Corps of Engineers
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Col. Moraski:

We have reviewed your draft detailed project report and draft environmental assessment for the Friday Harbor Marina Expansion project.

It appears the concerns of the Soil Conservation Service have been addressed and we have no comments to make at this time.

Sincerely,


LYNN A. BROWN
State Conservationist



The Soil Conservation Service
is an agency of the
Department of Agriculture

A2-11

SCS-AS-1
10-79



DEPARTMENT OF THE TREASURY

U.S. CUSTOMS SERVICE

Friday Harbor, Washington



REFER TO

Jan. 14, 1981

Colonel Leon Karacki
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Wash. 98124

Subject: Friday Harbor Marine Expansion 071-076-1-006938

Dear Sir;

I have been the United States Customs Port Director at Friday Harbor, Wa. since August 17, 1970. In the first five years I witnessed two major storms that did extensive damage at the Port of Friday Harbor. One of them, literally, put everything on the beach.

Fortunately in the past five years there have been no major wind storms at Friday Harbor, but, from my personal observation of the existing breakwater I feel the harbor is living on borrowed time, as the wave protection provided this breakwater in its present condition would be marginal, if any, during a storm from the northeast.

In addition the number of vessels reporting to Customs at Friday Harbor has increased from 2062 vessels in 1970 to just over 5000 in 1980. The present facility will no longer accommodate the increase in vessel traffic each year.

I would recommend that the construction of the new breakwater proceed as soon as possible.

Yours truly,

Max A. Montgomery

Max A. Montgomery
Port Director
U. S. Customs Service
Friday Harbor, Wa.



DEPARTMENT OF THE TREASURY

U.S. CUSTOMS SERVICE
SEATTLE, WASHINGTON



3 DEC 1979

REFER TO
FAC 7-02:DD:MS

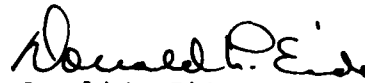
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Sir:

In reference to your letter NP SEN-PL-NC, dated October 25, 1979, the U.S. Customs Service concurs with the following stipulations to the Friday Harbor construction project as discussed between Mr. Disbrow, of your office and Mr. Hammeger, of the U.S. Customs Service.

The area specified for Customs Inspection and Clearance must be rent free and not be used for any purpose other than the U.S. Customs Inspection and Clearance.

Sincerely,


Donald L. Eide



DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
NORTHWEST REGION
FAA BUILDING KING COUNTY INT'L AIRPORT
SEATTLE, WASHINGTON 98108

January 12, 1981

Mr. Fred Weinmann
Environmental Coordinator
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Mr. Weinmann:

We have completed our review of the Draft Detailed Project Report and Draft Environmental Assessment for the proposed Friday Harbor Marina Expansion and find that the location of the seaplane float is acceptable as shown in Plate 2. Please notify my office if changes in the seaplane float location are contemplated. Thank you for the opportunity to review this report.

Sincerely,

George L. Buley
George L. Buley
Chief, Planning and
Programming Branch, ANW-610

cc:

Charles Nash, Chairperson, Friday Harbor Port Commission
Donald R. Eide, U.S. Customs Service
John Blanchard, Friday Harbor Seaplane Owners Association
William Hamilton, Washington State Department of Transportation



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
1700 Westlake Avenue North
Seattle, Washington 98109

F/NWR5:1503-11-1

SEP 22 1980

Colonel Leon K. Moraski, District Engineer
Seattle District Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

In response to your letter, received September 8, 1980, on the proposed expansion of the marina at Friday Harbor, Washington, we are enclosing a list of endangered and threatened species under National Marine Fisheries Service jurisdiction that may be present in marine waters of Western Washington. As noted, their occurrence is infrequent.

It is unlikely that development of the proposed marina would affect the listed species. Unless new information should indicate otherwise, no further consultation is required.

Sincerely,

H. A. Larkins
Regional Director

Enclosure



10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration

A young agency with a historic
tradition of service to the Nation

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

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

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

JOHN SPELLMAN
Governor



DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

4350-150th Ave NE • Redmond Washington 98052 • (206) 885-7000

March 18, 1981

U.S. Army, Corps of Engineers
4735 E. Marginal Way South
P.O. Box C-3755
Seattle, Washington 98134

Attention: Mr. Frank Urabeck

Subject: Friday Harbor Marina Expansion

Dear Mr. Urabeck:

The letter is to confirm our discussion of March 11, regarding the sewage disposal facilities for the proposed expansion of the Friday Harbor Marina.

The existing sewage pumpout station, together with the porta-pottie dump station under construction, should be adequate to serve the existing and proposed marina facilities. It will be the responsibility of the Port to keep these facilities functional and available to the marina customers.

Sincerely,

A handwritten signature in cursive script, appearing to read "David Nunnallee".

David Nunnallee
District Supervisor
Environmental Quality

DN:bh

cc: Mr. Jack Fairweather, Port of Friday Harbor

JOHN SPELLMAN
Governor



DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia Washington 98504 • (206) 753-2800

February 10, 1981

Leon K. Moraski
Colonel, Corps of Engineers
Seattle District Engineer
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

Thank you for the opportunity to review the draft environmental assessment for the Friday Harbor Marina. Headquarters and regional personnel have reviewed the document and have the following concerns.

The assessment indicates the principle source of water pollution in Friday Harbor is the sewage outfall. The Friday Harbor sewage treatment plant provides only primary treatment, (coarse screening, solids settling and chlorination) prior to discharge. Flows vary between 0.2 and 0.6 million gallons per day, with an average of about 0.4. During low tide sequences, a plume from the sewage plant outfall has been observed, i.e., the partially treated sewage rises to the surface of the salt water. In the proposed marina expansion, this plume can be expected to completely surround boats moored over the outfall.

Prior to the proposed marina expansion, the Friday Harbor sewage treatment plant outfall should be extended seaward, well outside of the proposed new breakwaters. Also, care should be exercised during construction to avoid damage of the outfall, and the pipe should be permanently protected from damage by dragging boat anchors.

The final report should clarify the location of the sewage outfall. Plate 1 shows the outfall just outside the existing marina and Plate 2 shows the same outfall located squarely in the middle of the proposed expansion. Water depths over the outfall are shown as about thirty feet.

If you have any questions, please contact Mr. Dave Nunnallee of our Northwest Regional Office (885-1900).

Sincerely,

A handwritten signature in cursive script that reads "Fred D. Hahn".

Fred D. Hahn, Assistant Director
Office of External Affairs

FDH:bjw

cc: Dave Nunnallee, DOE, NW Region A2-22
Barbara Ritchie, DOE, Headquarters

JOHN SPEELMAN
Governor



DONALD W. ALLEN
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504 • (206) 753-2800

May 5, 1981

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

Attention: Chief, Regulatory Functions Branch

Gentlemen:

Public Notice No. 071-OYB-1-006938-R
Friday Harbor, Port of

We have received and reviewed your public notice for a Department of the Army permit for work in navigable waters.

On behalf of the State of Washington, we have no objection to the issuance of the Corps Section 10 permit.

Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended, this project is in the coastal zone and appears to be consistent with the approved Washington State Coastal Zone Management Program.

We are forwarding the enclosed comments received from the Washington State Department of Transportation. They are for your information and the applicant's assistance and use.

Please note this letter does not exempt the applicant from compliance with other requirements of federal, state, and local agencies.

Sincerely,

M. F. Palko
Division Supervisor
Office of Field Operations

MFP:lt

Enclosures

cc: Applicant
File
U.S. Fish and Wildlife
WDOT

A2-22a

2147
2147



STATE OF
WASHINGTON

XXXXXX
XXXXXX

John Spellman
Governor

DEPARTMENT OF FISHERIES

115 General Administration Building, Olympia, Washington 98504

and

DEPARTMENT OF GAME

600 North Capitol Way, GJ-11 Olympia, Washington 98504

March 30, 1981

Port of Friday Harbor
c/o Krabbe and Starr, Inc.
P.O. Box 767
Friday Harbor, Washington 98250

Attention Mr. Fred Krabbe

Gentlemen:

Marina Addition, Floating Breakwater
Friday Harbor, Section 12, Township 35 North,
Range 3 West, W.M., in San Juan County
PN-071-0YB-1-006938 WRIA A-02

The Departments of Fisheries and Game have reviewed your plans. These departments approve the project as illustrated in the above-referenced Corps of Engineers Public Notice. Our approval is also subject to the following provisions. These provisions were established for the protection of juvenile salmonids migrating through the area.

- a. Time Limitation: Construction may be started June 15, 1981 and shall be completed by December 31, 1981. A time extension will be considered upon reapplication. However, there shall be no pile driving allowed during the time period of March 15 to June 15 of any year.
- b. All piling, lumber and material treated with creosote or other preservative shall be completely dry before use in the water.
- c. No deleterious materials shall be allowed to enter state waters as a result of this project.
- d. Any debris resulting from this construction project shall be removed from the water and disposed of or placed in such a manner to prevent its being washed back into the water by high water or wave action.
- e. Water quality is not to be degraded to the detriment of fish life as a result of this project. Compliance with the quality limits set forth in the Washington State Water Quality Regulations shall be maintained throughout the life of the project.
- f. These provisions shall be closely followed by the contractor(s) and the equipment operator(s) and shall be on the job site at all times.

SEPA: Final DNS, Port of Friday Harbor, March 19, 1981.

Port of Friday Harbor
c/o Krabbe and Starr, Inc.

- 2 -

March 30, 1981

This letter does not obviate the requirement to obtain approval from all other state, federal or local agencies for the activity authorized herein.

The Departments of Fisheries and Game reserve the right to make further restrictions if deemed necessary for the protection of fish life. This letter is written in the interest of fishery protection only, and these departments cannot be held liable for any property damage which might occur as a result of this project.

We appreciate your cooperation in our collective efforts to protect, perpetuate and manage the fishery resources of the State of Washington. If you have any questions or need additional information, please contact Curtis Dahlgren at (206) 753-2908.

Sincerely,


Rolland A. Schmitten, Director
DEPARTMENT OF FISHERIES


Frank R. Lockard, Director
DEPARTMENT OF GAME

cc: Alan Coburn



STATE OF
WASHINGTON

John Spellman
Governor

DEPARTMENT OF FISHERIES

January 27, 1981

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

Gentlemen:

Draft Detailed Project Report and Draft
Environmental Assessment for the Friday
Harbor Marina Expansion WRIA A-02

The Department of Fisheries has reviewed the above referenced document and offer the following comments.

We concur with your comments responding to recommendations 1 and 2 of the Fish and Wildlife Coordination Act report. No in-water construction from March 15 to June 15 will, as you stated, avoid any potential impacts to outmigrating juvenile chum salmon released in the Friday Harbor area. We also acknowledge and appreciate your comments in recommendation 2, supporting the incorporation of facilities for the recreational angler into the design of the breakwater.

It should be noted on page EA-10, that a joint written approval from the Department of Fisheries and the Department of Game is necessary prior to any work within the waters of the state. As a means of convenience, we will accept the Corps' Public Notice as an application for our approval.

Thank you for the opportunity to review and comment.

Sincerely,

by Sam Whight
for Rolland A. Schmitten,
Director



STATE OF
WASHINGTON

XXXXXXXXXX
XXXXXXXXXX

John Spellman
Governor

DEPARTMENT OF GAME

January 26, 1981

Fred Weinmann
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

DRAFT ENVIRONMENTAL ASSESSMENT:

Friday Harbor Marina Expansion

Mr. Weinmann:

Your document was reviewed by our staff as requested; comments follow.

In general, we concur with the draft Fish and Wildlife Coordination Act report prepared by the U.S. Fish and Wildlife Service (September 18, 1980). This project as proposed would likely change overall species composition, and by removing 14 acres of subtidal habitat, result in corresponding reductions in fish and waterfowl use.

On page EA-14 it is indicated that the proposed timing restriction from November 15 to February 15 will be deleted from the report. It should be noted, however, that if deemed necessary for the protection of fishery resources, we will impose such timing restrictions as mitigating provisions on any approvals for construction activities.

Thank you for the opportunity to review your document. We hope that you find our comments helpful.

Sincerely,

THE DEPARTMENT OF GAME

Fred Maybee, Assistant Program Manager
Environmental Affairs
Habitat Management Division

FHM:mjf

cc: Agencies
Region

JOHN SPELLMAN
Governor



W. A. BULLEY
Secretary

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

Highway Administration Building • Olympia, Washington 98504 • (206) 753-6005

February 26, 1981

State of Washington
Department of Ecology
Olympia, WA 98504

Attn: Ms. Shara Stelling
Corps of Engineers
Permit Coordinator

Re: OYB-1-6938
Port of Friday Harbor

Dear Ms. Stelling:

Although this Department has serious reservations to the marina improvements we will not object to the issuance of a permit for the work.

Our main concerns are all related to safety. The public notice does not indicate our ferry terminal which is located adjacent to the southern-most existing pier.

Because of a submerged rock out-cropping in the harbor vessels must steer quite close to the proposed breakwater. The ferry wake is considered a long period wave. The proposed floating breakwater is considered more effective in damping short period waves. Our calculations indicate that the wave force on the proposed breakwater will be more than four times greater than on the existing facilities.

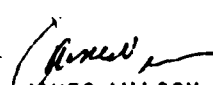
We also note that the breakwater, and the ramp shown on sheet 3 will force boaters to maneuver much closer to the ferries.

Another area about which the Department is anxious relates to the relocated seaplane float. This revised location will require the aircraft to taxi, for takeoff or landing at near right-angle to the ferries wake. This operation could be extremely hazardous.

For any further questions concerning our operation at Friday Harbor, please contact Mr. Clyde Slemmer, Olympia, phone 753-2116.

Very truly yours,

W. A. BULLEY
Secretary of Transportation

By: 
JAMES WILSON
Manager, Pre-Contract
Administration Office

WAB:sd
JW

A2-27



STATE OF
WASHINGTON

DEPARTMENT OF TRANSPORTATION KF-01
Highway Administration Building, Olympia, Washington 98504 206 753 6666

January 16, 1981

Mr. Alan Coburn, Study Manager
Navigation and Coastal Planning
U. S. Army Corps of Engineers
Seattle District
Post Office Box C-3755
Seattle, Washington 98124

U. S. Army Corps of Engineers
Friday Harbor Marina Expansion
Draft Environmental Assessment

Dear Mr. Coburn:

We have reviewed the subject document and have the following comment:

The Department's primary concern lies in the impacts that this development will have on existing parking facilities in Friday Harbor. We are planning to expand the existing parking facilities in conjunction with the ferry terminal. Therefore, we have some concerns that if enough marina parking does not exist then it might overflow into the ferry parking facilities.

If you have any questions, please call Jim Leonard at 753-6644.

Sincerely,

ROBERT S. NIELSEN
Assistant Secretary for Public
Transportation and Planning

By: JOSEPH BELL, Manager
Planning Implementation and
Environmental Policy

RSN:sab
JB/WBH

cc: J. D. Zirkle/T. R. Burke



STATE OF
WASHINGTON

Division of
Transportation

DEPARTMENT OF TRANSPORTATION

Highway Administration Building, Olympia, Washington 98501

August 19, 1980

Mr. Harry Disbrow
Navigation and Coastal Planning Section
Department of the Army
Corp of Engineers
P.O. Box C-3755
Seattle, WA 98124

Re: Army C.O.E
Project No. NPSEN-PL-NC

Dear Mr. Disbrow:

This will confirm our meeting of August 18, 1980, and the discussion with our Ferry Operation section regarding the project at Friday Harbor. We have expressed to you in our letter of July 21, 1980 some of our concerns relative to further restrictions to the navigation channel entering Friday Harbor.

As a result of our discussion we are in agreement that the boat haven and breakwater are important to the development of Friday Harbor. We will pursue some operational improvements to the navigation channel alignment which will enhance the approach to our terminal and reduce the risk associated with the proposed breakwater.

We appreciate the opportunity to discuss this project with you and will work closely with you during the construction phase to assure coordination at that time.

Very truly yours,

FRED L. PEIL
Assistant Secretary for
Marine Transportation

[Signature]
By: CLYDE L. SLEMMER
Operations Engineer for
Marine Transportation

FLP:vjb
CLS

cc: R. A. Berg
D. B. Rennie



STATE OF
WASHINGTON

Don't See How
Easy it is

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane, Olympia, Washington 98504

206/753-5755

January 8, 1981

35-6550-0000
Draft Detailed Project Report
and Draft Environmental
Assessment - Friday Harbor
Marina Expansion
(R-120)

Col. Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Col. Moraski:

The staff of the Washington State Parks and Recreation Commission has reviewed the document noted above and offers the following comments.

We concur with your finding that Alternative 5 would have the least impacts on existing wetlands, water quality and related environmental parameters while apparently offering a good cost benefit ratio over a 50 year project life.

We agree a strong need exists for increased recreational boating facilities in the Puget Sound area and that the proposed expansion of Friday Harbor Marina would help to fill this need where it is particularly acute, in the San Juan Islands.

Thank you for the opportunity to review your document. We hope our comments are helpful.

Sincerely,

David W. Heiser, E.P., Chief
Environmental Coordination

DJH/DAP:sh

cc: Eustace Vynne, Jr., State Parks and Recreation Commissioner
Jan Tveten, Director
Eugene Rohner, Regional Supervisor, Region II
Bill Bush, Chief, Research & Long Range Planning



STATE OF
WASHINGTON

Dixy Lee Ray
Governor

INTERAGENCY COMMITTEE FOR OUTDOOR RECREATION

4800 Capitol Blvd., KP-11, Tumwater, Washington 98504 206 753 7140

Robert L. Wilder, Administrator

April 4, 1980

Mr. Sidney Knutson
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

RE: Port of Friday Harbor
Crusoe Marina
IAC #72-022D

Dear Mr. Knutson:

At the request of the Port of Friday Harbor and in response to an earlier letter from your office I have reviewed the plan for the expansion of the Friday Harbor Marina. As presented to us, the plan appears to have no detrimental effects on our interest in the facility.

We would appreciate being kept fully up to date on the progress of this project.

Sincerely,

L. D. FAIRLEIGH
Project Specialist

cc: Port of Friday Harbor

LDF:ec



STATE OF
WASHINGTON

Dixy Lee Ray
Governor

OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION

111 West Twenty First Avenue, Olympia, Washington 98504 206 753 4011

Mr. John Malek
Environmental Coordinator
Department of the Army
Seattle District, COE
P.O. Box C-3755, Seattle, WA 98124
Dear Applicant:

Date: November 15, 1979
In reply refer to: 75-F-COE-S-04

Re: Friday Harbor Marina

We have reviewed the project materials forwarded to us for the above project and would like to make the following comments:

Insufficient information: We will need: a detailed narrative of the project elements; a vicinity map; a map of the project site and surrounding area showing topography, drainage, specific project boundaries, and indicating County, Section, Township, and Range; line drawings of the project; photographs of structures to be renovated or demolished.

No resources known: No properties are listed in the National or State Registers of Historic Places or the State Inventory of Historic Places which may be impacted by the project. Properties include archaeological and historic resources.

Project area has/ has not been surveyed for cultural resources.

Potential effects on unidentified resources: There is reasonable probability that cultural resources exist in the project areas. A cultural resources survey/ monitoring of the project area is recommended as part of project construction.

XX Resources present: no effect/XX effect uncertain; see below for comment.

No adverse effect/ Adverse effect on National Register property. See below for comment.

XX In the event that cultural materials are disclosed during construction, work in the immediate vicinity should be discontinued and this office notified.

Sincerely,

JEANNE M. WELCH, Deputy State
Historic Preservation Officer


Sheila A. Stump, Archaeologist

md

Comments: Sites 45 SJ 210 and 45 SJ 204 are reported to be in the project area and should be professionally assessed.



WASHINGTON ARCHAEOLOGICAL RESEARCH CENTER

COORDINATING OFFICE: WASHINGTON STATE UNIVERSITY, PULLMAN, WASHINGTON 99164

ACTING DIRECTOR
DALE R. GROES, PH.D.

ASSISTANT DIRECTOR
STEVEN HACKENBERGER

INFORMATION SPECIALIST
LLOYD E. WHEELER, PH.D.

PHONE 509/535-8566
SCAN 426-8566

February 19, 1981

David Masters
Environmental Coordinator, Friday Harbor Project
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Masters:

The following comments pertain to our phone conversation concerning the DPPR/DEA, dated December 1980, for the Friday Harbor Marina Expansion, Friday Harbor, San Juan County, Washington.

Upon checking our archaeological site inventory files for the Friday Harbor vicinity, it was noted that one site is immediately adjacent to the proposed marina expansion. As such, it may be threatened by the marina expansion unless proper care is taken to avoid it during the construction phase of the project. The following is a description of the site.

Site name: 45 SJ 211
Location:
Description:

Period: Prehistoric

While work off-shore does not appear to have adverse impacts, we are concerned about construction or secondary impacts on the shore, particularly since the above site description mentioned the greatest concentration of artifacts towards the southern end of the beach. Examples of such impacts include dumping rubble or construction of rip rap along the shore or beach.

Two other sites, 45 SJ 204 and 210 are also found within the vicinity of Friday Harbor, but are located well north from the marina expansion, so will suffer no impact from its construction.

Due to the confidential nature of site locations, we would appreciate the deletion of the legal description should this letter be published in a Final Environmental

A2-33

David Masters
February 19, 1981
Page 2

Assessment. Finally, we would appreciate copies of any reports on this site by Corps archaeologists so we can continue to update the WARC site files.

Sincerely yours,

A handwritten signature in cursive script, reading "William R. Haase". The signature is written in dark ink and is positioned above the typed name.

William R. Haase

WRH:bh
Enclosures
cc: Jake Thomas
Carol Kielusiak
Lloyd Whelchel

SAN JUAN COUNTY
PLANNING DEPARTMENT

Box 947 Friday Harbor, Washington 98250 206-378-2354

January 29, 1981

TO: Port Commission, Port of Friday Harbor
FROM: San Juan County Planning Department
RE: Proposed Friday Harbor Marina Expansion

This office has reviewed the Draft Detailed Project Report and Draft Environmental Assessment, including the preliminary finding of no significant impact, on the proposed marina expansion.

The report states comments received on the report and the assessment will be considered in the Corps of Engineers' determination as to the need for an Environmental Impact Statement.

It is in response to this statement that we request you and the Corps consider the questions and concerns raised in our review of these documents.

The assessment states that the Town of Friday Harbor will experience the primary impact of the project. It is clear from our review, however, that the less direct and longer-range impacts of the project on San Juan County need to be addressed.

San Juan County, as a close neighbor, waterfront property owner and a governing body, has an important relationship to the Port. The Planning Department therefore requests that the concerns noted below be addressed, and suggests that an Environmental Impact Statement may be the most appropriate means to provide the more comprehensive review of the impacts of this proposal.

In the "Economic and Social Evaluation," appendix C of the report, statistics on moorage demands and projected use are provided. The statistics do not, however, distinguish demands from island residents and non-residents although such information would presumably be available from the waiting lists which were consulted.

This information would provide an indication of the extent to which local moorage needs would be met by the proposed expansion, in relation to the demand from local residents, and establish a basis for considering the less direct impacts on the county in terms of resultant future demands

January 29, 1981
page 2 of 2

on transportation facilities (ferry and air services for non-resident boat owners); parks and recreation facilities; and fire, police protection and solid waste system capacities.

The county's shoreline management policies support marina development in urban shoreline areas which have the support services needed and where site conditions are appropriate. These policies also support the development and use of group facilities which will offset the increasing demands for individual, and scattered, moorage facilities throughout the county. For this reason as well, the county is concerned that the proposal be responsive to local moorage needs.

In addition, the report and impact assessment do not address the need for expanded parking facilities, public showers and toilets, and other shore facilities now provided at the port which would result from marina expansion. The county is the owner of the abutting shoreline property leased to the Port of Friday Harbor. The county therefore is concerned that the development of the abutting uplands in conjunction with the proposed expansion be done in a manner responsive to local needs.

On the basis of the above issues, the Planning Department requests that the Port Commission and the Corps address the need for additional study prior to making the final determination on the impacts of this proposal.

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661

Friday Harbor, Washington 98250

(206) 378-2688

March 30, 1981

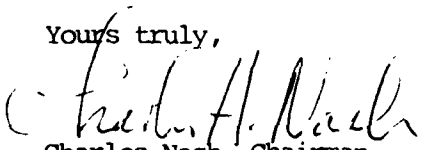
Mr. Allen Coburn
U. S. Army Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

RE: Port of Friday Harbor Breakwater Project

Dear Mr. Coburn:

Per recent discussions with the Town of Friday Harbor, the State Department of Ecology, and the Corps of Engineers, the Port of Friday Harbor has agreed to extend the existing Town sewer outfall line an additional 700 feet or as required to clear the proposed new Port breakwater. This construction will be paid for by the Port and done in accordance with all local, state and federal requirements.

Yours truly,


Charles Nash, Chairman
Friday Harbor Port Commission

CN:ys

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661
Friday Harbor, Washington 98250
(206) 378-2688

March 27, 1931

Colonel Leon K. Moraski
District Engineer
Seattle District, U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, Wash. 98124

Dear Colonel:

This is to advise you that the Port of Friday Harbor has reviewed the December 1930 Draft Detailed Project Report Environmental Assessment for the Friday Harbor Marina Expansion, Friday Harbor, Washington, and is aware of the current price level estimates of project costs, as will be contained in the final report. Accordingly we assure our willingness to meet the following criteria:

- a. Provide without cost to the United States all lands, 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 Federal improvements, and necessary mooring facilities, utilities, a public landing with suitable water supply and essential sanitary facilities, parking area and access roads open to all on equal terms.
- e. Provide a cash contribution equal to 48% of the final project costs allocated to general navigation.
- f. Provide a cash contribution equal to 50% of the final cost of construction of recreational facilities on the floating breakwater and the access facilities thereto, and 100% of the final cost of construction tieup servicing facilities on the floating breakwater.
- g. Maintain without cost to the United States all recreational and tieup and servicing facilities associated with the floating breakwater.

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661

Friday Harbor, Washington 98250

(206) 378-2688

h. Pay all project costs in excess of the Federal cost limitation of \$2 million as provided in Public Law 86-645 as amended. Provided that the improvement for navigation may be undertaken independently of providing public recreational facilities, whenever the required cooperation for navigation has been furnished.

The Port further agrees to:

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

b. Comply with Sections 210 and 305 of Public Law 92-646, approved January 2, 1971, and entitled the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970."

The Port of Friday Harbor, Washington, possesses the authority and capability under the Washington State Constitution and other law, to furnish the non-Federal cooperation required by the Federal legislation that authorizes the project.

Yours very truly,

Charles H. Nash
Charles Nash, Chairman
Friday Harbor Port Commission

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661
Friday Harbor, Washington 98250
(206) 378-2688

March 26, 1981

U.S. Army, Corps of Engineers
P.O. Box C-3755
Seattle, Wash. 98134

Attention: Alan Colburn

Subject: Oil Spill Prevention and Litter Control
Friday Harbor Marina Expansion

At the present time we have several large bales of absorbent chips on hand to deal with minor oil spills. We have ordered from Crowley Environmental Services, Seattle, Washington 100 3M TY 156 absorbent pads and several bales of absorbent 3M T 270 boom logs. These items should be delivered next month.

There should be no problem in containing an oil spill from a leaking or sinking boat using these absorbent aids and our power skiff.

In the event of a major oil spill, Crosby and Overton Environment Service of Bellingham who are on 24 hour call, could have clean up equipment in Friday Harbor within two hours.

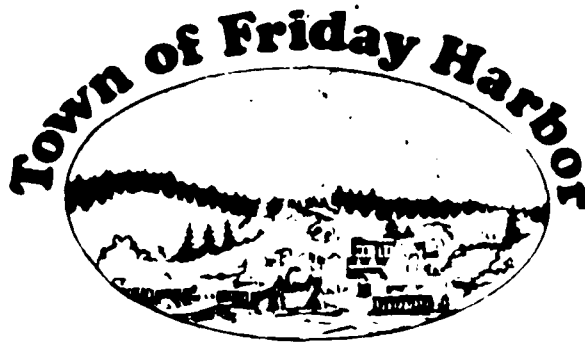
We now have nine $1\frac{1}{2}$ cubic yard garbage containers on the dock. We also have very adequate signs on the floats and breakwater directing boaters to them.

These containers are picked up by the town of Friday Harbor everyday during the summer months. The town garbage trucks are on call if an extra pickup becomes necessary. We have had no litter problems in the past.

When the Port expands, there will be additional garbage containers provided.

Yours very truly

Jack Fairweather
Jack Fairweather
Port Manager



March 23, 1981

U.S. Army Corps of Engineers
P.O. Box C-8755
Seattle, Washington 98124

RE: Public Notice: 071-OYB-1-006938
Friday Harbor, Port of

Gentlemen:

The Town of Friday Harbor has received and reviewed comments from various departments relative to the above Public Notice. Based upon those comments, the Town of Friday Harbor offers the following statement (s):

- ☒ 1. We have no objection to the project as stated in the above notice.
- ☐ 2. This agency has determined that this project is exempt from the Shoreline Management Act.
- ☒ 3. Applicant has applied for a Shoreline Management Permit. (Application approved March 19, 1981).
- ☐ 4. The applicant is hereby advised that work of this nature now comes under the regulation of the Shoreline Management Act of 1971. Forms are available from this office.
- ☐ 5. We request that the Corps permit be withheld until a Substantial Development Permit application has been reviewed.
- ☐ 6. Other

Sincerely,

Mayor pro tem

Post Office Box 219, Friday Harbor, Washington 98250

(206) 378 2810 378 2390

cc: Department of Ecology

A2-41

TOWN OF FRIDAY HARBOR
PERMIT FOR SHORELINE MANAGEMENT SUBSTANTIAL DEVELOPMENT
XXXXXXXXXXXXXXXXXXXX

Note - This page for
local government
use only

Application No. **19**.....
Administering Agency **Town of Friday Harbor**.....
Date received **12-3-80**.....
Approved **X**..... Denied
Date **3-19-81**.....

Type of Action(s)

- ☒ Substantial Development permit
☐ Conditional Use Permit
☐ Variance Permit

Pursuant to chapter 90.58 RCW, a permit is hereby granted/~~denied~~ to:

.... **Port of Friday Harbor**.....
(name of applicant)

.... **204 Front Street**.....
(address)

.... **Friday Harbor, Wa. 98250**.....

to undertake the following development: (Please be specific).....

.. **Additional moorage facilities as per Corps of Engineer**.....

.. **071-0XB-1-006938**.....

upon the following property (please list the legal description, i.e.,
section to the nearest quarter section, township, range):

.. **G.L. 7a Sec. 11, T. 35 N., R. 3 WWM**.....

within.... **Friday Harbor**.....and or its associated wetlands.
(name of water area)

The project will be/~~not~~ be within the shorelines of state-wide significance
RCW 90.58.030). The project will be located within a **marine**.....designation.
(environment)

The following master program provisions are applicable to this development
(state the master program section or page number):... **Section 5.15**.....

If a conditional use or variance, also identify the portion of the master
program which provides that the proposed use may be a conditional use, or
that portion of the master program being varied.

Development pursuant to this permit shall be undertaken pursuant to the following terms and conditions:

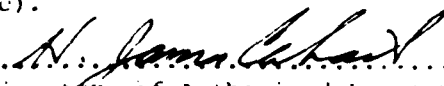
1. Provisions shall be made for inadvertent oil and fuel spills.
2. Streets from Port parking area as shown on the Town Traffic Study Report shall be constructed and completed prior to increased traffic buildup due to this project. The Port shall be responsible to work with the Town in the

acquisition and construction of said streets. This permit is granted pursuant to the Shoreline Management Act of 1971 and nothing in this permit shall excuse the applicant from compliance with any other federal, state or local statutes, ordinances or regulations applicable to this project, but not inconsistent with the Shoreline Management Act (Chapter 90.58 RCW).

This permit may be rescinded pursuant to RCW 90.58.140(8) in the event the permittee fails to comply with the terms or conditions thereof.

CONSTRUCTION PURSUANT TO THIS PERMIT WILL NOT BEGIN OR IS NOT APPROPRIATED UNTIL THIRTY DAYS FROM THE DATE OF FILING AS DEFINED IN RCW 90.58.140(5) AND WAC 173-14-090, OR UNTIL ALL REVIEW PROCEEDINGS INITIATED WITHIN THIRTY DAYS FROM THE DATE OF SUCH FILING HAVE TERMINATED: EXCEPT AS PROVIDED IN RCW 90.58.140(5) (a) (b) (c).

19 March 1981
(Date)


(Signature of Authorized Local Government Official) H. James Cahill, Mayor Protem

THIS SECTION FOR DEPARTMENT USE ONLY IN REGARD TO A CONDITIONAL USE OR VARIANCE PERMIT.

Date received by the department

Approved..... Denied

This conditional use/variance permit is approved/denied by the department pursuant to to chapter 90.58 RCW.

Development shall be undertaken pursuant to the following additional terms and conditions:

.....
.....

.....
(Date)

.....
(Signature of Authorized Department Official)

TOWN OF FRIDAY HARBOR

~~PROPOSED~~/FINAL DECLARATION
OF ~~SIGNIFICANCE~~/NON-SIGNIFICANCE

Description of Proposal Extension of floats

Proponent Port of Friday Harbor

Location of Proposal Court and Front Streets

Lead Agency Town of Friday Harbor

This proposal has been determined to ~~have~~/not have a significant adverse impact upon the environment. An EIS ~~is~~ not required under RCW 43.21.C.030 (2) (c). This decision was made after review by the lead agency of a completed environmental checklist and other information on file with the lead agency.

Responsible Official Cleave C. Vander sluis

Position/Title Town Administrator

Date MARCH 19, 1981 Signature [Signature]

TOWN OF FRIDAY HARBOR

PROPOSED/~~FINAL~~ DECLARATION
OF ~~SIGNIFICANCE~~/NON-SIGNIFICANCE

Description of Proposal Extension of Dock

Proponent Town of Friday Harbor

Location of Proposal South end of Port of Friday Harbor

Lead Agency Town of Friday Harbor

This proposal has been determined to ~~have~~/not have a significant adverse impact upon the environment. An EIS ~~is~~/ is not required under RCW 43.21.C.030 (2) (c). This decision was made after review by the lead agency of a completed environmental checklist and other information on file with the lead agency.

Responsible Official Glenve E. Anderson

Position/Title Town Administrator

Date FEBRUARY 4, 1981 Signature Glenve E. Anderson

ENVIRONMENTAL CHECKLIST

Introduction: The State Environmental Policy Act of 1971, chapter 43 21C RCW, requires all state and local governmental agencies to consider environmental values both for their own actions and when licensing private proposals. The Act also requires that an EIS be prepared for all major actions significantly affecting the quality of the environment. The purpose of this checklist is to help the agencies involved determine whether or not a proposal is such a major action.

Please answer the following questions as completely as you can with the information presently available to you. Where explanations of your answers are required, or where you believe an explanation would be helpful to government decision makers, include your explanation in the space provided, or use additional pages if necessary. You should include references to any reports or studies of which you are aware and which are relevant to the

answers you provide. Complete answers to these questions now will help all agencies involved with your proposal to undertake the required environmental review without unnecessary delay.

The following questions apply to your total proposal, not just to the license for which you are currently applying or the proposal for which approval is sought. Your answers should include the impacts which will be caused by your proposal when it is completed, even though completion may not occur until sometime in the future. This will allow all of the agencies which will be involved to complete their environmental review now, without duplicating paperwork in the future.

NOTE: This is a standard form being used by all state and local agencies in the State of Washington for various types of proposals. Many of the questions may not apply to your proposal. If a question does not apply, just answer it "no" and continue on to the next question.

ENVIRONMENTAL CHECKLIST FORM

I. BACKGROUND

1. Name of Proponent Port of Friday Harbor
2. Address and Phone Number of Proponent
204 Front Street North
Friday Harbor, WA 98250
3. Date Checklist Submitted Dec. 5, 1980
4. Agency Requiring Checklist Town of Friday Harbor
5. Name of "proposal, if applicable:
Extension of existing floats....
6. Nature and Brief Description of the Proposal (including but not limited to its size, general design elements, and other factors that will give an accurate understanding of its scope and nature): Add approx. 2600 feet of floats and adjoining fingers for additional permanent & overnight moorage, also a new series of floating breakwaters
7. Location of Proposal (describe the physical setting of the proposal, as well as the extent of the land area affected by any environmental impacts, including any other information needed to give an accurate understanding of the environmental setting of the proposal): Additional floats will be attached to and north of existing floats... Small addition southeast of main pier....
8. Estimated Date for Completion of the Proposal: Within 1 year from date of all approvals.
9. List of all Permits, Licenses or Government Approvals Required for the Proposal (federal, state and local—including rezones):
Army Corps of Engineers, Town of Friday Harbor (Substantial Devel. Permit), and Dept. of Nat. Resources

10. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
No
11. Do you know of any plans by others which may affect the property covered by your proposal? If yes, explain:
.....
12. Attach any other application form that has been completed regarding the proposal; if none has been completed, but is expected to be filed at some future date, describe the nature of such application form:
Application to Lease Bottomlands of the State of Washington.

II. ENVIRONMENTAL IMPACTS

(Explanations of all "yes" and "maybe" answers are required)

- | | | Yes | Maybe | No |
|-----|---|-----|-------|----|
| (1) | Earth: Will the proposal result in | | | |
| | (a) Unstable earth conditions or in changes in geologic substructures? | | | X |
| | (b) Disruptions, displacements, compaction or overcovering of the soil? | | | X |

	Yes	Maybe	No
(c) Change in topography or ground surface relief features?	---	---	<u>X</u>

(d) The destruction, covering or modification of any unique geologic or physical features?	---	---	<u>X</u>
--	-----	-----	----------

(e) Any increase in wind or water erosion of soils, either on or off the site?	---	---	<u>X</u>
--	-----	-----	----------

(f) Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?	---	<u>X</u>	---
--	-----	----------	-----

Explanation: Additional piles and floats may increase situation or deposition.

(2) Air. Will the proposal result in:

(a) Air emissions or deterioration of ambient air quality?	---	<u>X</u>	---
--	-----	----------	-----

(b) The creation of objectionable odors?	---	<u>X</u>	---
--	-----	----------	-----

(c) Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?	---	---	<u>X</u>
--	-----	-----	----------

Explanation: Additional boats may create additional exhaust fumes depending on fuel supplies

(3) Water. Will the proposal result in

(a) Changes in currents, or the course or direction of water movements, in either marine or fresh waters?	---	<u>X</u>	---
---	-----	----------	-----

(b) Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	---	---	<u>X</u>
---	-----	-----	----------

(c) Alterations to the course or flow of flood waters?	---	---	<u>X</u>
--	-----	-----	----------

(d) Change in the amount of surface water	---	---	<u>X</u>
---	-----	-----	----------

	Yes	Maybe	No
in any water body?	---	---	<u>X</u>

(e) Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	---	---	<u>X</u>
--	-----	-----	----------

(f) Alteration of the direction or rate of flow of ground waters	---	---	<u>X</u>
--	-----	-----	----------

(g) Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	---	---	<u>X</u>
--	-----	-----	----------

(h) Deterioration in ground water quality, either through direct injection, or through the seepage of leachate, phosphates, detergents, waterborne virus or bacteria, or other substances into the ground waters?	---	---	<u>X</u>
---	-----	-----	----------

(i) Reduction in the amount of water otherwise available for public water supplies?	---	<u>X</u>	---
---	-----	----------	-----

Explanation: Additional piles & floats may have an effect on current through mar but would be insignificant, additional fresh water may be used
(4) Flora. Will the proposal result in:

(a) Change in the diversity of species, or numbers of any species of flora (including trees, shrubs, grass, crops, microflora and aquatic plants)?	<u>X</u>	---	---
--	----------	-----	-----

(b) Reduction of the numbers of any unique, rare or endangered species of flora?	---	---	<u>X</u>
--	-----	-----	----------

(c) Introduction of new species of flora into an area, or in a barrier to the normal replenishment of existing species?	---	<u>X</u>	---
---	-----	----------	-----

(d) Reduction in acreage of any agricultural crop?	---	---	<u>X</u>
--	-----	-----	----------

Explanation: Increased habitat for certain species in and around pilings, may attract additional species because of increased food supply.

- | | Yes | Maybe | No |
|---|-----|-------|----|
| (5) Fauna. Will the proposal result in: | | | |
| (a) Changes in the diversity of species, or numbers of any species of fauna (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects or microfauna)? | X | | |
| (b) Reduction of the numbers of any unique, rare or endangered species of fauna? | | | X |
| (c) Introduction of new species of fauna into an area, or result in a barrier to the migration or movement of fauna? | | X | |
| (d) Deterioration to existing fish or wildlife habitat? | | | X |
| Explanation: Increased habitat and food supply will normally increase numbers of certain fish--may attract addn. species. | | | |
| (6) Noise. Will the proposal increase existing noise levels? | | X | |
| Explanation: More boats increase potential noise. | | | |
| (7) Light and Glare. Will the proposal produce new light or glare? | | X | |
| Explanation: Very slight addition of light for additional docks | | | |
| (8) Land Use. Will the proposal result in the alteration of the present or planned land use of an area? | | | X |
| Explanation: | | | |
| (9) Natural Resources. Will the proposal result in: | | | |
| (a) Increase in the rate of use of any natural resources? | | X | |
| (b) Depletion of any nonrenewable natural resource? | | | X |

- | | Yes | Maybe | No |
|---|-----|-------|----|
| Explanation: Possible increase use of water. | | | |
| (10) Risk of Upset. Does the proposal involve a risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions? | | X | |
| Explanation: Typical risk common to marina without fuel dock. | | | |
| (11) Population. Will the proposal alter the location, distribution, density, or growth rate of the human population of an area? | | X | |
| Explanation: Additional moorage space may attract more residents--liveaboards may be allowed to increase. | | | |
| (12) Housing. Will the proposal affect existing housing, or create a demand for additional housing? | | X | |
| Explanation: Additional moorage may attract more residents. | | | |
| (13) Transportation/Circulation. Will the proposal result in: | | | |
| (a) Generation of additional vehicular movement? | | X | |
| (b) Effects on existing parking facilities, or demand for new parking? | | X | |
| (c) Impact upon existing transportation systems? | | X | |
| (d) Alterations to present patterns of circulation or movement of people and/or goods? | | X | |
| (e) Alterations to water borne, rail or air traffic? | X | | |
| (f) Increase in traffic hazards to motor vehicles, bicyclists or pedestrians? | | X | |

Yes Maybe No
 Explanation: Additional boat movement, increased demand for parking, slight change in boat traffic pattern within port area.

(14) Public Services: Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:

(a) Fire protection?	X	---	---
(b) Police protection?	X	---	---
(c) Schools?	---	X	---
(d) Parks or other recreational facilities?	---	X	---
(e) Maintenance of public facilities, including roads?	X	---	---
(f) Other governmental services?	---	X	---

Explanation: Maintenance of additional docks, additional boats will receive police & fire protection, possible increase of services depending upon future residents or Port policy.

(15) Energy: Will the proposal result in:

(a) Use of substantial amounts of fuel or energy?	---	X	---
(b) Demand upon existing sources of energy, or require the development of new sources of energy?	X	---	---

Explanation: Slight increase demand upon existing electric system, possible increase in petroleum products.

(16) Utilities: Will the proposal result in a need for new systems, or alterations to the following utilities:

(a) Power or natural gas?	X	---	---
(b) Communications systems?	---	X	---
(c) Water?	X	---	---
(d) Sewer or septic tanks?	X	---	---
(e) Storm water drainage?	---	---	X
(f) Solid waste and disposal?	X	---	---

Yes Maybe No
 Explanation: Port expansion of each service planned for.

(17) Human Health: Will the proposal result in the creation of any health hazard or potential health hazard (excluding mental health)?

Explanation: _____ X

(18) Aesthetics: Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?

Explanation: Individual persons opinion so people may not like a larger small boat harbor. X

(19) Recreation: Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?

Explanation: Increased opportunity for water associated recreational activities. X

(20) Archeological/Historical: Will the proposal result in an alteration of a significant archeological or historical site, structure, object or building?

Explanation: _____ X

III. SIGNATURE

I, the undersigned, state that to the best of my knowledge the above information is true and complete. It is understood that the lead agency may withdraw any declaration of nonsignificance that it might issue in reliance upon this checklist should there be any willful misrepresentation or willful lack of full disclosure on my part.

Proponent: David O. Ellingson
 Project Administrator
 Krabbe & Starr, Inc.

Fees: In order to cover the cost for administration, a check for fifty dollars (\$50.00) made payable to the Town of Dry Harbor must be submitted with the completed environmental checklist.

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661

Friday Harbor, Washington 98250

(206) 378-2688

February 9, 1981

San Juan County Planning Department
P. O. Box 947
Friday Harbor, Wash. 98250

Re: Proposed Friday Harbor Marina Expansion

Gentlemen:

I am writing this letter in response to the County's concern as noted in your letter of January 29, 1981.

There will be 585 total berths when the new facility is completed. This total includes the present 195 permanent berths and the present 100 transient berths. Of the 295 people on our waiting list, 220 are local property owners. Of the 195 permanent berths now rented, 191 either own property or live here.

The Port is now contributing \$2000.00 a year to the Town of Friday Harbor for fire protection. This contribution will probably be increased when the Port is expanded. The Port plans to provide its own full-time security when expansion is completed.

As most of solid waste comes from transients boats and very little from permanently moored boats, we believe that solid waste capacities would have to be increased very little.

The parking lot behind the port office handles 50 cars. The Port's pay parking lot has 60 parking spaces. Also, we plan to utilize the former OPALCO property for additional parking area.

In 1977, when we enlarged our marina building, it was designed to meet future expansion needs. At the present time we have 8 toilets and 6 showers, 1 pump-out station and 1 porta potty dump station. In comparison, the Port of Everett has just completed installing 1400 new berths for a total of 2500 berths. They have 25 toilets, 6 showers, 1 pumpout station and 1 porta potty dump station. As you can see the ratio of facilities at the Port of Friday Harbor will be greater than the Port of Everett which is the largest and most modern marina on Puget Sound.

We would be happy to meet with you on the site here at the Port and discuss the concerns that you have. Please give us a call.

Yours very truly,

Jack Fairweather
Jack Fairweather
Port Manager

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661

Friday Harbor, Washington 98250

(206) 378-2688

February 3, 1981

Mr. Cleave Vandersluys
Town Administrator
Town of Friday Harbor
Friday Harbor, WA 98250

RE: Addition to Port of Friday Harbor

Dear Mr. Vandersluys:

I am writing this letter in response to the Town Administrator's letter dated December 26, 1980, in regard to the Town's concerns with further development of the Port facilities. After two joint public meetings and further private discussions between the Town Council and the Port Commissioners, let me make these points in accordance with the concerns listed in said letter:

1. There will be 565 total berths when the new facility is completed. Although there will be more pollution within the breakwater than outside, we have no reason to believe it will be anymore than it is now. The new marina covers considerably more area and the currents will still be allowed to flow through the area because all the breakwaters are floating.

We have provisions for solid waste pickup by the Town, and we would expect in the future to work with the Town to enlarge or modify these facilities so they will work most efficiently for all concerned.

There is one "pump out" station at the Port now. There are also plans for at least two others within Friday Harbor Bay. Although use in the past year has been very light, if further use demanded an additional pump, the Port would not hesitate to install it.

2. We are aware of the Town outfall line. We would, of course, locate it and mark it with floats during construction so that it would not be damaged. Any damage would certainly be our responsibility. We have no plans to extend it further as it ends within the existing marina now with no evidence of pollution. The new marina area will not aggravate this dilution process as it will be considerably larger. If in the future this does pose a problem, the Port would certainly cooperate with the Town in extending the outfall if required.

Mr. Cleave Vandersluys
February 3, 1981
Page Two

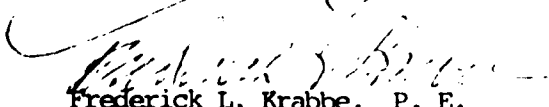
3. We are working on a waterfront development plan now which includes a walkway on the water side of Front Street from the Port dock over to the Mariner Restaurant. This walkway will be on the Port property which will allow all of the Front Street roadway to be used for automobiles. It will be a year or so before we will be able to do this however.
4. As you know, we built a 50-car parking lot last year, and we have in our plans an additional lot for about 50 more cars which we will build within the next few years when the need arises. Our existing parking lot is hardly being used at this time!

We agree with the desirability of having another vehicle access to the Port area and would suggest the one shown on your traffic study plan leading up to West Street. The Port Commissioners would expect to work with the Town in developing this new street.

5. As indicated in our earlier discussions, the County already takes care of our dock area. The Port, at this point, is planning to provide additional protection themselves when the marina has been expanded. This is certainly an area that the Port and Town should work together on.
6. The Port agrees with your concerns for fire protection and would expect to work with the Town in providing this protection. The Port already pays the Town \$2,000 a year for fire protection.
7. We will need or should have additional water taps. It was brought up at the Town meeting that considerable amounts of water could be saved if the Town would install some pressure regulators to the lines that serve the Port. I assume provisions for these additional taps can be made.
8. Extensive negotiations and testing has taken place and the ferry people are satisfied that the location of the new breakwater as proposed by the Corps of Engineers is satisfactory.
9. We would expect to get all the permits as required by law.
10. Please call us on anything additional you may have in mind.

We expect to work with the Town in all phases of this project; and if there are any questions, please call me.

Yours truly,

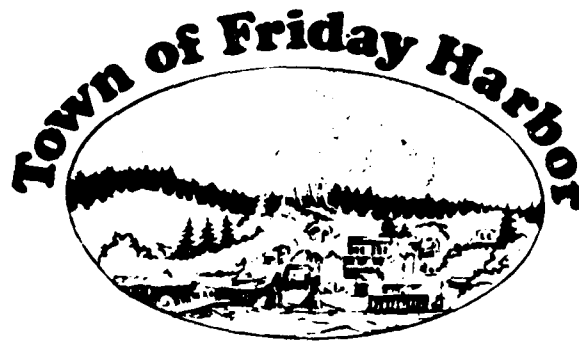

Frederick L. Krabbe, P. E.

Port Engineer

A2-52

cc: Port Commissioners
Jack Fairweather

FLK:VS



December 26, 1980

Port of Friday Harbor Commissioners
P.O. Box 661
Friday Harbor, Washington 98250

Dear Commissioners,

The Town of Friday Harbor is extremely interested in the proposed improvements to the Friday Harbor Dock Extension proposal. There are several areas of mutual concern which we feel must be settled on prior to the issuance of a Shoreline Management Permit for a Substantial Development. You are hereby invited to meet with the Town Council on January 2, 1981, for a preliminary discussion of these concerns.

1. The potential capacity of 600 boats at the Port is roughly equivalent to the number of houses currently in Friday Harbor. All boats create sewage and solid waste. We are concerned not only in keeping the harbor unpolluted, but with the impacts to the existing sewer and solid waste facilities. Are there plans for additional head pump-out facilities and relocated solid waste collection areas?
2. The existing outfall from the Town Sewer Treatment Plant lies within the proposed breakwater. This has not been indicated on your plans as proposed to being extended. This could create problems within the moorage area. This line and the diffuser should be relocated.
3. Additional traffic will be generated on Front Street. The street must be widened and sidewalks provided to separate vehicle and pedestrian traffic.
4. Front Street is a dead-end street with all of the new proposed improvements at the extreme dead-end. An alternate way of exiting/entering the facilities must be provided. Perhaps this could be accomplished along with the additional parking which will be required.
5. The potential impact on police coverage is more than the Town can absorb. Police protection should be provided by the County.

Post Office Box 219, Friday Harbor, Washington 98250

(206) 378-2810 378-2390

A2-53

6. Fire potential will be greatly increased. One good gasoline fueled fire could cause unlimited damage to the entire waterfront and Town. A contract for additional fire protection should be signed with the Town.
7. Water will undoubtedly be required on the new docks for general use and for fire purposes. The Town currently has a limitation on hookups per project.
8. The restriction in area available for general boating and the limitation of ferry maneuvering is also a concern.
9. Building and plumbing permits will be required.
10. Conditions may be attached to the Shoreline Permit to insure that favorable solutions to the above and other concerns are reached. All actions on the Shoreline Permit will be the result of Public Hearings and Council decisions.

Answers to the above questions will become a part of the S.E.P.A. checklist.

Sincerely,

Cleave C. Vandersluys
Cleave C. Vandersluys,
Town Administrator

cc: Dept. of the Army
Mayor Morgan
Councilmembers
Krabbe & Starr, Inc.

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661

Friday Harbor, Washington 98250

(206) 378-2688

January 27, 1977

Seattle District
Corps of Engineers
P.O. Box C3755
Seattle, Washington 98124

Attention: District Engineer

Re: Port of Friday Harbor Breakwater

Dear Sir:

We are writing this letter to ask if there is any possibility of the U.S. Corps of Engineers helping the Port of Friday Harbor in designing, financing and constructing a new breakwater to protect the existing port facilities.

As you may be aware, the existing floating breakwater was built in 1972 and has proven to be less than satisfactory. The wave attenuation has been only marginal, allowing the attenuated waves to be a foot or more in height when the basic wave is only about three feet high. In addition, we have had continual problems with the structural integrity of the breakwater.

Although recently we have made an "out of court" settlement with the design engineers for repairing the breakwater, we believe it is still a very doubtful structure and will be subject to extensive damage if exposed to a strong northeast wind, no matter what repairs are made. In the past three years we have been very lucky in that there has been no bad northeaster.

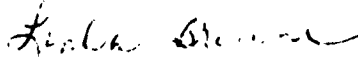
Our situation now is that we have the alternative to spend all our money, including money we must borrow through bond sales, to make extensive repairs to the existing breakwater structure which we feel will be only marginal at best, or to use this money as our share for a project the Corps might undertake; that is to build a substantial breakwater in front of our existing structure. This would make it possible to turn the existing breakwater into a dock for boat moorage and therefore make it unnecessary to do the extensive structural repairs that would be needed if it remained a breakwater.

EXHIBIT 1
PAGE 1 OF 2

We hereby request the Corps cooperation in considering a new substantial breakwater to protect the existing Port of Friday Harbor Marina. One that could provide the much needed protection the port does not have now and prevent what could be the loss of millions of dollars worth of property.

The Port Commissioners and the harbor master stand ready to cooperate with the Corps to the fullest extent in this matter, and suggest that possibly a meeting would be in order. This could be arranged for at your earliest convenience.

Respectfully,



Linda Browne
Chairperson

LB:br

EXHIBIT 1
PAGE 2 OF 2

Colonel Leon H. Moraski
Seattle Dist. Engineer
Corps of Engineers
P.O. Box C 3755
Seattle, Wash. 98124

Clark H. Sherwood
Rt. 1 Box 1444
Lacey, Wash. 98261

1- 6938 Friday Harbor, Port of

Dear Sir:

Regarding the proposed Friday Harbor Marina Expansion Project, I am strongly in favor of your approving their application.

I have no personal interest in the Marina, but am growing more disgusted with the ANTI-EVERYTHING group headed by Fred Ellis of Shaw Island (a former happy rancher-land speculator) who believe they have the right to scuttle every construction project in the San Juans in their fanatical quest to halt population growth in the Islands.

P.S. Many others feel as I do, but don't spend their time writing 2-3 letters to the Editor every week as Mr. Ellis does!

Respectfully Yours,

Clark H. Sherwood

ANS'D

A2-57

5 MAR 1981

C. J. Busch
PO Box 603
Friday Harbor
Washington

March 3, 1981

Colonel Leon K. Moraski
Seattle District Engineer
Corps of Engineers
PO Box C 3755
Seattle Washington

Ref: Proposed Marina Expansion at
Friday Harbor, Washington.

Dear Sir:

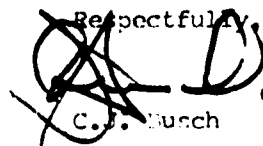
The time is now here to provide President Reagan with all the necessary backing in eliminating unnecessary dollar expenditures. On² which concerns me is the expansion of the Marina at Friday Harbor, Washington.

This project will only benefit a very few of the general public,-- particularly the boaters and a few of the Merchants of Friday Harbor.

Already the ferries are faced with both passenger and car overloads. The additional boaters who will be keeping their boats at the marina, will contribute to the overloading problem. The marina will contribute both to water and visual pollution.

Federal dollars are to help the general public, not just a select few. Curtailment of this project will also help in slowing inflation.

Your consideration would be appreciated.

Respectfully,

C. J. Busch

enclosure:

SM

Shaw Island
Washington 98286
February 19, 1981

Colonel Leon K. Moraski, Seattle District Engineer
Corps of Engineers
P. O. Box C3755
Seattle, Washington

171-04B-1-006938

Dear Colonel Moraski:

I was unable to attend the public hearing held January 29th in Friday Harbor with regard to the proposed marina extension. I am vigorously opposed to the extension on a number of grounds:

1. The present marina is as large a unit as should properly be sited in such a small area. A larger marina will become an unconscionable eyesore and turn that part of Friday Harbor into a boating slum. The environmental beauty of the area will be put in jeopardy.
2. Home owners surrounding the marina are subjected to the ugly sight of a forest of masts at their doorsteps.
3. The harbor itself is not large and such an extension intrudes heavily upon available room for anchoring. Many yachtsmen abhor marinas which by their nature are crowded and noisy - compounded by the omnipresence of alcohol.
4. In spite of posted rules, marinas inevitably are sources of sewage and pollution. Not only are toilets pumped out but bilge and engine oil are discharged; every boat can't be policed twenty-four hours a day!
5. A larger marina encourages the profligate use of an ever-decreasing supply of precious fuel oil. This oil might far better be used by industry and our national defense.
6. The proposed extension is fundamentally a no-win situation. One can envisage its backers coming back to the federal government - hat in hand - for another infusion of cash to add a further extension! Limits have got to be set; it is far easier to do so now than ten years hence.
7. Given President Reagan's call for fiscal economy in government and the rampant inflation which is destroying our currency, it should not fall upon the taxpayers and through them the Corps of Engineers to subsidize what is essentially a toy for a relatively small number of boat owners and the local merchants who profit from them.

-2-

It is my earnest hope that this proposed extension
aill be abandoned.

Very respectfully,


Frederick E. Ellis

FEE/s

A2-60



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

NPSN-PL-NC

2 MAR 1991

Mr. Frederick E. Ellis
Shaw Island, Washington 98286

Dear Mr. Ellis:

Thank you for your concern and comments regarding the proposed expansion of the Friday Harbor Marina. Many of your concerns have been addressed in the Draft Environmental Assessment for the project. I will take your comments under advisement when I make my recommendation to higher authority.

Sincerely,

/S/

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer



Washington Tug & Barge Co.

P.O. BOX 3505

SEATTLE, WASHINGTON 98124

206/935-5060

January 16, 1981

Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA. 98124

Reference: 071-OYB-1-006938
Friday Harbor, Port of

Gentlemen:

For many years we have serviced Union Oil Co. with our petroleum barges in making bulk petroleum deliveries to the Union Oil dock in Friday Harbor. These shipments range from two per month during the winter up to five per month during the busy summer season and are a vital part of the local San Juan community economy.

During the last few years developments and heavier marine traffic adjacent to the Union Oil dock have made these barge deliveries increasingly difficult and, at times, we now have to stand off the dock awaiting periods of marine congestion (State ferries, fishing vessels, traffic at the adjacent Chevron dock, and pleasure boats) to clear so that we do not create a hazardous situation with our petroleum barges.

We see now that the Port of Friday Harbor plans to encroach even further on the Union dock with a large marina addition. These plans will so constrict our maneuvering room that, even though there appears to be adequate room for everyone once our barge is secured to the dock, we will not be able to get to the dock.

We enclose a copy of the marina addition plans. This plan shows approximately 137 feet between the Union dock and the proposed marina breakwater. Our combined tug and barge width is 70 feet with the barge currently used for this delivery. Depending on wind and current conditions, vessels moored at the Chevron dock, and local traffic, our tug and barge require maneuvering room of approximately 100-150 feet around the Union dock in addition to the tug/barge width. It is obvious these marina addition plans will jeopardize our future deliveries to Union Oil at Friday Harbor.

PUGET SOUND — ALASKA TOWING



RAIL CARS — OIL BARGES

A2-62

112 C

Department of the Army
Seattle District, Corps of Engineers
January 16, 1981
Page 2

The barge now used for these shipments is the smallest on Puget Sound. Any relief or replacement barges will be considerably larger and will not be able to deliver Union Oil at Friday Harbor if the marina addition is constructed as planned. The enclosed copy of this plan shows in red the area we feel must be left unencumbered for the safe docking of our equipment at the Union Oil dock in Friday Harbor.

We would be pleased to discuss this issue further if you have any questions.

Very truly yours,

WASHINGTON TUG & BARGE CO.



Lee D. Freeman
Manager,
Petroleum Barging Operations

LDF:js
Enc.

PORT OF FRIDAY HARBOR

San Juan Island

P.O. Box 661

Friday Harbor, Washington 98250

(206) 378-2688

January 23, 1981

Lee D. Freeman, Manager
Petroleum Barging Operations
Washington Tug & Barge Co.
P. O. Box 3505
Seattle, Wash. 98124

Reference: 071-CYB-1-006938
Friday Harbor, Port of

Dear Sir:

As the Port Manager for more than nine years I have observed numerous landings by your fuel barges at the existing Union 76 Dock. The proposed new breakwater and marina facilities was designed with concern for these fuel barge landings. They have always approached from the south and have never needed the room you are requesting in your letter of January 16, 1981.

The local Union Oil Manager Robert Boyce has also indicated that our proposed marina and breakwater as designed will provide more than enough room for fuel barge docking. He has participated in nearly all landings and departures of the fuel barges at the Union Oil Dock for the past twenty-five years.

We are concerned about your comment letter and we would be happy to meet with you on the site here in Friday Harbor to discuss the matter. Please give me a call if you would like to arrange this meeting.

Very truly yours,

Jack Fairweather
Jack Fairweather
Port Manager

cc Army Engineers
Krabbe & Starr
Bob Boyce

P.O. Box 1415
Friday Harbor
Washington 98250

February 26, 1981

Colonel Leon K. Moraski
Seattle District Engineer
Corps of Engineers
P.O. Box C3755
Seattle, WA 98124

*Friday Har. 048-1-006938
Port of*

Dear Colonel Moraski:

My objection to the proposed expansion of the Marina in Friday Harbor is twofold. First, as a biologist, I believe that increased boat traffic resulting from this expansion would have serious detrimental effects on the marine life of the harbor. Increased moving would lead to increased dumpage of human waste, (Yes, I do know about the law; it is flaunted) and to increased amounts of fuel and oil spill and leakage. We do not want that.

Secondly, doubling the capacity of the Friday Harbor Marina would lead to increased population growth as services are required by the larger number of boat people and traffic problems are already severe in the area of the Marina due to the proximity of the ferry terminal and the lack of adequate through streets. The marina expansion would have a major impact on the ecology of the harbor and the town.

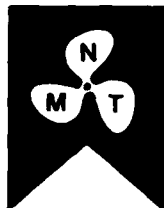
The project would benefit relatively few people while all taxpayers would bear the expense.

Many of us do not want it!

Sincerely,

Lee Campbell
Lee Campbell, PhD

NORTHWEST MARINE TRADE ASSOCIATION



Mariner's Square
Suite 233, 1900 N. Northlake Way, Seattle, Washington 98103 • (206) 634-0911

February 3, 1981

Mr. Alan Coburn
NPSEN-PL-NC
Department of the Army
Seattle District
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Coburn:

On behalf of over 600 marine business firms in the State of Washington, we are writing to express our strong support for the proposed expansion of the marina at Friday Harbor, Washington.

Recent published reports by the Army Corps of Engineers and the University of Washington Seagrass Program have strongly shown the need for continued expansion and development of new moorage facilities and access points (boat ramps) throughout Puget Sound to meet the growing need of the public and recreational boaters. Additionally, the recently completed census study has shown that the growth rate factor for most of the Puget Sound area has exceeded projections. The obvious implication of this rapidly expanding population base is that the need for marine recreational facilities will be even greater in the next two decades.

The marine industry is vitally concerned with supporting all projects that will allow the boaters and public access to the recreational benefit afforded by the Puget Sound and adjacent waters. The Friday Harbor expansion is desperately needed now and Northwest Marine Trade Association urges all efforts be made to allow this project to be completed on a timely and swift basis.

Cordially yours,

Louis V. Larsen
Executive Vice President

A2-66

"The Voice of the Boating Industry in the Pacific Northwest"

San Juan Island Chamber of Commerce

—DO—
Friday Harbor, Washington

January 16, 1981

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

1-6938

Friday Harbor, Wash.

Gentlemen,

We are in receipt of information sent regarding Friday Harbor Marine Expansion and we would like to go on record as enthusiastically supporting this projected expansion.

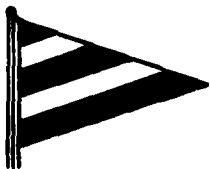
Sincerely,

Board of Directors
San Juan Island Chamber of Commerce

01 12 13 10:50

A2-67

1/2 C



San Juan Island Yacht Club

P. O. Box 67

Friday Harbor, Washington 98250

8 January 1981

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

Ref Project 071-OVB-1-006938 Port of Friday Harbor

Dear Sirs:

The San Juan Island Yacht Club supports and requests that the referenced Port of Friday Harbor expansion application be approved.

Additional moorage berths are sorely needed in this area as evidenced by the active and confirmed list of applicants now on record. The proposed design will provide a much safer floatplane mooring and increased protection from strong Northeasterly winds in the winter. The area has been historically commercial in nature and therefore no adverse impact of this nature is foreseen.

Sincerely yours

Fred R. Hoepfner

Fred R. Hoepfner
Commodore

cc Port Of Friday Harbor
Friday Harbor, Wa 98250

11 46:45

A2-68

FLK 1-14-81 35

1122



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

NPSEN-PL-NC

24 FEB 1981

Mr. Pat Brown
San Juan Marina, Incorporated
P. O. Box 340
Friday Harbor, Washington 98250

Dear Mr. Brown:

This is in regard to your concern expressed at the 29 January 1981 Port of Friday Harbor Commission Public Meeting regarding possible adverse impacts from the proposed Friday Harbor Marina Breakwater on your San Juan Marina. You indicated that the wave environment could be altered resulting in more severe waves at the San Juan Marina. Mr. Alan Coburn, Study Manager, discussed this concern with you on 13 February 1981.

My staff has reviewed the wave conditions associated with the project. As discussed by telephone on 13 February 1981 the responses to each of your concerns follows:

1. Concern:

The proposed layout of the floating breakwater would adversely affect sea conditions within the San Juan Marina during northeasterly storms, which occur frequently and, occasionally with severity, during the fall, winter and spring seasons.

Response:

The San Juan Marina will receive additional protection from "northeasters" with the proposed breakwater. Instead of direct exposure to northeast waves that occur now, these same waves will be reduced by up to 50 percent.

2. Concern:

Should the southern-most leg of the breakwater be built as proposed, northeasterly winds and swells would be funnelled directly through San Juan Marina dock and floats. With the ferry in dock, this would cause a venturi effect. The hazard and potential damage done to San Juan Marina property and to boats which are moored here would increase greatly.

24 FEB 1981

Response:

Waves will travel along the breakwater; however, this swell movement would occur unabated without the proposed breakwater. (See above comment). The possibility of a venturi effect created when the ferry is in dock is not likely. Our analysis indicates two conditions are necessary to create a "venturi situation":

- a. A 700' plus ferry in dock, and
- b. A strong wind through a very narrow window to the northeast.

The likelihood of both conditions occurring at the same time and consequently aggravating the present situation is very remote since the largest Washington State ferries are approximately 440' long. The hazard and potential of boat and property damage in San Juan Marina is reduced by the presence of the proposed breakwater.

Concern:

The southerly leg of the breakwater should be extended in a straight line. The cost would not change and the hazard to the San Juan Marina and to boats moored there would not be increased. At the same time, the desired protection of the Friday Harbor Marina would be the same as that afforded by the proposed breakwater and access to the Friday Harbor Marina and to the Union Oil dock would be increased.

Response:

The hazard to San Juan Marina and moored boats will not increase with the construction of the proposed Friday Harbor Marina Breakwater. As noted in Response #1 additional protection will be provided from the proposed breakwater.

Realignment of the south leg along N 06° 13' E bearing as suggested would provide the desired wave protection in the Friday Harbor Marina; however, this alinement is unacceptable due to navigational hazards.

Access to the Friday Harbor Marina would also be decreased rather than increased since vessels and fuel barges entering or exiting the marina would have to pass right in front of the ferry dock. The existing proposed alinement of the southern leg (N 45° 30' E) allows both vessels entering and exiting the marina and fuel barges departing the dock to turn immediately northeast and not conflict with ferries in final docking maneuvers.

Your concerns are appreciated. My staff did evaluate several new alinements of the south leg to see if better protection for the San Juan Marina is possible without reducing protection for the Friday Harbor Marina or creating problems for others. It is our view that:

NPSN-PL-NC
Mr. Pat Brown

24 FEB 1961

a. San Juan Marina will receive more wave protection with the proposed breakwater than the marina now enjoys, and more than any navigationally acceptable south leg alignment alternative.

b. Any changes in the San Juan Marina wave climate induced by the construction of the breakwater as proposed in the Detailed Project Report would be minor and present less risk from northeasterly storms to boats in the San Juan Marina than now experienced without the breakwater as proposed.

c. Realignment of the south leg would create increased risk of conflicts between and among oil barges, commercial craft, the increased numbers of recreational craft transiting to or from the Union and Chevron fueling dock, and San Juan Marina and store, and ferries in final docking maneuvers.

Thank you for your interest and cooperation and we trust this information resolves your concerns about the project. If you have any further questions, comments, or suggestions, please contact Alan Coburn, Study Manager, by telephone 764-3651 or by mail at U.S. Corps of Engineers, P. O. Box C-3755, Seattle, Washington 98124, Attention: Alan Coburn NPSN-PL-NC

Sincerely,

/S/

DWAIN F. HOGAN, P.E.
Chief, Planning Branch

Copy furnished:
Port of Friday Harbor

APPENDIX A, PART 3

U.S. FISH AND WILDLIFE SERVICE COORDINATION REPORT



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Area Office
2629 Parkmont Lane
Olympia, Washington 98502

February 25, 1981

Colonel Leon K. Moraski
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Moraski:

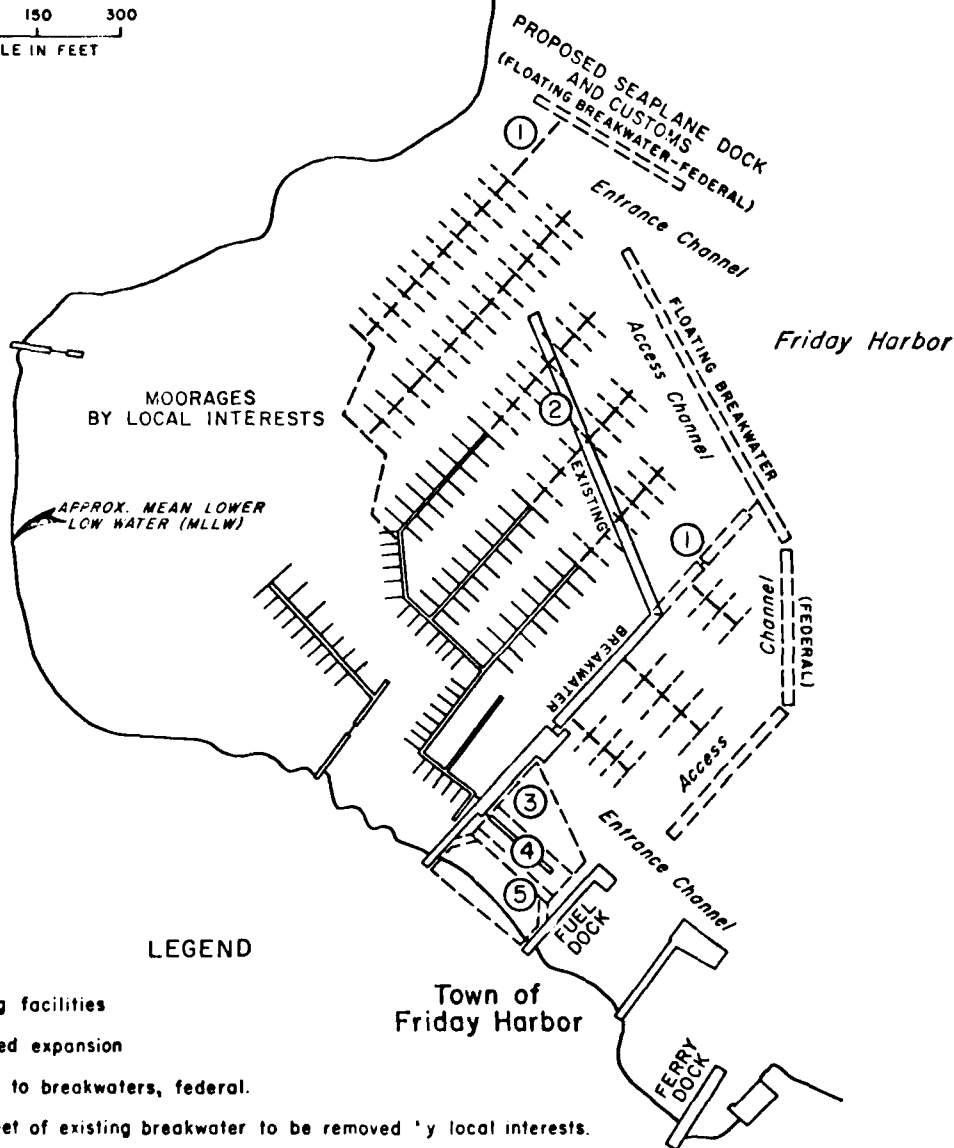
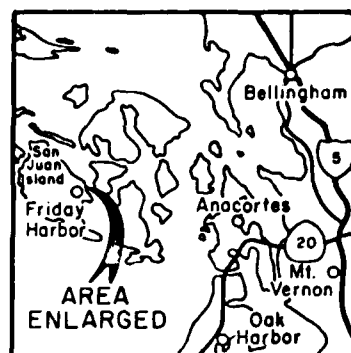
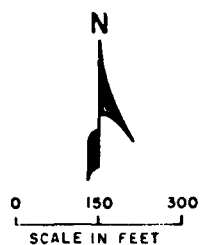
This is our final Fish and Wildlife Coordination Act report on the effects the proposed Friday Harbor Marina Expansion Project, San Juan Island, San Juan County, Washington, would have on fish and wildlife resources. It has been prepared under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report is being prepared for inclusion in your Detailed Project Report as authorized under Section 107 of the River and Harbor Act of 1960. Our analysis is based on project plans furnished this office through September 1980.

This report does not constitute review comments of the Department of the Interior on the draft environmental statement, as required under provisions of the National Environmental Policy Act (P.L. 91-190). It should be noted that non-Federal portions of the proposed project may be subject to permits for which this Department has review responsibilities. Accordingly, our comments do not preclude an additional and separate evaluation by the Fish and Wildlife Service if eventual project development requires a permit from the U.S. Coast Guard and/or the Corps of Engineers, U.S. Army (Sections 9 and 10 of the River and Harbor Act of 1899 and Section 404 of P.L. 92-500). All such permits are subject to separate review by the Service under existing statutes, executive order, memorandum of agreement, and other authorities. In review of permit applications, the Fish and Wildlife Service may concur, with or without stipulations, or object to the proposed work, depending on specific construction practices which may impact fish and wildlife resources.

INTRODUCTION

Friday Harbor is located on San Juan Island, in the San Juan Archipelago, northwestern Washington State (figure 1). The area is relatively isolated, with tourism as the major industry. Air and water quality are both excellent. Tidal currents provide extensive flushing of the harbor area.

Biologists from the Fish and Wildlife Service and Environmental Protection Agency conducted an underwater survey of the project area. The purpose of this survey was to identify general habitat types that may be impacted. This



LEGEND



Existing facilities

Proposed expansion

①

Access to breakwaters, federal.

②

600 feet of existing breakwater to be removed by local interests.

③

Proposed turning basin, federal dredging to -12 feet MLLW.

COMMERCIAL MOORAGE AREA

④

Existing seaplane dock to be removed by local interests.
Non-federal dredging to -12 feet MLLW.

⑤

Proposed net loading pier and fill area, locally constructed.

A3-2

Figure I. Friday Harbor Marina.

type of survey is not intended to provide detailed quantifiable data; rather, it is to assist biologists in gaining an overview of animal and plant communities and general habitat conditions associated with a specific site.

Marine habitat types identified during the underwater survey include: (1) Intertidal sand/gravel; (2) subtidal sand/gravel; (3) subtidal sand/silt; (4) rocky intertidal and subtidal; (5) open water; and (6) floating structures. The predominant subtidal habitat type below -25 feet mean lower low water (MLLW) was sand/silt. Maximum depth in the project area was approximately -50 feet MLLW. Sediments outside the present marina are relatively clean, whereas the area within the present marina was littered with debris from human activities, and a reduction in numbers and diversity of epibenthic organisms was noted but not quantified. The total amount of debris was less than we have observed in other marina areas in Puget Sound.

PROJECT DESCRIPTION

Friday Harbor Marina is presently protected by a floating breakwater 904 feet long and 25 feet wide. This structure is constructed of a timber deck supported by water-ballasted plastic floats. Breakwater failure, poor wave attenuation, and high maintenance costs contribute to the need to replace this structure. Existing moorage is available for 190 permanent and 97 transient boats.

The Port of Friday Harbor proposes a new concrete floating breakwater (figure 1) totaling 1,600 feet and made up of 100-foot-long modules. The new breakwater would be anchored from 85 to 160 feet seaward of the existing breakwater with cables attached to sunken piles. Parts of the old breakwater would be used as a floating dock. Expansion would allow an additional 294 permanent and 44 transient moorages. Total moorage capability would be 625, which is about double the existing facility.

As currently proposed, there would be no dredging or filling of subtidal or intertidal areas. The original design (figure 1) had included a commercial wharf and a proposal to dredge approximately 8,000 cubic yards of material, part of which would have been used as a fill for a commercial wharf. Your agency, after meeting with several resource agencies, decided that the Port of Friday Harbor had not adequately justified the proposed wharf and fill, subsequently this aspect of the design was removed from the project.

Alternatives that were considered in detail include: (1) No action; (2) rehabilitate existing breakwater; and (3) install a new breakwater and expand the marina.

The "With Project" sections of this report are based upon alternative 3; alternative 1 is covered under "Without the Project". Construction impacts, as discussed under alternative 3, would include impacts associated with alternative 2.

FISH

Without the Project

Waters of the San Juan Archipelago support some of the most diverse forms of marine life that can be found in the State of Washington. During a 2-year

study of nearshore fish resources in northern Puget Sound, which included the San Juan Islands, 84 species of fish were identified (Miller et al., 1977). Several sampling stations were relatively close to the Friday Harbor area. These were South Beach, Eagle Cove, Deadman Bay, and Westcott Bay on San Juan Island and Pt. George on Shaw Island. In addition, the Fish and Wildlife Service conducted herring spawning ground surveys, which included Friday Harbor, from 1975 through 1977 (Meyer and Adair, 1978). The northern Puget Sound nearshore fish survey found no significant dissimilarity in fish composition or distribution except by habitat type. Thus, fish common to specific habitat types, such as sand or gravel habitat, would also be expected to occur within similar habitat in the Friday Harbor area.

As previously stated, there are six major habitat types that are found in Friday Harbor. These include: (1) Intertidal sand/gravel; (2) subtidal sand/gravel; (3) subtidal sand/silt; (4) rocky tidal and subtidal; (5) open water; and (6) floating structures.

Pacific salmon juveniles, including chinook, coho, pink, and chum, have been found to be present in the general area from early spring through late summer. During the nearshore fish survey, from 1975 through 1976, while sampling for neritic fishes in the San Juan area, Miller et al. (1977) found that chum salmon juveniles ranked ninth in total occurrence, and coho juveniles ranked tenth for total biomass. During the same period, while sampling for demersal fish, Miller et al. (1977) found that chum salmon juveniles ranked eighth for total abundance and chinook salmon adults ranked tenth for total biomass (Miller et al., 1977).

The presence of high numbers of juvenile salmon, particularly chum and pink, can be attributed to their almost immediate migration to marine habitats after emerging from the spawning gravel as fry. During this early life stage, feeding is primarily on epibenthic organisms found in sand, gravel, and cobble substrates (Miller et al., 1977; Gerke and Kaczynski, 1972; U.S. Fish and Wildlife Service, unpublished). Shallow, nearshore areas are preferred over deeper, open-water habitat.

The northern Puget Sound nearshore fish survey showed fish standing crop (grams/m²) of nearshore demersal fish highest in gravel habitat (88.2g/m²), as well as the highest fish density (18.9 fish/m²). Sand/eelgrass habitat supported the second highest standing crop (44.5g/m²).

Analysis of 1,305 stomach samples from 57 species of marine fish, over the 2-year duration of the survey, showed epibenthic organisms were the dominant food of almost every species examined, particularly juvenile salmon. The study further noted that prey composition did vary between fish assemblages in nearshore habitats, with polychaetes, bivalves (siphons), tanaids, and cumaceans being more common to mud/eelgrass and sand/eelgrass habitats; and oniscoidean isopods, brachyuran crabs, and shrimp dominant in diets of fishes common to cobble and gravel habitats. The principal habitat types below mean lower low water within Friday Harbor can be classified as sand/silt with some sand/gravel with epibenthic assemblages similar to those found in the sand/eelgrass, gravel, and mud/eelgrass habitats identified in the nearshore survey.

The source for most juvenile salmon in this area is the Fraser River in Canada (Washington Department of Fisheries, unpublished data). Adult salmon found in the San Juan Island area are also primarily from the Fraser River System; however, results of tagging studies show stock contributions from drainages to Puget Sound and the Columbia River. Chum fry are being released in Friday Harbor by a local sports club (Washington Department of Fisheries, personal communication, 1980).

Washington Department of Fisheries 1978 sport catch report for the San Juan Islands shows 175,917 total angler trips, with a catch of 18,139 chinook; 18,154 coho; and 19 sockeye. It is not possible to isolate how many angler trips originated from Friday Harbor with these data.

In addition to Pacific salmon, English sole, Pacific herring, surf smelt, starry flounder, Pacific tomcod, shiner perch, northern anchovy, kelp greenling, copper rockfish, as well as several species of sculpin, utilize various marine habitats within Friday Harbor. The 1978 recreational harvest of bottomfish for the San Juan Island area was 85,797 fish (Washington Department of Fisheries).

Results from herring surveys conducted by the Fish and Wildlife Service from 1975 through 1977 (Meyer and Adair, 1978) showed no evidence of spawning in Friday Harbor, although herring larvae do drift into Friday Harbor from spawning that occurs in other areas.

Commercial gill netting occurs south of San Juan Island in the Strait of Juan de Fuca. Purse seining does take place in waters west of San Juan Island. The closest commercial fishing area to Friday Harbor would be Pt. George on Shaw Island where, according to unpublished data from Washington Department of Fisheries, a commercial reef net fishery has occurred in past years.

With the Project

The project, as presently proposed, would not require filling or dredging of subtidal or intertidal areas. An existing breakwater would be removed and replaced by a larger structure. Additional moorage would be provided. Therefore, impacts on fishery resources can generally be classified into three categories: (1) Construction of the breakwater; (2) long-term effect of a breakwater and float; and (3) increased utilization by the public.

Construction activities generally represent a short-term impact. Increased turbidity, temporary reduction in water quality, and potential for pollution from petroleum products are highest during construction periods. Juvenile salmon utilize the area between March and July with some evidence (Miller et al., 1977) that they do extend their usage into September. Schedule of construction during the fall would have the least impact on juvenile salmon.

Placement of a breakwater and floats has both a long-term positive effect for many marine organisms, as well as a potential detrimental impact on others. Based on present engineering details of the breakwater and floats, it is estimated that total surface area that would be available for colonization by marine organisms would at least double from existing conditions. These structures act as artificial reefs providing a unique habitat which is

protected from tidal fluctuations, thus preventing exposure to air and subsequent dehydration, which is common in intertidal areas. Currents are slower and water exchange is usually high. Algae, which rapidly establishes, provides cover for many forms of juvenile and adult marine organisms. Shiner perch particularly benefit from this type of habitat change.

There is evidence that breakwaters and floats also have a negative impact because of a reduction in light penetration through the water column. It has been shown (Price, 1975; Shimek and Sebens, 1974) that shading from docks and floats reduces abundance of algae growth on the bottom substrate. Red algae was particularly susceptible to reduction. It was further noted that increased algae growth on floating structures could sometimes offset this loss. However, a potential negative impact on fish could result even though the floats and breakwater increase habitat for other organisms.

As previously stated, the evidence that epibenthic organisms are the primary food of juvenile salmon and most other fish species has been well documented, both in Puget Sound and the San Juan Island area. Shading can reduce algae growth on the bottom. It can also affect the density of epibenthic organisms (Price, 1975). A reduction in the population of these organisms would have a corresponding reduction in available food supply for fish. Present data do not provide sufficient information to estimate how much of a reduction in population levels or diversity of epibenthic organisms will occur. The proposed marina expansion project will impact subtidal epibenthic communities which are utilized primarily by bottomfish, such as sole and flounder. Juvenile salmon feed in shallow, nearshore areas and their food supply should not be affected by the proposed project.

Increased utilization by the public will occur. The Interagency Committee for Outdoor Recreation (1980) has developed projections for increased recreational demand based upon population growth and travel distance. Their estimates show San Juan County increasing by at least 10,000 angler-activity occasions by the year 2000. With a corresponding increase in boating activity, there will be an increase in debris and petroleum products entering the water. Although the present Friday Harbor Marina is relatively clean when compared to other marinas in Puget Sound, increased litter will result in a further decrease in habitat for some epibenthic organisms, and a change in community structure will result. Bivalves will decrease, polychaetes will increase, and there will be similar changes in dominance by other organisms. We estimate, based upon the engineering details provided by your office, that approximately 6.5 acres would be affected by a combination of increased shading and littering with marina expansion. While it is known that the epibenthic community will change in character, it is not believed that this will be a significant impact to juvenile salmon. However, based upon stomach samples (Miller et al., 1977), it is evident that bottomfish prefer organisms that would not be as numerous under the proposed marina area. It would be impossible, given the present knowledge and data, to quantify any effect of this potential impact to the population level of any fish species.

WILDLIFE

Without the Project

Terrestrial habitat within the immediate vicinity of the proposed marina expansion can be classified as generally a mixture of urban/residential,

forest/shrub, and grassland/agricultural. Vegetation is dominated by trees such as willow, red alder, madrona, and some Douglas fir, western hemlock, Pacific yew, and western red cedar. Shrubs include various species of rose, honeysuckle, and berry.

Terrestrial mammal diversity is relatively low; only 17 species are known to occur on San Juan Island.

Avifauna are diverse, with over 200 species of birds identified as utilizing the island at various times of the year (Bakus, 1965). Sparrows, wrens, woodpeckers, thrushes, crows, ravens, and warblers are common. Raptors, such as the saw-whet owl, barn owl, red-tailed hawk, and Swainson's hawk, can also be found.

Principal wildlife populations that occur in the area influenced by the project are water-dependent birds. The Fish and Wildlife Service (1975 through 1979) and National Oceanic and Atmospheric Administration (NOAA) (Manuwal, et al., 1979) have both conducted extensive surveys of marine bird populations in the San Juan Island area, and specifically Friday Harbor. Observations during all seasons of the year show highly diverse utilization of the harbor area.

Those species that have been observed in the Friday Harbor area include: Common loon, arctic loon, red-throated loon, red-necked grebe, horned grebe, eared grebe, western grebe, double-crested cormorant, Brandt's cormorant, pelagic cormorant, great blue heron, swan, Canada goose, black brant, pintail, American wigeon, canvasback, greater scaup, common goldeneye, bufflehead, oldsquaw, harlequin duck, white-winged scoter, surf scoter, common merganser, red-breasted merganser, hooded merganser, bald eagle, black oystercatcher, killdeer, black turnstone, greater yellowlegs, parasitic jaeger, glaucous-winged gull, Thayer's gull, California gull, mew gull, Bonaparte's gull, Heerman's gull, common tern, common murre, pigeon guillemot, marbled murrelet, and rhinoceros auklet.

There is a definite seasonal distribution of most species. Marine birds, such as cormorants, are found all year; grebes and gulls are found primarily from fall through winter; and ducks and geese are migrants which show peak utilization during winter and spring migration.

In addition to water-dependent birds, several marine mammals are known to utilize or migrate near the Friday Harbor area. Aerial surveys by NOAA (Everitt, et al., 1979) have documented Dall porpoise, minke whale, and killer whale as migrants, and harbor seals as inhabitants of the area.

Hunting is not allowed within the project area. Nonconsumptive utilization (nature study) does occur. Although specific data are not available for Friday Harbor, the Interagency Committee for Outdoor Recreation reports 454,100 activity occasions associated with nature study presently occurring in San Juan County.

With the Project

As currently designed, little impact on terrestrial wildlife populations will occur since virtually no terrestrial habitat will be lost.

Avifauna, particularly waterfowl and water-dependent birds, may be impacted as a result of the proposed marina expansion. Construction activity represents a short-term impact that will cause disturbance of these birds. The magnitude of disturbance will depend on scheduling of construction. Winter (late November through March) is the highest usage period in Friday Harbor for migratory birds. In addition to short-term effects of construction, physical expansion of the marina will encompass approximately 6.5 surface acres of water that normally would have been available for water bird usage. Epibenthic communities which are providing food for many of these birds, such as scaup and scoters, will be reduced. Many other species are also known bottom feeders and they will no longer actively utilize the marina area either because of potential disturbance or because of a change in preferred food supply. Fish-eating birds, such as mergansers, will not be as affected by the project since some fish populations will increase around the breakwater and floats. Most species that utilize the area are fairly opportunistic feeders and will shift to other areas if food supply is available.

Because most water-dependent birds utilizing the harbor are seasonal, arriving in the area from fall through winter and leaving for breeding in early to late spring, peak populations will generally occur when human recreational activity is minimal; therefore, the amount of direct perturbation by humans should not be significant.

Marine mammals are the responsibility of the National Marine Fisheries Service. In a letter to your agency, they indicated no impacts on these species would occur as a result of the proposed project.

Threatened and Endangered Species

The bald eagle, listed as threatened in Washington State, occurs in the vicinity of the project area. The peregrine falcon, an endangered species, potentially occurs in the San Juan Island area.

These species were addressed in your December 1980 draft environmental assessment (EA). The FWS responded to the EA in a letter dated January 13, 1981, and recommended procedures to be included in future assessments. We concluded that although the EA did not adequately address the bald eagle, the project would not adversely affect this species and that formal Section 7 consultation was not necessary.

DISCUSSION

Friday Harbor provides important habitat for juvenile Pacific salmon from the Fraser River System. Chum and pink salmon are known to utilize the area during their early life stages before continuing their migration to sea. Migratory waterfowl, seabirds, and shorebirds utilize the area both for wintering and as a staging area during fall and spring migrations.

The proposed project will have both short- and long-term impacts on fish and wildlife resources. Construction of a new breakwater and floats would create an increased potential of petroleum products entering the water, and could disrupt normal feeding behavior of juvenile salmon, as well as water-dependent birds. This can be easily mitigated by scheduling construction to avoid peak populations of juvenile salmon.

Long-term impacts will result from increased shading from floating structures, along with increased litter from human activity. Approximately 6.5 acres of benthic substrate and water surface area will be affected. The present benthic community structure, which provides food organisms preferred by many species of fish, will change in composition. It is not known if food is limiting in the Friday Harbor subtidal area. Impacts can only be quantified as a reduction in total food supply and not extended to a population level.

Physical presence of the marina will remove approximately 6.5 water-surface acres from utilization by migratory waterfowl and other water-dependent birds. As with fish, preferred food for many species will be reduced as benthic communities change in composition. Increased boat traffic and human activity will result in increased disturbance and may cause some species to reduce their utilization of the area.

The bald eagle, a Federally listed threatened species in the State of Washington, is known to utilize the general area, and peregrine falcon may be a potential inhabitant. Impacts to these species and any others that may occur in the area have been addressed in a biological assessment by your agency.

An opportunity exists to provide recreational fishing for the public. The Washington Department of Fisheries and Interagency Committee for Outdoor Recreation estimate demand for this activity in San Juan County will increase by the year 2000. Washington Department of Fisheries should be consulted on opportunities to provide public fishing as a part of the project.

Marine mammals migrate through and utilize the Friday Harbor area. The National Marine Fisheries Service has been contacted as to possible impacts to these species and has determined that the project will have no impact on marine mammals.

RECOMMENDATIONS

We recommend:

1. Timing of construction be coordinated with Washington Department of Fisheries to prevent potential impacts to migrating and juvenile salmon.
2. Development of a public fishing program be provided. Washington Department of Fisheries should be consulted and any of their recommendations fully incorporated into the project.
3. The sponsor demonstrate an effort to actively encourage a reduction in litter entering the water as a result of increased boat moorage.

CONCLUSION

Approximately 6.5 acres of subtidal area will change in species composition. The organisms presently found are preferred food for many species of fish. Waterfowl and water-dependent birds will also have 6.5 water-surface acres removed from their potential utilization, as well as an associated reduction in preferred food.

Incorporation of our recommendations will lessen some short- and long-term impacts, but cannot totally compensate for the habitat changes which will occur.

Please notify us of your proposed action regarding our recommendations. We would also appreciate notification of final design plans so that we may revise or supplement this report as necessary.

Sincerely,



Joseph R. Blum
Area Manager

cc: HCRS
WDF
WDG
NMFS
RO (AE)
FAO
Nisqually NWR

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APPENDIX A, PART 4
COMMENTS AND RESPONSES

CONGRESS OF THE UNITED STATES, UNITED STATES SENATE, SENATOR SLADE
GORTON, 2 FEBRUARY 1981

Comment. The Port of Friday Harbor has requested assistance from the U.S. Army Corps of Engineers to construct a new floating breakwater in order to expand the existing marina. I would appreciate it very much if every effort could be made to expedite this project.

Response. Noted.

CONGRESS OF THE UNITED STATES, HOUSE OF REPRESENTATIVES, AL SWIFT,
28 JANUARY 1981

Comment. I would like to express my support of the application submitted by the Port of Friday Harbor for Federal assistance in construction of a new breakwater to protect existing Port facilities. I believe this is an excellent project and trust it can be funded.

Response. Noted.

U.S. DEPARTMENT OF TRANSPORTATION, U.S. COAST GUARD, 6 FEBRUARY 1981.

Comment. There is the possibility that some pleasure craft will anchor in the vicinity of the breakwater anchor cables. This could hazard the pleasure craft if their anchors fouled in the breakwater's anchor cables. Perhaps warning signs should be posted.

Response. Concur. The existing breakwater has signs warning of anchor cables. The Federal project will include similar warning signs on the new breakwater.

U.S. DEPARTMENT OF THE INTERIOR, OFFICE OF THE SECRETARY, PACIFIC NORTHWEST REGION, 24 FEBRUARY 1981

Comment. We feel provisions should be made for increased sanitary waste disposal from boat holding tanks due to increased boating recreational facilities.

Response. The Washington Department of Ecology (WDE) inspected Port of Friday Harbor holding tank pumpout and Portapotty waste disposal facilities in March 1981 and found the facilities to be adequate to accommodate the increased use expected when the marina is expanded (see appendix A, part 2).

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION X, 28 JANUARY 1981

Comment. The document does not identify oil spill contingency plans to either prevent or clean up potential oil or fuel spills.

Response. The Port has developed an oil spill prevention and contingency cleanup plan. Port has some containment and cleanup capability now for small spills. Port has retained a firm to respond to large spills.

Comment. The document does not mention additional shoreside automobile parking or the impacts of this additional parking.

Response. The town of Friday Harbor and Port of Friday Harbor have reached agreement on size and location of required additional parking. The agreement was a prerequisite to the issuance of a substantial development permit. The environmental impact of additional parking facilities is expected to be small since an existing under-utilized, gravel surfaced, port-owned parking facility will be used. Because the facility is gravel surfaced little or no increase in runoff is expected (see Port of Friday Harbor letter dated 9 February 1981, appendix A, part 2).

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, 21 JANUARY 1981

Comment. We have reviewed the document and it appears our concerns have been addressed.

Response. Noted.

DEPARTMENT OF THE TREASURY, U.S. CUSTOMS SERVICE, 14 JANUARY 1981.

Comment. The number of vessels reporting to Customs at Friday Harbor has increased from 2,062 in 1970 to over 5,000 in 1980. The present facility will no longer accommodate the increase in vessel traffic. Recommend the new breakwater proceed as soon as possible.

Response. Acknowledged.

U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE, AREA OFFICE, 13 JANUARY 1981

Comment. The environmental assessment does not identify the nearest bald eagle nests or develop a rationale as to why they would not be affected by the project. In future biological assessments, specific details should be developed to show project effects on the species. However, from our information, we believe a no effect situation exists and, therefore, that section 7 formal consultation will not be necessary at this time.

Response. Acknowledged.

U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION,
NORTHWEST REGION, 12 JANUARY 1981

Comment. We have reviewed the document and find the location of the seaplane float acceptable.

Response. Noted.

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY, 10 FEBRUARY 1981

Comment. During low tide sequences, plumes from the sewage plant outfall have been observed. In the proposed marina expansion, this plume can be expected to completely surround boats moored over the outfall. Prior to marina expansion, the outfall should be extended seaward.

Response. The Port of Friday Harbor concurs with WDE concern and will extend the outfall at least 100 feet beyond proposed breakwater as part of the project (see Port of Friday Harbor 30 March 1981 letter).

Comment. Care should be taken during marina construction to avoid damage to the outfall. Permanent protection should be provided so that the pipe is protected from dragging boat anchors.

Response. The outfall will be constructed after breakwater construction and during construction of the inner harbor improvements, thereby avoiding possibility of outfall damage during breakwater construction. The present and proposed floating breakwaters are anchored by cables attached to H-piles driven into the bottom. Signs warning boaters not to anchor near the breakwater are on the present breakwater, and similar signs will be placed on the new breakwater. The outfall will be protected by the signing, and since it will be in deep water (60 feet plus) anchoring of small vessels is not expected to be a major problem.

Comment. The final report should clarify the location of the sewage outfall.

Response. Concur. Plates 1 and 2 revised to clarify outfall location.

STATE OF WASHINGTON, DEPARTMENT OF FISHERIES AND DEPARTMENT OF GAME,
30 MARCH 1981

Comment. The Departments of Fisheries and Game have reviewed and approve the project as illustrated in the Public Notice. Our approval is subject to the following:

a. Construction may be started immediately and shall be completed by 31 December 1981. A time extension will be considered upon reapplication.

- b. No deleterious materials shall be allowed to enter state waters.
- c. Any debris resulting from this project shall be removed from the water.
- d. Water quality shall not be degraded to the detriment of fish life.

Response. Acknowledged. Per conversation between Curtis Dahlgren, WDF, and Alan Coburn, Corps of Engineers, the 31 December 1981 time limit is WDF permit policy and can be extended thru WDF via verbal or written request. This will be necessary as current schedule would not have construction occurring before May 1982, at earliest.

STATE OF WASHINGTON, DEPARTMENT OF GAME, 26 JANUARY 1981

Comment. After review of your document, we concur with the draft Fish and Wildlife Coordination Act Report prepared by the U.S. Fish and Wildlife Service. The report indicates that the proposed timing restriction from November 15 to February 15 will be deleted from the final report. It should be noted, that if deemed necessary for the protection of fishery resources, we will impose such timing restrictions as mitigating provisions on any approvals for construction activities.

Response. Acknowledged.

WASHINGTON DEPARTMENT OF TRANSPORTATION (WDOT), 26 FEBRUARY 1981

Comment. Have reservations regarding marina expansion but will not object to project permit.

Response. Acknowledged.

Comment. Submerged rock, mid-channel, forces ferries to steer quite close to the proposed breakwater.

Response. WDOT approved of project after 1979 cooperative tests which demonstrated that ferries could approach the terminal without undue risks to new breakwater (see appendix C, paragraphs 1.16 and 2.02).

Comment. Concern that proposed breakwater will not effectively attenuate long period waves from ferry wake. WDOT estimates the wave force from ferry wake will be four times greater than on existing facilities.

Response. The proposed floating breakwater is designed for wave loading and wave attenuation for both wind and ferry wake waves (see appendix C).

Comment. Breakwater ramp from the northernmost moorage float to north breakwater will force boaters much closer to ferries.

Response. Noted. The alinement presented is the same alinement studied with the ferry system in summer 1979 and approved by the ferry system in August 1980 (see above comment and response).

Comment. Concern that the proposed seaplane float location will require seaplanes to taxi at or near right angles to ferry wakes.

Response. Seaplanes have to taxi at or near right angles to ferry wakes now and have not indicated dissatisfaction. Also, the arrangement has been approved by the FAA (see page A2-14 and appendix C, paragraph 1.16). At the new seaplane float location pilots will also have more discretion as to how to taxi into ferry waves since there will be increased area to navigate, therefore more choices of taxi direction.

STATE OF WASHINGTON, DEPARTMENT OF TRANSPORTATION, 16 JANUARY 1981

Comment. This office is concerned that the increased demand for parking associated with the project will cause overflow parking into newly expanded ferry terminal parking facilities.

Response. The Port of Friday Harbor will provide the required separate, expanded parking facilities. According to the Friday Harbor traffic study, port marina parking will be adequate and will be far removed (1/4 mile) from planned ferry terminal parking facilities and therefore no spillover is expected.

STATE OF WASHINGTON, WASHINGTON STATE PARKS AND RECREATION COMMISSION,
8 JANUARY 1981

Comment. Having reviewed your document, we concur with your finding that alternative 5 would have the least impacts on existing wetlands, water quality, and related environmental parameters while offering a good cost to benefit ratio. We agree a strong need exists for increased recreational boating facilities in the Puget sound area and that the proposed expansion would help fill this need where it is particularly acute.

Response. Noted.

WASHINGTON ARCHAEOLOGICAL RESEARCH CENTER, 19 FEBRUARY 1981

Comment. We are concerned that secondary construction impacts (i.e., dumping rubble or construction of riprap along the shore or beach) will impact prehistoric site 45SJ211.

Response. This project will involve no such shoreside work.

SAN JUAN COUNTY PLANNING DEPARTMENT, 29 JANUARY 1981

Comment. Concern that adequate public support facilities, e.g., showers, parking, and toilets, be provided and that a state EIS might be needed to assess the impacts of the marina expansion.

Response. The town of Friday Harbor, the acting agency with jurisdiction, has determined that Port of Friday Harbor plans to expand parking and sanitary facilities are adequate to accommodate increased use. The town has further determined that the expansion impacts do not warrant preparation of a state EIS (see town of Friday Harbor letter dated 23 March 1981 with pertinent actions following). The Corps of Engineers in cooperation with other agencies has determined that no Federal EIS is required since the project is an expansion of an existing facility and no significant changes from existing conditions are expected (reference 9 February 1981 Port of Friday Harbor letter to San Juan County Planning Department).

CLARK SHERWOOD, 5 MARCH 1981

Comment. I am strongly in favor of this project. Although I have no personal interest in the marina, I am growing more disgusted with the anti-everything group who believe they have the right to scuttle every construction project in the San Jaun Islands.

Response. Noted.

C. J. BUSCH, 3 MARCH 1981

Comment. This project will only benefit a very few of the general public.

Response. The commercial and recreational craft benefits exceed the costs for providing the protection. All applicants for the proposed 290+ new, permanent slips are San Juan County property owners and/or residents.

Comment. Already the ferries are faced with both passenger and car overloads. The additional boaters who will be keeping their boats at the marina, will contribute to the overloading problem.

Response. Per conversation between Ken Payne, Washington State Ferry System, and Alan Coburn, Corps of Engineers, 16 March 1981, load factors on San Juan ferry runs vary from 50 to 70 percent. Therefore, there is additional capacity and ferry capacity will not be strained by the additional boaters. Also all 290+ new permanent slips are assigned to San Juan County landowners and/or residents so little real increase in auto traffic is expected.

Comment. The marina will contribute both to water and visual pollution.

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FRIDAY HARBOR MARINA EXPANSION STUDY--SAN JUAN ISLAND, WASHINGT--ETC(U)
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Response. The EA indicated water quality in the existing marina meets Washington State Marine Class AA standards. Continued and expanded pollution control efforts by the Port of Friday Harbor are expected to maintain compliance with this high standard. There is expected to be little change from existing conditions.

FREDRICK ELLIS, 19 FEBRUARY 1981

Comment. I am vigorously opposed to the extension on a number of grounds. The present marina is as large as should properly be sited in such a small area. A larger marina will become an unconscionable eyesore and turn that part of Friday Harbor into a boating slum. In spite of rules, marinas inevitably are sources of sewage and pollution. This expansion may only pave the way for additional expansion in future years. The taxpayers should not subsidize what is essentially a toy for a relatively small number of boat owners and the local merchants who profit from them.

Response. The Corps replied directly to Mr. Ellis by letter on 2 March 1981, a copy of which can be found in part 2 of this appendix.

PAT BROWN, SAN JUAN MARINA, VERBAL INQUIRY AT 29 JANUARY 1981, PUBLIC MEETING

Comment. Mr. Brown was concerned the construction of the proposed breakwater would create a worsened wave climate in the San Juan Marina.

Response. The Corps responded directly to Mr. Brown by letter dated 24 February 1981, a copy of which can be found in part 2 of this appendix.

WASHINGTON TUG AND BARGE, 16 JANUARY 1981

Comment. Marina expansion and south breakwater will restrict oil barge and tug navigation adjacent Union Oil dock.

Response. The local Union Oil manager has indicated the proposed marina expansion and south breakwater will not interfere with tug-barge movements as they have occurred over the last 25 years. In addition, observations and photographs, subsequent to the above comment, of tug-barge movements by Port officials indicate no conflict between oil barge navigation and the marina expansion and breakwater.

LEE CAMPBELL, 26 FEBRUARY 1981

Comment. I believe that increased boat traffic resulting from expansion would have serious detrimental effects on the marine life of the harbor.

Response. Effects of increased boat traffic are evaluated in the EA. No serious adverse effects are expected.

Comment. Doubling the capacity of the Friday Harbor Marina would lead to increased population growth because of the demand for additional services. This would have major impacts on the town.

Response. All proposed new berths are presently assigned to San Juan County property owners and/or residents.

NORTHWEST MARINE TRADE ASSOCIATION, 3 FEBRUARY 1981.

Comment. On behalf of over 600 marine business firms in the State of Washington, we are writing to express our strong support for the proposed expansion of the marina at Friday harbor.

Response. Noted.

SAN JUAN ISLAND CHAMBER OF COMMERCE, 16 JANUARY 1981

Comment. We would like to go on record as enthusiastically supporting this projected expansion.

Response. Noted.

SAN JUAN ISLAND YACHT CLUB, 8 JANUARY 1981

Comment. The San Juan Island Yacht Club supports the Port of Friday Harbor expansion plan. Additional moorage berths are sorely needed in this area. The proposed design will provide much safer floatplane mooring and increased protection from strong northeasterly winds.

Response. Noted.

APPENDIX B
ECONOMIC AND SOCIAL EVALUATION

SECTION 1. SOCIOECONOMIC ENVIRONMENT

1.01 Purpose and Scope. The purpose of this study was to evaluate economic benefits and economic and social impacts of proposed increased moorages at the Port of Friday Harbor. Moorage demand and navigation benefits were estimated for additional recreational and commercial fishing craft. Expected economic and social impacts of the expansion on the local community also were analyzed.

1.02 Location and Project Description. The Port of Friday Harbor Marina is located in San Juan County on San Juan Island, in the northwest part of the town of Friday Harbor. San Juan County is a group of islands of which San Juan Island, Orcas Island, and Lopez Island are the major inhabited places. Friday Harbor is located in a natural bay about 1-mile long and 1-mile wide, with Brown Island about 1/2-mile long and 1/4-mile wide in the center of the bay, creating a partially closed inner harbor. Accessible only by water and air, Friday Harbor is located on the eastern shore of San Juan Island, about 28 nautical miles from Victoria, British Columbia; 35 nautical miles from Bellingham, Washington; 18 nautical miles from Anacortes, Washington; and 60 nautical miles from Seattle. The marina is operated by the Port of Friday Harbor and is located within the Friday Harbor town limits. The facility currently provides permanent moorage for 190 pleasure and commercial fishing craft and transient moorage for an additional 97 vessels. Planned expansion of the marina will add 294 new permanent and 44 transient slips. The town of Friday Harbor is expected to experience the primary impact of the proposed project. Friday Harbor is one of the few commercial centers on the San Juan Islands that provide goods and services to the residents of San Juan and other islands in San Juan County, and to transients who visit the islands, principally during the summer recreational season. Located in rich fishing grounds and near the migratory route of salmon, Friday Harbor is also a port for commercial fishermen.

1.03 Natural Resources. There are over 400 islands, 172 named, which comprise the San Juan Archipelago. Residential development exists on at least 32 of the islands. San Juan Island is the second largest island in the San Juans, with an irregularly shaped land mass measuring about 13 miles long by 10 miles wide. Land use is predominantly forest and agricultural. Topography varies from hilly to gently rolling, with the highest elevation only a few hundred feet above sea level. Soils are not highly productive, with the principal soils most suitable for grazing, woodland, residences, recreation, or water supply. Water resources for residential and commercial purposes, while not limited in total, are limited in availability at some locations. Ground water sources are more highly developed than surface water.

Mineral deposits are limited to sand, gravel, and rock. A gravel mining operation is located north of Friday Harbor, outside town limits on the coastline. Output is used for construction within San Juan County or shipped to Vancouver Island, British Columbia.

The climate is moderate, classified as maritime. Summers are warm and dry, winters cool and wet. Average temperature is 48° F year-round; 57° F in the summer and 41° F in the winter. The islands are under the influence of the rain shadow effect of the Olympic Mountains, receiving from 19 to 30 inches of precipitation annually. These amounts compare with 39 inches at Seattle, which is 60 miles distant and outside the rain shadow. Winds are light and from a southerly direction in summer--ideal for sailboating. Winter storms from the north occasionally result in wind speeds of 80-100 knots.

Water surrounding the islands contain a varied fishery resource. Large numbers of salmon pass near the San Juans in their migrations. Bottom fish, shellfish, and crustaceans also abound in island waters. The fishery attracts large number of commercial as well as recreational fishermen.

1.04 Human Resources. Population of Friday Harbor, from a special census in April 1979, was 1,154 persons (table B-1), an increase of 44 percent since the 1970 Federal census. Population trends for the San Juans, including Friday Harbor, reflect the growing popularity of the islands, especially since the 1960's. San Juan County population, at 6,700, increased by 2.3 times from 1960 to 1978, reversing a declining trend from 1950 to 1960. Temporary and seasonal population to the island adds many more persons at peak summer periods, when county population exceeds the year-round population by at least 30 percent.

The desirable recreational environment has also been the main factor in residential population growth. The San Juan Islands have attracted a large retired contingent--about one in six (17 percent) of the persons residing in the San Juans is age 65 or over. In contrast, only one in 10 Washington State residents is 65 or over. According to the 1970 census data, San Juan Island was the place of residence of 1,853 persons, or 48 percent of the county population. Population forecasts reflect continued rapid growth in population in San Juan County to 11,600 persons in the year 2000 (table B-1).

1.05 Economy. Because of limited economic data for the town of Friday Harbor, information shown in this section is for San Juan County. Because of the similarity of economic activities throughout the county, and the large population concentration on San Juan Island, data for San Juan County are indicative of economic activity on San Juan Island and in Friday Harbor.

The importance of recreation and tourism to the economy of San Juan County is reflected in the distribution of employment among various economic activities (table B-2). The largest single sector is services, which employs about one of every three workers on the average and one per 2.6 at peak tourist times. About 80 percent of these persons are employed by hotels and resorts. The percentage of persons employed in service occupations in San Juan County is twice the percentage for the

state. Retail trade ranks second as a source of employment--one of five are employed in this activity, about the same proportion as for the state as a whole. The construction sector employed 16 percent of the work force, compared with about 6 percent for the state. Manufacturing, a minor employer, includes lumber and wood products, shipbuilding, and fish processing.

Trends in the local economy since the 1960's, when population began a rapid rise, show increases in the importance of construction, services, manufacturing, and finance/insurance/real estate. Manufacturing declined during the 1960's, but has increased since 1970. Other sectors changed little or declined in relative importance.

TABLE B-1
POPULATION TRENDS AND FORECASTS
FRIDAY HARBOR, SAN JUAN COUNTY, AND WASHINGTON

<u>Trend Years</u>	<u>Friday Harbor</u>	<u>San Juan County</u>	<u>State of Washington</u> (1,000)
1950	783	3,245	2,379.0
1960	706	2,872	2,853.2
1970	803	3,856	3,413.2
1978	1,060	6,700	3,774.3
1979	1,154	--	--
% Change 1970-1978	32.0	73.8	10.6
<u>Forecast Years</u>			
1990	1,616	10,000	4,587.1
2000	1,856	11,600	5,051.2
% Change 1978-2000	75.1	73.1	33.8

Sources: Populations estimates for 1950, 1960, and 1970 are from Census of Population, Washington, U.S. Department of Commerce, Bureau of Census. Populations for 1978 are from State of Washington Population Trends, 1978, Washington State Office of Financial Management, Population, Enrollment, and Economic Studies Division, August 1978. The 1979 estimate for Friday Harbor is from a special census by the town of Friday Harbor.

Forecasts for San Juan County and the State of Washington are from Washington State County Population Forecasts by Age and Sex: 1970-2005, Washington State Office of Financial Management, Population, Enrollment, and Economic Studies Division, December 1977. Friday Harbor forecasts assume about the same role for the town in San Juan County in the future as at present.

TABLE B-2

COVERED EMPLOYMENT AND PAYROLLS BY INDUSTRY
SAN JUAN COUNTY, 1977

	1977 Average		June 1978 Employment
	Employment	Wages Paid (\$1,000)	
Agriculture, Forestry, and Fishing	25	\$288	31
Mining	--	--	--
Construction	224	2,153	262
Manufacturing	96	898	98
Transportation and Public Utilities	157	1,421	177
Wholesale Trade	15	185	14
Retail Trade	288	1,470	366
Finance, Insurance, and Real Estate	69	607	86
Services	469	2,392	585
Government	73	32	421
Not Elsewhere Classified	--	--	22
Total	1,416	\$10,246	2,062

Source: Employment and Payrolls in Washington State by County and by Industry, Washington State Employment Security Department.

The level of unemployment in San Juan County, as estimated by the Washington State Employment Security Department, was 5.0 percent in December 1979, compared with 7.2 percent for the state.

In 1979, disposable income per household was estimated at \$17,014 for San Juan County. By comparison, disposable income per household for the State of Washington was \$18,743 for the same year. The lower level of household income in the San Juans may reflect the relatively high proportion of retired persons and relatively high proportion of jobs in low paying service categories.

1.06 Government. The town of Friday Harbor is governed by an elected Mayor and a five-member council. San Juan County is governed by the Board of Commissioners. Friday Harbor Marina is operated by the Port of Friday Harbor. The port has a three-member commission.

1.07 Facilities and Services. The Friday Harbor sewer system includes a primary treatment plant operating at about 50 percent of capacity with a marine outfall for disposal. Solid waste is collected from the marina

and other locations for disposal in a landfill. Plans call for completion of an incinerator for solid waste disposal in conjunction with the landfill. A town water system with a surface water source at Trout Lake provides water to local residents, including the Port of Friday Harbor Marina. Orcas Power and Light Company, a private utility, provides electrical power to the town and San Juan Island.

The Friday Harbor police force includes two full-time officers, a marshal and a deputy, and one part-time deputy. The volunteer fire department has a total roster of about 30 persons.

1.08 Land Use. Land use on San Juan Island is predominantly forest and agricultural. Residential use is concentrated at Friday Harbor with recreational developments in other areas throughout the island. Significant areas of park land are found at the historic American and English camp locations. Much of the land along the 70-mile shoreline is used for homesites. Land use in Friday Harbor is classified into six uses: single-family, multiple-family, commercial, professional services, light industry, and mobile home park. Commercial establishments, consisting primarily of food, drug, hardware, and gift stores, are concentrated in the 10- to 12-block area bordering the port and dock area. Port of Friday Harbor is located in a commercial area, with an oil company and oil dock on one side and the U.S. Customs Office and a sail-making establishment on the other side. Southeast of the port marina is a restaurant, a boat sales establishment, and the ferry loading and unloading dock. Next to the Port of Friday Harbor is the central business district of Friday Harbor. Northwest of the port marina are multiple-family and single-family homes. Further north is the University of Washington Marine Science facility.

1.09 Transportation. A principal factor in the enjoyment of the area by visitors as well as residents is boat transportation. Many persons arrive at Friday Harbor by private boats and use port facilities. Principal public means of entry to the islands is the Washington State ferry system, which provides seven round-trip ferries per day between Anacortes and the islands. One of the runs continues on to Sidney, British Columbia. Air travel is another important means of reaching and touring the San Juan Islands. Friday Harbor is reached by private aircraft or by means of a scheduled airline which serves the islands with connections at Seattle-Tacoma International Airport. Numerous all weather roads connect all parts of San Juan Island to Friday Harbor. All roads in San Juan County are county roads; neither the state nor Federal Government maintains roads on San Juan Island.

1.10 Tourism. The economy of Friday Harbor has developed principally to serve the recreation and tourism trade. More than 100,000 vehicles and nearly 200,000 persons are brought to Friday Harbor and San Juan Island annually by the ferries. During the summer season, population of San Juan Island increases by about 30 percent. A principal source of

tourists and recreationists is the Seattle metropolitan area, approximately 4 hours travel time by highway and ferry. Other sources of tourists and recreationists are Victoria and Vancouver, British Columbia; short distances north. Private boaters cruise and tour the islands and visit the many marine state parks. The recreation and tourism trade has experienced rapid growth in recent years with increased leisure time and higher per capita incomes. This trend is expected to continue with greater numbers of visitors to the San Juan Islands via ferry and small boats.

1.11 Future Development. The economy of the San Juan Islands will continue to derive income in large part from the recreational attributes of the islands. Limited lumbering and wood processing, agriculture, fishing, and fish processing will continue. Retired persons will continue as a significant, but perhaps declining, percent of the resident population while an increasing number of residents will work in the growing service sector associated with tourism and recreation. Careful planning by the county and its residents will be required to maintain a desirable environment, including land use planning and provision of public services such as water supply. Recreational facilities such as the planned expansion of 294 permanent and 44 transient boat slips by the Port of Friday Harbor should experience ready acceptance by the community and visitors. The proposed marina expansion is in concert with the long-term development goals of the county, including economic development responsive to county needs and provision of recreational opportunities.

SECTION 2. ECONOMIC EVALUATION

2.01 General. There are 190 designated permanent slips and 97 transient slips at the Port of Friday Harbor Marina. A total of 161 of the permanent slips are occupied by pleasure craft and the remaining 29 slips are occupied by commercial fishing boats. An additional 30-35 fishing boats moor at Friday Harbor Marina during the summer (July-November) fishing season. During peak use in the summertime, extra boats are accommodated by rafting vessels. Transient craft are also moored in permanent slips which are temporarily empty. Proposed expansion would provide an additional 294 permanent spaces (240 recreational and 54 commercial) and 44 added transient spaces. The facility would continue to provide anchorage for additional transient craft and craft seeking a harbor of refuge. Average annual benefits were estimated for additional recreational and commercial fishing craft. Benefits were not computed for damages to vessels in the marina due to overcrowding since the port does not allow overcrowding to the extent vessels are damaged. Damage to vessels forced to moor outside the marina because of limited moorage are not computed as benefits since there is no data base. Benefits were based on April 1981 price level, 50-year (1982-2032) project life, and 7-3/8 percent discount rate.

2.02 Moorage Demand. The waiting list of the Port of Friday Harbor for permanent moorage totaled 565 names as of February 1980. The port reports large numbers of inquiries about moorage availability by persons who do not place their names on the list. Due to the size of the list and interest indicated by frequent inquiries, sufficient demand is indicated to fill the additional 294 permanent spaces in the initial year after construction.

Factors likely to affect demand for moorage at Friday Harbor include: (1) outlook for the regional economy, (2) the regional demand for moorage, and (3) the effect of fuel supply and prices on recreational boating. Increasing diversification in manufacturing, together with strength of the Boeing Company and associated aerospace activities, are buoying the Seattle area economy. Growth is expected to be especially strong in nonmanufacturing businesses, particularly retail and service. Employment in Washington is projected by Pacific Northwest Bell to grow during the next 5 years at a rate 1.8 to 1.9 times that of the United States as a whole. Seattle First National Bank expects growth in Washington to be greater than nationally, based on a healthy aerospace industry and growth in other types of manufacturing.

An indication of regional moorage demand is found in a 1978 study by the Oceanographic Institute of Washington which reported nearly 10,000 names on moorage waiting lists in Washington. The survey also reported that, even if all marina expansions were made with the moorage capacity identified in the survey, only part of the total regional demand for moorage would be satisfied. Given the existing high level of demand, the marina was assumed to be completely filled throughout project life.

Distribution of craft by type shown in table B-3 was based on evaluation of the current waiting list at the Port of Friday Harbor and was assumed to remain constant throughout the 50-year period of analysis.

TABLE B-3
PROJECTED USE OF EXPANDED MOORAGE BY TYPE OF BOAT
PORT OF FRIDAY HARBOR, 1982-2032

<u>Type of Boat</u>	<u>Number</u>	<u>Percent</u>
Recreational:		
Inboard/Cruiser	132	44.9
Auxiliary Sailboat	96	32.7
Outboard	12	4.1
Commercial Fishing:		
Gillnet	39	13.3
Purse Seine	14	4.7
Tender	<u>1</u>	<u>0.3</u>
Total Permanent	294	100.0
Transient	44	--

2.03 Permanent Recreational Craft Benefits. Pleasure craft benefits were estimated in accordance with EM 1120-2-113, "Benefit Evaluation and Cost Sharing for Small Boat Harbor Projects" (11 June 1959). Benefits were based on the assumption that a reasonable estimate of recreational navigation benefits to a boat user is the net rate of return the owner would receive if the boat were operated on a rental or charter basis. A range of percentage returns for different types of craft is provided in the above regulation. Assuming straight-line depreciation, average depreciated value of a boat over service life is approximately equal to one-half of average value of a comparable new boat, including cost of outfitting the boat with navigation and safety equipment. Benefits were assumed to accrue only to boats in the marina expansion and not to boats already moored in the marina. Benefits were estimated both to permanently moored pleasure craft and to transient pleasure craft. Due to heavy demand for permanent moorage, no seasonal moorage was anticipated.

Table B-4 summarizes the derivation of average annual benefits to permanent recreational craft by type and length of boat. Boat values (column 2) were based on interviews with marina operators, boat dealers, and a small boat trade association. Percent annual return (column 3)

TABLE B-4

ANNUAL BENEFITS PER BOAT
PERMANENT RECREATIONAL CRAFT
FRIDAY HARBOR MARINA EXPANSION

Type and Length of Boat	Number of Boats (1)	Average Depreciated Value (2)	Percent Annual Return (3)	Potential Benefits Per Craft (4)	Percent Use of Marina (5)	Percent of Potential Benefits (6)	Total Annual Benefit (7)
Inboard/Cruiser	132						
22-foot	34	\$14,704	10	\$1,470	92	50	\$22,998
30-foot	47	22,112	10	2,211	92	50	47,806
40-foot	34	58,044	10	5,804	92	50	90,781
50-foot	17	110,560	10	11,056	92	50	86,458
						Subtotal	\$248,043
Auxiliary Sailboat	96						
22-foot	24	12,162	9	1,095	87	50	\$11,427
30-foot	35	18,242	9	1,642	87	50	24,997
40-foot	24	38,696	9	3,483	87	50	36,359
50-foot	13	74,628	9	6,717	87	50	37,982
						Subtotal	\$110,765
Outboard	12						
22-foot	6	5,528	14	774	95	50	\$2,206
30-foot	6	8,292	14	1,160	95	50	3,309
						Subtotal	\$5,515
TOTAL	240						\$364,323
						say	364,000

was based on guidelines in EM 1120-2-113 (see previous paragraph). Potential benefits per craft (column 4) is the product of columns 2 and 3. Percent use of marina (column 5) was obtained from a questionnaire survey conducted for a study of pleasure boating during 1978 in the Puget Sound area.^{1/} Benefits provided by the proposed marina expansion were not claimed for the percent of time permanent craft were assumed to be cruising or using other docking facilities. Column 6 was based on the estimated percentage of users of the expanded marina who are current boatowners. Based on analysis of the current waiting list and estimates by the port manager, about 80 percent of these users would be transfers from other marinas or boatowners who currently trailer their boats or use dryland storage. Because they already own and operate their craft, these users would receive benefits from boat ownership with or without the proposed project. Benefits to these users were held to an assumed 40 percent of potential benefits to reflect current boat ownership. The remaining 20 percent of users of the expanded facilities were assumed to be new boatowners who would receive 100 percent of potential benefits. Overall permanent recreational craft benefits were weighted at 52 percent of potential benefits (rounded to 50 percent).^{2/} Column 7, total annual benefits, is the product of columns 1, 4, 5, and 6.

2.04 Transient Recreational Craft Benefits. Average annual benefits per transient recreational craft were derived as shown in table B-5. Transient craft were assumed to follow the same distribution by craft type and length as shown for permanent recreational craft in table B-4. Average depreciated value (column 2) is a weighted average for each craft type based on columns 1 and 2 of table B-4. By definition of transient craft, use of the marina by transient craft was assumed to be 100 percent during the few days they are moored at Friday Harbor.

Transient craft benefits were based on a 210-day boating season with an assumed 117 days of transient use of each of the 44 new slips. Use days were based on historical usage of the existing marina. Benefits were derived as follows:

Step 1: Weighted average annual benefits of \$3,356 ÷ 210-day boating season = \$15.98 per transient craft per day.

Step 2: 117 boat-days per transient slip x 44 new slips = 5,148 transient use days.

Step 3: 5,148 days x \$15.98 per craft = \$82,265 (say 82,000) average annual benefits.

1/Recreational Small Boat Moorage Study: Puget Sound and Adjacent Waters, Seattle District, U.S. Army Corps of Engineers, 1980.

2/(80% x 40%) + (20% x 100%) = 52%.

TABLE B-5

ANNUAL BENEFITS PER BOAT, TRANSIENT RECREATIONAL CRAFT
FRIDAY HARBOR MARINA EXPANSION

Type of Boat	Percent of Boats (1)	Average Depreciated Value (2)	Percent Annual Return (3)	Weighted Average Annual Benefits (4)
Inboard/Cruiser	55	\$40,797	10	\$2,245
Auxiliary Sailboat	40	29,520	9	1,062
Outboard	5	6,965	14	49
Total	100			\$3,356

2.05 Commercial Fishing Benefits. Friday Harbor is located 30 to 60 minutes running time from some of the most productive salmon fishing grounds of Washington marine waters. The expanded marina will provide 54 additional slips for commercial fishing boats. These slips are expected to be leased by commercial fishermen who are now home-based at locations further distant from the commercial fishing grounds. Currently, many commercial fishermen have home ports at Anacortes, La Conner, Seattle, or as far away as Gig Harbor, but the trend is to move boats north as population pressure increases in the southern Puget Sound area. The basis for commercial fishing benefits was savings in operating cost by reduced running time between home port and the fishing grounds. Anacortes was assumed to be the typical average alternative port. The average commercial fishing boat could save 4 hours per week by having home base at Friday Harbor rather than Anacortes.

Commercial fishing for salmon is allowed during the weekdays between mid-July and 30 November. In past years, an early chinook season was allowed in May and June, but this is not expected to occur again in the near future because the season was based on the Fraser River run which has been badly depressed. In addition, some commercial salmon fishing boats fish for bottom fish outside the salmon fishing season. For purposes of analysis, length of fishing season was based on the salmon season and was assumed to be 20 weeks long. Commercial fishermen are predominantly gill netters and purse seiners. Hourly savings in operating costs were based on hourly maintenance, repair, fuel, and oil costs; insurance; depreciation; and equipment replacement. Savings were estimated at \$7.82 per hour for purse seiners and \$4.32 per hour for gillnet boats.^{1/}

^{1/}Source: Marine Advisory Program, Oregon State University, Corvallis, Oregon 97331.

Annual benefits to commercial fishing vessels were estimated at \$18,000 (table B-6). Distribution of boats between gillnet and purse seiners was based on the present distribution of boats in the marina and the distribution of boats on the waiting list.

TABLE B-6

ANNUAL BENEFITS TO COMMERCIAL FISHING BOATS
FRIDAY HARBOR MARINA EXPANSION

Type of Boat	Number	Total Annual Time Savings (hours) ^{1/}	Operating Cost per Hour	Savings in Operating Cost
Gillnet	39	2,808	\$4.32	\$12,131
Purse Seine	14	1,008	7.82	7,883
Tender ^{2/}	1	--	--	--
Total	54	3,816	--	\$20,000

^{1/}Time savings were assumed to be 72 hours per boat, based on 4 hours per week and 18 weeks. Number of weeks was based on 20 total with 2 weeks deducted for repairs, downtime, etc.

^{2/}Although a tender will likely be moored in the expanded marina, no savings were expected because the boat will likely unload on the mainland.

2.06 Charter Boat Benefits. There are no commercial charter fishing boats currently operating out of Friday Harbor Marina and none are expected. Therefore, benefits to charter fishing were not included in this analysis.

2.07 Harbor of Refuge Benefits. During the November to February period, the San Juan area is subject to northeastern storms. During these storms many boats moored on the west side of the harbor may use the port breakwater. Other boats further distant may anchor behind Brown Island for protection. Because of the existence of other locations for emergency moorage during storms, and the lack of adequate information on frequency of storms and damage incurred, harbor of refuge benefits were not estimated for the proposed breakwater project.

2.08 Recreation Benefits. Benefits attributable to installation of features primarily for sport fishing and sightseeing on the floating breakwater are derived from an estimate of the average number of anglers who would use the facilities.

Benefits of recreational fishing from the breakwater were based on guidance contained in subpart K of ER 1105-2-300. The procedure consists of multiplying the projected use (recreation days) by a unit day value to determine total benefits. The number of anglers per day projected to use the Friday Harbor facility was obtained by taking the estimate of anglers per day using a similar facility (Edmonds Fishing Pier) and modifying five independent variables which are assumed to influence visitation. Listed below are the five variables, the numerical values assigned to each, and an explanation (in footnotes) of the simplifying assumptions used in specifying the numerical values of these variables relative to the Edmonds Fishing Pier used for comparison:

<u>Variable</u>	<u>Numerical Value</u>
Ease of Access	.3 ^{1/}
Population Density within 25 miles	.25 ^{2/}
Proportion of Expected Visitation Included in Analysis	1.0 ^{3/}
Recreation Appeal and Potential for Fishing Success	.5 ^{4/}
Capacity of Fishing Facilities	<u>1.1</u>
Product of Variables	0.04 ^{5/}

Number of anglers per day using the Edmonds Fishing Pier = 167
 Estimate of number of anglers per day who will use the Friday Harbor Facility = $(0.04) \times (167) = 7$

^{1/}Ease of access to the Edmonds fishing pier is substantially greater than to the proposed Friday Harbor facility. The Edmonds pier is in relatively closer proximity to major highways and is accessible by auto, whereas Friday Harbor is accessible from the mainland only by plane, boat, or ferry.

^{2/}Population density is substantially less for Friday Harbor, as the area within a 25 mile radius is largely rural development or water. Within 25 miles of Edmonds is metropolitan Everett and a large portion of north Seattle.

^{3/}The Edmonds and proposed Friday Harbor facilities would share virtually none of the same market and, as noted by Ray Buckley, Washington Department of Fisheries (WDF), there are no facilities similar to the proposed pier in the Friday Harbor area (telephone conversation 4 September 1980 between Mr. Buckley and Paul Bailey, Corps of Engineers).

(Footnotes continued on next page.)

4/According to Mr. Buckley, WDF, recreation appeal of the Edmonds pier (other than fishing) is primarily sightseeing. He feels this is lacking at Friday Harbor as ferry and other general ship traffic and major viewing features at Edmonds are generally lacking at Friday Harbor. Potential fishing success at Friday Harbor is also less than at Edmonds because a greater fish population is generally found in water with a rocky bottom, as at Edmonds, rather than Friday Harbor's sandy bottom (telephone conversation 4 September 1980 between Mr. Buckley and Mr. Bailey).

5/The maximum capacity of the Friday Harbor breakwater (using the ratio of total lineal feet of rail of the Friday Harbor breakwater (1,200 feet) to the total lineal feet of rail of the Edmonds fishing pier (1,010 feet) would be 1.12 times that of the Edmonds fishing pier. However, modifying the projected usage of the Friday Harbor floating breakwater for fishing, based on the maximum capacity of the breakwater, assumes that visitation is always limited by the maximum use of the breakwater. Thus, the variable value of 1.12 would be too high. A more accurate estimate is obtained by assuming the maximum capacity of both the Edmonds fishing pier and the proposed Friday Harbor breakwater fishing facility is attained only 10 percent of the time. This would result in a variable value of $(0.1 \times 1,200 + 1,010) / 1,010 = 1.1$. But because those periods at which the maximum capacity is reached probably account for a large proportion of the total fishing demand, the value of this variable would be higher. For example, it is possible that at least 80 percent of the total demand for fishing facilities occurs on weekends for a 5-hour period in the morning and on weekdays for 3 hours in the evening. In this case, the peak visitation period would be of primary relevance in estimating demand. Thus, as a compromise, a variable value of 1.1 is used to account for the additional fishing facilities capacity attributable to the Friday Harbor floating breakwater as compared to the capacity of the Edmonds fishing pier. This conservatively leaves a large allowance for the possibility that most fishing demand occurs during less than capacity conditions. Dollar value per activity occasion and average annual benefits are then computed:

Breakwater fishing as specialized recreation activity (ER 1105-2-300, p. A-75, Table K-33):

	<u>Points</u>
a. This breakwater will have moderate specialized use with other use occasionally interfering with fishing activity.	15
b. No similar facilities will be available within 2 hours travel time	18
c. Adequate facilities exist to conduct activities at the proposed facility	6
d. There will be fair access to the site and within its immediate vicinity	10
e. This site has outstanding esthetic quality and no factors exist which lower its quality.	<u>17</u>
Computation of Dollar Value per recreation day (ER 1105-2-300, p. A-73, Table K-31)	66
60 = \$10.83	
by interpolation $\frac{.86}{10} = \frac{x}{6}$, $x = .51$; \$10.83 + .51 = \$11.34	
70 = \$11.69	

Average Annual Recreation Benefits.

7 (activity occasions/day) x \$11.34 (\$/activity occasion) x 365 (days/year) = \$28,982.53

Since annual benefits are not expected to change over the project life, amortization of the present value of the benefits is unnecessary.

Additional benefits could be derived from sightseeing and temporary pleasure boat tieups. However, benefits of these recreational pursuits were not calculated for this report as average annual benefits of fishing alone well exceed the average annual cost of providing the facilities.

2.09 National Economic Development (NED) Employment Benefits. As of February 1980, San Juan County was not listed as an area of "substantial and persistent unemployment" as designated by the Economic Development Administration, U.S. Department of Commerce. Accordingly, NED employment benefits were not estimated for the proposed project.

2.10 Summary of Benefits. A summary of average annual benefits which would accrue to the project is presented in table B-7.

TABLE B-7

SUMMARY OF AVERAGE ANNUAL BENEFITS
FRIDAY HARBOR BREAKWATER AND MARINA EXPANSION

<u>Source of Benefits</u>		<u>Average Annual Benefit</u>
Permanent Recreational Craft	(364,000)	
Transient Recreational Craft	(82,000)	
Commercial Fishing Boats	(20,000)	
Navigation Benefits		\$466,000
Breakwater Recreation		<u>29,000</u>
Total		\$495,000

2.11 Project Costs are summarized in table B-8.

TABLE B-8

SUMMARY OF ESTIMATED PROJECT FEDERAL
AND NON-FEDERAL FIRST COSTS^{1/}

Breakwater	\$2,740,000
Lands for General Navigation Facilities	10,000 ^{2/}
Aids to navigation - U.S. Coast Guard	<u>10,000</u>
Subtotal	\$2,760,000
Recreation Facilities on Floating Breakwater	<u>88,000</u>
TOTAL PROJECT FEDERAL AND NON-FEDERAL SHARED FIRST COSTS FOR BREAKWATER	\$2,848,000
Local Interest Cost of Facilities for Temporary Tieup of Craft on Floating Breakwater.	<u>116,000^{3/4/}</u>
TOTAL FEDERAL AND NON-FEDERAL FIRST COSTS FOR BREAKWATER	\$2,964,000 ^{4/}

^{1/}Numbers rounded April 1981 price levels.

^{2/}Port of Friday Harbor estimate includes contingencies, engineering and design, and supervision and administration.

^{3/}Self-liquidating, local interest cost. Not eligible for cost sharing. Not included in B/C ratio.

^{4/}Does not include local costs for moorage floats and other related small boat basin facilities. See table C-4 in appendix C for these cost estimates.

2.12 Justification and Benefit-to-Cost Ratio. Table B-9 presents a summary of annual benefits and costs based on 7-3/8 percent discount rate, April 1981 price level, and 50-year (1982-2032) project life.

TABLE B-9

SUMMARY OF ECONOMIC ANALYSIS
FRIDAY HARBOR MARINA EXPANSION

<u>Item</u>	<u>Average Annual Amount</u>
<u>Benefits:</u>	
Navigation Benefits	\$466,000
Breakwater Recreation	<u>29,000</u>
Total Average Annual Benefits	\$495,000
<u>Costs:</u>	
First Cost	\$216,000
Rehabilitation Cost	12,000
Maintenance and Aids to Navigation	<u>7,000</u>
Total Average Annual Costs	\$235,000
BENEFIT-TO-COST RATIO	2.1:1

2.13 Project Maximization. Physical constraints limit the marina expansion to the 338 new moorage positions. See paragraph 4.11 for further discussion of site limitations. Project benefits are maximized within the site constraints.

APPENDIX C

ENGINEERING, DESIGN, AND COST ESTIMATES

SECTION 1. DESIGN CONSIDERATIONS

1.01 Tides and Currents. Tides at Friday Harbor are typical of the Pacific Coast of North America. Tides are of the mixed type with two unequal highs and lows each day. Tidal range datums for Friday Harbor, as published by the National Ocean Survey, are as follows:

<u>Datum Plane</u>	<u>Elevation in Feet Referred to MLLW Datum</u>
Highest Estimated Tide (30 Dec 1952)	11.00
Mean Higher High Water	7.70
Mean High Water	7.00
Mean (half) Tide Level	4.75
Mean Sea Level	4.42
Mean Low Water	2.50
Mean Lower Low Water	0.00
Lowest Tide (15 Jan 1949)	-3.80

1.02 Current studies conducted by the Seattle District, Corps of Engineers, in August 1979 show the maximum current velocities at Friday Harbor are in a northerly direction, parallel to the existing breakwater, measuring less than 1.5 feet per second (f.p.s.) during the ebb tide phase. Currents are less than 1.0 f.p.s. during the flood tide and run in a southerly direction past the existing breakwater. The greatest flow enters and exists via the eastern opening between Brown and San Juan Islands.

1.03 Winds. During the summer, winds in the San Juans are light and predominantly from the south. Winter time storms, frequently producing winds in excess of 50 MPH, are from the north and east. Estimated maximum wind velocities and duration curves are shown on figure C-1 (bound at end of appendix).

1.04 Waves. The proposed breakwater is exposed to wind generated waves from two windows on either side of Brown Island. Winds from the north-east have a fetch of 1 mile and winds from the southeast have a fetch of 1/2 mile. Brown Island, about 1/2 mile offshore, provides some wave protection from easterly wind generated waves. The following tabulation shows the maximum wave characteristics for the principal fetch lengths in the wave generating area at the proposed breakwater. The north and east legs of the breakwater are exposed to northeast wind waves and wave action due to ferry and other boat traffic; the south legs of the breakwater are exposed to wind waves from the southeast. Design wave heights at the site are shown in the following tabulation.

Direction Fetch	Effective Fetch Length (Stat Mile)	Wind Velocity (MPH)	Wind Duration (HRS)	Wave Period (SEC)	Deepwater Wave Length (FT)	H _s Deepwater Wave Height (FT)
N55°E	1.0	54	0.24	3.2	54	2.8
N120°E	0.5	64	0.13	3.0	46	2.5

Most of the breakwater is located in water depths of over 50 feet, which are greater than one-half the wave length; therefore, shoaling and refraction by bathymetry is not significant.

1.05 Model Studies. To provide information for the design of the floating breakwaters, data from a model test for the East Bay Marina study were used. One-tenth scale model tests were conducted during the period October 1977 through September 1978 by the Hydraulics Laboratory at the U.S. Army Corps of Engineers Waterways Experiment Station (WES), Vicksburg, Mississippi (reference Technical Report HL-79-13, "Floating Breakwater Wave-Attenuation Tests for East Bay Marina, Olympia, Washington," August 1979). The study was conducted in two phases. In the first phase, the wave attenuating properties of three breakwater cross sections were determined. This was accomplished by two-dimensional (2-D) flume tests for a selected range of wave conditions. In the second phase of the study, three-dimensional (3-D) tests investigated the effects of structure alignment to wave attack, wave transmission, and wave diffraction.

1.06 Two rectangular floats and one twin pontoon float were used in the 2-D tests. Plan 1 was a 12-foot by 96-foot rectangular float with a draft of 3.5 feet. Both plans 1 and 2 are shown on figure C-2. Plan 3 was a twin pontoon float 21 feet wide by 120 feet long with a draft of 4.65 feet and is shown on figure C-3. In all tests, each of the breakwater's modules were anchored at all four corners and the modules were not connected to each other. Wave attenuation tests were conducted in prototype depths of 25 feet of water with wave periods of 2.5, 3.0, 3.5, 4.0, and 4.5 seconds. Test waves ranged in heights from 1.5 to 3.5 feet. In the 2-D testing of plans 1 and 2, plan 2 always yielded a somewhat lower transmitted wave height than plan 1, and plan 3 showed the best wave attenuation of all plans tested. Wave height transmission coefficients are plotted relative to the wave period on figure C-4. The combined effects of transmission and diffraction for various breakwater layouts were investigated in the 3-D wave attenuation tests. Three modules of plan 1 were arranged in various configuration (the 60 degree linear configuration is shown on figure C-5). Transmission coefficients plotted against wave period for the 3-D testing at the 25-foot depths are shown on figure C-6.

1.07 Geologic and Foundation Conditions. Friday Harbor occupies an ice scoured depression in the metamorphic bedrock surface of San Juan Island which has been partly mantled by Pleistocene glacial and glacio-marine drift and a variable thickness of bay mud. The periphery of the harbor is largely rockbound. The glacial deposits in the immediate area, mainly till and outwash, were apparently deposited when sea level was 100 to 200 feet lower than at present. The overlying glacio-marine materials appear to have originated during a period when the stand of the sea was only 15 to 20 feet lower than at present in an environment dominated by nearby floating ice.

1.08 The configuration of the present bottom topography and the distribution and thickness of the bay mud is somewhat enigmatic. Within the project area the bottom is characterized by three well defined geomorphic segments; a shallow "terrace-like" feature extending to about elevation minus 10 feet (mean lower low water (MLLW)), a steep marine slope to about elevation minus 40, and a gently sloping harbor bottom to the east. The "terrace" feature is underlain by silty bay mud, varying in thickness from 2 feet near the western edge of exploration to 30 feet at the eastern margin of the "terrace." The mud is usually underlain by a few feet of lag or marine sand and gravel, and is locally underlain on the seaward side by a few feet of glacio-marine silty sand. The whole feature is ultimately underlain by glacial till, the surface of which varies in elevation from minus 5 feet on the west to a little below minus 40 feet at the top of the steep marine slope. Thus the till surface in this area is at about the same elevation as the adjacent bottom beyond the toe of the steep marine slope, the slope being formed entirely in soft bay mud.

1.09 The gently sloping harbor bottom is underlain by 7 to 11-1/2 feet of soft bay mud underlain in turn by a variable thickness (6 inches to 10 feet) of marine silty sand and glacio-marine silt and clay. The silt and clay locally contains limited thin zones of gravel and sand that probably represent ice rafted materials. Materials which appear genetically related to these deposits also locally overlie the glacial till west of the steep marine slope. The glacio-marine sediments are generally firm for the top 10 feet or more, but become softer at greater depths. This phenomenon may be due to consolidation by surface desiccation, but the geologic history would not tend to support this. An alternate, and more supportable, explanation would be that surficial materials were partially consolidated by ice loading that did not persist long enough to permit consolidation at greater depths. The bay muds may, in part, be due to failure of portions of the steep marine slope and deposition by turbidity currents on the gently sloping bottom.

1.10 Changes in the scope of boat harbor facilities proposed for Friday Harbor have necessitated two generations of exploration by the Corps of Engineers. The first, in 1970, was for a smaller facility than presently proposed. This exploration was made to determine the feasibility of a rubblemound breakwater and the dredgability of the basin area. The

locations of these borings are on plate 3 and the detailed logs are on plates 4 and 5. Between 14 and 28 September 1979, 12 additional wash boring holes from 23 to 40 feet deep were drilled along the presently proposed floating breakwater anchor alinements. The locations and detailed logs of these borings are given on plates 3 and 4, respectively.

1.11 With the exception of the area at the north end of the project, the soil profile along the proposed pile anchorage alinements consists of a surface layer up to 8 feet thick of very soft silt overlying firmer materials. Along the seaward anchor line a zone of silty sand from 0.5 to 10.5 feet thick was found underlying the soft surface layer. Beneath the silty sand, or beneath the soft surface silt where the silty sand zone is absent, a zone of relatively firm silts and clays was found in all the 1979 borings, except 79-WB-28. The upper portion of this silt and clay deposit has apparently been overconsolidated by desiccation. The minimum thickness of this consolidated material encountered was about 10 feet in boring 79-WB-32. Beneath the consolidated material the silts and clays are soft and have little strength. As shown on plate 3, bedrock is exposed at the north end of the project. In 1970, the line of probe holes shown on section C-C, plate 3, was drilled to better define the rock limits in this area. A dense, silty, sandy gravel was found in borings 79-WB-28, 70-WB-13, and 70-WB-23. The site is clearly not appropriate for construction of a rubblemound breakwater because of the weak foundation material conditions.

1.12 For computation of allowable lateral loads on anchor piles, the soft surface silts were assumed to provide no lateral support. Sands and silty sands were assumed to have a shear strength of 30 degrees, with no cohesion. A shear strength of 0 degrees, $C = 800$ pounds per square foot, was assumed for the consolidated firm silts and clays. The underlying soft silts and clays were assumed to provide no lateral support.

1.13 Information furnished by the Port of Friday Harbor indicates that the existing floating breakwater anchors consist of timber piles driven to a minimum embedment depth in firm materials of 10 feet. These anchor piles were reportedly laterally load tested during construction, with the landward anchor piles tested to 27,000 pounds and the seaward piles tested to 37,000 pounds. The maximum loading on the new floating breakwater anchors would be 60,000 pounds per pile.

1.14 Near the north end of the proposed breakwater, bedrock is shallow and the overburden thickness is not adequate to permit use of driven piling. In addition, several borings in the general vicinity showed the presence of dense gravels which may preclude driving or jetting piling. Therefore, the construction contract will provide that within this specific area, where piles cannot be driven or jetted to the desired depth, appropriate anchorage will be installed by drilling a cased hole into rock or dense gravels. During construction, lateral load testing of up

to 25 percent of all the completed anchor piles will be required. The piling will be tested at loads up to at least one and one-half times the design load.

1.15 Breakwater Selection. Water depths at the outer portion of the proposed marina expansion and soft foundation materials preclude a timber pile, rubblemound, or combination timber pile/rubblemound breakwater as the cost would be prohibitive. A fixed breakwater would also be less advantageous due to the decrease in water circulation within the marina and potential foundation inadequacies. Accordingly, wave protection to the moorage area would best be provided by a floating breakwater.

1.16 Alternative Breakwater Alinements Considered. Fifteen alternative floating breakwater alinements were analyzed using criteria such as maximum wave protection afforded to the moorage area, length of breakwater versus additional moorage spaces provided, separation of commercial and recreational boating areas, entrance and access channels with ease of entrance and exit to surrounding waters, clearance of Washington State ferry lanes, and separation of boating and seaplane traffic. Two alinements were chosen for further study from this analysis. Buoys were placed to simulate the "worst-case" breakwater alinement and ferry captains were interviewed to determine whether this alinement presented any problems for ferry traffic. Verbal discussions with the Marine Facilities Engineer for the Washington State Ferry System revealed interference with the ferry traffic is not anticipated by the ferry captains, providing moorage of craft is not allowed along the seaward side of the breakwater. Both alinements were presented to representatives of the Federal Aviation Administration (FAA) at a joint meeting with representatives of the Kenmore Air Harbor, Friday Harbor Seaplane Owners' Association, the Port of Friday Harbor, and Senator Magnuson's office. One alinement satisfied all concerns and was selected for detailed studies. This breakwater alinement effectively established the maximum number of moorages which the expanded basin could accommodate without dredging the tidelands to the northeast of the present basin. The actual number of additional moorage spaces was arrived at through a detailed layout utilizing Corps' criteria for access, entrance channels, and maneuvering requirements.

SECTION 2. DESIGN FEATURES OF THE RECOMMENDED PLAN

2.01 General. From design and environmental standpoints, floating breakwaters have several advantages. First, floating breakwaters are not permanently fixed and rearrangement is possible. Second, floating breakwaters do not disrupt the benthic community to the extent that fixed breakwaters do. Third, unlike fixed breakwaters, the floating breakwater design does not interfere severely with fish migration or water circulation. Thus, floating breakwaters would more nearly comply with state and Federal environmental quality guidelines than do fixed breakwaters. For these reasons, the Washington State Department of Natural Resources, in its plan for state managed marine lands, states that "the use of floating breakwaters shall be encouraged as protective structures rather than using permanent earth and rockfills." Friday Harbor is the largest small boat harbor in the San Juan Islands, and was one of the first marinas in the state to be protected by a floating breakwater. Serious structural damage, high maintenance costs, and expansion needs require a new breakwater seaward of the existing one. Water depths in excess of 50 feet, poor foundation conditions, and environmental considerations make a floating breakwater the only feasible alternative.

2.02 Breakwater Layout. The orientation of the breakwater is similar to the existing breakwater, with expansion 200 to 300 feet seaward of the existing breakwater. Because of the potential for interference with ferry traffic, marker buoys were placed to outline the proposed layout. The buoys were placed on 27 July 1979 and left in place for approximately 2 weeks. Evaluation by the Department of Transportation during this period concluded that "the breakwater would not interfere with the existing navigation channel." Two entrances are provided to the moorage areas; one at the north and one at the south of the basin. Entrance openings are situated in deep water and do not require dredging. The northernmost breakwater is detached from the main breakwater to separate boat and seaplane traffic. This breakwater, in addition to its breakwater function, will be used for the arrival and tieup of incoming seaplanes. The existing seaplane float will be moored alongside the breakwater; on the outside during summer and inside during winter.

2.03 Wave Force Analyses. In 1975, the breakwaters at Friday Harbor, Washington, and at Tenakee, Alaska, were instrumented by the University of Washington Ocean Engineering Research Laboratory to measure performance characteristics and forces acting on the structure. This work was accomplished under contract to the U.S. Army Coastal Engineering Center and is reported in "Floating Breakwater Field Assessment Program, Friday Harbor, Washington." Wave gages were used to measure incident and transmitted waves, load cells were placed in the anchor lines, and a motion monitoring package was installed on the breakwater to record its response to wave action. Heavy wave action did not occur at the sites while the measurements were being taken; still, the records provide the

best available prototype data. Measurements from the load cells, located in the anchor lines, show that the anchor forces vary with two distinct periods. The loads consisted of a short period oscillation ($T = 3$ seconds), which is associated with the incident wave, superimposed on a longer period oscillation ($T = 60$ to 120 seconds), which is probably related to structure's mass. For the limited number of events that occurred, the long period forces were of greater magnitude. However, the highest waves that occurred were only about 1.5 feet, which may account for this relationship.

2.04 Additional wave force information on floating breakwaters is included in WES report, "Wave Transmission and Mooring Force Tests of Floating Breakwater, Oak Harbor, Washington," dated April 1971. Transmission and anchor load data were obtained for wave fields ranging from $H = 1.0$ foot, $T = 1.5$ seconds to $H = 4.0$ feet, $T = 3.5$ seconds. Anchor line forces showed the same short and long period load oscillations; however, the short period forces were of greater magnitude.

2.05 Application of Design Data. Practical experience, available prototype measurements, and model test data were combined to design the Friday Harbor breakwaters. Under contract with the Seattle District, Corps of Engineers, the Civil Engineering Department, University of Washington, reviewed and verified hydraulic and structural design recommendations.^{1/} Under the design wave conditions, a transmitted wave height of 1 foot was chosen as an acceptable and realistic goal. The WES model tests indicate that a 21-foot-wide float for the north and east legs and a 16-foot-wide float for the south legs would provide the desired level of protection.

2.06 An estimate of the forces acting on the breakwaters was necessary before the structural design could be carried out. Loads were calculated in such a manner that they retained the same general character of the forces observed in prototype and model measurements. As previously described, these forces are a combination of short period wave forces superimposed on a long period sway force.

2.07 Wave forces were calculated for the 10 percent wave ($H_{10} = 3.6'$) using the Miche-Rundgren method for nonbreaking waves. Allowance was made for wave transmission. As a result, the wave reflection coefficient was reduced with a corresponding change in the clapotis height and wave force. Assuming no viscous losses, the relation between the incident and reflected wave heights is $H_r = H_i (1 - C_t^2)^{.5}$ where C_t^2 is the breakwater transmission coefficient determined by the WES model test

$$(C_t = \frac{\text{transmitted wave height}}{\text{incident wave height}})$$

^{1/}Friday Harbor Floating Breakwater Design, University of Washington, July 1980.

2.08 Because wind waves are highly irregular, simultaneous arrival of a wave crest along the entire breakwater is unlikely. Recent measurements by Seltzer indicate that, for the restricted fetch conditions, and wind speeds over 30 miles per hour, the crest length is approximately equal to the wave length (L_o). Assuming crest lengths equal to L_o , maximum wave loading was calculated for an idealized situation in which the incident wave crests were evenly spaced along the breakwater with each crest separated from the two adjacent crests by a distance of still water, also equal to L_o .

2.09 Available information from model tests and from prototype observations suggest that only a portion of the wave force, calculated by the Miche-Rundgren method, is ultimately transmitted to the anchor lines. A value of 50 percent was selected as being a reasonable proportion of the short period incident wave load at the breakwater/anchor line connection. The maximum sway force was calculated as being equal to 5 percent of the structure displacement. This value was based on the forces measured on the breakwater at Tenakee, Alaska.

2.10 Design waves used in the analysis are based on the significant wave heights for transmission allowance into the moorage area and on the 10 percent wave for structural analysis purposes. Both wind generated waves and boat wakes were considered and the worst case condition used for design purposes. The following tabulation shows design wave conditions.

Wave Type	Direction	H_s (Feet)	H_{10} (Feet)	Period (Seconds)	Wave Length (Feet)
Wind generated	NE	2.8	3.6	3.2	52
Wind generated	SE	2.5	3.2	3.0	46
Boat wake		$H = 3.0$		3.2	52

2.11 For a 100-foot-long float, the combined sway and wave forces would produce a maximum total force on each anchor line of 60,000 pounds, assuming the loads are evenly distributed between the two seaward anchor lines. Transmission of the entire load down to the anchors is doubtful. Most likely, a percentage of the force applied at the breakwater, particularly the wave induced component, is lost to deformation and viscous damping of the anchor lines. Lacking other evidence, however, the anchors were designed to withstand the combined wave and sway forces used at the connection of breakwater and anchor line.

2.12 Structural Design. The floating breakwaters would consist of hollow concrete modules 100 feet long and 5 feet high. The 400-foot-long north breakwater would be composed of four modules 21 feet wide. The 1,200-foot-long main breakwater includes a 600-foot-long east leg composed of six modules 21 feet wide and two southern legs each 300 feet long and each composed of three modules (total of six modules) 16 feet

wide. Details of these modules are shown on plates 7 and 8. The walls of the 16-foot-wide modules would be 4.75-inch thick while the 21-foot-wide modules would have 5-inch-thick walls. All modules would be reinforced with welded wire and longitudinally post tensioned. The modules would be attached to form continuous sections shown on plate 6.

2.13 The breakwaters would be held in place by anchor lines attached to embedded steel H-pile anchors. The size and length of each anchor line, the pile size, and the pile embedment are shown on plate 8. The anchor lines would consist of 1-3/8-inch galvanized steel bridge rope with impressed cathodic protection to prevent corrosion. The anchor line would be pretensioned to 3,000 pounds during installation of the breakwater and 2,000-pound clump weights would be attached. The pretensioning and clump weights will increase the stiffness of the anchor system, thus minimizing lateral displacement of the breakwaters.

2.14 The modules would be connected by extruded rubber fenders anchored in reinforced concrete at corner intersections. Standard weight 5,000 pounds per square inch compressive strength concrete and grade 60 reinforcing steel will be used to construct breakwater modules. The modules will be subdivided into six compartments. Each compartment will be accessible through a bolted watertight hatch. The end compartments of each module will allow access for connection of the modules and for freeboard and trim ballasting of the completed breakwater. Sand ballast will be used to trim and maintain 1-1/2-foot freeboard.

2.15 The electrical and water services for transient moorage will be mounted on the marina side of the breakwater. The services will be contained in watertight, nonmetallic conduit and galvanized piping and will be bolted to the bottom surface of the timber fender strip. Vertical risers will be placed between the timber and concrete sidewall and will extend from the lateral lines to service outlets along the bull rail. Flexible conduit and piping will be used between the access ramp and the breakwater. Local sponsor will provide electrical and water services to the marina end of the access ramp.

Placing the service lines in cast-in-place ducting within the breakwater module was considered during preliminary design. However, interior ducting would require penetration of the exterior surfaces of the modules at service riser locations. The penetrations would adversely affect the watertight and structural integrity of the modules.

2.16 Effects on Adjacent Shorelines. The Friday Harbor Marina expansion should have no adverse effects on the adjacent shoreline. Location of the proposed access and entrance channels will actually reduce boat wakes approaching the shoreline in most areas as they are farther from shore than the existing entrance channels. Prudent navigation practices and regulations limiting the speeds to 5 knots or less would reduce the chance of damage to moored boats and the possibility of shoreline erosion. No blockage of littoral drift material would occur with usage of

the floating breakwaters and only minor changes in water circulation would result. During periods of wave action, wave reflection off the breakwaters will occur. Waves from the northeast will be reflected into the adjacent rocky shoreline. This shore is also exposed to the incident wave which are of greater height than the reflected wave. Southeast waves will be reflected off the southernmost breakwater leg into the ferry slip area. The ferry slip area is exposed to the incident wave which would be of greater height than the reflected waves. Also, the alinement of the proposed south breakwater parallels the existing breakwater and reflection off the existing breakwater has not reportedly caused problems.

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-1 through C-3. Table C-4 shows the estimated local interest cost of self-liquidating items. Table C-5 shows local interest's maintenance costs of recreational facilities on the floating breakwater. Quantities included in the first cost table, table C-1, do not include contingencies. Because of the precise nature of determining quantities for such items as concrete, connectors, etc., quantity contingencies have not been included for the breakwater materials. Project costs are based on April 1981 prices.

3.02 Operation and Maintenance. Federal responsibility for breakwater maintenance would include annual repair of spalled concrete and the cathodic protection system, replacement of the rubber connections every 10 years, and replacement of the cathodic protection anodes every 25 years. The concrete modules of the floating breakwater are designed for a 50-year life. Above water inspections of the breakwater would be made annually and after storms. Below water inspections of the breakwater modules and piles would be made by divers every 3 years. The U.S. Coast Guard would maintain aids to navigation. The average annual Federal maintenance costs for the above items are shown on table C-3.

3.03 Local interest's responsibility would include maintenance of all recreation features on the breakwater; moorage floats, docks, piers, or wharfs; access roads; marina parking; shoreside facilities; and other marina support facilities. The estimated local interests costs for maintenance of recreation facilities on the Federal floating breakwater are shown on table C-5. These costs include replacement of 50 percent of bull rails every 25 years and repair of access ramps every 10 years.

3.04 Design and Construction Schedule. Design and construction of major actions are shown in the following tabulation, assuming adequate funding will be available. See plate 9 for a more detailed presentation of the schedule.

Submit final detailed project report	Apr 81
Initiate plans and specifications	Jun 81
Advertise construction	Apr 82
Award contract	May 82
Complete construction	Apr 83

TABLE C-1

FRIDAY HARBOR
GENERAL NAVIGATION FACILITIES
ESTIMATED FIRST COST
PROPOSED PLAN
APRIL 1981 PRICE LEVEL

<u>FEATURE OR ITEM</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1. Floating Breakwater				
6 Units: 100' Long by 16' Wide				
By 5-foot Deep				
10 Units: 100' Long by 21' Wide				
By 5' Deep				
a. Quantity and Cost for One 16'x 5' Unit				
Concrete	C.Y.	78	\$120.00	\$9,360
Forming Bottom, Walls & Misc.	S.F.	5,128	3.80	19,486
Forming Top	S.F.	1,480	8.65	12,802
Reinforcing	LBS.	7,970	0.50	3,985
Manholes	EA.	6	325.00	1,950
Pipe Conduit 1-7/8"	L.F.	600	3.25	1,950
Post Tensioning				
6-1/2" Wire	L.F.	600	3.00	1,800
Anchors	EA.	6	1,620.00	9,720
Install, Tension, Grout	EA.	6	595.00	3,570
Launch & Tow to Site	EA.	1	11,000.00	<u>11,000</u>
			Cost for 1 Unit	\$75,623
			Cost for 6 Units	\$453,738
b. Quantity and Cost of One 21' By 5' Unit				
Concrete	C.Y.	98	\$120.00	\$11,760
Forming Bottom, Walls, & Misc.	S.F.	5,948	3.80	22,602
Forming Top	S.F.	1,971	8.65	17,049
Reinforcing	LBS.	15,900	0.50	7,950
Manholes	EA.	6	325.00	1,950
Pipe Conduit	L.F.	600	3.25	1,950
Post Tensioning				
10-1/2" Wire	L.F.	600	5.15	3,090
Anchors	EA.	6	1,600.00	9,600
Install, Tension, Grout	EA.	6	595.00	3,570

TABLE C-1 (con.)

<u>FEATURE OR ITEM</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
b. Quantity and Cost of One 21' by 5' Unit (con.)				
Launch & Tow to Site	JOB	1	L.S.	<u>\$11,000</u>
			Cost for 1 Unit	90,521
			Cost for 10 Units	<u>\$905,210</u>
c. Anchors - Pile (42 EA.)				
Drilled Pile	JOB	1	L.S.	<u>\$11,000</u>
Piling 12 x 53 (30 EA.)	L.F.	293	\$130.00	38,090
Piling 14 x 89 (12 EA.)	L.F.	180	140.00	25,200
1-1/8" Anchor Shackles	EA.	15	38.00	570
1-1/2" Anchor Shackles	EA.	29	56.00	1,624
1" Anchor Sockets	EA.	15	103.00	1,545
1-3/8" Anchor Sockets	EA.	29	113.00	3,277
Misc. Metal	LBS.	1,024	4.35	<u>4,454</u>
			SUBTOTAL	<u>\$85,760</u>
d. Anchor Lines (44 EA.)				
1-3/8" Dia. Galv. Bridge Rope	L.F.	9,950	\$15.10	\$150,245
1" Dia. Galv. Bridge Rope	L.F.	2,653	13.00	<u>34,489</u>
			SUBTOTAL	<u>\$184,734</u>
e. Anchor Connection to Module				
6" Dia. Pipe X-Strong	L.F.	198	\$21.60	\$4,277
Misc. Metal	LBS.	3,890	4.35	16,922
12" Manhole Covers	EA.	44	178.00	7,832
1-1/8" Chain-Alloy DI-Lok	L.F.	630	27.00	17,010
1" Diam. A-307 Bolts - 9" Long	EA.	88	5.95	524
1" Anchor Sockets	EA.	15	103.00	1,545
1-3/8" Anchor Sockets	EA.	29	113.00	3,277
1-1/8" Anchor Shackle	EA.	15	38.00	570
1-1/2" Anchor Shackle	EA.	29	56.00	<u>1,624</u>
			SUBTOTAL	<u>\$53,581</u>
f. Connections				
1-3/8" Diam. Dywidags 6' Long	EA.	288	\$30.20	\$8,698
Anchor Plates	LBS.	15,012	4.35	65,302
1-1/2" Gasket	L.F.	488	5.40	2,635
Tie Units Together	EA.	12	4,400.00	<u>52,800</u>
			SUBTOTAL	<u>\$129,435</u>

TABLE C-1 (con.)

<u>FEATURE OR ITEM</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
g. Connection Unit A-B & C Together				
1" Diam. Anchor Bolts 18" Long	EA.	194	\$13.00	\$2,522
1" Diam. Anchor Bolts 12" Long	EA.	194	8.65	1,678
Steel L	LBS.	1,997	4.35	8,687
1" Diam. x 15" Long Bolts	EA.	40	9.45	378
3/4" Diam. Bolts	EA.	312	1.65	515
Marine Fender	L.F.	40	373.00	14,920
Tie Units Together	EA.	3	2,160.00	6,480
			SUBTOTAL	\$35,180
h. Cathodic Protection System				
Anode	EA.	28	\$280.00	\$7,840
Anode Terminal Boxes	EA.	8	238.00	1,904
Rectifier	EA.	1	2,050.00	2,050
#2 CP Type Cable	L.F.	3,000	1.55	4,650
Ground Clamps	EA.	48	30.00	1,440
Connectors	EA.	48	30.00	1,440
Conduit 1-1/4" PVC	L.F.	1,300	1.50	1,950
Misc. Fittings	JOB	1	L.S.	3,780
			SUBTOTAL	\$25,054
i. Clump Weights (42 EA.)				
Concrete	C.Y.	21	\$189.00	\$3,969
Misc. Metal	LBS.	1,470	4.35	6,395
1" Anchor Shackles	EA.	42	37.80	1,588
Attachment Plate and Hardware	JOB	1	L.S.	32,000
			SUBTOTAL	\$43,952
Subtotal Breakwater Cost				\$1,916,644
Contingency 25%				479,356
SUBTOTAL				\$2,396,000
Engineering and Design				184,000
Supervision and Administration				160,000
SUBTOTAL FIRST COST				\$2,740,000
Aids to Navigation - U.S. Coast Guard				10,000
TOTAL FEDERAL FIRST COST - GENERAL NAVIGATION FACILITIES				\$2,750,000

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TABLE C-2

RECREATION AND TIEUP FACILITIES
ON PROPOSED FRIDAY HARBOR FLOATING BREAKWATER
APRIL 1981 PRICE LEVEL

<u>FEATURE OR ITEM</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1. Recreational Facilities - Federal Cost				
Access Ramp				
57' Long 4' Wide	EA.	2	\$15,700.00	\$31,400
Aluminum Plate	LBS.	4,100	1.80	7,380
3/8" Expansion Bolts	EA.	53	2.20	117
Bull Rails	BFM.	10,240	1.75	17,920
Anchor Bolts 3/4"	EA.	672	6.50	4,368
Subtotal				\$61,185
Contingency 25%				15,815
Subtotal				77,000
Engineering and Design				5,000
Supervision and Administration				6,000
TOTAL FIRST COST				\$88,000
2. Tieup Facilities - Local Cost				
Bumpers	BFM.	8,800	\$1.75	15,400
Anchors Bolts 3/4"	EA.	1,680	6.50	10,920
			SUBTOTAL	\$26,320
Water System				
1" Galvanized Water Pipe	L.F.	1,200	4.90	5,880
1" Flex. Joints	EA.	11	48.60	535
3/4" Hose Bibs	EA.	24	59.40	1,426
Misc. Fittings & Straps	JOB	1	L.S.	540
			SUBTOTAL	\$8,381
Electrical Power System				
Receptacle	EA.	24	700.00	16,800
Conduit 1-1/2" w/PVC	L.F.	1,200	9.75	11,700
3/C #4 Cable	L.F.	1,500	9.75	14,625
Misc. Fittings	JOB	1	L.S.	2,700
			SUBTOTAL	\$45,825
Subtotal				\$80,526
Contingency 25%				20,474
Subtotal				\$101,000
Engineering and Design				8,000
Supervision and Administration				7,000
TOTAL FIRST COST				\$116,000

TABLE C-3

BREAKWATER REHABILITATION COSTS
(APRIL 1981 PRICE LEVEL)

<u>Feature or Item</u>	<u>Amount</u>
1. Above Water Inspection (Annually and After Storms)	\$2,200/Year
2. Below Water Inspection (Every Third Year)	\$10,800/3 Years
3. Repairs and Replacement:	
a. Repair Spalled Concrete (Annually)	\$2,200/Year
b. Replace Rubber Connections (Every 10th Year)	\$28,000/10 Years
c. Replace 50 percent of Bull Rails (Every 10th Year)	\$9,700/10 Years
d. Repair Access Ramps (Every 10th Year)	\$1,100/10 Years
e. Maintain Cathodic Protection System (Annually)	\$2,200/Year
f. Replace Anodes on Cathodic Protection System (Every 25th Year)	\$8,100/25 Years
g. U.S. Coast Guard Maintenance Cost (Annually)	\$1,100/Year

TABLE C-4

ESTIMATED FIRST COST - LOCAL INTEREST
SELF-LIQUIDATING ITEMS

<u>Feature or Item</u>	<u>Amount</u>
1. Moorage Floats	
a. Disconnect and Relocate Existing Breakwater Floats	\$25,000
b. Remodel 300' Breakwater Float Into Two 8' x 300' Walk-way Floats	11,000
c. New Floats, Piling, and Gangways	859,000
d. Utilities	124,000
e. Relocate Seaplane Float	<u>6,000</u>
Subtotal	\$1,025,000
2. Recreation Facilities - Temporary Tieup on Floating Breakwater	116,000
3. Contingencies 15% of Item 1	<u>154,000</u>
Subtotal Construction Costs	\$1,295,000
4. Lands, Easements, Rights of Way (tidelands easements)	0
5. Engineering, Legal, Administrative	80,000
6. Sewer Outfall Extension	\$65,000
7. Parking Facilities	<u>36,000</u>
TOTAL ESTIMATED COST, SELF-LIQUIDATING ITEMS	\$1,476,000

TABLE C-5

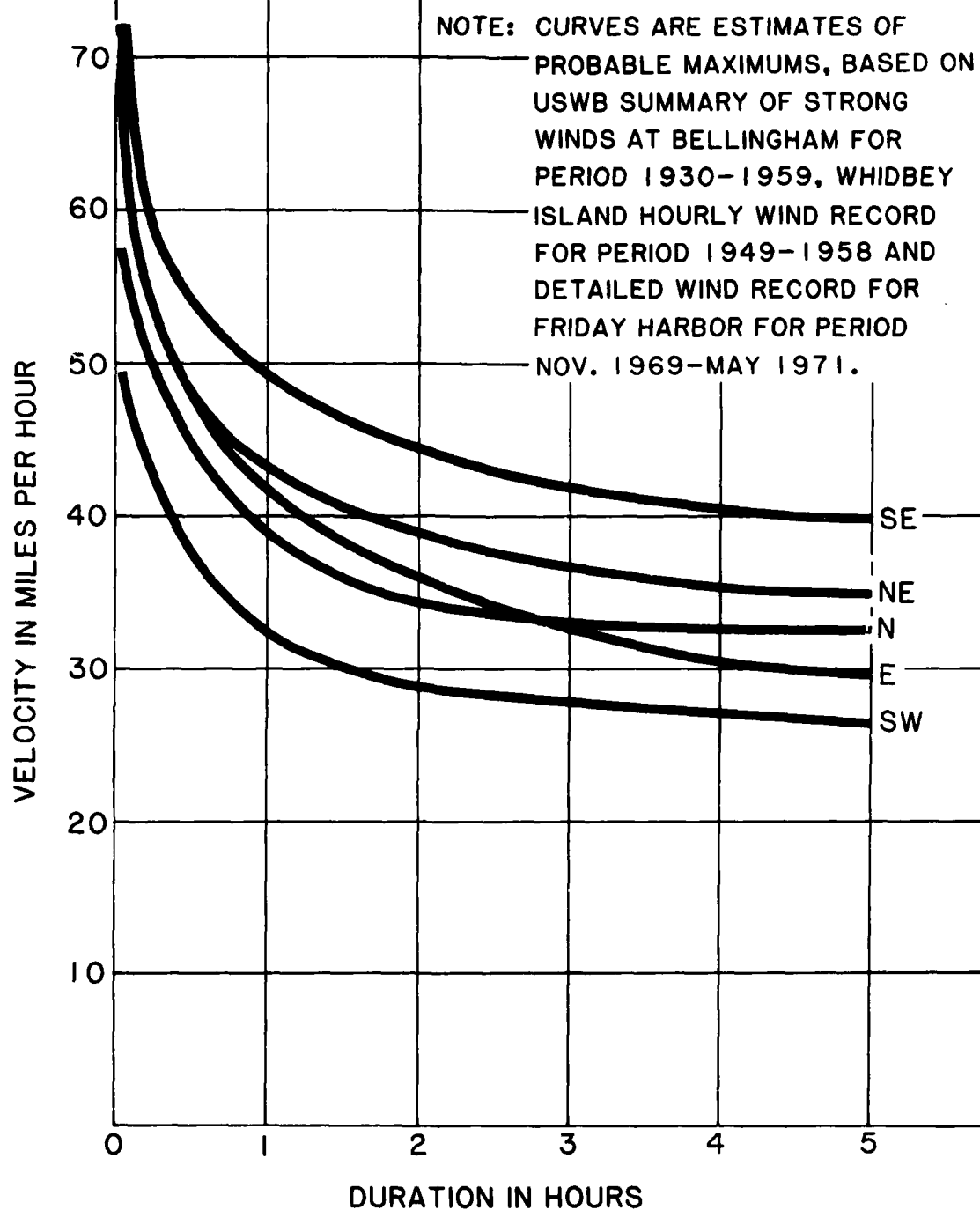
ESTIMATED LOCAL MAINTENANCE COSTS^{1/}
RECREATION FACILITIES ON FEDERAL FLOATING BREAKWATER

	<u>Costs^{2/}</u>	<u>Average Annual Costs^{3/}</u>
1. Replace 50 Percent of Bull Rails (Every 25th Year)	\$9,700	\$130
2. Repair Access Ramps (Every 10th year)	1,100	<u>90</u>
Subtotal		\$220
3. Contingencies		60
4. Engineering and Design		30
5. Supervision and Administration		<u>30</u>
Total		\$340

^{1/}Maintenance costs for recreation facilities on Federal floating breakwater are local cost items.

^{2/}Numbers rounded, 7-3/8 percent interest rate, 50-year project life.

^{3/}April 1981 price levels.



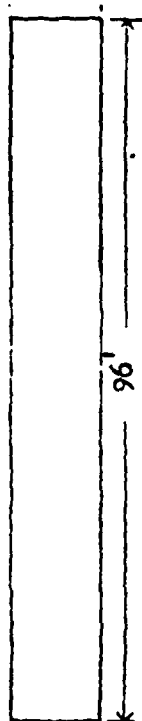
WIND VELOCITY
DURATION CURVES

FRIDAY HARBOR

WASH.

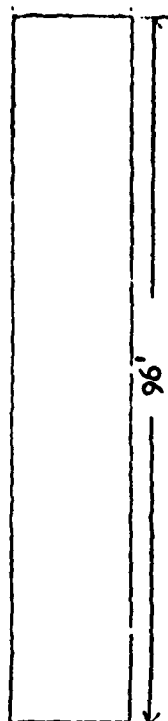
PLAN 1

96' X 12' RECTANGULAR MODULE

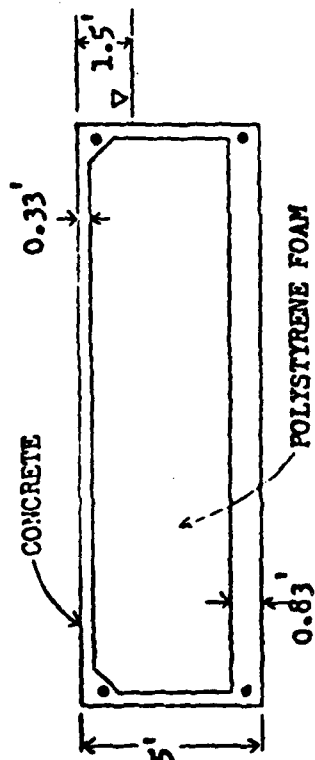


PLAN 2

96' X 16' RECTANGULAR MODULE



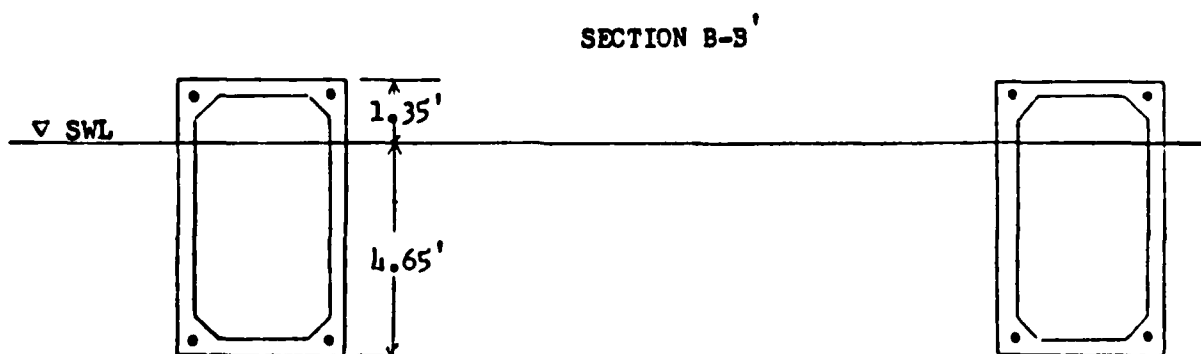
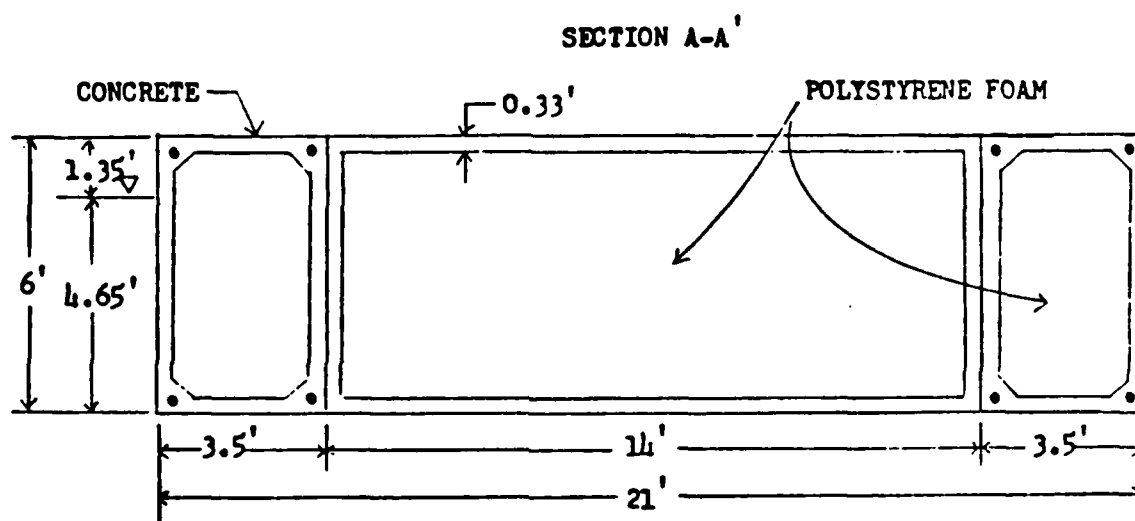
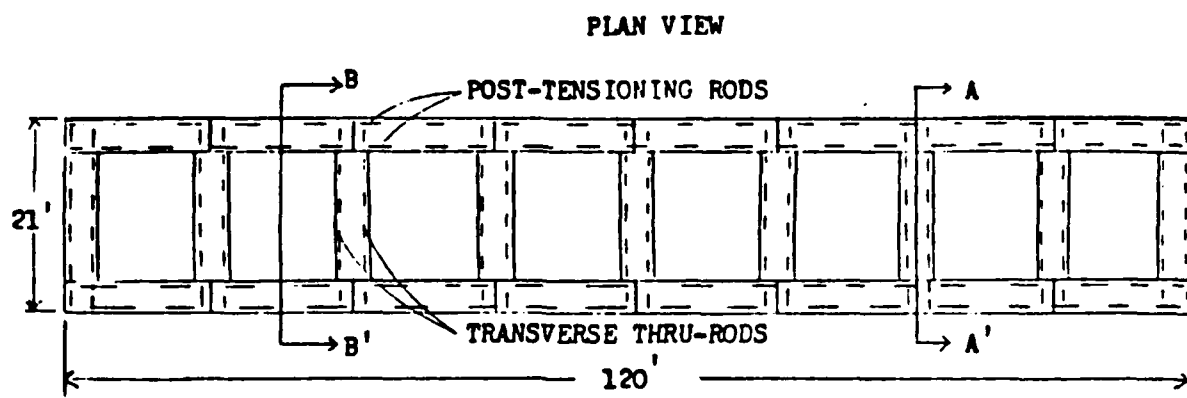
CROSS-SECTIONAL VIEW



CONFIGURATION	WEIGHTS AND UNIT WEIGHTS	
	WEIGHT, LBS	UNIT WEIGHT, PCF
PLAN 1	258,000	44.8
PLAN 2	344,000	44.8

DETAILS OF PLANS 1 AND 2

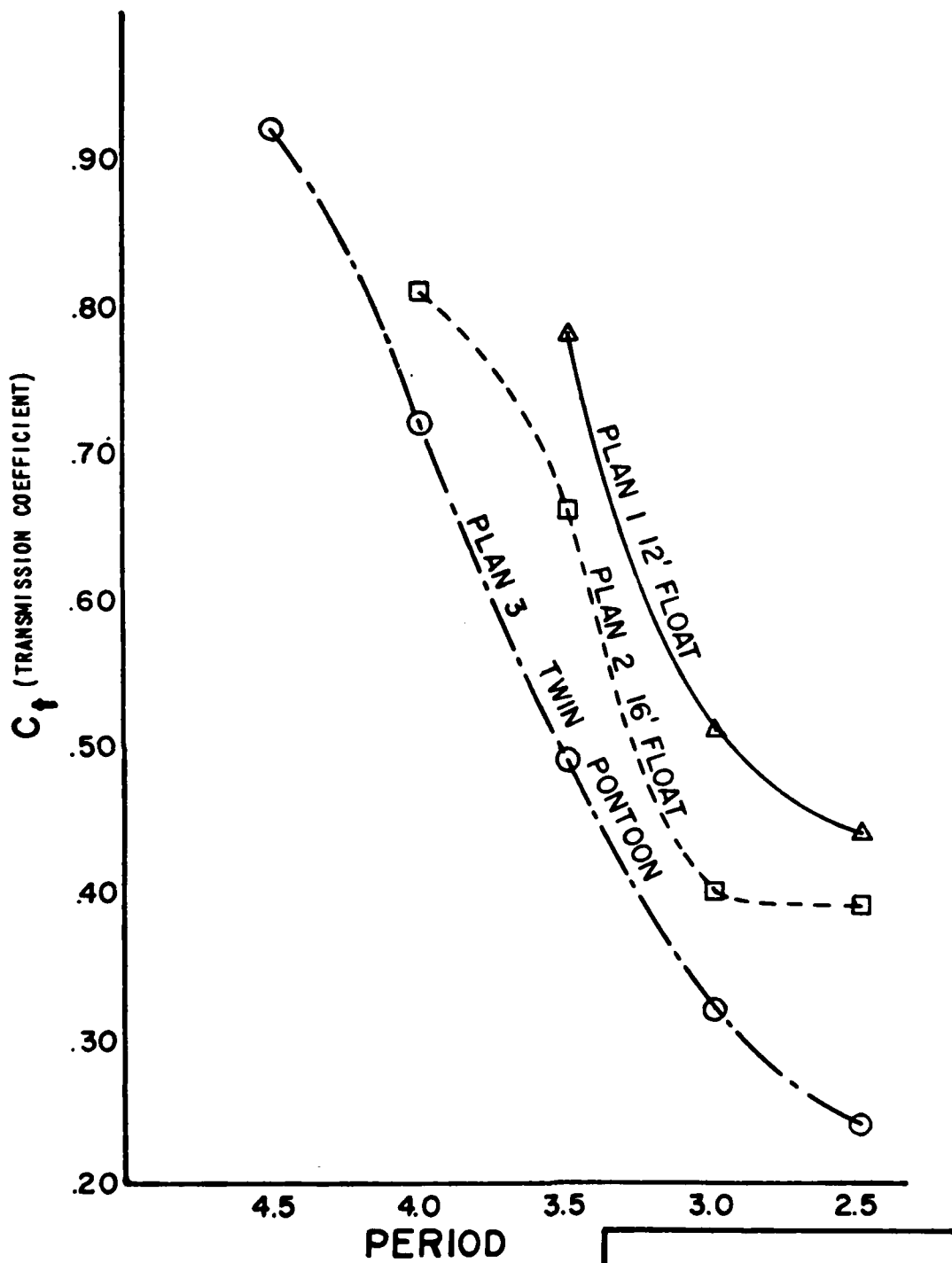
FIGURE C-2



WEIGHT = 381,226 LBS; UNIT WEIGHT = 49.6 PCF

DETAILS OF PLAN 3

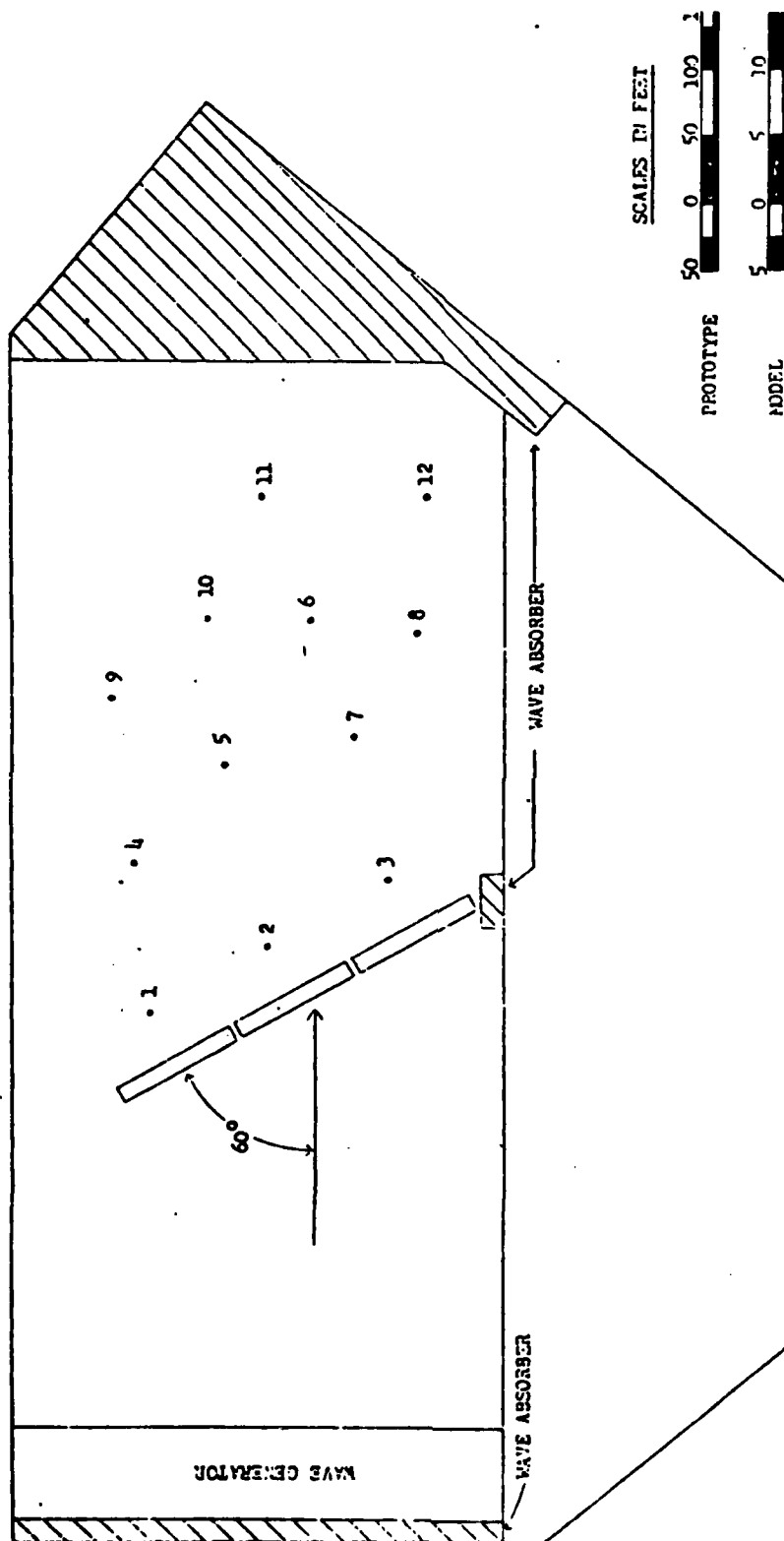
FIGURE C-3



2 - D MODEL TESTS

C_t vs WAVE PERIOD

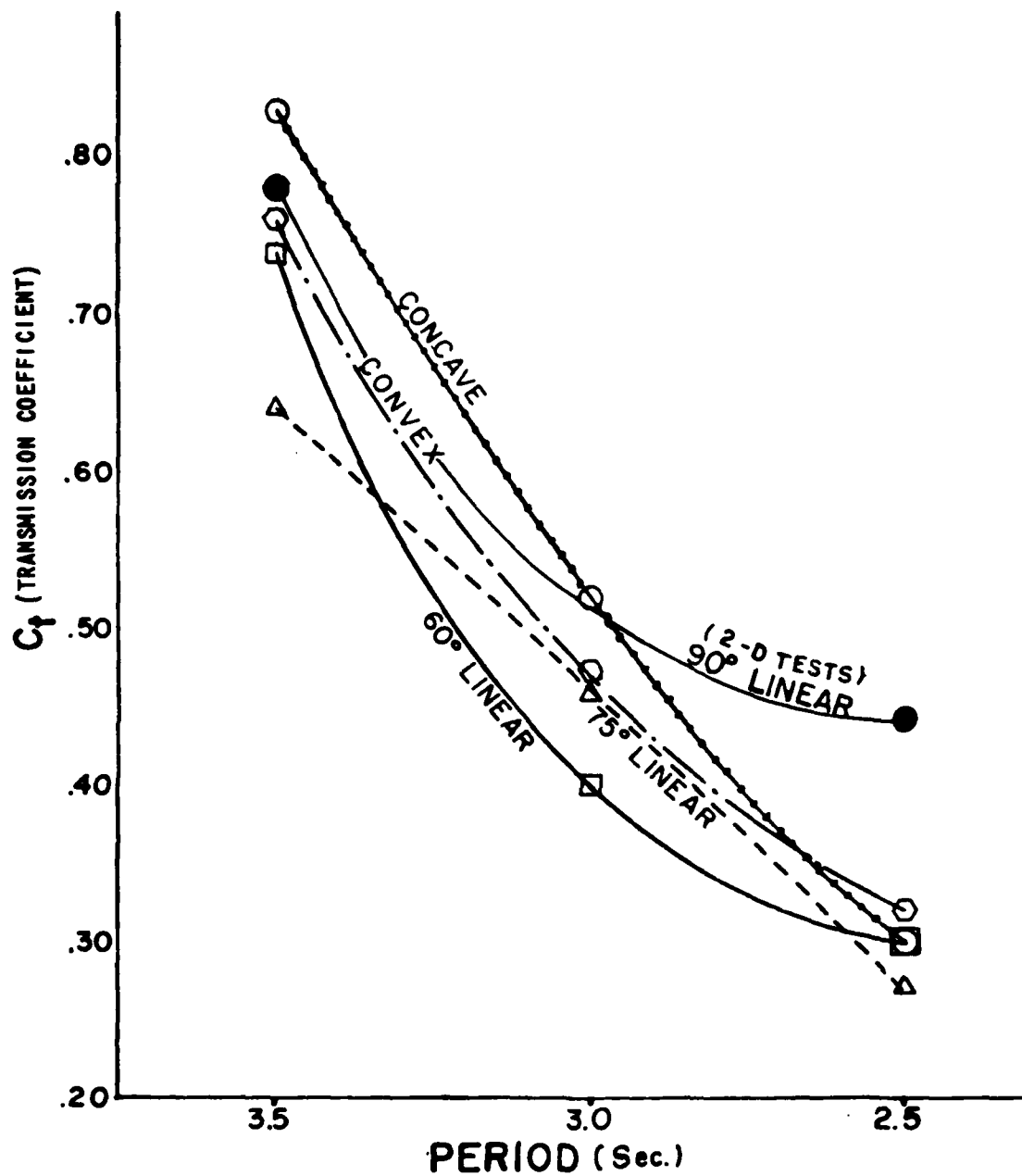
FIGURE C-4



• INDICATES WAVE GAGE LOCATION

MODEL LAYOUT
60°-LINEAR CONFIGURATION

FIGURE C-5



3-D MODEL TESTS
12' RECTANGULAR FLOAT
 C_t vs WAVE PERIOD
AVERAGE OF GAGES
2, 3, 6, 7, 8, 11, AND 12

FIGURE C-6

EN
DAT